Appendix A

Air Quality and Greenhouse Gas Models

Table 1
MAXIMUM DAILY CONSTRUCTION EMISSIONS

Phase	Pollutant Emissions (pounds per day)					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Site Preparation	1	10	4	<0.5	1	<0.5
Grading	4	102	28	<0.5	7	3
Trenching	1	5	5	<0.5	<0.5	<0.5
Building Construction	1	11	8	<0.5	1	1
Paving	1	9	8	<0.5	1	1
Architectural Coating	6	2	2	<0.5	<0.5	<0.5
TOTAL[1]	**6**	**102**	**28**	**<0.5**	**7**	**3**
Thresholds	*75*	*250*	*550*	*250*	*100*	*55*
Significant Impact?	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod
Notes: Includes standard fugitive dust reduction measures. Maximum daily ROG emissions occur during the Architectural Coatings phase. All other maximums occur during the Grading phase.
[1] The total presented is the sum of the unrounded values.

Table 2
OPERATION DAILY MAXIMUM EMISSIONS

Emission Source	Pollutant Emissions (pounds/day)					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Energy	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vehicular (Mobile)	5	17	40	<0.5	6	2
TOTAL[1]	5	17	40	<0.5	6	2
Thresholds	*75*	*250*	*550*	*250*	*100*	*55*
Significant Impact?	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod
[1] The total presented is the sum of the unrounded values.

Table 3
ESTIMATED CONSTRUCTION
GREENHOUSE GAS EMISSIONS

Year	Emissions ($MT\ CO_2e$)
Site Preparation	<0.5
Grading	24
Trenching	1
Building Construction	60
Paving	3
Architectural Coating	1
TOTAL[1]	**88**
Amortized Construction Emissions[2]	4

Source: CalEEMod
[1] The total presented is the sum of the unrounded values.
[2] Construction emissions are amortized over 20 years in accordance with City of San Diego guidance.

Table 4
PROJECT OPERATIONAL
GREENHOUSE GAS EMISSIONS

Emission Sources	CO_2e (MT/year)
Area	<0.5
Energy	60
Vehicular (Mobile)	1,431
Solid Waste	13
Water	5
Operational Subtotal[1]	**1,509**
Amortized Construction Emissions	4
TOTAL OPERATIONAL EMISSIONS	**1,513**
Screening Threshold	*3,000*
Significant Impact?	***No***

Source: CalEEMod output data
[1] The total presented is the sum of the unrounded values.

Source: Helix Environmental 2018

Graves Avenue 7/Eleven & Starbucks Project

San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	32.00	Space	0.29	12,800.00	0
Fast Food Restaurant with Drive Thru	1.80	1000sqft	0.04	1,800.00	0
Convenience Market (24 Hour)	4.47	1000sqft	0.10	4,467.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase -

Off-road Equipment -

Grading -

Architectural Coating - 50 g/L is assumed

Vehicle Trips - Traffic Impact Analysis provided by Darnell & Associates

Area Coating - Assume 50 g/L

Construction Off-road Equipment Mitigation -

Water Mitigation -

Waste Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	250.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	50.00
tblArchitecturalCoating	EF_Parking	250.00	50.00
tblArchitecturalCoating	EF_Residential_Exterior	250.00	50.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	50.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	250	50
tblAreaCoating	Area_EF_Nonresidential_Interior	250	50
tblAreaCoating	Area_EF_Parking	250	50
tblAreaCoating	Area_EF_Residential_Exterior	250	50
tblAreaCoating	Area_EF_Residential_Interior	250	50
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	PhaseEndDate	12/19/2018	12/10/2018
tblConstructionPhase	PhaseEndDate	12/5/2018	11/26/2018

tblConstructionPhase	PhaseEndDate	7/18/2018	7/4/2018
tblConstructionPhase	PhaseEndDate	12/12/2018	12/3/2018
tblConstructionPhase	PhaseEndDate	7/16/2018	7/2/2018
tblConstructionPhase	PhaseStartDate	12/13/2018	12/4/2018
tblConstructionPhase	PhaseStartDate	7/19/2018	7/10/2018
tblConstructionPhase	PhaseStartDate	7/17/2018	7/3/2018
tblConstructionPhase	PhaseStartDate	12/6/2018	11/27/2018
tblConstructionPhase	PhaseStartDate	7/14/2018	7/1/2018
tblGrading	MaterialExported	0.00	300.00
tblGrading	MaterialImported	0.00	4,300.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblVehicleTrips	ST_TR	863.10	576.56
tblVehicleTrips	ST_TR	722.03	576.56
tblVehicleTrips	SU_TR	758.45	576.56
tblVehicleTrips	SU_TR	542.72	576.56
tblVehicleTrips	WD_TR	737.99	576.56
tblVehicleTrips	WD_TR	496.12	576.56

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	6.4742	101.8881	28.3790	0.2402	6.1820	0.9915	7.1735	1.8613	0.9471	2.8084	0.0000	25,985.4475	25,985.4475	2.5283	0.0000	26,048.6551
Maximum	**6.4742**	**101.8881**	**28.3790**	**0.2402**	**6.1820**	**0.9915**	**7.1735**	**1.8613**	**0.9471**	**2.8084**	**0.0000**	**25,985.4475**	**25,985.4475**	**2.5283**	**0.0000**	**26,048.6551**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	6.4742	101.8881	28.3790	0.2402	5.5902	0.9915	6.5817	1.6068	0.9471	2.5539	0.0000	25,985.4475	25,985.4475	2.5283	0.0000	26,048.6551
Maximum	**6.4742**	**101.8881**	**28.3790**	**0.2402**	**5.5902**	**0.9915**	**6.5817**	**1.6068**	**0.9471**	**2.5539**	**0.0000**	**25,985.4475**	**25,985.4475**	**2.5283**	**0.0000**	**26,048.6551**

	ROG	**NOx**	**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**	**9.57**	**0.00**	**8.25**	**13.67**	**0.00**	**9.06**	**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	0.1475	4.0000e-005	3.9500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		8.3700e-003	8.3700e-003	2.0000e-005		8.9400e-003
Energy	9.5700e-003	0.0870	0.0731	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3821	104.3821	2.0000e-003	1.9100e-003	105.0024
Mobile	5.1174	17.0570	40.1835	0.0841	6.2164	0.1057	6.3220	1.6618	0.0993	1.7610		8,534.0285	8,534.0285	0.6654		8,550.6636
Total	**5.2744**	**17.1441**	**40.2605**	**0.0847**	**6.2164**	**0.1123**	**6.3287**	**1.6618**	**0.1059**	**1.7676**		**8,638.4190**	**8,638.4190**	**0.6674**	**1.9100e-003**	**8,655.6749**

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	0.1475	4.0000e-005	3.9500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		8.3700e-003	8.3700e-003	2.0000e-005		8.9400e-003
Energy	9.5700e-003	0.0870	0.0731	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3821	104.3821	2.0000e-003	1.9100e-003	105.0024
Mobile	5.1174	17.0570	40.1835	0.0841	6.2164	0.1057	6.3220	1.6618	0.0993	1.7610		8,534.0285	8,534.0285	0.6654		8,550.6636
Total	**5.2744**	**17.1441**	**40.2605**	**0.0847**	**6.2164**	**0.1123**	**6.3287**	**1.6618**	**0.1059**	**1.7676**		**8,638.4190**	**8,638.4190**	**0.6674**	**1.9100e-003**	**8,655.6749**

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

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	7/1/2018	7/2/2018	5	1	
2	Grading	Grading	7/3/2018	7/4/2018	5	2	
3	Building Construction	Building Construction	7/10/2018	11/26/2018	5	100	
4	Paving	Paving	11/27/2018	12/3/2018	5	5	
5	Architectural Coating	Architectural Coating	12/4/2018	12/10/2018	5	5	
6	Underground Infrastructure/Utilities	Trenching	7/5/2018	7/9/2018	5	3	

Acres of Grading (Site Preparation Phase): 0.5

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.29

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 9,401; Non-Residential Outdoor: 3,134; Striped Parking Area: 768 (Architectural Coating – sqft)

OffRoad Equipment

Graves Avenue 7/Eleven & Starbucks Project - San Diego County, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Underground Infrastructure/Utilities	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Site Preparation	Graders	1	8.00	187	0.41
Paving	Pavers	1	7.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Grading	Rubber Tired Dozers	1	1.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Underground Infrastructure/Utilities	2	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	575.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	8.00	3.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	2.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	0.7858	9.7572	4.2514	9.7600e-003		0.4180	0.4180		0.3846	0.3846		982.7113	982.7113	0.3059		990.3596
Total	**0.7858**	**9.7572**	**4.2514**	**9.7600e-003**	**0.5303**	**0.4180**	**0.9483**	**0.0573**	**0.3846**	**0.4418**		**982.7113**	**982.7113**	**0.3059**		**990.3596**

3.2 Site Preparation - 2018

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	0.0240	0.0172	0.1624	4.2000e-004	0.0411	3.0000e-004	0.0414	0.0109	2.7000e-004	0.0112		42.1164	42.1164	1.4600e-003		42.1529
Total	**0.0240**	**0.0172**	**0.1624**	**4.2000e-004**	**0.0411**	**3.0000e-004**	**0.0414**	**0.0109**	**2.7000e-004**	**0.0112**		**42.1164**	**42.1164**	**1.4600e-003**		**42.1529**

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					0.2386	0.0000	0.2386	0.0258	0.0000	0.0258			0.0000			0.0000
Off-Road	0.7858	9.7572	4.2514	9.7600e-003		0.4180	0.4180		0.3846	0.3846	0.0000	982.7113	982.7113	0.3059		990.3596
Total	**0.7858**	**9.7572**	**4.2514**	**9.7600e-003**	**0.2386**	**0.4180**	**0.6566**	**0.0258**	**0.3846**	**0.4103**	**0.0000**	**982.7113**	**982.7113**	**0.3059**		**990.3596**

3.2 Site Preparation - 2018

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	0.0240	0.0172	0.1624	4.2000e-004	0.0411	3.0000e-004	0.0414	0.0109	2.7000e-004	0.0112		42.1164	42.1164	1.4600e-003		42.1529
Total	**0.0240**	**0.0172**	**0.1624**	**4.2000e-004**	**0.0411**	**3.0000e-004**	**0.0414**	**0.0109**	**2.7000e-004**	**0.0112**		**42.1164**	**42.1164**	**1.4600e-003**		**42.1529**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.0760	0.0000	1.0760	0.4627	0.0000	0.4627			0.0000			0.0000
Off-Road	1.0643	9.4295	7.7762	0.0120		0.6228	0.6228		0.5943	0.5943		1,169.3502	1,169.3502	0.2254		1,174.9857
Total	**1.0643**	**9.4295**	**7.7762**	**0.0120**	**1.0760**	**0.6228**	**1.6987**	**0.4627**	**0.5943**	**1.0570**		**1,169.3502**	**1,169.3502**	**0.2254**		**1,174.9857**

3.3 Grading - 2018

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	2.7072	92.4241	20.2780	0.2274	5.0239	0.3682	5.3920	1.3768	0.3523	1.7291		24,731.8645	24,731.8645	2.3000		24,789.3637
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	0.0481	0.0344	0.3247	8.5000e-004	0.0822	5.9000e-004	0.0827	0.0218	5.5000e-004	0.0223		84.2327	84.2327	2.9200e-003		84.3057
Total	**2.7552**	**92.4586**	**20.6027**	**0.2283**	**5.1060**	**0.3688**	**5.4748**	**1.3986**	**0.3528**	**1.7514**		**24,816.0973**	**24,816.0973**	**2.3029**		**24,873.6694**

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					0.4842	0.0000	0.4842	0.2082	0.0000	0.2082			0.0000			0.0000
Off-Road	1.0643	9.4295	7.7762	0.0120		0.6228	0.6228		0.5943	0.5943	0.0000	1,169.3502	1,169.3502	0.2254		1,174.9857
Total	**1.0643**	**9.4295**	**7.7762**	**0.0120**	**0.4842**	**0.6228**	**1.1069**	**0.2082**	**0.5943**	**0.8025**	**0.0000**	**1,169.3502**	**1,169.3502**	**0.2254**		**1,174.9857**

3.3 Grading - 2018

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	2.7072	92.4241	20.2780	0.2274	5.0239	0.3682	5.3920	1.3768	0.3523	1.7291		24,731.8645	24,731.8645	2.3000		24,789.3637
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	0.0481	0.0344	0.3247	8.5000e-004	0.0822	5.9000e-004	0.0827	0.0218	5.5000e-004	0.0223		84.2327	84.2327	2.9200e-003		84.3057
Total	**2.7552**	**92.4586**	**20.6027**	**0.2283**	**5.1060**	**0.3688**	**5.4748**	**1.3986**	**0.3528**	**1.7514**		**24,816.0973**	**24,816.0973**	**2.3029**		**24,873.6694**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0848	11.0316	7.7512	0.0114		0.7087	0.7087		0.6520	0.6520		1,146.5323	1,146.5323	0.3569		1,155.4555
Total	**1.0848**	**11.0316**	**7.7512**	**0.0114**		**0.7087**	**0.7087**		**0.6520**	**0.6520**		**1,146.5323**	**1,146.5323**	**0.3569**		**1,155.4555**

3.4 Building Construction - 2018

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	0.0161	0.3959	0.1158	8.2000e-004	0.0203	3.1400e-003	0.0235	5.8500e-003	3.0100e-003	8.8500e-003		87.2094	87.2094	7.5500e-003		87.3980
Worker	0.0385	0.0275	0.2598	6.8000e-004	0.0657	4.7000e-004	0.0662	0.0174	4.4000e-004	0.0179		67.3862	67.3862	2.3400e-003		67.4446
Total	**0.0546**	**0.4235**	**0.3756**	**1.5000e-003**	**0.0860**	**3.6100e-003**	**0.0896**	**0.0233**	**3.4500e-003**	**0.0267**		**154.5956**	**154.5956**	**9.8900e-003**		**154.8426**

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	1.0848	11.0316	7.7512	0.0114		0.7087	0.7087		0.6520	0.6520	0.0000	1,146.5323	1,146.5323	0.3569		1,155.4555
Total	**1.0848**	**11.0316**	**7.7512**	**0.0114**		**0.7087**	**0.7087**		**0.6520**	**0.6520**	**0.0000**	**1,146.5323**	**1,146.5323**	**0.3569**		**1,155.4555**

3.4 Building Construction - 2018

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	0.0161	0.3959	0.1158	8.2000e-004	0.0203	3.1400e-003	0.0235	5.8500e-003	3.0100e-003	8.8500e-003		87.2094	87.2094	7.5500e-003		87.3980
Worker	0.0385	0.0275	0.2598	6.8000e-004	0.0657	4.7000e-004	0.0662	0.0174	4.4000e-004	0.0179		67.3862	67.3862	2.3400e-003		67.4446
Total	**0.0546**	**0.4235**	**0.3756**	**1.5000e-003**	**0.0860**	**3.6100e-003**	**0.0896**	**0.0233**	**3.4500e-003**	**0.0267**		**154.5956**	**154.5956**	**9.8900e-003**		**154.8426**

3.5 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9202	8.7447	7.2240	0.0113		0.5109	0.5109		0.4735	0.4735		1,070.1372	1,070.1372	0.3017		1,077.6798
Paving	0.1520					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0722**	**8.7447**	**7.2240**	**0.0113**		**0.5109**	**0.5109**		**0.4735**	**0.4735**		**1,070.1372**	**1,070.1372**	**0.3017**		**1,077.6798**

3.5 Paving - 2018

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	0.0866	0.0620	0.5845	1.5200e-003	0.1479	1.0600e-003	0.1489	0.0392	9.8000e-004	0.0402		151.6189	151.6189	5.2500e-003		151.7503
Total	**0.0866**	**0.0620**	**0.5845**	**1.5200e-003**	**0.1479**	**1.0600e-003**	**0.1489**	**0.0392**	**9.8000e-004**	**0.0402**		**151.6189**	**151.6189**	**5.2500e-003**		**151.7503**

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	0.9202	8.7447	7.2240	0.0113		0.5109	0.5109		0.4735	0.4735	0.0000	1,070.1372	1,070.1372	0.3017		1,077.6798
Paving	0.1520					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0722**	**8.7447**	**7.2240**	**0.0113**		**0.5109**	**0.5109**		**0.4735**	**0.4735**	**0.0000**	**1,070.1372**	**1,070.1372**	**0.3017**		**1,077.6798**

3.5 Paving - 2018

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	0.0866	0.0620	0.5845	1.5200e-003	0.1479	1.0600e-003	0.1489	0.0392	9.8000e-004	0.0402		151.6189	151.6189	5.2500e-003		151.7503
Total	**0.0866**	**0.0620**	**0.5845**	**1.5200e-003**	**0.1479**	**1.0600e-003**	**0.1489**	**0.0392**	**9.8000e-004**	**0.0402**		**151.6189**	**151.6189**	**5.2500e-003**		**151.7503**

3.6 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.1659					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506		281.4485	281.4485	0.0267		282.1171
Total	**6.4646**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**		**281.4485**	**281.4485**	**0.0267**		**282.1171**

3.6 Architectural Coating - 2018

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	9.6200e-003	6.8900e-003	0.0650	1.7000e-004	0.0164	1.2000e-004	0.0166	4.3600e-003	1.1000e-004	4.4700e-003		16.8466	16.8466	5.8000e-004		16.8611
Total	**9.6200e-003**	**6.8900e-003**	**0.0650**	**1.7000e-004**	**0.0164**	**1.2000e-004**	**0.0166**	**4.3600e-003**	**1.1000e-004**	**4.4700e-003**		**16.8466**	**16.8466**	**5.8000e-004**		**16.8611**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.1659					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2986	2.0058	1.8542	2.9700e-003		0.1506	0.1506		0.1506	0.1506	0.0000	281.4485	281.4485	0.0267		282.1171
Total	**6.4646**	**2.0058**	**1.8542**	**2.9700e-003**		**0.1506**	**0.1506**		**0.1506**	**0.1506**	**0.0000**	**281.4485**	**281.4485**	**0.0267**		**282.1171**

3.6 Architectural Coating - 2018

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	9.6200e-003	6.8900e-003	0.0650	1.7000e-004	0.0164	1.2000e-004	0.0166	4.3600e-003	1.1000e-004	4.4700e-003		16.8466	16.8466	5.8000e-004		16.8611
Total	**9.6200e-003**	**6.8900e-003**	**0.0650**	**1.7000e-004**	**0.0164**	**1.2000e-004**	**0.0166**	**4.3600e-003**	**1.1000e-004**	**4.4700e-003**		**16.8466**	**16.8466**	**5.8000e-004**		**16.8611**

3.7 Underground Infrastructure/Utilities - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5301	5.2381	4.6545	6.1900e-003		0.3711	0.3711		0.3414	0.3414		623.0159	623.0159	0.1940		627.8647
Total	**0.5301**	**5.2381**	**4.6545**	**6.1900e-003**		**0.3711**	**0.3711**		**0.3414**	**0.3414**		**623.0159**	**623.0159**	**0.1940**		**627.8647**

3.7 Underground Infrastructure/Utilities - 2018

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	0.0240	0.0172	0.1624	4.2000e-004	0.0411	3.0000e-004	0.0414	0.0109	2.7000e-004	0.0112		42.1164	42.1164	1.4600e-003		42.1529
Total	**0.0240**	**0.0172**	**0.1624**	**4.2000e-004**	**0.0411**	**3.0000e-004**	**0.0414**	**0.0109**	**2.7000e-004**	**0.0112**		**42.1164**	**42.1164**	**1.4600e-003**		**42.1529**

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	0.5301	5.2381	4.6545	6.1900e-003		0.3711	0.3711		0.3414	0.3414	0.0000	623.0159	623.0159	0.1940		627.8647
Total	**0.5301**	**5.2381**	**4.6545**	**6.1900e-003**		**0.3711**	**0.3711**		**0.3414**	**0.3414**	**0.0000**	**623.0159**	**623.0159**	**0.1940**		**627.8647**

3.7 Underground Infrastructure/Utilities - 2018

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	0.0240	0.0172	0.1624	4.2000e-004	0.0411	3.0000e-004	0.0414	0.0109	2.7000e-004	0.0112		42.1164	42.1164	1.4600e-003		42.1529
Total	**0.0240**	**0.0172**	**0.1624**	**4.2000e-004**	**0.0411**	**3.0000e-004**	**0.0414**	**0.0109**	**2.7000e-004**	**0.0112**		**42.1164**	**42.1164**	**1.4600e-003**		**42.1529**

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	5.1174	17.0570	40.1835	0.0841	6.2164	0.1057	6.3220	1.6618	0.0993	1.7610		8,534.0285	8,534.0285	0.6654		8,550.6636
Unmitigated	5.1174	17.0570	40.1835	0.0841	6.2164	0.1057	6.3220	1.6618	0.0993	1.7610		8,534.0285	8,534.0285	0.6654		8,550.6636

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Convenience Market (24 Hour)	2,575.47	2,575.47	2575.47	1,961,420	1,961,420
Fast Food Restaurant with Drive Thru	1,037.80	1,037.80	1037.80	969,642	969,642
Parking Lot	0.00	0.00	0.00		
Total	3,613.27	3,613.27	3,613.27	2,931,061	2,931,061

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
Convenience Market (24 Hour)	9.50	7.30	7.30	0.90	80.10	19.00	24	15	61
Fast Food Restaurant with Drive	9.50	7.30	7.30	2.20	78.80	19.00	29	21	50
Parking Lot	9.50	7.30	7.30	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
Convenience Market (24 Hour)	0.581689	0.044135	0.186694	0.113515	0.018244	0.005600	0.015197	0.022573	0.001888	0.002088	0.006279	0.000742	0.001357
Fast Food Restaurant with Drive Thru	0.581689	0.044135	0.186694	0.113515	0.018244	0.005600	0.015197	0.022573	0.001888	0.002088	0.006279	0.000742	0.001357
Parking Lot	0.581689	0.044135	0.186694	0.113515	0.018244	0.005600	0.015197	0.022573	0.001888	0.002088	0.006279	0.000742	0.001357

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	9.5700e-003	0.0870	0.0731	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3821	104.3821	2.0000e-003	1.9100e-003	105.0024
NaturalGas Unmitigated	9.5700e-003	0.0870	0.0731	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3821	104.3821	2.0000e-003	1.9100e-003	105.0024

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					
Convenience Market (24 Hour)	27.2915	2.9000e-004	2.6800e-003	2.2500e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004		3.2108	3.2108	6.0000e-005	6.0000e-005	3.2299
Fast Food Restaurant with Drive Thru	859.956	9.2700e-003	0.0843	0.0708	5.1000e-004		6.4100e-003	6.4100e-003		6.4100e-003	6.4100e-003		101.1713	101.1713	1.9400e-003	1.8500e-003	101.7725
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
Total		**9.5600e-003**	**0.0870**	**0.0731**	**5.3000e-004**		**6.6100e-003**	**6.6100e-003**		**6.6100e-003**	**6.6100e-003**		**104.3821**	**104.3821**	**2.0000e-003**	**1.9100e-003**	**105.0024**

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					
Convenience Market (24 Hour)	0.0272915	2.9000e-004	2.6800e-003	2.2500e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004		3.2108	3.2108	6.0000e-005	6.0000e-005	3.2299
Fast Food Restaurant with Drive Thru	0.859956	9.2700e-003	0.0843	0.0708	5.1000e-004		6.4100e-003	6.4100e-003		6.4100e-003	6.4100e-003		101.1713	101.1713	1.9400e-003	1.8500e-003	101.7725
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
Total		**9.5600e-003**	**0.0870**	**0.0731**	**5.3000e-004**		**6.6100e-003**	**6.6100e-003**		**6.6100e-003**	**6.6100e-003**		**104.3821**	**104.3821**	**2.0000e-003**	**1.9100e-003**	**105.0024**

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	0.1475	4.0000e-005	3.9500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		8.3700e-003	8.3700e-003	2.0000e-005		8.9400e-003
Unmitigated	0.1475	4.0000e-005	3.9500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		8.3700e-003	8.3700e-003	2.0000e-005		8.9400e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	8.4500e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1387					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	3.7000e-004	4.0000e-005	3.9500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		8.3700e-003	8.3700e-003	2.0000e-005		8.9400e-003
Total	**0.1475**	**4.0000e-005**	**3.9500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**8.3700e-003**	**8.3700e-003**	**2.0000e-005**		**8.9400e-003**

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	8.4500e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1387					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	3.7000e-004	4.0000e-005	3.9500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		8.3700e-003	8.3700e-003	2.0000e-005		8.9400e-003
Total	**0.1475**	**4.0000e-005**	**3.9500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**8.3700e-003**	**8.3700e-003**	**2.0000e-005**		**8.9400e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

Use Water Efficient Irrigation System

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

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

Graves Avenue 7/Eleven & Starbucks Project

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	32.00	Space	0.29	12,800.00	0
Fast Food Restaurant with Drive Thru	1.80	1000sqft	0.04	1,800.00	0
Convenience Market (24 Hour)	4.47	1000sqft	0.10	4,467.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase -

Off-road Equipment -

Grading -

Architectural Coating - 50 g/L is assumed

Vehicle Trips - Traffic Impact Analysis provided by Darnell & Associates

Area Coating - Assume 50 g/L

Construction Off-road Equipment Mitigation -

Water Mitigation -

Waste Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	250.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	50.00
tblArchitecturalCoating	EF_Parking	250.00	50.00
tblArchitecturalCoating	EF_Residential_Exterior	250.00	50.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	50.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	250	50
tblAreaCoating	Area_EF_Nonresidential_Interior	250	50
tblAreaCoating	Area_EF_Parking	250	50
tblAreaCoating	Area_EF_Residential_Exterior	250	50
tblAreaCoating	Area_EF_Residential_Interior	250	50
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	PhaseEndDate	12/19/2018	12/10/2018
tblConstructionPhase	PhaseEndDate	12/5/2018	11/26/2018

tblConstructionPhase	PhaseEndDate	7/18/2018	7/4/2018
tblConstructionPhase	PhaseEndDate	12/12/2018	12/3/2018
tblConstructionPhase	PhaseEndDate	7/16/2018	7/2/2018
tblConstructionPhase	PhaseStartDate	12/13/2018	12/4/2018
tblConstructionPhase	PhaseStartDate	7/19/2018	7/10/2018
tblConstructionPhase	PhaseStartDate	7/17/2018	7/3/2018
tblConstructionPhase	PhaseStartDate	12/6/2018	11/27/2018
tblConstructionPhase	PhaseStartDate	7/14/2018	7/1/2018
tblGrading	MaterialExported	0.00	300.00
tblGrading	MaterialImported	0.00	4,300.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblVehicleTrips	ST_TR	863.10	576.56
tblVehicleTrips	ST_TR	722.03	576.56
tblVehicleTrips	SU_TR	758.45	576.56
tblVehicleTrips	SU_TR	542.72	576.56
tblVehicleTrips	WD_TR	737.99	576.56
tblVehicleTrips	WD_TR	496.12	576.56

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0808	0.7156	0.4674	9.4000e-004	0.0110	0.0390	0.0501	3.1300e-003	0.0360	0.0391	0.0000	87.7237	87.7237	0.0200	0.0000	88.2248
Maximum	**0.0808**	**0.7156**	**0.4674**	**9.4000e-004**	**0.0110**	**0.0390**	**0.0501**	**3.1300e-003**	**0.0360**	**0.0391**	**0.0000**	**87.7237**	**87.7237**	**0.0200**	**0.0000**	**88.2248**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0808	0.7156	0.4674	9.4000e-004	0.0103	0.0390	0.0493	2.8600e-003	0.0360	0.0388	0.0000	87.7236	87.7236	0.0200	0.0000	88.2247
Maximum	**0.0808**	**0.7156**	**0.4674**	**9.4000e-004**	**0.0103**	**0.0390**	**0.0493**	**2.8600e-003**	**0.0360**	**0.0388**	**0.0000**	**87.7236**	**87.7236**	**0.0200**	**0.0000**	**88.2247**

	ROG	**NOx**	**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**	**6.71**	**0.00**	**1.48**	**8.63**	**0.00**	**0.69**	**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)
1	**7-1-2018**	**9-30-2018**	0.4657	0.4657
		Highest	0.4657	0.4657

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0269	0.0000	3.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	6.8000e-004	6.8000e-004	0.0000	0.0000	7.3000e-004
Energy	1.7500e-003	0.0159	0.0133	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	59.8470	59.8470	2.0400e-003	6.7000e-004	60.0982
Mobile	0.8970	3.1263	7.0566	0.0155	1.1048	0.0190	1.1238	0.2959	0.0178	0.3137	0.0000	1,428.6190	1,428.6190	0.1069	0.0000	1,431.2913
Waste						0.0000	0.0000		0.0000	0.0000	6.9342	0.0000	6.9342	0.4098	0.0000	17.1791
Water						0.0000	0.0000		0.0000	0.0000	0.2784	4.5974	4.8758	0.0288	7.1000e-004	5.8078
Total	**0.9257**	**3.1422**	**7.0703**	**0.0156**	**1.1048**	**0.0202**	**1.1250**	**0.2959**	**0.0190**	**0.3149**	**7.2126**	**1,493.0641**	**1,500.2766**	**0.5475**	**1.3800e-003**	**1,514.3771**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0269	0.0000	3.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	6.8000e-004	6.8000e-004	0.0000	0.0000	7.3000e-004
Energy	1.7500e-003	0.0159	0.0133	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	59.8470	59.8470	2.0400e-003	6.7000e-004	60.0982
Mobile	0.8970	3.1263	7.0566	0.0155	1.1048	0.0190	1.1238	0.2959	0.0178	0.3137	0.0000	1,428.6190	1,428.6190	0.1069	0.0000	1,431.2913
Waste						0.0000	0.0000		0.0000	0.0000	5.2006	0.0000	5.2006	0.3074	0.0000	12.8843
Water						0.0000	0.0000		0.0000	0.0000	0.2227	3.6779	3.9006	0.0230	5.7000e-004	4.6462
Total	**0.9257**	**3.1422**	**7.0703**	**0.0156**	**1.1048**	**0.0202**	**1.1250**	**0.2959**	**0.0190**	**0.3149**	**5.4233**	**1,492.1446**	**1,497.5679**	**0.4393**	**1.2400e-003**	**1,508.9207**

	ROG	NOx	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**	**24.81**	**0.06**	**0.18**	**19.76**	**10.14**	**0.36**

3.0 Construction Detail

Construction Phase

Graves Avenue 7/Eleven & Starbucks Project - San Diego County, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	7/1/2018	7/2/2018	5	1	
2	Grading	Grading	7/3/2018	7/4/2018	5	2	
3	Building Construction	Building Construction	7/10/2018	11/26/2018	5	100	
4	Paving	Paving	11/27/2018	12/3/2018	5	5	
5	Architectural Coating	Architectural Coating	12/4/2018	12/10/2018	5	5	
6	Underground Infrastructure/Utilities	Trenching	7/5/2018	7/9/2018	5	3	

Acres of Grading (Site Preparation Phase): 0.5

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.29

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 9,401; Non-Residential Outdoor: 3,134; Striped Parking Area: 768 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Graves Avenue 7/Eleven & Starbucks Project - San Diego County, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Underground Infrastructure/Utilities	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Site Preparation	Graders	1	8.00	187	0.41
Paving	Pavers	1	7.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Grading	Rubber Tired Dozers	1	1.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Underground Infrastructure/Utilities	2	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	5.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	575.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	5	8.00	3.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	2.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.9000e-004	4.8800e-003	2.1300e-003	0.0000		2.1000e-004	2.1000e-004		1.9000e-004	1.9000e-004	0.0000	0.4458	0.4458	1.4000e-004	0.0000	0.4492
Total	**3.9000e-004**	**4.8800e-003**	**2.1300e-003**	**0.0000**	**2.7000e-004**	**2.1000e-004**	**4.8000e-004**	**3.0000e-005**	**1.9000e-004**	**2.2000e-004**	**0.0000**	**0.4458**	**0.4458**	**1.4000e-004**	**0.0000**	**0.4492**

3.2 Site Preparation - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	8.0000e-005	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0193	0.0193	0.0000	0.0000	0.0193
Total	**1.0000e-005**	**1.0000e-005**	**8.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0193**	**0.0193**	**0.0000**	**0.0000**	**0.0193**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.2000e-004	0.0000	1.2000e-004	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.9000e-004	4.8800e-003	2.1300e-003	0.0000		2.1000e-004	2.1000e-004		1.9000e-004	1.9000e-004	0.0000	0.4458	0.4458	1.4000e-004	0.0000	0.4492
Total	**3.9000e-004**	**4.8800e-003**	**2.1300e-003**	**0.0000**	**1.2000e-004**	**2.1000e-004**	**3.3000e-004**	**1.0000e-005**	**1.9000e-004**	**2.0000e-004**	**0.0000**	**0.4458**	**0.4458**	**1.4000e-004**	**0.0000**	**0.4492**

3.2 Site Preparation - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	8.0000e-005	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0193	0.0193	0.0000	0.0000	0.0193
Total	**1.0000e-005**	**1.0000e-005**	**8.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0193**	**0.0193**	**0.0000**	**0.0000**	**0.0193**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0800e-003	0.0000	1.0800e-003	4.6000e-004	0.0000	4.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0600e-003	9.4300e-003	7.7800e-003	1.0000e-005		6.2000e-004	6.2000e-004		5.9000e-004	5.9000e-004	0.0000	1.0608	1.0608	2.0000e-004	0.0000	1.0659
Total	**1.0600e-003**	**9.4300e-003**	**7.7800e-003**	**1.0000e-005**	**1.0800e-003**	**6.2000e-004**	**1.7000e-003**	**4.6000e-004**	**5.9000e-004**	**1.0500e-003**	**0.0000**	**1.0608**	**1.0608**	**2.0000e-004**	**0.0000**	**1.0659**

3.3 Grading - 2018

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	2.6600e-003	0.0933	0.0195	2.3000e-004	4.9200e-003	3.6000e-004	5.2800e-003	1.3500e-003	3.5000e-004	1.7000e-003	0.0000	22.6560	22.6560	2.0400e-003	0.0000	22.7071
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	4.0000e-005	3.0000e-005	3.2000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0772	0.0772	0.0000	0.0000	0.0772
Total	**2.7000e-003**	**0.0934**	**0.0198**	**2.3000e-004**	**5.0000e-003**	**3.6000e-004**	**5.3600e-003**	**1.3700e-003**	**3.5000e-004**	**1.7200e-003**	**0.0000**	**22.7331**	**22.7331**	**2.0400e-003**	**0.0000**	**22.7843**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.8000e-004	0.0000	4.8000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0600e-003	9.4300e-003	7.7800e-003	1.0000e-005		6.2000e-004	6.2000e-004		5.9000e-004	5.9000e-004	0.0000	1.0608	1.0608	2.0000e-004	0.0000	1.0659
Total	**1.0600e-003**	**9.4300e-003**	**7.7800e-003**	**1.0000e-005**	**4.8000e-004**	**6.2000e-004**	**1.1000e-003**	**2.1000e-004**	**5.9000e-004**	**8.0000e-004**	**0.0000**	**1.0608**	**1.0608**	**2.0000e-004**	**0.0000**	**1.0659**

3.3 Grading - 2018

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	2.6600e-003	0.0933	0.0195	2.3000e-004	4.9200e-003	3.6000e-004	5.2800e-003	1.3500e-003	3.5000e-004	1.7000e-003	0.0000	22.6560	22.6560	2.0400e-003	0.0000	22.7071
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	4.0000e-005	3.0000e-005	3.2000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0772	0.0772	0.0000	0.0000	0.0772
Total	**2.7000e-003**	**0.0934**	**0.0198**	**2.3000e-004**	**5.0000e-003**	**3.6000e-004**	**5.3600e-003**	**1.3700e-003**	**3.5000e-004**	**1.7200e-003**	**0.0000**	**22.7331**	**22.7331**	**2.0400e-003**	**0.0000**	**22.7843**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0542	0.5516	0.3876	5.7000e-004		0.0354	0.0354		0.0326	0.0326	0.0000	52.0058	52.0058	0.0162	0.0000	52.4106
Total	**0.0542**	**0.5516**	**0.3876**	**5.7000e-004**		**0.0354**	**0.0354**		**0.0326**	**0.0326**	**0.0000**	**52.0058**	**52.0058**	**0.0162**	**0.0000**	**52.4106**

3.4 Building Construction - 2018

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	7.9000e-004	0.0200	5.5100e-003	4.0000e-005	1.0000e-003	1.6000e-004	1.1500e-003	2.9000e-004	1.5000e-004	4.4000e-004	0.0000	4.0149	4.0149	3.3000e-004	0.0000	4.0232
Worker	1.7100e-003	1.3500e-003	0.0130	3.0000e-005	3.2100e-003	2.0000e-005	3.2300e-003	8.5000e-004	2.0000e-005	8.7000e-004	0.0000	3.0871	3.0871	1.1000e-004	0.0000	3.0898
Total	**2.5000e-003**	**0.0214**	**0.0185**	**7.0000e-005**	**4.2100e-003**	**1.8000e-004**	**4.3800e-003**	**1.1400e-003**	**1.7000e-004**	**1.3100e-003**	**0.0000**	**7.1020**	**7.1020**	**4.4000e-004**	**0.0000**	**7.1129**

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	0.0542	0.5516	0.3876	5.7000e-004		0.0354	0.0354		0.0326	0.0326	0.0000	52.0058	52.0058	0.0162	0.0000	52.4105
Total	**0.0542**	**0.5516**	**0.3876**	**5.7000e-004**		**0.0354**	**0.0354**		**0.0326**	**0.0326**	**0.0000**	**52.0058**	**52.0058**	**0.0162**	**0.0000**	**52.4105**

3.4 Building Construction - 2018

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	7.9000e-004	0.0200	5.5100e-003	4.0000e-005	1.0000e-003	1.6000e-004	1.1500e-003	2.9000e-004	1.5000e-004	4.4000e-004	0.0000	4.0149	4.0149	3.3000e-004	0.0000	4.0232
Worker	1.7100e-003	1.3500e-003	0.0130	3.0000e-005	3.2100e-003	2.0000e-005	3.2300e-003	8.5000e-004	2.0000e-005	8.7000e-004	0.0000	3.0871	3.0871	1.1000e-004	0.0000	3.0898
Total	**2.5000e-003**	**0.0214**	**0.0185**	**7.0000e-005**	**4.2100e-003**	**1.8000e-004**	**4.3800e-003**	**1.1400e-003**	**1.7000e-004**	**1.3100e-003**	**0.0000**	**7.1020**	**7.1020**	**4.4000e-004**	**0.0000**	**7.1129**

3.5 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.3000e-003	0.0219	0.0181	3.0000e-005		1.2800e-003	1.2800e-003		1.1800e-003	1.1800e-003	0.0000	2.4270	2.4270	6.8000e-004	0.0000	2.4441
Paving	3.8000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.6800e-003**	**0.0219**	**0.0181**	**3.0000e-005**		**1.2800e-003**	**1.2800e-003**		**1.1800e-003**	**1.1800e-003**	**0.0000**	**2.4270**	**2.4270**	**6.8000e-004**	**0.0000**	**2.4441**

3.5 Paving - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.5000e-004	1.4600e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3473	0.3473	1.0000e-005	0.0000	0.3476
Total	**1.9000e-004**	**1.5000e-004**	**1.4600e-003**	**0.0000**	**3.6000e-004**	**0.0000**	**3.6000e-004**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3473**	**0.3473**	**1.0000e-005**	**0.0000**	**0.3476**

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	2.3000e-003	0.0219	0.0181	3.0000e-005		1.2800e-003	1.2800e-003		1.1800e-003	1.1800e-003	0.0000	2.4270	2.4270	6.8000e-004	0.0000	2.4441
Paving	3.8000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.6800e-003**	**0.0219**	**0.0181**	**3.0000e-005**		**1.2800e-003**	**1.2800e-003**		**1.1800e-003**	**1.1800e-003**	**0.0000**	**2.4270**	**2.4270**	**6.8000e-004**	**0.0000**	**2.4441**

3.5 Paving - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.5000e-004	1.4600e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3473	0.3473	1.0000e-005	0.0000	0.3476
Total	**1.9000e-004**	**1.5000e-004**	**1.4600e-003**	**0.0000**	**3.6000e-004**	**0.0000**	**3.6000e-004**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3473**	**0.3473**	**1.0000e-005**	**0.0000**	**0.3476**

3.6 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0154					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.5000e-004	5.0100e-003	4.6400e-003	1.0000e-005		3.8000e-004	3.8000e-004		3.8000e-004	3.8000e-004	0.0000	0.6383	0.6383	6.0000e-005	0.0000	0.6398
Total	**0.0162**	**5.0100e-003**	**4.6400e-003**	**1.0000e-005**		**3.8000e-004**	**3.8000e-004**		**3.8000e-004**	**3.8000e-004**	**0.0000**	**0.6383**	**0.6383**	**6.0000e-005**	**0.0000**	**0.6398**

3.6 Architectural Coating - 2018

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	2.0000e-005	2.0000e-005	1.6000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0386	0.0386	0.0000	0.0000	0.0386
Total	**2.0000e-005**	**2.0000e-005**	**1.6000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0386**	**0.0386**	**0.0000**	**0.0000**	**0.0386**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0154					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.5000e-004	5.0100e-003	4.6400e-003	1.0000e-005		3.8000e-004	3.8000e-004		3.8000e-004	3.8000e-004	0.0000	0.6383	0.6383	6.0000e-005	0.0000	0.6398
Total	**0.0162**	**5.0100e-003**	**4.6400e-003**	**1.0000e-005**		**3.8000e-004**	**3.8000e-004**		**3.8000e-004**	**3.8000e-004**	**0.0000**	**0.6383**	**0.6383**	**6.0000e-005**	**0.0000**	**0.6398**

3.6 Architectural Coating - 2018

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	2.0000e-005	2.0000e-005	1.6000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0386	0.0386	0.0000	0.0000	0.0386
Total	**2.0000e-005**	**2.0000e-005**	**1.6000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0386**	**0.0386**	**0.0000**	**0.0000**	**0.0386**

3.7 Underground Infrastructure/Utilities - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.0000e-004	7.8600e-003	6.9800e-003	1.0000e-005		5.6000e-004	5.6000e-004		5.1000e-004	5.1000e-004	0.0000	0.8478	0.8478	2.6000e-004	0.0000	0.8544
Total	**8.0000e-004**	**7.8600e-003**	**6.9800e-003**	**1.0000e-005**		**5.6000e-004**	**5.6000e-004**		**5.1000e-004**	**5.1000e-004**	**0.0000**	**0.8478**	**0.8478**	**2.6000e-004**	**0.0000**	**0.8544**

3.7 Underground Infrastructure/Utilities - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	3.0000e-005	2.4000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0579	0.0579	0.0000	0.0000	0.0579
Total	**3.0000e-005**	**3.0000e-005**	**2.4000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0579**	**0.0579**	**0.0000**	**0.0000**	**0.0579**

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	8.0000e-004	7.8600e-003	6.9800e-003	1.0000e-005		5.6000e-004	5.6000e-004		5.1000e-004	5.1000e-004	0.0000	0.8478	0.8478	2.6000e-004	0.0000	0.8544
Total	**8.0000e-004**	**7.8600e-003**	**6.9800e-003**	**1.0000e-005**		**5.6000e-004**	**5.6000e-004**		**5.1000e-004**	**5.1000e-004**	**0.0000**	**0.8478**	**0.8478**	**2.6000e-004**	**0.0000**	**0.8544**

3.7 Underground Infrastructure/Utilities - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	3.0000e-005	2.4000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0579	0.0579	0.0000	0.0000	0.0579
Total	**3.0000e-005**	**3.0000e-005**	**2.4000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0579**	**0.0579**	**0.0000**	**0.0000**	**0.0579**

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	0.8970	3.1263	7.0566	0.0155	1.1048	0.0190	1.1238	0.2959	0.0178	0.3137	0.0000	1,428.619 0	1,428.619 0	0.1069	0.0000	1,431.291 3
Unmitigated	0.8970	3.1263	7.0566	0.0155	1.1048	0.0190	1.1238	0.2959	0.0178	0.3137	0.0000	1,428.619 0	1,428.619 0	0.1069	0.0000	1,431.291 3

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Convenience Market (24 Hour)	2,575.47	2,575.47	2575.47	1,961,420	1,961,420
Fast Food Restaurant with Drive Thru	1,037.80	1,037.80	1037.80	969,642	969,642
Parking Lot	0.00	0.00	0.00		
Total	3,613.27	3,613.27	3,613.27	2,931,061	2,931,061

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
Convenience Market (24 Hour)	9.50	7.30	7.30	0.90	80.10	19.00	24	15	61
Fast Food Restaurant with Drive	9.50	7.30	7.30	2.20	78.80	19.00	29	21	50
Parking Lot	9.50	7.30	7.30	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
Convenience Market (24 Hour)	0.581689	0.044135	0.186694	0.113515	0.018244	0.005600	0.015197	0.022573	0.001888	0.002088	0.006279	0.000742	0.001357
Fast Food Restaurant with Drive Thru	0.581689	0.044135	0.186694	0.113515	0.018244	0.005600	0.015197	0.022573	0.001888	0.002088	0.006279	0.000742	0.001357
Parking Lot	0.581689	0.044135	0.186694	0.113515	0.018244	0.005600	0.015197	0.022573	0.001888	0.002088	0.006279	0.000742	0.001357

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	42.5654	42.5654	1.7100e-003	3.5000e-004	42.7138
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	42.5654	42.5654	1.7100e-003	3.5000e-004	42.7138
NaturalGas Mitigated	1.7500e-003	0.0159	0.0133	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2816	17.2816	3.3000e-004	3.2000e-004	17.3843
NaturalGas Unmitigated	1.7500e-003	0.0159	0.0133	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2816	17.2816	3.3000e-004	3.2000e-004	17.3843

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					
Convenience Market (24 Hour)	9961.41	5.0000e-005	4.9000e-004	4.1000e-004	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.5316	0.5316	1.0000e-005	1.0000e-005	0.5347
Fast Food Restaurant with Drive Thru	313884	1.6900e-003	0.0154	0.0129	9.0000e-005		1.1700e-003	1.1700e-003		1.1700e-003	1.1700e-003	0.0000	16.7501	16.7501	3.2000e-004	3.1000e-004	16.8496
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**1.7400e-003**	**0.0159**	**0.0133**	**9.0000e-005**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2816**	**17.2816**	**3.3000e-004**	**3.2000e-004**	**17.3843**

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					
Convenience Market (24 Hour)	9961.41	5.0000e-005	4.9000e-004	4.1000e-004	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.5316	0.5316	1.0000e-005	1.0000e-005	0.5347
Fast Food Restaurant with Drive Thru	313884	1.6900e-003	0.0154	0.0129	9.0000e-005		1.1700e-003	1.1700e-003		1.1700e-003	1.1700e-003	0.0000	16.7501	16.7501	3.2000e-004	3.1000e-004	16.8496
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**1.7400e-003**	**0.0159**	**0.0133**	**9.0000e-005**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2816**	**17.2816**	**3.3000e-004**	**3.2000e-004**	**17.3843**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Convenience Market (24 Hour)	56105.5	18.3358	7.4000e-004	1.5000e-004	18.3997
Fast Food Restaurant with Drive Thru	69660	22.7655	9.2000e-004	1.9000e-004	22.8449
Parking Lot	4480	1.4641	6.0000e-005	1.0000e-005	1.4692
Total		**42.5654**	**1.7200e-003**	**3.5000e-004**	**42.7138**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Convenience Market (24 Hour)	56105.5	18.3358	7.4000e-004	1.5000e-004	18.3997
Fast Food Restaurant with Drive Thru	69660	22.7655	9.2000e-004	1.9000e-004	22.8449
Parking Lot	4480	1.4641	6.0000e-005	1.0000e-005	1.4692
Total		**42.5654**	**1.7200e-003**	**3.5000e-004**	**42.7138**

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	0.0269	0.0000	3.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	6.8000e-004	6.8000e-004	0.0000	0.0000	7.3000e-004
Unmitigated	0.0269	0.0000	3.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	6.8000e-004	6.8000e-004	0.0000	0.0000	7.3000e-004

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	1.5400e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0253					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.0000e-005	0.0000	3.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	6.8000e-004	6.8000e-004	0.0000	0.0000	7.3000e-004
Total	**0.0269**	**0.0000**	**3.6000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**6.8000e-004**	**6.8000e-004**	**0.0000**	**0.0000**	**7.3000e-004**

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	1.5400e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0253					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.0000e-005	0.0000	3.6000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	6.8000e-004	6.8000e-004	0.0000	0.0000	7.3000e-004
Total	**0.0269**	**0.0000**	**3.6000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**6.8000e-004**	**6.8000e-004**	**0.0000**	**0.0000**	**7.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	3.9006	0.0230	5.7000e-004	4.6462
Unmitigated	4.8758	0.0288	7.1000e-004	5.8078

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Convenience Market (24 Hour)	0.331104 / 0.202935	2.2508	0.0109	2.7000e-004	2.6040
Fast Food Restaurant with Drive Thru	0.546361 / 0.0348741	2.6249	0.0179	4.4000e-004	3.2038
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**4.8758**	**0.0288**	**7.1000e-004**	**5.8078**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Convenience Market (24 Hour)	0.264883 / 0.162348	1.8007	8.7000e-003	2.2000e-004	2.0832
Fast Food Restaurant with Drive Thru	0.437089 / 0.0278993	2.0999	0.0143	3.5000e-004	2.5631
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**3.9006**	**0.0230**	**5.7000e-004**	**4.6462**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	5.2006	0.3074	0.0000	12.8843
Unmitigated	6.9342	0.4098	0.0000	17.1791

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Convenience Market (24 Hour)	13.43	2.7262	0.1611	0.0000	6.7540
Fast Food Restaurant with Drive Thru	20.73	4.2080	0.2487	0.0000	10.4252
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**6.9342**	**0.4098**	**0.0000**	**17.1791**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Convenience Market (24 Hour)	10.0725	2.0446	0.1208	0.0000	5.0655
Fast Food Restaurant with Drive Thru	15.5475	3.1560	0.1865	0.0000	7.8189
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**5.2006**	**0.3073**	**0.0000**	**12.8843**

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 B

Traffic Impact Study

TRAFFIC IMPACT STUDY

For

CONVIENENCE MARKET and
COFFEE SHOP WITH DRIVE THRU PROJECT
Located at 8606 Graves Avenue

in the City of Santee

Submitted To:
M. Grant Corporation,
Santee Navy Associates, LLC.
1080 Railroad Avenue
Santee, CA 92071

Prepared By:

Darnell & Associates, Inc.
4411 Mercury Street, Suite 207A
San Diego, California 92111

Revised May 30, 2019
Revised May 2, 2018
Revised November 21, 2017
Revised August 22, 2017
March 30, 2017

Darnell & ASSOCIATES, INC.

TRANSPORTATION PLANNING & TRAFFIC ENGINEERING

May 30, 2019

Michael Grant
Santee Navy Associates, LLC.
8510 Railroad Avenue
Santee, CA 92071

D&A Project No: 170104

Subject: Revised Traffic Study for the proposed Convenience Market and a Coffee Shop with drive thru located at 8606 Graves Avenue in the City of Santee.

Dear Mr. Grant:

In accordance with you authorization, Darnell & Associates, Inc. (D&A) has prepared this Traffic Impact Study to assess impacts associated with the proposed Convenience Market and a Coffee Shop with drive thru project located at 8606 Graves Avenue in the City of Santee.

This report analyzes the traffic impacts on local roadways and intersections that the project, Opening Day 2018 and Future conditions. The analysis was prepared in accordance with the City of Santee (City) and SANTEC/ITE Guidelines for Traffic Impact Studies (TIS) requirements. The report has been revised to respond to the City of Santee comments dated April 23, 2018.

If you have any questions, please feel free to contact this office.

Sincerely,
DARNELL & ASSOCIATES, INC.

Bill E Darnell

Bill E. Darnell, P.E.
Firm Principal

REGISTERED PROFESSIONAL ENGINEER
BILL E. DARNELL
No. 22338
CIVIL
STATE OF CALIFORNIA

Date Signed: May 30, 2019

BED/jam/vla
170104 -CONVEINENCE MARKET AND COFFEE SHOP WITH DRIVE THRU TRAFFIC STUDY_ MAY 2019 STRIKEOUT.DOC

REGISTERED PROFESSIONAL ENGINEER
BILL E. DARNELL
No. 639
TRAFFIC
STATE OF CALIFORNIA

FOCUSED TRAFFIC STUDY

FOR

CONVIENENCE MARKET AND A COFFEE SHOP WITH DRIVE THRU PROJECT LOCATED AT 8606 GRAVES AVENUE

In the City of Santee

Submitted To:

M. Grant Corporation
Santee Navy Associates, LLC.
8510 Railroad Avenue
Santee, CA 92071

Prepared By:

Darnell & Associates, Inc.
4411 Mercury Street, Suite 207A
San Diego, CA 92111
619-233-9373

May 30, 2019

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SECTION I - INTRODUCTION

PROJECT DESCRIPTION

Darnell and Associates Inc (D&A) has prepared the following traffic impact analysis to assess the impacts to the surrounding street system as a result of the addition of project traffic from the Convenience Market and Coffee Shop with Drive Thru Project ("Project"). The project proposes the development of a 4,467 square foot Convenience Market and an 1,800 square foot Coffee Shop with Drive Thru. The Project site is located on the northwest corner of the Graves Avenue/ Prospect Avenue intersection in the City of Santee. Figure 1 shows the Vicinity Map and Figure 2 presents the project site plan.

The proposed project is consistent with the property's existing General Commercial Zoning and General Plan designated for the project site.

The traffic analysis presented in this report includes the following:

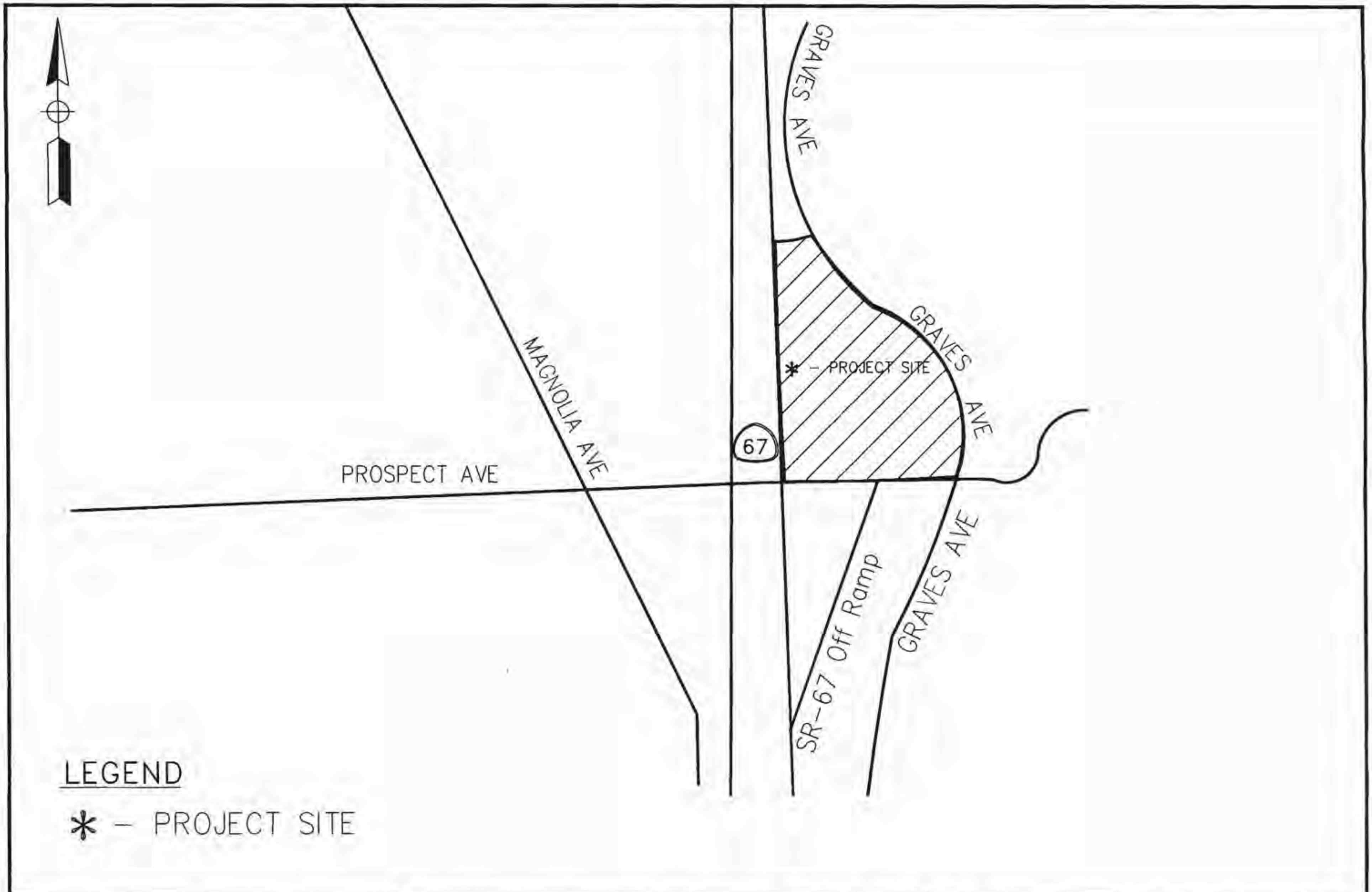
- Project Description
- Existing Conditions
- Analysis Approach and Methodology
- Significance Criteria
- Existing Conditions
- Project Traffic
- Existing Plus Project Conditions
- 2018 Opening Day Conditions
- 2018 Opening Day Plus Project Conditions
- Horizon Year 2035
- Prospect Avenue Queuing Analysis at SR-67
- Site Access \ Circulation Discussion
- Significance of Impacts and Mitigation Measures

ANALYSIS APPROACH AND METHODOLOGY

Level of Service

Level of Service (LOS) is a professional industry standard by which the operating conditions of a given roadway segment or intersection are measured. Level of Service is defined on a scale of "A" to "F"; where LOS "A" represents the best operating conditions and LOS F represents the worst operating conditions. LOS "A" facilities are characterized as having free flowing traffic conditions with no restrictions on maneuvering or operating speeds; traffic volumes are low and travel speeds are high. LOS "F" facilities are characterized as having forced flow with many stoppages and low operating speeds. Table 1 shows the ADT and delay ranges that are equivalent to each level of service.

The City of Santee has established LOS standards and thresholds to analyze arterial roadway segment performance. The analysis of roadway segment level of service is based on the functional classification of the roadway, the maximum desired level of service capacity, roadway geometrics, and the existing or forecasted average daily traffic (ADT) volume. Table 1 summarizes the City's roadway segment threshold criteria for a residential collector and associated levels of service where daily traffic demand is compared to the given roadway capacity.



Darnell & ASSOCIATES, INC.

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FIGURE 1

VICINITY MAP

SITE PLAN

FOR

7/11 AND STARBUCKS DRIVE-THRU

SITE INFORMATION:

ADDRESS: 8606 GRAVES AVE, SANTEE, CA 92071

ASSESSOR'S PARCEL NUMBER: 384-142-21

ACREAGE: 1.02 ACRES (AFTER STREET DEDICATION & VACATION)

GENERAL PLAN DESIGNATION: GC (GENERAL COMMERCIAL)

ZONING: GC (GENERAL COMMERCIAL)

EXCEPTIONS

1. THE FACT THAT THE OWNERSHIP OF SAID LAND DOES NOT INCLUDE DIRECT RIGHTS OF ACCESS TO OR FROM A HIGHWAY ABUTTING SAID LAND, SUCH RIGHTS HAVING BEEN SEVERED FROM SAID LAND BY THE DOCUMENT RECORDED NOVEMBER 7, 1962 AS INSTRUMENT NO. 190233 OF OFFICIAL RECORDS, WHICH AFFECTS THE FREEWAY ADJACENT THERETO. ACCESS IS ALLOWED TO ADJACENT FRONTAGE ROAD AS SET FORTH IN SAID DOCUMENT.
2. THE FACT THAT THE OWNERSHIP OF SAID LAND DOES NOT INCLUDE DIRECT RIGHTS OF ACCESS TO OR FROM A HIGHWAY ABUTTING SAID LAND, SUCH RIGHTS HAVING BEEN SEVERED FROM SAID LAND BY THE DOCUMENT RECORDED AUGUST 7, 1963 AS INSTRUMENT NO. 139127 OF OFFICIAL RECORDS, WHICH AFFECTS THE FREEWAY ADJACENT THERETO. ACCESS IS ALLOWED TO ADJACENT FRONTAGE ROAD AT CERTAIN COURSES AS SET FORTH AND DELINEATED IN SAID DOCUMENT.
3. THE FACT THAT THE OWNERSHIP OF SAID LAND DOES NOT INCLUDE RIGHTS OF ACCESS TO OR FROM A HIGHWAY ABUTTING SAID LAND, SUCH RIGHTS HAVING BEEN SEVERED FROM SAID LAND BY THE DOCUMENT RECORDED MARCH 4, 1980 AS INSTRUMENT NO. 80-073271 OF OFFICIAL RECORDS, WHICH AFFECTS THE FREEWAY ADJACENT THERETO.

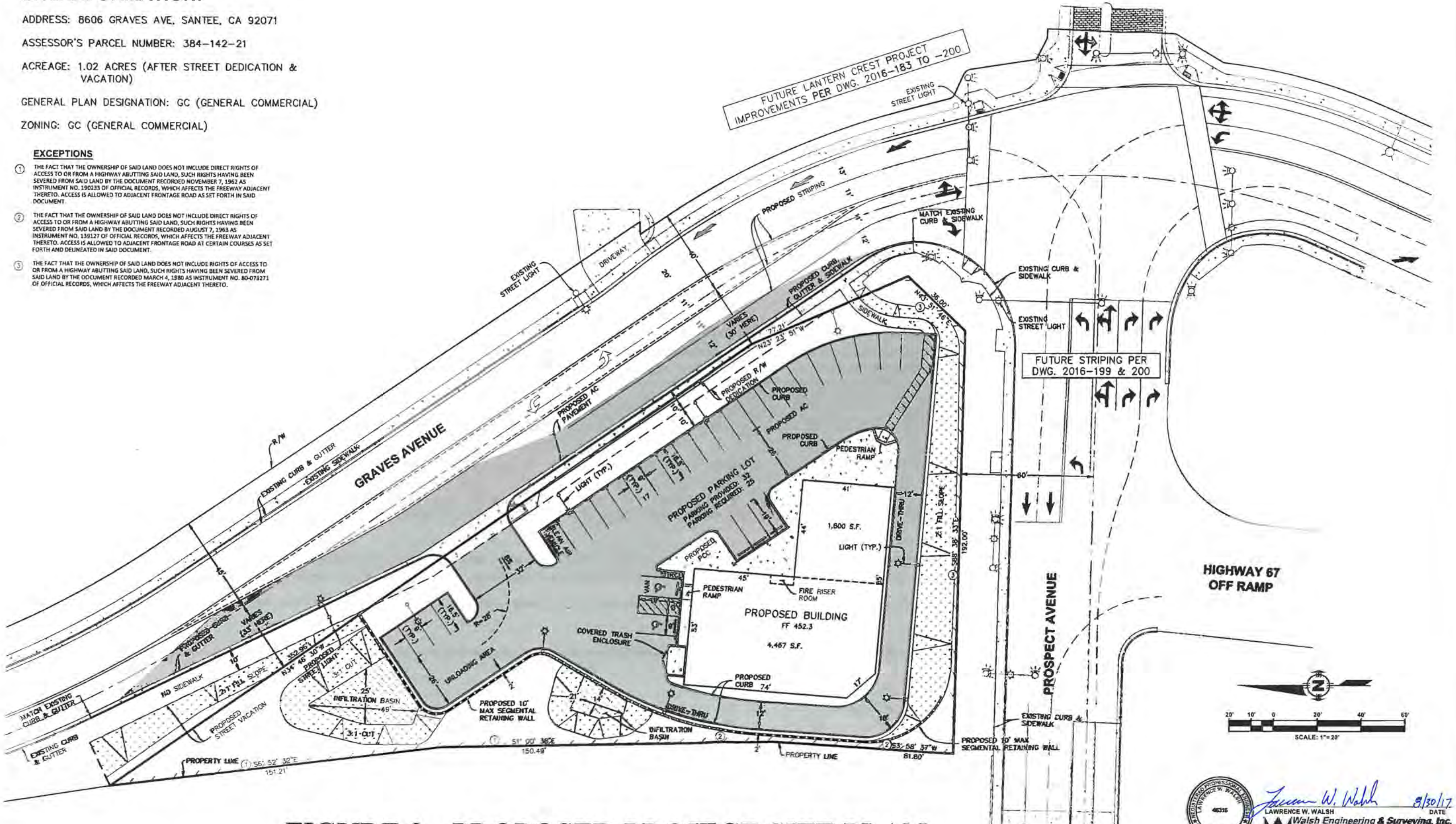

FIGURE 2 - PROPOSED PROJECT SITE PLAN

Table 1 City of Santee Revised Roadway Classifications and Standards							
Street Classification	**Description/ Sub-classification**	**# of Lanes**	**LOS/ADT Thresholds**				
			A	**B**	**C**	**D**	**E**
Circulation Element							
Prime Arterial	Median	6 lanes	25,000	35,000	50,000	55,000	60,000
Major Arterial	Median	4 lanes	15,000	21,000	30,000	35,000	40,000
Parkway	Median	4 lanes	15,000	21,000	30,000	35,000	40,000
	w/TWLTL	2 lanes w/TWLTL	5,000	7,000	10,000	13,000	15,000
	-	2 lanes	4,000	5,500	7,500	9,000	10,000
Collector	w/TWLTL	2 lanes w/TWLTL	5,000	7,000	10,000	13,000	15,000
	Industrial Collector	2 lanes	2,500	3,500	5,000	6,500	8,000
	Residential Collector	2 lanes	2,500	3,500	5,000	6,500	8,000
Non-Circulation Element							
Industrial Local		2 lanes	-	-	2,200*	-	-
Residential Local		2 lanes	-	-	2,200*	-	-
Cul-De-Sac Street		2 lanes	-	-	300*	-	-
Hillside Street		2 lanes	-	-	700*	-	-
Notes: TWLTL = Two-way left-turn lane. *represents design capacity of non-CE road. LOS does not apply to non-CE roads.							

The analysis of signalized and unsignalized intersection Level of Service is based on the Highway Capacity Manual (HCM) The Levels of Service for signalized intersections is presented in Table 2. The Level of Service criteria for unsignalized intersections is presented on Table 3. Synchro 8 Software has been used to perform the analysis.

TABLE 2 SIGNALIZED INTERSECTION LEVEL OF SERVICE HIGHWAY CAPACITY MANUAL OPERATIONAL ANALYSIS METHOD	
Average Stopped Delay per Vehicle (seconds)	**Level of Service Characteristics**
≤ 10.0	LOS A occurs when the volume – to- capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during a green indication and travel through the intersection without stopping.
10.1 – 20.0	LOS B occurs when the volume –to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.
20.1 – 35.0	LOS C occurs when progression is favorable or the cycle length is moderate. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.
35.1 – 55.0	LOS D occurs when the volume –to-capacity ratio is high and either progression is highly favorable or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.
55.1 – 80.0	LOS E occurs when the volume –to-capacity ratio is high and either progression is unfavorable or the cycle length is long. Individual cycle failures are frequent.
>80.0	LOS F occurs when the volume –to-capacity ratio is very high, progression is very poor or the cycle length is long. Most cycles fail to clear the intersection.
Source: 2010 Highway Capacity Manual, Chapter 18	

TABLE 3 - LEVEL OF SERVICE CRITERIA FOR STOP CONTROLLED UNSIGNALIZED INTERSECTIONS.	
≤ 10.0	A
10.1 – 15.0	B
15.1 – 25.0	C
25.1 – 35.0	D
35.1 – 50.0	E
>50.0	F
Source: 2010 Highway Capacity Manual, Chapters 19 & 20	

ANALYSIS METHODOLOGY

Roadway Segments

Roadway segment operation was analyzed using the volume to capacity (V/C) threshold analysis by comparing the average daily traffic (ADT) to a roadway segment's maximum capacity (see Table 1). These values are reported in V/C and assigned to Level of Service.

Intersections

The Synchro coordination software (Version 8.0) was utilized to analyze the morning and afternoon peak hour conditions of the study intersections. This version of Synchro is based on the methodologies outlined in the 2000 Highway Capacity Manual (HCM). The coordination software defines LOS based on delay using variables such as lane configuration, traffic volumes and signal timings. The unsignalized intersection methodology defines LOS based on the longest delay experienced by any single critical movement.

SIGNIFICANCE CRITERIA

The City of Santee uses the regionally adopted SANTEC/ITE Guidelines for the purposes of traffic impact analysis. The City of Santee considers LOS D as the minimum acceptable level of service. A project is considered to have a significant impact if the new project traffic decreases the operations of surrounding roadways by a defined threshold. The defined thresholds shown in ***Table 5–1*** for roadway segments and intersections are based on published *San Diego Traffic Engineers' Council* (SANTEC) guidelines. If the project exceeds the thresholds in *Table 5–1*, then the project may be considered to have a significant project impact. If a significant impact is identified the project will need to identify a feasible mitigation measure to return the impact to a level within the allowable increase or better.

TABLE 4 - CITY OF SANTEE TRAFFIC IMPACT SIGNIFICANT THRESHOLDS		
Level of Service with Project	**Allowable Increase Due to Project Impacts [a]**	
	Roadway Segments	**Intersections**
	V/C	**Delay (sec.)**
E & F[b]	0.02	2

a. If a proposed project's traffic impacts exceed the values shown in the table, then the impacts are deemed "significant." The project applicant shall identify "feasible mitigation measures".
b. The acceptable Level of Service (LOS) standard for roadways and intersections in the City of Santee is LOS D. Hence, if the project maintains the level of service at LOS D, the impact is not considered significant,

V/C = Volume to Capacity Ratio, Delay = Average stopped delay per vehicle measured in seconds for intersections, LOS = Level of Service.

REPORT ORGANIZATION

Section II evaluates the existing roadway characteristics and traffic conditions surrounding the project area. Section III examines the project related potential trips generated by the proposed project and it defines the trip distribution assumptions. Section IV examines project impacts for existing plus project conditions and 2018 Opening Day Conditions and 2018 Opening Day plus Project conditions. Section V analyzes the projects access and on-site circulation. Section VI provides recommended mitigation measures, significance of impacts and summary of findings.

SECTION II - EXISTING CONDITIONS

This section of the traffic study assesses the existing conditions of the roadways and intersections within the vicinity of the project to determine travel flow and/or delay difficulties, if any, that exist prior to adding the traffic generated by the proposed project. The existing conditions analysis establishes a base condition which is used to assess the other scenarios discussed in this report. Darnell & Associates, Inc. (D&A) conducted a field review of the area surrounding the project in February 2017. The existing roadway geometrics for the study area are illustrated in Figure 3.

KEY INTERSECTIONS

The key intersections analyzed in this study are identified below:

Prospect Avenue at Graves Avenue;
Prospect Avenue at SR-67 Northbound Off Ramp;
Prospect Avenue at Magnolia Avenue; and
Graves Avenue at the Project Access.

ROADWAY SEGMENTS

The key roadway segments analyzed in the study area are identified below:

Prospect Avenue west of Magnolia Avenue is an east-west Circulation Element roadway that is constructed as a 2-Lane Collector Road with a center lane and bike lanes on each side. The LOS E Capacity of the roadway is 15,000 vehicles per day. The posted speed limit on this segment of Prospect Avenue is 35 miles per hour.

Prospect Avenue between Magnolia Avenue (overcrossing of SR-67), is improved to provide two (2) eastbound and three (3) westbound travel lanes equivalent to a 4-Lane Major Road. The LOS "E" capacity of the road is 40,000 vehicles per day.

Graves Avenue is a north-south circulation element roadway that is improved ~~to a 2-Lane Collector~~ as a 2-Lane a Residential Collector Road with a LOS E Capacity of 8,000 vehicles per day. South of Prospect Avenue is constructed equivalent to a 2-Lane Parkway with the LOS "E" capacity of 10,000 vehicles per day North of Prospect Avenue. The posted speed limit is 35 miles per hour.

Magnolia Avenue is a north-south circulation element roadway that is constructed as a 6-Lane Prime Arterial Road north of Prospect Avenue with a LOS E Capacity of 60,000 vehicles per day. South of Prospect Avenue, Magnolia Avenue is constructed equivalent to a 4-Lane Major Road with a center turn lane with the LOS "E" capacity of 40,000 vehicles per day.

EXISTING CONDITIONS

Daily, morning and afternoon peak hour traffic counts were conducted at key roadway and intersections, during typical weekdays, in March 2017. Count summary sheets can be found in Appendix A. Existing daily and peak hour traffic volumes are presented on Figure 4.

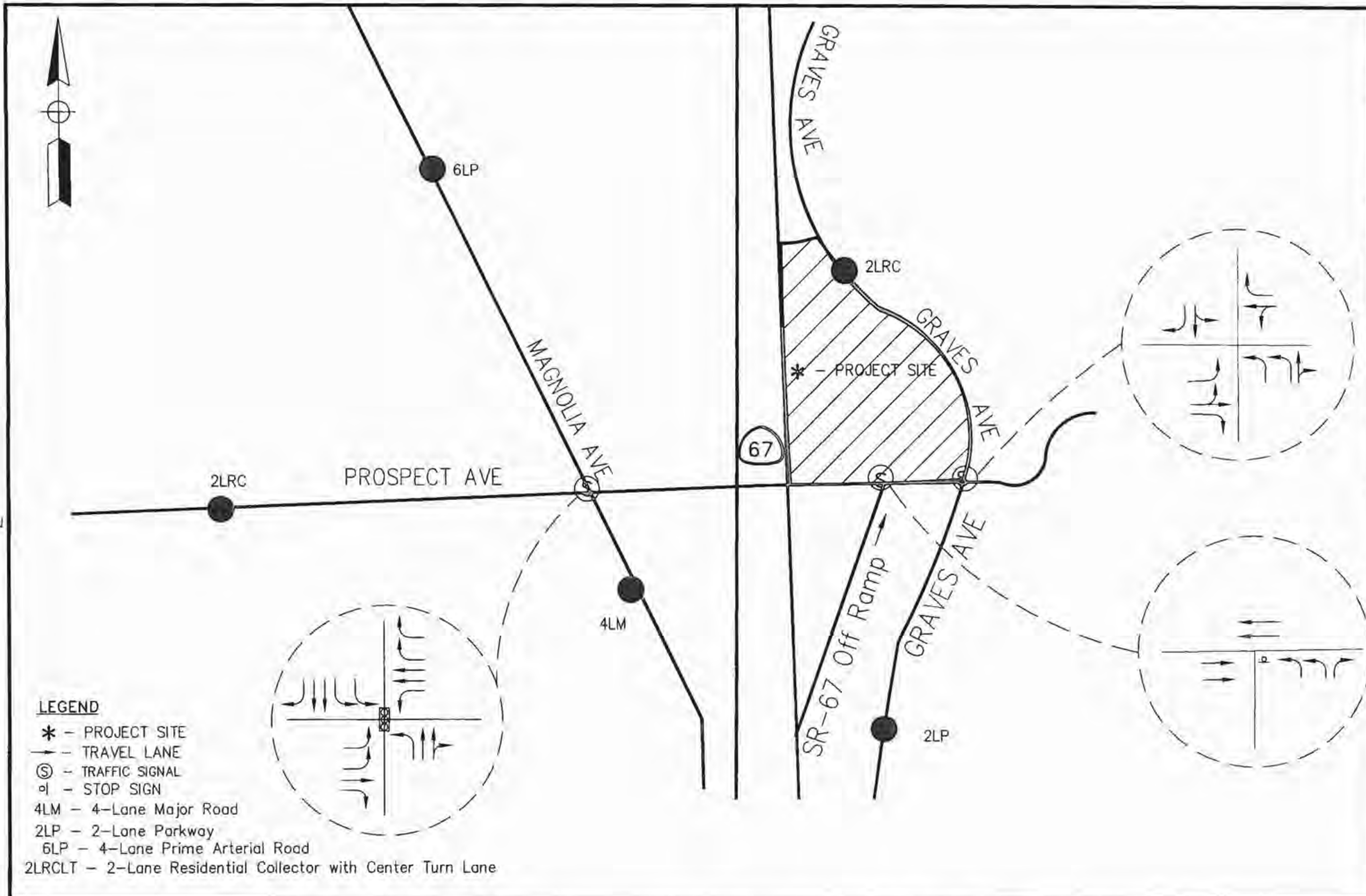

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FIGURE 3

EXISTING ROADWAY GEOMETRICS

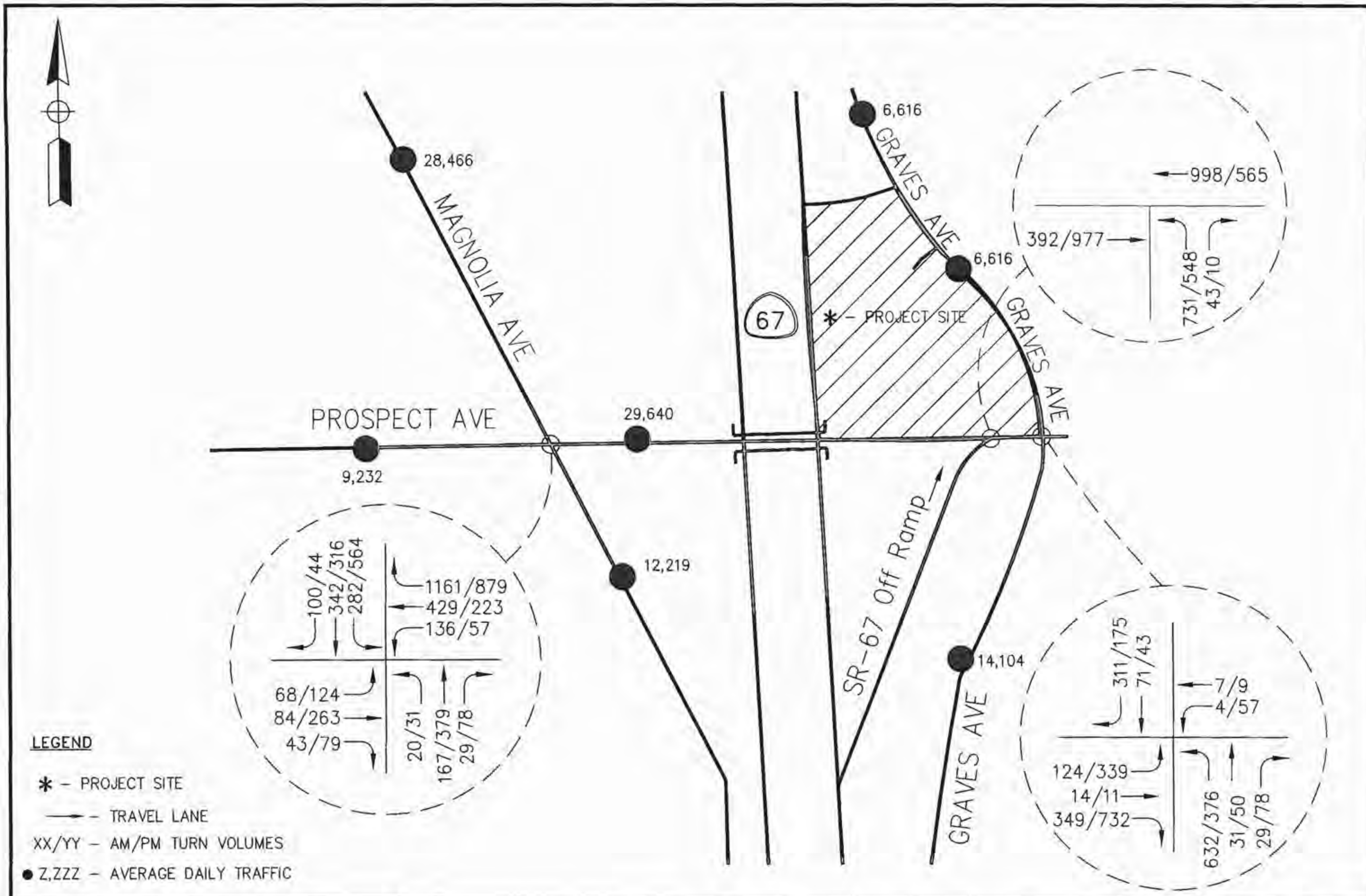

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FIGURE 4

EXISTING TRAFFIC VOLUMES

Existing Roadway Segment operation

Table 5 summarizes the existing conditions roadway segment operation. As shown on Table 5 ~~each of the roadways analyzed operates at LOS "C" or better except Graves Avenue south of Prospect Avenue which~~ Magnolia Avenue and Prospect Avenue operate at LOS "C" or better and Graves Avenue operates at LOS "E" north of Prospect Avenue and LOS "F" south of Prospect Avenue.

Existing Intersection Operation

Table 6 summarizes the existing intersection operation. As shown on Table 6 each of the three (3) intersections analyzed operates at LOS "C" or better in the AM peak hours and PM LOS "D" or better in the PM hours. A copy of the Synchro Worksheets is presented in Appendix B.

Table 5 - Existing Roadway Segment Level of Service

Roadway Segment	Class	Capacity (LOS E)	Existing (2017) Conditions		
			ADT	V/C	LOS
Prospect Avenue					
West of Magnolia Avenue	2LCTL 2-Lane Collector (with center turn lane)	15,000	9,232	0.62	B
East of Magnolia Avenue	4M (4-Lane Major Road)	40,000	29,640	0.74	C
Graves Avenue					
North of Project	2-Lane Residential Collector	8,000	6.616	**0.827**	**E**
North of Prospect Avenue	2-Lane Residential Collector	8,000	6.616	**0.827**	**E**
South of Prospect Avenue	2-Lane Parkway	**10,000**	**14,104**	**1.41**	**F**
Magnolia Avenue					
North of Prospect Avenue	6LP (6-Lane Prime Arterial)	60,000	28,466	0.47	A
South of Prospect Avenue	4M (4-Lane Major Road)	40,000	12,219	0.31	A

LOS=level of service; ADT=Average daily traffic;
V/C=volume to capacity ratio, LOS E Capacity per City of Santee Levels of Service.

Table 6 - Existing Conditions Intersection Operation

Intersection	**Control Type**	**Existing Conditions**			
		AM PEAK		**PM PEAK**	
		Delay (veh/sec)	**LOS**	**Delay (veh/sec)**	**LOS**
Graves Avenue at Project Access	DNE				
Graves Avenue at Prospect Avenue	Signalized	14.7	B	13.5	B
Prospect Avenue at Magnolia Avenue	Signalized	32.9	C	37.5	D
Prospect Avenue at SR-67 Northbound Off Ramp	Signalized	16.5	B	11.3	B

Delay is measured in seconds per vehicle; LOS=level of service; Delay and LOS calculated using Synchro 8 (with HCS value), DNE = Does Not Exist, sec/veh = Second per Vehicle.

SECTION III - PROJECT RELATED CONDITIONS

TRIP GENERATION

The weekday trip generation potential for the proposed project is based on daily and peak hour trip generation rates obtained from the *(Not So) Brief Guide of Traffic Generators for the San Diego Region* published by the San Diego Association of Governments (SANDAG) in April 2002 Utilizing the SANDAG rates and the characteristics of the proposed project, estimates of daily and peak hour traffic volumes generated by the project can be calculated. Table 7 summarizes the weekday trip generation rates and calculations for the proposed project.

As shown in Table 8, the proposed project is estimated to generate 4,519 average weekday daily trips with 453 trips being generated during the morning peak hour and 302 trips being generated during the afternoon peak hour. Further review of Table 8 shows that the total cumulative trips with pass-by reductions results in 3,615 Daily, 453 AM peak hour trips and 150 PM peak hour trips to be added to the surrounding roadways in the study area.

Table 7 - Trip Generation Rates and Calculations Summary

Land Use	Daily	AM Peak Hour			PM Peak Hour		
		Rate	In	Out	Rate	In	Out
Convenience Market (24 Hours)	700.00 trips/ 1,000 sq. ft	63.00/ksf	0.50	0.50	49.00/ksf	0.50	0.50
Coffee Shop w/Drive Thru	773.17 trips/ 1,000 sq. ft	95.00/ksf	0.55	0.45	46.11/ksf	0.53	0.47

Table 8 - Project Trip Generation Summary

Land Use	Density	Daily	AM Peak Hour			PM Peak Hour		
			Total	In	Out	Total	In	Out
Project Trip Generation								
Coffee Shop with Drive Thru	1.800 ksf	1,392	95	76	171	44	39	83
Pass-By Reduction (15% Daily, 50% PM)		-209	n/a			-22	-20	-42
Transit Reduction (5% daily)		-70	n/a			n/a		
Convenience Market	4.467 ksf	3,127	141	141	282	110	109	219
Pass-By Reduction (15% Daily, 50% PM)		-469	n/a			-55	-55	-110
Transit Reduction (5% daily)		-156	n/a			n/a		
Total Driveway Trips		**4,519**	**236**	**217**	**453**	**154**	**148**	**302**
Total Cumulative Trips		**3,615**	**236**	**217**	**453**	**77**	**73**	**150**

Note: Trip generation rates are based on SANDAG's (Not So) Brief guide to Vehicular Generation Rates for the San Diego Region (April 2002). Driveway trips reflect the total project traffic. Cumulative Trips reflect trip generation after Pass-by traffic subtracted. The trip rates for the Starbucks with a drive-thru are based on the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition. ksf = 1,000 square foot.

TRIP DISTRIBUTION & ASSIGNMENT

The trip distribution percentages for the project were estimated based on likely travel routes and distributions, as well as circulation to local state routes and major arterials. Figure 5 demonstrates the project trip percentages. The project traffic presented on Table 8 was assigned to the roadway network and is shown on Figure 6.

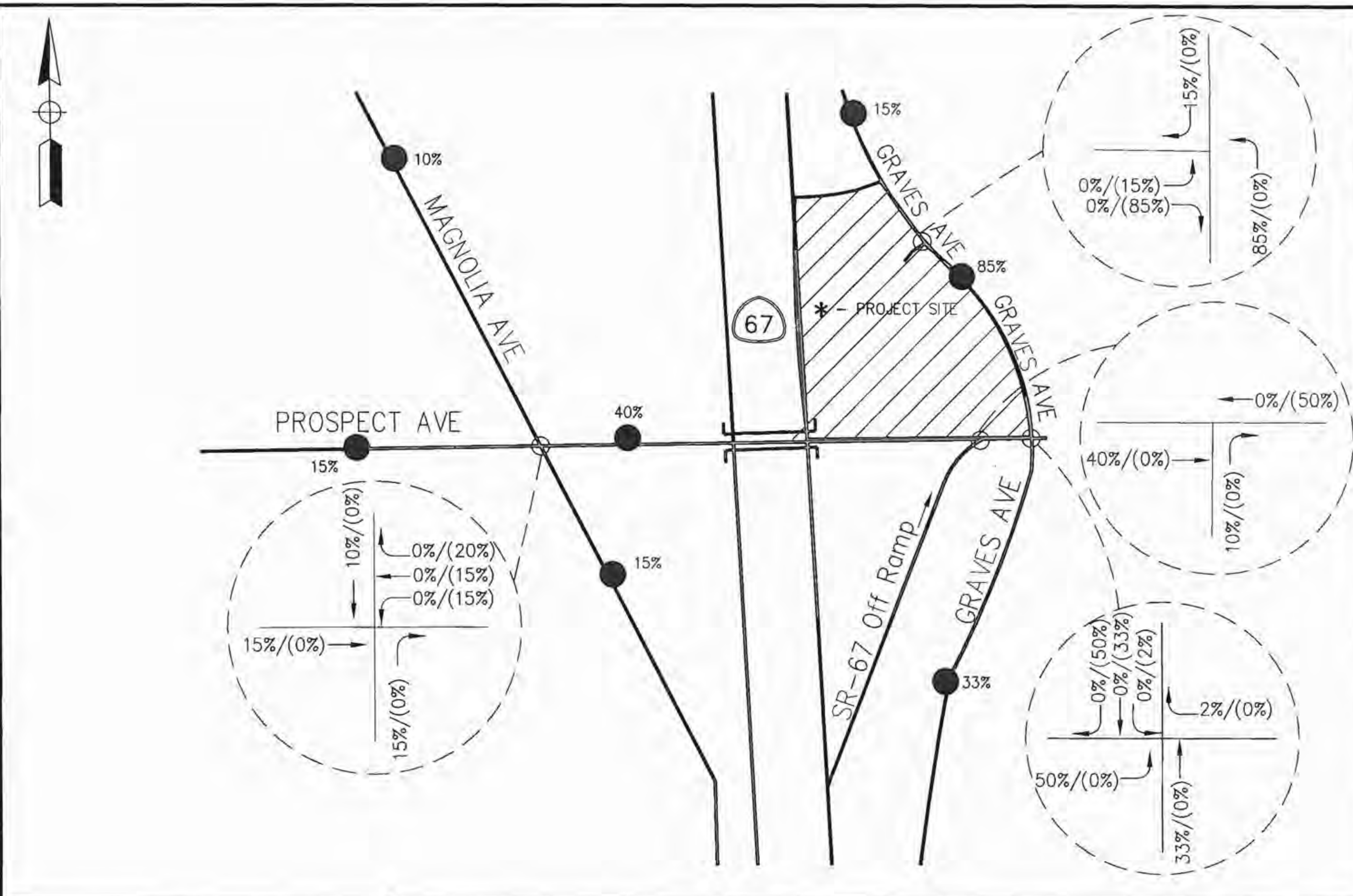

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FIGURE 5

PROJECT DISTRIBUTION PERCENTAGES

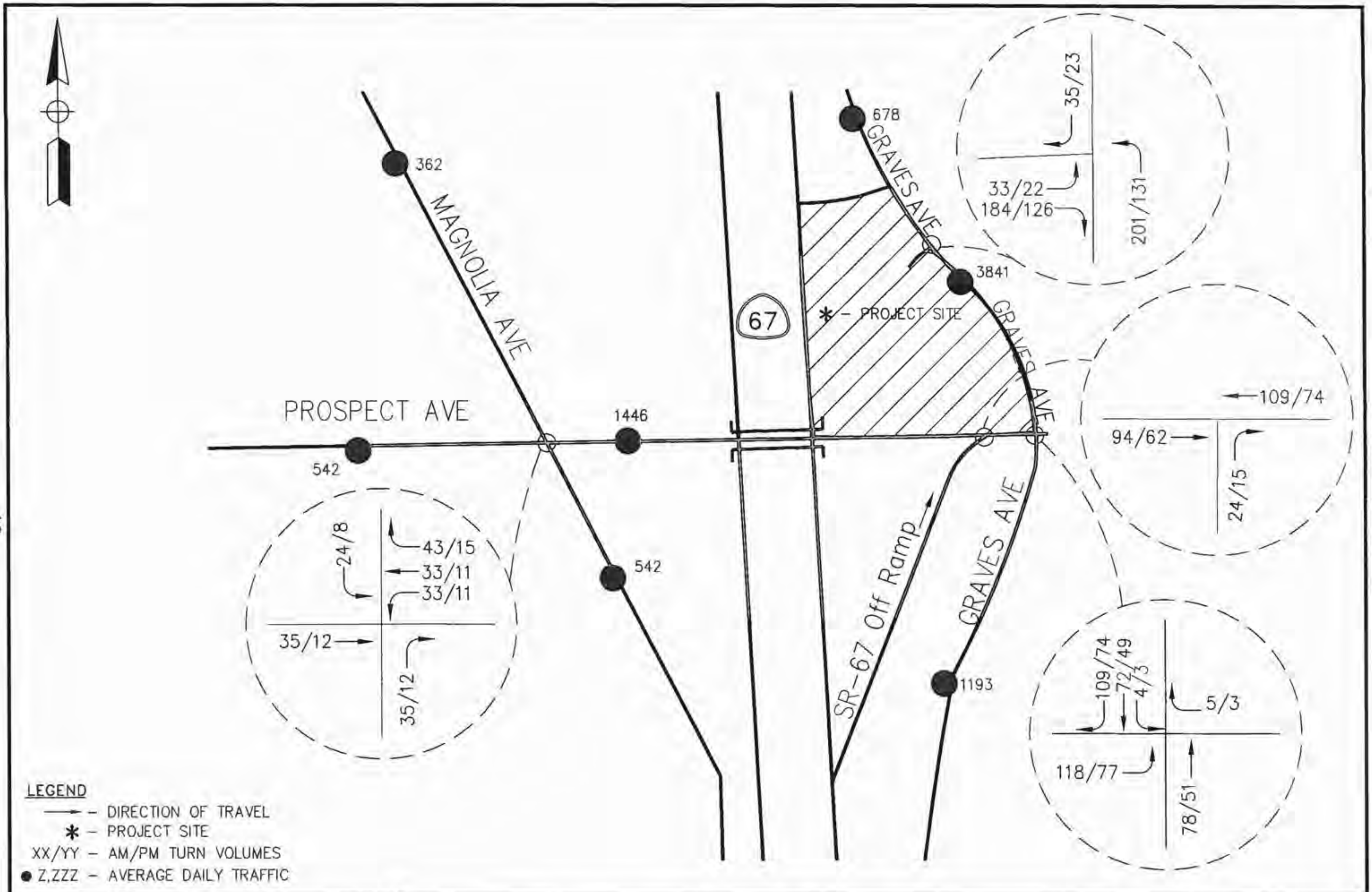

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FIGURE 6

PROJECT TRAFFIC VOLUMES

SECTION IV - EXISTING PLUS PROJECT CONDITIONS

This scenario analyzes the traffic impacts of the proposed project under existing conditions. The construction of the project will improve the projects Graves Avenue frontage and complete improvements to the Prospect Avenue/Graves Avenue intersection that are previously approved for the Lantern Crest Project. With these improvements the roadways and intersections geometrics presented on Figure 7 and will be used for further analysis in this report. The existing plus project traffic volumes are presented on Figure 8.

ROADWAY SEGMENT

The daily traffic data presented on Figure 8 was analyzed and the results are presented on Table 9. Review of Table 9 shows ~~each roadway segment continues to operate at LOS "C" or better except for Graves Avenue north and south of Prospect Avenue which operates at LOS "F".~~ Magnolia Avenue and Prospect Avenue continues to operate at LOS C or better and Graves Avenue continues to operate at LOS "F" north and south of Prospect Avenue. The addition of project traffic to Graves Avenue is considered to create a significant impact for existing plus project conditions on Graves Avenue north and south of Prospect Avenue.

Table 9 - Existing Plus Project Roadway Segment Level of Service

Roadway Segment	Functional Classification	LOS E Capacity	Existing (2017)			Existing (2017) Plus Project				
			ADT	V/C	LOS	ADT	V/C	LOS	ΔV/C	Proj. Sign?
Prospect Avenue										
West of Magnolia Ave.	2LCTL 2-Lane Collector (with center turn lane)	15,000	9,232	0.62	B	9,774	0.65	B	0.03	No
East of Magnolia Ave.	4M (4-Lane Major Road)	40,000	29,640	0.74	C	31,086	0.77	C	0.03	No
Graves Avenue										
North of Project	2-Lane Residential	8,000	6,616	0.83	C	7,279	**0.91**	**E**	**0.08**	**Yes**
North of Prospect Ave	2-Lane Residential	8,000	6,616	0.83	C	10,457	**1.31**	**F**	**0.48**	**Yes**
South of Prospect Ave.	2-Lane Parkway	10,000	**14,104**	**1.41**	**F**	**15,297**	**1.53**	**F**	**0.12**	**Yes**
Magnolia Avenue										
North of Prospect Ave.	6LP (6-Lane Prime Arterial)	60,000	28,466	0.47	A	28,808	0.48	A	0.01	No
South of Prospect Ave.	4M (4-Lane Major Road)	40,000	12,219	0.31	A	12,761	0.32	A	0.01	No

LOS=level of service; ADT=Average daily traffic; V/C=volume to capacity ratio, LOS E Capacity per City of Santee Levels of Service

INTERSECTION

The traffic volumes presented on Figure 8 were analyzed with the Synchro software. Intersection operation level of service for the Existing Plus Project scenarios are summarized on Table 10. Review of Table 10 shows each of the four (4) intersections analyzed operate at LOS "C" or better in the AM peak hours and LOS "D" or better in the PM peak Hour. A copy of the Synchro worksheets is presented in Appendix C. The resulting operating conditions analysis identifies the project does not create any significant impacts.

Table 10 - Existing Plus Project Intersection Operation Summary

Intersection	Traffic Control	Existing (2017) Conditions				Existing (2017) Plus Project Conditions							
		AM Peak		PM Peak		AM Peak				PM Peak			
		Delay sec/veh	LOS	Delay sec/veh	LOS	Delay sec/veh	LOS	Δ Delay sec/veh	Sign.	Delay sec/veh	LOS	Δ Delay sec/veh	Sign.
Graves Ave. at Project Access	OWSC	DNE				17.6	C	17.6	No	12.8	B	12.8	No
Graves Ave. at Prospect Ave.	Signalized	14.7	B	13.5	B	21.3	C	6.6	No	16.3	C	2.8	No
Prospect Ave. at Magnolia Ave.	Signalized	32.9	C	37.5	D	33.5	C	0.6	No	37.8	D	0.3	No
Prospect Ave. at SR-67 Northbound Off Ramp	Signalized	16.5	B	11.3	B	16.6	B	0.1	No	11.8	B	0.5	No

Delay is measured in seconds per vehicle; LOS=level of service; Delay and LOS calculated using Synchro 8 (with HCS value) Sign = Significant, OWSC = One way stop control, DNE = Does Not Exist, sec/veh = Second per Vehicle.

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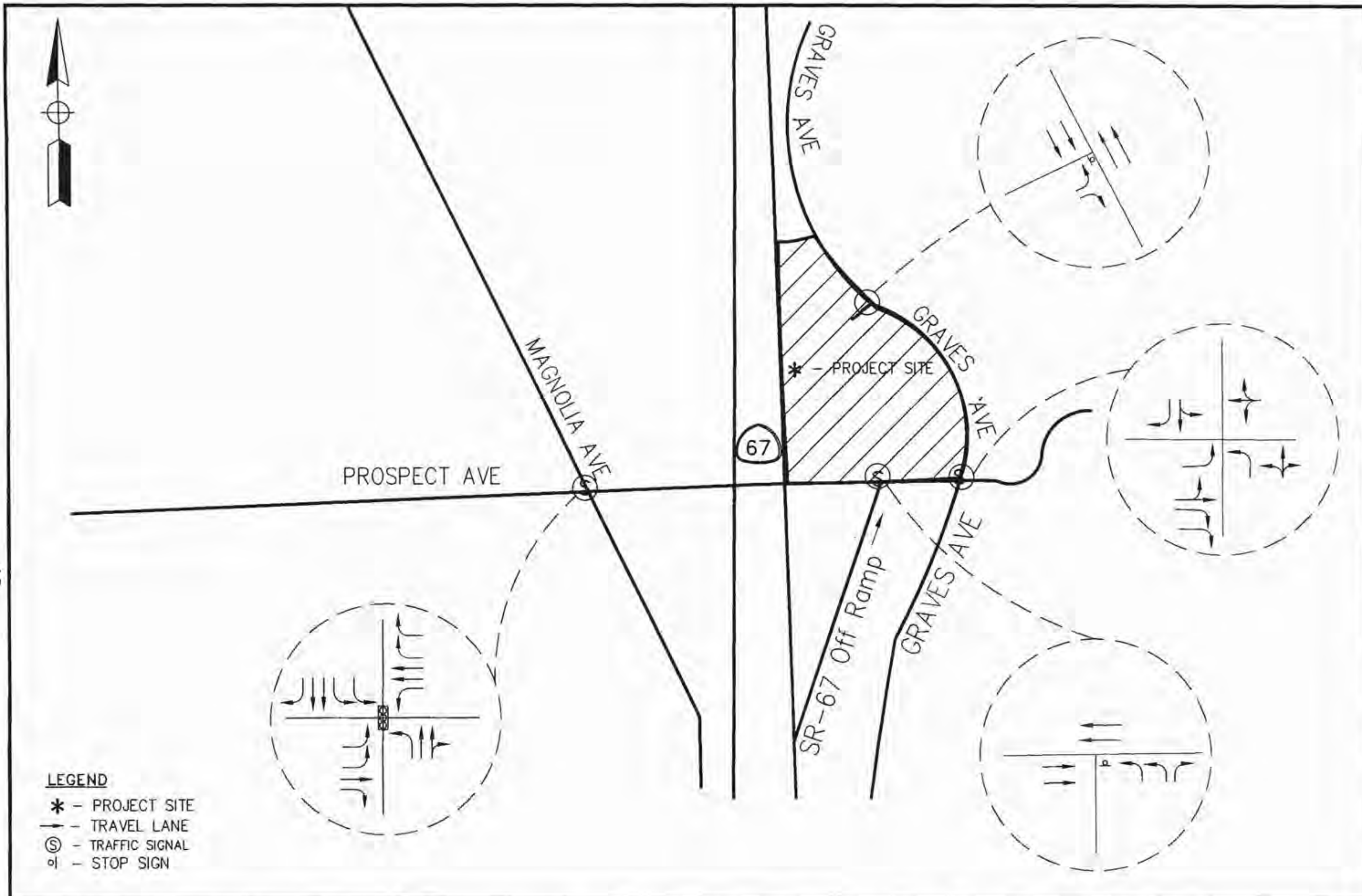

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FIGURE 7

EXISTING PLUS PROJECT ROADWAY GEOMETRICS

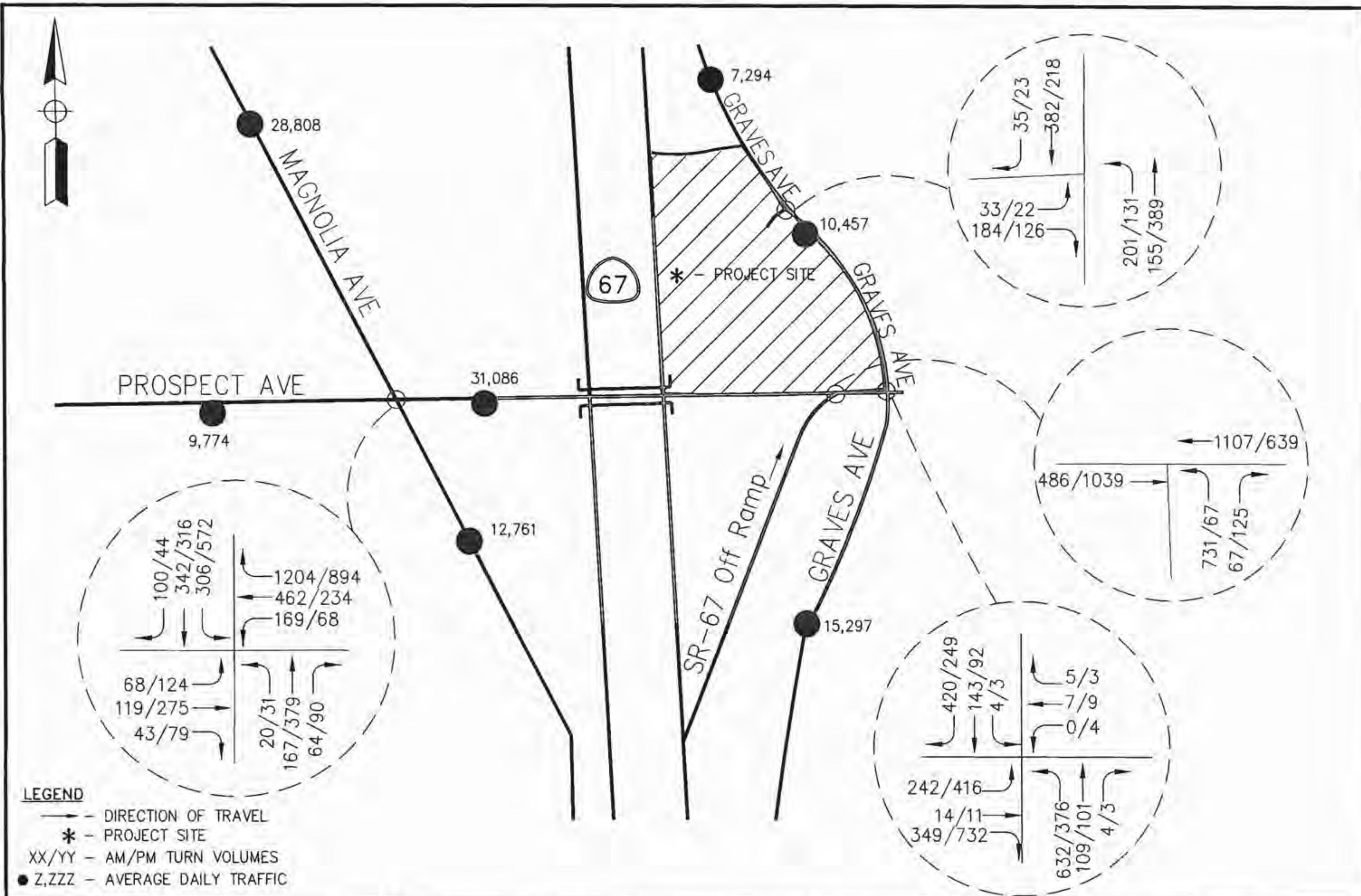

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FIGURE 8

EXISTING + PROJECT TRAFFIC

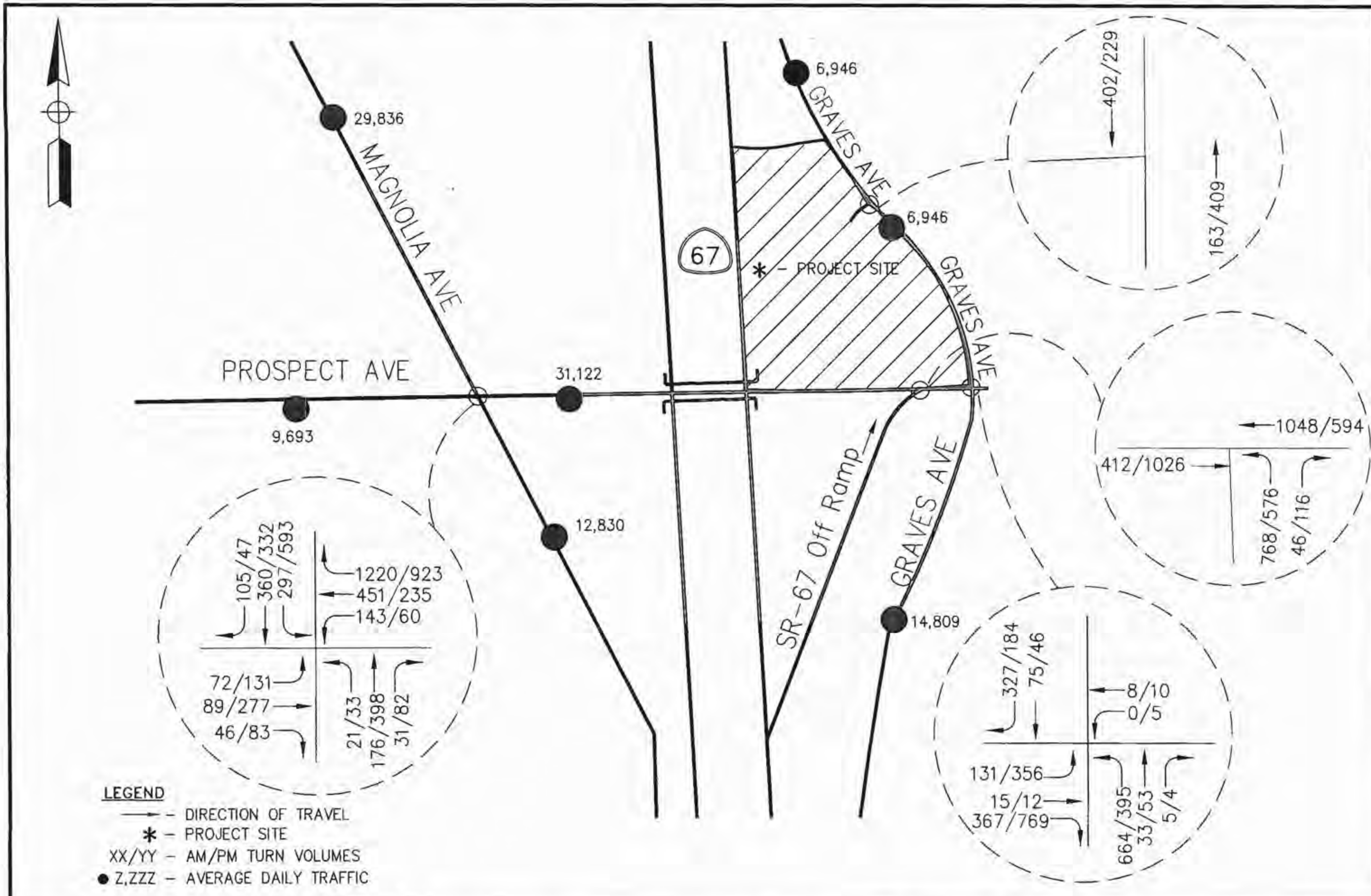

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FIGURE 9

OPENING DAY 2018 TRAFFIC VOLUMES

SECTION V - 2018 OPENING DAY CONDITIONS

2018 OPENING DAY CONDITIONS

This scenario analyzes the traffic impacts of the proposed project under 2018 Opening day and 2018 Opening Day Plus Project Conditions. The 2018 Opening Day and Opening Day Plus Project analysis is considered the horizon Year Analysis for the project. To establish 2018 Opening Day traffic volumes the existing 2017 traffic volumes presented on Figure 4 were increased five (5) percent. The resulting 2018 Opening Day traffic volumes are presented on Figure 8. Project traffic volumes shown on Figure 6 was added to 2018 Opening Day traffic volumes. Figure 10 presents the 2018 Opening Day plus project traffic volumes. In conjunction with the adjacent development of the Lantern Crest Project the project will improve its Graves Avenue frontage and complete the Prospect Avenue/Graves Avenue intersection improvements shown on the Project Site Plan.

The construction of the proposed project improvements and the completion of the Prospect Avenue/Graves Avenue intersection improvements to be constructed by the lantern Crest Development on the east side of Graves Avenue will complete the development of the area. Therefore, additional Horizon Year Analysis is not required.

ROADWAY SEGMENT

The daily traffic volumes presented on Figures 9 and Figure 10 were analyzed and the results are presented on Table 11. Review of Table 11 shows the addition of project traffic volumes to the 2018 Opening Day traffic conditions. Each roadway analyzed will operate at LOS “D” or better for 2018 Opening Day Conditions except Graves Avenue south of Prospect Avenue will operate at LOS “F” for Opening Day 2018 conditions and Graves Avenue north and south of Prospect will continue to operate at LOS “F” with the addition of project traffic.

INTERSECTION

Intersection operation results for the 2018 Opening Day scenarios based on existing intersection geometrics presented on Figure 3 are summarized on Table 12. As shown on Table 12 each of the five intersections analyzed operate at LOS “C” or better in the AM peak hour and LOS “D” in the PM peak hour. The increase in delay is less than 0.02 second/vehicle. Therefore, the project does not create a significant impact. A copy of the Synchro Worksheets is presented in Appendix C.

Additional analysis of the Opening Day 2018 and Opening Day 2018 plus project traffic conditions based on the proposed Prospect Avenue and the Graves Avenue roadway and intersection improvements presented on Figure 11 were prepared. The improvements presented on Figure 11 include the required traffic signal modifications at the Prospect Avenue/Graves Avenue intersection. A copy of the traffic signal modification plan to be constructed by the Lantern Crest project is presented in Appendix D.

Table 13 shows each intersection will continue to operate at LOS D or better with the addition of project traffic. A copy of the worksheets is presented in Appendix C.

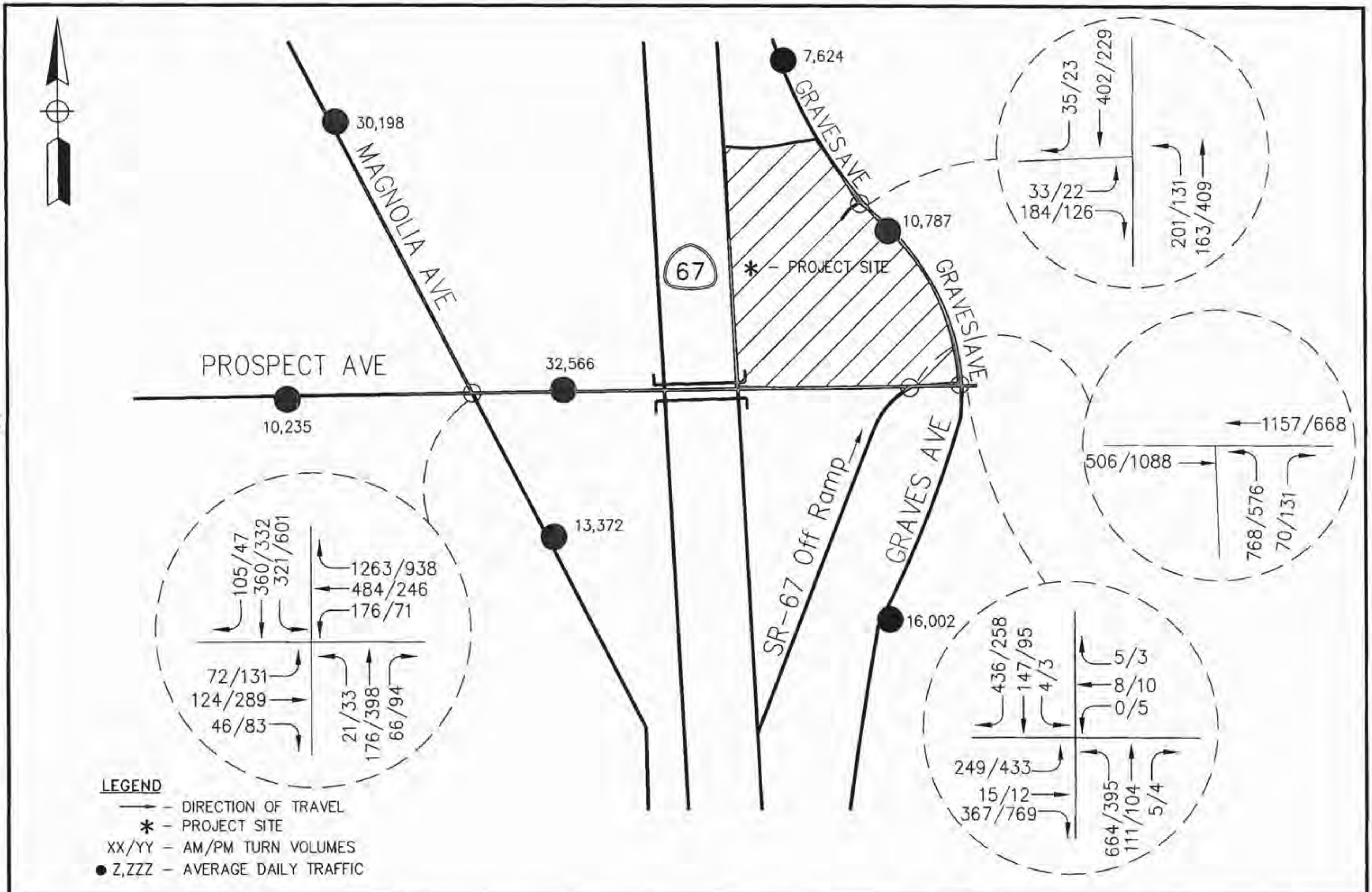

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FIGURE 10

OPENING DAY 2018 TRAFFIC PLUS PROJECT TRAFFIC

Table 11 – 2018 Opening Day Roadway Segment Level of Service										
Roadway Segment	Functional Classification	**LOS E Capacity**	**Opening Day (2018)**			**Opening Day (2018) Plus Project**				
			ADT	**V/C**	**LOS**	**ADT**	**V/C**	**LOS**	**Δ V/C**	**Proj. Sign?**
Prospect Avenue										
West of Magnolia Avenue	2LCTL 2-Lane Collector (with center turn lane)	15,000	9,693	0.65	C	10,235	0.68	D	0.03	No
East of Magnolia Avenue	4M (4-Lane Major Road)	40,000	31,122	0.78	D	32,566	0.81	D	0.03	No
Graves Avenue										
North of Project	Collector (2-Lane without Fronting Property)	**8,000**	**6,946**	**0.868**	**E**	**7,624**	**0.953**	**E**	**0.085**	**Yes**
North of Prospect Avenue	Collector (2-Lane without Fronting Property)	**8,000**	**6,946**	**0.868**	**E**	**10,787**	**1.348**	**F**	**0.480**	**Yes**
South of Prospect Avenue	Collector (2-Lane without Fronting Property)	10,000	**14,809**	**1.48**	**F**	**16,002**	**1.60**	**F**	**0.12**	**Yes**
Magnolia Avenue										
North of Prospect Avenue	6LP (6-Lane Prime Arterial)	60,000	29,836	0.50	B	30,198	0.50	B	0.00	No
South of Prospect Avenue	4M (4-Lane Major Road)	40,000	12,830	0.32	B	13,372	0.33	B	0.01	No
LOS=level of service; ADT=Average daily traffic; V/C=volume to capacity ratio, LOS E Capacity per City of Santee Levels of Service										

Table 12 – 2018 Opening Day Intersection Operation Summary (a)

Intersection	Traffic Control	Opening Day (2018) Conditions (a)				Opening Day (2018) Plus Project Conditions (a)							
		AM Peak		PM Peak		AM Peak				PM Peak			
		Delay sec/veh	LOS	Delay sec/veh	LOS	Delay sec/veh	LOS	Δ Delay sec/veh	Sign.	Delay sec/veh	LOS	Δ Delay sec/veh	Sign.
Graves Ave. at Project Access	OWSC	DNE				18.4	C	18.4	No	13.1	B	13.1	No
Graves Ave. at Prospect Ave.	Signalized	19.8	B	28.5	C	18.9	B	-0.8	No	22.0	C	-0.6	No
Prospect Ave. at Magnolia Ave.	Signalized	32.4	C	38.1	D	33.3	C	0.9	No	38.3	D	0.2	No
Prospect Ave. at SR-67 Northbound Off Ramp	Signalized	20.5	C	16.9	B	18.9	B	-1.6	No	15.8	B	-1.4	No

Delay is measured in seconds per vehicle; LOS=level of service; Delay and LOS calculated using Synchro 8 (with HCS value) Sign = Significant, OWSC = One way stop control, DNE = Does Not Exist, sec/veh = Second per Vehicle. (a) Based on the existing intersection geometrics presented on Figure 3.

Table 13 – 2018 Opening Day Intersection Operation Summary with Figure 11 Improvements

Intersection	Traffic Control	Opening Day (2018) Conditions (a)				Opening Day (2018) Plus Project Conditions (b)							
		AM Peak		PM Peak		AM Peak				PM Peak			
		Delay sec/veh	LOS	Delay sec/veh	LOS	Delay sec/veh	LOS	Δ Delay sec/veh	Sign.	Delay sec/veh	LOS	Δ Delay sec/veh	Sign.
Graves Ave. at Prospect Ave.	Signalized	19.8	B	28.5	B	28.4	C	8.6	No	14.4	B	-14.1	No
Prospect Ave. at SR-67 Northbound Off Ramp	Signalized	20.5	C	16.9	B	18.5	B	-2.0	No	15.7	B	-1.2	No

Delay is measured in seconds per vehicle; LOS=level of service; Delay and LOS calculated using Synchro 8 (with HCS value) Sign = Significant, sec/veh = Second per Vehicle.
(a) Based on the existing intersection geometrics presented on Figure 3, (b) Based on the intersection geometrics for Prospect Avenue at Graves Avenue presented on Figure 7.

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PROSPECT AVENUE QUEUING ANALYSIS AT SR-67 NORTHBOUND OFF RAMP AND GRAVES AVENUE INTERSECTION

Caltrans has requested the vehicle queues on the SR-67 Northbound Off Ramp at Prospect Avenue be analyzed to confirm that traffic does not back upon the off ramp and conflict with the northbound thru lanes on SR-67. In addition, they have requested the analysis to include the eastbound Prospect Avenue traffic lanes at Graves Avenue to show eastbound traffic queues stopped at Graves Avenue do not bloke the SR-67 northbound off-ramp. The Synchro 8 software was used to calculate the 95th percentile queues for the northbound left turn lane and the northbound right turn lane on the SR-67 off-ramp. Table 14 summarizes the existing storage lengths and the resulting queue lengths for the scenarios analyzed.

Table 14 – SR-67 Northbound Off Ramp Queuing Analysis Summary

Intersection	Peak Hour	Movement	Storage Length (ft)	95th Percentile Queue Length (ft)		
				2018 Opening Day Existing Conditions	2018 Opening Day Existing Plus Project Conditions	2018 Opening Day Existing Plus Project Conditions with Figure 11 Improvements
Prospect Ave / SR-67 NB Off-Ramp	AM	NBL	2,050’ (2 lanes x 1,025’)	300’	300’	300’
	PM			225’	225’	225’
	AM	NBR	1,025’	25’	50’	50’
	PM			75’	75’	75’
	AM	EBT	880’ (2 lanes x 440’)	100’	125’	125’
	PM			250’	275’	275’
Prospect Avenue at Graves Avenue	AM	EBL	220’ (2 lanes x 110’)	75’	75’	125’
	PM			150’	125’	200’
	AM	EBR	170’ (110’ + 60’)	50’	50’	0’
	PM			150’	225’	0’

Notes: Figure 3 presents the existing geometrics used in the Opening Day 2018 and Opening Day 2018 plus Project analysis. Figure 11 presents the propose intersection geometrics at the Prospect Avenue/Graves Avenue intersection. (a) Queue lengths were rounded up to the nearest 25 feet to represent the length of a typical vehicle. NBL = Northbound left, NBR = Northbound Right, EBT = Eastbound Thru, EBR = Eastbound Right, EBLT = Eastbound Left and Thru lane

Review of Table 14 shows there is adequate vehicle stacking on the SR-67 Northbound off-ramp with existing intersection geometrics and with the project intersection geometrics. Further review of Table 14 shows the 95th percentile queues for the eastbound left and thru movements on Prospect Avenue at Graves Avenue not exceed available storage for all the conditions analyzed. Further review of Table 14 shows the eastbound right turn movement at Graves Avenue will exceed available storage for 2018 Opening Day plus Project with existing geometrics. However, Table 14 shows no vehicle queue with the proposed Prospect Avenue and Graves Avenue geometrics shown on Figure 11.

In summary the vehicle queues on eastbound Prospect Avenue at Graves Avenue can be mitigated by construction of the proposed intersection geometrics shown on Figure 11 and the traffic signal is modified as shown on the approved signal modification plan presented in Appendix D.

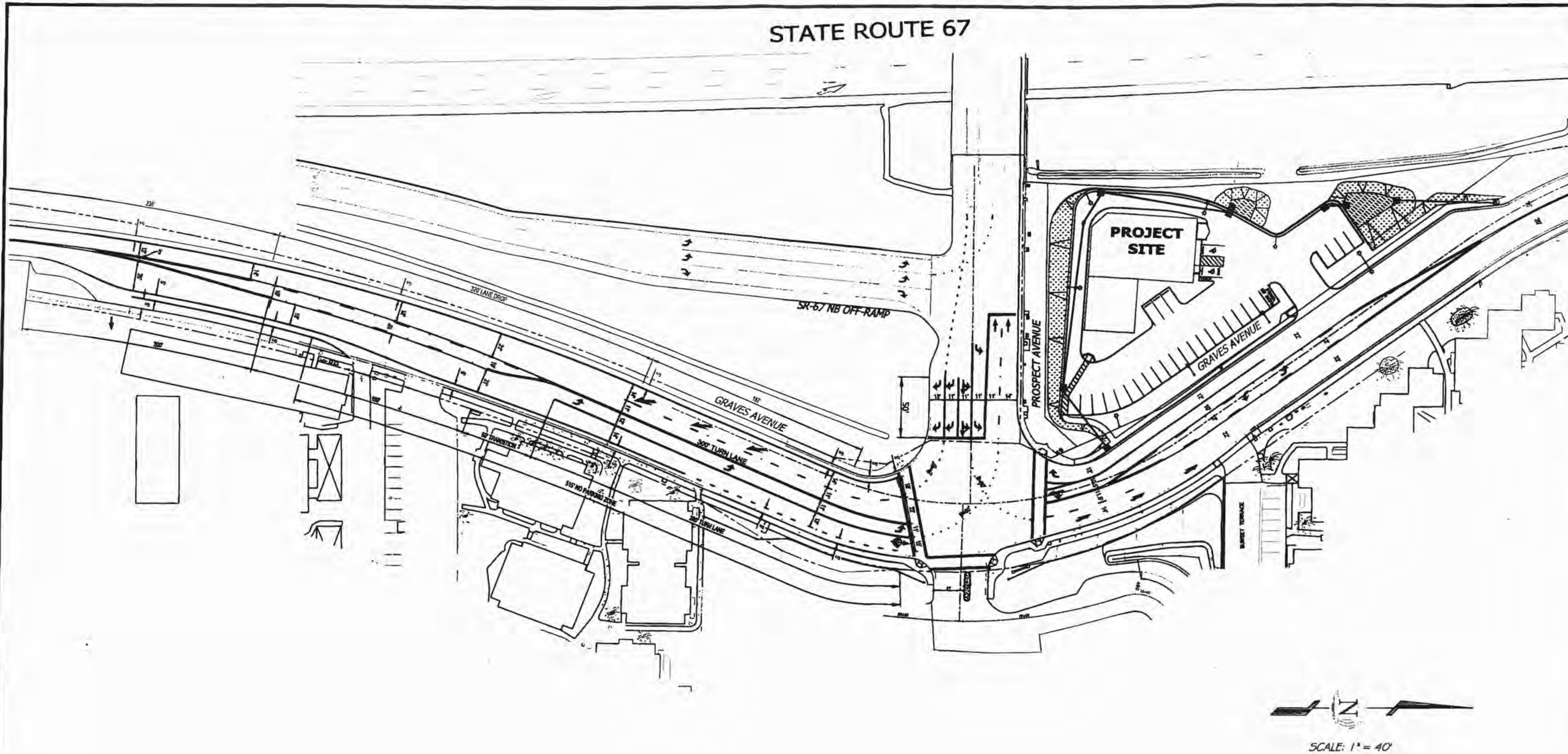


FIGURE 11
GRAVES AVENUE AT PROSPECT AVENUE
PROPOSED CHANNELIZATION IMPROVEMENTS
COFFEE SHOP / 7/11 DEVELOPMENT

Sheet 1 of 1 Sheets

HORIZON YEAR 2035

To address the project impacts on Graves Avenue south of Prospect Avenue, the City of Santee Senior Traffic Engineer has requested, that we prepare a 2035 Analysis for Graves Avenue south of Prospect Avenue to determine if the proposed project percentage increase in daily traffic volumes is significant. In addition, we also estimated the Year 2035 turning movements at Graves Avenue and Prospect Avenue and prepared the Daily and AM/PM peak hour analysis of the 2035 Future Traffic Volumes.

To establish the Year 2035 Traffic Forecasts, we assembled the SANDAG Year 2035 Series 12 Traffic Volume Forecasts, prepared by SANDAG for the City of Santee 2035 Mobility Element. Land Use and Vehicle Trips generated for the area for the project area north of Graves Avenue and East of SR-67. Figure 12 presents a copy of the SANDAG Series 12 Year 2035 Forecast for the City of Santee Mobility Element.

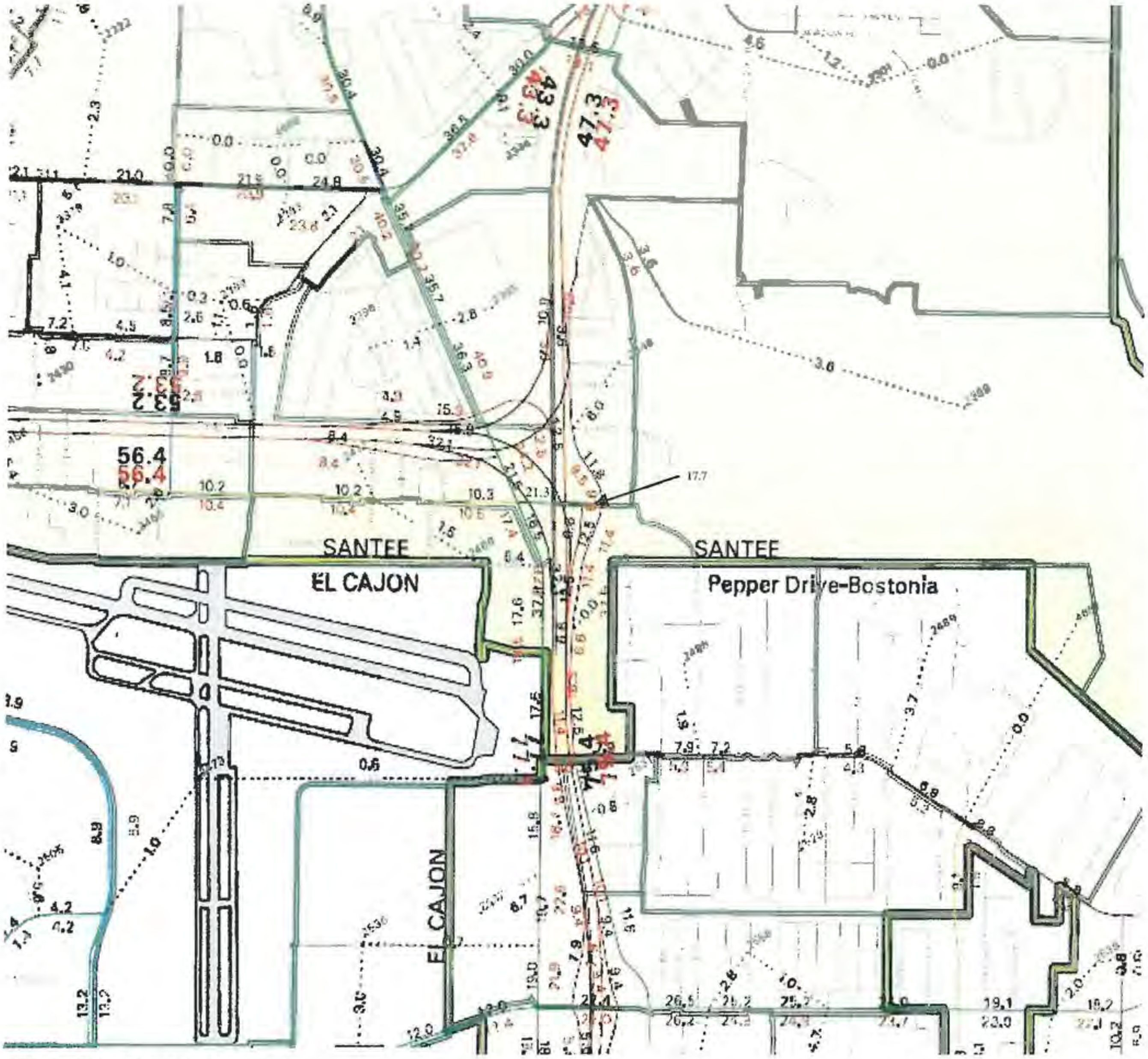
The next step in the analysis process involves a review of the SANDAG 2035 Land Uses for the project area. The project is within TAZ 2348, which includes the project site and the area north of Graves Avenue and east of SR-67. Table 15 presents the SANDAG TAZ 2348 Land Uses and shows 2.3 acres of Neighborhood Commercial Land Use that generates 2,096 daily trips. The Neighborhood Commercial Land Use is representative of the proposed project site.

Table 15 – City of Santee Mobility Element Year 2035 Traffic Analysis Zone 2348

Land Use Code	Description	Type	Amount
101	SINGLE FAMILY	Dwelling Unit	90
102	MULTI-FAMILY	Dwelling Unit	573
4112	RIGHT-OF-WAY	Acre	30.9
4113	COMMUNICATION OR UTILITY	Acre	2.7
5004	NEIGHBORHOOD COMMERCIAL	Acre	2.3
9101	INACTIVE USE	Acre	7.8

To estimate the Year 2035 Buildout scenario turning movement volumes at the study intersection, the existing turning movements at the intersection were factored up based on the projected Average Daily Traffic (ADT) volumes along each segment. Each respective movement was derived using an iterative approach that balances the inflows and outflows for each approach. The input values include the existing turning movement volumes and future year peak hour approach and departure volumes along each leg of the intersection. The future peak hour approach volumes were estimated by applying the existing peak hour factor (K-factor) and directional distributional percentage (D-factor) to the future ADT volumes along each approach. A more detailed description of the methodology used to forecast turning movement volumes is contained in the National Cooperative Highway Research Program (NCHRP) 255 Highway Traffic Data for Urbanized Area Project Planning and Design, Chapter 8. Figure 12 presents the resulting Year 2035 AM/PM peak hour daily traffic.

Based on the City of Santee comments that the proposed project generates additional traffic greater than the 2035 Forecasts. The increase is estimated to be 1,580 Daily, 199 AM peak hour trips and 66 PM peak hour trips. Since the project generates an additional 1,580 Daily, 199 AM peak hour traffic and 66 PM peak hour traffic. The additional traffic was distributed to the surrounding roadways and the Prospect Avenue /Graves Avenue intersection. Figure 14 presents the additional traffic to be added. The results are presented on Figure 15.



SANDAG Series 12
2035 Revenue Constrained
Highway Network
Forecasted Daily Volumes

CITY OF SANTEE

Model Run 4/02/15
2035 RC RP11
City of Santee GP Update
2035rc11prefA

Forecasted Volumes:

- \# Adjusted Volume
- \# Unadjusted Volume
- \# Traffic Analysis Zone

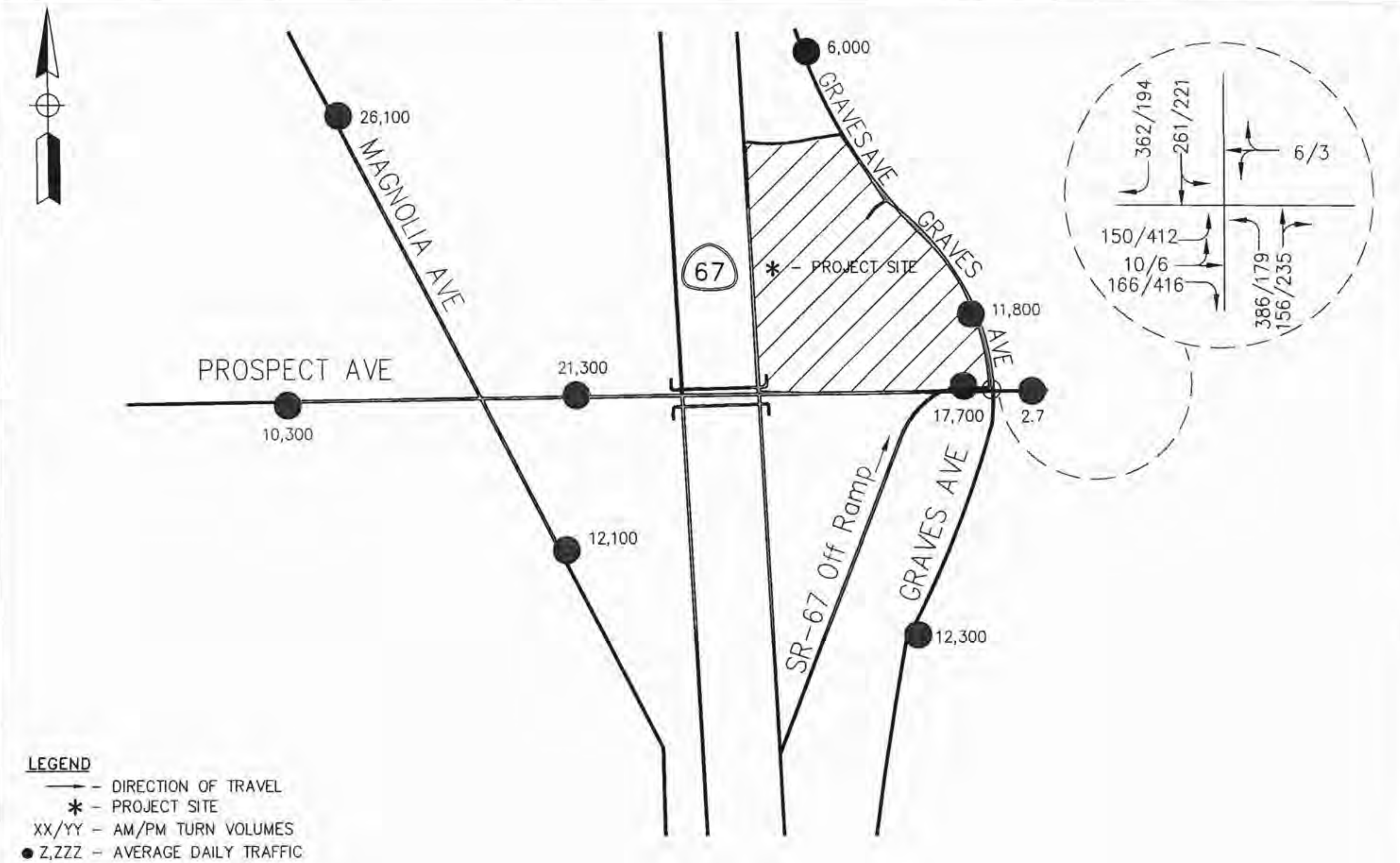
SANDAG

April 2, 2015

Darnell &ASSOCIATES, INC.

170104-CC.dwg 05-01-18 VLA

FIGURE 11
City of Santee 2035 Daily Traffic Volumes



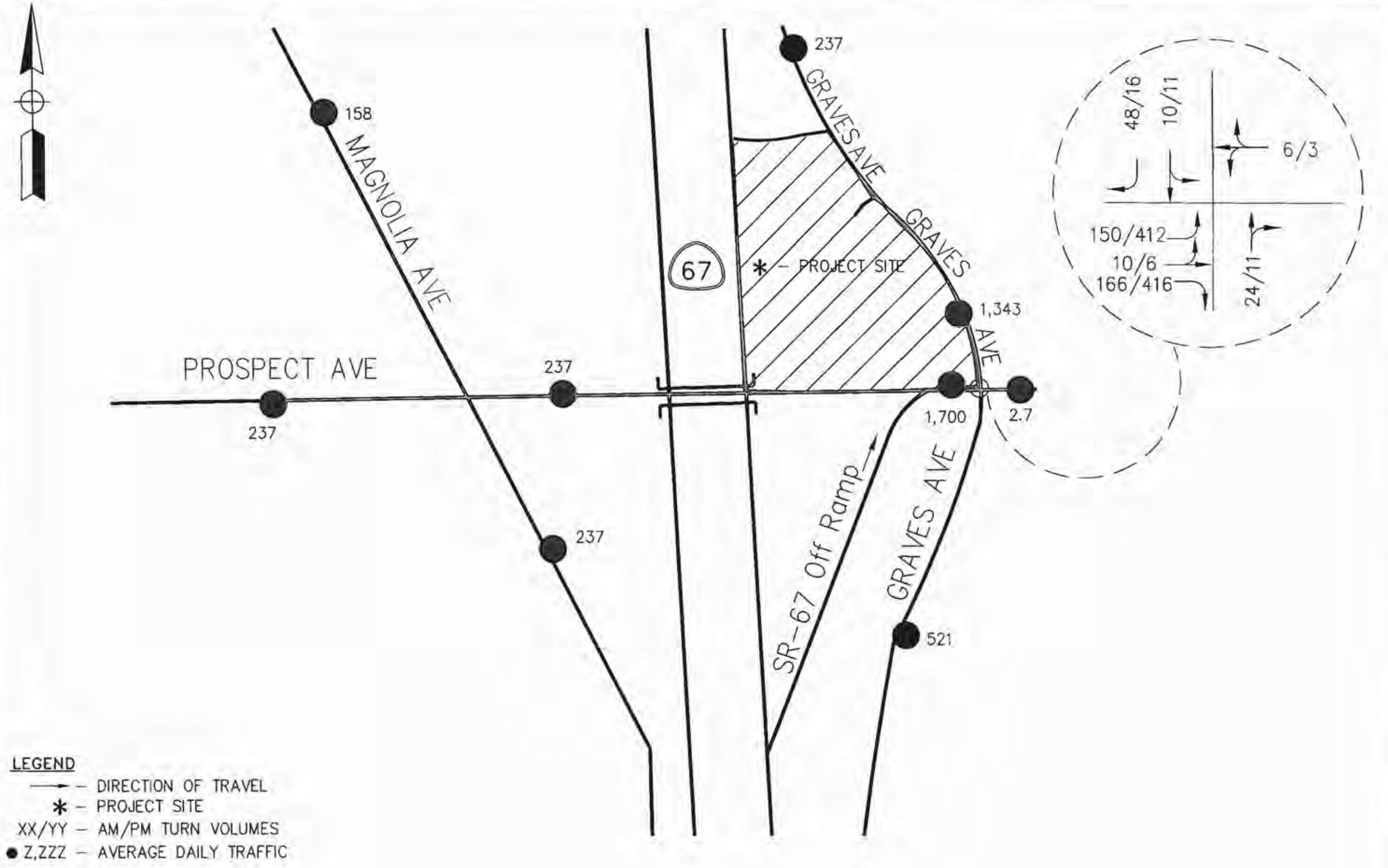
SOURCE; CITY OF SANTEE YEAR 2035 MOBILITY ELEMENT FORECASTS

Darnell & ASSOCIATES, INC.

170104DD.dwg 5-30-19 JAM

FIGURE 13

YEAR 2035 TRAFFIC VOLUMES



SOURCE; CITY OF SANTEE YEAR 2035 MOBILITY ELEMENT FORECASTS

Darnell & ASSOCIATES, INC.

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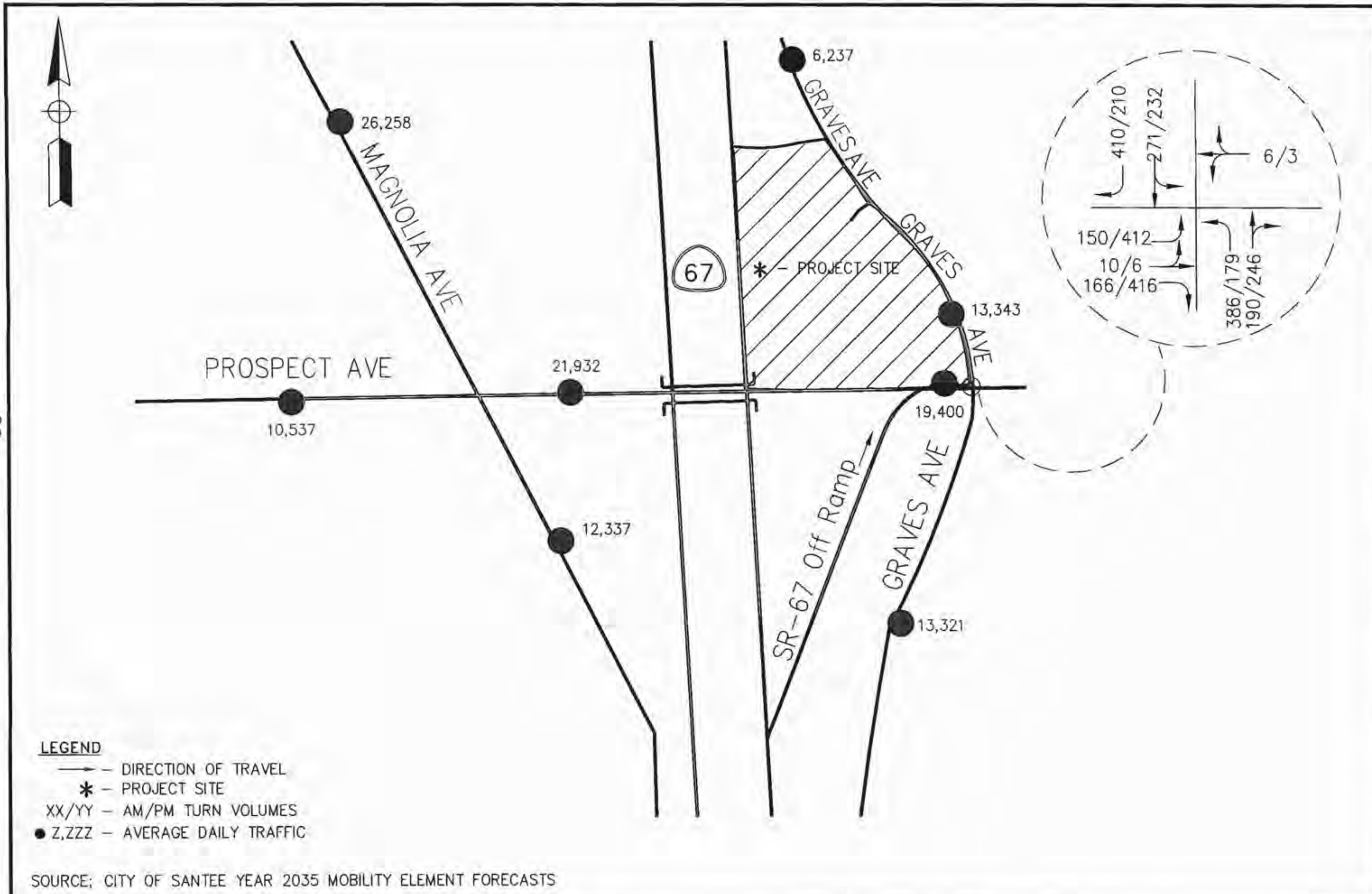
FIGURE 14

ADDITIONAL YEAR 2035 PROJECT TRAFFIC VOLUMES



Darnell & ASSOCIATES, INC.

170104DD.dwg 5-30-19 JAM

FIGURE 15

YEAR 2035 PLUS PROJECT TRAFFIC VOLUMES

The Year 2035 daily traffic volumes presented on Figure 15 were then analyzed and the results are presented on Table 16.

Table 16 – Year 2035 Roadway Segment Level of Service

Roadway Segment	Functional Classification	LOS E Capacity	Year 2035 Plus Project			
			ADT	V/C	LOS	Proj. Sign?
Graves Avenue						
North of Prospect Avenue	Residential 2 lanes	8,000	13,143	**1.64**	**F**	**Yes**
South of Prospect Avenue	Parkway 2 lanes	10,000	13,321	**1.33**	**F**	**Yes**

LOS=level of service; ADT=Average daily traffic; V/C=volume to capacity ratio, LOS E Capacity per City of Santee Levels of Service

Review of Table 16 shows Graves Avenue will operate at LOS F, based on the City of Santee Roadway Classifications. Therefore, the mitigation of the projects Year 2035 impacts are required.

The next step in the analysis process requires mitigation of the projects unacceptable LOS F on Graves Avenue north and south of Prospect Avenue. To mitigate the projects impacts, we analyzed Graves Avenue north and south of Prospect Avenue, based on the recommended channelization shown on Figure 11 to provide a continuous two-way left turn from north of the project driveway to approximately 840 feet south of Prospect Avenue. With this improvement the LOS E capacity of the roadway will be increased to 15,000 ADT. Table 17 was then prepared summarizing the results of the analysis.

Table 17 – Year 2035 Mitigated Level of Service

Roadway Segment	Class.	Existing Conditions				Mitigated Conditions					
		LOS E Capacity	ADT	V/C	LOS	Class.	LOS E Capacity	ADT	V/C	Δ V/C	LOS
Graves Avenue											
North of Prospect Avenue	Residential 2 lanes	8,000	13,143	**1.64**	**F**	Collector w/TWLTL	15,000	13,143	**0.876**	**-0.77**	**E**
South of Prospect Avenue	Parkway 2 lanes	10,000	13,321	**1.33**	**F**	Collector w/TWLTL	15,000	13,321	**0.874**	**-0.46**	**E**

LOS=level of service; ADT=Average daily traffic; V/C=volume to capacity ratio, Class. = Classification of Roadway, LOS E Capacity per City of Santee Levels of Service

Review of Table 17 shows the proposed improvements improve the Level of Service from LOS “F” to LOS “E” and provide mitigation of the project’s impacts.

The next step in the analysis involves the Year 2035 analysis of the Prospect Avenue/Graves Avenue intersection AM/PM peak hour conditions. For Year 2035 conditions, we analyzed the peak hour volumes based on the intersection improvements presented on Figure 11. The results of the analysis are presented on Table 18.

Table 18 – Year 2035 Intersection Operation Summary

Intersection	Traffic Control	Year 2035 Conditions				Project Sign.
		AM Peak		PM Peak		
		Delay sec/veh	LOS	Delay sec/veh	LOS	
Graves Ave. at Prospect Ave.	Signalized	29.3	C	31.0	C	No

Delay is measured in seconds per vehicle; LOS=level of service; Delay and LOS calculated using Synchro 8 (with HCS value) Sign = Significant, OWSC = One way stop control, DNE = Does Not Exist, sec/veh = Second per Vehicle. (b) Based on the intersection geometrics for Prospect Avenue at Graves Avenue presented on Figure 11.

Review of Table 18 shows that the addition of project traffic to the Prospect Avenue and Graves Avenue intersection will operate at LOS C in the AM and PM peak hour conditions for Year 2035 Conditions including the additional project traffic. Therefore, the project is not considered to have a significant direct impact on the Graves Avenue/ Prospect Avenue intersection.

~~In summary Graves Avenue south of Prospect Avenue will operate at LOS D based on the City of Santee 15,000 capacity of a 2-Lane Collector Street with a continuous left turn lane as identified on the City of Santee Mobility Element~~.

SECTION VI - PROJECT ACCESS & INTERNAL CIRCULATION

PROJECT ACCESS

The project proposes the development of a 4,467 square foot Convenience Market and an 1,800 square foot Coffee Shop with Drive Thru. The Project site is located on the northwest corner of the Graves Avenue/ Prospect Avenue intersection in the City of Santee.

Development of the project includes the improvement of the project frontage along Graves Avenue in accordance with the City of Santee requirements and the previously approved improvements for the Prospect Avenue/Graves Avenue intersection. Figure 11 presents these improvements. The improvements need to include the installation of a stop sign for traffic control at the project's driveway entering Graves Avenue.

ON-CITE CIRCULATION

Traffic enters the project site from a single access point near the north end of the project site. The access provides direct access to the drive-thru around the buildings and enters the parking lot adjacent to Graves Avenue.

The proposed circulation plan provides good circulation for customers parking and entering the two (2) facilities. It also reduces conflict between the drive thru uses and the customers parking. The Convenience Market and Coffee Shop with drive thru is designed to accommodate a minimum of nine (9) vehicles from the order pick up window with stacking for an additional three (3) vehicles before they reach the parking aisle at the project's driveway.

Based on our experience and reviews of other projects with Drive Thru Facilities the proposed Drive thru stacking was found satisfactory. In summary the proposed on-site circulation of the Convenience Market and Coffee Shop with Drive thru stacking was found satisfactory.

SECTION VII - MITIGATION

Graves Avenue north and south of Prospect Avenue will operate at LOS "F" for Opening Day 2018 Plus Project Conditions based on the daily capacity of the roadways. However, a review of the Opening Day 2018 Plus Project intersection Analysis shown on Table 12 shows each intersection will operate at LOS "D" or better. To further support the roadway will also operate at an acceptable condition, we prepared Figure 11 depicting the recommended striping and channelization that can be provided on Graves Avenue from north of the project to south of Prospect Avenue. The proposed improvements previously presented on Figure 11 include the previously approved Lantern Crest Improvements. The channelization shown on Figure 11 also depicts the recommended striping and channelization from the projects northern Graves Avenue boundary to 840 feet south of Prospect Avenue. The addition of the two-way left turn lane allows left turning vehicles to move out of the through lanes of traffic and increases the traffic flow and capacity of the roadway.

To further support the conclusion that the proposed improvements will improve the level of service on Graves Avenue south of Prospect Avenue, we used the Synchro Software to determine the AM and PM level of service for northbound and southbound on Graves Avenue between Prospect Avenue and Pepper Drive. The Synchro Software allows the analysis of the traffic volumes entering and exiting Graves Avenue to determine the level of service. Table 19 presents the results of the analysis. Review of Table 19 shows in the AM peak northbound traffic on Graves Avenue operates at LOS "C" and southbound traffic on Graves Avenue operates at LOS "B". In the afternoon PM peak Graves Avenue operates at LOS "C" for the northbound traffic flow towards Prospect Avenue and operates at LOS "B" for the southbound traffic flow towards Pepper Drive.

The arterial analysis process involves use of the Synchro 8 software to analysis the level of service of Graves Avenue roadways between Prospect Avenue and Pepper Street. Based on the traffic control at each intersection with the proposed improvements to the Prospect Avenue/Graves Avenue intersection. Review of Table 19 shows the speed, running time, travel time and arterial speeds of the roadway and calculates the level of service of the roadway.
The arterial analysis has analyzed the traffic volumes on Graves Avenue north of the project site to Pepper Drive. It evaluates the volumes on the roadway for each intersection controls to show the acceptable intersection Level of Service benefits the roadway segments. Whereas, the Daily capacity analysis does not consider the peak hour Level of Service.

To further support the adequacy of Graves Avenue south of Prospect Avenue the Horizon Year 2035 Traffic Forecasts were analyzed and found to operate at LOS D. This conclusion is supported by the Year 2035 Santee Mobility Element traffic forecasts for the area and interchange improvements at SR-67/Bradley Avenue that will reduce demands on Graves Avenue and Prospect Avenue.

In summary the arterial Level of Service supports the conclusion that Graves Avenue will operate at LOS "C" or better and will not require mitigation.

Table 19 – Existing Plus Project Graves Avenue from North of Prospect Avenue approximately to Pepper Drive Arterial Level of Service								
Arterial Level of Service: Northbound Graves Ave – AM Peak								
Cross Street	**Arterial Class**	**Flow Speed**	**Running Time**	**Signal Delay**	**Travel Time(s)**	**Dist (mi)**	**Arterial Speed**	**Arterial LOS**
Pepper Dr	III	35	14.2	0.0	14.2	0.11	26.7	B
Prospect Ave	III	35	49.8	22.2	72.0	0.41	20.7	C
Total	**III**		**64.0**	**22.2**	**86.2**	**0.52**	**21.7**	**C**
Arterial Level of Service: Southbound Graves Ave – AM Peak								
Cross Street	**Arterial Class**	**Flow Speed**	**Running Time**	**Signal Delay**	**Travel Time(s)**	**Dist (mi)**	**Arterial Speed**	**Arterial LOS**
Pepper Dr	III	35	48.6	45.0	93.6	0.41	15.6	D
Prospect Ave	III	35	49.8	0.0	49.8	0.41	30.0	B
Total	**III**		**98.4**	**45.0**	**143.4**	**0.82**	**20.6**	**C**
Arterial Level of Service: Northbound Graves Ave – PM Peak								
Cross Street	**Arterial Class**	**Flow Speed**	**Running Time**	**Signal Delay**	**Travel Time(s)**	**Dist (mi)**	**Arterial Speed**	**Arterial LOS**
Pepper Dr	III	35	14.2	7.7	21.9	0.11	17.3	D
Prospect Ave	III	35	49.8	21.2	71.0	0.41	21.0	C
Total	**III**		**64.0**	**28.9**	**92.9**	**0.52**	**20.1**	**C**
Arterial Level of Service: Southbound Graves Ave – PM Peak								
Cross Street	**Arterial Class**	**Flow Speed**	**Running Time**	**Signal Delay**	**Travel Time(s)**	**Dist (mi)**	**Arterial Speed**	**Arterial LOS**
Pepper Dr	III	35	48.6	37.7	86.3	0.41	16.9	D
Prospect Ave	III	35	49.8	8.4	58.	0.41	25.6	B
Total	**III**		**98.4**	**46.1**	**144.5**	**0.82**	**20.4**	**C**

SECTION VIII – SUMMARY AND SIGNIFICANCE OF IMPACTS

SUMMARY

- The project proposes the development of a 4,467 square foot Convenience Market and an 1,800 square foot Coffee Shop with Drive Thru. The Project site is located on the northwest corner of the Graves Avenue/ Prospect Avenue intersection in the City of Santee.

- The proposed project is estimated to 4,519 average weekday daily trips with 302 trips being generated during the morning peak hour and 453 trips being generated during the afternoon peak hour. Further review of Table 8 shows that the total cumulative trips with pass-by reductions the site will generate 3,615 Daily, 453 AM peak hour trips and 150 PM peak hour trips to be added to the surrounding roadways in the study area.

- Analysis of existing, existing plus project, 2018 Opening Day and 2018 Opening Day plus project conditions found the roadways analyzed would operate at LOS "C" or better except for Graves Avenue, which will operate at LOS "F" north and south of Prospect Avenue with additional of project traffic.

- Analysis of Opening Day 2018 plus project conditions at the three (3) study intersections found each intersection to operate at a LOS "C" or better with the addition of project traffic.

- Opening Day 2018 and Opening Day 2018 plus Project analysis of northbound SR-67 off-ramp at Prospect Avenue was prepared and it was concluded the vehicle queues would be accommodated and would not create an impact to the Caltrans SR-67 Northbound off-ramp and or the Eastbound Prospect Avenue at Graves Avenue.

- Analysis of the Year 2035 traffic volumes found the Prospect Avenue/Graves Avenue intersection to operate at LOS "C" with the recommended channelization improvements shown on Figure 11 and Graves Avenue north and south of Prospect Avenue improve for LOS "F" to LOS "E".

- On-site Circulation and vehicle stacking for the drive thru window was reviewed and found to be satisfactory.

- Improve the projects Graves Avenue frontage, to be consistent with the City of Santee requirements and provide the Graves Avenue/Prospect Avenue intersection improvements shown on the site plan and Figure 11 including the addition of the continuous Two-Way Left Turn Lane on Graves Avenue to increase the capacity of the Graves Avenue to 15,000 daily vehicles

- Stop sign control is recommended to be installed at the project's driveway entering Graves Avenue.

- Figure 11 was prepared to identify Prospect Avenue and Graves Avenue improvements to be constructed by the project. Graves Avenue improvements will mitigate the projects impacts. Constructions of the improvements shown on Figure 11 will adequally mitigate the projects impacts.

- The project will be required to obtain an Encroachment Permit from Caltrans to construct the Graves Avenue roadway and the Prospect Avenue/Graves Avenue traffic signal improvements presented in Appendix D.

- Arterial Level of Service Analysis for the AM and PM peak hour conditions was prepared and the results are presented on Table 15. Table 15 shows Graves Avenue will operate at LOS "C" or better in the AM and PM peak hours. Based on the arterial level of service analysis Northbound Graves Avenue will operate at LOS "C" in the AM and PM peak hours and Southbound Graves Avenue will operate at LOS "B" in the AM and PM peak hours. Therefore, mitigation of the daily level of service identified on Table 15 is not required.

SIGNIFICANCE OF IMPACTS

- Analysis of the intersections within the study area found each intersection to operate at LOS "D" or better. The analysis also concluded the project does not create any significant direct intersection impacts.

- Analysis of the roadway segments within the study area found each roadway to operate at LOS "D" or better except for Graves Avenue north and south of Prospect Avenue. However, analysis of the Year 2035 Conditions on Graves Avenue based on the City of Santee Mobility Element and restriping of Graves Avenue from north and south of the projects access to approximately 840 feet south of Prospect Avenue found Graves would ~~operate at an acceptable LOS D.~~ improve the LOS F to a LOE E

- The analysis of project vehicle queues on Prospect Avenue at the SR-67 Northbound off-ramp found the project would create a vehicle queuing impact at the SR-67 Northbound off-ramp.

APPENDIX A

Traffic Counts

Prepared by NDS/ATD

VOLUME

Magnolia Ave N/O Prospect Ave

Day: Thursday
Date: 3/2/2017

City: Santee
Project #: CA17_4056_001

DAILY TOTALS	NB	SB	EB	WB	Total
	17,031	11,435	0	0	28,466

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	34		30						64		12:00	261		180						441	
00:15	36		23						59		12:15	247		195						442	
00:30	25		22						47		12:30	249		184						433	
00:45	21	116	13	88					34	204	12:45	248	1005	166	725					414	1730
01:00	17		17						34		13:00	234		158						392	
01:15	14		17						31		13:15	266		149						415	
01:30	11		12						23		13:30	268		178						446	
01:45	7	49	9	55					16	104	13:45	293	1061	179	664					472	1725
02:00	12		13						25		14:00	268		210						478	
02:15	8		9						17		14:15	236		192						428	
02:30	10		7						17		14:30	308		205						513	
02:45	18	48	11	40					29	88	14:45	296	1108	219	826					515	1934
03:00	14		9						23		15:00	309		232						541	
03:15	13		10						23		15:15	283		203						486	
03:30	28		6						34		15:30	317		237						554	
03:45	25	80	7	32					32	112	15:45	315	1224	209	881					524	2105
04:00	25		7						32		16:00	330		224						554	
04:15	23		6						29		16:15	360		248						608	
04:30	36		22						58		16:30	336		218						554	
04:45	66	150	25	60					91	210	16:45	327	1353	225	915					552	2268
05:00	75		18						93		17:00	358		240						598	
05:15	99		27						126		17:15	329		233						562	
05:30	143		34						177		17:30	292		248						540	
05:45	185	502	54	133					239	635	17:45	307	1286	247	968					554	2254
06:00	167		54						221		18:00	267		212						479	
06:15	170		76						246		18:15	250		190						440	
06:30	235		73						308		18:30	221		189						410	
06:45	267	839	108	311					375	1150	18:45	196	934	165	756					361	1690
07:00	270		107						377		19:00	178		173						351	
07:15	325		171						496		19:15	167		135						302	
07:30	322		154						476		19:30	147		130						277	
07:45	383	1300	191	623					574	1923	19:45	171	663	192	630					363	1293
08:00	370		222						592		20:00	170		163						333	
08:15	294		158						452		20:15	155		159						314	
08:30	254		136						390		20:30	129		169						298	
08:45	259	1177	108	624					367	1801	20:45	124	578	150	641					274	1219
09:00	244		106						350		21:00	118		137						255	
09:15	226		122						348		21:15	119		107						226	
09:30	189		120						309		21:30	95		90						185	
09:45	220	879	134	482					354	1361	21:45	87	419	83	417					170	836
10:00	217		117						334		22:00	66		90						156	
10:15	183		121						304		22:15	76		67						143	
10:30	205		126						331		22:30	69		60						129	
10:45	230	835	134	498					364	1333	22:45	63	274	59	276					122	550
11:00	252		134						386		23:00	68		52						120	
11:15	230		148						378		23:15	40		36						76	
11:30	234		148						382		23:30	40		52						92	
11:45	250	966	173	603					423	1569	23:45	37	185	47	187					84	372
TOTALS		6941		3549						10490	TOTALS		10090		7886						17976
SPLIT %		66.2%		33.8%						36.9%	SPLIT %		56.1%		43.9%						63.1%

DAILY TOTALS	NB	SB	EB	WB	Total
	17,031	11,435	0	0	28,466

	NB	SB	EB	WB	TOTAL		NB	SB	EB	WB	TOTAL
AM Peak Hour	07:15	07:15			07:15	PM Peak Hour	16:15	17:00			16:15
AM Pk Volume	1400	738			2138	PM Pk Volume	1381	968			2312
Pk Hr Factor	0.914	0.831			0.903	Pk Hr Factor	0.959	0.976			0.951
7 - 9 Volume	2477	1247			3724	4 - 6 Volume	2639	1883			4522
7 - 9 Peak Hour	07:15	07:15			07:15	4 - 6 Peak Hour	16:15	17:00			16:15
7 - 9 Pk Volume	1400	738			2138	4 - 6 Pk Volume	1381	968			2312
Pk Hr Factor	0.914	0.831			0.903	Pk Hr Factor	0.959	0.976			0.951

Prepared by NDS/ATD

VOLUME

Prospect Ave W/O Magnolia Ave

Day: Thursday
Date: 3/2/2017

City: Santee
Project #: CA17_4056_002

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	4,509	4,723	9,232

AM Period	NB	SB	EB	EB (hr)	WB	WB (hr)	TOTAL	TOTAL (hr)	PM Period	NB	SB	EB	EB (hr)	WB	WB (hr)	TOTAL	TOTAL (hr)
00:00			4		5		9		12:00			76		77		153	
00:15			3		2		5		12:15			65		83		148	
00:30			3		3		6		12:30			80		65		145	
00:45			2	12	1	11	3	23	12:45			77	298	77	302	154	600
01:00			0		4		4		13:00			81		70		151	
01:15			0		1		1		13:15			64		67		131	
01:30			2		6		8		13:30			65		80		145	
01:45			0	2	2	13	2	15	13:45			81	291	85	302	166	593
02:00			0		3		3		14:00			74		83		157	
02:15			1		1		2		14:15			90		78		168	
02:30			3		1		4		14:30			102		66		168	
02:45			3	7	2	7	5	14	14:45			95	361	68	295	163	656
03:00			2		2		4		15:00			105		88		193	
03:15			3		2		5		15:15			112		82		194	
03:30			1		4		5		15:30			124		82		206	
03:45			1	7	1	9	2	16	15:45			118	459	87	339	205	798
04:00			2		3		5		16:00			113		81		194	
04:15			2		7		9		16:15			127		88		215	
04:30			3		3		6		16:30			114		71		185	
04:45			3	10	13	26	16	36	16:45			99	453	82	322	181	775
05:00			7		17		24		17:00			139		54		193	
05:15			17		23		40		17:15			104		68		172	
05:30			8		38		46		17:30			100		76		176	
05:45			9	41	49	127	58	168	17:45			116	459	73	271	189	730
06:00			20		55		75		18:00			103		67		170	
06:15			31		90		121		18:15			103		41		144	
06:30			34		94		128		18:30			67		37		104	
06:45			33	118	160	399	193	517	18:45			62	335	37	182	99	517
07:00			34		107		141		19:00			64		48		112	
07:15			47		137		184		19:15			50		33		83	
07:30			47		129		176		19:30			39		23		62	
07:45			48	176	163	536	211	712	19:45			44	197	43	147	87	344
08:00			60		114		174		20:00			49		31		80	
08:15			64		94		158		20:15			36		25		61	
08:30			43		81		124		20:30			55		30		85	
08:45			55	222	76	365	131	587	20:45			29	169	14	100	43	269
09:00			41		70		111		21:00			24		17		41	
09:15			52		79		131		21:15			23		24		47	
09:30			46		66		112		21:30			18		4		22	
09:45			57	196	77	292	134	488	21:45			22	87	17	62	39	149
10:00			49		66		115		22:00			18		11		29	
10:15			67		72		139		22:15			4		6		10	
10:30			65		68		133		22:30			18		3		21	
10:45			69	250	85	291	154	541	22:45			8	48	13	33	21	81
11:00			81		76		157		23:00			9		5		14	
11:15			71		53		124		23:15			6		4		10	
11:30			69		82		151		23:30			6		8		14	
11:45			66	287	57	268	123	555	23:45			3	24	7	24	10	48
TOTALS				1328		2344		3672	TOTALS				[illegible]		2379		5560
SPLIT %				36.2%		63.8%		39.8%	SPLIT %				[illegible]		42.8%		60.2%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	4,509	4,723	9,232

	NB	SB	EB	WB	Total		NB	SB	EB	WB	Total
AM Peak Hour			10:45	07:15	07:15	PM Peak Hour			15:30	[illegible]	[illegible]
AM Pk Volume			290	543	745	PM Pk Volume			482	[illegible]	[illegible]
Pk Hr Factor			0.895	0.833	0.883	Pk Hr Factor			[illegible]	[illegible]	[illegible]
7 - 9 Volume			398	901	1299	4 - 6 Volume			912	[illegible]	[illegible]
7 - 9 Peak Hour			08:00	07:15	07:15	4 - 6 Peak Hour			16:15	16:00	[illegible]
7 - 9 Pk Volume			222	543	745	4 - 6 Pk Volume			479	322	775
Pk Hr Factor			0.867	0.833	0.883	Pk Hr Factor			0.852	0.915	[illegible]

Prepared by NDS/ATD

VOLUME

Magnolia Ave S/O Prospect Ave

Day: Thursday
Date: 3/2/2017

City: Santee
Project #: CA17_4056_003

DAILY TOTALS	NB	SB	EB	WB	Total
	5,222	6,997	0	0	12,219

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	13		21						34		12:00	87		111						198	
00:15	19		13						32		12:15	101		133						234	
00:30	2		6						8		12:30	114		136						250	
00:45	5	39	7	47					12	86	12:45	109	411	111	491					220	902
01:00	4		11						15		13:00	100		128						228	
01:15	6		9						15		13:15	89		110						199	
01:30	4		9						13		13:30	78		113						191	
01:45	2	16	2	31					4	47	13:45	88	355	110	461					198	816
02:00	4		8						12		14:00	94		106						200	
02:15	3		3						6		14:15	97		123						220	
02:30	7		8						15		14:30	112		132						244	
02:45	11	25	5	24					16	49	14:45	113	416	118	479					231	895
03:00	6		7						13		15:00	110		118						228	
03:15	5		9						14		15:15	111		116						227	
03:30	7		6						13		15:30	109		118						227	
03:45	3	21	8	30					11	51	15:45	110	440	101	453					211	893
04:00	2		2						4		16:00	112		96						208	
04:15	6		4						10		16:15	129		110						239	
04:30	5		20						25		16:30	112		122						234	
04:45	6	19	37	63					43	82	16:45	100	453	110	438					210	891
05:00	12		19						31		17:00	147		111						258	
05:15	22		34						56		17:15	110		116						226	
05:30	15		41						56		17:30	94		98						192	
05:45	27	76	62	156					89	232	17:45	96	447	128	453					224	900
06:00	26		62						88		18:00	90		92						182	
06:15	28		77						105		18:15	81		80						161	
06:30	32		83						115		18:30	66		73						139	
06:45	43	129	101	323					144	452	18:45	73	310	77	322					150	632
07:00	41		95						136		19:00	53		60						113	
07:15	33		112						145		19:15	58		57						115	
07:30	49		117						166		19:30	50		59						109	
07:45	60	183	145	469					205	652	19:45	44	205	91	267					135	472
08:00	71		149						220		20:00	60		101						161	
08:15	52		119						171		20:15	57		92						149	
08:30	59		99						158		20:30	53		94						147	
08:45	60	242	87	454					147	696	20:45	63	233	77	364					140	597
09:00	62		85						147		21:00	44		80						124	
09:15	57		103						160		21:15	43		65						108	
09:30	55		96						151		21:30	28		40						68	
09:45	61	235	115	399					176	634	21:45	40	155	39	224					79	379
10:00	60		89						149		22:00	30		40						70	
10:15	58		83						141		22:15	27		34						61	
10:30	74		91						165		22:30	26		32						58	
10:45	78	270	99	362					177	632	22:45	22	105	35	141					57	246
11:00	90		94						184		23:00	27		41						68	
11:15	84		116						200		23:15	16		23						39	
11:30	92		106						198		23:30	10		35						45	
11:45	92	358	100	416					192	774	23:45	26	79	31	130					57	209
TOTALS		1613		2774						4387	TOTALS		3609		4223						7832
SPLIT %		36.8%		63.2%						35.9%	SPLIT %		46.1%		53.9%						64.1%

DAILY TOTALS	NB	SB	EB	WB	Total
	5,222	6,997	0	0	12,219

	NB	SB	EB	WB	TOTAL		NB	SB	EB	WB	TOTAL
AM Peak Hour	11:45	07:30			11:45	PM Peak Hour	16:15	12:15			16:15
AM Pk Volume	394	530			874	PM Pk Volume	488	508			941
Pk Hr Factor	0.864	0.889			0.874	Pk Hr Factor	0.830	0.934			0.912
7 - 9 Volume	425	923			1348	4 - 6 Volume	900	891			1791
7 - 9 Peak Hour	07:45	07:30			07:30	4 - 6 Peak Hour	16:15	16:30			16:15
7 - 9 Pk Volume	242	530			762	4 - 6 Pk Volume	488	459			941
Pk Hr Factor	0.852	0.889			0.866	Pk Hr Factor	0.830	0.941			0.912

Prepared by NDS/ATD

VOLUME

Prospect Ave E/O Magnolia Ave

Day: Thursday
Date: 3/2/2017

City: Santee
Project #: CA17_4056_004

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	9,062	16,578	25,640

AM Period	NB		SB		EB		WB		TOTAL	
00:00					23		31		54	
00:15					15		24		39	
00:30					21		20		41	
00:45					12	71	15	90	27	161
01:00					13		14		27	
01:15					9		12		21	
01:30					11		17		28	
01:45					8	41	10	53	18	94
02:00					12		15		27	
02:15					8		16		24	
02:30					9		14		23	
02:45					5	34	9	54	14	88
03:00					3		12		15	
03:15					2		12		14	
03:30					1		23		24	
03:45					2	8	22	69	24	77
04:00					9		25		34	
04:15					11		23		34	
04:30					12		36		48	
04:45					14	46	82	166	96	212
05:00					11		86		97	
05:15					15		99		114	
05:30					12		169		181	
05:45					25	63	217	571	242	634
06:00					23		215		238	
06:15					32		234		266	
06:30					36		289		325	
06:45					45	136	375	1113	420	1249
07:00					61		323		384	
07:15					72		418		490	
07:30					95		410		505	
07:45					97	325	490	1641	587	1966
08:00					131		410		541	
08:15					104		324		428	
08:30					63		276		339	
08:45					75	373	263	1273	338	1646
09:00					77		217		294	
09:15					84		246		330	
09:30					65		206		271	
09:45					80	306	245	914	325	1220
10:00					77		210		287	
10:15					100		183		283	
10:30					96		203		299	
10:45					102	375	232	828	334	1203
11:00					106		214		320	
11:15					110		214		324	
11:30					94		220		314	
11:45					131	441	218	866	349	1307
TOTALS						2219		7638		9857
SPLIT %						22.5%		77.5%		38.4%

PM Period	NB		SB		EB		WB		TOTAL	
12:00					113		236		349	
12:15					119		244		363	
12:30					139		192		331	
12:45					121	492	222	894	343	1386
13:00					134		229		363	
13:15					122		231		353	
13:30					121		267		388	
13:45					136	513	282	1009	418	1522
14:00					178		250		428	
14:15					176		239		415	
14:30					168		251		419	
14:45					190	712	255	995	445	1707
15:00					218		271		489	
15:15					178		259		437	
15:30					222		265		487	
15:45					215	833	280	1075	495	1908
16:00					211		257		468	
16:15					237		323		560	
16:30					208		275		483	
16:45					213	869	316	1171	529	2040
17:00					248		246		494	
17:15					215		289		504	
17:30					252		268		520	
17:45					261	976	305	1108	566	2084
18:00					215		232		447	
18:15					212		228		440	
18:30					195		212		407	
18:45					148	770	178	850	326	1620
19:00					172		170		342	
19:15					133		150		283	
19:30					130		146		276	
19:45					139	574	173	639	312	1213
20:00					116		139		255	
20:15					114		129		243	
20:30					126		102		228	
20:45					115	471	88	458	203	929
21:00					91		100		191	
21:15					72		102		174	
21:30					69		73		142	
21:45					77	309	80	355	157	664
22:00					76		56		132	
22:15					43		61		104	
22:30					48		42		90	
22:45					35	202	60	219	95	421
23:00					31		58		89	
23:15					35		34		69	
23:30					26		46		72	
23:45					30	122	29	167	59	289
TOTALS						6843		8940		15783
SPLIT %						43.4%		56.6%		61.6%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	9,062	16,578	25,640

	EB	WB	TOTAL		EB	WB	TOTAL
AM Peak Hour	11:45	07:15	07:15	PM Peak Hour	17:00	16:00	17:00
AM Pk Volume	502	1728	2123	PM Pk Volume	976	1171	2084
Pk Hr Factor	0.903	0.882	0.904	Pk Hr Factor	0.935	0.906	0.920
7 - 9 Volume	698	2914	3612	4 - 6 Volume	1845	2279	4124
7 - 9 Peak Hour	07:30	07:15	07:15	4 - 6 Peak Hour	17:00	16:00	17:00
7 - 9 Pk Volume	427	1728	2123	4 - 6 Pk Volume	976	1171	2084
Pk Hr Factor	0.815	0.882	0.904	Pk Hr Factor	0.935	0.906	0.920

Prepared by NDS/ATD

VOLUME

Graves Ave S/O Prospect Ave

Day: Thursday
Date: 3/2/2017

City: Santee
Project #: CA17_4056_006

DAILY TOTALS	NB	SB	EB	WB	Total
	6,440	7,664	0	0	14,104

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	9		32				41		12:00	91		95				186	
00:15	7		20				27		12:15	91		91				182	
00:30	9		25				34		12:30	85		122				207	
00:45	6	31	16	93			22	124	12:45	93	360	97	405			190	765
01:00	6		18				24		13:00	95		109				204	
01:15	4		12				16		13:15	77		97				174	
01:30	4		10				14		13:30	97		115				212	
01:45	6	20	12	52			18	72	13:45	105	374	116	437			221	811
02:00	2		13				15		14:00	80		152				232	
02:15	6		15				21		14:15	93		145				238	
02:30	3		9				12		14:30	97		136				233	
02:45	5	16	5	42			10	58	14:45	102	372	170	603			272	975
03:00	3		7				10		15:00	102		178				280	
03:15	8		5				13		15:15	114		164				278	
03:30	8		12				20		15:30	106		186				292	
03:45	16	35	6	30			22	65	15:45	116	438	191	719			307	1157
04:00	13		2				15		16:00	108		183				291	
04:15	15		9				24		16:15	126		200				326	
04:30	14		6				20		16:30	101		186				287	
04:45	29	71	4	21			33	92	16:45	94	429	183	752			277	1181
05:00	40		6				46		17:00	105		209				314	
05:15	44		10				54		17:15	101		168				269	
05:30	84		9				93		17:30	111		207				318	
05:45	85	253	12	37			97	290	17:45	115	432	203	787			318	1219
06:00	92		19				111		18:00	88		183				271	
06:15	86		33				119		18:15	88		150				238	
06:30	122		32				154		18:30	88		139				227	
06:45	138	438	36	120			174	558	18:45	55	319	111	583			166	902
07:00	107		52				159		19:00	65		125				190	
07:15	140		69				209		19:15	38		104				142	
07:30	152		86				238		19:30	61		105				166	
07:45	181	580	98	305			279	885	19:45	61	225	106	440			167	665
08:00	196		132				328		20:00	33		96				129	
08:15	135		105				240		20:15	32		103				135	
08:30	143		57				200		20:30	33		96				129	
08:45	109	583	59	353			168	936	20:45	25	123	89	384			114	507
09:00	96		65				161		21:00	31		76				107	
09:15	114		69				183		21:15	39		56				95	
09:30	104		54				158		21:30	32		48				80	
09:45	98	412	68	256			166	668	21:45	30	132	60	240			90	372
10:00	85		56				141		22:00	21		65				86	
10:15	68		85				153		22:15	24		41				65	
10:30	73		77				150		22:30	21		46				67	
10:45	87	313	55	273			142	586	22:45	20	86	43	195			63	281
11:00	89		86				175		23:00	20		45				65	
11:15	84		93				177		23:15	24		49				73	
11:30	68		80				148		23:30	15		41				56	
11:45	91	332	102	361			193	693	23:45	7	66	41	176			48	242
TOTALS		3084		1943				5027	TOTALS		3356		5721				9077
SPLIT %		61.3%		38.7%				35.6%	SPLIT %		37.0%		63.0%				64.4%

DAILY TOTALS	NB	SB	EB	WB	Total
	6,440	7,664	0	0	14,104

	NB	SB	Total		NB	SB	Total
AM Peak Hour	07:15	07:30	07:30	PM Peak Hour	15:30	17:00	17:00
AM Pk Volume	669	421	1085	PM Pk Volume	456	787	1219
Pk Hr Factor	0.853	0.797	0.827	Pk Hr Factor	0.905	0.941	0.958
7 - 9 Volume	1163	658	1821	4 - 6 Volume	861	1539	2400
7 - 9 Peak Hour	07:15	07:30	07:30	4 - 6 Peak Hour	17:00	17:00	17:00
7 - 9 Pk Volume	669	421	1085	4 - 6 Pk Volume	432	787	1219
Pk Hr Factor	0.853	0.797	0.827	Pk Hr Factor	0.939	0.941	0.958

Prepared by NDS/ATD

VOLUME

Graves Ave N/O Prospect Ave

Day: Thursday
Date: 3/2/2017

City: Santee
Project #: CA17_4056_007

DAILY TOTALS	NB	SB	EB	WB	Total
	3,308	3,308	0	0	6,616

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	9		5				14		12:00	44		45				89	
00:15	7		1				8		12:15	32		39				71	
00:30	8		2				10		12:30	53		37				90	
00:45	1	25	2	10			3	35	12:45	38	167	33	154			71	321
01:00	3		2				5		13:00	42		38				80	
01:15	4		3				7		13:15	45		48				93	
01:30	3		4				7		13:30	39		60				99	
01:45	2	12	2	11			4	23	13:45	54	180	60	206			114	386
02:00	5		1				6		14:00	48		57				105	
02:15	11		2				13		14:15	58		36				94	
02:30	1		1				2		14:30	77		51				128	
02:45	6	23	1	5			7	28	14:45	68	251	54	198			122	449
03:00	1		2				3		15:00	76		57				133	
03:15	1		4				5		15:15	68		42				110	
03:30	3		4				7		15:30	65		46				111	
03:45	1	6	12	22			13	28	15:45	73	282	44	189			117	471
04:00	1		2				3		16:00	70		46				116	
04:15	1		7				8		16:15	72		62				134	
04:30	2		12				14		16:30	58		45				103	
04:45	2	6	25	46			27	52	16:45	62	262	51	204			113	466
05:00	2		16				18		17:00	85		52				137	
05:15	1		19				20		17:15	79		56				135	
05:30	9		36				45		17:30	107		49				156	
05:45	10	22	38	109			48	131	17:45	88	359	56	213			144	572
06:00	13		48				61		18:00	86		46				132	
06:15	6		56				62		18:15	91		35				126	
06:30	10		66				76		18:30	93		47				140	
06:45	11	40	75	245			86	285	18:45	67	337	34	162			101	499
07:00	18		97				115		19:00	66		32				98	
07:15	21		112				133		19:15	64		27				91	
07:30	29		92				121		19:30	44		25				69	
07:45	33	101	102	403			135	504	19:45	52	226	20	104			72	330
08:00	45		90				135		20:00	44		20				64	
08:15	41		59				100		20:15	56		21				77	
08:30	32		48				80		20:30	55		20				75	
08:45	36	154	57	254			93	408	20:45	52	207	23	84			75	291
09:00	25		50				75		21:00	40		28				68	
09:15	25		43				68		21:15	37		22				59	
09:30	31		47				78		21:30	35		18				53	
09:45	24	105	47	187			71	292	21:45	37	149	13	81			50	230
10:00	27		38				65		22:00	20		10				30	
10:15	35		36				71		22:15	24		15				39	
10:30	31		43				74		22:30	16		12				28	
10:45	35	128	45	162			80	290	22:45	11	71	9	46			20	117
11:00	31		37				68		23:00	14		11				25	
11:15	31		39				70		23:15	17		13				30	
11:30	29		39				68		23:30	17		17				34	
11:45	43	134	46	161			89	295	23:45	13	61	11	52			24	113
TOTALS		756		1615				2371	TOTALS		2552		1693				4245
SPLIT %		31.9%		68.1%				35.8%	SPLIT %		60.1%		39.9%				64.2%

DAILY TOTALS	NB	SB	EB	WB	Total
	3,308	3,308	0	0	6,616

	NB	SB	EB	WB	TOTAL		NB	SB	EB	WB	TOTAL
AM Peak Hour	11:45	07:00			07:15	PM Peak Hour	17:30	13:15			17:00
AM Pk Volume	172	403			524	PM Pk Volume	372	225			572
Pk Hr Factor	0.811	0.900			0.970	Pk Hr Factor	0.869	0.938			0.917
7 - 9 Volume	255	657			912	4 - 6 Volume	621	417			1038
7 - 9 Peak Hour	08:00	07:00			07:15	4 - 6 Peak Hour	17:00	17:00			17:00
7 - 9 Pk Volume	154	403			524	4 - 6 Pk Volume	359	213			572
Pk Hr Factor	0.856	0.900			0.970	Pk Hr Factor	0.839	0.951			0.917

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-001 **Day:** Thursday

City: Santee **Date:** 3/2/2017

AM

NS/EW Streets:	Magnolia Ave			Magnolia Ave			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	2	2	1	2	1	1	1	2	2	
7:00 AM	5	27	4	43	50	19	13	13	13	20	77	227	511
7:15 AM	2	36	4	53	84	28	14	16	10	25	115	278	665
7:30 AM	3	31	7	62	77	21	18	24	9	27	107	269	655
7:45 AM	5	55	8	72	92	25	11	17	13	43	127	327	795
8:00 AM	10	45	10	95	89	26	25	27	11	41	80	287	746
8:15 AM	8	44	6	78	73	17	22	19	14	33	65	228	607
8:30 AM	11	42	5	48	64	18	17	11	16	15	59	201	507
8:45 AM	7	48	7	48	55	11	13	17	19	17	54	193	489

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	51	328	51	499	584	165	133	144	105	221	684	2010	4975
APPROACH %'s :	11.86%	76.28%	11.86%	39.98%	46.79%	13.22%	34.82%	37.70%	27.49%	7.58%	23.46%	68.95%	

PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL. :	20	167	29	282	342	100	68	84	43	136	429	1161	2861
PEAK HR FACTOR :		0.794			0.862			0.779			0.898		0.900

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
0	0		
0	0		
0	0		
0	0		
1	0		
0	0		
1	0		
0	1		

NB	SB	EB	WB
2	1	0	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-001 **Day:** Thursday

City: Santee **Date:** 3/2/2017

PM

NS/EW Streets:	Magnolia Ave			Magnolia Ave			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	2	2	1	2	1	1	1	2	2	
4:00 PM	2	96	15	143	70	18	31	52	18	12	53	195	705
4:15 PM	6	99	17	144	76	19	28	77	16	11	71	239	803
4:30 PM	3	88	28	128	84	11	35	49	21	17	51	211	726
4:45 PM	14	71	15	132	74	9	21	66	20	15	64	237	738
5:00 PM	8	121	18	160	82	5	40	71	22	14	37	192	770
5:15 PM	5	81	24	131	81	9	36	58	11	17	54	219	726
5:30 PM	4	62	27	171	77	11	26	57	8	15	56	195	709
5:45 PM	4	68	24	156	81	9	23	78	19	25	60	225	772
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	46	686	168	1165	625	91	240	508	135	126	446	1713	5949
APPROACH %'s :	5.11%	76.22%	18.67%	61.94%	33.23%	4.84%	27.18%	57.53%	15.29%	5.51%	19.52%	74.97%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	33	379	78	564	326	44	124	253	79	57	283	879	3037
PEAK HR FACTOR :		0.830			0.936			0.875			0.900		0.946

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
0	0	0	
0	0	0	
0	1	0	
1	0	0	
0	0	1	
0	0	1	
0	0	0	
0	0	0	
NB	SB	EB	WB
1	1	2	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-001 **Day:** Thursday

City: Santee **Date:** 3/2/2017

NOON

NS/EW Streets:	Magnolia Ave			Magnolia Ave			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	2	2	1	2	1	1	1	2	2	

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	0 AM												TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :		0.000			0.000			0.000			0.000		0.000

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB

NB	SB	EB	WB
0	0	0	0

ITM Peak Hour Summary

Prepared by:

NDS

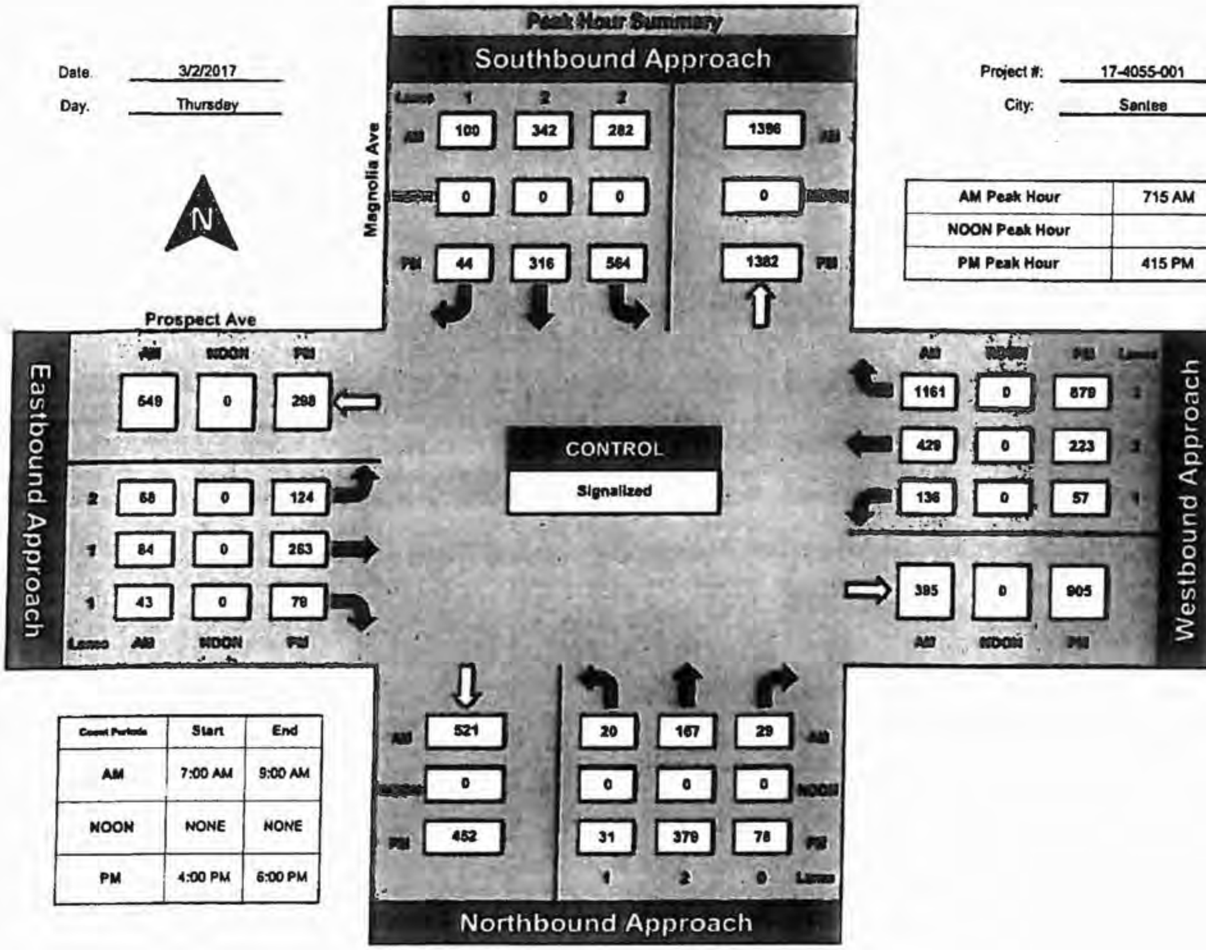
National Data & Surveying Services

Magnolia Ave and Prospect Ave , Santee

Date.	3/2/2017
Day.	Thursday

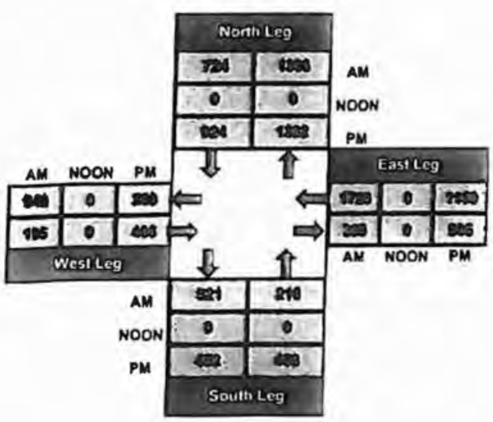
Project #:	17-4055-001
City:	Santee

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	415 PM

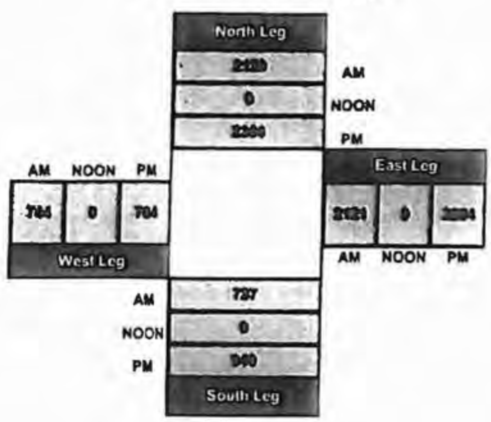


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-002 **Day:** Thursday

City: Santee **Date:** 3/2/2017

AM

NS/EW Streets:	Graves Ave			Graves Ave			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	1	0	0	1	1	1.5	0.5	1	1	0.5	0.5	
7:00 AM	99	3	0	0	8	88	18	2	49	0	1	0	268
7:15 AM	137	5	0	0	9	101	13	2	54	0	0	0	321
7:30 AM	150	3	1	0	11	91	29	4	76	0	0	0	365
7:45 AM	175	3	1	0	17	95	31	5	78	0	3	0	408
8:00 AM	188	10	1	0	26	68	33	2	108	0	2	0	438
8:15 AM	119	15	1	0	17	57	31	3	87	0	2	0	332
8:30 AM	126	12	3	0	7	42	22	5	51	3	1	0	272
8:45 AM	107	3	1	0	6	55	32	4	51	1	2	0	262
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	1101	54	8	0	102	597	209	27	554	4	11	0	2666
APPROACH %'s :	94.67%	4.64%	0.69%	0.00%	14.47%	85.53%	26.46%	3.42%	70.13%	26.67%	73.33%	0.00%	
PEAK HR START TIME :	730 AM												TOTAL
PEAK HR VOL :	632	31	4	0	71	311	124	14	349	0	7	0	1543
PEAK HR FACTOR :		0.839			0.853			0.851			0.583		0.881

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
0	0	0	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-002 | **Day:** Thursday

City: Santee | **Date:** 3/2/2017

PM

NS/EW Streets:	Graves Ave			Graves Ave			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES.	2	1	0	0	1	1	1.5	0.5	1	1	0.5	0.5	
4:00 PM	104	8	0	0	5	41	62	2	177	1	1	0	401
4:15 PM	111	10	1	0	11	54	69	4	194	0	6	0	460
4:30 PM	93	10	2	0	9	41	49	2	172	1	5	0	384
4:45 PM	90	4	0	0	10	44	63	1	177	0	2	0	391
5:00 PM	82	10	2	0	12	37	79	1	188	4	3	0	418
5:15 PM	92	18	0	0	10	49	72	4	164	0	1	0	410
5:30 PM	97	11	1	0	9	39	95	5	188	0	4	0	449
5:45 PM	105	11	0	0	12	50	93	1	192	0	1	0	465
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	774	82	6	0	78	355	582	20	1452	6	23	0	3378
APPROACH %'s :	89.79%	9.51%	0.70%	0.00%	18.01%	81.99%	28.33%	0.97%	70.69%	20.69%	79.31%	0.00%	
PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	376	50	3	0	43	175	339	11	732	4	9	0	1742
PEAK HR FACTOR :	0.925			0.879			0.939			0.464			0.937

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
0	0	0	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-002 **Day:** Thursday

City: Santee **Date:** 3/2/2017

NOON

NS/EW Streets:	Graves Ave			Graves Ave			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	1	0	0	1	1	1.5	0.5	1	1	0.5	0.5	

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	0 AM												TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :		0.000			0.000			0.000			0.000		0.000

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

ITM Peak Hour Summary

Prepared by:

NDS

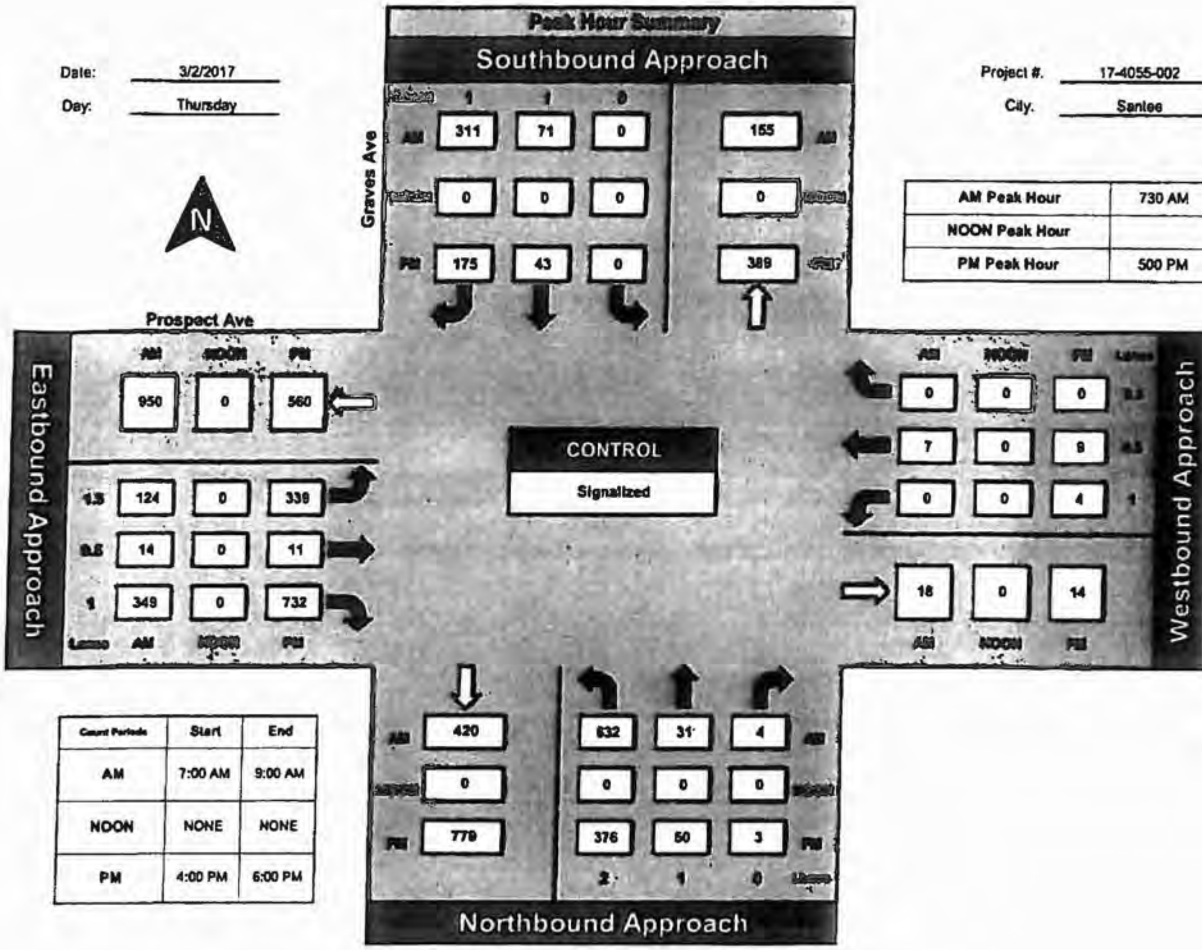
National Data & Surveying Services

Graves Ave and Prospect Ave , Santee

Date:	3/2/2017
Day:	Thursday

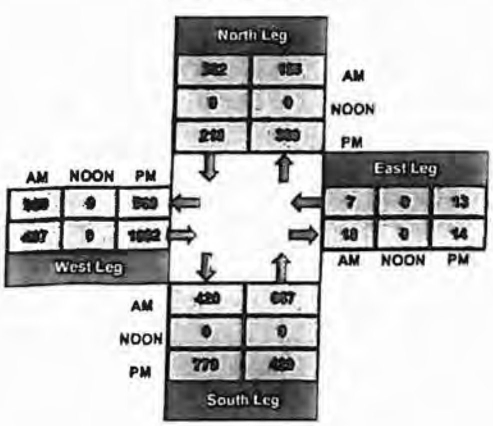
Project #.	17-4055-002
City.	Santee

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	500 PM

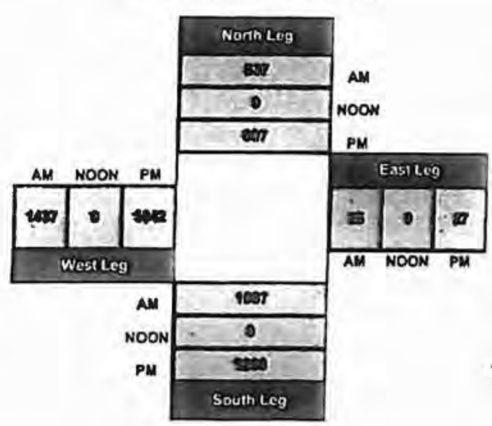


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-003 **Day:** Thursday

City: Santee **Date:** 3/2/2017

AM

NS/EW Streets:	SR-67 SB Off Ramp			SR-67 SB Off Ramp			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	0	1	0	0	0	0	2	0	0	2	0	
7:00 AM	128	0	6	0	0	0	0	62	0	0	194	0	390
7:15 AM	183	0	6	0	0	0	0	65	0	0	235	0	489
7:30 AM	178	0	11	0	0	0	0	97	0	0	235	0	521
7:45 AM	206	0	13	0	0	0	0	100	0	0	281	0	600
8:00 AM	164	0	33	0	0	0	0	130	0	0	247	0	554
8:15 AM	157	0	19	0	0	0	0	105	0	0	171	0	452
8:30 AM	93	0	12	0	0	0	0	63	0	0	176	0	344
8:45 AM	101	0	12	0	0	0	0	75	0	0	164	0	352

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	1210	0	92	0	0	0	0	697	0	0	1703	0	3702
APPROACH %'s :	92.93%	0.00%	7.07%	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	100.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR START TIME :	7:15 AM												TOTAL
PEAK HR VOL :	731	0	63	0	0	0	0	392	0	0	[illegible]	0	2184
PEAK HR FACTOR :	0.894			0.000			0.754			[illegible]			0.910

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
0	0	0	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-003 | **Day:** Thursday

City: Santee | **Date:** 3/2/2017

PM

NS/EW Streets:	SR-67 NB Off Ramp			SR-67 SB Off Ramp			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	0	1	0	0	0	0	2	0	0	2	0	
4:00 PM	117	0	21	0	0	0	0	214	0	0	148	0	500
4:15 PM	158	0	33	0	0	0	0	234	0	0	164	0	589
4:30 PM	139	0	16	0	0	0	0	212	0	0	144	0	511
4:45 PM	171	0	24	0	0	0	0	213	0	0	137	0	545
5:00 PM	136	0	25	0	0	0	0	243	0	0	115	0	520
5:15 PM	136	0	26	0	0	0	0	220	0	0	148	0	530
5:30 PM	142	0	35	0	0	0	0	249	0	0	139	0	565
5:45 PM	134	0	24	0	0	0	0	265	0	0	162	0	585

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	1133	0	204	0	0	0	0	1850	0	0	1158	0	4345
APPROACH %'s :	84.74%	0.00%	15.26%	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	100.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR START TIME :	[illegible] PM												TOTAL
PEAK HR VOL. :	548	0	110	0	0	0	0	977	0	0	585	0	2200
PEAK HR FACTOR :		0.829			0.000			0.922			0.872		0.940

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB

NB	SB	EB	WB
0	0	0	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4055-003 | **Day:** Thursday

City: Santee | **Date:** 3/2/2017

NOON

NS/EW Streets:	SR-67 NB Off Ramp			SR-67 NB Off Ramp			Prospect Ave			Prospect Ave			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	0	1	0	0	0	0	2	0	0	2	0	

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	0 AM												TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :		0.000			0.000			0.000			0.000		0.000

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
0	0	0	0

ITM Peak Hour Summary

Prepared by:

NDS

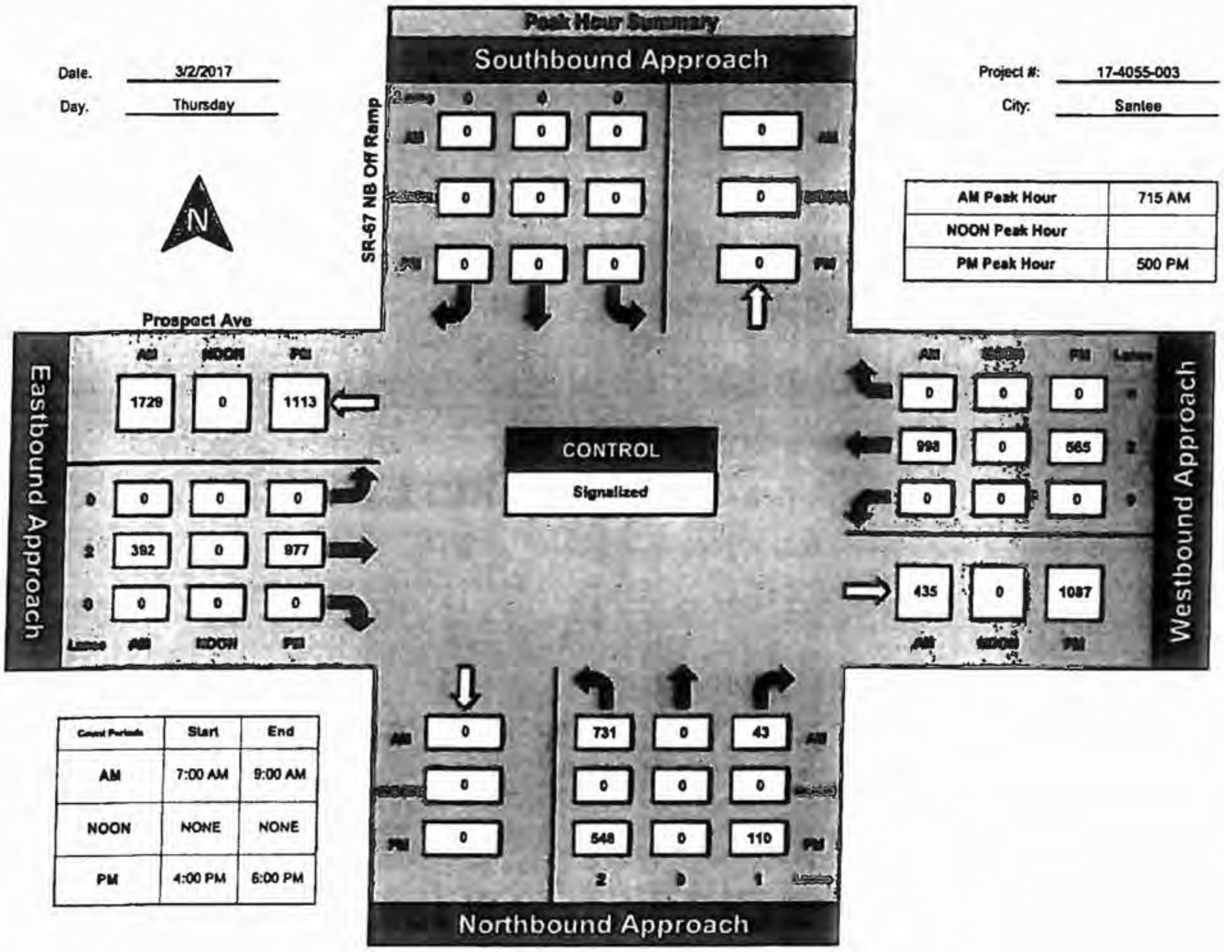
National Data & Surveying Services

SR-67 NB Off Ramp and Prospect Ave , Santee

Date.	3/2/2017
Day.	Thursday

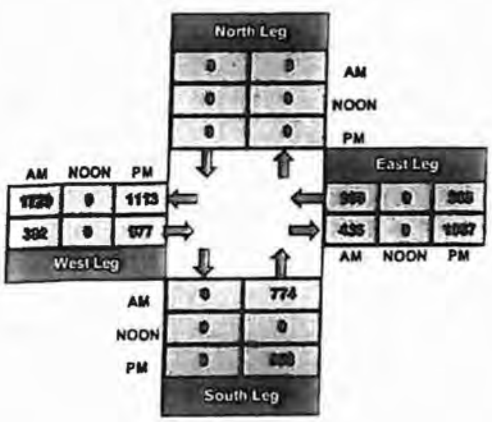
Project #:	17-4055-003
City:	Santee

AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	500 PM

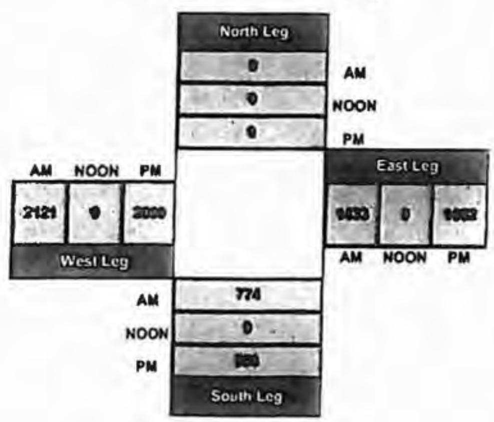


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



APPENDIX B

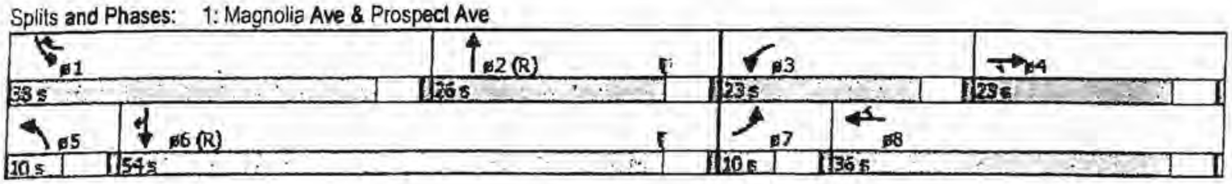
Existing Synchro Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Volume (vph)	68	84	43	136	429	1161	20	167	282	342	100
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2	1	6	
Permitted Phases			4			8					6
Detector Phase	7	4	4	3	8	1	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	23.0	23.0	9.0	23.0	9.0	9.0	23.0	9.0	23.0	23.0
Total Split (s)	10.0	23.0	23.0	23.0	36.0	38.0	10.0	26.0	38.0	54.0	54.0
Total Split (%)	9.1%	20.9%	20.9%	20.9%	32.7%	34.5%	9.1%	23.6%	34.5%	49.1%	49.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 42 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 1: Magnolia Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	68	84	43	136	429	1161	20	167	29	282	342	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.88	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	3539	2787	1770	3461		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	3539	2787	1770	3461		3433	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	76	93	48	151	477	1290	22	186	32	313	380	111
RTOR Reduction (vph)	0	0	43	0	0	280	0	10	0	0	0	51
Lane Group Flow (vph)	76	93	5	151	477	1010	22	208	0	313	380	60
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	6.6	11.6	11.6	15.8	20.8	45.5	3.3	37.9		24.7	59.3	59.3
Effective Green, g (s)	6.6	11.6	11.6	15.8	20.8	45.5	3.3	37.9		24.7	59.3	59.3
Actuated g/C Ratio	0.06	0.11	0.11	0.14	0.19	0.41	0.03	0.34		0.22	0.54	0.54
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	205	196	166	254	669	1279	53	1192		770	1907	853
v/s Ratio Prot	0.02	0.05		c0.09	0.13	c0.18	0.01	0.06		0.09	c0.11	
v/s Ratio Perm			0.00			0.19						0.04
v/c Ratio	0.37	0.47	0.03	0.59	0.71	0.79	0.42	0.17		0.41	0.20	0.07
Uniform Delay, d1	49.7	46.3	44.2	44.1	41.8	28.1	52.4	25.1		36.4	13.1	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	1.8	0.1	3.7	3.6	3.3	5.2	0.3		0.4	0.2	0.2
Delay (s)	50.8	48.1	44.2	47.8	45.4	31.4	57.6	25.5		36.7	13.3	12.3
Level of Service	D	D	D	D	D	C	E	C		D	B	B
Approach Delay (s)		48.2			36.2			28.4			22.3	
Approach LOS		D			D			C			C	

Intersection Summary

HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

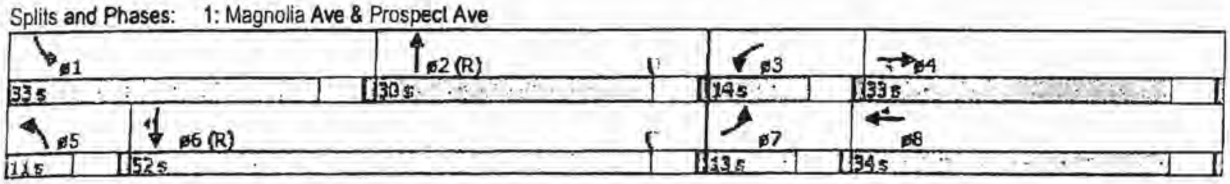
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Volume (vph)	124	263	79	57	223	879	31	379	564	316	44
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases			4			8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	23.0	23.0	9.0	23.0	23.0	9.0	23.0	9.0	23.0	23.0
Total Split (s)	13.0	33.0	33.0	14.0	34.0	34.0	11.0	30.0	33.0	52.0	52.0
Total Split (%)	11.8%	30.0%	30.0%	12.7%	30.9%	30.9%	10.0%	27.3%	30.0%	47.3%	47.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 1: Magnolia Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱	↰	↑↑	↱↱	↰	↑↱		↰↰	↑↑	↱
Volume (vph)	124	263	79	57	223	879	31	379	78	564	316	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.88	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	3539	2787	1770	3449		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	3539	2787	1770	3449		3433	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	131	277	83	60	235	925	33	399	82	594	333	46
RTOR Reduction (vph)	0	0	65	0	0	718	0	14	0	0	0	23
Lane Group Flow (vph)	131	277	18	60	235	207	33	467	0	594	333	23
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	8.7	23.3	23.3	7.3	21.9	21.9	4.4	35.6		23.8	55.0	55.0
Effective Green, g (s)	8.7	23.3	23.3	7.3	21.9	21.9	4.4	35.6		23.8	55.0	55.0
Actuated g/C Ratio	0.08	0.21	0.21	0.07	0.20	0.20	0.04	0.32		0.22	0.50	0.50
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	271	394	335	117	704	554	70	1116		742	1769	791
v/s Ratio Prot	c0.04	c0.15		0.03	0.07		0.02	c0.14		c0.17	0.09	
v/s Ratio Perm			0.01			0.07						0.01
v/c Ratio	0.48	0.70	0.05	0.51	0.33	0.37	0.47	0.42		0.80	0.19	0.03
Uniform Delay, d1	48.5	40.1	34.6	49.6	37.8	38.1	51.7	29.1		40.9	15.2	14.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	5.6	0.1	3.8	0.3	0.4	4.9	1.2		6.2	0.2	0.1
Delay (s)	49.9	45.8	34.6	53.4	38.1	38.5	56.6	30.3		47.0	15.4	14.0
Level of Service	D	D	C	D	D	D	E	C		D	B	B
Approach Delay (s)		45.0			39.2			32.0			34.7	
Approach LOS		D			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	62.9%	ICU Level of Service	B	
Analysis Period (min)	15			

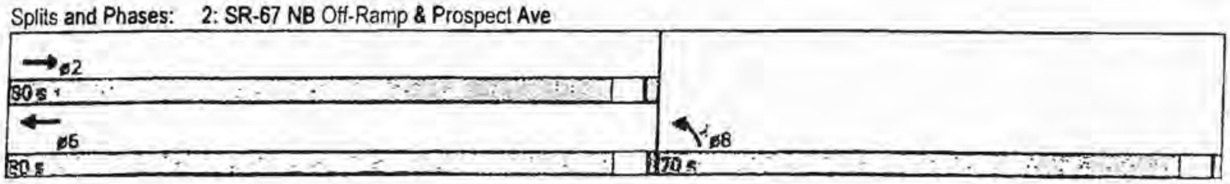
c Critical Lane Group

	→	←	↖	↗
Lane Group	EBT	WBT	NBL	NBR
Lane Configurations	↑↑	↑↑	↰↰	↱
Volume (vph)	392	998	731	43
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	13.0	10.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0
Total Split (s)	80.0	80.0	70.0	70.0
Total Split (%)	53.3%	53.3%	46.7%	46.7%
Yellow Time (s)	4.1	4.1	4.0	4.0
All-Red Time (s)	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	5.6	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	None	Min	Min

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 73.5
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰↰	↱
Volume (vph)	392	0	0	998	731	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			5.6	5.5	5.5
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	445	0	0	1134	831	49
RTOR Reduction (vph)	0	0	0	0	0	27
Lane Group Flow (vph)	445	0	0	1134	831	22
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	34.5			35.0	26.8	26.8
Effective Green, g (s)	34.5			35.0	26.8	26.8
Actuated g/C Ratio	0.47			0.48	0.37	0.37
Clearance Time (s)	6.1			5.6	5.5	5.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1674			1699	1262	581
v/s Ratio Prot	0.13			c0.32	c0.24	
v/s Ratio Perm						0.01
v/c Ratio	0.27			0.67	0.66	0.04
Uniform Delay, d1	11.6			14.5	19.2	14.8
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			1.0	1.3	0.0
Delay (s)	11.7			15.5	20.5	14.8
Level of Service	B			B	C	B
Approach Delay (s)	11.7			15.5	20.2	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	72.9	Sum of lost time (s)	11.6
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

	→	←	↖	↗
Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	445	1134	831	49
v/c Ratio	0.27	0.67	0.66	0.08
Control Delay	12.8	17.7	23.2	7.3
Queue Delay	0.0	0.1	0.0	0.0
Total Delay	12.8	17.8	23.2	7.3
Queue Length 50th (ft)	59	191	154	2
Queue Length 95th (ft)	112	328	270	24
Internal Link Dist (ft)	544	70	303	
Turn Bay Length (ft)				200
Base Capacity (vph)	3289	3297	2979	1380
Starvation Cap Reductn	0	1001	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.14	0.49	0.28	0.04

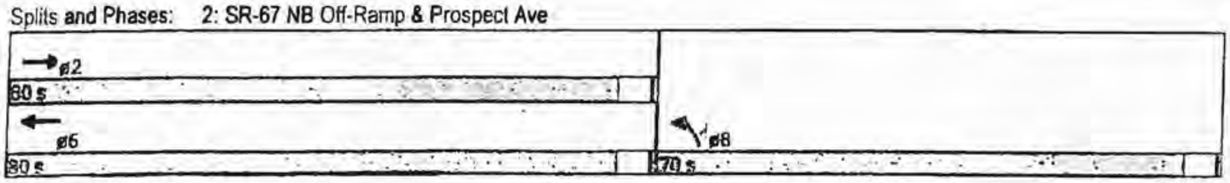
Intersection Summary

Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	977	565	548	110
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0	23.0	23.0	23.0
Total Split (s)	80.0	80.0	70.0	70.0
Total Split (%)	53.3%	53.3%	46.7%	46.7%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	None	Min	Min

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 53.7
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	977	0	0	565	548	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.0	5.0	5.0
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1039	0	0	601	583	117
RTOR Reduction (vph)	0	0	0	0	0	46
Lane Group Flow (vph)	1039	0	0	601	583	71
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	25.9			25.9	17.4	17.4
Effective Green, g (s)	25.9			25.9	17.4	17.4
Actuated g/C Ratio	0.49			0.49	0.33	0.33
Clearance Time (s)	5.0			5.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1719			1719	1120	516
v/s Ratio Prot	c0.29			0.17	c0.17	
v/s Ratio Perm						0.04
v/c Ratio	0.60			0.35	0.52	0.14
Uniform Delay, d1	10.0			8.5	14.6	12.7
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.6			0.1	0.4	0.1
Delay (s)	10.6			8.6	15.0	12.8
Level of Service	B			A	B	B
Approach Delay (s)	10.6			8.6	14.6	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	53.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1039	601	583	117
v/c Ratio	0.61	0.35	0.52	0.21
Control Delay	12.3	9.6	17.4	8.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.3	9.7	17.4	8.6
Queue Length 50th (ft)	111	54	73	10
Queue Length 95th (ft)	209	108	143	46
Internal Link Dist (ft)	544	70	303	
Turn Bay Length (ft)				200
Base Capacity (vph)	3539	3539	3382	1560
Starvation Cap Reductn	0	1204	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.29	0.26	0.17	0.07

Intersection Summary

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	124	14	349	7	632	31	71	311
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	40.0	40.0	40.0	21.0	40.0	40.0	40.0	40.0
Total Split (s)	45.0	45.0	43.0	21.0	43.0	43.0	41.0	45.0
Total Split (%)	30.0%	30.0%	28.7%	14.0%	28.7%	28.7%	27.3%	30.0%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lag	Lag		Lead				Lag
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	None	None	Min	None	Min	Min	None	None

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 60.2
Natural Cycle: 145
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Graves Ave & Prospect Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	124	14	349	0	7	0	632	31	4	0	71	311
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	1.00			1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.98			1.00	0.85
Flt Protected	0.95	0.96	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1702	1583		1863		3433	1833			1863	1583
Flt Permitted	0.95	0.96	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1702	1583		1863		3433	1833			1863	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	138	16	388	0	8	0	702	34	4	0	79	346
RTOR Reduction (vph)	0	0	163	0	0	0	0	2	0	0	0	235
Lane Group Flow (vph)	77	77	225	0	8	0	702	36	0	0	79	111
Turn Type	Split	NA	pm+ov		NA		Split	NA			NA	pm+ov
Protected Phases	8	8	6	7	7		6	6			2	8
Permitted Phases			8									2
Actuated Green, G (s)	10.2	10.2	37.1		0.9		26.9	26.9			7.4	17.6
Effective Green, g (s)	10.2	10.2	37.1		0.9		26.9	26.9			7.4	17.6
Actuated g/C Ratio	0.16	0.16	0.58		0.01		0.42	0.42			0.12	0.28
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	267	271	917		26		1442	770			215	539
v/s Ratio Prot	c0.05	0.05	0.10		c0.00		c0.20	0.02			c0.04	0.03
v/s Ratio Perm			0.04									0.04
v/c Ratio	0.29	0.28	0.25		0.31		0.49	0.05			0.37	0.21
Uniform Delay, d1	23.7	23.7	6.6		31.2		13.5	11.0			26.1	17.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.6	0.6	0.2		2.4		0.3	0.0			1.4	0.2
Delay (s)	24.3	24.3	6.8		33.7		13.9	11.0			27.6	18.0
Level of Service	C	C	A		C		B	B			C	B
Approach Delay (s)		11.8			33.7			13.7			19.8	
Approach LOS		B			C			B			B	

Intersection Summary

HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	64.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

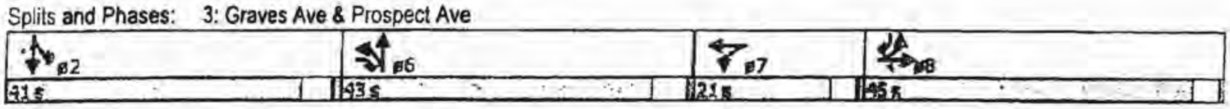
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	339	11	732	9	376	50	43	175
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	40.0	40.0	40.0	21.0	40.0	40.0	40.0	40.0
Total Split (s)	45.0	45.0	43.0	21.0	43.0	43.0	41.0	45.0
Total Split (%)	30.0%	30.0%	28.7%	14.0%	28.7%	28.7%	27.3%	30.0%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lag	Lag		Lead				Lag
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 60.4
Natural Cycle: 145
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	339	11	732	4	9	0	376	50	3	0	43	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	1.00			1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.99			1.00	0.85
Flt Protected	0.95	0.96	1.00		0.99		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1691	1583		1837		3433	1848			1863	1583
Flt Permitted	0.95	0.96	1.00		0.99		0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1691	1583		1837		3433	1848			1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	361	12	779	4	10	0	400	53	3	0	46	186
RTOR Reduction (vph)	0	0	290	0	0	0	0	1	0	0	0	129
Lane Group Flow (vph)	188	185	489	0	14	0	400	55	0	0	46	57
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA			NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	15.1	15.1	40.7		0.9		25.6	25.6			4.6	19.7
Effective Green, g (s)	15.1	15.1	40.7		0.9		25.6	25.6			4.6	19.7
Actuated g/C Ratio	0.23	0.23	0.63		0.01		0.40	0.40			0.07	0.30
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	391	394	994		25		1356	730			132	583
v/s Ratio Prot	0.11	0.11	c0.19		c0.01		0.12	0.03			c0.02	0.02
v/s Ratio Perm			0.11									0.01
v/c Ratio	0.48	0.47	0.49		0.56		0.29	0.08			0.35	0.10
Uniform Delay, d1	21.5	21.4	6.5		31.8		13.4	12.2			28.7	16.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.9	0.9	0.5		15.9		0.2	0.1			2.1	0.1
Delay (s)	22.4	22.3	7.0		47.7		13.6	12.3			30.8	16.2
Level of Service	C	C	A		D		B	B			C	B
Approach Delay (s)		12.0			47.7			13.4			19.1	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	64.8	Sum of lost time (s)	18.6
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX C

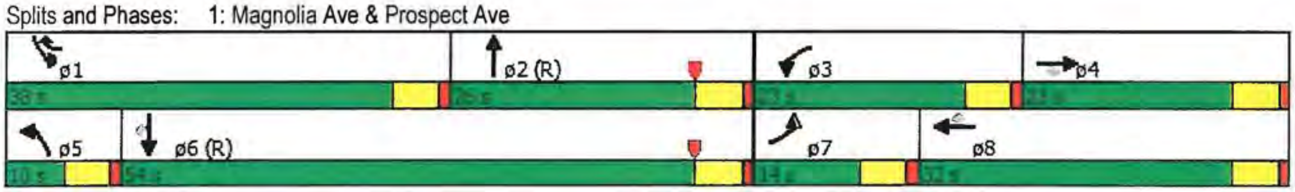
Existing Plus Project Synchro Worksheets
2018 Opening Day Synchro Worksheets
2018 Opening Day Plus Project Synchro Worksheets
Horizon Year 2035 Synchro Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Volume (vph)	68	119	43	169	462	1204	20	167	317	342	100
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2	1	6	
Permitted Phases			4			8					6
Detector Phase	7	4	4	3	8	1	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	23.0	23.0	9.0	23.0	9.0	9.0	23.0	9.0	23.0	23.0
Total Split (s)	14.0	23.0	23.0	23.0	32.0	38.0	10.0	26.0	38.0	54.0	54.0
Total Split (%)	12.7%	20.9%	20.9%	20.9%	29.1%	34.5%	9.1%	23.6%	34.5%	49.1%	49.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 42 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 1: Magnolia Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	68	119	43	169	462	1204	20	167	64	317	342	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.88	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	3539	2787	1770	3392		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	3539	2787	1770	3392		3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	129	47	184	502	1309	22	182	70	345	372	109
RTOR Reduction (vph)	0	0	41	0	0	338	0	29	0	0	0	53
Lane Group Flow (vph)	74	129	6	184	502	971	22	223	0	345	372	56
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	6.6	14.0	14.0	16.5	23.9	44.5	2.8	38.9		20.6	56.7	56.7
Effective Green, g (s)	6.6	14.0	14.0	16.5	23.9	44.5	2.8	38.9		20.6	56.7	56.7
Actuated g/C Ratio	0.06	0.13	0.13	0.15	0.22	0.40	0.03	0.35		0.19	0.52	0.52
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	205	237	201	265	768	1254	45	1199		642	1824	815
v/s Ratio Prot	0.02	0.07		c0.10	0.14	c0.14	0.01	0.07		0.10	c0.11	
v/s Ratio Perm			0.00			0.20						0.04
v/c Ratio	0.36	0.54	0.03	0.69	0.65	0.77	0.49	0.19		0.54	0.20	0.07
Uniform Delay, d1	49.7	45.0	42.1	44.4	39.3	28.4	52.9	24.6		40.4	14.4	13.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	2.5	0.1	7.7	2.0	3.0	8.1	0.3		0.9	0.3	0.2
Delay (s)	50.8	47.6	42.1	52.0	41.3	31.4	61.0	24.9		41.3	14.7	13.6
Level of Service	D	D	D	D	D	C	E	C		D	B	B
Approach Delay (s)		47.5			35.8			27.8			25.6	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		

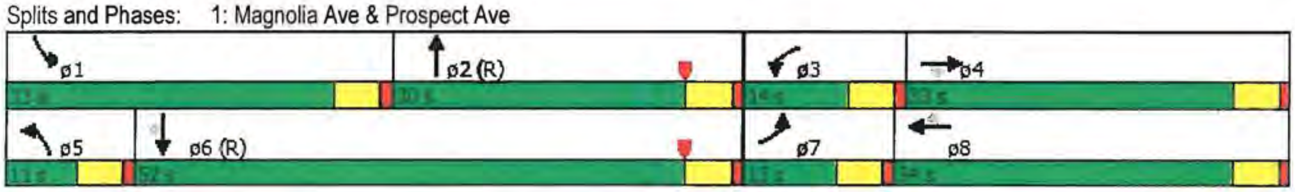
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Volume (vph)	124	275	79	68	234	894	31	379	576	316	44
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases			4			8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	23.0	23.0	9.0	23.0	23.0	9.0	23.0	9.0	23.0	23.0
Total Split (s)	13.0	33.0	33.0	14.0	34.0	34.0	11.0	30.0	33.0	52.0	52.0
Total Split (%)	11.8%	30.0%	30.0%	12.7%	30.9%	30.9%	10.0%	27.3%	30.0%	47.3%	47.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 1: Magnolia Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	124	275	79	68	234	894	31	379	90	576	316	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.88	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	3539	2787	1770	3437		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	3539	2787	1770	3437		3433	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	131	289	83	72	246	941	33	399	95	606	333	46
RTOR Reduction (vph)	0	0	65	0	0	711	0	16	0	0	0	23
Lane Group Flow (vph)	131	289	18	72	246	230	33	478	0	606	333	23
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	8.7	23.8	23.8	7.7	22.8	22.8	4.4	34.4		24.1	54.1	54.1
Effective Green, g (s)	8.7	23.8	23.8	7.7	22.8	22.8	4.4	34.4		24.1	54.1	54.1
Actuated g/C Ratio	0.08	0.22	0.22	0.07	0.21	0.21	0.04	0.31		0.22	0.49	0.49
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	271	403	342	123	733	577	70	1074		752	1740	778
v/s Ratio Prot	0.04	c0.16		c0.04	0.07		0.02	c0.14		c0.18	0.09	
v/s Ratio Perm			0.01			0.08						0.01
v/c Ratio	0.48	0.72	0.05	0.59	0.34	0.40	0.47	0.44		0.81	0.19	0.03
Uniform Delay, d1	48.5	40.0	34.2	49.6	37.1	37.7	51.7	30.2		40.7	15.7	14.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	6.0	0.1	6.9	0.3	0.5	4.9	1.3		6.3	0.2	0.1
Delay (s)	49.9	46.0	34.2	56.5	37.4	38.1	56.6	31.5		47.0	15.9	14.5
Level of Service	D	D	C	E	D	D	E	C		D	B	B
Approach Delay (s)		45.0			39.0			33.1			35.0	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

	→	←	↖	↗
Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	486	1107	731	67
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	13.0	10.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0
Total Split (s)	80.0	80.0	70.0	70.0
Total Split (%)	53.3%	53.3%	46.7%	46.7%
Yellow Time (s)	4.1	4.1	4.0	4.0
All-Red Time (s)	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	5.6	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	None	Min	Min

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 75.8
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	486	0	0	1107	731	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			5.6	5.5	5.5
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	528	0	0	1203	795	73
RTOR Reduction (vph)	0	0	0	0	0	43
Lane Group Flow (vph)	528	0	0	1203	795	30
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	36.6			37.1	27.0	27.0
Effective Green, g (s)	36.6			37.1	27.0	27.0
Actuated g/C Ratio	0.49			0.49	0.36	0.36
Clearance Time (s)	6.1			5.6	5.5	5.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1722			1745	1232	568
v/s Ratio Prot	0.15			c0.34	c0.23	
v/s Ratio Perm						0.02
v/c Ratio	0.31			0.69	0.65	0.05
Uniform Delay, d1	11.6			14.6	20.1	15.7
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			1.2	1.2	0.0
Delay (s)	11.7			15.8	21.3	15.8
Level of Service	B			B	C	B
Approach Delay (s)	11.7			15.8	20.8	
Approach LOS	B			B	C	

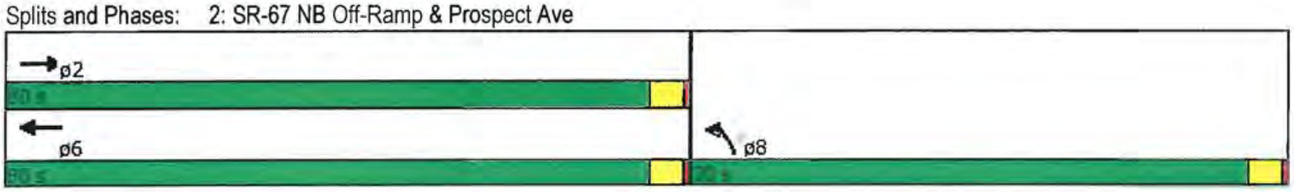
Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	11.6
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	1039	639	548	125
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0	23.0	23.0	23.0
Total Split (s)	80.0	80.0	70.0	70.0
Total Split (%)	53.3%	53.3%	46.7%	46.7%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	None	Min	Min

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 57.6
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1039	0	0	639	548	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.0	5.0	5.0
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1105	0	0	680	583	133
RTOR Reduction (vph)	0	0	0	0	0	39
Lane Group Flow (vph)	1105	0	0	680	583	94
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	28.6			28.6	18.5	18.5
Effective Green, g (s)	28.6			28.6	18.5	18.5
Actuated g/C Ratio	0.50			0.50	0.32	0.32
Clearance Time (s)	5.0			5.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1772			1772	1112	512
v/s Ratio Prot	c0.31			0.19	c0.17	
v/s Ratio Perm						0.06
v/c Ratio	0.62			0.38	0.52	0.18
Uniform Delay, d1	10.3			8.8	15.7	13.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.7			0.1	0.4	0.2
Delay (s)	11.0			8.9	16.2	14.1
Level of Service	B			A	B	B
Approach Delay (s)	11.0			8.9	15.8	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	242	14	349	7	632	109	4	143	420
Turn Type	Split	NA	pm+ov	NA	Split	NA	Perm	NA	pm+ov
Protected Phases	8	8	6	7	6	6		2	8
Permitted Phases			8				2		2
Detector Phase	8	8	6	7	6	6	2	2	8
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	40.0	40.0	40.0	21.0	40.0	40.0	40.0	40.0	40.0
Total Split (s)	45.0	45.0	43.0	21.0	43.0	43.0	41.0	41.0	45.0
Total Split (%)	30.0%	30.0%	28.7%	14.0%	28.7%	28.7%	27.3%	27.3%	30.0%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3		4.9	4.2
Lead/Lag	Lag	Lag		Lead					Lag
Lead-Lag Optimize?	Yes	Yes		Yes					Yes
Recall Mode	None	None	Min	None	Min	Min	None	None	None

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 81.8
Natural Cycle: 145
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Graves Ave & Prospect Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	14	349	0	7	5	632	109	4	4	143	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	0.88		0.95		0.97	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.94		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.96	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1694	2787		1668		3433	1854			1860	1583
Flt Permitted	0.95	0.96	1.00		1.00		0.95	1.00			0.57	1.00
Satd. Flow (perm)	1681	1694	2787		1668		3433	1854			1054	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	15	379	0	8	5	687	118	4	4	155	457
RTOR Reduction (vph)	0	0	174	0	5	0	0	1	0	0	0	192
Lane Group Flow (vph)	139	139	205	0	8	0	687	121	0	0	159	265
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Perm	NA	pm+ov
Protected Phases	8	8	6	7	7		6	6			2	8
Permitted Phases			8							2		2
Actuated Green, G (s)	15.4	15.4	45.5		1.0		30.1	30.1			19.0	34.4
Effective Green, g (s)	15.4	15.4	45.5		1.0		30.1	30.1			19.0	34.4
Actuated g/C Ratio	0.18	0.18	0.54		0.01		0.36	0.36			0.23	0.41
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	307	310	1507		19		1228	663			238	726
v/s Ratio Prot	c0.08	0.08	0.05		c0.00		c0.20	0.07				0.07
v/s Ratio Perm			0.02								c0.15	0.10
v/c Ratio	0.45	0.45	0.14		0.42		0.56	0.18			0.67	0.36
Uniform Delay, d1	30.6	30.6	9.6		41.3		21.7	18.6			29.7	17.3
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.1	1.0	0.1		5.5		0.7	0.2			7.5	0.3
Delay (s)	31.7	31.6	9.6		46.7		22.3	18.7			37.2	17.6
Level of Service	C	C	A		D		C	B			D	B
Approach Delay (s)		18.9			46.7			21.8			22.6	
Approach LOS		B			D			C			C	

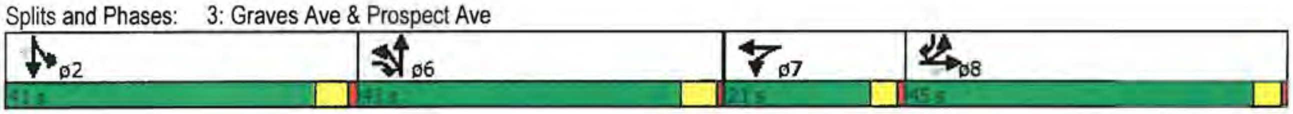
Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	84.1	Sum of lost time (s)	18.6
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations									
Volume (vph)	416	11	732	4	9	376	101	92	249
Turn Type	Split	NA	pm+ov	Split	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	7	6	6	2	8
Permitted Phases			8						2
Detector Phase	8	8	6	7	7	6	6	2	8
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	40.0	40.0	40.0	21.0	21.0	40.0	40.0	40.0	40.0
Total Split (s)	45.0	45.0	43.0	21.0	21.0	43.0	43.0	41.0	45.0
Total Split (%)	30.0%	30.0%	28.7%	14.0%	14.0%	28.7%	28.7%	27.3%	30.0%
Yellow Time (s)	3.2	3.2	4.3	3.2	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lag	Lag		Lead	Lead				Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes
Recall Mode	None	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 73.8
Natural Cycle: 145
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	416	11	732	4	9	3	376	101	3	3	92	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3	4.2	4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	0.88	0.95	0.95		0.97	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1690	2787	1681	1708		3433	1855			1860	1583
Flt Permitted	0.95	0.95	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1690	2787	1681	1708		3433	1855			1860	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	443	12	779	4	10	3	400	107	3	3	98	265
RTOR Reduction (vph)	0	0	300	0	3	0	0	1	0	0	0	169
Lane Group Flow (vph)	226	229	479	4	10	0	400	109	0	0	101	96
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	18.9	18.9	46.9	2.0	2.0		28.0	28.0			8.8	27.7
Effective Green, g (s)	18.9	18.9	46.9	2.0	2.0		28.0	28.0			8.8	27.7
Actuated g/C Ratio	0.25	0.25	0.61	0.03	0.03		0.37	0.37			0.12	0.36
Clearance Time (s)	4.2	4.2	5.3	4.2	4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9	2.0	2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	416	418	1713	44	44		1259	680			214	661
v/s Ratio Prot	0.13	c0.14	0.10	0.00	c0.01		c0.12	0.06			c0.05	0.04
v/s Ratio Perm			0.07									0.02
v/c Ratio	0.54	0.55	0.28	0.09	0.23		0.32	0.16			0.47	0.15
Uniform Delay, d1	24.9	25.0	6.8	36.3	36.4		17.3	16.2			31.6	16.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.5	1.5	0.1	0.3	1.0		0.2	0.1			2.2	0.1
Delay (s)	26.4	26.5	7.0	36.6	37.4		17.5	16.4			33.8	16.4
Level of Service	C	C	A	D	D		B	B			C	B
Approach Delay (s)		14.1			37.2			17.3			21.2	
Approach LOS		B			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	76.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	33	184	201	155	382	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	200	218	168	415	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				227		
pX, platoon unblocked						
vC, conflicting volume	1040	227	453			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1040	227	453			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	80	74	80			
cM capacity (veh/h)	181	776	1104			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	236	218	168	277	176
Volume Left	36	218	0	0	0
Volume Right	200	0	0	0	38
cSH	518	1104	1700	1700	1700
Volume to Capacity	0.46	0.20	0.10	0.16	0.10
Queue Length 95th (ft)	59	18	0	0	0
Control Delay (s)	17.6	9.1	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	17.6	5.1		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	22	126	131	389	218	23
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	137	142	423	237	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				227		
pX, platoon unblocked	0.99					
vC, conflicting volume	957	131	262			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	951	131	262			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	85	89			
cM capacity (veh/h)	227	894	1299			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	161	142	423	158	104
Volume Left	24	142	0	0	0
Volume Right	137	0	0	0	25
cSH	622	1299	1700	1700	1700
Volume to Capacity	0.26	0.11	0.25	0.09	0.06
Queue Length 95th (ft)	26	9	0	0	0
Control Delay (s)	12.8	8.1	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	12.8	2.0		0.0	
Approach LOS	B				

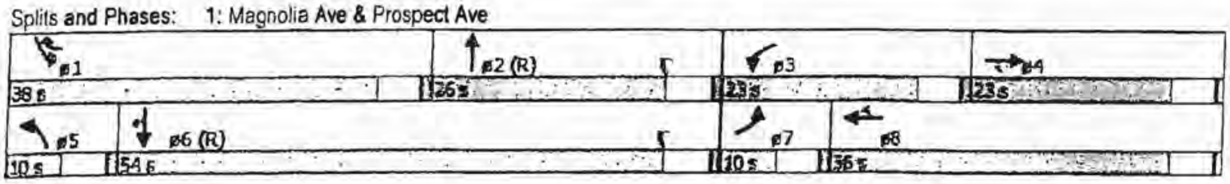
Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱	↰	↑↑	↱↱	↰	↑↱	↰↰	↑↑	↱
Volume (vph)	72	89	46	143	451	1220	21	176	297	360	105
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2	1	6	
Permitted Phases			4			8					6
Detector Phase	7	4	4	3	8	1	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	23.0	23.0	9.0	23.0	9.0	9.0	23.0	9.0	23.0	23.0
Total Split (s)	10.0	23.0	23.0	23.0	36.0	38.0	10.0	26.0	38.0	54.0	54.0
Total Split (%)	9.1%	20.9%	20.9%	20.9%	32.7%	34.5%	9.1%	23.6%	34.5%	49.1%	49.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 42 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 1: Magnolia Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	89	46	143	451	1220	21	176	31	297	360	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.88	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	3539	2787	1770	3461		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	3539	2787	1770	3461		3433	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	80	99	51	159	501	1356	23	196	34	330	400	117
RTOR Reduction (vph)	0	0	44	0	0	246	0	11	0	0	0	56
Lane Group Flow (vph)	80	99	7	159	501	1110	23	219	0	330	400	61
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	6.8	14.4	14.4	15.0	22.6	49.0	3.3	34.2		26.4	57.3	57.3
Effective Green, g (s)	6.8	14.4	14.4	15.0	22.6	49.0	3.3	34.2		26.4	57.3	57.3
Actuated g/C Ratio	0.06	0.13	0.13	0.14	0.21	0.45	0.03	0.31		0.24	0.52	0.52
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	212	243	207	241	727	1368	53	1076		823	1843	824
v/s Ratio Prot	0.02	0.05		c0.09	0.14	c0.19	0.01	0.06		0.10	c0.11	
v/s Ratio Perm			0.00			0.20						0.04
v/c Ratio	0.38	0.41	0.03	0.66	0.69	0.81	0.43	0.20		0.40	0.22	0.07
Uniform Delay, d1	49.6	43.9	41.7	45.1	40.4	26.5	52.4	27.9		35.2	14.2	13.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	1.1	0.1	6.4	2.7	3.8	5.6	0.4		0.3	0.3	0.2
Delay (s)	50.7	45.0	41.8	51.5	43.2	30.3	58.0	28.3		35.5	14.5	13.3
Level of Service	D	D	D	D	D	C	E	C		D	B	B
Approach Delay (s)		46.3			35.1			31.0			22.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

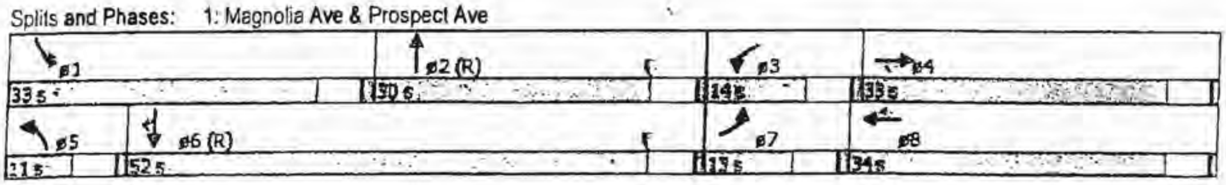
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Volume (vph)	131	277	83	60	235	923	33	398	593	332	47
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases			4			8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	23.0	23.0	9.0	23.0	23.0	9.0	23.0	9.0	23.0	23.0
Total Split (s)	13.0	33.0	33.0	14.0	34.0	34.0	11.0	30.0	33.0	52.0	52.0
Total Split (%)	11.8%	30.0%	30.0%	12.7%	30.9%	30.9%	10.0%	27.3%	30.0%	47.3%	47.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 1: Magnolia Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	131	277	83	60	235	923	33	398	82	593	332	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.88	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	3539	2787	1770	3449		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	3539	2787	1770	3449		3433	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	138	292	87	63	247	972	35	419	86	624	349	49
RTOR Reduction (vph)	0	0	68	0	0	704	0	14	0	0	0	25
Lane Group Flow (vph)	138	292	19	63	247	268	35	491	0	624	349	24
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	8.8	23.9	23.9	7.4	22.5	22.5	4.5	34.2		24.5	54.2	54.2
Effective Green, g (s)	8.8	23.9	23.9	7.4	22.5	22.5	4.5	34.2		24.5	54.2	54.2
Actuated g/C Ratio	0.08	0.22	0.22	0.07	0.20	0.20	0.04	0.31		0.22	0.49	0.49
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	274	404	343	119	723	570	72	1072		764	1743	779
v/s Ratio Prot	c0.04	c0.16		0.04	0.07		0.02	c0.14		c0.18	0.10	
v/s Ratio Perm			0.01			0.10						0.02
v/c Ratio	0.50	0.72	0.06	0.53	0.34	0.47	0.49	0.46		0.82	0.20	0.03
Uniform Delay, d1	46.5	40.0	34.1	49.6	37.4	38.5	51.6	30.5		40.6	15.7	14.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.5	6.3	0.1	4.2	0.3	0.6	5.1	1.4		6.8	0.3	0.1
Delay (s)	50.0	46.3	34.2	53.8	37.7	39.1	56.7	31.9		47.4	16.0	14.4
Level of Service	D	D	C	D	D	D	E	C		D	B	B
Approach Delay (s)		45.2			39.6			33.5			35.1	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	38.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

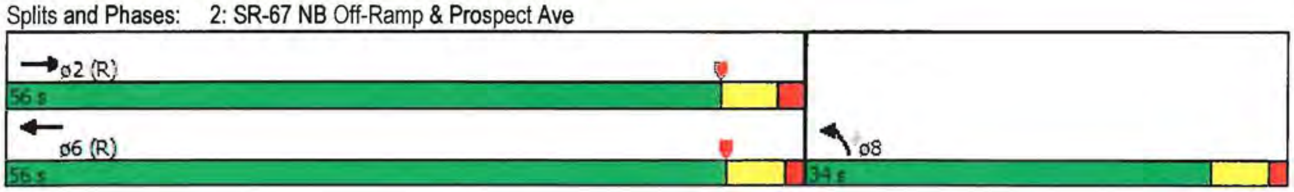
c Critical Lane Group

Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	412	1048	768	46
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	13.0	10.0	5.0	5.0
Minimum Split (s)	24.0	23.0	23.0	23.0
Total Split (s)	56.0	56.0	34.0	34.0
Total Split (%)	62.2%	62.2%	37.8%	37.8%
Yellow Time (s)	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	5.6	5.6	5.6
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Min	Min

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 87 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	438	1115	817	49
v/c Ratio	0.21	0.54	0.83	0.10
Control Delay	9.7	14.4	37.9	7.3
Queue Delay	0.0	4.6	0.0	0.0
Total Delay	9.7	19.0	37.9	7.3
Queue Length 50th (ft)	60	311	218	0
Queue Length 95th (ft)	88	372	282	25
Internal Link Dist (ft)	544	70	431	
Turn Bay Length (ft)				200
Base Capacity (vph)	2062	2081	1083	533
Starvation Cap Reductn	0	877	0	0
Spillback Cap Reductn	66	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.22	0.93	0.75	0.09

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰↰	↱
Volume (vph)	412	0	0	1048	768	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			5.6	5.6	5.6
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	438	0	0	1115	817	49
RTOR Reduction (vph)	0	0	0	0	0	35
Lane Group Flow (vph)	438	0	0	1115	817	14
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	52.4			52.9	25.9	25.9
Effective Green, g (s)	52.4			52.9	25.9	25.9
Actuated g/C Ratio	0.58			0.59	0.29	0.29
Clearance Time (s)	6.1			5.6	5.6	5.6
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2060			2080	987	455
v/s Ratio Prot	0.12			c0.32	c0.24	
v/s Ratio Perm						0.01
v/c Ratio	0.21			0.54	0.83	0.03
Uniform Delay, d1	9.0			11.2	30.0	23.0
Progression Factor	1.00			1.15	1.00	1.00
Incremental Delay, d2	0.2			0.9	5.8	0.0
Delay (s)	9.2			13.7	35.8	23.1
Level of Service	A			B	D	C
Approach Delay (s)	9.2			13.7	35.1	
Approach LOS	A			B	D	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.7
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	1026	594	576	116
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	13.0	10.0	5.0	5.0
Minimum Split (s)	24.0	23.0	23.0	23.0
Total Split (s)	56.0	56.0	34.0	34.0
Total Split (%)	62.2%	62.2%	37.8%	37.8%
Yellow Time (s)	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	5.6	5.6	5.6
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Min	Min

Intersection Summary

Cycle Length: 90
Actual Cycle Length: 90
Offset: 87 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1091	632	613	123
v/c Ratio	0.49	0.28	0.74	0.28
Control Delay	10.6	10.7	36.6	12.2
Queue Delay	0.1	1.0	0.0	0.0
Total Delay	10.7	11.7	36.6	12.2
Queue Length 50th (ft)	160	151	165	19
Queue Length 95th (ft)	248	37	205	58
Internal Link Dist (ft)	544	70	431	
Turn Bay Length (ft)				200
Base Capacity (vph)	2219	2238	1083	553
Starvation Cap Reductn	0	1283	0	0
Spillback Cap Reductn	169	0	0	3
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.53	0.66	0.57	0.22

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰↰	↱
Volume (vph)	1026	0	0	594	576	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			5.6	5.6	5.6
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1091	0	0	632	613	123
RTOR Reduction (vph)	0	0	0	0	0	60
Lane Group Flow (vph)	1091	0	0	632	613	63
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	56.4			56.9	21.9	21.9
Effective Green, g (s)	56.4			56.9	21.9	21.9
Actuated g/C Ratio	0.63			0.63	0.24	0.24
Clearance Time (s)	6.1			5.6	5.6	5.6
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2217			2237	835	385
v/s Ratio Prot	c0.31			0.18	c0.18	
v/s Ratio Perm						0.04
v/c Ratio	0.49			0.28	0.73	0.16
Uniform Delay, d1	9.1			7.4	31.4	26.8
Progression Factor	1.00			1.28	1.00	1.00
Incremental Delay, d2	0.8			0.3	3.4	0.2
Delay (s)	9.9			9.8	34.7	27.0
Level of Service	A			A	C	C
Approach Delay (s)	9.9			9.8	33.5	
Approach LOS	A			A	C	

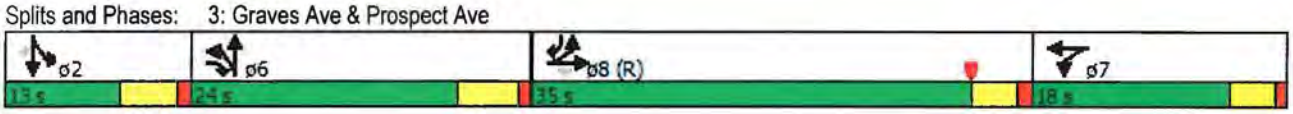
Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.7
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	131	15	367	8	664	33	75	327
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.2	25.2	22.3	25.2	22.3	22.3	11.9	25.2
Total Split (s)	35.0	35.0	24.0	18.0	24.0	24.0	13.0	35.0
Total Split (%)	38.9%	38.9%	26.7%	20.0%	26.7%	26.7%	14.4%	38.9%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lead	Lead		Lag				Lead
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	C-Max	C-Max	Min	None	Min	Min	None	C-Max

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 8:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	76	79	390	9	706	40	80	348
v/c Ratio	0.11	0.11	0.29	0.06	0.65	0.07	0.38	0.34
Control Delay	13.1	13.0	1.5	39.6	30.8	21.0	41.7	1.9
Queue Delay	0.8	0.8	0.3	0.0	52.2	0.0	0.0	0.1
Total Delay	13.8	13.8	1.9	39.6	83.0	21.0	41.7	2.0
Queue Length 50th (ft)	30	31	0	5	160	13	43	0
Queue Length 95th (ft)	66	67	45	20	#307	42	84	25
Internal Link Dist (ft)		70		31		339	147	
Turn Bay Length (ft)					225			
Base Capacity (vph)	692	700	1329	285	1090	583	213	1018
Starvation Cap Reductn	433	439	455	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	466	0	0	93
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.30	0.45	0.03	1.13	0.07	0.38	0.38

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	131	15	367	0	8	0	664	33	5	0	75	327
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	1.00			1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.98			1.00	0.85
Flt Protected	0.95	0.96	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1702	1583		1863		3433	1828			1863	1583
Flt Permitted	0.95	0.96	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1702	1583		1863		3433	1828			1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	139	16	390	0	9	0	706	35	5	0	80	348
RTOR Reduction (vph)	0	0	124	0	0	0	0	3	0	0	0	188
Lane Group Flow (vph)	76	79	266	0	9	0	706	37	0	0	80	160
Turn Type	Split	NA	pm+ov		NA		Split	NA			NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	32.7	32.7	61.3		1.4		28.6	28.6			8.7	41.4
Effective Green, g (s)	32.7	32.7	61.3		1.4		28.6	28.6			8.7	41.4
Actuated g/C Ratio	0.36	0.36	0.68		0.02		0.32	0.32			0.10	0.46
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	610	618	1171		28		1090	580			180	728
v/s Ratio Prot	0.05	0.05	c0.07		c0.00		c0.21	0.02			c0.04	0.08
v/s Ratio Perm			0.10									0.02
v/c Ratio	0.12	0.13	0.23		0.32		0.65	0.06			0.44	0.22
Uniform Delay, d1	19.1	19.1	5.4		43.8		26.4	21.4			38.4	14.6
Progression Factor	0.64	0.64	1.36		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.4	0.4	0.1		2.4		1.5	0.1			2.3	0.2
Delay (s)	12.6	12.6	7.5		46.2		27.8	21.4			40.7	14.8
Level of Service	B	B	A		D		C	C			D	B
Approach Delay (s)		8.9			46.2			27.5			19.6	
Approach LOS		A			D			C			B	

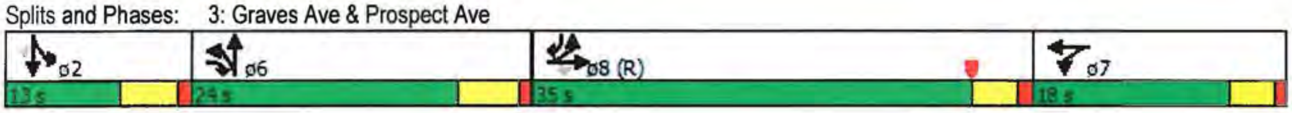
Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	356	12	769	10	395	53	46	184
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.2	25.2	22.3	25.2	22.3	22.3	11.9	25.2
Total Split (s)	35.0	35.0	24.0	18.0	24.0	24.0	13.0	35.0
Total Split (%)	38.9%	38.9%	26.7%	20.0%	26.7%	26.7%	14.4%	38.9%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lead	Lead		Lag				Lead
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	C-Max	C-Max	Min	None	Min	Min	None	C-Max

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 8:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	197	195	818	16	420	60	49	196
v/c Ratio	0.24	0.23	0.56	0.11	0.44	0.12	0.27	0.20
Control Delay	10.4	10.4	5.3	40.6	28.0	22.4	40.8	1.8
Queue Delay	0.7	0.7	0.5	0.0	1.3	0.0	0.0	0.0
Total Delay	11.2	11.1	5.7	40.6	29.3	22.4	40.8	1.9
Queue Length 50th (ft)	75	74	113	9	95	22	26	0
Queue Length 95th (ft)	151	149	243	29	150	56	59	22
Internal Link Dist (ft)		70		31		339	147	
Turn Bay Length (ft)					225			
Base Capacity (vph)	829	834	1456	281	971	524	189	1003
Starvation Cap Reductn	377	382	249	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	347	0	0	19
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.43	0.68	0.06	0.67	0.11	0.26	0.20

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	356	12	769	5	10	0	395	53	4	0	46	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	1.00			1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.99			1.00	0.85
Flt Protected	0.95	0.96	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1691	1583		1834		3433	1844			1863	1583
Flt Permitted	0.95	0.96	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1691	1583		1834		3433	1844			1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	379	13	818	5	11	0	420	56	4	0	49	196
RTOR Reduction (vph)	0	0	235	0	0	0	0	3	0	0	0	98
Lane Group Flow (vph)	197	195	583	0	16	0	420	57	0	0	49	98
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA			NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	39.1	39.1	64.1		1.4		25.0	25.0			5.9	45.0
Effective Green, g (s)	39.1	39.1	64.1		1.4		25.0	25.0			5.9	45.0
Actuated g/C Ratio	0.43	0.43	0.71		0.02		0.28	0.28			0.07	0.50
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	730	734	1220		28		953	512			122	791
v/s Ratio Prot	0.12	0.12	c0.13		c0.01		0.12	0.03			c0.03	0.05
v/s Ratio Perm			0.24									0.01
v/c Ratio	0.27	0.27	0.48		0.57		0.44	0.11			0.40	0.12
Uniform Delay, d1	16.3	16.3	5.6		44.0		26.7	24.2			40.4	12.0
Progression Factor	0.55	0.55	7.16		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.8	0.8	0.4		16.3		0.4	0.1			2.9	0.1
Delay (s)	9.9	9.8	40.8		60.3		27.2	24.4			43.2	12.1
Level of Service	A	A	D		E		C	C			D	B
Approach Delay (s)		30.8			60.3			26.8			18.3	
Approach LOS		C			E			C			B	

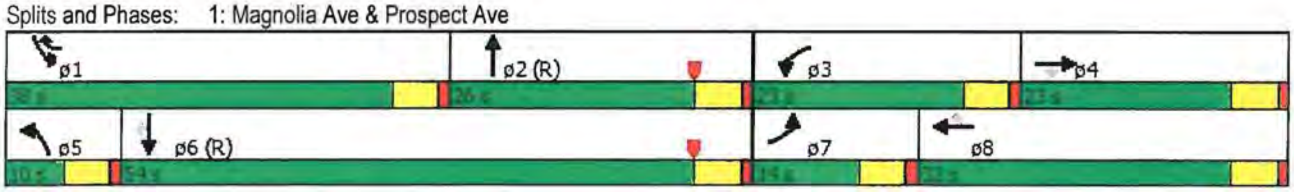
Intersection Summary			
HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Volume (vph)	72	124	46	176	484	1263	21	176	321	360	105
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2	1	6	
Permitted Phases			4			8					6
Detector Phase	7	4	4	3	8	1	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	23.0	23.0	9.0	23.0	9.0	9.0	23.0	9.0	23.0	23.0
Total Split (s)	14.0	23.0	23.0	23.0	32.0	38.0	10.0	26.0	38.0	54.0	54.0
Total Split (%)	12.7%	20.9%	20.9%	20.9%	29.1%	34.5%	9.1%	23.6%	34.5%	49.1%	49.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 42 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 1: Magnolia Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	124	46	176	484	1263	21	176	66	321	360	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.88	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	3539	2787	1770	3394		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	3539	2787	1770	3394		3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	135	50	191	526	1373	23	191	72	349	391	114
RTOR Reduction (vph)	0	0	44	0	0	302	0	30	0	0	0	56
Lane Group Flow (vph)	78	135	7	191	526	1071	23	233	0	349	391	58
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	6.7	14.3	14.3	17.0	24.6	47.5	2.5	35.8		22.9	56.2	56.2
Effective Green, g (s)	6.7	14.3	14.3	17.0	24.6	47.5	2.5	35.8		22.9	56.2	56.2
Actuated g/C Ratio	0.06	0.13	0.13	0.15	0.22	0.43	0.02	0.33		0.21	0.51	0.51
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	209	242	205	273	791	1330	40	1104		714	1808	808
v/s Ratio Prot	0.02	0.07		c0.11	0.15	c0.17	0.01	0.07		0.10	c0.11	
v/s Ratio Perm			0.00			0.22						0.04
v/c Ratio	0.37	0.56	0.03	0.70	0.66	0.81	0.57	0.21		0.49	0.22	0.07
Uniform Delay, d1	49.6	44.9	41.8	44.1	38.9	27.2	53.2	26.9		38.4	14.8	13.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	2.8	0.1	7.6	2.1	3.6	18.4	0.4		0.5	0.3	0.2
Delay (s)	50.8	47.7	41.9	51.7	41.1	30.9	71.7	27.3		38.9	15.1	13.8
Level of Service	D	D	D	D	D	C	E	C		D	B	B
Approach Delay (s)		47.5			35.3			30.9			24.6	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

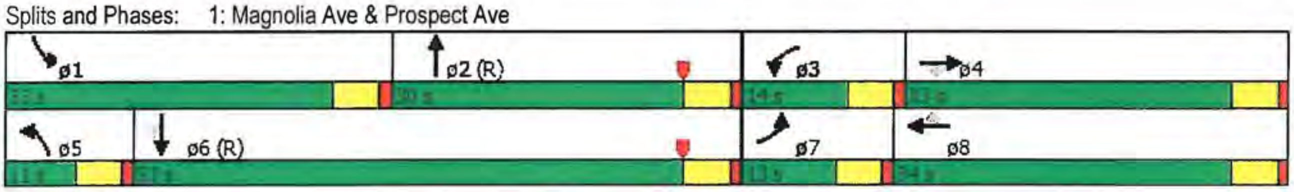
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱	↰	↑↑	↱↱	↰	↑↱	↰↰	↑↑	↱
Volume (vph)	131	289	83	71	246	938	33	398	601	332	47
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases			4			8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	23.0	23.0	9.0	23.0	23.0	9.0	23.0	9.0	23.0	23.0
Total Split (s)	13.0	33.0	33.0	14.0	34.0	34.0	11.0	30.0	33.0	52.0	52.0
Total Split (%)	11.8%	30.0%	30.0%	12.7%	30.9%	30.9%	10.0%	27.3%	30.0%	47.3%	47.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 1: Magnolia Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	131	289	83	71	246	938	33	398	94	601	332	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.88	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	3539	2787	1770	3438		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	3539	2787	1770	3438		3433	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	138	304	87	75	259	987	35	419	99	633	349	49
RTOR Reduction (vph)	0	0	67	0	0	694	0	17	0	0	0	25
Lane Group Flow (vph)	138	304	20	75	259	293	35	501	0	633	349	24
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	8.6	24.7	24.7	7.6	23.7	23.7	4.2	33.0		24.7	53.5	53.5
Effective Green, g (s)	8.6	24.7	24.7	7.6	23.7	23.7	4.2	33.0		24.7	53.5	53.5
Actuated g/C Ratio	0.08	0.22	0.22	0.07	0.22	0.22	0.04	0.30		0.22	0.49	0.49
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	268	418	355	122	762	600	67	1031		770	1721	769
v/s Ratio Prot	0.04	c0.16		c0.04	0.07		0.02	c0.15		c0.18	0.10	
v/s Ratio Perm			0.01			0.11						0.02
v/c Ratio	0.51	0.73	0.06	0.61	0.34	0.49	0.52	0.49		0.82	0.20	0.03
Uniform Delay, d1	48.7	39.5	33.5	49.8	36.5	37.8	51.9	31.6		40.6	16.1	14.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.7	6.2	0.1	8.9	0.3	0.6	7.2	1.6		7.1	0.3	0.1
Delay (s)	50.4	45.7	33.6	58.6	36.8	38.5	59.1	33.2		47.6	16.4	14.8
Level of Service	D	D	C	E	D	D	E	C		D	B	B
Approach Delay (s)		44.9			39.3			34.8			35.5	
Approach LOS		D			D			C			D	

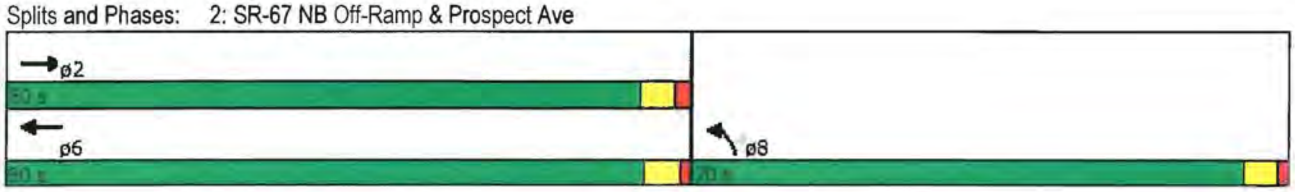
Intersection Summary			
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	506	1157	768	70
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	13.0	10.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0
Total Split (s)	80.0	80.0	70.0	70.0
Total Split (%)	53.3%	53.3%	46.7%	46.7%
Yellow Time (s)	4.1	4.1	4.0	4.0
All-Red Time (s)	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	5.6	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	None	Min	Min

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 82.7
Natural Cycle: 55
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰↰	↱
Volume (vph)	506	0	0	1157	768	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			5.6	5.5	5.5
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	550	0	0	1258	835	76
RTOR Reduction (vph)	0	0	0	0	0	43
Lane Group Flow (vph)	550	0	0	1258	835	33
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	40.5			41.0	29.9	29.9
Effective Green, g (s)	40.5			41.0	29.9	29.9
Actuated g/C Ratio	0.49			0.50	0.36	0.36
Clearance Time (s)	6.1			5.6	5.5	5.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1747			1769	1251	577
v/s Ratio Prot	0.16			c0.36	c0.24	
v/s Ratio Perm						0.02
v/c Ratio	0.31			0.71	0.67	0.06
Uniform Delay, d1	12.4			15.9	21.9	16.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			1.4	1.4	0.0
Delay (s)	12.5			17.3	23.2	17.0
Level of Service	B			B	C	B
Approach Delay (s)	12.5			17.3	22.7	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	82.0	Sum of lost time (s)	11.6
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	1088	668	576	131
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0	23.0	23.0	23.0
Total Split (s)	80.0	80.0	70.0	70.0
Total Split (%)	53.3%	53.3%	46.7%	46.7%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	None	Min	Min

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 61.2
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1088	0	0	668	576	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.0	5.0	5.0
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1157	0	0	711	613	139
RTOR Reduction (vph)	0	0	0	0	0	33
Lane Group Flow (vph)	1157	0	0	711	613	106
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	30.7			30.7	20.0	20.0
Effective Green, g (s)	30.7			30.7	20.0	20.0
Actuated g/C Ratio	0.51			0.51	0.33	0.33
Clearance Time (s)	5.0			5.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1789			1789	1131	521
v/s Ratio Prot	c0.33			0.20	c0.18	
v/s Ratio Perm						0.07
v/c Ratio	0.65			0.40	0.54	0.20
Uniform Delay, d1	11.0			9.3	16.6	14.6
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.8			0.1	0.5	0.2
Delay (s)	11.8			9.4	17.1	14.8
Level of Service	B			A	B	B
Approach Delay (s)	11.8			9.4	16.7	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.7	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

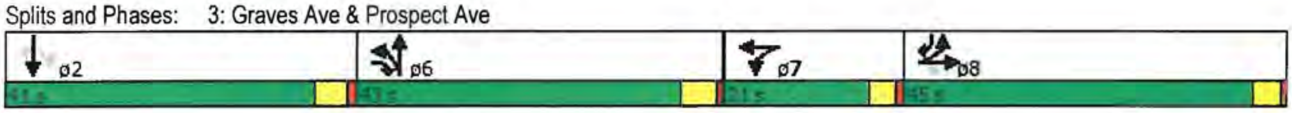
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	249	15	367	8	664	111	4	147	436
Turn Type	Split	NA	pm+ov	NA	Split	NA	Perm	NA	pm+ov
Protected Phases	8	8	6	7	6	6		2	8
Permitted Phases			8				2		2
Detector Phase	8	8	6	7	6	6	2	2	8
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	40.0	40.0	40.0	21.0	40.0	40.0	40.0	40.0	40.0
Total Split (s)	45.0	45.0	43.0	21.0	43.0	43.0	41.0	41.0	45.0
Total Split (%)	30.0%	30.0%	28.7%	14.0%	28.7%	28.7%	27.3%	27.3%	30.0%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3		4.9	4.2
Lead/Lag	Lag	Lag		Lead					Lag
Lead-Lag Optimize?	Yes	Yes		Yes					Yes
Recall Mode	None	None	Min	None	Min	Min	None	None	None

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 87.4
Natural Cycle: 145
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	249	15	367	0	8	5	664	111	5	4	147	436
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	0.88		0.95		0.97	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	0.99			1.00	0.85
Flt Protected	0.95	0.96	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1694	2787		1675		3433	1852			1860	1583
Flt Permitted	0.95	0.96	1.00		1.00		0.95	1.00			0.57	1.00
Satd. Flow (perm)	1681	1694	2787		1675		3433	1852			1061	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	271	16	399	0	9	5	722	121	5	4	160	474
RTOR Reduction (vph)	0	0	181	0	5	0	0	1	0	0	0	189
Lane Group Flow (vph)	144	143	218	0	9	0	722	125	0	0	164	285
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Perm	NA	pm+ov
Protected Phases	8	8	6	7	7		6	6			2	8
Permitted Phases			8							2		2
Actuated Green, G (s)	16.7	16.7	48.6		2.1		31.9	31.9			19.7	36.4
Effective Green, g (s)	16.7	16.7	48.6		2.1		31.9	31.9			19.7	36.4
Actuated g/C Ratio	0.19	0.19	0.55		0.02		0.36	0.36			0.22	0.41
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	315	317	1521		39		1230	663			234	722
v/s Ratio Prot	c0.09	0.08	0.05		c0.01		c0.21	0.07				0.07
v/s Ratio Perm			0.03								c0.15	0.11
v/c Ratio	0.46	0.45	0.14		0.23		0.59	0.19			0.70	0.40
Uniform Delay, d1	32.1	32.1	9.9		42.7		23.2	19.6			31.9	18.5
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.1	1.0	0.1		1.1		0.8	0.2			9.7	0.4
Delay (s)	33.2	33.1	10.0		43.8		24.0	19.8			41.6	18.9
Level of Service	C	C	B		D		C	B			D	B
Approach Delay (s)		19.7			43.8			23.4			24.7	
Approach LOS		B			D			C			C	

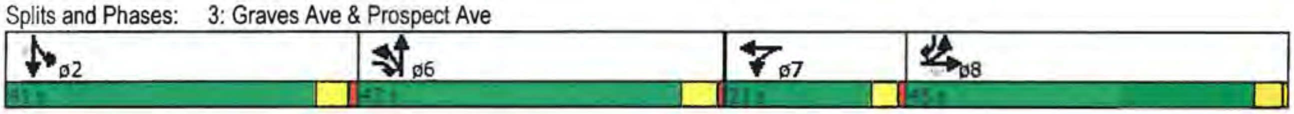
Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations									
Volume (vph)	433	12	769	5	10	395	104	95	258
Turn Type	Split	NA	pm+ov	Split	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	7	6	6	2	8
Permitted Phases			8						2
Detector Phase	8	8	6	7	7	6	6	2	8
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	40.0	40.0	40.0	21.0	21.0	40.0	40.0	40.0	40.0
Total Split (s)	45.0	45.0	43.0	21.0	21.0	43.0	43.0	41.0	45.0
Total Split (%)	30.0%	30.0%	28.7%	14.0%	14.0%	28.7%	28.7%	27.3%	30.0%
Yellow Time (s)	3.2	3.2	4.3	3.2	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lag	Lag		Lead	Lead				Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes
Recall Mode	None	None	None	None	None	None	None	None	None

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 76.8
Natural Cycle: 145
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	433	12	769	5	10	3	395	104	4	3	95	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3	4.2	4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	0.88	0.95	0.95		0.97	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99			1.00	0.85
Flt Protected	0.95	0.95	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1690	2787	1681	1711		3433	1853			1860	1583
Flt Permitted	0.95	0.95	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1690	2787	1681	1711		3433	1853			1860	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	461	13	818	5	11	3	420	111	4	3	101	274
RTOR Reduction (vph)	0	0	307	0	3	0	0	1	0	0	0	173
Lane Group Flow (vph)	235	239	511	4	12	0	420	114	0	0	104	101
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	20.0	20.0	49.5	2.0	2.0		29.5	29.5			9.1	29.1
Effective Green, g (s)	20.0	20.0	49.5	2.0	2.0		29.5	29.5			9.1	29.1
Actuated g/C Ratio	0.25	0.25	0.62	0.03	0.03		0.37	0.37			0.11	0.37
Clearance Time (s)	4.2	4.2	5.3	4.2	4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9	2.0	2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	424	426	1741	42	43		1278	690			213	665
v/s Ratio Prot	0.14	c0.14	0.11	0.00	c0.01		c0.12	0.06			c0.06	0.04
v/s Ratio Perm			0.07									0.03
v/c Ratio	0.55	0.56	0.29	0.10	0.28		0.33	0.17			0.49	0.15
Uniform Delay, d1	25.7	25.8	6.8	37.7	37.9		17.8	16.6			32.9	16.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.6	1.7	0.1	0.4	1.3		0.2	0.2			2.3	0.1
Delay (s)	27.3	27.5	6.9	38.1	39.2		18.0	16.8			35.2	16.9
Level of Service	C	C	A	D	D		B	B			D	B
Approach Delay (s)		14.4			39.0			17.7			21.9	
Approach LOS		B			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	79.2	Sum of lost time (s)	18.6
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	33	184	201	163	402	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	200	218	177	437	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				227		
pX, platoon unblocked						
vC, conflicting volume	1070	238	475			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1070	238	475			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	74	80			
cM capacity (veh/h)	172	764	1083			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	236	218	177	291	184
Volume Left	36	218	0	0	0
Volume Right	200	0	0	0	38
cSH	502	1083	1700	1700	1700
Volume to Capacity	0.47	0.20	0.10	0.17	0.11
Queue Length 95th (ft)	62	19	0	0	0
Control Delay (s)	18.4	9.2	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	18.4	5.1		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	22	126	131	409	229	23
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	137	142	445	249	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				227		
pX, platoon unblocked	0.99					
vC, conflicting volume	991	137	274			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	983	137	274			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	85	89			
cM capacity (veh/h)	215	886	1286			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	161	142	445	166	108
Volume Left	24	142	0	0	0
Volume Right	137	0	0	0	25
cSH	606	1286	1700	1700	1700
Volume to Capacity	0.27	0.11	0.26	0.10	0.06
Queue Length 95th (ft)	27	9	0	0	0
Control Delay (s)	13.1	8.1	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.1	2.0		0.0	
Approach LOS	B				

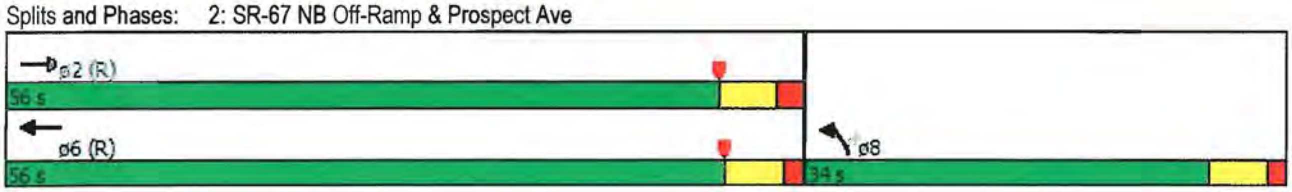
Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	37.2%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	506	1157	768	70
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	13.0	10.0	5.0	5.0
Minimum Split (s)	24.0	23.0	23.0	23.0
Total Split (s)	56.0	56.0	34.0	34.0
Total Split (%)	62.2%	62.2%	37.8%	37.8%
Yellow Time (s)	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	5.6	5.6	5.6
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Min	Min

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 87 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	538	1231	817	74
v/c Ratio	0.26	0.59	0.83	0.15
Control Delay	10.1	11.2	37.9	6.5
Queue Delay	0.0	25.4	0.0	0.0
Total Delay	10.1	36.6	37.9	6.5
Queue Length 50th (ft)	75	330	218	0
Queue Length 95th (ft)	108	m377	282	30
Internal Link Dist (ft)	544	112	431	
Turn Bay Length (ft)				200
Base Capacity (vph)	2062	2081	1083	550
Starvation Cap Reductn	0	896	0	0
Spillback Cap Reductn	15	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.26	1.04	0.75	0.13

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰↰	↱
Volume (vph)	506	0	0	1157	768	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			5.6	5.6	5.6
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	538	0	0	1231	817	74
RTOR Reduction (vph)	0	0	0	0	0	53
Lane Group Flow (vph)	538	0	0	1231	817	21
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	52.4			52.9	25.9	25.9
Effective Green, g (s)	52.4			52.9	25.9	25.9
Actuated g/C Ratio	0.58			0.59	0.29	0.29
Clearance Time (s)	6.1			5.6	5.6	5.6
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2060			2080	987	455
v/s Ratio Prot	0.15			c0.35	c0.24	
v/s Ratio Perm						0.01
v/c Ratio	0.26			0.59	0.83	0.05
Uniform Delay, d1	9.3			11.7	30.0	23.1
Progression Factor	1.00			0.83	1.00	1.00
Incremental Delay, d2	0.3			0.9	5.8	0.0
Delay (s)	9.6			10.6	35.8	23.2
Level of Service	A			B	D	C
Approach Delay (s)	9.6			10.6	34.7	
Approach LOS	A			B	C	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.7
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL	NBR
Lane Configurations				
Volume (vph)	1088	668	576	131
Turn Type	NA	NA	Prot	Perm
Protected Phases	2	6	8	
Permitted Phases				8
Detector Phase	2	6	8	8
Switch Phase				
Minimum Initial (s)	13.0	10.0	5.0	5.0
Minimum Split (s)	24.0	23.0	23.0	23.0
Total Split (s)	56.0	56.0	34.0	34.0
Total Split (%)	62.2%	62.2%	37.8%	37.8%
Yellow Time (s)	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	5.6	5.6	5.6
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Min	Min

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 87 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 2: SR-67 NB Off-Ramp & Prospect Ave

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1157	711	613	139
v/c Ratio	0.52	0.32	0.74	0.32
Control Delay	11.0	6.5	36.6	16.1
Queue Delay	0.1	1.0	0.0	0.0
Total Delay	11.1	7.5	36.6	16.1
Queue Length 50th (ft)	174	151	165	32
Queue Length 95th (ft)	269	51	205	75
Internal Link Dist (ft)	544	70	431	
Turn Bay Length (ft)				200
Base Capacity (vph)	2219	2238	1083	545
Starvation Cap Reductn	0	1189	0	0
Spillback Cap Reductn	189	0	0	3
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.68	0.57	0.26

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰↰	↱
Volume (vph)	1088	0	0	668	576	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			5.6	5.6	5.6
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			3539	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			3539	3433	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1157	0	0	711	613	139
RTOR Reduction (vph)	0	0	0	0	0	51
Lane Group Flow (vph)	1157	0	0	711	613	88
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	56.4			56.9	21.9	21.9
Effective Green, g (s)	56.4			56.9	21.9	21.9
Actuated g/C Ratio	0.63			0.63	0.24	0.24
Clearance Time (s)	6.1			5.6	5.6	5.6
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2217			2237	835	385
v/s Ratio Prot	c0.33			0.20	c0.18	
v/s Ratio Perm						0.06
v/c Ratio	0.52			0.32	0.73	0.23
Uniform Delay, d1	9.3			7.6	31.4	27.3
Progression Factor	1.00			0.75	1.00	1.00
Incremental Delay, d2	0.9			0.3	3.4	0.3
Delay (s)	10.2			6.0	34.7	27.6
Level of Service	B			A	C	C
Approach Delay (s)	10.2			6.0	33.4	
Approach LOS	B			A	C	

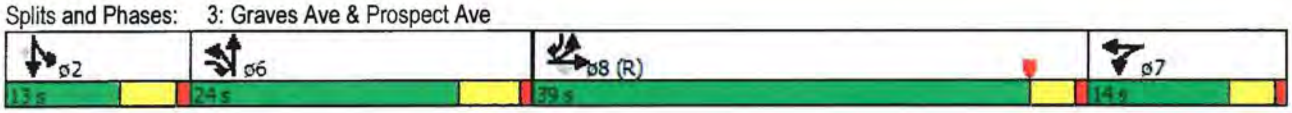
Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.7
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	249	15	367	8	664	111	147	436
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.2	25.2	22.3	25.2	22.3	22.3	11.9	25.2
Total Split (s)	39.0	39.0	24.0	14.0	24.0	24.0	13.0	39.0
Total Split (%)	43.3%	43.3%	26.7%	15.6%	26.7%	26.7%	14.4%	43.3%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lead	Lead		Lag				Lead
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	C-Max	C-Max	Min	None	Min	Min	None	C-Max

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 8:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	140	141	390	14	409	420	160	464
v/c Ratio	0.22	0.22	0.19	0.10	0.90	0.91	0.55	0.43
Control Delay	12.2	12.2	0.2	32.6	57.8	58.8	43.7	3.4
Queue Delay	1.5	1.5	0.2	0.0	52.4	51.7	0.0	0.0
Total Delay	13.7	13.7	0.5	32.6	110.2	110.5	43.7	3.4
Queue Length 50th (ft)	54	54	0	5	233	240	83	26
Queue Length 95th (ft)	103	103	0	24	#481	#498	#180	52
Internal Link Dist (ft)		112		31		329	171	
Turn Bay Length (ft)					225			
Base Capacity (vph)	649	655	2078	197	455	463	292	1073
Starvation Cap Reductn	358	363	1015	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	186	189	0	38
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.48	0.37	0.07	1.52	1.53	0.55	0.45

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	249	15	367	0	8	5	664	111	5	4	147	436
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	0.88		1.00		0.95	0.95			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.96	1.00		1.00		0.95	0.97			1.00	1.00
Satd. Flow (prot)	1681	1694	2787		1773		1681	1706			1860	1583
Flt Permitted	0.95	0.96	1.00		1.00		0.95	0.97			1.00	1.00
Satd. Flow (perm)	1681	1694	2787		1773		1681	1706			1860	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	265	16	390	0	9	5	706	118	5	4	156	464
RTOR Reduction (vph)	0	0	148	0	5	0	0	1	0	0	0	170
Lane Group Flow (vph)	140	141	242	0	9	0	409	419	0	0	160	294
Turn Type	Split	NA	pm+ov		NA		Split	NA		Split	NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	31.4	31.4	55.8		1.4		24.4	24.4			14.2	45.6
Effective Green, g (s)	31.4	31.4	55.8		1.4		24.4	24.4			14.2	45.6
Actuated g/C Ratio	0.35	0.35	0.62		0.02		0.27	0.27			0.16	0.51
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	586	591	1892		27		455	462			293	802
v/s Ratio Prot	0.08	0.08	0.03		c0.01		0.24	c0.25			c0.09	c0.13
v/s Ratio Perm			0.05									0.06
v/c Ratio	0.24	0.24	0.13		0.34		0.90	0.91			0.55	0.37
Uniform Delay, d1	20.8	20.8	7.1		43.8		31.6	31.7			34.9	13.5
Progression Factor	0.61	0.61	0.04		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.9	0.9	0.0		2.7		20.5	21.6			2.5	0.4
Delay (s)	13.6	13.6	0.3		46.5		52.1	53.3			37.5	13.8
Level of Service	B	B	A		D		D	D			D	B
Approach Delay (s)		5.9			46.5			52.7			19.9	
Approach LOS		A			D			D			B	

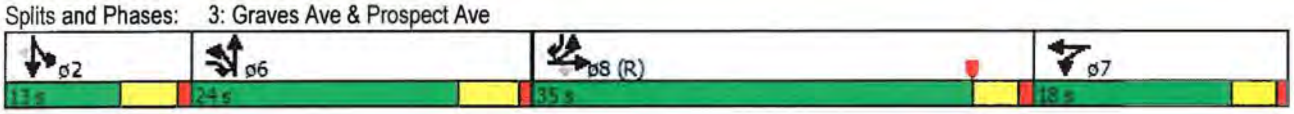
Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	433	12	769	10	395	104	95	258
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.2	25.2	22.3	25.2	22.3	22.3	11.9	25.2
Total Split (s)	35.0	35.0	24.0	18.0	24.0	24.0	13.0	35.0
Total Split (%)	38.9%	38.9%	26.7%	20.0%	26.7%	26.7%	14.4%	38.9%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lead	Lead		Lag				Lead
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	C-Max	C-Max	Min	None	Min	Min	None	C-Max

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 8:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	235	239	818	19	265	270	104	274
v/c Ratio	0.32	0.32	0.36	0.13	0.61	0.61	0.44	0.27
Control Delay	13.8	13.8	0.4	36.8	37.6	37.2	41.8	1.5
Queue Delay	1.1	1.1	0.2	0.0	6.9	6.4	0.0	0.0
Total Delay	14.9	14.9	0.6	36.8	44.5	43.7	41.8	1.6
Queue Length 50th (ft)	107	109	0	9	118	121	56	0
Queue Length 95th (ft)	181	184	0	30	#272	#274	101	21
Internal Link Dist (ft)		70		31		339	147	
Turn Bay Length (ft)					225			
Base Capacity (vph)	732	736	2274	278	432	442	236	1019
Starvation Cap Reductn	298	298	574	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	121	123	0	29
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.55	0.48	0.07	0.85	0.85	0.44	0.28

Intersection Summary

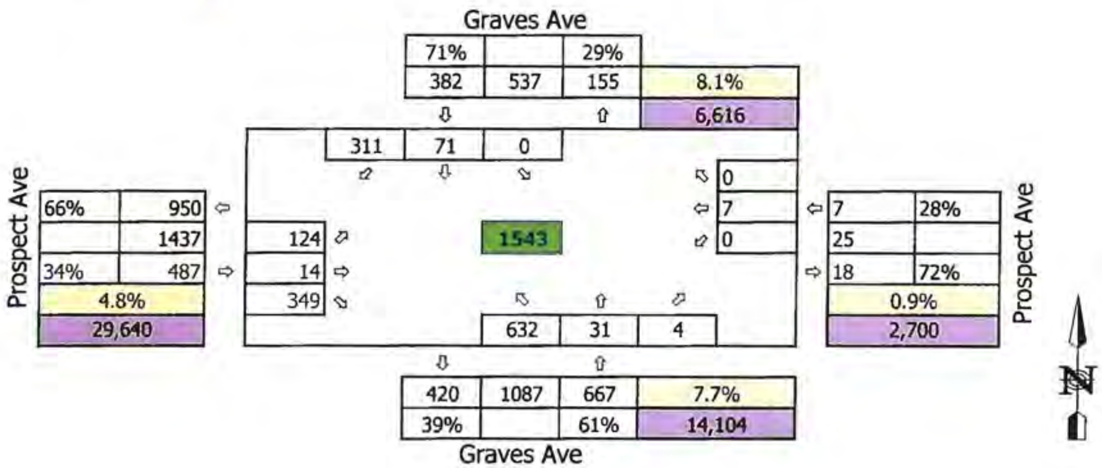
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	433	12	769	5	10	3	395	104	4	3	95	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	0.88		1.00		0.95	0.95			1.00	1.00
Frt	1.00	1.00	0.85		0.98		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.99		0.95	0.97			1.00	1.00
Satd. Flow (prot)	1681	1690	2787		1799		1681	1716			1860	1583
Flt Permitted	0.95	0.95	1.00		0.99		0.95	0.97			1.00	1.00
Satd. Flow (perm)	1681	1690	2787		1799		1681	1716			1860	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	461	13	818	5	11	3	420	111	4	3	101	274
RTOR Reduction (vph)	0	0	284	0	3	0	0	1	0	0	0	135
Lane Group Flow (vph)	235	239	534	0	16	0	265	269	0	0	104	139
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	35.7	35.7	58.8		2.8		23.1	23.1			9.8	45.5
Effective Green, g (s)	35.7	35.7	58.8		2.8		23.1	23.1			9.8	45.5
Actuated g/C Ratio	0.40	0.40	0.65		0.03		0.26	0.26			0.11	0.51
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	666	670	1984		55		431	440			202	800
v/s Ratio Prot	0.14	c0.14	0.07		c0.01		c0.16	0.16			c0.06	0.07
v/s Ratio Perm			0.12									0.02
v/c Ratio	0.35	0.36	0.27		0.29		0.61	0.61			0.51	0.17
Uniform Delay, d1	19.0	19.1	6.6		42.6		29.5	29.5			37.9	12.1
Progression Factor	0.62	0.62	0.01		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.3	1.3	0.1		1.1		2.9	2.8			2.9	0.1
Delay (s)	13.1	13.2	0.2		43.7		32.5	32.3			40.7	12.2
Level of Service	B	B	A		D		C	C			D	B
Approach Delay (s)		4.9			43.7			32.4			20.0	
Approach LOS		A			D			C			C	

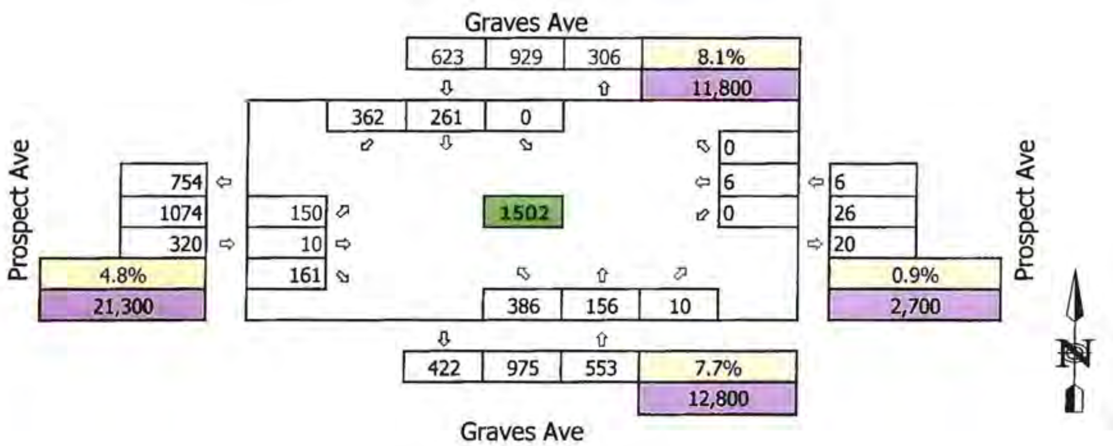
Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Int 1 AM Peak Volumes

Scenario:	**Existing Conditions (2017)**
N/S Street:	**Graves Ave**
E/W Street:	**Prospect Ave**
Intersection #:	**1**



Scenario:	**Year 2035**
N/S Street:	**Graves Ave**
E/W Street:	**Prospect Ave**



LEGEND

Existing K-Factor	xx%
ADT Volume	xx

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Volume (vph)	150	10	161	6	386	156	261	362
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.2	25.2	22.3	25.2	22.3	22.3	11.9	25.2
Total Split (s)	25.8	25.8	34.0	25.2	34.0	34.0	20.0	25.8
Total Split (%)	24.6%	24.6%	32.4%	24.0%	32.4%	32.4%	19.0%	24.6%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lead	Lead		Lag				Lead
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	C-Max	C-Max	Min	None	Min	Min	None	C-Max

Intersection Summary

Cycle Length: 105
Actuated Cycle Length: 105
Offset: 0 (0%), Referenced to phase 8:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 3: Graves Ave & Prospect Ave

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	202	10	161	8	386	190	271	410
Future Volume (vph)	202	10	161	8	386	190	271	410
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.2	25.2	22.3	25.2	22.3	22.3	11.9	25.2
Total Split (s)	25.8	25.8	34.0	25.2	34.0	34.0	20.0	25.8
Total Split (%)	24.6%	24.6%	32.4%	24.0%	32.4%	32.4%	19.0%	24.6%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lead	Lead		Lag				Lead
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	C-Max	C-Max	Min	None	Min	Min	None	C-Max

Intersection Summary

Cycle Length: 105
Actuated Cycle Length: 105
Offset: 0 (0%), Referenced to phase 8:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 3: Graves Ave & Prospect Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	202	10	161	0	8	0	386	190	10	0	271	410
Future Volume (vph)	202	10	161	0	8	0	386	190	10	0	271	410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	0.88		1.00		0.95	0.95			1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.99			1.00	0.85
Flt Protected	0.95	0.96	1.00		1.00		0.95	0.98			1.00	1.00
Satd. Flow (prot)	1681	1693	2787		1863		1681	1732			1863	1583
Flt Permitted	0.95	0.96	1.00		1.00		0.95	0.98			1.00	1.00
Satd. Flow (perm)	1681	1693	2787		1863		1681	1732			1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	215	11	171	0	9	0	411	202	11	0	288	436
RTOR Reduction (vph)	0	0	76	0	0	0	0	2	0	0	0	192
Lane Group Flow (vph)	112	114	95	0	9	0	308	314	0	0	288	244
Turn Type	Split	NA	pm+ov		NA		Split	NA			NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	32.0	32.0	58.2		1.4		26.2	26.2			26.8	58.8
Effective Green, g (s)	32.0	32.0	58.2		1.4		26.2	26.2			26.8	58.8
Actuated g/C Ratio	0.30	0.30	0.55		0.01		0.25	0.25			0.26	0.56
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	512	515	1685		24		419	432			475	886
v/s Ratio Prot	0.07	0.07	0.01		c0.00		c0.18	0.18			c0.15	c0.08
v/s Ratio Perm			0.02									0.07
v/c Ratio	0.22	0.22	0.06		0.38		0.74	0.73			0.61	0.28
Uniform Delay, d1	27.2	27.2	10.8		51.4		36.2	36.1			34.5	12.0
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.0	1.0	0.0		3.6		7.0	6.4			2.5	0.2
Delay (s)	28.2	28.2	10.8		54.9		43.2	42.5			36.9	12.2
Level of Service	C	C	B		D		D	D			D	B
Approach Delay (s)		20.7			54.9			42.8			22.1	
Approach LOS		C			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

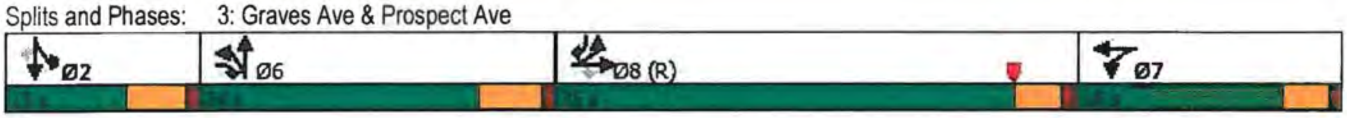
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	424	6	416	4	179	246	232	210
Future Volume (vph)	424	6	416	4	179	246	232	210
Turn Type	Split	NA	pm+ov	NA	Split	NA	NA	pm+ov
Protected Phases	8	8	6	7	6	6	2	8
Permitted Phases			8					2
Detector Phase	8	8	6	7	6	6	2	8
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.2	25.2	22.3	25.2	22.3	22.3	11.9	25.2
Total Split (s)	35.0	35.0	24.0	18.0	24.0	24.0	13.0	35.0
Total Split (%)	38.9%	38.9%	26.7%	20.0%	26.7%	26.7%	14.4%	38.9%
Yellow Time (s)	3.2	3.2	4.3	3.2	4.3	4.3	3.9	3.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.2	4.2	5.3	4.2	5.3	5.3	4.9	4.2
Lead/Lag	Lead	Lead		Lag				Lead
Lead-Lag Optimize?	Yes	Yes		Yes				Yes
Recall Mode	C-Max	C-Max	Min	None	Min	Min	None	C-Max

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 8:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 3: Graves Ave & Prospect Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	424	6	416	69	4	0	179	246	77	0	232	210
Future Volume (vph)	424	6	416	69	4	0	179	246	77	0	232	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Lane Util. Factor	0.95	0.95	0.88		1.00		0.95	0.95			1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	0.97			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1687	2787		1778		1681	1705			1863	1583
Flt Permitted	0.95	0.95	1.00		0.95		0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	1687	2787		1778		1681	1705			1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	451	6	443	73	4	0	190	262	82	0	247	223
RTOR Reduction (vph)	0	0	204	0	0	0	0	12	0	0	0	111
Lane Group Flow (vph)	230	227	239	0	77	0	171	351	0	0	247	112
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA			NA	pm+ov
Protected Phases	8	8	6	7	7		6	6		2	2	8
Permitted Phases			8									2
Actuated Green, G (s)	29.9	29.9	48.6		7.4		18.7	18.7			15.4	45.3
Effective Green, g (s)	29.9	29.9	48.6		7.4		18.7	18.7			15.4	45.3
Actuated g/C Ratio	0.33	0.33	0.54		0.08		0.21	0.21			0.17	0.50
Clearance Time (s)	4.2	4.2	5.3		4.2		5.3	5.3			4.9	4.2
Vehicle Extension (s)	3.0	3.0	3.9		2.0		3.9	3.9			3.9	3.0
Lane Grp Cap (vph)	558	560	1669		146		349	354			318	796
v/s Ratio Prot	c0.14	0.13	0.03		c0.04		0.10	c0.21			c0.13	0.05
v/s Ratio Perm			0.06									0.02
v/c Ratio	0.41	0.41	0.14		0.53		0.49	0.99			0.78	0.14
Uniform Delay, d1	23.3	23.2	10.3		39.6		31.4	35.6			35.7	11.9
Progression Factor	0.66	0.66	0.17		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	2.0	1.9	0.0		1.6		1.4	45.5			11.9	0.1
Delay (s)	17.4	17.2	1.8		41.2		32.9	81.1			47.5	12.1
Level of Service	B	B	A		D		C	F			D	B
Approach Delay (s)		9.7			41.2			65.6			30.7	
Approach LOS		A			D			E			C	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

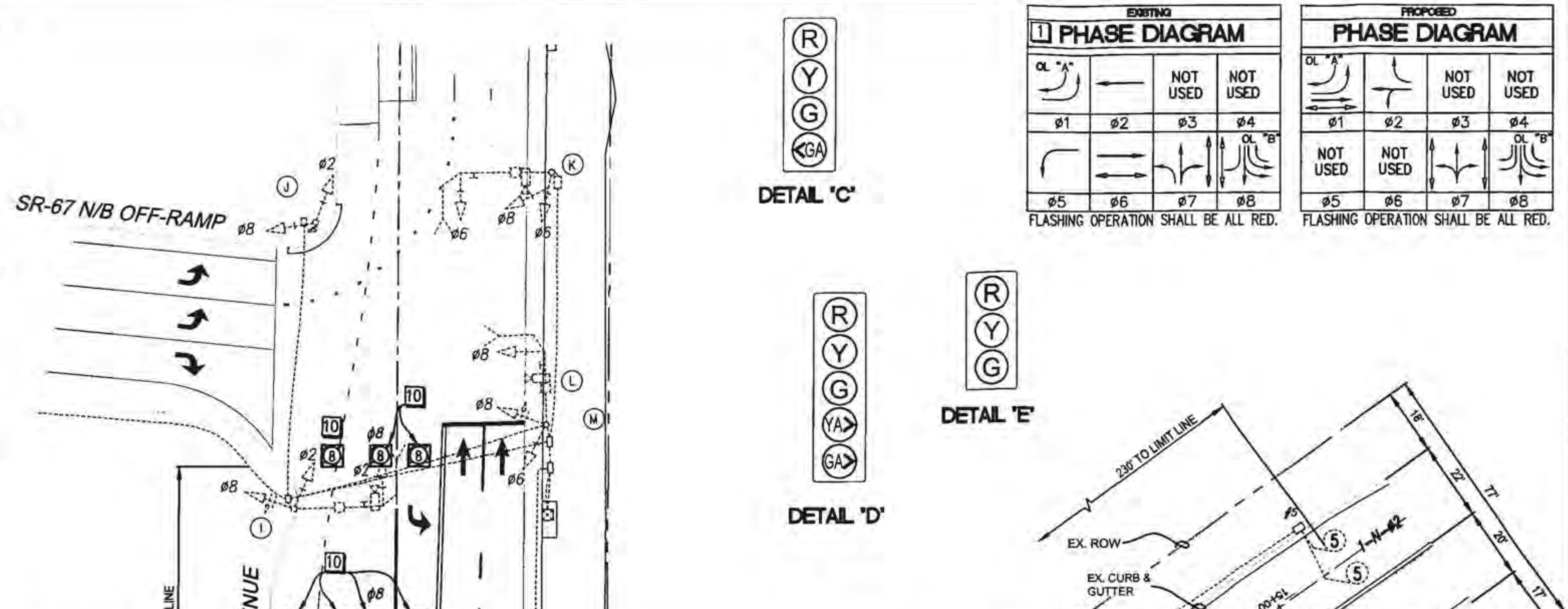
c Critical Lane Group

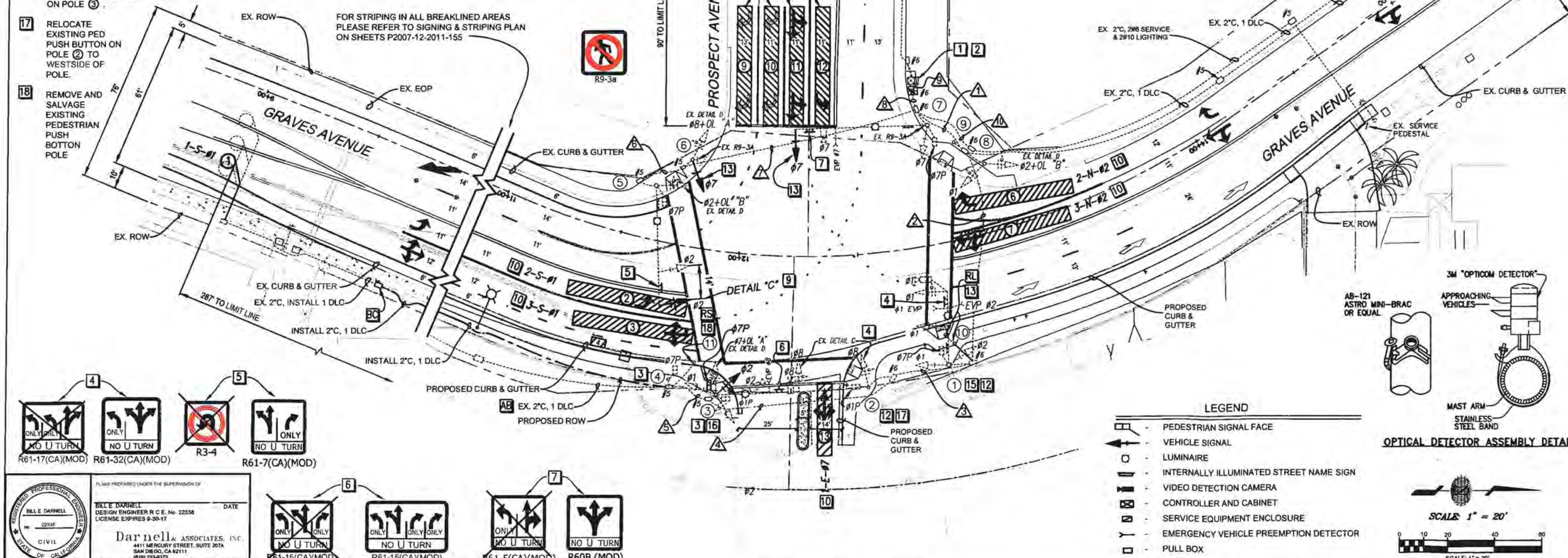
APPENDIX D

Prospect Avenue/Graves Avenue Intersection and Signalization Improvement Plan

CONSTRUCTION NOTES

1. MODIFY EXISTING 170 CONTROLLER AND CABINET TO PROVIDE THE OPERATION SHOWN ON THIS PLAN
2. THE CONTRACTOR SHALL REVISE FIELD WIRING CONNECTIONS IN THE CONTROLLER CABINET AND AT EACH POLE TO REFLECT THE PROPOSED CONTROLLER PHASING.
3. REMOVE AND SALVAGE EXITING POLE ④. RELOCATE PEDESTRIAN SIGNAL TO POLE ③ TO PROVIDE SV-2-T. REMOVE POLE ④ FOUNDATION.
4. REMOVE AND SALVAGE EXISTING R61-17(CA) MOD AND INSTALL R61-32(CA) MOD SIGN (SEE SIGN LEGEND BELOW).
5. REMOVE AND SALVAGE EXISTING R3-4 SIGN AND INSTALL R61-7(CA) MOD SIGN (SEE SIGN LEGEND BELOW).
6. REMOVE AND SALVAGE EXISTING R61-15(CA) MOD AND INSTALL MODIFIED R61-15(CA) SIGN WITH DOUBLE RIGHTS (SEE SIGN LEGEND BELOW).
7. REMOVE AND SALVAGE EXISTING R61-5(CA) MOD AND INSTALL MODIFIED R60B (CA) LEFT, THRU, RIGHT SIGN (SEE SIGN LEGEND BELOW).
8. REMOVE AND SALVAGE EXISTING 250 WATT HPS LUMINAIRE. INSTALL 150 WATT INDUCTION LUMINAIRE.
9. REMOVE AND SALVAGE EXISTING SIGNAL HEAD AND INSTALL NEW PER DETAIL "C".
10. CONTRACTOR TO MODIFY VIDEO DETECTION ZONES AS SHOWN ON PLAN.
11. CONTRACTOR SHALL ADJUST ALL EXISTING AND PROPROSED PULLBOXES TO FINISH GRADE.
12. CONTACTOR SHALL PATCH HOLES IN SIGNAL POLES WHERE PEDESTRIAN PUSH BUTTONS AND SIGNAL HARDWARE IS REMOVED.
13. MODIFY EXISTING 4-SECTION SIGNAL HEAD AND BACKPLATE TO PROVIDE 3-SECTION SIGNAL HEAD PER DETAIL "E".
14. ADJUST ALL PEDESTRIAN PUSH BUTTONS TO PROPER ADA HEIGHT.
15. REMOVE AND SALVAGE EXISTING PED PUSH BUTTON ON POLE ①.
16. INSTALL NEW PED PUSH BUTTON FOR PHASE ϕ7 ON POLE ③.
17. RELOCATE EXISTING PED PUSH BUTTON ON POLE ② TO WESTSIDE OF POLE.
18. REMOVE AND SALVAGE EXISTING PEDESTRIAN PUSH BOTTON POLE





LEGEND

- PEDESTRIAN SIGNAL FACE
- VEHICLE SIGNAL
- LUMINAIRE
- INTERNALLY ILLUMINATED STREET NAME SIGN
- VIDEO DETECTION CAMERA
- CONTROLLER AND CABINET
- SERVICE EQUIPMENT ENCLOSURE
- EMERGENCY VEHICLE PREEMPTION DETECTOR
- PULL BOX

PLANS PREPARED UNDER THE SUPERVISION OF
BILL E. DARNELL
DESIGN ENGINEER R.C.E. No. 22338
LICENSE EXPIRES 9-30-17

Darnell & ASSOCIATES, INC.
4411 MERCURY STREET, SUITE 207A
SAN DIEGO, CA 92111

DATE Sep. 12, 2016

BENCH MARK: CITY OF SANTEE VERTICAL CONTROL MONUMENT #2076 PER R.O.S. 11252, LOCATED AT THE INTERSECTION OF PROSPECT AVENUE AND ARGENT STREET ELEVATION 346.35 FEET (MSL)

SCALE: HORIZ. 1" = 20' VERT. N/A

DESIGNED BY BED | DRAWN BY DAB | CHECKED BY BED

CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES
TRAFFIC SIGNAL MODIFICATION PLAN FOR:
GRAVES AVE & PROSPECT AVE.
LANTERN CREST

CITY W.O. NO. P2007-12
DRAWING NO. 2016-199
SHEET 17 OF 18

Appendix C

Biological Survey Report

February 16, 2017

Mr. Michael Grant
Development Contractor, Inc.
110 Town Center Parkway
Santee, CA 92071

Reference: 8606 Graves Avenue Biology Survey Report (RECON Number 8615)

Dear Mr. Grant:

A biological survey was conducted within the proposed 8606 Graves Avenue project (project boundary) to determine the biological resources present. The purpose of this letter is to provide information on the current condition of the biological resources within the project boundary.

Introduction

The proposed project would construct a Starbucks and 7-Eleven at the northeast corner of Graves Avenue and Prospect Avenue in the city of Santee, California (Figure 1). The project boundary encompasses approximately one acre (Assessor's Parcel Number 384-142-21-00). The site is located within the El Cajon Land Grant of the El Cajon quadrangle U.S. Geological Survey (USGS) topographic map (Figure 2; USGS 1975). The project site is bounded by California State Route 67 (also known as San Vicente Freeway) to the west, Graves Avenue to the north and east, and Prospect Avenue to the south (Figure 3). The project boundary is further surrounded by a mosaic of residential and commercial development.

The proposed project is within the boundaries of the City of Santee draft Multiple Species Conservation Program Subarea Plan, which has yet to be approved (City of Santee 1996).

Methods

RECON biologist Mandy Weston conducted a biological survey on February 7, 2017, to determine the biological resources present within the one-acre project boundary. General plant and wildlife species were documented to identify any potential sensitive species or vegetation communities within the project boundary. All plant and wildlife species apparent at the time of the survey were recorded. Plant species that could not be readily identified in the field were collected and identified using a taxonomic key. Floral nomenclature follows that specified in the Jepson Online Interchange (University of California 2014). Zoological nomenclature for birds is in accordance with the American Ornithologist's Union Checklist (2015) and Revised Checklist of North American Mammals North of Mexico (Baker 2003). Vegetation community classifications follow Oberbauer (2008), which is based on Holland's 1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. Determination of the potential occurrence for listed, sensitive, or noteworthy species is based upon known ranges and habitat preferences for the species (Jennings and Hayes 1994; Unitt 2004; CNPS 2017; Reiser 2001), and species occurrence records from the California Natural Diversity Database (CNDDB; State of California 2017) and other sites in the vicinity of the survey area.

Biological Resources

The project boundary contains one acre of disturbed habitat (Figure 4; Photographs 1 and 2). The disturbed land within the project boundary is dominated by non-native plant species, including cheeseweed (*Malva parviflora*), redstem filaree (*Erodium cicutarium*), and short-pod mustard (*Hirschfeldia incana*) and includes some scattered native individual species that are too few and widespread to form a distinct native habitat. These native species consist of broom baccharis (*Baccharis sarothroides*), California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and saw-toothed goldenbush (*Hazardia squarrosa*).

A total of 17 plant species, 13 non-native species and four native species, were identified within the project boundary, and 10 wildlife species were identified within the project boundary. Complete lists of the plant and wildlife species identified within the project boundary are provided in Tables 1 and 2, respectively. No Narrow Endemic plant species were detected during the survey, and none are not expected to occur within the project boundary.

Table 1
Plant Species Observed

Scientific Name	Common Name
ANGIOSPERMS: MONOCOTS	
POACEAE (GRAMINEAE)	**GRASS FAMILY**
Cynodon dactylon (L.) Pers.	Bermuda grass (I)
Schismus barbatus (L.) Thell.	Mediterranean schismus (I)
ANGIOSPERMS: DICOTS	
ANACARDIA`CEAE	**SUMAC OR CASHEW FAMILY**
Schinus molle L.	Peruvian pepper tree (I)
Schinus terebinthifolius Raddi	Brazilian pepper tree (I)
ASTERACEAE	**SUNFLOWER FAMILY**
Artemisia californica Less.	California sagebrush
Baccharis sarothroides A. Gray	broom baccharis
Hazardia squarrosa (Hook. & Arn.) Greene	saw-toothed goldenbush
Senecio vulgaris L.	common groundsel (I)
BRASSICACEAE (CRUCIFERAE)	**MUSTARD FAMILY**
Hirschfeldia incana (L.) Lagr.-Fossat	short-pod mustard (I)
CHENOPODIACEAE	**GOOSEFOOT FAMILY**
Salsola tragus L.	Russian thistle, tumbleweed (I)
FABACEAE (LEGUMINOSAE)	**LEGUME FAMILY**
Melilotus indicus (L.) All.	sourclover (I)
Parkinsonia aculeata L.	Mexican palo verde (I)
GERANIACEAE	**GERANIUM FAMILY**
Erodium botrys (Cav.) Bertol.	long-beak filaree (I)
Erodium cicutarium (L.) L'Hér. ex Aiton	redstem filaree (I)
MALVACEAE	**MALLOW FAMILY**
Malva parviflora L.	cheeseweed, little mallow (I)
PLANTAGINACEAE	**PLANTAIN FAMILY**
Plantago lanceolata L.	English plantain (I)
POLYGONACEAE	**BUCKWHEAT FAMILY**
Eriogonum fasciculatum Benth.	California buckwheat
I = introduced species	

Table 2 Wildlife Species Observed	
Scientific Name	Common Name
BIRDS	
ACCIPITRIDAE	**HAWKS, KITES, & EAGLES**
Buteo jamaicensis	red-tailed hawk
COLUMBIDAE	**PIGEONS & DOVES**
Zenaida macroura marginella	mourning dove
TROCHILIDAE	**HUMMINGBIRDS**
Calypte anna	Anna's hummingbird
PARULIDAE	**WOOD WARBLERS**
Setophaga [=*Dendroica*] *coronata*	yellow-rumped warbler
EMBERIZIDAE	**EMBERIZIDS**
Melozone [=*Pipilo*] *crissalis*	California towhee
FRINGILLIDAE	**FINCHES**
Haemorhous [=*Carpodacus*] *mexicanus frontalis*	house finch
MAMMALS	
LEPORIDAE	**RABBITS & HARES**
Sylvilagus audubonii	desert cottontail
SCIURIDAE	**SQUIRRELS & CHIPMUNKS**
Spermophilus beecheyi	California ground squirrel
GEOMYIDAE	**POCKET GOPHERS**
Thomomys bottae	Botta's pocket gopher
CANIDAE	**CANIDS**
Canis latrans	coyote

Sensitive Biological Resources

The presence of sensitive biological resources and their potential for occurrence were evaluated within the project boundary. No sensitive biological resources, including sensitive plants or wildlife, were identified at the time of the survey. Additionally, no sensitive plants or wildlife species are anticipated to occur due to the high levels of disturbance (e.g., existing development, visible soil disturbance, and prevalence of non-native species) and lack of native habitat within the project boundary. One sensitive bird species, coastal California gnatcatcher (*Polioptila californica californica*), has been known to occur within 0.25 mile of the project boundary (State of California 2017). This species is not anticipated to occur within the project boundary due to lack of suitable coastal sage scrub habitat for nesting. No Narrow Endemic species were identified during the survey, and none are expected to occur.

Impacts

The project would impact one acre of disturbed habitat (see Figure 4). Impacts to disturbed habitat are not considered significant, as this land cover type is not considered a sensitive biological resource. No impacts to sensitive plant or wildlife species are anticipated, as no sensitive species were identified within the project boundary and none are expected to occur. There is a potential for the project to have direct impacts on nesting and migratory bird species from the removal of trees within the project boundary. However, the Migratory Bird Treaty Act of 1918 (MBTA) and California Department of Fish and Game Code 3503 (CDFG code) require that no direct impacts shall occur to any nesting birds or their eggs, chicks, or nests during the breeding season (i.e., February 15–September 15). Thus, project compliance with existing regulations would ensure that impacts to nesting and migratory birds would be less than significant. If project grading and/or brush management is proposed during the bird breeding season or an active nest is noted, nest avoidance measures would be required in accordance with the MBTA and CDFG code. Direct impacts to nesting and migratory birds would be less than significant.

Mitigation

Mitigation is required for impacts that are considered significant under the California Environmental Quality Act. As no significant impacts would occur, no mitigation would be required.

Conclusion

The project boundary does not contain any sensitive vegetation communities, plants, or wildlife. Compliance with existing regulations would ensure that potential impacts to migratory or nesting birds during construction would be less than significant. If you have any questions concerning the contents of this letter, please contact me at (619) 308-9333 x153 or mweston@reconenvironmental.com

Sincerely,

Mandy Weston
Biologist

MEW:eab

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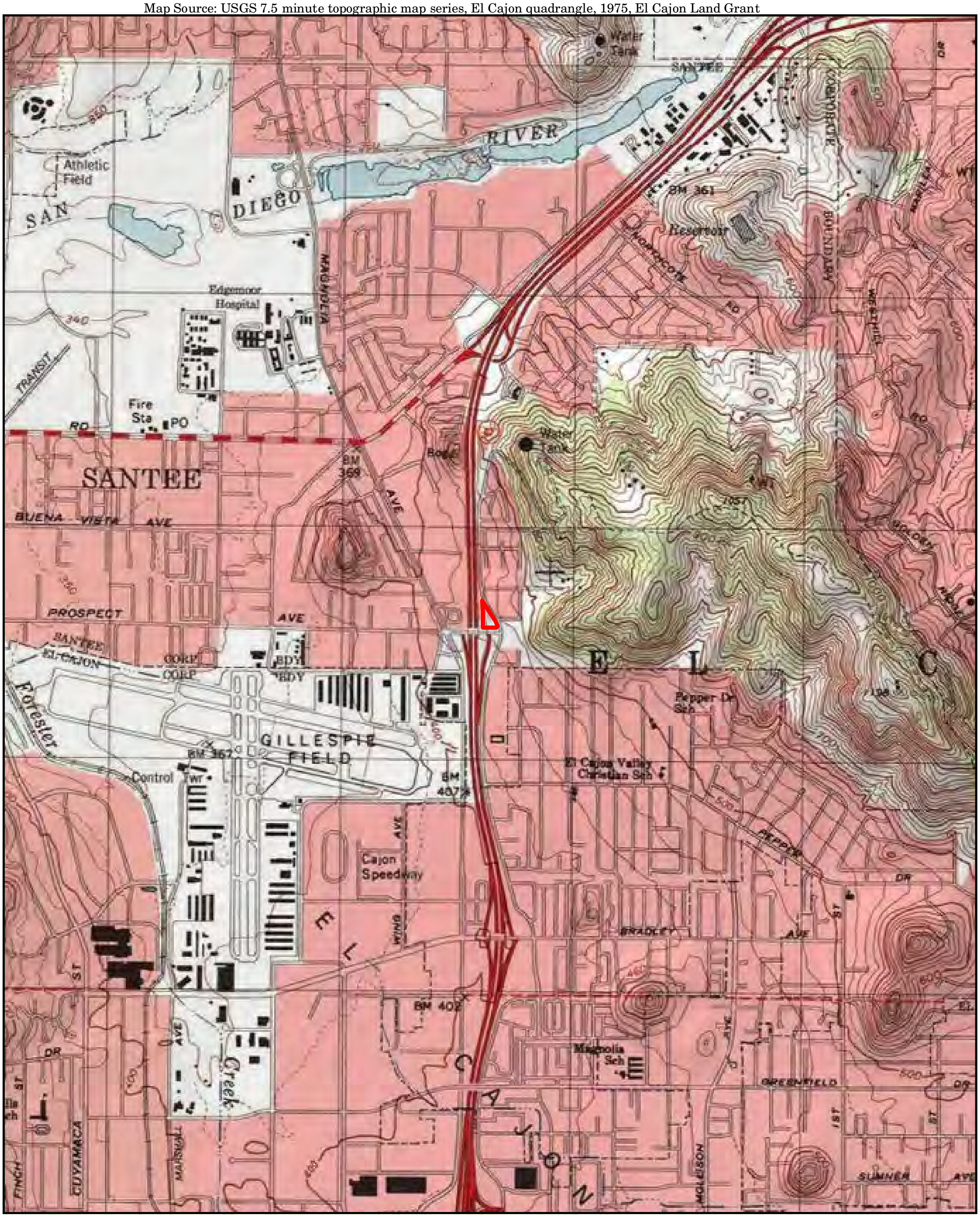
Project Location

FIGURE 1
Regional Location

RECON

\\serverfs01\gis\JOBS5\8615\common_gis\fig1.mxd 2/13/2017 fmm

Map Source: USGS 7.5 minute topographic map series, El Cajon quadrangle, 1975, El Cajon Land Grant



0 Feet 2,000

Project Boundary

FIGURE 2

Project Location on USGS Map

RECON

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Image Source: Nearmap (flown January 2017)

Project Boundary

FIGURE 3

Project Location on Aerial Photograph

RECON

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Image Source: Nearmap (flown January 2017)

Project Boundary

Disturbed Habitat

RECON

FIGURE 4

Vegetation Community on Aerial Photograph

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PHOTOGRAPH 1
View of Project Site Looking Southwest

PHOTOGRAPH 2
View of Project Site Looking North-Northwest

Appendix D

Phase I Environmental Site Assessment

CERES

Advantaged Asset Acquisitions I, LLC

PHASE I
ENVIRONMENTAL SITE ASSESSMENT *

Undeveloped Property
8606 Graves Avenue
Santee, California

CERES, Corp.

4617 CALAVO DRIVE
LA MESA, CALIFORNIA 91941
Phone (800) 258-1490

*** Based on guidelines designated in ASTM E 1527-13 for the Phase I Environmental Site Assessment Process**

CERES

To the user:

This Phase I Environmental Site Assessment (ESA) report is designed by CERES and is based on the *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* developed by the American Society for Testing and Materials (ASTM) Committee E-50 on Environmental Assessment, designated E 1527-13. The purpose of E 1527-13 is to define good commercial and customary practice in the United States of America for conducting an ESA of a parcel of commercial real estate with respect to the range of contaminants within the scope of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. As such, this practice is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations on CERCLA liability; that is, the practices that constitute "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" as defined in 42 USC Section 9601(35)(B). An evaluation of business environmental risk associated with a parcel of commercial real estate may necessitate investigation beyond that identified in this practice (ASTM E 1527-13, Section 1.1).

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in Section 312.10 of 40 CFR 312 and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. Unless otherwise indicated herein, we have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312 (ASTM E 1527-13, Sections 12.13.1 and 12.13.2). Qualifications of the individuals who prepared this report are included in Appendix A - Professional Qualifications (ASTM E 1527-13, Section 12.14).

CERES

COVER: View of the Property looking northeastward from near its southwesternmost corner

CERES

Prepared for:

Advantaged Asset Acquisitions I, LLC
8510 Railroad Avenue
Santee, California 92072

PHASE I ENVIRONMENTAL SITE ASSESSMENT
Undeveloped Property
8606 Graves Avenue
Santee, California

Project C477-01

Prepared by:

____
Scott W. Green
Senior Environmental Specialist

Reviewed by:

____
Jeffrey B. Fleming, REPA #994321
President

(E 1527-13, Section 12.12)

***CERES*, Corp.**
4617 Calavo Drive
La Mesa, California 91941
(800) 258-1490 / Fax (208) 765-1745

May 5, 2017

TABLE OF CONTENTS

1.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

At the request of Advantaged Asset Acquisitions I, LLC, CERES Corp., (CERES) completed a Phase I Environmental Site Assessment (ESA) of an undeveloped property located at 8606 Graves Avenue within the city limits of Santee, San Diego County, California (Property) (refer to Figure 1 - Property Location Maps). The Phase I ESA included: a Property and adjoining sites reconnaissance; interviews with informed persons; reviews of public records, historical topographic maps, aerial photographs, and an environmental database report.

The reported 1.09-acre Property is located at the northwest corner of the Graves Avenue and Prospect Avenue intersection. It is reportedly owned by Advantaged Asset Acquisitions I, LLC. The undeveloped , relatively flat Property was covered with weedy vegetation and several trees at the time of the Property reconnaissance. The perimeter of the Property was partially fenced.

CERES has performed a Phase I ESA in conformance with the scope and limitations of ASTM E 1527-13 of the Property and to the limitations provided in Section 6.0 of this report. Any exceptions to, or deletions from, this practice, if any, are described herein. This assessment has revealed no evidence of recognized environmental conditions (including historical and controlled) in connection with the Property (E 1527-13, Section 12.8.1). Based on the findings of this assessment, CERES does not recommend additional assessment at this time (E 1527-13, Sections 12.5. and 12.6).

2.0 PHYSICAL SETTING

2.1 UNITED STATES GEOLOGICAL SURVEY (USGS) MAP REVIEW (E 1527-13, Section 8.2.4)

The elevation of the Property ranges from approximately 440 to 450 feet above mean sea level (amsl). The immediate surrounding area of the Property slopes westward at a gradient of approximately 6.0 x 10^{-2} feet per foot. The nearest surface water to the Property is the San Diego River which is located about 1.1 miles to the north-northwest (United States Geological Survey [USGS], 1967, *El Cajon Quadrangle, California - San Diego County, 7.5 Minute Series (Topographic)*; photorevised 1975, scale 1:24,000).

2.2 PROPERTY ENVIRONMENTAL CONDITIONS (E 1527-13, Section 9.4.1.6)

The Property is underlain by Mesozoic -age granitic rocks consisting of biotite granite (gr_3). This light- to dark-colored granite is characterized by abundant coarse pink to gray feldspar and biotite (California Division of Mines and Geology, 1992, *Geologic Map of California, San Diego - El Centro Sheet*). Soil underlying the Property is described as Visalia sandy loam, 9 to 15 percent slopes (VaD). This strongly sloping soil generally occurs at the base of steep slopes. In many areas it formed in colluvium of sandy loam texture. Runoff is medium and VaD has a moderate erosion hazard. The Visalia series consists of moderately well drained, very deep sandy loams derived from granitic alluvium (United States Department of Agriculture, Soil Conservation Service and Forest Service, 1973, *Soil Survey, San Diego Area, California*).

Depth to groundwater beneath the Property was not found. Groundwater depth reportedly ranged from 19 to 23 feet below ground surface (bgs) as measured from groundwater monitoring wells installed at 10775 Rockville Street. The measurements were made in 1998 and 1999. This site is located about 1,200 feet north-northwest of the northern Property corner (across California State Highway 67). Groundwater flow direction was not reported from this site (Geocon, Inc., July 12, 2016, *Soil Management Plan, Santee Self-Storage, 10775 Rockville Street, Santee, California*). Based on an interpretation of elevation contours, groundwater beneath the Property is expected to flow approximately westward.

The Property is located in the Santee Hydrologic Subarea of the Lower San Diego Hydrologic Area of the San Diego Hydrologic Unit of the San Diego Basin Planning Area (907.12). Groundwater in the Santee Hydrologic Subarea is beneficial for municipal, agricultural, and industrial supply and process uses (California Regional Water Quality Control Board, 1994, *Water Quality Control Plan for the San Diego Basin (9)*).

3.0 PROPERTY RECONNAISSANCE

3.1 PROPERTY AND ADJOINING SITES DESCRIPTION

An unaccompanied walking reconnaissance of the Property was made on May 4, 2017, by Mr. Scott Green. Environmental irregularities, problems, and concerns, if noted, were marked on a map drawn by CERES in the field (E 1527-13, Section 9.2.3). The Property was observed for evidence of hazardous substances that may affect the environmental quality of the Property. CERES observed the Property for evidence of aboveground and underground storage tanks (ASTs and USTs), surface staining, hazardous materials, suspected polychlorinated biphenyls (PCBs)-containing devices, asbestos-containing building materials (ACBMs), and other indications of environmental concern.

The reported 1.09-acre Property is undeveloped and characterized as relatively flat and covered in weedy vegetation interspersed with a few trees. The perimeter of the Property is partially fenced. Refer to Figure 2 and Photographs 1 through 6 in Section 7.0 - Property Photographs (E 1527-13, Section 9).

POTABLE WATER (E 1527-13, Section 9.4.1.9)

Potable water is not currently provided to the Property. Padre Dam Municipal Water District is the likely source of water for future developments.

HEATING AND COOLING (E 1527-13, Section 9.4.3.1)

Heating, ventilation and air conditioning energy s not currently provided to the Property. The source of this energy for future developments is expected to be San Diego Gas and Electric (SDG&E).

SEWAGE DISPOSAL SYSTEM (E 1527-13, Sections 9.4.1.10 and 9.4.4.7)

Sewage disposal for the Property is not currently provided to the Property. Padre Dam Municipal Water District will likely provide municipal sewer service to future developments. Evidence of cesspools was not found.

INTERIOR--STAINS, CORROSION, DRAINS, AND SUMPS (E 1527-13, Sections 9.4.3.2 and 9.4.3.3)

Interior spaces are not present at the Property.

EXTERIOR–PITS, PONDS, LAGOONS, SURFACE STAINING, STRESSED VEGETATION, AND WELLS (E 1527-13, Sections 9.4.4.1, 9.4.4.2, 9.4.4.3, and 9.4.4.6)

Pits, ponds, lagoons, significant surface staining, stressed vegetation, and wells were not observed on the Property.

SOLID WASTE AND WASTE WATER (E 1527-13, Sections 9.4.4.4 and 9.4.4.5).

Solid waste and waste water were not observed on the Property.

CURRENT AND PAST USES OF ADJOINING SITES AND SURROUNDING AREA (E 1527-13, Sections 9.4.1.3, 9.4.1.4, and 9.4.1.5)

Sunset Trails Apartments (a large, multi-building apartment complex addressed 8655 Graves Avenue) adjoins the Property to the north and northwest, across Graves Avenue. Undeveloped parcels of land and the terminus to an off-ramp from California State Highway 67, adjoin the Property to the south, across Prospect Avenue. East of the approximate southern half of the Property, across Graves Avenue, is the entry (i.e., paved driveway) to the residential complex known as Lantern Crest Senior Living. Adjoining the Property to the west is a sloped easement leading to California State Highway 67. The immediate surrounding area of the Property is dominated by multi-family residential use.

3.2 HAZARDOUS MATERIALS

HAZARDOUS MATERIALS (E 1527-13, Sections 9.4.2.3, 9.4.2.8 and 9.4.2.9)

Evidence of the storage of hazardous materials was not observed at the Property.

STORAGE TANKS (E 1527-13, Section 9.4.2.4)

Evidence of USTs, ASTs, clarifiers, and other hazardous materials storage tanks was observed during the Property reconnaissance.

ODORS, POOLS OF LIQUID, DRUMS (E 1527-13, Sections 9.4.2.5, 9.4.2.6 and 9.4.2.7)

Evidence of unusual odors, pools of liquid, or drums was not observed during the Property reconnaissance.

POLYCHLORINATED BIPHENYLS (PCBs) (E 1527-13, Section 9.4.2.10)

Evidence of PCBs was not found during the Property reconnaissance.

4.0 INTERVIEWS AND DATABASE REVIEW

4.1 INTERVIEWS

- CERES interviewed Ms. Shannon Hines, a representative of the Property owner, for information regarding past uses of the Property and the use, storage, or disposal of hazardous materials on the Property. Ms. Hines indicated that she was not aware of any issues regarding hazardous materials/wastes associated with the Property. She was also not aware of the presence or past presence of Property USTs or other subsurface features of concern (E 1527-13, Section 10).

- Mr. Michael Grant, a Property owner, completed a *User Questionnaire* (UQ) provided by CERES. Mr. Grant did not indicate environmental issues regarding the Property on the UQ. Refer to Appendix B - Additional Records for a copy of the completed UQ (E 1527-13, Section 10).

- CERES contacted the County of San Diego Department of Environmental Health (DEH) with a request to research UST and hazardous materials files for the Property address. According to Mr. Edwin C. Andrus of the DEH, records for the Property address were not found (E 1527-13, Section 11).

All pertinent records may not have been available for this review. If a site is currently under litigation, the file information will not be made available. In addition, some public records may be filed by information that was not given to CERES, i.e. incident date, and thus may not have been accessed.

4.2 ENVIRONMENTAL DATABASE REVIEW

CERES subcontracted the services of an environmental database search firm to provide a list of sites within designated distances of the Property that are listed by regulatory agencies as having potential environmental concern (refer to Appendix C - Environmental Database Report). This is done to assess the potential for offsite contamination which may adversely affect the environmental quality of the Property. A table is provided in Appendix C indicating referenced agency lists and the distances from the Property for which searches are conducted (E 1527-13, Section 8.2.1.1).

The environmental database report was generated on April 27, 2017. Selected sites found on referenced agency lists within the designated distances of the Property are discussed below. Sites which are listed as not requiring further action (NFA) or were deemed by CERES to be too distant to represent an environmental concern, are excluded from the discussion. Acronyms placed in bold letters refer to database lists and the bold number is the map identification number. The Property and its adjoining sites were not found on referenced agency lists. The nearest **Leaking UST** site to the Property is as follows:

CERES

A1 Prospect Plaza Enterprises, 8518 Magnolia Avenue, is reportedly located 0.129 miles southwest of the Property (across California State Highway 67), and is listed on **SWEEPS UST**, **SAN DIEGO CO. SAM** and **LUST**, as a facility that was assigned an unauthorized release case by the DEH (H20822-001). The case involved ten USTs that were formerly operated at the site and during removal were discovered to have impacted the soil/groundwater with gasoline. Case H20822-001 was opened in February 1986, and after the completion of cleanup and abatement orders, the DEH closed the April 5, 2002. Based on case status and distance, this site does not represent a significant risk to the environmental integrity of the Property.

Other than the aforementioned, there are numerous sites listed on various agency lists within one-half mile of the Property. This is reflective of the light industrial nature of the immediate surrounding area of the Property. Based on distance and/or case status, the sites listed in the database report are not considered by CERES to represent a significant environmental concern to the Property.

Munger Map Book, California-Alaska Oil and Gas Fields, 1994, is a compilation of maps produced by the State of California Department of Natural Resources - Division of Oil and Gas, Oil Operators, Munger Oilogram, and other journals of present or past drilling locations for oil and gas exploration. CERES reviewed the map book to assess if oil wells were located on the Property. Wells were not depicted on the Property or on its adjoining sites.

5.0 HISTORICAL REVIEW

5.1 HISTORICAL AERIAL PHOTOGRAPHS AND TOPOGRAPHIC MAP

Historical aerial photographs were reviewed by CERES using an Abrams Instrument Corporation stereoscope, model CB-1, with a built-in 2-power magnifier, and 4-power binoculars. During review, CERES looked for evidence of hazardous materials and features that might affect the environmental quality of the Property, such as sumps, pits, ponds, lagoons, ASTs, landfills, outside storage of hazardous materials, and general land use (E 1527-13, Section 8.3.4.1).

This review has been supplemented by geographic place names and other data obtained in other assessment activities of this ESA. Eleven aerial photographs, one set of stereoscopic aerial photographs, and one topographic map were reviewed as follows.

SOURCE	YEAR/DATE	PRINTED SCALE	MEDIUM
County of San Diego	1928	1 inch equals 1,000 feet	Stereoscopic Aerial Photographs
historicaerials.com	1953	not printed	Single Aerial Photograph
CERES Archives (XI-SD-12-13)	March 4, 1958	1 inch equal 3,250 feet	Single Aerial Photograph
historicaerials.com	1964	not printed	Single Aerial Photograph
historicaerials.com	1966	not printed	Single Aerial Photograph
historicaerials.com	1971	not printed	Single Aerial Photograph
historicaerials.com	1980	not printed	Single Aerial Photograph
historicaerials.com	1989	not printed	Single Aerial Photograph
Google Earth	May 30, 1994	not printed	Single Aerial Photograph
Google Earth	June 27, 2002	not printed	Single Aerial Photograph
Google Earth	August 23, 2010	not printed	Single Aerial Photograph
Google Earth	October 27, 2012	not printed	Single Aerial Photograph
United States Geological Survey	1967, Photorevised 1975	1 inch equals 2,000 feet	El Cajon Quadrangle Topographic Map

Aerial Photographs

1928 - The Property was undeveloped and may have been utilized for limited agricultural use. Land use in the Property vicinity was a mix of residential, agricultural, and undeveloped sites. Graves Avenue and California State Highway 67 were not present.

1953 - The Property was undeveloped and appeared to be part of two agricultural fields. The immediate surrounding area of the Property was also in agricultural use. A small house was nearby at the approximate location of the entrance to Lantern Crest Senior Living. Graves Avenue and California State Highway 67 were not present. A narrow, unpaved road was in the place of Prospect Avenue.

1958 - Significant discernible changes to the Property and its adjoining sites were not observed from what was noted in the 1953 photograph.

1964 - The approximate northern half of the Property was undeveloped without a discernible use. The approximate southern half of the Property was developed with a small structure near its southeasternmost corner. Remaining areas of the Property appeared cultivated. A small commercial structure adjoined the Property to the northeast, across Graves Avenue. What appeared to be a residence with associated outbuildings adjoined the Property to the east, across Graves Avenue. Undeveloped land adjoined the Property to the south, across Prospect Avenue. Graves Avenue and Prospect Avenue were apparent as paved roads. The existing Prospect bridge over California State Highway 67 was present. The portion of California State Highway 67 adjoining the western Property border appeared to be under construction.

1966 - The approximate northern half of the Property was undeveloped without a discernible use. The approximate southern half of the Property was developed with three small structures. This portion of the Property appeared to be used as a plant nursery. Similar structures to what was observed in the 1966 photograph adjoined the Property to the northeast and east, across Graves Avenue. This area may have been used as a plant nursery as well. California State Highway 67 adjoined the western Property. Undeveloped parcels of land and the terminus to an off-ramp from California State Highway 67 adjoined the Property to the south, across Prospect Avenue.

1971- Except that a small commercial building had been removed from the adjoining site to the northeast, across Graves Avenue, significant discernible changes to the Property and its adjoining sites were not observed from what was noted in the 1966 photograph.

1980 - Except that the suspect nursery operation east of the Property, across Graves Avenue, had been diminished in size, significant discernible changes to the Property and its adjoining sites were not observed from what was noted in the 1971 photograph.

1989 - The Property was undeveloped and cleared of vegetation. Existing Sunset Trails Apartments adjoined the Property to the north and northeast, across Graves Avenue. Undeveloped land adjoined the approximate southern half of the Property to the east, across Graves Avenue. Significant discernible changes to the Property's other adjoining sites were not observed from what was noted in the 1980 photograph

1994 - Except that the Property was overgrown with weedy vegetation and a few trees, significant discernible changes to the Property and its adjoining sites were not observed from what was noted in the 1989 photograph.

2002 - Significant discernible changes to the Property and its adjoining sites were not observed from what was noted in the 1994 photograph.

2010 - Significant discernible changes to the Property and its adjoining sites were not observed from what was noted in the 2002 photograph.

2012 - The existing entrance to the Lantern Crest Senior Living complex adjoined the approximate southern half of the Property to the east, across Graves Avenue. Significant discernible changes to the Property and its other adjoining sites were not observed from what was noted in the 2010 photograph.

Topographic Map (E 1527-13, Section 8.3.4.5)

CERES reviewed *El Cajon Quadrangle, California - San Diego County, 7.5 Minute Series (Topographic)* map printed at a scale of one inch equals 2,000 feet (USGS, 1967, photorevised 1975). This map depicts features from 1967 and 1975 as photorevisions, as follows:

1967 - The Property was depicted with two small structures. Graves Avenue, Prospect Avenue, and California State Highway 67 were depicted. Undeveloped land was depicted to the north, south, and east of the Property.

1975 - Photorevised features were not depicted on the Property or on its adjoining sites.

5.2 BUILDING DEPARTMENT RECORDS

CERES requested a review of building department records for the Property at the City of Santee Building Department. Building permits indicating previous use and occupants of the Property were found as follows:

YEAR	DOCUMENT
1987	Permit application by Alice Johnson for a "Kiosk Sign"

Information regarding uses of the Property prior to 1987, was not found at the City of Santee Building Department (E 1527-13, Section 8.3.4.7).

5.3 ADDITIONAL HISTORICAL SOURCES

The aforementioned sources of historical information provided historical information of the Property use pursuant to Section 8.3 of E 1527-13; thus, additional information and reports were not reviewed for this ESA.

5.4 SUMMARY OF HISTORICAL USE

Based on reviews of available historical records, the Property was undeveloped and in agricultural use from as early as 1928 to 1958. By 1964 a small structure had been built near the southeasternmost corner of the Property, and the existing Graves Avenue and Prospect Avenue intersection had been constructed. A small cultivated area was also noted on the Property in this year. From about 1966 to sometime in the 1980s, the approximate southern half of the Property was developed with three small structures, and this area appeared to be used as a plant nursery. By 1989, this use had ceased and the Property was undeveloped without a discernible use. Reasonably ascertainable historical information dated prior to 1928, was not found during the assessment activities of this Phase I ESA (E 1527-13, Section 8.3.2).

6.0 LIMITATIONS

The scope of work described herein is designed to meet the minimum requirements of ASTM document E 1527-13. However, it is not intended to be all inclusive, identify all potential concerns, or eliminate the possibility of the Property having some degree of environmental problems. It is possible that variations in soil or groundwater conditions or unpermitted, undocumented, or concealed improvements or alterations to the Property could exist beyond what was found during this ESA. Changes in observed conditions could also occur in the future due to variations in environmental and physical conditions.

Any geologic and hydrogeologic data are gathered for drawing conclusions, by CERES, within the context and timing of this report only.

No ESA can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. Performance of Practice E 1527-13 is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with a property, and this practice recognizes reasonable limits of time and cost (E 1527-13, Section 4.5.1).

All appropriate inquiry does not mean an exhaustive assessment of a clean property. There is a point at which the cost of information obtained or the time required to gather it outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of transactions. One of the purposes of E 1527-13 is to identify a balance between the competing goals of limiting the costs and time demands inherent in performing an ESA and the reduction of uncertainty about unknown conditions resulting from additional information (E 1527-13, Section 4.5.2). Not every property will warrant the same level of assessment (E 1527-13, Section 4.5.3).

Much of the information on which the conclusions and recommendations of this ESA are based comes from data provided by others. CERES is not responsible for the accuracy or completeness of this information. CERES is not required to verify independently the information provided [from others] but may rely on information provided (E 1527-13, Section 7.5.2.1). Inaccurate data or information that was not found or made available to CERES may result in a modification of the presented conclusions and recommendations.

REPORT USE

This report was prepared for the sole use and benefit of Advantaged Asset Acquisitions I, LLC. This report is not a legal opinion and does not offer warranties or guarantees.

CERES would like to thank Advantaged Asset Acquisitions I, LLC, for the opportunity to work on this project. We look forward to working together on future projects.

7.0 PROPERTY PHOTOGRAPHS

Photograph 1: View of the Property looking northeastward from near its southwesternmost corner

Photograph 2: View of the Property looking northwestward from near its southeasternmost corner

Photograph 3: View of the Property looking northward from near its southeasternmost corner

Photograph 4: View of the approximate southern half of the Property looking southwestward from along the eastern Property border

Photograph 5: View of the central portion of the Property looking westward from along the eastern Property border

Photograph 6: View of the Property looking southward from near the northernmost Property corner

FIGURES

Delorme Street Atlas USA 2015

Undeveloped Property
8606 Graves Avenue
Santee, California

N

Property Location Maps

FIGURE 1

CERES

Project C477-01 May 2017

Approximate scale: 1 inch = 90 feet

underlying image courtesy of Google Earth collection date: November 8, 2016

Undeveloped Property
8606 Graves Avenue
Santee, California

approximate Property border

Adjoining sites in italics

N

Property Map

FIGURE
2

CERES Project C477-01 May 2017

APPENDIX A
PROFESSIONAL QUALIFICATIONS

SCOTT W. GREEN

SENIOR ENVIRONMENTAL SPECIALIST

Education

Degree

Bachelor of Science, Environmental Science, University of California, Santa Barbara, California

Certification

OSHA, Hazardous Waste Operators and Emergency Response (HAZWOPER) Standard, 29 CFR 1910.120(e) and 8 CCR 5192(e), Environmental Training and Compliance

Registration

State of Nevada, Certified Environmental Manager

Summary of Experience

Mr. Green has twenty-three years experience in conducting and managing environmental investigations. His experience includes supervision of assessment and remediation projects associated with contaminated soil and groundwater sites, including underground storage tank removals, groundwater and vadose zone well completions, and soil and groundwater quality assessment and mitigation. He is experienced in interfacing with clients and regulatory agencies. Mr. Green is also experienced in conducting and managing Phase I, II, and III Environmental Site Assessments (ESAs) and Transaction Screen Assessments (TSAs) for property transfers. He has conducted these assessments and surveys at a large variety of sites, including commercial, residential, agricultural, and undeveloped properties throughout California, Arizona, and Nevada.

JEFFREY B. FLEMING
PRESIDENT/ENVIRONMENTAL SPECIALIST

Education

Degrees

Bachelor of Science, Physics/Scientific and Technical Communication, University of Washington, Seattle, Washington

Master of Arts, Physical Geography, San Diego State University, San Diego, California

Registrations

National Registry of Environmental Professions, Registered Environmental Property Assessor (REPA) #994321

Mr. Fleming was a State of California Registered Environmental Assessor (#7055) from 1997 through 2012. The State of California discontinued this program in 2012.

Summary of Experience

Mr. Fleming has twenty-seven years experience conducting and managing environmental investigations, teaching environmental science, and managing environmental risk. His environmental work experience includes private consulting, County government, banking, and college-level instruction. He has conducted or managed Phase I, II, and III Environmental Site Assessments (ESAs), Transaction Screens, Second Level Reviews, asbestos surveys, and lead-in-paint sampling. He has conducted these assessments and surveys at a large variety of sites, including commercial, residential, agricultural, and undeveloped properties. His fieldwork experience includes borehole drilling; underground storage tank removal; groundwater, surface water, soil, and soil vapor sampling; and geophysical surveys.

As an Environmental Resources Specialist III with the Orange County Environmental Management Agency, California, Mr. Fleming was tasked with the management of Phase I ESAs, conducted storm water sampling and gauging, and assisted in the development of Best Management Practices in the control of storm water runoff quality. As an Environmental Analyst with a major bank in the State of California, Mr. Fleming assessed and managed environmental risk associated with collateralized loans and foreclosures. He was active in the supervision of Phase II assessments and Phase III characterization activities. His teaching experience at San Diego State University and the University of Wisconsin - Madison included undergraduate instruction in physiography, hydrology, and climatology.

APPENDIX B
ADDITIONAL RECORDS

CERES CERES PROJECT NUMBER: C477-01

CERES, Corp., is conducting a Phase I Environmental Site Assessment of:
Undeveloped Property, 8606 Graves Avenue, Santee, California (Property)

Property Name and Address

Please complete this User Questionnaire in order to qualify for one of the Landowner Liability Protections offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001. Failure to provide this information could result in a determination that "all appropriate inquiry" is not complete (E 1527-13, Appendix X3). After completion, please fax back to 208.765.1745, email to jefffleming@roadrunner.com, or call 800.258.1490 for mailing instructions.

1) Are you aware of any environmental cleanup liens against the Property that are filed or recorded under federal, tribal, state or local law?

YES ☐ NO ☒ Comments:

2) Are you aware of any Activity and Use Limitations (AULs), such as engineering controls, land use restrictions or institutional controls that are in place at the Property and/or have been filed or recorded in a registry under federal, tribal, state or local law?

YES ☐ NO ☒ Comments:

3) Do you have any specialized knowledge or experience related to the Property or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the Property or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business?

YES ☐ NO ☒ Comments:

4) Does the purchase price being paid for this Property reasonably reflect the fair market value of the Property? If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the Property?

YES ☒ NO ☐ Comments:

5) Are you aware of commonly known or reasonably ascertainable information about the Property that would help the environmental professional to identify conditions indicative of releases or threatened releases? [For example: past uses(s), chemical use, spills/releases, environmental cleanups].

YES ☐ NO ☒ Comments:

6) Based on your knowledge and experience related to the Property, are there any obvious indicators that point to the presence or likely presence of contamination at the Property?

YES ☐ NO ☒ Comments:

7) Do you have any other knowledge or experience with the Property that may be pertinent to the environmental professional? [For example: copies of prior environmental site assessment reports, correspondence, etc.].

YES ☐ NO ☒ Comments:

Michael Grant 4/25/17

Completed By (Signature) Date

Michael Grant, Pres M. Grant Corp. Managing member

Printed Name Title

APPENDIX C
ENVIRONMENTAL DATABASE REPORT

Appendix E

Geotechnical Investigation Report and Infiltration Testing Results

August 30, 2016 (Revised September 28, 2018)

Development Contractor, Inc.
110 Town Center Parkway
Santee, CA 92071

Attention: Michael Grant, President

SUBJECT: Infiltration Testing Results
8606 Graves Avenue
Santee, California

Mr. Grant:

In accordance with our proposal dated July 13, 2016, Group Delta Consultants, Inc. (Group Delta) is submitting the results from the infiltration testing for the proposed development of the above referenced site. Figure No. 1 shows the location of the site. We have revised this letter to respond to a comment in a City of Santee review letter dated July 18, 2017 requesting an update to incorporate the latest proposed plans.

We have based on our understanding of the project on a preliminary grading plan prepared by Walsh Engineering & Surveying dated August 30, 2017 that shows the location of the two proposed infiltration basins. The basins will be in undeveloped landscaped areas within the western portion of the site. An approximately 10-foot high Segmental Retaining Wall (SRW) will form a portion of the basin walls. The bottom elevation of the basins (441.0 and 442.5 feet) will be located a minimum horizontal distance ranging from about 25 to 30 feet from the corresponding elevation (441.0 and 442.5 feet) near the crest of an existing west facing cut slope along the eastern side of State Route 67. Figure No. 2 shows the location of the proposed infiltration basins. The latest preliminary grading is also attached for reference.

PURPOSE and SCOPE OF WORK

The purpose of our geotechnical services was to evaluate the geotechnical aspects of storm water management in accordance with the City of Santee Design Manual. The scope of work consisted of the following tasks:

- Evaluation of Feasibility for On-Site Storm Water Infiltration
- Test Boring
- Laboratory Testing
- Infiltration Testing

The following sections provide specific information about each task.

Evaluation of Feasibility for On-Site Storm Water Infiltration

Group Delta reviewed the site and subsurface conditions relative to the criteria stated in Form I-8: Categorization of Infiltration Feasibility Condition in the Work. The completed form is attached to this letter.

Test Boring

Group Delta advanced one test boring (B-1) to a depth 20.5 feet to evaluate soil characteristics and the depth of groundwater. Figure 2 shows the location of this boring. A descriptive log for this boring is attached to this letter.

Laboratory Testing

Disturbed soil samples were obtained from the test borings for particle size distribution testing to evaluate the physical characteristics of the soils. Test results are attached to this letter.

Infiltration Testing

Infiltration testing was conducted using the Borehole Percolation Test method (Riverside County Percolation Test, 2011) referenced in the Design Manual. Four tests (B-2 through B-5) were completed at the approximate locations shown on Figure No. 2. The depth of all the infiltration tests was five feet. Descriptive logs for the borings associated with these tests are attached.

FINDINGS

Evaluation of Feasibility

The feasibility screening category is "*Full Infiltration*". The completed form I-8 is attached.

Test Boring

Residual soils associated with the weathering of granite that transitioned to decomposed granite with depth were encountered in test boring B-1. The soils observed in driven split barrel samplers consisted of fine to medium grained silty sand. Based on drive sampler resistance, the relative density of these materials was dense to very dense. No groundwater was encountered.

Laboratory Testing

The soils tested were classified as Silty Sand (SM) per ASTM D2487 with average of about 29 percent fines (silt and clay). The test results are attached.

Infiltration Testing

The average design infiltration is 0.6 inches/hour. The infiltration test data is summarized in the table below.

Test Hole	Stabilized Infiltration Rate inches/hour	Design Infiltration Rate* inches/hour
B-2	1.32	0.6
B-3	0.54	0.3
B-4	2.24	1.1
B-5	0.78	0.4
	Average	**0.6**

* Design infiltration rate adopted a factor of safety of 2.0.

CONCLUSIONS

The site should be suitable for full infiltration. The average design infiltration is greater than 0.5 inches/hour, which is the recommended minimum infiltration rate for full infiltration per the Design Manual. In our opinion, it is geotechnically feasible to adopt full infiltration at the proposed basin locations. Note the following items regarding this conclusion.

- The infiltration basins will be in undeveloped, landscaped areas of the site.
- The bottom elevation of the basins (441.0 and 442.5 feet) will be located a minimum horizontal distance ranging from about 25 to 30 feet from the corresponding elevation (441.0 and 442.5 feet) near the crest of an existing west facing slope along the eastern portion of State Route 67.
- Considering the findings from test boring B-1, the existing west facing slope along the eastern portion of State Route 67 should be formed in dense to very dense residual soils and decomposed granite.
- The reinforced zone of the proposed SRWs that forms part of the basins will need to be deepened to extend below the bottom elevation of the basin.
- We understand there are no existing or proposed utilities near the proposed basins.
- Additional geotechnical considerations are discussed in the attached Form I-8.

LIMITATIONS

The conclusion and recommendations stated in this letter assume that soil and groundwater conditions do not deviate appreciably from those locally observed by Group Delta. Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and geologists practicing in this or similar localities. No warranty, express or implied, is made as to the conclusions and professional advice included in this report. We appreciate this opportunity to be of professional service. Feel free to contact the office with any questions or comments, or if you need anything else.

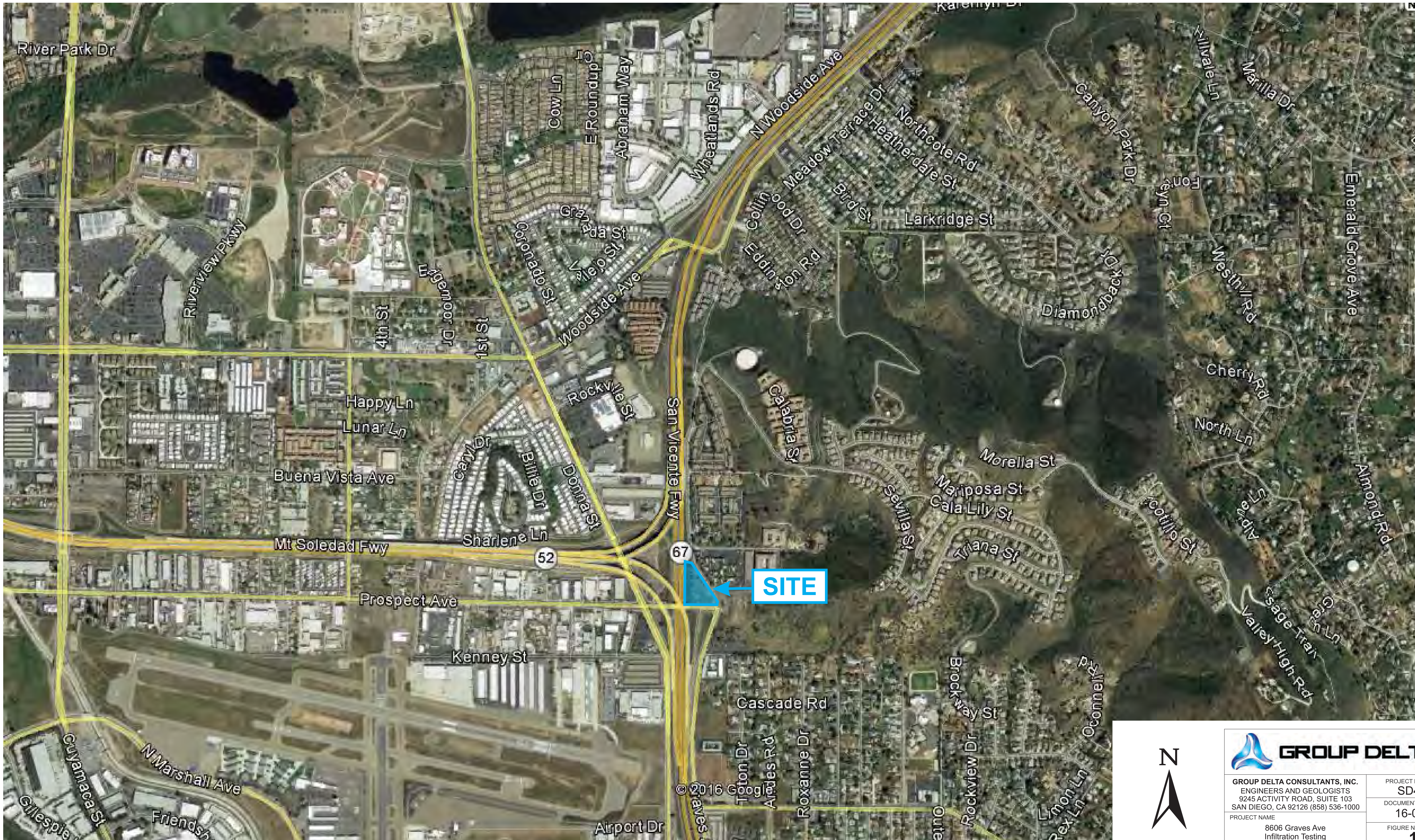
GROUP DELTA CONSULTANTS

REGISTERED PROFESSIONAL ENGINEER
CHARLES ROBIN STROOP
GE2298
Exp. 03-31-18
GEOTECHNICAL
STATE OF CALIFORNIA

Charles Robin (Rob) Stroop, G.E. 2298
Associate Geotechnical Engineer

Attachments: Figure No. 1, Site Location Plan
Figure No. 2, Exploration Plan
Boring Legend and Records
Laboratory Test Results
Form I-8: Categorization of Infiltration Feasibility Condition
Preliminary Grading Plan, Walsh Engineering & Surveying, August 30, 2017

Distribution: (1) Addressee, Mr. Michael Grant (grant.michael@sbcglobal.net)
(2) Walsh Engineering & Surveying, William O'Gorman (william@walsh-engineering.com)



N

NO SCALE

GROUP DELTA

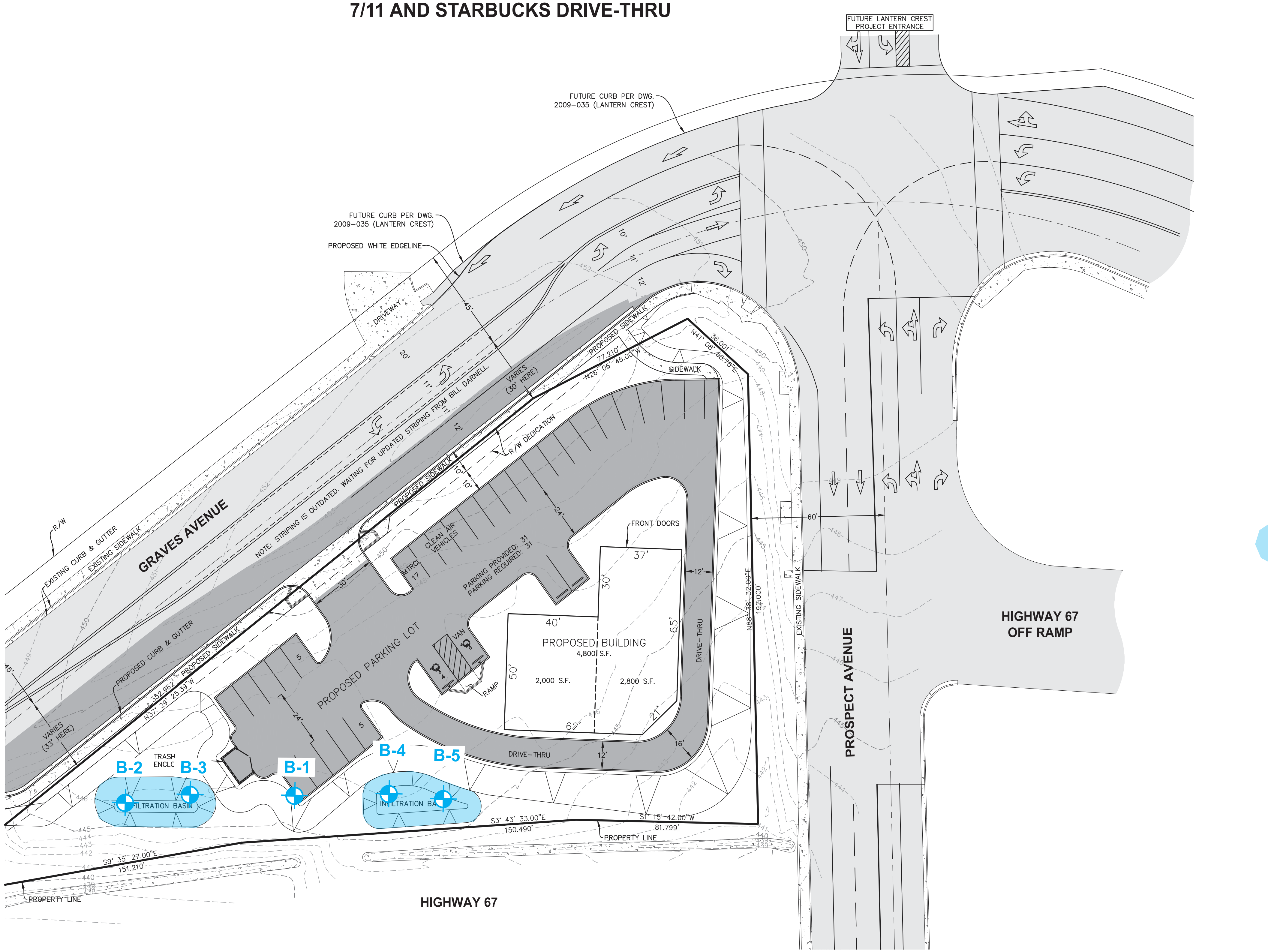
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NUMBER	SD493
DOCUMENT NUMBER	16-0170
PROJECT NAME: 8606 Graves Ave Infiltration Testing	FIGURE NUMBER: 1

SITE LOCATION MAP

Reference: Google Earth v.7.1.5.1557

SITE PLAN
FOR
7/11 AND STARBUCKS DRIVE-THRU



EXPLANATION:

B-5 — Approximate location of borings.

Approximate location of storm water infiltration basins

N

NO SCALE

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NUMBER	SD493
DOCUMENT NUMBER	16-0170
PROJECT NAME	8606 Graves Ave Infiltration Testing
FIGURE NUMBER	2

EXPLORATION PLAN

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence	Identification Components	Refer to Section: Field	Refer to Section: Lab	Required	Optional
1	Group Name	2.5.2	3.2.2	●	
2	Group Symbol	2.5.2	3.2.2	●	
	Description Components				
3	Consistency of Cohesive Soil	2.5.3	3.2.3	●	
4	Apparent Density of Cohesionless Soil	2.5.4		●	
5	Color	2.5.5		●	
6	Moisture	2.5.6		●	
7	Percent or Proportion of Soil	2.5.7	3.2.4	●	⬬
7	Particle Size	2.5.8	2.5.8	●	⬬
7	Particle Angularity	2.5.9			○
7	Particle Shape	2.5.10			○
8	Plasticity (for fine-grained soil)	2.5.11	3.2.5		○
9	Dry Strength (for fine-grained soil)	2.5.12			○
10	Dilatency (for fine-grained soil)	2.5.13			○
11	Toughness (for fine-grained soil)	2.5.14			○
12	Structure	2.5.15			○
13	Cementation	2.5.16		●	
14	Percent of Cobbles and Boulders	2.5.17		●	
14	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Describe the soil using descriptive terms in the order shown

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent or Proportion of Soil; Particle Size; Plasticity (optional).

⬬ = optional for non-Caltrans projects

Where applicable:

Cementation; % cobbles & boulders; Description of cobbles & boulders; Consistency field test result

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

HOLE IDENTIFICATION

Holes are identified using the following convention:

H – YY – NNN

Where:

H: Hole Type Code

YY: 2-digit year

NNN: 3-digit number (001-999)

Hole Type Code and Description

Hole Type Code	Description
A	Auger boring (hollow or solid stem, bucket)
R	Rotary drilled boring (conventional)
RC	Rotary core (self-cased wire-line, continuously-sampled)
RW	Rotary core (self-cased wire-line, not continuously sampled)
P	Rotary percussion boring (Air)
HD	Hand driven (1-inch soil tube)
HA	Hand auger
D	Driven (dynamic cone penetrometer)
CPT	Cone Penetration Test
O	Other (note on LOTB)

Description Sequence Examples:

SANDY lean CLAY (CL); very stiff; yellowish brown; moist; mostly fines; some SAND, from fine to medium; few gravels; medium plasticity; PP=2.75.

Well-graded SAND with SILT and GRAVEL and COBBLES (SW-SM); dense; brown; moist; mostly SAND, from fine to coarse; some fine GRAVEL; few fines; weak cementation; 10% GRANITE COBBLES; 3 to 6 inches; hard; subrounded.

Clayey SAND (SC); medium dense, light brown; wet; mostly fine sand,; little fines; low plasticity.

GROUP DELTA

Project No. SD493

8606 Graves Ave

BORING RECORD LEGEND #1

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- **C** Consolidation (ASTM D 2435)
- **CL** Collapse Potential (ASTM D 5333)
- **CP** Compaction Curve (CTM 216)
- **CR** Corrosion, Sulfates, Chlorides (CTM 643; CTM 417; CTM 422)
- **CU** Consolidated Undrained Triaxial (ASTM D 4767)
- **DS** Direct Shear (ASTM D 3080)
- **EI** Expansion Index (ASTM D 4829)
- **M** Moisture Content (ASTM D 2216)
- **OC** Organic Content (ASTM D 2974)
- **P** Permeability (CTM 220)
- **PA** Particle Size Analysis (ASTM D 422)
- **PI** Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
- **PL** Point Load Index (ASTM D 5731)
- **PM** Pressure Meter
- **R** R-Value (CTM 301)
- **SE** Sand Equivalent (CTM 217)
- **SG** Specific Gravity (AASHTO T 100)
- **SL** Shrinkage Limit (ASTM D 427)
- **SW** Swell Potential (ASTM D 4546)
- **UC** Unconfined Compression - Soil (ASTM D 2166); Unconfined Compression - Rock (ASTM D 2938)
- **UU** Unconsolidated Undrained Triaxial (ASTM D 2850)
- **UW** Unit Weight (ASTM D 4767)

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler (2.4" ID, 3" OD)
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- ▽ First Water Level Reading (during drilling)
- ▼ Static Water Level Reading (after drilling, date)

Definitions for Change in Material

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core and the location of change can be accurately located.	———
Estimated Material Change	Change in material cannot be accurately located either because the change is gradational or because of limitations of the drilling and sampling methods.	– – – – –
Soil / Rock Boundary	Material changes from soil characteristics to rock characteristics.	

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA

Project No. SD493

8606 Graves Ave

BORING RECORD LEGEND #2

CONSISTENCY OF COHESIVE SOILS				
Description	Shear Strength (tsf)	Pocket Penetrometer, PP, Measurement (tsf)	Torvane, TV, Measurement (tsf)	Vane Shear, VS, Measurement (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

APPARENT DENSITY OF COHESIONLESS SOILS	
Description	SPT N_{60} (blows / 12 inches)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE	
Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS	
Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 - 10%
Little	15 - 25%
Some	30 - 45%
Mostly	50 - 100%

PARTICLE SIZE		
Description		Size (in)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

CEMENTATION	
Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

Plasticity

Description	Criteria
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CONSISTENCY OF COHESIVE SOILS	
Description	SPT N_{60} (blows/12 inches)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	Greater than 30

Ref: Peck, Hansen, and Thornburn, 1974, "Foundation Engineering," Second Edition.

Note: Only to be used (with caution) when pocket penetrometer or other data on undrained shear strength are unavailable. Not allowed by Caltrans Soil and Rock Logging and Classification Manual, 2010.

GROUP DELTA

Project No. SD493

8606 Graves Ave

BORING RECORD LEGEND #3

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
8606 Graves Ave	SD493	**B-1**

SITE LOCATION	START	FINISH	SHEET NO.
Santee, California	7/22/2016	7/22/2016	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	T. Latimer	R. Stroop

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Truck Rig (Unimog)	6	20.5	~445	▼ / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 82%, N_{60} ~ 82/60 * N ~ 1.37 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												RESIDUAL SOIL: Silty SAND (SM); dense; reddish brown; moist; mostly fine to medium grained SAND; some fines; nonplastic; piece of granitic rock in bottom 3" of sample.
			R-1	13 18 17	35	32			PA			70% SAND: 30% FINES
			R-2	10 33 50 (3")	83 (9")	76 (9")			PA			Very dense; brown. 72% SAND: 28% FINES
5										5		Little fines.
			S-3	31 31 50 (3")	81 (9")	111 (9")			PA			73% SAND: 27% FINES
			R-4	38 50 (4")	50 (4")	46 (4")						
10			S-5	50 (4")	50 (4")	68 (4")				10		**DECOMPOSED GRANITE:** Silty SAND (SM); very dense; light gray-brown; some fines, increase in SILT content; nonplastic.
15			S-6	50 (4")	50 (4")	68 (4")				15		Fine to coarse grained SAND associated with decomposed granite.
20			S-7	50 (4")	50 (4")	68 (4")				20		
												Bottom of boring at 20½ feet below ground surface. No groundwater encountered. Boring backfilled with soil cuttings on 07/22/16.

GROUP DELTA CONSULTANTS, INC.
9245 Activity Road, Suite 103
San Diego, CA 92126

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1

BORING RECORD

PROJECT NAME: 8606 Graves Ave			PROJECT NUMBER: SD493	BORING: **B-2**
SITE LOCATION: Santee, California		START: 8/5/2016	FINISH: 8/5/2016	SHEET NO.: 1 of 1
DRILLING COMPANY: Pacific Drilling	DRILLING METHOD: Hollow Stem Auger		LOGGED BY: T. Latimer	CHECKED BY: R. Stroop
DRILLING EQUIPMENT: Truck Rig (Diedrich D50)	BORING DIA. (in): 6	TOTAL DEPTH (ft): 5	GROUND ELEV (ft): ~445	DEPTH/*ELEV.* GROUND WATER (ft): ▼ / *na*
SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)	NOTES: ETR ~ 80%, N_{60} ~ 80/60 * N ~ 1.33 * N			

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0–5												**FILL:** Silty SAND (SM); brown; moist; mostly fine grained SAND; some fines; non-plastic; weakly cemented.
		☒	S-1	7 8 9	17	23						
5										5		Bottom of boring at 5 feet below ground surface. Groundwater not encountered. Boring backfilled with soil cuttings 08/05/16.
10										10		
15										15		
20										20		

GROUP DELTA CONSULTANTS, INC.
9245 Activity Road, Suite 103
San Diego, CA 92126

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
8606 Graves Ave	SD493	**B-3**

SITE LOCATION	START	FINISH	SHEET NO.
Santee, California	8/5/2016	8/5/2016	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	T. Latimer	R. Stroop

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Truck Rig (Diedrich D50)	6	5	~445	▼ / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 80%, N_{60} ~ 80/60 * N ~ 1.33 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												RESIDUAL SOIL: Clayey SAND (SC); very dense; brown; moist; mostly fine to medium SAND; some fines; nonplastic.
		☒	S-1	16 24 43	67	89						
5										5		
												Bottom of boring at 5 feet below ground surface. Groundwater not encountered. Boring backfilled with soil cuttings 08/05/16.
10										10		
15										15		
20										20		

GROUP DELTA CONSULTANTS, INC.
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San Diego, CA 92126

FIGURE A-3

GDC_LOG_BORING_MMX_SOIL_SD SD493 LOGS.GPJ GDCLOG.GDT 8/26/16

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
8606 Graves Ave	SD493	**B-4**

SITE LOCATION	START	FINISH	SHEET NO.
Santee, California	8/5/2016	8/5/2016	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	T. Latimer	R. Stroop

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Truck Rig (Diedrich D50)	6	5	~446	▼ / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 80%, N_{60} ~ 80/60 * N ~ 1.33 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												RESIDUAL SOIL: Silty SAND (SM); very dense; reddish brown; moist; mostly fine to medium SAND; some fines; nonplastic.
		☒	S-1	18 26 38	64	85						
5										5		
												Bottom of boring at 5 feet below ground surface. Groundwater not encountered. Boring backfilled with soil cuttings 08/05/16.
10										10		
15										15		
20										20		

GDC_LOG_BORING_MMX_SOIL_SD SD493 LOGS.GPJ GDCLOG.GDT 8/26/16

GROUP DELTA CONSULTANTS, INC.
9245 Activity Road, Suite 103
San Diego, CA 92126

FIGURE

A-4

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
8606 Graves Ave	SD493	**B-5**

SITE LOCATION	START	FINISH	SHEET NO.
Santee, California	8/5/2016	8/5/2016	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	T. Latimer	R. Stroop

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Truck Rig (Diedrich D50)	6	5	~446	▼ / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 80%, N_{60} ~ 80/60 * N ~ 1.33 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												RESIDUAL SOIL: Silty SAND (SM); brown; moist; mostly fine to medium SAND; some fines; non-plastic.
			S-1	7 16 21	37	49						Fine to coarse grained SAND; weakly cemented.
5										5		
												Bottom of boring at 5 feet below ground surface. Groundwater not encountered. Boring backfilled with soil cuttings 08/05/16.
10										10		
15										15		
20										20		

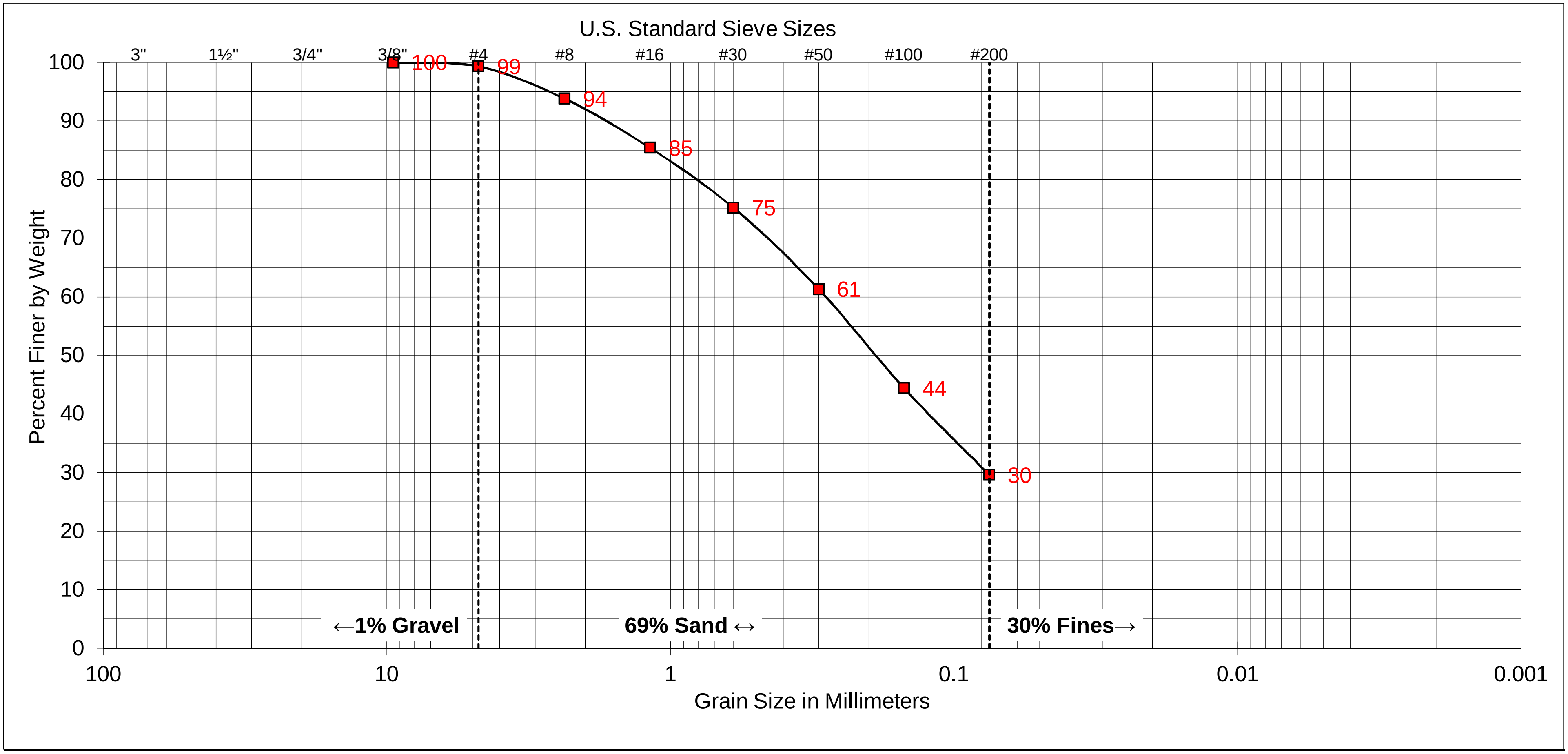
GDC_LOG_BORING_MMX_SOIL_SD SD493 LOGS.GPJ GDCLOG.GDT 8/26/16

GROUP DELTA CONSULTANTS, INC.
9245 Activity Road, Suite 103
San Diego, CA 92126

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE

A-5



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
BORING NUMBER:	B-1
SAMPLE DEPTH:	2.5-3'

UNIFIED SOIL CLASSIFICATION: SC

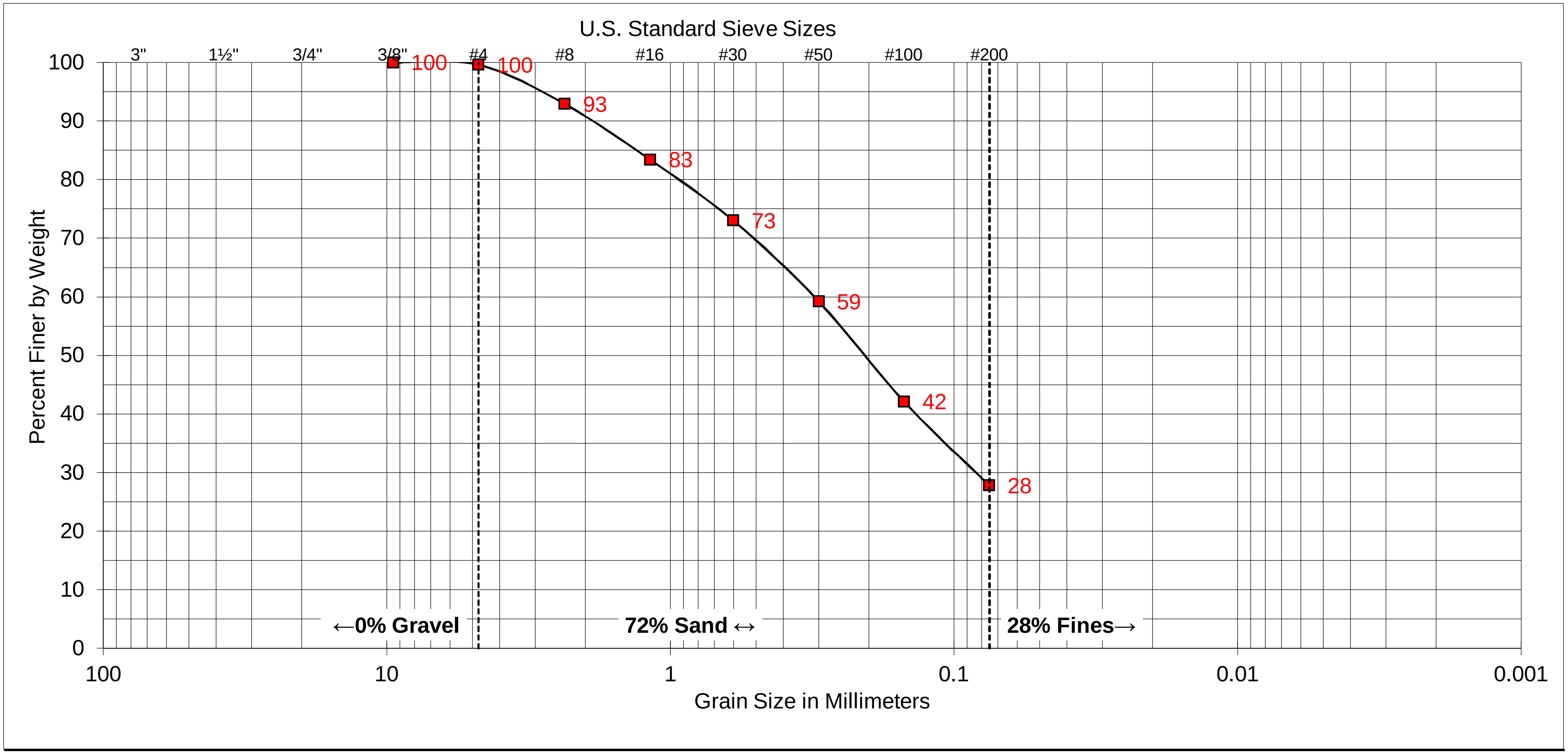
DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Document No. 16-0170
Project No. SD493



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE	
BORING NUMBER:	B-1
SAMPLE DEPTH:	4-4.5'

UNIFIED SOIL CLASSIFICATION: SC

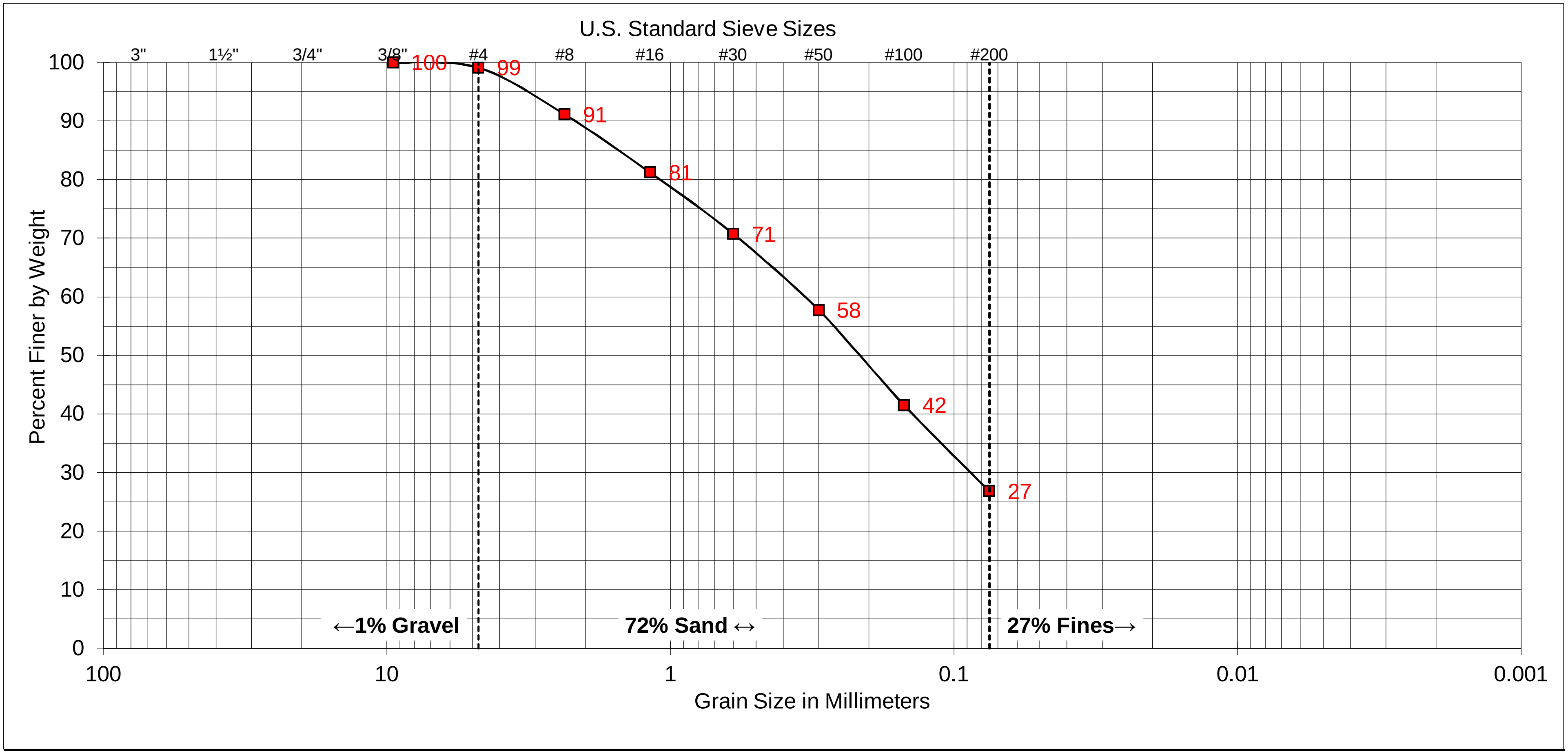
DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Document No. 16-0170
Project No. SD493



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
BORING NUMBER:	B-1
SAMPLE DEPTH:	5-6.5'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Document No. 16-0170
Project No. SD493

Categorization of Infiltration Feasibility Condition		Form I-8	
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	✓	
Provide basis: The average design infiltration rate from field testing is 0.6 inches/per hour as summarized in Group Delta letter dated August 30, 2016. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	✓	
Provide basis: See Group Delta letter dated August 30, 2016. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

<table>
<tr><th colspan="4">Form I-8 Page 2 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>3</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>✓</td><td></td></tr>
<tr><td colspan="4">Provide basis:

Groundwater level is more than 20 feet from bottom of infiltration basin as presented in Group Delta letter dated August 30, 2016.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>✓</td><td></td></tr>
<tr><td colspan="4">Provide basis:

There are no streams or bodies of surface water near the site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 1 Result *</td><td colspan="2">If all answers to rows 1 - 4 are “Yes” a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration

If any answer from row 1-4 is “No”, infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a “full infiltration” design. Proceed to Part 2</td><td>Full Infiltration</td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

PRELIMINARY GRADING PLAN

FOR

7/11 AND STARBUCKS DRIVE-THRU

8606 GRAVES AVE, SANTEE, CA 92071

APN: 384-142-21

GRADING TABULATION

CUT VOLUME: 300 CY
FILL VOLUME: 4,300 CY
IMPORT VOLUME: 4,000 CY

REGISTERED PROFESSIONAL ENGINEER LAWRENCE W. WALSH 46316 CIVIL STATE OF CALIFORNIA

Lawrence W. Walsh 8/30/17

LAWRENCE W. WALSH DATE

Walsh Engineering & Surveying, Inc.
607 Aldwych Road, El Cajon, CA 92020
(619) 588-6747 (619) 792-1232 Fax

L:\PROJECTS 3D\11732-2 GRAVES\PRODUCTION DRAWINGS\DELIVERABLES\11732-2 PGP.DWG August 30, 2017 – 2:39pm

REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

Proposed Lantern Crest Commercial Building
8606 Graves Avenue
Santee, California

JOB NO. 15-10852
16 October 2015

Prepared for:

Advantaged Asset Acquisitions I, LLC

16 October 2015

Advantaged Asset Acquisitions I, LLC
110 Town Center Parkway
Santee, CA 92071
Attn: Mr. Michael Grant

Job No. 15-10852

Subject: **Report of Preliminary Geotechnical Investigation**
Proposed Lantern Crest Commercial Building
8606 Graves Avenue
Santee, California

Dear Mr. Grant:

In accordance with your request, and our proposal of April 16, 2015, ***Geotechnical Exploration, Inc***. has performed a preliminary geotechnical investigation for the subject property. The fieldwork was performed on September 10, 2015.

If the conclusions and recommendations presented in this report are incorporated into the design and construction of the proposed commercial building project, it is our opinion that the site is suitable for the project.

This opportunity to be of service is sincerely appreciated. Should you have any questions concerning the following report, please do not hesitate to contact us. Reference to our **Job No. 15-10852** will expedite a response to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

PROFESSIONAL ENGINEER REGISTERED WM. DAVID HESPELER No. 396 Exp. 3/31/16 GEOTECHNICAL STATE OF CALIFORNIA

TABLE OF CONTENTS

REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION
Proposed Lantern Crest Commercial Building
8606 Graves Avenue
Santee, California

Job No. 15-10852

The following report presents the findings and recommendations of ***Geotechnical Exploration, Inc.*** for the subject proposed commercial building project in Santee, California. Refer to the Vicinity Map, Figure No. I, for the location of the site.

I. PROJECT SUMMARY AND SCOPE OF SERVICES

It is our understanding, based on our conversations, that the currently vacant site will be developed to receive a single-story commercial building with pavements and other associated improvements. Although site development and grading plans are not available at this time, we anticipate that grading to achieve the desired finish site grades will be minimal with cuts and fills of less than about 2 feet.

The scope of work performed for this investigation included a site reconnaissance and subsurface exploration program, laboratory testing, geotechnical engineering analysis of the field and laboratory data, and the preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for the project earthwork, building foundations, slab on-grade floors and pavements.

II. SITE DESCRIPTION

The relatively flat triangular-shaped lot, with a plan area of about 2½ acres, is located northwest of Prospect Street and Graves Avenue. The site is currently vacant and vegetation consists of a sparse growth of dry grass and weeds.

III. FIELD INVESTIGATION

The field investigation consisted of a surface reconnaissance and a subsurface exploration program using a rubber tired backhoe to investigate and sample the subsurface soils. Three exploratory trenches were excavated across the site on September 10, 2015, to a maximum depth of 5½ feet. The soils encountered in the trenches were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (refer to Appendix A). The approximate locations of the trenches are shown on the Site Plan, Figure No. II.

Representative samples were obtained from the exploratory trenches at selected depths appropriate to the investigation. All samples were returned to our laboratory for evaluation and testing. Trench logs have been prepared on the basis of our observations and laboratory test results. Logs of the trenches are attached as Figure Nos. IIIa-c.

IV. LABORATORY TESTS AND SOIL INFORMATION

Laboratory tests were performed on disturbed and relatively undisturbed soil samples in order to evaluate their index, strength, expansion, and compressibility properties. The following tests were conducted on the sampled soils and the results are presented on the boring logs:

1. *Laboratory Compaction Characteristics (ASTM D1557-12)*
2. *Determination of Percentage of Particles Passing #200 Sieve (ASTM D1140-06)*

Laboratory compaction tests establish the laboratory maximum dry density and optimum moisture content of the tested soils and are used to aid in evaluating the degree of compaction of existing fill soils and their strength characteristics.

The particle size smaller than a No. 200 sieve analysis aids in classifying the tested soils in accordance with the Unified Soil Classification System and provides qualitative information related to engineering characteristics such as expansion potential, permeability, and shear strength.

The test results are presented on the trench logs at the appropriate sample depths.

V. <u>SOIL DESCRIPTION</u>

Existing fill soils consisting of dry to damp, loose to medium dense silty sands were encountered in trench 2 to a depth of 2 feet. The materials encountered beneath the fill soils in trench 2 (and from the ground surface in trenches 1 and 3) consisted of medium dense to dense clayey and silty sand residuum to the depth explored in trench 2, to a depth of 4½ feet in trench 1, and to a depth of 4¼ feet in trench 3. The residuum in trenches 1 and 3 was underlain by weathered granitic material consisting of very dense silty sand to the depths explored of 5 and 4½ feet.

VI. <u>GROUNDWATER</u>

Free groundwater was not encountered in the exploratory trenches at the time of excavation. It must be noted, however, that fluctuations in the level of groundwater may occur due to variations in ground surface topography, subsurface stratification, rainfall, and other possible factors that may not have been evident at the time of our field investigation.

It should be kept in mind that grading operations can change surface drainage patterns and/or reduce permeabilities due to the densification of compacted soils. Such changes of surface and subsurface hydrologic conditions, plus irrigation of landscaping or significant increases in rainfall, may result in the appearance of surface or near-surface water at locations where none existed previously. The appearance of such water is expected to be localized and cosmetic in nature, if good positive drainage is implemented, as recommended in this report, during and at the completion of construction.

It must be understood that unless discovered during initial site exploration or encountered during site grading operations, it is extremely difficult to predict if or where perched or true groundwater conditions may appear in the future. When site fill or formational soils are fine-grained and of low permeability, water problems may not become apparent for extended periods of time.

Water conditions, where suspected or encountered during construction, should be evaluated and remedied by the project civil and geotechnical consultants. The project developer and property owner, however, must realize that post-construction appearances of groundwater may have to be dealt with on a site-specific basis.

VII. SEISMIC CONSIDERATIONS

The San Diego area, as most of California, is located in a seismically active region. The San Diego area has been referred to as the eastern edge of the Southern California Continental Borderland, an extension of the Peninsular Ranges Geomorphic Province. The borderland is part of a broad tectonic boundary between the North American and Pacific Plates. The plate boundary is dominated by a complex system of active major strike-slip (right lateral), northwest trending faults extending from the San Andreas fault, about 70 miles east, to the San Clemente fault, about 50 miles west of the San Diego metropolitan area.

Based on our review of some available published information there are no faults known to pass through the site. The prominent fault zones generally considered having the most potential for earthquake damage in the vicinity of the site are the active Rose Canyon and Coronado Bank fault zones mapped approximately 13 and 27 miles southwest of the site, respectively, and the active Elsinore and San Jacinto fault zones mapped approximately 28 and 49 miles northeast of the site, respectively.

Although research on earthquake prediction has greatly increased in recent years, geologists and seismologists have not yet reached the point where they can predict when and where an earthquake will occur. Nevertheless, on the basis of current technology, it is reasonable to assume that the proposed structure may be subject to the effects of at least one moderate to major earthquake during its design life. During such an earthquake, the danger from fault offset through the site is remote, but relatively strong ground shaking is likely to occur.

VIII. CONCLUSIONS AND RECOMMENDATIONS

From a geotechnical engineering standpoint, it is our opinion that the site is suitable for construction of the proposed commercial building provided the conclusions and recommendations presented in this report are incorporated into its design and construction.

The following conclusions and recommendations are based on the field investigation conducted by our firm, our laboratory test results, and our experience with similar soils and formational materials. The opinions, conclusions, and recommendations presented in this report are contingent upon ***Geotechnical Exploration, Inc.*** being retained to review the final plans and specifications as they are developed and to observe the site earthwork and installation of foundations. Accordingly, we recommend that the following paragraph be included on the grading and foundation plans for the project.

If the geotechnical consultant of record is changed for the project, the work shall be stopped until the replacement has agreed in writing to accept the responsibility within their area of technical competence for approval upon completion of the work. It shall be the responsibility of the permittee to notify the City Engineer in writing of such change prior to the recommencement of grading and/or foundation installation work.

A. ***Site Preparation and Earthwork***

1. *Clearing and Stripping:* The site should be cleared of any debris that may be present at the time of construction. After clearing, the ground surface should be stripped of surface vegetation as well as associated root systems. Holes resulting from the removal of buried obstructions that extend below the proposed finished site grades should be cleared and backfilled with suitable material compacted to the requirements given under Recommendation No. 5, "Compaction." The cleared and stripped materials should be properly disposed of off-site.

2. *Treatment of Existing Fill Soils:* In order to provide suitable foundation support for the proposed buildings and other improvements (such as exterior flatwork and pavements), we recommend that all existing fill soils that remain after the necessary site excavations have been made be removed and recompacted. The areal extent and depth required to remove the existing fill soils should be determined by our representatives during the excavation work based on their examination of the soils being exposed. Any unsuitable materials (such as oversize rubble, construction debris and/or organic matter) should be selectively removed as directed by our representative and disposed of off-site.

3. *Subgrade Preparation:* After the site has been cleared, stripped, and the required excavations made, the exposed subgrade soils in those areas to receive fill or building improvements (including any exterior flatwork or pavement areas) should be scarified to a depth of 12 inches, moisture conditioned, and compacted to the requirements of Recommendation No. 5, "Compaction."

4. *Materials for Fill:* All on-site soils with an organic content of less than 3 percent by volume are in general suitable for reuse as fill. Fill material should not, however, contain rocks or lumps over 6 inches in greatest dimension and not more than 15 percent larger than 2½ inches. No more than 25 percent of the fill should be larger than ¼-inch. In addition to the preceding size requirements, any required imported fill material should be a granular soil with an Expansion Index of 50 or less as determined by ASTM D4829.

5. *Compaction:* All structural fill and backfill should be compacted to a minimum degree of compaction of 90 percent at a moisture content at least 2 percent above the optimum moisture content based upon ASTM D1557-12. Fill material should be spread and compacted in uniform horizontal lifts not exceeding 8 inches in uncompacted thickness. Before compaction begins, the fill should be brought to a moisture content that will permit proper compaction by either 1) aerating and drying the fill if it is too wet, or 2) moistening the fill with water if it is too dry. Each lift should be thoroughly mixed before compaction to ensure a uniform distribution of moisture.

6. *Permanent Slopes:* We recommend that any required permanent cut or fill slopes be constructed to an inclination no steeper than 2 to 1 (horizontal to vertical). The project plans and specifications should contain all necessary design features and construction requirements to prevent erosion of the on-site soils both during and after construction. Slopes and other exposed ground surfaces should be appropriately planted with a protective groundcover.

7. *Trench Backfill:* ***All*** pipeline trenches should be backfilled with compacted fill. Backfill material should be placed in lift thicknesses appropriate to the type of compaction equipment utilized and compacted to a minimum degree of compaction of 90 percent by mechanical means. Our experience has shown that even shallow, narrow trenches, such as for irrigation and electrical lines, which are not properly compacted, can result in problems, particularly with respect to shallow groundwater accumulation and migration.

8. *Drainage:* Positive surface gradients should be provided adjacent to the building, and roof gutters and downspouts should be installed to direct water away from foundations and slabs toward suitable discharge facilities. Ponding of surface water should not be allowed, especially adjacent to the building or on pavements.

B. Design Parameters for Proposed Foundations

9. *Footings:* We recommend that the proposed buildings be supported on conventional, individual-spread and/or continuous footing foundations bearing on well-compacted fill soil and/or dense natural soils. All footings should be founded at least 18 inches below the lowest adjacent finished grade.

   At the recommended depth, footings may be designed for allowable bearing pressures of 2,500 pounds per square foot (psf) for combined dead and live loads and 3,300 psf for all loads, including wind or seismic. The footings should, however, have a minimum width of 12 inches.

10. *General Criteria For All Footings*: Footings located adjacent to the tops of slopes or on sloping natural ground should be extended sufficiently deep so as to provide at least 10 feet of horizontal cover or 1½ times the width of the footing, whichever is greater, between the slope face and outside edge of the footing at the footing bearing level. Footings located adjacent to utility trenches should have their bearing surfaces situated below an imaginary 1.5 to 1.0 plane projected upward from the bottom edge of the adjacent utility trench.

All continuous footings should contain top and bottom reinforcement to provide structural continuity and to permit spanning of local irregularities. We recommend that a minimum of two No. 5 top and two No. 5 bottom reinforcing bars be provided in the footings. A minimum clearance of 3 inches should be maintained between steel reinforcement and the bottom or sides of the footing. In order for us to offer an opinion as to whether the footings are founded on soils of sufficient load bearing capacity, it is essential that our representative inspect the footing excavations prior to the placement of reinforcing steel or concrete.

NOTE: The project Civil/Structural Engineer should review all reinforcing schedules. The reinforcing minimums recommended herein are not to be construed as structural designs, but merely as minimum reinforcement to reduce the potential for cracking and separations.

11. *Lateral Loads:* Lateral load resistance for the buildings supported on footing foundations may be developed in friction between the foundation bottoms and the supporting subgrade. An allowable friction coefficient of 0.35 is considered applicable. An additional allowable passive resistance equal to an equivalent fluid weight of 300 pcf acting against the foundations may be used in design provided the footings are poured neat against the adjacent undisturbed compacted fill materials and/or dense natural soils. These lateral resistance values assume a level surface in front of the footing for a minimum distance of three times the embedment depth of the footing and any shear keys.

12. *Settlement:* Settlement under building loads is expected to be within tolerable limits for the proposed structures. For footings designed in accordance with the recommendations presented in the preceding paragraphs, we anticipate that total settlements should not exceed 1 inch and that post-construction differential settlements should be less than ½-inch in 25 feet.

13. *Seismic Design Criteria:* Site-specific seismic design criteria for the proposed residence are presented in the following table in accordance with Section 1613 of the 2013 CBC, which incorporates by reference ASCE 7-10 for seismic design. We have determined the mapped spectral acceleration values for the site, based on a latitude of 32.8315 degrees and longitude of -116.9612 degrees, utilizing a tool provided by the USGS, which provides a solution for ASCE 7-10 (Section 1613 of the 2013 CBC) utilizing digitized files for the Spectral Acceleration maps. Based on our past experience with similar conditions, we have assigned a Site Soil Classification of C.

TABLE I
Mapped Spectral Acceleration Values and Design Parameters

S_s	S_1	F_a	F_v	S_{ms}	S_{m1}	S_{ds}	S_{d1}
0.874g	0.339g	1.050	1.461	0.918g	0.495g	0.612g	0.330g

14. *Retaining Walls*: Any retaining walls must be designed to resist lateral earth pressures and any additional lateral pressures caused by surcharge loads on the adjoining retained surface. We recommend that unrestrained (cantilever) retaining walls with level backfill be designed for an equivalent fluid pressure of 35 pcf. We recommend that restrained walls (i.e., any retaining walls with angle points or that are curvilinear that restrain them

from rotation) with level backfill be designed for an equivalent fluid pressure of 35 pcf plus an additional uniform lateral pressure of 8H pounds per square foot where H is equal to the height of backfill above the top of the wall footing in feet.

The preceding design pressures assume that the walls are backfilled with low expansion potential on-site or imported materials and that there is sufficient drainage behind the walls to prevent the build-up of hydrostatic pressures from surface water infiltration. We recommend that drainage be provided by a composite drainage material such as Miradrain 6000/6200 and QuickDrain or equivalent that is discharged to a free outlet. No gravel or perforated pipe is used with the Miradrain/QuickDrain system. The drain material should terminate 12 inches below the finish surface where the surface is covered by slabs or 18 inches below the finish surface in landscape areas.

Backfill placed behind the walls should be compacted to a minimum degree of compaction of 90 percent using light compaction equipment. If heavy equipment is used, the walls should be appropriately temporarily braced.

Retaining walls should be supported on footing foundations designed in accordance with the recommendations presented previously under Recommendation Nos. 9 and 10. Lateral load resistance for the walls can be developed in accordance with the recommendations presented under Recommendation No. 11 "Lateral Loads."

C. Concrete Slab-on-grade Criteria

15. *Minimum Floor Slab Thickness and Reinforcement:* Based on our experience, we have found that, for various reasons, floor slabs occasionally crack, causing brittle surfaces such as ceramic tiles to become damaged. Therefore, we recommend that all slabs-on-grade contain at least a minimum amount of reinforcing steel to reduce the separation of cracks, should they occur.

    15.1 Interior floor slabs should be a minimum of 5 inches actual thickness and be reinforced with No. 4 bars on 18-inch centers, both ways, placed at midheight in the slab. Slab subgrade soil should be verified by a ***Geotechnical Exploration, Inc***. representative to have the proper moisture content within 48 hours prior to placement of the vapor barrier and pouring of concrete.

    15.2 Following placement of any concrete floor slabs, sufficient drying time must be allowed prior to placement of floor coverings. Premature placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials.

16. *Concrete Isolation Joints:* We recommend the project Civil/Structural Engineer incorporate isolation joints and sawcuts to at least one-fourth the thickness of the slab in any floor designs. The joints and cuts, if properly placed, should reduce the potential for and help control floor slab cracking. We recommend that concrete shrinkage joints be spaced no farther than approximately 20 feet apart, and also at re-entrant corners. However, due to a number of reasons (such as base preparation, construction techniques,

curing procedures, and normal shrinkage of concrete), some cracking of slabs can be expected.

17. *Slab Moisture Protection and Vapor Barrier Membrane:* Although it is not the responsibility of geotechnical engineering firms to provide moisture protection recommendations, as a service to our clients we provide the following discussion and suggested minimum protection criteria. Actual recommendations should be provided by the architect and waterproofing consultants.

Soil moisture vapor can result in damage to moisture-sensitive floors, some floor sealers, or sensitive equipment in direct contact with the floor, in addition to mold and staining on slabs, walls and carpets. The common practice in Southern California is to place vapor retarders made of PVC, or of polyethylene. PVC retarders are made in thickness ranging from 10- to 60-mil. Polyethylene retarders, called visqueen, range from 5- to 10-mil in thickness. These products are no longer considered adequate for moisture protection and can actually deteriorate over time.

Specialty vapor retarding products possess higher tensile strength and are more specifically designed for and intended to retard moisture transmission into and through concrete slabs. The use of such products is highly recommended for reduction of floor slab moisture emission.

The following American Society for Testing and Materials (ASTM) and American Concrete Institute (ACI) sections address the issue of moisture transmission into and through concrete slabs: ASTM E1745-97 (2009) Standard Specification for Plastic Water Vapor Retarders Used in Contact

Concrete Slabs; ASTM E154-88 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth; ASTM E96-95 Standard Test Methods for Water Vapor Transmission of Materials; ASTM E1643-98 (2009) Standard Practice for Installation of Water Vapor Retarders Used in Contact Under Concrete Slabs; and ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

17.1 Based on the above, we recommend that the vapor barrier consist of a minimum 15-mil extruded polyolefin plastic (no recycled content or woven materials permitted). Permeance as tested before and after mandatory conditioning (ASTM E1745 Section 7.1 and sub-paragraphs 7.1.1-7.1.5) should be less than 0.01 perms (grains/square foot/hour in Hg) and comply with the ASTM E1745 Class A requirements. Installation of vapor barriers should be in accordance with ASTM E1643. The basis of design is 15-mil StegoWrap vapor barrier placed per the manufacturer's guidelines. Reef Industries Vapor Guard membrane has also been shown to achieve a permeance of less than 0.01 perms. We recommend that the slab be poured directly on the vapor barrier which is placed directly on the prepared subgrade soil.

17.2 Common to all acceptable products, vapor retarder/barrier joints must be lapped and sealed with mastic or the manufacturer's recommended tape or sealing products. In actual practice, stakes are often driven through the retarder material, equipment is dragged or rolled across the retarder, overlapping or jointing is not properly implemented, etc. All these construction deficiencies reduce the retarder's effectiveness. In no case should retarder/barrier products be punctured or gaps be allowed to form prior to or during concrete placement.

17.3 Vapor retarders/barriers do not provide full waterproofing for structures constructed below free water surfaces. They are intended to help reduce or prevent vapor transmission and/or capillary migration through the soil and through the concrete slabs. Waterproofing systems must be designed and properly constructed if full waterproofing is desired. The owner and project designers should be consulted to determine the specific level of protection required.

17.4 Following placement of concrete floor slabs, sufficient drying time must be allowed prior to placement of any floor coverings. Premature placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials.

18. *Exterior Slab Thickness and Reinforcement:* As a minimum for protection of on-site improvements, we recommend that all exterior pedestrian concrete slabs be founded on properly compacted and tested fill, with No. 3 bars at 15-inch centers, both ways, at the center of the slab, and contain adequate isolation and control joints. The performance of on-site improvements can be greatly affected by soil base preparation and the quality of construction. It is therefore important that all improvements are properly designed and constructed for the existing soil conditions. The improvements should not be built on loose soils or fills placed without our observation and testing.

For exterior slabs with the minimum shrinkage reinforcement, control joints should be placed at spaces no farther than 15 feet apart or the width of the slab, whichever is less, and also at re-entrant corners. Control joints in exterior slabs should be sealed with elastomeric joint sealant. The sealant should be inspected every 6 months and be properly maintained.

19. *Asphalt Concrete Pavements*: Based on the results of our exploratory borings and laboratory tests as well as our experience with soils similar to those encountered at the site, we anticipate that pavement sections for the proposed development will be on the order of 2½ inches of asphalt concrete on 4 inches of aggregate base for parking stalls and minor traffic channels (Traffic Index of 4.0), 3 inches on 5½ inches for major automobile traffic channels (TI of 5.0), and 3 inches on 7 inches for pavements subject to up to 13 heavy 2-axle trucks per week (TI of 5.5). Final pavement section recommendations should be based on R-value (Resistance) tests performed on bulk samples of the soils that are exposed at the finished subgrade elevations across the site at the completion of the mass grading operations.

    Asphalt concrete should consist of Type III-C2-PG64-10 conforming to the Standard Specifications for Public Works Construction, 2000 Edition (Standard Specifications), Section 400-4 and be placed in accordance with Section 302-5. Aggregate base should conform to the requirements for Crushed Aggregate Base or Crushed Miscellaneous Base in Section 200-2 of the Standard Specifications. The upper 6 inches of the pavement subgrade soil as well as the aggregate base layer should be compacted to a minimum degree of compaction of 95 percent. Preparation of the subgrade and placement of the asphalt concrete and base materials should be performed under the observation of our representative.

D. ***Slope Performance***

20. *Slope Top/Face Performance:* The soils that occur in close proximity to the top or face of even properly compacted fill or dense natural ground cut slopes often possess poor lateral stability. The degree of lateral and vertical

deformation depends on the inherent expansion and strength characteristics of the soil types comprising the slope, slope steepness and height, loosening of slope face soils by burrowing rodents, and irrigation and vegetation maintenance practices, as well as the quality of compaction of fill soils. Structures and other improvements could suffer damage due to these soil movement factors if not properly designed to accommodate or withstand such movement.

21. *Slope Top Structure Performance:* Rigid improvements such as top-of-slope walls, columns, decorative planters, concrete flatwork, and other similar types of improvements can be expected to display varying degrees of separation typical of improvements constructed at the top of a slope. The separations result primarily from slope top lateral and vertical soil deformation processes. These separations often occur regardless of being underlain by cut or fill slope material. Proximity to a slope top is often the primary factor affecting the degree of separations occurring.

Typical and to-be-expected separations can range from minimal to up to 1 inch or greater in width. In order to minimize the effect of slope-top lateral soil deformation, we recommend that the top-of-slope improvements be designed with flexible connections and joints in rigid structures so that the separations do not result in visually apparent cracking damage and/or can be cosmetically dressed as part of the ongoing property maintenance. These flexible connections may include "slip joints" in wrought iron fencing, evenly spaced vertical joints in block walls or fences, control joints with flexible caulking in exterior flatwork improvements, etc.

E. General Recommendations

22. *Project Start Up Notification:* In order to minimize any work delays during site development, this firm should be contacted 24 hours prior to any need for observation of footing excavations or field density testing of compacted fill soils. If possible, placement of formwork and steel reinforcement in footing excavations should not occur prior to observing the excavations; in the event that our observations reveal the need for deepening or redesigning foundation structures at any locations, any formwork or steel reinforcement in the affected footing excavation areas would have to be removed prior to correction of the observed problem (i.e., deepening the footing excavation, recompacting soil in the bottom of the excavation, etc.).

IX. GRADING NOTES

Geotechnical Exploration, Inc. recommends that we be retained to verify the actual soil conditions revealed during site grading work and footing excavations to be as anticipated in this "*Report of Preliminary Geotechnical Investigation*" for the project. In addition, the compaction of any fill soils placed during site grading work must be observed and tested by the soil engineer. It is the responsibility of the grading contractor to comply with the requirements on the grading plans and the local grading ordinance. All retaining wall and trench backfill should be properly compacted. ***Geotechnical Exploration, Inc.*** will assume no liability for damage occurring due to improperly or uncompacted backfill placed without our observation and testing.

X. LIMITATIONS

Our conclusions and recommendations have been based on available data obtained from our field investigation and laboratory analysis, as well as our experience with similar soils and formational materials located in this area of San Diego County. Of necessity, we must assume a certain degree of continuity between exploratory borings. It is, therefore, necessary that all observations, conclusions, and recommendations be verified at the time grading operations begin or when footing excavations are placed. In the event discrepancies are noted, additional recommendations may be issued, if required.

The work performed and recommendations presented herein are the result of an investigation and analysis that meet the contemporary standard of care in our profession within the County of San Diego. No warranty is provided.

This report should be considered valid for a period of two (2) years, and is subject to review by our firm following that time. If significant modifications are made to the building plans, especially with respect to the height and location of any proposed structures, this report must be presented to us for immediate review and possible revision.

It is the responsibility of the owner and/or developer to ensure that the recommendations summarized in this report are carried out in the field operations and that our recommendations for design of this project are incorporated in the structural plans. We should be retained to review the project plans once they are available, to verify that our recommendations are adequately incorporated in the plans.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for the safety of personnel other than our own on the site; the safety of others is the responsibility of the contractor. The contractor should notify the owner if any of the recommended actions presented herein are considered unsafe.

The firm of ***Geotechnical Exploration, Inc.*** shall not be held responsible for changes to the physical condition of the property, such as addition of fill soils or changing drainage patterns, which occur subsequent to issuance of this report and the changes are made without our observations, testing, and approval.

Once again, should any questions arise concerning this report, please feel free to contact the undersigned. Reference to our **Job No. 15-10852** will expedite a reply to your inquiries.

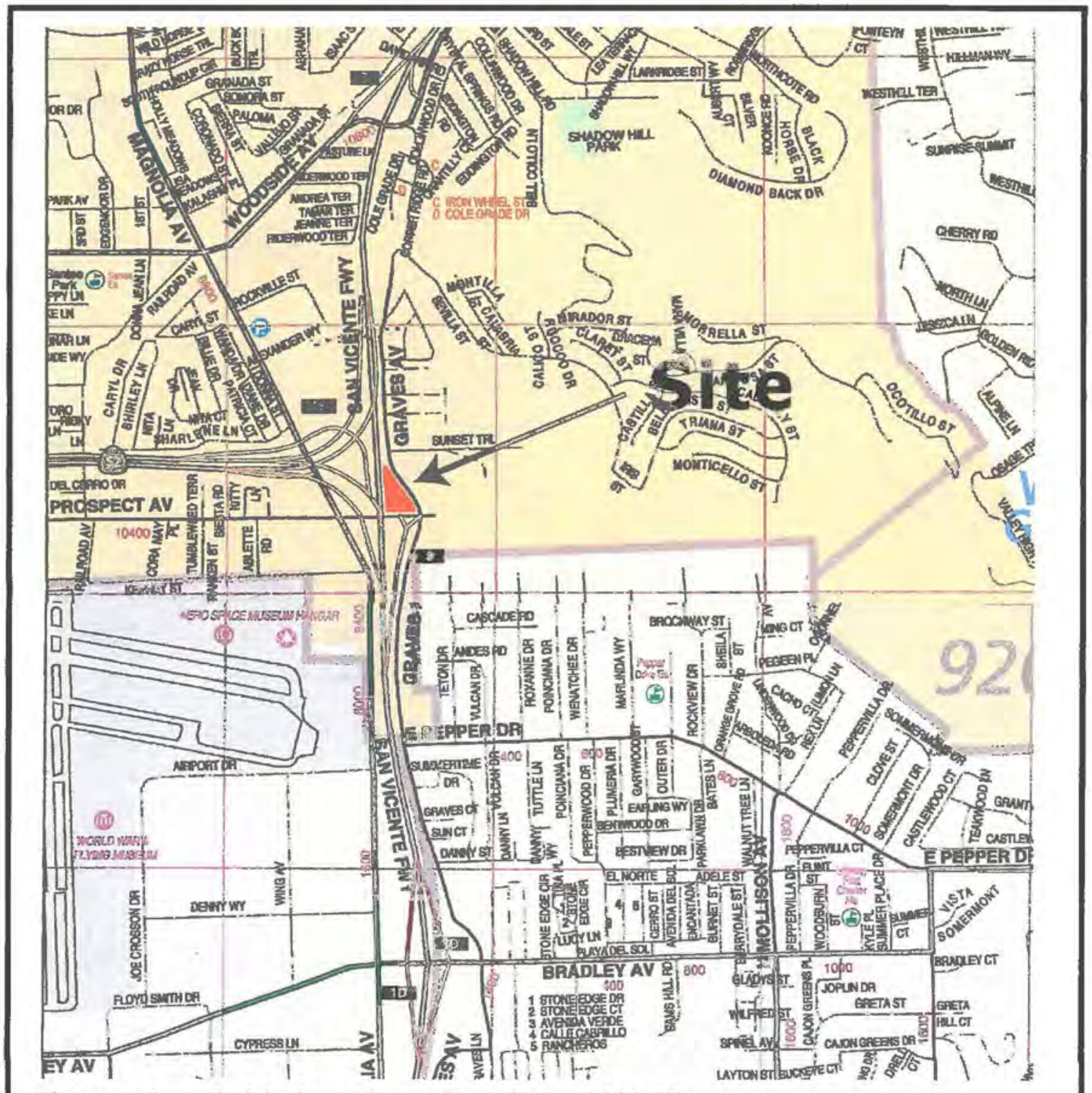
Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
WM. DAVID HESPELER
No. 396
Exp. 3/31/16
GEOTECHNICAL
STATE OF CALIFORNIA

VICINITY MAP



Thomas Bros Guide San Diego County pg 1231-F7

Proposed Lantern Crest Commercial Building
8606 Graves Avenue
Santee, CA.

Figure No. I
Job No. 15-10852

LEGEND

T-3 — Indicates Approximate Location of Exploratory Trench

SITE PLAN

SCALE: 1" = 40'

SITE INFORMATION:

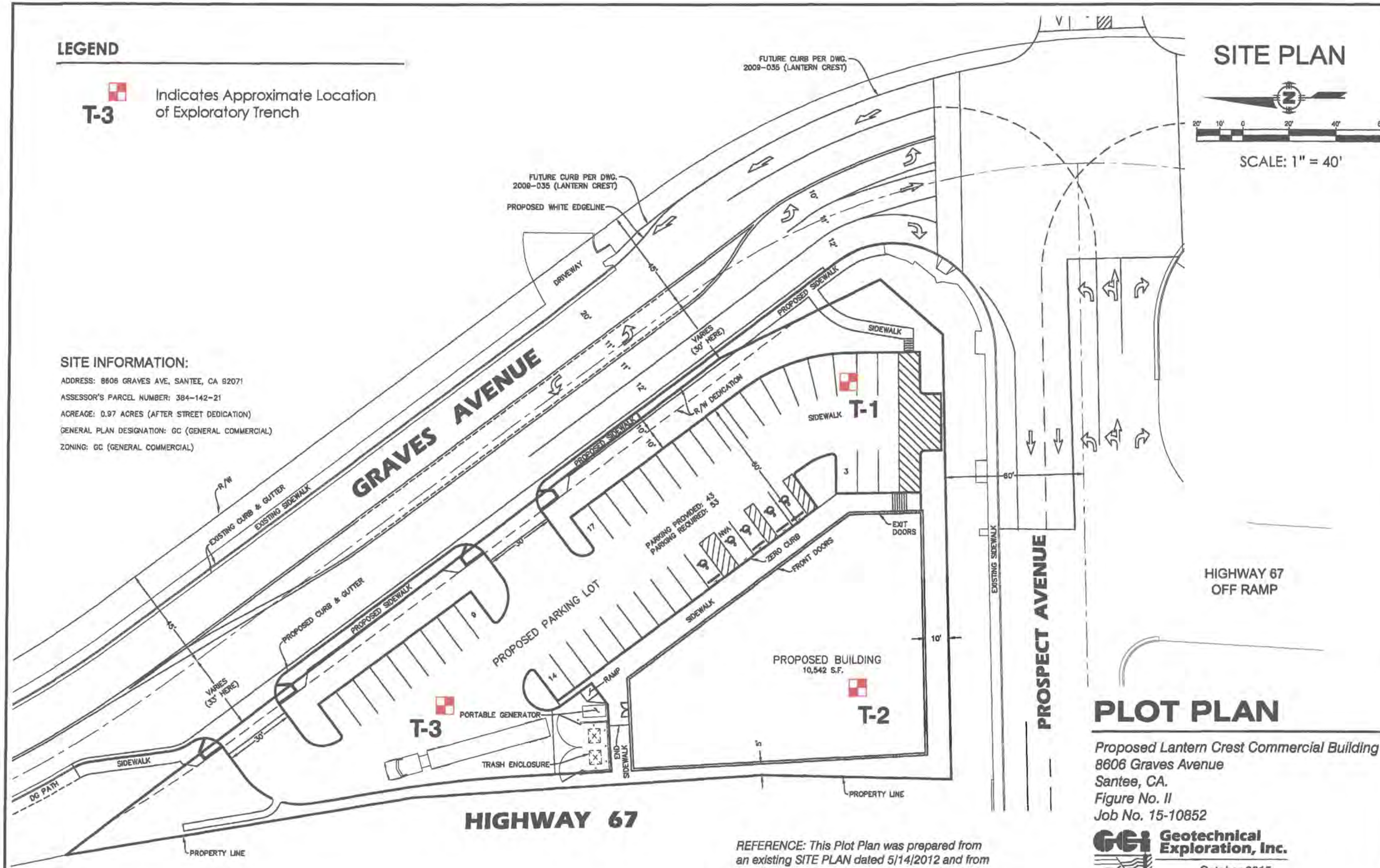
ADDRESS: 8606 GRAVES AVE, SANTEE, CA 92071

ASSESSOR'S PARCEL NUMBER: 384-142-21

ACREAGE: 0.97 ACRES (AFTER STREET DEDICATION)

GENERAL PLAN DESIGNATION: GC (GENERAL COMMERCIAL)

ZONING: GC (GENERAL COMMERCIAL)



REFERENCE: *This Plot Plan was prepared from an existing SITE PLAN dated 5/14/2012 and from on-site field reconnaissance performed by GEI.*

PLOT PLAN

Proposed Lantern Crest Commercial Building
8606 Graves Avenue
Santee, CA.
Figure No. II
Job No. 15-10852

Geotechnical Exploration, Inc.

October 2015

15-10852-p.ai

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Rubber-tire Backhoe	**13' X 2' X 5' Trench**	**9-10-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 447' Mean Sea Level	**Not Encountered**	**JAB**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION: DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0–3			**SILTY SAND**, fine- to coarse-grained, with abundant pinhole voids. Medium dense. Dry (in the upper 1') to moist. Light red-brown. **RESIDUUM** -- trace rootlets in the upper 2'. -- 31% passing #200 sieve.	SM								
3–4.5			**CLAYEY SAND**, fine- to coarse-grained, with some pinhole voids. Dense. Moist. Dark red-brown. **RESIDUUM** -- 31% passing #200 sieve.	SC								
4.5–5			**SILTY SAND**, medium- to coarse-grained; moderately weathered. Very dense. Moist. Dark red-gray. **GRANITIC BEDROCK/ TONALITE (Kgt)**	SM								
			Bottom @ 5'									

PERCHED WATER TABLE

BULK BAG SAMPLE

1 IN-PLACE SAMPLE

MODIFIED CALIFORNIA SAMPLE

S NUCLEAR FIELD DENSITY TEST

STANDARD PENETRATION TEST

JOB NAME		
Lantern Crest Commercial Building		
SITE LOCATION: **8606 Graves Avenue, Santee, CA**		
JOB NUMBER: **15-10852**	REVIEWED BY: **WDH**	LOG No.
FIGURE NUMBER: **IIIa**	Geotechnical Exploration, Inc.	**T-1**

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Rubber-tire Backhoe	**12' X 2' X 5.5' Trench**	**9-10-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 442' Mean Sea Level	**Not Encountered**	**JAB**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0–2			**SILTY SAND**, fine- to coarse-grained. Medium dense. Dry (in the upper 1.5') to moist. Light red-brown. **FILL (Qaf)** -- 31% passing #200 sieve.	SM								
1		☒			1.0	106.3	7.8	134.0	79			
			-- trace rootlets in the upper 2'.									
2–4			**SILTY SAND**, fine- to coarse-grained, with some pinhole voids. Medium dense to dense. Moist. Dark red-brown. **RESIDUUM** -- gopher hole @ 3'.	SM								
4–5.5			**CLAYEY SAND**, fine- to coarse-grained, with some pinhole voids. Medium dense to dense. Moist. Dark red-brown. **RESIDUUM** -- gopher hole @ 4.5'.	SC								
6			Bottom @ 5.5'									

- ▼ PERCHED WATER TABLE
- ☒ BULK BAG SAMPLE
- [1] IN-PLACE SAMPLE
- ■ MODIFIED CALIFORNIA SAMPLE
- [S] NUCLEAR FIELD DENSITY TEST
- ▨ STANDARD PENETRATION TEST

JOB NAME		
Lantern Crest Commercial Building		
SITE LOCATION		
8606 Graves Avenue, Santee, CA		
JOB NUMBER: **15-10852**	REVIEWED BY: **WDH**	LOG No.
FIGURE NUMBER: **IIIb**	Geotechnical Exploration, Inc.	**T-2**

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Rubber-tire Backhoe	**12' X 2' X 4.5' Trench**	**9-10-15**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 444' Mean Sea Level	**Not Encountered**	**JAB**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION — DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + CONSOL. - (%)	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
0–3			**SILTY SAND**, fine- to coarse-grained, with abundant pinhole voids. Medium dense. Dry (in the upper 1.5') to moist. Light red-brown. **RESIDUUM** – trace roots and rootlets.	SM								
3–4.25			**CLAYEY SAND**, fine- to coarse-grained, with some pinhole voids. Dense. Moist. Dark red-brown. **RESIDUUM**	SC								
4.25–4.5			**SILTY SAND**, medium- to coarse-grained; moderately weathered. Very dense. Moist. Dark red-gray. **GRANITIC BEDROCK/ TONALITE (Kgt)** Bottom @ 4.5'	SM								

- PERCHED WATER TABLE
- BULK BAG SAMPLE
- IN-PLACE SAMPLE
- MODIFIED CALIFORNIA SAMPLE
- NUCLEAR FIELD DENSITY TEST
- STANDARD PENETRATION TEST

JOB NAME		
Lantern Crest Commercial Building		
SITE LOCATION		
8606 Graves Avenue, Santee, CA		
JOB NUMBER: **15-10852**	REVIEWED BY: **WDH**	LOG No. **T-3**
FIGURE NUMBER: **IIIc**	Geotechnical Exploration, Inc.	

APPENDIX A
UNIFIED SOIL CLASSIFICATION CHART
SOIL DESCRIPTION

Coarse-grained (More than half of material is larger than a No. 200 sieve)

GRAVELS, CLEAN GRAVELS (More than half of coarse fraction is larger than No. 4 sieve size, but smaller than 3")	GW	Well-graded gravels, gravel and sand mixtures, little or no fines.
	GP	Poorly graded gravels, gravel and sand mixtures, little or no fines.
GRAVELS WITH FINES (Appreciable amount)	GC	Clay gravels, poorly graded gravel-sand-silt mixtures
SANDS, CLEAN SANDS (More than half of coarse fraction is smaller than a No. 4 sieve)	SW	Well-graded sand, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines.
SANDS WITH FINES (Appreciable amount)	SM	Silty sands, poorly graded sand and silty mixtures.
	SC	Clayey sands, poorly graded sand and clay mixtures.

Fine-grained (More than half of material is smaller than a No. 200 sieve)

SILTS AND CLAYS

Liquid Limit Less than 50	ML	Inorganic silts and very fine sands, rock flour, sandy silt and clayey-silt sand mixtures with a slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, silty clays, clean clays.
	OL	Organic silts and organic silty clays of low plasticity.
Liquid Limit Greater than 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
	CH	Inorganic clays of high plasticity, fat clays.
	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

(rev. 6/05)

Appendix F

Amendment to Storm Water Quality Management Plan and Storm Water Quality Management Plan

CITY OF SANTEE

AMENDMENT TO STORM WATER QUALITY MANAGEMENT PLAN

FOR

7/11 AND STARBUCKS DRIVE-THRU
8606 GRAVES AVENUE
SANTEE, CALIFORNIA 92071

ASSESSOR'S PARCEL NUMBER(S): 384-142-21

PREPARED FOR:

MICHAEL GRANT
DEVELOPMENT CONTRACTORS, INC.
110 TOWN CENTER PARKWAY
SANTEE, CALIFORNIA

PREPARED BY:

REC CONSULTANTS, INC.
2442 SECOND AVENUE
SAN DIEGO, CALIFORNIA 92101
(619) 232-9200

DATE:
DECEMBER 14, 2017

PLANS PREPARED BY:
REC CONSULTANTS, INC.
2442 SECOND AVENUE
SAN DIEGO, CALIFORNIA 92101
(619) 232-9200

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Table of Contents

TABLES

1. INTRODUCTION

This Amendment to the Storm Water Quality Management Plan (SWQMP) by Walsh Engineering & Surveying, Inc. (August 2017) has been prepared to modify the proposed basin for DMA-B (infiltration basin #2). This modification is due to the fact that additional areas will be flowing onto the project site, and that the proposed basins also need to comply with Q100 requirements. Per Project Clean Water Maps, the project site is exempt from hydromodification, thus basins do not need to meet hydromodification requirements.

The City of Santee has requested that the improvements to the adjacent Graves Avenue to the east of the project site, include grading in such a way that a larger portion of the roadway will drain onto the project area. This roadway will undergo improvements; as such, runoff from the centerline to the project boundary will be directed towards the two proposed infiltration basins within the project area.

Additionally, it has been determined that flood control requirements need to be met. This amendment is complementary to a separate drainage report prepared by REC Consultants (December 2017) where Q100 needs are addressed.

This document also establishes that the Graves Commercial Center project site is considered to be exempt from hydromodification. The necessary documentation has been provided to demonstrate that this is the case.

2. DESCRIPTION OF PROPOSED SITE DRAINAGE

The proposed grading will not be altered within the project site with the increase of Graves Avenue improvement area. Runoff from roadway will be conveyed via storm water drains onto the infiltration basins as proposed in the SWQMP report. The following table shows the increase in DMA areas:

Table 1. Increase in areas treated by proposed Infiltration Basins

DMA	INFILTRATON BASIN	AREA IN SWQMP (sq-ft)	AMENDED AREA (sq-ft)	DIFFERENCE (sq-ft)
A	1	16,976	20,557	+3,581
B	2	24,942	28,478	+3,536
TOTAL	-	41,918	49,035	+7,117

3. DESCRIPTION OF BMP STRATEGY

The existing SWQMP prepared by Walsh Engineering proposes two (2) infiltration basins with the intent of meeting water quality purposes. These basins have been revised in such a way that they are able to receive runoff from the increased areas and that they serve not only water quality purposes, but that they are able to comply with Q100 requirements as well. Additionally, per web soil survey, the project site is underlined by soil type “A” throughout entire area, which is used in this analysis.

Basin 1, which receives runoff from the southern section of the project site (DMA-A), remains the same. The basin, as designed in the SWQMP, has the capacity to meet both Water Quality and Q100 needs for the newly increased areas.

On the other hand, Basin 2, which receives runoff from the northern section of the project site (DMA-B), has been revised as the original design found in the SWQMP was deemed insufficient for flood control requirements. The basin remains an infiltration basin but with an increased area, and a total depth of 2.75 ft. BMP design spreadsheets have been included in Appendix 2 of this amendment.

For details regarding the compliance of flood control please refer to the project's Drainage Study prepared by REC and dated December 2017.

The following table summarizes the proposed basins details:

Table 2. SUMMARY OF BMP DETAILS

DMA	BMP	BOTTOM BMP AREA (sq-ft)	CREST BMP AREA (sq-ft)	DEPTH (ft)	LOS FLOW ORIFICE (inches)	RISER DEPTH (in)	SLOT WIDTH (in)	FLOWS TO
A	1	296	940	3	-	-	-	POC-A
B	2	2255	2255	2.75	1	8	36	POC-B

4. HYDROMODIFICATION COMPLIANCE

The project area lies in an area that has been found to be exempt from hydromodification, as receiving bodies of water are lined by concrete. Appendix 3 provides a Project Clean Water Hydromodification Exemption map.

ATTACHMENT 1: REVISED BMP EXHIBIT

DMA-BMP EXHIBIT (POST-DEVELOPED)

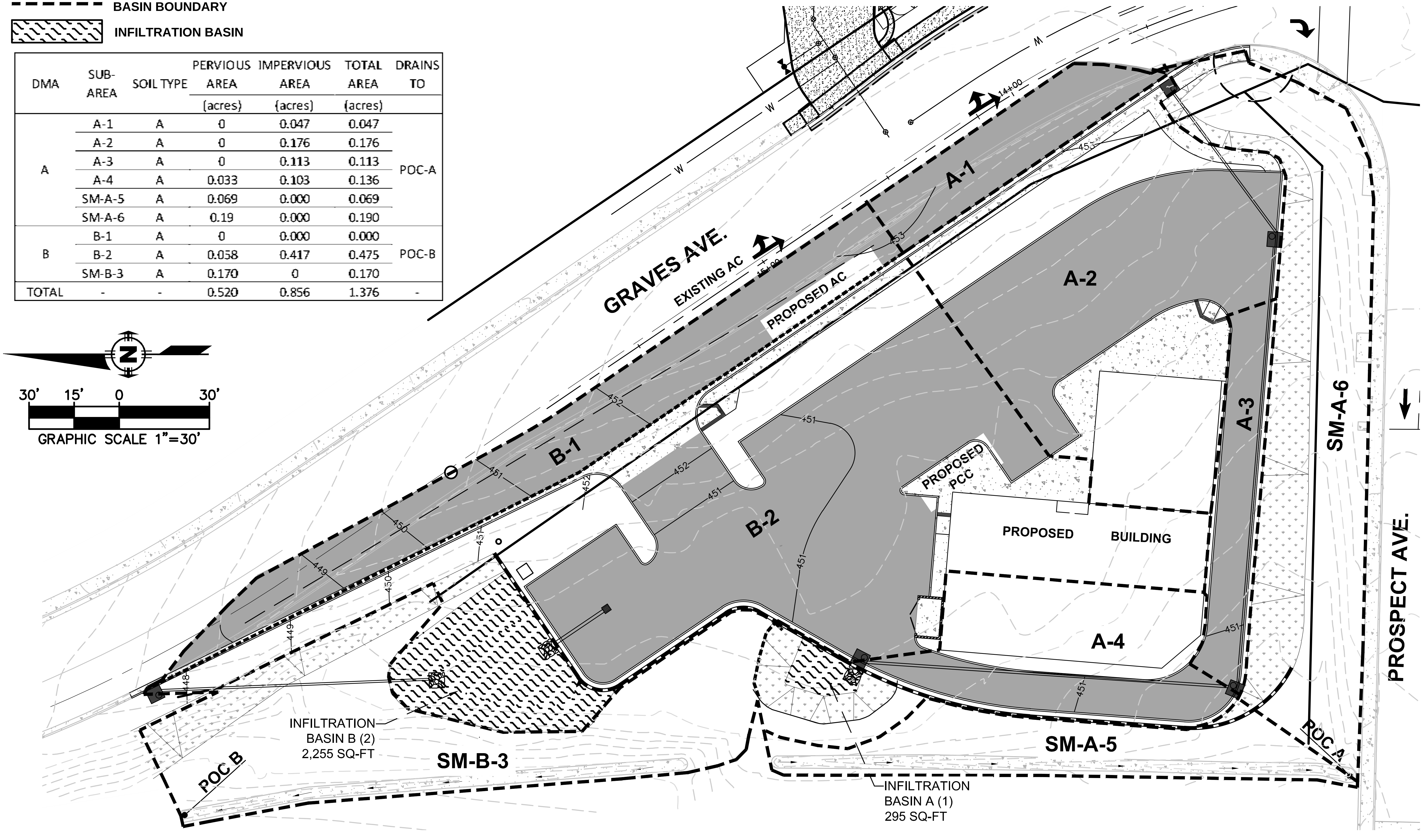
7/11 AND STARBUCKS DRIVE-THRU
8606 GRAVES AVE, SANTEE, CA 92071

LEGEND:

BASIN BOUNDARY

INFILTRATION BASIN

DMA	SUB-AREA	SOIL TYPE	PERVIOUS AREA (acres)	IMPERVIOUS AREA (acres)	TOTAL AREA (acres)	DRAINS TO
A	A-1	A	0	0.047	0.047	POC-A
	A-2	A	0	0.176	0.176	
	A-3	A	0	0.113	0.113	
	A-4	A	0.033	0.103	0.136	
	SM-A-5	A	0.069	0.000	0.069	
	SM-A-6	A	0.19	0.000	0.190	
B	B-1	A	0	0.000	0.000	POC-B
	B-2	A	0.058	0.417	0.475	
	SM-B-3	A	0.170	0	0.170	
TOTAL	-	-	0.520	0.856	1.376	-



P:\ACAD\1175 GRAVES COMMERCIAL\REPORTS\DRAINAGE STUDY\DRAINAGE - SHEETS.DWG December 15, 2017 - 9:57am

ATTACHMENT 2: BMP DESIGN CALCULATIONS

Automated Worksheet B.1-1: Calculation of Design Capture Volume (V1.3)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	DMA-1	DMA-2									unitless
	1	Basin Drains to the Following BMP Type	Retention	Retention									unitless
	2	85th Percentile 24-hr Storm Depth	0.48	0.48									inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.620	0.620									in/hr
	4	Impervious Surfaces <u>Not Directed to Dispersion Area</u> (C=0.90)	20,049	25,949									sq-ft
	5	Semi-Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.10)											sq-ft
	7	Natural Type A Soil <u>Not Serving as Dispersion Area</u> (C=0.10)	1,440	2,529									sq-ft
	8	Natural Type B Soil <u>Not Serving as Dispersion Area</u> (C=0.14)											sq-ft
	9	Natural Type C Soil <u>Not Serving as Dispersion Area</u> (C=0.23)											sq-ft
	10	Natural Type D Soil <u>Not Serving as Dispersion Area</u> (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No			No	No	No	No	No	No	yes/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	19	Number of Tree Wells Proposed per SD-A											#
	20	Average Mature Tree Canopy Diameter											ft
	21	Number of Rain Barrels Proposed per SD-E											#
	22	Average Rain Barrel Size											gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in <u>Downstream</u> Drainage?	No	No	No	No	No	No	No	No	No	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series											unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas											percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	21,489	28,478	0	0	0	0	0	0	0	0	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.85	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	31	Initial Weighted Runoff Factor	0.85	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	32	Initial Design Capture Volume	731	945	0	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	34	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.85	0.83	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	38	Design Capture Volume After Dispersion Techniques	731	945	0	0	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.85	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	42	Final Effective Tributary Area	18,266	23,637	0	0	0	0	0	0	0	0	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	731	945	0	0	0	0	0	0	0	0	cubic-feet

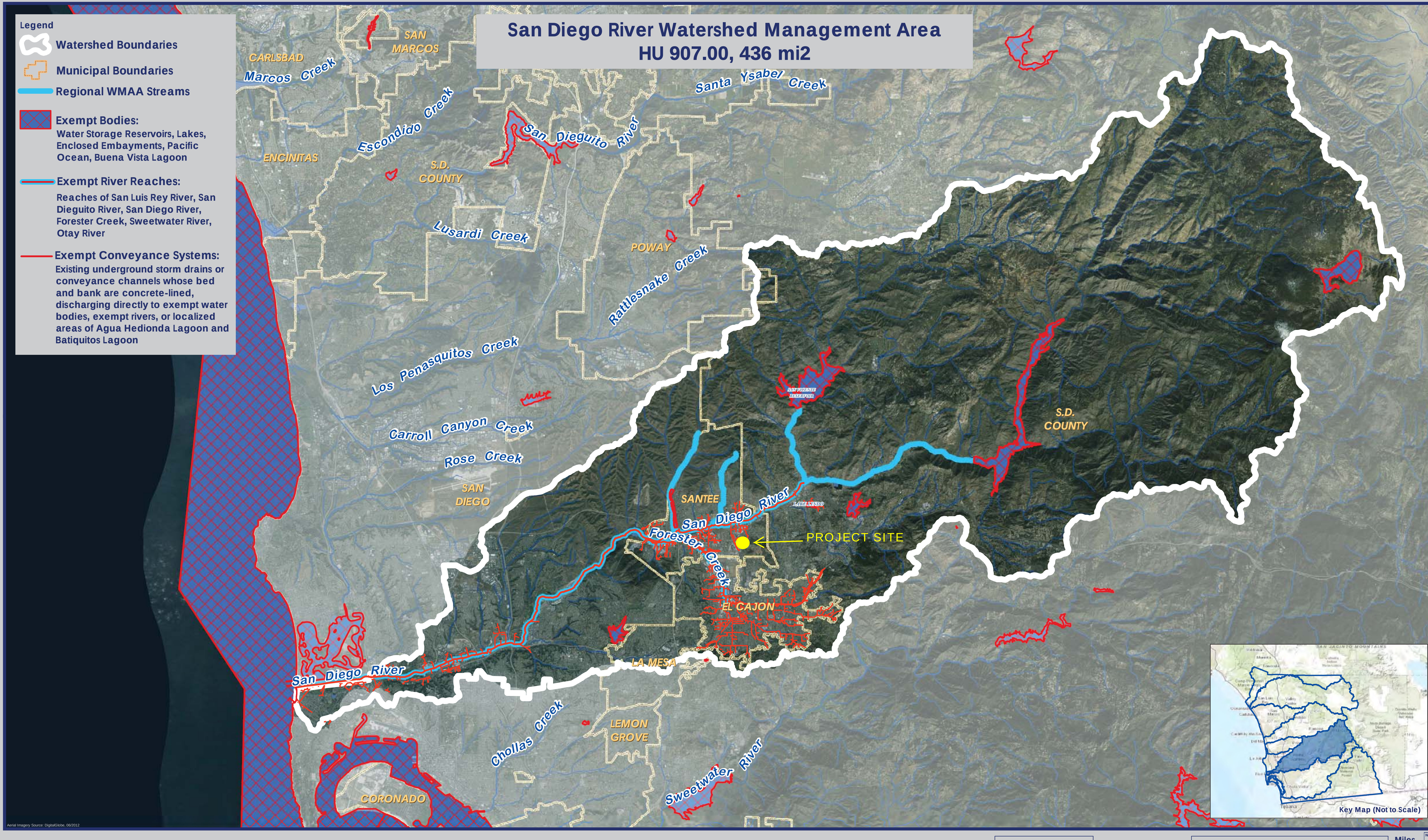
Automated Worksheet B.4-1: Sizing Retention BMPs (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	DMA-1	DMA-2	-	-	-	-	-	-	-	-	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.620	0.620	-	-	-	-	-	-	-	-	in/hr
	2	Design Capture Volume Tributary to BMP	731	945	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Non-Vegetated	Non-Vegetated									unitless
	4	Provided Surface Area	296	2,255									sq-ft
	5	Provided Surface Ponding Depth	36	33									inches
	6	Provided Soil Media Thickness	0	0									inches
	7	Provided Gravel Storage Thickness	0	0									inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	92	699	0	0	0	0	0	0	0	0	cubic-feet
	9	Soil Media Pore Space	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	10	Gravel Pore Space	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	36.0	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	58	53	0	0	0	0	0	0	0	0	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	64	59	0	0	0	0	0	0	0	0	hours
	14	Volume Retained by BMP	980	6,900	0	0	0	0	0	0	0	0	cubic-feet
	15	Fraction of DCV Retained	1.34	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	16	Percentage of Performance Requirement Satisfied	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
General Info	0	Drainage Basin ID or Name	DMA-1	DMA-2	-	-	-	-	-	-	-	-	unitless
	1	85th Percentile Storm Depth	0.48	0.48	-	-	-	-	-	-	-	-	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.620	0.620	-	-	-	-	-	-	-	-	in/hr
	3	Total Tributary Area	21,489	28,478	-	-	-	-	-	-	-	-	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	860	1,139	-	-	-	-	-	-	-	-	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.85	0.83	-	-	-	-	-	-	-	-	unitless
	6	Initial Design Capture Volume	731	945	-	-	-	-	-	-	-	-	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	-	-	-	-	-	-	-	-	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	-	-	-	-	-	-	-	-	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	18,266	23,637	-	-	-	-	-	-	-	-	square feet
	10	Final Design Capture Volume Tributary to BMP	731	945	-	-	-	-	-	-	-	-	cubic-feet
	11	Basin Drains to the Following BMP Type	Retention	Retention	-	-	-	-	-	-	-	-	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	731	945	-	-	-	-	-	-	-	-	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	1.00	1.00	-	-	-	-	-	-	-	-	fraction
	14	Percent of Average Annual Runoff Retention Provided	80.4%	80.4%	-	-	-	-	-	-	-	-	%
	15	Percent of Average Annual Runoff Retention Required	80.0%	80.0%	-	-	-	-	-	-	-	-	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	100.0%	-	-	-	-	-	-	-	-	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	0	0	-	-	-	-	-	-	-	-	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	0	0	-	-	-	-	-	-	-	-	cubic-feet

ATTACHMENT 3: HYDROMODIFICATION EXEMPTION DOCUMENTATION



Receiving Waters and Conveyance Systems Exempt from Hydromodification Management Requirements

Exhibit Date: Sept. 8, 2014

Geosyntec consultants

RICK ENGINEERING COMPANY

CITY OF SANTEE

PRIORITY DEVELOPMENT PROJECT (PDP)

STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)

FOR

7/11 and Starbucks Drive-Thru

8606 Graves Ave.
Santee, CA 92071

ASSESSOR'S PARCEL NUMBER:
384-142-21
ENGINEER OF WORK:

REGISTERED PROFESSIONAL ENGINEER
LAWRENCE W. WALSH
No. 46316
CIVIL
STATE OF CALIFORNIA

Lawrence W. Walsh, RCE 46306

PREPARED FOR:

Michael Grant
Development Contractors Inc.
110 Town Center Parkway
Santee, CA 92071

PLANS AND PDP SWQMP PREPARED BY:

Walsh Engineering & Surveying, Inc.
607 Aldwych Road
El Cajon, CA 92020
(619) 588-6747

DATE OF SWQMP:
August 30, 2017

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TABLE OF CONTENTS

ACRONYMS

APN	Assessor's Parcel Number
BMP	Best Management Practice
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWQMP	Storm Water Quality Management Plan

SWQMP PREPARER'S

CERTIFICATION PAGE

Project Name: 7/11 and Starbucks Drive-Thru
Permit Application Number:

PREPARER'S CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the PDP requirements of the City of Santee BMP Design Manual, which is a design manual for compliance with local City of Santee and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2015-0100) requirements for storm water management.

I have read and understand that the [City Engineer] has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the [City Engineer] is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

9/1/17

Engineer of Work's Signature, PE Number & Expiration Date

Lawrence W. Walsh, RCE 46306
Print Name

Walsh Engineering & Surveying, Inc.
Company

9/1/17

Date

Engineer's Seal:

REGISTERED PROFESSIONAL ENGINEER
LAWRENCE W. WALSH
No. 46316
CIVIL
STATE OF CALIFORNIA

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SWQMP PROJECT OWNER'S
CERTIFICATION PAGE

Project Name: 7/11 and Starbucks Drive-Thru
Permit Application Number:

PROJECT OWNER'S CERTIFICATION

This PDP SWQMP has been prepared for me by Walsh Engineering & Surveying, Inc. The PDP SWQMP is intended to comply with the PDP requirements of the City of Santee BMP Design Manual, which is a design manual for compliance with local City of Santee and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2015-0100) requirements for storm water management.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan. Once the undersigned transfers its interests in the property, its successor-in-interest shall bear the aforementioned responsibility to implement the best management practices (BMPs) described within this plan, including ensuring on-going operation and maintenance of structural BMPs. A signed copy of this document shall be available on the subject property into perpetuity.

Michael Grant
Project Owner's Signature

Michael Grant, President
Print Name

8/31/17
Date

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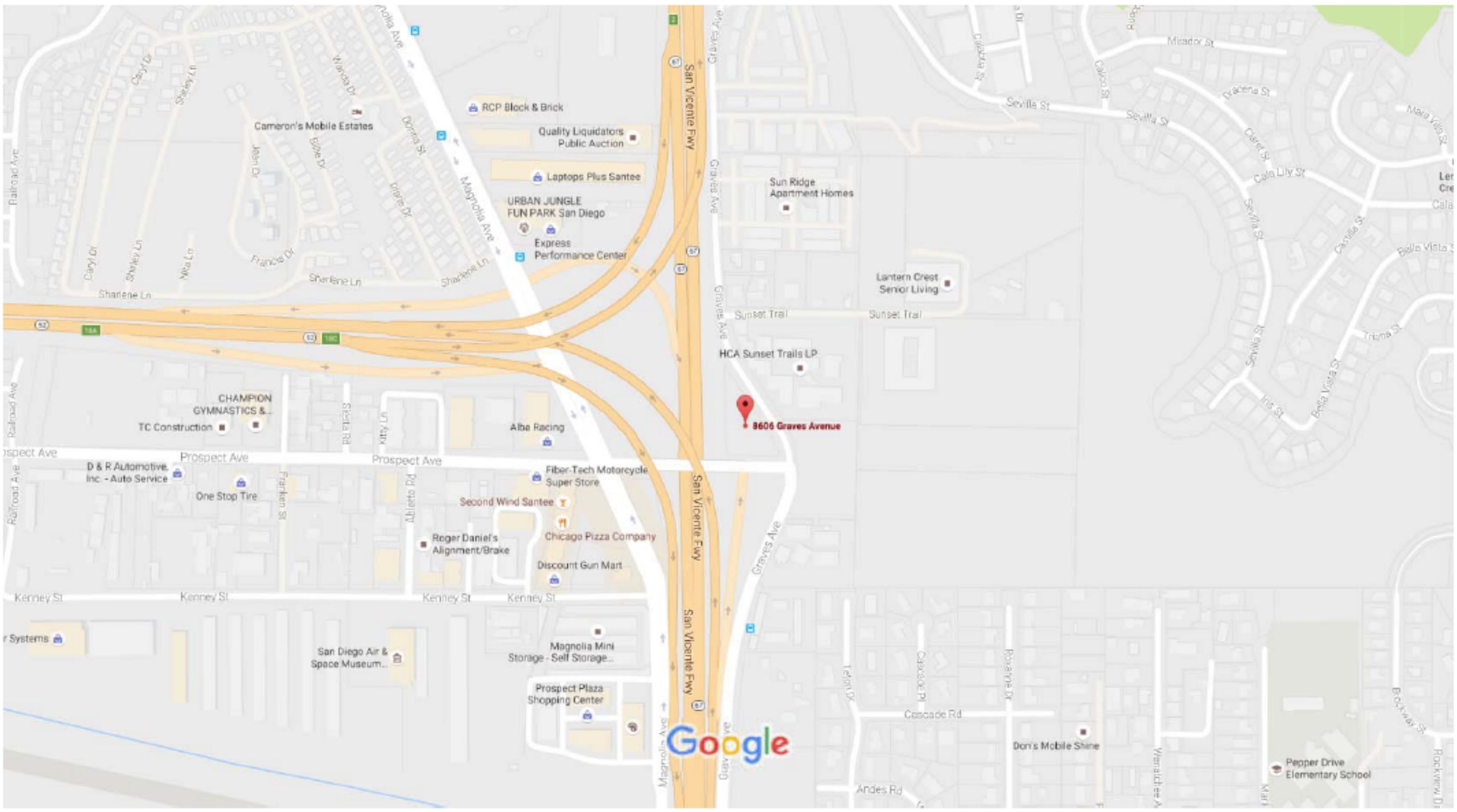
SUBMITTAL RECORD

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In column 4 summarize the changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Submittal Number	Date	Project Status	Summary of Changes
1		☑ Preliminary Design / Planning/ CEQA ☐ Final Design	Initial Submittal
2	2-6-17	☑ Preliminary Design / Planning/ CEQA ☐ Final Design	Formal Submittal
3	8-30-17	☑ Preliminary Design / Planning/ CEQA ☐ Final Design	Addressed comments dated 7-18-17
4		☐ Preliminary Design / Planning/ CEQA ☐ Final Design	

PROJECT VICINITY MAP

Project Name: 7/11 and Starbucks Drive-Thru
Permit Application Number:



Map data ©2016 Google 200 ft

Applicability of Permanent, Post-Construction Storm Water BMP Requirements (Storm Water Intake Form for all Development Permit Applications)	Form I-1 Model BMP Design Manual [August 31, 2015]

Project Identification

Project Name: 7/11 and Starbucks Drive-Thru

Permit Application Number:

Date: 10-12-16

Project Address: 8606 Graves Ave.
Santee, CA 92071

Determination of Requirements

The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.

Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". **Upon reaching a Stop, do not complete further Steps beyond the Stop.**

Refer to BMP Design Manual sections and/or separate forms referenced in each step below.

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the BMP Design Manual for guidance.	☑ Yes	Go to Step 2.
	☐ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, see Section 1.4 of the BMP Design Manual *in its entirety* for guidance, AND complete Form I-2, Project Type Determination.	☐ Standard Project	Stop. Only Standard Project requirements apply, including Standard Project SWQMP.
	☑ PDP	Standard and PDP requirements apply, including PDP SWQMP. Go to Step 3.
	☐ Exception to PDP definitions	Stop. Standard Project requirements apply, and any additional requirements specific to the type of project. Provide discussion and list any additional requirements below. Prepare Standard Project SWQMP.

Form I-1 Page 2, Form Template Date: August 31, 2015		
[Step 2 Continued from Page 1] Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		
Step 3 (PDPs only). Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the BMP Design Manual for guidance.	☐ Yes	Consult the [City Engineer] to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	☑ No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (*not required if prior lawful approval does not apply*):		
Step 4 (PDPs only). Do hydromodification control requirements apply? See Section 1.6 of the BMP Design Manual for guidance.	☑ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	☐ No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do <u>not</u> apply:		
Step 5 (PDPs subject to hydromodification control requirements only). Does protection of critical coarse sediment yield areas apply based on review of WMAA Potential Critical Coarse Sediment Yield Area Map? See Section 6.2 of the BMP Design Manual for guidance.	☑ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☐ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.

Priority Determination Form	**Form I-2** Model BMP Design Manual [August 31, 2015]

Project Information

Project Name: 7/11 and Starbucks Drive-Thru	
Permit Application Number:	Date: 10-12-16
Project Address: 8606 Graves Ave. Santee, CA 92071	

Project Type Determination: Standard Project or Priority Development Project (PDP)

The project is (select one): ✓ New Development ☐ Redevelopment

The total proposed newly created or replaced impervious area is: 28,899 ft^2 (0.66) acres

Is the project in any of the following categories, (a) through (f)?

Yes	No		
Yes ✓	No ☐	(a)	New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☐	No ✓	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ✓	No ☐	(c)	New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

Form I-2 Page 2, Form Template Date: August 31, 2015			
Yes ☐	No ☑	(d)	New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). *Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See BMP Design Manual Section 1.4.2 for additional guidance.*
Yes ☐	No ☑	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.
Yes ☐	No ☑	(f)	New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. *Note: See BMP Design Manual Section 1.4.2 for additional guidance.*

Does the project meet the definition of one or more of the Priority Development Project categories (a) through (f) listed above?

☐ No – the project is <u>not</u> a Priority Development Project (Standard Project).

☑ Yes – the project is a Priority Development Project (PDP).

The following is for redevelopment PDPs only:

The area of existing (pre-project) impervious area at the project site is: _________ ft^2 (A)
The total proposed newly created or replaced impervious area is _________ ft^2 (B)
Percent impervious surface created or replaced (B/A)*100: _______%
The percent impervious surface created or replaced is (select one based on the above calculation):

☐ less than or equal to fifty percent (50%) – only new impervious areas are considered PDP

OR

☐ greater than fifty percent (50%) – the entire project site is a PDP

Site Design Checklist For PDPs	**Form I-3B (PDPs)** Model BMP Design Manual [August 31, 2015]
Project Summary Information	
Project Name	7/11 and Starbucks Drive-Thru
Project Address	8606 Graves Ave. Santee, CA 92071
Assessor's Parcel Number(s) (APN(s))	384-142-21
Permit Application Number	
Project Hydrologic Unit	Select One: ☐ Santa Margarita 902 ☐ San Luis Rey 903 ☐ Carlsbad 904 ☐ San Dieguito 905 ☐ Penasquitos 906 ☑ San Diego 907 ☐ Pueblo San Diego 908 ☐ Sweetwater 909 ☐ Otay 910 ☐ Tijuana 911
Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	907.13 - San Diego HU, Lower San Diego HA, El Cajon HSA
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	1.01 Acres (43,982 Square Feet)
Area to be Disturbed by the Project (Project Area)	0.97 Acres (42,295 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	0.66 Acres (28,899 Square Feet)
Project Proposed Pervious Area (subset of Project Area)	0.31 Acres (13,396 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

Form I-3B Page 2 of 10, Form Template Date: August 31, 2015
Description of Existing Site Condition
Current Status of the Site (select all that apply): ☐ Existing development ☐ Previously graded but not built out ☐ Demolition completed without new construction ☐ Agricultural or other non-impervious use ☑ Vacant, undeveloped/natural Description / Additional Information:
Existing Land Cover Includes (select all that apply): ☑ Vegetative Cover ☐ Non-Vegetated Pervious Areas ☐ Impervious Areas Description / Additional Information:
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☐ NRCS Type A ☐ NRCS Type B ☐ NRCS Type C ☑ NRCS Type D
Approximate Depth to Groundwater (GW): ☐ GW Depth < 5 feet ☐ 5 feet < GW Depth < 10 feet ☐ 10 feet < GW Depth < 20 feet ☑ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

☐ Watercourses

☐ Seeps

☐ Springs

☐ Wetlands

☑ None

Description / Additional Information:

Form I-3B Page 3 of 10, Form Template Date: August 31, 2015
Description of Existing Site Drainage Patterns

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

(1) whether existing drainage conveyance is natural or urban;

(2) Is runoff from offsite conveyed through the site? if yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site;

(3)Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and

(4) Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:

Existing runoff from the project site sheet flows across natural vegetation to the West into two concrete ditches immediately past the property line. No off site run-on flows onto the site. No on site drainage conveyance structures exist on site.

Form I-3B Page 4 of 10, Form Template Date: August 31, 2015
Description of Proposed Site Development
Project Description / Proposed Land Use and/or Activities: The applicant proposes to construct a drive-thru Starbucks coffee shop and 7/11 convenience store.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): Road widening, sidewalk, parking lot, walkways, and buildings.
List/describe proposed pervious features of the project (e.g., landscape areas): Landscaped areas.
Does the project include grading and changes to site topography? ☑ Yes ☐ No Description / Additional Information: Grading for the road widening, parking lot, and building.

Form I-3B Page 5 of 10, Form Template Date: August 31, 2015
Description of Proposed Site Drainage Patterns
Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)? ☑ Yes ☐ No If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre- and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations. Describe proposed site drainage patterns:: Curb inlets and storm drains will be constructed on Graves Avenue and on site to convey runoff from the development to two infiltration basins for treatment. Any runoff not detained by the infiltration basins will sheet flow into two ditches immediately to the West of the project site.

Form I-3B Page 6 of 10, Form Template Date: August 31, 2015
Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply): ☑ On-site storm drain inlets ☐ Interior floor drains and elevator shaft sump pumps ☐ Interior parking garages ☐ Need for future indoor & structural pest control ☑ Landscape/Outdoor Pesticide Use ☐ Pools, spas, ponds, decorative fountains, and other water features ☑ Food service ☑ Refuse areas ☐ Industrial processes ☐ Outdoor storage of equipment or materials ☐ Vehicle and Equipment Cleaning ☐ Vehicle/Equipment Repair and Maintenance ☐ Fuel Dispensing Areas ☐ Loading Docks ☑ Fire Sprinkler Test Water ☐ Miscellaneous Drain or Wash Water ☑ Plazas, sidewalks, and parking lots Description / Additional Information:

Form I-3B Page 7 of 10, Form Template Date: August 31, 2015

Identification and Narrative of Receiving Water and Pollutants of Concern

Describe flow path of storm water from the project site discharge location(s), through urban storm conveyance systems as applicable, to receiving creeks, rivers, and lagoons as applicable, and ultimate discharge to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable):

Runoff sheet flows from the infiltration basins into two concrete ditches immediately West of the project site. One ditch heads North and discharges into the San Diego River. The other ditch heads South and then East and discharges into Forrester Creek which confluences with the San Diego River. Flow from the San Diego River flows into the Pacific Ocean.

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
Forrester Creek	Fecal Coliform, Selenium, TDS, pH	Bacteria
San Diego River	Enterococcus, Fecal coliform, DO, Manganese, Nitrogen, selenium, TDS, pH, Toxcicity	Bacteria

Identification of Project Site Pollutants*

***Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)**

Identify pollutants expected from the project site based on all proposed use(s) of the site (see BMP Design Manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Expected from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment			
Nutrients			
Heavy Metals			
Organic Compounds		N/A	
Trash & Debris			
Oxygen Demanding Substances			
Oil & Grease			
Bacteria & Viruses			
Pesticides			

Form I-3B Page 8 of 10, Form Template Date: August 31, 2015
Hydromodification Management Requirements
Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)? ☑ Yes, hydromodification management flow control structural BMPs required. ☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides. Description / Additional Information (to be provided if a 'No' answer has been selected above):
Critical Coarse Sediment Yield Areas* ***This Section only required if hydromodification management requirements apply**

Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries?

☐ Yes

☑ No, No critical coarse sediment yield areas to be protected based on WMAA maps

If yes, have any of the optional analyses presented in Section 6.2 of the BMP Design Manual been performed?

☐ 6.2.1 Verification of Geomorphic Landscape Units (GLUs) Onsite

☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment

☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite

☐ No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps

If optional analyses were performed, what is the final result?

☐ No critical coarse sediment yield areas to be protected based on verification of GLUs onsite

☐ Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 2.b of the SWQMP.

☐ Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit.

Discussion / Additional Information:

Form I-3B Page 9 of 10, Form Template Date: August 31, 2015
Flow Control for Post-Project Runoff* ***This Section only required if hydromodification management requirements apply**
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit. POC A for Basin A is located at the flow line of the Southerly heading ditch immediately past the West property line. POC B for Basin B is located at the flow line of the Northerly heading ditch immediately past the West property line. See HMP map in Attachment 2.
Has a geomorphic assessment been performed for the receiving channel(s)? ☑ No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐ Yes, the result is the low flow threshold is 0.1Q2 ☐ Yes, the result is the low flow threshold is 0.3Q2 ☐ Yes, the result is the low flow threshold is 0.5Q2 If a geomorphic assessment has been performed, provide title, date, and preparer: Discussion / Additional Information: (optional)

Form I-3B Page 10 of 10, Form Template Date: August 31, 2015
Other Site Requirements and Constraints
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements. No constraints are apparent at this time.
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Source Control BMP Checklist for All Development Projects (Standard Projects and Priority Development Projects)	Form I-4 Model BMP Design Manual [August 31, 2015]		
Project Identification			
Project Name	7/11 and Starbucks Drive-Thru		
Permit Application Number			
Source Control BMPs			
All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the Model BMP Design Manual for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the Model BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.			
Source Control Requirement	**Applied?**		
SC-1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-1 not implemented:			
SC-2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented:			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if SC-3 not implemented:			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if SC-4 not implemented:			

Form I-4 Page 2 of 2, Form Template Date: August 31, 2015			
Source Control Requirement	**Applied?**		
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented:			
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants			
(must answer for each source listed below)			
☐ On-site storm drain inlets	☑ Yes	☐ No	☐ N/A
☐ Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☑ N/A
☐ Interior parking garages	☐ Yes	☐ No	☑ N/A
☐ Need for future indoor & structural pest control	☐ Yes	☐ No	☑ N/A
☐ Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
☐ Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
☐ Food service	☑ Yes	☐ No	☐ N/A
☐ Refuse areas	☑ Yes	☐ No	☐ N/A
☐ Industrial processes	☐ Yes	☐ No	☑ N/A
☐ Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
☐ Vehicle and Equipment Cleaning	☐ Yes	☐ No	☑ N/A
☐ Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
☐ Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
☐ Loading Docks	☐ Yes	☐ No	☑ N/A
☐ Fire Sprinkler Test Water	☑ Yes	☐ No	☐ N/A
☐ Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☑ N/A
☐ Plazas, sidewalks, and parking lots	☑ Yes	☐ No	☐ N/A

Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.

Site Design BMP Checklist for All Development Projects (Standard Projects and Priority Development Projects)	Form I-5 Model BMP Design Manual [August 31, 2015]

Project Identification

Project Name 7/11 and Starbucks Drive-Thru

Permit Application Number

Site Design BMPs

All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the Model BMP Design Manual for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the Model BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

Site Design Requirement	Applied?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-1 not implemented:			
SD-2 Conserve Natural Areas, Soils, and Vegetation	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-2 not implemented:			
SD-3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented:			
SD-4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented:			
SD-5 Impervious Area Dispersion	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-5 not implemented: Impervious Area Dispersion is not feasible due to limited area available.			

Form I-5 Page 2 of 2, Form Template Date: August 31, 2015			
Site Design Requirement	**Applied?**		
SD-6 Runoff Collection	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-6 not implemented:			
SD-7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented:			
SD-8 Harvesting and Using Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-8 not implemented: Harvest and Use not feasible. See Attachment 1.			

Summary of PDP Structural BMPs	Form I-6 (PDPs) Model BMP Design Manual [August 31, 2015]
Project Identification	
Project Name 7/11 and Starbucks Drive-Thru	
Permit Application Number	
PDP Structural BMPs	
All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s). PDP structural BMPs must be verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 1.12 of the BMP Design Manual). PDP structural BMPs must be maintained into perpetuity, and the local jurisdiction must confirm the maintenance (see Section 7 of the BMP Design Manual). Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).	
Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. Infiltration basins were selected due to acceptable infiltration rates on site and the inability to discharge an outlet pipe from the basin at a suitable discharge location. The infiltration basins are located to evenly split the flow from the development to mimic the existing condition. Any overflow from the infiltration basins will sheet flow into the two existing ditches immediately past the property line which also mimics the existing condition. The infiltration basins will satisfy both pollutant control and hydromodification flow control. (Continue on page 2 as necessary.)	

Form I-6 Page 2 of X, Form Template Date: August 31, 2015
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1)

Form I-6 Page 3 of X (Copy as many as needed) , Form Template Date: August 31, 2015

Structural BMP Summary Information
(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. Infiltration Basin #1

Construction Plan Sheet No.

Type of structural BMP:

☐ Retention by harvest and use (HU-1)
☑ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☐ Biofiltration (BF-1)
☐ Biofiltration with Nutrient Sensitive Media Design (BF-2)
☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

☐ Pollutant control only
☐ Hydromodification control only
☑ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Walsh Engineering & Surveying, Inc. 607 Aldwych Road El Cajon, CA 92020
Who will be the final owner of this BMP?	Development Contractors Inc.
Who will maintain this BMP into perpetuity?	Owner(s) of building
What is the funding mechanism for maintenance?	Profits from buisiness

Form I-6 Page 4 of X (Copy as many as needed) , Form Template Date: August 31, 2015
Structural BMP ID No.
Construction Plan Sheet No.
Discussion (as needed):

Form I-6 Page 3 of X (Copy as many as needed) , Form Template Date: August 31, 2015	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. Infiltration Basin #2	
Construction Plan Sheet No.	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☑ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the BMP Design Manual)	Walsh Engineering & Surveying, Inc. 607 Aldwych Road El Cajon, CA 92020
Who will be the final owner of this BMP?	Development Contractors Inc.
Who will maintain this BMP into perpetuity?	Owner(s) of building
What is the funding mechanism for maintenance?	Profits from buisiness

Form I-6 Page 4 of X (Copy as many as needed) , Form Template Date: August 31, 2015
Structural BMP ID No.
Construction Plan Sheet No.
Discussion (as needed):

ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	**Contents**	**Checklist**
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a ☐ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☐ Included ☑ Not included because the entire project will use infiltration BMPs
Attachment 1d	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☑ Included ☐ Not included because the entire project will use harvest and use BMPs Included in "Infiltration Testing Results" report by Group Delta dated August 30, 2016
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines	☑ Included

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- ☑ Underlying hydrologic soil group
- ☑ Approximate depth to groundwater
- N/A ☑ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☑ Critical coarse sediment yield areas to be protected
- ☑ Existing topography and impervious areas
- ☑ Existing and proposed site drainage network and connections to drainage offsite
- N/A ☑ Proposed demolition
- ☑ Proposed grading
- ☑ Proposed impervious features
- ☑ Proposed design features and surface treatments used to minimize imperviousness
- ☑ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☑ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- ☑ Structural BMPs (identify location, type of BMP, and size/detail)

DRAINAGE MANAGEMENT AREA EXHIBIT

7/11 AND STARBUCKS DRIVE-THRU
8606 GRAVES AVE, SANTEE, CA 92071

LEGEND:

- DMA BOUNDARY
- BOTTOM OF INFILTRATION BASIN

SOURCE CONTROL BMPS

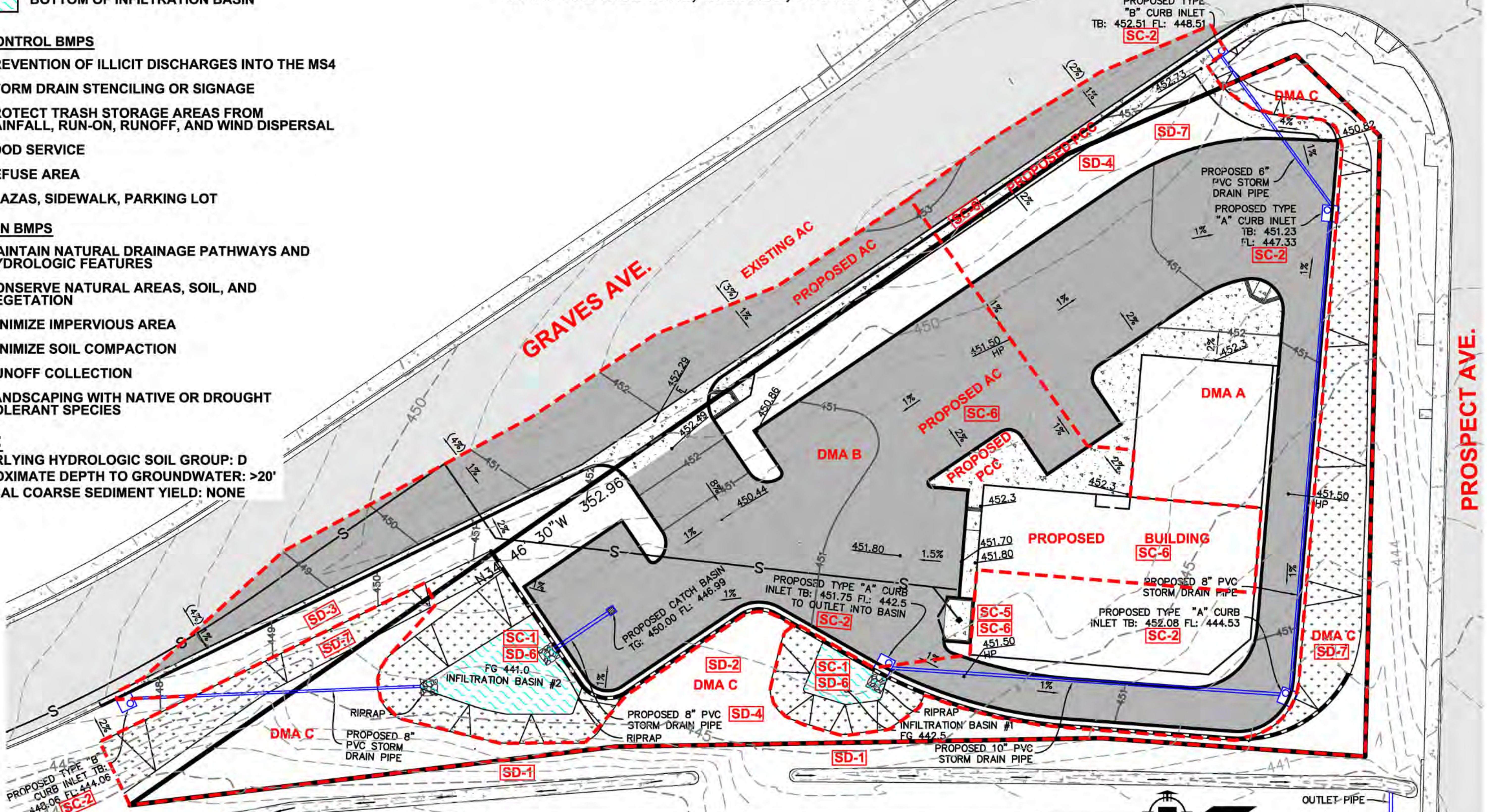
- SC-1 PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- SC-2 STORM DRAIN STENCILING OR SIGNAGE
- SC-5 PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON, RUNOFF, AND WIND DISPERSAL
- SC-6 FOOD SERVICE
- SC-6 REFUSE AREA
- SC-6 PLAZAS, SIDEWALK, PARKING LOT

SITE DESIGN BMPS

- SD-1 MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDROLOGIC FEATURES
- SD-2 CONSERVE NATURAL AREAS, SOIL, AND VEGETATION
- SD-3 MINIMIZE IMPERVIOUS AREA
- SD-4 MINIMIZE SOIL COMPACTION
- SD-6 RUNOFF COLLECTION
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

NOTES:

1. UNDERLYING HYDROLOGIC SOIL GROUP: D
2. APPROXIMATE DEPTH TO GROUNDWATER: >20'
3. CRITICAL COARSE SEDIMENT YIELD: NONE



DMA	AREA (SF)	DMA TYPE	BMP
A	18,976	DRAINS TO BMP	INFILTRATION BASIN #1
B	24,942	DRAINS TO BMP	INFILTRATION BASIN #2
C	10,003	SELF-MITIGATING	–

30' 15' 0 30'
GRAPHIC SCALE 1"=30'

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Automated Worksheet B.3-1: Project-Scale BMP Feasibility Analysis (V1.2)

Category	#	Description	Value	Units
Capture & Use Inputs	0	Design Capture Volume for Entire Project Site	1,421	cubic-feet
	1	Proposed Development Type	Retail	unitless
	2	Number of Residents or Employees at Proposed Development	0	#
	3	Total Planted Area within Development	10,000	sq-ft
	4	Water Use Category for Proposed Planted Areas	Moderate	unitless
Infiltration Inputs	5	Is Average Site Design Infiltration Rate ≤0.500 Inches per Hour?	No	yes/no
	6	Is Average Site Design Infiltration Rate ≤0.010 Inches per Hour?	No	yes/no
	7	Is Infiltration of the Full DCV Anticipated to Produce Negative Impacts?	No	yes/no
	8	Is Infiltration of Any Volume Anticipated to Produce Negative Impacts?	No	yes/no
Calculations	9	36-Hour Toilet Use Per Resident or Employee	1.40	cubic-feet
	10	Subtotal: Anticipated 36 Hour Toilet Use	0	cubic-feet
	11	Anticipated 1 Acre Landscape Use Over 36 Hours	196.52	cubic-feet
	12	Subtotal: Anticipated Landscape Use Over 36 Hours	45	cubic-feet
	13	Total Anticipated Use Over 36 Hours	45	cubic-feet
	14	Total Anticipated Use / Design Capture Volume	0.03	cubic-feet
	15	Are Full Capture and Use Techniques Feasible for this Project?	No	unitless
	16	Is Full Retention Feasible for this Project?	Yes	yes/no
	17	Is Partial Retention Feasible for this Project?	Yes	yes/no
Result	18	Feasibility Category	3	1, 2, 3, 4, 5

Worksheet B.3-1 General Notes:

A. Applicants may use this worksheet to determine the types of structural BMPs that are acceptable for implementation at their project site (as required in Section 5 of the BMPDM). User input should be provided for yellow shaded cells, values for all other cells will be automatically generated. Projects demonstrating feasibility or potential feasibility via this worksheet are encouraged to incorporate capture and use features in their project.

B. Negative impacts associated with retention may include geotechnical, groundwater, water balance, or other issues identified by a geotechnical engineer and substantiated through completion of Form I-8.

C. Feasibility Category 1: Applicant must implement capture & use, retention, and/or infiltration elements for the entire DCV.

D. Feasibility Category 2: Applicant must implement capture & use elements for the entire DCV.

E. Feasibility Category 3: Applicant must implement retention and/or infiltration elements for all DMAs with Design Infiltration Rates greater than 0.50 in/hr.

F. Feasibility Category 4: Applicant must implement standard unlined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.011 to 0.50 in/hr. Applicants may be permitted to implement lined BMPs, reduced size BMPs, and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

G. Feasibility Category 5: Applicant must implement standard lined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.010 in/hr or less. Applicants may also be permitted to implement reduced size and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

H. PDPs participating in an offsite alternative compliance program are not held to the feasibility categories presented herein.

Automated Worksheet B.1-1: Calculation of Design Capture Volume (V1.2)

Category	#	Description	*i*	*ii*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	DMA A	DMA B	unitless
	1	Basin Drains to the Following BMP Type	Retention	Retention	unitless
	2	85th Percentile 24-hr Storm Depth	0.51	0.51	inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.620	0.620	in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	15,456	18,432	sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)			sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)			sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)			sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)			sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)			sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	3,520	6,510	sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	yes/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)			sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)			sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)			sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)			sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)			sq-ft
	19	Number of Tree Wells Proposed per SD-A			#
	20	Average Mature Tree Canopy Diameter			ft
	21	Number of Rain Barrels Proposed per SD-E			#
	22	Average Rain Barrel Size			gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series			unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas			percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	18,976	24,942	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.79	0.74	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	unitless
	31	Initial Weighted Runoff Factor	0.79	0.74	unitless
	32	Initial Design Capture Volume	637	784	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	0	sq-ft
	34	Total Pervious Dispersion Area	0	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.79	0.74	unitless
	38	Design Capture Volume After Dispersion Techniques	637	784	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.79	0.74	unitless
	42	Final Effective Tributary Area	14,991	18,457	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	637	784	cubic-feet

Worksheet B.1-1 General Notes:

A. Applicants may use this worksheet to calculate design capture volumes for up to 10 drainage areas User input must be provided for yellow shaded cells, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below. Upon completion of this worksheet, proceed to the appropriate BMP Sizing worksheet(s).

Automated Worksheet B.4-1: Sizing Retention BMPs (V1.2)

Category	#	Description	*i*	*ii*	Units
BMP Inputs	0	Drainage Basin ID or Name	DMA A	DMA B	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.620	0.620	in/hr
	2	Design Capture Volume Tributary to BMP	637	784	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Non-Vegetated	Non-Vegetated	unitless
	4	Provided Surface Area	296	885	sq-ft
	5	Provided Surface Ponding Depth	36	36	inches
	6	Provided Soil Media Thickness	0	0	inches
	7	Provided Gravel Storage Thickness	0	0	inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	92	274	cubic-feet
	9	Soil Media Pore Space	0.40	0.40	unitless
	10	Gravel Pore Space	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	36.0	36.0	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	58	58	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	64	64	hours
	14	Volume Retained by BMP	980	2,929	cubic-feet
	15	Fraction of DCV Retained	1.54	3.00	ratio
	16	Percentage of Performance Requirement Satisfied	1.00	1.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	1.00	1.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	**0**	**0**	cubic-feet

Worksheet B.4-1 General Notes:

A. Applicants may use this worksheet to size Infiltration, Bioretention, and/or Permeable Pavement BMPs (INF-1, INF-2, INF-3) for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

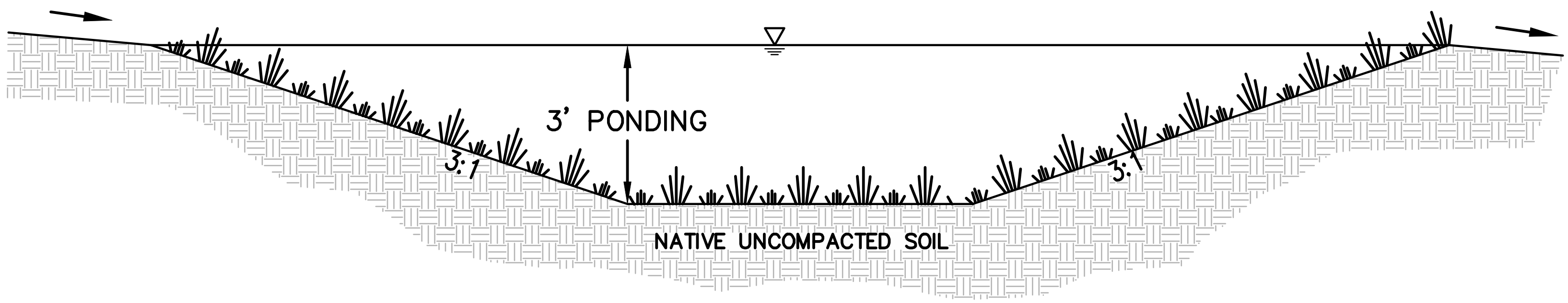
Summary of Stormwater Pollutant Control Calculations (V1.2)

Category	#	Description	*i*	*ii*	Units
General Info	0	Drainage Basin ID or Name	DMA A	DMA B	unitless
	1	85th Percentile Storm Depth	0.51	0.51	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.620	0.620	in/hr
	3	Total Tributary Area	18,976	24,942	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	806	1,060	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.79	0.74	unitless
	6	Initial Design Capture Volume	637	784	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	14,991	18,457	square feet
	10	Final Design Capture Volume Tributary to BMP	637	784	cubic-feet
	11	Basin Drains to the Following BMP Type	Retention	Retention	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	637	784	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	1.00	1.00	fraction
	14	Percent of Average Annual Runoff Retention Provided	80.4%	80.4%	%
	15	Percent of Average Annual Runoff Retention Required	80.0%	80.0%	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	100.0%	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	0	0	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	0	0	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on previous user inputs. If applicable, drainage basin elements that require revisions and/or supplemental information outside the scope of these worksheets are highlighted in orange and summairzed in the red

-Congratulations, all specified drainage basins and BMPs are in compliance with stormwater pollutant control requirements. Include 11x17 color prints of this summary sheet and supporting worksheet calculations as part of the SWQMP submittal package.



INFILTRATION BASIN DETAIL

NO SCALE

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	**Contents**	**Checklist**
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☑ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐ Included ☑ Not required because BMPs will drain in less than 96 hours

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- ☑ Underlying hydrologic soil group
- ☑ Approximate depth to groundwater
- ☑ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☑ Critical coarse sediment yield areas to be protected
- ☑ Existing topography
- ☑ Existing and proposed site drainage network and connections to drainage offsite
- ☑ Proposed grading
- ☑ Proposed impervious features
- ☑ Proposed design features and surface treatments used to minimize imperviousness
- ☑ Point(s) of Compliance (POC) for Hydromodification Management
- ☑ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- ☑ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

HYDROMODIFICATION EXHIBIT (PRE-DEVELOPED)

7/11 AND STARBUCKS DRIVE-THRU
8606 GRAVES AVE, SANTEE, CA 92071

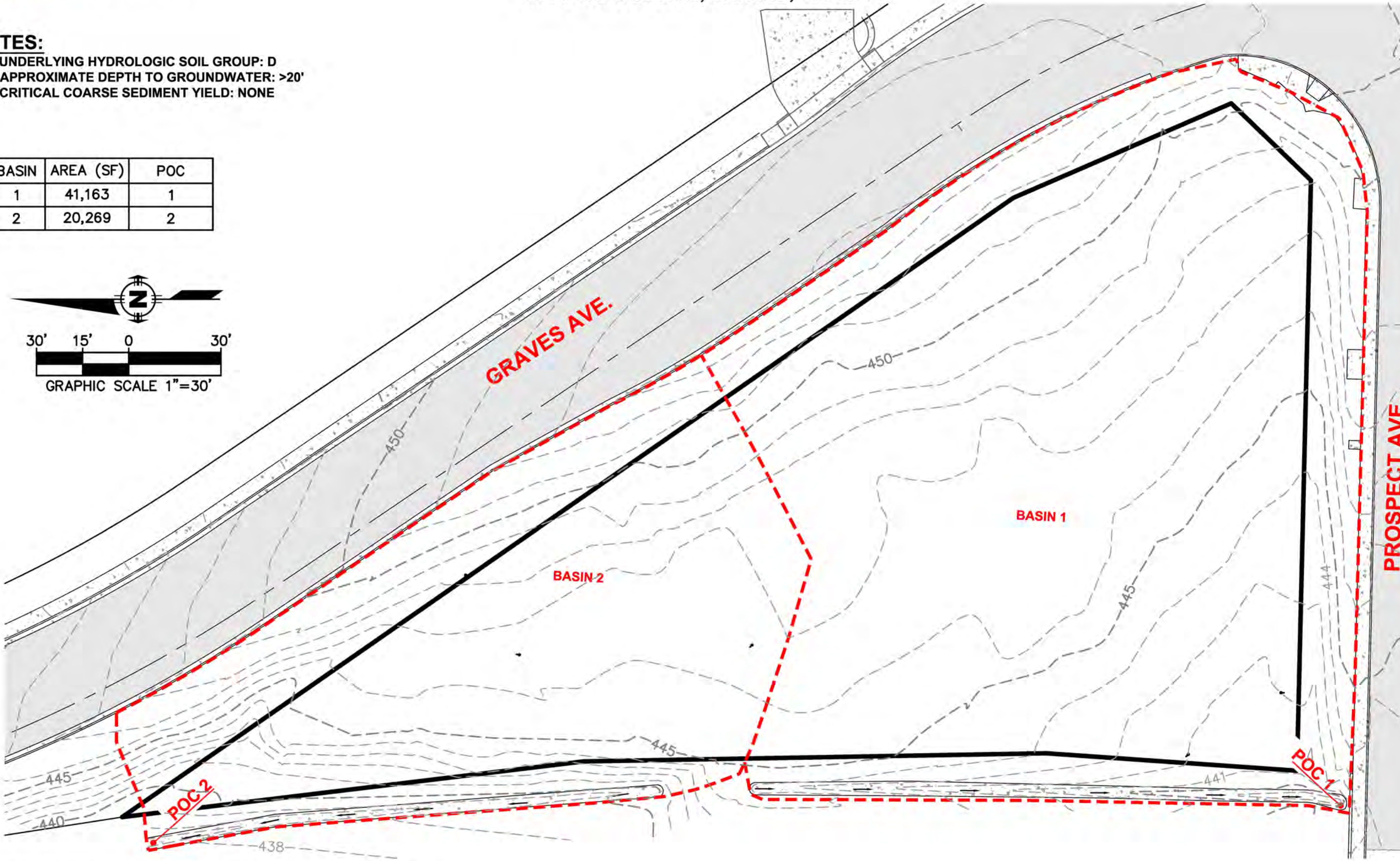
LEGEND:

BASIN BOUNDARY

NOTES:

1. UNDERLYING HYDROLOGIC SOIL GROUP: D
2. APPROXIMATE DEPTH TO GROUNDWATER: >20'
3. CRITICAL COARSE SEDIMENT YIELD: NONE

BASIN	AREA (SF)	POC
1	41,163	1
2	20,269	2



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HYDROMODIFICATION EXHIBIT (POST-DEVELOPED)

7/11 AND STARBUCKS DRIVE-THRU
8606 GRAVES AVE, SANTEE, CA 92071

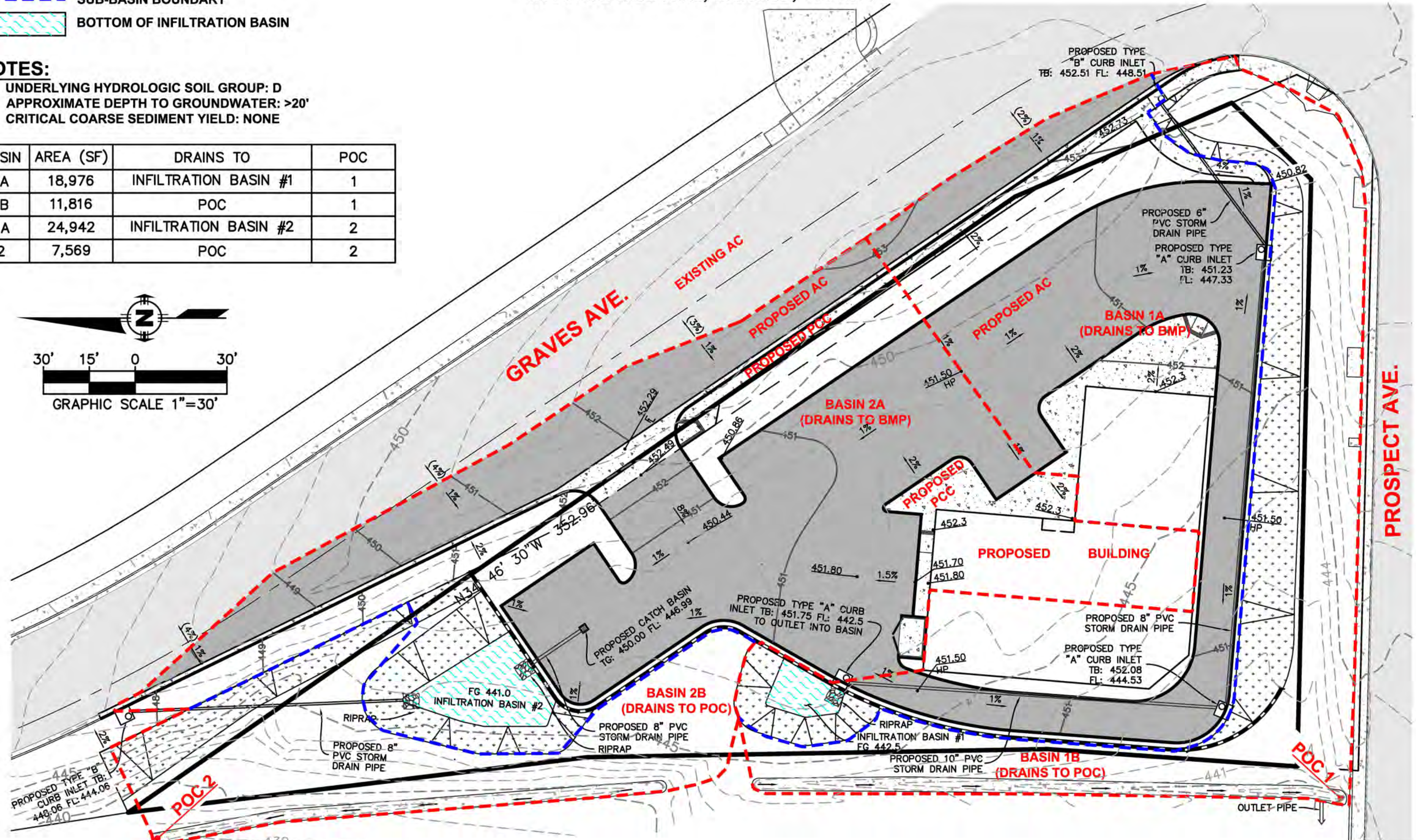
LEGEND:

- BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- BOTTOM OF INFILTRATION BASIN

NOTES:

1. UNDERLYING HYDROLOGIC SOIL GROUP: D
2. APPROXIMATE DEPTH TO GROUNDWATER: >20'
3. CRITICAL COARSE SEDIMENT YIELD: NONE

BASIN	AREA (SF)	DRAINS TO	POC
1A	18,976	INFILTRATION BASIN #1	1
1B	11,816	POC	1
2A	24,942	INFILTRATION BASIN #2	2
2	7,569	POC	2



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SDHM 3.0

PROJECT REPORT

General Model Information

Project Name:	11732-2 Graves 8-29-17
Site Name:	11732-2 Graves
Site Address:	8606 Graves Ave.
City:	Santee
Report Date:	8/29/2017
Gage:	SANTEE
Data Start:	10/01/1973
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2016/05/13

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year
Low Flow Threshold for POC2:	10 Percent of the 2 Year
High Flow Threshold for POC2:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Flat	0.33
D,NatVeg,Moderate	0.48
D,NatVeg,Steep	0.13
Pervious Total	0.94
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.94

Element Flows To:

Surface	Interflow	Groundwater

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Flat	0.12
D,NatVeg,Moderate	0.19
D,NatVeg,Steep	0.16
Pervious Total	0.47
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.47

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1A (Drains to BMP)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Flat	0.06
Pervious Total	0.06
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.38
Impervious Total	0.38
Basin Total	0.44

Element Flows To:

Surface	Interflow	Groundwater
Infiltration Basin #1	Infiltration Basin #1	

Basin 2A (Drains to BMP)

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Flat	0.15
Pervious Total	0.15
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.42
Impervious Total	0.42
Basin Total	0.57

Element Flows To:

Surface	Interflow	Groundwater
Infiltration Basin #2	Infiltration Basin #2	

Basin 2B (Drains to POC)

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Steep	0.09
D,NatVeg,Flat	0.03
D,NatVeg,Moderate	0.05
Pervious Total	0.17
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.17

Element Flows To:

Surface	Interflow	Groundwater

Basin 1B (Drains to POC)

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Steep	0.18
D,NatVeg,Flat	0.04
D,NatVeg,Moderate	0.05
Pervious Total	0.27
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.27

Element Flows To:

Surface	Interflow	Groundwater

Routing Elements

Predeveloped Routing

Mitigated Routing

Infiltration Basin #1

Bottom Length:	22.00 ft.
Bottom Width:	13.30 ft.
Depth:	3.1 ft.
Volume at riser head:	0.0423 acre-feet.
Infiltration On	
Infiltration rate:	0.6
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	9.722
Total Volume Through Riser (ac-ft.):	0.76
Total Volume Through Facility (ac-ft.):	10.482
Percent Infiltrated:	92.75
Total Precip Applied to Facility:	0.345
Total Evap From Facility:	0.061
Side slope 1:	3 To 1
Side slope 2:	3 To 1
Side slope 3:	3 To 1
Side slope 4:	0 To 1
Discharge Structure	
Riser Height:	3 ft.
Riser Diameter:	99 in.
Element Flows To:	
Outlet 1	Outlet 2

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.006	0.000	0.000	0.000
0.0344	0.006	0.000	0.000	0.004
0.0689	0.007	0.000	0.000	0.004
0.1033	0.007	0.000	0.000	0.004
0.1378	0.007	0.001	0.000	0.004
0.1722	0.007	0.001	0.000	0.004
0.2067	0.007	0.001	0.000	0.004
0.2411	0.007	0.001	0.000	0.004
0.2756	0.007	0.002	0.000	0.004
0.3100	0.008	0.002	0.000	0.004
0.3444	0.008	0.002	0.000	0.004
0.3789	0.008	0.002	0.000	0.005
0.4133	0.008	0.003	0.000	0.005
0.4478	0.008	0.003	0.000	0.005
0.4822	0.008	0.003	0.000	0.005
0.5167	0.008	0.004	0.000	0.005
0.5511	0.009	0.004	0.000	0.005
0.5856	0.009	0.004	0.000	0.005
0.6200	0.009	0.005	0.000	0.005
0.6544	0.009	0.005	0.000	0.005
0.6889	0.009	0.005	0.000	0.005
0.7233	0.009	0.005	0.000	0.005
0.7578	0.009	0.006	0.000	0.006
0.7922	0.010	0.006	0.000	0.006
0.8267	0.010	0.007	0.000	0.006
0.8611	0.010	0.007	0.000	0.006

0.8956	0.010	0.007	0.000	0.006
0.9300	0.010	0.008	0.000	0.006
0.9644	0.010	0.008	0.000	0.006
0.9989	0.011	0.008	0.000	0.006
1.0333	0.011	0.009	0.000	0.006
1.0678	0.011	0.009	0.000	0.006
1.1022	0.011	0.010	0.000	0.007
1.1367	0.011	0.010	0.000	0.007
1.1711	0.011	0.010	0.000	0.007
1.2056	0.012	0.011	0.000	0.007
1.2400	0.012	0.011	0.000	0.007
1.2744	0.012	0.012	0.000	0.007
1.3089	0.012	0.012	0.000	0.007
1.3433	0.012	0.012	0.000	0.007
1.3778	0.012	0.013	0.000	0.007
1.4122	0.013	0.013	0.000	0.007
1.4467	0.013	0.014	0.000	0.008
1.4811	0.013	0.014	0.000	0.008
1.5156	0.013	0.015	0.000	0.008
1.5500	0.013	0.015	0.000	0.008
1.5844	0.014	0.016	0.000	0.008
1.6189	0.014	0.016	0.000	0.008
1.6533	0.014	0.017	0.000	0.008
1.6878	0.014	0.017	0.000	0.008
1.7222	0.014	0.018	0.000	0.008
1.7567	0.014	0.018	0.000	0.009
1.7911	0.015	0.019	0.000	0.009
1.8256	0.015	0.019	0.000	0.009
1.8600	0.015	0.020	0.000	0.009
1.8944	0.015	0.020	0.000	0.009
1.9289	0.015	0.021	0.000	0.009
1.9633	0.016	0.021	0.000	0.009
1.9978	0.016	0.022	0.000	0.009
2.0322	0.016	0.023	0.000	0.009
2.0667	0.016	0.023	0.000	0.010
2.1011	0.016	0.024	0.000	0.010
2.1356	0.017	0.024	0.000	0.010
2.1700	0.017	0.025	0.000	0.010
2.2044	0.017	0.025	0.000	0.010
2.2389	0.017	0.026	0.000	0.010
2.2733	0.017	0.027	0.000	0.010
2.3078	0.018	0.027	0.000	0.010
2.3422	0.018	0.028	0.000	0.011
2.3767	0.018	0.029	0.000	0.011
2.4111	0.018	0.029	0.000	0.011
2.4456	0.018	0.030	0.000	0.011
2.4800	0.019	0.030	0.000	0.011
2.5144	0.019	0.031	0.000	0.011
2.5489	0.019	0.032	0.000	0.011
2.5833	0.019	0.032	0.000	0.011
2.6178	0.019	0.033	0.000	0.012
2.6522	0.020	0.034	0.000	0.012
2.6867	0.020	0.035	0.000	0.012
2.7211	0.020	0.035	0.000	0.012
2.7556	0.020	0.036	0.000	0.012
2.7900	0.020	0.037	0.000	0.012
2.8244	0.021	0.037	0.000	0.012
2.8589	0.021	0.038	0.000	0.012

2.8933	0.021	0.039	0.000	0.013
2.9278	0.021	0.040	0.000	0.013
2.9622	0.022	0.040	0.000	0.013
2.9967	0.022	0.041	0.000	0.013
3.0311	0.022	0.042	0.480	0.013
3.0656	0.022	0.043	1.470	0.013
3.1000	0.022	0.043	2.769	0.013

Infiltration Basin #2

Bottom Length:	27.00 ft.	
Bottom Width:	32.23 ft.	
Depth:	3.1 ft.	
Volume at riser head:	0.0933 acre-feet.	
Infiltration On		
Infiltration rate:	0.6	
Infiltration safety factor:	1	
Wetted surface area On		
Total Volume Infiltrated (ac-ft.):		11.994
Total Volume Through Riser (ac-ft.):		0.095
Total Volume Through Facility (ac-ft.):		12.089
Percent Infiltrated:		99.21
Total Precip Applied to Facility:		0.647
Total Evap From Facility:		0.096
Side slope 1:	3 To 1	
Side slope 2:	3 To 1	
Side slope 3:	0 To 1	
Side slope 4:	3 To 1	
Discharge Structure		
Riser Height:	3 ft.	
Riser Diameter:	99 in.	
Element Flows To:		
Outlet 1	Outlet 2	

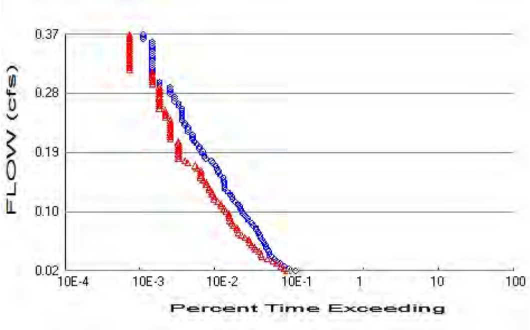
Pond Hydraulic Table

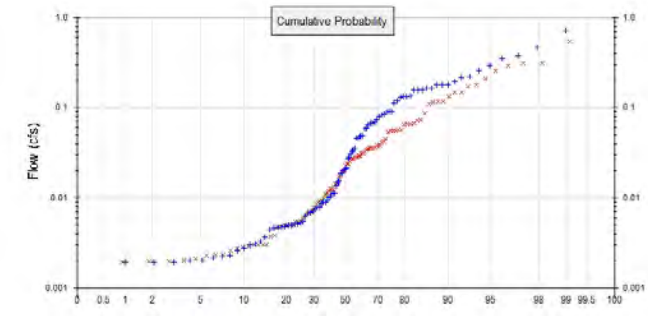
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.020	0.000	0.000	0.000
0.0344	0.020	0.000	0.000	0.012
0.0689	0.020	0.001	0.000	0.012
0.1033	0.020	0.002	0.000	0.012
0.1378	0.020	0.002	0.000	0.012
0.1722	0.021	0.003	0.000	0.012
0.2067	0.021	0.004	0.000	0.012
0.2411	0.021	0.005	0.000	0.013
0.2756	0.021	0.005	0.000	0.013
0.3100	0.022	0.006	0.000	0.013
0.3444	0.022	0.007	0.000	0.013
0.3789	0.022	0.008	0.000	0.013
0.4133	0.022	0.008	0.000	0.013
0.4478	0.022	0.009	0.000	0.013
0.4822	0.023	0.010	0.000	0.014
0.5167	0.023	0.011	0.000	0.014
0.5511	0.023	0.012	0.000	0.014
0.5856	0.023	0.012	0.000	0.014
0.6200	0.024	0.013	0.000	0.014
0.6544	0.024	0.014	0.000	0.014
0.6889	0.024	0.015	0.000	0.014
0.7233	0.024	0.016	0.000	0.015
0.7578	0.025	0.017	0.000	0.015
0.7922	0.025	0.017	0.000	0.015
0.8267	0.025	0.018	0.000	0.015
0.8611	0.025	0.019	0.000	0.015
0.8956	0.025	0.020	0.000	0.015
0.9300	0.026	0.021	0.000	0.015

0.9644	0.026	0.022	0.000	0.016
0.9989	0.026	0.023	0.000	0.016
1.0333	0.026	0.024	0.000	0.016
1.0678	0.027	0.025	0.000	0.016
1.1022	0.027	0.026	0.000	0.016
1.1367	0.027	0.027	0.000	0.016
1.1711	0.027	0.027	0.000	0.016
1.2056	0.028	0.028	0.000	0.017
1.2400	0.028	0.029	0.000	0.017
1.2744	0.028	0.030	0.000	0.017
1.3089	0.028	0.031	0.000	0.017
1.3433	0.029	0.032	0.000	0.017
1.3778	0.029	0.033	0.000	0.017
1.4122	0.029	0.034	0.000	0.018
1.4467	0.030	0.035	0.000	0.018
1.4811	0.030	0.036	0.000	0.018
1.5156	0.030	0.038	0.000	0.018
1.5500	0.030	0.039	0.000	0.018
1.5844	0.031	0.040	0.000	0.018
1.6189	0.031	0.041	0.000	0.018
1.6533	0.031	0.042	0.000	0.019
1.6878	0.031	0.043	0.000	0.019
1.7222	0.032	0.044	0.000	0.019
1.7567	0.032	0.045	0.000	0.019
1.7911	0.032	0.046	0.000	0.019
1.8256	0.032	0.047	0.000	0.019
1.8600	0.033	0.048	0.000	0.020
1.8944	0.033	0.050	0.000	0.020
1.9289	0.033	0.051	0.000	0.020
1.9633	0.033	0.052	0.000	0.020
1.9978	0.034	0.053	0.000	0.020
2.0322	0.034	0.054	0.000	0.020
2.0667	0.034	0.056	0.000	0.021
2.1011	0.035	0.057	0.000	0.021
2.1356	0.035	0.058	0.000	0.021
2.1700	0.035	0.059	0.000	0.021
2.2044	0.035	0.060	0.000	0.021
2.2389	0.036	0.062	0.000	0.021
2.2733	0.036	0.063	0.000	0.022
2.3078	0.036	0.064	0.000	0.022
2.3422	0.037	0.065	0.000	0.022
2.3767	0.037	0.067	0.000	0.022
2.4111	0.037	0.068	0.000	0.022
2.4456	0.037	0.069	0.000	0.022
2.4800	0.038	0.071	0.000	0.023
2.5144	0.038	0.072	0.000	0.023
2.5489	0.038	0.073	0.000	0.023
2.5833	0.039	0.075	0.000	0.023
2.6178	0.039	0.076	0.000	0.023
2.6522	0.039	0.077	0.000	0.024
2.6867	0.039	0.079	0.000	0.024
2.7211	0.040	0.080	0.000	0.024
2.7556	0.040	0.081	0.000	0.024
2.7900	0.040	0.083	0.000	0.024
2.8244	0.041	0.084	0.000	0.024
2.8589	0.041	0.086	0.000	0.025
2.8933	0.041	0.087	0.000	0.025
2.9278	0.042	0.088	0.000	0.025

2.9622	0.042	0.090	0.000	0.025
2.9967	0.042	0.091	0.000	0.025
3.0311	0.042	0.093	0.480	0.025
3.0656	0.043	0.094	1.470	0.026
3.1000	0.043	0.096	2.769	0.026

Analysis Results
POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.94
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.33
Total Impervious Area: 0.38

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.157588
5 year	0.231316
10 year	0.366588
25 year	0.507783

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.087318
5 year	0.187906
10 year	0.298205
25 year	0.351284

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0158	331	257	77	Pass
0.0193	270	234	86	Pass
0.0228	238	211	88	Pass
0.0264	205	187	91	Pass
0.0299	186	165	88	Pass
0.0335	172	139	80	Pass
0.0370	158	117	74	Pass
0.0406	151	114	75	Pass
0.0441	146	107	73	Pass
0.0477	141	98	69	Pass
0.0512	133	93	69	Pass
0.0547	132	86	65	Pass
0.0583	124	80	64	Pass
0.0618	119	78	65	Pass
0.0654	112	70	62	Pass
0.0689	109	62	56	Pass
0.0725	106	57	53	Pass
0.0760	99	55	55	Pass
0.0795	97	54	55	Pass
0.0831	90	49	54	Pass
0.0866	86	47	54	Pass
0.0902	78	44	56	Pass
0.0937	75	43	57	Pass
0.0973	71	43	60	Pass
0.1008	66	42	63	Pass
0.1044	64	39	60	Pass
0.1079	61	37	60	Pass
0.1114	59	34	57	Pass
0.1150	56	33	58	Pass
0.1185	51	30	58	Pass
0.1221	47	27	57	Pass
0.1256	46	27	58	Pass
0.1292	44	25	56	Pass
0.1327	41	25	60	Pass
0.1362	38	23	60	Pass
0.1398	37	23	62	Pass
0.1433	37	21	56	Pass
0.1469	37	21	56	Pass
0.1504	36	19	52	Pass
0.1540	36	18	50	Pass
0.1575	33	18	54	Pass
0.1611	31	18	58	Pass
0.1646	31	18	58	Pass
0.1681	29	16	55	Pass
0.1717	28	15	53	Pass
0.1752	26	12	46	Pass
0.1788	25	11	44	Pass
0.1823	21	9	42	Pass
0.1859	20	9	45	Pass
0.1894	19	9	47	Pass
0.1929	19	9	47	Pass
0.1965	17	9	52	Pass
0.2000	17	9	52	Pass

0.2036	16	9	56	Pass
0.2071	15	9	60	Pass
0.2107	14	7	50	Pass
0.2142	14	7	50	Pass
0.2178	14	7	50	Pass
0.2213	12	7	58	Pass
0.2248	12	7	58	Pass
0.2284	12	7	58	Pass
0.2319	11	7	63	Pass
0.2355	11	7	63	Pass
0.2390	10	7	70	Pass
0.2426	10	6	60	Pass
0.2461	10	6	60	Pass
0.2496	10	6	60	Pass
0.2532	10	6	60	Pass
0.2567	10	5	50	Pass
0.2603	9	5	55	Pass
0.2638	9	5	55	Pass
0.2674	8	5	62	Pass
0.2709	8	5	62	Pass
0.2745	8	5	62	Pass
0.2780	7	5	71	Pass
0.2815	7	5	71	Pass
0.2851	7	5	71	Pass
0.2886	7	5	71	Pass
0.2922	5	4	80	Pass
0.2957	5	4	80	Pass
0.2993	4	4	100	Pass
0.3028	4	4	100	Pass
0.3063	4	4	100	Pass
0.3099	4	4	100	Pass
0.3134	4	2	50	Pass
0.3170	4	2	50	Pass
0.3205	4	2	50	Pass
0.3241	4	2	50	Pass
0.3276	4	2	50	Pass
0.3312	4	2	50	Pass
0.3347	4	2	50	Pass
0.3382	4	2	50	Pass
0.3418	4	2	50	Pass
0.3453	4	2	50	Pass
0.3489	4	2	50	Pass
0.3524	4	2	50	Pass
0.3560	4	2	50	Pass
0.3595	3	2	66	Pass
0.3630	3	2	66	Pass
0.3666	3	2	66	Pass

Water Quality

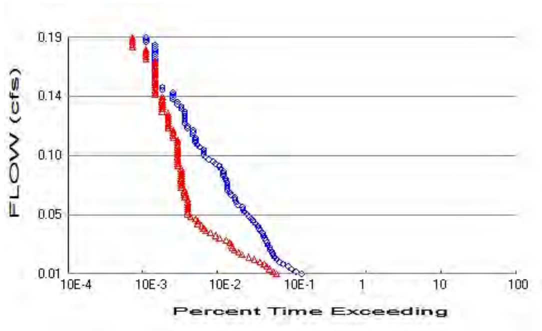
Drawdown Time Results

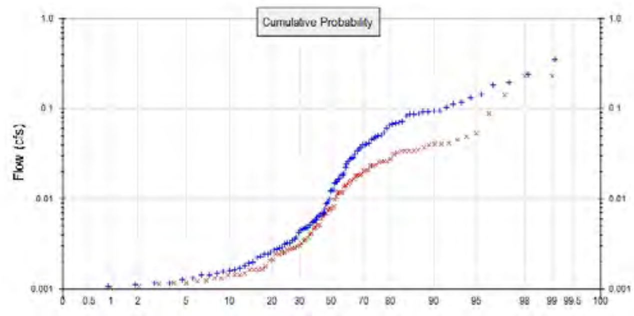
Pond: Infiltration Basin #1

Days	Stage(feet)	Percent of Total Run Time
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A

Maximum Stage: 3.018 Drawdown Time: Less than 1 day

POC 2





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0.47
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0.32
Total Impervious Area: 0.42

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.086491
5 year	0.122177
10 year	0.187591
25 year	0.26028

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.03401
5 year	0.04631
10 year	0.110628
25 year	0.233646

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0086	366	170	46	Pass
0.0105	312	153	49	Pass
0.0123	270	138	51	Pass
0.0141	243	125	51	Pass
0.0159	209	116	55	Pass
0.0177	186	102	54	Pass
0.0195	172	86	50	Pass
0.0213	161	72	44	Pass
0.0231	153	58	37	Pass
0.0249	147	53	36	Pass
0.0267	141	46	32	Pass
0.0285	137	44	32	Pass
0.0303	132	42	31	Pass
0.0321	127	40	31	Pass
0.0340	123	36	29	Pass
0.0358	117	29	24	Pass
0.0376	113	26	23	Pass
0.0394	109	22	20	Pass
0.0412	103	19	18	Pass
0.0430	99	18	18	Pass
0.0448	95	17	17	Pass
0.0466	89	15	16	Pass
0.0484	82	15	18	Pass
0.0502	78	14	17	Pass
0.0520	73	12	16	Pass
0.0538	68	11	16	Pass
0.0556	63	11	17	Pass
0.0575	60	11	18	Pass
0.0593	59	11	18	Pass
0.0611	51	11	21	Pass
0.0629	49	11	22	Pass
0.0647	47	11	23	Pass
0.0665	46	10	21	Pass
0.0683	42	10	23	Pass
0.0701	40	10	25	Pass
0.0719	37	10	27	Pass
0.0737	37	9	24	Pass
0.0755	37	9	24	Pass
0.0773	37	9	24	Pass
0.0791	36	9	25	Pass
0.0809	35	9	25	Pass
0.0828	33	9	27	Pass
0.0846	33	9	27	Pass
0.0864	33	9	27	Pass
0.0882	31	9	29	Pass
0.0900	29	8	27	Pass
0.0918	26	8	30	Pass
0.0936	24	8	33	Pass
0.0954	21	8	38	Pass
0.0972	19	8	42	Pass
0.0990	18	8	44	Pass
0.1008	18	8	44	Pass
0.1026	18	8	44	Pass

0.1044	16	8	50	Pass
0.1063	15	8	53	Pass
0.1081	14	8	57	Pass
0.1099	14	8	57	Pass
0.1117	14	7	50	Pass
0.1135	13	7	53	Pass
0.1153	13	7	53	Pass
0.1171	13	7	53	Pass
0.1189	11	6	54	Pass
0.1207	11	6	54	Pass
0.1225	10	6	60	Pass
0.1243	10	6	60	Pass
0.1261	10	6	60	Pass
0.1279	10	6	60	Pass
0.1298	10	6	60	Pass
0.1316	10	5	50	Pass
0.1334	9	5	55	Pass
0.1352	9	5	55	Pass
0.1370	8	5	62	Pass
0.1388	8	5	62	Pass
0.1406	7	5	71	Pass
0.1424	7	5	71	Pass
0.1442	7	4	57	Pass
0.1460	7	4	57	Pass
0.1478	5	4	80	Pass
0.1496	5	4	80	Pass
0.1514	4	4	100	Pass
0.1532	4	4	100	Pass
0.1551	4	4	100	Pass
0.1569	4	4	100	Pass
0.1587	4	4	100	Pass
0.1605	4	4	100	Pass
0.1623	4	4	100	Pass
0.1641	4	4	100	Pass
0.1659	4	4	100	Pass
0.1677	4	4	100	Pass
0.1695	4	4	100	Pass
0.1713	4	3	75	Pass
0.1731	4	3	75	Pass
0.1749	4	3	75	Pass
0.1767	4	3	75	Pass
0.1786	4	3	75	Pass
0.1804	4	2	50	Pass
0.1822	4	2	50	Pass
0.1840	3	2	66	Pass
0.1858	3	2	66	Pass
0.1876	3	2	66	Pass

Water Quality
Drawdown Time Results

Pond: Infiltration Basin #2

Days	Stage(feet)	Percent of Total Run Time
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A

Maximum Stage: 3.004 Drawdown Time: Less than 1 day

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

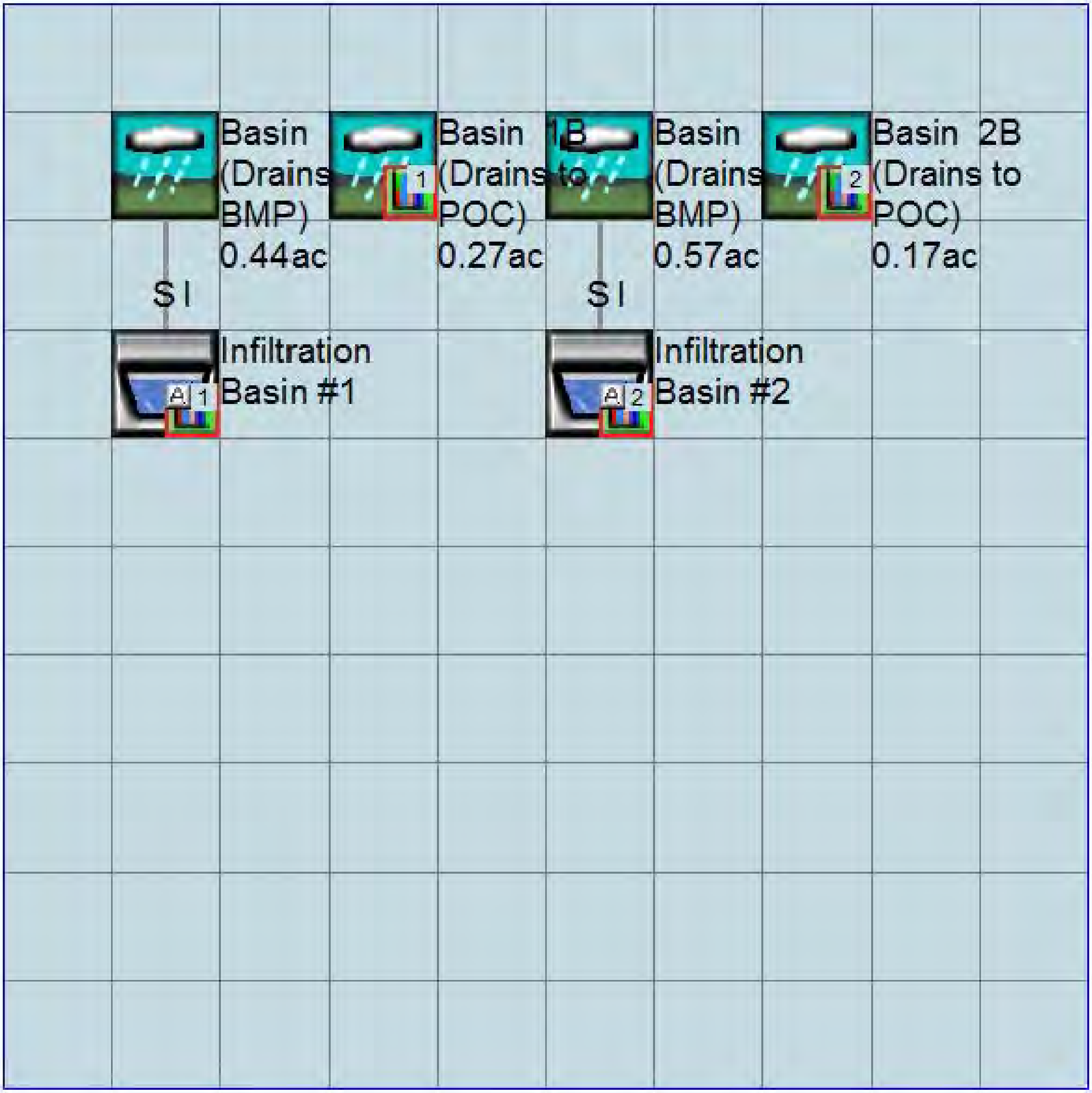
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic



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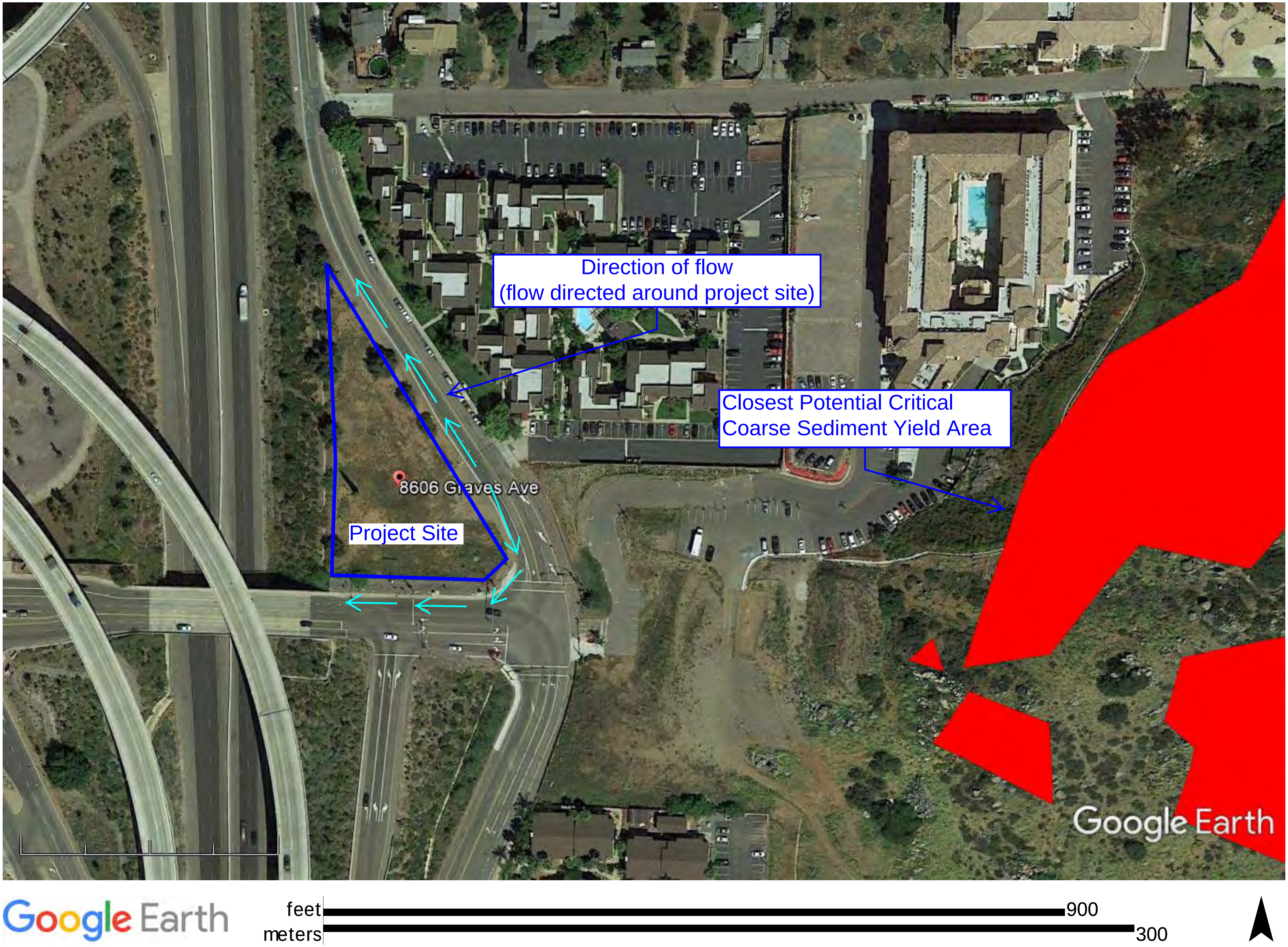
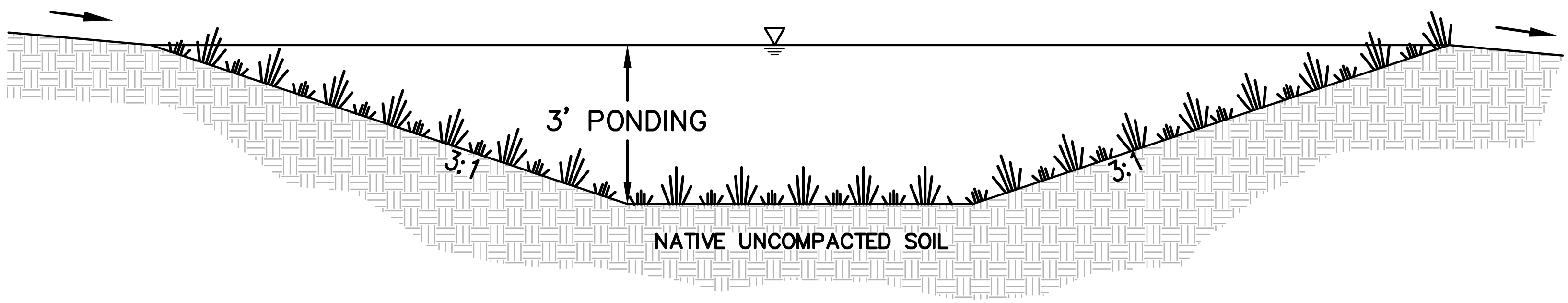
Potential Critical Coarse Sediment Yield Area Exhibit



Source: San Diego River Watershed Management Area Analysis



INFILTRATION BASIN DETAIL

NO SCALE

ATTACHMENT 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	**Contents**	**Checklist**
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☑ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Maintenance Agreement (when applicable)	☐ Included ☑ Not Applicable (Preliminary Design)

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

✔ **Preliminary Design / Planning / CEQA level submittal:**

Attachment 3a must identify:

- ☐ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual

Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

☐ **Final Design level submittal:**

Attachment 3a must identify:

- ☐ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For private entity operation and maintenance, Attachment 3b shall include a draft maintenance agreement in the local jurisdiction's standard format (PDP applicant to contact the [City Engineer] to obtain the current maintenance agreement forms).

BMP: Infiltration Basin
MAINTENANCE ACTIVITIES

ROUTINE ACTION	MAINTENANCE INDICATOR	FIELD MEASUREMENT	MEASUREMENT FREQUENCY	MAINTENANCE ACTIVITY	Frequency (# of times per year)	Hours per Event	Average Labor Crew Size	Avg. (Pro-Rated) Labor Rate/Hr. ($)	Equipment	Equipment Cost/Hour ($)	Materials & Incidentals Cost or Disposal Cost/Event ($)	Total cost per visit ($)	Total cost per year ($)
Vegetation Management for Aesthetics (optional)	Average vegetation height greater than 12-inches, emergence of trees or woody vegetation,	Visual observation and random measurements through out the side slope area	Annually, prior to start of wet season	Cut vegetation to an average height of 6-inches and remove trimmings. Remove any trees, or woody vegetation.	1.0	1.0	2	$ 74.97	Utility Truck	$ 14.39	$ 50.00	$ 214	$ 214
Slope Stability	Evidence of erosion	Visual observation	Annually, prior to start of wet season	Reseed/revegetate barren spots prior to wet season.	1.0	4.0	2	$ 74.97	Utility Truck	$ 14.39	$ 150.00	$ 807	$ 807
Standing Water	Standing water for more than 96 hrs	Visual observation	Annually, 96 hours after a target storm (0.60 in) event	Drain facility. Remove sediment, scarify invert, and regrade if necessary. (expected every 10 years)	0.1	24.0	3	$ 74.97	Utility Truck, 10-15 yd Truck, Backhoe	$ 56.02		$ 6,742	$ 674
Trash and Debris	Trash and Debris present	Visual observation	Annually, prior to start of wet season	Remove and dispose of trash and debris	1.0	2.0	2	$ 74.97	Utility Truck	$ 14.39		$ 329	$ 329
Sediment Management	Sediment depth exceeds 10% of the facility design or drain time exceed 96 hours.	Measure depth at apparent maximum and minimum accumulation of sediment. Calculate average depth. Visual observation of drain time.	Annually, prior to start of wet season	Remove and properly dispose of sediment. Regrade if necessary. (expected every 10 years)	0.1	8.0	3	$ 74.97	Utility Truck, 10-15 yd Truck, Backhoe	$ 56.02	$ 400.00	$ 2,647	$ 265
General Maintenance Inspection	Inlet structures, outlet structures, side slopes or other features damaged, significant erosion, burrows, emergence of trees or woody vegetation, graffiti or vandalism, fence damage, etc.	Visual observation	Annually, prior to start of wet season	Corrective action prior to wet season. Consult engineers if immediate solution is not evident.	1.0	1.0	2	$ 74.97	Utility Truck	$ 14.39		$ 164	$ 164
Reporting					1.0	3.0	1	$ 74.97				$ 225	$ 225
				Average Annual Total		**28.6**							**$ 2,679**

Small Infiltration Basin (1500 sf)		**28.6**	**$ 2,679**
Medium Infiltration Basin (3750 sf)		**33.0**	**$ 3,297**
Large Infiltration Basin (7500 sf)		**46.2**	**$ 4,287**

Labor Rate	$74.97/hr

Equipment	Equipment Cost
Utility Truck	$14.39/hr
10-15 yd truck	$28.27/hr
Backhoe	$13.36/hr
Vactor	$62.70/hr
Sweeper	$123.26/hr

ATTACHMENT 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- ☑ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☑ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☑ Details and specifications for construction of structural BMP(s)
- N/A ☑ Signage indicating the location and boundary of structural BMP(s) as required by the [City Engineer]
- ☑ How to access the structural BMP(s) to inspect and perform maintenance
- N/A ☑ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- N/A ☑ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- N/A - Inc. in Maint. Plan ☑ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- N/A - Inc. in Maint. Plan ☑ Recommended equipment to perform maintenance
- N/A ☑ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☑ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☑ All BMPs must be fully dimensioned on the plans
- N/A ☑ When proprietary BMPs are used, site-specific cross section with outflow, inflow, and model number shall be provided. Photocopies of general brochures are not acceptable.

Appendix G

Drainage Study

DRAINAGE STUDY

For

GRAVES COMMERCIAL CENTER

SANTEE, CA 92071

GRADING PLAN NO. ____________

Prepared for:

Development Contractor, Inc.
110 Town Center Parkway
Santee, Ca 92071
(619) 444-2054

Prepared by:

R·E·C

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Report Prepared:

January 2019

REGISTERED PROFESSIONAL ENGINEER
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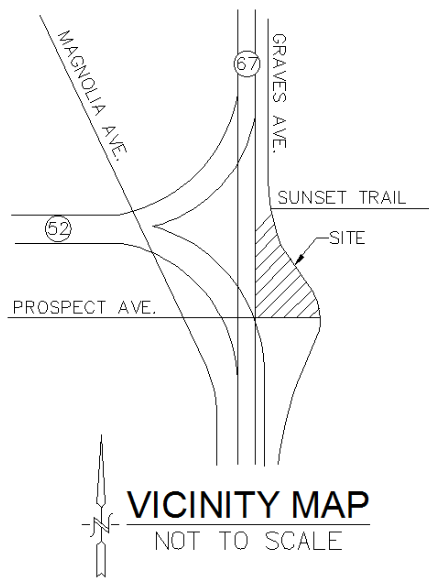
CHAPTER 1 - EXECUTIVE SUMMARY

1.1 – Introduction

The Graves Commercial project proposes to develop an empty lot with a 7/11 and a Starbucks and widen the adjacent road. This project is located west of Graves Avenue, north of Prospect Avenue and east of San Vicente Freeway (Highway 67) in the city of Santee, in San Diego County, California. The total project area is 1.60 acres. See Figure 1 below:

Figure 1–Vicinity Map



The site is currently undeveloped. The site is comprised of four (4) drainage management areas (DMA) each flowing to a corresponding point of compliance (POC). Approximately one-third of the site currently drains to the southwest towards an existing concrete drainage channel. Similarly, the remaining two thirds of the site drain to the northwest towards another existing concrete channel. Drainage from the adjacent street, Graves Avenue, is also split with a portion draining to the south towards an existing curb inlet and the remainder draining to the north towards another existing curb inlet.

The proposed development consists of equivalently sized DMAs as in pre-developed conditions. Onsite runoff from the developed project site shall drain to two (2) proposed infiltration basins via overland flow, gutters, and a storm drain system. These basins have been sized to mitigate the 100-year storm peak flows.

The proposed storm drain system has been sized assuming fully developed conditions. This study analyzes and verifies that the 100-year runoff from the developed site can be conveyed by the system.

Per FEMA Flood Insurance Map 06065C2720G, revised August 28, 2008 and provided as part of Chapter 9, the project site resides in Zone X, indicating that the site is an area determined to be outside the 1% annual change floodplain. Therefore a letter of map revision is not needed.

Per County of San Diego drainage criteria, the Rational Method should be used to determine peak design flowrates when the contributing drainage area is less than 1.0 sq-mile. The total watershed area discharging from the site is less than 1.0 sq-mile, thus CivilCadd/CivilDesign Engineering Software (CivilD) has been used to model the pre- and post-developed condition runoff response. The existing conditions hydrology calculations from CivilD can be found in Chapter 3 of this report. The proposed unmitigated and mitigated hydrology calculations from CivilD can be found in Chapters 4 and 5, respectively.

Methodology used for the peak 100-year flow analyses of existing and proposed conditions are consistent with criteria set forth in the County of San Diego Hydrology Manual. The time of concentration (T_c) for each drainage area was calculated in accordance with section 3.1.4 and was performed by CivilD. In order to calculate the T_c, a Manning's Roughness Coefficient, n, was assumed for each surface type. The n values chosen for the analyses are consistent with Table A-1 of the San Diego County Drainage Design Manual. A roughness coefficient of 0.015 was chosen for concrete gutters and concrete drainage channels, 0.013 for RCP and PVC pipes and 0.013 for asphalt. As the site is comprised of both short and high grass an average n value of 0.035 was assumed. A more detailed explanation of the protocols followed for this analysis and all corresponding tables are provided in Chapter 2 of this report.

Developed condition's peak flows were calculated using CivilD. The corresponding hydrographs were generated using Rick Engineering's RATHYDRO software per the County of San Diego Hydrology Manual. Hydraulic Modified-Puls infiltration basin routing of the CivilD rational method hydrology was performed using the Army Corps of Engineers HEC-HMS 4.0 software. The hydrographs and infiltration basin routing results can be found in Chapter 6 of this report.

1.2 – Summary of Existing Conditions

The project site is currently an undeveloped lot with poor vegetative covering. Drainage from the site is divided into two areas, DMA-A and DMA-B, and drainage from the gutter along Graves Avenue is divided into two areas, DMA-C and DMA-D. Approximately two-thirds of onsite flows drain to the southwest corner of the site to an existing concrete drainage channel (POC-A) via overland flow. POC-A also receives runoff from the adjacent street, Prospect Avenue, via an existing grate inlet. The remaining one-third of the site flows to the northwest corner of the site to an existing concrete drainage channel (POC-B) via overland flow. The southern portion of Graves Avenue's runoff flow southeast via the gutter then sheet flows across the intersection into an existing curb inlet (POC-C). Similarly, the northern portion of Graves Avenue's runoff flows northeast via the gutter before sheet flowing across Graves Avenue into an existing curb inlet (POC-D).

The results of the Web Soil Survey, provided as part of Chapter 9, show that the site sits entirely on Type A soil. Per table 3-1 of the County of San Diego Hydrology Manual, a runoff coefficient of 0.80 for General Commercial was used for drainage within Graves and Prospect Avenue and a runoff coefficient of 0.2 for Undisturbed Natural Runoff was used for the project site. Per the County of San Diego rainfall isopluvial maps, the design 6-hr 100-year rainfall depth for the site is 2.53 inches and the 24-hr 100-year rainfall depth is 4.47 inches. The runoff coefficient table and isopluvial maps have been included as part of Chapter 2 of this report.

Table 1 summarizes the existing condition 100-year peak flows from the project site. The complete analysis of the existing drainage conditions can be found in Chapter 3 of this report.

Table 1–SUMMARY OF EXISTING CONDITIONS FLOWS

POC	Drainage Area (ac)	100-Year Peak Flow(cfs)
POC-A	1.10	1.31
POC-B	0.49	0.43
POC-C	0.004	0.02
POC-D	0.01	0.05

1.3 – Summary of Developed Conditions

The proposed project consists of the construction of a commercial building, walkways, a parking lot, infiltration basins and landscape areas. The widening of Graves Avenue is also proposed.

Due to the widening of Graves Avenue, post-developed drainage areas differ from pre-existing. In order to remedy this and avoid diversion of flow, DMA-A and DMA-B shall receive drainage from a portion of Graves Avenue, equivalent to the area of the widening. This design shall ensure that POC-A and POC-B receive the same amount of runoff in pre- and post-developed conditions. The remaining runoff from Graves Avenue, equivalent to DMA-C and DMA-D in pre-developed conditions, shall continue to flow to their respective POCs.

As previously mentioned, the site sits entirely on Type A soil. Per Table 3-1 of the County of San Diego Hydrology Manual, runoff coefficients of 0.80 for General Commercial and 0.2 for Permanent Open Space were assumed. Areas designated as “Permanent Open Space” are considered infeasible for future development as they are mainly comprised of steep slopes and the required infiltration basins.

Table 2 summarizes the unmitigated, developed condition design 100-year peak flow from the project site. The complete unmitigated flow analysis can be found in Chapter 4 of this report.

Table 2–SUMMARY OF DEVELOPED CONDITIONS FLOWS – UNMITIGATED

POC	Drainage Area (ac)	100-Year Peak Flow (cfs)
POC-A	1.10	3.86
POC-B	0.49	1.34
POC-C	0.004	0.02
POC-D	0.01	0.05

Onsite 100-year storm peak flows shall be mitigated by implementing two (2) infiltration basins, BMP-A and BMP-B. The peak flows arriving to the infiltration basins were calculated using CivilD. The complete mitigation analyses for DMA-A and DMA-B can be found in Chapter 5 of this report. As the peak flows for DMA-C and DMA-D are the same in pre- and post-developed conditions no mitigation measures are required for these areas.

The proposed development peak flows were calculated using the rational method in conformance with the County of San Diego's Hydrology Manual. The corresponding hydrographs were generated using the RATHYDRO computer program by Rick Engineering. The hydrographs were then routed in HEC-HMS, per the Modified Puls method, through the proposed BMP facilities. Tables 3 summarize the design criteria of the infiltration basins, Table 4 summarizes the design of the outlet structures and Table 5 summarizes the HEC-HMS routing results.

Table 3–SUMMARY OF INFILTRATION BASINS

System	Surface Area (ft^2)	Freeboard(1) (in)	Ponding (in)	Total Depth (ft)
BMP-A	925	6	0	3.0
BMP-B	317	12	12	3.0

Note: (1): Elevation is from the emergency weir invert elevation to the top of storage system

Table 4–SUMMARY OF OUTLET DETAILS

System	Low Orifice	Lower Slot			Emergency Weir	
	Diameter (in)	Width (in)	Height (in)	Invert(1) (ft)	Width (ft)	Invert(1) (ft)
BMP-A	3	N/A	N/A	N/A	8	2.5
BMP-B	N/A	6	1	1	8	2.0

Note: (1): Elevation 0.00 ft is at the invert of storage system

Table 5–SUMMARY OF BMP ROUTING

System	100-Year Peak Inflow (cfs)	100-Year Peak Outflow (cfs)	Peak Water Surface Elevation (ft)
BMP-A	3.02	0.36	2.30(1)
BMP-B	1.17	0.16	1.70(1)

Note: (1): Elevation is from invert of storage system and is obtained from HEC-HMS

As HEC-HMS uses an elevation-storage-discharge function to model the basin volume (stage-storage) and basin discharge (stage-discharge) relationships, the available storage volume was calculated from the first surface slot to the crest of the basins.

The Rational Method hydrographs, stage-storage, stage-discharge relationships and HEC-HMS model output is provided in Chapter 6 of this report.

1.4 – Summary of Results

Table 6 summarizes the drainage areas for the developed and existing conditions and the resultant 100-year peak flow rates at each POC for the Graves Commercial Center project.

Table 6–SUMMARY OF AREAS AND PEAK FLOWS - MITIGATED

Discharge Location	Area (ac)		100 Year Peak Flow (cfs)		
	Existing	Developed	Existing	Developed*	Difference
POC-A	1.10	1.10	1.22	1.09	-0.13
POC-B	0.49	0.49	0.43	0.41	-0.02
POC-C	0.004	0.004	0.02	0.02	0.0
POC-D	0.01	0.01	0.05	0.05	0.0
TOTAL	1.604	1.604	1.72	1.57	-0.15

As shown in the above table, the proposed Graves Commercial Center project will not increase the 100-year peak flow discharged to any of the points of compliance. The net reduction in flows from pre-developed conditions is approximately 0.15 cfs.

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1.5 – Conclusions

This report has been prepared in accordance with the County of San Diego Hydrology Manual. This report has evaluated and addressed the potential impacts and proposed mitigation measures. A summary of the facts and findings associated with this project and the measures addressed by this report are as follows:

- The project will not alter drainage patterns on the site or increase runoff after development.
- The ultimate discharge points will not be changed.
- Graded areas and slopes will be hydro-seeded to reduce or eliminate sediment discharge.
- The project will respond to the CEQA questions that follow.

CEQA: Identify and discuss, with appropriate backup/research information, the following questions item by item for CEQA purposes. Would the project:

A. Substantially alter the existing drainage patterns of the site or area, including through the alteration if the course of a stream or river, in a manner which would result in substantial erosion or siltation on – or off-site?

The project does not substantially alter the existing drainage pattern of the area and does not alter the course of a stream or river. The storm drain system is designed to route offsite flows through the site to the existing point of confluence.

B. Substantially alter the existing drainage patterns of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

The project will not substantially alter the existing drainage pattern of the area as it will not alter the course of a stream or river, and also will not substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding.

C. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems?

The project will not create runoff water which would exceed the capacity of the existing storm water system. All project discharge points release water at rates less than or equal to planned existing conditions.

D. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps? For example; research the foregoing and provide same (to indicate applicability or not) in the study?

The project does not place any housing within a 100-year flood hazard area.

E. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

There are no structures proposed within a 100-year flood hazard area.

F. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam on-sit or off-site?

N/A

1.6 – References

"*County of San Diego Hydrology Manual*", June 2003

"*San Diego County Hydraulics Design Manual*", September 2014

"*Stormwater Quality Management Plan for 7/11 and Starbucks Drive Thru*", dated August 2017 by Walsh Engineering

"*Amendment to Stormwater Quality Management Plan for 7/11 and Starbucks Drive Thru*", dated December 2017, revised August 2018, but REC Consultants

"*Infiltration Testing Results for 8606 Graves Avenue, Santee, California*" dated August 2016, revised September 2017, by Group Delta.

1.7 – Declaration of Responsible Charge

THIS DRAINAGE STUDY HAS BEEN PREPARED UNDER THE DIRECTION OF THE FOLLOWING REGISTERED CIVIL ENGINEER. THE REGISTERED ENGINEER ATTESTS TO THE TECHNICAL INFORMATION CONTAINED HEREIN AND THE ENGINEERING DATA UPON WHICH RECOMMENDATIONS, CONCLUSIONS, AND DECISIONS ARE BASED.

Jonathan Raab Rydeen **R.C.E. 64811**

REGISTERED PROFESSIONAL ENGINEER
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CHAPTER 2 – METHODOLOGY

2.1 – County of San Diego Rational Method Design Criteria

The following are excerpts from the San Diego County Hydrology Manual. As the project site is less than 1 square mile the Rational Method, as described below, was used to determine the peak flows for pre- and post-developed conditions.

SECTION 3
RATIONAL METHOD AND MODIFIED RATIONAL METHOD

3.1 The Rational Method

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. The RM is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 1 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section 3.4); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Section 4).

The RM can be applied using any design storm frequency (e.g., 100-year, 50-year, 10-year, etc.). The local agency determines the design storm frequency that must be used based on the type of project and specific local requirements. A discussion of design storm frequency is provided in Section 2.3 of this manual. A procedure has been developed that converts the 6-hour and 24-hour precipitation isopluvial map data to an Intensity-Duration curve that can be used for the rainfall intensity in the RM formula as shown in Figure 3-1. The RM is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration.

3.1.1 Rational Method Formula

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (T_c), which is the time required for water to flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

$$Q = C\,I\,A$$

Where: Q = peak discharge, in cubic feet per second (cfs)
C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)
I = average rainfall intensity for a duration equal to the T_c for the area, in inches per hour (Note: If the computed T_c is less than 5 minutes, use 5 minutes for computing the peak discharge, Q)
A = drainage area contributing to the design location, in acres

Combining the units for the expression CIA yields:

$$\left(\frac{1\,\text{acre} \times \text{inch}}{\text{hour}}\right)\left(\frac{43{,}560\,\text{ft}^2}{\text{acre}}\right)\left(\frac{1\,\text{foot}}{12\,\text{inches}}\right)\left(\frac{1\,\text{hour}}{3{,}600\,\text{seconds}}\right) \Rightarrow 1.008\,\text{cfs}$$

For practical purposes the unit conversion coefficient difference of 0.8% can be ignored.

The RM formula is based on the assumption that for constant rainfall intensity, the peak discharge rate at a point will occur when the raindrop that falls at the most upstream point in the tributary drainage basin arrives at the point of interest.

Unlike the MRM (discussed in Section 3.4) or the NRCS hydrologic method (discussed in Section 4), the RM does not create hydrographs and therefore does not add separate subarea hydrographs at collection points. Instead, the RM develops peak discharges in the main line by increasing the T_c as flow travels downstream.

Characteristics of, or assumptions inherent to, the RM are listed below:

- The discharge flow rate resulting from any I is maximum when the I lasts as long as or longer than the T_c.

2.2 – Runoff Coefficient Determination

The results of the Web Soil Survey, which can be found as part of Chapter 9, show that the site sits entirely on Type A soil. Per County of San Diego criteria, a runoff coefficient "C" value of 0.2 was assumed for the existing Undisturbed Natural Terrain. In developed conditions, a runoff coefficient of 0.80 was assumed for General Commercial and 0.2 was assumed for Permanent Open Space (identified as the self-mitigating areas in this report).

- The storm frequency of peak discharges is the same as that of I for the given T_c.
- The fraction of rainfall that becomes runoff (or the runoff coefficient, C) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in Section 4.1.2.4).
- The peak rate of runoff is the only information produced by using the RM.

3.1.2 Runoff Coefficient

Table 3-1 lists the estimated runoff coefficients for urban areas. The concepts related to the runoff coefficient were evaluated in a report entitled *Evaluation, Rational Method "C" Values* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

The runoff coefficients are based on land use and soil type. Soil type can be determined from the soil type map provided in Appendix A. An appropriate runoff coefficient (C) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient (Σ[CA]). Good engineering judgment should be used when applying the values presented in Table 3-1, as adjustments to these values may be appropriate based on site-specific characteristics. In any event, the impervious percentage (% Impervious) as given in the table, for any area, shall govern the selected value for C. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:

$$C = 0.90 \times (\%\ \text{Impervious}) + C_p \times (1 - \%\ \text{Impervious})$$

Where: C_p = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious). Soil type can be determined from the soil type map provided in Appendix A.

The values in Table 3-1 are typical for most urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the local agency.

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

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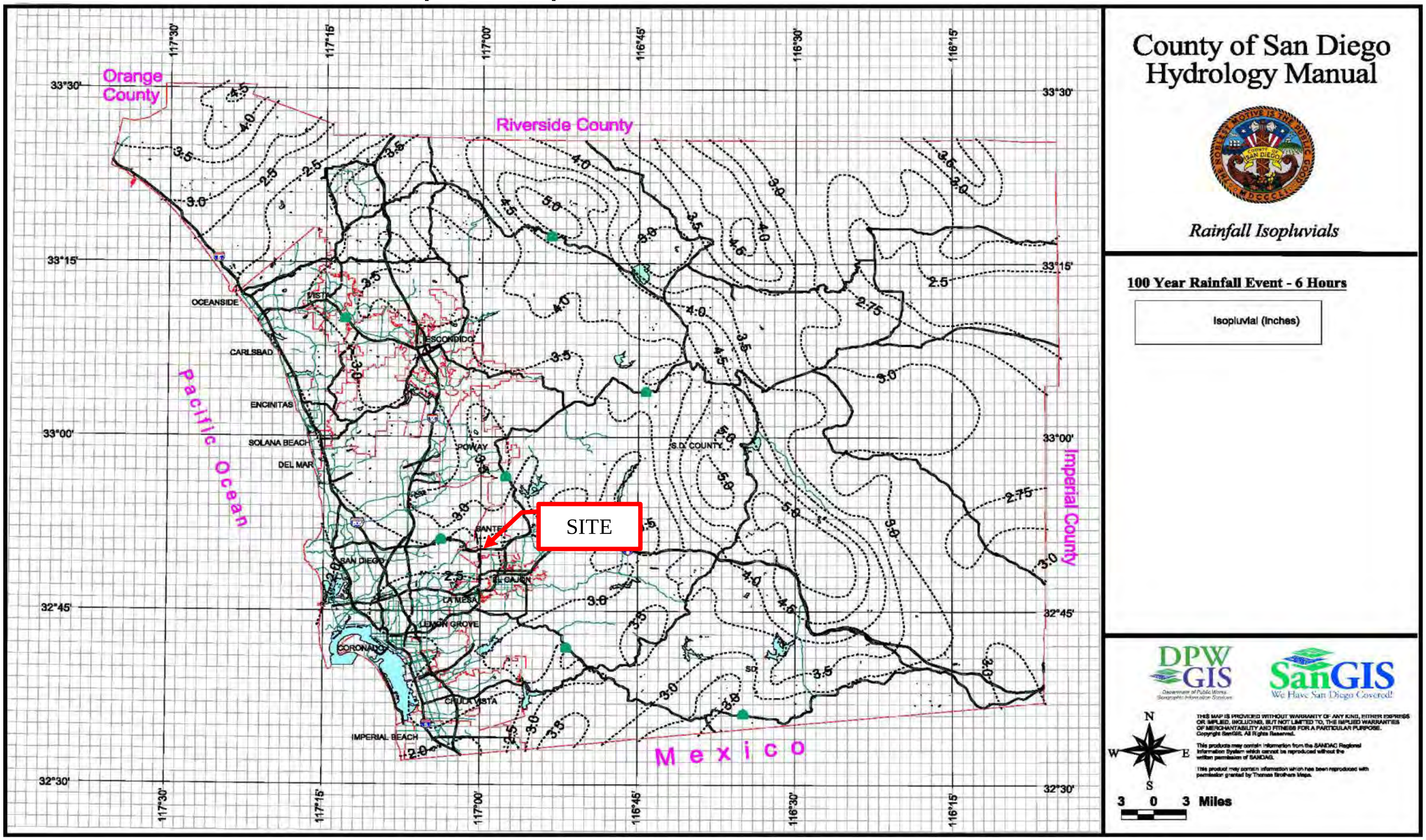
2.3 – Design Rainfall Determination

Peak flows were calculated for the 100-year storm per the County of San Diego Hydrology Manual. The following maps provide the 6-hr and 24-hr 100-year rainfall isopluvial data. A P6 and P24 value of 2.53 and 4.47 inches, respectively, were assumed for this analysis.

2.3.1 – 100-Year, 6-Hour Rainfall Isopluvial Map



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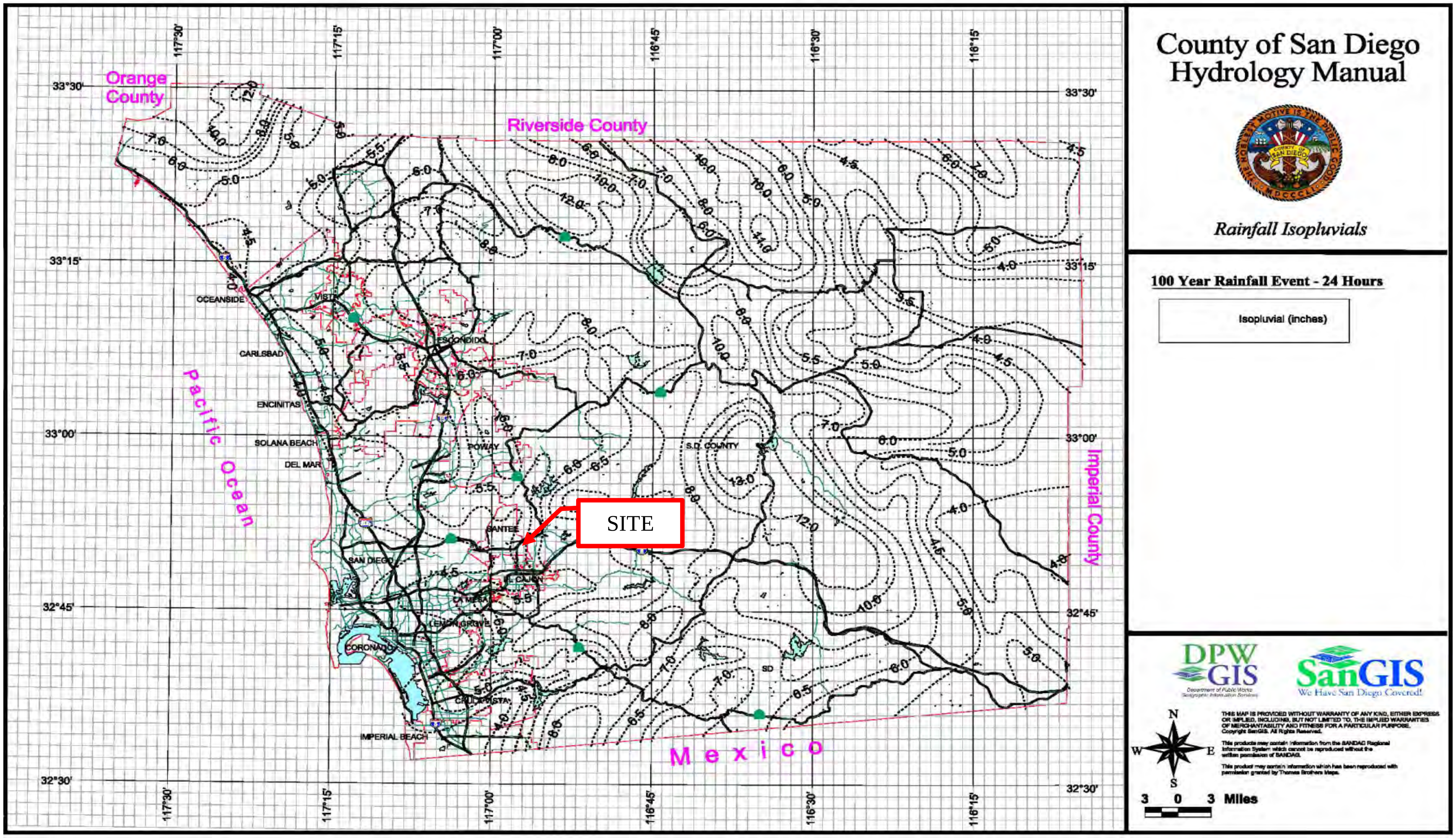
2.3.2 – 100-Year, 24-Hour Rainfall Isopluvial Map



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2.4 – Urban Watershed Overland Time of Flow Nomograph

The time of concentration (T_c) for each drainage area was calculated per the methodology outlined below. T_c calculations were performed using Table 3-2 by CivilD and can be found in Chapters 3-5 of this report.

3.1.4 Time of Concentration

The Time of Concentration (T_c) is the time required for runoff to flow from the most remote part of the drainage area to the point of interest. The T_c is composed of two components: initial time of concentration (T_i) and travel time (T_t). Methods of computation for T_i and T_t are discussed below. The T_i is the time required for runoff to travel across the surface of the most remote subarea in the study, or "initial subarea." Guidelines for designating the initial subarea are provided within the discussion of computation of T_i. The T_t is the time required for the runoff to flow in a watercourse (e.g., swale, channel, gutter, pipe) or series of watercourses from the initial subarea to the point of interest. For the RM, the T_c at any point within the drainage area is given by:

$$T_c = T_i + T_t$$

Methods of calculation differ for natural watersheds (nonurbanized) and for urban drainage systems. When analyzing storm drain systems, the designer must consider the possibility that an existing natural watershed may become urbanized during the useful life of the storm drain system. Future land uses must be used for T_c and runoff calculations, and can be determined from the local Community General Plan.

3.1.4.1 Initial Time of Concentration

The initial time of concentration is typically based on sheet flow at the upstream end of a drainage basin. The Overland Time of Flow (Figure 3-3) is approximated by an equation developed by the Federal Aviation Agency (FAA) for analyzing flow on runaways (FAA, 1970). The usual runway configuration consists of a crown, like most freeways, with sloping pavement that directs flow to either side of the runway. This type of flow is uniform in the direction perpendicular to the velocity and is very shallow. Since these depths are ¼ of an inch (more or less) in magnitude, the relative roughness is high. Some higher relative roughness values for overland flow are presented in Table 3.5 of the *HEC-1 Flood Hydrograph Package User's Manual* (USACE, 1990).

The sheet flow that is predicted by the FAA equation is limited to conditions that are similar to runway topography. Some considerations that limit the extent to which the FAA equation applies are identified below:

- Urban Areas – This "runway type" runoff includes:
  1) Flat roofs, sloping at 1% ±
  2) Parking lots at the extreme upstream drainage basin boundary (at the "ridge" of a catchment area).
     Even a parking lot is limited in the amounts of sheet flow. Parked or moving vehicles would "break-up" the sheet flow, concentrating runoff into streams that are not characteristic of sheet flow.
  3) Driveways are constructed at the upstream end of catchment areas in some developments. However, if flow from a roof is directed to a driveway through a downspout or other conveyance mechanism, flow would be concentrated.
  4) Flat slopes are prone to meandering flow that tends to be disrupted by minor irregularities and obstructions. Maximum Overland Flow lengths are shorter for the flatter slopes (see Table 3-2).

- Rural or Natural Areas - The FAA equation is applicable to these conditions since (.5% to 10%) slopes that are uniform in width of flow have slow velocities consistent with the equation. Irregularities in terrain limit the length of application.
  1) Most hills and ridge lines have a relatively flat area near the drainage divide. However, with flat slopes of .5% ±, minor irregularities would cause flow to concentrate into streams.
  2) Parks, lawns and other vegetated areas would have slow velocities that are consistent with the FAA Equation.

The concepts related to the initial time of concentration were evaluated in a report entitled *Initial Time of Concentration, Analysis of Parameters* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

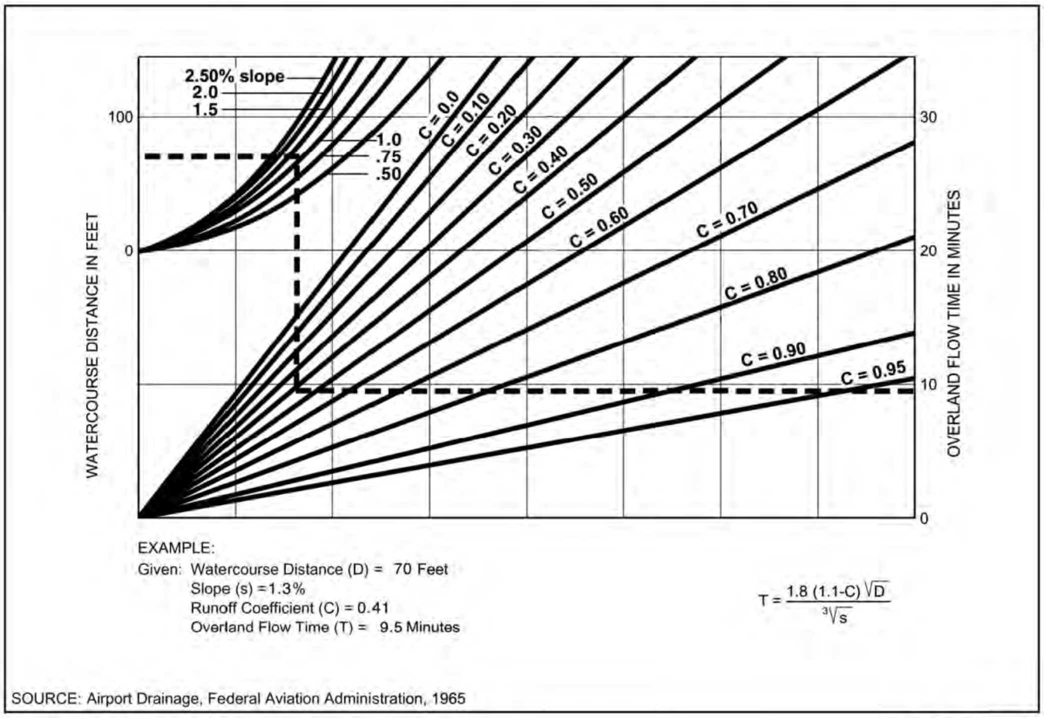
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

**MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)**

Element*	DU/	.5%		1%		2%		3%		5%		10%	
	Acre	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description



Rational Formula - Overland Time of Flow Nomograph

FIGURE 3-3

In order to calculate time of concentration a roughness value, n, from Manning's formula must be assigned based on the characteristics of the channel. The following table is from the San Diego County Drainage Design Manual and provides n values for various surface types. Note, since the site is a mixture of short and high grass an average n value of 0.035 was assumed.

Table A-1

Table A-1 Average Manning Roughness Coefficients for Pavement and Gutters[1]

Concrete Gutter[2]	0.015
Concrete Pavement	
Float Finish	0.014
Broom Finish	0.016
Concrete Gutter with Asphalt Pavement	
Smooth Finish	0.013
Rough Texture	0.015
Asphalt Pavement	
Smooth Finish	0.013
Rough Texture	0.016

Based on FHWA HEC-22.

[1] Based on materials and workmanship required by standard specifications.
[2] Increase roughness coefficient in gutters with mild slopes where sediment might accumulate by 0.020.

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Table A-2

Table A-2 Average Manning Roughness Coefficients for Closed Conduits[3]

Reinforced Concrete Pipe (RCP)	0.013
Corrugated Metal Pipe and Pipe Arch	
2-3/8 x 1/2 inch Corrugations	
Unlined	0.024
Half Lined	
Full Flow	0.018
d/D>=0.60	0.016
d/D<0.60	0.013
Fully Lined	0.013
3 x 1 inch Corrugations	0.027
6 x 2 inch Corrugations	0.032
Spiral Rib Pipe	0.013
Helically Wound Pipe	
18-inch	0.015
24-inch	0.017
30-inch	0.019
36-inch	0.021
42-inch	0.022
48-inch	0.023
Plastic Pipe (HPDE and PVC)	
Smooth	0.013
Corrugated	0.024
Vitrified Clay Pipe	0.014
Cast-Iron Pipe (Uncoated)	0.013
Steel Pipe	0.011
Brick	0.017
Cast-In-Place Concrete Pipe	
Rough Wood Forms	0.017
Smooth Wood or Steel Forms	0.014

[3] Based on materials and workmanship required by standard specifications.

Table A-3

Table A-3 Average Manning Roughness Coefficients for Small Open Channels Conveying Less than 50 cfs[4]

	Design Flow Depth		
Lining Type	**0 – 0.5 ft**	**0.5 – 2.0 ft**	**> 2.0 ft**
Concrete (Poured)	$\boxed{0.015}$	0.013	0.013
Air Blown Concrete	0.023	0.019	0.016
Grouted Riprap	0.040	0.030	0.028
Stone Masonry	0.042	0.032	0.030
Soil Cement	0.025	0.022	0.020
Bare Soil	0.023	0.020	0.020
Rock Cut	0.045	0.035	0.025
Rock Riprap	Based on Rock Size (See Section 5.7.2)		

Table A-4

Table A-4 Average Manning Roughness Coefficients for Larger Open Channels

Unlined Channels
- Clay Loam 0.023
- Sand 0.020

Lined Channels
- Grass Lined (Well-Maintained) 0.035
- Grass Lined (Not Maintained) 0.045
- Wetland-Bottom Channels (New Channel) 0.023

Wetland-Bottom Channels (Mature Channel) .... See Table A-5
Riprap-Lined Channels .... See Section 5.7.2
Concrete (Poured) 0.014
Air Blown Mortar (Gunite or Shotcrete)[5] 0.016
Asphaltic Concrete or Bituminous Plant Mix 0.018

For channels with revetments or multiple lining types, use composite Manning roughness coefficient based on component lining materials.

[4] Based on materials and workmanship required by standard specifications.
[5] For air-blown concrete, use n=0.012 (if troweled) and n=0.025 if purposely roughened.

Table A-5

Table A-5 Average Manning Roughness Coefficients for Natural Channels

Minor Streams (Surface Width at Flood Stage < 100 ft)	
Fairly Regular Section	
(A) Some Grass and Weeds, Little or No Brush	0.030
(B) Dense Growth of Weeds, Depth of Flow Materially Greater Than Weed Height	0.040
(C) Some Weeds, Light Brush on Banks	0.040
(D) Some Weeds, Heavy Brush on Banks	0.060
(E) For Trees within Channel with Branches Submerged at High Stage, Increase All Above Values By	0.015
Irregular Section, with Pools, Slight Channel Meander Channels (A) to (E) Above, Increase All Values By	0.015
Mountain Streams; No Vegetation in Channel, Banks Usually Steep, Trees and Brush along Banks Submerged at High Stage	
(A) Bottom, Gravel, Cobbles and Few Boulders	0.050
(B) Bottom, Cobbles with Large Boulders	0.060
Flood Plains (Adjacent To Natural Streams)	
Pasture, No Brush	
(A) Short Grass	0.030
(B) High Grass	0.040
Cultivated Areas	
(A) No Crop	0.040
(B) Mature Row Crops	0.040
(C) Mature Field Crops	0.050
Heavy Weeds, Scattered Brush	0.050
Light Brush and Trees	0.060
Medium To Dense Brush	0.090
Dense Willows	0.170
Cleared Land with Tree Stumps, 100-150 Per Acre	0.060
Heavy Stand of Timber, Little Undergrowth	
(A) Flood Depth below Branches	0.110
(B) Flood Depth Reaches Branches	0.140

2.5 – County of San Diego Intensity- Duration Curve

The rainfall intensity (I) for each drainage area was determined using the 100-year P6 value and the time of concentration. The intensity was calculated in CivilD and was used to determine the peak flow for each drainage area.

3.1.3 Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr) for a duration equal to the T_c for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_c calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration Design Chart (Figure 3-1). The 6-hour storm rainfall amount (P_6) and the 24-hour storm rainfall amount (P_{24}) for the selected storm frequency are also needed for calculation of I. P_6 and P_{24} can be read from the isopluvial maps provided in Appendix B. An Intensity-Duration Design Chart applicable to all areas within San Diego County is provided as Figure 3-1. Figure 3-2 provides an example of use of the Intensity-Duration Design Chart. Intensity can also be calculated using the following equation:

$$I = 7.44\ P_6\ D^{-0.645}$$

Where: P_6 = adjusted 6-hour storm rainfall amount (see discussion below)
D = duration in minutes (use T_c)

Note: This equation applies only to the 6-hour storm rainfall amount (i.e., P_6 cannot be changed to P_{24} to calculate a 24-hour intensity using this equation).

The Intensity-Duration Design Chart and the equation are for the 6-hour storm rainfall amount. In general, P_6 for the selected frequency should be between 45% and 65% of P_{24} for the selected frequency. If P_6 is not within 45% to 65% of P_{24}, P_6 should be increased or decreased as necessary to meet this criteria. The isopluvial lines are based on precipitation gauge data. At the time that the isopluvial lines were created, the majority of precipitation gauges in San Diego County were read daily, and these readings yielded 24-hour precipitation data. Some 6-hour data were available from the few recording gauges distributed throughout the County at that time; however, some 6-hour data were extrapolated. Therefore, the 24-hour precipitation data for San Diego County are considered to be more reliable.

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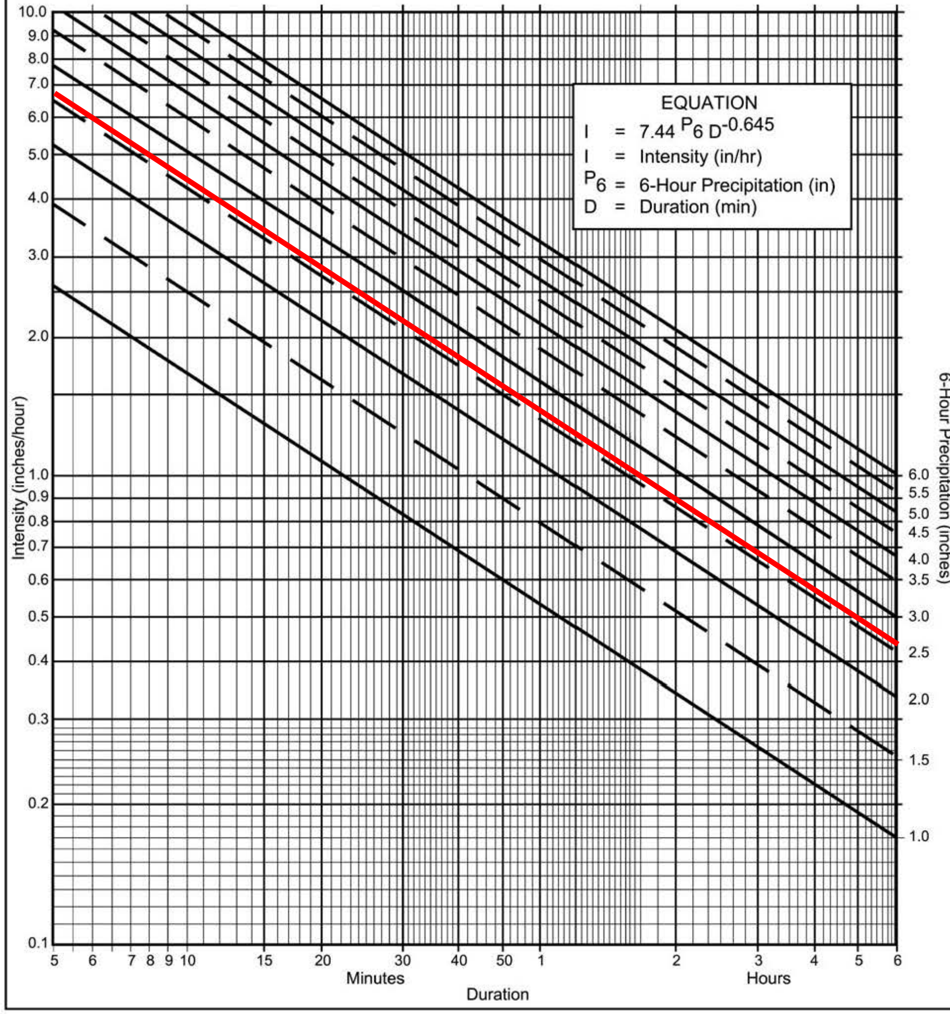

Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 2.53 in., P_{24} = 4.47, $\frac{P_6}{P_{24}}$ = 56.6 %(2)

(c) Adjusted $P_6^{(2)}$ = ______ in.

(d) t_x = ______ min.

(e) I = ______ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE
3-1

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2.6 – Model Development Summary

The following excerpt from the County of San Diego Hydrology Manual is an overview for developing the drainage areas to be analyzed and calculating the peak flows. Each drainage area in pre- and post-developed conditions was delineated and analyzed following the protocol outlined below. A map of the pre-developed and post-developed drainage areas may be found in Chapter 7 of this report.

3.2 Developing Input Data for the Rational Method

This section describes the development of the necessary data to perform RM calculations. Section 3.3 describes the RM calculation process. Input data for calculating peak flows and T_c's with the RM should be developed as follows:

1. On a topographic base map, outline the overall drainage area boundary, showing adjacent drains, existing and proposed drains, and overland flow paths.

2. Verify the accuracy of the drainage map in the field.

3. Divide the drainage area into subareas by locating significant points of interest. These divisions should be based on topography, soil type, and land use. Ensure that an appropriate first subarea is delineated. For natural areas, the first subarea flow path length should be less than or equal to 4,000 feet plus the overland flow length (Table 3-2). For developed areas, the initial subarea flow path length should be consistent with Table 3-2. The topography and slope within the initial subarea should be generally uniform.

4. Working from upstream to downstream, assign a number representing each subarea in the drainage system to each point of interest. Figure 3-8 provides guidelines for node numbers for geographic information system (GIS)-based studies.

5. Measure each subarea in the drainage area to determine its size in acres (A).

6. Determine the length and effective slope of the flow path in each subarea.

7. Identify the soil type for each subarea.

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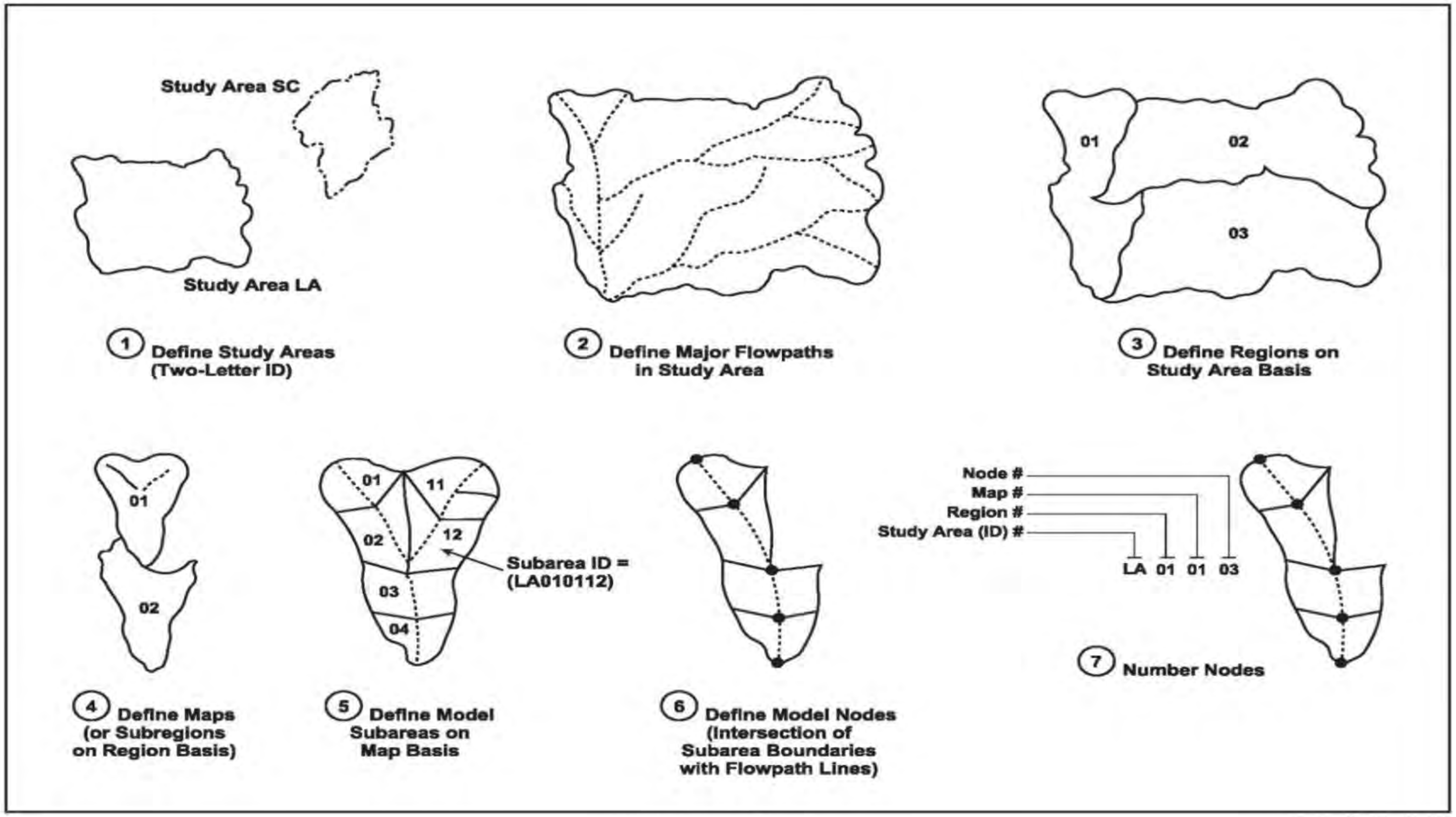

GIS/Hydrologic Model
Data Base Linkage Setup:
Nodes, Subareas, Links

FIGURE
3-8

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8. Determine the runoff coefficient (C) for each subarea based on Table 3-1. If the subarea contains more than one type of development classification, use a proportionate average for C. In determining C for the subarea, use future land use taken from the applicable community plan, Multiple Species Conservation Plan, National Forest land use plan, etc.

9. Calculate the CA value for the subarea.

10. Calculate the Σ(CA) value(s) for the subareas upstream of the point(s) of interest.

11. Determine P_6 and P_{24} for the study using the isopluvial maps provided in Appendix B. If necessary, adjust the value for P_6 to be within 45% to 65% of the value for P_{24}.

See Section 3.3 for a description of the RM calculation process.

3.3 Performing Rational Method Calculations

This section describes the RM calculation process. Using the input data, calculation of peak flows and T_c's should be performed as follows:

1. Determine T_i for the first subarea. Use Table 3-2 or Figure 3-3 as discussed in Section 3.1.4. If the watershed is natural, the travel time to the downstream end of the first subarea can be added to T_i to obtain the T_c. Refer to paragraph 3.1.4.2 (a).

2. Determine I for the subarea using Figure 3-1. If T_i was less than 5 minutes, use the 5 minute time to determine intensity for calculating the flow.

3. Calculate the peak discharge flow rate for the subarea, where $Q_p = \Sigma(CA)\ I$.
In case that the downstream flow rate is less than the upstream flow rate, due to the long travel time that is not offset by the additional subarea runoff, use the upstream peak flow for design purposes until downstream flows increase again.

4. Estimate the T_t to the next point of interest.

5. Add the T_t to the previous T_c to obtain a new T_c.

6. Continue with step 2, above, until the final point of interest is reached.

Note: The MRM should be used to calculate the peak discharge when there is a junction from independent subareas into the drainage system.

3.4 Modified Rational Method (for Junction Analysis)

The purpose of this section is to describe the steps necessary to develop a hydrology report for a small watershed using the MRM. It is necessary to use the MRM if the watershed contains junctions of independent drainage systems. The process is based on the design manuals of the City/County of San Diego. The general process description for using this method, including an example of the application of this method, is described below.

The engineer should only use the MRM for drainage areas up to approximately 1 square mile in size. If the watershed will significantly exceed 1 square mile then the NRCS method described in Section 4 should be used. The engineer may choose to use either the RM or the MRM for calculations for up to an approximately 1-square-mile area and then transition the study to the NRCS method for additional downstream areas that exceed approximately 1 square mile. The transition process is described in Section 4.

3.4.1 Modified Rational Method General Process Description

The general process for the MRM differs from the RM only when a junction of independent drainage systems is reached. The peak Q, T_c, and I for each of the independent drainage systems at the point of the junction are calculated by the RM. The independent drainage systems are then combined using the MRM procedure described below. The peak Q, T_c, and I for each of the independent drainage systems at the point of the junction must be calculated prior to using the MRM procedure to combine the independent drainage systems, as these values will be used for the MRM calculations. After the independent drainage systems have been combined, RM calculations are continued to the next point of interest.

3.4.2 Procedure for Combining Independent Drainage Systems at a Junction

Calculate the peak Q, T_c, and I for each of the independent drainage systems at the point of the junction. These values will be used for the MRM calculations.

At the junction of two or more independent drainage systems, the respective peak flows are combined to obtain the maximum flow out of the junction at T_c. Based on the approximation that total runoff increases directly in proportion to time, a general equation may be written to determine the maximum Q and its corresponding T_c using the peak Q, T_c, and I for each of the independent drainage systems at the point immediately before the junction. The general equation requires that contributing Q's be numbered in order of increasing T_c.

Let Q_1, T_1, and I_1 correspond to the tributary area with the shortest T_c. Likewise, let Q_2, T_2, and I_2 correspond to the tributary area with the next longer T_c; Q_3, T_3, and I_3 correspond to the tributary area with the next longer T_c; and so on. When only two independent drainage systems are combined, leave Q_3, T_3, and I_3 out of the equation. Combine the independent drainage systems using the junction equation below:

Junction Equation: $T_1 < T_2 < T_3$

$$Q_{T1} = Q_1 + \frac{T_1}{T_2} Q_2 + \frac{T_1}{T_3} Q_3$$

$$Q_{T2} = Q_2 + \frac{I_2}{I_1} Q_1 + \frac{T_2}{T_3} Q_3$$

$$Q_{T3} = Q_3 + \frac{I_3}{I_1} Q_1 + \frac{I_3}{I_2} Q_2$$

Calculate Q_{T1}, Q_{T2}, and Q_{T3}. Select the largest Q and use the T_c associated with that Q for further calculations (see the three Notes for options). If the largest calculated Q's are equal (e.g., $Q_{T1} = Q_{T2} > Q_{T3}$), use the shorter of the T_c's associated with that Q.

This equation may be expanded for a junction of more than three independent drainage systems using the same concept. The concept is that when Q from a selected subarea (e.g., Q_2) is combined with Q from another subarea with a shorter T_c (e.g., Q_1), the Q from the subarea with the shorter T_c is reduced by the ratio of the I's (I_2/I_1); and when Q from a selected subarea (e.g., Q_2) is combined with Q from another subarea with a longer T_c (e.g., Q_3), the Q from the subarea with the longer T_c is reduced by the ratio of the T_c's (T_2/T_3).

Note #1: At a junction of two independent drainage systems that have the same T_c, the tributary flows may be added to obtain the Q_p.

$$Q_p = Q_1 + Q_2\text{; when } T_1 = T_2\text{; and } T_c = T_1 = T_2$$

This can be verified by using the junction equation above. Let Q_3, T_3, and $I_3 = 0$. When T_1 and T_2 are the same, I_1 and I_2 are also the same, and T_1/T_2 and $I_2/I_1 = 1$. T_1/T_2 and I_2/I_1 are cancelled from the equations. At this point, $Q_{T1} = Q_{T2} = Q_1 + Q_2$.

Note #2: In the upstream part of a watershed, a conservative computation is acceptable. When the times of concentration (T_c's) are relatively close in magnitude (within 10%), use the shorter T_c for the intensity and the equation $Q = \Sigma(CA)I$.

Note #3: . An optional method of determining the T_c is to use the equation
$T_c = [(\Sigma\ (CA)7.44\ P_6)/Q]^{1.55}$

This equation is from $Q = \Sigma(CA)I = \Sigma(CA)(7.44\ P_6/T_c^{.645})$ and solving for T_c. The advantage in this option is that the T_c is consistent with the peak flow Q, and avoids inappropriate fluctuation in downstream flows in some cases.

2.7 – Rational Method Hydrograph Procedure

The following excerpt from the County of San Diego Hydrology Manual explains the procedure followed in order to mitigate the peak 100-year flow and properly size the two (2) infiltration basins required for the site.

SECTION 6
RATIONAL METHOD HYDROGRAPH PROCEDURE

6.1 INTRODUCTION

The procedures in this section are for the development of hydrographs from RM study results for study areas up to approximately 1 square mile in size. The RM, discussed in Section 3, is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. However, in some instances such as for design of detention basins, the peak runoff rate is insufficient information for the design, and a hydrograph is needed. Unlike the NRCS hydrologic method (discussed in Section 4), the RM itself does not create hydrographs. The procedures for detention basin design based on RM study results were first developed as part of the East Otay Mesa Drainage Study. Rick Engineering Company performed this study under the direction of County Flood Control. The procedures in this section may be used for the development of hydrographs from RM study results for study areas up to approximately 1 square mile in size.

6.2 HYDROGRAPH DEVELOPMENT

The concept of this hydrograph procedure is based on the RM formula:

$$Q = C\,I\,A$$

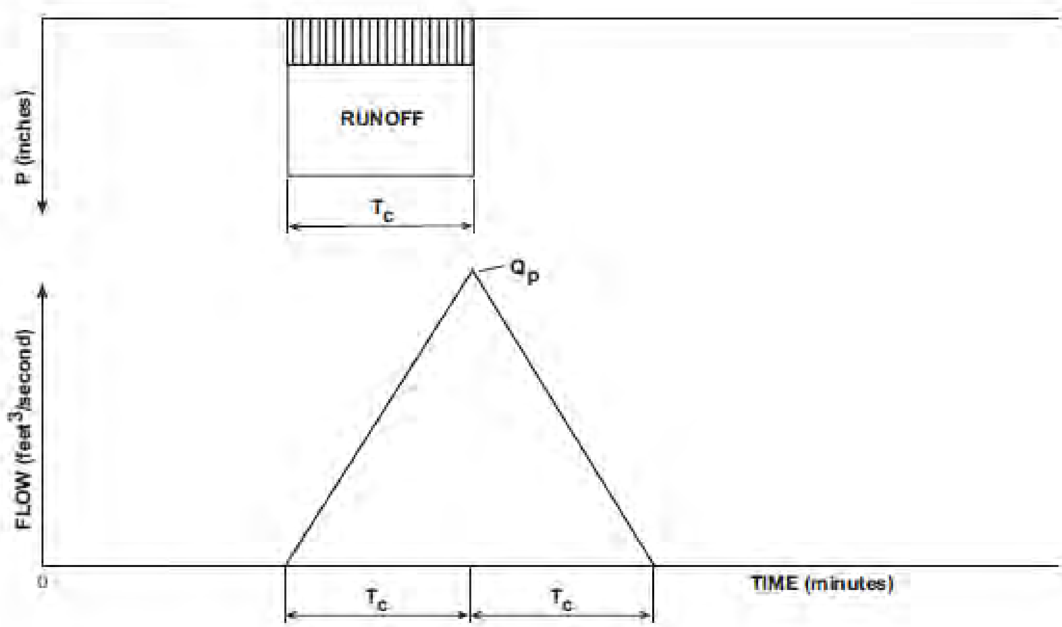
Where:
- Q = peak discharge, in cubic feet per second (cfs)
- C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)
- I = average rainfall intensity for a duration equal to the T_c for the area, in inches per hour
- A = drainage area contributing to the design location, in acres

The RM formula is discussed in more detail in Section 3.

An assumption of the RM is that discharge increases linearly over the T_c for the drainage area until reaching the peak discharge as defined by the RM formula, and then decreases linearly. A linear hydrograph can be developed for the peak flow occurring over the T_c as shown in Figure 6-1. However, for designs that are dependent on the total storm volume, it is not sufficient to consider a single hydrograph for peak flow occurring over the T_c at the beginning of a 6-hour storm event because the hydrograph does not account for the entire volume of runoff from the storm event. The volume under the hydrograph shown in Figure 6-1 is equal to the rainfall intensity multiplied by the duration for which that intensity occurs (T_c), the drainage area (A) contributing to the design location, and the runoff coefficient (C) for the drainage area. For designs that are dependent on the total storm volume, a hydrograph must be generated to account for the entire volume of runoff from the 6-hour storm event. The hydrograph for the entire 6-hour storm event is generated by creating a rainfall distribution consisting of blocks of rain, creating an incremental hydrograph for each block of rain, and adding the hydrographs from each block of rain. This process creates a hydrograph that contains runoff from all the blocks of rain and accounts for the entire volume of runoff from the 6-hour storm event. The total volume under the resulting hydrograph is equal to the following equation:

$$VOL = CP_6A \qquad \text{(Eq. 6-1)}$$

Where: VOL = volume of runoff (acre-inches)
P_6 = 6-hour rainfall (inches)
C = runoff coefficient
A = area of the watershed (acres)



Triangular Hydrograph

FIGURE 6-1

6.2.1 Rainfall Distribution

Figure 6-2 shows a 6-hour rainfall distribution consisting of blocks of rain over increments of time equal to T_c. The number of blocks is determined by rounding T_c to the nearest whole number of minutes, dividing 360 minutes (6 hours) by T_c, and rounding again to the nearest whole number. The blocks are distributed using a (2/3, 1/3) distribution in which the peak rainfall block is placed at the 4-hour time within the 6-hour rainfall duration. The additional blocks are distributed in a sequence alternating two blocks to the left and one block to the right of the 4-hour time (see Figure 6-2). The total amount of rainfall ($P_{T(N)}$) for any given block (N) is determined as follows:

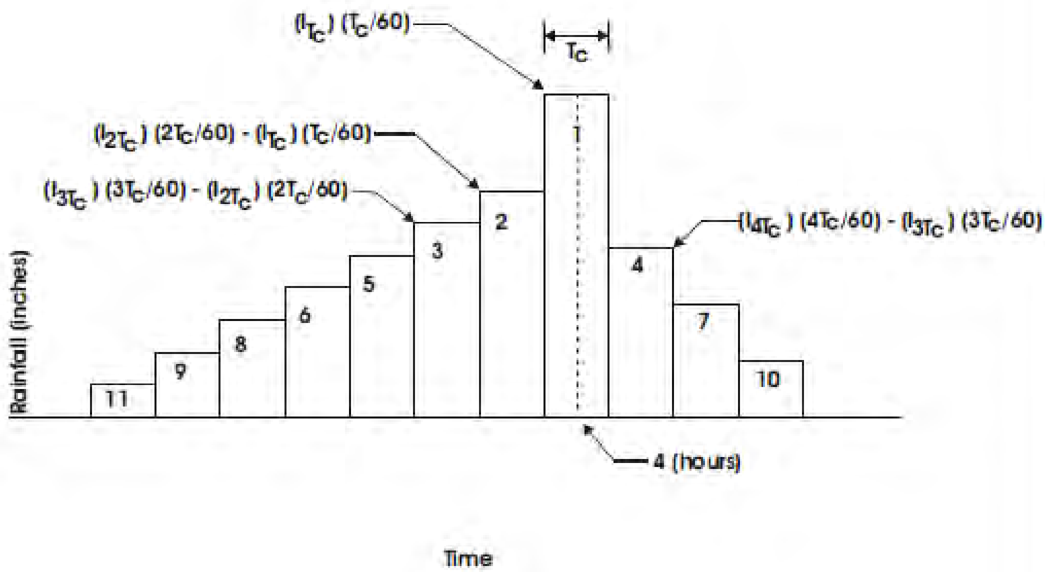
$$P_{T(N)} = (I_{T(N)}\ T_{T(N)}) / 60$$

Where: $P_{T(N)}$ = total amount of rainfall for any given block (N)
$I_{T(N)}$ = average rainfall intensity for a duration equal to $T_{T(N)}$ in inches per hour
$T_{T(N)}$ = NT_c in minutes (N is an integer representing the given block number of rainfall)

Intensity is calculated using the following equation (described in detail in Section 3):

$$I = 7.44\ P_6\ D^{-0.645}$$

Where: I = average rainfall intensity for a duration equal to D in inches per hour
P_6 = adjusted 6-hour storm rainfall
D = duration in minutes



Rainfall Distribution

FIGURE

6-2

Substituting the equation for I in the equation above for $P_{T(N)}$ and setting the duration (D) equal to $T_{T(N)}$ yields:

$$P_{T(N)} = [(7.44\ P_6/T_{T(N)}^{0.645})(T_{T(N)})] / 60$$
$$P_{T(N)} = 0.124\ P_6 T_{T(N)}^{0.355}$$

Substituting NT_c for T_T (where N equals the block number of rainfall) in the equation above yields:

$$P_{T(N)} = 0.124\ P_6\ (NT_c)^{0.355} \qquad \text{(Eq. 6-2)}$$

Equation 6-2 represents the total rainfall amount for a rainfall block with a time base equal to $T_{T(N)}$ (NT_c). The actual time base of each rainfall block in the rainfall distribution is T_c, as shown in Figure 6-2. The actual rainfall amount (P_N) for each block of rain is equal to P_T at N ($P_{T(N)}$) minus the previous P_T at N–1 ($P_{T(N-1)}$) at any given multiple of T_c (any NT_c). For example, the rainfall for block 2 is equal to $P_{T(N)}$ at $T_{T(N)} = 2T_c$ minus the $P_{T(N)}$ at $T_{T(N)} = 1T_c$, and the rainfall for block 3 equals $P_{T(N)}$ at $T_{T(N)} = 3T_c$ minus the $P_{T(N)}$ at $T_{T(N)} = 2T_c$, or P_N can be represented by the following equation:

$$P_N = P_{T(N)} - P_{T(N-1)} \qquad \text{(Eq. 6-3)}$$

For the rainfall distribution, the rainfall at block N = 1, ($1T_c$), is centered at 4 hours, the rainfall at block N = 2, ($2T_c$), is centered at 4 hours – $1T_c$, the rainfall at block N = 3, ($3T_c$), is centered at 4 hours – $2T_c$, and the rainfall at at block N = 4, ($4T_c$), is centered at 4 hours + $1T_c$. The sequence continues alternating two blocks to the left and one block to the right (see Figure 6-2).

2.8 –Generating a Hydrograph

The County of San Diego Hydrology Manual encourages the use of Rick Engineering's RATHYDRO computer program for generating hydrographs. The excerpt below explains the procedure for developing a hydrograph using this software. The results of this analysis for DMA-A and DMA-B can be found in Chapter 6 of this report.

6.3 Generating a Hydrograph Using RATHYDRO

The rainfall distribution and related hydrographs can be developed using the RATHYDRO computer program provided to the County by Rick Engineering Company. A copy of this program is available at no cost from the County. The output from this computer program may be used with HEC-1 or other software for routing purposes.

The design storm pattern used by the RATHYDRO program is based on the (2/3, 1/3) distribution described in Sections 4.1.1 and 6.2.1. The ordinates on the hydrograph are calculated based on the County of San Diego Intensity-Duration Design Chart (Figure 3-1), which uses the intensity equation described in Sections 3.1.3 and 6.2.1 to relate the intensity (I) of the storm to T_c, $I = 7.44\ P_6 D^{-0.645}$. The computer program uses equations 6-2 and 6-3 described above and calculates I_N directly. The intensity at any given multiple of T_c is calculated by the following equation:

$$I_N = [(I_{T(N)})\ (T_{T(N)}) - (I_{T(N-1)})\ (T_{T(N-1)})]\ /\ T_c \qquad \text{(Eq. 6-6)}$$

Where: N = number of rainfall blocks

$T_{T(N)}$ = time of concentration at rainfall block N in minutes (equal to NT_c)

I_N = actual rainfall intensity at rainfall block N in inches per hour

$I_{T(N)}$ = rainfall intensity at time of concentration $T_{T(N)}$ in inches per hour

Figure 6-2 shows the rainfall distribution used in the RM hydrograph, computed at multiples of T_c. The rainfall at block N = 1, ($1T_c$), is centered at 4 hours, the rainfall at block N = 2, ($2T_c$), is centered at 4 hours – $1T_c$, the rainfall at block N = 3, ($3T_c$), is centered at 4 hours – $2T_c$, and the rainfall at at block N = 4, ($4T_c$), is centered at 4 hours + $1T_c$. The sequence continues alternating two blocks to the left and one block to the right (see Figure 6-2).

As described in Section 6.2.2, the peak discharge (Q_N) of the hydrograph for any given rainfall block (N) is determined by the RM formula Q = CIA, where I = I_N = the actual rainfall intensity for the rainfall block. The RATHYDRO program substitutes equation 6-6 into the RM formula to determine Q_N yielding the following equation:

$$Q_N = [(I_{T(N)})\,(T_{T(N)}) - (I_{T(N-1)})\,(T_{T(N-1)})]\ CA / T_c \qquad \text{(Eq. 6-7)}$$

Where: Q_N = peak discharge for rainfall block N in cubic feet per second (cfs)
N = number of rainfall blocks
$T_{T(N)}$ = time of concentration at rainfall block N in minutes (equal to NT_c)
$I_{T(N)}$ = rainfall intensity at time of concentration $T_{T(N)}$ in inches per hour
C = RM runoff coefficient
A = area of the watershed (acres)

To develop the hydrograph for the 6-hour design storm, a series of triangular hydrographs with ordinates at multiples of the given T_c are created and added to create the hydrograph. This hydrograph has its peak at 4 hours plus ½ of the T_c. The total volume under the hydrograph is equal to the following equation (equation 6-1):

$$VOL = CP_6A$$

Where: VOL = volume of runoff (acre-inches)
P_6 = 6-hour rainfall (inches)
C = runoff coefficient
A = area of the watershed (acres)

CHAPTER 3 - 100 YEAR HYDROLOGIC ANALYSIS FOR EXISTING CONDITIONS

```
              San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
      Rational Hydrology Study        Date: 11/28/18
------------------------------------------------------------------------
EXISTING CONDITIONS HYDROLOGY
100 YEAR STORM
GRAVES COMMERCIAL
SANTEE, CA
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 6292

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.530
24 hour precipitation(inches) =  4.470
P6/P24 =    56.6%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  453.500(Ft.)
Lowest elevation =  446.600(Ft.)
Elevation difference =    6.900(Ft.) Slope =  6.900 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.90 %, in a development type of
 Permanent Open Space
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.70 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      4.663(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.093(CFS)
Total initial stream area =        0.100(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   446.600(Ft.)
Downstream point elevation =   441.800(Ft.)
Channel length thru subarea  =   100.000(Ft.)
Channel base width  =   10.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =      0.485(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.485(CFS)
Depth of flow =   0.043(Ft.), Average velocity =   1.132(Ft/s)
Channel flow top width =   10.000(Ft.)
Flow Velocity =    1.13(Ft/s)
Travel time  =    1.47 min.
Time of concentration =   10.17 min.
Critical depth =      0.042(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      4.216(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      4.216(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      0.188
Subarea runoff =      0.699(CFS) for      0.840(Ac.)
Total runoff =      0.793(CFS)   Total area =       0.940(Ac.)
Depth of flow =   0.058(Ft.), Average velocity =   1.377(Ft/s)
Critical depth =      0.058(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station     100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   441.800(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =    91.000(Ft.)
Channel base width  =    4.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =      0.793(CFS)
Depth of flow =   0.078(Ft.), Average velocity =   2.488(Ft/s)
Channel flow top width =    4.156(Ft.)
Flow Velocity =    2.49(Ft/s)
Travel time  =    0.61 min.
Time of concentration =   10.78 min.
Critical depth =      0.105(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     100.000 to Point/Station     100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
```

```
In Main Stream number: 1
Stream flow area =      0.940(Ac.)
Runoff from this stream =      0.793(CFS)
Time of concentration =   10.78 min.
Rainfall intensity =     4.061(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   85.000(Ft.)
Highest elevation =  450.500(Ft.)
Lowest elevation =  448.200(Ft.)
Elevation difference =    2.300(Ft.) Slope =  2.706 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   2.70 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.40 minutes
 (for slope value of   3.00 %)
Calculated TC of    3.400 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.160(CFS)
Total initial stream area =        0.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   448.200(Ft.)
End of street segment elevation =   443.300(Ft.)
Length of street segment  =   129.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  37.000(Ft.)
Distance from crown to crossfall grade break  =  33.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  20.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.423(CFS)
Depth of flow =   0.114(Ft.), Average velocity =   2.706(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.000(Ft.)
Flow velocity =   2.71(Ft/s)
Travel time =    0.79 min.     TC =    4.19  min.
```

```
 Adding area flow to street
Calculated TC of    4.194 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.128
Subarea runoff =      0.693(CFS) for      0.130(Ac.)
Total runoff =      0.853(CFS)   Total area =       0.160(Ac.)
Street flow at end of street =      0.853(CFS)
Half street flow at end of street =      0.427(CFS)
Depth of flow =   0.148(Ft.), Average velocity =   3.226(Ft/s)
Flow width (from curb towards crown)=   2.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station      100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   443.300(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =    19.000(Ft.)
Channel base width  =    2.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      0.853(CFS)
Depth of flow =   0.066(Ft.), Average velocity =   6.462(Ft/s)
Channel flow top width =    2.000(Ft.)
Flow Velocity =    6.46(Ft/s)
Travel time  =    0.05 min.
Time of concentration =    4.24 min.
Critical depth =      0.178(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.160(Ac.)
Runoff from this stream =      0.853(CFS)
Time of concentration =    4.24 min.
Rainfall intensity =     6.666(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.793     10.78            4.061
2        0.853      4.24            6.666
Qmax(1) =
          1.000 *    1.000 *     0.793) +
          0.609 *    1.000 *     0.853) + =       1.312
```

```
Qmax(2) =
         1.000 *    0.394 *     0.793) +
         1.000 *    1.000 *     0.853) + =       1.165

Total of 2 main streams to confluence:
Flow rates before confluence point:
       0.793       0.853
Maximum flow rates at confluence using above data:
        1.312        1.165
Area of streams before confluence:
        0.940        0.160


Results of confluence:
Total flow rate =      1.312(CFS)
Time of concentration =    10.781 min.
Effective stream area after confluence  =      1.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  453.300(Ft.)
Lowest elevation =  446.300(Ft.)
Elevation difference =    7.000(Ft.) Slope =  7.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   7.00 %, in a development type of
 Permanent Open Space
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.70 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      4.663(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.084(CFS)
Total initial stream area =        0.090(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      12.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   446.300(Ft.)
Downstream point elevation =   440.200(Ft.)
Channel length thru subarea  =    54.000(Ft.)
Channel base width  =   10.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =      0.270(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.270(CFS)
Depth of flow =   0.023(Ft.), Average velocity =   1.161(Ft/s)
Channel flow top width =   10.000(Ft.)
Flow Velocity =    1.16(Ft/s)
```

```
Travel time  =    0.78 min.
Time of concentration =    9.48 min.
Critical depth =      0.028(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      4.414(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                  ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      4.414(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      0.098
Subarea runoff =      0.349(CFS) for      0.400(Ac.)
Total runoff =      0.433(CFS)   Total area =       0.490(Ac.)
Depth of flow =   0.031(Ft.), Average velocity =   1.399(Ft/s)
Critical depth =      0.039(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      200.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   440.200(Ft.)
Downstream point elevation =   436.600(Ft.)
Channel length thru subarea  =   164.000(Ft.)
Channel base width  =    4.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =      0.433(CFS)
Depth of flow =   0.053(Ft.), Average velocity =   2.029(Ft/s)
Channel flow top width =    4.105(Ft.)
Flow Velocity =    2.03(Ft/s)
Travel time  =    1.35 min.
Time of concentration =   10.82 min.
Critical depth =      0.071(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      200.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.490(Ac.)
Runoff from this stream =      0.433(CFS)
Time of concentration =   10.82 min.
Rainfall intensity =     4.051(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        0.433     10.82            4.051
Qmax(1) =
          1.000 *    1.000 *     0.433) + =       0.433

Total of 1 main streams to confluence:
Flow rates before confluence point:
```

```
       0.433
Maximum flow rates at confluence using above data:
        0.433
Area of streams before confluence:
        0.490


Results of confluence:
Total flow rate =      0.433(CFS)
Time of concentration =    10.823 min.
Effective stream area after confluence  =      0.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =  114.000(Ft.)
Highest elevation =  453.000(Ft.)
Lowest elevation =  452.200(Ft.)
Elevation difference =    0.800(Ft.) Slope =  0.702 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.70 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.70 minutes
 (for slope value of   0.50 %)
Calculated TC of    4.700 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.021(CFS)
Total initial stream area =        0.004(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station      300.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   452.200(Ft.)
Downstream point elevation =   446.000(Ft.)
Channel length thru subarea  =   217.000(Ft.)
Channel base width  =   23.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    0.100(Ft.)
Flow(q) thru subarea =      0.021(CFS)
Depth of flow =   0.003(Ft.), Average velocity =   0.362(Ft/s)
Channel flow top width =   23.000(Ft.)
Flow Velocity =    0.36(Ft/s)
Travel time  =   10.00 min.
Time of concentration =   14.70 min.
Critical depth =      0.003(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      300.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.004(Ac.)
Runoff from this stream =      0.021(CFS)
Time of concentration =   14.70 min.
Rainfall intensity =     3.325(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.021     14.70            3.325
Qmax(1) =
          1.000 *    1.000 *     0.021) + =       0.021

Total of 1 main streams to confluence:
Flow rates before confluence point:
       0.021
Maximum flow rates at confluence using above data:
        0.021
Area of streams before confluence:
        0.004


Results of confluence:
Total flow rate =      0.021(CFS)
Time of concentration =    14.697 min.
Effective stream area after confluence  =      0.004(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =  289.000(Ft.)
Highest elevation =  453.000(Ft.)
Lowest elevation =  447.000(Ft.)
Elevation difference =    6.000(Ft.) Slope =  2.076 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.08 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.60 minutes
 (for slope value of   2.00 %)
Calculated TC of    3.600 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.053(CFS)
Total initial stream area =        0.010(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station      400.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   447.000(Ft.)
Downstream point elevation =   438.000(Ft.)
Channel length thru subarea  =   508.000(Ft.)
Channel base width  =   23.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    0.100(Ft.)
Flow(q) thru subarea =      0.053(CFS)
Depth of flow =   0.005(Ft.), Average velocity =   0.452(Ft/s)
Channel flow top width =   23.000(Ft.)
Flow Velocity =    0.45(Ft/s)
Travel time  =   18.72 min.
Time of concentration =   22.32 min.
Critical depth =      0.005(Ft.)


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Process from Point/Station      400.000 to Point/Station      400.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.010(Ac.)
Runoff from this stream =      0.053(CFS)
Time of concentration =   22.32 min.
Rainfall intensity =     2.540(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.053     22.32            2.540
Qmax(1) =
          1.000 *    1.000 *     0.053) + =       0.053

Total of 1 main streams to confluence:
Flow rates before confluence point:
       0.053
Maximum flow rates at confluence using above data:
        0.053
Area of streams before confluence:
        0.010


Results of confluence:
Total flow rate =      0.053(CFS)
Time of concentration =    22.322 min.
Effective stream area after confluence  =      0.010(Ac.)
End of computations, total study area =           1.604 (Ac.)
```

Calculations Summary

Existing Conditions Q_{100} Calculation Summary					
DMA	**Tc (min)**	**C**	**I (in/in)**	**A (ac)**	**Q_{100} (cfs)**
A-1	8.7	0.2	4.663	0.1	0.09
A-2	10.2	0.2	4.216	0.84	0.7
OFF-A-1	5	0.8	6.666	0.03	0.16
OFF-A-2	5	0.8	6.666	0.13	0.69
B-1	8.7	0.2	4.663	0.09	0.08
B-2	9.5	0.2	4.414	0.4	0.35
C	5	0.8	6.666	0.004	0.02
D	5	0.8	6.666	0.01	0.05

CHAPTER 4 - 100 YEAR HYDROLOGIC ANALYSIS FOR UNMITIGATED CONDITIONS

```
             San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
       Rational Hydrology Study        Date: 11/28/18
------------------------------------------------------------------------
PROPOSED CONDITIONS HYDROLOGY - UNMITIGATED
100 YEAR STORM
GRAVES COMMERCIAL
SANTEE, CA
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 6292

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.530
24 hour precipitation(inches) =  4.470
P6/P24 =    56.6%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   50.000(Ft.)
Highest elevation =  453.000(Ft.)
Lowest elevation =  452.500(Ft.)
Elevation difference =    0.500(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.10 minutes
 (for slope value of   1.00 %)
Calculated TC of    4.100 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.107(CFS)
Total initial stream area =       0.020(Ac.)


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Process from Point/Station       2.000 to Point/Station       3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   452.500(Ft.)
End of street segment elevation =   451.800(Ft.)
Length of street segment  =    68.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.108(CFS)
Depth of flow =   0.087(Ft.), Average velocity =   1.179(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.000(Ft.)
Flow velocity =   1.18(Ft/s)
Travel time =    0.96 min.     TC =    5.06  min.
 Adding area flow to street
Rainfall intensity (I) =      6.613(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.613(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.032
Subarea runoff =      0.105(CFS) for      0.020(Ac.)
Total runoff =      0.212(CFS)   Total area =       0.040(Ac.)
Street flow at end of street =      0.212(CFS)
Half street flow at end of street =      0.106(CFS)
Depth of flow =   0.112(Ft.), Average velocity =   1.395(Ft/s)
Flow width (from curb towards crown)=   2.000(Ft.)


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Process from Point/Station       3.000 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   447.200(Ft.)
Downstream point/station elevation =   445.900(Ft.)
Pipe length  =   129.80(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.212(CFS)
Given pipe size =     18.00(In.)
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```
Calculated individual pipe flow  =     0.212(CFS)
Normal flow depth in pipe =    1.77(In.)
Flow top width inside pipe =   10.72(In.)
Critical depth could not be calculated.
Pipe flow velocity =      2.36(Ft/s)
Travel time through pipe =    0.92 min.
Time of concentration (TC) =     5.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station       4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.040(Ac.)
Runoff from this stream =      0.212(CFS)
Time of concentration =    5.98 min.
Rainfall intensity =     5.940(In/Hr)


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Process from Point/Station        5.000 to Point/Station       4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   44.000(Ft.)
Highest elevation =  452.800(Ft.)
Lowest elevation =  452.400(Ft.)
Elevation difference =    0.400(Ft.) Slope =  0.909 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   0.91 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.10 minutes
 (for slope value of   1.00 %)
Calculated TC of    4.100 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.107(CFS)
Total initial stream area =        0.020(Ac.)


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Process from Point/Station        4.000 to Point/Station       4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.020(Ac.)
Runoff from this stream =      0.107(CFS)
Time of concentration =    4.10 min.
Rainfall intensity =     6.666(In/Hr)
Summary of stream data:
```

```
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.212      5.98           5.940
2        0.107      4.10           6.666
Qmax(1) =
          1.000 *    1.000 *     0.212) +
          0.891 *    1.000 *     0.107) + =       0.307
Qmax(2) =
          1.000 *    0.686 *     0.212) +
          1.000 *    1.000 *     0.107) + =       0.252

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.212       0.107
Maximum flow rates at confluence using above data:
        0.307       0.252
Area of streams before confluence:
        0.040       0.020
Results of confluence:
Total flow rate =      0.307(CFS)
Time of concentration =     5.978 min.
Effective stream area after confluence =      0.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   445.900(Ft.)
Downstream point/station elevation =   445.600(Ft.)
Pipe length  =    12.30(Ft.) Slope =   0.0244  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.307(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.307(CFS)
Normal flow depth in pipe =    1.71(In.)
Flow top width inside pipe =   10.56(In.)
Critical depth could not be calculated.
Pipe flow velocity =      3.60(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     6.04 min.


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Process from Point/Station       6.000 to Point/Station       6.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.060(Ac.)
Runoff from this stream =      0.307(CFS)
Time of concentration =    6.04 min.
Rainfall intensity =     5.904(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station       8.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   60.000(Ft.)
Highest elevation =  452.500(Ft.)
Lowest elevation =  451.700(Ft.)
Elevation difference =    0.800(Ft.) Slope =  1.333 %
Top of Initial Area Slope adjusted by User to  1.300 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.30 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.10 minutes
 (for slope value of   1.00 %)
Calculated TC of    4.100 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.160(CFS)
Total initial stream area =       0.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   451.700(Ft.)
End of street segment elevation =   450.800(Ft.)
Length of street segment  =   155.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   0.025(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.754(CFS)
Depth of flow =   0.255(Ft.), Average velocity =   1.407(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.395(Ft.)
Flow velocity =   1.41(Ft/s)
Travel time =    1.84 min.     TC =    5.94  min.
 Adding area flow to street
Rainfall intensity (I) =      5.967(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
```

```
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      5.967(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.240
Subarea runoff =      1.272(CFS) for      0.270(Ac.)
Total runoff =      1.432(CFS)   Total area =       0.300(Ac.)
Street flow at end of street =      1.432(CFS)
Half street flow at end of street =      1.432(CFS)
Depth of flow =   0.301(Ft.), Average velocity =   1.609(Ft/s)
Flow width (from curb towards crown)=   8.738(Ft.)


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Process from Point/Station       6.000 to Point/Station       6.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.300(Ac.)
Runoff from this stream =      1.432(CFS)
Time of concentration =    5.94 min.
Rainfall intensity =     5.967(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.307      6.04           5.904
2        1.432      5.94           5.967
Qmax(1) =
          1.000 *    1.000 *     0.307) +
          0.989 *    1.000 *     1.432) + =       1.724
Qmax(2) =
          1.000 *    0.984 *     0.307) +
          1.000 *    1.000 *     1.432) + =       1.734

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.307       1.432
Maximum flow rates at confluence using above data:
        1.724        1.734
Area of streams before confluence:
        0.060        0.300
Results of confluence:
Total flow rate =      1.734(CFS)
Time of concentration =     5.936 min.
Effective stream area after confluence =      0.360(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.000 to Point/Station       9.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   445.600(Ft.)
Downstream point/station elevation =   444.100(Ft.)
Pipe length  =   104.80(Ft.) Slope =   0.0143  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.734(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     1.734(CFS)
Normal flow depth in pipe =    4.52(In.)
```

```
Flow top width inside pipe =   15.61(In.)
Critical Depth =    5.93(In.)
Pipe flow velocity =      4.99(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =     6.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.360(Ac.)
Runoff from this stream =      1.734(CFS)
Time of concentration =    6.29 min.
Rainfall intensity =     5.751(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station      10.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   60.000(Ft.)
Highest elevation =  452.500(Ft.)
Lowest elevation =  451.800(Ft.)
Elevation difference =    0.700(Ft.) Slope =  1.167 %
Top of Initial Area Slope adjusted by User to  1.200 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.20 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.10 minutes
 (for slope value of   1.00 %)
Calculated TC of    4.100 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.320(CFS)
Total initial stream area =        0.060(Ac.)


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Process from Point/Station       10.000 to Point/Station       9.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   451.800(Ft.)
End of street segment elevation =   451.000(Ft.)
Length of street segment  =   166.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
```

```
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  22.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.777(CFS)
Depth of flow =   0.263(Ft.), Average velocity =   1.313(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.820(Ft.)
Flow velocity =   1.31(Ft/s)
Travel time =    2.11 min.     TC =    6.21  min.
 Adding area flow to street
Rainfall intensity (I) =      5.798(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      5.798(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.224
Subarea runoff =      0.979(CFS) for      0.220(Ac.)
Total runoff =      1.299(CFS)   Total area =       0.280(Ac.)
Street flow at end of street =      1.299(CFS)
Half street flow at end of street =      1.299(CFS)
Depth of flow =   0.301(Ft.), Average velocity =   1.464(Ft/s)
Flow width (from curb towards crown)=   8.720(Ft.)


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Process from Point/Station        9.000 to Point/Station       9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.280(Ac.)
Runoff from this stream =      1.299(CFS)
Time of concentration =    6.21 min.
Rainfall intensity =     5.798(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        1.734      6.29            5.751
2        1.299      6.21            5.798
Qmax(1) =
          1.000 *    1.000 *     1.734) +
          0.992 *    1.000 *     1.299) + =       3.022
Qmax(2) =
          1.000 *    0.987 *     1.734) +
          1.000 *    1.000 *     1.299) + =       3.011

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
       1.734       1.299
Maximum flow rates at confluence using above data:
        3.022        3.011
Area of streams before confluence:
        0.360        0.280
Results of confluence:
Total flow rate =      3.022(CFS)
Time of concentration =     6.286 min.
Effective stream area after confluence =      0.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   444.100(Ft.)
Downstream point/station elevation =   444.000(Ft.)
Pipe length  =    10.00(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.022(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.022(CFS)
Normal flow depth in pipe =    6.61(In.)
Flow top width inside pipe =   17.35(In.)
Critical Depth =    7.93(In.)
Pipe flow velocity =      5.14(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     6.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   442.700(Ft.)
Downstream point/station elevation =   441.300(Ft.)
Pipe length  =   122.50(Ft.) Slope =   0.0114  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.022(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.022(CFS)
Normal flow depth in pipe =    6.38(In.)
Flow top width inside pipe =   17.22(In.)
Critical Depth =    7.93(In.)
Pipe flow velocity =      5.39(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =     6.70 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   441.300(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =    39.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.035
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      3.022(CFS)
```

```
Depth of flow =   0.224(Ft.), Average velocity =   2.699(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    2.70(Ft/s)
Travel time  =    0.24 min.
Time of concentration =    6.94 min.
Critical depth =      0.225(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.640(Ac.)
Runoff from this stream =      3.022(CFS)
Time of concentration =    6.94 min.
Rainfall intensity =     5.396(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  445.400(Ft.)
Lowest elevation =  441.300(Ft.)
Elevation difference =    4.100(Ft.) Slope =  4.100 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   4.10 %, in a development type of
 Permanent Open Space
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.70 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      4.663(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.056(CFS)
Total initial stream area =        0.060(Ac.)


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Process from Point/Station       14.000 to Point/Station      100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   441.300(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =   104.000(Ft.)
Channel base width  =    4.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      0.084(CFS)
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Manning's 'N'    = 0.015
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =      0.084(CFS)
Depth of flow =   0.023(Ft.), Average velocity =   0.896(Ft/s)
Channel flow top width =    4.047(Ft.)
Flow Velocity =    0.90(Ft/s)
Travel time  =    1.93 min.
Time of concentration =   10.63 min.
Critical depth =      0.024(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      4.097(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      4.097(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      0.024
Subarea runoff =      0.042(CFS) for      0.060(Ac.)
Total runoff =      0.098(CFS)   Total area =       0.120(Ac.)
Depth of flow =   0.026(Ft.), Average velocity =   0.954(Ft/s)
Critical depth =      0.026(Ft.)


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Process from Point/Station      100.000 to Point/Station      100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.120(Ac.)
Runoff from this stream =      0.098(CFS)
Time of concentration =   10.63 min.
Rainfall intensity =     4.097(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  451.700(Ft.)
Lowest elevation =  445.700(Ft.)
Elevation difference =    6.000(Ft.) Slope =  6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.00 %, in a development type of
 Permanent Open Space
```

```
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.70 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      4.663(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.065(CFS)
Total initial stream area =       0.070(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station      100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   445.700(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =   154.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =      0.117(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.117(CFS)
Depth of flow =   0.030(Ft.), Average velocity =   0.780(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    0.78(Ft/s)
Travel time  =    3.29 min.
Time of concentration =   11.99 min.
Critical depth =      0.026(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      3.792(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      3.792(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      0.036
Subarea runoff =      0.071(CFS) for      0.110(Ac.)
Total runoff =      0.137(CFS)   Total area =       0.180(Ac.)
Depth of flow =   0.033(Ft.), Average velocity =   0.831(Ft/s)
Critical depth =      0.028(Ft.)


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Process from Point/Station      100.000 to Point/Station      100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.180(Ac.)
Runoff from this stream =      0.137(CFS)
Time of concentration =   11.99 min.
Rainfall intensity =     3.792(In/Hr)
Program is now starting with Main Stream No. 4
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Process from Point/Station      17.000 to Point/Station      18.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   85.000(Ft.)
Highest elevation =  450.500(Ft.)
Lowest elevation =  448.200(Ft.)
Elevation difference =    2.300(Ft.) Slope =  2.706 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   2.70 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.40 minutes
 (for slope value of   3.00 %)
Calculated TC of    3.400 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.160(CFS)
Total initial stream area =       0.030(Ac.)


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Process from Point/Station      18.000 to Point/Station      19.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   448.200(Ft.)
End of street segment elevation =   443.300(Ft.)
Length of street segment  =   129.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  37.000(Ft.)
Distance from crown to crossfall grade break  =  33.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  20.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.423(CFS)
Depth of flow =   0.114(Ft.), Average velocity =   2.706(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.000(Ft.)
Flow velocity =   2.71(Ft/s)
Travel time =    0.79 min.     TC =    4.19  min.
 Adding area flow to street
Calculated TC of    4.194 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
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Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.128
Subarea runoff =      0.693(CFS) for      0.130(Ac.)
Total runoff =      0.853(CFS)   Total area =       0.160(Ac.)
Street flow at end of street =      0.853(CFS)
Half street flow at end of street =      0.427(CFS)
Depth of flow =   0.148(Ft.), Average velocity =   3.226(Ft/s)
Flow width (from curb towards crown)=   2.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station      100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   443.300(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =    19.000(Ft.)
Channel base width  =    2.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      0.853(CFS)
Depth of flow =   0.066(Ft.), Average velocity =   6.462(Ft/s)
Channel flow top width =    2.000(Ft.)
Flow Velocity =    6.46(Ft/s)
Travel time  =    0.05 min.
Time of concentration =    4.24 min.
Critical depth =      0.178(Ft.)


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Process from Point/Station      100.000 to Point/Station      100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 4
Stream flow area =      0.160(Ac.)
Runoff from this stream =      0.853(CFS)
Time of concentration =    4.24 min.
Rainfall intensity =     6.666(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        3.022      6.94           5.396
2        0.098     10.63           4.097
3        0.137     11.99           3.792
4        0.853      4.24           6.666
Qmax(1) =
```

```
          1.000 *    1.000 *     3.022) +
          1.000 *    0.652 *     0.098) +
          1.000 *    0.579 *     0.137) +
          0.810 *    1.000 *     0.853) + =       3.856
Qmax(2) =
          0.759 *    1.000 *     3.022) +
          1.000 *    1.000 *     0.098) +
          1.000 *    0.887 *     0.137) +
          0.615 *    1.000 *     0.853) + =       3.038
Qmax(3) =
          0.703 *    1.000 *     3.022) +
          0.926 *    1.000 *     0.098) +
          1.000 *    1.000 *     0.137) +
          0.569 *    1.000 *     0.853) + =       2.836
Qmax(4) =
          1.000 *    0.612 *     3.022) +
          1.000 *    0.399 *     0.098) +
          1.000 *    0.354 *     0.137) +
          1.000 *    1.000 *     0.853) + =       2.789

Total of 4 main streams to confluence:
Flow rates before confluence point:
       3.022       0.098       0.137       0.853
Maximum flow rates at confluence using above data:
        3.856        3.038        2.836        2.789
Area of streams before confluence:
        0.640        0.120        0.180        0.160


Results of confluence:
Total flow rate =      3.856(CFS)
Time of concentration =     6.938 min.
Effective stream area after confluence  =      1.100(Ac.)


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Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   85.000(Ft.)
Highest elevation =  453.200(Ft.)
Lowest elevation =  450.500(Ft.)
Elevation difference =    2.700(Ft.) Slope =  3.176 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   3.18 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.40 minutes
 (for slope value of   3.00 %)
Calculated TC of    3.400 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
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Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.320(CFS)
Total initial stream area =       0.060(Ac.)


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Process from Point/Station       21.000 to Point/Station      22.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   450.500(Ft.)
End of street segment elevation =   449.500(Ft.)
Length of street segment  =    53.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  15.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.532(CFS)
Depth of flow =   0.193(Ft.), Average velocity =   2.252(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   3.309(Ft.)
Flow velocity =   2.25(Ft/s)
Travel time =    0.39 min.     TC =    3.79  min.
 Adding area flow to street
Calculated TC of    3.792 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.120
Subarea runoff =      0.480(CFS) for      0.090(Ac.)
Total runoff =      0.800(CFS)   Total area =       0.150(Ac.)
Street flow at end of street =      0.800(CFS)
Half street flow at end of street =      0.800(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   2.320(Ft/s)
Flow width (from curb towards crown)=   4.670(Ft.)


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Process from Point/Station       22.000 to Point/Station      23.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   445.600(Ft.)
Downstream point/station elevation =   445.000(Ft.)
Pipe length  =    21.70(Ft.) Slope =   0.0276  Manning's N = 0.013
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```
No. of pipes = 1  Required pipe flow  =     0.800(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.800(CFS)
Normal flow depth in pipe =    2.62(In.)
Flow top width inside pipe =   12.70(In.)
Critical Depth =    3.98(In.)
Pipe flow velocity =      5.02(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     3.86 min.


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Process from Point/Station       23.000 to Point/Station      23.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.150(Ac.)
Runoff from this stream =      0.800(CFS)
Time of concentration =    3.86 min.
Rainfall intensity =     6.666(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station      24.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   75.000(Ft.)
Highest elevation =  452.800(Ft.)
Lowest elevation =  451.000(Ft.)
Elevation difference =    1.800(Ft.) Slope =  2.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.40 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.60 minutes
 (for slope value of   2.00 %)
Calculated TC of    3.600 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.160(CFS)
Total initial stream area =        0.030(Ac.)


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Process from Point/Station       24.000 to Point/Station      25.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   451.000(Ft.)
End of street segment elevation =   449.200(Ft.)
Length of street segment  =    81.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
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Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.241(CFS)
Depth of flow =   0.132(Ft.), Average velocity =   2.287(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.000(Ft.)
Flow velocity =   2.29(Ft/s)
Travel time =    0.59 min.     TC =    4.19  min.
 Adding area flow to street
Calculated TC of    4.190 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.056
Subarea runoff =      0.213(CFS) for      0.040(Ac.)
Total runoff =      0.373(CFS)   Total area =       0.070(Ac.)
Street flow at end of street =      0.373(CFS)
Half street flow at end of street =      0.373(CFS)
Depth of flow =   0.156(Ft.), Average velocity =   2.552(Ft/s)
Flow width (from curb towards crown)=   2.000(Ft.)


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Process from Point/Station      25.000 to Point/Station      23.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   445.200(Ft.)
Downstream point/station elevation =   445.000(Ft.)
Pipe length  =    23.00(Ft.) Slope =   0.0087  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.373(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.373(CFS)
Normal flow depth in pipe =    2.40(In.)
Flow top width inside pipe =   12.24(In.)
Critical depth could not be calculated.
Pipe flow velocity =      2.66(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     4.33 min.


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Process from Point/Station      23.000 to Point/Station      23.000
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**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.070(Ac.)
Runoff from this stream =      0.373(CFS)
Time of concentration =    4.33 min.
Rainfall intensity =     6.666(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        0.800      3.86           6.666
2        0.373      4.33           6.666
Qmax(1) =
         1.000 *    1.000 *     0.800) +
         1.000 *    0.892 *     0.373) + =       1.133
Qmax(2) =
         1.000 *    1.000 *     0.800) +
         1.000 *    1.000 *     0.373) + =       1.173

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.800       0.373
Maximum flow rates at confluence using above data:
        1.133        1.173
Area of streams before confluence:
        0.150        0.070
Results of confluence:
Total flow rate =      1.173(CFS)
Time of concentration =     4.334 min.
Effective stream area after confluence =      0.220(Ac.)


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Process from Point/Station       23.000 to Point/Station       26.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   441.500(Ft.)
Downstream point/station elevation =   441.000(Ft.)
Pipe length  =    44.90(Ft.) Slope =   0.0111  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.173(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     1.173(CFS)
Normal flow depth in pipe =    3.96(In.)
Flow top width inside pipe =   14.91(In.)
Critical Depth =    4.85(In.)
Pipe flow velocity =      4.08(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =     4.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station      200.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   441.000(Ft.)
Downstream point elevation =   436.600(Ft.)
Channel length thru subarea  =    41.000(Ft.)
Channel base width  =    5.000(Ft.)
```

```
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.035
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      1.173(CFS)
Depth of flow =   0.088(Ft.), Average velocity =   2.680(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    2.68(Ft/s)
Travel time  =    0.25 min.
Time of concentration =    4.77 min.
Critical depth =      0.119(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      200.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.220(Ac.)
Runoff from this stream =      1.173(CFS)
Time of concentration =    4.77 min.
Rainfall intensity =     6.666(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       28.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  452.000(Ft.)
Lowest elevation =  438.600(Ft.)
Elevation difference =   13.400(Ft.) Slope = 13.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  13.40 %, in a development type of
 Permanent Open Space
In Accordance With Table 3-2
Initial Area Time of Concentration =   6.90 minutes
 (for slope value of  10.00 %)
Rainfall intensity (I) =      5.415(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.065(CFS)
Total initial stream area =        0.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station      200.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   438.600(Ft.)
Downstream point elevation =   436.600(Ft.)
Channel length thru subarea  =   129.000(Ft.)
Channel base width  =    4.000(Ft.)
```

```
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      0.179(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =      0.179(CFS)
Depth of flow =   0.034(Ft.), Average velocity =   1.290(Ft/s)
Channel flow top width =    4.069(Ft.)
Flow Velocity =    1.29(Ft/s)
Travel time  =    1.67 min.
Time of concentration =    8.57 min.
Critical depth =      0.040(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      4.710(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      4.710(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      0.054
Subarea runoff =      0.189(CFS) for      0.210(Ac.)
Total runoff =      0.254(CFS)   Total area =       0.270(Ac.)
Depth of flow =   0.042(Ft.), Average velocity =   1.482(Ft/s)
Critical depth =      0.050(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      200.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.270(Ac.)
Runoff from this stream =      0.254(CFS)
Time of concentration =    8.57 min.
Rainfall intensity =     4.710(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        1.173      4.77            6.666
2        0.254      8.57            4.710
Qmax(1) =
          1.000 *    1.000 *     1.173) +
          1.000 *    0.557 *     0.254) + =       1.315
Qmax(2) =
          0.707 *    1.000 *     1.173) +
          1.000 *    1.000 *     0.254) + =       1.083

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.173       0.254
Maximum flow rates at confluence using above data:
        1.315        1.083
Area of streams before confluence:
```

```
        0.220       0.270
Results of confluence:
Total flow rate =      1.315(CFS)
Time of concentration =     4.773 min.
Effective stream area after confluence =      0.490(Ac.)


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Process from Point/Station        3.000 to Point/Station       29.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   25.000(Ft.)
Highest elevation =  451.800(Ft.)
Lowest elevation =  451.200(Ft.)
Elevation difference =    0.600(Ft.) Slope =  2.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.40 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.49 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8000)*(  75.000^.5)/(   2.400^(1/3)]=   3.49
Calculated TC of    3.493 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.021(CFS)
Total initial stream area =        0.004(Ac.)


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Process from Point/Station       29.000 to Point/Station      300.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   451.200(Ft.)
Downstream point elevation =   446.000(Ft.)
Channel length thru subarea  =   191.000(Ft.)
Channel base width  =   23.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    0.100(Ft.)
Flow(q) thru subarea =      0.021(CFS)
Depth of flow =   0.003(Ft.), Average velocity =   0.356(Ft/s)
Channel flow top width =   23.000(Ft.)
Flow Velocity =    0.36(Ft/s)
Travel time  =    8.93 min.
Time of concentration =   12.42 min.
Critical depth =      0.003(Ft.)


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Process from Point/Station      300.000 to Point/Station      300.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.004(Ac.)
Runoff from this stream =      0.021(CFS)
Time of concentration =   12.42 min.
Rainfall intensity =     3.706(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.021     12.42            3.706
Qmax(1) =
          1.000 *    1.000 *     0.021) + =       0.021

Total of 1 main streams to confluence:
Flow rates before confluence point:
       0.021
Maximum flow rates at confluence using above data:
        0.021
Area of streams before confluence:
        0.004


Results of confluence:
Total flow rate =      0.021(CFS)
Time of concentration =    12.423 min.
Effective stream area after confluence  =      0.004(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   96.000(Ft.)
Highest elevation =  450.000(Ft.)
Lowest elevation =  447.000(Ft.)
Elevation difference =    3.000(Ft.) Slope =  3.125 %
Top of Initial Area Slope adjusted by User to  3.100 %
Bottom of Initial Area Slope adjusted by User to  3.100 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   3.10 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.41 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8000)*(  85.000^.5)/(   3.100^(1/3)]=   3.41
The initial area total distance of   96.00 (Ft.) entered leaves a
```

```
remaining distance of   11.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   0.19 minutes
for a distance of  11.00 (Ft.) and a slope of  3.10 %
with an elevation difference of   0.34(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    0.188 Minutes
Tt=[(11.9*0.0021^3)/(  0.34)]^.385=  0.19
Total initial area Ti =   3.41 minutes from Figure 3-3 formula plus
  0.19 minutes from the Figure 3-4 formula =   3.60 minutes
Calculated TC of    3.603 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.053(CFS)
Total initial stream area =        0.010(Ac.)


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Process from Point/Station       31.000 to Point/Station      400.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   447.000(Ft.)
Downstream point elevation =   438.000(Ft.)
Channel length thru subarea  =   509.000(Ft.)
Channel base width  =   23.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.013
Maximum depth of channel  =    0.100(Ft.)
Flow(q) thru subarea =      0.053(CFS)
Depth of flow =   0.005(Ft.), Average velocity =   0.452(Ft/s)
Channel flow top width =   23.000(Ft.)
Flow Velocity =    0.45(Ft/s)
Travel time  =   18.77 min.
Time of concentration =   22.37 min.
Critical depth =      0.005(Ft.)


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Process from Point/Station      400.000 to Point/Station      400.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.010(Ac.)
Runoff from this stream =      0.053(CFS)
Time of concentration =   22.37 min.
Rainfall intensity =     2.536(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.053     22.37            2.536
Qmax(1) =
         1.000 *    1.000 *     0.053) + =       0.053

Total of 1 main streams to confluence:
Flow rates before confluence point:
       0.053
```

```
Maximum flow rates at confluence using above data:
        0.053
Area of streams before confluence:
        0.010


Results of confluence:
Total flow rate =      0.053(CFS)
Time of concentration =    22.373 min.
Effective stream area after confluence  =      0.010(Ac.)
End of computations, total study area =           1.604 (Ac.)
```

Calculations Summary

Proposed Conditions Q_{100} Calculation Summary					
DMA	**Tc (min)**	**C**	**I (in/in)**	**A (ac)**	**Q_{100} (cfs)**
A-1	5	0.8	6.666	0.02	0.11
A-2	5	0.8	6.613	0.02	0.11
A-3	5	0.8	6.666	0.02	0.11
A-4	5	0.8	6.666	0.03	0.16
A-5	5.9	0.8	6.395	0.27	1.27
A-6	5	0.8	6.666	0.06	0.32
A-7	6.2	0.8	5.798	0.22	0.98
SM-A-1	8.7	0.2	4.663	0.06	0.06
SM-A-2	10.6	0.2	4.097	0.06	0.04
SM-A-3	8.7	0.2	4.663	0.07	0.07
SM-A-4	12	0.2	3.792	0.11	0.07
OFF-A-1	5	0.8	6.666	0.03	0.16
OFF-A-2	5	0.8	6.666	0.13	0.69
B-1	5	0.8	6.666	0.06	0.32
B-2	5	0.8	6.666	0.09	0.48
B-3	5	0.8	6.666	0.03	0.16
B-4	5	0.8	6.666	0.04	0.21
SM-B-1	6.9	0.2	5.415	0.06	0.07
SM-B-2	8.6	0.2	4.71	0.21	0.19
C	5	0.8	6.666	0.004	0.02
D	5	0.8	6.666	0.01	0.05

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CHAPTER 5 - 100 YEAR HYDROLOGIC ANALYSIS FOR MITIGATED CONDITIONS

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              San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2012 Version 7.9

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
       Rational Hydrology Study        Date: 11/28/18
------------------------------------------------------------------------
DEVELOPED CONDITIONS HYDROLOGY - MITIGATED
100 YEAR STORM
GRAVES COMMERCIAL
SANTEE, CA
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 6292

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.530
24 hour precipitation(inches) =  4.470
P6/P24 =    56.6%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   50.000(Ft.)
Highest elevation =  453.000(Ft.)
Lowest elevation =  452.500(Ft.)
Elevation difference =    0.500(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.10 minutes
 (for slope value of   1.00 %)
Calculated TC of    4.100 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
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Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.107(CFS)
Total initial stream area =       0.020(Ac.)


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Process from Point/Station       2.000 to Point/Station       3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   452.500(Ft.)
End of street segment elevation =   451.800(Ft.)
Length of street segment  =    68.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.108(CFS)
Depth of flow =   0.087(Ft.), Average velocity =   1.179(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.000(Ft.)
Flow velocity =   1.18(Ft/s)
Travel time =    0.96 min.     TC =    5.06  min.
 Adding area flow to street
Rainfall intensity (I) =      6.613(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.613(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.032
Subarea runoff =      0.105(CFS) for      0.020(Ac.)
Total runoff =      0.212(CFS)   Total area =       0.040(Ac.)
Street flow at end of street =      0.212(CFS)
Half street flow at end of street =      0.106(CFS)
Depth of flow =   0.112(Ft.), Average velocity =   1.395(Ft/s)
Flow width (from curb towards crown)=   2.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   447.200(Ft.)
Downstream point/station elevation =   445.900(Ft.)
Pipe length  =   129.80(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.212(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.212(CFS)
```

```
Normal flow depth in pipe =    1.77(In.)
Flow top width inside pipe =   10.72(In.)
Critical depth could not be calculated.
Pipe flow velocity =      2.36(Ft/s)
Travel time through pipe =    0.92 min.
Time of concentration (TC) =     5.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.040(Ac.)
Runoff from this stream =      0.212(CFS)
Time of concentration =    5.98 min.
Rainfall intensity =     5.940(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   44.000(Ft.)
Highest elevation =  452.800(Ft.)
Lowest elevation =  452.400(Ft.)
Elevation difference =    0.400(Ft.) Slope =  0.909 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   0.91 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.10 minutes
 (for slope value of   1.00 %)
Calculated TC of    4.100 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.107(CFS)
Total initial stream area =        0.020(Ac.)


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Process from Point/Station       4.000 to Point/Station       4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.020(Ac.)
Runoff from this stream =      0.107(CFS)
Time of concentration =    4.10 min.
Rainfall intensity =     6.666(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
```

```
 No.       (CFS)       (min)                 (In/Hr)


1        0.212      5.98           5.940
2        0.107      4.10           6.666
Qmax(1) =
         1.000 *    1.000 *     0.212) +
         0.891 *    1.000 *     0.107) + =       0.307
Qmax(2) =
         1.000 *    0.686 *     0.212) +
         1.000 *    1.000 *     0.107) + =       0.252

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.212       0.107
Maximum flow rates at confluence using above data:
        0.307        0.252
Area of streams before confluence:
        0.040        0.020
Results of confluence:
Total flow rate =      0.307(CFS)
Time of concentration =     5.978 min.
Effective stream area after confluence =      0.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   445.900(Ft.)
Downstream point/station elevation =   445.600(Ft.)
Pipe length  =    12.30(Ft.) Slope =   0.0244  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.307(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.307(CFS)
Normal flow depth in pipe =    1.71(In.)
Flow top width inside pipe =   10.56(In.)
Critical depth could not be calculated.
Pipe flow velocity =      3.60(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     6.04 min.


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Process from Point/Station       6.000 to Point/Station       6.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.060(Ac.)
Runoff from this stream =      0.307(CFS)
Time of concentration =    6.04 min.
Rainfall intensity =     5.904(In/Hr)


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Process from Point/Station       7.000 to Point/Station       8.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
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```
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   60.000(Ft.)
Highest elevation =  452.500(Ft.)
Lowest elevation =  451.700(Ft.)
Elevation difference =    0.800(Ft.) Slope =  1.333 %
Top of Initial Area Slope adjusted by User to  1.300 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.30 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.10 minutes
 (for slope value of   1.00 %)
Calculated TC of    4.100 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.160(CFS)
Total initial stream area =       0.030(Ac.)


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Process from Point/Station       8.000 to Point/Station       6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   451.700(Ft.)
End of street segment elevation =   450.800(Ft.)
Length of street segment  =   155.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   0.025(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.754(CFS)
Depth of flow =   0.255(Ft.), Average velocity =   1.407(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.395(Ft.)
Flow velocity =   1.41(Ft/s)
Travel time =    1.84 min.     TC =    5.94  min.
 Adding area flow to street
Rainfall intensity (I) =      5.967(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      5.967(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
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```
(Q=KCIA) is C = 0.800  CA =      0.240
Subarea runoff =      1.272(CFS) for      0.270(Ac.)
Total runoff =      1.432(CFS)   Total area =       0.300(Ac.)
Street flow at end of street =      1.432(CFS)
Half street flow at end of street =      1.432(CFS)
Depth of flow =   0.301(Ft.), Average velocity =   1.609(Ft/s)
Flow width (from curb towards crown)=   8.738(Ft.)


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Process from Point/Station       6.000 to Point/Station       6.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.300(Ac.)
Runoff from this stream =      1.432(CFS)
Time of concentration =    5.94 min.
Rainfall intensity =     5.967(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.307      6.04           5.904
2        1.432      5.94           5.967
Qmax(1) =
          1.000 *    1.000 *     0.307) +
          0.989 *    1.000 *     1.432) + =       1.724
Qmax(2) =
          1.000 *    0.984 *     0.307) +
          1.000 *    1.000 *     1.432) + =       1.734

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.307       1.432
Maximum flow rates at confluence using above data:
        1.724        1.734
Area of streams before confluence:
        0.060        0.300
Results of confluence:
Total flow rate =      1.734(CFS)
Time of concentration =     5.936 min.
Effective stream area after confluence =      0.360(Ac.)


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Process from Point/Station       6.000 to Point/Station       9.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   445.600(Ft.)
Downstream point/station elevation =   444.100(Ft.)
Pipe length  =   104.80(Ft.) Slope =   0.0143  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.734(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     1.734(CFS)
Normal flow depth in pipe =    4.52(In.)
Flow top width inside pipe =   15.61(In.)
Critical Depth =    5.93(In.)
Pipe flow velocity =      4.99(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =     6.29 min.
```

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Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.360(Ac.)
Runoff from this stream =      1.734(CFS)
Time of concentration =    6.29 min.
Rainfall intensity =     5.751(In/Hr)


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Process from Point/Station        7.000 to Point/Station       10.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   60.000(Ft.)
Highest elevation =  452.500(Ft.)
Lowest elevation =  451.800(Ft.)
Elevation difference =    0.700(Ft.) Slope =  1.167 %
Top of Initial Area Slope adjusted by User to  1.200 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.20 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.10 minutes
 (for slope value of   1.00 %)
Calculated TC of    4.100 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.320(CFS)
Total initial stream area =        0.060(Ac.)


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Process from Point/Station       10.000 to Point/Station        9.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   451.800(Ft.)
End of street segment elevation =   451.000(Ft.)
Length of street segment  =   166.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  22.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
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 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.777(CFS)
Depth of flow =   0.263(Ft.), Average velocity =   1.313(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.820(Ft.)
Flow velocity =   1.31(Ft/s)
Travel time =    2.11 min.     TC =    6.21  min.
 Adding area flow to street
Rainfall intensity (I) =      5.798(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      5.798(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.224
Subarea runoff =      0.979(CFS) for      0.220(Ac.)
Total runoff =      1.299(CFS)   Total area =       0.280(Ac.)
Street flow at end of street =      1.299(CFS)
Half street flow at end of street =      1.299(CFS)
Depth of flow =   0.301(Ft.), Average velocity =   1.464(Ft/s)
Flow width (from curb towards crown)=   8.720(Ft.)


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Process from Point/Station       9.000 to Point/Station       9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.280(Ac.)
Runoff from this stream =      1.299(CFS)
Time of concentration =    6.21 min.
Rainfall intensity =     5.798(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        1.734      6.29           5.751
2        1.299      6.21           5.798
Qmax(1) =
          1.000 *    1.000 *     1.734) +
          0.992 *    1.000 *     1.299) + =       3.022
Qmax(2) =
          1.000 *    0.987 *     1.734) +
          1.000 *    1.000 *     1.299) + =       3.011

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.734       1.299
Maximum flow rates at confluence using above data:
        3.022        3.011
Area of streams before confluence:
        0.360        0.280
Results of confluence:
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Total flow rate =      3.022(CFS)
Time of concentration =     6.286 min.
Effective stream area after confluence =      0.640(Ac.)


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Process from Point/Station       9.000 to Point/Station      11.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   444.100(Ft.)
Downstream point/station elevation =   444.000(Ft.)
Pipe length  =    10.00(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.022(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.022(CFS)
Normal flow depth in pipe =    6.61(In.)
Flow top width inside pipe =   17.35(In.)
Critical Depth =    7.93(In.)
Pipe flow velocity =      5.14(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     6.32 min.


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Process from Point/Station      11.000 to Point/Station      11.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity (I) =      4.263(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  10.00 min.  Rain intensity =       4.26(In/Hr)
Total area =        0.640(Ac.)  Total runoff =     0.360(CFS)


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Process from Point/Station      11.000 to Point/Station      12.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   442.700(Ft.)
Downstream point/station elevation =   441.300(Ft.)
Pipe length  =   122.50(Ft.) Slope =   0.0114  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.360(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.360(CFS)
Normal flow depth in pipe =    2.21(In.)
Flow top width inside pipe =   11.81(In.)
Critical Depth =    2.64(In.)
Pipe flow velocity =      2.90(Ft/s)
Travel time through pipe =    0.70 min.
Time of concentration (TC) =    10.70 min.


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Process from Point/Station      12.000 to Point/Station     100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
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________________________________________________________________________
Upstream point elevation =   441.300(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =    39.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.035
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.360(CFS)
Depth of flow =   0.061(Ft.), Average velocity =   1.181(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    1.18(Ft/s)
Travel time  =    0.55 min.
Time of concentration =   11.25 min.
Critical depth =      0.055(Ft.)


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Process from Point/Station      100.000 to Point/Station      100.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.640(Ac.)
Runoff from this stream =      0.360(CFS)
Time of concentration =   11.25 min.
Rainfall intensity =     3.950(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  445.400(Ft.)
Lowest elevation =  441.300(Ft.)
Elevation difference =    4.100(Ft.) Slope =  4.100 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   4.10 %, in a development type of
 Permanent Open Space
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.70 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      4.663(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.056(CFS)
Total initial stream area =       0.060(Ac.)


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Process from Point/Station       14.000 to Point/Station      100.000
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**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   441.300(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =   104.000(Ft.)
Channel base width  =    4.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      0.084(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =      0.084(CFS)
Depth of flow =   0.023(Ft.), Average velocity =   0.896(Ft/s)
Channel flow top width =    4.047(Ft.)
Flow Velocity =    0.90(Ft/s)
Travel time  =    1.93 min.
Time of concentration =   10.63 min.
Critical depth =      0.024(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      4.097(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      4.097(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      0.024
Subarea runoff =      0.042(CFS) for      0.060(Ac.)
Total runoff =      0.098(CFS)   Total area =       0.120(Ac.)
Depth of flow =   0.026(Ft.), Average velocity =   0.954(Ft/s)
Critical depth =      0.026(Ft.)


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Process from Point/Station      100.000 to Point/Station     100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.120(Ac.)
Runoff from this stream =      0.098(CFS)
Time of concentration =   10.63 min.
Rainfall intensity =     4.097(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station       15.000 to Point/Station      16.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
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```
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  451.700(Ft.)
Lowest elevation =  445.700(Ft.)
Elevation difference =    6.000(Ft.) Slope =  6.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   6.00 %, in a development type of
 Permanent Open Space
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.70 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      4.663(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.065(CFS)
Total initial stream area =        0.070(Ac.)


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Process from Point/Station       16.000 to Point/Station      100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   445.700(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =   154.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =      0.117(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.117(CFS)
Depth of flow =   0.030(Ft.), Average velocity =   0.780(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    0.78(Ft/s)
Travel time  =    3.29 min.
Time of concentration =   11.99 min.
Critical depth =      0.026(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      3.792(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      3.792(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      0.036
Subarea runoff =      0.071(CFS) for      0.110(Ac.)
Total runoff =      0.137(CFS)   Total area =       0.180(Ac.)
Depth of flow =   0.033(Ft.), Average velocity =   0.831(Ft/s)
Critical depth =      0.028(Ft.)


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Process from Point/Station      100.000 to Point/Station      100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
```

```
Stream flow area =      0.180(Ac.)
Runoff from this stream =      0.137(CFS)
Time of concentration =   11.99 min.
Rainfall intensity =     3.792(In/Hr)
Program is now starting with Main Stream No. 4


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Process from Point/Station       17.000 to Point/Station      18.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   85.000(Ft.)
Highest elevation =  450.500(Ft.)
Lowest elevation =  448.200(Ft.)
Elevation difference =    2.300(Ft.) Slope =  2.706 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   2.70 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.40 minutes
 (for slope value of   3.00 %)
Calculated TC of    3.400 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.160(CFS)
Total initial stream area =       0.030(Ac.)


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Process from Point/Station       18.000 to Point/Station      19.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   448.200(Ft.)
End of street segment elevation =   443.300(Ft.)
Length of street segment  =   129.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  37.000(Ft.)
Distance from crown to crossfall grade break  =  33.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  20.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.423(CFS)
Depth of flow =   0.114(Ft.), Average velocity =   2.706(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.000(Ft.)
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Flow velocity =   2.71(Ft/s)
Travel time =    0.79 min.     TC =    4.19  min.
 Adding area flow to street
Calculated TC of    4.194 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                          ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.128
Subarea runoff =      0.693(CFS) for      0.130(Ac.)
Total runoff =      0.853(CFS)   Total area =       0.160(Ac.)
Street flow at end of street =      0.853(CFS)
Half street flow at end of street =      0.427(CFS)
Depth of flow =   0.148(Ft.), Average velocity =   3.226(Ft/s)
Flow width (from curb towards crown)=   2.000(Ft.)


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Process from Point/Station       19.000 to Point/Station      100.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   443.300(Ft.)
Downstream point elevation =   440.000(Ft.)
Channel length thru subarea  =    19.000(Ft.)
Channel base width  =    2.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      0.853(CFS)
Depth of flow =   0.066(Ft.), Average velocity =   6.462(Ft/s)
Channel flow top width =    2.000(Ft.)
Flow Velocity =    6.46(Ft/s)
Travel time  =    0.05 min.
Time of concentration =    4.24 min.
Critical depth =      0.178(Ft.)


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Process from Point/Station      100.000 to Point/Station      100.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 4
Stream flow area =      0.160(Ac.)
Runoff from this stream =      0.853(CFS)
Time of concentration =    4.24 min.
Rainfall intensity =     6.666(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1        0.360     11.25           3.950
2        0.098     10.63           4.097
3        0.137     11.99           3.792
4        0.853      4.24           6.666
Qmax(1) =
          1.000 *    1.000 *     0.360) +
          0.964 *    1.000 *     0.098) +
          1.000 *    0.939 *     0.137) +
          0.593 *    1.000 *     0.853) + =       1.089
Qmax(2) =
          1.000 *    0.945 *     0.360) +
          1.000 *    1.000 *     0.098) +
          1.000 *    0.887 *     0.137) +
          0.615 *    1.000 *     0.853) + =       1.084
Qmax(3) =
          0.960 *    1.000 *     0.360) +
          0.926 *    1.000 *     0.098) +
          1.000 *    1.000 *     0.137) +
          0.569 *    1.000 *     0.853) + =       1.059
Qmax(4) =
          1.000 *    0.377 *     0.360) +
          1.000 *    0.399 *     0.098) +
          1.000 *    0.354 *     0.137) +
          1.000 *    1.000 *     0.853) + =       1.077

Total of 4 main streams to confluence:
Flow rates before confluence point:
       0.360       0.098       0.137       0.853
Maximum flow rates at confluence using above data:
        1.089        1.084        1.059        1.077
Area of streams before confluence:
        0.640        0.120        0.180        0.160


Results of confluence:
Total flow rate =      1.089(CFS)
Time of concentration =    11.255 min.
Effective stream area after confluence  =      1.100(Ac.)


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Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   85.000(Ft.)
Highest elevation =  453.200(Ft.)
Lowest elevation =  450.500(Ft.)
Elevation difference =    2.700(Ft.) Slope =  3.176 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft)
for the top area slope value of   3.18 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.40 minutes
```

```
 (for slope value of   3.00 %)
Calculated TC of    3.400 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.320(CFS)
Total initial stream area =       0.060(Ac.)


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Process from Point/Station       21.000 to Point/Station       22.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   450.500(Ft.)
End of street segment elevation =   449.500(Ft.)
Length of street segment  =    53.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  15.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.532(CFS)
Depth of flow =   0.193(Ft.), Average velocity =   2.252(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   3.309(Ft.)
Flow velocity =   2.25(Ft/s)
Travel time =    0.39 min.     TC =    3.79  min.
 Adding area flow to street
Calculated TC of    3.792 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                      ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.120
Subarea runoff =      0.480(CFS) for      0.090(Ac.)
Total runoff =      0.800(CFS)   Total area =       0.150(Ac.)
Street flow at end of street =      0.800(CFS)
Half street flow at end of street =      0.800(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   2.320(Ft/s)
Flow width (from curb towards crown)=   4.670(Ft.)


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Process from Point/Station       22.000 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
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Upstream point/station elevation =   445.600(Ft.)
Downstream point/station elevation =   445.000(Ft.)
Pipe length  =    21.70(Ft.) Slope =   0.0276  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.800(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.800(CFS)
Normal flow depth in pipe =    2.62(In.)
Flow top width inside pipe =   12.70(In.)
Critical Depth =    3.98(In.)
Pipe flow velocity =      5.02(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     3.86 min.


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Process from Point/Station       23.000 to Point/Station       23.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.150(Ac.)
Runoff from this stream =      0.800(CFS)
Time of concentration =    3.86 min.
Rainfall intensity =     6.666(In/Hr)


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Process from Point/Station        5.000 to Point/Station       24.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                       ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Initial subarea total flow distance  =   75.000(Ft.)
Highest elevation =  452.800(Ft.)
Lowest elevation =  451.000(Ft.)
Elevation difference =    1.800(Ft.) Slope =  2.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   2.40 %, in a development type of
 General Commercial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.60 minutes
 (for slope value of   2.00 %)
Calculated TC of    3.600 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.800
Subarea runoff =      0.160(CFS)
Total initial stream area =       0.030(Ac.)


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Process from Point/Station       24.000 to Point/Station       25.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   451.000(Ft.)
End of street segment elevation =   449.200(Ft.)
```

```
Length of street segment  =    81.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.241(CFS)
Depth of flow =   0.132(Ft.), Average velocity =   2.287(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.000(Ft.)
Flow velocity =   2.29(Ft/s)
Travel time =    0.59 min.     TC =    4.19  min.
 Adding area flow to street
Calculated TC of    4.190 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.666(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.800
Rainfall intensity =      6.666(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      0.056
Subarea runoff =      0.213(CFS) for      0.040(Ac.)
Total runoff =      0.373(CFS)   Total area =       0.070(Ac.)
Street flow at end of street =      0.373(CFS)
Half street flow at end of street =      0.373(CFS)
Depth of flow =   0.156(Ft.), Average velocity =   2.552(Ft/s)
Flow width (from curb towards crown)=   2.000(Ft.)


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Process from Point/Station       25.000 to Point/Station       23.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   445.200(Ft.)
Downstream point/station elevation =   445.000(Ft.)
Pipe length  =    23.00(Ft.) Slope =   0.0087  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.373(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.373(CFS)
Normal flow depth in pipe =    2.40(In.)
Flow top width inside pipe =   12.24(In.)
Critical depth could not be calculated.
Pipe flow velocity =      2.66(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     4.33 min.


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Process from Point/Station       23.000 to Point/Station       23.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.070(Ac.)
Runoff from this stream =      0.373(CFS)
Time of concentration =    4.33 min.
Rainfall intensity =     6.666(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.800      3.86           6.666
2        0.373      4.33           6.666
Qmax(1) =
          1.000 *    1.000 *     0.800) +
          1.000 *    0.892 *     0.373) + =       1.133
Qmax(2) =
          1.000 *    1.000 *     0.800) +
          1.000 *    1.000 *     0.373) + =       1.173

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.800       0.373
Maximum flow rates at confluence using above data:
        1.133        1.173
Area of streams before confluence:
        0.150        0.070
Results of confluence:
Total flow rate =      1.173(CFS)
Time of concentration =     4.334 min.
Effective stream area after confluence =      0.220(Ac.)


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Process from Point/Station       23.000 to Point/Station       23.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity (I) =      4.923(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   8.00 min.  Rain intensity =       4.92(In/Hr)
Total area =        0.220(Ac.)  Total runoff =     0.160(CFS)


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Process from Point/Station       23.000 to Point/Station       26.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   441.500(Ft.)
Downstream point/station elevation =   441.000(Ft.)
Pipe length  =    44.90(Ft.) Slope =   0.0111  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.160(CFS)
```

```
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.160(CFS)
Normal flow depth in pipe =    1.51(In.)
Flow top width inside pipe =    9.98(In.)
Critical depth could not be calculated.
Pipe flow velocity =      2.25(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     8.33 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station      200.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   441.000(Ft.)
Downstream point elevation =   436.600(Ft.)
Channel length thru subarea  =    41.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.035
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.160(CFS)
Depth of flow =   0.026(Ft.), Average velocity =   1.220(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    1.22(Ft/s)
Travel time  =    0.56 min.
Time of concentration =    8.89 min.
Critical depth =      0.032(Ft.)


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Process from Point/Station      200.000 to Point/Station      200.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.220(Ac.)
Runoff from this stream =      0.160(CFS)
Time of concentration =    8.89 min.
Rainfall intensity =     4.598(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       28.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  452.000(Ft.)
Lowest elevation =  438.600(Ft.)
Elevation difference =   13.400(Ft.) Slope = 13.400 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  13.40 %, in a development type of
 Permanent Open Space
```

```
In Accordance With Table 3-2
Initial Area Time of Concentration =   6.90 minutes
 (for slope value of  10.00 %)
Rainfall intensity (I) =      5.415(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff =      0.065(CFS)
Total initial stream area =        0.060(Ac.)


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Process from Point/Station       28.000 to Point/Station      200.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   438.600(Ft.)
Downstream point elevation =   436.600(Ft.)
Channel length thru subarea  =   129.000(Ft.)
Channel base width  =    4.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      0.179(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =      0.179(CFS)
Depth of flow =   0.034(Ft.), Average velocity =   1.290(Ft/s)
Channel flow top width =    4.069(Ft.)
Flow Velocity =    1.29(Ft/s)
Travel time  =    1.67 min.
Time of concentration =    8.57 min.
Critical depth =      0.040(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      4.710(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Rainfall intensity =      4.710(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.200  CA =      0.054
Subarea runoff =      0.189(CFS) for      0.210(Ac.)
Total runoff =      0.254(CFS)   Total area =       0.270(Ac.)
Depth of flow =   0.042(Ft.), Average velocity =   1.482(Ft/s)
Critical depth =      0.050(Ft.)


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Process from Point/Station      200.000 to Point/Station      200.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.270(Ac.)
Runoff from this stream =      0.254(CFS)
Time of concentration =    8.57 min.
Rainfall intensity =     4.710(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1        0.160      8.89           4.598
2        0.254      8.57           4.710
Qmax(1) =
          1.000 *    1.000 *     0.160) +
          0.976 *    1.000 *     0.254) + =       0.408
Qmax(2) =
          1.000 *    0.963 *     0.160) +
          1.000 *    1.000 *     0.254) + =       0.408

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.160       0.254
Maximum flow rates at confluence using above data:
        0.408       0.408
Area of streams before confluence:
        0.220       0.270
Results of confluence:
Total flow rate =      0.408(CFS)
Time of concentration =     8.567 min.
Effective stream area after confluence =      0.490(Ac.)
End of computations, total study area =          2.450 (Ac.)
```

Calculations Summary

Proposed Conditions Q_{100} Calculation Summary					
DMA	**Tc (min)**	**C**	**I (in/in)**	**A (ac)**	**Q_{100} (cfs)**
A-1	5	0.8	6.666	0.02	0.11
A-2	5	0.8	6.613	0.02	0.11
A-3	5	0.8	6.666	0.02	0.11
A-4	5	0.8	6.666	0.03	0.16
A-5	5.9	0.8	6.395	0.27	1.27
A-6	5	0.8	6.666	0.06	0.32
A-7	6.2	0.8	5.798	0.22	0.98
SM-A-1	8.7	0.2	4.663	0.06	0.06
SM-A-2	10.6	0.2	4.097	0.06	0.04
SM-A-3	8.7	0.2	4.663	0.07	0.07
SM-A-4	12	0.2	3.792	0.11	0.07
OFF-A-1	5	0.8	6.666	0.03	0.16
OFF-A-2	5	0.8	6.666	0.13	0.69
B-1	5	0.8	6.666	0.06	0.32
B-2	5	0.8	6.666	0.09	0.48
B-3	5	0.8	6.666	0.03	0.16
B-4	5	0.8	6.666	0.04	0.21
SM-B-1	6.9	0.2	5.415	0.06	0.07
SM-B-2	8.6	0.2	4.71	0.21	0.19
C	5	0.8	6.666	0.004	0.02
D	5	0.8	6.666	0.01	0.05

CHAPTER 6 – MODIFIED-PULS DETENTIONS ROUTING

6.1 – Rational Method Hydrograph

DMA-A

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 11/28/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.53 INCHES
BASIN AREA 0.64 ACRES
RUNOFF COEFFICIENT 0.8
PEAK DISCHARGE 3.02 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.1
TIME (MIN) = 12	DISCHARGE (CFS) = 0.1
TIME (MIN) = 18	DISCHARGE (CFS) = 0.1
TIME (MIN) = 24	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 36	DISCHARGE (CFS) = 0.1
TIME (MIN) = 42	DISCHARGE (CFS) = 0.1
TIME (MIN) = 48	DISCHARGE (CFS) = 0.1
TIME (MIN) = 54	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 66	DISCHARGE (CFS) = 0.1
TIME (MIN) = 72	DISCHARGE (CFS) = 0.1
TIME (MIN) = 78	DISCHARGE (CFS) = 0.1
TIME (MIN) = 84	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 96	DISCHARGE (CFS) = 0.1
TIME (MIN) = 102	DISCHARGE (CFS) = 0.1
TIME (MIN) = 108	DISCHARGE (CFS) = 0.1
TIME (MIN) = 114	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 126	DISCHARGE (CFS) = 0.1
TIME (MIN) = 132	DISCHARGE (CFS) = 0.1
TIME (MIN) = 138	DISCHARGE (CFS) = 0.1
TIME (MIN) = 144	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 156	DISCHARGE (CFS) = 0.1
TIME (MIN) = 162	DISCHARGE (CFS) = 0.2
TIME (MIN) = 168	DISCHARGE (CFS) = 0.2
TIME (MIN) = 174	DISCHARGE (CFS) = 0.2
TIME (MIN) = 180	DISCHARGE (CFS) = 0.2
TIME (MIN) = 186	DISCHARGE (CFS) = 0.2
TIME (MIN) = 192	DISCHARGE (CFS) = 0.2
TIME (MIN) = 198	DISCHARGE (CFS) = 0.2
TIME (MIN) = 204	DISCHARGE (CFS) = 0.2
TIME (MIN) = 210	DISCHARGE (CFS) = 0.3
TIME (MIN) = 216	DISCHARGE (CFS) = 0.3
TIME (MIN) = 222	DISCHARGE (CFS) = 0.4
TIME (MIN) = 228	DISCHARGE (CFS) = 0.4
TIME (MIN) = 234	DISCHARGE (CFS) = 0.6
TIME (MIN) = 240	DISCHARGE (CFS) = 0.9
TIME (MIN) = 246	DISCHARGE (CFS) = 3.02
TIME (MIN) = 252	DISCHARGE (CFS) = 0.5
TIME (MIN) = 258	DISCHARGE (CFS) = 0.3
TIME (MIN) = 264	DISCHARGE (CFS) = 0.3
TIME (MIN) = 270	DISCHARGE (CFS) = 0.2
TIME (MIN) = 276	DISCHARGE (CFS) = 0.2
TIME (MIN) = 282	DISCHARGE (CFS) = 0.2
TIME (MIN) = 288	DISCHARGE (CFS) = 0.1
TIME (MIN) = 294	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 306	DISCHARGE (CFS) = 0.1
TIME (MIN) = 312	DISCHARGE (CFS) = 0.1
TIME (MIN) = 318	DISCHARGE (CFS) = 0.1
TIME (MIN) = 324	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 336	DISCHARGE (CFS) = 0.1
TIME (MIN) = 342	DISCHARGE (CFS) = 0.1
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TIME (MIN) = 354	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 366	DISCHARGE (CFS) = 0

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DMA-B

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 11/8/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.53 INCHES
BASIN AREA 0.22 ACRES
RUNOFF COEFFICIENT 0.8
PEAK DISCHARGE 1.17 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0
TIME (MIN) = 12	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 0
TIME (MIN) = 24	DISCHARGE (CFS) = 0
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TIME (MIN) = 42	DISCHARGE (CFS) = 0
TIME (MIN) = 48	DISCHARGE (CFS) = 0
TIME (MIN) = 54	DISCHARGE (CFS) = 0
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TIME (MIN) = 180	DISCHARGE (CFS) = 0.1
TIME (MIN) = 186	DISCHARGE (CFS) = 0.1
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TIME (MIN) = 222	DISCHARGE (CFS) = 0.1
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TIME (MIN) = 294	DISCHARGE (CFS) = 0
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TIME (MIN) = 348	DISCHARGE (CFS) = 0
TIME (MIN) = 354	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 366	DISCHARGE (CFS) = 0

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6.2 – Stage-Storage & Stage-Discharge Relationships

Stage Storage for BMP-A

Depth (ft)	Area (ft^2)	Volume (ft^3)	
0.00	925	0	**3" LOW ORIFICE**
0.08	925	77	
0.17	925	154	
0.25	925	231	
0.33	925	308	
0.42	925	385	
0.50	925	463	
0.58	925	540	
0.67	925	617	
0.75	925	694	
0.83	925	771	
0.92	925	848	
1.00	925	925	
1.08	925	1002	
1.17	925	1079	
1.25	925	1156	
1.33	925	1233	
1.42	925	1310	
1.50	925	1388	
1.58	925	1465	
1.67	925	1542	
1.75	925	1619	
1.83	925	1696	
1.92	925	1773	
2.00	925	1850	
2.08	925	1927	
2.17	925	2004	
2.25	925	2081	
2.33	925	2158	
2.42	925	2235	
2.50	925	2313	**EMERGENCY WEIR**
2.58	925	2390	
2.67	925	2467	
2.75	925	2544	
2.83	925	2621	
2.92	925	2698	
3.00	925	2775	

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Stage Storage for BMP-B

Depth (ft)	Area (ft^2)	Volume (ft^3)	
0.00	317	0	
0.08	337	27	
0.17	358	56	
0.25	380	87	
0.33	401	120	
0.42	423	154	
0.50	446	190	
0.58	468	228	
0.67	492	268	
0.75	515	310	
0.83	539	354	
0.92	564	400	
1.00	588	448	**LOWER SLOT INVERT**
1.08	614	498	
1.17	639	550	
1.25	665	605	
1.33	691	661	
1.42	718	720	
1.50	745	781	
1.58	773	844	
1.67	801	910	
1.75	829	977	
1.83	858	1048	
1.92	887	1120	
2.00	916	1195	**EMERGENCY WEIR**
2.08	946	1273	
2.17	976	1353	
2.25	1007	1436	
2.33	1038	1521	
2.42	1069	1609	
2.50	1101	1699	
2.58	1133	1792	
2.67	1166	1888	
2.75	1199	1987	
2.83	1232	2088	
2.92	1266	2192	
3.00	1300	2299	

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Graves Commercial Center
Drainage Study

Stage Discharge for BMP-A

Low orifice:	3”		Emergency Weir Invert:	2.5 ft
No. of orifice:	1		Emergency Weir Permieter:	8.0 ft
Cg-low:	0.62			

h* (ft)	Qlow-orif (cfs)	Qtot-low (cfs)	Qemerg (cfs)	Qtot (cfs)
0.00	0.00	0.00	0.00	0.000
0.08	0.00	0.01	0.00	0.011
0.17	0.05	0.04	0.00	0.041
0.25	0.09	0.08	0.00	0.081
0.33	0.11	0.11	0.00	0.111
0.42	0.13	0.13	0.00	0.132
0.50	0.15	0.15	0.00	0.150
0.58	0.17	0.17	0.00	0.165
0.67	0.18	0.18	0.00	0.180
0.75	0.19	0.19	0.00	0.193
0.83	0.21	0.21	0.00	0.206
0.92	0.22	0.22	0.00	0.217
1.00	0.23	0.23	0.00	0.228
1.08	0.24	0.24	0.00	0.239
1.17	0.25	0.25	0.00	0.249
1.25	0.26	0.26	0.00	0.259
1.33	0.27	0.27	0.00	0.268
1.42	0.28	0.28	0.00	0.278
1.50	0.29	0.29	0.00	0.286
1.58	0.29	0.29	0.00	0.295
1.67	0.30	0.30	0.00	0.303
1.75	0.31	0.31	0.00	0.311
1.83	0.32	0.32	0.00	0.319
1.92	0.33	0.33	0.00	0.327
2.00	0.33	0.33	0.00	0.334
2.08	0.34	0.34	0.00	0.342
2.17	0.35	0.35	0.00	0.349
2.25	0.36	0.36	0.00	0.356
2.33	0.36	0.36	0.00	0.363
2.42	0.37	0.37	0.00	0.370
2.50	0.38	0.38	0.00	0.376
2.58	0.38	0.38	0.60	0.980
2.67	0.39	0.39	1.69	2.077
2.75	0.40	0.40	3.10	3.496
2.83	0.40	0.40	4.77	5.175
2.92	0.41	0.41	6.67	7.078
3.00	0.41	0.41	8.77	9.182

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Stage Discharge for BMP-B

Lower slot Invert:	1.0 ft	Emergency Weir Invert:	2.0 ft
No. of slots:	1	Emergency Weir Permieter:	8.0 ft
Dimension:	0.50 x 0.083 ft		

h* (ft)	Qslot-low (cfs)	Qemerg (cfs)	Qtot (cfs)
0.00	0.00	0.00	0.00
0.08	0.00	0.00	0.00
0.17	0.00	0.00	0.00
0.25	0.00	0.00	0.00
0.33	0.00	0.00	0.00
0.42	0.00	0.00	0.00
0.50	0.00	0.00	0.00
0.58	0.00	0.00	0.00
0.67	0.00	0.00	0.00
0.75	0.00	0.00	0.00
0.83	0.00	0.00	0.00
0.92	0.00	0.00	0.00
1.00	0.00	0.00	0.00
1.08	0.04	0.00	0.04
1.17	0.07	0.00	0.07
1.25	0.09	0.00	0.09
1.33	0.11	0.00	0.11
1.42	0.12	0.00	0.12
1.50	0.14	0.00	0.14
1.58	0.15	0.00	0.15
1.67	0.16	0.00	0.16
1.75	0.17	0.00	0.17
1.83	0.18	0.00	0.18
1.92	0.19	0.00	0.19
2.00	0.20	0.00	0.20
2.08	0.21	0.60	0.80
2.17	0.22	1.69	1.90
2.25	0.22	3.10	3.32
2.33	0.23	4.77	5.00
2.42	0.24	6.67	6.91
2.50	0.25	8.77	9.01
2.58	0.25	11.05	11.30
2.67	0.26	13.50	13.76
2.75	0.27	16.11	16.37
2.83	0.27	18.87	19.14
2.92	0.28	21.77	22.04
3.00	0.29	24.80	25.09

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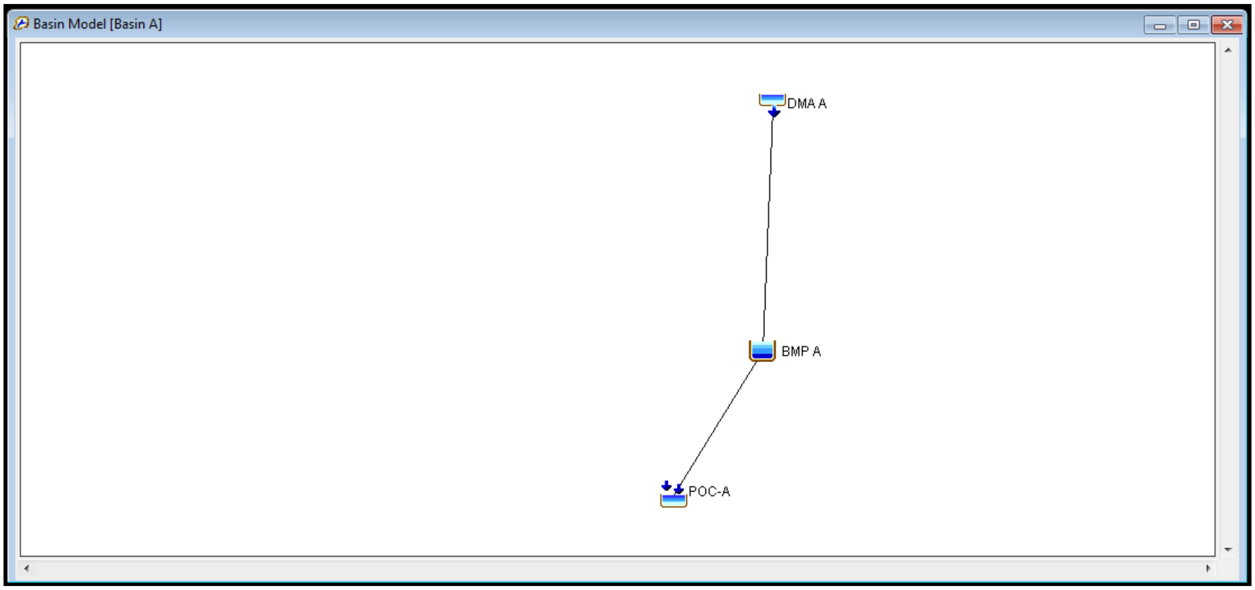
6.3 – HEC-HMS Modified-Puls Routing Results

HEC-HMS POST DEVELOPMENT: DMA-A



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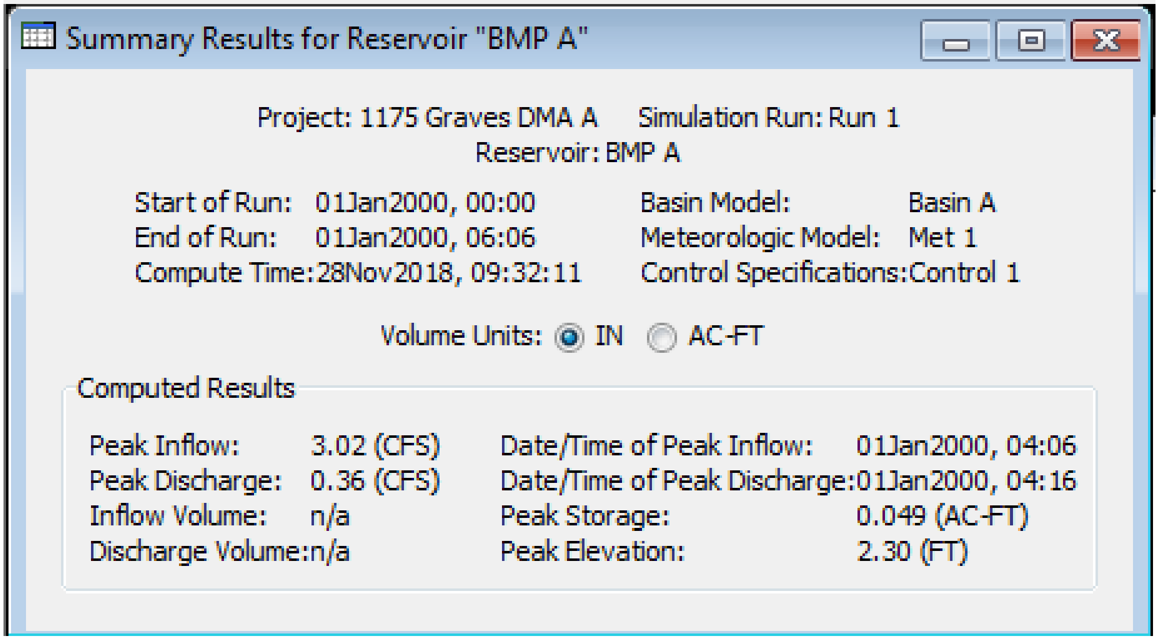

Summary Results for Reservoir "BMP A"

Project: 1175 Graves DMA A   Simulation Run: Run 1
Reservoir: BMP A

Start of Run:	01Jan2000, 00:00	Basin Model:	Basin A
End of Run:	01Jan2000, 06:06	Meteorologic Model:	Met 1
Compute Time:	28Nov2018, 09:32:11	Control Specifications:	Control 1

Volume Units: (•) IN ( ) AC-FT

Computed Results

Peak Inflow:	3.02 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:06
Peak Discharge:	0.36 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:16
Inflow Volume:	n/a	Peak Storage:	0.049 (AC-FT)
Discharge Volume:	n/a	Peak Elevation:	2.30 (FT)

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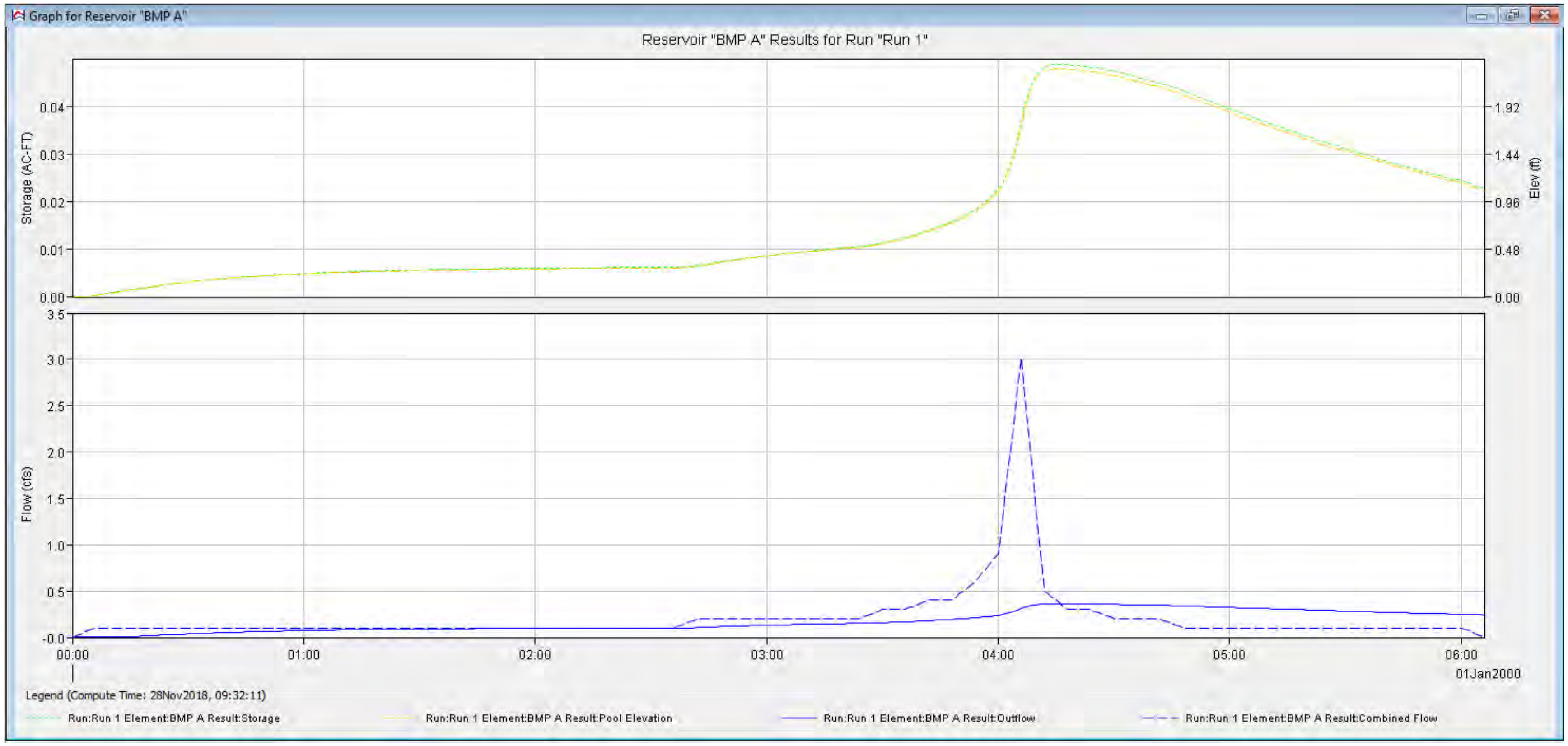
Graph for Reservoir "BMP A"
Reservoir "BMP A" Results for Run "Run 1"
Storage (AC-FT)
0.04
0.03
0.02
0.01
0.00
Elev (ft)
1.92
1.44
0.96
0.48
0.00
Flow (cfs)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
-0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 28Nov2018, 09:32:11)
Run:Run 1 Element:BMP A Result:Storage
Run:Run 1 Element:BMP A Result:Pool Elevation
Run:Run 1 Element:BMP A Result:Outflow
Run:Run 1 Element:BMP A Result:Combined Flow

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Project: 1175 Graves DMA A Simulation Run: Run 1
Reservoir: BMP A

Start of Run: 01Jan2000, 00:00 Basin Model: Basin A
End of Run: 01Jan2000, 06:06 Meteorologic Model: Met 1
Compute Time: 28Nov2018, 09:32:11 Control Specifications:Control 1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:00	0.00	0.000	0.00	0.00
01Jan2000	00:01	0.02	0.000	0.00	0.00
01Jan2000	00:02	0.03	0.000	0.00	0.00
01Jan2000	00:03	0.05	0.000	0.00	0.00
01Jan2000	00:04	0.07	0.000	0.01	0.00
01Jan2000	00:05	0.08	0.000	0.01	0.00
01Jan2000	00:06	0.10	0.000	0.02	0.00
01Jan2000	00:07	0.10	0.001	0.02	0.00
01Jan2000	00:08	0.10	0.001	0.03	0.00
01Jan2000	00:09	0.10	0.001	0.04	0.00
01Jan2000	00:10	0.10	0.001	0.04	0.01
01Jan2000	00:11	0.10	0.001	0.05	0.01
01Jan2000	00:12	0.10	0.001	0.05	0.01
01Jan2000	00:13	0.10	0.001	0.06	0.01
01Jan2000	00:14	0.10	0.001	0.06	0.01
01Jan2000	00:15	0.10	0.002	0.07	0.01
01Jan2000	00:16	0.10	0.002	0.08	0.01
01Jan2000	00:17	0.10	0.002	0.08	0.01
01Jan2000	00:18	0.10	0.002	0.09	0.01
01Jan2000	00:19	0.10	0.002	0.09	0.02
01Jan2000	00:20	0.10	0.002	0.10	0.02
01Jan2000	00:21	0.10	0.002	0.11	0.02
01Jan2000	00:22	0.10	0.002	0.11	0.02
01Jan2000	00:23	0.10	0.002	0.12	0.02
01Jan2000	00:24	0.10	0.003	0.12	0.03
01Jan2000	00:25	0.10	0.003	0.13	0.03

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:26	0.10	0.003	0.13	0.03
01Jan2000	00:27	0.10	0.003	0.14	0.03
01Jan2000	00:28	0.10	0.003	0.14	0.03
01Jan2000	00:29	0.10	0.003	0.15	0.03
01Jan2000	00:30	0.10	0.003	0.15	0.04
01Jan2000	00:31	0.10	0.003	0.16	0.04
01Jan2000	00:32	0.10	0.003	0.16	0.04
01Jan2000	00:33	0.10	0.003	0.17	0.04
01Jan2000	00:34	0.10	0.004	0.17	0.04
01Jan2000	00:35	0.10	0.004	0.17	0.04
01Jan2000	00:36	0.10	0.004	0.18	0.04
01Jan2000	00:37	0.10	0.004	0.18	0.05
01Jan2000	00:38	0.10	0.004	0.18	0.05
01Jan2000	00:39	0.10	0.004	0.19	0.05
01Jan2000	00:40	0.10	0.004	0.19	0.05
01Jan2000	00:41	0.10	0.004	0.19	0.05
01Jan2000	00:42	0.10	0.004	0.20	0.05
01Jan2000	00:43	0.10	0.004	0.20	0.06
01Jan2000	00:44	0.10	0.004	0.20	0.06
01Jan2000	00:45	0.10	0.004	0.20	0.06
01Jan2000	00:46	0.10	0.004	0.21	0.06
01Jan2000	00:47	0.10	0.004	0.21	0.06
01Jan2000	00:48	0.10	0.004	0.21	0.06
01Jan2000	00:49	0.10	0.004	0.21	0.06
01Jan2000	00:50	0.10	0.005	0.22	0.06
01Jan2000	00:51	0.10	0.005	0.22	0.07
01Jan2000	00:52	0.10	0.005	0.22	0.07
01Jan2000	00:53	0.10	0.005	0.22	0.07
01Jan2000	00:54	0.10	0.005	0.22	0.07
01Jan2000	00:55	0.10	0.005	0.23	0.07
01Jan2000	00:56	0.10	0.005	0.23	0.07

Page 2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:57	0.10	0.005	0.23	0.07
01Jan2000	00:58	0.10	0.005	0.23	0.07
01Jan2000	00:59	0.10	0.005	0.23	0.07
01Jan2000	01:00	0.10	0.005	0.24	0.07
01Jan2000	01:01	0.10	0.005	0.24	0.07
01Jan2000	01:02	0.10	0.005	0.24	0.08
01Jan2000	01:03	0.10	0.005	0.24	0.08
01Jan2000	01:04	0.10	0.005	0.24	0.08
01Jan2000	01:05	0.10	0.005	0.24	0.08
01Jan2000	01:06	0.10	0.005	0.24	0.08
01Jan2000	01:07	0.10	0.005	0.25	0.08
01Jan2000	01:08	0.10	0.005	0.25	0.08
01Jan2000	01:09	0.10	0.005	0.25	0.08
01Jan2000	01:10	0.10	0.005	0.25	0.08
01Jan2000	01:11	0.10	0.005	0.25	0.08
01Jan2000	01:12	0.10	0.005	0.25	0.08
01Jan2000	01:13	0.10	0.005	0.25	0.08
01Jan2000	01:14	0.10	0.005	0.25	0.08
01Jan2000	01:15	0.10	0.005	0.25	0.08
01Jan2000	01:16	0.10	0.005	0.26	0.08
01Jan2000	01:17	0.10	0.005	0.26	0.08
01Jan2000	01:18	0.10	0.005	0.26	0.08
01Jan2000	01:19	0.10	0.005	0.26	0.08
01Jan2000	01:20	0.10	0.006	0.26	0.08
01Jan2000	01:21	0.10	0.006	0.26	0.08
01Jan2000	01:22	0.10	0.006	0.26	0.09
01Jan2000	01:23	0.10	0.006	0.26	0.09
01Jan2000	01:24	0.10	0.006	0.26	0.09
01Jan2000	01:25	0.10	0.006	0.26	0.09
01Jan2000	01:26	0.10	0.006	0.26	0.09
01Jan2000	01:27	0.10	0.006	0.27	0.09

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:28	0.10	0.006	0.27	0.09
01Jan2000	01:29	0.10	0.006	0.27	0.09
01Jan2000	01:30	0.10	0.006	0.27	0.09
01Jan2000	01:31	0.10	0.006	0.27	0.09
01Jan2000	01:32	0.10	0.006	0.27	0.09
01Jan2000	01:33	0.10	0.006	0.27	0.09
01Jan2000	01:34	0.10	0.006	0.27	0.09
01Jan2000	01:35	0.10	0.006	0.27	0.09
01Jan2000	01:36	0.10	0.006	0.27	0.09
01Jan2000	01:37	0.10	0.006	0.27	0.09
01Jan2000	01:38	0.10	0.006	0.27	0.09
01Jan2000	01:39	0.10	0.006	0.27	0.09
01Jan2000	01:40	0.10	0.006	0.27	0.09
01Jan2000	01:41	0.10	0.006	0.28	0.09
01Jan2000	01:42	0.10	0.006	0.28	0.09
01Jan2000	01:43	0.10	0.006	0.28	0.09
01Jan2000	01:44	0.10	0.006	0.28	0.09
01Jan2000	01:45	0.10	0.006	0.28	0.09
01Jan2000	01:46	0.10	0.006	0.28	0.09
01Jan2000	01:47	0.10	0.006	0.28	0.09
01Jan2000	01:48	0.10	0.006	0.28	0.09
01Jan2000	01:49	0.10	0.006	0.28	0.09
01Jan2000	01:50	0.10	0.006	0.28	0.09
01Jan2000	01:51	0.10	0.006	0.28	0.09
01Jan2000	01:52	0.10	0.006	0.28	0.09
01Jan2000	01:53	0.10	0.006	0.28	0.09
01Jan2000	01:54	0.10	0.006	0.28	0.09
01Jan2000	01:55	0.10	0.006	0.28	0.09
01Jan2000	01:56	0.10	0.006	0.28	0.09
01Jan2000	01:57	0.10	0.006	0.28	0.09
01Jan2000	01:58	0.10	0.006	0.28	0.09

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:59	0.10	0.006	0.28	0.09
01Jan2000	02:00	0.10	0.006	0.28	0.09
01Jan2000	02:01	0.10	0.006	0.28	0.09
01Jan2000	02:02	0.10	0.006	0.29	0.09
01Jan2000	02:03	0.10	0.006	0.29	0.09
01Jan2000	02:04	0.10	0.006	0.29	0.09
01Jan2000	02:05	0.10	0.006	0.29	0.09
01Jan2000	02:06	0.10	0.006	0.29	0.09
01Jan2000	02:07	0.10	0.006	0.29	0.09
01Jan2000	02:08	0.10	0.006	0.29	0.09
01Jan2000	02:09	0.10	0.006	0.29	0.10
01Jan2000	02:10	0.10	0.006	0.29	0.10
01Jan2000	02:11	0.10	0.006	0.29	0.10
01Jan2000	02:12	0.10	0.006	0.29	0.10
01Jan2000	02:13	0.10	0.006	0.29	0.10
01Jan2000	02:14	0.10	0.006	0.29	0.10
01Jan2000	02:15	0.10	0.006	0.29	0.10
01Jan2000	02:16	0.10	0.006	0.29	0.10
01Jan2000	02:17	0.10	0.006	0.29	0.10
01Jan2000	02:18	0.10	0.006	0.29	0.10
01Jan2000	02:19	0.10	0.006	0.29	0.10
01Jan2000	02:20	0.10	0.006	0.29	0.10
01Jan2000	02:21	0.10	0.006	0.29	0.10
01Jan2000	02:22	0.10	0.006	0.29	0.10
01Jan2000	02:23	0.10	0.006	0.29	0.10
01Jan2000	02:24	0.10	0.006	0.29	0.10
01Jan2000	02:25	0.10	0.006	0.29	0.10
01Jan2000	02:26	0.10	0.006	0.29	0.10
01Jan2000	02:27	0.10	0.006	0.29	0.10
01Jan2000	02:28	0.10	0.006	0.29	0.10
01Jan2000	02:29	0.10	0.006	0.29	0.10

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	02:30	0.10	0.006	0.29	0.10
01Jan2000	02:31	0.10	0.006	0.29	0.10
01Jan2000	02:32	0.10	0.006	0.29	0.10
01Jan2000	02:33	0.10	0.006	0.29	0.10
01Jan2000	02:34	0.10	0.006	0.29	0.10
01Jan2000	02:35	0.10	0.006	0.29	0.10
01Jan2000	02:36	0.10	0.006	0.29	0.10
01Jan2000	02:37	0.12	0.006	0.29	0.10
01Jan2000	02:38	0.13	0.006	0.30	0.10
01Jan2000	02:39	0.15	0.006	0.30	0.10
01Jan2000	02:40	0.17	0.006	0.30	0.10
01Jan2000	02:41	0.18	0.007	0.31	0.10
01Jan2000	02:42	0.20	0.007	0.31	0.10
01Jan2000	02:43	0.20	0.007	0.32	0.11
01Jan2000	02:44	0.20	0.007	0.32	0.11
01Jan2000	02:45	0.20	0.007	0.33	0.11
01Jan2000	02:46	0.20	0.007	0.34	0.11
01Jan2000	02:47	0.20	0.007	0.34	0.11
01Jan2000	02:48	0.20	0.007	0.35	0.12
01Jan2000	02:49	0.20	0.008	0.35	0.12
01Jan2000	02:50	0.20	0.008	0.36	0.12
01Jan2000	02:51	0.20	0.008	0.37	0.12
01Jan2000	02:52	0.20	0.008	0.37	0.12
01Jan2000	02:53	0.20	0.008	0.38	0.12
01Jan2000	02:54	0.20	0.008	0.38	0.12
01Jan2000	02:55	0.20	0.008	0.39	0.12
01Jan2000	02:56	0.20	0.008	0.39	0.13
01Jan2000	02:57	0.20	0.008	0.40	0.13
01Jan2000	02:58	0.20	0.009	0.40	0.13
01Jan2000	02:59	0.20	0.009	0.41	0.13
01Jan2000	03:00	0.20	0.009	0.41	0.13

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:01	0.20	0.009	0.42	0.13
01Jan2000	03:02	0.20	0.009	0.42	0.13
01Jan2000	03:03	0.20	0.009	0.43	0.13
01Jan2000	03:04	0.20	0.009	0.43	0.13
01Jan2000	03:05	0.20	0.009	0.44	0.14
01Jan2000	03:06	0.20	0.009	0.44	0.14
01Jan2000	03:07	0.20	0.009	0.44	0.14
01Jan2000	03:08	0.20	0.009	0.45	0.14
01Jan2000	03:09	0.20	0.010	0.45	0.14
01Jan2000	03:10	0.20	0.010	0.46	0.14
01Jan2000	03:11	0.20	0.010	0.46	0.14
01Jan2000	03:12	0.20	0.010	0.46	0.14
01Jan2000	03:13	0.20	0.010	0.47	0.14
01Jan2000	03:14	0.20	0.010	0.47	0.14
01Jan2000	03:15	0.20	0.010	0.47	0.14
01Jan2000	03:16	0.20	0.010	0.48	0.14
01Jan2000	03:17	0.20	0.010	0.48	0.15
01Jan2000	03:18	0.20	0.010	0.48	0.15
01Jan2000	03:19	0.20	0.010	0.49	0.15
01Jan2000	03:20	0.20	0.010	0.49	0.15
01Jan2000	03:21	0.20	0.010	0.49	0.15
01Jan2000	03:22	0.20	0.011	0.50	0.15
01Jan2000	03:23	0.20	0.011	0.50	0.15
01Jan2000	03:24	0.20	0.011	0.50	0.15
01Jan2000	03:25	0.22	0.011	0.51	0.15
01Jan2000	03:26	0.23	0.011	0.51	0.15
01Jan2000	03:27	0.25	0.011	0.52	0.15
01Jan2000	03:28	0.27	0.011	0.52	0.15
01Jan2000	03:29	0.28	0.011	0.53	0.16
01Jan2000	03:30	0.30	0.011	0.54	0.16
01Jan2000	03:31	0.30	0.012	0.55	0.16

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:32	0.30	0.012	0.55	0.16
01Jan2000	03:33	0.30	0.012	0.56	0.16
01Jan2000	03:34	0.30	0.012	0.57	0.16
01Jan2000	03:35	0.30	0.012	0.58	0.17
01Jan2000	03:36	0.30	0.013	0.59	0.17
01Jan2000	03:37	0.32	0.013	0.60	0.17
01Jan2000	03:38	0.33	0.013	0.61	0.17
01Jan2000	03:39	0.35	0.013	0.62	0.17
01Jan2000	03:40	0.37	0.013	0.63	0.17
01Jan2000	03:41	0.38	0.014	0.65	0.18
01Jan2000	03:42	0.40	0.014	0.66	0.18
01Jan2000	03:43	0.40	0.014	0.68	0.18
01Jan2000	03:44	0.40	0.015	0.69	0.18
01Jan2000	03:45	0.40	0.015	0.71	0.19
01Jan2000	03:46	0.40	0.015	0.72	0.19
01Jan2000	03:47	0.40	0.016	0.73	0.19
01Jan2000	03:48	0.40	0.016	0.75	0.19
01Jan2000	03:49	0.43	0.016	0.76	0.19
01Jan2000	03:50	0.47	0.016	0.78	0.20
01Jan2000	03:51	0.50	0.017	0.79	0.20
01Jan2000	03:52	0.53	0.017	0.81	0.20
01Jan2000	03:53	0.57	0.018	0.83	0.21
01Jan2000	03:54	0.60	0.018	0.86	0.21
01Jan2000	03:55	0.65	0.019	0.89	0.21
01Jan2000	03:56	0.70	0.020	0.92	0.22
01Jan2000	03:57	0.75	0.020	0.95	0.22
01Jan2000	03:58	0.80	0.021	0.99	0.23
01Jan2000	03:59	0.85	0.022	1.03	0.23
01Jan2000	04:00	0.90	0.023	1.07	0.24
01Jan2000	04:01	1.25	0.024	1.12	0.24
01Jan2000	04:02	1.61	0.025	1.20	0.25

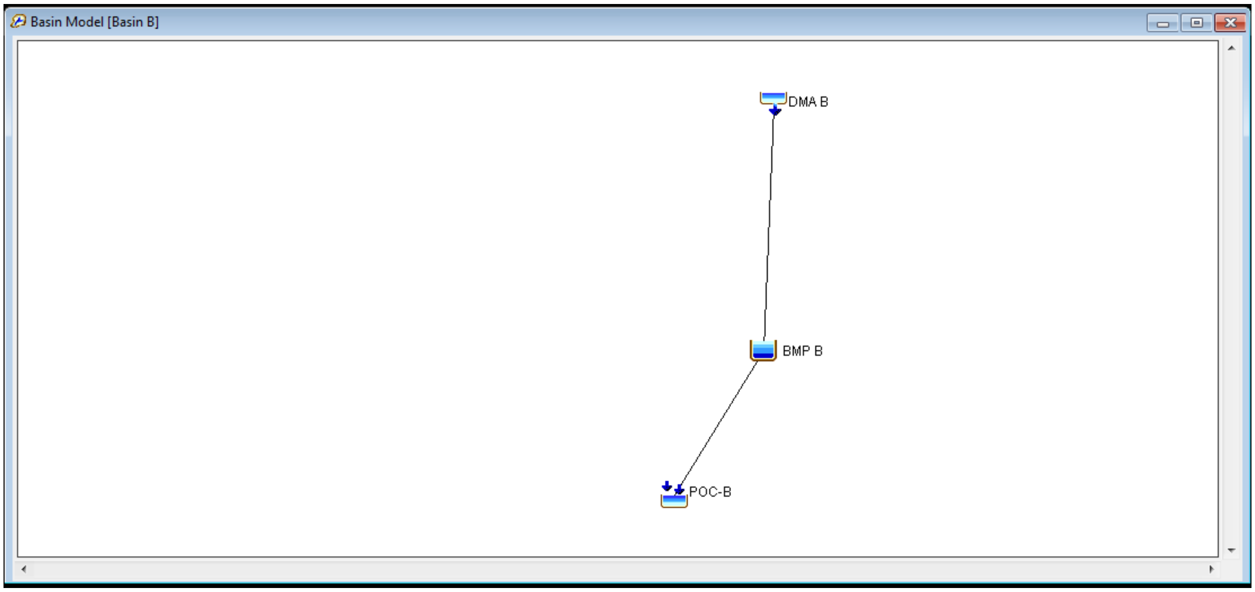
Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:03	1.96	0.028	1.30	0.26
01Jan2000	04:04	2.31	0.030	1.42	0.28
01Jan2000	04:05	2.67	0.033	1.56	0.29
01Jan2000	04:06	3.02	0.037	1.73	0.31
01Jan2000	04:07	2.60	0.040	1.89	0.32
01Jan2000	04:08	2.18	0.043	2.02	0.34
01Jan2000	04:09	1.76	0.045	2.13	0.35
01Jan2000	04:10	1.34	0.047	2.21	0.35
01Jan2000	04:11	0.92	0.048	2.25	0.36
01Jan2000	04:12	0.50	0.048	2.28	0.36
01Jan2000	04:13	0.47	0.049	2.29	0.36
01Jan2000	04:14	0.43	0.049	2.29	0.36
01Jan2000	04:15	0.40	0.049	2.29	0.36
01Jan2000	04:16	0.37	0.049	2.30	0.36
01Jan2000	04:17	0.33	0.049	2.30	0.36
01Jan2000	04:18	0.30	0.049	2.29	0.36
01Jan2000	04:19	0.30	0.049	2.29	0.36
01Jan2000	04:20	0.30	0.049	2.29	0.36
01Jan2000	04:21	0.30	0.048	2.28	0.36
01Jan2000	04:22	0.30	0.048	2.28	0.36
01Jan2000	04:23	0.30	0.048	2.27	0.36
01Jan2000	04:24	0.30	0.048	2.27	0.36
01Jan2000	04:25	0.28	0.048	2.27	0.36
01Jan2000	04:26	0.27	0.048	2.26	0.36
01Jan2000	04:27	0.25	0.048	2.25	0.36
01Jan2000	04:28	0.23	0.048	2.25	0.36
01Jan2000	04:29	0.22	0.048	2.24	0.36
01Jan2000	04:30	0.20	0.047	2.23	0.35
01Jan2000	04:31	0.20	0.047	2.22	0.35
01Jan2000	04:32	0.20	0.047	2.21	0.35
01Jan2000	04:33	0.20	0.047	2.20	0.35

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:34	0.20	0.047	2.19	0.35
01Jan2000	04:35	0.20	0.046	2.18	0.35
01Jan2000	04:36	0.20	0.046	2.17	0.35
01Jan2000	04:37	0.20	0.046	2.16	0.35
01Jan2000	04:38	0.20	0.046	2.15	0.35
01Jan2000	04:39	0.20	0.045	2.14	0.35
01Jan2000	04:40	0.20	0.045	2.13	0.35
01Jan2000	04:41	0.20	0.045	2.12	0.35
01Jan2000	04:42	0.20	0.045	2.11	0.34
01Jan2000	04:43	0.18	0.045	2.10	0.34
01Jan2000	04:44	0.17	0.044	2.09	0.34
01Jan2000	04:45	0.15	0.044	2.08	0.34
01Jan2000	04:46	0.13	0.044	2.07	0.34
01Jan2000	04:47	0.12	0.044	2.05	0.34
01Jan2000	04:48	0.10	0.043	2.04	0.34
01Jan2000	04:49	0.10	0.043	2.02	0.34
01Jan2000	04:50	0.10	0.043	2.01	0.33
01Jan2000	04:51	0.10	0.042	1.99	0.33
01Jan2000	04:52	0.10	0.042	1.98	0.33
01Jan2000	04:53	0.10	0.042	1.96	0.33
01Jan2000	04:54	0.10	0.041	1.95	0.33
01Jan2000	04:55	0.10	0.041	1.94	0.33
01Jan2000	04:56	0.10	0.041	1.92	0.33
01Jan2000	04:57	0.10	0.040	1.91	0.33
01Jan2000	04:58	0.10	0.040	1.89	0.32
01Jan2000	04:59	0.10	0.040	1.88	0.32
01Jan2000	05:00	0.10	0.040	1.86	0.32
01Jan2000	05:01	0.10	0.039	1.84	0.32
01Jan2000	05:02	0.10	0.039	1.83	0.32
01Jan2000	05:03	0.10	0.039	1.82	0.32
01Jan2000	05:04	0.10	0.038	1.80	0.32

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:05	0.10	0.038	1.79	0.31
01Jan2000	05:06	0.10	0.038	1.77	0.31
01Jan2000	05:07	0.10	0.037	1.76	0.31
01Jan2000	05:08	0.10	0.037	1.75	0.31
01Jan2000	05:09	0.10	0.037	1.73	0.31
01Jan2000	05:10	0.10	0.037	1.72	0.31
01Jan2000	05:11	0.10	0.036	1.71	0.31
01Jan2000	05:12	0.10	0.036	1.70	0.31
01Jan2000	05:13	0.10	0.036	1.68	0.30
01Jan2000	05:14	0.10	0.035	1.67	0.30
01Jan2000	05:15	0.10	0.035	1.66	0.30
01Jan2000	05:16	0.10	0.035	1.64	0.30
01Jan2000	05:17	0.10	0.035	1.63	0.30
01Jan2000	05:18	0.10	0.034	1.62	0.30
01Jan2000	05:19	0.10	0.034	1.60	0.30
01Jan2000	05:20	0.10	0.034	1.59	0.30
01Jan2000	05:21	0.10	0.033	1.57	0.29
01Jan2000	05:22	0.10	0.033	1.56	0.29
01Jan2000	05:23	0.10	0.033	1.55	0.29
01Jan2000	05:24	0.10	0.033	1.54	0.29
01Jan2000	05:25	0.10	0.032	1.53	0.29
01Jan2000	05:26	0.10	0.032	1.51	0.29
01Jan2000	05:27	0.10	0.032	1.50	0.29
01Jan2000	05:28	0.10	0.032	1.49	0.28
01Jan2000	05:29	0.10	0.031	1.48	0.28
01Jan2000	05:30	0.10	0.031	1.47	0.28
01Jan2000	05:31	0.10	0.031	1.46	0.28
01Jan2000	05:32	0.10	0.031	1.44	0.28
01Jan2000	05:33	0.10	0.030	1.43	0.28
01Jan2000	05:34	0.10	0.030	1.42	0.28
01Jan2000	05:35	0.10	0.030	1.41	0.28

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:36	0.10	0.030	1.40	0.28
01Jan2000	05:37	0.10	0.029	1.39	0.27
01Jan2000	05:38	0.10	0.029	1.37	0.27
01Jan2000	05:39	0.10	0.029	1.36	0.27
01Jan2000	05:40	0.10	0.029	1.35	0.27
01Jan2000	05:41	0.10	0.028	1.34	0.27
01Jan2000	05:42	0.10	0.028	1.33	0.27
01Jan2000	05:43	0.10	0.028	1.32	0.27
01Jan2000	05:44	0.10	0.028	1.31	0.27
01Jan2000	05:45	0.10	0.028	1.30	0.26
01Jan2000	05:46	0.10	0.027	1.29	0.26
01Jan2000	05:47	0.10	0.027	1.28	0.26
01Jan2000	05:48	0.10	0.027	1.27	0.26
01Jan2000	05:49	0.10	0.027	1.26	0.26
01Jan2000	05:50	0.10	0.026	1.25	0.26
01Jan2000	05:51	0.10	0.026	1.24	0.26
01Jan2000	05:52	0.10	0.026	1.23	0.26
01Jan2000	05:53	0.10	0.026	1.22	0.25
01Jan2000	05:54	0.10	0.026	1.21	0.25
01Jan2000	05:55	0.10	0.025	1.20	0.25
01Jan2000	05:56	0.10	0.025	1.19	0.25
01Jan2000	05:57	0.10	0.025	1.18	0.25
01Jan2000	05:58	0.10	0.025	1.17	0.25
01Jan2000	05:59	0.10	0.025	1.16	0.25
01Jan2000	06:00	0.10	0.024	1.15	0.25
01Jan2000	06:01	0.08	0.024	1.14	0.25
01Jan2000	06:02	0.07	0.024	1.13	0.24
01Jan2000	06:03	0.05	0.024	1.11	0.24
01Jan2000	06:04	0.03	0.023	1.10	0.24
01Jan2000	06:05	0.02	0.023	1.08	0.24
01Jan2000	06:06	0.00	0.023	1.07	0.24

HEC-HMS POST DEVELOPMENT: DMA-B



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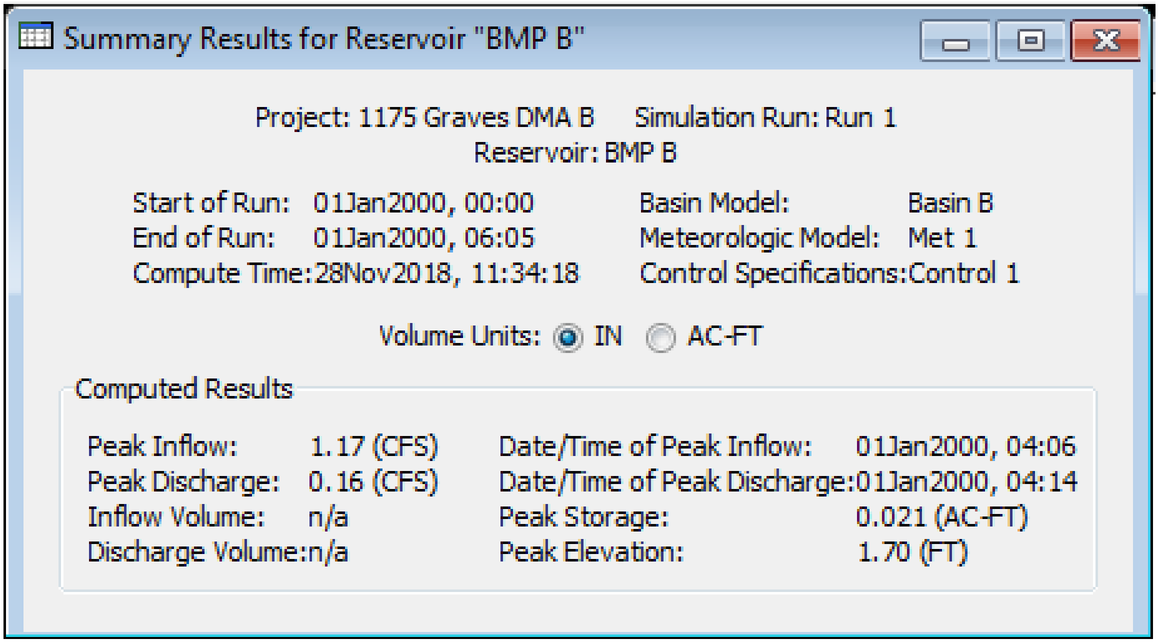

Summary Results for Reservoir "BMP B"

Project: 1175 Graves DMA B Simulation Run: Run 1
Reservoir: BMP B

Start of Run:	01Jan2000, 00:00	Basin Model:	Basin B
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	28Nov2018, 11:34:18	Control Specifications:	Control 1

Volume Units: IN AC-FT

Computed Results

Peak Inflow:	1.17 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:06
Peak Discharge:	0.16 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:14
Inflow Volume:	n/a	Peak Storage:	0.021 (AC-FT)
Discharge Volume:	n/a	Peak Elevation:	1.70 (FT)

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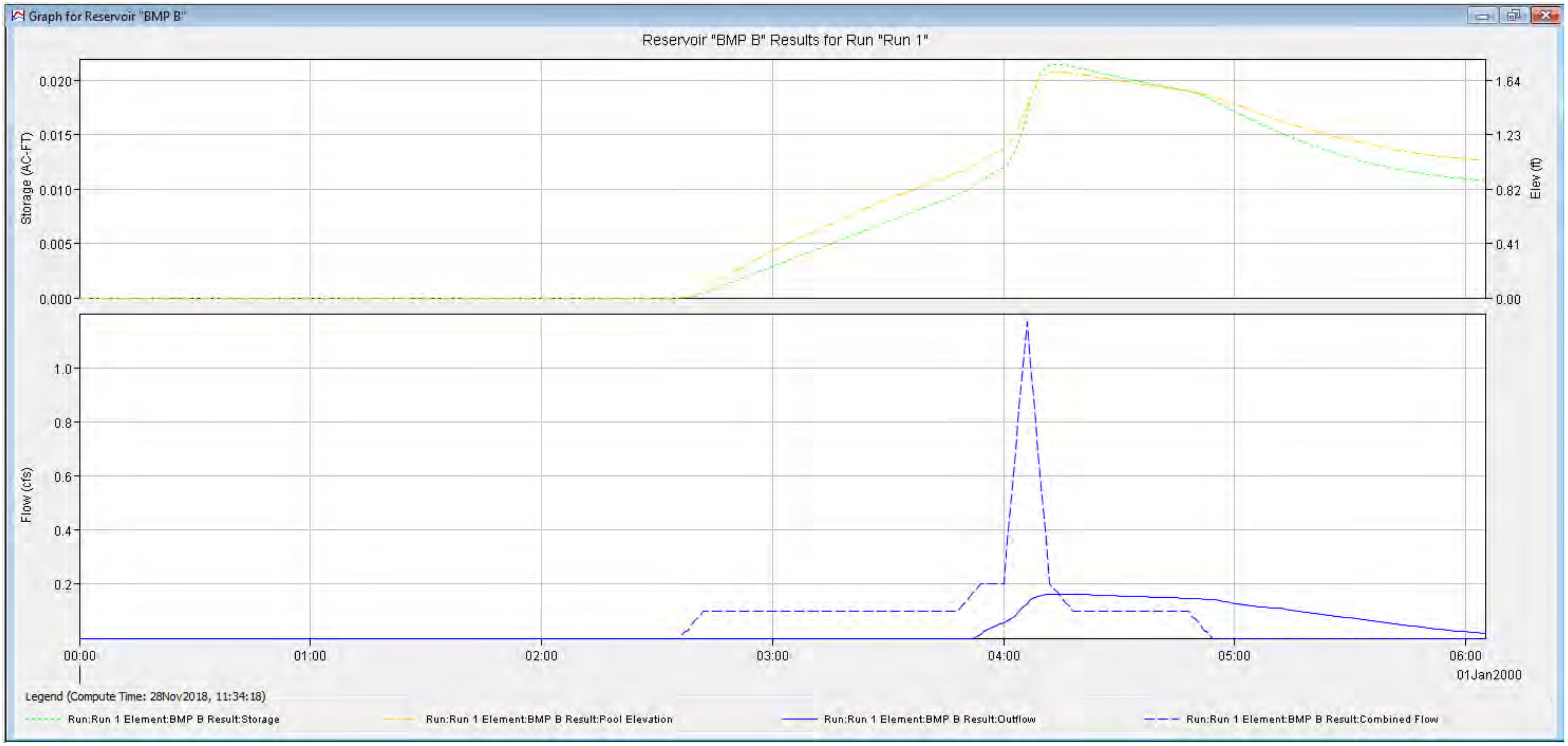
Graves Commercial Center
Drainage Study



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Project: 1175 Graves DMA B Simulation Run: Run 1
Reservoir: BMP B

Start of Run: 01Jan2000, 00:00 Basin Model: Basin B
End of Run: 01Jan2000, 06:05 Meteorologic Model: Met 1
Compute Time: 28Nov2018, 11:34:18 Control Specifications: Control 1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:00	0.00	0.000	0.00	0.00
01Jan2000	00:01	0.00	0.000	0.00	0.00
01Jan2000	00:02	0.00	0.000	0.00	0.00
01Jan2000	00:03	0.00	0.000	0.00	0.00
01Jan2000	00:04	0.00	0.000	0.00	0.00
01Jan2000	00:05	0.00	0.000	0.00	0.00
01Jan2000	00:06	0.00	0.000	0.00	0.00
01Jan2000	00:07	0.00	0.000	0.00	0.00
01Jan2000	00:08	0.00	0.000	0.00	0.00
01Jan2000	00:09	0.00	0.000	0.00	0.00
01Jan2000	00:10	0.00	0.000	0.00	0.00
01Jan2000	00:11	0.00	0.000	0.00	0.00
01Jan2000	00:12	0.00	0.000	0.00	0.00
01Jan2000	00:13	0.00	0.000	0.00	0.00
01Jan2000	00:14	0.00	0.000	0.00	0.00
01Jan2000	00:15	0.00	0.000	0.00	0.00
01Jan2000	00:16	0.00	0.000	0.00	0.00
01Jan2000	00:17	0.00	0.000	0.00	0.00
01Jan2000	00:18	0.00	0.000	0.00	0.00
01Jan2000	00:19	0.00	0.000	0.00	0.00
01Jan2000	00:20	0.00	0.000	0.00	0.00
01Jan2000	00:21	0.00	0.000	0.00	0.00
01Jan2000	00:22	0.00	0.000	0.00	0.00
01Jan2000	00:23	0.00	0.000	0.00	0.00
01Jan2000	00:24	0.00	0.000	0.00	0.00
01Jan2000	00:25	0.00	0.000	0.00	0.00

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:26	0.00	0.000	0.00	0.00
01Jan2000	00:27	0.00	0.000	0.00	0.00
01Jan2000	00:28	0.00	0.000	0.00	0.00
01Jan2000	00:29	0.00	0.000	0.00	0.00
01Jan2000	00:30	0.00	0.000	0.00	0.00
01Jan2000	00:31	0.00	0.000	0.00	0.00
01Jan2000	00:32	0.00	0.000	0.00	0.00
01Jan2000	00:33	0.00	0.000	0.00	0.00
01Jan2000	00:34	0.00	0.000	0.00	0.00
01Jan2000	00:35	0.00	0.000	0.00	0.00
01Jan2000	00:36	0.00	0.000	0.00	0.00
01Jan2000	00:37	0.00	0.000	0.00	0.00
01Jan2000	00:38	0.00	0.000	0.00	0.00
01Jan2000	00:39	0.00	0.000	0.00	0.00
01Jan2000	00:40	0.00	0.000	0.00	0.00
01Jan2000	00:41	0.00	0.000	0.00	0.00
01Jan2000	00:42	0.00	0.000	0.00	0.00
01Jan2000	00:43	0.00	0.000	0.00	0.00
01Jan2000	00:44	0.00	0.000	0.00	0.00
01Jan2000	00:45	0.00	0.000	0.00	0.00
01Jan2000	00:46	0.00	0.000	0.00	0.00
01Jan2000	00:47	0.00	0.000	0.00	0.00
01Jan2000	00:48	0.00	0.000	0.00	0.00
01Jan2000	00:49	0.00	0.000	0.00	0.00
01Jan2000	00:50	0.00	0.000	0.00	0.00
01Jan2000	00:51	0.00	0.000	0.00	0.00
01Jan2000	00:52	0.00	0.000	0.00	0.00
01Jan2000	00:53	0.00	0.000	0.00	0.00
01Jan2000	00:54	0.00	0.000	0.00	0.00
01Jan2000	00:55	0.00	0.000	0.00	0.00
01Jan2000	00:56	0.00	0.000	0.00	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:57	0.00	0.000	0.00	0.00
01Jan2000	00:58	0.00	0.000	0.00	0.00
01Jan2000	00:59	0.00	0.000	0.00	0.00
01Jan2000	01:00	0.00	0.000	0.00	0.00
01Jan2000	01:01	0.00	0.000	0.00	0.00
01Jan2000	01:02	0.00	0.000	0.00	0.00
01Jan2000	01:03	0.00	0.000	0.00	0.00
01Jan2000	01:04	0.00	0.000	0.00	0.00
01Jan2000	01:05	0.00	0.000	0.00	0.00
01Jan2000	01:06	0.00	0.000	0.00	0.00
01Jan2000	01:07	0.00	0.000	0.00	0.00
01Jan2000	01:08	0.00	0.000	0.00	0.00
01Jan2000	01:09	0.00	0.000	0.00	0.00
01Jan2000	01:10	0.00	0.000	0.00	0.00
01Jan2000	01:11	0.00	0.000	0.00	0.00
01Jan2000	01:12	0.00	0.000	0.00	0.00
01Jan2000	01:13	0.00	0.000	0.00	0.00
01Jan2000	01:14	0.00	0.000	0.00	0.00
01Jan2000	01:15	0.00	0.000	0.00	0.00
01Jan2000	01:16	0.00	0.000	0.00	0.00
01Jan2000	01:17	0.00	0.000	0.00	0.00
01Jan2000	01:18	0.00	0.000	0.00	0.00
01Jan2000	01:19	0.00	0.000	0.00	0.00
01Jan2000	01:20	0.00	0.000	0.00	0.00
01Jan2000	01:21	0.00	0.000	0.00	0.00
01Jan2000	01:22	0.00	0.000	0.00	0.00
01Jan2000	01:23	0.00	0.000	0.00	0.00
01Jan2000	01:24	0.00	0.000	0.00	0.00
01Jan2000	01:25	0.00	0.000	0.00	0.00
01Jan2000	01:26	0.00	0.000	0.00	0.00
01Jan2000	01:27	0.00	0.000	0.00	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:28	0.00	0.000	0.00	0.00
01Jan2000	01:29	0.00	0.000	0.00	0.00
01Jan2000	01:30	0.00	0.000	0.00	0.00
01Jan2000	01:31	0.00	0.000	0.00	0.00
01Jan2000	01:32	0.00	0.000	0.00	0.00
01Jan2000	01:33	0.00	0.000	0.00	0.00
01Jan2000	01:34	0.00	0.000	0.00	0.00
01Jan2000	01:35	0.00	0.000	0.00	0.00
01Jan2000	01:36	0.00	0.000	0.00	0.00
01Jan2000	01:37	0.00	0.000	0.00	0.00
01Jan2000	01:38	0.00	0.000	0.00	0.00
01Jan2000	01:39	0.00	0.000	0.00	0.00
01Jan2000	01:40	0.00	0.000	0.00	0.00
01Jan2000	01:41	0.00	0.000	0.00	0.00
01Jan2000	01:42	0.00	0.000	0.00	0.00
01Jan2000	01:43	0.00	0.000	0.00	0.00
01Jan2000	01:44	0.00	0.000	0.00	0.00
01Jan2000	01:45	0.00	0.000	0.00	0.00
01Jan2000	01:46	0.00	0.000	0.00	0.00
01Jan2000	01:47	0.00	0.000	0.00	0.00
01Jan2000	01:48	0.00	0.000	0.00	0.00
01Jan2000	01:49	0.00	0.000	0.00	0.00
01Jan2000	01:50	0.00	0.000	0.00	0.00
01Jan2000	01:51	0.00	0.000	0.00	0.00
01Jan2000	01:52	0.00	0.000	0.00	0.00
01Jan2000	01:53	0.00	0.000	0.00	0.00
01Jan2000	01:54	0.00	0.000	0.00	0.00
01Jan2000	01:55	0.00	0.000	0.00	0.00
01Jan2000	01:56	0.00	0.000	0.00	0.00
01Jan2000	01:57	0.00	0.000	0.00	0.00
01Jan2000	01:58	0.00	0.000	0.00	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:59	0.00	0.000	0.00	0.00
01Jan2000	02:00	0.00	0.000	0.00	0.00
01Jan2000	02:01	0.00	0.000	0.00	0.00
01Jan2000	02:02	0.00	0.000	0.00	0.00
01Jan2000	02:03	0.00	0.000	0.00	0.00
01Jan2000	02:04	0.00	0.000	0.00	0.00
01Jan2000	02:05	0.00	0.000	0.00	0.00
01Jan2000	02:06	0.00	0.000	0.00	0.00
01Jan2000	02:07	0.00	0.000	0.00	0.00
01Jan2000	02:08	0.00	0.000	0.00	0.00
01Jan2000	02:09	0.00	0.000	0.00	0.00
01Jan2000	02:10	0.00	0.000	0.00	0.00
01Jan2000	02:11	0.00	0.000	0.00	0.00
01Jan2000	02:12	0.00	0.000	0.00	0.00
01Jan2000	02:13	0.00	0.000	0.00	0.00
01Jan2000	02:14	0.00	0.000	0.00	0.00
01Jan2000	02:15	0.00	0.000	0.00	0.00
01Jan2000	02:16	0.00	0.000	0.00	0.00
01Jan2000	02:17	0.00	0.000	0.00	0.00
01Jan2000	02:18	0.00	0.000	0.00	0.00
01Jan2000	02:19	0.00	0.000	0.00	0.00
01Jan2000	02:20	0.00	0.000	0.00	0.00
01Jan2000	02:21	0.00	0.000	0.00	0.00
01Jan2000	02:22	0.00	0.000	0.00	0.00
01Jan2000	02:23	0.00	0.000	0.00	0.00
01Jan2000	02:24	0.00	0.000	0.00	0.00
01Jan2000	02:25	0.00	0.000	0.00	0.00
01Jan2000	02:26	0.00	0.000	0.00	0.00
01Jan2000	02:27	0.00	0.000	0.00	0.00
01Jan2000	02:28	0.00	0.000	0.00	0.00
01Jan2000	02:29	0.00	0.000	0.00	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	02:30	0.00	0.000	0.00	0.00
01Jan2000	02:31	0.00	0.000	0.00	0.00
01Jan2000	02:32	0.00	0.000	0.00	0.00
01Jan2000	02:33	0.00	0.000	0.00	0.00
01Jan2000	02:34	0.00	0.000	0.00	0.00
01Jan2000	02:35	0.00	0.000	0.00	0.00
01Jan2000	02:36	0.00	0.000	0.00	0.00
01Jan2000	02:37	0.02	0.000	0.00	0.00
01Jan2000	02:38	0.03	0.000	0.01	0.00
01Jan2000	02:39	0.05	0.000	0.01	0.00
01Jan2000	02:40	0.07	0.000	0.02	0.00
01Jan2000	02:41	0.08	0.000	0.04	0.00
01Jan2000	02:42	0.10	0.000	0.06	0.00
01Jan2000	02:43	0.10	0.001	0.07	0.00
01Jan2000	02:44	0.10	0.001	0.09	0.00
01Jan2000	02:45	0.10	0.001	0.11	0.00
01Jan2000	02:46	0.10	0.001	0.13	0.00
01Jan2000	02:47	0.10	0.001	0.14	0.00
01Jan2000	02:48	0.10	0.001	0.16	0.00
01Jan2000	02:49	0.10	0.001	0.18	0.00
01Jan2000	02:50	0.10	0.002	0.19	0.00
01Jan2000	02:51	0.10	0.002	0.21	0.00
01Jan2000	02:52	0.10	0.002	0.23	0.00
01Jan2000	02:53	0.10	0.002	0.24	0.00
01Jan2000	02:54	0.10	0.002	0.26	0.00
01Jan2000	02:55	0.10	0.002	0.27	0.00
01Jan2000	02:56	0.10	0.002	0.29	0.00
01Jan2000	02:57	0.10	0.002	0.30	0.00
01Jan2000	02:58	0.10	0.003	0.32	0.00
01Jan2000	02:59	0.10	0.003	0.34	0.00
01Jan2000	03:00	0.10	0.003	0.35	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:01	0.10	0.003	0.37	0.00
01Jan2000	03:02	0.10	0.003	0.38	0.00
01Jan2000	03:03	0.10	0.003	0.40	0.00
01Jan2000	03:04	0.10	0.003	0.41	0.00
01Jan2000	03:05	0.10	0.004	0.43	0.00
01Jan2000	03:06	0.10	0.004	0.44	0.00
01Jan2000	03:07	0.10	0.004	0.45	0.00
01Jan2000	03:08	0.10	0.004	0.46	0.00
01Jan2000	03:09	0.10	0.004	0.48	0.00
01Jan2000	03:10	0.10	0.004	0.49	0.00
01Jan2000	03:11	0.10	0.004	0.50	0.00
01Jan2000	03:12	0.10	0.005	0.51	0.00
01Jan2000	03:13	0.10	0.005	0.53	0.00
01Jan2000	03:14	0.10	0.005	0.54	0.00
01Jan2000	03:15	0.10	0.005	0.56	0.00
01Jan2000	03:16	0.10	0.005	0.57	0.00
01Jan2000	03:17	0.10	0.005	0.58	0.00
01Jan2000	03:18	0.10	0.005	0.60	0.00
01Jan2000	03:19	0.10	0.006	0.61	0.00
01Jan2000	03:20	0.10	0.006	0.62	0.00
01Jan2000	03:21	0.10	0.006	0.63	0.00
01Jan2000	03:22	0.10	0.006	0.65	0.00
01Jan2000	03:23	0.10	0.006	0.66	0.00
01Jan2000	03:24	0.10	0.006	0.67	0.00
01Jan2000	03:25	0.10	0.006	0.68	0.00
01Jan2000	03:26	0.10	0.006	0.69	0.00
01Jan2000	03:27	0.10	0.007	0.71	0.00
01Jan2000	03:28	0.10	0.007	0.72	0.00
01Jan2000	03:29	0.10	0.007	0.73	0.00
01Jan2000	03:30	0.10	0.007	0.74	0.00
01Jan2000	03:31	0.10	0.007	0.76	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:32	0.10	0.007	0.77	0.00
01Jan2000	03:33	0.10	0.007	0.78	0.00
01Jan2000	03:34	0.10	0.008	0.79	0.00
01Jan2000	03:35	0.10	0.008	0.80	0.00
01Jan2000	03:36	0.10	0.008	0.81	0.00
01Jan2000	03:37	0.10	0.008	0.82	0.00
01Jan2000	03:38	0.10	0.008	0.83	0.00
01Jan2000	03:39	0.10	0.008	0.84	0.00
01Jan2000	03:40	0.10	0.008	0.85	0.00
01Jan2000	03:41	0.10	0.009	0.87	0.00
01Jan2000	03:42	0.10	0.009	0.88	0.00
01Jan2000	03:43	0.10	0.009	0.89	0.00
01Jan2000	03:44	0.10	0.009	0.90	0.00
01Jan2000	03:45	0.10	0.009	0.91	0.00
01Jan2000	03:46	0.10	0.009	0.92	0.00
01Jan2000	03:47	0.10	0.009	0.93	0.00
01Jan2000	03:48	0.10	0.010	0.94	0.00
01Jan2000	03:49	0.12	0.010	0.95	0.00
01Jan2000	03:50	0.13	0.010	0.97	0.00
01Jan2000	03:51	0.15	0.010	0.98	0.00
01Jan2000	03:52	0.17	0.010	1.00	0.00
01Jan2000	03:53	0.18	0.010	1.01	0.01
01Jan2000	03:54	0.20	0.011	1.03	0.02
01Jan2000	03:55	0.20	0.011	1.05	0.02
01Jan2000	03:56	0.20	0.011	1.07	0.03
01Jan2000	03:57	0.20	0.011	1.08	0.04
01Jan2000	03:58	0.20	0.012	1.10	0.05
01Jan2000	03:59	0.20	0.012	1.11	0.05
01Jan2000	04:00	0.20	0.012	1.13	0.06
01Jan2000	04:01	0.36	0.012	1.15	0.06
01Jan2000	04:02	0.52	0.013	1.19	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:03	0.69	0.014	1.23	0.09
01Jan2000	04:04	0.85	0.015	1.29	0.10
01Jan2000	04:05	1.01	0.016	1.36	0.11
01Jan2000	04:06	1.17	0.017	1.45	0.13
01Jan2000	04:07	1.01	0.018	1.52	0.14
01Jan2000	04:08	0.85	0.019	1.58	0.15
01Jan2000	04:09	0.69	0.020	1.63	0.16
01Jan2000	04:10	0.52	0.021	1.67	0.16
01Jan2000	04:11	0.36	0.021	1.69	0.16
01Jan2000	04:12	0.20	0.021	1.70	0.16
01Jan2000	04:13	0.18	0.021	1.70	0.16
01Jan2000	04:14	0.17	0.021	1.70	0.16
01Jan2000	04:15	0.15	0.021	1.70	0.16
01Jan2000	04:16	0.13	0.021	1.70	0.16
01Jan2000	04:17	0.12	0.021	1.69	0.16
01Jan2000	04:18	0.10	0.021	1.69	0.16
01Jan2000	04:19	0.10	0.021	1.69	0.16
01Jan2000	04:20	0.10	0.021	1.68	0.16
01Jan2000	04:21	0.10	0.021	1.68	0.16
01Jan2000	04:22	0.10	0.021	1.67	0.16
01Jan2000	04:23	0.10	0.021	1.67	0.16
01Jan2000	04:24	0.10	0.021	1.66	0.16
01Jan2000	04:25	0.10	0.021	1.66	0.16
01Jan2000	04:26	0.10	0.021	1.65	0.16
01Jan2000	04:27	0.10	0.021	1.65	0.16
01Jan2000	04:28	0.10	0.020	1.64	0.16
01Jan2000	04:29	0.10	0.020	1.64	0.16
01Jan2000	04:30	0.10	0.020	1.63	0.16
01Jan2000	04:31	0.10	0.020	1.63	0.16
01Jan2000	04:32	0.10	0.020	1.63	0.16
01Jan2000	04:33	0.10	0.020	1.62	0.15

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:34	0.10	0.020	1.62	0.15
01Jan2000	04:35	0.10	0.020	1.61	0.15
01Jan2000	04:36	0.10	0.020	1.61	0.15
01Jan2000	04:37	0.10	0.020	1.60	0.15
01Jan2000	04:38	0.10	0.020	1.60	0.15
01Jan2000	04:39	0.10	0.020	1.59	0.15
01Jan2000	04:40	0.10	0.020	1.59	0.15
01Jan2000	04:41	0.10	0.020	1.59	0.15
01Jan2000	04:42	0.10	0.019	1.58	0.15
01Jan2000	04:43	0.10	0.019	1.58	0.15
01Jan2000	04:44	0.10	0.019	1.57	0.15
01Jan2000	04:45	0.10	0.019	1.57	0.15
01Jan2000	04:46	0.10	0.019	1.57	0.15
01Jan2000	04:47	0.10	0.019	1.56	0.15
01Jan2000	04:48	0.10	0.019	1.56	0.15
01Jan2000	04:49	0.08	0.019	1.56	0.15
01Jan2000	04:50	0.07	0.019	1.55	0.15
01Jan2000	04:51	0.05	0.019	1.54	0.15
01Jan2000	04:52	0.03	0.019	1.54	0.14
01Jan2000	04:53	0.02	0.018	1.53	0.14
01Jan2000	04:54	0.00	0.018	1.52	0.14
01Jan2000	04:55	0.00	0.018	1.51	0.14
01Jan2000	04:56	0.00	0.018	1.50	0.14
01Jan2000	04:57	0.00	0.018	1.49	0.14
01Jan2000	04:58	0.00	0.017	1.48	0.13
01Jan2000	04:59	0.00	0.017	1.47	0.13
01Jan2000	05:00	0.00	0.017	1.46	0.13
01Jan2000	05:01	0.00	0.017	1.45	0.13
01Jan2000	05:02	0.00	0.017	1.44	0.12
01Jan2000	05:03	0.00	0.017	1.43	0.12
01Jan2000	05:04	0.00	0.016	1.42	0.12

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:05	0.00	0.016	1.40	0.12
01Jan2000	05:06	0.00	0.016	1.39	0.12
01Jan2000	05:07	0.00	0.016	1.38	0.12
01Jan2000	05:08	0.00	0.016	1.37	0.11
01Jan2000	05:09	0.00	0.016	1.36	0.11
01Jan2000	05:10	0.00	0.015	1.35	0.11
01Jan2000	05:11	0.00	0.015	1.34	0.11
01Jan2000	05:12	0.00	0.015	1.33	0.11
01Jan2000	05:13	0.00	0.015	1.32	0.11
01Jan2000	05:14	0.00	0.015	1.31	0.11
01Jan2000	05:15	0.00	0.015	1.30	0.10
01Jan2000	05:16	0.00	0.015	1.29	0.10
01Jan2000	05:17	0.00	0.014	1.28	0.10
01Jan2000	05:18	0.00	0.014	1.28	0.10
01Jan2000	05:19	0.00	0.014	1.27	0.09
01Jan2000	05:20	0.00	0.014	1.26	0.09
01Jan2000	05:21	0.00	0.014	1.25	0.09
01Jan2000	05:22	0.00	0.014	1.24	0.09
01Jan2000	05:23	0.00	0.014	1.24	0.09
01Jan2000	05:24	0.00	0.014	1.23	0.08
01Jan2000	05:25	0.00	0.013	1.22	0.08
01Jan2000	05:26	0.00	0.013	1.22	0.08
01Jan2000	05:27	0.00	0.013	1.21	0.08
01Jan2000	05:28	0.00	0.013	1.20	0.08
01Jan2000	05:29	0.00	0.013	1.20	0.08
01Jan2000	05:30	0.00	0.013	1.19	0.07
01Jan2000	05:31	0.00	0.013	1.18	0.07
01Jan2000	05:32	0.00	0.013	1.18	0.07
01Jan2000	05:33	0.00	0.013	1.17	0.07
01Jan2000	05:34	0.00	0.013	1.16	0.07
01Jan2000	05:35	0.00	0.012	1.16	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:36	0.00	0.012	1.15	0.06
01Jan2000	05:37	0.00	0.012	1.14	0.06
01Jan2000	05:38	0.00	0.012	1.14	0.06
01Jan2000	05:39	0.00	0.012	1.13	0.06
01Jan2000	05:40	0.00	0.012	1.13	0.06
01Jan2000	05:41	0.00	0.012	1.12	0.05
01Jan2000	05:42	0.00	0.012	1.11	0.05
01Jan2000	05:43	0.00	0.012	1.11	0.05
01Jan2000	05:44	0.00	0.012	1.10	0.05
01Jan2000	05:45	0.00	0.012	1.10	0.05
01Jan2000	05:46	0.00	0.012	1.09	0.04
01Jan2000	05:47	0.00	0.012	1.09	0.04
01Jan2000	05:48	0.00	0.011	1.09	0.04
01Jan2000	05:49	0.00	0.011	1.08	0.04
01Jan2000	05:50	0.00	0.011	1.08	0.04
01Jan2000	05:51	0.00	0.011	1.07	0.04
01Jan2000	05:52	0.00	0.011	1.07	0.04
01Jan2000	05:53	0.00	0.011	1.07	0.03
01Jan2000	05:54	0.00	0.011	1.06	0.03
01Jan2000	05:55	0.00	0.011	1.06	0.03
01Jan2000	05:56	0.00	0.011	1.06	0.03
01Jan2000	05:57	0.00	0.011	1.05	0.03
01Jan2000	05:58	0.00	0.011	1.05	0.03
01Jan2000	05:59	0.00	0.011	1.05	0.02
01Jan2000	06:00	0.00	0.011	1.05	0.02
01Jan2000	06:01	0.00	0.011	1.04	0.02
01Jan2000	06:02	0.00	0.011	1.04	0.02
01Jan2000	06:03	0.00	0.011	1.04	0.02
01Jan2000	06:04	0.00	0.011	1.04	0.02
01Jan2000	06:05	0.00	0.011	1.04	0.02

CHAPTER 7 – HYDROLOGY MAPS

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DMA SUMMARY TABLE

	DMA	SUB-DMA	AREA	Q_{100}	MITIGATION	POC
	A (TOTAL 1.10 AC)	A-1	0.10	0.10	BMP-A	POC-A
		A-2	0.84	0.71	BMP-A	
		OFF-A-1	0.03	0.16	N/A	
		OFF-A-2	0.13	0.69	N/A	
	B (TOTAL 0.49 AC)	B-1	0.09	0.09	BMP-B	POC-B
		B-2	0.40	0.35	BMP-B	
	C		0.004	0.02	N/A	POC-C
	D		0.01	0.05	N/A	POC-D
TOTAL			1.604			

REVISIONS

NO.	DESCRIPTION	DATE	APP'D

R·E·C Consultants, Inc.
Civil Engineering · Environmental Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

DATE: 11.27.18
SCALE: 1" = 20'
DRAWN: GMB
CHECKED: JRR

SHEET TITLE
EXISTING CONDITIONS

PROJECT
GRAVES COMMERCIAL
8606 GRAVES AVE.
SANTEE, CA 92071

SHEET 1 OF 1 SHEETS

SAVE DATE: 12/5/2018 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Reports\Drainage Study\Drainage - Existing Exhibit.dwg

DMA SUMMARY TABLE

	DMA	SUB–DMA	AREA	Q_{100}	MITIGATION	POC
	A (TOTAL 1.10 AC)	A–1	0.02	0.11	BMP–A	POC–A
		A–2	0.02	0.11	BMP–A	
		A–3	0.02	0.11	BMP–A	
		A–4	0.03	0.16	BMP–A	
		A–5	0.27	1.27	BMP–A	
		A–6	0.06	0.32	BMP–A	
		A–7	0.22	0.98	BMP–A	
		SM–A–1	0.06	0.06	N/A	
		SM–A–2	0.06	0.04	N/A	
		SM–A–3	0.07	0.07	N/A	
		SM–A–4	0.11	0.07	N/A	
		OFF–A–1	0.03	0.16	N/A	
		OFF–A–2	0.13	0.69	N/A	
	B (TOTAL 0.49 AC)	B–1	0.06	0.32	BMP–B	POC–B
		B–2	0.09	0.48	BMP–B	
		B–3	0.03	0.16	BMP–B	
		B–4	0.04	0.21	BMP–B	
		SM–B–1	0.06	0.07	N/A	
		SM–B–2	0.21	0.19	N/A	
	C		0.004	0.02	N/A	POC–C
	D		0.01	0.05	N/A	POC–D
TOTAL			1.604			

LEGEND

BASIN INFO — NODE TO NODE; AREA (AC); Q (CFS)

BASIN LIMITS

PROJECT BOUNDARY

FLOW PATH — L=100'

NODE INFO — NODE #, ELEVATION

R·E·C Consultants, Inc.
Civil Engineering · Environmental Land Surveying
2442 Second Avenue San Diego, CA 92101 (619)232-9200 (619)232-9210 Fax

REVISIONS: NO. | DESCRIPTION | DATE | APP'D

DATE: 11.28.18
SCALE: 1" = 20'
DRAWN: GMB
CHECKED: JRR

SHEET TITLE: PROPOSED CONDITIONS

PROJECT: GRAVES COMMERCIAL
8606 GRAVES AVE.
SANTEE, CA 92071

SHEET 1 OF 1 SHEETS

SAVE DATE: 1/29/2019 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Reports\Drainage Study\Drainage ~ Proposed Exhibits.dwg

CHAPTER 8 – GRADING PLAN

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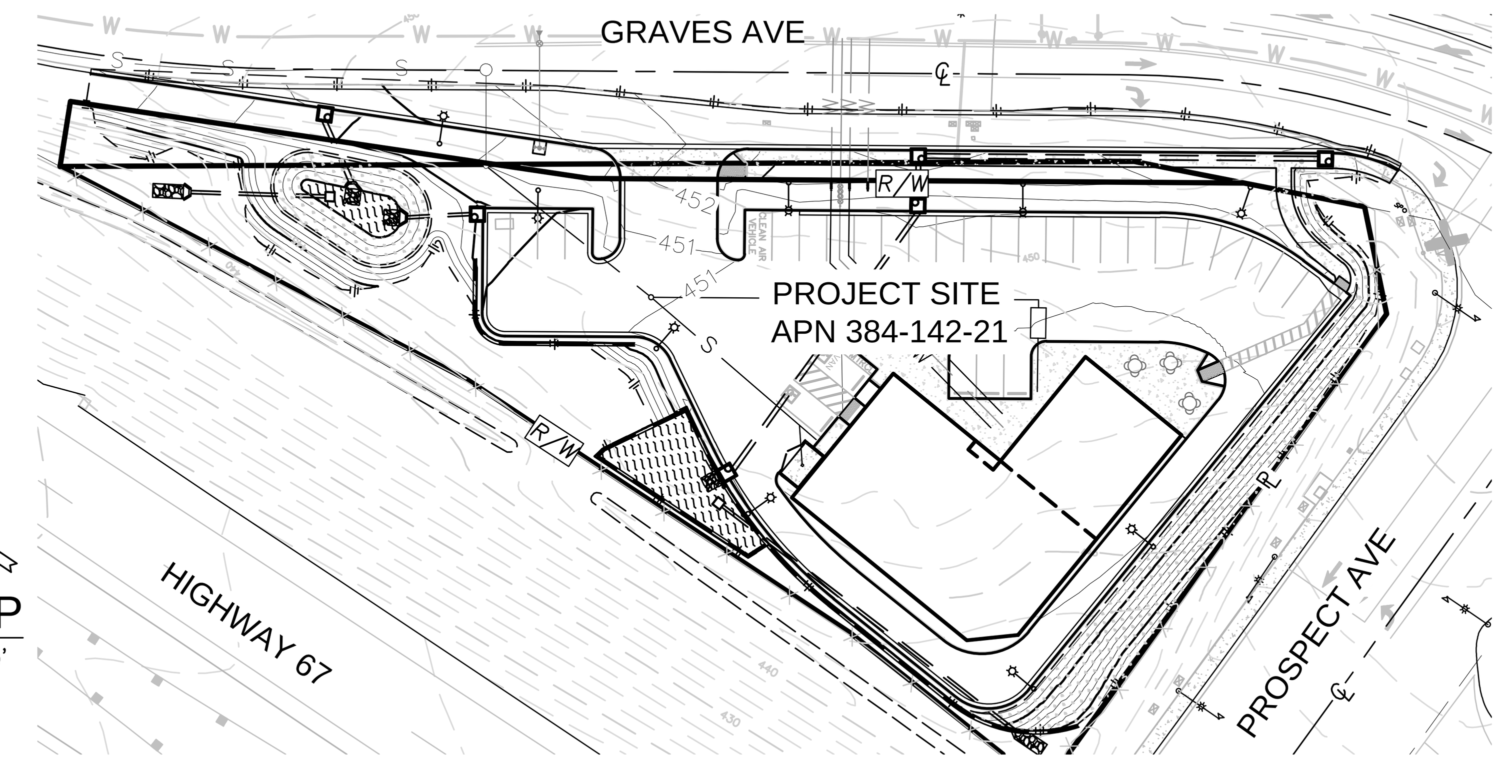
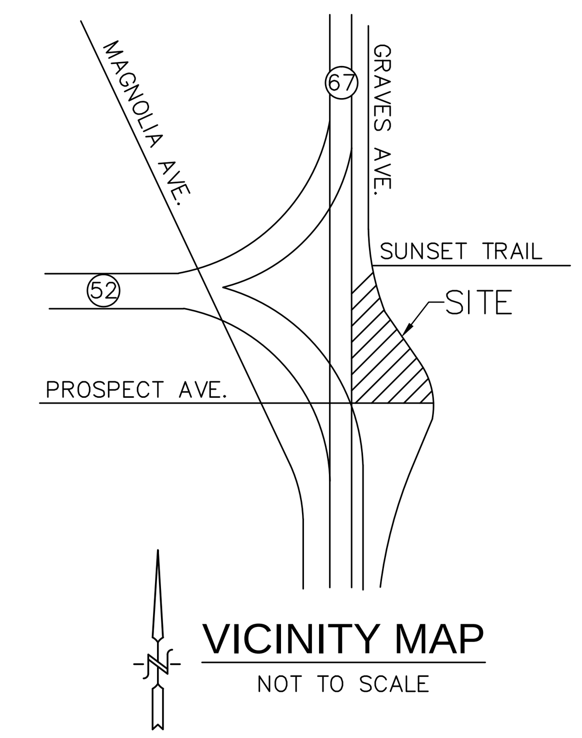
GRAVES COMMERCIAL

GRADING PLAN - CITY OF SANTEE
8606 GRAVES AVE, SANTEE, CA 92071



KEY MAP
SCALE: 1"=50'



VICINITY MAP
NOT TO SCALE

ENGINEER OF WORK'S DESIGN CERTIFICATION

I, JONATHAN R. RYDEEN, HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE ENGINEERING DESIGN OF THIS PROJECT AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I, UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS IN THE CITY OF SANTEE IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS THE ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

I FURTHER UNDERSTAND THAT UPON APPROVAL OF THESE PLANS BY THE CITY ENGINEER, THE PLANS BECOME THE PROPERTY OF THE CITY OF SANTEE IN ACCORDANCE WITH THE CITY PUBLIC WORKS STANDARDS. AS SUCH, I HEREBY RELENQUISH RIGHT OF OWNERSHIP TO THE CITY TO USE THESE PLANS AS THEY MAY DEEM NECESSARY.

SIGNED:________________________DATE:__________
REGISTRATION NO. 64811 EXPIRES ON: 6-30-19

FIRM: REC CONSULTANTS
ADDRESS: 2442 SECOND AVE
SAN DIEGO, CA 92101
TELEPHONE: 619-232-9200

REGISTERED PROFESSIONAL ENGINEER · JONATHAN RAAB RYDEEN · RCE ~ 64811 · EXP 6/30/19 · CIVIL · STATE OF CALIFORNIA

ENGINEER OF WORK'S AS-BUILT CERTIFICATION

I, JONATHAN R. RYDEEN, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, HEREBY DECLARE THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE PREPARATION OF THE ENGINEERING PORTION OF THE AS-BUILT DRAWINGS AND THAT THE INFORMATION SHOWN IS BASED ON AN INVESTIGATION AND SURVEY OF THE IMPROVEMENTS BETWEEN THE DATES OF __________ AND __________ .TO THE BEST OF MY KNOWLEDGE AND EXPERIENCE THE INFORMATION SHOWN ON THESE PLANS PROVIDE AN ACCURATE AND CORRECT REPRESENTATION OF THE AS-BUILT CONDITIONS.

SIGNED:________________________DATE:__________
REGISTRATION NO. 64811 EXPIRES ON: 6-30-19

FIRM: REC CONSULTANTS
ADDRESS: 2442 SECOND AVE
SAN DIEGO, CA 92101
TELEPHONE: 619-232-9200

SOIL ENGINEER'S DESIGN CERTIFICATION

I, CHARLES ROBIN STROOP, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, PRINCIPALLY DOING BUSINESS IN THE FIELD OF APPLIED SOIL MECHANICS, HEREBY CERTIFY THAT A SAMPLING AND STUDY OF THE SOIL CONDITIONS PREVALENT WITHIN THIS SITE WAS MADE BY ME OR UNDER MY DIRECTION BETWEEN THE DATES OF APRIL 1, 2015 AND MAY 30, 2015 THREE COMPLETE COPIES OF THE SOILS REPORT COMPLIED FROM WITH MY RECOMMENDATIONS, HAS BEEN SUBMITTED TO THE OFFICE OF THE DIRECTOR OF DEVELOPMENT SERVICES.

I HAVE REVIEWED THE PROJECT DESIGN AND THE GRADING SHOWN HEREON IS CONSISTENT WITH THE RECOMMENDATIONS CONTAINED IN THE APPROVED SOILS AND GEOTECHNICAL REPORTS FOR THE PROJECT.

I FURTHER UNDERSTAND THAT UPON APPROVAL OF THESE PLANS BY THE CITY ENGINEER, THE PLANS BECOME THE PROPERTY OF THE CITY OF SANTEE IN ACCORDANCE WITH THE CITY PUBLIC WORKS STANDARDS. AS SUCH, I HEREBY RELINQUISH RIGHT OF OWNERSHIP TO THE CITY TO USE THESE PLANS AS THEY MAY DEEM NECESSARY.

*SIGNED:*________________________ *DATE:*__________
REGISTRATION NO. 2298 EXPIRES ON 03-31-30

FIRM: GROUP DELTA
ADDRESS: 9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126
TELEPHONE: 858-536-1000

SOIL ENGINEER'S AS-BUILT CERTIFICATION

I, CHARLES ROBIN STROOP, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, HEREBY DECLARE THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE GEOTECHNICAL ASPECTS OF THE GRADING OF THIS PROJECT. TO THE BEST OF MY KNOWLEDGE AND EXPERIENCE THE GRADING CONFORMS WITH THE RECOMMENDATIONS CONTAINED IN THE SOILS REPORTS AND PLANS WITH THE EXCEPTION THAT ANY CHANGES OR DEVIATIONS FROM THE PLANS DUE TO UNFORESEEN FIELD CONDITIONS HAVE BEEN IDENTIFIED IN THE FINAL SOILS REPORT FOR THE PROJECT.

SIGNED:________________________DATE:__________
REGISTRATION NO. 2298 EXPIRES ON 03-31-30

FIRM: GROUP DELTA
ADDRESS: 9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126
TELEPHONE: 858-536-1000

RESIDENTIAL FLOOD STATEMENT

I, JONATHAN R. RYDEEN, A REGISTERED CIVIL ENGINEER/LAND SURVEYOR HEREBY CERTIFY THAT THE PAD ELEVATIONS SHOWN ON THIS AS-BUILT GRADING PLAN HAVE BEEN VERIFIED BY ME AND THAT SAID ELEVATIONS ARE AT OR ABOVE THE BASE FLOOD ELEVATION AS ESTABLISHED BY THE BASE FLOOD DISCHARGE RATES SET FORTH IN THE FLOOD DAMAGE PREVENTION ORDINANCE - CHAPTER 15.52 OF THE SANTEE MUNICIPAL CODE.

SIGNED:________________________DATE:__________
REGISTRATION NO. 64811 EXPIRES ON: 6-30-19

DIGALERT
DIAL TOLL FREE
1-800-422-4133
AT LEAST TWO DAYS
BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

OWNER'S ACCEPTANCE

I, MICHAEL GRANT, AS OWNER OF THE PROPERTY DESCRIBED HEREON ACKNOWLEDGE THESE PLANS HAVE BEEN PREPARED AT MY DIRECTION AND WITH MY FULL CONSENT. I UNDERSTAND ALL CONSTRUCTION MUST CONFORM TO CURRENT CITY STANDARDS AND BE COMPLETED IN ACCORDANCE WITH THESE PLANS. ANY CHANGES TO THE WORK MUST BE APPROVED IN ADVANCE, IN ACCORDANCE WITH THE CITY'S CONSTRUCTION CHANGE POLICY. I AGREE TO REMOVE AND RECONSTRUCT AT MY COST ANY WORK NOT COMPLETED IN STRICT ACCORDANCE WITH THESE PLANS OR ANY CONSTRUCTION CHANGES APPROVED INCIDENTAL THERETO. I HAVE REVIEWED THESE PLANS AND UNDERSTAND AND AGREE TO THE TERMS AND CONDITIONS CONTAINED HEREIN AND AS ATTACHED BY REFERENCE TO THIS GRADING PERMIT.I UNDERSTAND FAILURE TO ABIDE BY THESE TERMS IS GROUNDS FOR REVOCATION OF THE GRADING PERMIT. SHOULD THE PERMIT BE REVOKED CONTINUATION OF THE WORK WITHOUT A GRADING PERMIT CONSTITUTES ILLEGAL GRADING WHICH MAY RESULT IN FINE, IMPRISONMENT OR BOTH.

SIGNED:________________________ DATE:__________
MICHAEL GRANT, OWNER
DEVELOPMENT CONTRACTOR INC.

ADDRESS: 110 TOWN CENTER PARKWAY
SANTEE, CA 92071
TELEPHONE: 619-444-2054

LANDSCAPE ARCHITECT'S DESIGN CERTIFICATION

I, GARY F. HOYT, HEREBY DECLARE THAT I AM THE LANDSCAPE ARCHITECT OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN THE BUSINESS AND PROFESSIONALS CODE, OVER THE DESIGN OF THIS PROJECT AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS IN THE CITY OF SANTEE IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS THE LANDSCAPE ARCHITECT OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

I FURTHER UNDERSTAND THAT UPON APPROVAL OF THESE PLANS BY THE CITY ENGINEER, THE PLANS BECOME THE PROPERTY OF THE CITY OF SANTEE IN ACCORDANCE WITH THE CITY PUBLIC WORKS STANDARDS. AS SUCH, I HEREBY RELINQUISH RIGHT OF OWNERSHIP TO THE CITY TO USE THESE PLANS AS THEY MAY DEEM NECESSARY.

*SIGNED:*________________________ *DATE:*__________
REGISTRATION NO. 2517, MY REGISTRATION EXPIRES ON 12-31-18

FIRM: GARY F. HOYT LANDSCAPE ARCHITECTURE, INC.
ADDRESS: 13625 ADRIAN ST.
POWAY, CA 92064
TELEPHONE: 858-486-4931

LANDSCAPE ARCHITECT'S RECORD DRAWING CERTIFICATION

I, GARY F. HOYT, A REGISTERED LANDSCAPE ARCHITECT IN THE STATE OF CALIFORNIA, HEREBY DECLARE THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE PREPARATION OF THESE RECORD DRAWINGS AS THEY PERTAIN TO THE LANDSCAPE IMPROVEMENTS. THE INFORMATION SHOWN IS BASED ON ACTUAL SITE INVESTIGATION AND SURVEY OF THE IMPROVEMENTS BETWEEN THE DATES OF__________AND__________. TO THE BEST OF MY KNOWLEDGE AND EXPERIENCE THE INFORMATION SHOWN ON THESE PLANS PROVIDE AN ACCURATE AND CORRECT REPRESENTATION OF THE AS-BUILT CONDITIONS.

SIGNED:________________________DATE:__________
REGISTRATION NO. 2517, MY REGISTRATION EXPIRES ON 12-31-18

FIRM: GARY F. HOYT LANDSCAPE ARCHITECTURE, INC.
ADDRESS: 13625 ADRIAN ST.
POWAY, CA 92064
TELEPHONE: 858-486-4931

R·E·C Consultants, Inc.
Civil Engineering · Environmental Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

REGISTERED PROFESSIONAL ENGINEER · JONATHAN RAAB RYDEEN · RCE ~ 64811 · EXP 6/30/19 · CIVIL · STATE OF CALIFORNIA

ASSESSOR PARCEL NUMBER

384-142-21

LEGAL DESCRIPTION

A PORTION OF LOT 9 IN BLOCK 7 OF SUBDIVISION OF TRACTS "H" AND "O", RANCHO EL CAJON, IN THE CITY OF SANTEE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE MAP THEREOF NO. 817, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN DIEGO COUNTY, APRIL 2, 1896.

SITE ADDRESS

8606 GRAVES AVE.
SANTEE, CA 92071

GRADING QUANTITIES

CUT =	130 CY
FILL =	6,420 CY
IMPORT =	6,190 CY

WDID#

PENDING

PUBLIC UTILITIES

SAN DIEGO GAS & ELECTRIC	800-422-4133
SBC TELEPHONE	800-422-4133
COX COMMUNICATIONS (CATV)	619-263-5793
PADRE DAM MWD (WATER & SEWER)	619-448-3111

SHEET INDEX

CITY OF SANTEE

FIRE DEPARTMENT	
DEPUTY FIRE CHIEF	DATE
COMMUNITY SERVICES DEPARTMENT	
PUBLIC WORKS MANAGER	DATE
ENGINEERING DIVISION	
FOR CITY ENGINEER RCE NO: 62189 EXPIRES: 09/30/11	DATE
PLANNING DIVISION	
PROJECT PLANNER	DATE
TRAFFIC ENGINEERING DIVISION	
PRINCIPAL TRAFFIC ENGINEER	DATE
CAPITAL IMPROVEMENTS DIVISION	

SEWER & WATER AGENCY

PADRE DAM MUNICIPAL WATER DISTRICT

APPROVED BY: ____________ Director of Engineering and Planning ____ Date
____________ R.C.E. No. ____ Date
Project / File Name ____ Job No. ____ SA
VALID FOR ONE YEAR FROM DATE OF SIGNATURE.
SIGNATURE OF THESE PLANS IS NOT A COMMITMENT TO SERVE.

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH SERVICES
REVIEWED __________ PROJECT NO. __________
BY__________ __________ TITLE

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR					
INSPECTOR					
DATE COMPLETED					

BENCH MARK # 2143
STANDARD STREET SURVEY MONUMENT STAMPED RCE 21944 PER R.O.S. 10733. CENTERLINE INTERSECTION OF HART DRIVE AND GRAVES AVENUE.
MAP: R.O.S. 10733 ELEVATION: 412.23'
HORZ. DATUM: NAD 83 VERT. DATUM: MSLD

SCALE
HORIZ: AS NOTED
VERT: AS NOTED

DESIGNED BY	DRAWN BY	CHECKED BY
JMW	JMW	JRR

PLANS PREPARED UNDER THE SUPERVISION OF
JONATHAN RAAB RYDEEN DATE __________
RCE NO. 64811 EXPIRES 6/30/19

REVIEWED __________
BY__________ PROJECT ENGINEER

CITY OF SANTEE	DEPARTMENT OF DEVELOPMENT SERVICES	CITY W.O. NO.	DRAWING NO.
GRADING PLAN FOR:	GRAVES COMMERCIAL APN: 384-142-21		SHEET 1 OF 10

SAVE DATE: 1/28/2019 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Civil\Grading Plan\Rough Grading Plan\Grading Plan.dwg

GENERAL NOTES

1. SUBDIVISION MONUMENTATION SHALL BE PROTECTED AT ALL TIMES. PRIOR TO ISSUANCE OF GRADING PERMIT THE SUBDIVISION BOUNDARY SHALL BE STAKED AND FLAGGED, WITH LATHS AT LEAST THREE FEET IN HEIGHT, AT ALL SUBDIVISION CORNERS, ANGLE POINTS, AND POINTS OF CURVE. WHERE BOUNDARY LINES EXCEED THREE HUNDRED FEET IN LENGTH STAKES SHALL BE PLACED ON LINE AT NOT OVER THREE HUNDRED FOOT INTERVALS. WHERE PERMISSION FOR OFFSITE GRADING HAS BEEN GRANTED THE LIMITS OF OFF-SITE WORK SHALL BE STAKED AND FLAGGED ALSO. OFF-SITE WORK SHALL BE CLEARLY IDENTIFIED WITH DIFFERENT COLOR FLAGGING OR MARKINGS FROM THE SUBDIVISION BOUNDARY FLAGGING. THE CONTRACTOR SHALL AT ALL TIMES PROTECT THE SUBDIVISION BOUNDARY AND OFF-SITE MARKERS AND SHALL IMMEDIATELY REPLACE ANY MARKERS THAT ARE DISTURBED OR DESTROYED.
2. ACCEPTANCE OF THIS GRADING PLAN DOES NOT CONSTITUTE ACCEPTANCE OF VERTICAL OR HORIZONTAL ALIGNMENT OF ANY PRIVATE ROAD SHOWN HEREON FOR PUBLIC ROAD PURPOSES.
3. FINAL ACCEPTANCE OF THESE GRADING PLANS IS SUBJECT TO FINAL ACCEPTANCE OF THE ASSOCIATED IMPROVEMENT PLANS WHERE APPLICABLE. FINAL CURB GRADE ELEVATIONS MAY REQUIRE CHANGES IN THESE PLANS.
4. IMPORT MATERIAL SHALL BE OBTAINED FROM A LEGAL SITE.
5. WASTE MATERIAL GENERATED FROM GRADING OPERATIONS SHALL BE HAULED TO A LEGAL DUMP SITE AS APPROVED BY THE DIRECTOR OF DEVELOPMENT SERVICES.
6. AN ENCROACHMENT PERMIT IS REQUIRED PRIOR TO ANY WORK BEING PERFORMED WITHIN THE LIMITS OF THE PUBLIC RIGHT OF WAY.
7. ALL SLOPES OVER THREE FEET IN HEIGHT SHALL BE LANDSCAPED AND IRRIGATED IN ACCORDANCE WITH CITY SPECIFICATIONS.
8. THE CONTRACTOR SHALL VERIFY THE EXISTENCE AND LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK. NOTICE OF PROPOSED WORK SHALL BE GIVEN TO THE FOLLOWING AGENCIES:

SAN DIEGO GAS & ELECTRIC	1-800-422-4133
PACIFIC BELL TELEPHONE	1-800-422-4133
COX CABLE TV	263-5793
PADRE DAM MUNICIPAL WATER DISTRICT (WATER AND SEWER)	448-3111

9. REQUESTS FOR RELEASE OF GRADING AND EROSION CONTROL SECURITIES UPON COMPLETION OF THE WORK SHALL BE MADE IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN THE CITY OF SANTEE LAND DEVELOPMENT MANUAL
10. ACCEPTANCE OF THESE PLANS BY THE CITY ENGINEER DOES NOT AUTHORIZE ANY WORK OR GRADING TO BE PERFORMED UNTIL THE PROPERTY OWNER'S PERMISSION HAS BEEN OBTAINED AND A VALID GRADING PERMIT HAS BEEN ISSUED.
11. THE CITY ENGINEER'S ACCEPTANCE OF THESE PLANS DOES NOT CONSTITUTE THE BUILDING OFFICIALS' ACCEPTANCE OF ANY FOUNDATION FOR STRUCTURES TO BE PLACED IN THE AREA COVERED BY THESE PLANS. NO WAIVER OF THE GRADING ORDINANCE REQUIREMENTS CONCERNING MINIMUM COVER OVER EXPANSIVE SOILS IS MADE OR IMPLIED (SECTION 15.58.590, SANTEE MUNICIPAL CODE).
12. ALL OPERATIONS CONDUCTED ON THE PREMISES, INCLUDING THE WARMING UP, REPAIR, ARRIVAL, DEPARTURE OR RUNNING OF TRUCKS, EARTHMOVING EQUIPMENT, CONSTRUCTION EQUIPMENT AND ANY OTHER ASSOCIATED CONSTRUCTION ACTIVITY SHALL BE LIMITED TO THE PERIOD BETWEEN 7:00 A.M. AND 7:00 P.M. EACH DAY, MONDAY THROUGH FRIDAY. NO EARTHMOVING OR GRADING OPERATIONS SHALL BE CONDUCTED ON THE PREMISES ON SUNDAY OR CITY HOLIDAYS. WORK ON SATURDAY REQUIRES THE WRITTEN APPROVAL OF THE CITY ENGINEER.
13. ALL MAJOR SLOPES SHALL BE ROUNDED INTO EXISTING TERRAIN TO PRODUCE A SMOOTH CONTOURED TRANSITION FROM CUT OR FILL FACES TO NATURAL GROUND AND ABUTTING CUT OR FILL SURFACES.
14. NOTWITHSTANDING THE MINIMUM STANDARDS SET FORTH IN THE GRADING ORDINANCE AND NOTWITHSTANDING THE ACCEPTANCE OF THESE GRADING PLANS, THE PERMITTEE IS RESPONSIBLE FOR THE PREVENTION OF DAMAGE TO ADJACENT PROPERTY. NO PERSON SHALL EXCAVATE ON LAND SO CLOSE TO THE PROPERTY LINE AS TO ENDANGER ANY ADJOINING PUBLIC STREET, SIDEWALK, ALLEY, FUNCTION OF ANY SEWAGE DISPOSAL SYSTEM, OR ANY OTHER PUBLIC OR PRIVATE PROPERTY WITHOUT SUPPORTING AND PROTECTING SUCH PROPERTY FROM SETTLING, CRACKING, EROSION, SILTING, SCOUR OR OTHER DAMAGE WHICH MIGHT RESULT FROM GRADING DESCRIBED ON THIS PLAN. THE CITY WILL HOLD THE PERMITTEE RESPONSIBLE FOR CORRECTION ON NON-DEDICATED IMPROVEMENTS WHICH DAMAGE ADJACENT PROPERTY.
15. ALL OFFSITE HAUL ROUTES ARE SUBJECT TO THE ACCEPTANCE OF THE CITY ENGINEER. THE CONTRACTOR SHALL MAKE APPLICATION FOR A HAUL PERMIT, IN A FORMAT SUITABLE TO THE DEPARTMENT OF DEVELOPMENT SERVICES, A MINIMUM OF 72 HOURS PRIOR TO BEGINNING WORK. THE GRADING PERMIT SHALL NOT BE ISSUED PRIOR TO ISSUANCE OF THE HAUL PERMIT.
16. SPECIAL CONDITIONS: IF ANY ARCHAEOLOGICAL RESOURCES ARE DISCOVERED ON THE SITE OF THIS GRADING DURING GRADING OPERATIONS, SUCH OPERATIONS WILL CEASE IMMEDIATELY, AND THE PERMITTEE WILL NOTIFY THE CITY ENGINEER OF THE DISCOVERY. GRADING OPERATIONS WILL NOT COMMENCE UNTIL THE PERMITTEE HAS RECEIVED WRITTEN AUTHORITY FROM THE CITY ENGINEER TO DO SO.
17. ALL GRADING SHOWN ON THESE PLANS SHALL BE COMPLETED AS A SINGULAR UNIT WITH NO PROVISION FOR PARTIAL RELEASES. IF ANY PORTION OF THIS PROJECT IS TO BE COMPLETED SEPARATELY, A SEPARATE PLAN AND PERMIT APPLICATION SHALL BE SUBMITTED FOR ACCEPTANCE.
18. FINISH GRADING AND PLANTING SHALL BE ACCOMPLISHED ON ALL SLOPES PRIOR TO OCTOBER 1 OR IMMEDIATELY UPON COMPLETION OF ANY SLOPES BETWEEN OCTOBER 1 AND APRIL 1. ALL LANDSCAPING SHALL BE DONE IN ACCORDANCE WITH THE ACCEPTED LANDSCAPING AND IRRIGATION PLANS.
19. THE CONTRACTOR SHALL NOTIFY THE CITY OF SANTEE-DEPARTMENT OF DEVELOPMENT SERVICES AT (619) 258-4100 A MINIMUM OF 48 HOURS BEFORE ANY WORK COMMENCES AND 24 HOURS PRIOR TO REQUESTS FOR INSPECTION. CALL (619) 258-4100 x 168 FOR ALL INSPECTION REQUESTS. ALL WORK PERFORMED UNDER THIS PERMIT IS SUBJECT TO THE INSPECTION REQUIREMENTS OF THE SANTEE GRADING ORDINANCE. THE CONTRACTOR IS REFERRED TO SECTION 15.58.930 OF THE SANTEE MUNICIPAL CODE FOR A LIST OF DETAILED INSPECTION REQUIREMENTS. FAILURE TO PROVIDE ADEQUATE NOTIFICATION TO THE DEPARTMENT OF DEVELOPMENT SERVICES REQUESTING INSPECTION OF THE WORK AT THE APPROPRIATE TIMES MAY RESULT IN ISSUANCE OF A STOP WORK ORDER FOR THE GRADING OPERATIONS.
20. TO ENSURE COMPLIANCE WITH THE ACCEPTED GRADING PLAN AND AS A CONDITION OF ACCEPTANCE OF THE GRADING PLAN, THE OWNER, ITS TENANTS, ITS CONTRACTORS, AND ITS SUB-CONTRACTORS SHALL MAINTAIN THE PREMISES SUBJECT TO THE GRADING PLAN OPEN FOR INSPECTION BY CITY REPRESENTATIVES AT ALL TIMES GRADING OPERATIONS ARE OCCURRING, AND AT ALL OTHER TIMES, UPON REASONABLE DEMAND BY THE CITY.
21. UPON COMPLETION OF THE GRADING WORK SHOWN ON THESE PLANS AND PRIOR TO FINAL ACCEPTANCE OF THE WORK BY THE CITY, THE OWNER SHALL HAVE AS-BUILT GRADING PLANS PREPARED. PLANS SHALL BE PREPARED IN ACCORDANCE WITH THE CITY OF SANTEE-DEPARTMENT OF DEVELOPMENT SERVICES POLICY REGARDING CONSTRUCTION CHANGES AND AS-BUILT DRAWINGS FOR PRIVATE DEVELOPMENT.
22. SLOPE RATIOS:

    CUT 2:1 FILL 2:1
    EXCAVATION: 130 C.Y. FILL: 6,420 C.Y. IMPORT: 6,190 C.Y.
    (NOTE: A SEPARATE VALID PERMIT MUST EXIST FOR EITHER WASTE OR IMPORT AREAS).

    SHRINKAGE _____%
23. ACCEPTANCE OF THESE PLANS BY THE CITY OF SANTEE IS VALID FOR ONE YEAR FROM THE DATE OF ACCEPTANCE. FAILURE TO COMMENCE CONSTRUCTION WITHIN ONE YEAR VOIDS ACCEPTANCE OF THE PLANS.
24. THE FOLLOWING SOILS REPORT(S) SHALL BE CONSIDERED PART OF THIS GRADING PLAN. ALL GRADING SHALL BE DONE IN ACCORDANCE WITH THE RECOMMENDATIONS AND SPECIFICATIONS CONTAINED IN SAID REPORT(S).

    (a) "INFILTRATION TESTING RESULTS FOR 8606 GRAVES AVENUE, SANTEE, CALIFORNIA" ~ DATED: AUGUST 30, 2016
    PREPARED BY: GROUP DELTA
    PH: 858-536-1000
    9245 ACTIVITY ROAD, SUITE 103
    SAN DIEGO, CA 92126

PAVING NOTES:

1. A MINIMUM OF SEVEN DAYS PRIOR TO THE PLACEMENT OF ROADWAY BASE MATERIAL THE CONTRACTOR SHALL SUBMIT A CERTIFIED SOILS REPORT FROM A REGISTERED CIVIL OR GEOTECHNICAL ENGINEER CERTIFYING ALL ROADWAY AND UTILITY TRENCHING HAS BEEN COMPACTED TO THE MINIMUM REQUIREMENTS SPECIFIED IN THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION AND THE RECOMMENDATIONS CONTAINED IN THE PROJECT'S SOILS REPORT.
2. A FINAL PAVEMENT STRUCTURAL SECTION DESIGN SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL A MINIMUM OF TEN DAYS PRIOR TO PLACEMENT OF BASE MATERIAL. THE DESIGN REPORT SHALL CONFORM TO CITY FORM 435 – PAVEMENT DESIGN AND R-VALUE TEST SUBMITTAL PROCEDURES. THE DESIGN SHALL ADHERE TO THE METHODOLOGY SET FORTH IN CHAPTER 600 OF THE CALTRANS HIGHWAY DESIGN MANUAL AND UTILIZE THE "R" VALUE METHOD. DESIGN SHALL BE SUBMITTED IN REPORT FORM AND MUST INCLUDE ALL SUPPORTING CALCULATIONS AND TEST RESULTS. THE "R" VALUE TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH CALIFORNIA TEST NO. 301 AND SHALL BE PERFORMED BY A REGISTERED CIVIL ENGINEER WHOSE PRIMARY PROFESSIONAL ACTIVITY IS PERFORMING SUCH TESTS. THE NUMBER AND LOCATION OF R-VALUE TESTS SHALL BE COORDINATED WITH THE CITY PROJECT INSPECTOR AND BE SUBJECT TO APPROVAL OF THE CITY PROJECT ENGINEER.
3. THE FOLLOWING MINIMUM STRUCTURAL THICKNESS ARE BASED ON AN R-VALUE OF 30. TRAFFIC INDEXES ARE BASED ON CITY PUBLIC WORKS STANDARDS AND SHALL BE USED FOR PAVEMENT DESIGN BASED ON ACTUAL R-VALUES OBTAINED AT TIME OF CONSTRUCTION.

STREET NAME	TRAFFIC INDEX	ANTICIPATED STRUCTURAL SECTION
A. PASSENGER CAR PARKING	5.0	3" AC / 5" AB
B. TRUCK TRAFFIC AREAS	6.0	4" AC / 5" AB
C. HEAVY TRAFFIC AREAS	7.0	4" AC / 7" AB

*STRUCTURAL SECTION RECOMMENDATION PROVIDED BY "PRELIMINARY PAVEMENT DESIGN" REPORT DATED APRIL 6, 2017 BY ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MINIMUM CONCRETE SECTION SHALL BE 5.5" PCC OVER 95% COMPACTED NON EXPANSIVE SOILS. MIX DESIGN SHALL BE MINIMUM CLASS 520-C-2500 PER RESOLUTION NO. 050-2006

THE MINIMUM SECTIONS LISTED ABOVE ARE FOR ESTIMATION AND DESIGN PURPOSES ONLY AND ARE SUBJECT TO CHANGE FOLLOWING SUBMITTAL OF THE FINAL PAVEMENT DESIGN REPORT.

4. ASPHALT CONCRETE SHALL CONFORM TO ALL PROVISIONS OF SECTION 39 OF THE CURRENT CALTRANS STANDARD SPECIFICATIONS. SURFACE COURSE SHALL BE A MINIMUM THICKNESS IS 2 INCHES, MAXIMUM THICKNESS IS 3 INCHES. ASPHALT CONCRETE SECTIONS GREATER THAN 3 INCHES SHALL CONTAIN A BASE COURSE OF ASPHALT, A MINIMUM THICKNESS OF 2 INCHES.

ACCEPTED UNTREATED BASE MATERIALS INCLUDE:

PER SECTION 200-2.2	CRUSHED AGGREGATE BASE
PER SECTION 200-2.4	CRUSHED MISCELLANEOUS BASE
CALTRANS	CLASS 2 – AGGREGATE BASE

PROCESSED MISCELLANEOUS BASE PER THE GREEN BOOK AND CALTRANS CLASS 2 RECYCLED BASE ARE NOT PERMITTED.

ACCEPTED ASPHALT BASE COURSE MIXES INCLUDE:

PER CALTRANS 39 PG 64-10 – $\frac{3}{4}$" MAXIMUM, COARSE

ACCEPTED ASPHALT SURFACE COURSE MIXES INCLUDE:

PER CALTRANS 39 PG 64-10 – $\frac{1}{2}$" MAXIMUM, COARSE

NOTE:

SEE IMPROVEMENT PLAN DWG. NO. XXXXX FOR WATER AND SEWER INFORMATION.

STORMWATER POLLUTION PREVENTION NOTES:

1. APPROPRIATE EROSION PREVENTION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED AT ALL TIMES.
2. THE TOPS OF ALL SLOPES SHALL HAVE A DIKE OR TRENCH TO PREVENT WATER FROM FLOWING OVER THE CRESTS OF SLOPES.
3. CLEAN GRAVEL ONLY WILL BE USED IN GRAVEL BAGS.
4. CATCH BASINS, DESILTING BASINS, GRAVEL BAGS, CHECK DAMS AND STORM DRAIN SYSTEMS SHALL BE INSTALLED TO THE SATISFACTION OF THE CITY ENGINEER. THESE FACILITIES SHALL BE CLEANED ON A REGULAR BASIS, AND KEPT FREE OF SILT ACCUMULATION.
5. GRAVEL BAG CHECK DAMS SHALL BE PLACED IN UNPAVED AREAS WITH GRADIENTS IN EXCESS OF 2%, IN OTHER GRADED OR EXCAVATED AREAS AS REQUIRED BY THE DEPARTMENT OF DEVELOPMENT SERVICES, AND AT OR NEAR EVERY POINT WHERE CONCENTRATED FLOWS LEAVE THE DEVELOPMENT.
6. GRAVEL BAGS SHALL BE PLACED ON THE UPSTREAM SIDE OF ALL DRAINAGE INLETS TO MINIMIZE SILT BUILDUP IN THE INLETS AND PIPES.
7. THE CONTRACTOR SHALL IMMEDIATELY REPAIR ANY ERODED SLOPES.
8. ROADWAYS AND ENTRANCES TO AND FROM THE SITE SHALL BE SWEPT ON A REGULAR BASIS TO KEEP THEM FREE OF SOIL ACCUMULATION.
9. CONTRACTOR SHALL HAVE WATER TRUCKS AND EQUIPMENT ON-SITE TO PREVENT AIRBORNE DUST CREATED FROM GRADING AND HAULING OPERATIONS OR WIND CONDITIONS. WATERING SHALL BE PERFORMED ON A CONTINUOUS BASIS TO PREVENT AIRBORNE DUST AND AT ALL OTHER TIMES AS DIRECTED BY THE CITY ENGINEER. ADDITIONAL DUST CONTROL MEASURES SHALL BE IMPLEMENTED AS NEEDED.
10. STOCKPILES SHALL BE COVERED AT THE END OF EACH WORKING DAY AND PRIOR TO PREDICTED RAIN EVENTS. ASPHALT SHALL BE STORED ON A LAYER OF PLASTIC SHEETING, OR EQUIVALENT.
11. ALL PORTABLE TOILETS SHALL HAVE A SECONDARY CONTAINMENT AND NOT BE LOCATED NEAR A STORM DRAIN (I.E. CATCH BASIN OR STREET).
12. INACTIVE SLOPES SHALL BE PROTECTED AND STABILIZED WITHIN 10 CALENDAR DAYS OF LAST BEING WORKED, OR ON THE DIRECTION OF THE CITY. ACTIVE SLOPES SHALL BE STABILIZED DURING RAIN.
13. EROSION CONTROL ON SLOPES SHALL BE MITIGATED BY INSTALLING LANDSCAPING AS PER APPROVED LANDSCAPE PLANS AS REQUIRED BY THE DEVELOPMENT REVIEW CONDITIONS, OR BY TEMPORARY EROSION CONTROL CONFORMING TO THE FOLLOWING:

NON-IRRIGATED HYDROSEED MIX

LBS. PER ACRE	% PURITY PER ACRE	SEED SPECIES
20	70% PLS.	ATRIPLEX GLAUCA
50		PLANTAGE INSULARIS
8		ENCELIS FARINOSA
6	SCARIFIED	LOTUS SCOPARIUS
7	50% PLS.	EXCHSCHOLTZIA CALIF.
91 LBS.		

14. VEHICLE MAINTENANCE, REPAIR AND STORAGE BMPS WILL BE IMPLEMENTED INCLUDING: USE OF DRIP PANS OR EQUIVALENT UNDER VEHICLE STORED OVERNIGHT; DAILY INSPECTION FOR LEAKS AND SPILLS; PROMPT REMOVAL OF SPILLS; AVAILABILITY OF OIL-ABSORBENT SPILL REMOVAL MATERIALS ON SITE.
15. HEAVY EQUIPMENT WILL NOT BE STORED ON THE PUBLIC RIGHT-OF-WAY.
16. TRASH SHALL BE PLACED IN DUMPSTERS. OFFCUTS FROM FRAMING WILL BE STORED APPROPRIATLY AND NOT ALLOWED TO ACCUMULATE IN STOCKPILES AROUND THE SITE.
17. TRASH DUMPSTERS WILL HAVE LIDS. THE LIDS WILL REMAIN CLOSED AND THE DUMPSTERS WILL NOT BE OVERFILLED. ADDITIONAL TRASH PICK UPS SHALL BE MADE AS NECESSARY.
18. LIQUID MATERIALS WILL BE STORED IN CLOSED CONTAINERS IN SECONDARY CONTAINMENT AND UNDER COVER. SOLID MATERIALS WILL BE STORED ON PALLETS AND BE COVERED DURING RAIN.
19. A MATERIALS WASHOUT WILL BE AVAILABLE ONSITE WHENEVER LIQUID MATERIALS ARE USED. THE WASHOUT WILL FULLY CONTAIN THOSE MATERIALS AND THE SURROUNDING AREA SHALL BE KEPT FREE OF SPILLS.
20. DISCHARGE OF POTABLE WATER (SUCH AS FROM POWERWASHING OR FILLING WATER TRUCKS) WILL BE PREVENTED.
21. 125 PERCENT OF THE MATERIALS REQUIRED TO MAINTAIN STORM WATER BMPS SHALL BE PRESENT ON THE SITE AT ALL TIMES.
22. STORMWATER CONTROL MEASURES SHOWN HEREON ARE BEST MANAGEMENT PRACTICES FOR THIS SITE BASED ON THE ANTICIPATED PROGRESS OF THE WORK. ADDITIONAL MEASURES MAY BE REQUIRED AT ANY TIME AT THE DISCRETION OF THE CITY ENGINEER AS THE WORK PROGRESSES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE ADEQUATE PROTECTION IS IN PLACE AT ALL TIMES TO PREVENT ANY DISCHARGE OF POLLUTANTS, INCLUDING SEDIMENT, FROM THE EXPOSED SITE AREAS. BMPS WILL BE MAINTAINED UNTIL REMOVAL.

FIRE DEPARTMENT NOTES:

PROVIDE A MINIMUM 20' WIDE, CLEAR AREA (NO PARKING), ALL-WEATHER, PAVED (OR OTHER APPROVED SURFACE) EMERGENCY ACCESS ROADWAY FOR THE SITE PRIOR TO THE DELIVERY OF COMBUSTIBLE CONSTRUCTION MATERIALS. ADDITIONALLY, ALL UNDERGROUND UTILITIES INCLUDING FIRE MAINS, FIRE HYDRANTS AND FIRE SERVICE UNDERGROUND DEVICES SHALL BE INSTALLED PRIOR TO THE DELIVERY OF CONSTRUCTION MATERIALS. AN EMERGENCY ACCESS PLAN FOR THE SITE SHALL BE SUBMITTED FOR APPROVAL PRIOR TO CONSTRUCTION. EMERGENCY ACCESS MUST BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

GENERAL STANDARDS OF CONSTRUCTION

UNLESS OTHERWISE NOTED ON THE PLANS, ALL WORK SHALL CONFORM WITH THE FOLLOWING STANDARD SPECIFICATIONS AND DRAWINGS:

STANDARD SPECIFICATIONS:

1. STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, LATEST EDITION.
2. STANDARD SPECIAL PROVISIONS.
3. CITY OF SANTEE PUBLIC WORKS STANDARDS, SEPTEMBER 1982.
4. CALIFORNIA DEPARTMENT OF TRANSPORTATION, "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)" LATEST EDITION.
5. STANDARD SPECIFICATIONS OF THE PADRE DAM MUNICIPAL WATER DISTRICT, WATER AGENCY STANDARDS, W.A.S.
6. CALIFORNIA STORMWATER QUALITY ASSOCIATION (CASQA), STORMWATER BEST MANAGEMENT PRACTICE HANDBOOK CONSTRUCTION, LATEST EDITION.

STANDARD DRAWINGS:

1. CITY OF SANTEE STANDARD DRAWINGS.
2. SAN DIEGO REGIONAL STANDARD DRAWINGS (S.D.R.S.D.) AS RECOMMENDED BY THE REGIONAL STANDARDS COMMITTEE, MAINTAINED AND PUBLISHED BY THE SAN DIEGO COUNTY DEPARTMENT OF PUBLIC WORKS, LATEST EDITION.
3. STANDARD DRAWINGS OF THE PADRE DAM MUNICIPAL WATER DISTRICT, WATER AGENCY STANDARDS, W.A.S.

LEGEND

DESCRIPTION		SYMBOL
BOUNDARY		
FINISH CONTOURS		360
CENTERLINE		℄
CURB AND GUTTER	G-02	
CONCRETE WALKWAYS	G-07	
PVT RETAINING WALL (PER SEPARATE PERMIT)		
DRIVEWAY ENTRANCE W/ CROSS GUTTER	G-12, G-14E	
AC PAVEMENT		
TRENCH RESURFACING	G-24A	
CURB RAMP	G-27, -31 THRU 32	
LIGHT	E-01	
LANDSCAPING (PER OTHER)		
INFILTRATION BASIN		
STORM DRAIN (SIZE PER PLAN)		
TYPE 'A' CURB INLET	SDRSD D-01	CURB LINE
TYPE 'B' CURB INLET	SDRSD D-02	CURB LINE
RIP RAP	SDRSD D-40	
SEWER LATERAL (PVT.) (SIZE PER PLAN)	SDRSD SS-01, -03	S
SEWER MANHOLE	SDRSD SM-01, -03	
SEWER CLEAN OUT	SDRSD SC-01	
2" WATER SERVICE(PVT.) WITH 2" METER AND RPDA	WS-01, WS-02, WR-01	W
2" METER AND RPDA (PVT.)	WR-01, WS-02, WS-03	W
6" FIRE SERVICE (PVT.)	WF-05, WS-04	FS
FIRE HYDRANT	WF-01	
EXISTING CONTOURS		360
EXISTING CURB AND GUTTER		
EXISTING MANHOLE FOR SEWER MAIN		
EXISTING WATER		W
EXISTING SEWER		S

REGISTERED PROFESSIONAL ENGINEER
JONATHAN RAAB RYDEEN
RCE – 64811
EXP 6/30/19
CIVIL
STATE OF CALIFORNIA

R·E·C Consultants, Inc.
Civil Engineering · Environmental Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR ______					
INSPECTOR ______					
DATE COMPLETED ______					

BENCH MARK # 2143
STANDARD STREET SURVEY MONUMENT STAMPED RCE 21944 PER R.O.S. 10733. CENTERLINE INTERSECTION OF HART DRIVE AND GRAVES AVENUE.
MAP: R.O.S. 10733 ELEVATION: 412.23'
HORZ. DATUM: NAD 83 VERT. DATUM: MSLD

SCALE
HORIZ: AS NOTED
VERT: AS NOTED

DESIGNED BY	DRAWN BY	CHECKED BY
JMW	JMW	JRR

PLANS PREPARED UNDER THE SUPERVISION OF
JONATHAN RAAB RYDEEN DATE ______
RCE NO. 64811 EXPIRES 6/30/19

REVIEWED ______
BY ______
PROJECT ENGINEER

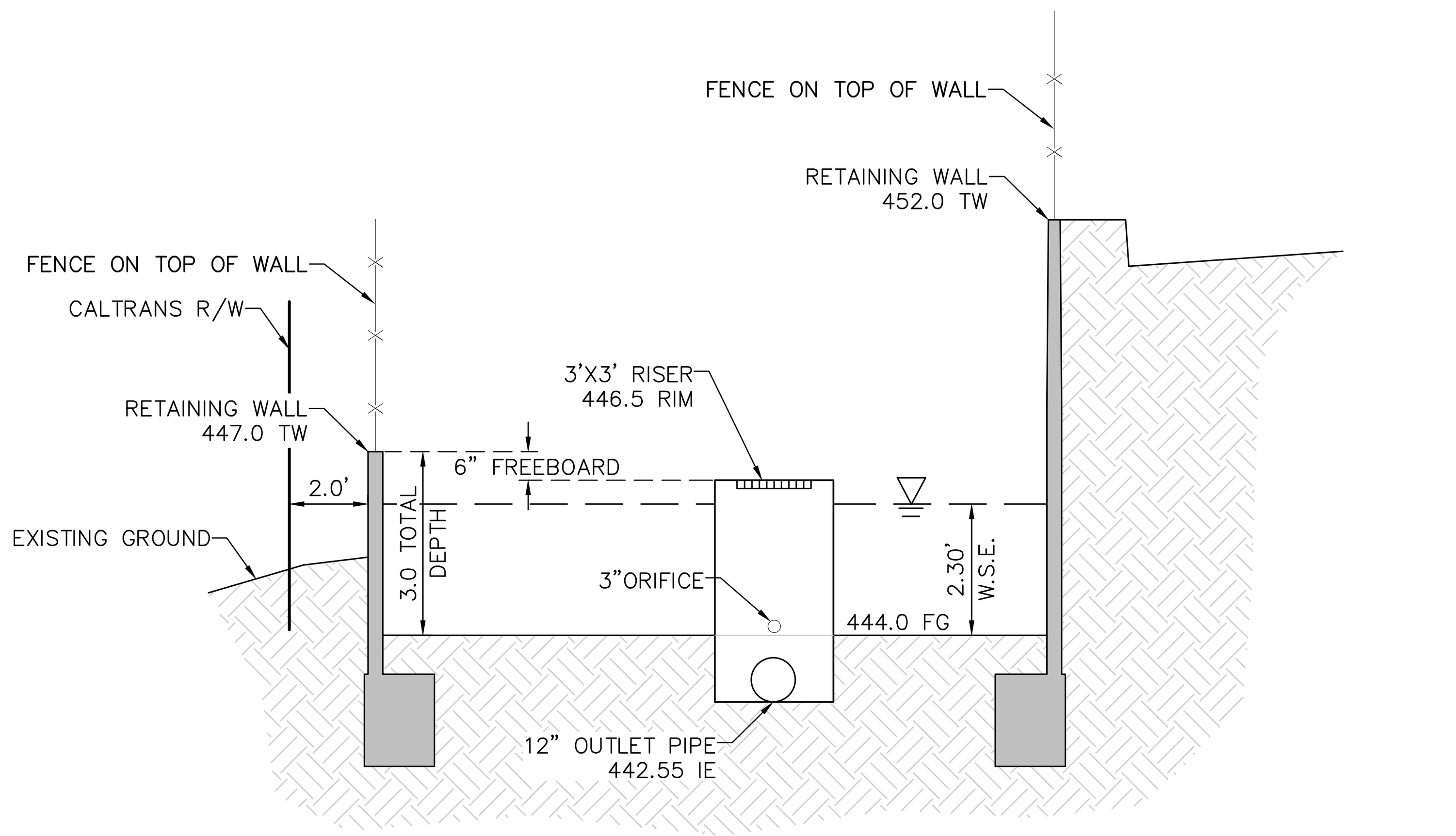
CITY OF SANTEE | DEPARTMENT OF DEVELOPMENT SERVICES | CITY W.O. NO. | DRAWING NO.

NOTES FOR:

GRAVES COMMERCIAL
APN: 384-142-21

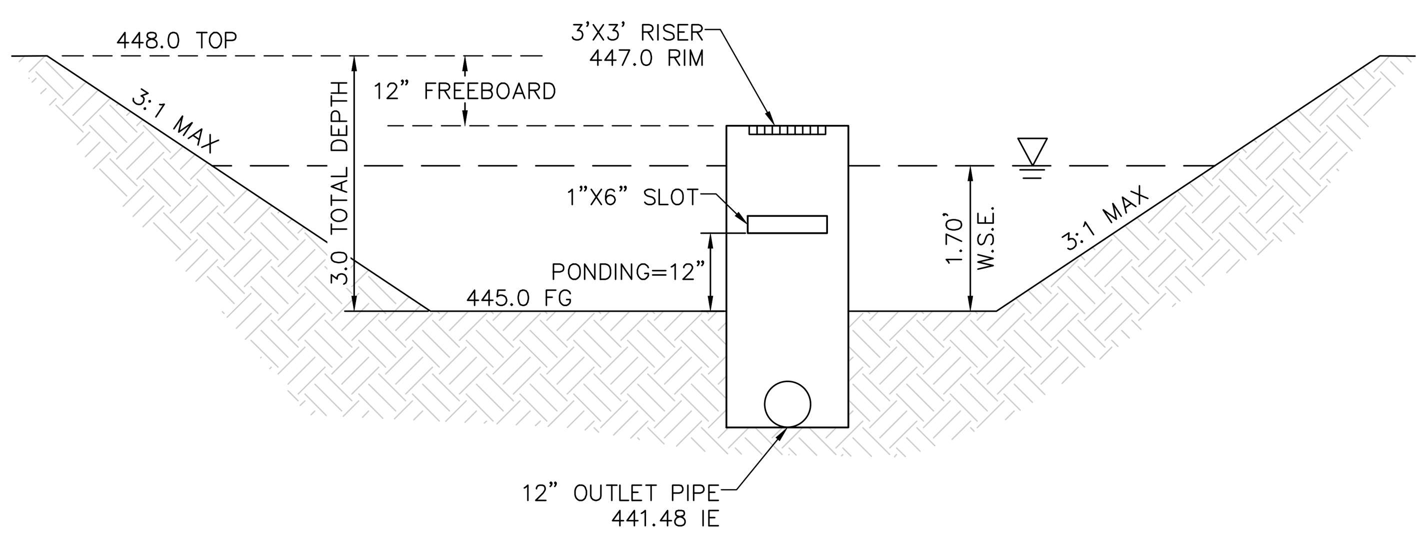
SHEET 2 OF 10

SAVE DATE: 1/28/2019 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Civil\Grading Plan\Rough Grading Plan\Grading Plan.dwg



BMP-A: INFILTRATION BASIN DETAIL (PVT)

NOT TO SCALE



BMP-B: INFILTRATION BASIN DETAIL (PVT)

NOT TO SCALE

DMA DATA TABLE

DMA	BMP	TOTAL AREA (AC)	IMP AREA (AC)	PER AREA (AC)	TREATMENT TYPE	TREATMENT REQ'D	TREATMENT PROVIDED
A	A	1.10	0.80	0.30	INFILTRATION BASIN	363 SF	925 SF
B	B	0.49	0.21	0.28	INFILTRATION BASIN	112 SF	317 SF

INFILTRATION BASIN DESIGN DATA TABLE

BMP	SURFACE AREA (SF)	FREEBOARD (IN)	PONDING (IN)	TOTAL DEPTH (FT)
A	925	6	N/A	3.0
B	317	12	12	3.0

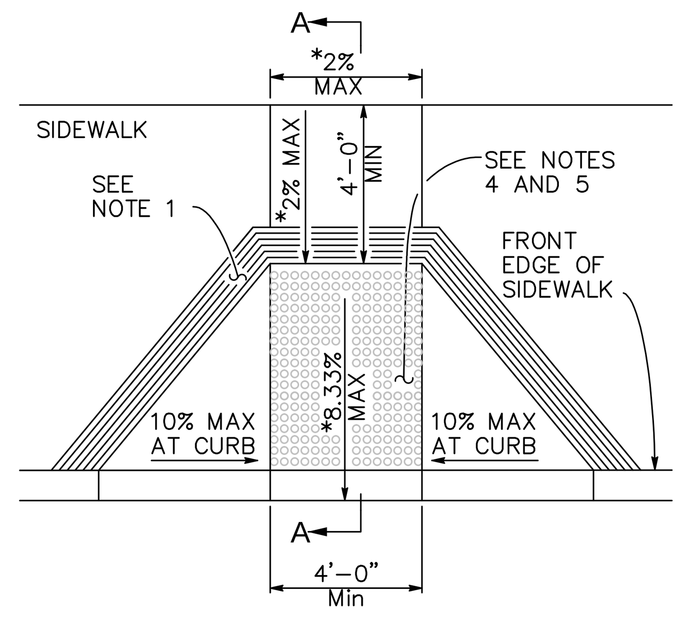
OUTLET STRUCTURE DETAILS

BMP	LOW ORIFICE	LOWER SLOT			EMERGENCY WEIR	
	DIAMETER (IN)	BASE (IN)	HEIGHT (IN)	INVERT* (FT)	WIDTH (FT)	INVERT* (FT)
A	3	N/A	N/A	N/A	8	2.5
B	N/A	6	1	1	8	2.0

*ELEVATION OF 0.00 FT IS AT THE INVERT OF SYSTEM

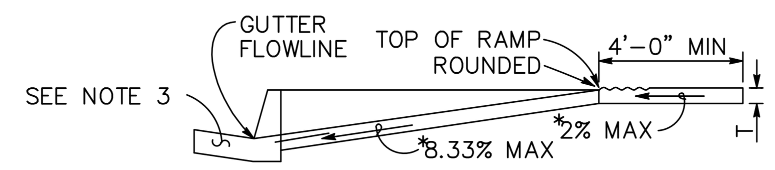
NOTE:

SEE IMPROVEMENT PLAN DWG. NO. XXXXX FOR WATER AND SEWER INFORMATION.

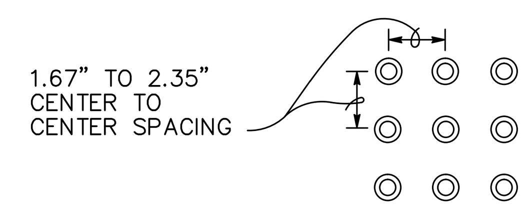


CASE A

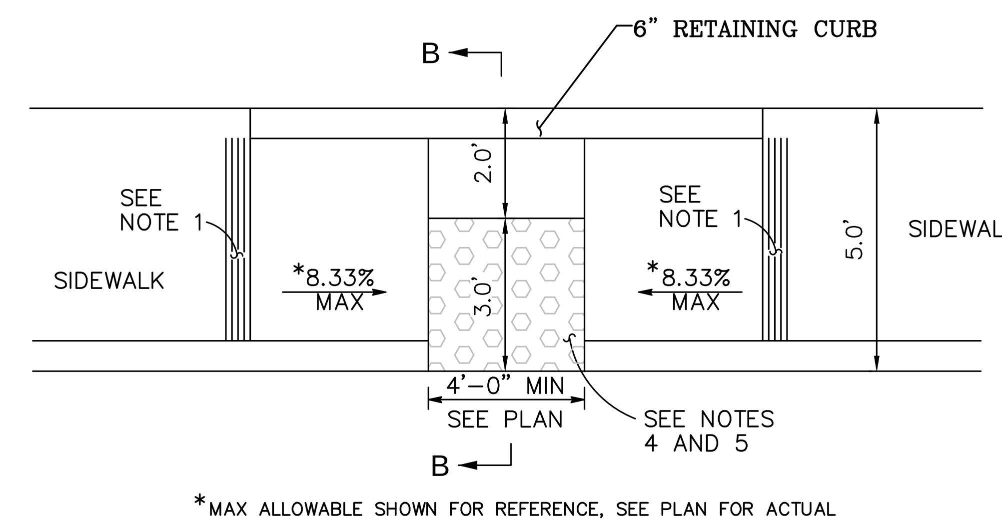
*MAX ALLOWABLE SHOWN FOR REFERENCE, SEE PLAN FOR ACTUAL



SECTION A-A

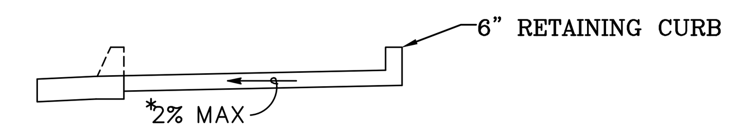


RAISED TRUNCATED DOME PATTERN (IN-LINE)
DETECTABLE WARNING SURFACE

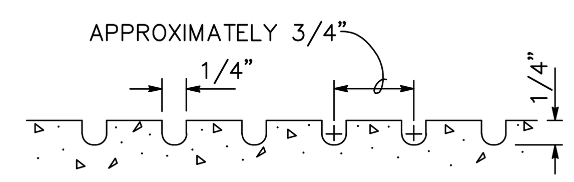


*MAX ALLOWABLE SHOWN FOR REFERENCE, SEE PLAN FOR ACTUAL

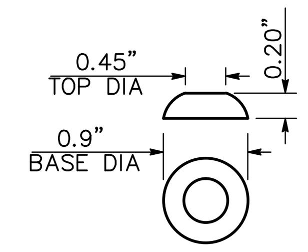
CASE C



SECTION B-B



GROOVING DETAIL



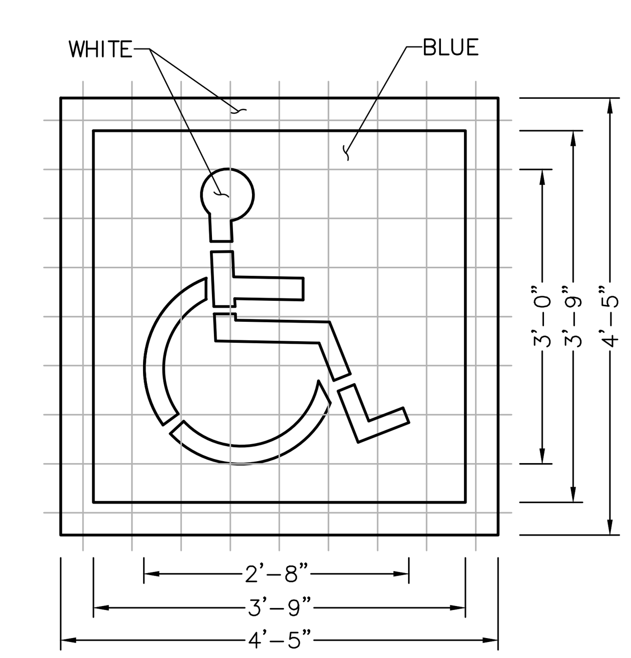
RAISED TRUNCATED DOME

NOTES:

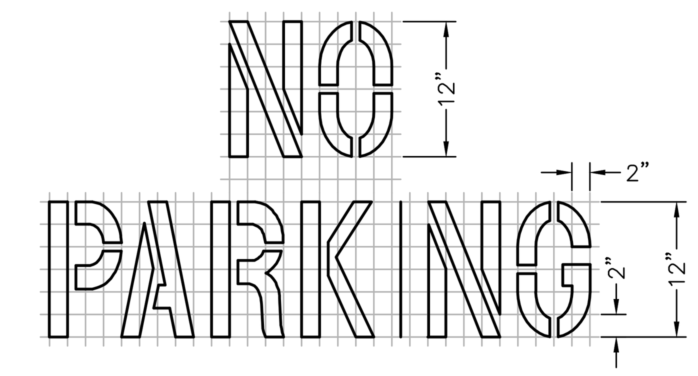
1. THE CURB RAMP SHALL BE OUTLINED, AS SHOWN, WITH A 1'-0" WIDE BORDER WITH ¼" GROOVES APPROXIMATELY ¾" ON CENTER. SEE GROOVING DETAIL.
2. TRANSITIONS FROM RAMPS AND LANDING TO WALKS, GUTTERS OR STREETS SHALL BE FLUSH AND FREE OF ABRUPT CHANGES.
3. MAXIMUM SLOPES OF ADJOINING GUTTERS, THE ROAD SURFACE IMMEDIATELY ADJACENT TO THE CURB RAMP OR ACCESSIBLE ROUTE SHALL NOT EXCEED 5 PERCENT WITHIN 4'-0" OF THE TOP AND BOTTOM OF THE CURB RAMP.
4. CURB RAMPS SHALL HAVE A DETECTABLE WARNING SURFACE THAT EXTENDS THE FULL WIDTH AND DEPTH OF THE RAMP. CASE "C" SHALL HAVE DETECTABLE WARNING SURFACE FULL WIDTH AND 3' DEPTH OF LANDING. DETECTABLE WARNING SURFACES SHALL CONFORM TO THE DETAILS ON THIS PLAN.
5. THE EDGE OF THE DETECTABLE WARNING SURFACE NEAREST THE STREET SHALL BE BETWEEN 6" AND 8" FROM FACE OF THE BOTTOM OF CURB.

(3) CURB RAMP DETAILS

NOT TO SCALE

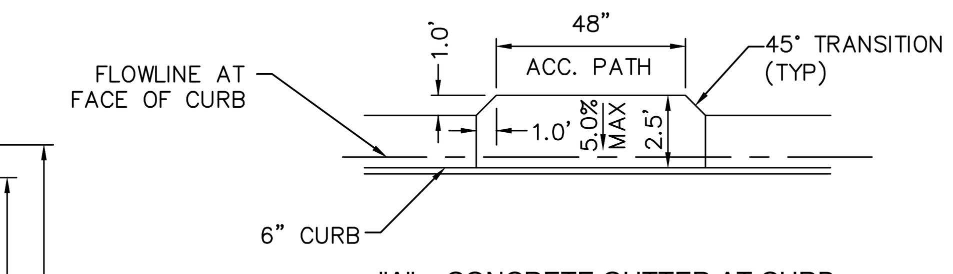


PARKING STALL ISA DETAIL



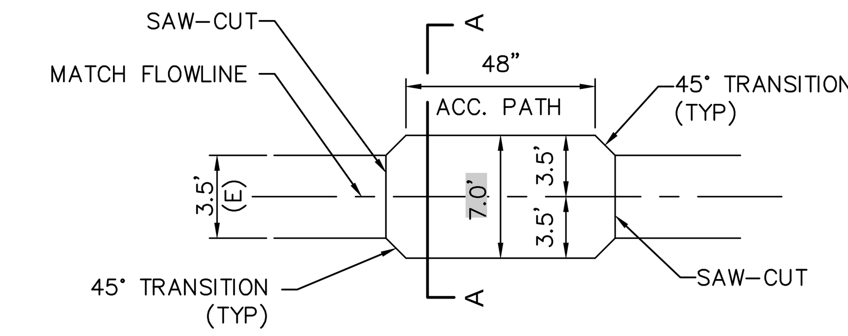
(5) PARKING STALL LOADING LETTERING

NOT TO SCALE



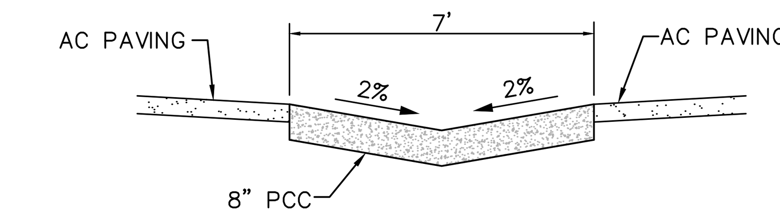
"A" ~ CONCRETE GUTTER AT CURB

NOT TO SCALE



"B" ~ CONCRETE RIBBON GUTTER

NOT TO SCALE

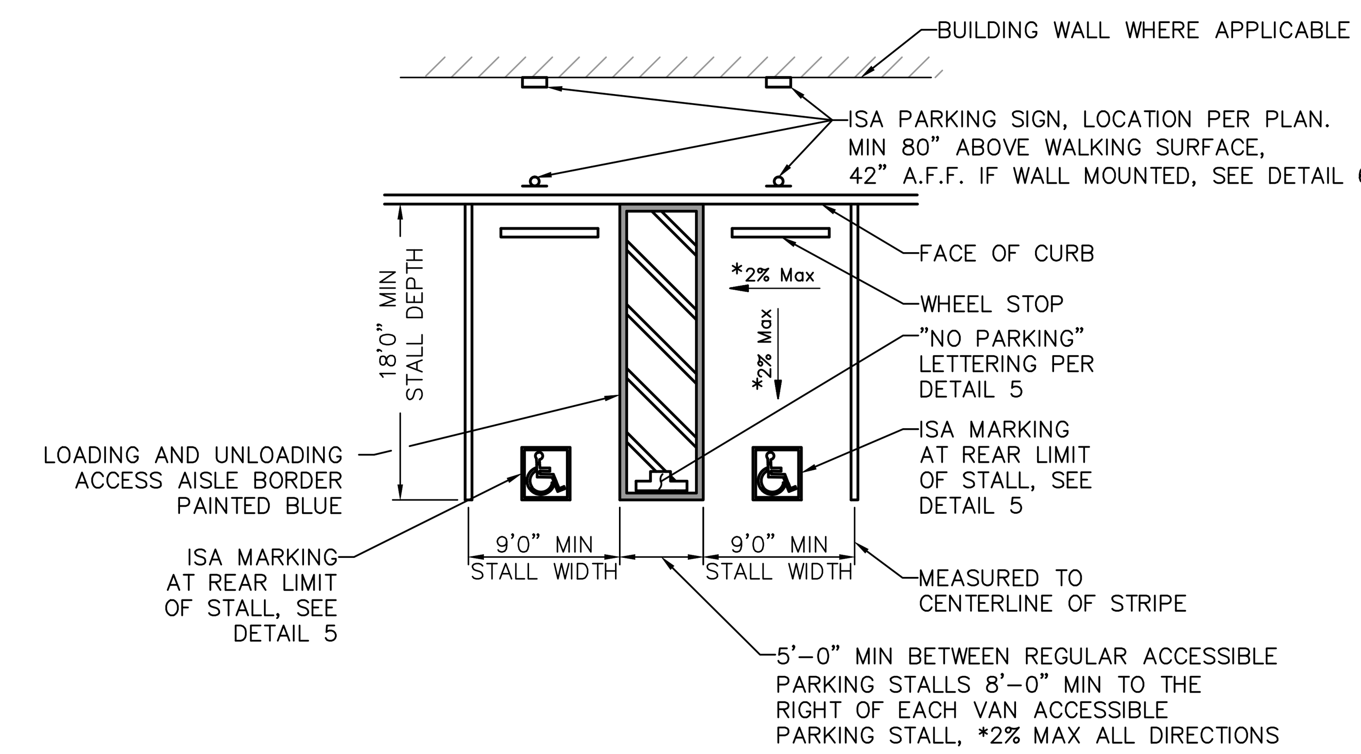


SECTION A-A

NOT TO SCALE

(8) ACCESSIBLE CONCRETE GUTTER

NOT TO SCALE



*MAX ALLOWABLE SHOWN FOR REFERENCE, SEE PLAN FOR ACTUAL

(4) ACCESSIBLE PARKING STALL DETAILS

NOT TO SCALE

PLAQUE R99B (CA)
SIGN R99 (CA) WITH PLAQUE R99B (CA)

SIGN R99C (CA)

SIGN R100B (CA)

SIGN R7-8b
SEE NOTES 3 AND 4

NOTES:

1) A R100B (CA) SIGN SHALL BE POSTED IN A CONSPICUOUS PLACE AT EACH ENTRANCE TO OFF-STREET PARKING FACILITIES OR IMMEDIATELY ADJACENT TO AND VISIBLE FROM EACH STALL. THE SIGN SHALL INCLUDE THE ADDRESS WHERE THE TOWED VEHICLE MAY BE RECLAIMED AND THE TELEPHONE NUMBER OF THE LOCAL TRAFFIC LAW ENFORCEMENT AGENCY. (VERIFY EXISTING SIGN MATCHES THIS DETAIL)
2) ACCESSIBLE PARKING ONLY SIGN SHALL BE SIGN R99C (CA) OR SIGN R99 (CA) WITH PLAQUE R99B (CA).
3) AT VAN ACCESSIBLE STALLS THE R7-8B SIGN SHALL BE MOUNTED BELOW THE R99B (CA) PLAQUE OR THE R99C (CA) SIGN AT A MINIMUM OF 7'-0" ABOVE THE PARKING SURFACE OR OR 42" A.F.F. IF WALL MOUNTED
4) WHERE PLAQUE R99B (CA), SIGN R99C (CA) OR SIGN R7-8B ARE INSTALLED, THE BOTTOM OF THE SIGN OR PLAQUE PANEL SHALL BE A MINIMUM OF 7'-0" ABOVE THE PARKING SURFACE, OR 42" A.F.F. IF WALL MOUNTED

(6) ADA SIGN DETAILS

NOT TO SCALE

R·E·C Consultants, Inc.
Civil Engineering · Environmental
Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR					
INSPECTOR					
DATE COMPLETED					

BENCH MARK # 2143
STANDARD STREET SURVEY MONUMENT STAMPED RCE 21944 PER R.O.S. 10733. CENTERLINE INTERSECTION OF HART DRIVE AND GRAVES AVENUE.
MAP: R.O.S. 10733 ELEVATION: 412.23'
HORZ. DATUM: NAD 83 VERT. DATUM: MSLD

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY
	JMW	JMW	JRR
HORIZ: AS NOTED	PLANS PREPARED UNDER THE SUPERVISION OF		
VERT: AS NOTED	JONATHAN RAAB RYDEEN DATE	RCE NO. 64811	EXPIRES 6/30/19

REVIEWED ____

BY ____ PROJECT ENGINEER

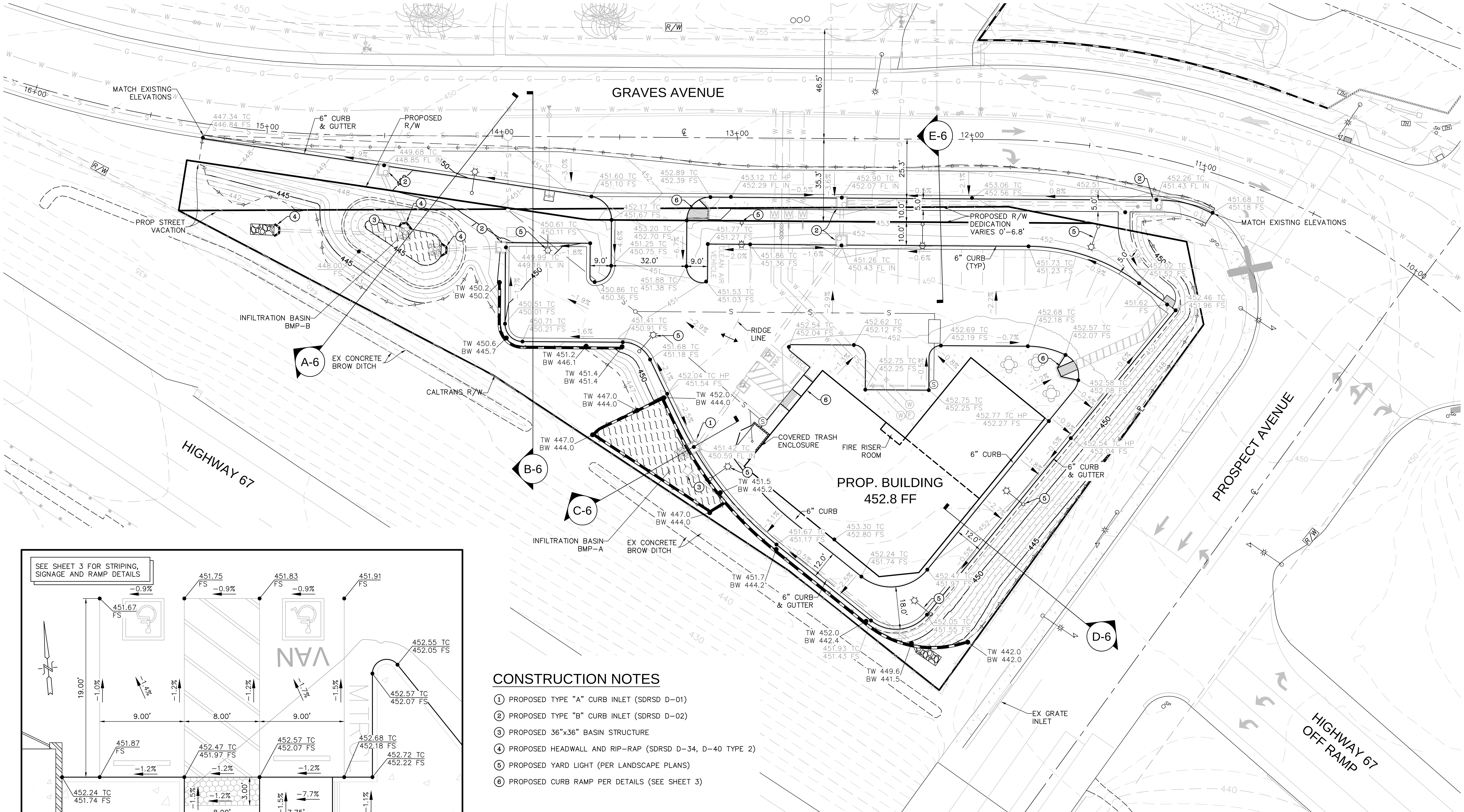
CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES

DETAILS FOR:

GRAVES COMMERCIAL
APN: 384-142-21

CITY W.O. NO. | DRAWING NO.

SHEET 3 OF 10



ADA PARKING DETAIL

SCALE: 1"=5'

CONSTRUCTION NOTES

1. PROPOSED TYPE "A" CURB INLET (SDRSD D-01)
2. PROPOSED TYPE "B" CURB INLET (SDRSD D-02)
3. PROPOSED 36"x36" BASIN STRUCTURE
4. PROPOSED HEADWALL AND RIP-RAP (SDRSD D-34, D-40 TYPE 2)
5. PROPOSED YARD LIGHT (PER LANDSCAPE PLANS)
6. PROPOSED CURB RAMP PER DETAILS (SEE SHEET 3)

NOTE:

SEE IMPROVEMENT PLAN DWG. NO. XXXXX FOR WATER AND SEWER INFORMATION.

20 10 0 20 40 60

SCALE: 1" = 20'

REGISTERED PROFESSIONAL ENGINEER — JONATHAN RAAB RYDEEN — RCE – 64811 — EXP 6/30/19 — CIVIL — STATE OF CALIFORNIA

R·E·C Consultants, Inc.
Civil Engineering · Environmental Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR					
INSPECTOR					
DATE COMPLETED					

BENCH MARK # 2143
STANDARD STREET SURVEY MONUMENT STAMPED RCE 21944 PER R.O.S. 10733. CENTERLINE INTERSECTION OF HART DRIVE AND GRAVES AVENUE.
MAP: R.O.S. 10733 ELEVATION: 412.23'
HORZ. DATUM: NAD 83 VERT. DATUM: MSLD

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY
HORIZ: AS NOTED	JMW	JMW	JRR
VERT: AS NOTED			

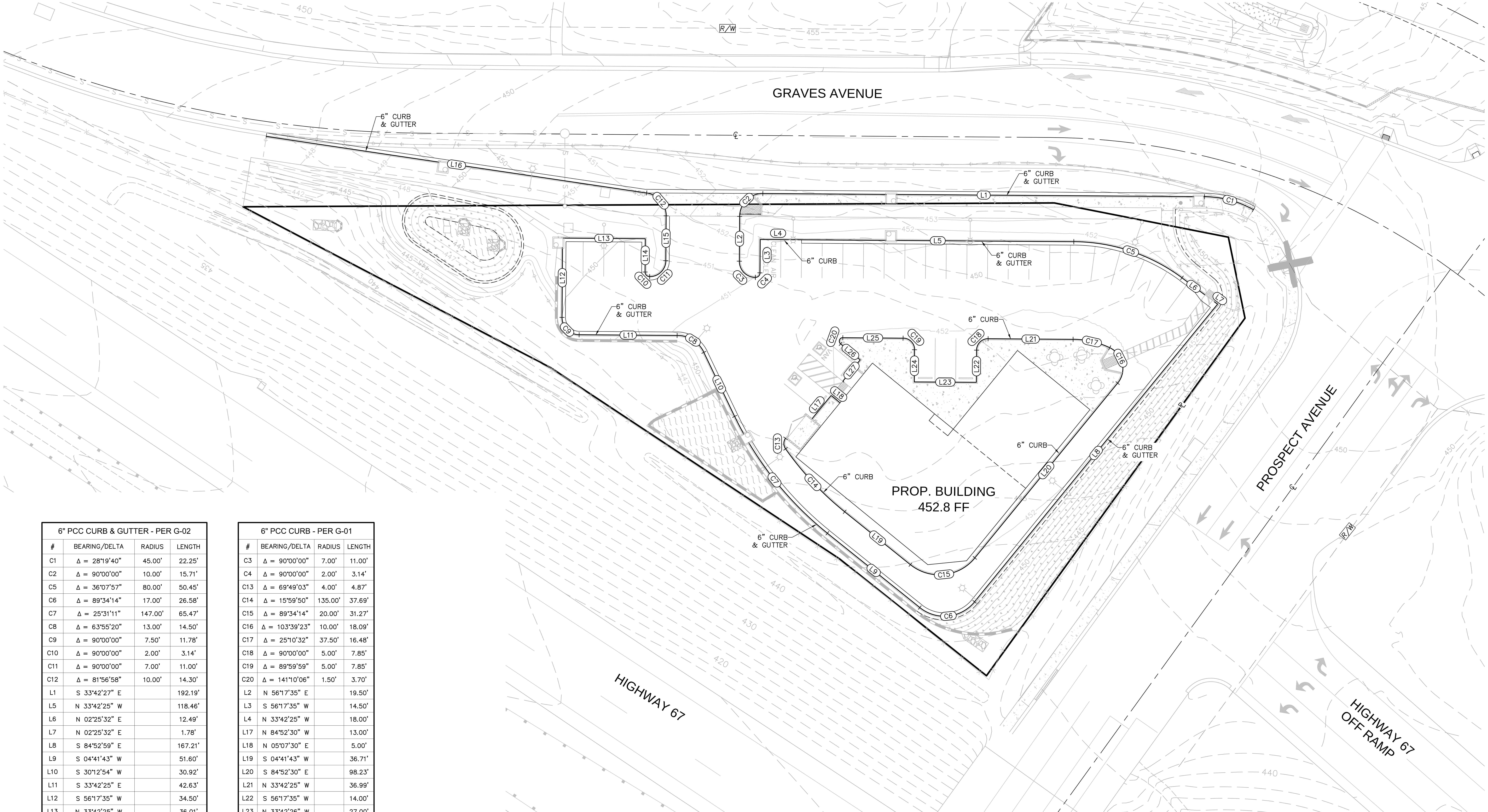
PLANS PREPARED UNDER THE SUPERVISION OF
JONATHAN RAAB RYDEEN DATE
RCE NO. 64811 EXPIRES 6/30/19

REVIEWED
BY PROJECT ENGINEER

CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES — CITY W.O. NO. — DRAWING NO.

GRADING PLAN FOR:
GRAVES COMMERCIAL
APN: 384-142-21

SAVE DATE: 1/28/2019 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Civil\Grading Plan\Rough Grading Plan\Grading Plan.dwg



6" PCC CURB & GUTTER - PER G-02			
#	BEARING/DELTA	RADIUS	LENGTH
C1	Δ = 28°19'40"	45.00'	22.25'
C2	Δ = 90°00'00"	10.00'	15.71'
C5	Δ = 36°07'57"	80.00'	50.45'
C6	Δ = 89°34'14"	17.00'	26.58'
C7	Δ = 25°31'11"	147.00'	65.47'
C8	Δ = 63°55'20"	13.00'	14.50'
C9	Δ = 90°00'00"	7.50'	11.78'
C10	Δ = 90°00'00"	2.00'	3.14'
C11	Δ = 90°00'00"	7.00'	11.00'
C12	Δ = 81°56'58"	10.00'	14.30'
L1	S 33°42'27" E		192.19'
L5	N 33°42'25" W		118.46'
L6	N 02°25'32" E		12.49'
L7	N 02°25'32" E		1.78'
L8	S 84°52'59" E		167.21'
L9	S 04°41'43" W		51.60'
L10	S 30°12'54" W		30.92'
L11	S 33°42'25" E		42.63'
L12	S 56°17'35" W		34.50'
L13	N 33°42'25" W		36.01'
L14	N 56°19'50" E		14.50'
L15	S 56°17'35" W		19.50'
L16	S 25°39'23" E		167.31'

6" PCC CURB - PER G-01			
#	BEARING/DELTA	RADIUS	LENGTH
C3	Δ = 90°00'00"	7.00'	11.00'
C4	Δ = 90°00'00"	2.00'	3.14'
C13	Δ = 69°49'03"	4.00'	4.87'
C14	Δ = 15°59'50"	135.00'	37.69'
C15	Δ = 89°34'14"	20.00'	31.27'
C16	Δ = 103°39'23"	10.00'	18.09'
C17	Δ = 25°10'32"	37.50'	16.48'
C18	Δ = 90°00'00"	5.00'	7.85'
C19	Δ = 89°59'59"	5.00'	7.85'
C20	Δ = 141°10'06"	1.50'	3.70'
L2	N 56°17'35" E		19.50'
L3	S 56°17'35" W		14.50'
L4	N 33°42'25" W		18.00'
L17	N 84°52'30" W		13.00'
L18	N 05°07'30" E		5.00'
L19	S 04°41'43" W		36.71'
L20	S 84°52'30" E		98.23'
L21	N 33°42'25" W		36.99'
L22	S 56°17'35" W		14.00'
L23	N 33°42'26" W		27.00'
L24	N 56°17'35" E		14.00'
L25	N 33°42'25" W		26.24'
L26	S 05°07'30" W		11.02'
L27	N 84°52'30" W		12.00'

NOTE:

SEE IMPROVEMENT PLAN DWG. NO. XXXXX FOR WATER AND SEWER INFORMATION.

20 10 0 20 40 60

SCALE: 1" = 20'

REGISTERED PROFESSIONAL ENGINEER
JONATHAN RAAB RYDEEN
RCE ~ 64811
EXP 6/30/19
CIVIL
STATE OF CALIFORNIA

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Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR					
INSPECTOR					
DATE COMPLETED					

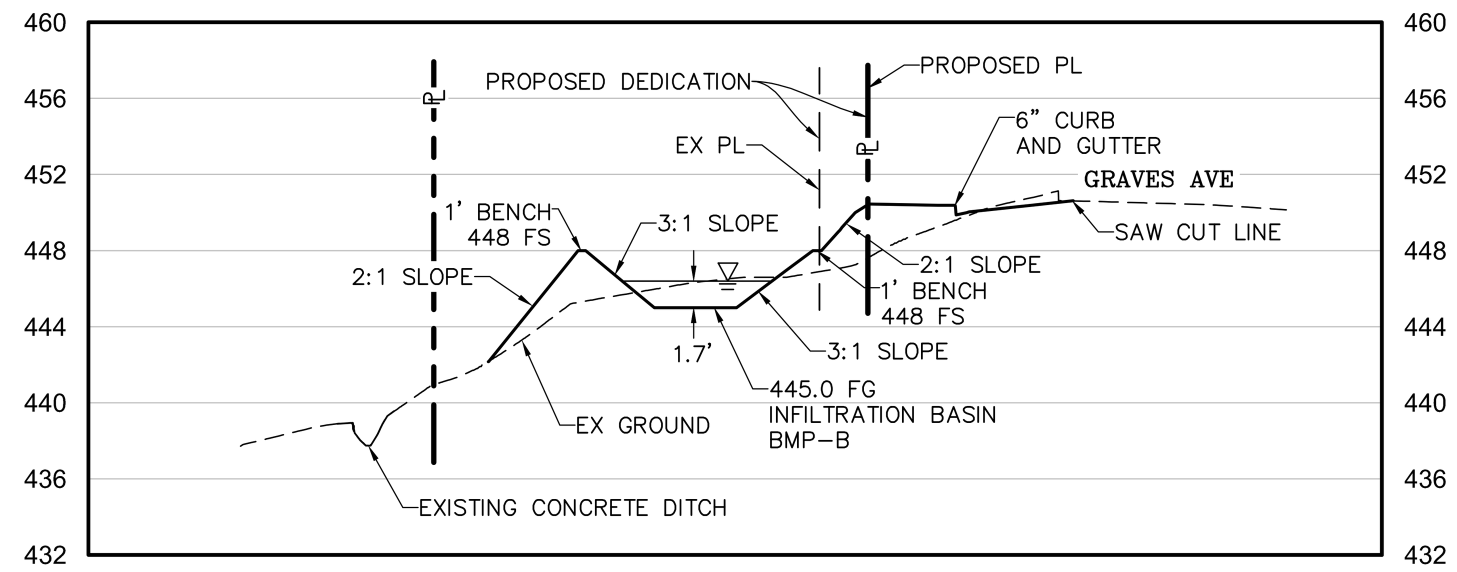
BENCH MARK # 2143
STANDARD STREET SURVEY MONUMENT STAMPED RCE 21944 PER R.O.S. 10733. CENTERLINE INTERSECTION OF HART DRIVE AND GRAVES AVENUE.
MAP: R.O.S. 10733 ELEVATION: 412.23'
HORZ. DATUM: NAD 83 VERT. DATUM: MSLD

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY
	JMW	JMW	JRR
HORIZ: AS NOTED	PLANS PREPARED UNDER THE SUPERVISION OF		
	JONATHAN RAAB RYDEEN	DATE	
VERT: AS NOTED	RCE NO. 64811	EXPIRES 6/30/19	

REVIEWED ____________

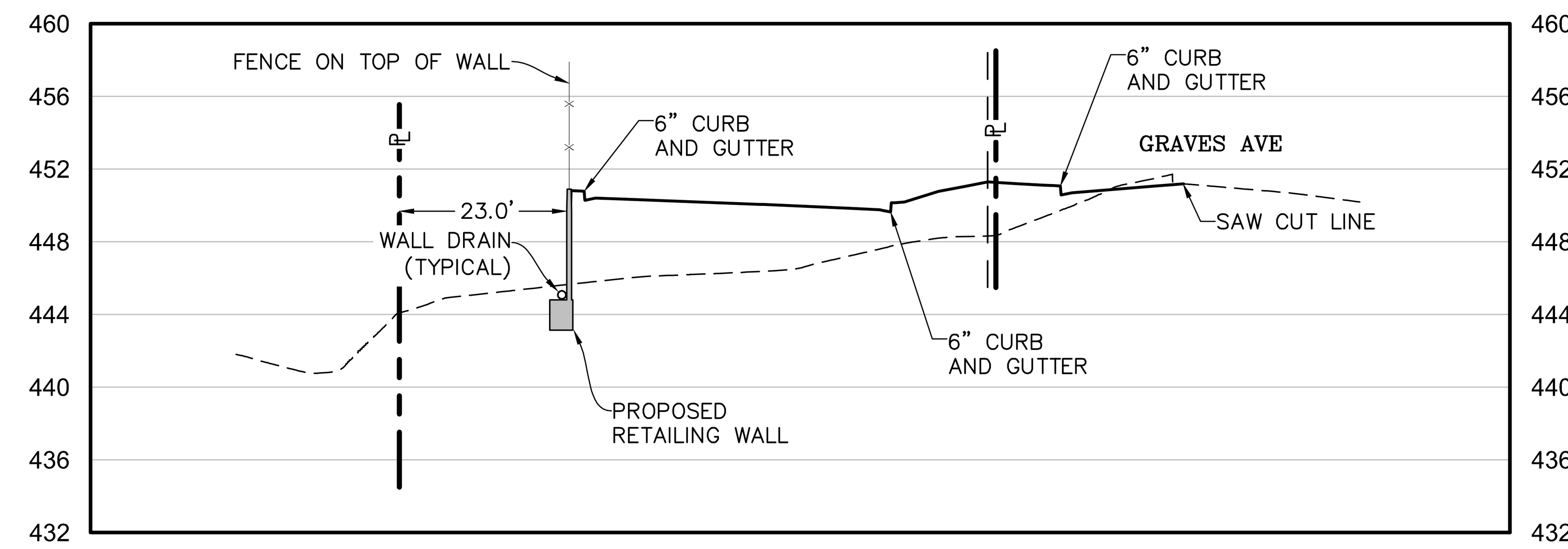
BY ____________
PROJECT ENGINEER

CITY OF SANTEE	DEPARTMENT OF DEVELOPMENT SERVICES	CITY W.O. NO.	DRAWING NO.
CURB PLAN FOR:	GRAVES COMMERCIAL APN: 384-142-21		SHEET 5 OF 10



SECTION A

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'



SECTION B

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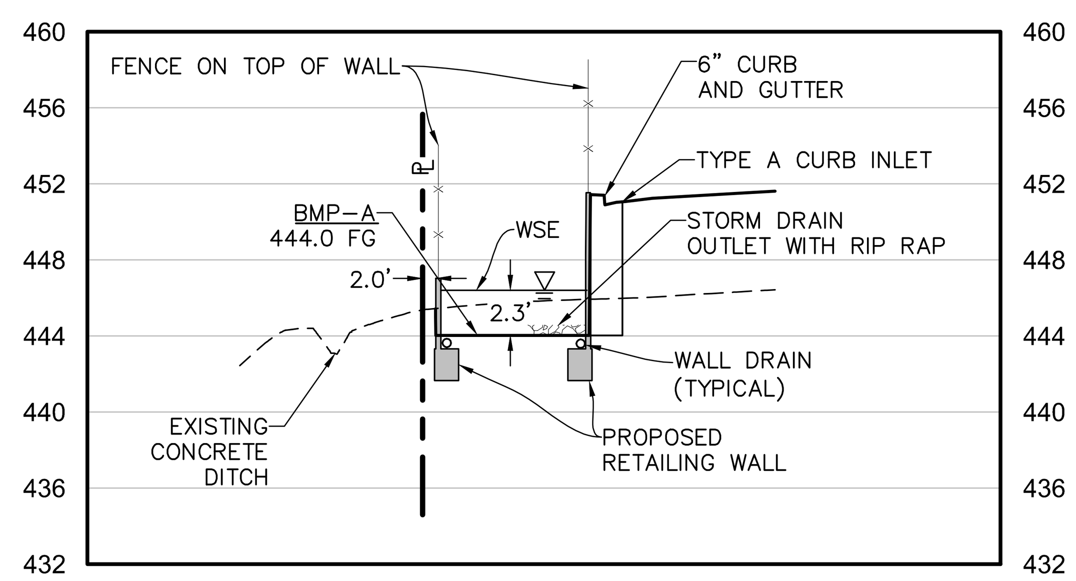
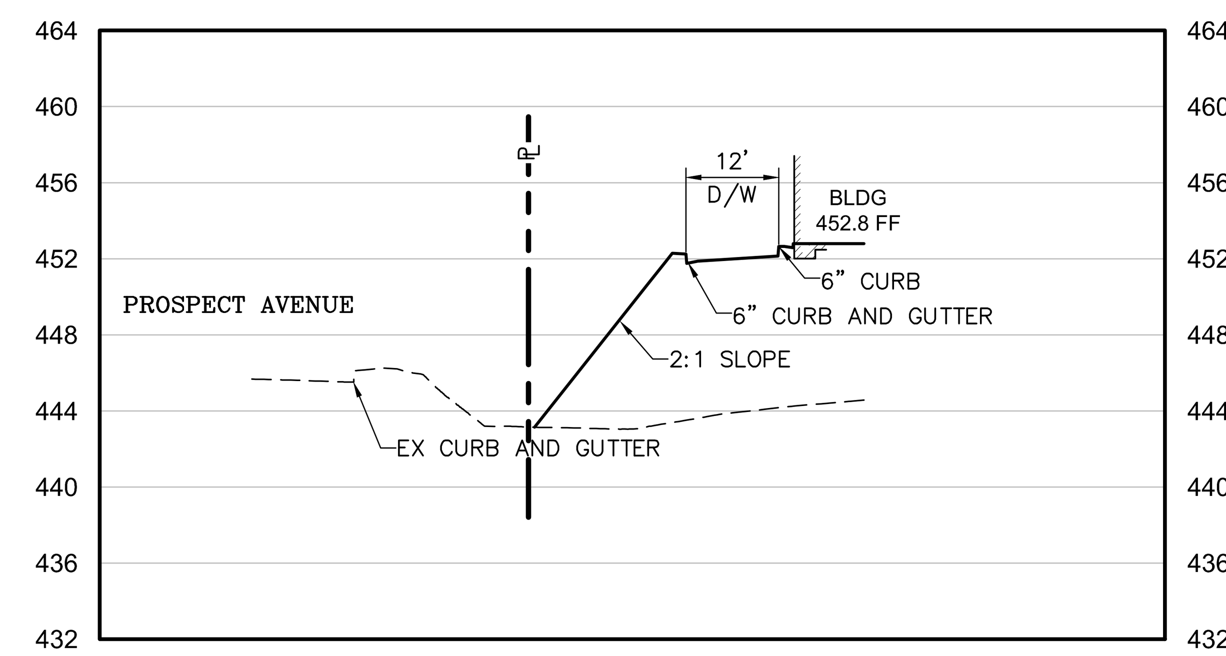


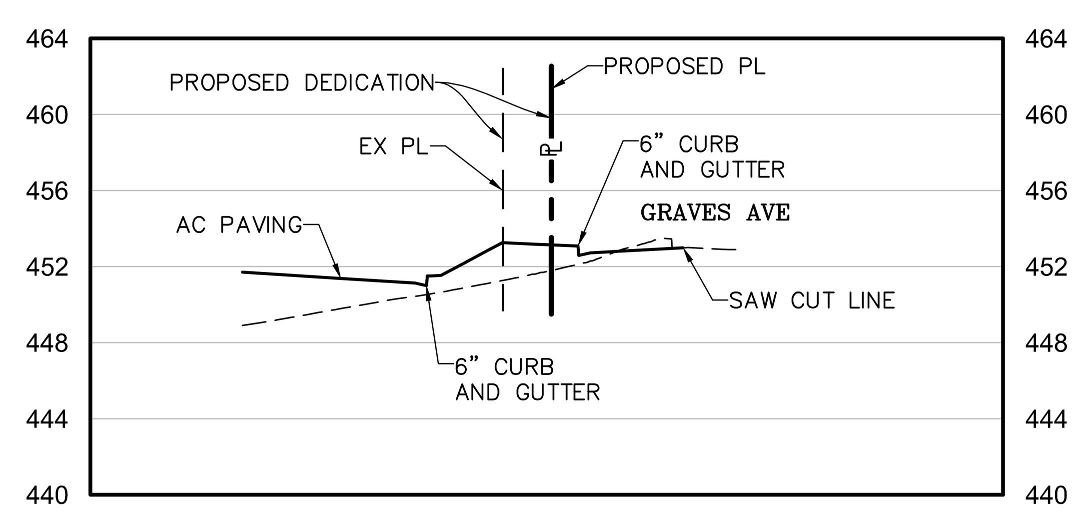
SECTION C

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'



SECTION D

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'



SECTION E

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'

REGISTERED PROFESSIONAL ENGINEER JONATHAN RAAB RYDEEN RCE – 64811 EXP 6/30/19 CIVIL STATE OF CALIFORNIA

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(619)232–9200 (619)232–9210 Fax

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR					
INSPECTOR					
DATE COMPLETED					

BENCH MARK # 2143
STANDARD STREET SURVEY MONUMENT STAMPED RCE 21944 PER R.O.S. 10733. CENTERLINE INTERSECTION OF HART DRIVE AND GRAVES AVENUE.
MAP: R.O.S. 10733 ELEVATION: 412.23'
HORZ. DATUM: NAD 83 VERT. DATUM: MSLD

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY
	JMW	JMW	JRR
HORIZ: AS NOTED	PLANS PREPARED UNDER THE SUPERVISION OF		
VERT: AS NOTED	JONATHAN RAAB RYDEEN DATE	RCE NO. 64811 EXPIRES 6/30/19	

REVIEWED
BY
PROJECT ENGINEER

CITY OF SANTEE
DEPARTMENT OF DEVELOPMENT SERVICES
CITY W.O. NO.
DRAWING NO.
SITE CROSS SECTIONS FOR:
GRAVES COMMERCIAL
APN: 384-142-21

SAVE DATE: 1/28/2019 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Civil\Grading Plan\Rough Grading Plan\Grading Plan.dwg

STORM DRAIN DATA TABLE (PVT)

#	BEARING/DELTA	RADIUS	LENGTH	NOTES
L1	N 33°42'38" W		129.80'	18" RCP
L2	N 56°17'35" E		12.33'	18" RCP
L3	N 88°20'56" W		104.83'	18" PVC
L4	N 37°15'37" W		21.70'	12" PVC
L5	N 32°04'34" E		22.98'	18" RCP
L6	N 32°13'51" W		44.87'	12" PVC
L7	N 03°25'25" E		122.50'	12" PVC

BMP TABLE

DMA	SUB-DMA	TOTAL AREA (SF)	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	SELF-MITIGATING AREA (SF)	TREATMENT TYPE	TREATMENT REQUIRED (SF)	TREATMENT PROVIDED (SF)
A	A-1	1909	1909	0	0	INFILTRATION BASIN (BMP-A)	363	925
	A-2	1062	1062	0	0			
	A-3	13035	10498	2480	57			
	A-4	11787	11787	0	0			
	SM-A-4	5228	0	0	5228	N/A	N/A	N/A
	SM-A-5	8024	0	0	8024	N/A	N/A	N/A
B	B-1	6545	5147	1398	0	INFILTRATION BASIN (BMP-B)	112	673
	B-2	2763	2763	0	0			
	SM-B-2	11959	0	0	11959	N/A	N/A	N/A
C	C-1	170	170	0	0	N/A	N/A	N/A
D	D-1	433	433	0	0	N/A	N/A	N/A
	TOTAL:	62915	33769	3878	25268			

NOTE:

SEE IMPROVEMENT PLAN DWG. NO. XXXXX FOR WATER AND SEWER INFORMATION.

20 10 0 20 40 60

SCALE: 1" = 20'

REGISTERED PROFESSIONAL ENGINEER
JONATHAN RAAB RYDEEN
RCE ~ 64811
EXP 6/30/19
CIVIL
STATE OF CALIFORNIA

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BENCH MARK # 2143
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SCALE
HORIZ: AS NOTED
VERT: AS NOTED

DESIGNED BY	DRAWN BY	CHECKED BY
JMW	JMW	JRR

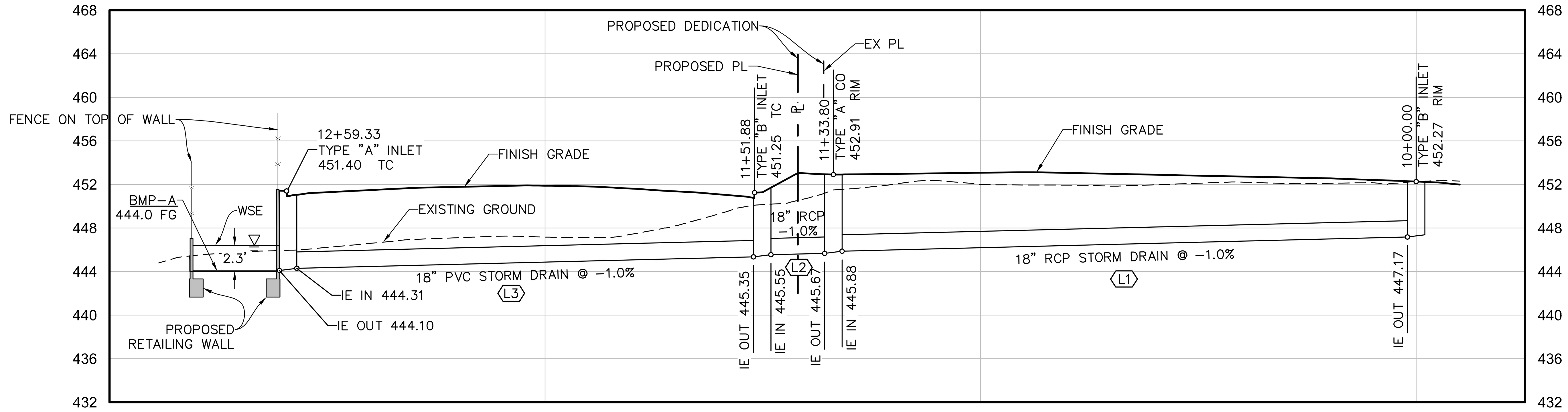
PLANS PREPARED UNDER THE SUPERVISION OF
JONATHAN RAAB RYDEEN DATE
RCE NO. 64811 EXPIRES 6/30/19

REVIEWED
BY
PROJECT ENGINEER

CITY OF SANTEE
DEPARTMENT OF DEVELOPMENT SERVICES
STORM DRAIN PLAN FOR:
GRAVES COMMERCIAL
APN: 384-142-21

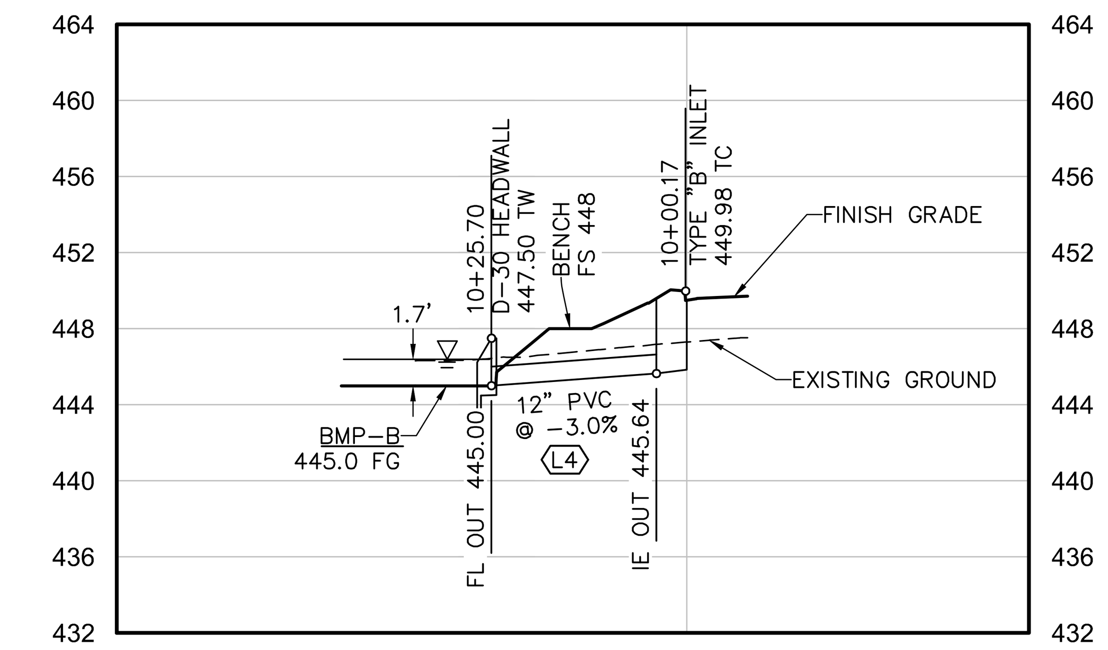
CITY W.O. NO.
DRAWING NO.

SAVE DATE: 1/28/2019 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Civil\Grading Plan\Rough Grading Plan\Grading Plan.dwg



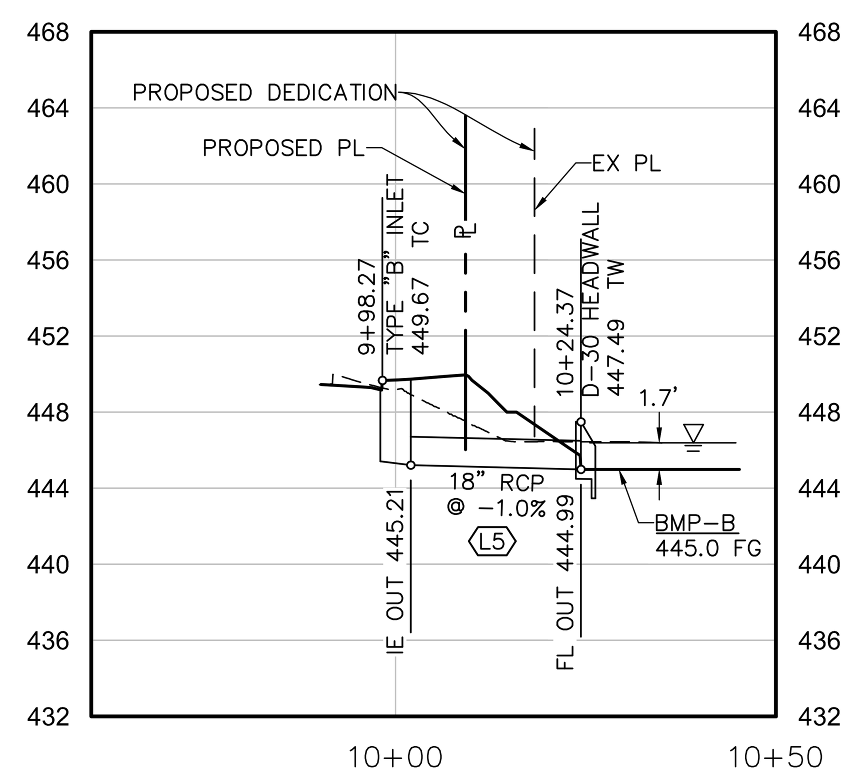
SD-1 - PROFILE

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'



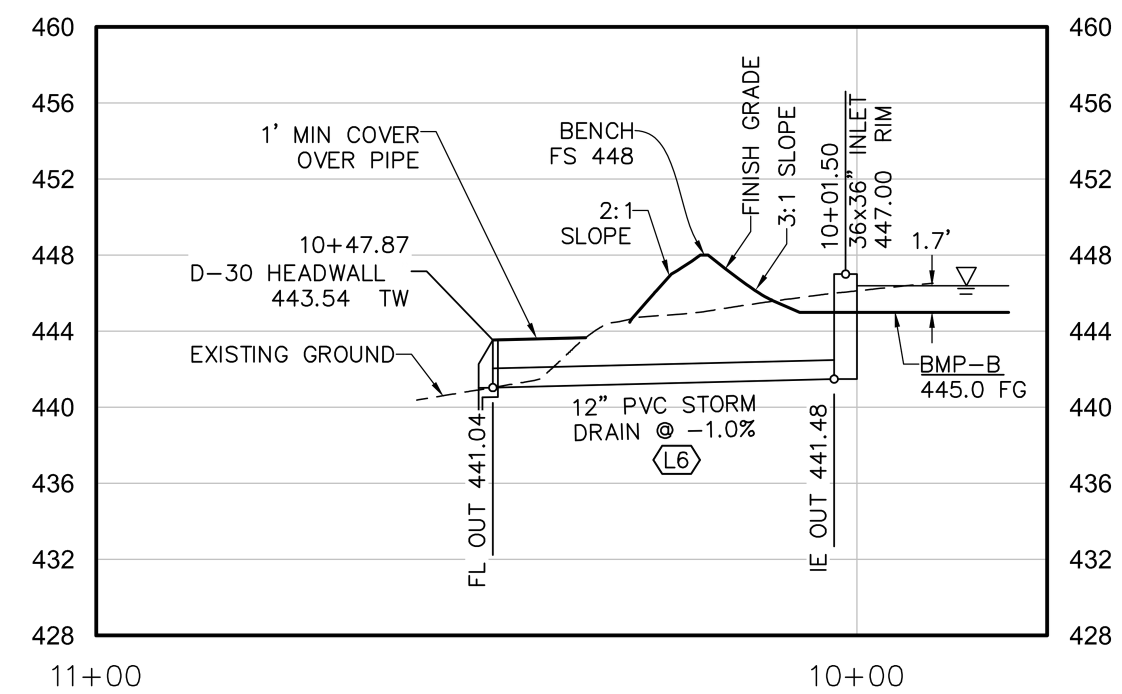
SD-2 - PROFILE

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'



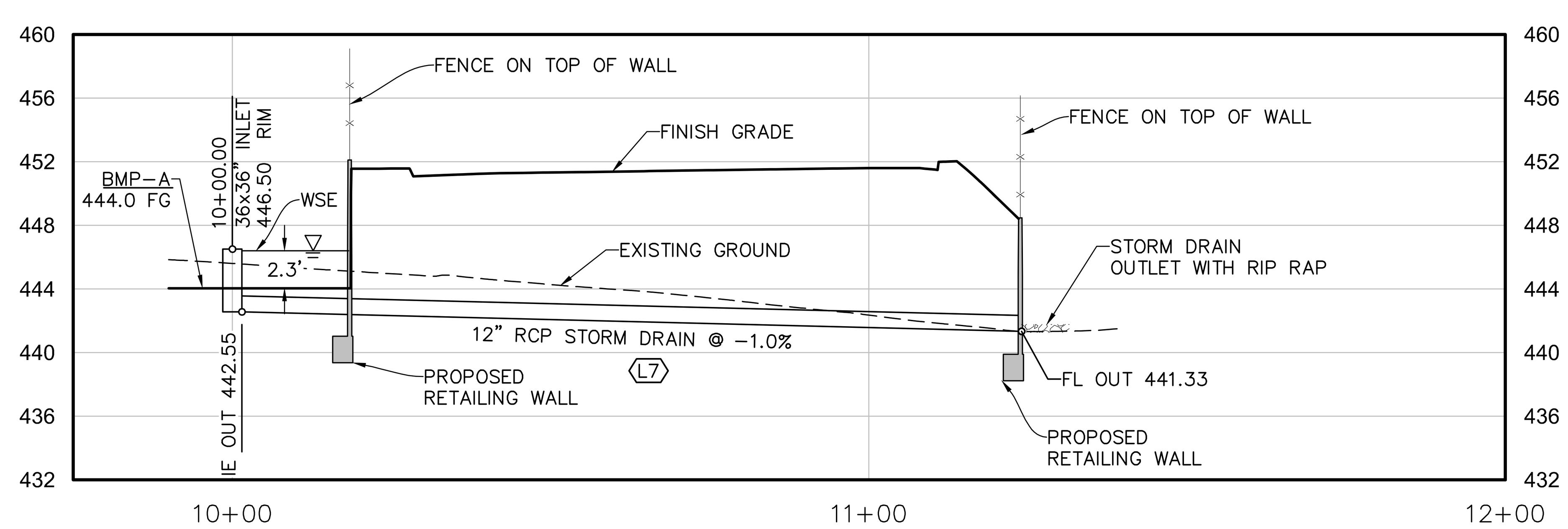
SD-3 - PROFILE

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'



SD-4 - PROFILE

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'



SD-5 - PROFILE

SCALE: HORZ: 1" = 20'
VERT: 1" = 8'

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(619)232-9200 (619)232-9210 Fax

CONSTRUCTION RECORD | REFERENCES | DATE | BY | REVISIONS | ACPTD

CONTRACTOR
INSPECTOR
DATE COMPLETED

BENCH MARK # 2143
STANDARD STREET SURVEY MONUMENT STAMPED RCE 21944 PER R.O.S. 10733. CENTERLINE INTERSECTION OF HART DRIVE AND GRAVES AVENUE.
MAP: R.O.S. 10733 ELEVATION: 412.23'
HORZ. DATUM: NAD 83 VERT. DATUM: MSLD

SCALE
HORIZ: AS NOTED
VERT: AS NOTED

DESIGNED BY	DRAWN BY	CHECKED BY
JMW	JMW	JRR

PLANS PREPARED UNDER THE SUPERVISION OF
JONATHAN RAAB RYDEEN DATE
RCE NO. 64811 EXPIRES 6/30/19

REVIEWED
BY
PROJECT ENGINEER

CITY OF SANTEE
DEPARTMENT OF DEVELOPMENT SERVICES
STORM DRAIN PROFILES FOR:
GRAVES COMMERCIAL
APN: 384-142-21

CITY W.O. NO.
DRAWING NO.
SHEET 8 OF 10

SAVE DATE: 1/28/2019 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Civil\Grading Plan\Rough Grading Plan\Grading Plan.dwg

GRAVES COMMERCIAL

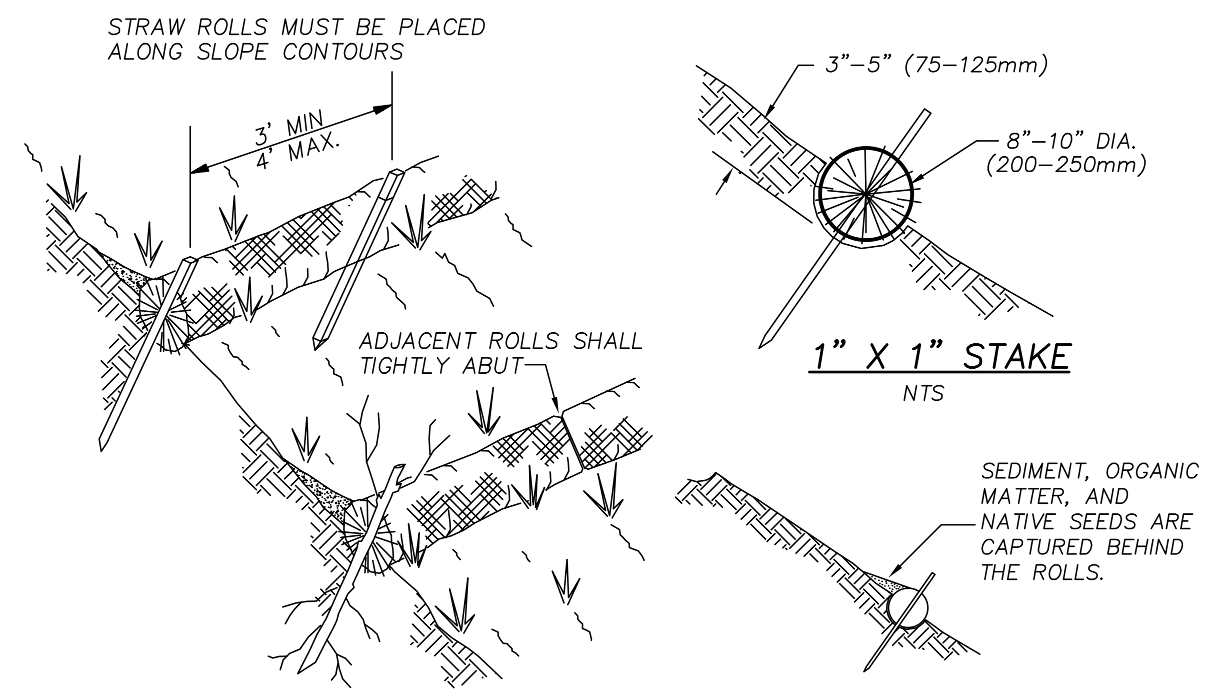
EROSION CONTROL - CITY OF SANTEE

NOTE:

1. STORM WATER CONTROL MEASURES SHOWN HEREON ARE BEST MANAGEMENT PRACTICES FOR THIS SITE BASED ON THE ANTICIPATED PROGRESS OF THE WORK. ADDITIONAL MEASURES MAY BE REQUIRED AT ANY TIME AT THE DISCRETION OF THE CITY ENGINEER OF DEVELOPMENT SERVICES AS THE WORK PROGRESSES. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE ADEQUATE IS PROTECTION IN PLACE AT ALL TIMES TO PREVENT ANY DISCHARGE OF POLLUTANTS, INCLUDING SEDIMENT, FROM THE EXPOSED SITE AREAS.
2. TO PROTECT UNDERGROUND DETENTION SYSTEM DURING CONSTRUCTION CONTRACTOR TO UTILIZE SE-10 THROUGHOUT CONSTRUCTION UNTIL PROJECT IS COMPLETE

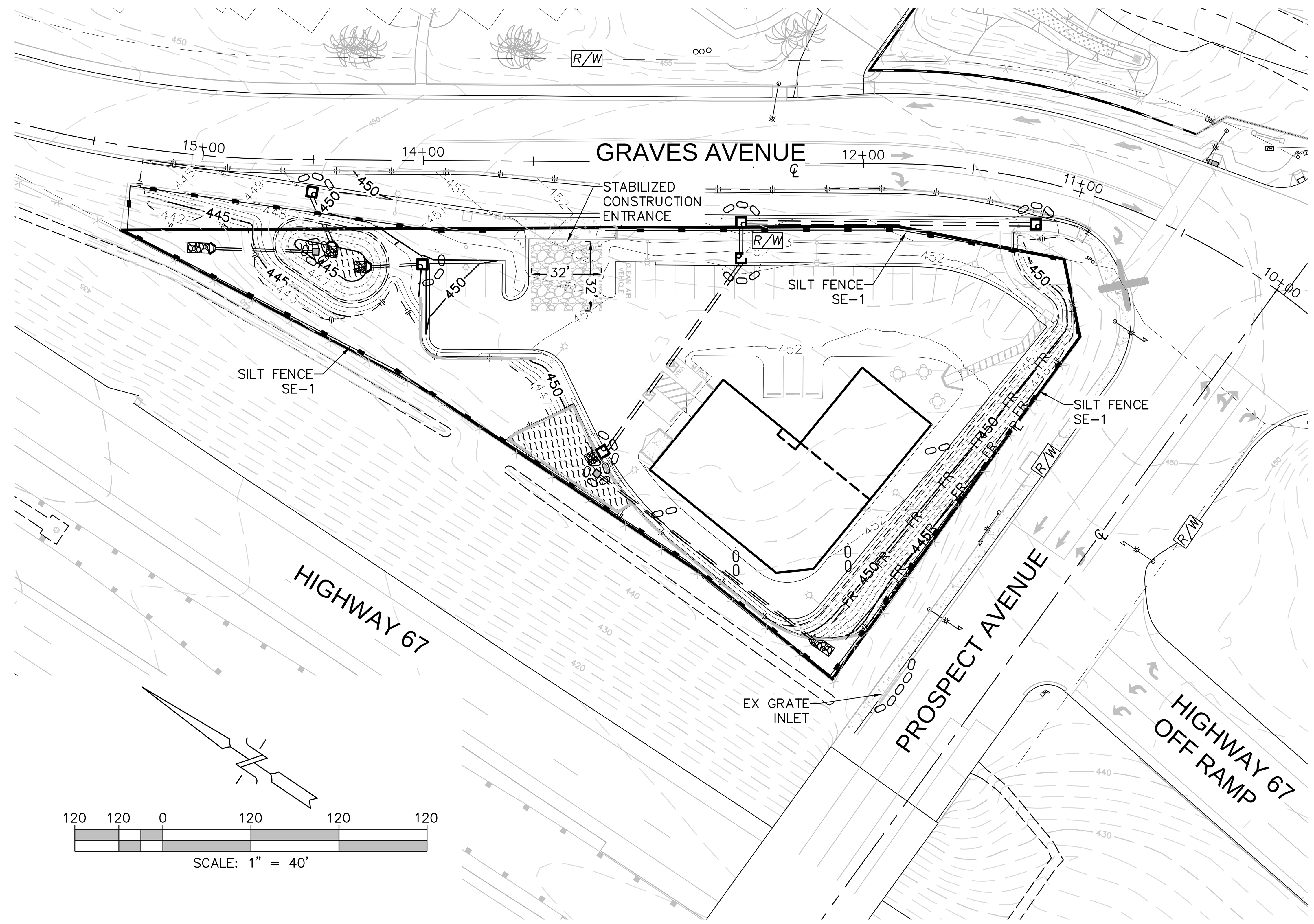
LEGEND

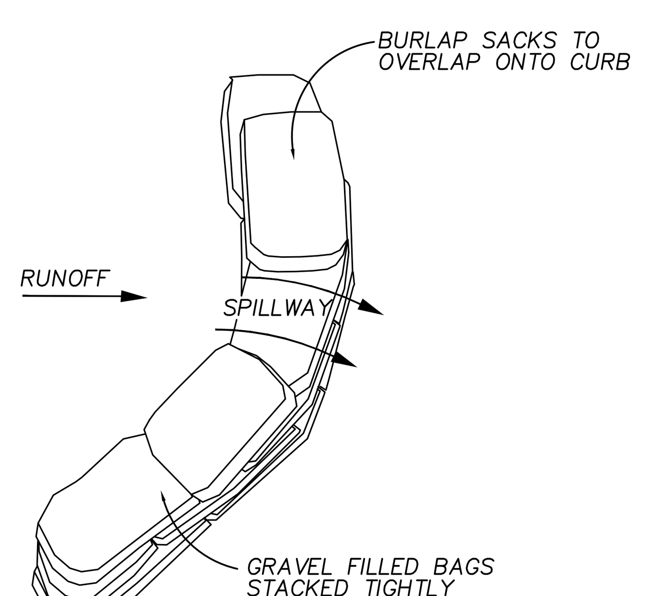
ITEM	CASQUA #	SYMBOL
RIPRAP ENERGY DISSIPATOR	SS-10	
SILT FENCE	SE-1	
STORM DRAIN INLET PROTECTION	SE-10	
GRAVEL BAGS	SE-6, SE-8	
STABILIZED CONSTRUCTION ENTRANCE	TC-1	
FIBER ROLL:	SE-5	—FR——FR—



NOTE:
1. STRAW ROLL INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE ROLL IN A TRENCH, 3"-5" (75-125mm) DEEP, DUG ON CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.

FIBER ROLLS
NTS

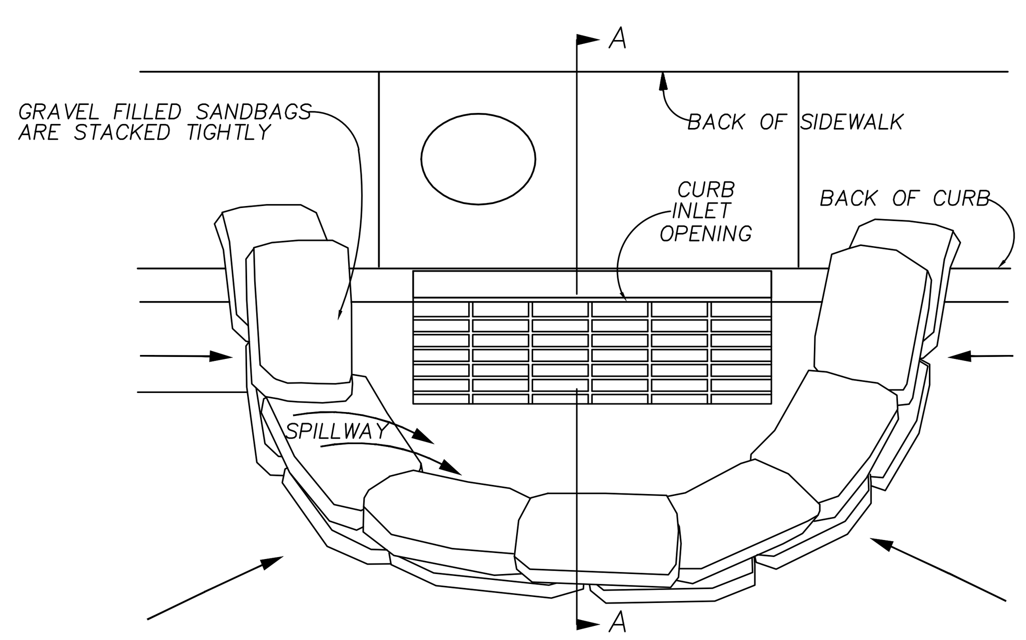




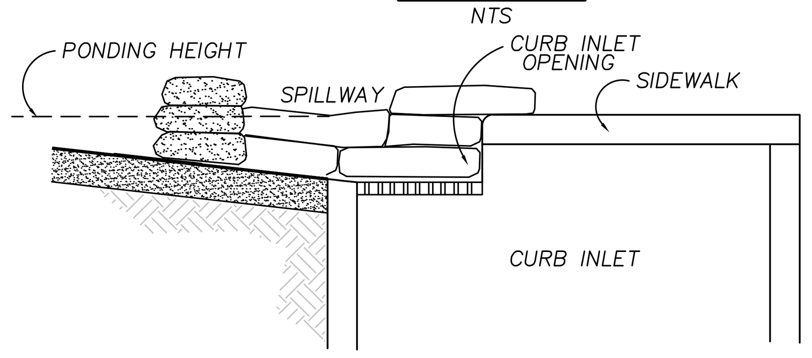
PLAN VIEW

NOTES:
1. PLACE CURB TYPE SEDIMENT BARRIERS ON GENTLY SLOPING SEGMENTS, WHERE WATER CAN POND AND ALLOW SEDIMENT TO SEPARATE FROM RUNOFF.
2. BAGS OF EITHER BURLAP OR WOVEN GEOTEXTILE FABRIC, ARE FILLED WITH GRAVEL, LAYERED AND PACKED TIGHTLY.
3. LEAVE A ONE GRAVELBAG GAP IN THE TOP ROW TO PROVIDE A SPILLWAY FOR OVERFLOW.
4. INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT. SEDIMENT AND GRAVEL MUST BE REMOVED FROM THE TRAVELED WAY IMMEDIATELY.

GRAVEL BAG BARRIER
NTS

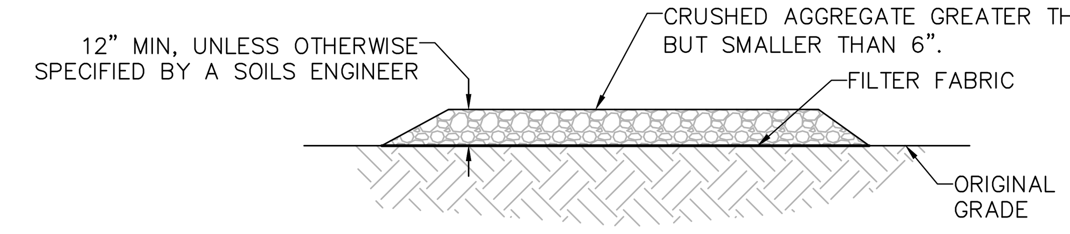


PLAN VIEW
NTS



SECTION A – A
NTS

CURB INLET BARRIER
NTS



SECTION B–B
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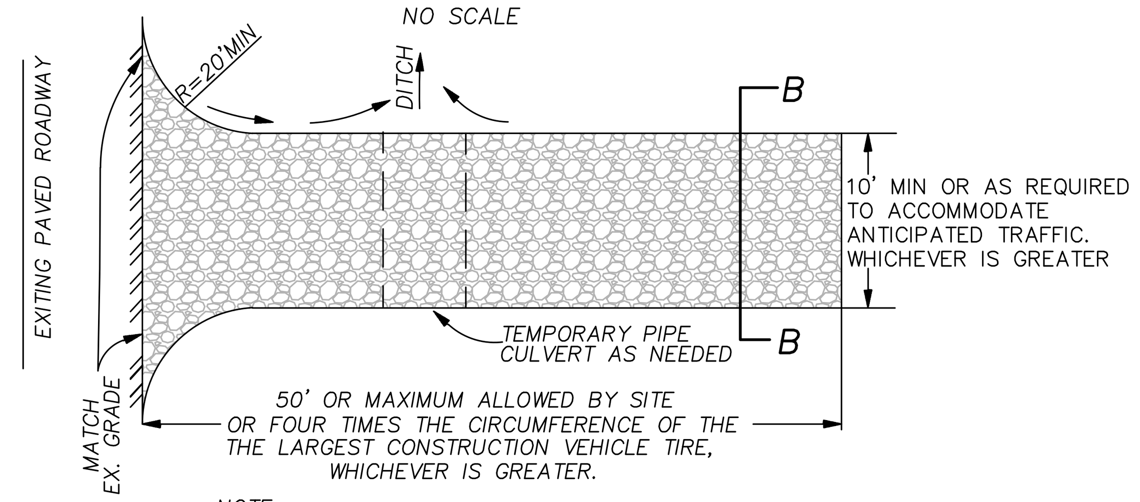
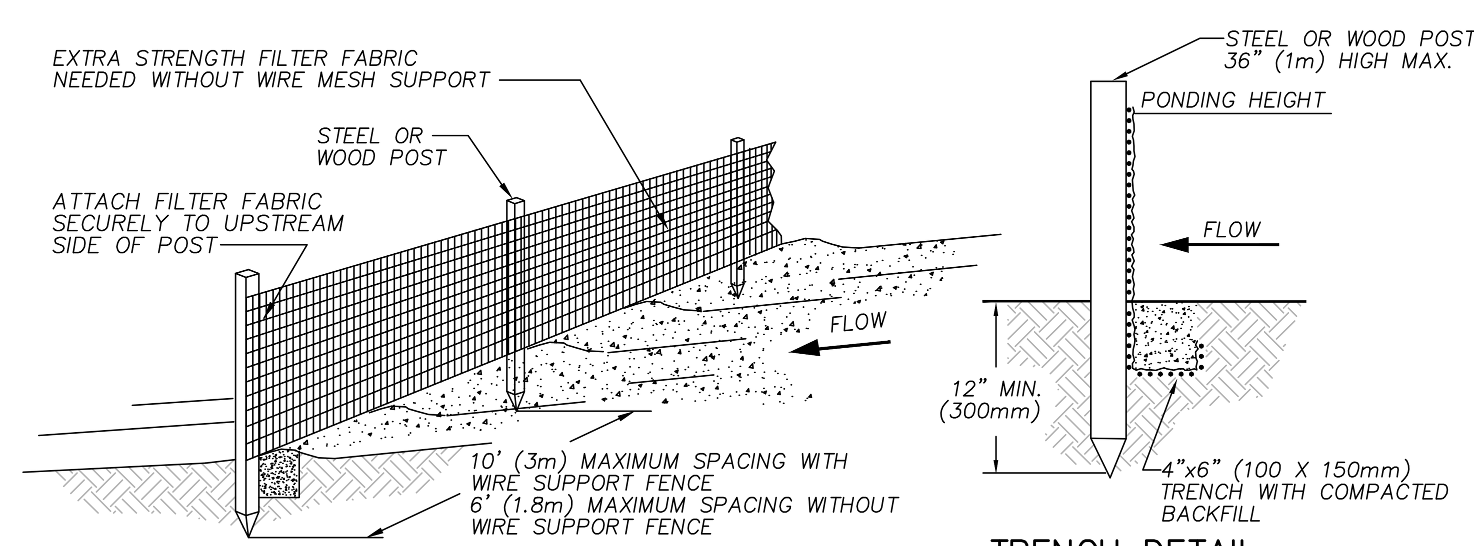


NOTE:
CONSTRUCTION SEDIMENT BARRIER AND CHANNELIZE RUNOFF TO SEDIMENT TRAPPING DEVICE.

DETAIL: STABILIZED CONSTRUCTION ENTRANCE
NO SCALE



TRENCH DETAIL
NTS

NOTES:
1.– SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2.– INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 9" (225mm) MAXIMUM RECOMMENDED STORAGE HEIGHT.
3.– REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.

SILT FENCE

REGISTERED PROFESSIONAL ENGINEER JONATHAN RAAB RYDEEN RCE ~ 64811 EXP 6/30/19 CIVIL STATE OF CALIFORNIA

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(619)232-9200 (619)232-9210 Fax

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD	BENCH MARK # 2143	SCALE	DESIGNED BY	DRAWN BY	CHECKED BY		CITY OF SANTEE	DEPARTMENT OF DEVELOPMENT SERVICES	CITY W.O. NO.	DRAWING NO.
CONTRACTOR ____						STANDARD STREET SURVEY MONUMENT STAMPED RCE 21944 PER R.O.S. 10733. CENTERLINE INTERSECTION OF HART DRIVE AND GRAVES AVENUE.	HORIZ: AS NOTED	JMW	JMW	JRR	REVIEWED ____	EROSION CONTROL PLAN FOR:	GRAVES COMMERCIAL APN: 384-142-21		
INSPECTOR ____						MAP: R.O.S. 10733 ELEVATION: 412.23'		PLANS PREPARED UNDER THE SUPERVISION OF							
DATE COMPLETED ____						HORZ. DATUM: NAD 83 VERT. DATUM: MSLD	VERT: AS NOTED	JONATHAN RAAB RYDEEN RCE NO. 64811	DATE ____ EXPIRES 6/30/19		BY ____ PROJECT ENGINEER				SHEET 9 OF 10

SAVE DATE: 1/28/2019 ~ PLOT DATE: 1/29/2019 ~ FILE NAME: P:\Acad\1175 Graves Commercial\Civil\Grading Plan\Rough Grading Plan\Grading Plan.dwg

CHAPTER 9 – APPENDICES

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NOAA Atlas 14, Volume 6, Version 2
Location name: Santee, California, USA*
Latitude: 32.8315°, Longitude: -116.9612°
Elevation: 449.14 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.115 (0.097–0.138)	0.145 (0.122–0.175)	0.185 (0.155–0.224)	0.219 (0.182–0.266)	0.265 (0.212–0.335)	0.302 (0.236–0.389)	0.340 (0.259–0.449)	0.379 (0.281–0.516)	0.433 (0.307–0.617)	0.475 (0.325–0.702)
10-min	0.165 (0.139–0.198)	0.208 (0.175–0.250)	0.266 (0.222–0.321)	0.314 (0.260–0.382)	0.380 (0.305–0.480)	0.433 (0.339–0.558)	0.487 (0.371–0.644)	0.543 (0.402–0.740)	0.621 (0.440–0.884)	0.681 (0.466–1.01)
15-min	0.199 (0.168–0.240)	0.251 (0.211–0.303)	0.321 (0.269–0.388)	0.379 (0.315–0.462)	0.460 (0.368–0.580)	0.523 (0.410–0.674)	0.589 (0.449–0.779)	0.657 (0.487–0.895)	0.751 (0.532–1.07)	0.824 (0.564–1.22)
30-min	0.277 (0.233–0.333)	0.350 (0.293–0.421)	0.447 (0.374–0.539)	0.527 (0.438–0.642)	0.640 (0.512–0.807)	0.727 (0.570–0.938)	0.818 (0.625–1.08)	0.913 (0.677–1.25)	1.04 (0.740–1.49)	1.15 (0.784–1.69)
60-min	0.392 (0.330–0.471)	0.494 (0.415–0.595)	0.632 (0.529–0.762)	0.746 (0.619–0.908)	0.904 (0.724–1.14)	1.03 (0.806–1.33)	1.16 (0.883–1.53)	1.29 (0.957–1.76)	1.48 (1.05–2.10)	1.62 (1.11–2.39)
2-hr	0.541 (0.455–0.650)	0.679 (0.570–0.817)	0.864 (0.724–1.04)	1.02 (0.845–1.24)	1.23 (0.986–1.55)	1.40 (1.10–1.80)	1.57 (1.20–2.08)	1.75 (1.30–2.39)	2.00 (1.42–2.85)	2.20 (1.50–3.25)
3-hr	0.650 (0.547–0.781)	0.816 (0.685–0.982)	1.04 (0.869–1.25)	1.22 (1.01–1.49)	1.48 (1.18–1.86)	1.68 (1.32–2.16)	1.89 (1.44–2.50)	2.10 (1.56–2.87)	2.40 (1.70–3.42)	2.64 (1.80–3.89)
6-hr	0.867 (0.729–1.04)	1.09 (0.917–1.32)	1.39 (1.17–1.68)	1.64 (1.36–2.00)	1.98 (1.59–2.50)	2.25 (1.76–2.90)	2.53 (1.93–3.35)	2.82 (2.09–3.84)	3.22 (2.28–4.58)	3.53 (2.42–5.22)
12-hr	1.14 (0.961–1.37)	1.46 (1.23–1.76)	1.88 (1.57–2.27)	2.22 (1.85–2.71)	2.70 (2.16–3.40)	3.07 (2.40–3.95)	3.44 (2.63–4.56)	3.83 (2.84–5.22)	4.37 (3.10–6.22)	4.78 (3.27–7.06)
24-hr	1.44 (1.26–1.67)	1.86 (1.64–2.16)	2.42 (2.12–2.82)	2.88 (2.50–3.38)	3.50 (2.96–4.24)	3.98 (3.30–4.91)	4.47 (3.62–5.64)	4.98 (3.93–6.44)	5.67 (4.30–7.62)	6.20 (4.56–8.61)
2-day	1.80 (1.59–2.09)	2.36 (2.07–2.74)	3.09 (2.71–3.59)	3.68 (3.20–4.32)	4.49 (3.79–5.43)	5.11 (4.23–6.30)	5.75 (4.65–7.25)	6.40 (5.05–8.28)	7.29 (5.53–9.80)	7.97 (5.86–11.1)
3-day	2.00 (1.76–2.32)	2.64 (2.32–3.06)	3.48 (3.05–4.05)	4.16 (3.62–4.88)	5.09 (4.30–6.16)	5.81 (4.81–7.16)	6.54 (5.29–8.25)	7.30 (5.75–9.44)	8.32 (6.32–11.2)	9.12 (6.70–12.7)
4-day	2.17 (1.91–2.52)	2.87 (2.53–3.34)	3.80 (3.34–4.43)	4.56 (3.97–5.35)	5.60 (4.72–6.77)	6.40 (5.29–7.89)	7.21 (5.84–9.09)	8.06 (6.35–10.4)	9.21 (6.99–12.4)	10.1 (7.43–14.0)
7-day	2.60 (2.29–3.02)	3.45 (3.03–4.01)	4.57 (4.01–5.32)	5.50 (4.78–6.45)	6.76 (5.70–8.18)	7.74 (6.41–9.54)	8.74 (7.08–11.0)	9.79 (7.72–12.7)	11.2 (8.51–15.1)	12.3 (9.06–17.1)
10-day	2.89 (2.54–3.35)	3.84 (3.37–4.45)	5.10 (4.47–5.93)	6.13 (5.34–7.19)	7.56 (6.38–9.15)	8.67 (7.18–10.7)	9.81 (7.94–12.4)	11.0 (8.67–14.2)	12.6 (9.58–17.0)	13.9 (10.2–19.3)
20-day	3.48 (3.06–4.03)	4.65 (4.09–5.40)	6.22 (5.46–7.24)	7.53 (6.55–8.83)	9.34 (7.88–11.3)	10.8 (8.90–13.3)	12.2 (9.88–15.4)	13.7 (10.8–17.8)	15.8 (12.0–21.3)	17.5 (12.8–24.3)
30-day	4.16 (3.66–4.82)	5.58 (4.90–6.47)	7.49 (6.56–8.71)	9.08 (7.90–10.6)	11.3 (9.53–13.7)	13.0 (10.8–16.1)	14.8 (12.0–18.7)	16.7 (13.2–21.6)	19.3 (14.6–26.0)	21.3 (15.7–29.6)
45-day	4.82 (4.24–5.59)	6.48 (5.69–7.52)	8.72 (7.65–10.2)	10.6 (9.22–12.4)	13.2 (11.2–16.0)	15.3 (12.7–18.9)	17.4 (14.1–22.0)	19.7 (15.5–25.5)	22.8 (17.3–30.6)	25.2 (18.5–35.0)
60-day	5.53 (4.86–6.41)	7.43 (6.53–8.63)	10.0 (8.77–11.7)	12.2 (10.6–14.3)	15.2 (12.8–18.4)	17.6 (14.6–21.7)	20.1 (16.2–25.3)	22.7 (17.9–29.3)	26.2 (19.9–35.3)	29.1 (21.4–40.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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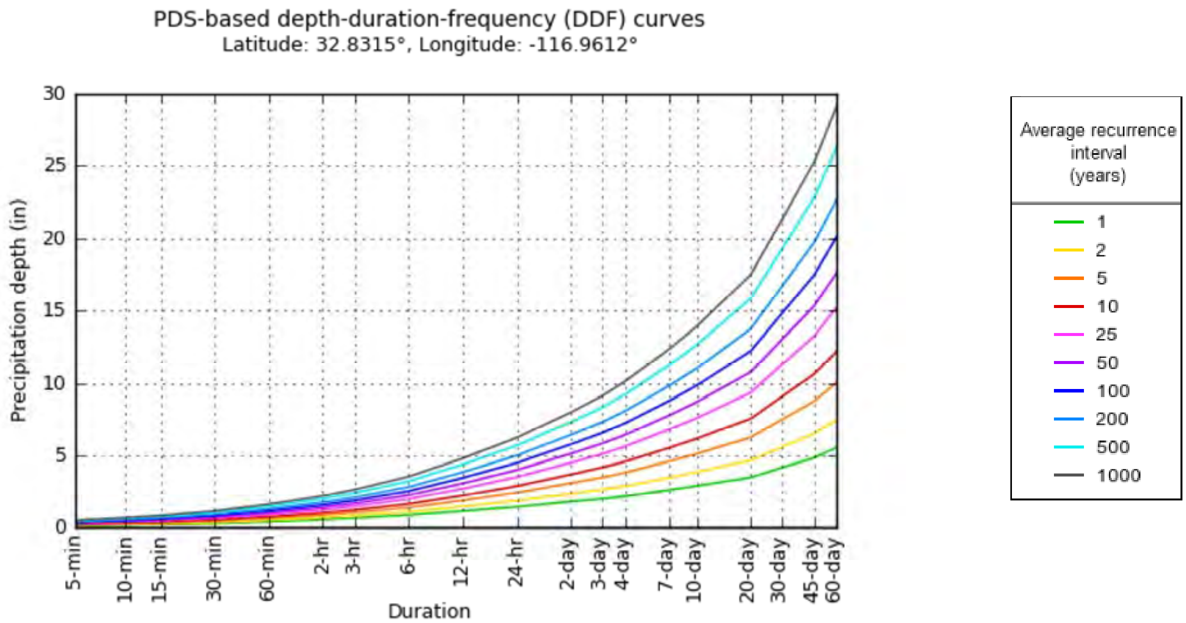
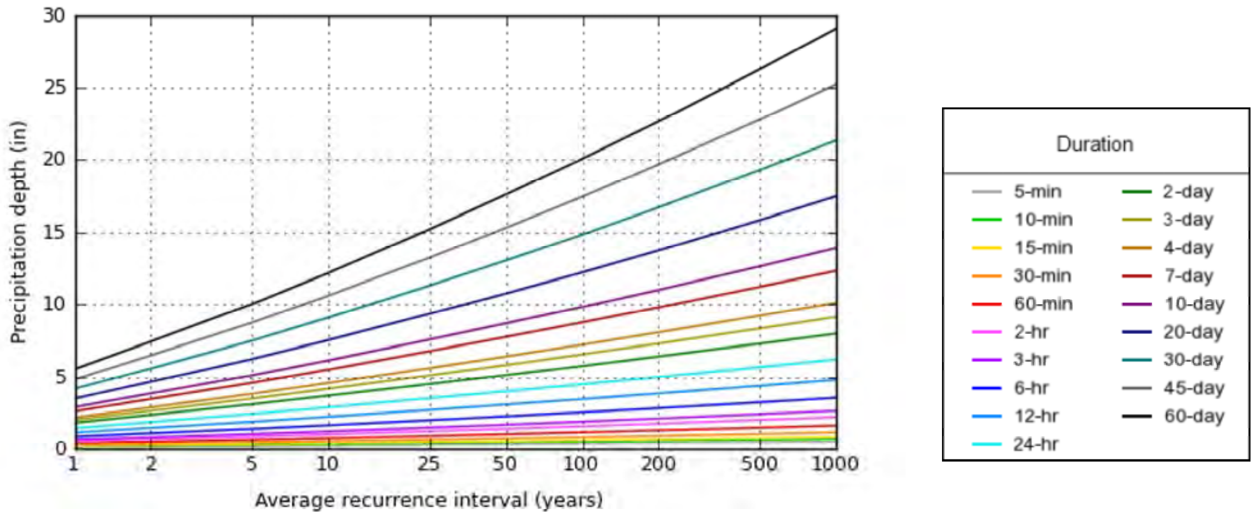
PF graphical





NOAA Atlas 14, Volume 6, Version 2 Created (GMT): Tue Dec 5 20:39:30 2017

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Maps & aerials

Small scale terrain

Large scale terrain

Large scale map

Large scale aerial

[Back to Top]

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Map Scale: 1:1,570 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 20, 40, 80, 120

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 12, Sep 13, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RaC	Ramona sandy loam, 5 to 9 percent slopes	C	0.0	0.9%
VaD	Visalia sandy loam, 9 to 15 percent slopes	A	4.0	99.1%
Totals for Area of Interest			**4.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

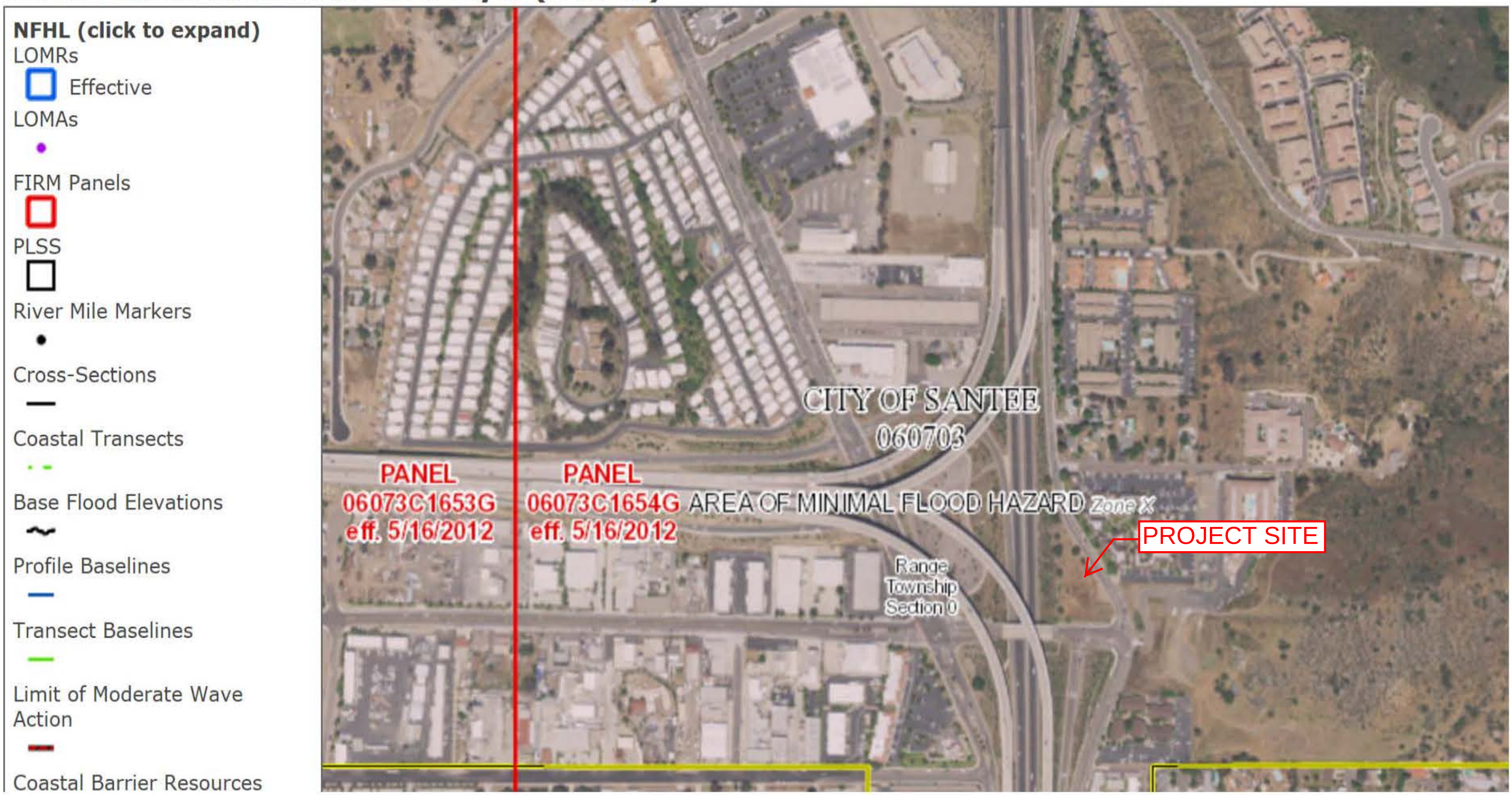
A — A	Cross section line
23 — 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE	1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 FT	5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 19, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 16, 2012 – to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update map elevations to North American Vertical Datum of 1988.

FEMA's National Flood Hazard Layer (Official)



GROUP DELTA

August 30, 2016 (Revised September 28, 2018)

Development Contractor, Inc.
110 Town Center Parkway
Santee, CA 92071

Attention: Michael Grant, President

SUBJECT: **Infiltration Testing Results**
8606 Graves Avenue
Santee, California

Mr. Grant:

In accordance with our proposal dated July 13, 2016, Group Delta Consultants, Inc. (Group Delta) is submitting the results from the infiltration testing for the proposed development of the above referenced site. Figure No. 1 shows the location of the site. We have revised this letter to respond to a comment in a City of Santee review letter dated July 18, 2017 requesting an update to incorporate the latest proposed plans.

We have based on our understanding of the project on a preliminary grading plan prepared by Walsh Engineering & Surveying dated August 30, 2017 that shows the location of the two proposed infiltration basins. The basins will be in undeveloped landscaped areas within the western portion of the site. An approximately 10-foot high Segmental Retaining Wall (SRW) will form a portion of the basin walls. The bottom elevation of the basins (441.0 and 442.5 feet) will be located a minimum horizontal distance ranging from about 25 to 30 feet from the corresponding elevation (441.0 and 442.5 feet) near the crest of an existing west facing cut slope along the eastern side of State Route 67. Figure No. 2 shows the location of the proposed infiltration basins. The latest preliminary grading is also attached for reference.

PURPOSE and SCOPE OF WORK

The purpose of our geotechnical services was to evaluate the geotechnical aspects of storm water management in accordance with the City of Santee Design Manual. The scope of work consisted of the following tasks:

- Evaluation of Feasibility for On-Site Storm Water Infiltration
- Test Boring
- Laboratory Testing
- Infiltration Testing

The following sections provide specific information about each task.

Evaluation of Feasibility for On-Site Storm Water Infiltration

Group Delta reviewed the site and subsurface conditions relative to the criteria stated in Form I-8: Categorization of Infiltration Feasibility Condition in the Work. The completed form is attached to this letter.

Test Boring

Group Delta advanced one test boring (B-1) to a depth 20.5 feet to evaluate soil characteristics and the depth of groundwater. Figure 2 shows the location of this boring. A descriptive log for this boring is attached to this letter.

Laboratory Testing

Disturbed soil samples were obtained from the test borings for particle size distribution testing to evaluate the physical characteristics of the soils. Test results are attached to this letter.

Infiltration Testing

Infiltration testing was conducted using the Borehole Percolation Test method (Riverside County Percolation Test, 2011) referenced in the Design Manual. Four tests (B-2 through B-5) were completed at the approximate locations shown on Figure No. 2. The depth of all the infiltration tests was five feet. Descriptive logs for the borings associated with these tests are attached.

FINDINGS

Evaluation of Feasibility

The feasibility screening category is "*Full Infiltration*". The completed form I-8 is attached.

Test Boring

Residual soils associated with the weathering of granite that transitioned to decomposed granite with depth were encountered in test boring B-1. The soils observed in driven split barrel samplers consisted of fine to medium grained silty sand. Based on drive sampler resistance, the relative density of these materials was dense to very dense. No groundwater was encountered.

Laboratory Testing

The soils tested were classified as Silty Sand (SM) per ASTM D2487 with average of about 29 percent fines (silt and clay). The test results are attached.

Infiltration Testing

The average design infiltration is 0.6 inches/hour. The infiltration test data is summarized in the table below.

Test Hole	Stabilized Infiltration Rate inches/hour	Design Infiltration Rate* inches/hour
B-2	1.32	0.6
B-3	0.54	0.3
B-4	2.24	1.1
B-5	0.78	0.4
	Average	**0.6**

* Design infiltration rate adopted a factor of safety of 2.0.

CONCLUSIONS

The site should be suitable for full infiltration. The average design infiltration is greater than 0.5 inches/hour, which is the recommended minimum infiltration rate for full infiltration per the Design Manual. In our opinion, it is geotechnically feasible to adopt full infiltration at the proposed basin locations. Note the following items regarding this conclusion.

- The infiltration basins will be in undeveloped, landscaped areas of the site.
- The bottom elevation of the basins (441.0 and 442.5 feet) will be located a minimum horizontal distance ranging from about 25 to 30 feet from the corresponding elevation (441.0 and 442.5 feet) near the crest of an existing west facing slope along the eastern portion of State Route 67.
- Considering the findings from test boring B-1, the existing west facing slope along the eastern portion of State Route 67 should be formed in dense to very dense residual soils and decomposed granite.
- The reinforced zone of the proposed SRWs that forms part of the basins will need to be deepened to extend below the bottom elevation of the basin.
- We understand there are no existing or proposed utilities near the proposed basins.
- Additional geotechnical considerations are discussed in the attached Form I-8.

LIMITATIONS

The conclusion and recommendations stated in this letter assume that soil and groundwater conditions do not deviate appreciably from those locally observed by Group Delta. Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and geologists practicing in this or similar localities. No warranty, express or implied, is made as to the conclusions and professional advice included in this report. We appreciate this opportunity to be of professional service. Feel free to contact the office with any questions or comments, or if you need anything else.

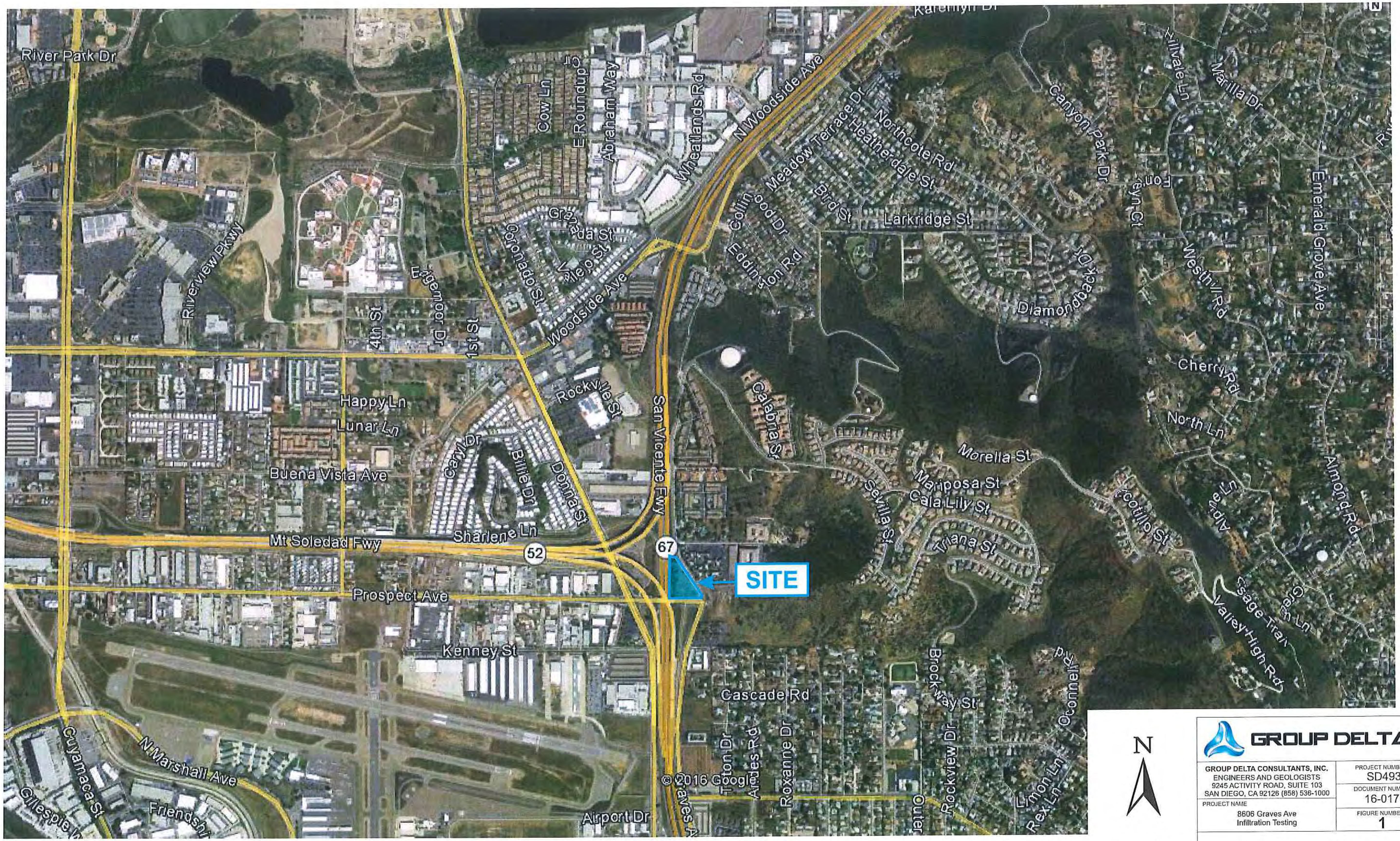
GROUP DELTA CONSULTANTS

Charles Robin (Rob) Stroop, G.E. 2298
Associate Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
CHARLES ROBIN STROOP
GE2298
Exp. 03-31-18
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments: Figure No. 1, Site Location Plan
Figure No. 2, Exploration Plan
Boring Legend and Records
Laboratory Test Results
Form I-8: Categorization of Infiltration Feasibility Condition
Preliminary Grading Plan, Walsh Engineering & Surveying, August 30, 2017

Distribution: (1) Addressee, Mr. Michael Grant (grant.michael@sbcglobal.net)
(2) Walsh Engineering & Surveying, William O'Gorman (william@walsh-engineering.com)



N

NO SCALE

Reference: Google Earth v.7.1.5.1557

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME
8606 Graves Ave
Infiltration Testing

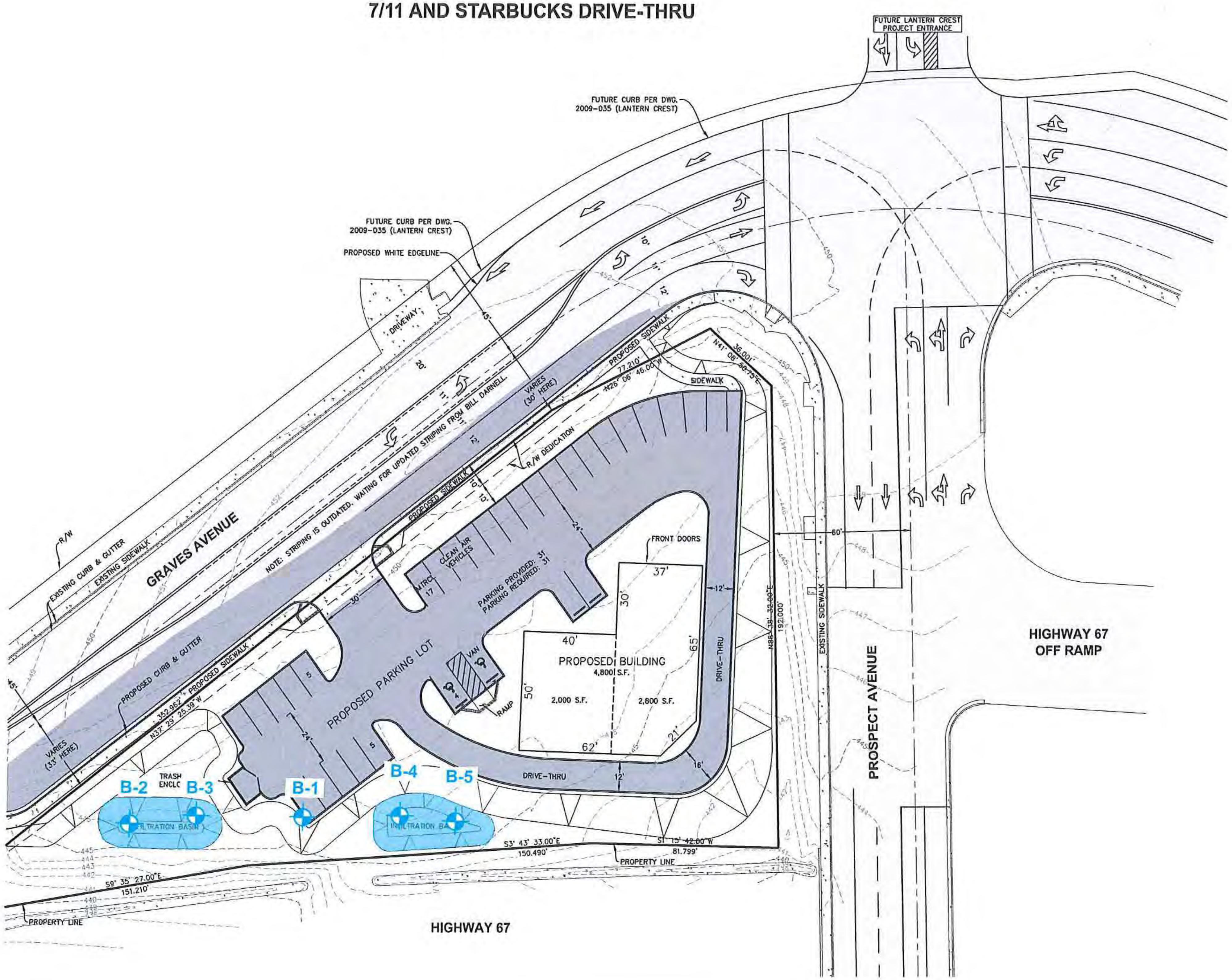
PROJECT NUMBER
SD493

DOCUMENT NUMBER
16-0170

FIGURE NUMBER
1

SITE LOCATION MAP

SITE PLAN
FOR
7/11 AND STARBUCKS DRIVE-THRU



EXPLANATION:

B-5 — Approximate location of borings.

Approximate location of storm water infiltration basins

N

NO SCALE

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NUMBER	SD493
DOCUMENT NUMBER	16-0170
PROJECT NAME: 8606 Graves Ave Infiltration Testing	FIGURE NUMBER 2

EXPLORATION PLAN

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence	Identification Components	Refer to Section: Field	Refer to Section: Lab	Required	Optional
1	Group Name	2.5.2	3.2.2	●	
2	Group Symbol	2.5.2	3.2.2	●	
	Description Components				
3	Consistency of Cohesive Soil	2.5.3	3.2.3	●	
4	Apparent Density of Cohesionless Soil	2.5.4		●	
5	Color	2.5.5		●	
6	Moisture	2.5.6		●	
7	Percent or Proportion of Soil	2.5.7	3.2.4	●	○
	Particle Size	2.5.8	2.5.8	●	○
	Particle Angularity	2.5.9			○
	Particle Shape	2.5.10			○
8	Plasticity (for fine-grained soil)	2.5.11	3.2.5		○
9	Dry Strength (for fine-grained soil)	2.5.12			○
10	Dilatency (for fine-grained soil)	2.5.13			○
11	Toughness (for fine-grained soil)	2.5.14			○
12	Structure	2.5.15			○
13	Cementation	2.5.16		●	
14	Percent of Cobbles and Boulders	2.5.17		●	
	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Describe the soil using descriptive terms in the order shown

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent or Proportion of Soil; Particle Size; Plasticity (optional).

○ = optional for non-Caltrans projects

Where applicable:

Cementation; % cobbles & boulders; Description of cobbles & boulders; Consistency field test result

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

HOLE IDENTIFICATION

Holes are identified using the following convention:

H – YY – NNN

Where:

H: Hole Type Code

YY: 2-digit year

NNN: 3-digit number (001-999)

Hole Type Code and Description

Hole Type Code	Description
A	Auger boring (hollow or solid stem, bucket)
R	Rotary drilled boring (conventional)
RC	Rotary core (self-cased wire-line, continuously-sampled)
RW	Rotary core (self-cased wire-line, not continuously sampled)
P	Rotary percussion boring (Air)
HD	Hand driven (1-inch soil tube)
HA	Hand auger
D	Driven (dynamic cone penetrometer)
CPT	Cone Penetration Test
O	Other (note on LOTB)

Description Sequence Examples:

SANDY lean CLAY (CL); very stiff; yellowish brown; moist; mostly fines; some SAND, from fine to medium; few gravels; medium plasticity; PP=2.75.

Well-graded SAND with SILT and GRAVEL and COBBLES (SW-SM); dense; brown; moist; mostly SAND, from fine to coarse; some fine GRAVEL; few fines; weak cementation; 10% GRANITE COBBLES; 3 to 6 inches; hard; subrounded.

Clayey SAND (SC); medium dense, light brown; wet; mostly fine sand,; little fines; low plasticity.

GROUP DELTA

Project No. SD493

8606 Graves Ave

BORING RECORD LEGEND #1

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

C	Consolidation (ASTM D 2435)
CL	Collapse Potential (ASTM D 5333)
CP	Compaction Curve (CTM 216)
CR	Corrosion, Sulfates, Chlorides (CTM 643, CTM 417, CTM 422)
CU	Consolidated Undrained Triaxial (ASTM D 4767)
DS	Direct Shear (ASTM D 3080)
EI	Expansion Index (ASTM D 4829)
M	Moisture Content (ASTM D 2216)
OC	Organic Content (ASTM D 2974)
P	Permeability (CTM 220)
PA	Particle Size Analysis (ASTM D 422)
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
PL	Point Load Index (ASTM D 5731)
PM	Pressure Meter
R	R-Value (CTM 301)
SE	Sand Equivalent (CTM 217)
SG	Specific Gravity (AASHTO T 100)
SL	Shrinkage Limit (ASTM D 427)
SW	Swell Potential (ASTM D 4546)
UC	Unconfined Compression - Soil (ASTM D 2166) Unconfined Compression - Rock (ASTM D 2938)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
UW	Unit Weight (ASTM D 4767)

SAMPLER GRAPHIC SYMBOLS

Standard Penetration Test (SPT)

Standard California Sampler

Modified California Sampler (2.4" ID, 3" OD)

Shelby Tube

Piston Sampler

NX Rock Core

HQ Rock Core

Bulk Sample

Other (see remarks)

DRILLING METHOD SYMBOLS

Auger Drilling

Rotary Drilling

Dynamic Cone or Hand Driven

Diamond Core

WATER LEVEL SYMBOLS

▽ First Water Level Reading (during drilling)

▼ Static Water Level Reading (after drilling, date)

Definitions for Change in Material

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core and the location of change can be accurately located.	————
Estimated Material Change	Change in material cannot be accurately located either because the change is gradational or because of limitations of the drilling and sampling methods.	— — — — —
Soil / Rock Boundary	Material changes from soil characteristics to rock characteristics.	~

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA

Project No. SD493

8606 Graves Ave

BORING RECORD LEGEND #2

CONSISTENCY OF COHESIVE SOILS				
Description	Shear Strength (tsf)	Pocket Penetrometer, PP Measurement (tsf)	Torvane, TV, Measurement (tsf)	Vane Shear, VS, Measurement (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

APPARENT DENSITY OF COHESIONLESS SOILS	
Description	SPT N_{60} (blows / 12 inches)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE	
Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS	
Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 - 10%
Little	15 - 25%
Some	30 - 45%
Mostly	50 - 100%

PARTICLE SIZE		
Description		Size (in)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

CEMENTATION	
Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

Plasticity

Description	Criteria
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CONSISTENCY OF COHESIVE SOILS	
Description	SPT N_{60} (blows/12 inches)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	Greater than 30

Ref: Peck, Hansen, and Thornburn, 1974, "Foundation Engineering," Second Edition.

Note: Only to be used (with caution) when pocket penetrometer or other data on undrained shear strength are unavailable. Not allowed by Caltrans Soil and Rock Logging and Classification Manual, 2010.

GROUP DELTA

Project No. SD493

8606 Graves Ave

BORING RECORD LEGEND #3

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
8606 Graves Ave	SD493	B-1

SITE LOCATION	START	FINISH	SHEET NO.
Santee, California	7/22/2016	7/22/2016	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	T. Latimer	R. Stroop

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Truck Rig (Unimog)	6	20.5	~445	▼ / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 82%, N_{60} ~ 82/60 * N ~ 1.37 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												RESIDUAL SOIL: Silty SAND (SM); dense; reddish brown; moist; mostly fine to medium grained SAND; some fines; nonplastic; piece of granitic rock in bottom 3" of sample.
			R-1	13 18 17	35	32			PA			70% SAND: 30% FINES
			R-2	10 33 50 (3")	83 (9")	76 (9")			PA			Very dense; brown. 72% SAND: 28% FINES
5										5		Little fines.
			S-3	31 31 50 (3")	81 (9")	111 (9")			PA			73% SAND: 27% FINES
			R-4	38 50 (4")	50 (4")	46 (4")						
10			S-5	50 (4")	50 (4")	68 (4")				10		**DECOMPOSED GRANITE:** Silty SAND (SM); very dense; light gray-brown; some fines, increase in SILT content; nonplastic.
15			S-6	50 (4")	50 (4")	68 (4")				15		Fine to coarse grained SAND associated with decomposed granite.
20			S-7	50 (4")	50 (4")	68 (4")				20		
												Bottom of boring at 20½ feet below ground surface. No groundwater encountered. Boring backfilled with soil cuttings on 07/22/16.

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San Diego, CA 92126

FIGURE A-1

GDC_LOG_BORING_MMX_SOIL_SD SD493 LOGS.GPJ GDCLOG.GDT 8/26/16

BORING RECORD

PROJECT NAME 8606 Graves Ave			**PROJECT NUMBER** SD493	**BORING** **B-2**
SITE LOCATION Santee, California		**START** 8/5/2016	**FINISH** 8/5/2016	**SHEET NO.** 1 of 1
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Hollow Stem Auger		**LOGGED BY** T. Latimer	**CHECKED BY** R. Stroop
DRILLING EQUIPMENT Truck Rig (Diedrich D50)	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 5	**GROUND ELEV (ft)** ~445	**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ / *na*
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** ETR ~ 80%, N_{60} ~ 80/60 * N ~ 1.33 * N			

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0–5												**FILL:** Silty SAND (SM); brown; moist; mostly fine grained SAND; some fines; non-plastic; weakly cemented.
		☒	S-1	7 8 9	17	23						
5										5		Bottom of boring at 5 feet below ground surface. Groundwater not encountered. Boring backfilled with soil cuttings 08/05/16.
10										10		
15										15		
20										20		

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE
A-2

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
8606 Graves Ave	SD493	B-3

SITE LOCATION	START	FINISH	SHEET NO.
Santee, California	8/5/2016	8/5/2016	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	T. Latimer	R. Stroop

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Truck Rig (Diedrich D50)	6	5	~445	▼ / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 80%, N_{60} ~ 80/60 * N ~ 1.33 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												RESIDUAL SOIL: Clayey SAND (SC); very dense; brown; moist; mostly fine to medium SAND; some fines; nonplastic.
5		⊠	S-1	16 24 43	67	89				5		
												Bottom of boring at 5 feet below ground surface. Groundwater not encountered. Boring backfilled with soil cuttings 08/05/16.
10										10		
15										15		
20										20		

GDC_LOG_BORING_MMX_SOIL_SD SD493 LOGS.GPJ GDCLOG.GDT 8/26/16

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE
A-3

BORING RECORD

PROJECT NAME: 8606 Graves Ave			PROJECT NUMBER: SD493	BORING: **B-4**
SITE LOCATION: Santee, California		START: 8/5/2016	FINISH: 8/5/2016	SHEET NO.: 1 of 1
DRILLING COMPANY: Pacific Drilling	DRILLING METHOD: Hollow Stem Auger		LOGGED BY: T. Latimer	CHECKED BY: R. Stroop
DRILLING EQUIPMENT: Truck Rig (Diedrich D50)	BORING DIA. (in): 6	TOTAL DEPTH (ft): 5	GROUND ELEV (ft): ~446	DEPTH/*ELEV.* GROUND WATER (ft): ▼ / *na*
SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)	NOTES: ETR ~ 80%, N_{60} ~ 80/60 * N ~ 1.33 * N			

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												RESIDUAL SOIL: Silty SAND (SM); very dense; reddish brown; moist; mostly fine to medium SAND; some fines; nonplastic.
		X	S-1	18 26 38	64	85						
5										5		Bottom of boring at 5 feet below ground surface. Groundwater not encountered. Boring backfilled with soil cuttings 08/05/16.
10										10		
15										15		
20										20		

BORING RECORD

PROJECT NAME 8606 Graves Ave	**PROJECT NUMBER** SD493		**BORING** B-5
SITE LOCATION Santee, California	**START** 8/5/2016	**FINISH** 8/5/2016	**SHEET NO.** 1 of 1
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** T. Latimer	**CHECKED BY** R. Stroop
DRILLING EQUIPMENT Truck Rig (Diedrich D50)	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 5 / **GROUND ELEV (ft)** ~446	**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ / *na*
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** ETR ~ 80%, N_{60} ~ 80/60 * N ~ 1.33 * N		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												RESIDUAL SOIL: Silty SAND (SM); brown; moist; mostly fine to medium SAND; some fines; non-plastic.
		☒	S-1	7 16 21	37	49						Fine to coarse grained SAND; weakly cemented.
5										5		Bottom of boring at 5 feet below ground surface. Groundwater not encountered. Boring backfilled with soil cuttings 08/05/16.
10										10		
15										15		
20										20		

GROUP DELTA CONSULTANTS, INC.
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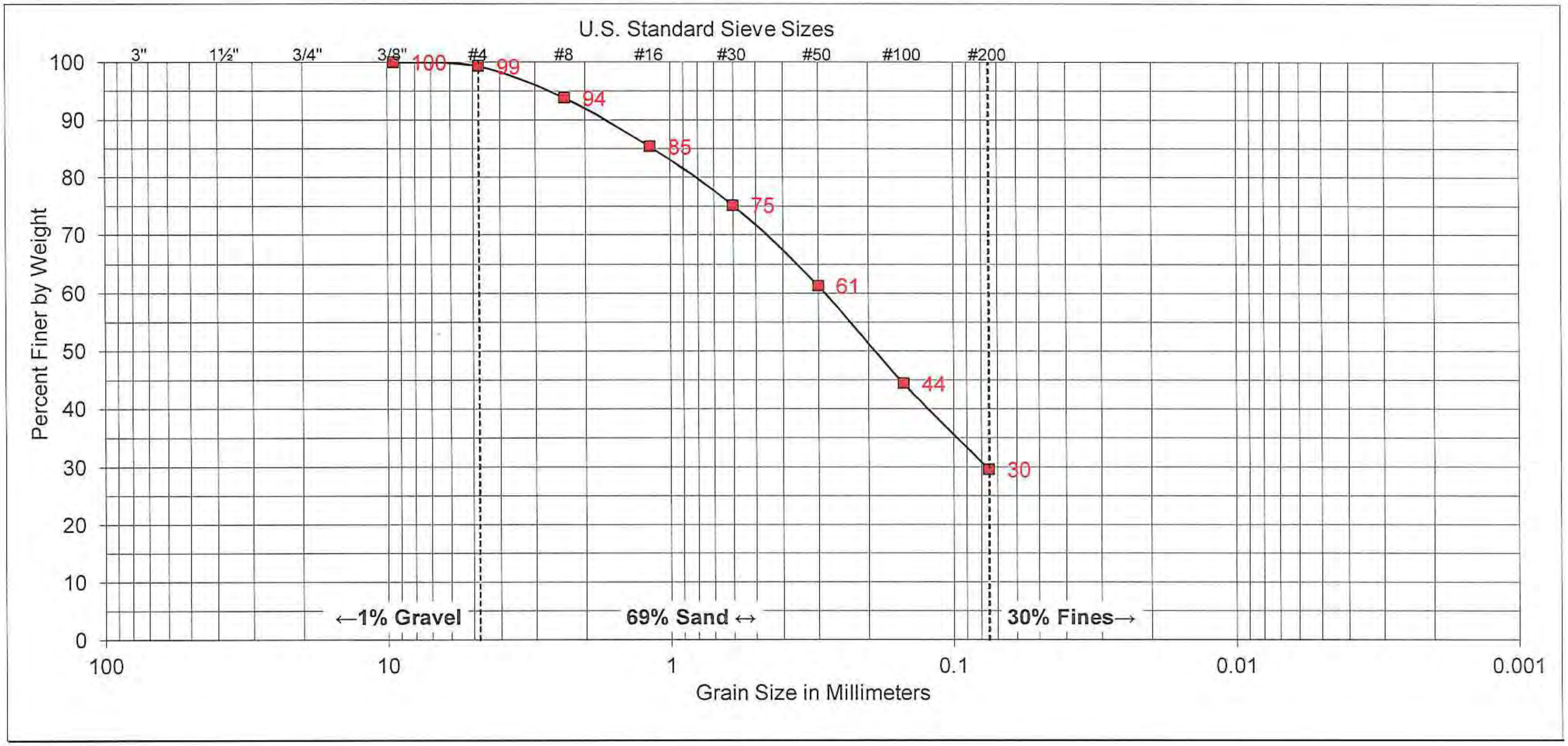
San Diego, CA 92126

FIGURE
A-5

GDC_LOG_BORING_MMX_SOIL_SD SD493 LOGS.GPJ GDCLOG.GDT 8/26/16



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
BORING NUMBER:	B-1
SAMPLE DEPTH:	2.5-3'

UNIFIED SOIL CLASSIFICATION: SC

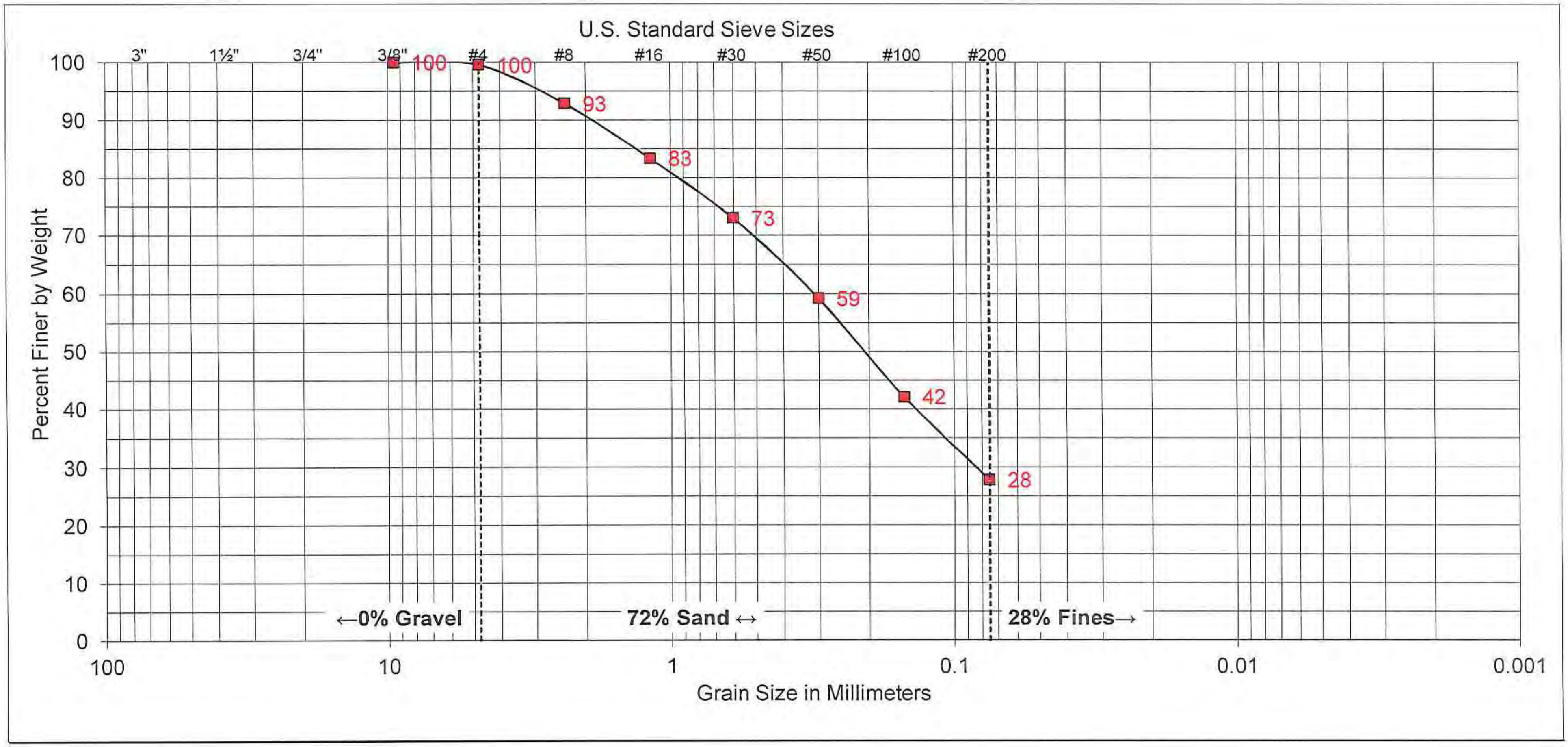
DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Document No. 16-0170
Project No. SD493



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
BORING NUMBER:	B-1
SAMPLE DEPTH:	4-4.5'

UNIFIED SOIL CLASSIFICATION: SC

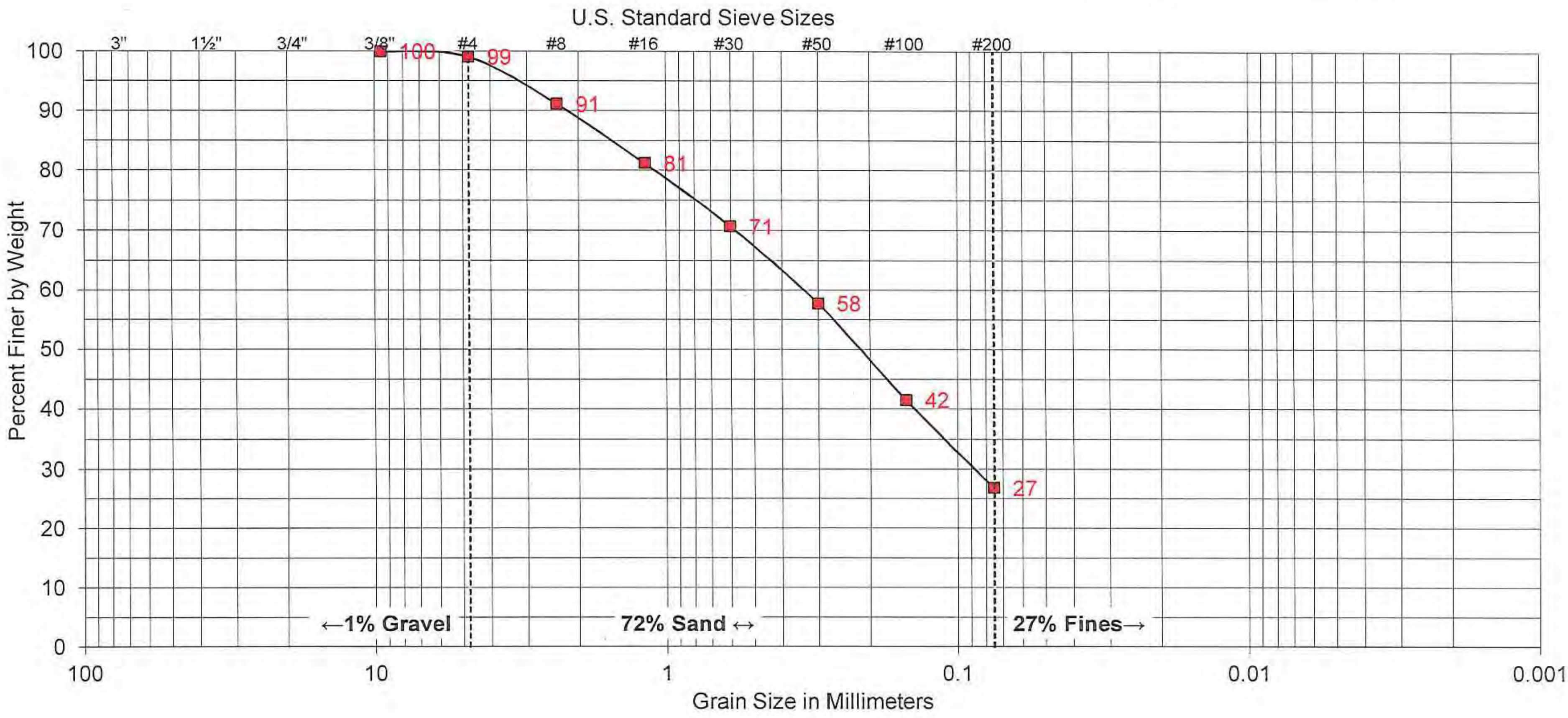
DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Document No. 16-0170
Project No. SD493



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE	
BORING NUMBER:	B-1
SAMPLE DEPTH:	5-6.5'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Document No. 16-0170
Project No. SD493

Categorization of Infiltration Feasibility Condition			Form I-8
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	✓	
Provide basis: The average design infiltration rate from field testing is 0.6 inches/per hour as summarized in Group Delta letter dated August 30, 2016. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	✓	
Provide basis: See Group Delta letter dated August 30, 2016. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Form I-8 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	

Provide basis:

Groundwater level is more than 20 feet from bottom of infiltration basin as presented in Group Delta letter dated August 30, 2016.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	

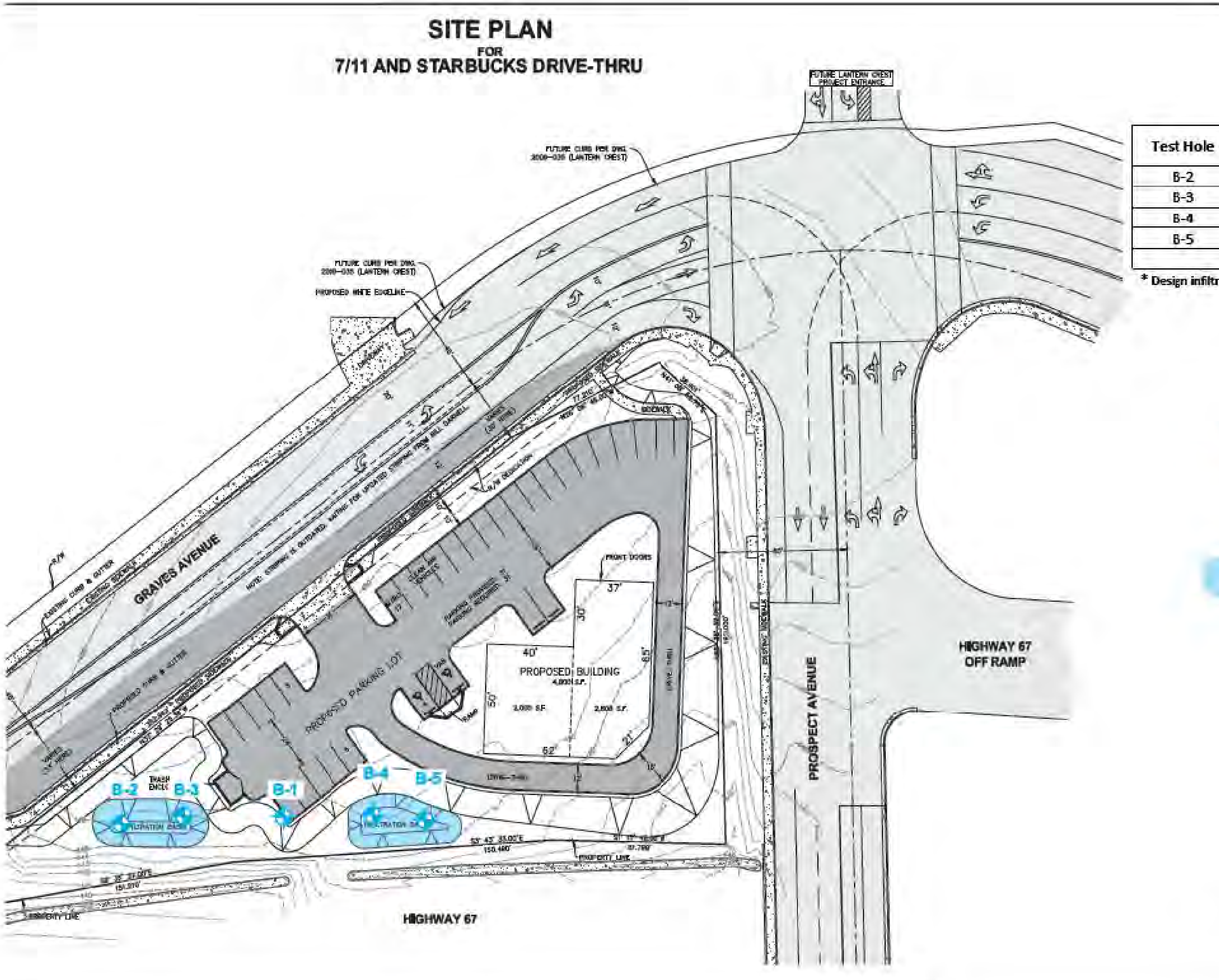
Provide basis:

There are no streams or bodies of surface water near the site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Part 1 Result *	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2	Full Infiltration

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings



Test Hole	Stabilized Infiltration Rate inches/hour	Design Infiltration Rate* inches/hour
B-2	1.32	0.6
B-3	0.54	0.3
B-4	2.24	1.1
B-5	0.78	0.4
	Average	0.6

* Design infiltration rate adopted a factor of safety of 2.0.

EXPLANATION:

B-5 Approximate location of borings.

Approximate location of storm water infiltration basins

NO SCALE

GROUP DELTA

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9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NUMBER SD493
DOCUMENT NUMBER 16-0170
PROJECT NAME 8606 Graves Ave Infiltration Testing
FIGURE NUMBER 2

EXPLORATION PLAN

CONSTRUCTION NOTES

1. INSTALL PEDESTRIAN RAMP PER SDRSD G-27 TYPE A.
2. INSTALL PEDESTRIAN RAMP PER DETAIL 'B' ON SHEET 6.
3. EXISTING TRAFFIC SIGNAL POLE TO REMAIN.
4. WATER SYSTEM FACILITY TO BE INSTALLED BY PDMWD AT DEVELOPER'S EXPENSE. PROPOSED WATER SERVICES WILL NOT BE INSTALLED UNTIL THE TIME SIGNATURES ARE REQUIRED FOR BUILDING PERMITS THEY WILL SERVE.

NOTES

1. ACTUAL LIMITES OF OVERLAY OR RECONSTRUCTIVE PAVING TO BE DETERMINED AFTER COMPLETION OF UNDERGROUND WORK BASED ON THE IMPROVEMENTS CONSTRUCTED BY THIS DEVELOPER.
2. THE R/W LIMITS WILL BE ADJUSTED TO REMOVE THE BUS TURNOUT THAT IS NO LONGER NECESSARY. SEE STREET VACATION DOCUMENT RECORDED ON __________ AS FILE NO. __________________.

PVT. STORM DRAIN 1
1" = 20' HOR.
1" = 4' VERT.

STORM DRAIN DATA (PVT.)

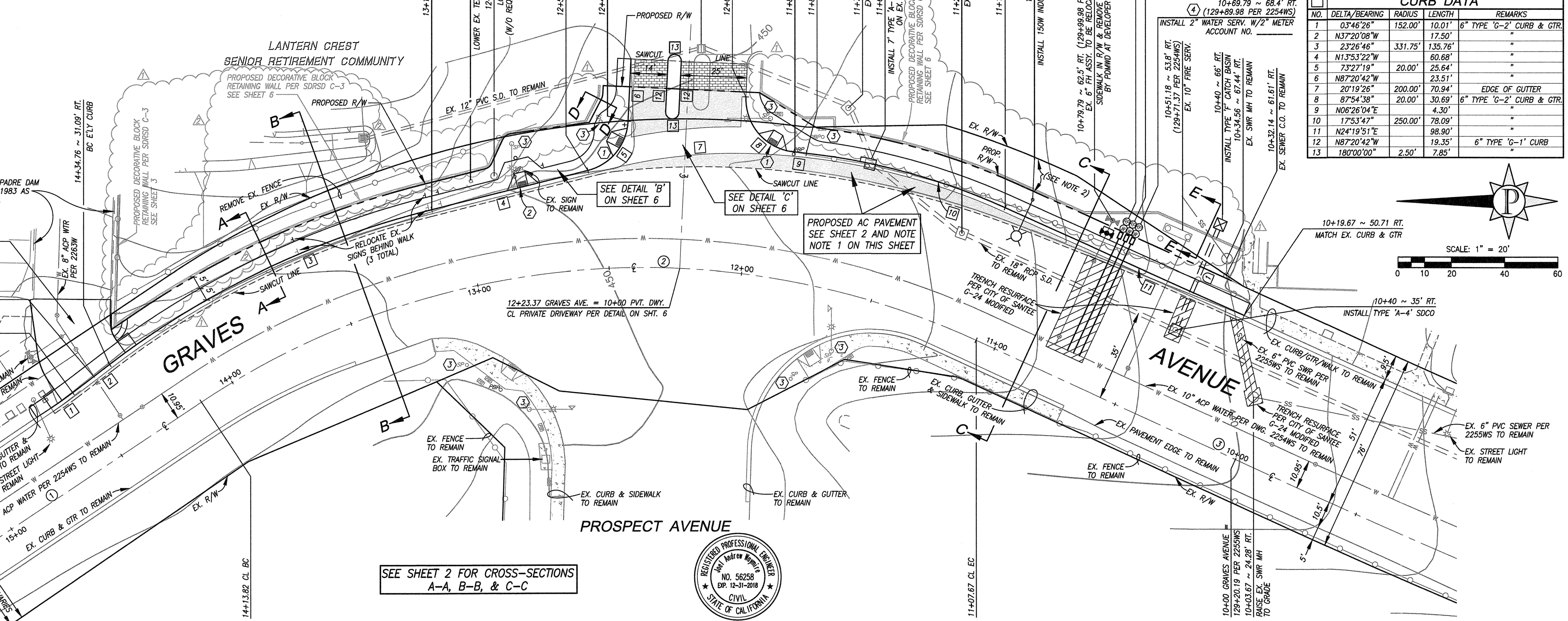
NO.	DELTA/BEARING	RADIUS	LENGTH	REMARKS
1	N66°52'57"E		39.12'	18" RCP S.D. (D-1350)

CENTERLINE DATA

NO.	DELTA/BEARING	RADIUS	LENGTH	REMARKS
1	N33°42'57"W		–	GRAVES AVENUE (PUBLIC)
2	58°28'08"	300.00'	306.14'	"
3	N24°45'07"E		138.04'	"

CURB DATA

NO.	DELTA/BEARING	RADIUS	LENGTH	REMARKS
1	03°46'26"	152.00'	10.01'	6" TYPE 'G-2' CURB & GTR.
2	N37°20'08"W		17.50'	"
3	23°26'46"	331.75'	135.76'	"
4	N13°53'22"W		60.68'	"
5	73°27'19"	20.00'	25.64'	"
6	N87°20'42"W		23.51'	"
7	20°19'26"	200.00'	70.94'	EDGE OF GUTTER
8	87°54'38"	20.00'	30.69'	6" TYPE 'G-2' CURB & GTR.
9	N06°26'04"E		4.30'	"
10	17°53'47"	250.00'	78.09'	"
11	N24°19'51"E		98.90'	"
12	N87°20'42"W		19.35'	6" TYPE 'G-1' CURB
13	180°00'00"	2.50'	7.85'	"



SEE SHEET 2 FOR CROSS-SECTIONS A-A, B-B, & C-C

Planning ✦ Engineering ✦ Mapping
POLARIS
Development Consultants, Inc.
2514 Jamacha Road, Suite 502-31 • El Cajon, CA 92019 • 619-444-2923

REGISTERED PROFESSIONAL ENGINEER
Joel Andrew Waymire
NO. 56258
EXP. 12-31-2018
CIVIL
STATE OF CALIFORNIA

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD	BENCH MARK
CONTRACTOR ____	556W, 2254WS, 2255WS, 2263WS	1/17	PDC	1 REVISE WALL & NORTHERLY STREET/CURB ELEVATIONS.	JC	CITY OF SANTEE VERTICAL CONTROL MONUMENT #2076 PER R.O.S. 11252, LOCATED AT THE INTERSECTION OF PROSPECT AVENUE AND ARGENT STREET. ELEVATION: 346.35 FEET (MSL)
INSPECTOR ____	2011-026, 2011-031, 2011-037	11/17	PDC	2 REVISE WALL TO C-3 WALL & REVISE N'LY PROFILE		
DATE COMPLETED ____						

SCALE	
HORIZ:	N/A
VERT:	N/A

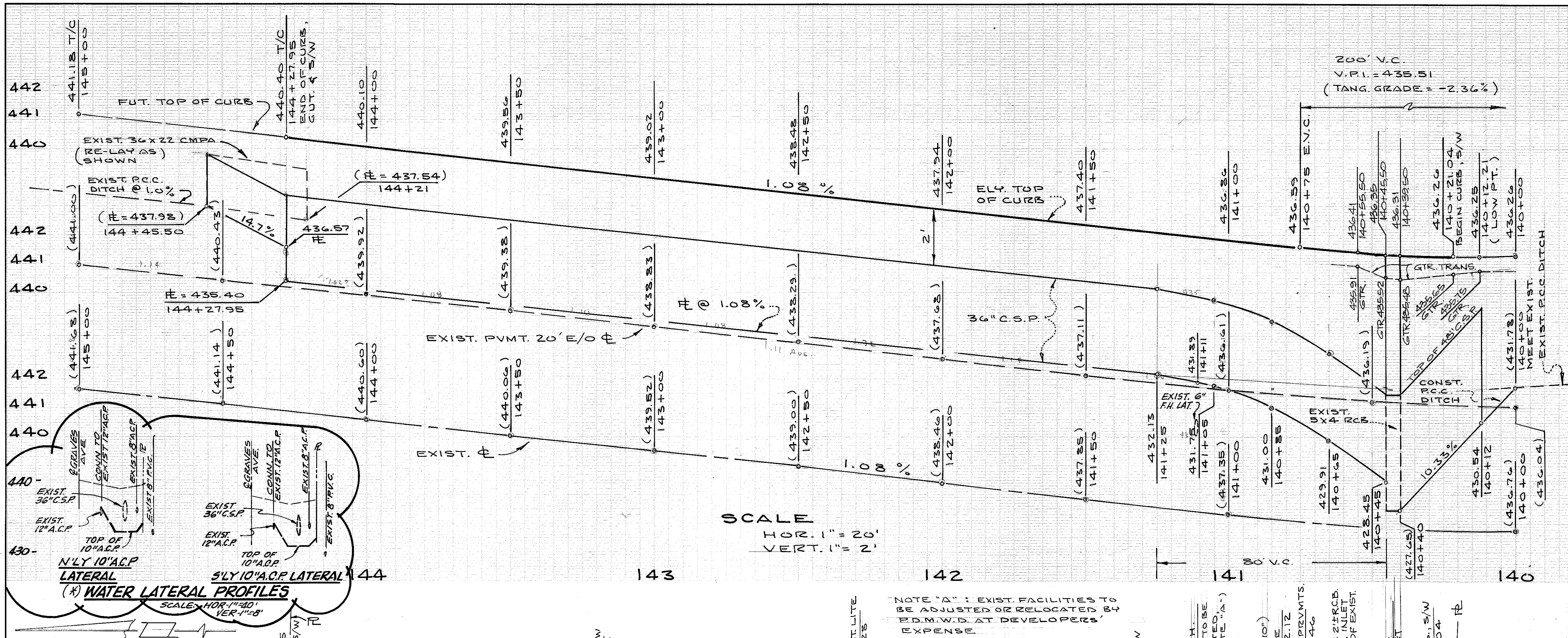
DESIGNED BY	DRAWN BY	CHECKED BY
J.A.W.	J.A.W.	J.A.W.

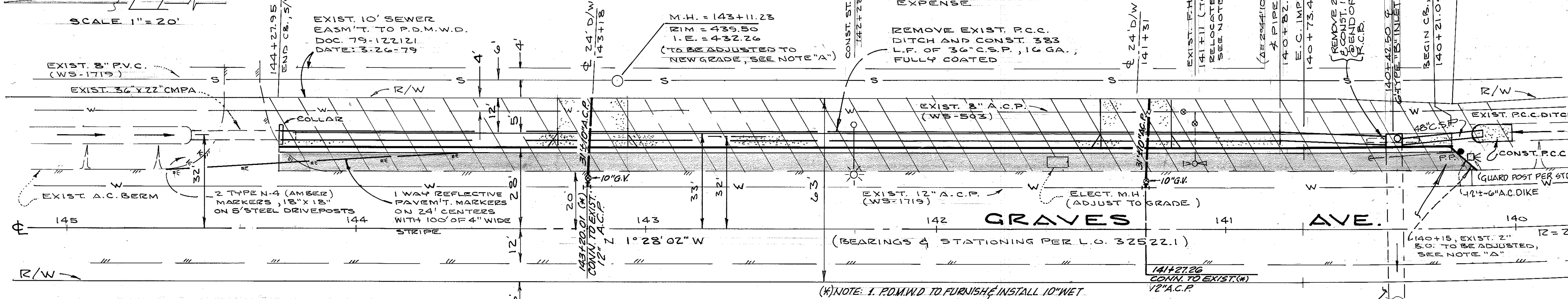
PLANS PREPARED UNDER THE SUPERVISION OF ____ DATE ____
RCE NO. 56258 EXPIRES 12-31-2018

REVIEWED ____
BY ____ PROJECT ENGINEER

CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES
IMPROVEMENT PLAN FOR:
GRAVES AVENUE
LANTERN CREST

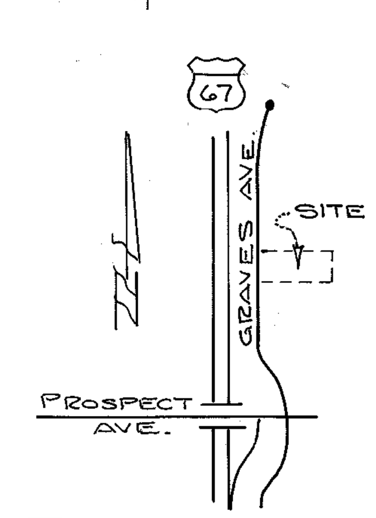
CITY W.O. NO. P2007-12
DRAWING NO. 2016-187
SHEET 5 OF 18



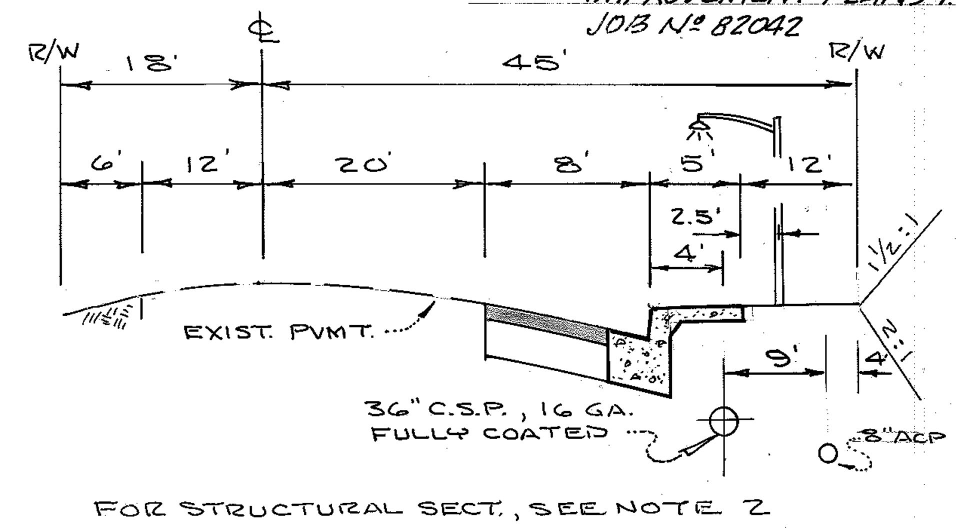


(*) NOTE:
1. P.D.M.W.D. TO FURNISH & INSTALL 10" WET TAP AT DEVELOPERS EXPENSE
2. TO BE CONSTRUCTED AS PART OF ON-SITE IMPROVEMENTS P.D.M.W.D. JOB № 82042
3. FOR ADDITIONAL PLAN & PROFILE INFORMATION SEE ON-SITE IMPROVEMENT PLANS P.D.M.W.D JOB № 82042

HWY 67



VICINITY MAP
NO SCALE



FOR STRUCTURAL SECT., SEE NOTE 2

TYPICAL SECTION
NO SCALE

WORK TO BE DONE:

IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS; THE CURRENT SANTEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR IMPROVEMENT OF SUBDIVISION STREETS AND STANDARD REFERENCE DRAWINGS.

ITEM	STD. DWG.	LEGEND
GRADING, SUBGRADE PREP.		
CURB, GUT., SIDEWALK	G-3	
A.C. PAVEMENT		
STORM DRAIN	D-60	
TYPE MODIFIED 'B' INLET	D-2	
PIPE COLLAR	D-62	
P.C.C. DITCH	D-70	
P.C.C. DRIVEWAY	G-14, 16	
STREET LIGHT (250 WATT H.P.S.)	E-1, 2	
A.C. SPILLWAY	D-2	

GENERAL NOTES

1. A PERMIT SHALL BE OBTAINED FROM THE CITY DEPARTMENT OF PUBLIC SERVICES FOR ANY WORK WITHIN THE STREET RIGHT-OF-WAY.
2. THE STRUCTURAL SECTION SHALL BE IN ACCORDANCE WITH THE SAN DIEGO COUNTY STANDARDS AND AS APPROVED BY THE DIRECTOR.
3. APPROVAL OF THESE IMPROVEMENT PLANS AS SHOWN DOES NOT CONSTITUTE APPROVAL OF ANY CONSTRUCTION OUTSIDE THE PROJECT BOUNDARY.
4. ALL UNDERGROUND UTILITIES WITHIN THE STREET RIGHT-OF-WAY SHALL BE CONSTRUCTED, CONNECTED AND TESTED PRIOR TO CONSTRUCTION OF BERM, CURB, CROSS GUTTER AND PAVING.
5. THE EXISTENCE AND LOCATION OF EXISTING UNDERGROUND FACILITIES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO OTHER EXISTING FACILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR HOWEVER, IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT ANY EXISTING FACILITY SHOWN HEREON AND ANY OTHER WHICH IS NOT OF RECORD OR NOT SHOWN ON THESE PLANS.
6. LOCATION AND ELEVATION OF IMPROVEMENTS TO BE MET BY WORK TO BE DONE SHALL BE CONFIRMED BY FIELD MEASUREMENTS PRIOR TO CONSTRUCTION OF NEW WORK. CONTRACTOR WILL MAKE EXPLORATORY EXCAVATIONS AND LOCATE EXISTING UNDERGROUND FACILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF REVISIONS ARE NECESSARY BECAUSE OF ACTUAL LOCATION OF EXISTING FACILITIES.
7. THE CONTRACTOR SHALL NOTIFY THE APPROPRIATE UTILITY COMPANY PRIOR TO STARTING WORK NEAR EXISTING FACILITIES AND SHALL COORDINATE HIS WORK WITH THE COMPANY REPRESENTATIVES.

   NOTICE: ALL UTILITIES WITHIN THIS PROJECT ARE "UNDERGROUND INSTALLATIONS"

   FOR LOCATION OF EXISTING FACILITIES, CONTACT THE FOLLOWING:

   SAN DIEGO GAS AND ELECTRIC CO. .... 232-4252 EXT. 1658
   PACIFIC TELEPHONE CO. 298-9696
   MISSION CABLE TV 582-0343
8. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO CONTACT THE UTILITIES AGENCIES, ADVISE THEM OF THE PROPOSED IMPROVEMENTS, AND BEAR THE COST OF RELOCATIONS, IF NECESSARY.
9. NO PAVING SHALL BE DONE UNTIL EXISTING POWER POLES ARE RELOCATED OUTSIDE OF THE AREAS TO BE PAVED.
10. POWER SOURCES AND RUNS SERVING STREET LIGHTS SHALL BE SHOWN ON THE "AS-BUILT" IMPROVEMENT DRAWINGS. ALL SOURCES SHALL BE LOCATED WITHIN THE DEDICATED RIGHT-OF-WAY, OR WITHIN EASEMENTS DEDICATED TO THE CITY OF SANTEE.
11. A STREET LIGHTING SYSTEM, CONFORMING TO SANTEE CITY STANDARDS, SHALL BE CONSTRUCTED, AT NO COST TO THE PUBLIC, SUBJECT TO THE FOLLOWING:
    (a) CUT-OFF LUMINAIRES SHALL BE INSTALLED WHICH WILL PROVE TRUE NINETY DEGREE (90°) CUT-OFF AND PREVENT PROJECTION OF LIGHT ABOVE THE HORIZONTAL FROM THE LOWEST POINT OF THE LAMP OR LIGHT EMITTING REFRACTOR OR DEVICE.
    (b) ALL FIXTURES SHALL USE A CLEAR, HIGH PRESSURE SODIUM VAPOR LIGHT SOURCE.
    (c) NO MERCURY VAPOR, QUARTZ, METAL HALIDE OR PHOSPHOR COATED HIGH PRESSURE SODIUM LAMPS SHALL BE INSTALLED.
12. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO INSTALL ALL STRIPING TO THE FOLLOWING STANDARDS:

    PAINT APPLICATION - 4-7 MILS DRY THICKNESS

    BEAD APPLICATION - 4-6 LBS OF RETAINED GLASS BEADS PER GALLON
13. CONTRACTOR SHALL NOTIFY PADRE DAM MUNICIPAL WATER DISTRICT FORTY-EIGHT (48) HOURS PRIOR TO COMMENCING WORK, TEL. 448-3111, AND SHALL VERIFY LOCATION AND MAINTAIN ALL EXISTING WATER AND SEWER UTILITIES. DURING CONSTRUCTION, CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING WATER OR SEWER MAINS ON SITE AS A RESULT OF HIS OPERATION, AND SHALL HAVE ON SITE SUFFICIENT PIPELINE MATERIALS AND EQUIPMENT TO IMMEDIATELY REPAIR ANY DAMAGE TO THE EXISTING WATER OR SEWER MAINS.

PERMITS

SPECIAL USE PERMIT	N/A
REZONE	N/A
GRADING PERMIT	L-9973

PADRE DAM MUNICIPAL WATER DISTRICT

APPROVED BY: M. Hale Ruffin

ASS'T. MGR.-ENG'R.		16595 R.C.E
DATE	A IMPRVMT. DIST.	82042 JOB NO.

I HEREBY AGREE TO BEGIN WORK ON THE IMPROVEMENTS SHOWN ON THESE PLANS, WITHIN EXISTING CITY RIGHT-OF-WAY, WITHIN SIXTY (60) DAYS AFTER ISSUANCE OF THE CONSTRUCTION PERMIT AND TO PURSUE SUCH WORK ACTIVELY ON EVERY NORMAL WORKING DAY UNTIL COMPLETED, IRRESPECTIVE AND INDEPENDENT OF ANY OTHER WORK ASSOCIATED WITH THIS PROJECT OR UNDER MY CONTROL.

SIGNED: Dean Brown
DEAN BROWN

OWNER'S ADDRESS: 246 DENNY WAY, EL CAJON
TEL. NO: 448-3972 ASSESSOR'S NO: 384-140-55,76

CITY APPROVED CHANGES

No.	Description	Approved by	Date

BENCH MARK

DESCRIPTION: 3/4" I.P. (CALTRANS B.M. #11)
LOCATION: 155' RT. OF "B" LINE STATION 151+00
RECORD FROM: XI-SD-198-8 (SHT. 7 OF 54)
ELEVATION: 459.164 DATUM: M.S.L.

PHILLIPS-REYNOLDS ENGINEERING, INC.
71 NORTH FOURTH AVENUE
CHULA VISTA, CALIFORNIA 92010
(714) 426-5400

PRIVATE CONTRACT

SHEET 1 — CITY OF SANTEE, DEPARTMENT OF PUBLIC SERVICES — 1 SHEETS

PLANS FOR THE IMPROVEMENT OF

GRAVES AVE.

CALIF. COORD. 242-1779

Recommended for approval: ENGINEER
Approved: John P. Sullivan 1-12-83 DIRECTOR OF PUBLIC SERVICES
Engineer of work: R.G. Reynolds R.C.E. 20521
Checked by:
Approval date:
C-055

FILE NO. 4016

ENGINEER'S NAME: PHILLIPS-REYNOLDS ENG., INC.
PHONE NO. (714) 426-5400

COUNTY OF SAN DIEGO

RANCHO EL CAJON

Dist.	County	Route	Post Miles Total Project	Sheet No.	Total Sheets
11	SD	67	R1.5/R2.2	4	44

PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO. 24557

DATE APPROVED October 29, 1979

CONTRACT QUANTITIES

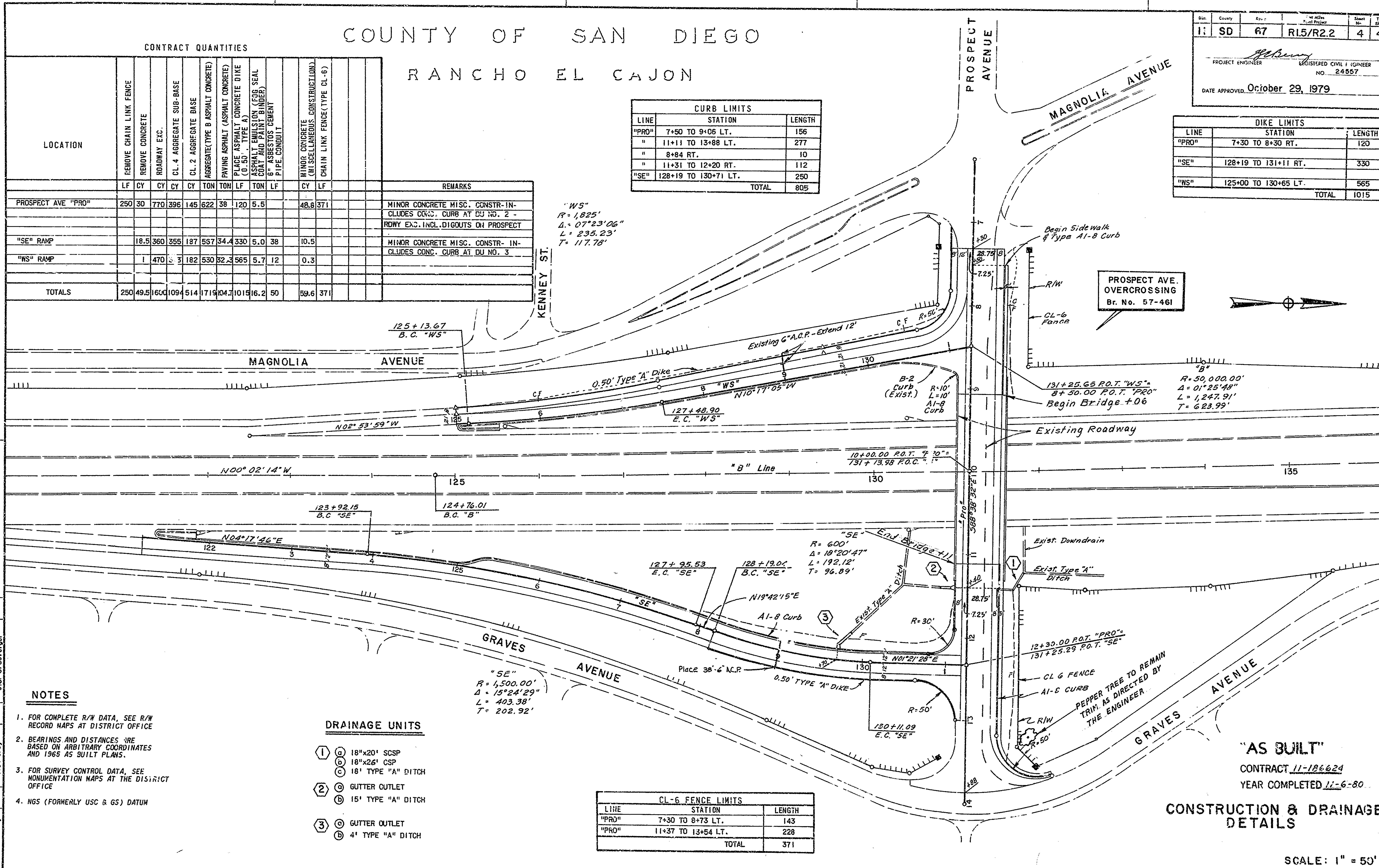
LOCATION	REMOVE CHAIN LINK FENCE	REMOVE CONCRETE	ROADWAY EXC.	CL. 4 AGGREGATE SUB-BASE	CL. 2 AGGREGATE BASE	AGGREGATE (TYPE B ASPHALT CONCRETE)	PAVING ASPHALT (ASPHALT CONCRETE)	PLACE ASPHALT CONCRETE DIKE (0.50', TYPE A)	ASPHALT EMULSION (FOG SEAL COAT AND PAINT BINDER)	6" ASBESTOS CEMENT PIPE CONDUIT		MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	CHAIN LINK FENCE (TYPE CL-6)	REMARKS
	LF	CY	CY	CY	CY	TON	TON	LF	TON	LF		CY	LF	
PROSPECT AVE "PRO"	250	30	770	396	145	622	38	120	5.5			48.8	371	MINOR CONCRETE MISC. CONSTR-INCLUDES CONC. CURB AT DU NO. 2 - RDWY EXC. INCL. DIGOUTS ON PROSPECT
"SE" RAMP		18.5	360	355	187	557	34.4	330	5.0	38		10.5		MINOR CONCRETE MISC. CONSTR- INCLUDES CONC. CURB AT DU NO. 3
"WS" RAMP		1	470	[illegible]	182	530	32.3	565	5.7	12		0.3		
TOTALS	250	49.5	1600	1094	514	1719	104.7	1015	16.2	50		59.6	371	

CURB LIMITS

LINE	STATION	LENGTH
"PRO"	7+50 TO 9+06 LT.	156
"	11+11 TO 13+88 LT.	277
"	8+84 RT.	10
"	11+31 TO 12+20 RT.	112
"SE"	128+19 TO 130+71 LT.	250
	TOTAL	805

DIKE LIMITS

LINE	STATION	LENGTH
"PRO"	7+30 TO 8+30 RT.	120
"SE"	128+19 TO 131+11 RT.	330
"WS"	125+00 TO 130+65 LT.	565
	TOTAL	1015



NOTES

1. FOR COMPLETE R/W DATA, SEE R/W RECORD MAPS AT DISTRICT OFFICE
2. BEARINGS AND DISTANCES ARE BASED ON ARBITRARY COORDINATES AND 1965 AS BUILT PLANS.
3. FOR SURVEY CONTROL DATA, SEE MONUMENTATION MAPS AT THE DISTRICT OFFICE
4. NGS (FORMERLY USC & GS) DATUM

DRAINAGE UNITS

1. ⓐ 18"x20' SCSP ⓑ 18"x26' CSP ⓒ 18' TYPE "A" DITCH
2. ⓐ GUTTER OUTLET ⓑ 15' TYPE "A" DITCH
3. ⓐ GUTTER OUTLET ⓑ 4' TYPE "A" DITCH

CL-6 FENCE LIMITS

LINE	STATION	LENGTH
"PRO"	7+30 TO 8+73 LT.	143
"PRO"	11+37 TO 13+54 LT.	228
	TOTAL	371

Project Engineer	Date	Design Engineer	Date	Approved Recommended by	Date
G. E. Berry		J.O. Gray		J.O. Grosberger	

"AS BUILT"
CONTRACT 11-186624
YEAR COMPLETED 11-6-80

CONSTRUCTION & DRAINAGE DETAILS

SCALE: 1" = 50'
SHEET 1 OF 2

E. A. 186621

4

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

AS BUILT PLANS
Contract No. 11-186624
Date Completed 11-6-80
Document No. ______

(New XI-SD-67)

REG. No.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET No.	TOTAL SHEETS
7	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET No.	TOTAL SHEETS
XI	SD	198	B	5	54

Asst. State Hwy. Engr.

APPROVED April 28, 1964

W. L. Warren

Engineer of Design
Registered Civil Engineer No. 7603

SAN DIEGO COUNTY

CURVE DATA

No.	Line	BC	EC	Delta	Radius	Tangent	Length
1	WS-Pro	125+13.67	127+48.90	07°23'06"	1825	117.78	235.23
2	B	124+76.01	137+23.93	01°25'48"	50,000	623.99	1247.92
3	SE-Pro	123+92.08	127+95.46	15°24'29"	1500	202.92	403.38

NOTE:
1. For R/W Data and Accurate Access Determination, See R/W Record Maps at District Office.

DESIGN DEPT.	INITIAL	DATE
Designed		
Traced		
Checked		
Supervised by		

AS BUILT PLANS
Contract No. 11-022934
Date Completed
Document No. A0000223

11-022934

5

Project Engineer	Date	Design Engineer	Date	Approval Recommended By	Date

ECH 7-62

CHAPTER 10 – REVEW COMMENTS AND RESPONSES

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R·E·C Civil Engineering Environmental Land Surveying
rec-consultants.com

2442 Second Avenue
San Diego, California 92101
Phone: 619.232.9200
Fax: 619.232.9210

To: ROY ABBOUD **Date:** February 1, 2019
DEVELOPMENT REVIEW COORDINATOR

From: REC Consultants, Inc.

Subject: Hydraulic Development Review – Prospect and Graves Retail

Please see below for our responses to the review comments provided by the Caltrans Hydraulics Department pertaining to the Hydrology Study for the Graves Commercial Center project:

Grading Plans

1. Sheet 3 of 10 – BMP
   a. Show the Caltrans R/W and distance between fence and Caltrans R/W.

The distance of 2 ft. between Caltrans R/W and the fence has been provided. Please see BMP-A Detail on Sheet 3 of the grading plans.

2. Sheet 6 of 10
   a. Show distance between face of wall and Caltrans R/W

A distance of 23 ft. and 2 ft. between the face of wall and Caltrans R/W has been added to Section B and Section C, respectively. See sections provided on Sheet 6 of the grading plans.

3. Caltrans requests that the project be conditioned for;
   a. Any retaining wall interfacing with infiltration/retention basin be designed for the presence of groundwater and hydrostatic pressure
   b. Drainage pattern cannot be altered from what is shown in provided drainage study (dated December 2018) nor can they be altered from existing conditions

This comment has been noted. The project shall not alter any drainage patterns from the Drainage Study dated January 2019. Additionally, all retaining walls interfacing with the basins shall be designed for the presence of groundwater and hydrostatic pressure.

Drainage Study

4. Drainage Study
   a. Explain the difference between nodes 11 and 12 and nodes 23 and 26 for the mitigated and unmitigated conditions.

   In unmitigated conditions the flow being conveyed through the pipe between nodes 11 and 12 and 23 and 26 are calculated assuming no detention. In the mitigated conditions these flows have been adjusted for detention of Q_{100} in the basins thus yielding a lower value.

   b. Between node 9 to 11 and 11 to 12 the time of concentration goes from 6.32 mins to 10.70 mins. How is this? Why is there a user defined Tc at node 11 to 11 of 10 minutes?

   There is a difference in time of concentration between the unmitigated and the mitigated calculations because the detention time of the water is being accounted for in the mitigated conditions. The detention of the Q_{100} flows was modeled in HEC-HMS and then the results were input into CivilD to determine the peak discharge at the POC. The user defined input at Node 11 to 11 is the insertion of the HEC-HMS results.

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San Diego, California 92101
Phone: 619.232.9200
Fax: 619.232.9210

c. Between node 23 to 23 and 23 to 26 time of concentration goes from 4.33 minutes to 8.33 minutes. How is this? Why is there a user defined Tc at node 23 to 23 of 8 minutes?

There is a difference in time of concentration between the unmitigated and the mitigated calculations because the detention time of the water is being accounted for in the mitigated conditions. The detention of the Q_{100} flows was modeled in HEC-HMS and then the results were input into CivilD to determine the peak discharge at the POC. The user defined input at Node 23 to 23 is the insertion of the HEC-HMS results.

d. Please provide flowrate (Q) calculations for all sub-DMA areas, include C values used, Tc used, and intensity used

A summary has been included at the end of Chapters 4, 5 and 6 which provide the time of concentration, runoff coefficient, intensity, area and Q_{100} value for each sub-DMA for the Existing Conditions Hydrology, the Proposed Conditions-Unmitigated Hydrology and the Proposed Conditions-Mitigated Hydrology, respectively.

e. 6.2 – according to plan sheet 3 of 10 the orifice elevation is shown at 444.0 ft. Why does the stage storage show it at 444.08 ft?

Section 6.2 of the Drainage Study has been revised to accurately depict the orifice elevation.

f. 6.2 – is the column labeled "elevation" an elevation or depth?

This column has been revised to read "depth" for clarification.

5. Stage – Discharge for BMP- A & B

a. What is the purpose of calculating H/D low and H/D mid?

H/D low and H/D mid columns have been removed.

b. Remove columns/inputs not used.

Unused columns and inputs have been removed.

6. Provide a copy of all input for HEC-HMS

HEC-HMS inputs have been provided with this submittal.

R·E·C Civil Engineering Environmental Land Surveying
rec-consultants.com

2442 Second Avenue
San Diego, California 92101
Phone: 619.232.9200
Fax: 619.232.9210

To: ROY ABBOUD
DEVELOPMENT REVIEW COORDINATOR

Date: November 29, 2018

From: REC Consultants, Inc.

Subject: Hydraulic Development Review – Prospect and Graves Retail

Please see below for our responses to the review comments provided by the Caltrans Hydraulics Department pertaining to the Hydrology Study for the Graves Commercial Center project:

1. Please update the entire Study to reflect the correct existing hydrology of Graves Ave and the elimination of the diversion of flow from the proposed design.
   The drainage areas have been revised for existing conditions and the division of flow has been eliminated in proposed conditions. The Drainage Study has been revised accordingly to reflect these changes.
2. Missing Stamped Signature Page.
   The report has been signed.
3. Provide a letter from the City of Santee that indicates the City will enforce that the infiltration basins
   - Remain a permanent feature on the property;
   - Be maintained in good working order and;
   - Be reconstructed should they fail

   As part of the SWQMP requirements, a Maintenance Agreement shall be made between the owner and the City to ensure the infiltration basins will be maintained in accordance with Project Clean Water Standards. This agreement is required by the City and shall be included in the SWQMP as Attachment 3. This is a stamped and recorded agreement between the owner and the City. The BMP Maintenance Fact Sheet for infiltration basins has been included as part of this submittal for your reference.

Grading Plans

4. Sheet 3 of 8: none of the tree well details match the proposed conditions. Provided appropriate details.
   No longer applicable – tree wells have been removed from design.
5. Sheet 4 of 8:
   a. Contour representing 446’ between existing contour 447’ and proposed infiltration basin/detention basin BMP-A is missing
      Contours have been revised.
   b. Will pipe backfill for pipe draining BMP-A be at least 0.5’ from Caltrans R/W?
      The design for the outlet pipe from BMP-A has been revised slightly. This revision places it further away from Caltrans R/W so yes, the outlet pipe shall be at least 0.5’ from Caltrans R/W.
   c. All existing drainage features should be shown. This includes the existing inlet on Prospect that drains to the affected channel.

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San Diego, California 92101
Phone: 619.232.9200
Fax: 619.232.9210

The existing grate inlet on Prospect Avenue is shown and called out on the plans and accounted for in the Drainage Study.

d. A copy of these plans should be part of the drainage study in an Appendix
The grading plans have been included in the Drainage Study as Chapter 8.

Drainage Study

Introduction

6. Street trees are not a flow mitigation measure recognized by Caltrans. Provide an appropriate mitigation measure or analyze without mitigation consideration. Revise throughout report.
No longer applicable – tree wells have been removed from design.

Summary of Existing Conditions

7. The areas shown for POC-C and POC-D should only cover the area that is in the gutter pans. The areas delineated for these in the existing conditions are not reflecting actual flow patterns. Revise throughout report.
DMA-C and DMA-D have been revised to only include the area in the gutter pans.

Summary of Developed Conditions

8. This development is diverting flows. The first sentence of the second paragraph is an incorrect statement. Portions of areas that drained to one discharge location drain to a different discharge location post project. This constitutes a change in drainage pattern and diversion of flow. It appears the Caltrans ditches are being bypassed by the proposed pipes.
The site has been redesigned so that the proposed drainage areas match the existing drainage areas. All DMAs are the same area in pre- and post-developed conditions. To account for the widening of Graves Avenue, which is a requirement of the project, DMA-C and D have been purposely excluded from the area that drains to the basins. These areas will flow to their respective curb inlets as in pre-existing conditions. The pipes from the outlet structures have been designed accordingly to ensure emergency overflow does not inundate the basins and drains to the corresponding POC. Caltrans brow ditches shall still be used to convey flows to the respective POCs. All of these changes have been reflected on the Proposed Conditions Hydrology Map provided in Chapter 7 of the Drainage Study.

9. Missing discussion of travel time
Discussion of travel time has been included in the introduction of the report. Travel time methodology is also included as part of Chapter 2.

10. Missing runoff coefficient calculations
The C values were derived from the San Diego County Hydrology Manual per Table 3-1. A discussion of the runoff coefficients has been included in the introduction of the report and the runoff coefficient information and methodology is also included as part of Chapter 2 Section 2.2.

11. Unable to verify dimensions used in analysis for BMP-C and BMP-D
Hydrology map has been revised to clearly show the drainage paths and associated lengths. See Chapter 7 of the Drainage Study for the revised Hydrology maps.

Conclusion

12. First part of the first bullet. Same as comment number 8.
See response for comment 8.

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Chapter 2 – Methodology

13. Missing methodology used for detention basin design and analysis
    Modified Puls Method, in accordance with the County of San Diego Hydrology Manual, was used for the basin detention analysis. The analysis was performed using HEC-HMS. Discussion of this methodology has been included in Chapter 2 Section 2.7 of the report. The HEC-HMS executable files have also been provided as part of this submittal.

Runoff Coefficient Calculations (Missing)

14. Provide runoff calculations/determinations
    The C values were derived from the San Diego County Hydrology Manual per Table 3-1. A discussion of the runoff coefficients has been included in the introduction of the report and the runoff coefficient information and methodology is also included as part of Chapter 2 Section 2.2.
15. Provide justification for any area within the property that uses the Permanent Open Space values. What guarantees these areas will remain open space
    Justification for the use of Permanent Open Space has been included in Section 1.3 of the Drainage Study.

Chapter 3 – 100-Year Hydrologic Analysis for Existing Conditions

16. Maximum overland flow length used for initial time of concentration does not correspond with information provided. Revise.
    Maximum overland flow lengths have been revised to be in accordance with Table 3-2 of the San Diego County Hydrology Manual. Information provided in the report is consistent with the lengths used.
17. Provide back-up for Manning's n values used.
    Discussion of Manning's roughness coefficient value, n, has been included in the introduction of the report and the tables have been included in Chapter 2 Section 2.4
18. Runoff coefficient calculations missing
    Runoff coefficient calculations are performed by CivilD and are included in the results analysis provided as Chapter 3.
19. There does not appear to be a trapezoidal channel between Nodes 2 and 100. Revise.
    The existing conditions analysis has been revised. See Chapter 3 for results.
20. For all channels a back-up for dimensions used must be provided, such as an as-built plan
    As-built drawings have been provided as part of Chapter 9 of the Drainage Study.
21. Provide back-up for Manning's values used.
    Back-up for the Manning's Roughness Coefficient values used in the analysis is provided in Section 2.4 of the report.
22. POC-A (Node 100) receives flows from an existing inlet (SCSP) on Prospect Ave. The flows to this inlet appear to be altered due to widening on Graves Ave. Provide the pre-project calculations for the inlet on Prospect Ave.
    Runoff from the existing inlet on Prospect Avenue has been included in the analysis of POC-A. The flows to the inlet are not altered by the widening of Graves Avenue as those flows drain towards an existing curb inlet adjacent to the site as discussed in the report.
23. These comments apply to all other basins.
    Comment noted

Chapter 4 – 100-Year Hydrologic Analysis for Unmitigated Conditions

24. See comments 18-24
    See responses above.

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25. Initial length has a portion that is steep, is this accounted for appropriately for the slope used in the analysis?
    Per the County of San Diego Hydrology Manual table 3-2 for maximum overland flow length and initial time of concentration, the steep slopes have been appropriately accounted for in the initial area analysis. The initial lengths chosen for evaluation we're taken from this table which is based on the slope. Discussion of this methodology and the table referenced has been included in Chapter 2 Section 2.4 of this report.
26. Provide back-up for pipes, such as profile plans
    Pipe profiles are part of the grading plans which have been provided in Chapter 8.
27. The drainage areas from Graves/Prospect Ave and Nodes 10-100 are not accounted for. Revise
    The open space has been accounted for. See Nodes 13 and 14 of the analysis.
28. These comments apply to all other basins.
    Comment noted.

Chapter 5 – 100-Year Hydrologic Analysis for Mitigated Conditions

29. Mitigated conditions should be analyzed using hydrographs.
    The mitigated conditions are analyzed using hydrographs. The discussion of the mitigation process has been revised to better clarify the procedures followed. Refer to Section 2.8 for methodology and Chapter 6 for results.

Chapter 6 – Modified-Puls Detention Routing

30. Rational Method Hydrograph by Rick Engineering?
    The County of San Diego Hydrology Manual specifies that the computer program by Rick Engineering, RATHYDRO, may be used for the creation of the unit hydrograph. Discussion for this methodology has been included in Section 2.8 of the report.
31. Letter from City approving the use of this program?
    The City of Santee follows the County of San Diego Hydrology Manual thus use of this program is approved.

6.2 – Stage-Storage and Stage-Discharge Relationships

32. Stage discharge calculations?
    Stage-discharge calculations are included in the Drainage Study in Chapter 6 Section 6.2.

6.3 – HEC-HMS Modified Puls Routing Results

33. Provide copy of HEC-HMS Input Data
    HEC-HMS files have been included with this submittal.

Chapter 7: Hydrology Maps

34. Provide in color and assign a color to each unique delineated basin area. This applies to subbasins
    The Hydrology Maps have been revised to provide a specific color for each subbasin.
35. All information should be legible when printed. May require printing on larger sheet
    Comment noted
36. Each basin area should have a unique identifier as well as corresponding unique ids for each subbasin.
    Hydrology Maps have been revised to identify each subbasin with a corresponding ID
37. Pre-Development
    a. Delineated basin areas and flowpaths need to be corrected to reflect actual flow patterns. Based on existing contours the existing areas for DMA-C and D are both showing larger than actual areas. Only flow in gutter is likely to follow this

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drainage path (approximately 2' wide). Flow paths do not correspond to contours provided.
DMA-C and DMA-D have been revised to only include flow in the gutter pans.

b. Corresponding C values missing

The C values were derived from the San Diego County Hydrology Manual per Table 3-1. A discussion of the runoff coefficients has been included in the introduction of the report and the runoff coefficient information and methodology is also included as part of Chapter 2 Section 2.2.

c. Basin area from an existing SCSP on Prospect is missing. All contributing flows must be considered for proper analysis of POC-A.
Basin area has been provided. See updated calculations and hydrology map in Chapter 3 and 7, respectively.

38. Post-Development
 a. See comment 2a
 See response for comment 2a.
 b. Basin area from an existing SCSP on Prospect is missing. All contributing flows must be considered for proper analysis of POC-A.
 Basin area has been provided for and is accounted for in the analysis of POC-A. See updated calculations and hydrology map in Chapters 3 and 7, respectively.
 c. Corresponding C values missing

Discussion of C values used for the post-developed conditions analysis is provided in section 1.3 of the report. The tables from which the values were obtained is provided in Section 2.2

General:

a. The Hydrology and Hydraulics Report is a standalone document (i.e. all pertinent information should be contained within). Include a copy of pertinent as-built plan sheets, all tables, figures, and recommended assumptions as back-up in an appendix within this report. (Previous comment – not addressed)
Noted – all applicable information has been provided within the report.

INF-1
Infiltration Basin

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP INF-1 INFILTRATION BASIN

An **infiltration basin** typically consists of an earthen basin with a flat bottom constructed in uncompacted native soils. An infiltration basin retains storm water and allows it to evaporate and/or percolate into the underlying soils. Infiltration basins can also be constructed as linear trenches or as underground infiltration galleries. Typical infiltration basin components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Forebay to provide pretreatment, or other pretreatment device (e.g., drainage inlet inserts, hydrodynamic separator installed within storm drain system)
- Surface ponding for captured flows
- Vegetation or other surface cover such as mulch or rocks selected based on basin use, climate, and ponding depth
- Uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Infiltration basins require routine maintenance to: remove accumulated materials such as sediment, trash or debris from the forebay and the basin; maintain vegetation health if the BMP includes vegetation; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface or subsurface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the underlying native soils, or clogging of covers applied at the basin surface such as topsoil, mulch, or rock layer. The specific cause of the drainage issue must be determined and corrected. For surface-level basins (i.e., not underground infiltration galleries), surface cover materials can be removed and replaced, and/or native soils can be scarified or tilled to help reestablish infiltration. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, or if the infiltration surface area is not accessible (e.g., an underground infiltration gallery) the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
- Sediment, trash, or debris accumulation has filled the forebay or other pretreatment device within one month, or if no forebay or other pretreatment device is present, has filled greater than 25% of the surface ponding volume within one maintenance cycle. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require adding a forebay or other pretreatment measures within the tributary area draining to the BMP to intercept the materials if no pretreatment component is present, or increased maintenance frequency for an existing forebay or other pretreatment device. Pretreatment components, especially for sediment, will extend the life of the infiltration basin.

- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

If the infiltration basin is vegetated: Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario**.

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-1 INFILTRATION BASIN		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris in forebay and/or basin	Remove and properly dispose of accumulated materials, (without damage to vegetation when applicable).	• Inspect monthly. If the forebay is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found within the infiltration area at each inspection. • When the BMP includes a forebay, materials must be removed from the forebay when the forebay is 25% full*, or if accumulation within the forebay blocks flow to the infiltration area.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Poor vegetation establishment (when the BMP includes vegetated surface by design)	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation (when the BMP includes vegetated surface by design)	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation (when the BMP includes vegetated surface by design)	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-1 INFILTRATION BASIN (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in infiltration basin without subsurface infiltration gallery for longer than 24-96 hours following a storm event	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or removing/replacing clogged or compacted surface treatments and/or scarifying or tilling native soils. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Standing water in subsurface infiltration gallery for longer than 24-96 hours following a storm event	This condition requires investigation of why infiltration is not occurring. If feasible, corrective action shall be taken to restore infiltration (e.g., flush fine sediment or remove and replace clogged soils). BMP may require retrofit if infiltration cannot be restored. The [City Engineer] shall be contacted prior to any repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-1 INFILTRATION BASIN (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. For subsurface infiltration galleries, ensure access covers are tight fitting, with gaps or holes no greater than 1/16 inch, and/or install barriers such as inserts or screens that prevent mosquito access to the subsurface storage. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook

County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet INF-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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INF-1
Infiltration Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

Property / Development Name:	Responsible Party Name and Phone Number:
Property Address of BMP:	Responsible Party Address:

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 1 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Materials must be removed from the forebay when the forebay is 25% full*. In any case, materials must be removed if accumulation blocks flow to the infiltration area. Materials must be removed from the infiltration area any time accumulation is observed in the infiltration area. Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, (without damage to the vegetation when applicable) ☐ If accumulation within the forebay is greater than 25% in one month, increase the inspection and maintenance frequency** ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).
**If no forebay is present, if sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month, add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials.

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 2 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Poor vegetation establishment (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Dead or diseased vegetation (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 3 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 4 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 5 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in infiltration basin without subsurface infiltration gallery for longer than 24-96 hours following a storm event* Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or removing/replacing clogged or compacted surface treatments and/or scarifying or tilling native soils. ☐ Other / Comments:		
Standing water in subsurface infiltration gallery for longer than 24-96 hours following a storm event* Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ If feasible, take corrective action to restore infiltration (e.g., flush fine sediment or remove and replace clogged soils). BMP may require retrofit if infiltration cannot be restored. The [City Engineer] shall be contacted prior to any repairs or reconstruction. ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface or subsurface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the underlying native soils, or clogging of covers applied at the basin surface such as topsoil, mulch, or rock layer. The specific cause of the drainage issue must be determined and corrected. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, or if the infiltration surface is not accessible (e.g., an underground infiltration gallery) the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

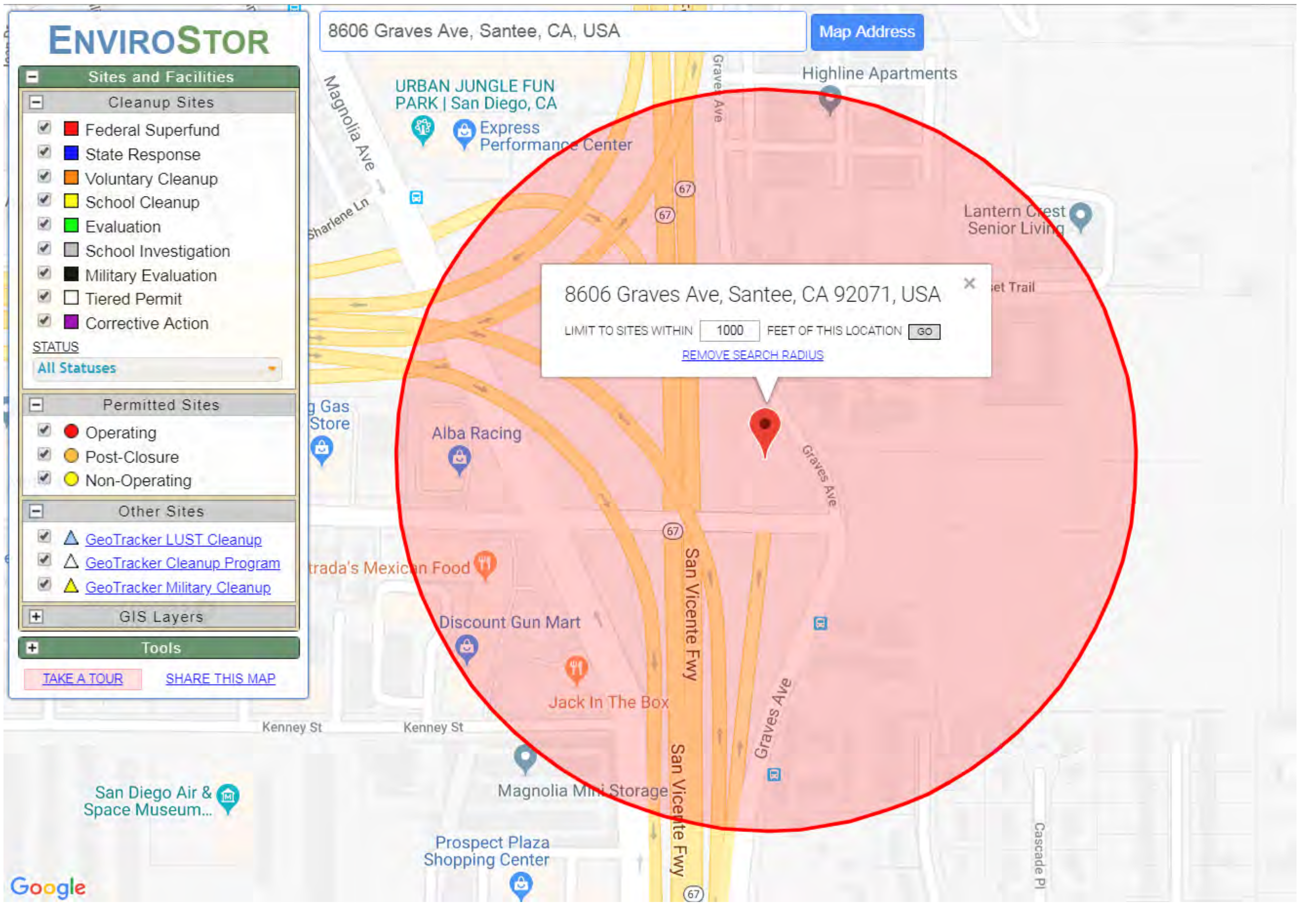
Appendix H

Cortese List Verification

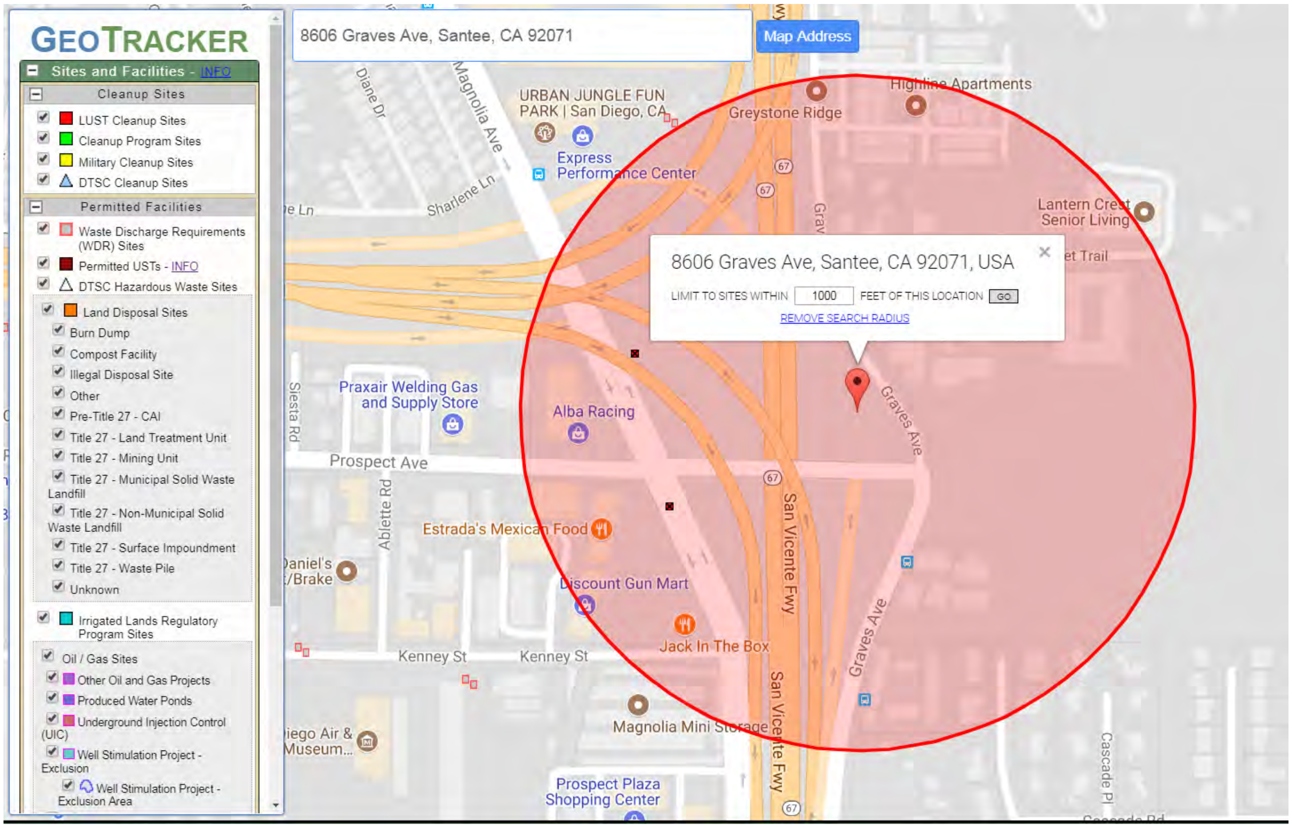
Cortese List Verification

Project: Graves Commercial Center
Address: 8606 Graves Avenue, Santee, CA 92071
Prepared By: REC Consultants, Inc. – March 2018

1. The California Department of Toxic Substances Control (DTSC) EnviroStor database indicates that the property of interest is **NOT** included in the Hazardous Waste & Substances Site List.



2. The list of Leaking Underground Storage Tank sites by County from the Water Board GeoTracker database indicates that the property of interest is **NOT** included in this list.



3. The list of solid waste disposal sites identified by Water Board with waste constituents above hazardous waste levels outside the waste management unit indicates that the property of interest is **NOT** included in this list.

SITES IDENTIFIED WITH WASTE CONSTITUENTS ABOVE HAZARDOUS WASTE LEVELS OUTSIDE THE WASTE MANAGEMENT UNIT

COUNTY	CITY	REGION	SWAT I	WASTE DISCHARGER SYSTEM NO.	SOLID WASTE ID NO.	WASTE MANAGEMENT UNIT NAME	FACILITY NAME	AGENCY NAME
DEL NORTE	CRESCENT CITY	1	2	1A880520NSL-01		DEL NORTE COUNTY- PESTICIDE STORAGE	DEL NORTE PESTICIDE STORAGE AR	DEL NORTE, COUNTY OF
CONTRA COSTA	PITTSBURG	2	1	2 071059002-02	07-A1-0001	U.S. STEEL CORP.-PITTSBURG SITE LA	WDR-USS-POSCO	USS-POSCO
SOLANO	VALLEJO	2	1	2 482011003-01	48-AA-0008	US NAVY MARE ISLAND SANITARY LANDFILL	WDR-NAVAL SHIPYARD/CLASS I LAN	MARE ISLAND NAVAL SHIPYARD
CONTRA COSTA	RICHMOND	2	3	2 071007002-01		CHEVRON CHEMICAL COMPANY-OLD SITES	WDR-ORTHO DIV-RICHMOND PLANT	CHEVRON CHEMICAL COMPANY
MONTEREY	FORT ORD (Marina)	3	1	3 270301004-01	27-AA-0015	FORT ORD LANDFILL	SANITARY LANDFILL	U.S. ARMY, FORT ORD
SANTA BARBARA	LOMPOC	3	3	3 420305001-01	42-AA-0017	LOMPOC CITY LANDFILL	SOLID WASTE DISPOSAL SITE	LOMPOC CITY
LOS ANGELES	MONTEREY PARK	4	1	4B190332001-01	19-AM-0001	OPERATING INDUSTRIES LANDFILL	OPERATING INDUSTRIES, INC.	OPERATING INDUSTRIES, INC.
TULARE	WOODLAKE	5F	1	5D540300010-01	54-AA-0007	TULARE COUNTY-WOODLAKE LANDFILL	WOODLAKE SWDS	TULARE, COUNTY OF
FRESNO	FRESNO	5F	2	5D100300001-01		MCKINLEY AVE. YARD	T.H. AGRICULTURE AND NUTRITION	NORTH AMERICAN PHILLIPS
KINGS	CORCORAN	5F	2	5D160302001-01	16-AA-0011	KINGS COUNTY-CORCORAN LANDFILL	CORCORAN SWDS	KINGS COUNTY WASTE MGMT AUTH.
FRESNO	FRESNO	5F	3	5D100319001-01	10-AA-0013	ORANGE AVENUE DISPOSAL COMPANY	ORANGE AVENUE LANDFILL	ORANGE AVENUE DISP CO. INC
TULARE	EXETER	5F	3	5D540300003-01	54-AA-0002	TULARE COUNTY-EXETER DISPOSAL SITE	EXETER SWDS	TULARE, COUNTY OF
MERCED	ATWATER	5F	4	5C240115001-01		ATWATER CITY	BERT CRANE ROAD LANDFILL	ATWATER, CITY OF
FRESNO	FOWLER	5F	5	5D100325N01-01		FOWLER CITY	FOWLER CITY LANDFILL (OLD)	FOWLER, CITY OF
BUTTE	OROVILLE	5R	2	5A042005001-01		KOPPERS COMPANY-OROVILLE SITE	KOPPERS WOOD PRESERVING ISW	KOPPERS INDUSTRIES INC.
BUTTE	CHICO	5R	4	5A040302N01-01		CHICO CITY BURN DUMP	HUMBOLDT ROAD LANDFILL	CHICO, CITY OF
SACRAMENTO	SACRAMENTO	5S	1	5A340700003-01	34-AA-0008	US AIR FORCE-MCCLELLAN AFB LANDFILL	CLASS III SITE 8 (CLOSURE)	US AIR FORCE-MCCLELLAN AFB
SACRAMENTO	MATHER (Rancho Cordova)	5S	2	5A340700001-01		US AIR FORCE-MATHER FIELD LANDFILL	MATHER AFB ENVIRONMENTAL MGMT	US AIR FORCE – MATHER AFB
SACRAMENTO	SACRAMENTO	5S	3	5B342000N01-01		SACRAMENTO ARMY DEPOT	SACRAMENTO ARMY DEPOT	U.S. ARMY
SAN JOAQUIN	STOCKTON	5S	3	5 390002NUR-01	39-AA-0006	US NAVY COMMUNICATIONS LANDFILL	U.S.N. COMMUNICATION STA. LANDF	U.S. NAVY COMMUNICATIONS
SAN JOAQUIN	FRENCH CAMP	5S	3	5 390003NUR-01		US ARMY-SHARPE ARMY DEPOT	US ARMY-SHARPE ARMY DEPOT	US ARMY
SAN JOAQUIN	TRACY	5S	5	5 390006NUR-01		SITE 300 (OTHER 39 WMUS)	LAWRENCE LIVERMORE LAB	LAWRENCE LIVERMORE LABS
INYO	KEELER	6V	1	6B142000041-01	14-AA-0008	US TUNGSTEN OWENS LAKE LANDFILL	OWENS LAKE LANDFILL	UMETCO MINERALS CORPORATION
ORANGE	FULLERTON	8	1	8300002NUR-01		MCCOLL SITE	MCCOLL SLUDGE DISPOSAL SITE	TOXIC SUBSTANCES CONTROL DIVIS
RIVERSIDE	RIVERSIDE	8	1	8 330325001-01		STRINGFELLOW QUARRY ACID PITS	STATE OF CALIFORNIA-STRINGFELLOW	TOXIC PROGRAM MANAGEMENT SECT

4. The (MS Excel) list of "active" CDO and CAO from the Water Board indicates that the property of interest is **NOT** included in this list.

5. The list of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code, identified by DTSC, indicate that the property of interest is **NOT** included in this list.

Cortese List: Section 65962.5(a)

Information Required From the Department of Toxic Substances Control (DTSC) Under Government Code Section 65962.5(a)

Section 65962.5(a)(1) requires that DTSC "shall compile and update as appropriate, but at least annually, and shall submit to the Secretary for Environmental Protection, a list of all the following: ….(1) [a]ll hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code ("HSC")."

The hazardous waste facilities identified in HSC § 25187.5 are those where DTSC has taken or contracted for corrective action because a facility owner/operator has failed to comply with a date for taking corrective action in an order issued under HSC § 25187, or because DTSC determined that immediate corrective action was necessary to abate an imminent or substantial endangerment. This is a very small and specific subgroup of facilities and they are not separately posted on the DTSC or CalEPA's website.

The facilities listed below fall under this category:

- AAD Distribution & Dry Cleaning Inc. EPA ID CAD9813974172306 E. 38th StreetVernon, CA 90058
- The Marquardt Co. CA ID CAD044696102 16555 Saticoy Street Van Nuys, CA 91406

Section 65962.5(a)(2) requires that DTSC "shall compile and update as appropriate, but at least annually, and shall submit to the Secretary for Environmental Protection, a list of all the following: … (2) [a]ll land designated as hazardous waste property or border zone property pursuant to Article 11 (commencing with Section 25220) of Chapter 6.5 of Division 20 of the Health and Safety Code."

No facilities or lands are listed under this provision because DTSC has not designated any hazardous waste property or border zone property pursuant to the cited provisions.

Section 65962.5(a)(3) requires that DTSC "shall compile and update as appropriate, but at least annually, and shall submit to the Secretary for Environmental Protection, a list of all the following: ….(3) [a]ll information received by the Department of Toxic Substances Control pursuant to Section 25242 of the Health and Safety Code on hazardous waste disposals on public land.

HSC § 25242(a) requires a city, county, or state agency that owns or leases land to notify DTSC if it "has probable cause to believe that a disposal of hazardous waste, which is not authorized pursuant to this chapter has occurred on, under or into the land which the city, county, or state agency owns or leases…"; DTSC then shall determine if there has been an unauthorized disposal of hazardous waste.

In practice, if a city, county or state agency contacts DTSC to provide such information, they also will have contacted or will be directed to contact DTSC's Emergency Response Duty Officer, who determines whether to authorize DTSC-funding for an emergency action to properly remove and dispose of the hazardous waste.

DTSC's Emergency Response program does not keep separate records of such reports that relate to city, county or state agency property.

In the future, DTSC will track any reports received from cities, counties, or state agencies of hazardous waste disposal on land owned or leased by a city, county or state agency, where hazardous waste was released into the environment, and provide the information to CalEPA for inclusion in this section of the Cortese list.

Section 65962.5(a)(4)requires that DTSC "shall compile and update as appropriate, but at least annually, and shall submit to the Secretary for Environmental Protection, a list of all the following: ….(4) [a]ll sites listed pursuant to Section 25356 of the Health and Safety Code."

HSC § 25356(b)(1) requires "a listing of hazardous substance release sites selected for, and subject to, a response action under this chapter." HSC § 25356(b)(2) requires DTSC to "update the list of sites at least annually to reflect new information regarding previously listed sites or the addition of new sites requiring response action." The implementing regulations provide that sites may be listed pursuant to HSC § 25356 if (a) they are not owned by the Federal Government and (b) a release or threatened release of hazardous substances has been confirmed by on-site sampling. (California Code of Regulations, Title 22, Section 67400.1). DTSC's list of sites that meet those criteria as well as the criteria in HSC § 25356(c), is found in a report in DTSC's "Envirostor" database:

- Hazardous Waste and Substances site "Cortese" list

Sites where response actions have been completed and no operation and maintenance activities are required are not included on the list.

Section 65962.5(a)(5) requires that DTSC "shall compile and update as appropriate, but at least annually, and shall submit to the Secretary for Environmental Protection, a list of all the following: ….(5) [a]ll sites included in the Abandoned Site Assessment Program."

DTSC had an abandoned site program in the 1980s. HSC § 25369, which was enacted in 1985, required an abandoned site survey in "rural unsurveyed counties." Sites identified in the abandoned site program were included in the "CalSites" database of known and potential hazardous substance release sites. After further investigation, many sites were removed from the "CalSites" database because there was no evidence that a release of hazardous substances occurred. Some time in the early 1990s, DTSC's activities under HSC § 25369, and the entire Abandoned Site Program, were concluded.

DTSC recently replaced the "CalSites" database with a new database of hazardous substance release sites, known as the "EnviroStor" database. The EnviroStor database does not indicate if a specific site was at one time included in the abandoned site program and does not have a category for sites that are considered abandoned. The CalSites database also did not include this information. Consequently, DTSC does not provide the information to CalEPA originally called for under section 65962.5(a)(5).

Background and History

Appendix I

FAA Determination of No Hazard

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2016-AWP-12463-OE

Issued Date: 03/30/2017

Michael Grant
DCI
110 Town Center Parkway
Santee, CA 92071

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building Graves Commercial
Location:	Santee, CA
Latitude:	32-49-52.40N NAD 83
Longitude:	116-57-40.14W
Heights:	452 feet site elevation (SE)
	36 feet above ground level (AGL)
	488 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 L Change 1.

This determination expires on 09/30/2018 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

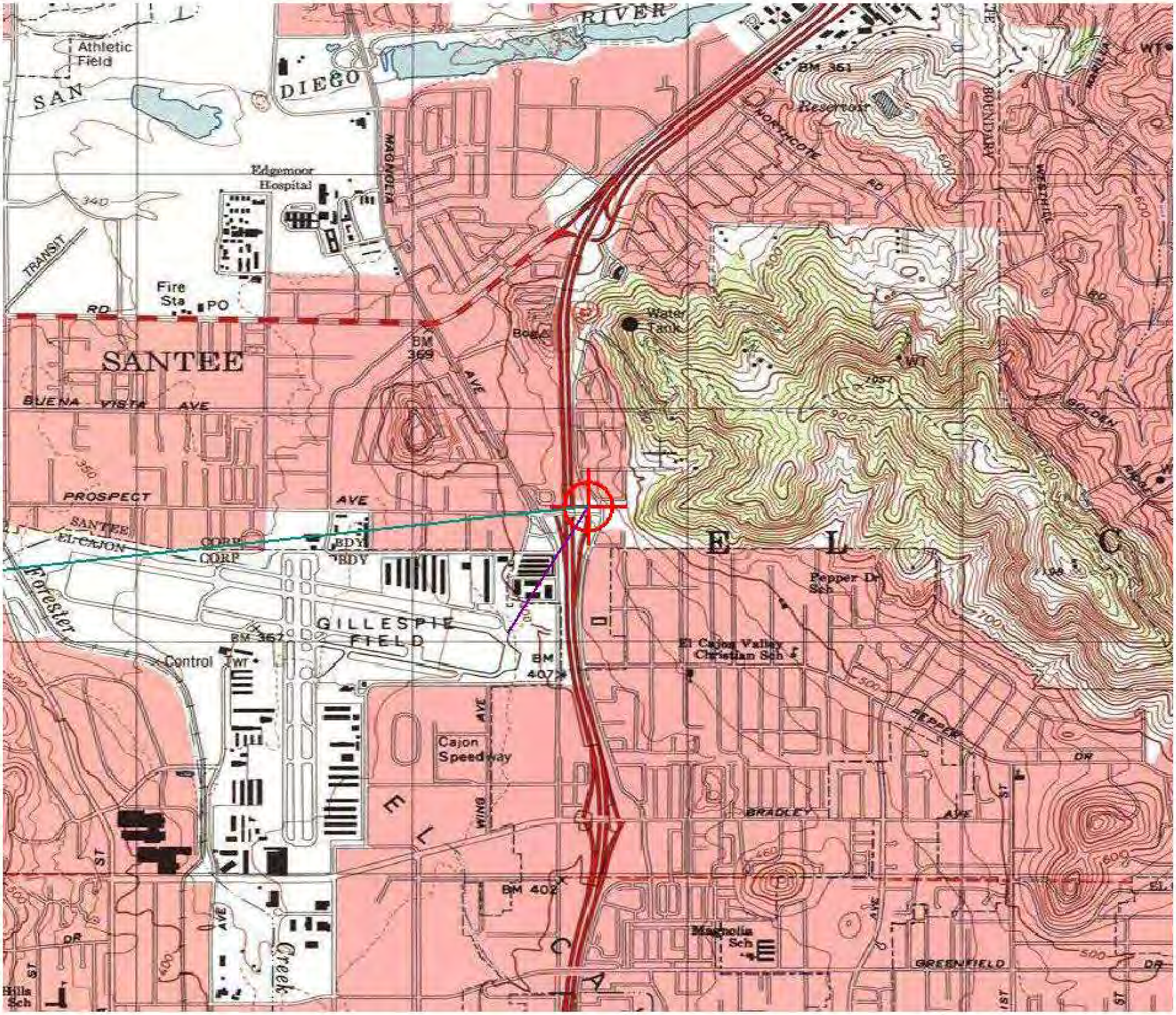
If we can be of further assistance, please contact our office at (310) 725-6558. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2016-AWP-12463-OE.

Signature Control No: 312986571-327129359 (DNE)

LaDonna James
Technician

Attachment(s)
Map(s)

Verified Map for ASN 2016-AWP-12463-OE



Appendix J

Noise Impact Analysis

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942
619.462.1515 tel
619.462.0552 fax
www.**helixepi**.com

March 2, 2018

Hannah Gbeh
REC Consultants, Inc.
2442 Second Avenue
San Diego, CA 92101

Subject: Graves Avenue 7-Eleven and Starbucks Project Noise Impact Analysis

Dear Ms. Gbeh:

HELIX Environmental Planning, Inc. (HELIX) has performed a noise impact analysis for the construction and operational noise impacts of the proposed Graves Avenue 7-Eleven and Starbucks Project (project). This letter summarizes the modeling used to assess the noise impacts associated with construction activity and operation of the drive-through speaker setup for the Starbucks coffee shop and rooftop-mounted heating, ventilation, and air conditioning (HVAC) units.

PROJECT DESCRIPTION AND ENVIRONMENTAL SETTING

The approximately one-acre project site is located at 8606 Graves Avenue in the City of Santee (City), California. The site is bounded by State Route (SR-) 67 to the west, Prospect Avenue to the south, and Graves Avenue to the north and east. The project proposes the construction of a single structure divided into two retail spaces totaling 6,267 square feet (SF). The larger store would provide 4,467 SF of space for the 7-Eleven convenience store, and the smaller store would provide 1,800 SF for the Starbucks coffee shop. The project proposes a drive-through to serve the Starbucks coffee shop which would wrap around the southern and western edges of the structure. The project also proposes 32 parking spaces, street and sidewalk improvements, and two infiltration basins. The site has a General Plan and zoning designation of General Commercial.

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise, including residences, hospitals, schools, hotels, resorts, libraries, sensitive wildlife habitat, or similar facilities where quiet is an important attribute of the environment. Noise receptors are individual locations that may be affected by noise. NSLUs in the project vicinity include multi-family residences to the east and south across Graves Avenue, with the nearest residences approximately 100 feet east of the project boundary. Refer to the Figure 1, *Drive-through Speaker Noise Contours* for nearby land uses.

TERMINOLOGY

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting (dBA) to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, with a specified duration. The Community Noise Equivalent Level (CNEL) is a 24-hour average, where noise levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an added 5 dBA weighting, and noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dBA weighting.

NOISE MODELING SOFTWARE

Project construction noise was analyzed using the Roadway Construction Noise Model (RCNM; United States Department of Transportation [USDOT] 2008), which utilizes estimates of sound levels from standard construction equipment to determine the noise level at a given distance.

Modeling of the operational speaker system and rooftop HVAC units was accomplished using Computer Aided Noise Abatement (CadnaA) version 2018. CadnaA is a model-based computer program developed by *DataKustik* for predicting noise impacts in a wide variety of conditions. CadnaA assists in the calculation, presentation, assessment, and mitigation of noise exposure. It allows for the input of project-related information, such as noise source data, barriers, structures, and topography to create a detailed model for the prediction of outdoor noise impacts.

Project traffic-related noise was analyzed using the Traffic Noise Model (TNM) version 2.5, which calculates daytime average hourly L_{EQ} from various model inputs and traffic data (Caltrans 2004). The one-hour L_{EQ} noise level is calculated utilizing peak-hour traffic; peak-hour traffic volumes can be estimated based on the assumption that 10 percent of the average daily traffic would occur during a peak hour. The model-calculated one-hour L_{EQ} noise output is the equivalent to the CNEL (Caltrans Technical Noise Supplement, November 2009).

NOISE STANDARDS

Construction Noise Standards

Chapter 8.12.290 of the Santee Municipal Code regulates noise emissions from construction equipment. The Municipal Code states that no equipment or combination of equipment shall be operated so as to cause noise at a level in excess of 75 dBA for more than eight hours during any 24-hour period. Noise levels from construction equipment are corrected for based on time duration, and are shown in Table 1, *City of Santee Construction Noise Level Limits*.

Table 1
CITY OF SANTEE OPERATIONAL NOISE LEVEL LIMITS

Total Duration in 24-Hour Period	Decibel Level Allowance	Total Decibel Level
Up to 15 minutes	+15	90
Up to 30 minutes	+12	87
Up to 1 hour	+9	84
Up to 2 hours	+6	81
Up to 4 hours	+3	78
Up to 8 hours	0	75

Operational Noise Standards

Table 8.12.040(A) of the City of Santee Municipal Code regulates operational noise exposure limits for residential properties. These standards are depicted in Table 2, *City of Santee Operational Noise Level Limits.* The drive-through would be open 24 hours per day, so the project's operational noise sources must be below the City's lowest limit of 40 dBA L_{EQ} during nighttime hours.

Table 2
CITY OF SANTEE OPERATIONAL NOISE LEVEL LIMITS

Zone	Time Period	Applicable Limit One-Hour Average Sound Level (dB)
Residential	7 a.m. to 7 p.m.	50
	7 p.m. to 10 p.m.	45
	10 p.m. to 7 a.m.	40

Source: Table 8.12.040(A) of City of Santee Municipal Code

NOISE ANALYSIS AND IMPACTS

Construction Noise Impacts

Construction of the proposed project would involve site grading and preparation, underground utilities installation, building construction, and paving. Construction equipment is mobile and would be moving across the site throughout the construction period. For modeling purposes, equipment was assumed to operate at an average distance of approximately 120 feet from the nearest residence. The loudest construction noise levels would occur during grading, which would involve the simultaneous use of a tractor, backhoe, and front end loader. A tractor, backhoe, and front end loader is assumed to be operating simultaneously for 40 percent during a given hour. If used each hour over an eight-hour work day, this construction equipment would generate a noise level of 74.3 dBA L_{EQ} at 120 feet. Noise levels would not exceed the City's 75 dBA construction noise level limit and impacts from construction would be less than significant. For modeling results, see Attachment 1, *Construction Noise Modeling Outputs.*

Operational Noise Impacts

Operational sources of noise associated with the proposed project include the drive-through speaker system and HVAC units located on the roof. Table 3, *Site Features Included in the Noise Model*, shows the proposed features at the project site that were included in the CadnaA noise model. These features would affect the emission, obstruction, and reflection of noise from the speaker. Because it is assumed that an idling automobile would be present when the speaker is operating, a single vehicle was included in the model directly opposite the speaker to account for obstruction and reflection of sound that may occur. Per project designs, a parapet was included around the border of the roof, which would decrease noise levels from the HVAC units. To isolate noise generation from speaker and HVAC unit noise, the model did not include existing traffic noise from vehicles along Graves Avenue, Prospect Avenue, or SR-67.

Table 3
SITE FEATURES INCLUDED
IN THE NOISE MODEL

Description	Height[1]
Proposed 7-Eleven/Starbucks building	15 feet
Parapet	4 feet
Automobile	6 feet

[1] Heights are estimated from architectural plans and from typical heights of objects/buildings.

Specific planning for the proposed speaker system is not available at this point in the planning process. A speaker at a similar style restaurant was measured for this analysis (HELIX 2016). A sound level meter at approximately five feet from a typical speaker measured 86.6 dBA L_{EQ} averaged over one hour. The summed measurement time period data (20-second average) are shown in octave format in Table 4, *Octave Data of Measured Drive-through Speaker*.

Table 4
OCTAVE DATA OF MEASURED DRIVE-THROUGH SPEAKER[1]

Octave Band Center Frequency (Hz)	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	dBA L_{EQ}*
Measured Sound Pressure	79.3	75.2	72.2	74.8	84.8	80.0	61.1	51.9	86.6

[1] Drive-through speaker measured at a distance of five feet from the source.

The measurement data in Table 4 depicts the dBA L_{EQ} during the continuous use of a speaker for one hour. For the purposes of this analysis, it is assumed that a speaker would be in use for approximately 30 minutes in each hour. Assuming a one-minute customer order, the analysis for the proposed coffee shop assumes a conservative 60 customers per hour, with the speaker in use for half of a single order.

Specific planning for future HVAC systems is not available at this point in project design. Analysis using a typical rooftop commercial HVAC unit was analyzed for the project buildings. The unit used in this analysis is a Carrier Centurion Model 50 PG03-12 with a sound rating of 80 dBA sound power. The summed measurement time period data (20-second average) are shown in octave format in Table 5, *Octave Data of Carrier 50 PG03 12-Ton HVAC Unit.* A single one-ton HVAC unit is commonly required for every 350 square feet of habitable space (ASHRAE Handbook 2012). Using this calculation, two units for the combined 7-Eleven and Starbucks building would be required.

Table 5
OCTAVE DATA OF CARRIER 50 PG03 12-TON HVAC UNIT

Octave Band Center Frequency (Hz)	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	dBA L_{EQ*}
Measured Sound Pressure	90.4	83.1	80.9	77.8	75.2	70.0	66.1	57.6	80.2

Source: Carrier Product Data: Centurion.

Noise levels at three receivers placed at the three nearest residences were modeled in CadnaA using the data described above. The location of the three receivers and their proximity to the proposed project is depicted on Figure 1, *Drive-through Speaker Noise Contours* (see Attachment 2). Operation of the project, including a drive-through speaker and two HVAC units, would emit noise levels of approximately 30.1 dBA L_{EQ} at Receiver 1, 29.4 dBA L_{EQ} at Receiver 2, and 26.5 dBA L_{EQ} at Receiver 3. Noise levels would not exceed the City's 40 dBA L_{EQ} nighttime limit.

Project Traffic-Related Noise Impacts

Traffic noise levels presented in this analysis are based on traffic volumes provided by the project's Traffic Study (Darnell & Associates, Inc. 2017). TNM was used to calculate the noise contour distances for Existing and Existing + Project conditions along Graves Avenue north of Prospect Avenue. This roadway segment was analyzed because it would accommodate most of the traffic generated by the project, and thus provides a conservative analysis for project traffic noise levels. Additionally, residences are located along this segment of Graves Avenue, approximately 50 feet from the roadway centerline. The project's traffic levels and the results of the analysis for the CNEL at 50 feet from the roadway centerline are shown below in Table 6, *Existing and Future Traffic Volumes and Noise Levels*.

A significant direct impact would occur if the project's traffic more than doubles (increases by more than 3 CNEL) the existing noise level. The project would not increase traffic-related noise levels by more than 3 CNEL, and impacts would be less than significant.

Table 6
EXISTING AND FUTURE TRAFFIC VOLUMES AND NOISE LEVELS

Roadway Segment	Existing		Existing + Project		Change from Existing	
	ADT	CNEL @ 50 feet	ADT	CNEL @ 50 feet	ADT	CNEL @ 50 feet
Graves Avenue						
North of Prospect Avenue	6,616	59.9	10,457	61.9	+3,841	+2.0

ADT = Average Daily Traffic
Source: Darnell & Associates, Inc 2017; TNM

Conclusions

Construction, operation of the project, and additional project-related traffic would not generate noise levels above City standards. Impacts would be less than significant.

Jason Runyan
Noise Analyst

Joanne M. Dramko, AICP
Senior Technical Specialist

Attachments:

Attachment 1: Construction Noise Modeling Outputs

Attachment 2: Figure 1-Drive-through Speaker Noise Contours

REFERENCES

ASHRAE. 2012. ASHRAE Handbook – HVAC Systems and Equipment.

California Department of Transportation (Caltrans). 2009. Technical Noise Supplement. November.

2004. California Department of Transportation, Traffic Noise Model (TNM).

Darnell & Associates. 2017. Traffic Impact Study for Convenience Market and Coffee Shop with Drive Thru Project. March 30. Revised August 22.

HELIX Environmental Planning, Inc. 2016. Noise Impact Analysis Tacos El Gavilan Drive-Through Restaurant. February 18

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 2/22/2018
Case Description:

---- Receptor #1 ----

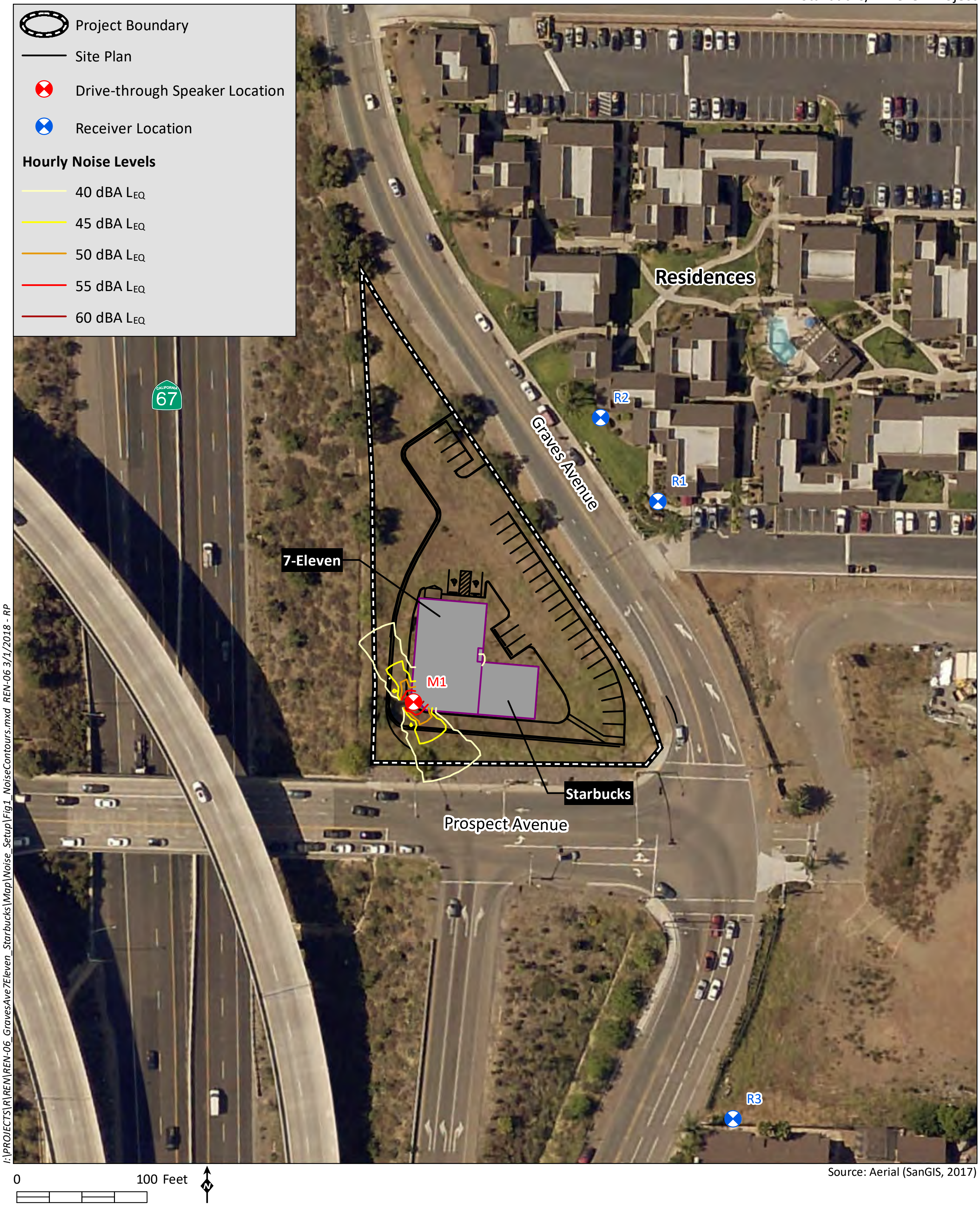
Descriptior	Land Use	Baselines (dBA) Daytime	Evening	Night
Multi-famil	Residential	70	70	70

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84		120	0
Backhoe	No	40		77.6	120	0
Front End Loader	No	40		79.1	120	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	76.4	72.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	70	66	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	71.5	67.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	76.4	74.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.



Source: Aerial (SanGIS, 2017)

HELIX Environmental Planning

Drive-through Speaker Noise Contours

Figure 1

Appendix K

Padre Dam Municipal Water District Project Availability Forms

CITY OF SANTEE

PROJECT FACILITY AVAILABILITY FORM, Sewer

Please type or use pen

Advantaged Asset Acquisitions I, LLC — 619-449-0249
Owner's Name — Phone

8510 Railroad Avenue
Owner's Mailing Address — Street

Santee — CA — 92071
City — State — Zip

ORG______
ACCT______
ACT______
TASK______
DATE______
AMT $______

DISTRICT CASHIER'S USE ONLY

S

SECTION 1. PROJECT DESCRIPTION — TO BE COMPLETED BY APPLICANT

A. ☐ Major Subdivision (TM) ☐ Specific Plan or Specific Plan Amendment
☐ Minor Subdivision (TPM) ☐ Certificate of Compliance:______
☐ Boundary Adjustment
☐ Rezone (Reclassification) from______ to ______ zone.
☐ Major Use Permit (MUP), purpose:______
☐ Time Extension?Case No.______
☐ Expired Map?Case No.______
☒ Other CUP to construct and operate retail w/ drivethrough

B. ☐ Residential ...... Total number of dwelling units______
☒ Commercial...... Gross floor area 6,267 sf
☐ Industrial .... Gross floor area______
☐ Other .... Gross floor area______

C. ☒ Total Project acreage 1.02 Total number of lots 1

D. Is the project proposing its own wastewater treatment plant? ☐ Yes ☒ No
Is the project proposing the use of reclaimed water? ☐ Yes ☒ No

Assessor's Parcel Number(s)
(Add extra if necessary)

384-142-21	

Thomas Bros. Page ______ Grid ______

8606 Graves Avenue
Project address — Street

Santee — 92071
Community Planning Area/Subregion — Zip

Owner/Applicant agrees to pay all necessary construction costs, dedicate all district required easements to extend service to the project.
OWNER/APPLICANT MUST COMPLETE ALL CONDITIONS REQUIRED BY THE DISTRICT.

Applicant's Signature: [signature] Date: 2/1/2018

Address: 8510 Railroad Avenue, Santee, CA 92071 Phone: 619-449-0249

(On completion of above, present to the district that provides water protection to complete Section 2 below.)

SECTION 2: FACILITY AVAILABILITY — TO BE COMPLETED BY DISTRICT

***LETTER EXPIRES 2/21/2019

District Name: PADRE DAM MUNICIPAL WATER DISTRICT Service area WSA

A. ☒ Project is in the district.
☐ Project is not in the district but is within its Sphere of Influence boundary, owner must apply for annexation.
☐ Project is not in the district and is not within its Sphere of Influence boundary.
☐ The project is not located entirely within the district and a potential boundary issue exists with the ______ District.

B. ☒ Facilities to serve the project ☒ ARE ☐ ARE NOT reasonably expected to be available within the next 5 years based on the capital facility plans of the district. Explain in space below or on attached______. (Number of sheets)
☐ Project will not be served for the following reason(s):______

C. ☒ District conditions are attached. Number of sheets attached: 1
☐ District has specific water reclamation conditions which are attached. Number of sheets attached:______
☐ District will submit conditions at a later date.
☐ Additional District conditions: ______

D. ☐ How far will the pipeline(s) have to be extended to serve the project?______

This Project Facility Availability Form is valid until final discretionary action is taken pursuant to the application for the proposed project or until it is withdrawn, unless a shorter expiration date is otherwise noted.

Authorized signature: Cheryl Brugman Print name Cheryl Brugman

Print title Senior Engineering Technician Phone 619 258-4635 Date 2/21/18

NOTE: THIS DOCUMENT IS NOT A COMMITMENT OF SERVICE OR FACILITIES BY THE DISTRICT
On completion of Section 2 by the district, applicant is to submit this form with application to:
Department of Development Services, 10601 Magnolia Avenue, Santee, CA 92071

PADRE DAM
Municipal Water District

9300 Fanita Parkway, Santee
619-258-4635

SEWER AVAILABILITY ATTACHMENT
CONDITIONS OF APPROVAL

PROJECT NAME 7/11 and Starbucks FOR Commercial Business Corner MAP NUMBER ________

A.P.N.(s) 384-142-21

Padre Dam does not require that all lots be connected to the public sewer system. Alternate sources of sewer disposal are under the jurisdiction of the County of San Diego, or the City of Santee.

SPECIAL CONDITIONS

[X] A private sewer system is required.

[X] The nearest sewer connection to serve this parcel is an 8 inch VCP main in Graves Avenue at Sunset Trails Road. Padre Dam will install the public lateral portion (±10') in Graves Avenue at the developer's expense.

[X] The developer is responsible for extending the private lateral to the project site.

Approved by: Cheryl Brugman

Date: 2/21/2018

E-32 R-8/08

CITY OF SANTEE

PROJECT FACILITY AVAILABILITY FORM, Water

Please type or use pen

Advantaged Asset Acquisitions I, LLC — 619-449-0249 Owner's Name — Phone	ORG ______
8510 Railroad Avenue Owner's Mailing Address — Street	ACCT ______ ACT ______
Santee — CA — 92071 City — State — Zip	TASK ______ DATE ______ AMT $ ______
	W *DISTRICT CASHIER'S USE ONLY*

SECTION 1. PROJECT DESCRIPTION — **TO BE COMPLETED BY APPLICANT**

A.
- ☐ Major Subdivision (TM)
- ☐ Minor Subdivision (TPM)
- ☐ Boundary Adjustment
- ☐ Rezone (Reclassification) from ______ to ______ zone.
- ☐ Major Use Permit (MUP), purpose: ______
- ☐ Time Extension?Case No. ______
- ☐ Expired Map?Case No. ______
- ☒ Other CUP to construct and operate retail w/ drivethrough
- ☐ Specific Plan or Specific Plan Amendment
- ☐ Certificate of Compliance: ______

Assessor's Parcel Number(s)
(Add extra if necessary)

384-142-21	

B.
- ☐ Residential...... Total number of dwelling units ______
- ☒ Commercial...... Gross floor area 6,267 sf
- ☐ Industrial .... Gross floor area ______
- ☐ Other .... Gross floor area ______

Thomas Bros. Page ______ Grid ______

8606 Graves Avenue
Project address — Street

C. ☐ Total Project acreage 1.02 Total number of lots 1

Santee — 92071
Community Planning Area/Subregion — Zip

D. Is the project proposing the use of groundwater? ☐ Yes ☒ No
Is the project proposing the use of reclaimed water? ☐ Yes ☒ No

Owner/Applicant agrees to pay all necessary construction costs, dedicate all district required easements to extend service to the project and COMPLETE ALL CONDITIONS REQUIRED BY THE DISTRICT.

Applicant's Signature: [signature] Date: 2/1/2018

Address: 8510 Railroad Avenue, Santee, CA 92071 Phone: 619-449-0249

(On completion of above, present to the district that provides water protection to complete Section 2 below.)

SECTION 2: FACILITY AVAILABILITY — **TO BE COMPLETED BY DISTRICT**

*****LETTER EXPIRES** 2/21/2019

District Name: **PADRE DAM MUNICIPAL WATER DISTRICT** Service area WSA

A.
- ☒ Project is in the district.
- ☐ Project is not in the district but is within its Sphere of Influence boundary, owner must apply for annexation.
- ☐ Project is not in the district and is not within its Sphere of Influence boundary.
- ☐ The project is not located entirely within the district and a potential boundary issue exists with the ______ District.

B.
- ☒ Facilities to serve the project ☒ ARE ☐ ARE NOT reasonably expected to be available within the next 5 years based on the capital facility plans of the district. Explain in space below or on attached ______. (Number of sheets)
- ☐ Project will not be served for the following reason(s): ______

C.
- ☒ District conditions are attached. Number of sheets attached: 1
- ☐ District has specific water reclamation conditions which are attached. Number of sheets attached: ______
- ☐ District will submit conditions at a later date.
- ☐ Additional District conditions: ______

D. ☐ How far will the pipeline(s) have to be extended to serve the project? ______

This Project Facility Availability Form is valid until final discretionary action is taken pursuant to the application for the proposed project or until it is withdrawn, unless a shorter expiration date is otherwise noted.

Authorized signature: Cheryl Brugman Print name Cheryl Brugman

Print title Senior Engineering Technician Phone 619 258-4635 Date 2/21/18

NOTE: THIS DOCUMENT IS NOT A COMMITMENT OF SERVICE OR FACILITIES BY THE DISTRICT
On completion of Section 2 by the district, applicant is to submit this form with application to:
Department of Development Services, 10601 Magnolia Avenue, Santee, CA 92071

PADRE DAM
Municipal Water District

9300 Fanita Parkway, Santee
619-258-4635

WATER AVAILABILITY ATTACHMENT
CONDITIONS OF APPROVAL

PROJECT NAME 7/11 and Starbucks FOR Commercial Business Corner MAP NUMBER____________

A.P.N.(s) 384-142-21

Padre Dam does not require that all lots be connected to the public water system. Alternate sources of water are under the jurisdiction of the County of San Diego, or the City of Santee.

EASEMENTS

[X] Developer shall dedicate to Padre Dam all necessary easements for that portion of the water system which is to be public.

SPECIAL CONDITIONS

[X] The onsite water system will be private.

[X] There is an existing 10 inch ACP water main in Graves Avenue to serve the project.

[X] A separate irrigation meter is required.

[X] Any existing water services not used as part of the project to be abandoned by Padre Dam at developer's expense.

[X] Submit all street improvement and landscape plans to Padre Dam for review and approval.

Approved by: Cheryl Brugman Date: 2/21/2018