

Appendix K Preliminary Hydrology Calculations

Appendices

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MEMORANDUM

DATE June 17, 2016
TO County of Los Angeles
CONTACT
FROM Dr. Cathleen Fitzgerald, P.E.
RE **Preliminary Hydrology Calculations for County of Los Angeles Consolidated Correctional Treatment Facility**
PROJECT NO. COLA-14

Men's Central Jail (MCJ) Site

The Project site is fully developed with impervious surface comprising approximately 99% of the Project site. The impervious surfaces include buildings, plazas, walkways, and parking structures. Pervious surfaces are minimal and consist primarily of ornamental landscaping. Surface water runoff is directed into an existing storm drain system that connects to two larger storm drains that pass through or are adjacent to the site.

The proposed Project would be located on the existing developed site and the percentage of impervious surfaces would not significantly change. Therefore, the proposed Project would not substantially alter existing drainage patterns nor increase the amount of stormwater discharged from the site. According to the Los Angeles County standards for storm drain systems, as specified in the Los Angeles County Department of Public Works – Hydrology Manual (dated January 2006), the storm water drainage from the site must be designed for the 25-year, 24-hour storm event.

Stormwater Runoff Rates

The procedures specified in the LA County Hydrology Manual were used for preliminary calculations to determine pre- and post-development stormwater flow rates. The Los Angeles County's HydroCalc calculator was used for the 50-year and 25-year storm events. The project site is located within the Los Angeles River Watershed. The 50-year 24-hour rainfall amount is 6.1 inches/hour. Soil type is 006 – Hanford Fine Sandy Loam. The Project site encompasses approximately 17.7 acres. The percentage of impervious surfaces was conservatively assumed to be 99% for both pre- and post-development conditions. Based on topographic maps of the site, the slope was assumed to be 0.004 and the flow path length was assumed to be 800 feet.

The Project would be subject to LID requirements to capture and infiltrate the design capture volume, based on the runoff produced from either a 0.75-inch storm event or the 85th percentile storm event, whichever is greater. Since the 85th percentile storm event is greater in this case, it was used to determine the Stormwater Quality Design Volume (SWQDv). The Los Angeles County HydroCalc calculator was used to determine the LID volume of stormwater runoff to be mitigated as well as the peak mitigated flow rate for the SWQDv. This amount was subtracted from the existing conditions flow rates to determine stormwater runoff rates under post-development conditions. The calculations are attached and summarized in the following table.

Table 1
Existing vs. Proposed Runoff Volumes for
50-Year and 25-Year Storm Events for MCJ Site

	<i>Area (ac)</i>		<i>Peak Flow Rate (cfs)</i>		
	<i>Existing</i>	<i>Post-construction</i>	<i>Existing</i>	<i>Post-construction</i>	<i>Difference</i>
50-Year Storm	17.7	17.7	40	37	-3 (7.5%)
25-Year Storm	17.7	17.7	34	30	-4 (11.7%)

The preliminary hydrology calculations show that both the 50-year and 25-year storm event would not produce an increase in peak runoff flow rates as compared to pre-development conditions. In fact, peak flow rates would be slightly lower with the implementation of LID measures. As stated previously, Los Angeles County regulations require an on-site storm drain system to be adequate to convey the peak flow rate from the 25-year, 24-hour storm.

Results from the Los Angeles County LID calculations indicate that the required treatment/infiltration volumes at the site would 56,839 cubic feet (ft³) or approximately 1.3 acre-feet. A LID Plan will be prepared and submitted to the LA County Public Works prior to the start of construction that shows the location of all BMP/LID features and calculations to show that the required treatment volumes have been achieved.

Spring Street Parking Structure (SSPS) Site

The same methodology was used to determine existing vs. proposed conditions for the SSPS Site. Currently, this site is developed as a surface parking lot with approximately 99% impervious surfaces. There is no on-site connection to the storm drain system. Stormwater runoff occurs via sheet flow to the adjacent streets (New High Street and North Spring Street). Redevelopment of the site as a multi-story parking garage will include BMP and LID features as well as a direct connection to the existing storm drain system on New High Street.

The 50-year 24-hour rainfall amount at this location is also 6.1 inches/hour and the soil type is 006 – Hanford Fine Sandy Loam. The Project site encompasses approximately 1.66 acres. Based on topographic maps of the site, the slope was assumed to be 0.045 and the flow path length was assumed to be 115 feet. The calculations are attached and summarized in the following table.

Table 2
Existing vs. Proposed Runoff Volumes for
50-Year and 25-Year Storm Events for SSPS Site

	<i>Area (ac)</i>		<i>Peak Flow Rate (cfs)</i>		
	<i>Existing</i>	<i>Post-construction</i>	<i>Existing</i>	<i>Post-construction</i>	<i>Difference</i>
50-Year Storm	1.66	1.66	5.4	4.6	-0.8 (14.8%)
25-Year Storm	1.66	1.66	4.8	4.0	-0.8 (16.6%)

Results from the Los Angeles County LID calculations indicate that the required treatment/infiltration volumes at the SSPS site would be 5,331 cubic feet (ft³) or approximately 0.12 acre-feet. A LID Plan will be prepared and submitted to the LA County Public Works prior to the start of construction that shows the location of all BMP/LID features.

Peak Flow Hydrologic Analysis

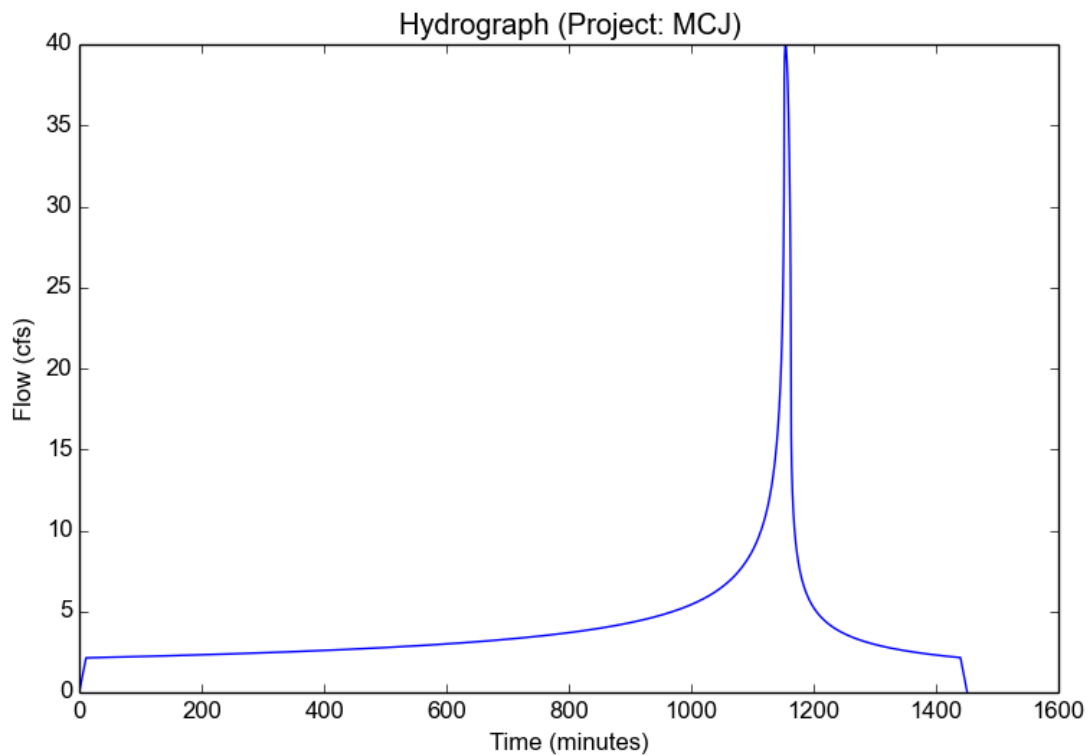
File location: C:/Users/cfitzgerald/Music/Documents/Hydrology Projects/LA County Men's Jail Expansion COLA-14/Calcs/Revised Calcs/50-Year Storm -
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Project
Subarea ID	MCJ
Area (ac)	17.7
Flow Path Length (ft)	800.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.1
Peak Intensity (in/hr)	2.5124
Undeveloped Runoff Coefficient (Cu)	0.788
Developed Runoff Coefficient (Cd)	0.8989
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	39.9733
Burned Peak Flow Rate (cfs)	39.9733
24-Hr Clear Runoff Volume (ac-ft)	7.9699
24-Hr Clear Runoff Volume (cu-ft)	347169.9291



Peak Flow Hydrologic Analysis

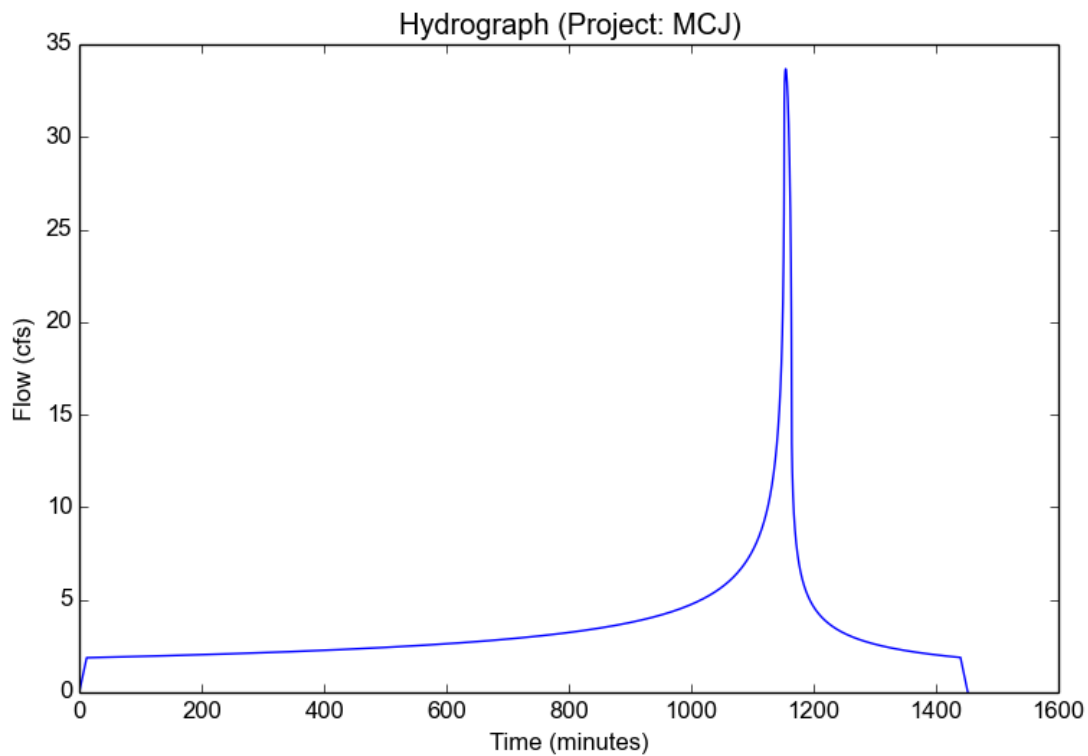
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Input Parameters

Project Name	Project
Subarea ID	MCJ
Area (ac)	17.7
Flow Path Length (ft)	800.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3558
Peak Intensity (in/hr)	2.1175
Undeveloped Runoff Coefficient (Cu)	0.7452
Developed Runoff Coefficient (Cd)	0.8985
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	33.6741
Burned Peak Flow Rate (cfs)	33.6741
24-Hr Clear Runoff Volume (ac-ft)	6.9963
24-Hr Clear Runoff Volume (cu-ft)	304757.3438



Peak Flow Hydrologic Analysis

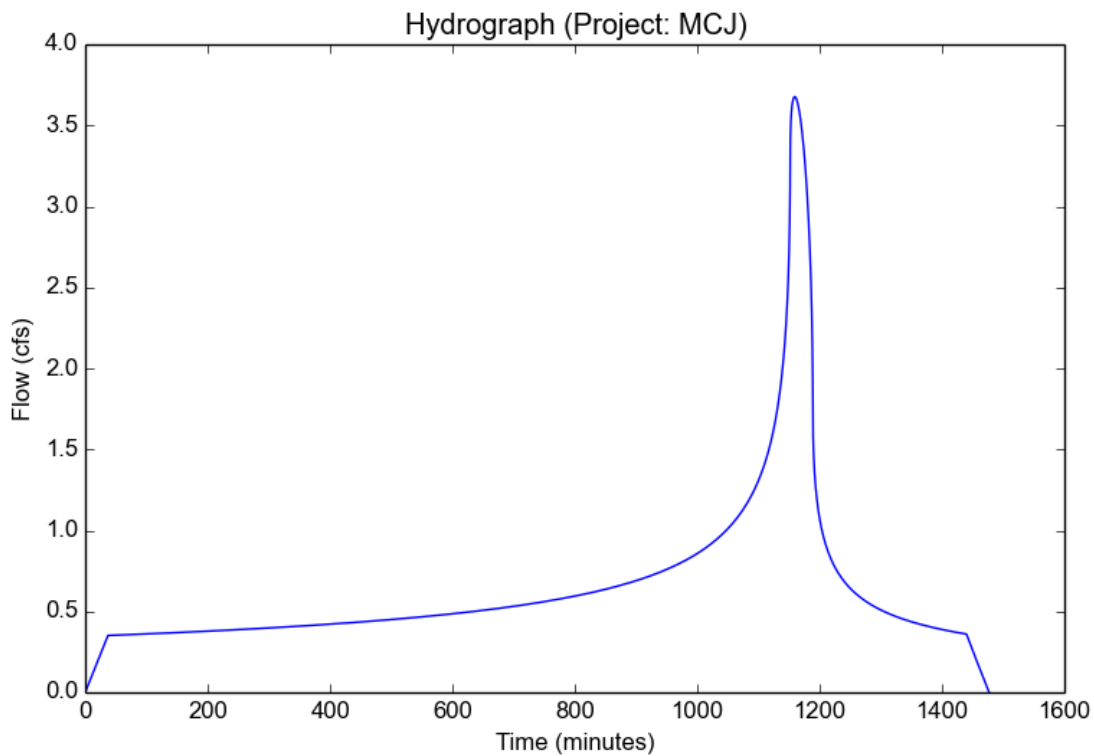
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Version: HydroCalc 1.0.2

Input Parameters

Project Name	Project
Subarea ID	MCJ
Area (ac)	17.7
Flow Path Length (ft)	800.0
Flow Path Slope (vft/hft)	0.004
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2329
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.892
Time of Concentration (min)	37.0
Clear Peak Flow Rate (cfs)	3.6771
Burned Peak Flow Rate (cfs)	3.6771
24-Hr Clear Runoff Volume (ac-ft)	1.3048
24-Hr Clear Runoff Volume (cu-ft)	56839.2372



Peak Flow Hydrologic Analysis

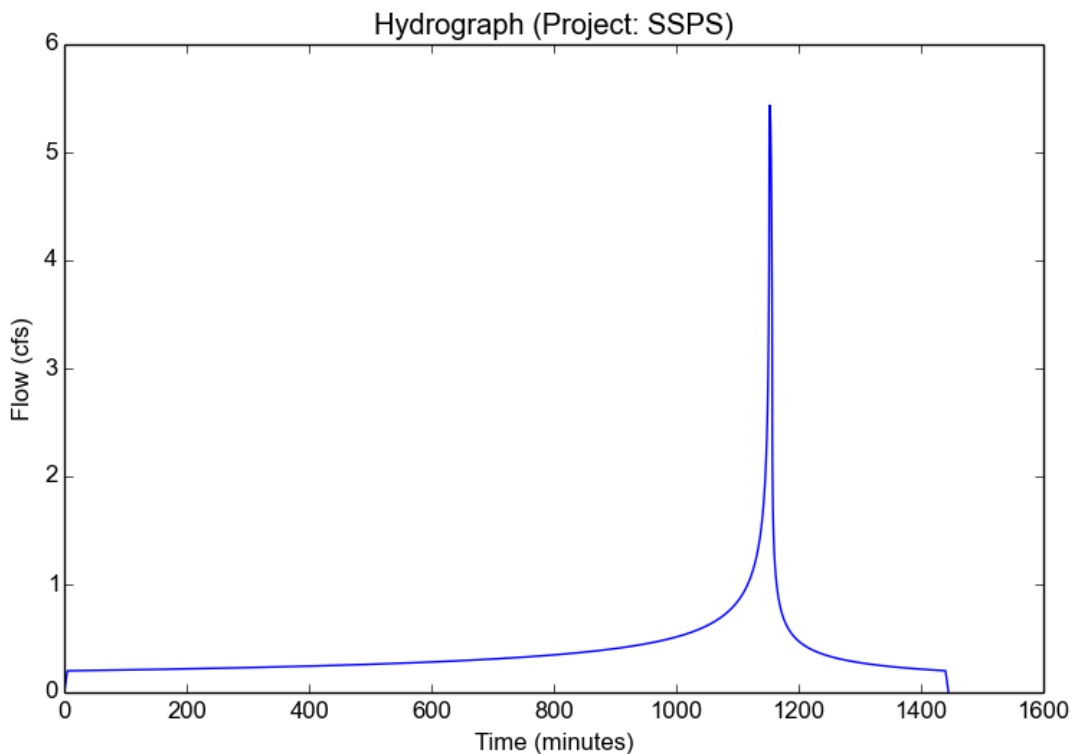
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Version: HydroCalc 1.0.2

Input Parameters

Project Name	Project
Subarea ID	SSPS
Area (ac)	1.66
Flow Path Length (ft)	115.0
Flow Path Slope (vft/hft)	0.045
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.1
Peak Intensity (in/hr)	3.6394
Undeveloped Runoff Coefficient (Cu)	0.8627
Developed Runoff Coefficient (Cd)	0.8996
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.4351
Burned Peak Flow Rate (cfs)	5.4351
24-Hr Clear Runoff Volume (ac-ft)	0.7475
24-Hr Clear Runoff Volume (cu-ft)	32559.9554



Peak Flow Hydrologic Analysis

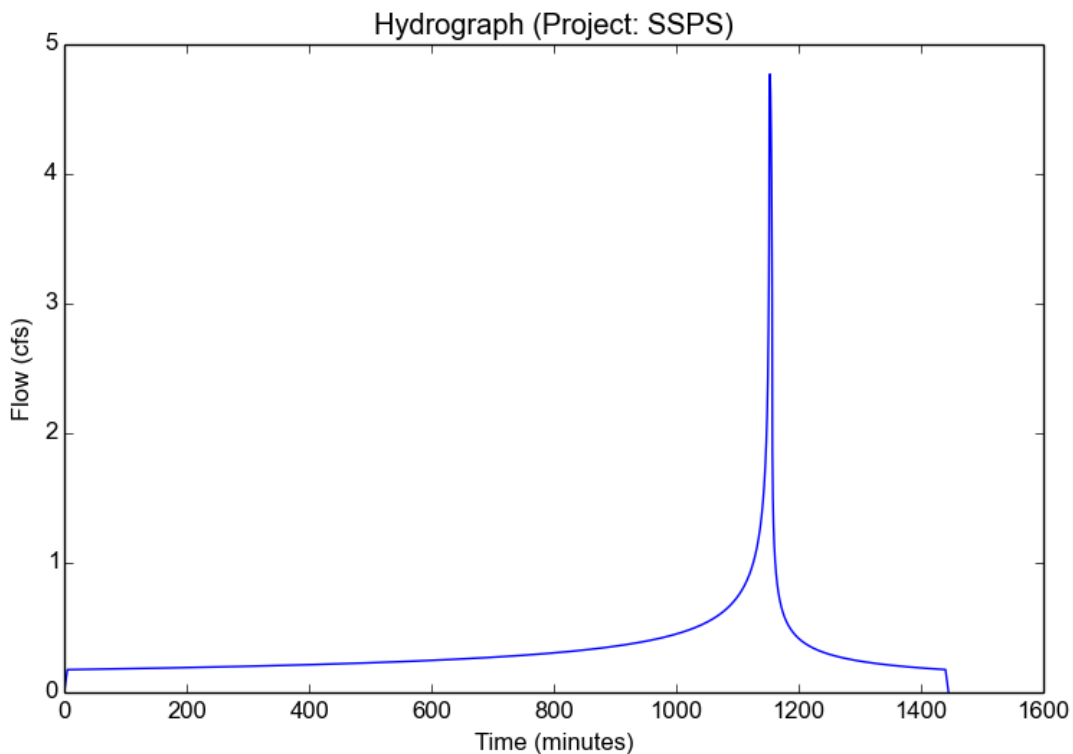
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Version: HydroCalc 1.0.2

Input Parameters

Project Name	Project
Subarea ID	SSPS
Area (ac)	1.66
Flow Path Length (ft)	115.0
Flow Path Slope (vft/hft)	0.045
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3558
Peak Intensity (in/hr)	3.1954
Undeveloped Runoff Coefficient (Cu)	0.836
Developed Runoff Coefficient (Cd)	0.8994
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	4.7706
Burned Peak Flow Rate (cfs)	4.7706
24-Hr Clear Runoff Volume (ac-ft)	0.6562
24-Hr Clear Runoff Volume (cu-ft)	28582.3092



Peak Flow Hydrologic Analysis

File location: C:/Users/cfitzgerald/Music/Documents/Hydrology Projects/LA County Men's Jail Expansion COLA-14/Calcs/Revised Calcs/85th Percentile -
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Project
Subarea ID	SSPS
Area (ac)	1.66
Flow Path Length (ft)	115.0
Flow Path Slope (vft/hft)	0.045
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.5094
Undeveloped Runoff Coefficient (Cu)	0.33
Developed Runoff Coefficient (Cd)	0.8943
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	0.7562
Burned Peak Flow Rate (cfs)	0.7562
24-Hr Clear Runoff Volume (ac-ft)	0.1224
24-Hr Clear Runoff Volume (cu-ft)	5331.1285

