PRELIMINARY HYDROLOGIC AND HYDRAULIC ANALYSIS
FOR
LEGACY PARK
TR. 36760

IN THE CITY OF MORENO VALLEY, CALIFORNIA

June 19, 2015
Revised: July 22, 2016
Revised: September 21, 2016

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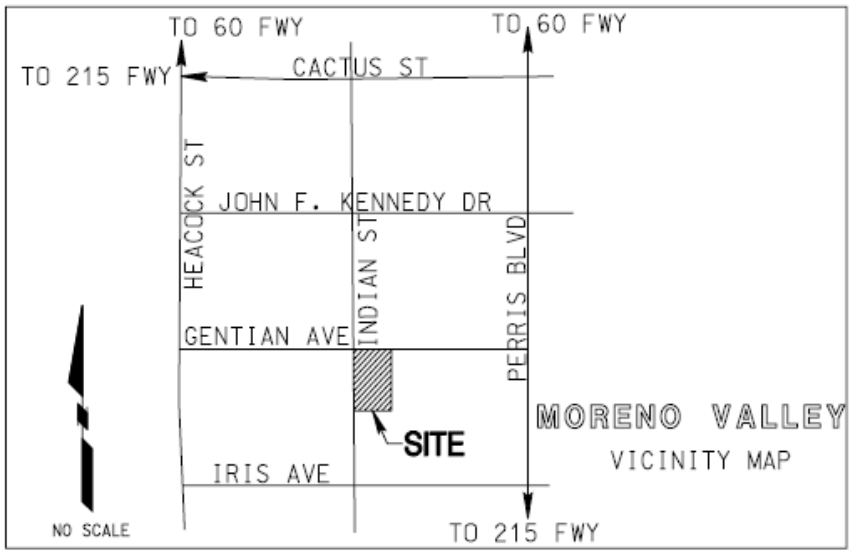
Introduction

This study presents the hydrologic and hydraulic analysis of the Legacy Park Tract 36760. The project site is located at the southeast corner of Indian Street and Gentian Avenue in the City of Moreno Valley, California. The site is approximately 48.5 acres and is located in the Perris Valley Hydrologic Subarea of the Santa Ana Watershed. The site drains to two separate basins in both the southwestern and southeastern corners. Tract 36370 proposes 221 single-family residential lots. The two onsite basins will be designed as bioretention basins, and will serve to treat the water for water quality. The basins are also attenuating flows, but this volume fits entirely within the water quality volume, therefore they are acting as water quality and not detention basins. The water exiting the west basin will tie into an existing storm drain system, and the water from the east basin will outlet into a proposed storm drain system to the east.

The site is surrounded by existing residential development to the West and proposed residential development to the North. To the East of the site there is an easement for the California DWR Aqueduct, with commercial development bordering it. To the South of the site is March Middle School which is designated as public use.

The vicinity map below shows the location of the project site.



2.0 Methodology

The hydrologic and hydraulic criteria used for the design of the storm drain systems are outlined in the Riverside County Flood Control Hydrology Manual. The 10-year storm shall be contained within the roadway from curb to curb. The 100-year storm shall be contained within the roadway right of way limits. To meet these requirements the 100-year storm event is contained within the roadway from curb to curb. All habitable dwellings shall be free of inundation during the 100-year storm.

HYDROLOGIC ANALYSIS

The Rational Method program from Advanced Engineering Software (AES) was used to perform the hydrologic analysis. The analysis represents the watershed as a link-node model. The existing and proposed conditions drainage basin maps with drainage basin boundaries and nodes are provided in Attachment 2 & 3, entitled Rational Method Hydrology Maps. The analysis can perform up to 15 hydrologic processes. These processes are assigned code numbers, which appear in the printed results. The code numbers and their meanings are as follows:

Hydrologic Process Code	Subarea Hydrologic Processes
1.	CONFLUENCE analysis at node
2.	INITIAL subarea analysis
3.	PIPEFLOW travel time (COMPUTER-Estimated pipe size)
4.	PIPEFLOW travel time (USER-Specified pipe size)
5.	TRAPEZOIDAL channel travel time
6.	STREET-FLOW analysis
7.	USER-SPECIFIED information at node
8.	ADDITION of subarea runoff to mainline
9.	V-GUTTER flow through subarea
10.	COPY Mainstream data onto a memory bank
11.	CONFLUENCE a memory BANK with the Main-Stream memory
12.	CLEAR a memory BANK
13.	CLEAR the Mainstream memory
14.	COPY a memory Bank onto the Main-Stream Memory
15.	HYDROLOGIC data BANK storage functions

ROUTING

The hydrology portion of this report, as shown on the attached hydrology map, is for hydrologic "Routing" purposes only. Peak flow-rates are routed through the system. At each confluence, flow-rates are adjusted to take into account their different times of concentration. The storm drains may require minor size and elevation changes upon completing the hydraulic portion of the calculations. Refer to the tentative tract map for proposed invert elevations and pipe sizes.

3.0 Rational Method Hydrology

3.1 Pre-Project Condition

The pre-project rational method was analyzed for the entire project site. The flows from the pre-project site split to the west and the east. Approximately 23.6 acres drain west while 25.4 acres drain east.

In the existing western portion of Tract 36760, water sheet flows to the southwest corner of the site. The water then flows south along the existing curb and gutter, and enters an existing catch basin on the eastern portion of Indian Street. The catch basin drains to the existing Riverside County Flood Control and Water Conservation District Master Drainage Line D-1. Line D-1 is a 36" RCP located South of Santiago Drive on the western portion of Indian Street. Along the eastern portion of the existing site water will sheet flow to the southeast and drain east along Santiago Drive before discharging into the Perris Valley Channel downstream of the site.

The results from the west side of the site show that a Q_{100} of 23.3 cfs currently enters into Line D-1. The results from the east side of the site show a Q_{100} of 27.2 cfs. Both the east and west flows eventually converge in the Perris Valley Channel which is an MS4 storm drain facility. Please see Attachment 2 for calculations and backup plans.

3.2 Post-Project Condition

In the post-project condition the majority of the flows from the eastern and western portion of the site flow to the basin at the southwest corner adjacent to Indian Avenue and Santiago Drive. The flows from the remaining eastern portion will drain to the basin in the southeastern corner of the site. Since both of these flows will ultimately outlet into the Perris Valley channel, this remains consistent with the pre-project condition.

The western basin will pick up flows from the western and northeastern portions of the site, including the proposed park along the southern boundary. The western portion drains in a general southwestern pattern. Water from the northeast lots will drain through Street M before being picked up in a set of storm drain catch basins. Water from Street L will also be picked up in catch basins near the intersection of street L and Street D. The storm drain will drain southwest through Street D, where other flows from Streets B, D, K and portions of I and N will be picked up in catch basins just before entering into the Basin at the end of Street D cul-de-sac. At this point, flows from the southern areas (Street G, a portion of Street N, and the park) will confluence with the storm drain flows at Node 134.0 to outlet into the basin. Water from Streets A, C, H, and J flows south/west, draining to the end of the Street C cul-de-sac. The 100 year peak flow into the western basin is 74.3 cfs. Once in the basin, flows will outlet west to the connection into Line D-1 on Indian Street. The existing storm drain is capable of receiving 21.9 cfs. This project site will add the full 21.9 cfs into the storm drain. Any remaining flows will be detained by the basin. Please see the Tract 36760 Pre and Post Rational Method Hydrology maps and calculations located in Attachment 3.

The eastern basin will pick up flows from the southeastern portions of the site. The water will drain southeast through the site to the basin located at the southeast corner. The high points on Streets L and G delineate the drainage boundary for the eastern portions. Water from Street L will drain south and then east to join Street G surface flows before being picked up in a set of catch basins. Water from Street E will split to drain to both street L and Street M. Street M drains south, joining with Street F, and eventually to the catch

basin located on Street G. A portion of Street L (south of Street G) drains north to join flows from the southern half of Street G as well as Street P, which enter a catch basin on Street G. These flows are conveyed through storm drain to enter the eastern basin at Node 210.0. The most southerly portion of Street L drains south towards Santiago Drive. Flows from this portion of Street L and Santiago Drive (east) are picked up by catch basins and outlet into the basin at Nodes 218.0 and 221.0. The east end of Street G drains to the east and flows are picked up by a catch basin at the Street G cul-de-sac, which are also conveyed through storm drain to outlet to the basin at Node 215.0. From the confluence off all the flows draining to the southeast basin, the 100 year peak flow is 24.6 cfs. Flows from the basin will outlet into the proposed Line M-2 storm drain, which will then drain to the Perris Valley Channel. The proposed storm drain Line M-2 will receive 10.0 cfs from the project site, while the remaining flows will be detained by the basin. Please see the Tract 36760 Pre and Post Rational Method Hydrology maps and calculations located in Attachment 3.

4.0 Synthetic Unit Hydrograph

Due to the outlet of flows into the existing and proposed storm drain facilities, the 1-hour, 3-hour, 6-hour, and 24-hour storm events were analyzed for the 2-year, 10-year, and 100-year storms in order to obtain the required detention volume for the basins. For the analysis of the mitigation for the required storm events, the synthetic unit hydrograph (SUH) was used in accordance with the RCFC&WCD hydrology manual. All SUH results for the pre-project condition can be found in Attachment 4 and the post-project conditions can be found in Attachment 5.

All flows drain according to the previously explained flow patterns. The pre-project and post-project conditions were analyzed for all storm events for comparison between the separate areas.

For the western basin only the 10-year 1-hour and the 100-year 1-hour storm events produced flows in excess of the 21.9 cfs outlet. Therefore these two storm events were

the only events to be analyzed for detention sizing. The 100-year1-hour storm event generated the largest storage volume needed to detain the post-project condition down to the allowable outlet of 21.9 cfs. The required detention volume was 0.75 ac-ft. The western basin was sized to allow for 2 feet of freeboard within the basin.

For the eastern basin only the 100-year 1-hour storm event produced flows in excess of the 10.0 cfs outlet. Therefore this storm event was the only event to be analyzed for detention sizing. The required detention volume was 0.11 ac-ft. The eastern basin was sized to allow for 2 feet of freeboard within the basin.

For water quality requirements, it was found that 1.19 ac-ft of storage volume is required for the western basin and 0.42 ac-ft of storage volume is required for the eastern basin. According to the Riverside County Flood Control and Water Conservation District LID Manual, the bioretention facility will consist of a layer of soil media (24" for the east basin, 36" for the west basin) at a porosity of 30% and a 12" layer of gravel with a porosity of 40%. Since the water quality storage volume exceeds the required detention volume, the basins will be designed solely as water quality features and not detention basins. Therefore the necessary basin capacities, governed by the water quality volume are 1.2 ac-ft for the western basin and 0.4 ac-ft for the eastern basin.

In the final hydrology analysis, the basin will not be designed to retain the total storage without an adequate outlet to maintain the required 48-hour drawdown time. All outlet sizing, including emergency overflows for the 100-year 1-hour storm event bypass, will be done in the final analysis for the project site.

5.0 Hydraulics

As indicated above, hydrologic process No. 6 analyzes street flow (using Manning's Equation), and calculates the depth of flow in the gutter. The storm drain systems will be designed to intercept the 100-year street flows into catch basins before the depth in the street reaches the top of curb or splits over the street crown. Therefore, the 10-year storm water surface will never exceed the top of curb. Per the City of Moreno Valley Plan

Check Manual page 45, the design HGL should be 6" below the local depression lip of inlets.

6.0 Conclusion

The supporting hydrologic and hydraulic calculations are provided in the following sections to substantiate the design of the proposed storm drain facilities. The hydrology rational method calculations for pre and post project conditions onsite hydrology routing are shown in attachments 2 and 3 respectively. The Synthetic Unit Hydrograph calculations are located in attachment 4 of this report.

Attachment 1

Attachment 2

Attachment 3

Attachment 4