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This report is part of the Planning Board packet.

September 13, 2022

Mr. Justin Martin
Interim Public Works Director
City of Marco Island
50 Bald Eagle Drive
Marco Island, FL 34145

Re: 711-731 S. Collier Blvd – E Residences: Stormwater Study

Dear Mr. Martin:

The following is a summary of our analysis and design calculations for the subject project. This report is intended to demonstrate that on site retention/detention volume will be provided, and that impact on the ROW drainage system will be minimal, with SFWMD criteria used for analysis.

Pre- and Post-development Conditions

The site is located at the SE corner of S. Collier Blvd. and Valley Ave. Muspa Way (alley) is immediately to the east. Of the three lots included in this development, the northern two are currently developed as a surface parking lot with a stormwater management system in swales around the perimeter. It has a control structure with 3" orifice for bleed-down, and grate that controls maximum stage. The control structure discharges into the storm system on the S. Collier Blvd R.O.W. According to the SDP for the project, the system was designed only for water quality retention, which was the norm for Marco Island at that time (2013).

The third lot is currently a vacant, flat, grassed, lot. For pre-development conditions (using NRCS guidelines) we have chosen a reasonable curve number curve number (CN) of 39 to represent the entire property. This is listed in the literature for >75% grassed, Soil Group A (sandy). We did not analyze the effective CN of the existing paved lots; we just used a reasonable undeveloped CN for the whole property.

The proposed project consists of a four-story parking garage / residential / commercial structure that occupies all the buildable area on the lots. The ground-level parking is under the raised building. This means that the landscaped areas outside of the building are larger than what would normally be required as buffers. All areas outside the building are landscaped with the exception of vehicle and pedestrian access.

For post-development conditions, we used a CN of 98 for the roof, and weighted CN of 54 for the areas outside the building.

Water Quality Calculations

Lot area is 50,866 SF.

Vol = 50% X 2.5 X Area X % Impervious (Dry retention)
Vol = .5 X 2.5 IN X 50866 SF X .74 X (1 FT/12 IN = 3,921 CF

Checking one inch minimum calculation:

V = 50866 / 12 = 4,239 CF (Minimum 1”, controls)

Our design includes 4,269 CF on-site retention. This is accomplished by providing an outlet pipe from the stormwater vault, with an invert of 3.17. The vault is 59’ X 108’, with the bottom set at 2.50. So retention is calculated at 59’ X 108’ X (3.17-2.50) = 4,269 CF.

Note that the bottom is set at 2.5’, based on our own determination (via hand-auger bore) that the wet season water table is 1.5‘.

Stormwater Design

We developed a design that mimics existing conditions to a large extent. It includes a detention vault under the ramp in ground-level parking. The bottom of the vault will be 1 ft above the estimated WSWT. All roof and area drains in the structure drain to this vault. The outlet pipe invert is set to elevation 3.17, which provides the required water quality volume.

We were able to integrate the existing control structure into the design, by adding an additional orifice, above the existing bleeder. Therefore in this design, discharge from the detention pond goes to the same outfall as the previous retention system. Proposed landscaped areas outside the building drain directly to R.O.W. just as the vacant lot and existing landscaped areas do now.

Discharge Calculations (Water Quantity)

We modeled the system using HydroCAD. This software has the SFWMD 25-yr, 3-day storm built in. It is only necessary to select the rainfall depth, which we took as 12.7” from the isohyetal map (Fig. A-18). First, the design storm was routed through predevelopment condition. The result indicates a peak discharge of 2.79 CFS. The modeling was repeated for post-development conditions. This was split into the portion draining to detention (all roof and area drainage for the building) and the landscaped areas around the perimeter of the parking lot that bypass detention. The results (after tweaking the design) indicate that the combined peak discharge is 2.77 CFS. This demonstrates that the on-site detention system effectively attenuates the discharge to have minimal impact on R.O.W. or surrounding properties.

The complete calculation inputs and results follow this page. Note separate HydroCAD outputs for both Pre- (pages 1-4) and Post-development conditions (pages 5-11).

Please let me know if you have any questions about the contents of this report, or if you need any additional information.

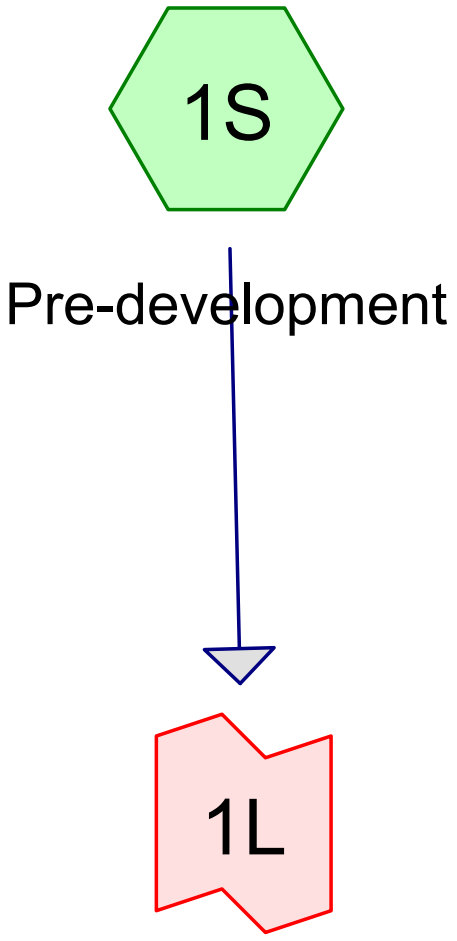
Sincerely yours,

Printed copies of this document are not considered signed and sealed, and the signature must be verified on any electronic copies

c=US, st=Florida, l=Naples, o=Martin Pinckney, cn=Martin D. Pinckney, email=martin@aec-mi.com
This item has been digitally signed and sealed on the date adjacent to the seal I agree to the terms defined by the placement of my signature on this document
2022.09.14 15:53:24 -04'00'

Martin D. Pinckney, P.E.
Chief Engineer

PRE-DEVELOPMENT DISCHARGE



Subcat Reach Pond Link

Routing Diagram for E Residences-pre dev
Prepared by Martin D. Pinckney, P.E., Printed 9/5/2022

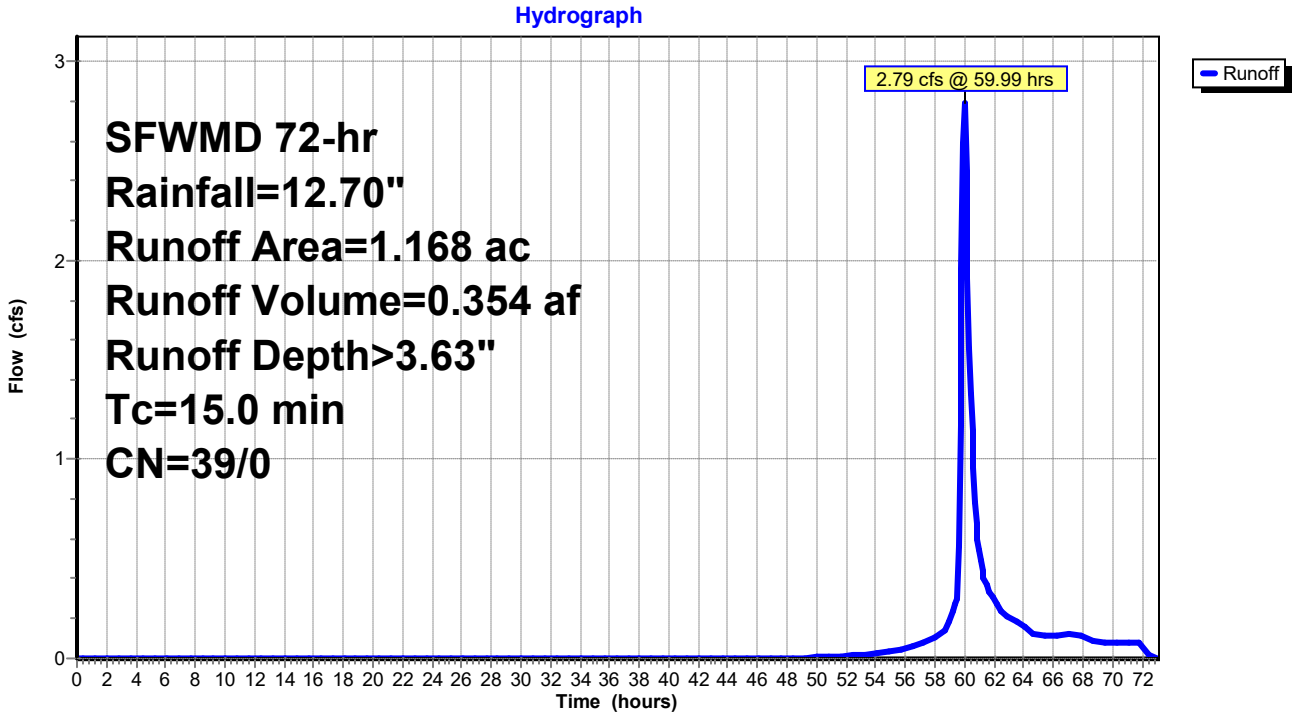
Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.168	39	>75% Grass cover, Good, HSG A (1S)
1.168	**39**	**TOTAL AREA**

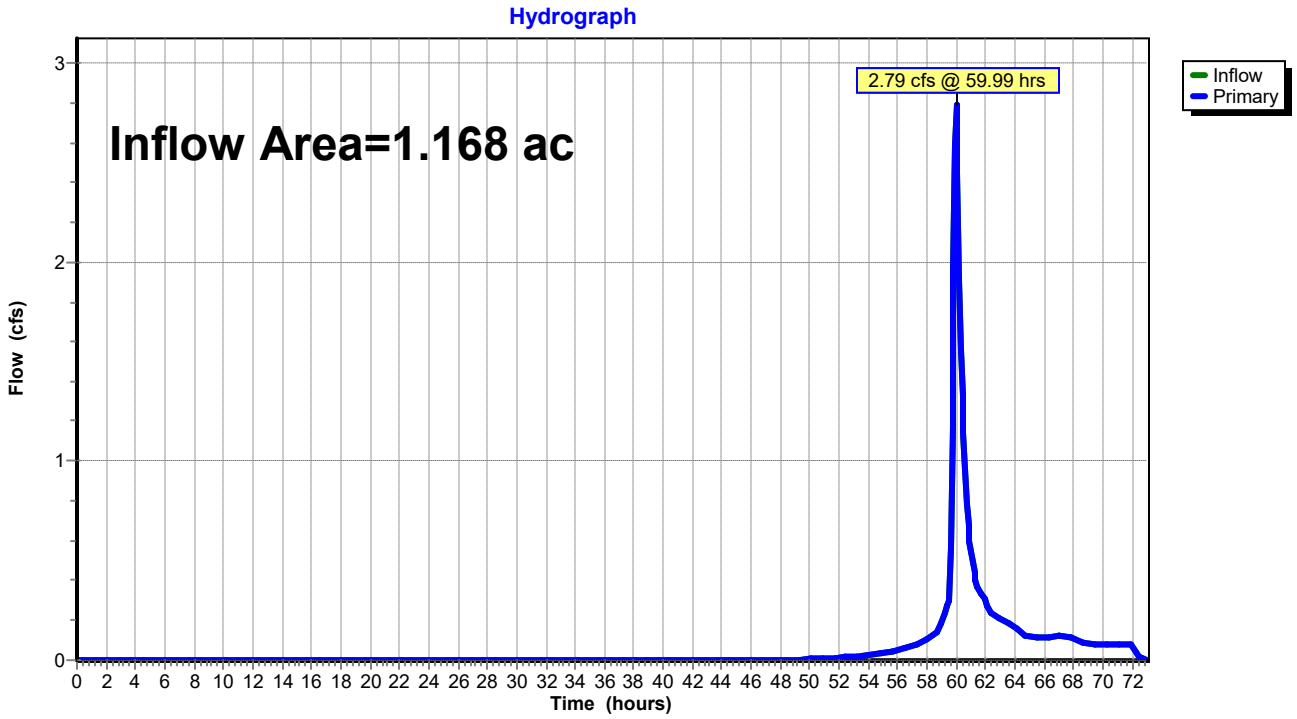
Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.168	HSG A	1S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.168		**TOTAL AREA**

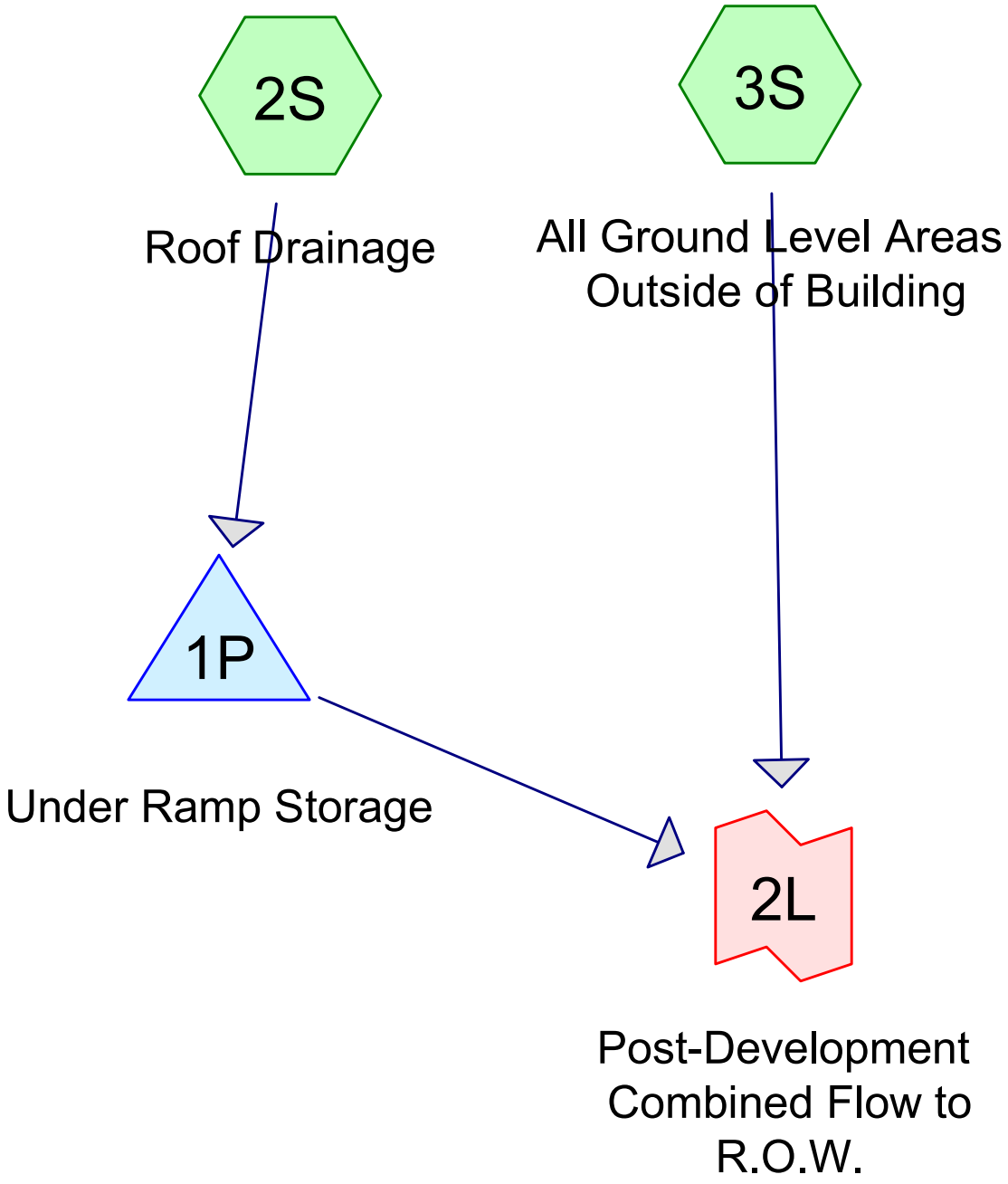
Subcatchment 1S: Pre-development



Link 1L: Flow to R.O.W.



POST-DEVELOPMENT DISCHARGE



Subcat Reach Pond Link

Routing Diagram for E Residences-post dev
Prepared by Martin D. Pinckney, P.E., Printed 9/5/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.148	98	Paved parking, HSG A (3S)
0.725	98	Roofs, HSG A (2S)
0.295	32	Woods/grass comb., Good, HSG A (3S)
1.168	**81**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.168	HSG A	2S, 3S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.168		**TOTAL AREA**

Time span=0.00-73.00 hrs, dt=0.05 hrs, 1461 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Roof Drainage Runoff Area=0.725 ac 100.00% Impervious Runoff Depth=12.47"
Tc=5.0 min CN=98 Runoff=6.02 cfs 0.753 af

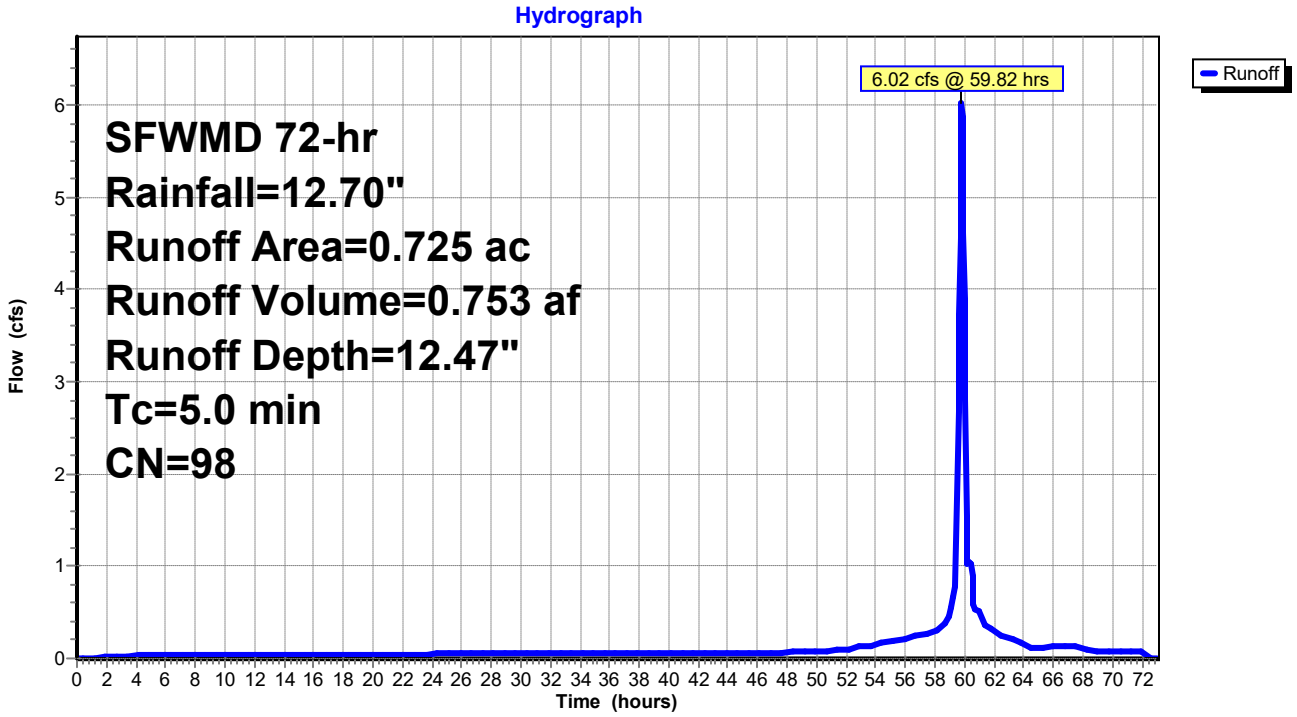
Subcatchment 3S: All Ground Level Areas Runoff Area=0.443 ac 33.41% Impervious Runoff Depth=6.20"
Tc=10.0 min CN=54 Runoff=2.28 cfs 0.229 af

Pond 1P: Under Ramp Storage Peak Elev=4.22' Storage=0.251 af Inflow=6.02 cfs 0.753 af
Outflow=0.59 cfs 0.721 af

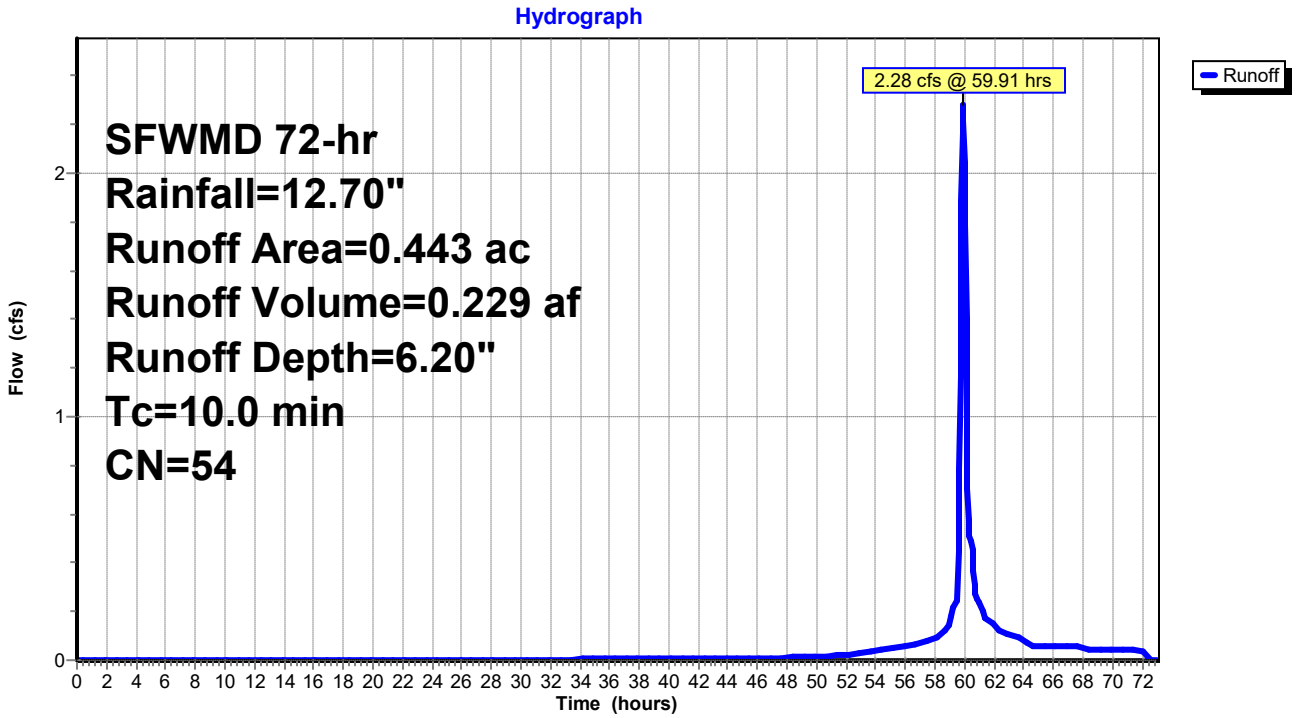
Link 2L: Post-Development Combined Flow to R.O.W. Inflow=2.77 cfs 0.949 af
Primary=2.77 cfs 0.949 af

Total Runoff Area = 1.168 ac Runoff Volume = 0.982 af Average Runoff Depth = 10.09"
25.26% Pervious = 0.295 ac 74.74% Impervious = 0.873 ac

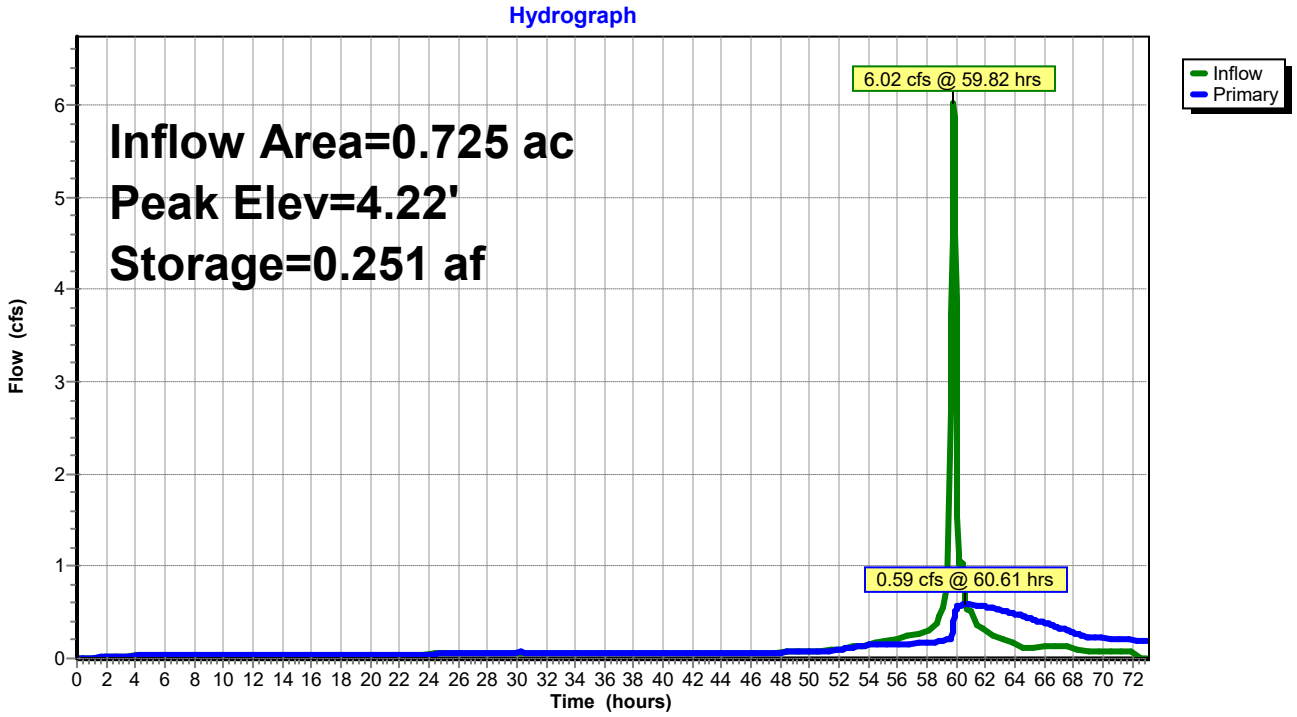
Subcatchment 2S: Roof Drainage



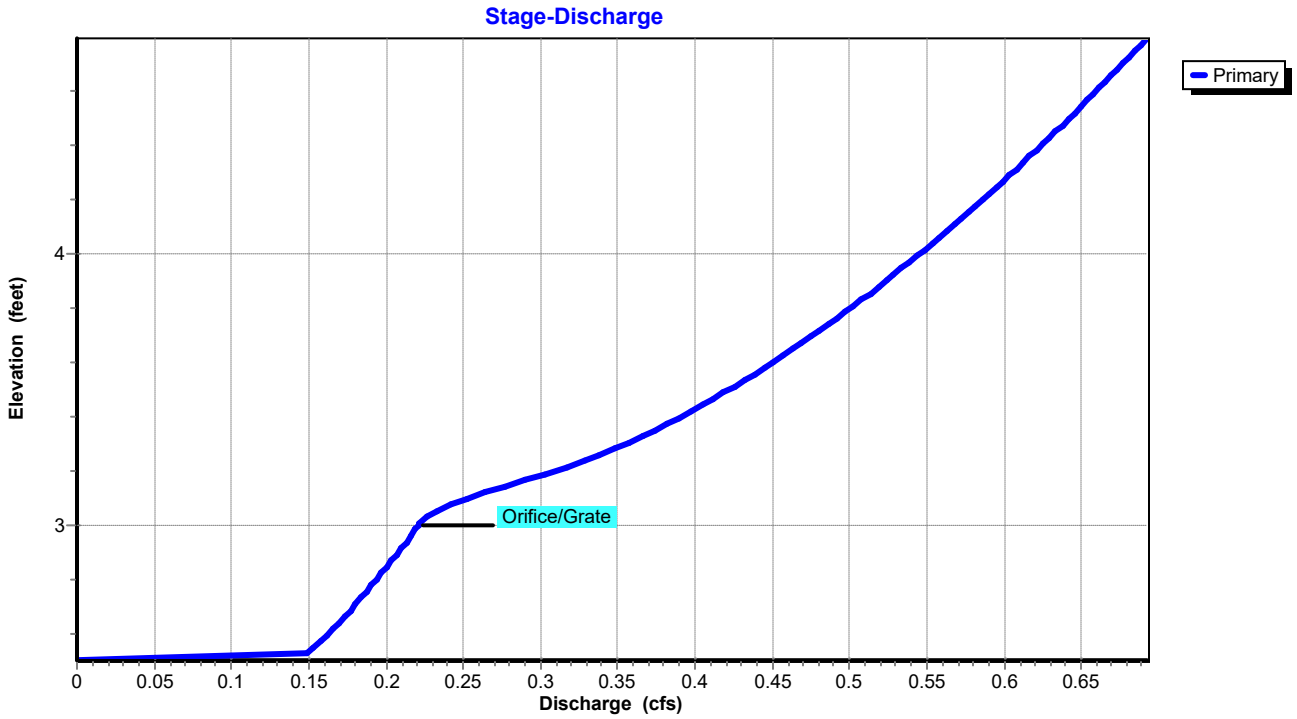
Subcatchment 3S: All Ground Level Areas Outside of Building



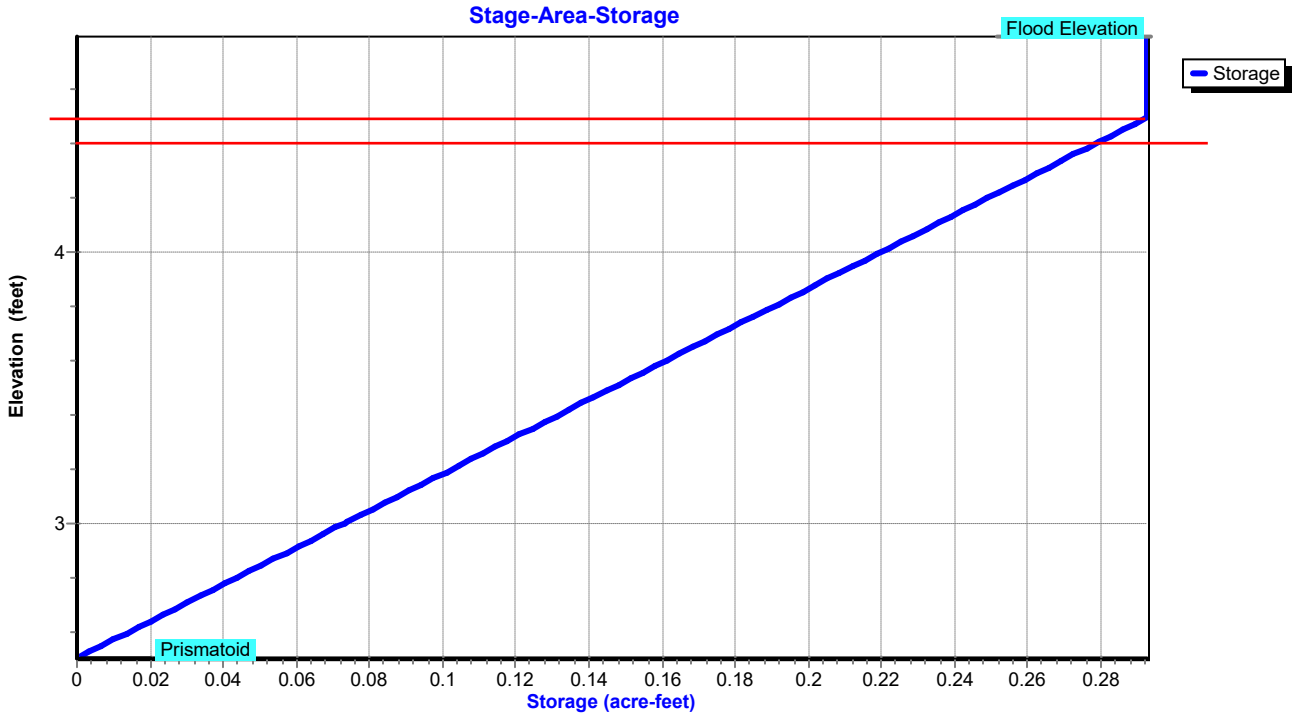
Pond 1P: Under Ramp Storage



Pond 1P: Under Ramp Storage



Pond 1P: Under Ramp Storage



Link 2L: Post-Development Combined Flow to R.O.W.