STORMWATER MANAGEMENT & ENGINEER'S REPORT

EMERSON BUILDING COMPLEX
PHASE III

315-326 15th Street
BLOCK 6903, LOTS 1.01, 1.02, 2.01, 3.01, 3.02, 3.03, 3.04, &4
City of Jersey City
Hudson County, New Jersey

Prepared For:
EMERSON LEASING CO. III LLC

Prepared By:

urban architecture llc

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"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining and preparing the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment."

Digitally signed by Jeffrey Reeves
Date: 2023.11.07 14:19:06-05'00'

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I. INTRODUCTION:

The Site was known as 255-259 Coles Street, situated in Block 6903, Lots 1, 2 & 3 in the City of Jersey City. The Site is bounded by 14th Street, 15th Street and 16th Street in the north–south direction and Coles Street and Monmouth Street in the east –west direction. The Site is in the Jersey Avenue Park Redevelopment Plan in the Emerson District known as the STATCO warehouse building.

The Emerson Building Complex received preliminary Major Site Plan approval for all four multi-phased, mixed-use buildings on the existing STATCO Warehouse site and received final approval for Phase I in 2018. The four (4) phase project will consist of a mixture of 3 new 26 story high rise towers and a conversion of the original, historic building containing a total of 1,100 residential dwelling units. The project will also include retail space and public use space. The project received final subdivision approval in 2018, subdividing the existing 3 lots into 8 new lots. The subdivision was perfected and recorded in Hudson County Court House on July 10, 2019 and has been assigned new lot designations by the Jersey City Tax Accessor. The subdivision is included within the Civil Construction set of drawings. The new roadways will be dedicated to the City of Jersey City after the improvements are constructed and approved by Jersey City Engineering.

The STATCO property will be redeveloped into The Emerson Building Complex, as a four phased, multi-building mixed-use project complying with Jersey City's – Jersey Avenue Park Redevelopment Plan. The large parcel encompasses over two city blocks measuring approximately 184,000 square feet or 4.22 Acres with frontage on numerous city streets including Coles Street and Monmouth Street running in the north – south direction and 14th Street and 16th Street running in the east – west direction. The original existing 15th Street, which was closed and vacated will now be part of the proposed Emerson Building Project. This part of the original STATCO building will be removed

and the area will be reconstructed as a new roadway and reopened creating a pedestrian friendly, stamped concrete, cobble stoned plaza.

The existing facility was originally constructed as the Continental Can Company in the 1920's and later used by the Emerson Radio Company to make Emerson Radio's in its factory. The original structure located at 16th Street and Coles Street, will be restored and repurposed into residential lofts while all other later built structures will be removed to make way for 3 new 26 story high rise towers. The exterior façade of the original Emerson Building will be completely restored including repairing and/or replacing spalled concrete and brick, replacing all windows with new energy efficient units matching original historic patterns. New modern and secured entrances will be constructed with canopies while all services to the existing building will be replaced with all new utility laterals, including new potable water service, new sanitary sewer laterals, underground electric transformer service, new gas laterals, new fire main protection equipment and high speed internet.

The existing infrastructure surrounding the site and other blocks within this district will be replaced with new and modern services greatly improving the reliability of infrastructure. This will be realized as part of the four-phase building complex. The Roadway Improvements Project includes separating the existing combined sewer system into two systems, the first system will collect the sanitary sewer discharges from the buildings and will flow northward connecting into the existing 36" interceptor sewer main that flows eastward along 18th Street. The second system will collect the storm runoff from the roadways and properties and continue to discharge into the existing combined sewer system in Jersey Avenue. The future master utility plan will also include a new 12" DIP water main that will loop the new neighborhood and will connect back into the existing water main system located on 18th Street and south of 14th Street along Coles Street. Wherever practical the roadways will be elevated as high as possible to reduce the frequency of localized flooding. The new reconstructed roadways will include tinted concrete curbing, decorative tinted scored concrete sidewalks with permeable paver bands adjacent to the curbing, new flowering street trees, new decorative street lighting and miscellaneous street furniture. The new roadways will be reconstructed and paved with HMA in accordance with Jersey City roadway standards.

This application is for Building "C", known as Emerson Building Complex Phase III, located at 316 15th Street in Lot 3.04 in Block 6903. Phase III consists of repurposing the original five (5) story historic building into 140 dwelling units, and approximately 30,000 SF of Retail Space. Phase III is located at the corner of Coles Street and 16th Street. The Flood Hazard Area application for Phase I was previously approved in 2019 and the remaining Phases II and Phase IV will follow this application in the near future.

The existing Statco Building that is Phase III of the Emerson Building Complex is located completely within Zone "AE 11" as determined by the preliminary FIRM panel 34017C0106E revised date January 30, 2015. The Flood Hazard Elevation (100-year storm elevation) is +11.0' (NAVD88). NJDEP requires all proposed residential floors to be built one foot above the Flood Hazard Elevation. Therefore, the Design Base Flood Elevation for all residential floors is required to be above elevation +12.0 (NAVD88). The Finished Floor Elevation of the existing Statco Building is at elevation 13.0, therefore in compliance with the regulations. The retail space along 16th Street is also proposed at Elevation 13. There is an entrance corridor along Coles Street below Elevation 12.0 that will be wet flood proofed with smart vents. The loading dock garage doors are designed with open grates to allow flood water to eb and flow without being restricted. See drawing C-397 for further information and details.

Discussed below are three major sections representing the water system design, the sanitary sewer design, and the storm water management design for the proposed Emerson Building Complex. We believe each utility section clearly demonstrates the project is adequately designed in accordance with current regulations.

II. WATER DISTRIBUTION SERVICE DESIGN:

The estimated total water demand for all phases of the project is 146,784 gallons per day based on the guidelines set in the New Jersey Safe Drinking Water Act (N.J.A.C. 7:10) section 12.6. Using a peaking factor of 3, the peak daily demand is 440,351 gallons per day. See attached Water Demand Estimates for each phase in **Appendix B** for reference. Pursuant to N.J.A.C. 7:10-11.10, a Water Main Extension Permit from New Jersey Department of Environmental Projection (NJDEP) is required for this project. It is our

understanding that JCMUA Water Department obtains a general master permit each year from NJDEP and an individual permit from NJDEP for this project is not required.

- Building 'A' Daily Flow = 52,289 GPD & Peak Flow = 156,866 GPD
- Building 'B' Daily Flow = 43,060 GPD & Peak Flow = 129,180 GPD
- Building 'C' Daily Flow = 20,470 GPD & Peak Flow = 61,410 GPD
- Building 'D' Daily Flow = 32,340 GPD & Peak Flow = 97,020 GPD

One 8-inch DIP combined water service lateral is proposed for each of the four buildings proposed for the Emerson Building Complex. The new 12" DIP water mains will loop around the new neighborhood connecting to the existing water mains on 18th Street, all side roadways and south of 14th Street along Coles Street.

To support redevelopment of the area, the Emerson Building Complex project will include reconstructing and elevating all the roadways within the complex to the extent feasible and installing new 12" DIP potable water mains on each street. The new water main system will include new fire hydrants and isolation valves at each intersection. The existing water mains will remain functioning and connected to the existing buildings until the entire new system is installed and approved by Suez Water Company. The existing water mains will be abandoned, removed, or filled with slurry.

III. SANITARY SEWER SERVICE DESIGN:

The proposed sanitary sewer service design was based on the NJDEP flow criteria outlined in N.J.A.C. 7:14A-23.3. The gravity sanitary sewer pipes have been designed to carry twice the estimated sewerage flow when flowing half full. There are two sanitary sewer laterals proposed for each building. One 8" lateral and one 10" lateral, both are proposed at 2.0% slope. The laterals will connect to the new 12" PVC sanitary sewer main being proposed on 15th Street to Coles Street by The Emerson Building Complex. The new 12" PVC sanitary sewer main will continue on Coles Street and connect into the existing sanitary sewer main located at 17th Street intersection. The capacity of the sanitary sewer laterals were calculated using Manning's Equation. Please see the attached "Sanitary Sewer Calculations" spreadsheets for each building in **Appendix C** for details.

- Building ‘A’ Total Daily Flow = 71,040 GPD
- Building ‘B’ Total Daily Flow = 70,350 GPD
- Building ‘C’ Total Daily Flow = 28,800 GPD
- Building ‘D’ Total Daily Flow = 50,550 GPD

The anticipated total sanitary sewer flow for the Emerson Building Complex project is 220,740 gal/day, as calculated per the state regulations outlined in N.J.A.C. 7:14A-23.3. The anticipated flow is greater than 8,000 gal/day and therefore a Treatment Works Approval is required for each Phase of proposed Emerson Building Complex project. Approval of the new sanitary sewer mains will be obtained from Jersey City Municipal Utilities Authority and the Passaic Valley Sewerage Commission prior to submitting to NJDEP for the Treatment Works Approval Permit.

The Emerson Building Complex discharges its sanitary flow into the 15th and 16th Street systems that connects to the Coles Street system. For further review of the sanitary sewer mains see the Sanitary Sewer Calculations Analysis Report prepared for the Roadway Improvements project.

The sanitary sewer collection system designed for this project is based on sound engineering practice and the NJDEP Division of Water Quality and the Jersey City Municipal Utilities Authority Rules and Regulations, as demonstrated by the design computations and analyses provided herein.

IV. STORM WATER MANAGEMENT DESIGN:

The Site currently consists of the 5 story, STATCO warehouse building, concrete & asphalt pavement, debris piles, and overgrown areas. See the Existing Condition Drainage Map for further review. The proposed Emerson Building Complex project will consist entirely of impervious cover totaling 184,000 square feet. There are several small areas of pervious pavers along the curb line of proposed roadways and five Bio-Planters proposed at low point intersections within the complex. These areas will retain 75% of the water quality storm produced from the storm event.

The rooftop runoff from the four proposed buildings will be conveyed via roof leaders designed by our mechanical engineer and discharged into the new 15th Street storm sewer system that will be constructed to the Jersey Avenue combined sewer system.

The Emerson Building Complex project is classified as a "Major Development" pursuant to the Jersey City Stormwater Management Ordinance and falls under the Major Development classification by the New Jersey Stormwater Rules at N.J.A.C. 7:8 therefore, must comply with the standards for groundwater recharge, runoff quantity, and runoff quality standards, as follows:

- **Groundwater Recharge**: The site is exempt from groundwater recharge requirements because it is within the designated Metropolitan Planning Area (PA1) by the State Planning Policy Map (SPPM). The code reads: "This groundwater recharge requirement does not apply to projects that qualify as within the urban redevelopment area" (N.J.A.C. 7:8-5.4(a)2ii). An "Urban Redevelopment Area" is defined as: "delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area (PA1), Designated Centers, Cores or Nodes" (N.J.A.C. 7:8-1.2). In addition, Jersey City is identified as a Special Urban Area pursuant to New Jersey's Coastal Zone Management (CZM) Rules at N.J.A.C. 7:7E-3.43.

  While we believe this project is exempt from this requirement, to enhance the neighborhood we are proposing a 4' wide pervious paver strip adjacent to the concrete curb along the sidewalk edge. The 4' wide pervious band is part of the total 15' width sidewalk that will capture the storm runoff from the sidewalks and infiltrate this volume into the ground. The entire amount of runoff from the sidewalks for the water quality storm, which is 1.25" of runoff, will be retained in the 18" thick stone layer below the pervious pavers. The infiltrated volume will never flow into the combined sewer system in Jersey Avenue. This reduces the runoff volume in the combined sewer system and provides needed capacity for other areas of the neighborhood to discharge.

- **Runoff Quality** – The site is exempt from storm water quality measures because the increase in impervious surface coverage is less than one-quarter acre. Per the

NJDEP Stormwater Management Rules at N.J.A.C. 7:8-5.5, "Stormwater management measures shall only be required for water quality control if an additional one-quarter acre of impervious surface is being proposed on a development site." In addition to above all the storm runoff that discharges the neighborhood flows into the combined sewer in Jersey Avenue. The combined flow is treated by Passaic Valley Sewerage Commission. Since the Site discharges into a combined sewer system routed to a treatment plant regulated under a NJPDES permit, the Project is exempt from the runoff quality requirements.

While we believe this project is exempt from this requirement, to further enhance the neighborhood and introduce some green technologies into the neighborhood we are proposing Bio-Planters at the roadway intersections that are low points. The Bio–Planters are located within the bump-outs of the intersections. The bump-outs are a suggested design based on the "Total Streets" concept to reduce the width of pavement required for pedestrian crossings, this enhances public safety. The Bio-planters will collect roadway runoff that will be filtered through plant media and infiltrated into the ground. Overflow connections are being provided by an 8" PVC pipe connecting the dry wells to the proposed roadway storm systems being designed as part of the Emerson Building Complex.

The proposed Bio-Planters located at the intersections will greatly reduce the runoff volume from their respective roadway areas. There is a discussion in the Roadway Improvement Stormwater Pipe Calculations Report that compares a typical roadway without any green technologies, to a roadway that is introducing green technologies similar to what is proposed for the Emerson Building Complex. The report demonstrates a 20% reduction in runoff compared to a conventional roadway.

One of the proposed 15th Street drainage areas was used to determine the volume of runoff for the (WQ) water quality storm of 1.25 in / 2 Hr. The total drainage catchment area used for this example is 5850 SF. The pavement area is 3,300 SF and the sidewalk area that includes the pavers and planters is 2,550 SF. The

runoff from the sidewalk will flow across the pavers and infiltrate into the gravel layer. The 18" thick of gravel will provide 400 CF of storage volume. The WQ volume is 265 CF. Therefore 100% of the WQ storm will be retained from the sidewalk area.

The roadway pavement area is 3,300 SF equaling a runoff of 344 CF. The Bio planter area with two drywells and a 24" thick gravel layer will provide approximately 175 CF of storage. This equates to approximately 50% of retained storage. If we compute the weighted average for the drainage area we would determine 75% of the water quality storm will be retained on site and never be discharged into the combined storm system in Jersey Avenue. The total volume of infiltrated flow for this drainage area is 575 CF or 4,300 gallons of first flush dirty water. If we assume the same methodology for the other 5 Bio-Planters within the Emerson Building Complex the approximate volume of first flush runoff not discharging into the combined sewer system in Jersey Avenue is over 21,500 gallons.

Clearly this demonstrates the project will greatly reduce the amount of runoff volume generated from the Emerson Lofts project.

- **Roadway storm pipe system:** - The storm water piping system proposed by the Emerson Building Complex is designed using the rational method with 25-year storm intensity. The Roadway Improvements project consists of three major storm water trunk systems that collect roadway runoff from the neighborhood and discharge the runoff into the existing combined sewer system located in Jersey Avenue. The Emerson Building Complex project will discharge into the 15th Street and 16th Street systems and not the 17th Street system. The 15th and 16th Street systems are described below.

    - The 16th Street storm sewer trunk main starts on Monmouth Street north of 16th Street and flows south to 16th Street. The storm system then flows east along 16th Street collecting the runoff from areas along the north and part of the Emerson Building Complex project on the south side of 16th Street. The trunk storm sewer crosses Coles Street and incrementally

increases in size to a 36” diameter pipe, and discharges into the existing 48"x96" elliptical combined sewer main in Jersey Avenue.

- The 15th Street storm sewer trunk main starts south of 14th Street along Monmouth Street near its intersection with 13th Street, the system collects runoff from the area under the turnpike bridges and flows north along Monmouth Street to 14th Street where it turns east and flows to Coles Street. The system collects runoff from Coles Street and continues north to 15th Street. The system then collects runoff from the 15th Street west branch, this branch collects the north and south side of 15th Street and the volume from both proposed detention basins of the Emerson Building Complex project. Once the system reaches Coles Street it combines with the flow from Coles Street south and continues down 15th Street toward Jersey Avenue. The system incrementally increases in size to a 36" diameter pipe, and discharges into the existing 48"x96" elliptical combined sewer in Jersey Avenue.

Detailed storm sewer capacity calculations can be found in Appendix A of the Stormwater Pipe Calculations Analysis report. Capacity of each pipe run was calculated using Manning’s equation. The report adequately demonstrates the storm drainage system is properly designed to pass the 25-year storm in accordance with Jersey City Engineering requirements.

- **Runoff Quantity (Peak Flow Reductions)** – The Emerson Building Complex project is designed to reduce the post-construction peak runoff rates for the 2, 10 and 100 year storm events by 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The proposed 4 phased Emerson Lofts project will have two detention tanks. Buildings 1 & 2 will have one combined detention tank to serve both building rooftops and building 4 will have a detention tank to serve its own rooftop. Building 3 will not have a detention tank and split its discharge to the drainage systems in 15th and 16th Streets undetained.

  The site is divided into 12 drainage areas to adequately analyze the proposed development. The existing areas are the following. A1 = 4.02 Ac. representing

the existing building and impervious areas of the site. A5 = 0.20 Ac. is the existing pervious area. The combined existing flow is A6 = 4.22 Ac. matching the total area of the site. The combined existing flows shown in A6 are used to determine the peak flow reduction numbers for the post-construction allowable flows for the 2, 10 and 100 year storm events.

The proposed undetained areas are the following. A3 = 1.47 Ac. represents Building III that will discharge directly to 16th Street undetained. A7 = 0.11 Ac. represents the undetained non-building area that flows directly into the roadway drainage system without being retained by pervious pavers or flowing into the Bio-Planters. A4 = 0.60 Ac. represents the roadway and sidewalk areas that do flow into the pervious paver sidewalks or directly into one of the three Bio-Planters. The runoff will be slowed flowing through the pervious pavers and Bio-Planters therefore a 20-minute time of concentration was assumed compared to the standard 10 minutes. The runoff coefficient was assumed at CN = 61 for this area to represent the pervious pavers and Bio-Planters that have infiltrated flow. The combined undetained area is A8 = 2.18 AC.

The Emerson Building Complex project is proposing two detention chambers. The first detention chamber will be located in building 1 under the parking entrance ramp. The chamber will be 21' x 48' x 11' deep with a 4' x 4' three stage control structure having a 4" dia. orifice at elevation 6.00, 14" dia. orifice at elevation 12.50 and a 24" rectangular weir at elevation 15.50. The inflow to chamber 1 is A2 = 1.70 Ac. The routed outflow is represented by A11. The second detention chamber will be located in building IV, 30' x 30' x 6' deep with a 4' x4' three stage control structure having a 3.5" dia. orifice at elevation 5.70, 6" dia. orifice at elevation 7.00 and a 24" rectangular weir at elevation 8.50. The inflow to chamber 2 is A9 = 0.34 Ac. and the routed outflow is represented by A10. A12 represents the combined proposed hydrographs for the 2, 10 and 100 year storm events.

See **the table** below to compare the combined proposed A12 to the existing combined A6 with the 50, 75 and 80 percent reduction factors applied.

HYDROGRAPH NUMBER	AREA (AC.)	DESCRIPTION	Q2 (CF/S)	Q10 (CF/S)	Q100 (CF/S)
1	4.02	EXISTING CONDITIONS IMPERVIOUS	9.36	14.30	23.76
5	0.20	EXISTING CONDITIONS PERVIOUS	0.33	0.59	1.08
6	4.22	COMBINED EXISTING FLOW	9.70	14.89	24.84
ALLOWABLE FLOWS		EXISTING CONDITIONS FLOW	50% 4.85	75% 11.17	80% 19.87
2	1.70	PROPOSED I & II ROOF DECK	3.96	6.05	10.05
3	1.47	PROPOSED UNDETAINED BUILDING III	3.42	5.23	8.69
4	0.60	PROPOSED UNDETAINED PERVIOUS	0.16	0.56	1.65
7	0.11	PROPOSED IMPERVIOUS SIDEWALKS & ROADWAYS	0.26	0.39	0.65
8	2.18	COMBINED UNDETAINED	3.77	6.09	10.81
9	0.34	PROPOSED BUILDING IV	0.79	1.21	2.01
10	N/A	BASIN NO. 2	0.31	0.71	1.30
11	N/A	BASIN NO. 1	1.00	4.21	8.55
12	N/A	COMBINED PROPOSED FLOW	4.83	8.80	19.86

Based on the table above we generated the table below that clearly demonstrates the two detention chambers combined with the proposed development exceeds the storm water reduction factors for the proposed Emerson Building Complex development. The proposed Emerson Building Complex development compared to the existing conditions will reduce the overall volume of runoff discharging from the site and reduce the peak discharges to below the allowable runoff valves.

See **the table** below.

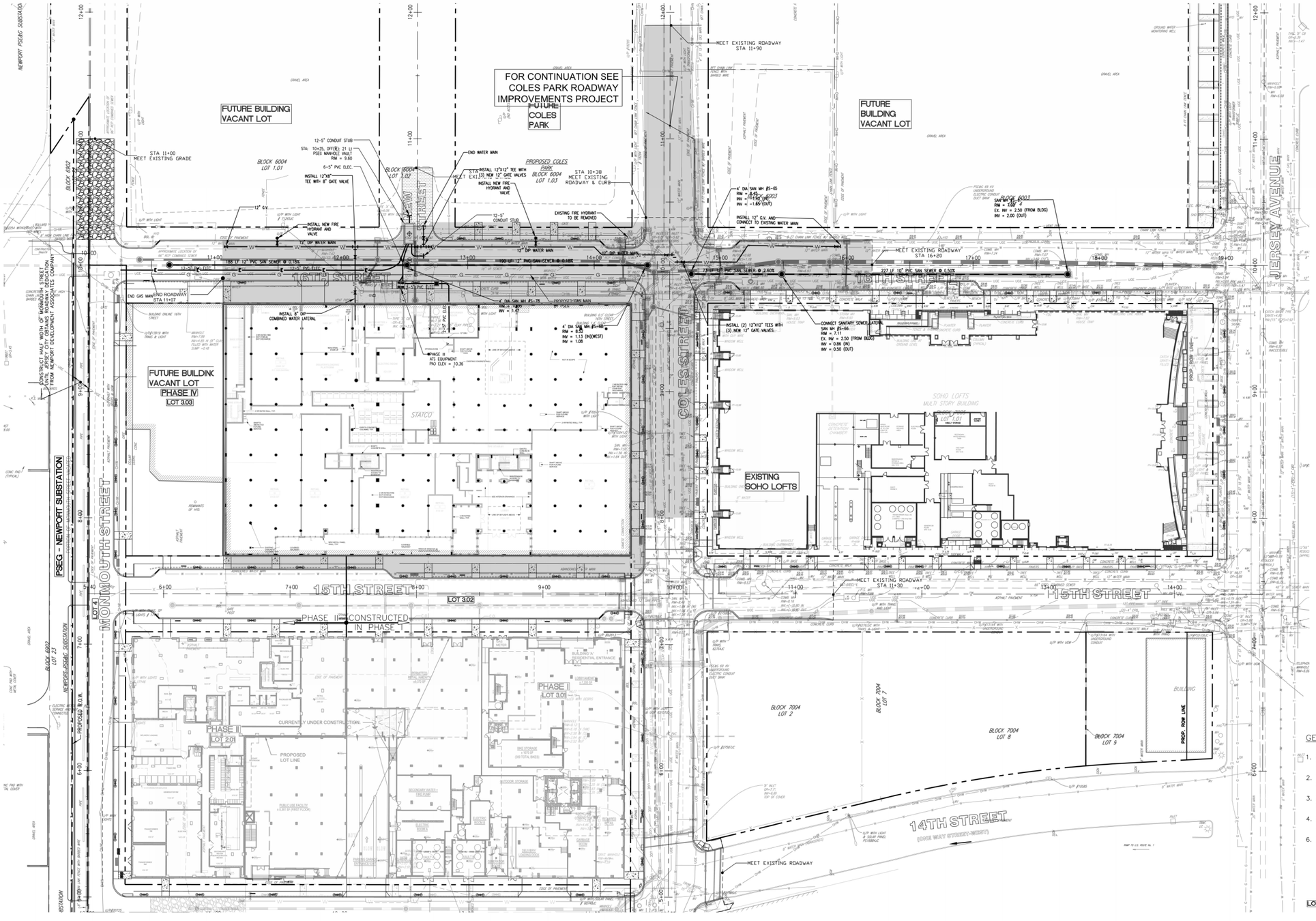
Runoff Rate/Water Surface Elevation Summary

Storm Event	Pre-construction Peak Runoff (cfs)	Allowable Runoff (cfs)	Post-construction Undetained Runoff (cfs)	Post-Construction Reduced Runoff (cfs)	Post-Construction Total Runoff (cfs)	Surface Elevation (ft) (Basin 1 & 2)
2	9.70	**4.85**	3.77	1.06	**4.83**	11.83 / 6.95
10	14.89	**11.17**	6.09	2.71	**8.80**	13.53 / 7.38
100	24.84	**19.87**	10.81	9.05	**19.86**	15.18 / 8.06

Refer to Appendix D for Drainage Area Maps, Peak Runoff calculation, and the detention chambers outlet storm sewer pipe capacity calculations.

APPENDIX ‘A’:

UTILITY PLAN



UTILITY PLAN

1"=30'-0"

KEY MAP:

SCALE: 1" = 200'

PREPARED FOR:

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SCALE:

30 15 0 30 60
HORIZONTAL SCALE: 1"=30'

DRAWN BY:	CHECKED BY:
HJD	JDR

urban architecture llc

300 Coles Street, Suite 2 | Jersey City, New Jersey 07310 | T 201.656.0314
Certificate of Authorization # 24GA28287900

ISSUES:			ISSUES:	
NO.	DESCRIPTIONS	DATE:	NO.	DESCRIPTIONS	DATE
11	REVISED AS PER TWA COMMENTS	11.23.20	1	PLANNING BOARD SUBMISSION	03.29.16
12	HERPSCO - SOIL EROSION PERMIT	02.10.22	2	PLANNING DEPT. RESUBMISSION	05.08.18
13	FLOOD HAZARD AREA RESUBMISSION	05.17.23	3	PLANNING DEPARTMENT CONFORM SUBMISSION	10.31.18
			4	REVISED PLANNING DEPT. CONFORM SUBMISSION	02.11.19
			5	NJDEP - FHA PRE-APPLICATION SUBMISSION	06.21.19
			6	NJDEP - FLOOD HAZARD AREA FULL SUBMISSION	08.12.19
			7	FINAL SITE PLAN	11.11.19
			8	FINAL SITE PLAN - PHASES 2, 3 & 4 RESUBMISSION	04.24.20
			9	NJDEP - PHASE 3 FLOOD HAZARD AREA SUBMISSION	05.15.20
			10	JCMUA - TWA SUBMISSION	06.15.20

JEFFREY D. REEVES
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PROJECT:

EMERSON BUILDING COMPLEX PHASE III

BLOCK 6903, PROPOSED LOT 3.04
316 15TH STREET,
JERSEY CITY, HUDSON COUNTY,
NEW JERSEY

DRAWING TITLE:

UTILITY PLAN

DRAWING NUMBER:

C-340

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APPENDIX ‘B’:

WATER DEMAND CALCULATIONS

Water Demand Estimates
Emerson Building Complex Ph. I

Building Type: **HIGH RISE**

UNIT TYPE	UNIT	NO. UNITS (SF)	GALLONS PER UNIT PER DAY	DAILY DEMAND		"PEAKING FACTOR"	PEAK DAILY DEMAND (GPD)	
				GPD	MGD		GPD	MGD
Residential Demand								
Studio	UNIT	41	80	3,280	0.003	3	9,840	0.010
1-BEDROOM	UNIT	83	100	8,300	0.008	3	24,900	0.025
2-BEDROOM	UNIT	122	160	19,520	0.020	3	58,560	0.059
3-BEDROOM	UNIT	105	160	16,800	0.017	3	50,400	0.050
	Total	351						
			Total Residential Demand	47,900	0.0479		143,700	0.144
Non-Residential Demand								
Retail Space	Gal/Sq Ft	11,096	0.125	1,387	0.0014	3	4,161	0.004
Store / Office Space	Gal/Sq Ft	24013	0.125	3,002	0.003	3	9,005	0.009
			Total Non-Residential Demand	4,389	0.004		13,166	0
TOTAL SITE DEMAND				***52,289***	***0.052***		***156,866***	***0.157***

**Residential Demand As Per N.J.A.C. 5:21-5.1*

***Non-Residential Demand As Per N.J.A.C. 7:10-12.6 TABLE 1*

BUILDING TYPE	STUDIO	1 BR	2 BR	3 BR	4 BR
GARDEN APARTMENT	120	120	175	270	270
TOWNHOUSE	125	125	150	210	275
HIGH RISE	80	100	160	160	160
SINGLE FAMILY	215	215	215	320	395

Water Demand Estimates
Emerson Building Complex Ph. II

Building Type: **HIGH RISE**

UNIT TYPE	UNIT	NO. UNITS (SF)	GALLONS PER UNIT PER DAY	DAILY DEMAND		"PEAKING FACTOR"	PEAK DAILY DEMAND (GPD)	
				GPD	MGD		GPD	MGD
Residential Demand								
Studio	UNIT	57	80	4,560	0.005	3	13,680	0.014
1-BEDROOM	UNIT	113	100	11,300	0.011	3	33,900	0.034
2-BEDROOM	UNIT	82	160	13,120	0.013	3	39,360	0.039
3-BEDROOM	UNIT	88	160	14,080	0.014	3	42,240	0.042
	Total	340						
Total Residential Demand				43,060	0.0431		129,180	0.129
Non-Residential Demand								
Retail Space	Gal/Sq Ft	0	0.125	0	0.0000	3	0	0.000
Store / Office Space	Gal/Sq Ft	0	0.125	0	0.000	3	0	0.000
Total Non-Residential Demand				0	0.000		0	0
TOTAL SITE DEMAND				***43,060***	***0.043***		***129,180***	***0.129***

**Residential Demand As Per N.J.A.C. 5:21-5.1*
***Non-Residential Demand As Per N.J.A.C. 7:10-12.6 TABLE 1*

BUILDING TYPE	STUDIO	1 BR	2 BR	3 BR	4 BR
GARDEN APARTMENT	120	120	175	270	270
TOWNHOUSE	125	125	150	210	275
HIGH RISE	80	100	160	160	160
SINGLE FAMILY	215	215	215	320	395

Water Demand Estimates
Emerson Building Complex Ph. III

Building Type: **HIGH RISE**

UNIT TYPE	UNIT	NO. UNITS (SF)	GALLONS PER UNIT PER DAY	DAILY DEMAND		"PEAKING FACTOR"	PEAK DAILY DEMAND (GPD)	
				GPD	MGD		GPD	MGD
Residential Demand								
Studio	UNIT	8	80	640	0.001	3	1,920	0.002
1-BEDROOM	UNIT	84	100	8,400	0.008	3	25,200	0.025
2-BEDROOM	UNIT	32	160	5,120	0.005	3	15,360	0.015
3-BEDROOM	UNIT	16	160	2,560	0.003	3	7,680	0.008
	Total	140						
			Total Residential Demand	16,720	0.0167		50,160	0.050
Non-Residential Demand								
Retail Space	Gal/Sq Ft	30,000	0.125	3,750	0.0038	3	11,250	0.011
Store / Office Space	Gal/Sq Ft	0	0.125	0	0.000	3	0	0.000
			Total Non-Residential Demand	3,750	0.004		11,250	0
TOTAL SITE DEMAND				***20,470***	***0.020***		***61,410***	***0.061***

**Residential Demand As Per N.J.A.C. 5:21-5.1*

***Non-Residential Demand As Per N.J.A.C. 7:10-12.6 TABLE 1*

Water Demand Estimates
Emerson Building Complex Ph IV

Building Type: **HIGH RISE**

UNIT TYPE	UNIT	NO. UNITS (SF)	GALLONS PER UNIT PER DAY	DAILY DEMAND		"PEAKING FACTOR"	PEAK DAILY DEMAND (GPD)	
				GPD	MGD		GPD	MGD
Residential Demand								
Studio	UNIT	5	80	400	0.000	3	1,200	0.001
1-BEDROOM	UNIT	129	100	12,900	0.013	3	38,700	0.039
2-BEDROOM	UNIT	70	160	11,200	0.011	3	33,600	0.034
3-BEDROOM	UNIT	49	160	7,840	0.008	3	23,520	0.024
	Total	253						
			Total Residential Demand	32,340	0.0323		97,020	0.097
Non-Residential Demand								
Retail Space	Gal/Sq Ft	0	0.125	0	0.0000	3	0	0.000
Store / Office Space	Gal/Sq Ft	0	0.125	0	0.000	3	0	0.000
			Total Non-Residential Demand	0	0.000		0	0
TOTAL SITE DEMAND				***32,340***	***0.032***		***97,020***	***0.097***

**Residential Demand As Per N.J.A.C. 5:21-5.1*
***Non-Residential Demand As Per N.J.A.C. 7:10-12.6 TABLE 1*

BUILDING TYPE	STUDIO	1 BR	2 BR	3 BR	4 BR
GARDEN APARTMENT	120	120	175	270	270
TOWNHOUSE	125	125	150	210	275
HIGH RISE	80	100	160	160	160
SINGLE FAMILY	215	215	215	320	395

APPENDIX ‘C’:

SANITARY SEWER CALCUATIONS

Sanitary Sewer Calculations
Emerson Building Complex Ph I

Analysis

Demand Estimates per N.J.A.C. 7:14A-23.3

Type of Establishment	Measurement Units	# Units	Gallons Per Day/Unit	Gallons Per Day (GPD)
		(A)	(B)	(A)*(B)
Studio	# Dwelling	0	150	0
1 Bedroom	# Dwelling	124	150	18,600
2 Bedroom	# Dwelling	122	225	27,450
3 Bedroom	# Dwelling	105	300	31,500
Total	#Dwelling	351		
Retail Space	(SF)	11,096	0.1	1,110
Public Use Space	(SF)	24,385	0.1	2,439
TOTAL FLOW (gpd) (Q_{demand})				**81,098**
TOTAL FLOW (cfs) (Q_{demand})				**0.125**

Mannings Formula

$Q = (1.49/n)(A)(R^{2/3})(S^{1/2})$

A = area of flowing
= $0.5\ \pi r^2$
R = hydraulic radius of pipe
= A / P
= D / 4 for pipe flowing at one-half or full depth
r = radius of pipe

P = wetted perimeter of pipe
= $2\pi r$
S = slope of pipe
π = 3.141593

- analyze half-full flow condition

Typical Mannings "n" values	
RCP	0.012
PVC	**0.01**
CM	0.024
VC	0.014
Cast Iron	0.013
DIP	0.011
Brick	0.016

PIPE	Length	n	S	Pipe Dia.		A	P	R	V_{pipe}	Q_{pipe}	Q_{pipe}
	(ft)		(ft./ft.)	(in.)	(ft.)	(SF)	(ft.)	(ft.)	(fps)	(cfs)	(MGD)
8" PVC LATERAL	35	0.010	0.02	8	0.67	0.17	1.05	0.17	***6.38***	***1.11***	***0.72***

PIPE	Length	n	S	Pipe Dia.		A	P	R	Vpipe	Qpipe	Qpipe
	(ft)		(ft./ft.)	(in.)	(ft.)	(SF)	(ft.)	(ft.)	(fps)	(cfs)	(MGD)
10" PVC LATERAL	35	0.010	0.02	10	0.83	0.27	1.31	0.21	***7.41***	***2.02***	***1.30***

Conclusions

In all cases, $Q_{pipe} > 2xQ_{demand}$	TRUE
In all cases, $V_{pipe} > 2.0$ fps	TRUE
Therefore, Design is	ADEQUATE

Sanitary Sewer Calculations
Emerson Building Complex Ph II

Analysis

Demand Estimates per N.J.A.C. 7:14A-23.3

Type of Establishment	Measurement Units	# Units	Gallons Per Day/Unit	Gallons Per Day (GPD)
		(A)	(B)	(A)*(B)
Studio	# Dwelling	0	150	0
1 Bedroom	# Dwelling	170	150	25,500
2 Bedroom	# Dwelling	82	225	18,450
3 Bedroom	# Dwelling	88	300	26,400
Total	#Dwelling	340		
Retail Space	(SF)	0	0.1	0
Public Use Space	(SF)	0	0.1	0
TOTAL FLOW (gpd) (Q_{demand})				**70,350**
TOTAL FLOW (cfs) (Q_{demand})				**0.109**

Mannings Formula

$Q = (1.49/n)(A)(R^{2/3})(S^{1/2})$

A = area of flowing
= $0.5\ \pi r^2$
R = hydraulic radius of pipe
= A / P
= D / 4 for pipe flowing at one-half or full depth
r = radius of pipe

P = wetted perimeter of pipe
= $2\pi r$
S = slope of pipe
π = 3.141593

- analyze half-full flow condition

Typical Mannings "n" values	
RCP	0.012
PVC	**0.01**
CM	0.024
VC	0.014
Cast Iron	0.013
DIP	0.011
Brick	0.016

PIPE	Length	n	S	Pipe Dia.		A	P	R	V_{pipe}	Q_{pipe}	Q_{pipe}
	(ft)		(ft./ft.)	(in.)	(ft.)	(SF)	(ft.)	(ft.)	(fps)	(cfs)	(MGD)
10" PVC LATERAL	58	0.010	0.02	10	0.83	0.27	1.31	0.21	***7.41***	***2.02***	***1.30***

PIPE	Length	n	S	Pipe Dia.		A	P	R	Vpipe	Qpipe	Qpipe
	(ft)		(ft./ft.)	(in.)	(ft.)	(SF)	(ft.)	(ft.)	(fps)	(cfs)	(MGD)
8" PVC LATERAL	58	0.010	0.02	8	0.67	0.17	1.05	0.17	***6.38***	***1.11***	***0.72***

Conclusions

In all cases, $Q_{pipe} > 2xQ_{demand}$	TRUE
In all cases, $V_{pipe} > 2.0$ fps	TRUE
Therefore, Design is	ADEQUATE

Sanitary Sewer Calculations
Emerson Building Complex Ph III

Analysis

Demand Estimates per N.J.A.C. 7:14A-23.3

Type of Establishment	Measurement Units	# Units	Gallons Per Day/Unit	Gallons Per Day (GPD)
		(A)	(B)	(A)*(B)
Studio	# Dwelling	8	150	1,200
1 Bedroom	# Dwelling	84	150	12,600
2 Bedroom	# Dwelling	32	225	7,200
3 Bedroom	# Dwelling	16	300	4,800
Total	#Dwelling	140		
Retail Space	(SF)	30,000	0.1	3,000
Public Use Space	(SF)	0	0.1	0
TOTAL FLOW (gpd) (Q_{demand})				**28,800**
TOTAL FLOW (cfs) (Q_{demand})				**0.045**

Mannings Formula

$Q = (1.49/n)(A)(R^{2/3})(S^{1/2})$

A = area of flowing
= $0.5\ \pi r^2$

R = hydraulic radius of pipe
= A / P
= D / 4 for pipe flowing at one-half or full depth

r = radius of pipe

P = wetted perimeter of pipe
= $2\pi r$

S = slope of pipe

π = 3.141593

- analyze half-full flow condition

Typical Mannings "n" values	
RCP	0.012
PVC	**0.01**
CM	0.024
VC	0.014
Cast Iron	0.013
DIP	0.011
Brick	0.016

PIPE	Length	n	S	Pipe Dia.		A	P	R	V_{pipe}	Q_{pipe}	Q_{pipe}
	(ft)		(ft./ft.)	(in.)	(ft.)	(SF)	(ft.)	(ft.)	(fps)	(cfs)	(MGD)
10" PVC LATERAL	35	0.010	0.02	10	0.83	0.27	1.31	0.21	***7.41***	***2.02***	***1.30***

PIPE	Length	n	S	Pipe Dia.		A	P	R	Vpipe	Qpipe	Qpipe
	(ft)		(ft./ft.)	(in.)	(ft.)	(SF)	(ft.)	(ft.)	(fps)	(cfs)	(MGD)
10" PVC LATERAL	35	0.010	0.02	10	0.83	0.27	1.31	0.21	***7.41***	***2.02***	***1.30***

Conclusions

In all cases, $Q_{pipe} > 2xQ_{demand}$	TRUE
In all cases, $V_{pipe} > 2.0$ fps	TRUE
Therefore, Design is	ADEQUATE

Sanitary Sewer Calculations
Emerson Building Complex Ph IV

Analysis

Demand Estimates per N.J.A.C. 7:14A-23.3

Type of Establishment	Measurement Units	# Units	Gallons Per Day/Unit	Gallons Per Day (GPD)
		(A)	(B)	(A)*(B)
Studio	# Dwelling	0	150	0
1 Bedroom	# Dwelling	134	150	20,100
2 Bedroom	# Dwelling	70	225	15,750
3 Bedroom	# Dwelling	49	300	14,700
Total	#Dwelling	253		
Retail Space	(SF)	0	0.1	0
Public Use Space	(SF)	0	0.1	0
TOTAL FLOW (gpd) (Q_{demand})				**50,550**
TOTAL FLOW (cfs) (Q_{demand})				**0.078**

Mannings Formula

$Q = (1.49/n)(A)(R^{2/3})(S^{1/2})$

A = area of flowing
= $0.5\ \pi r^2$
R = hydraulic radius of pipe
= A / P
= D / 4 for pipe flowing at one-half or full depth
r = radius of pipe

P = wetted perimeter of pipe
= $2\pi r$
S = slope of pipe
π = 3.141593

- analyze half-full flow condition

Typical Mannings "n" values	
RCP	0.012
PVC	**0.01**
CM	0.024
VC	0.014
Cast Iron	0.013
DIP	0.011
Brick	0.016

PIPE	Length	n	S	Pipe Dia.		A	P	R	V_{pipe}	Q_{pipe}	Q_{pipe}
	(ft)		(ft./ft.)	(in.)	(ft.)	(SF)	(ft.)	(ft.)	(fps)	(cfs)	(MGD)
10" PVC LATERAL	58	0.010	0.02	10	0.83	0.27	1.31	0.21	***7.41***	***2.02***	***1.30***

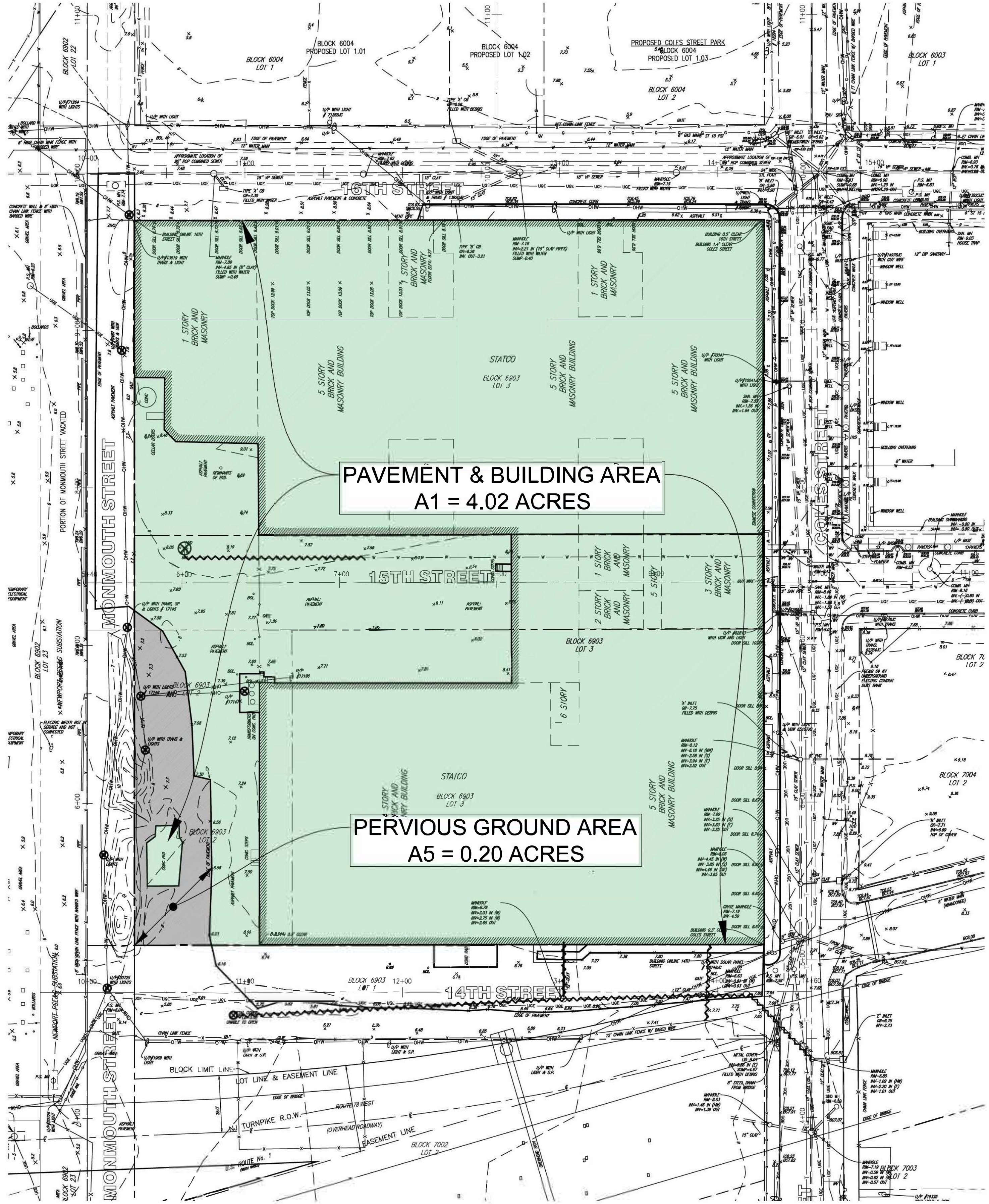
PIPE	Length	n	S	Pipe Dia.		A	P	R	Vpipe	Qpipe	Qpipe
	(ft)		(ft./ft.)	(in.)	(ft.)	(SF)	(ft.)	(ft.)	(fps)	(cfs)	(MGD)
8" PVC LATERAL	58	0.010	0.02	8	0.67	0.17	1.05	0.17	***6.38***	***1.11***	***0.72***

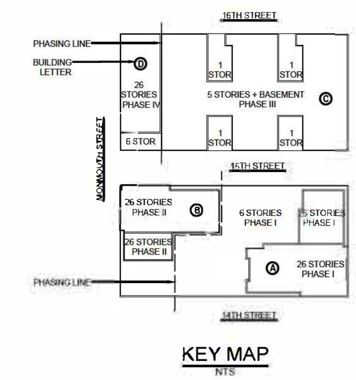
Conclusions

In all cases, $Q_{pipe} > 2xQ_{demand}$	TRUE
In all cases, $V_{pipe} > 2.0$ fps	TRUE
Therefore, Design is	ADEQUATE

APPENDIX ‘D’:

DRAINAGE MAPS & STORM WATER CALCULATIONS





TOTAL EXISTING AREA
A6 = 4.22 ACRES

EXISTING DRAINAGE MAP
1"=30'-0"

PREPARED FOR:
EMERSON LEASING CO. I LLC
300 COLES STREET, SUITE 2
JERSEY CITY, NEW JERSEY 07310
T: 201.656.0314

SCALE:
HORIZONTAL SCALE: 1"=30'-0"

DRAWN BY: HJD
CHECKED BY: JDR

urban architecture llc
300 Coles Street, Suite 2 | Jersey City, New Jersey 07310 | T 201.656.0314
Certificate of Authorization # 24GA28287900

ISSUES:

NO.	DESCRIPTIONS	DATE
11	NJ-DEP Flood Hazard Area Submission	5.20.20

ISSUES:

NO.	DESCRIPTIONS	DATE
1	PLANNING BOARD SUBMISSION	03.29.18
2	PLANNING DEPT. RESUBMISSION	05.08.18
3	PLANNING DEPARTMENT CONFORM SUBMISSION	10.31.18
4	REVISED PLANNING DEPT. CONFORM SUBMISSION	02.11.19
5	JCMUA REVIEW SUBMITTAL	06.04.19
6	30% CD SUBMITTAL	06.07.19
7	NJDEP - FHA PRE-APPLICATION SUBMISSION	06.21.19
8	MEPFP PROPOSAL DOCUMENTS	06.27.19
9	TWA SUBMISSION	07.02.19
10	NJDEP - FLOOD HAZARD AREA FULL SUBMISSION	08.12.19

JEFFREY D. REEVES
PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER 24GE04036700

PROJECT:
EMERSON BUILDING COMPLEX
BLOCK 6903, PROPOSED LOT 3.01
351 15TH STREET,
JERSEY CITY, HUDSON COUNTY,
NEW JERSEY

DRAWING TITLE:
EXISTING DRAINAGE MAP

DRAWING NUMBER:

MATCH LINE STA. 11+00 (SEE DRAWING No. C-402)

MATCH LINE STA. 11+00

NOTES:
1. ALL PROPOSED CATCH BASINS (CB) TO BE "TYPE B" UNLESS OTHERWISE NOTED.
2. TRENCH DRAIN CONNECTIONS TO BE 6" PVC, SCH 40.
3. ALL PIPES CONNECTING CATCH BASINS TO MANHOLES SHALL BE 12" DIP @ 1.00% UNLESS OTHERWISE NOTED

PREPARED FOR:
JERSEY PARK INFRASTRUCTURE, LLC
300 COLES STREET
SUITE 2
JERSEY CITY, NEW JERSEY 07310
T: 201.656.0314

PROJECT:
JERSEY PARK ROADWAY IMPROVEMENTS
BLOCK 6003, 6004, 6005, 6006, 6903, 7002, 7004 & 7005
CITY OF JERSEY CITY, HUDSON COUNTY, NJ

urban architecture llc
300 Coles Street, Suite 2 | Jersey City, New Jersey 07310 | T 201.656.0314
Certificate of Authorization # 24GA28287900

JEFFREY D. REEVES
PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER 24GE04036700

ISSUES:

NO.	DESCRIPTIONS	DATE
1	PLANNING BOARD SUBMISSION	03.29.18
2	PSEG SUBMISSION	08.01.18
3	SAD CONFORM SUBMISSION	10.19.18
4	REVISED UTILITIES - PSE&G CONFLICTS	12.27.18
5	ENG. DEPT. CONFORMANCE	01.23.19
6	UPDATED PER EMERSON PH. I SITE PLAN	10.09.19
7	UPDATED NEW STREET PROFILE PER COLES PARK	01.24.19
7	REVISED C-150	04.07.20
8	UPDATED DRAINAGE PER PH II, III, VI RESUBMISSION	05.15.20

SCALE: HORIZONTAL SCALE: 1"=30'

DRAWING TITLE: DRAINAGE AREA MAP FULL SET

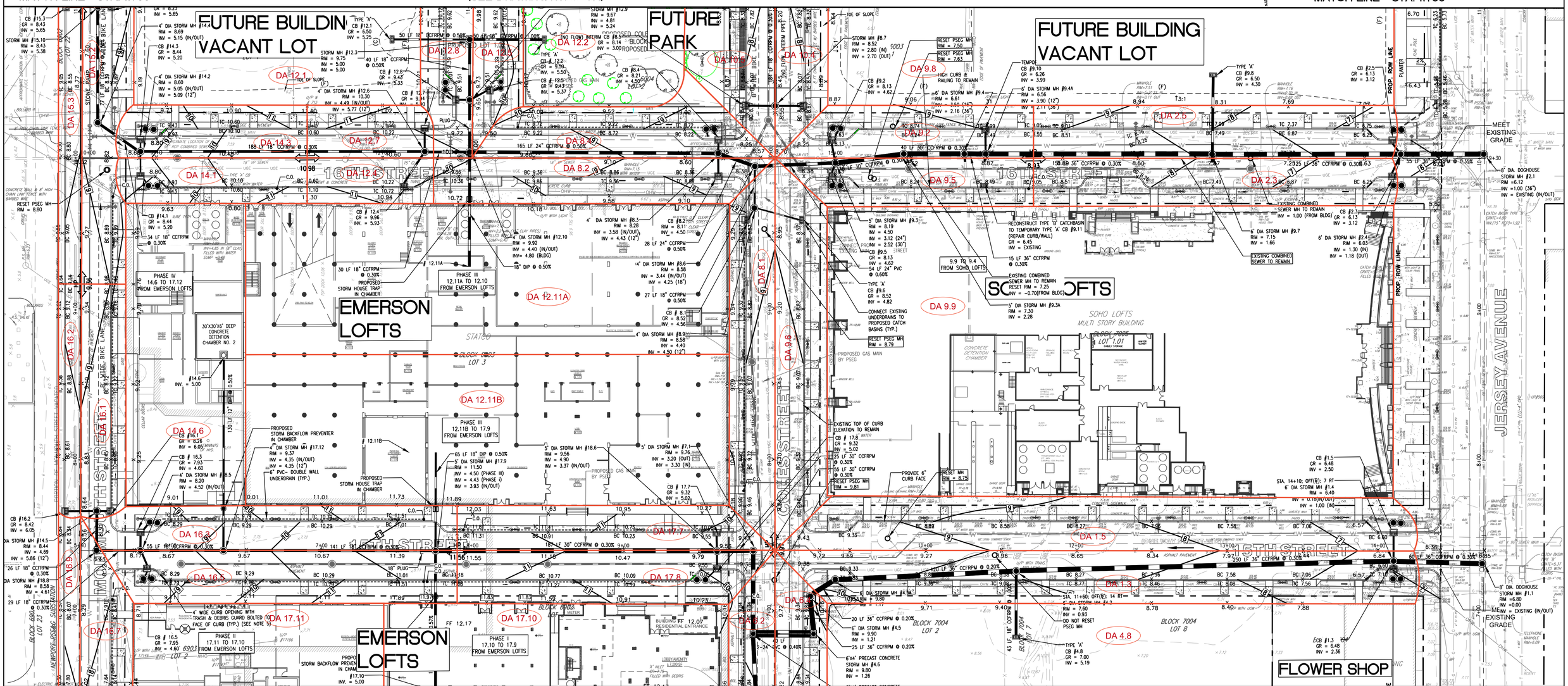
DRAWN BY: HJD

CHECKED BY: JDR

DRAWING NUMBER: C-401

52

MATCH LINE STA. 11+00 (SEE DRAWING No. C-401) MATCH LINE STA. 11+00



MATCH LINE STA. 6+50 (SEE DRAWING No. C-403) MATCH LINE STA. 6+50

NOTES:
1. ALL PROPOSED CATCH BASINS (CB) TO BE "TYPE B" UNLESS OTHERWISE NOTED.
2. TRENCH DRAIN CONNECTIONS TO BE 6" PVC, SCH 40.
3. ALL PIPES CONNECTING CATCH BASINS TO MANHOLES SHALL BE 12" DIP @ 1.00% UNLESS OTHERWISE NOTED

PREPARED FOR:
JERSEY PARK INFRASTRUCTURE, LLC
300 COLES STREET
SUITE 2
JERSEY CITY, NEW JERSEY 07310
T: 201.656.0314

PROJECT:
JERSEY PARK ROADWAY IMPROVEMENTS
BLOCK 6003, 6004, 6005, 6006,
6903, 7002, 7004 & 7005
CITY OF JERSEY CITY,
HUDSON COUNTY, NJ

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300 Coles Street, Suite 2 | Jersey City, New Jersey 07310 | T 201.656.0314
Certificate of Authorization # 24GA28287900

JEFFREY D. REEVES
PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER 24GE04036700

ISSUES:

NO.	DESCRIPTIONS	DATE

ISSUES:

NO.	DESCRIPTIONS	DATE
1	PLANNING BOARD SUBMISSION	03.29.18
2	PSEG SUBMISSION	08.01.18
3	SAD CONFORM SUBMISSION	10.19.18
4	REVISED UTILITIES - PSE&G CONFLICTS	12.27.18
5	ENG. DEPT. CONFORMANCE	01.23.19
6	UPDATED PER EMERSON PH. I SITE PLAN	10.09.19
7	UPDATED NEW STREET PROFILE PER COLES PARK	01.24.19
7	REVISED C-150	04.07.20
8	UPDATED DRAINAGE PER PH II, III, VI RESUBMISSION	05.15.20

SCALE:
30 15 0 30 60
HORIZONTAL SCALE: 1"=30'

DRAWING TITLE:
DRAWING AREA MAP
FULL SET

DRAWN BY:	CHECKED BY:	DRAWING NUMBER:
HJD	JDR	C-402

NOTES:

1. ALL PROPOSED CATCH BASINS (CB) TO BE "TYPE B" UNLESS OTHERWISE NOTED.
2. TRENCH DRAIN CONNECTIONS TO BE 6" PVC, SCH 40.
3. ALL PIPES CONNECTING CATCH BASINS TO MANHOLES SHALL BE 12" DIP @ 1.00% UNLESS OTHERWISE NOTED

PREPARED FOR:

JERSEY PARK INFRASTRUCTURE, LLC
300 COLES STREET
SUITE 2
JERSEY CITY, NEW JERSEY 07310

T: 201.656.0314

PROJECT:

JERSEY PARK ROADWAY IMPROVEMENTS

BLOCK 6003, 6004, 6005, 6006, 6903, 7002, 7004 & 7005
CITY OF JERSEY CITY, HUDSON COUNTY, NJ

urban architecture llc

300 Coles Street, Suite 2 | Jersey City, New Jersey 07310 | T 201.656.0314
Certificate of Authorization # 24GA28287900

JEFFREY D. REEVES
PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER 24GE04036700

ISSUES:

NO.	DESCRIPTIONS	DATE
1	PLANNING BOARD SUBMISSION	03.29.18
2	PSEG SUBMISSION	08.01.18
3	SAD CONFORM SUBMISSION	10.19.18
4	REVISED UTILITIES - PSE&G CONFLICTS	12.27.18
5	ENG. DEPT. CONFORMANCE	01.23.19
6	UPDATED PER EMERSON PH. I SITE PLAN	10.09.19
7	UPDATED NEW STREET PROFILE PER COLES PARK	01.24.19
7	REVISED C-150	04.07.20
8	UPDATED DRAINAGE PER PH II, III, VI RESUBMISSION	05.15.20

SCALE: HORIZONTAL SCALE: 1"=30'

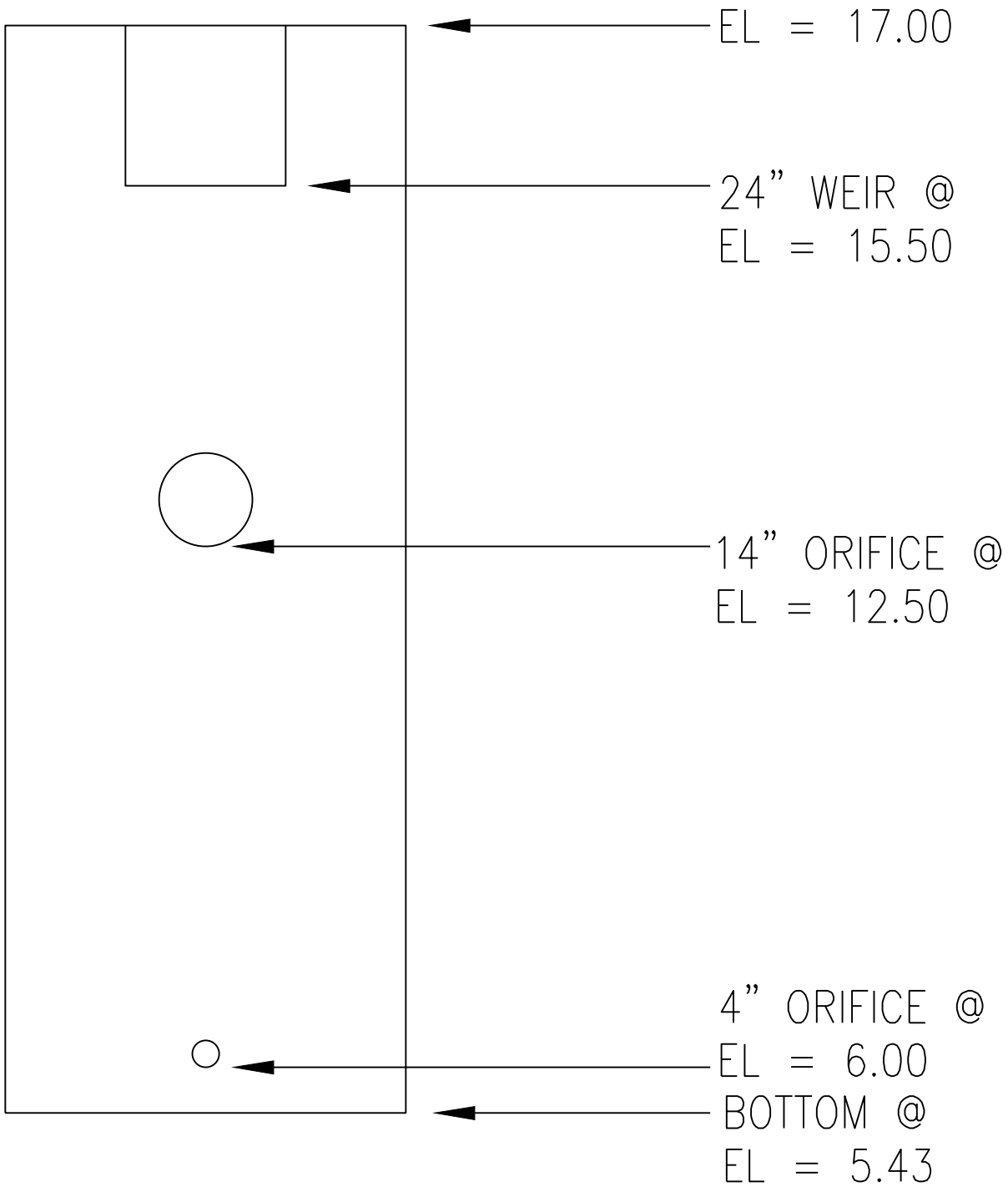
DRAWN BY: HJD

CHECKED BY: JDR

DRAWING TITLE: DRAINAGE AREA MAP FULL SET

DRAWING NUMBER: C-403

PROPOSED DETENTION TANK NO. 1



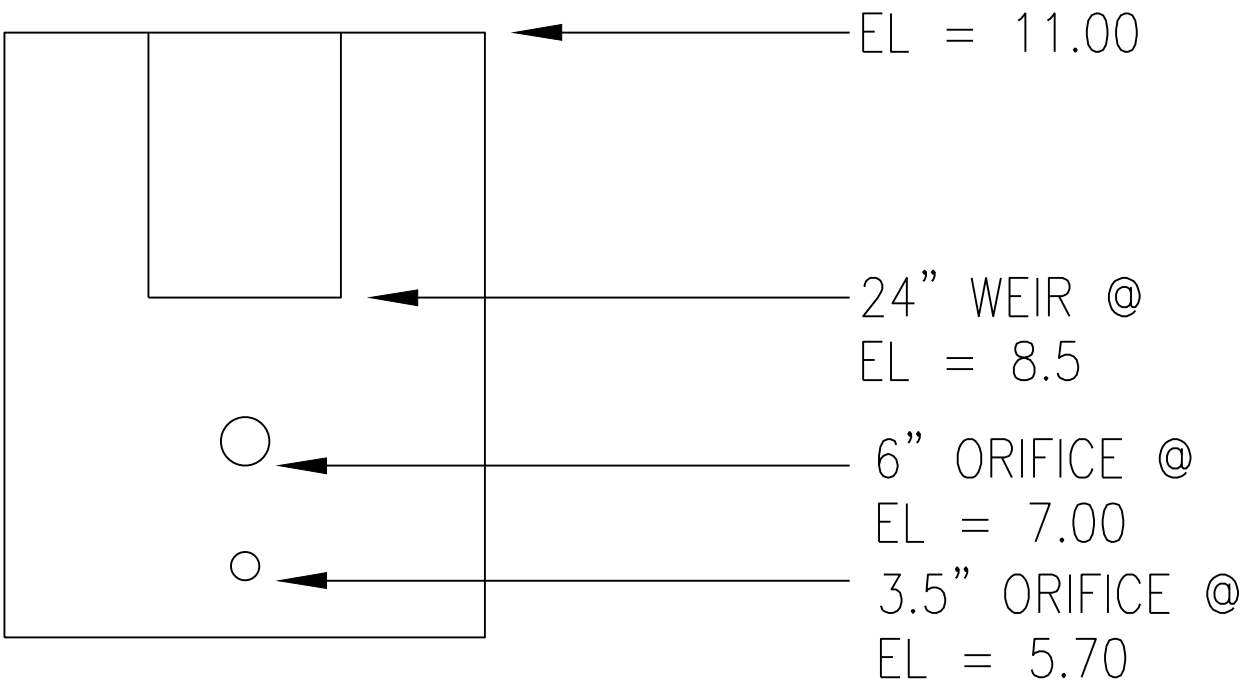
NOTES:
1. DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY.

SCALE: NTS

urban architecture llc
300 COLES STREET, SUITE 2
JERSEY CITY, NJ 07310
T: 201.656.0314

PROJECT:	LOCATION:	DRAWING NAME:	DRWG Nº:
EMERSON LOFTS STORMWATER MANAGEMENT	BLOCKS 6003, 6004, 6005, 6006, 6903, 7004 & 7005 CITY OF JERSEY CITY HUDSON COUNTY, NEW JERSEY	DETENTION TANK DETAIL No. 1	FIG-01 DATE: AUGUST 2020

PROPOSED DETENTION TANK NO. 2



NOTES:
1. DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY.

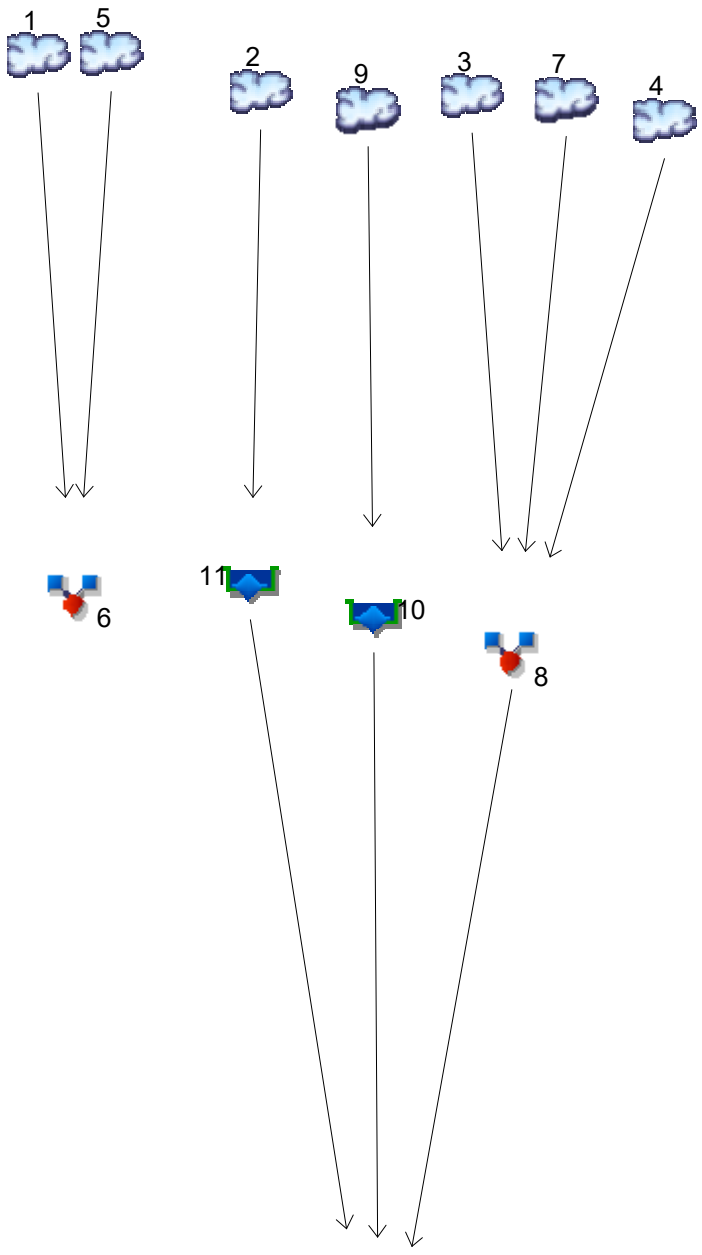
SCALE: NTS

urban architecture llc
300 COLES STREET, SUITE 2
JERSEY CITY, NJ 07310
T: 201.656.0314

PROJECT:	LOCATION:	DRAWING NAME:	DRWG Nº:
EMERSON LOFTS STORMWATER MANAGEMENT	**BLOCKS 6003, 6004, 6005, 6006, 6903, 7004 & 7005 CITY OF JERSEY CITY HUDSON COUNTY, NEW JERSEY**	DETENTION TANK DETAIL No. 2	FIG-02 DATE: **AUGUST 2020**

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3



Legend

Hyd.	Origin	Description
1	SCS Runoff	Existing Conditions (Impervious)
2	SCS Runoff	Proposed Emerson I & II Roof
3	SCS Runoff	Proposed Undetained Building III (impervious)
4	SCS Runoff	Proposed Undetained (Pervious)
5	SCS Runoff	Existing Conditions (Pervious)
6	Combine	Total Existing Runoff
7	SCS Runoff	Proposed Impervious Sidewalks and Roadways
8	Combine	Proposed undetained area
9	SCS Runoff	Proposed Building IV Roof
10	Reservoir	Detention Chamber No 2
11	Reservoir	Detention Chamber No 1
12	Combine	Combined Proposed Flow

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	9.367	-------	-------	14.30	-------	-------	23.76	Existing Conditions (Impervious)
2	SCS Runoff	------	-------	3.961	-------	-------	6.049	-------	-------	10.05	Proposed Emerson I & II Roof
3	SCS Runoff	------	-------	3.425	-------	-------	5.230	-------	-------	8.690	Proposed Undetained Building III (imp
4	SCS Runoff	------	-------	0.159	-------	-------	0.565	-------	-------	1.650	Proposed Undetained (Pervious)
5	SCS Runoff	------	-------	0.330	-------	-------	0.586	-------	-------	1.080	Existing Conditions (Pervious)
6	Combine	1, 5	-------	9.698	-------	-------	14.89	-------	-------	24.84	Total Existing Runoff
7	SCS Runoff	------	-------	0.256	-------	-------	0.391	-------	-------	0.650	Proposed Impervious Sidewalks and
8	Combine	3, 4, 7	-------	3.775	-------	-------	6.093	-------	-------	10.81	Proposed undetained area
9	SCS Runoff	------	-------	0.792	-------	-------	1.210	-------	-------	2.010	Proposed Building IV Roof
10	Reservoir	9	-------	0.313	-------	-------	0.714	-------	-------	1.303	Detention Chamber No 2
11	Reservoir	2	-------	1.000	-------	-------	4.208	-------	-------	8.551	Detention Chamber No 1
12	Combine	8, 10, 11	-------	4.838	-------	-------	8.802	-------	-------	19.86	Combined Proposed Flow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

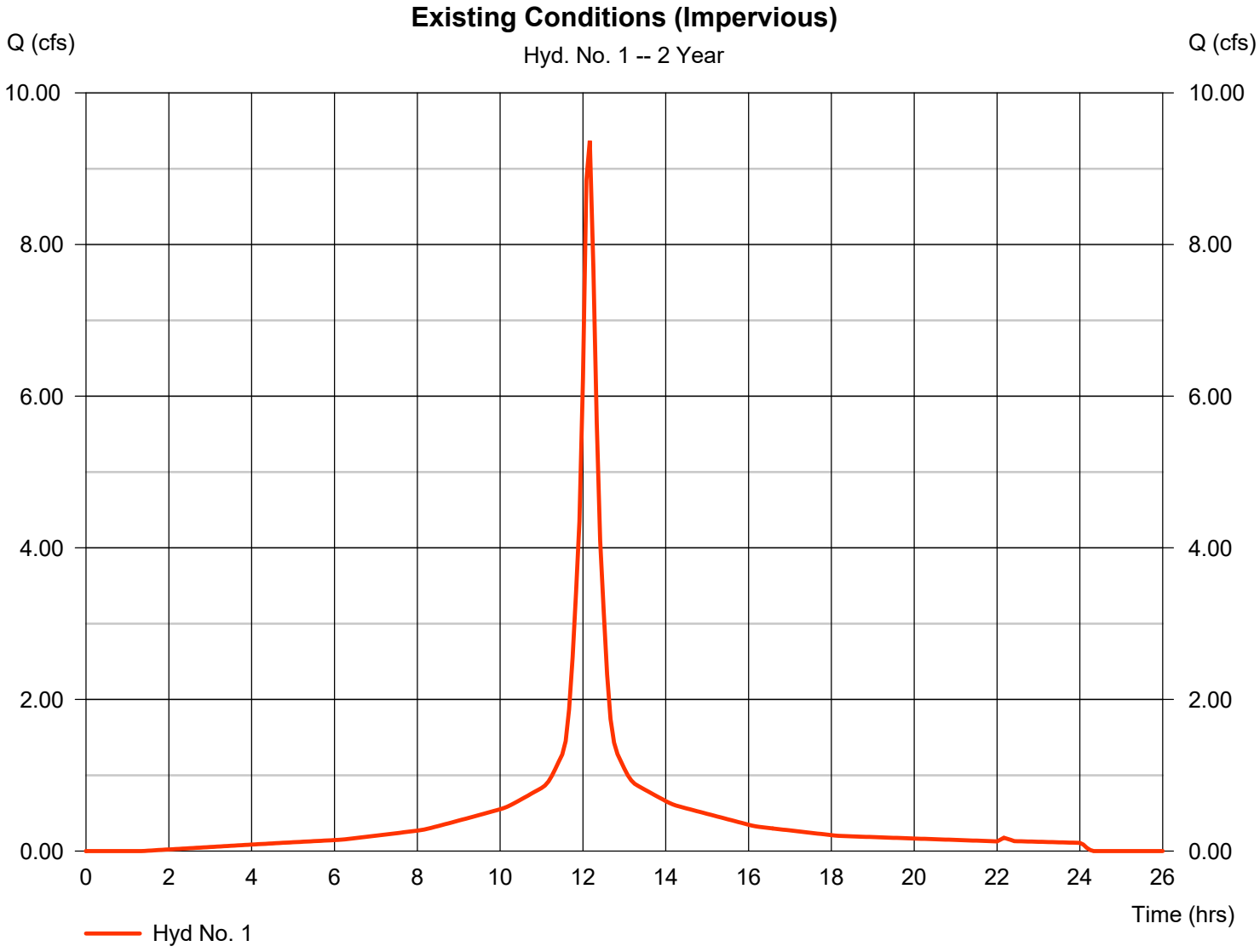
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	9.367	5	730	42,096	------	------	------	Existing Conditions (Impervious)
2	SCS Runoff	3.961	5	730	17,802	------	------	------	Proposed Emerson I & II Roof
3	SCS Runoff	3.425	5	730	15,393	------	------	------	Proposed Undetained Building III (imp
4	SCS Runoff	0.159	5	745	1,067	------	------	------	Proposed Undetained (Pervious)
5	SCS Runoff	0.330	5	730	1,314	------	------	------	Existing Conditions (Pervious)
6	Combine	9.698	5	730	43,411	1, 5	------	------	Total Existing Runoff
7	SCS Runoff	0.256	5	730	1,152	------	------	------	Proposed Impervious Sidewalks and
8	Combine	3.775	5	730	17,612	3, 4, 7	------	------	Proposed undetained area
9	SCS Runoff	0.792	5	730	3,560	------	------	------	Proposed Building IV Roof
10	Reservoir	0.313	5	745	3,560	9	6.95	812	Detention Chamber No 2
11	Reservoir	1.000	5	755	17,798	2	11.83	5,874	Detention Chamber No 1
12	Combine	4.838	5	730	38,970	8, 10, 11	------	------	Combined Proposed Flow

Hydrograph Report

Hyd. No. 1

Existing Conditions (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 9.367 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 42,096 cuft
Drainage area	= 4.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

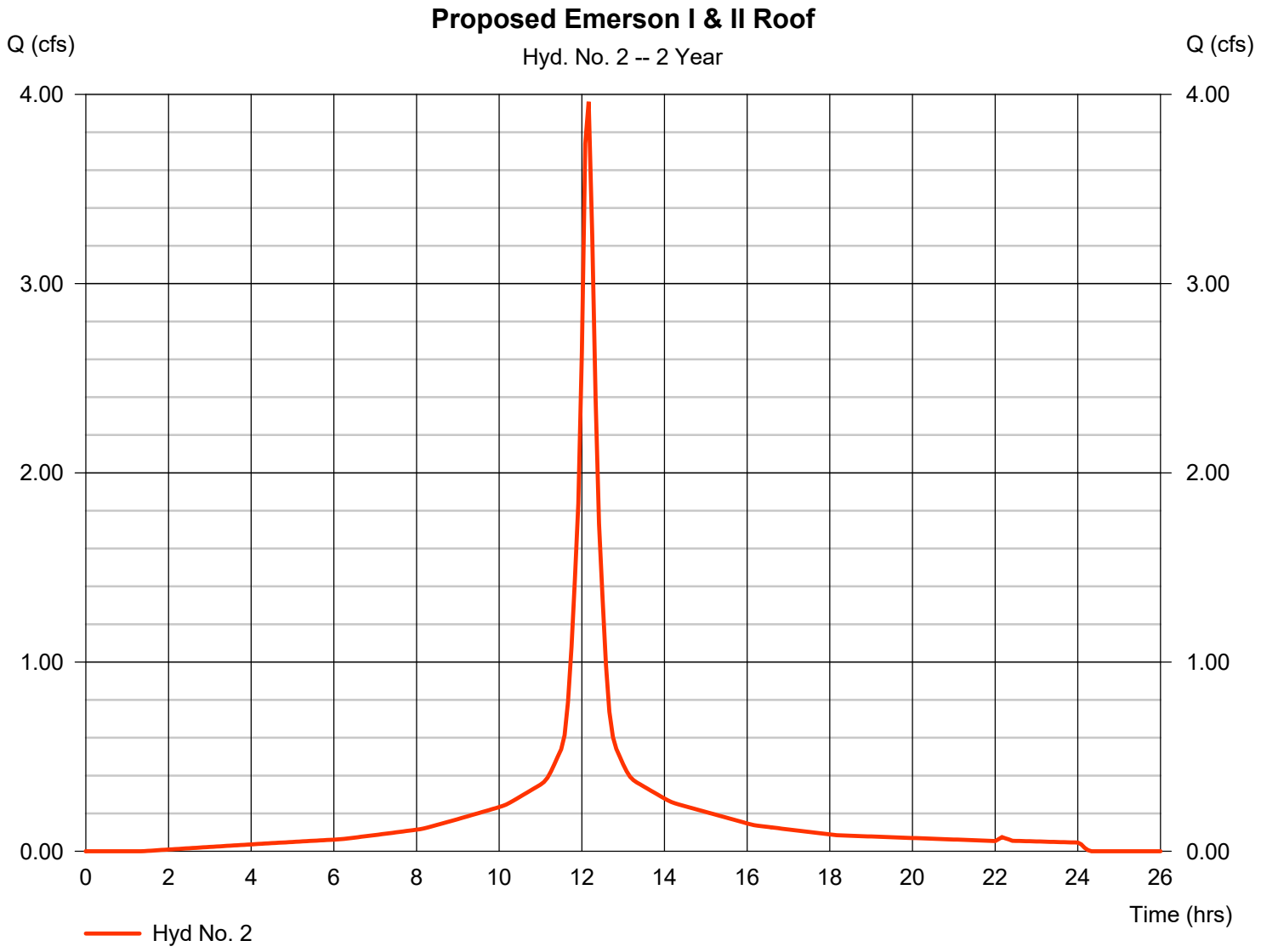


Hydrograph Report

Hyd. No. 2

Proposed Emerson I & II Roof

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.961 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	17,802 cuft
Drainage area	=	1.700 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.31 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

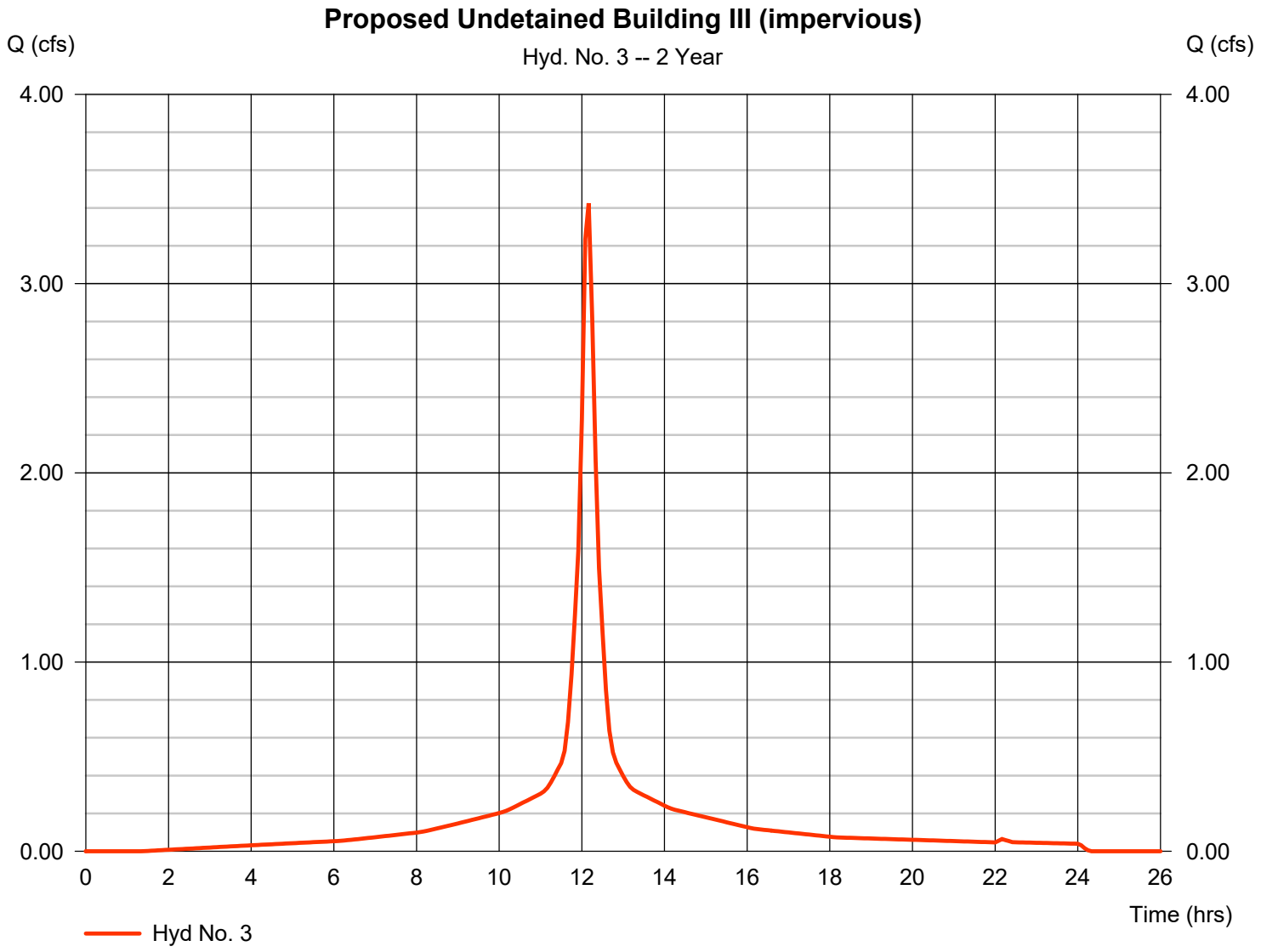


Hydrograph Report

Hyd. No. 3

Proposed Undetained Building III (impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.425 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 15,393 cuft
Drainage area	= 1.470 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

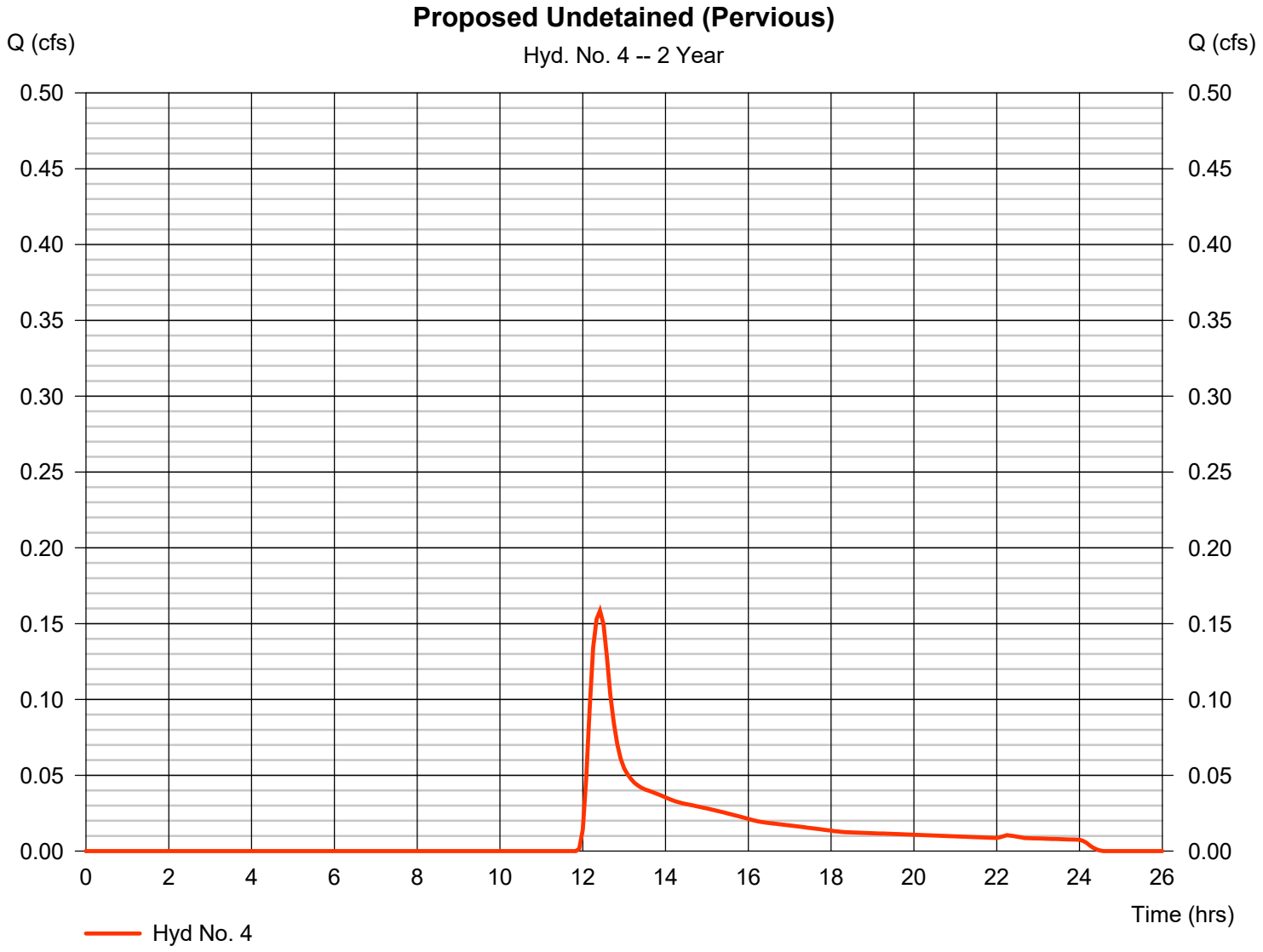


Hydrograph Report

Hyd. No. 4

Proposed Undetained (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.159 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.42 hrs
Time interval	= 5 min	Hyd. volume	= 1,067 cuft
Drainage area	= 0.600 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.00 min
Total precip.	= 3.31 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

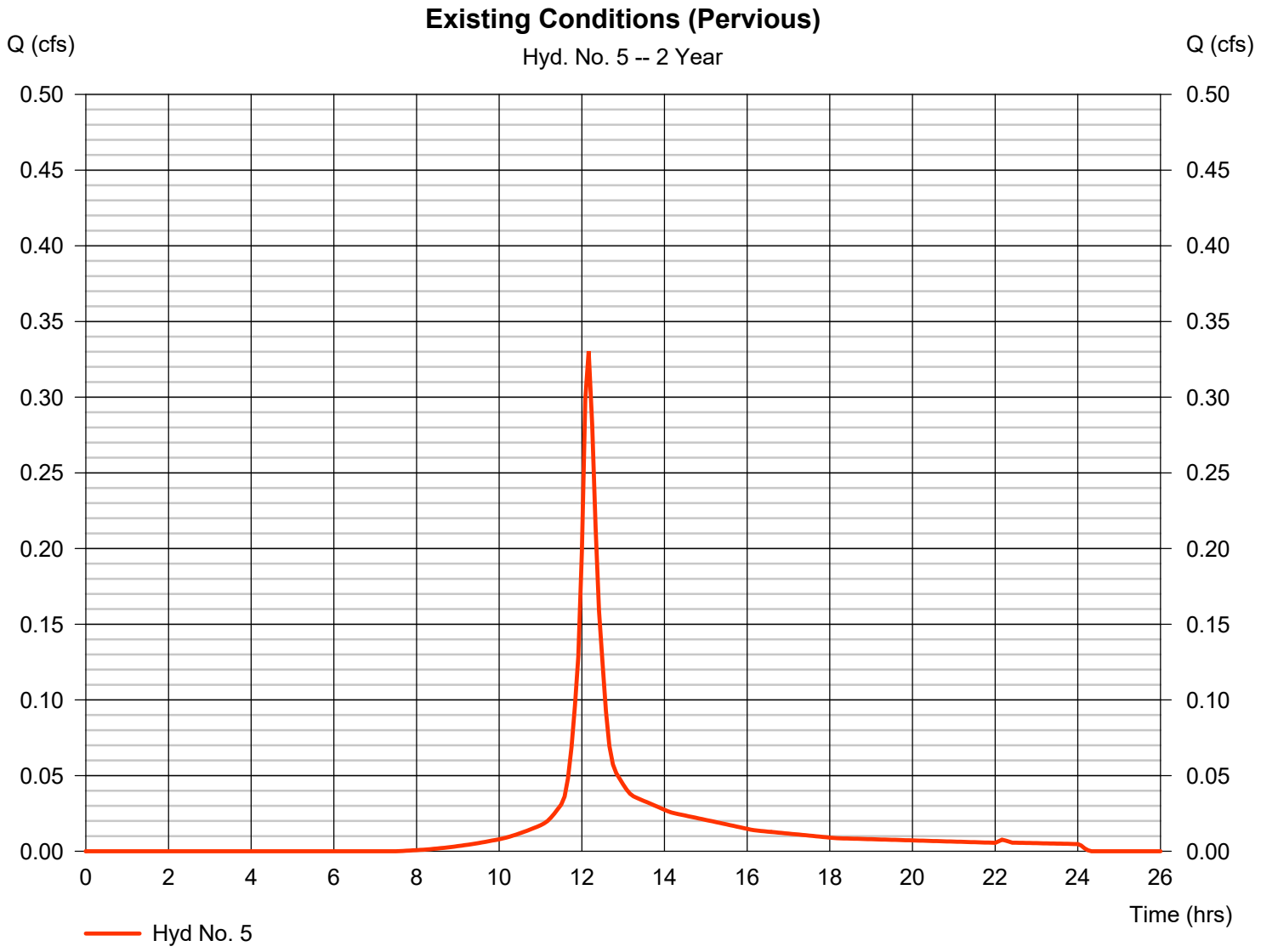


Hydrograph Report

Hyd. No. 5

Existing Conditions (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.330 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,314 cuft
Drainage area	= 0.200 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

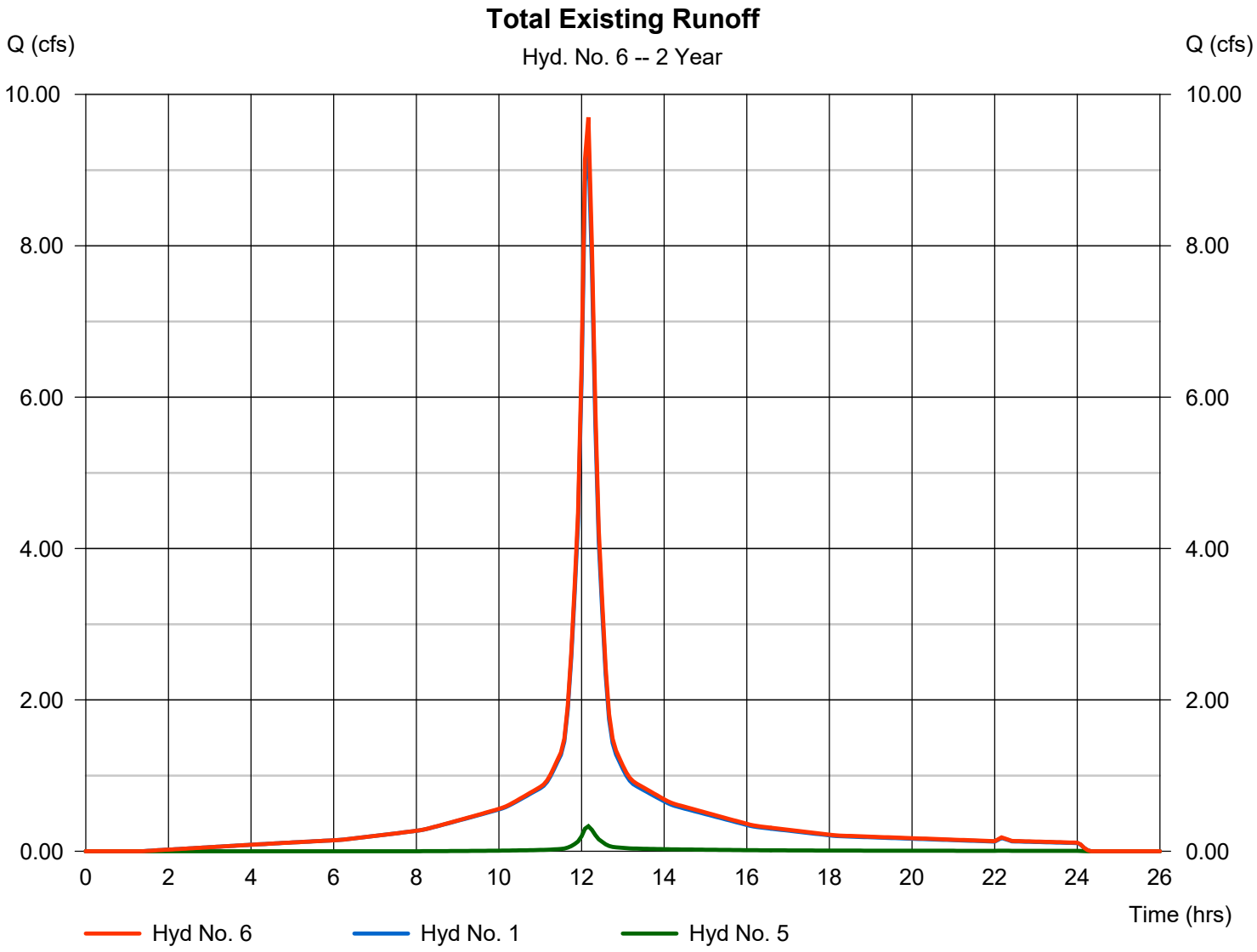


Hydrograph Report

Hyd. No. 6

Total Existing Runoff

Hydrograph type	= Combine	Peak discharge	= 9.698 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 43,411 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 4.220 ac

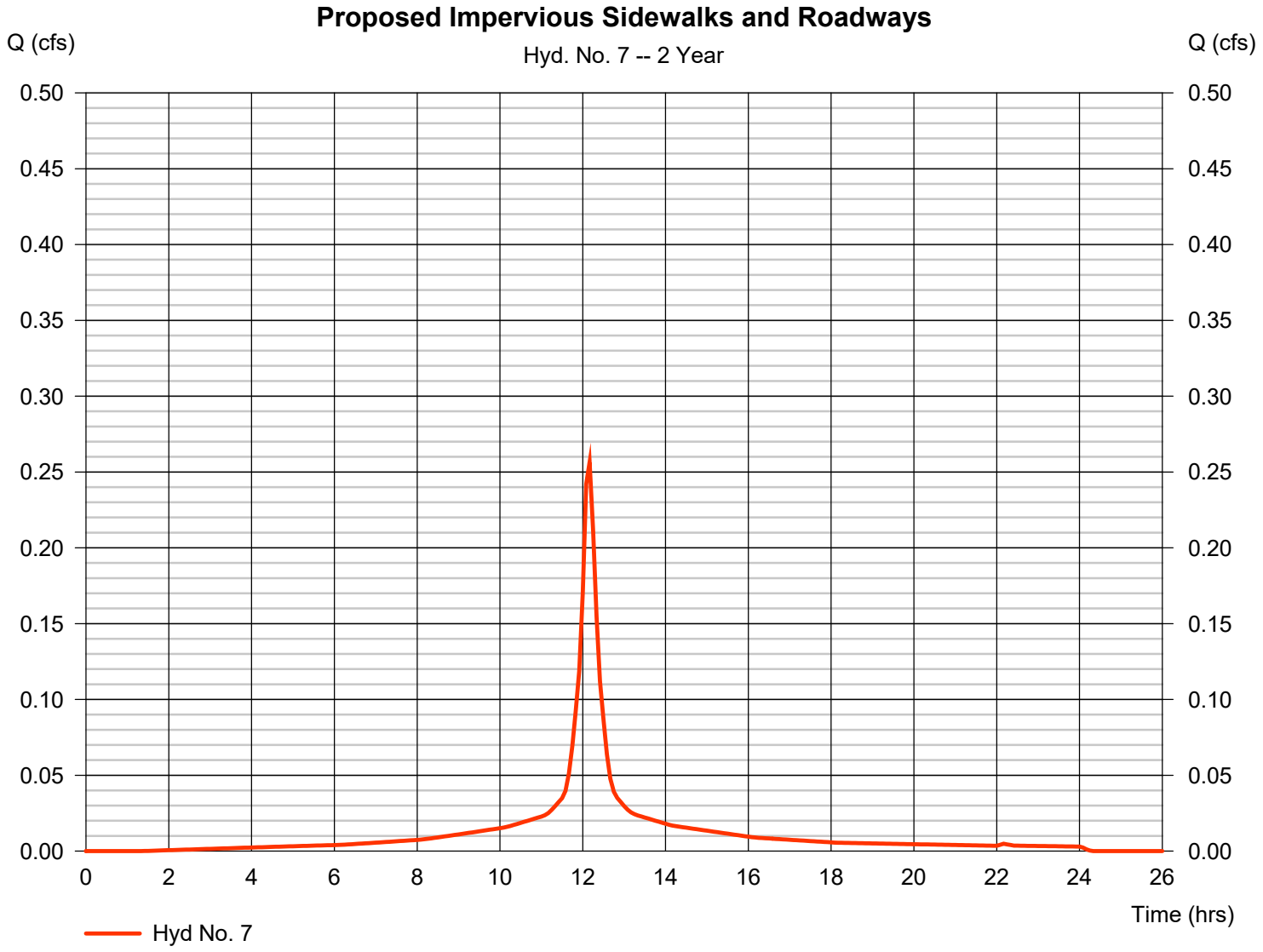


Hydrograph Report

Hyd. No. 7

Proposed Impervious Sidewalks and Roadways

Hydrograph type	= SCS Runoff	Peak discharge	= 0.256 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,152 cuft
Drainage area	= 0.110 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.31 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

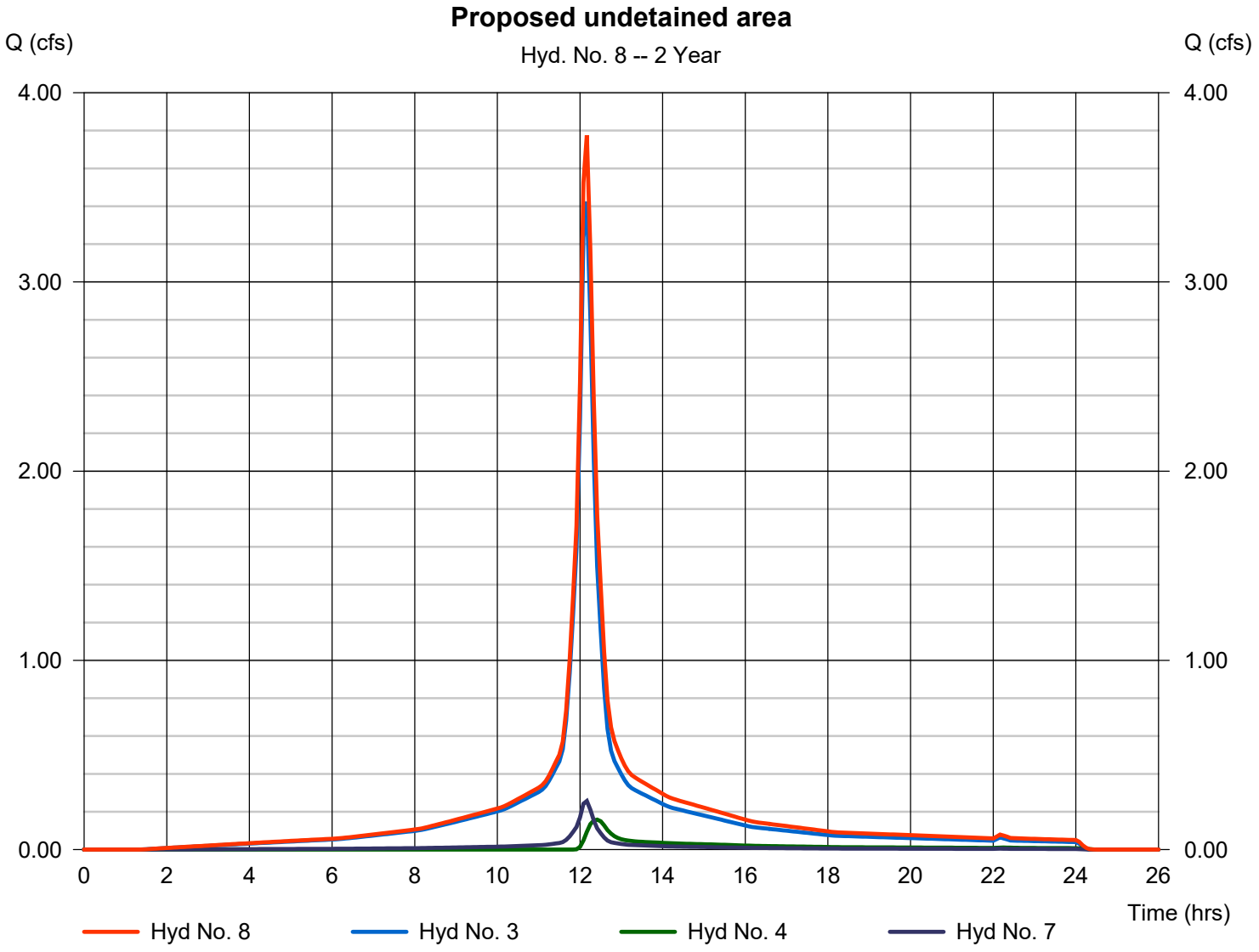


Hydrograph Report

Hyd. No. 8

Proposed undetained area

Hydrograph type	=	Combine	Peak discharge	=	3.775 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	17,612 cuft
Inflow hyds.	=	3, 4, 7	Contrib. drain. area	=	2.180 ac

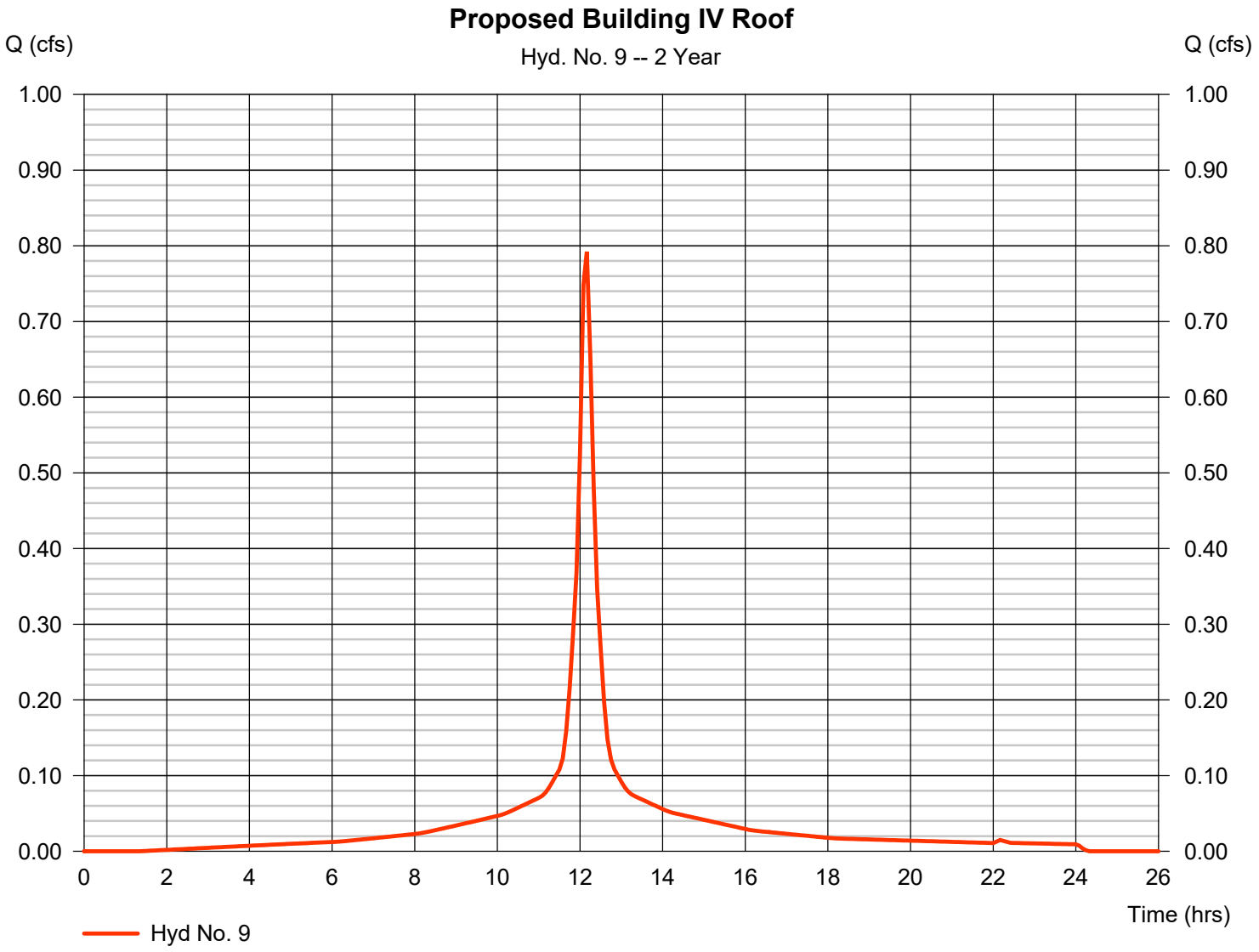


Hydrograph Report

Hyd. No. 9

Proposed Building IV Roof

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.792 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	3,560 cuft
Drainage area	=	0.340 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.31 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



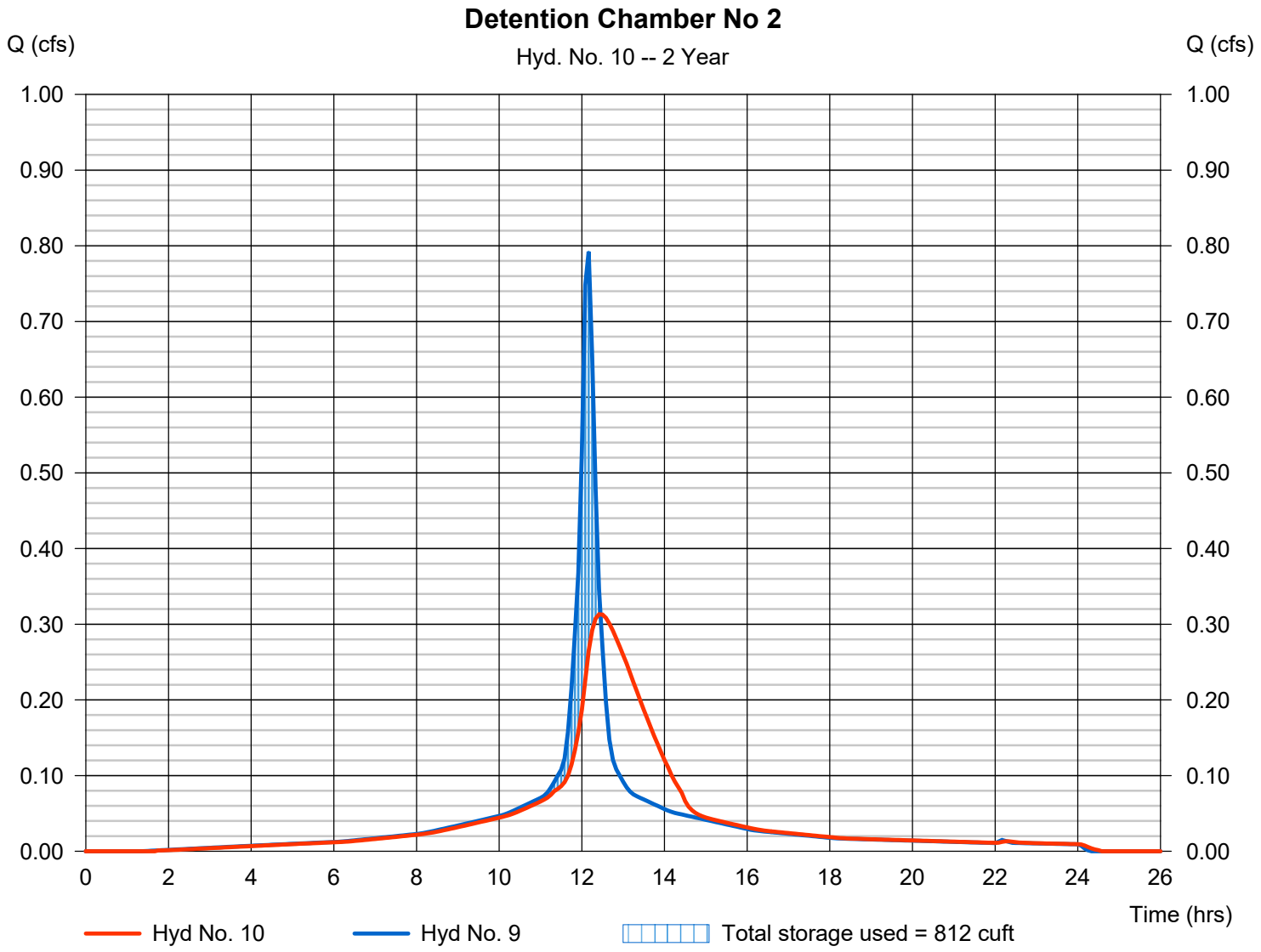
Hydrograph Report

Hyd. No. 10

Detention Chamber No 2

Hydrograph type	=	Reservoir	Peak discharge	=	0.313 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.42 hrs
Time interval	=	5 min	Hyd. volume	=	3,560 cuft
Inflow hyd. No.	=	9 - Proposed Building IV Roof	Max. Elevation	=	6.95 ft
Reservoir name	=	Detention Chamber No 2	Max. Storage	=	812 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Detention Chamber No 2

Pond Data

UG Chambers -Invert elev. = 5.70 ft, Rise x Span = 6.00 x 30.00 ft, Barrel Len = 30.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	5.70	n/a	0	0
0.60	6.30	n/a	540	540
1.20	6.90	n/a	540	1,080
1.80	7.50	n/a	540	1,620
2.40	8.10	n/a	540	2,160
3.00	8.70	n/a	540	2,701
3.60	9.30	n/a	540	3,241
4.20	9.90	n/a	540	3,781
4.80	10.50	n/a	540	4,321
5.40	11.10	n/a	540	4,861
6.00	11.70	n/a	540	5,401

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	3.50	6.00	0.00
Span (in)	= 12.00	3.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 5.00	5.70	7.00	0.00
Length (ft)	= 130.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .010	.010	.010	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

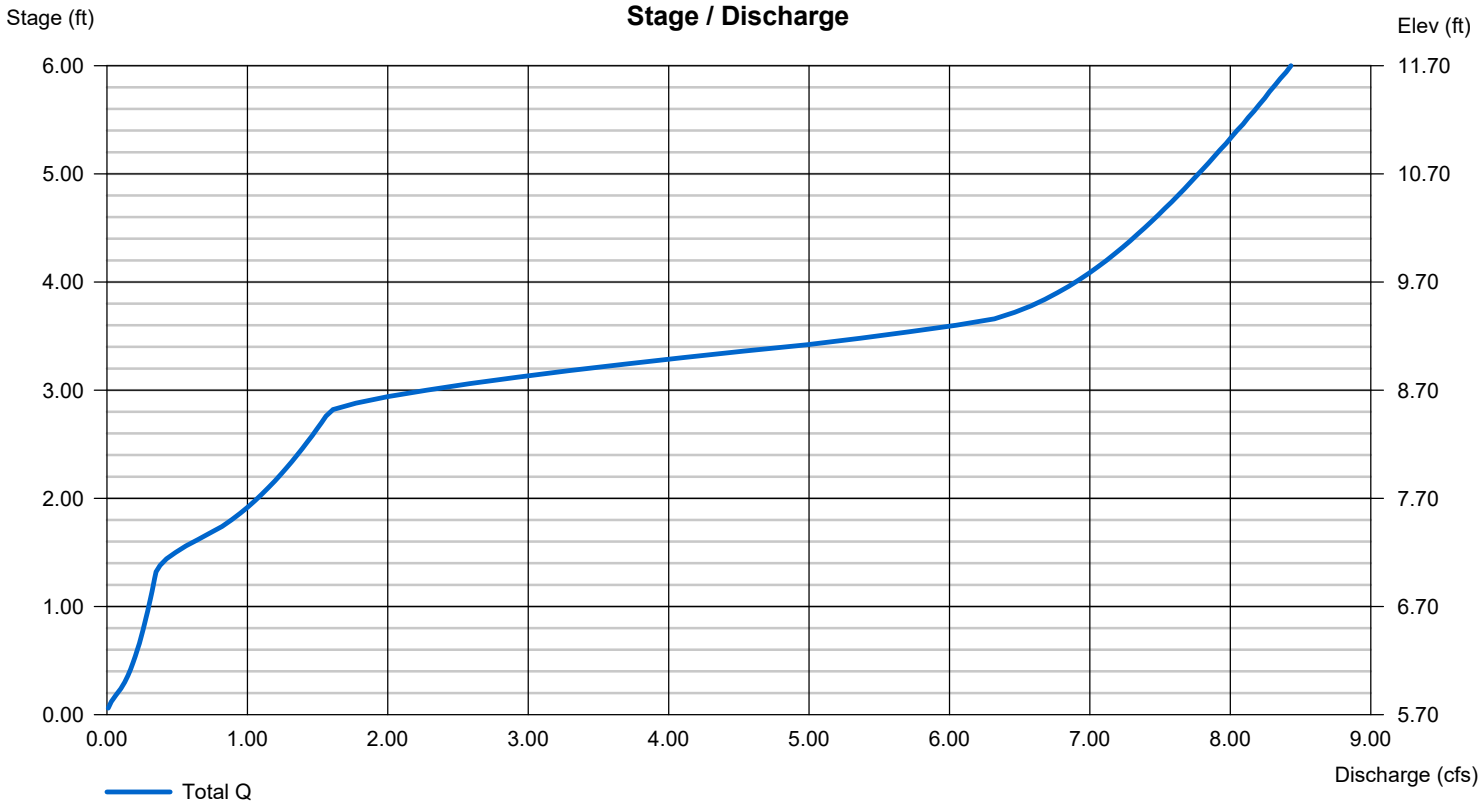
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.00	0.00	0.00	0.00
Crest El. (ft)	= 8.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



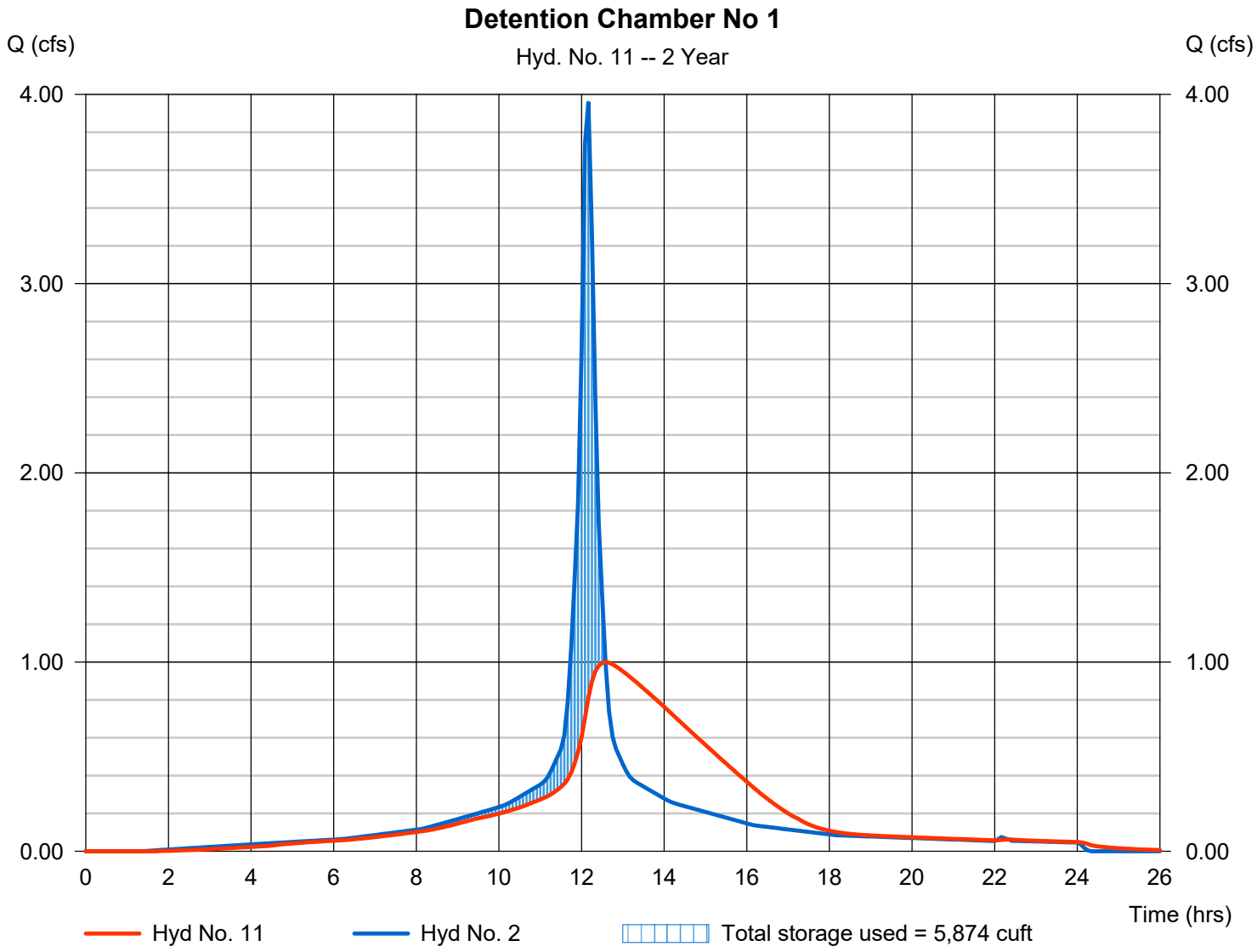
Hydrograph Report

Hyd. No. 11

Detention Chamber No 1

Hydrograph type	=	Reservoir	Peak discharge	=	1.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.58 hrs
Time interval	=	5 min	Hyd. volume	=	17,798 cuft
Inflow hyd. No.	=	2 - Proposed Emerson I & II Roofs	Max. Elevation	=	11.83 ft
Reservoir name	=	Detention Chamber No 1	Max. Storage	=	5,874 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention Chamber No 1

Pond Data

UG Chambers -Invert elev. = 6.00 ft, Rise x Span = 11.00 x 48.00 ft, Barrel Len = 21.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	6.00	n/a	0	0
1.10	7.10	n/a	1,109	1,109
2.20	8.20	n/a	1,109	2,218
3.30	9.30	n/a	1,109	3,327
4.40	10.40	n/a	1,109	4,436
5.50	11.50	n/a	1,109	5,545
6.60	12.60	n/a	1,109	6,654
7.70	13.70	n/a	1,109	7,763
8.80	14.80	n/a	1,109	8,872
9.90	15.90	n/a	1,109	9,981
11.00	17.00	n/a	1,109	11,090

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	4.00	14.00	0.00
Span (in)	= 18.00	4.00	14.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 5.43	6.00	12.50	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .010	.010	.010	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

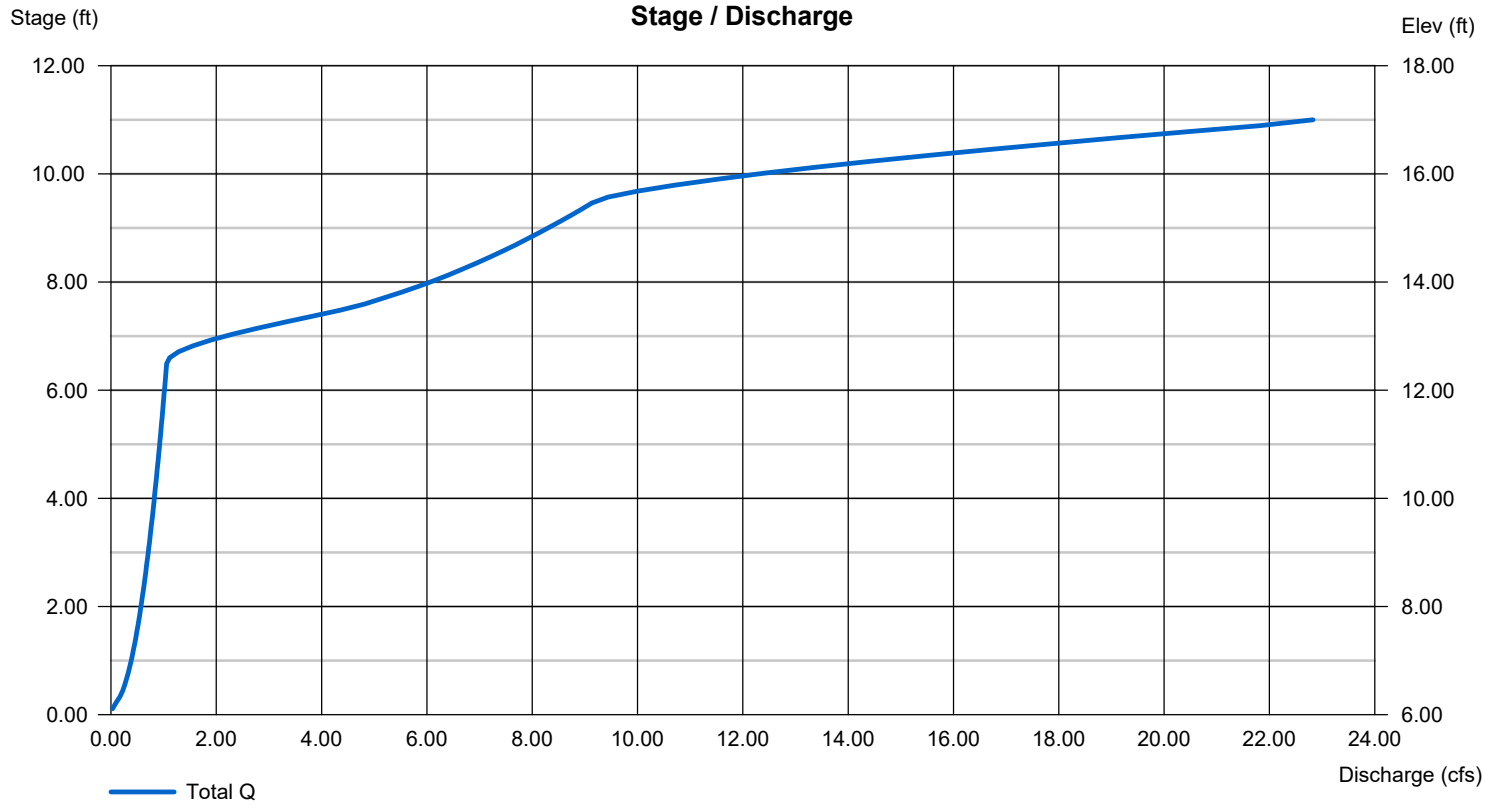
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.00	0.00	0.00	0.00
Crest El. (ft)	= 15.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

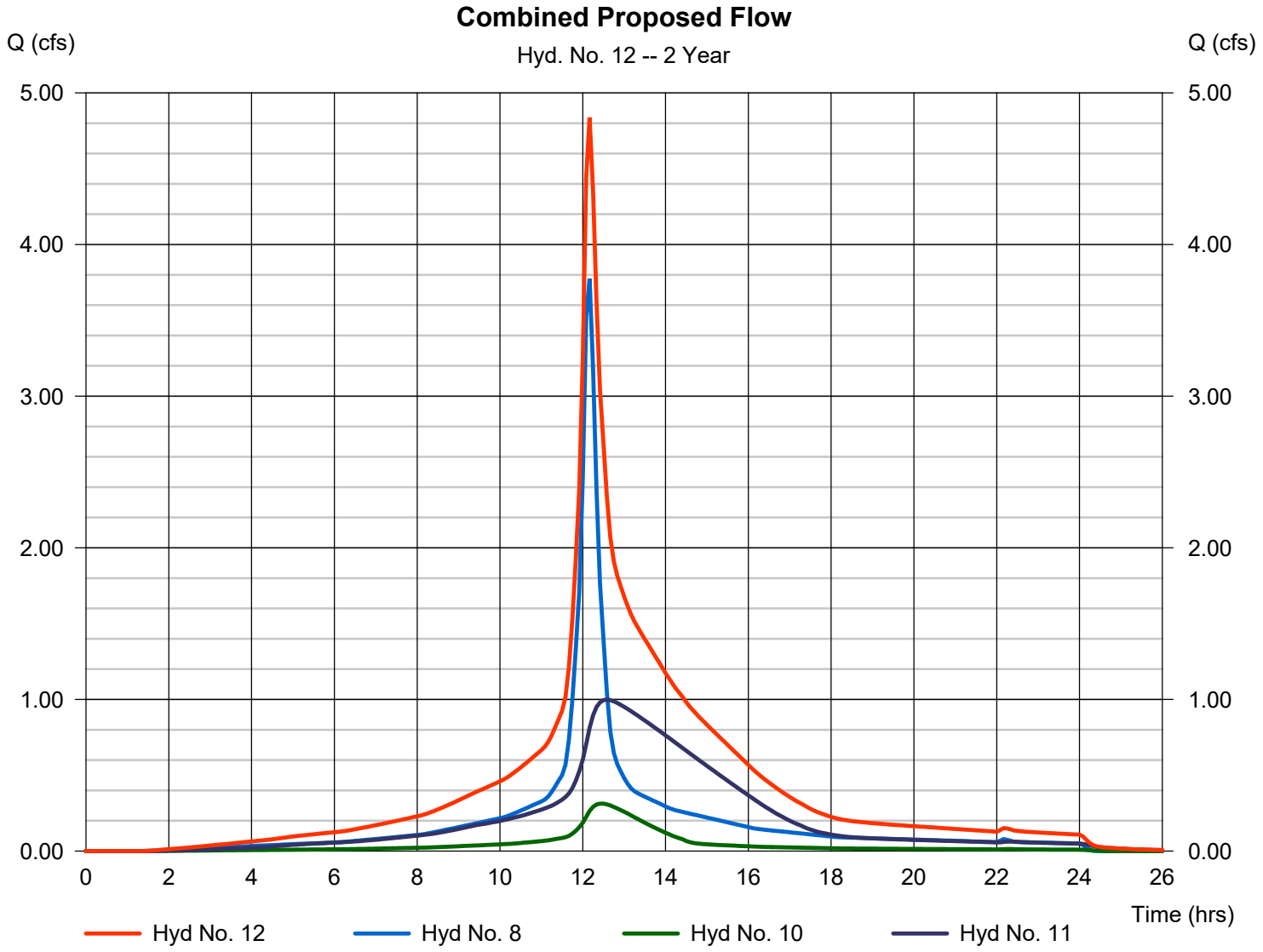


Hydrograph Report

Hyd. No. 12

Combined Proposed Flow

Hydrograph type	= Combine	Peak discharge	= 4.838 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 38,970 cuft
Inflow hyds.	= 8, 10, 11	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

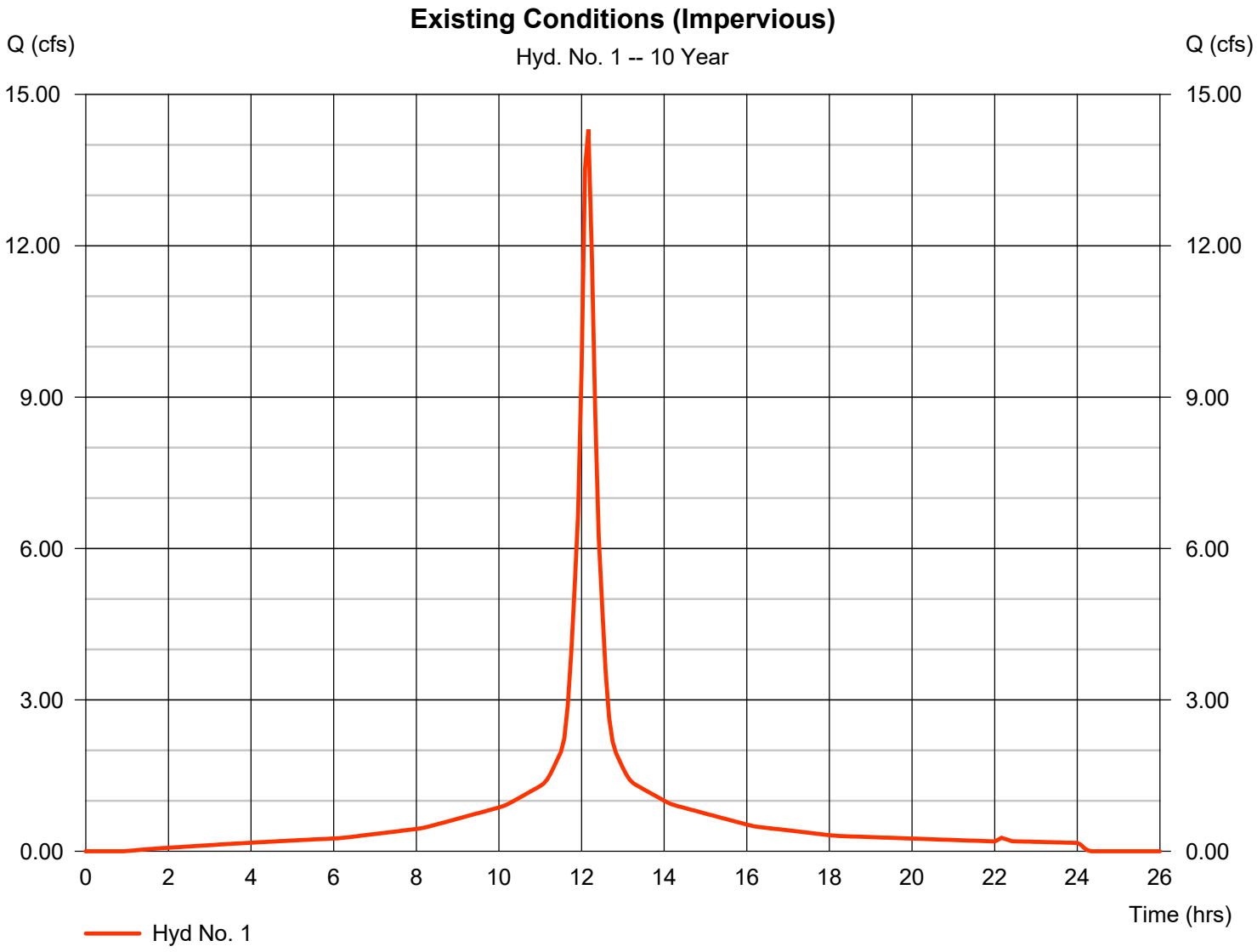
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	14.30	5	730	65,436	------	------	------	Existing Conditions (Impervious)
2	SCS Runoff	6.049	5	730	27,672	------	------	------	Proposed Emerson I & II Roof
3	SCS Runoff	5.230	5	730	23,928	------	------	------	Proposed Undetained Building III (imp
4	SCS Runoff	0.565	5	740	3,008	------	------	------	Proposed Undetained (Pervious)
5	SCS Runoff	0.586	5	730	2,372	------	------	------	Existing Conditions (Pervious)
6	Combine	14.89	5	730	67,808	1, 5	------	------	Total Existing Runoff
7	SCS Runoff	0.391	5	730	1,791	------	------	------	Proposed Impervious Sidewalks and
8	Combine	6.093	5	730	28,727	3, 4, 7	------	------	Proposed undetained area
9	SCS Runoff	1.210	5	730	5,534	------	------	------	Proposed Building IV Roof
10	Reservoir	0.714	5	740	5,534	9	7.38	1,201	Detention Chamber No 2
11	Reservoir	4.208	5	740	27,668	2	13.53	7,510	Detention Chamber No 1
12	Combine	8.802	5	735	61,929	8, 10, 11	------	------	Combined Proposed Flow

Hydrograph Report

Hyd. No. 1

Existing Conditions (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.30 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	65,436 cuft
Drainage area	=	4.020 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.02 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

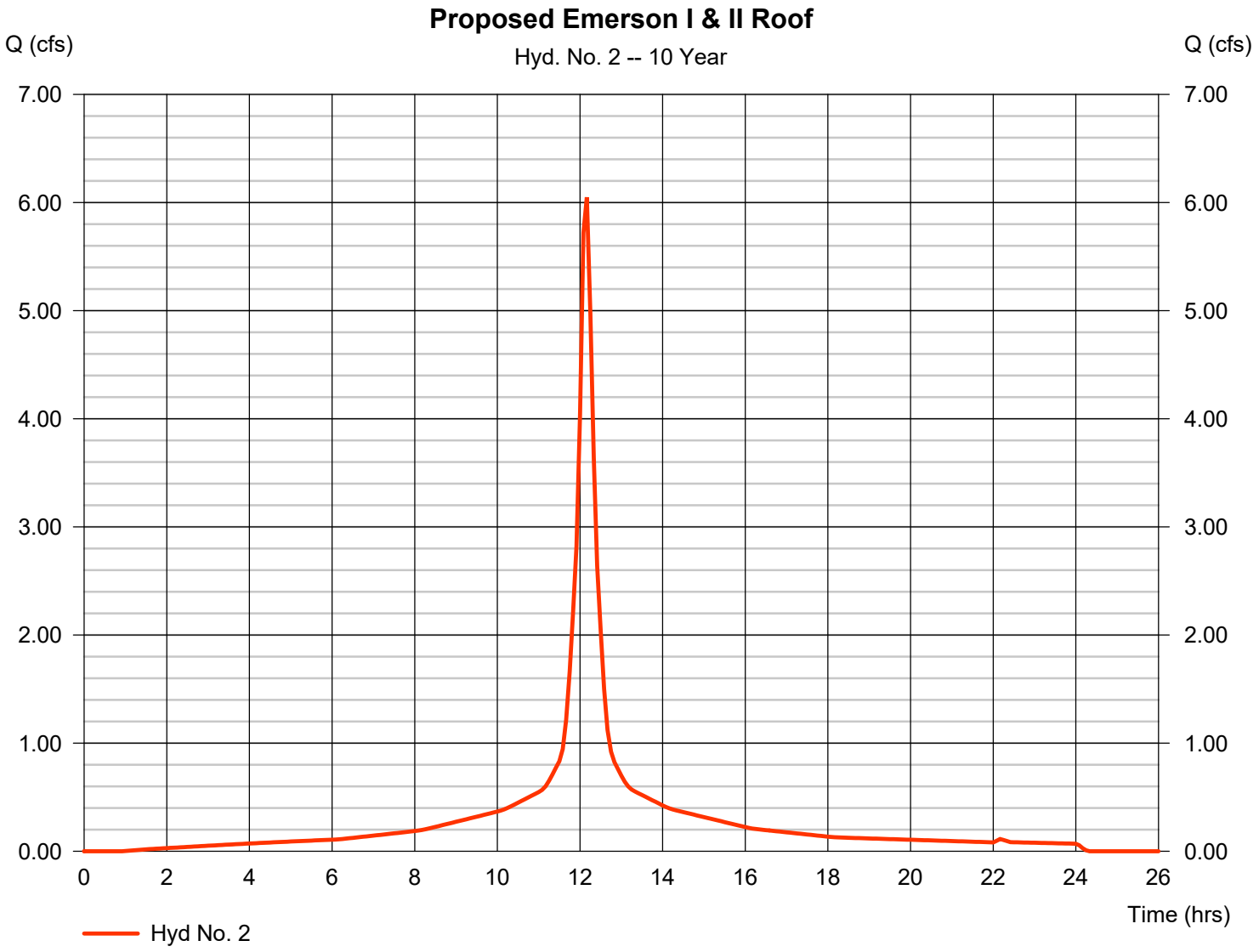


Hydrograph Report

Hyd. No. 2

Proposed Emerson I & II Roof

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.049 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	27,672 cuft
Drainage area	=	1.700 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.02 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

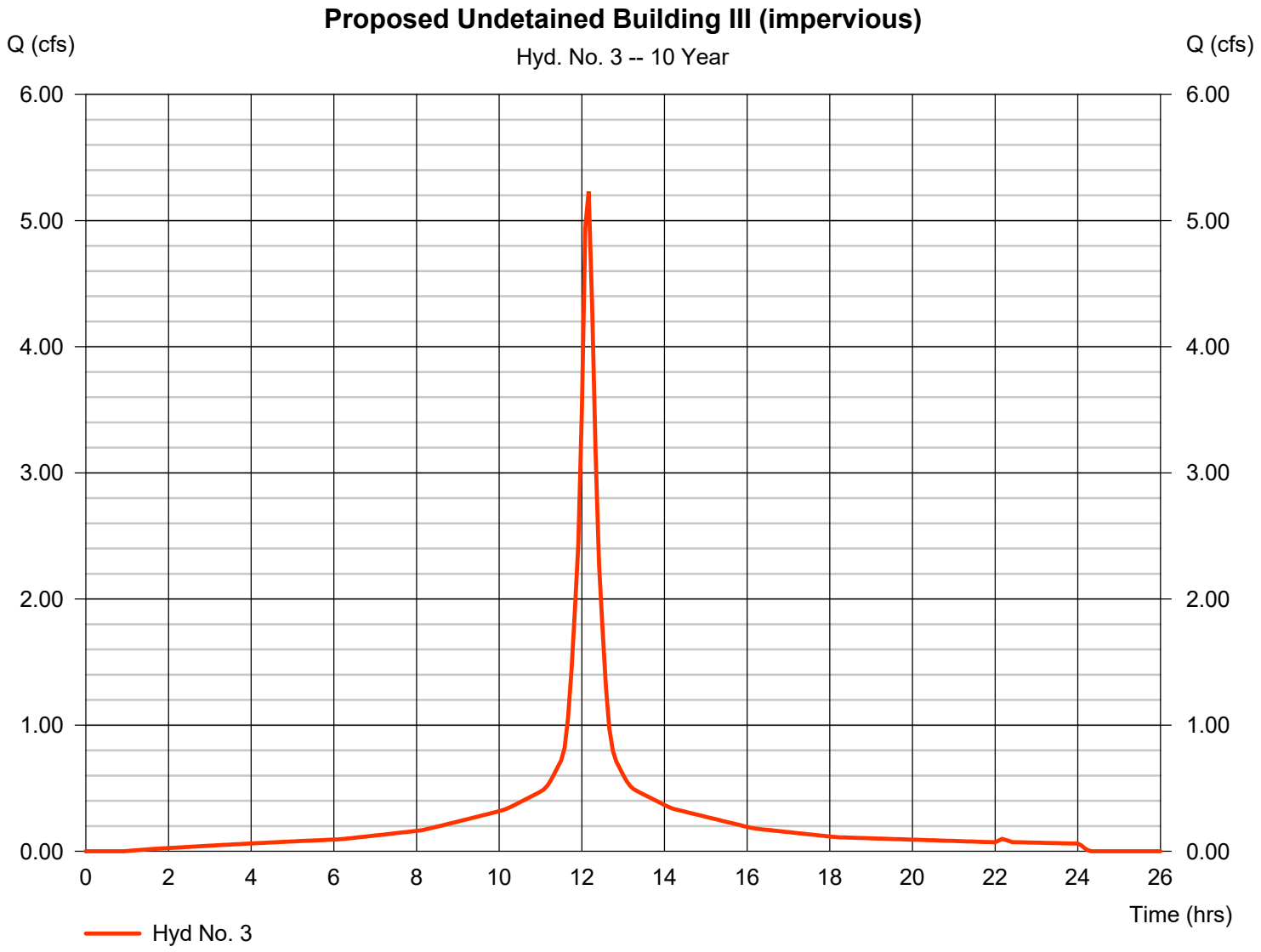


Hydrograph Report

Hyd. No. 3

Proposed Undetained Building III (impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.230 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	23,928 cuft
Drainage area	=	1.470 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.02 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

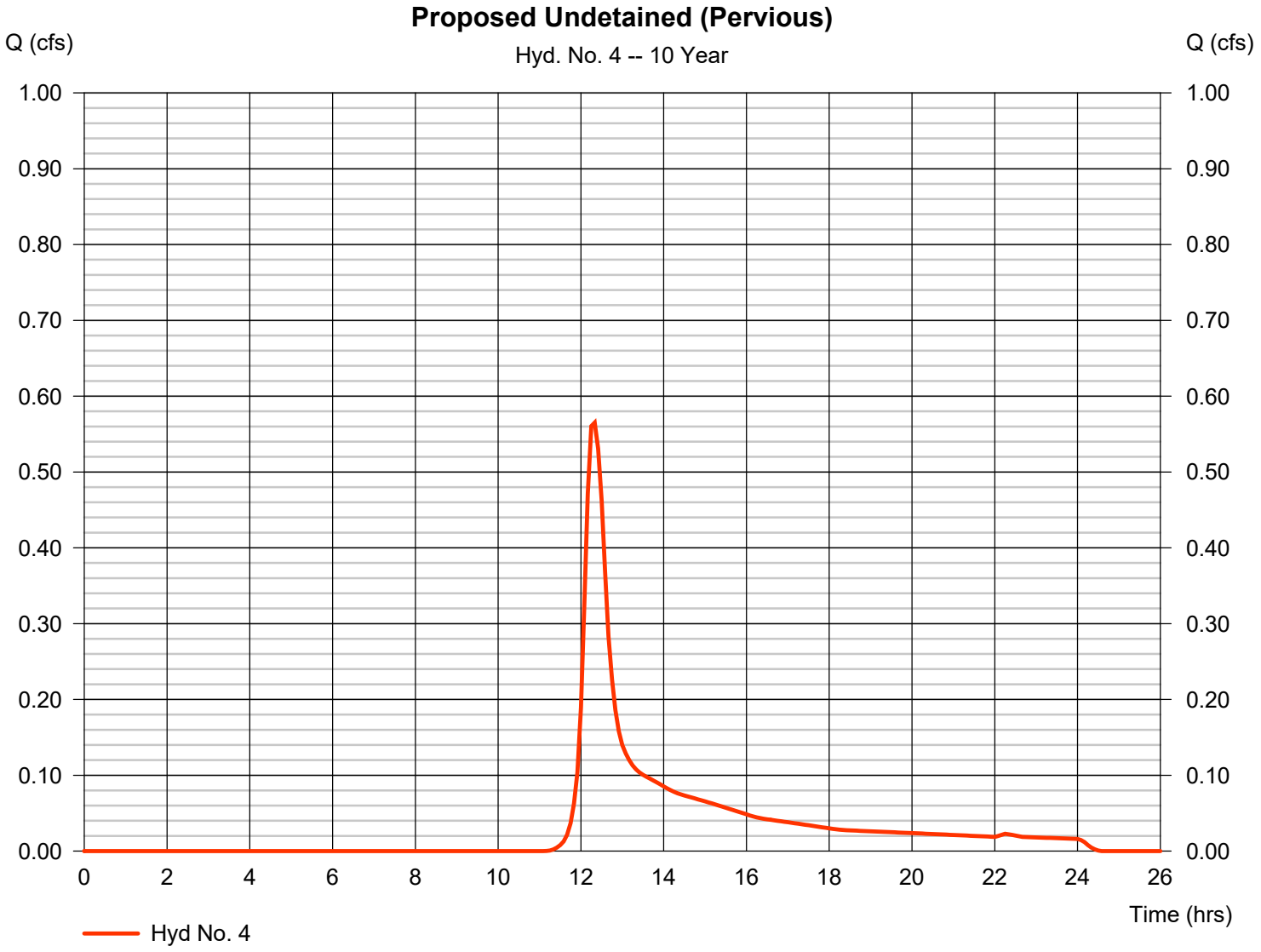


Hydrograph Report

Hyd. No. 4

Proposed Undetained (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.565 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.33 hrs
Time interval	=	5 min	Hyd. volume	=	3,008 cuft
Drainage area	=	0.600 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.00 min
Total precip.	=	5.02 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

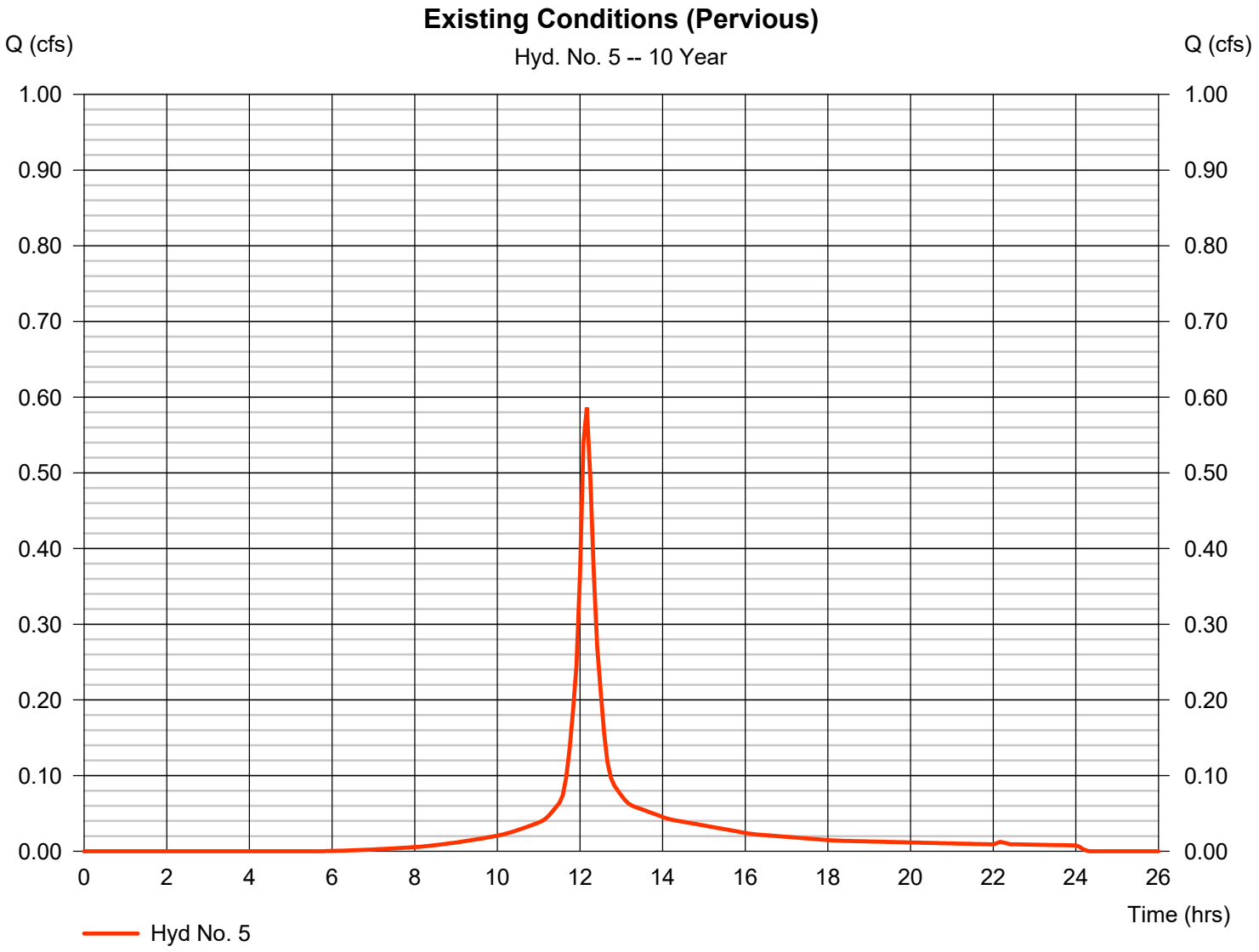


Hydrograph Report

Hyd. No. 5

Existing Conditions (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.586 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	2,372 cuft
Drainage area	=	0.200 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.02 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

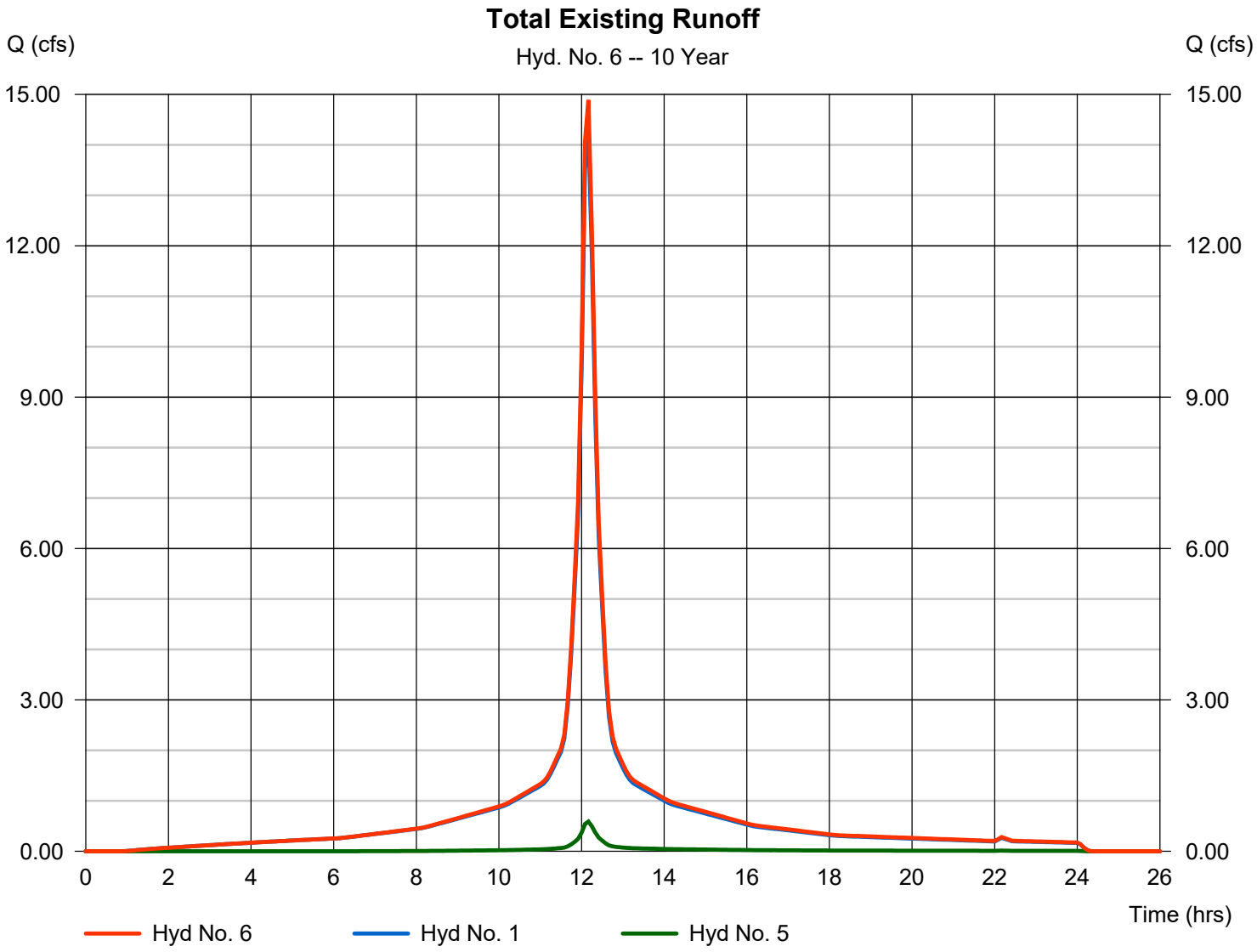


Hydrograph Report

Hyd. No. 6

Total Existing Runoff

Hydrograph type	= Combine	Peak discharge	= 14.89 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 67,808 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 4.220 ac

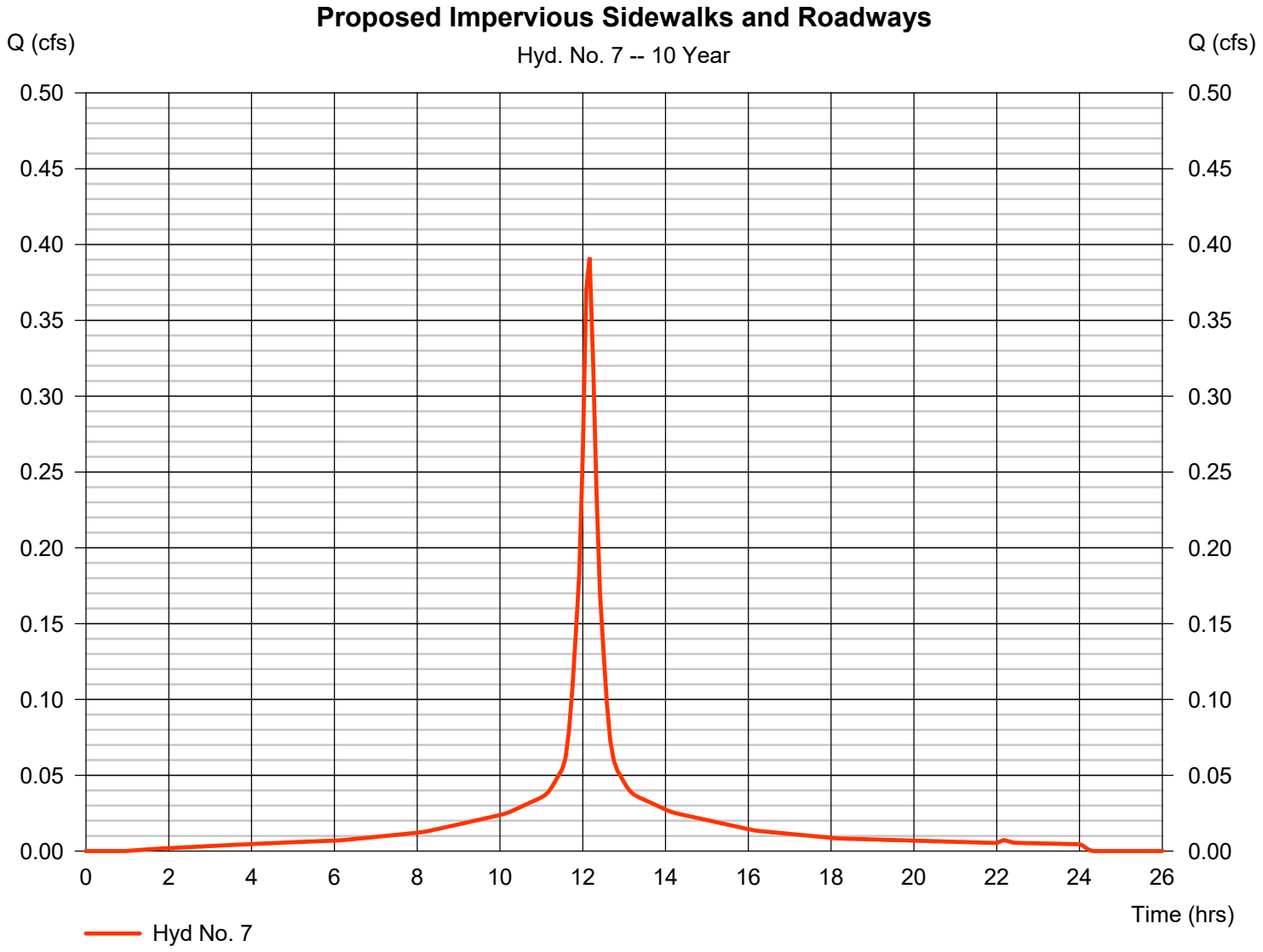


Hydrograph Report

Hyd. No. 7

Proposed Impervious Sidewalks and Roadways

Hydrograph type	= SCS Runoff	Peak discharge	= 0.391 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,791 cuft
Drainage area	= 0.110 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

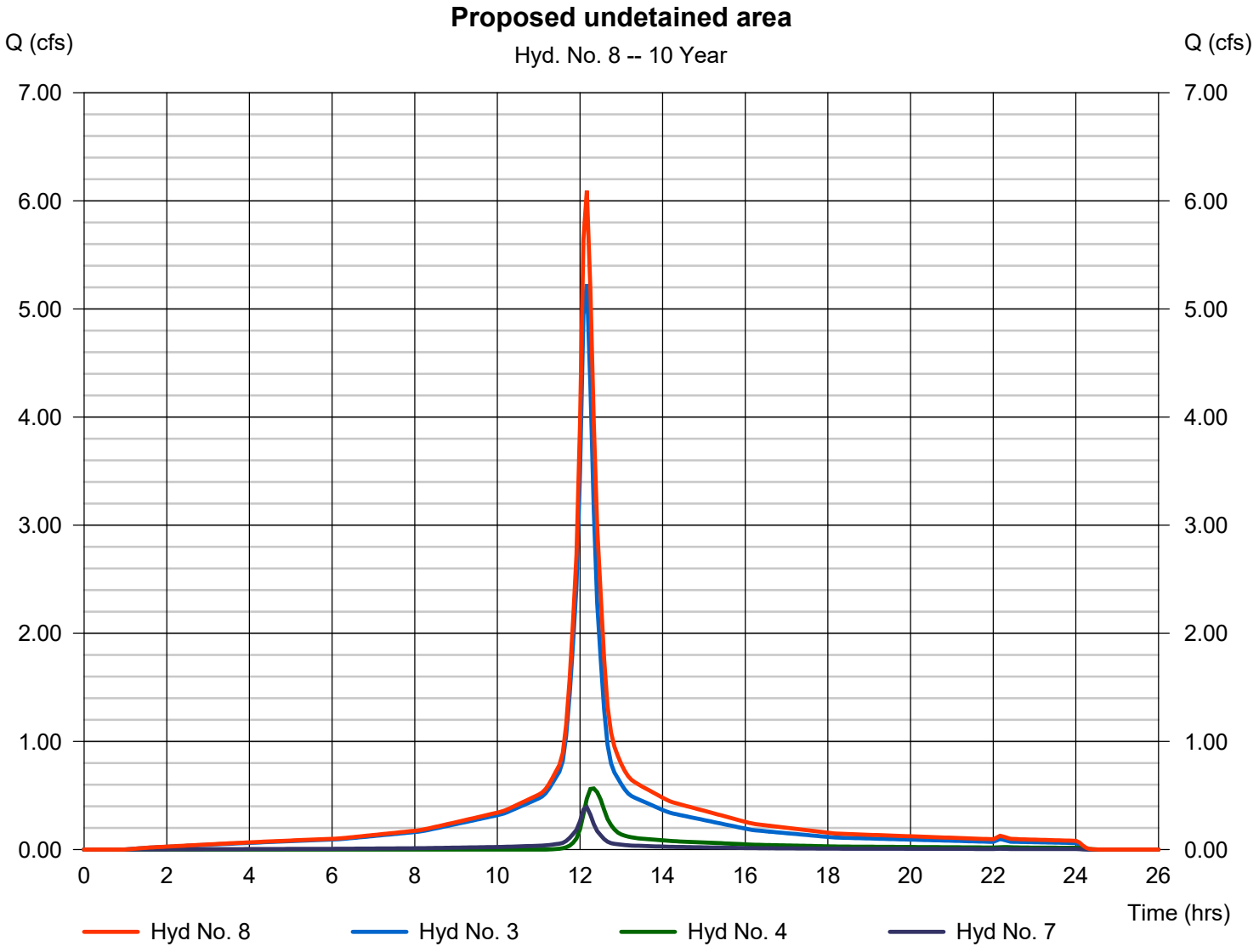


Hydrograph Report

Hyd. No. 8

Proposed undetained area

Hydrograph type	= Combine	Peak discharge	= 6.093 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 28,727 cuft
Inflow hyds.	= 3, 4, 7	Contrib. drain. area	= 2.180 ac

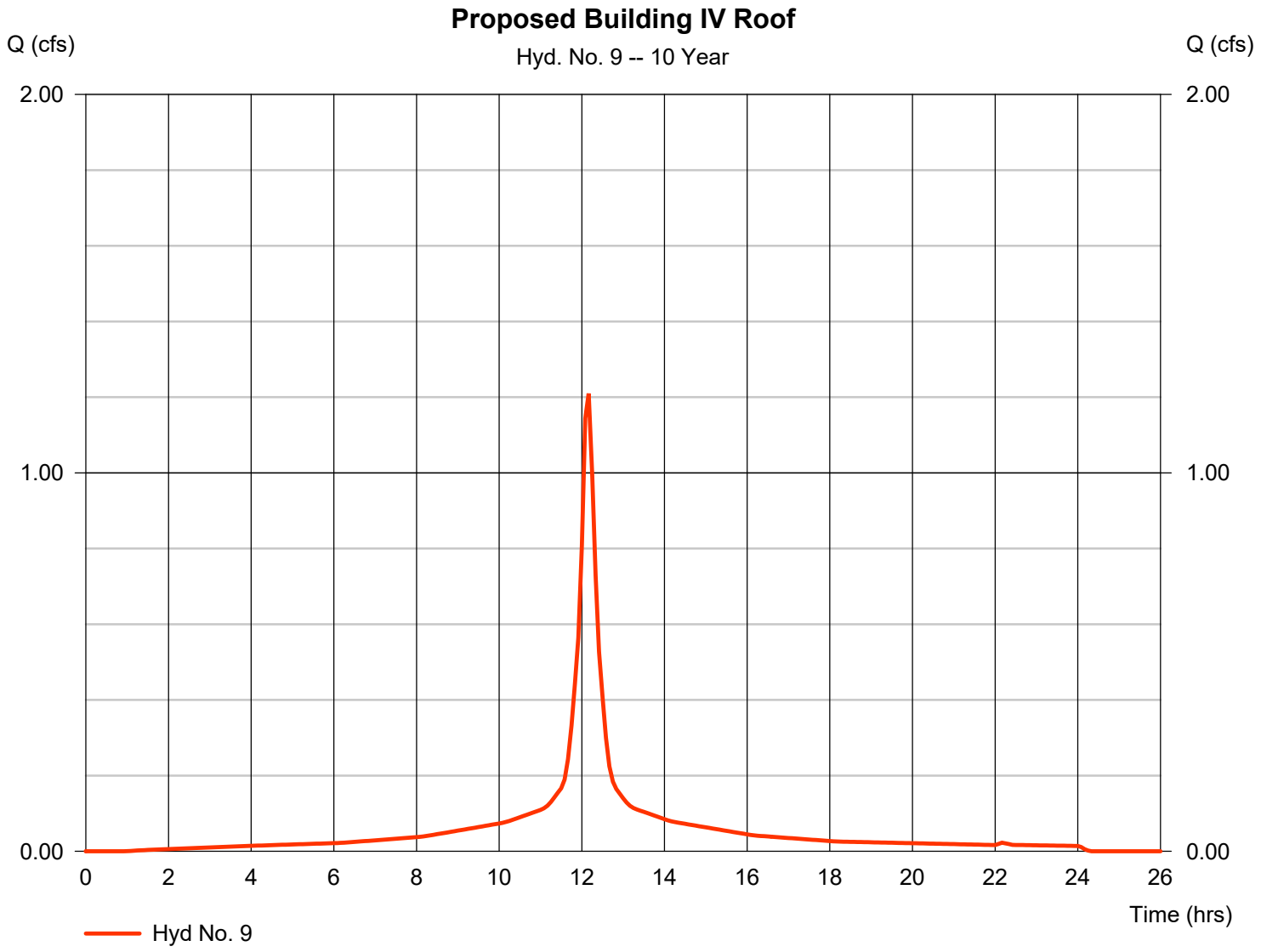


Hydrograph Report

Hyd. No. 9

Proposed Building IV Roof

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.210 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	5,534 cuft
Drainage area	=	0.340 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.02 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



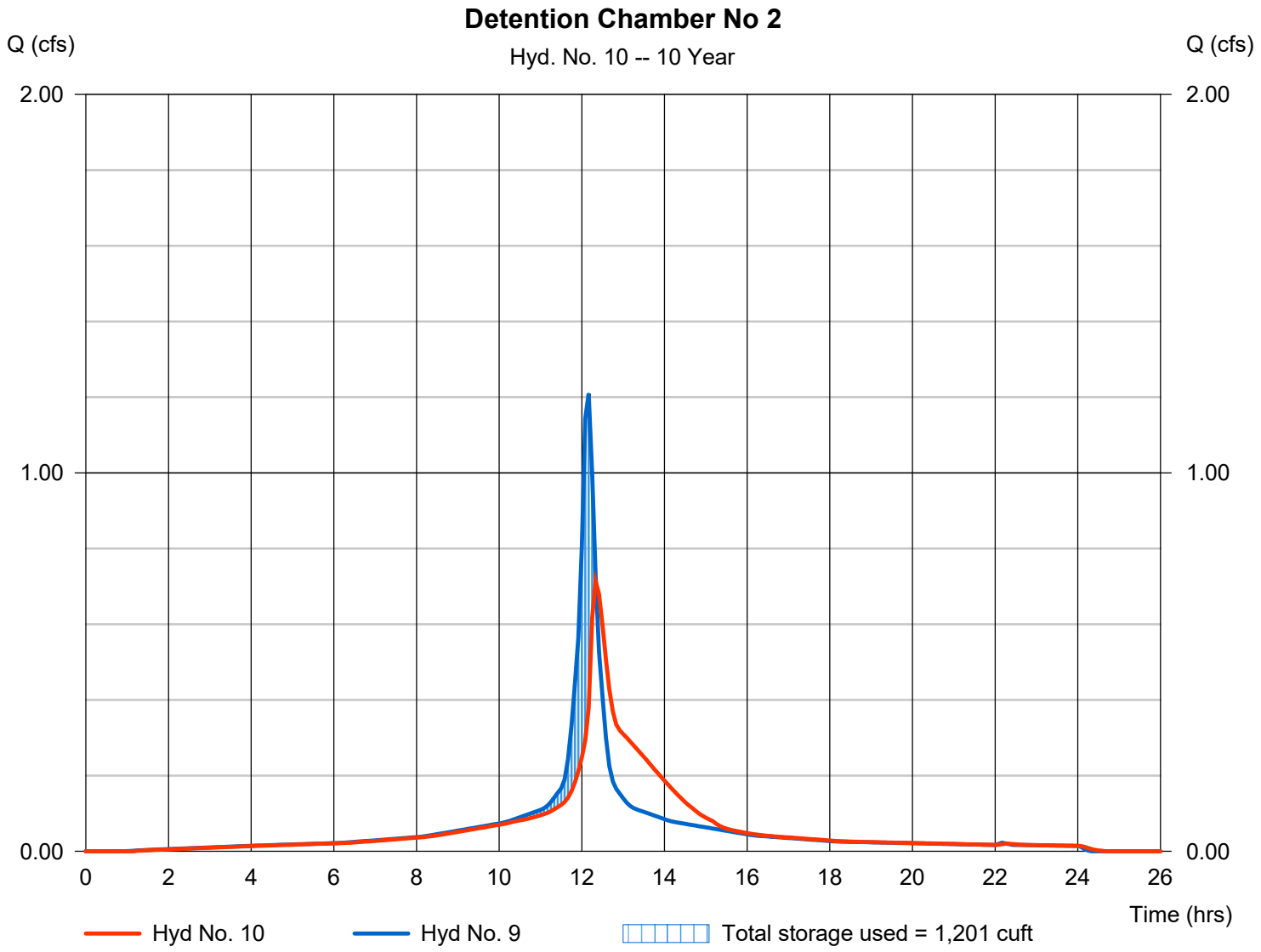
Hydrograph Report

Hyd. No. 10

Detention Chamber No 2

Hydrograph type	=	Reservoir	Peak discharge	=	0.714 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.33 hrs
Time interval	=	5 min	Hyd. volume	=	5,534 cuft
Inflow hyd. No.	=	9 - Proposed Building IV Roof	Max. Elevation	=	7.38 ft
Reservoir name	=	Detention Chamber No 2	Max. Storage	=	1,201 cuft

Storage Indication method used.



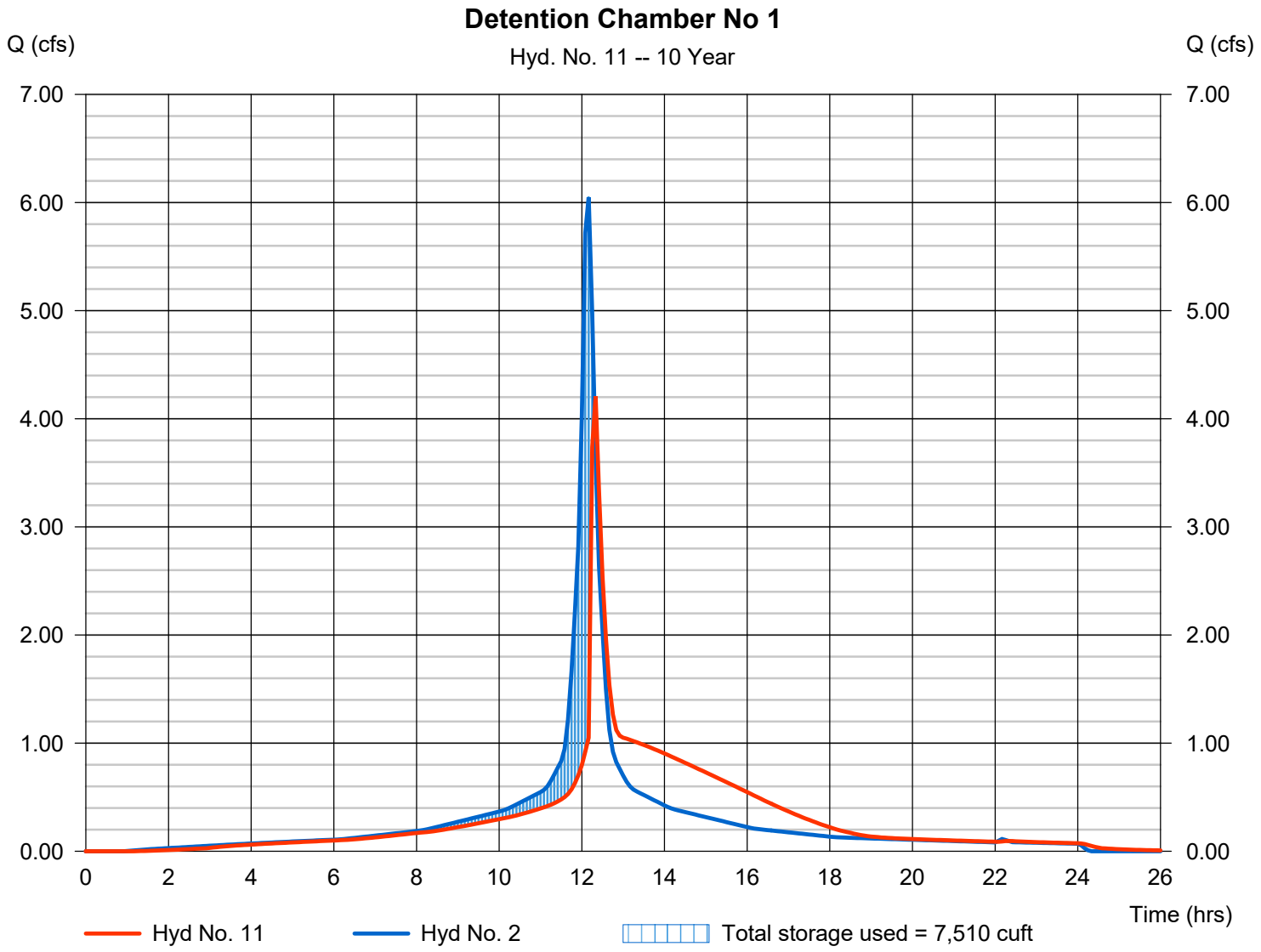
Hydrograph Report

Hyd. No. 11

Detention Chamber No 1

Hydrograph type	=	Reservoir	Peak discharge	=	4.208 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.33 hrs
Time interval	=	5 min	Hyd. volume	=	27,668 cuft
Inflow hyd. No.	=	2 - Proposed Emerson I & II Roofs	Max. Elevation	=	13.53 ft
Reservoir name	=	Detention Chamber No 1	Max. Storage	=	7,510 cuft

Storage Indication method used.

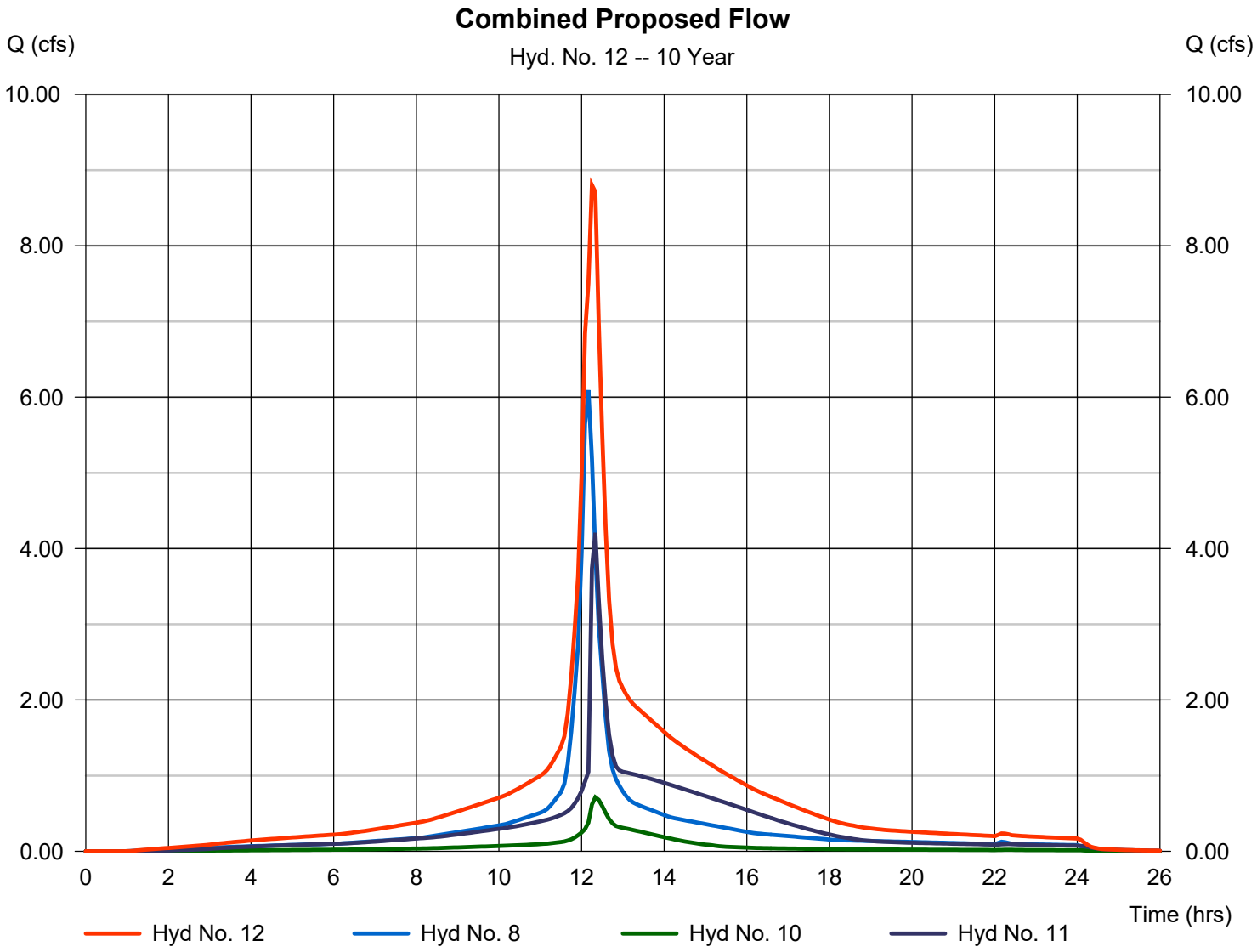


Hydrograph Report

Hyd. No. 12

Combined Proposed Flow

Hydrograph type	=	Combine	Peak discharge	=	8.802 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.25 hrs
Time interval	=	5 min	Hyd. volume	=	61,929 cuft
Inflow hyds.	=	8, 10, 11	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

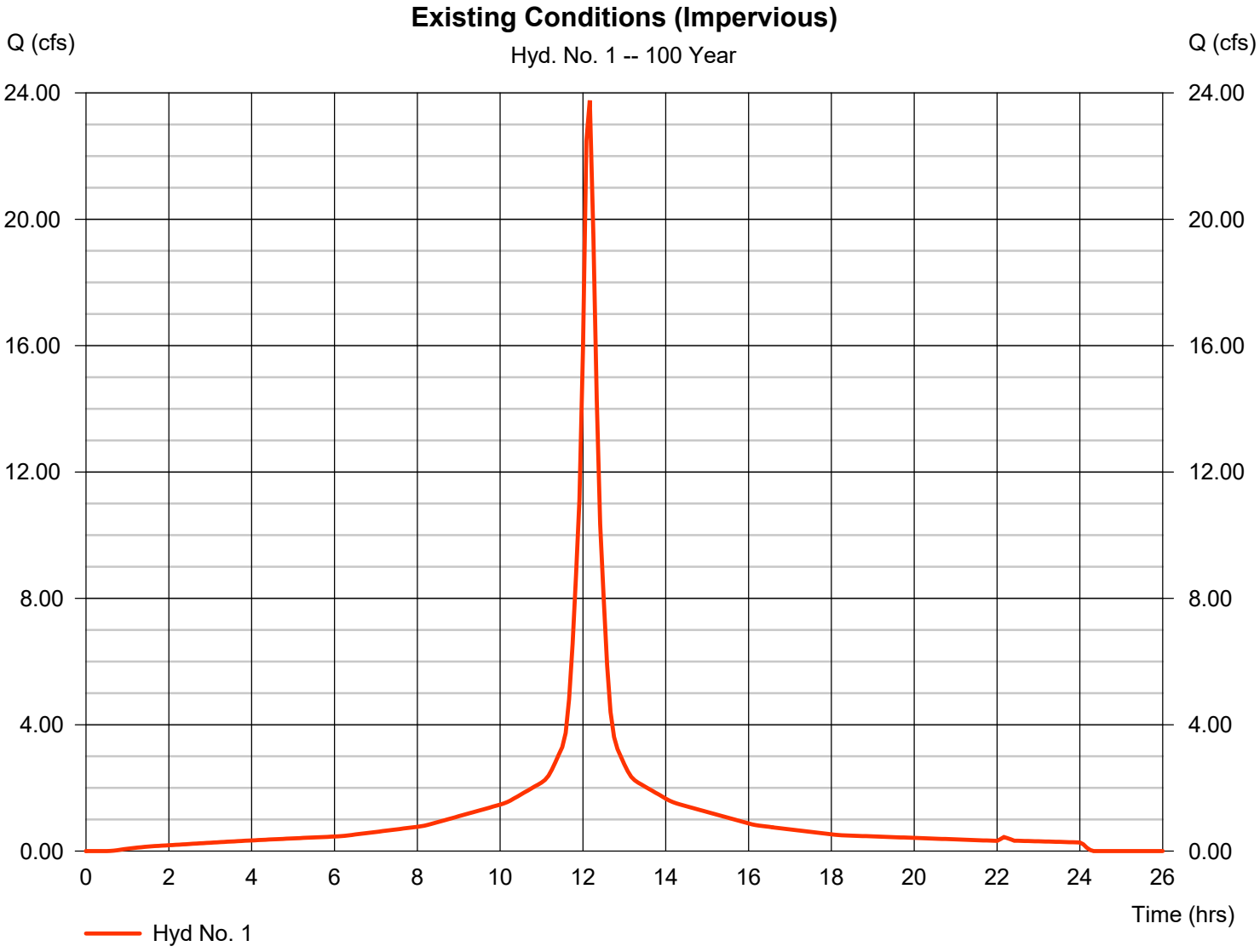
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	23.76	5	730	110,402	------	------	------	Existing Conditions (Impervious)
2	SCS Runoff	10.05	5	730	46,688	------	------	------	Proposed Emerson I & II Roof
3	SCS Runoff	8.690	5	730	40,371	------	------	------	Proposed Undetained Building III (imp
4	SCS Runoff	1.650	5	735	8,021	------	------	------	Proposed Undetained (Pervious)
5	SCS Runoff	1.080	5	730	4,514	------	------	------	Existing Conditions (Pervious)
6	Combine	24.84	5	730	114,916	1, 5	------	------	Total Existing Runoff
7	SCS Runoff	0.650	5	730	3,021	------	------	------	Proposed Impervious Sidewalks and
8	Combine	10.81	5	730	51,413	3, 4, 7	------	------	Proposed undetained area
9	SCS Runoff	2.010	5	730	9,338	------	------	------	Proposed Building IV Roof
10	Reservoir	1.303	5	740	9,337	9	8.06	1,801	Detention Chamber No 2
11	Reservoir	8.551	5	735	46,684	2	15.18	9,207	Detention Chamber No 1
12	Combine	19.86	5	730	107,433	8, 10, 11	------	------	Combined Proposed Flow

Hydrograph Report

Hyd. No. 1

Existing Conditions (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 23.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 110,402 cuft
Drainage area	= 4.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.31 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

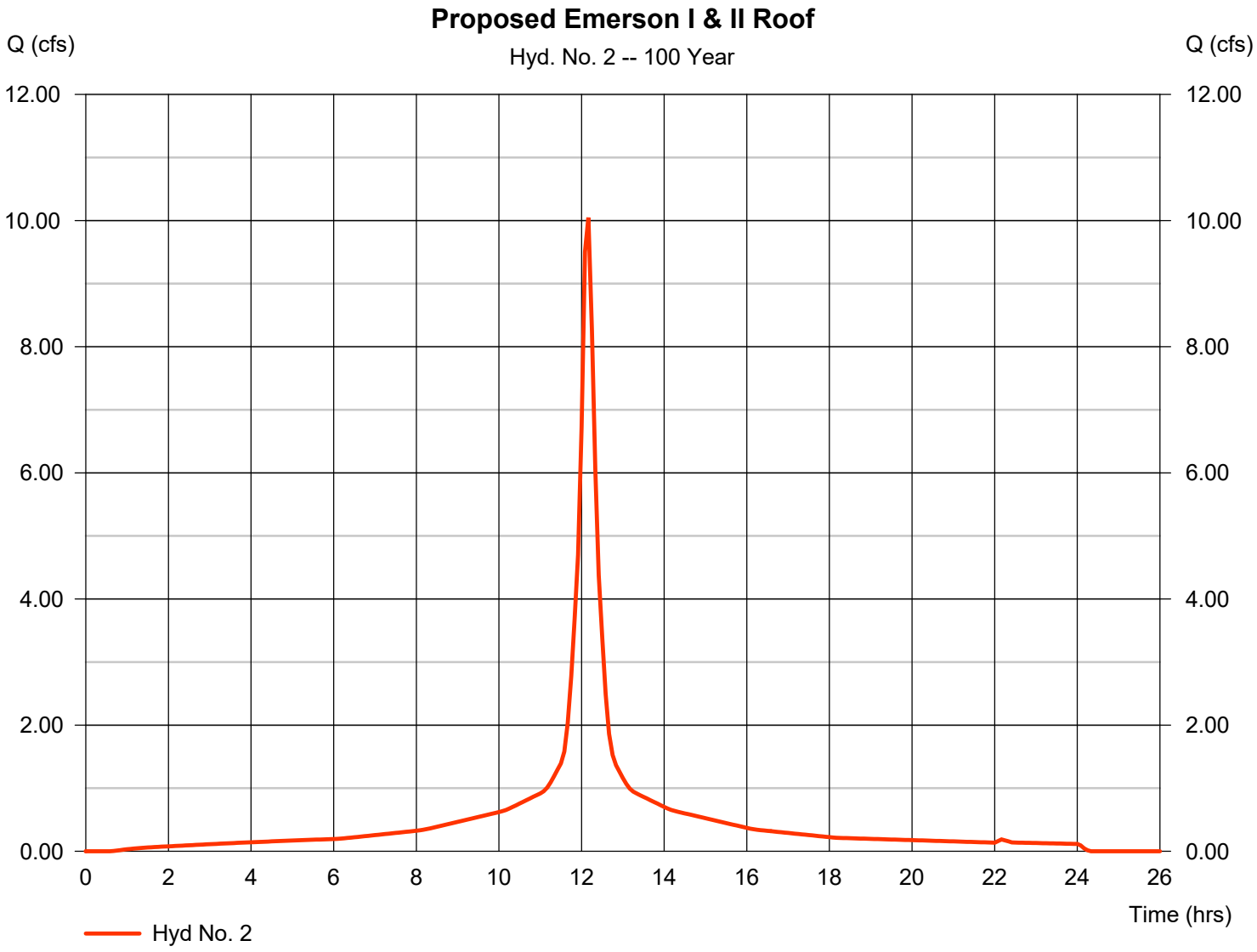


Hydrograph Report

Hyd. No. 2

Proposed Emerson I & II Roof

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.05 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	46,688 cuft
Drainage area	=	1.700 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	8.31 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

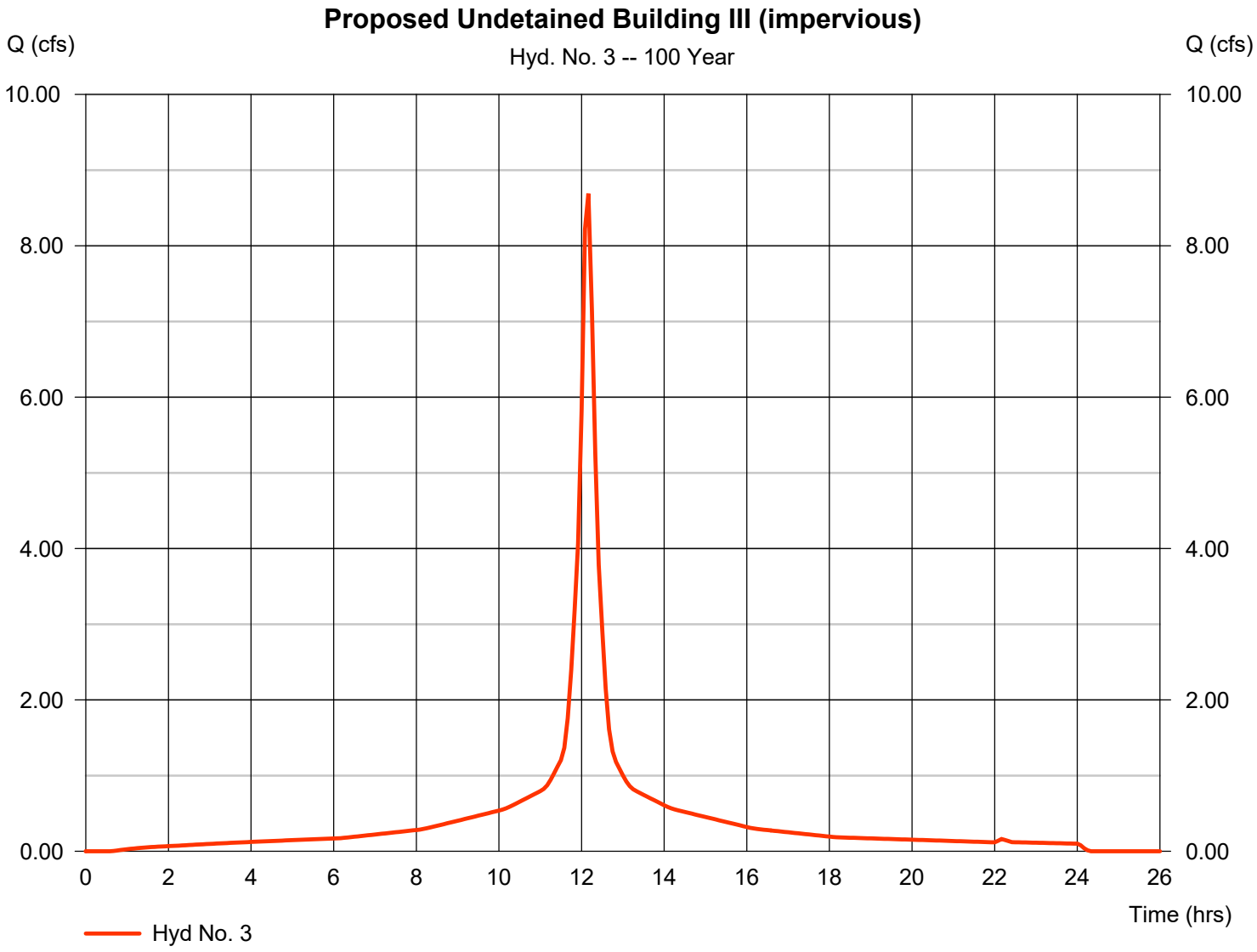


Hydrograph Report

Hyd. No. 3

Proposed Undetained Building III (impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.690 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	40,371 cuft
Drainage area	=	1.470 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	8.31 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

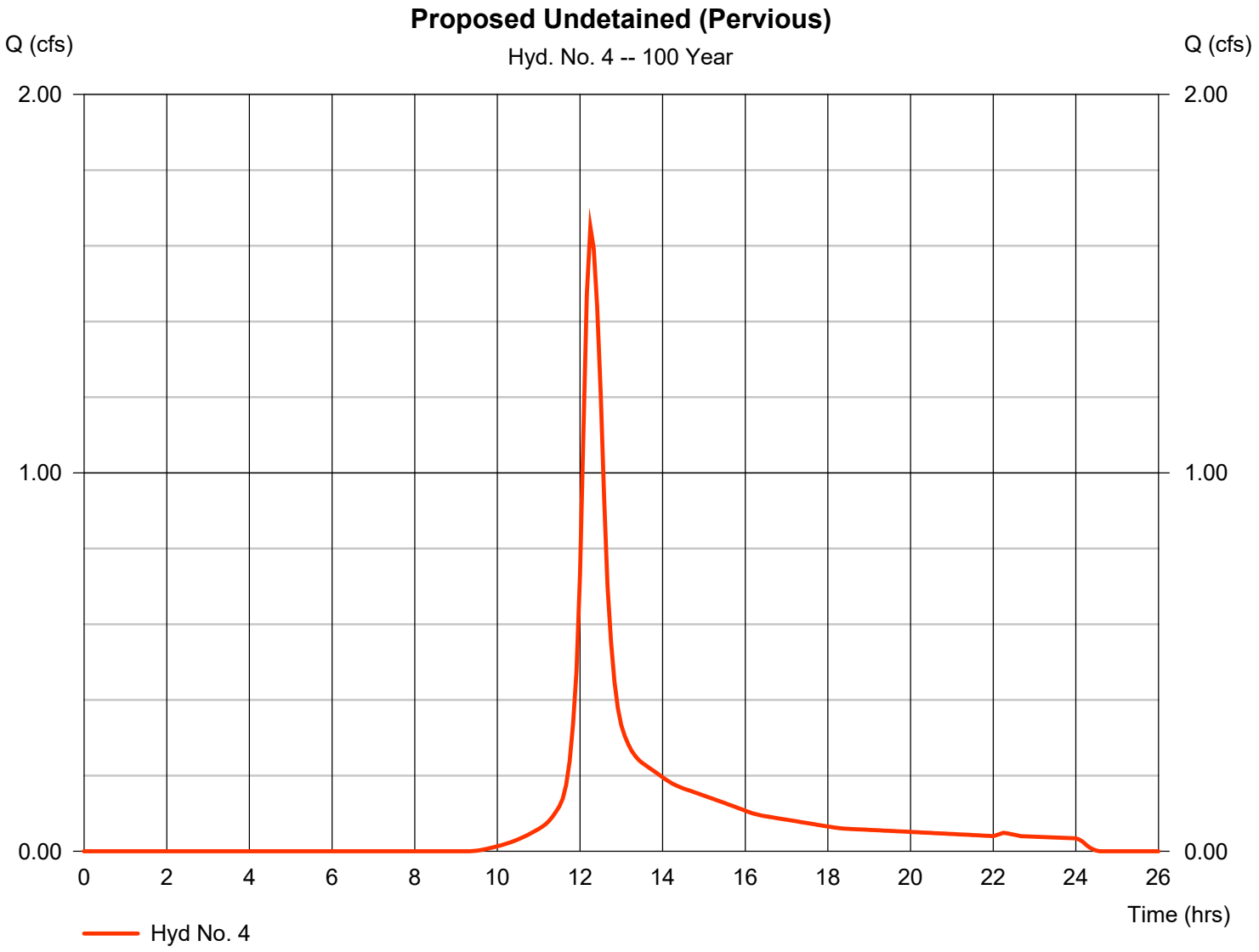


Hydrograph Report

Hyd. No. 4

Proposed Undetained (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.650 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.25 hrs
Time interval	=	5 min	Hyd. volume	=	8,021 cuft
Drainage area	=	0.600 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.00 min
Total precip.	=	8.31 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

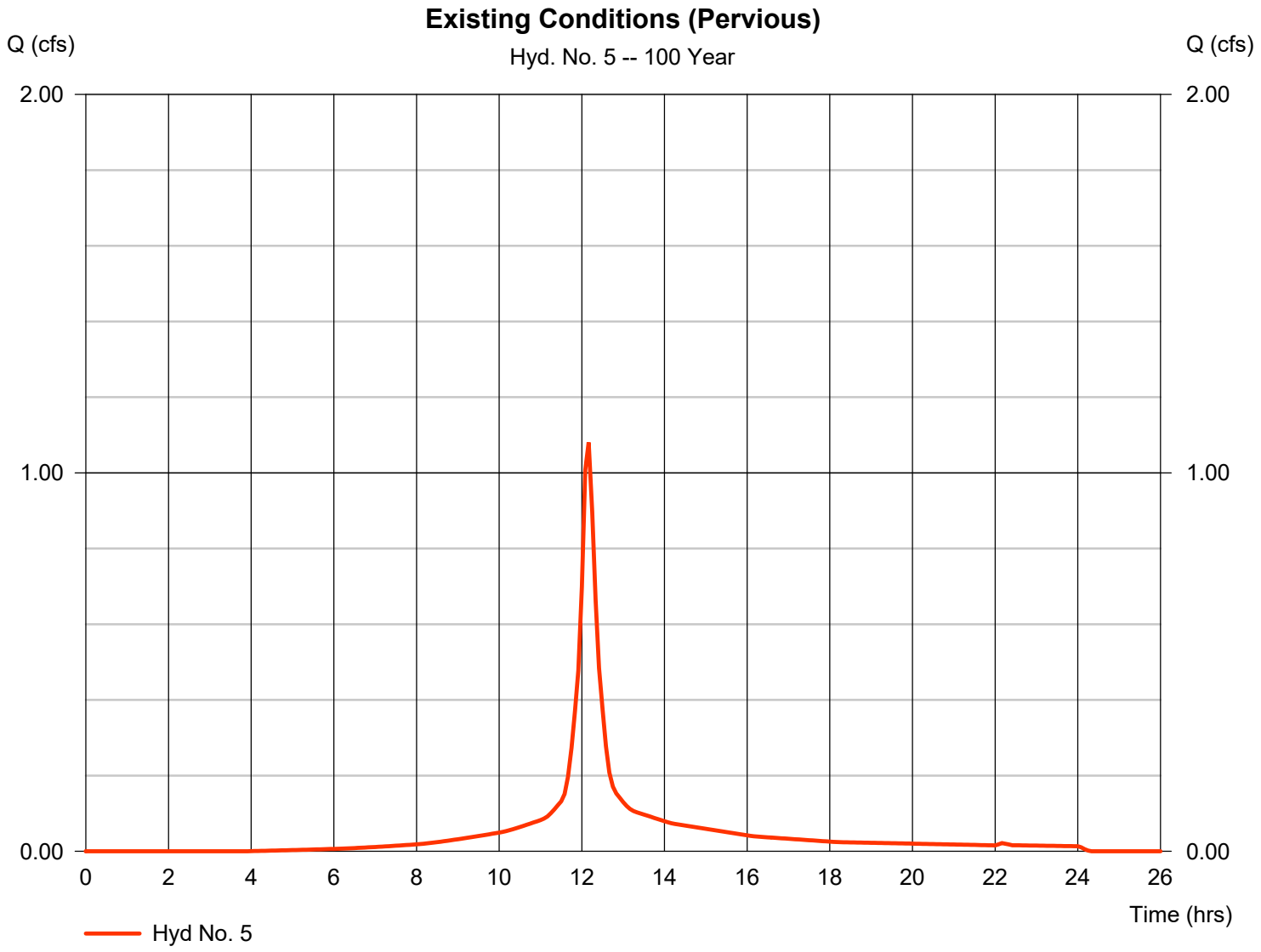


Hydrograph Report

Hyd. No. 5

Existing Conditions (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.080 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	4,514 cuft
Drainage area	=	0.200 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	8.31 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

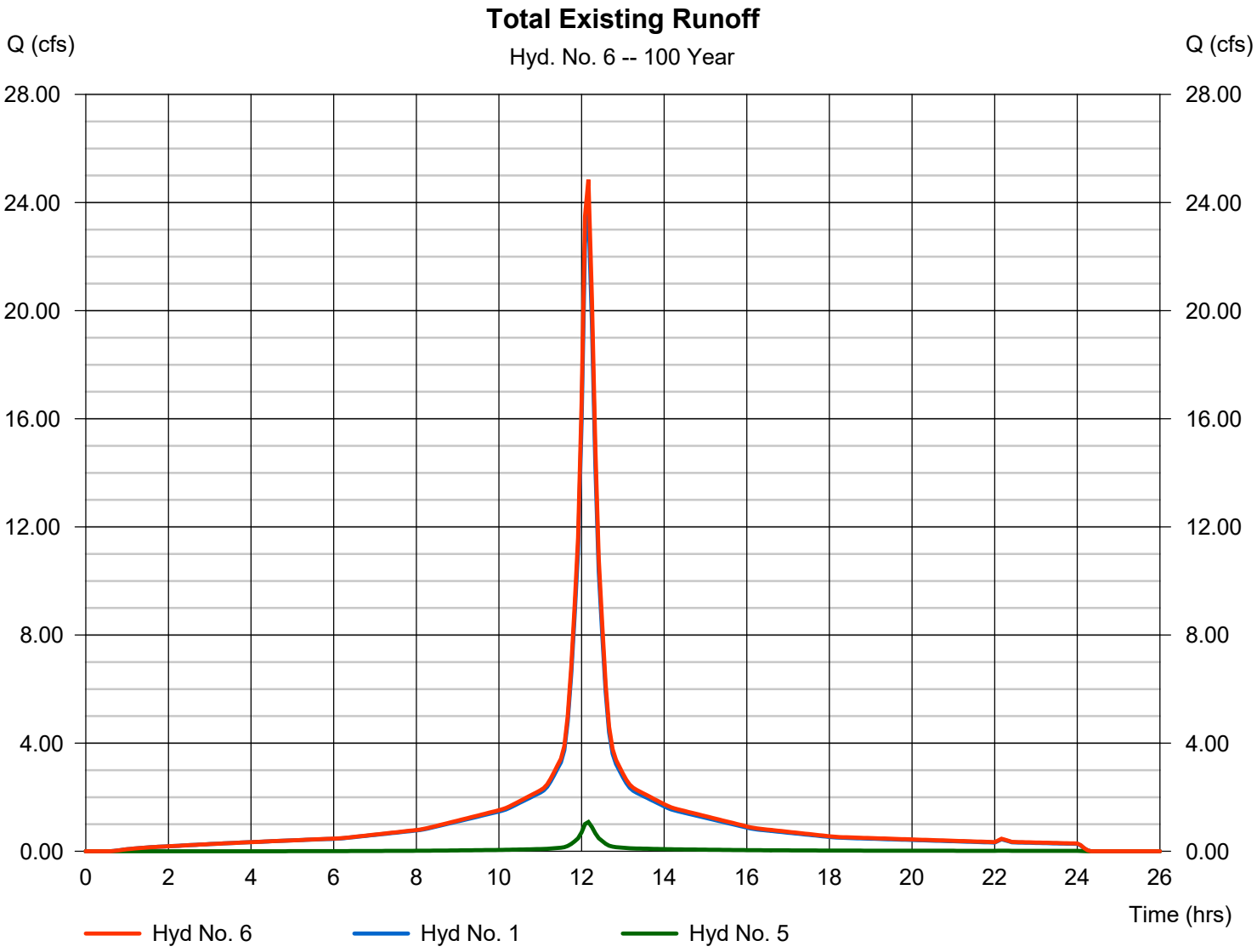


Hydrograph Report

Hyd. No. 6

Total Existing Runoff

Hydrograph type	= Combine	Peak discharge	= 24.84 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 114,916 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 4.220 ac

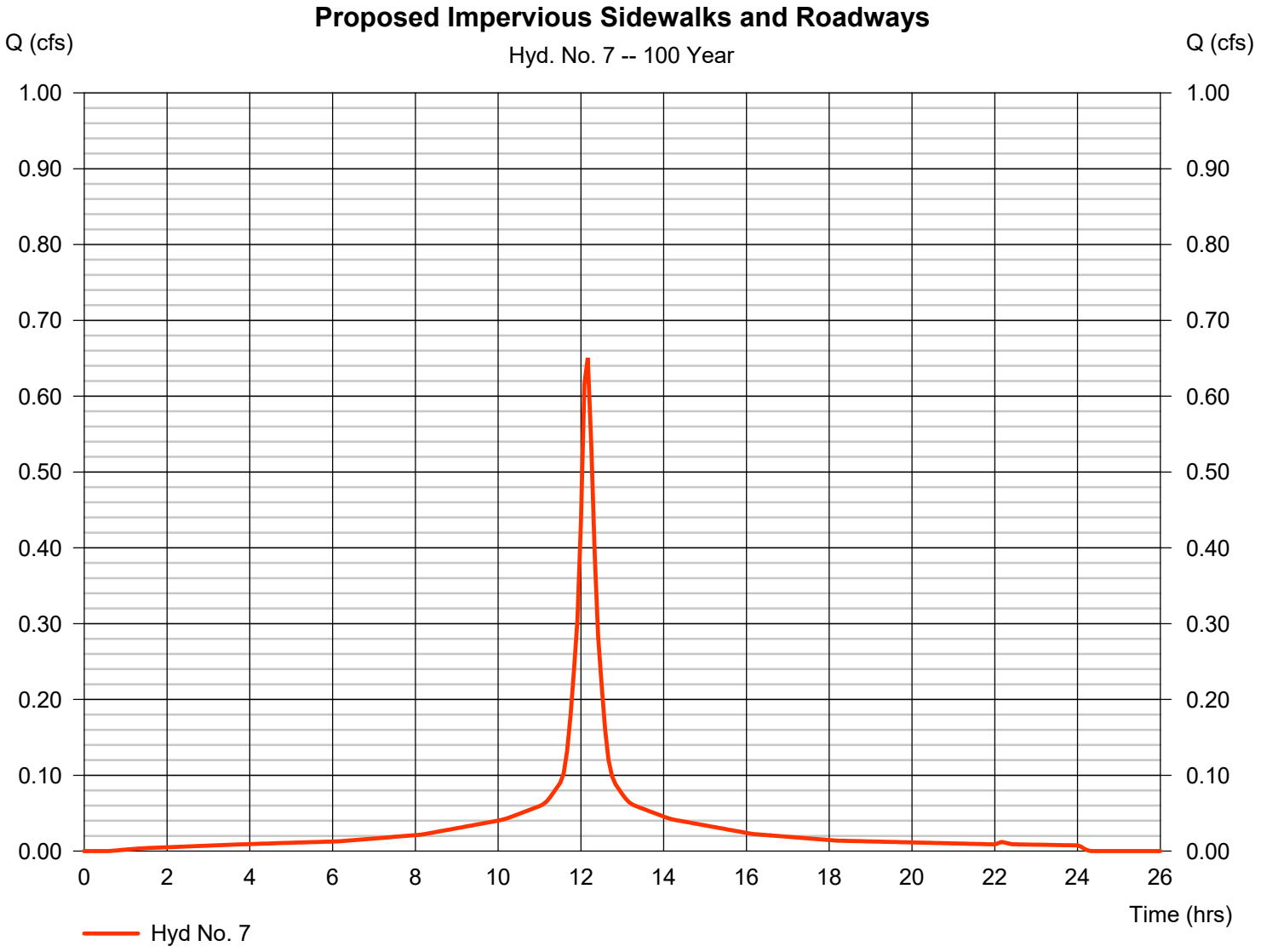


Hydrograph Report

Hyd. No. 7

Proposed Impervious Sidewalks and Roadways

Hydrograph type	= SCS Runoff	Peak discharge	= 0.650 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,021 cuft
Drainage area	= 0.110 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.31 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

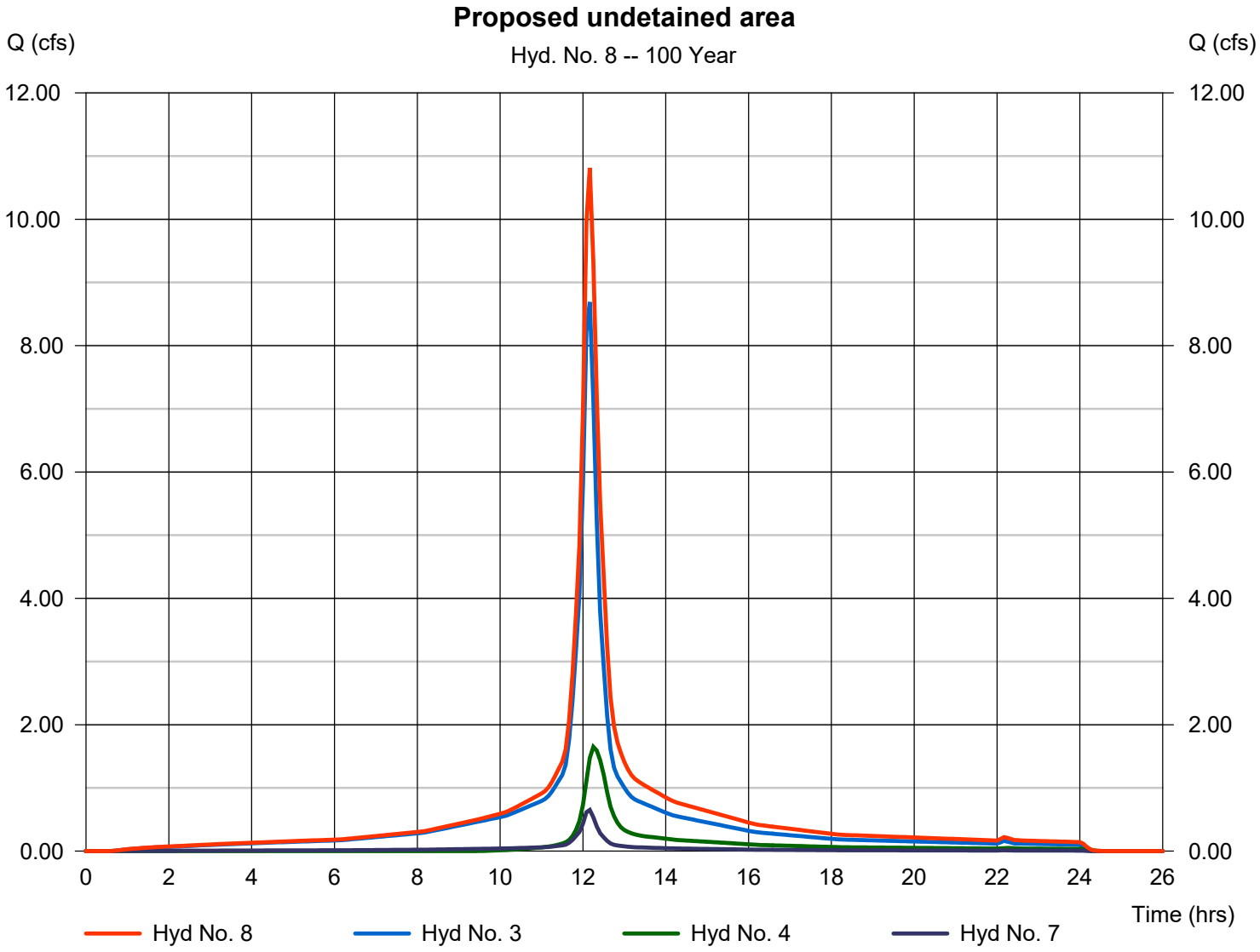


Hydrograph Report

Hyd. No. 8

Proposed undetained area

Hydrograph type	=	Combine	Peak discharge	=	10.81 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	51,413 cuft
Inflow hyds.	=	3, 4, 7	Contrib. drain. area	=	2.180 ac

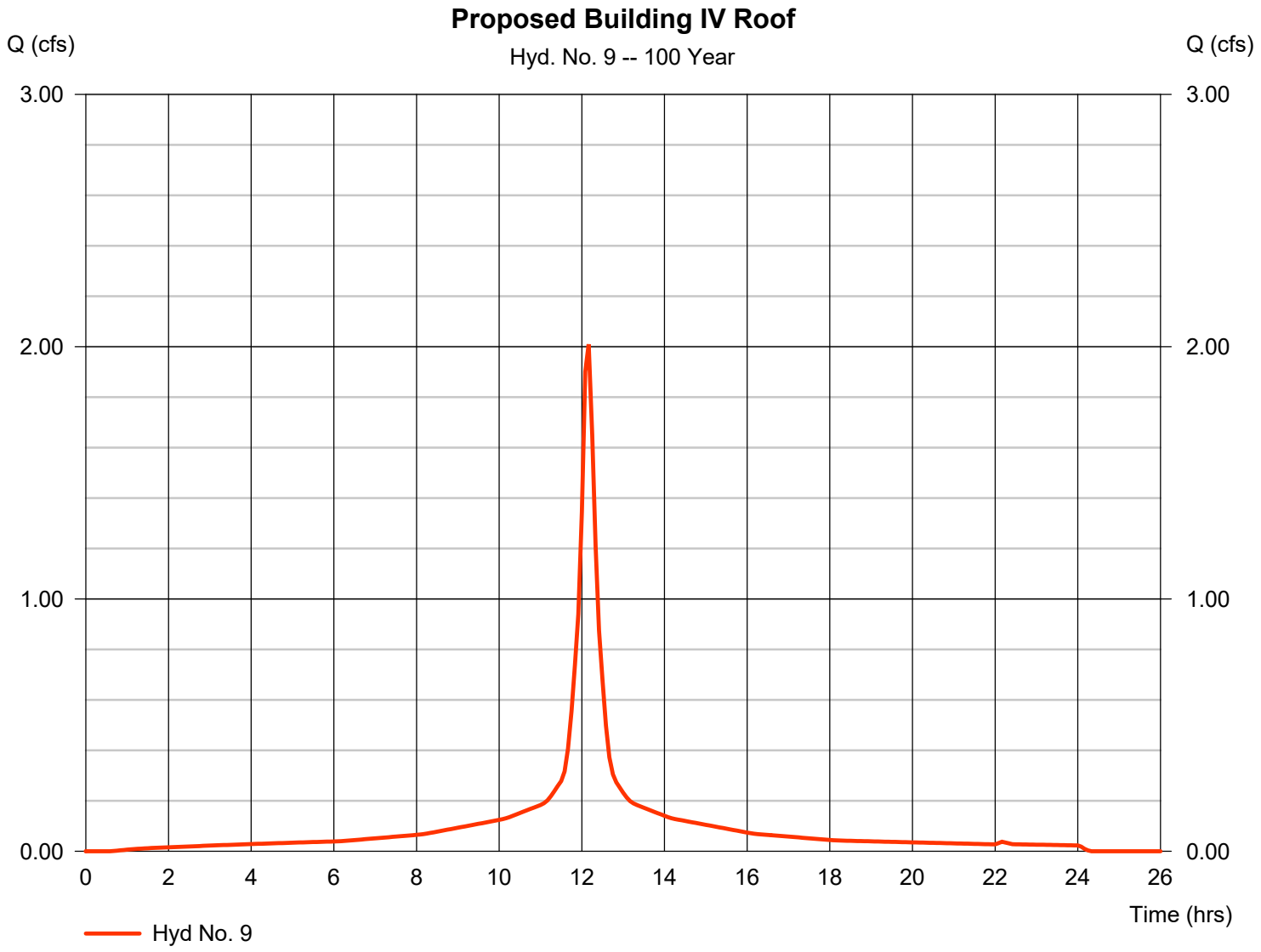


Hydrograph Report

Hyd. No. 9

Proposed Building IV Roof

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.010 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	9,338 cuft
Drainage area	=	0.340 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	8.31 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



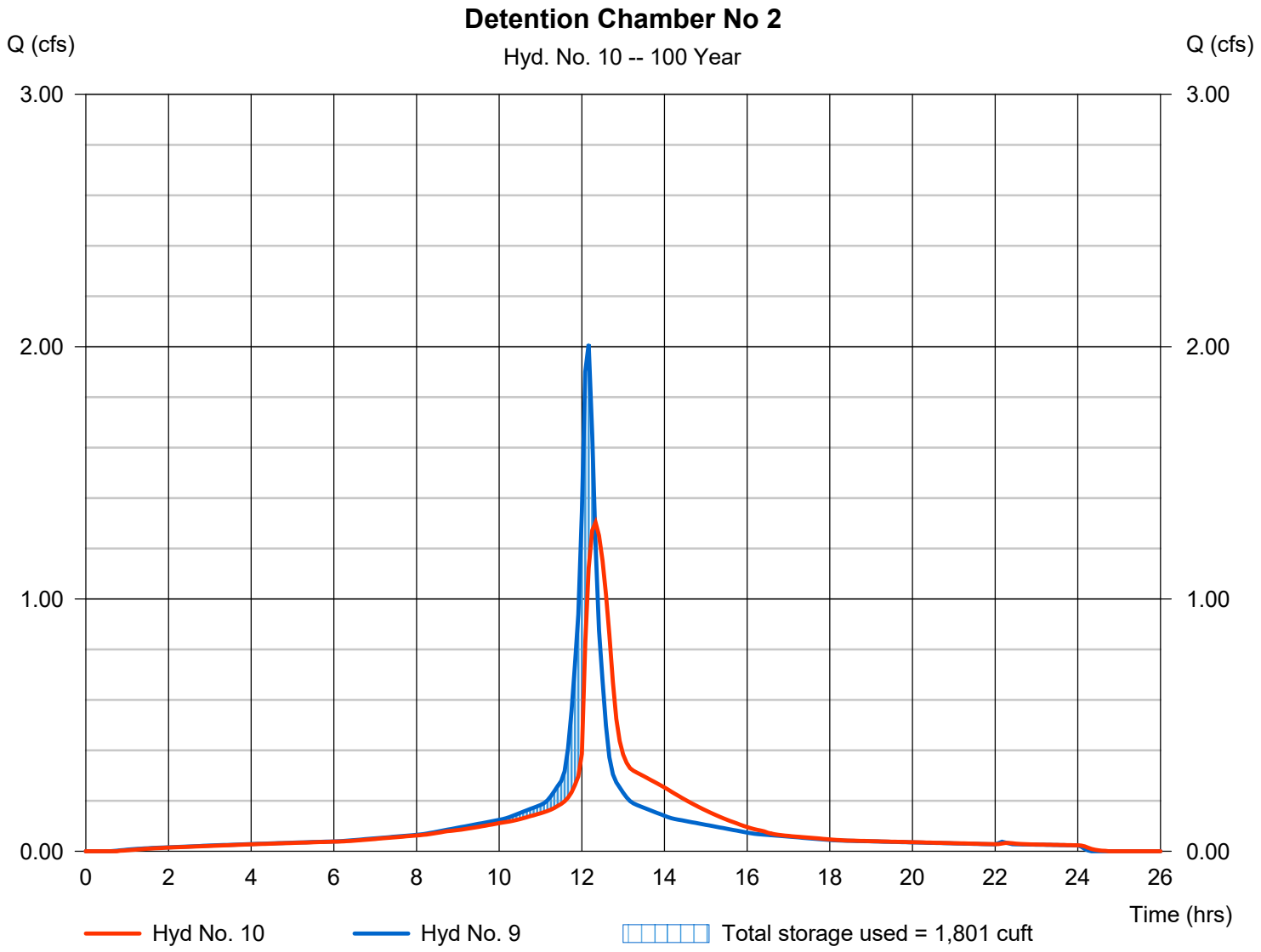
Hydrograph Report

Hyd. No. 10

Detention Chamber No 2

Hydrograph type	=	Reservoir	Peak discharge	=	1.303 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.33 hrs
Time interval	=	5 min	Hyd. volume	=	9,337 cuft
Inflow hyd. No.	=	9 - Proposed Building IV Roof	Max. Elevation	=	8.06 ft
Reservoir name	=	Detention Chamber No 2	Max. Storage	=	1,801 cuft

Storage Indication method used.



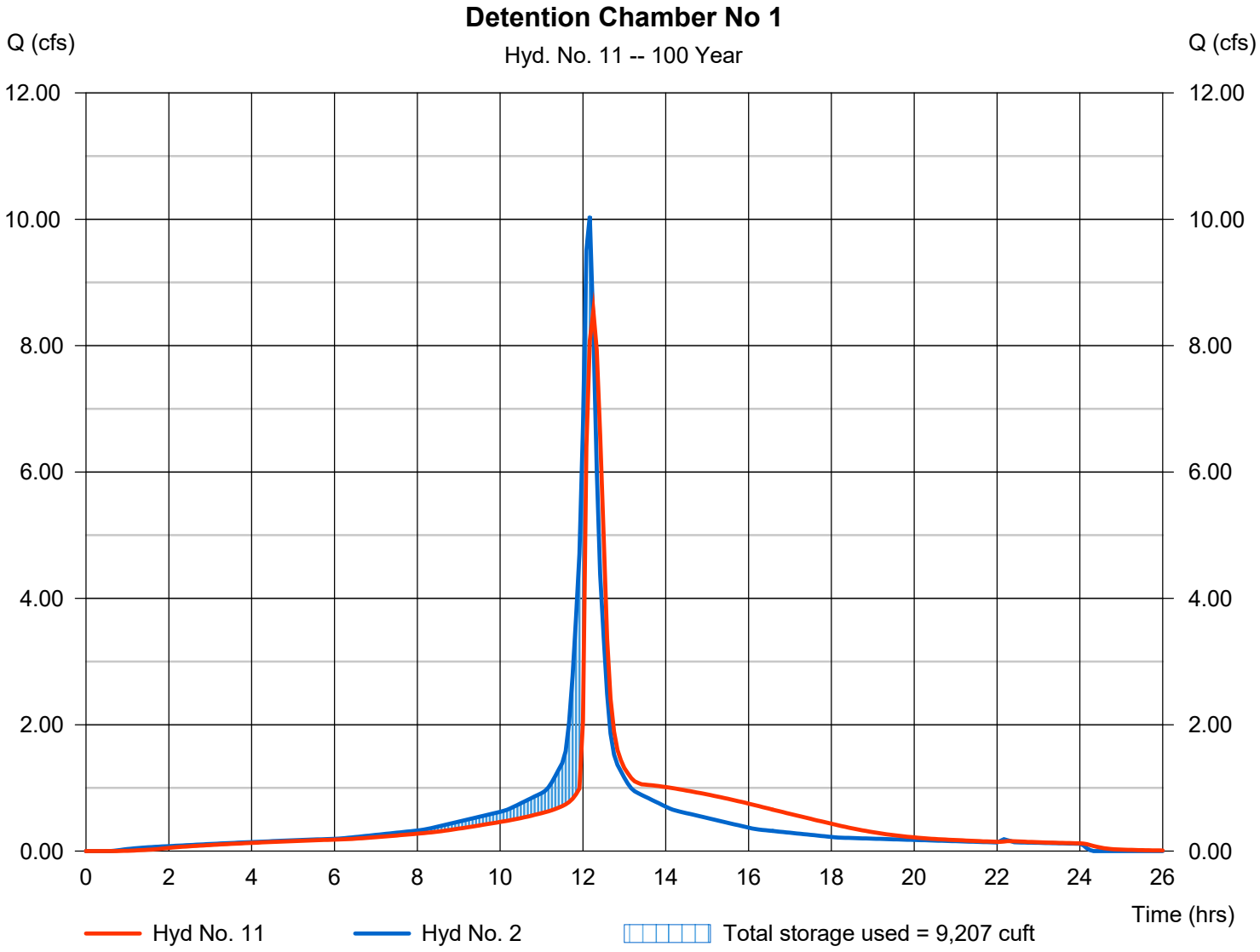
Hydrograph Report

Hyd. No. 11

Detention Chamber No 1

Hydrograph type	=	Reservoir	Peak discharge	=	8.551 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.25 hrs
Time interval	=	5 min	Hyd. volume	=	46,684 cuft
Inflow hyd. No.	=	2 - Proposed Emerson I & II Roofs	Max. Elevation	=	15.18 ft
Reservoir name	=	Detention Chamber No 1	Max. Storage	=	9,207 cuft

Storage Indication method used.

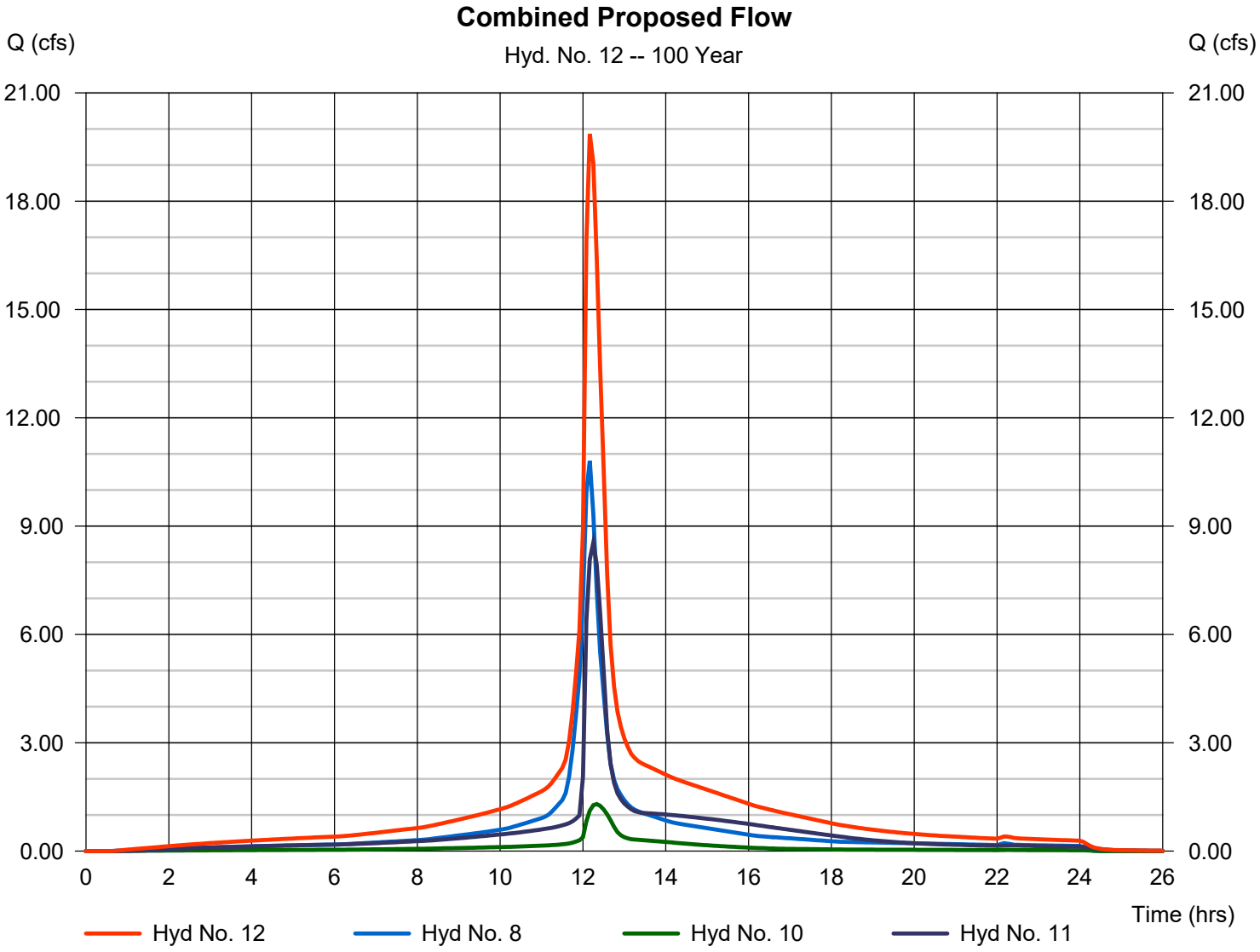


Hydrograph Report

Hyd. No. 12

Combined Proposed Flow

Hydrograph type	= Combine	Peak discharge	= 19.86 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 107,433 cuft
Inflow hyds.	= 8, 10, 11	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: E:\Hydroflow Projects\Rainfall data for Hydroflow\NJ-Hudson.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.70	3.31	0.00	4.23	5.02	6.19	7.20	8.31
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hydraflow Table of Contents

APPENDIX ‘E’:

STORMWATER MANAGEMENT MAINTINANCE MANUAL

STORMWATER MAINTENANCE MANUAL:

The Emerson Building Complex consist of two internal detention tanks, one located in the Phase I Building under the entrance ramp to the parking garage and the other located in the Phase IV Building below the ground floor building slab. Both detention tanks collect roof runoff including the roof top amenity spaces. The proposed Emerson Building Complex project will consist mainly of impervious cover totaling 184,000 square feet. There are several small areas of pervious pavers along the curb line of proposed roadways and five Bio-Planters with dry wells proposed at low point intersections within the complex. These areas will retain 75% of the water quality storm produced from the storm event.

Contact person authorized to direct storm water maintenance:

Alex Wright, Director of Purchasing
Office (201) 275-6377, Cell (201) 275-6377
Manhattan Building Company
300 Coles Street, Suite #2
Jersey City, NJ 07310
Email: alex.wright@manhattanbuildingcompany.com

The Bio-Planters proposed in the Emerson Building Complex make a significant positive impact on the water quality of the discharge flow and promote infiltration reducing the volume of discharge flowing into the downstream systems. The shallow impoundment is designed to capture and absorb rainwater. The soil in the bio-planters naturally remove pollutants such as phosphorus, nitrogen, and heavy metals from the storm runoff. This helps prevent these and other pollutants from entering the downstream systems. Bio-planters contain plants with long roots that soak up the water within 48 hours of an average rainfall.

Maintenance of the storm water system is a critical part of the long-term operation of the system. Even when maintenance schedules are followed adequately, variables such as climate patterns, weather variability, public use of the devices, etc. can lead to unforeseen maintenance needs. Inspection and adaptive management are critical components to any

maintenance program. Below are maintenance procedures to follow to guarantee many years of successful operation of the storm water system.

1. Maintenance procedures to follow for the detention tanks:
    - Check on a semi-annually basis the outlet control structure.
    - Remove any debris that has accumulated in front of the orifices.
    - On an annual basis remove any built up of sediment inside the detention tank by sweeping and vacuuming out the chamber.
2. Maintenance procedures to follow for the pervious pavers:
    - The pavers are generally self-cleaning with rainwater.
    - Check on a semi-annually basis settlement of pavers and reset as required.
    - Semiannually blow out built up dirt in joints and apply additional pea gravel as required to promote infiltration.
3. Maintenance procedures to follow for the dry wells:
    - On a monthly basis check the drywell domed beehive grate and remove any built-up debris restricting flow.
    - Annually remove the grate and visually inspect the inside of the drywell to check for built up sediment debris, cracks, or failing structure. Repair, as necessary.
4. Maintenance procedures to follow for the Bio-Planters:
    - First year after planting. Adequate water is crucial to plant survival, and temporary irrigation will be needed unless rainfall is adequate until plants mature.
    - As needed:
        - Prune and weed to maintain appearance.
        - Remove invasive plants as required.
        - Stabilize or replace mulch when erosion is evident.
        - Remove surface trash and debris.
        - Renew mulch that has broken down into organic matter.
        - Verify Bio-Planter is emptying within 48 hours after a storm.
        - All bio-planters expect to receive and/or trap debris and sediment and must be inspected for clogging and excessive debris and sediment accumulation after every storm exceeding 1 inch of rainfall.
    - Semi – annually inspection:
        - Inspect inflow points for clogging and remove sediment.

- Inspect trash guard to verify it is secure and inflow point for scour, check riprap, replace, as necessary.
- Inspect herbaceous vegetation, trees, and shrubs to evaluate their health and replant as appropriate any vegetation not meeting project goals.
- Remove any dead and severely diseased vegetation

- Annually inspection:
  - Inspect and remove any built-up sediment and debris.
  - Inspect inflow point by trash rack for built –up road sand associated with winter salting and sanding of roadways. Remove as necessary and replant areas that have been impacted by sand/salt build up.
  - Cut back and remove previous year's plant material and remove accumulated leaves, as necessary.
  - Check for animal / rodent burrows and provide pest control.
  - Check for evidence of sink holes or excessive settlement. Replace topsoil and regrade as necessary with light equipment.