MOTT MACDONALD

PennEast PIPELINE

Mainline Block Valve (MLV) 2 Post Construction Stormwater Management Report

PennEast Pipeline Project

Date: October 2019

PennEast Pipeline Project
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Mott MacDonald
111 Wood Avenue South
Iselin, NJ 08830-4112
973-379-3400

PennEast Pipeline
Company, LLC.
835 Knitting Mills Way
Wyomissing, PA 19610
610-373-7999

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1 Executive Summary

PennEast proposes to construct, install and operate the Project facilities to provide approximately 1.1 million dekatherms per day (MMDth/d) of year-round transportation service from northern Pennsylvania to markets in New Jersey, eastern and southeastern Pennsylvania and surrounding states. The Project is designed to provide a long-term solution to bring the lowest cost natural gas available in the country, produced in the Marcellus Shale region in northern Pennsylvania, to homes and businesses in New Jersey, Pennsylvania and surrounding states.

The Project facilities include a 36-inch diameter, 115-mile mainline pipeline, extending from Luzerne County, Pennsylvania, to Mercer County, New Jersey. The Project will extend from various receipt point interconnections in the eastern Marcellus region, including interconnections with Transcontinental Gas Pipe Line Company, LLC (Transco) and gathering systems operated by Williams Partners L.P., Energy Transfer Partners, L.P. (formerly Regency Energy Partners, LP), and UGI Energy Services, LLC in Luzerne County, Pennsylvania, to various delivery point interconnections in the heart of major northeastern natural gas-consuming markets, including interconnections with UGI Central Penn Gas, Inc., (Blue Mountain) in Carbon County, Pennsylvania, UGI Utilities, Inc. and Columbia Gas Transmission, LLC in Northampton County, Pennsylvania, and Elizabethtown Gas, NRG REMA, LLC, Texas Eastern Transmission, LP (Texas Eastern) and Algonquin Gas Transmission, LLC (Algonquin) in Hunterdon County, New Jersey. The terminus of the proposed PennEast system will be located at a delivery point with Transco in Mercer County, New Jersey.

This report provides an engineering analysis of the stormwater management practices for the MLV-2 site, which is a part of the PennEast Pipeline Project. The methods of analysis included use of the stormwater modeling software Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2019 by Autodesk, Inc., Rational Method Calculations, and the associated PADEP BMP worksheets. The methods of analysis were used to demonstrate the meeting of the proposed requirements for the following facilities:

- Infiltration trench

The resulting data for the stormwater facilities can be found in Section 4 and in the appendices. The completed model and worksheets show that the post-construction stormwater runoff does not exceed the pre-construction stormwater flows and that the volume requirements are met. The report shows that the proposed stormwater BMPs for the MLV-2 site for the PennEast pipeline will allow the proposed project to comply with the applicable regulatory requirements under Pennsylvania Code Section 102.8, and the applicable Act 167 requirements.

2 Introduction/Overview

The PennEast Pipeline Project was developed in response to market demands in New Jersey and Pennsylvania, and interest from shippers that require transportation capacity to accommodate increased demand and greater reliability of natural gas in the region. The Project will include a new pipeline and above ground facilities that will provide a new source of natural gas supply from the Marcellus Shale producing region to New Jersey and Pennsylvania.

The Mainline Block Valve (MLV) 2 site is located in Bear Creek Township in Luzerne County, PA. (See Figure 1 for a Location Map and Appendix E for Proposed Site Plan). The MLV 2 site is being developed as a mainline valve site that will include: the mainline piping (located below grade), the mainline valve (located below grade), the actuator for the mainline valve, two risers with blow off piping, bypass piping between the blow offs, and a RTU panel with communications capabilities. The site will be completely fenced with drive gate(s) and man gate(s) for access into the site. The mainline valve setting will be used to isolate sections of the mainline for operational maintenance, pressure testing, and other tasks associated with the operation of the system. The proposed site will include the block valve and supporting equipment on a gravel pad and access driveway. Stormwater management facilities are proposed to meet the regulatory requirements for this type of development.

3 Regulatory Compliance

Regulatory jurisdiction over stormwater runoff from the MLV-2 site is the responsibility of the Pennsylvania Department of Environmental Protection (PADEP), under Title 25 – Environmental Protection, Chapter 102 Erosion and Sediment Control, Section 102.8 – Post-Construction Stormwater Requirements. This Post-Construction Stormwater Management Plan fulfills part of the requirements of the Erosion and Sediment Control General Permit (ESCGP-3).

The following paragraphs present each requirement of Pennsylvania Code Section 102.8, incorporating the requirements of Act 167 where applicable, and indicates how they will be addressed. Regulatory requirements are shown in **bold**, and the compliance method is shown in *italics*.

3.1 Post-Construction Stormwater Management Plan General Requirements

(b) General PCSM planning and design. The management of post construction stormwater shall be planned and conducted to the extent practicable in accordance with the following:

This site is subject to the requirements of the Luzerne County Act 167 Watershed Management Plan, which imposes stricter requirements than item (g)(2) of Pennsylvania Code Section 102.8. Volume control must be provided as the larger of the difference between the post-development and pre-development 2-year runoff volume, or 2 inches of runoff from new impervious area. MLV-2 is not covered by a Stormwater Management District Map and therefore the post development discharge rates shall not exceed the predevelopment rates for the 1- through 100-year, 24-hour storms. Volume and peak flow requirements of the Act 167 Plan have been met, with the objective to preserve the integrity of stream channels and the receiving stream.

(1) Preserve the integrity of stream channels and maintain and protect the physical, biological and chemical qualities of the receiving stream.

One of the objectives in minimizing changes in runoff volume and rate of runoff flow is to preserve the integrity of stream channels and any receiving streams. There are no stream channels within 150 feet of the site. Under existing conditions, offsite runoff flows overland across the site in the south direction. Under proposed conditions, the site runoff will be conveyed overland to the subsurface infiltration trench within the site. It will be attenuated and then discharged out and inlet in order to preserve existing drainage patterns and to preserve the integrity of the receiving watercourse.

The project will eliminate the net change in stormwater volume, rate and quality for stormwater events up to and including the 2-year/24-hour storm. The project will use various structural and non-structural BMPs to meet the water quantity and quality requirements. The peak runoffs will be attenuated with an infiltration trench. The stormwater will be routed through structural and non-structural BMPs and discharged overland towards the stream which is greater than 150' away from the site. Therefore, the project falls into the definition of a non-discharge alternative. See Section 4 for compliance calculations and descriptions.

(2) Prevent an increase in the rate of stormwater runoff.

Increases in the rate of stormwater runoff are not anticipated. Stormwater management will be provided by an infiltration trench, and vegetated swale to attenuate peaks in post-development runoff. See Table 1.

(3) Minimize any increase in stormwater runoff volume.

Increases in stormwater runoff volume up to and including the 2-year storm or 2 inches of runoff from new impervious areas are not anticipated. Stormwater management will be provided with an infiltration trench to provide storage and infiltration volume of post-development runoff. See Table 2.

(4) Minimize impervious areas.

The site has been designed to minimize the area of disturbance, which minimizes impervious areas. Of the 50' x 50' site area, only a smaller 30' x 30' gravel area is proposed. In addition, in lieu of asphalt, gravel has been chosen to stabilize the pad site. Any areas that are not within the gravel area will be vegetated. Site areas outside of the gravel area and infiltration trench will be allowed to revert to meadow. The 30' x 30' gravel area has been raised above exiting grade so that off-site water is diverted around the pad. Given the limited site traffic (several vehicles a week), and the fact that equipment and concrete barriers will block vehicular access to parts of the site, it is anticipated that the gravel will remain pervious. However, for the gravel driveways leading up to the gravel pad and a 10' wide drive isle within the pad has been considered impervious in this analysis for regulatory purposes. The remaining gravel area has been considered pervious as it will not be compacted by vehicular traffic due to the installation of concrete barriers to prevent compaction of the gravel in these areas. The extents of the pad have been restricted to the minimum size necessary for safe and effective operation of the station.

(5) Maximize the protection of existing drainage features and existing vegetation.

Existing drainage features and vegetation have been preserved and protected to the greatest extent practicable, by limiting disturbances and limiting the extents of the project area to the minimum necessary to accomplish the project objectives.

(6) Minimize land clearing and grading.

The site layout has been designed to minimize the area of disturbance, which minimizes land clearing and grading.

(7) Minimize soil compaction.

The site has been designed to minimize the area of disturbance, which minimizes soil compaction. Heavy construction equipment will be restricted to access roads, designated laydown areas and localized work areas. Areas to be used for PCSM BMPs will be clearly identified during construction, and the contractor will be required to prevent compaction of soils in areas that are occupied or to be occupied by PCSM BMPs.

(8) Utilize other structural or nonstructural BMPs that prevent or minimize changes in stormwater runoff.

Gravel is proposed instead of asphalt in order to minimize any increase in the rate or volume of stormwater runoff from the site, and an infiltration trench and vegetated swale are utilized to minimize any remaining changes in stormwater runoff from pre-development to post-development. The site has also been raised to limit the off-site flows that naturally would flow over the site.

3.1.1 Fifteen Factors of the Post-Construction Stormwater Management Plan

(f) PCSM Plan contents. The PCSM Plan must contain drawings and a narrative consistent with the requirements of this chapter. The PCSM Plan shall be designed to minimize the threat to human health, safety and the environment to the greatest extent practicable. PCSM Plans must contain at a minimum the following:

(1) The existing topographic features of the project site and the immediate surrounding area.

The proposed MLV 2 site is located in Bear Creek Township, in Luzerne County, Pennsylvania.

The drainage area of the project site is 0.33 acres, with existing slope of approximately 8%-25%. The site generally drains from north to south and eventually discharges to Shade Creek. See Existing Conditions figure in Appendix E for site topographic information.

(2) The types, depth, slope, locations and limitations of the soils and geologic formations.

The MLV-2 site lies within the Duncannon Member of the Catskill Formation, according to the Pennsylvania Department of Conservation and Natural Resources (PADCNR). The Duncannon Member of the Catskill Formation consists of interbedded sandstone, siltstone, mudstone, and shale in fining-upward sequences. The sandstone is fine to very coarse grained, grayish red to grayish purple, and crossbedded to planar bedded in beds approximately 10 to 30 feet thick. The siltstones are grayish red, fissile to massive, and commonly interbedded with shale, which is grayish red and generally has extensive cleavage. Conglomerates occur at the base of some cycles.

Although the proposed interconnect site falls within the approximate outlines of the Duncannon Member of the Catskill Formation, it is possible that other formations or rock types could occur in the vicinity of the valve, due to the approximate nature of USGS maps.

Based on the Natural Resources Conservation Service (NRCS) Web Soil Survey, the surficial geology within the area of interest consists heavily of Lackawanna channery and Wellsboro channery silt. The excerpt in Appendix C from Table E.1 in the PADEP Erosion and Sediment Pollution Control Program Manual lists the limitations of Lackawanna channery and Wellsboro channery silt.

The Lackawanna channery is mapped as roughly 14.5% clay, 43.8% silt, and 41.7% sand. It is well drained and generally consists of slopes ranging from 8%-25%. It is a part of the group C hydrologic soil group. The Wellsboro channery silt consists of 14.8% clay, 44.7% silt, and 40.5% sand. It is moderately well drained and generally has slopes on site ranging from 3%-8%.

These limitations will be addressed through site specific testing for infiltration rates, which will serve as the basis of design for stormwater BMPs.

(3) The characteristics of the project site, including the past, present and proposed land uses and the proposed alteration to the project site.

Aerial images from 1992 depict the MLV 2 site and its surroundings as a wooded forest and as time as went on, no development occurred on site. There are no known wetlands located within the proposed MLV 2 site. The proposed site location exists presently as wooded and is served by State Route 115. The runoff rate under the existing conditions was calculated for MLV 2 based on this site land use.

The project proposes to construct a valve access area on approximately 0.09 acres of gravel. The site will drain from north to south. The infiltration trench and vegetated swale will be installed to comply with regulatory stormwater requirements.

(4) An identification of the net change in volume and rate of stormwater from preconstruction hydrology to post construction hydrology for the entire project site and each drainage area.

See Section 4 of this report for details on net change in volume and rate of stormwater runoff from pre-construction to post construction.

The summary of these net changes is provided in Tables 1 and 2.

Infiltration volume is provided up to the 2-year storm, and peak runoff rate does not exceed pre-construction rates (see column 'Maximum Allowable Proposed Peak') under the 2, 10, 50, and 100 year/24-hour storm events.

Table 1: Peak Flow Summary

Recurrence Interval (yrs)	Existing Disturbed Conditions Site Q (cfs)	Existing Undisturbed Conditions Offsite Q (cfs)	Maximum Allowable Proposed Peak Flow (cfs)	Proposed Q (cfs)	Proposed Less than Allowable? (Y/N)
1	0.119	0.175	0.271	0.185	Yes
2	0.172	0.260	0.403	0.297	Yes
5	0.258	0.399	0.618	0.525	Yes
10	0.338	0.529	0.819	0.718	Yes
25	0.471	0.746	1.154	1.025	Yes
50	0.599	0.959	1.481	1.308	Yes
100	0.757	1.221	1.882	1.630	Yes

Table 2: Total Volume Summary

Recurrence Interval (yrs)	Existing Volume (cf)	Proposed Unmitigated Volume from Model (cf)	Difference between Proposed and Existing (cf)	Proposed Trench Infiltration Capacity (cf)	Adequate Infiltration Volume? (Y/N)
1	376	684	308	430	Yes
2	533	879	347	430	Yes
Act 167 2" Capture			306	430	Yes

(5) An identification of the location of surface waters of this Commonwealth, which may receive runoff within or from the project site and their classification under Chapter 93 (relating to water quality standards).

The site drains to Shade Creek, which in turn drains to Bear Creek and from there into the Lehigh River, see Figure 2-1. The site is part of the Bear Creek Watershed . Chapter 93.9d from the Pennsylvania Code indicates that Bear Creek is classified as "HQ-CWF, MF" and there are no exceptions to specific criteria. HQ-CWF (high quality cold water fishery) indicates the passage, maintenance, and propagation of fish species including the family Salmonidae and additional flora and fauna which are indigenous to a cold-water habitat. MF (migratory fishes) indicates the passage, maintenance and propagation of anadromous and catadromous fishes and other fishes which move to or from flowing waters to complete their life cycle in other waters.

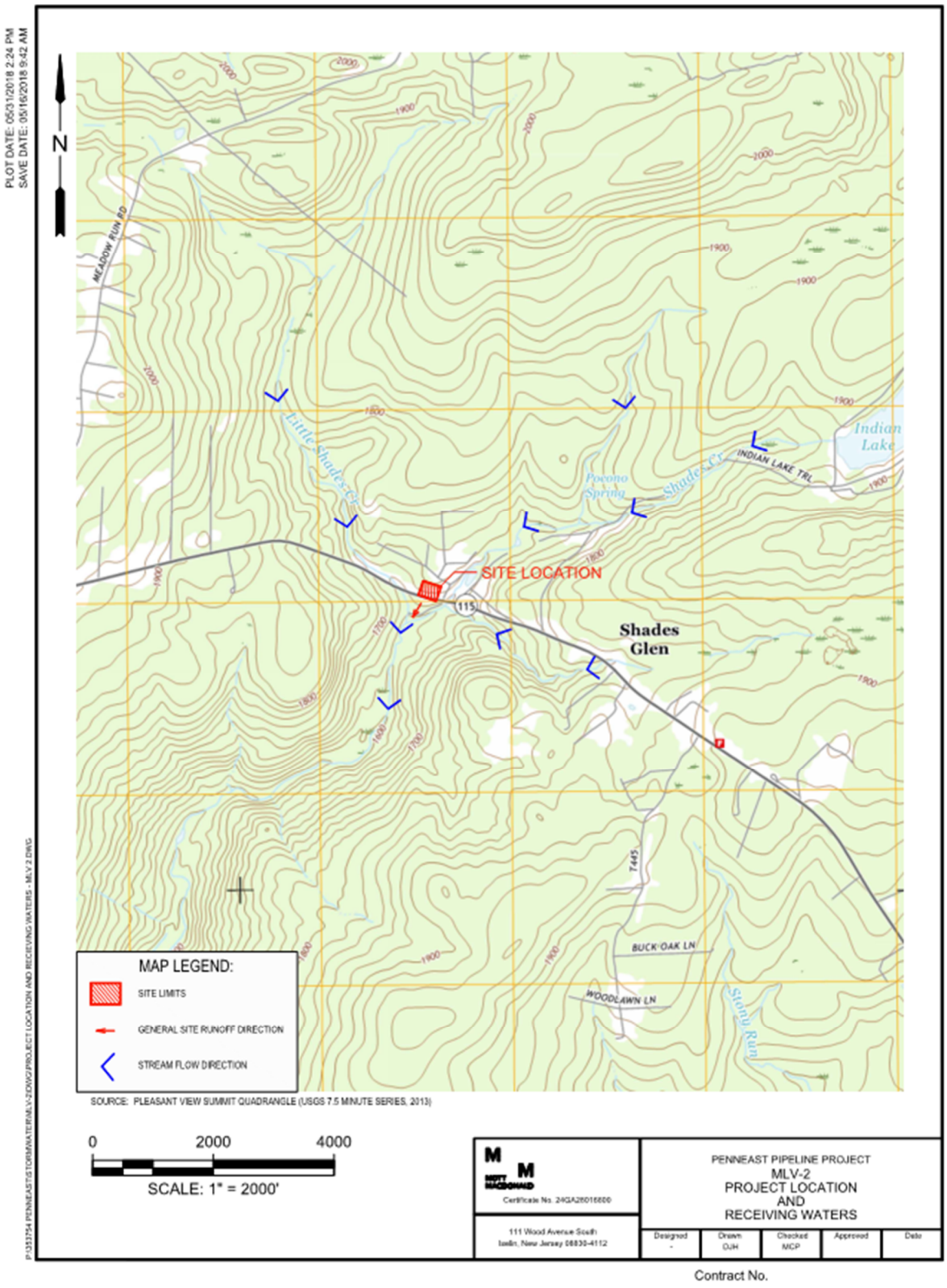

Figure 1: USGS Map showing project site and flow path to receiving waters

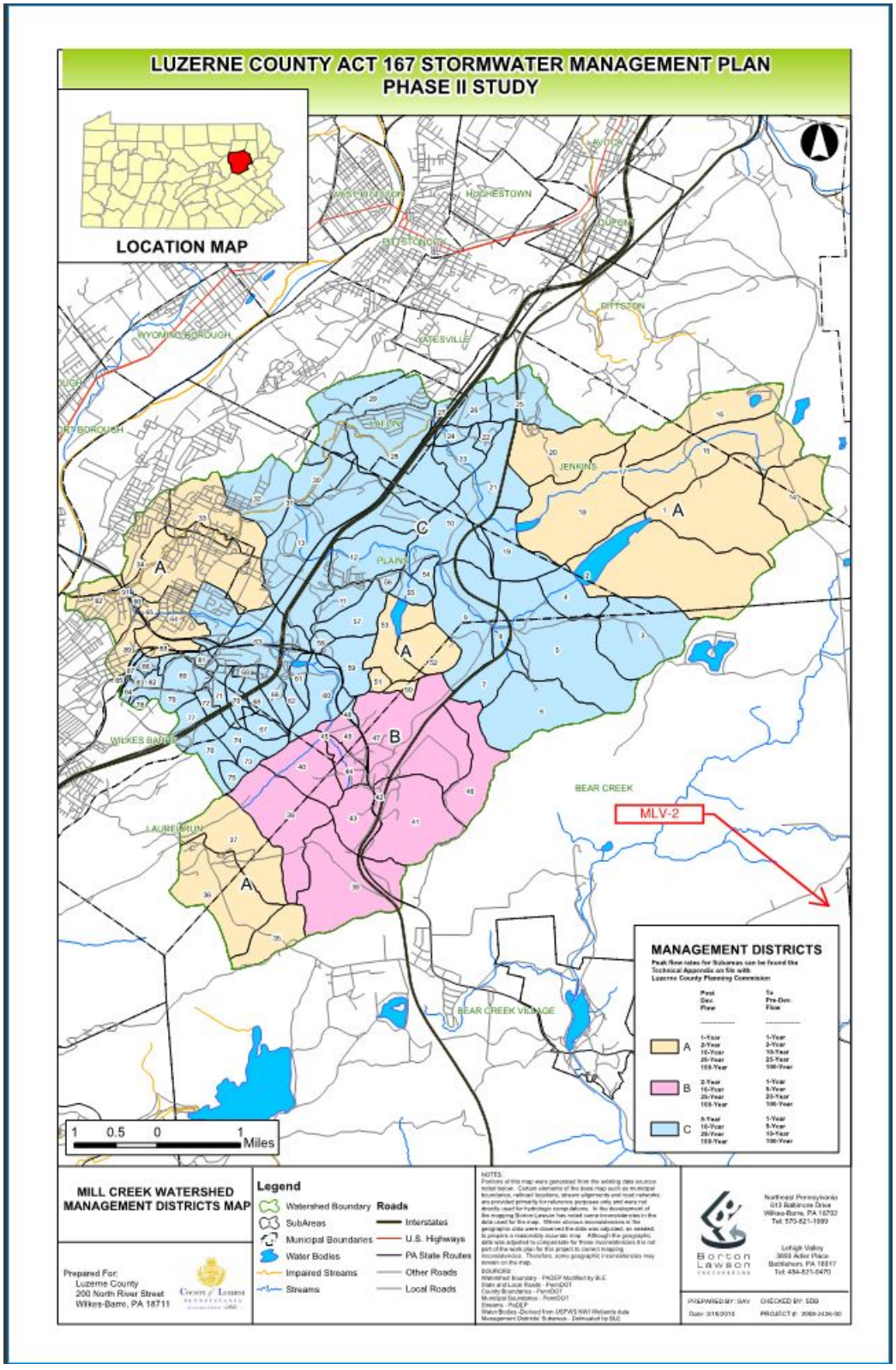

Figure 2: Act 167 Stormwater Management Plan Map

(6) A written description of the location and type of PCSM BMPs including construction details for permanent stormwater BMPs including permanent stabilization specifications and locations.

BMPs have been designed according to the recommendations set out in the Pennsylvania Stormwater BMP Manual, as follows:

Infiltration Trench: An infiltration trench will be within the elevated pad site, in order to temporarily store and infiltrate stormwater runoff. The trench temporarily stores the runoff to attenuate peak flows. The trench bottom will have an approximate base area of 1,760 square feet. The trench will consist of perforated pipe and stone. The infiltration trench will be constructed on uncompacted subgrade.

Vegetated Swale: Swale 1 is designed to collect the runoff from site and offsite areas that drain towards the proposed pad. The swale is designed in accordance with Pennsylvania BMP to divert undisturbed runoff from flowing over the gravel areas within the pad site. The swales will convey the 100-year storm event with a minimum of 6 inches of freeboard.

The recommended guideline in the PA BMP Manual is Impervious Loading Ratio of 5:1 and Total Loading Ratio of 8:1, which are achieved, see Table 3. It is also noted that the hydrologic calculations on Section 4 demonstrate that the trench performance requirements are met. Very little sediment load is anticipated as the site sees minimal vehicular. Properly implemented inspection and maintenance practices will verify the trench's performance.

Table 3: Trench Loading Ratios

ID	TRENCH FLOOR AREA (ACRES)	TOTAL DRAINAGE AREA (ACRES)	INFLUENT IMPERVIOUS AREA (ACRES)	EFFECTIVE LOADING RATIO BASED ON INFLUENT TOTAL AREA	EFFECTIVE LOADING RATIO BASED ON INFLUENT IMPERVIOUS AREA
TRENCH	0.04	0.09	0.04	2	1
SWALE	0.007	0.158	0.000	22.6	0

The proposed stormwater swale is not to be used for water quality purposes. The swale is used for conveyance to direct offsite stormwater around the site and away from the proposed infiltration trench. Undisturbed drainage area is composed of dense forest and it is not expected to have large amounts of runoff directed to it.

In addition to structural BMPs, the follow non-structural PCSM BMPs are employed on the site:

- *The site has been designed to minimize the area of disturbance, which minimizes impervious areas, and the extents of the gravel pad have been restricted to be minimum necessary for safe, effective operation of the station. Gravel was selected in lieu of asphalt for the pad area, the extents of the gravel were limited where possible to align with BMPs 5.7 – Reduce Impervious Cover.*
- *The site has been designed to minimize the required area for MLV Site. The pad area and driveway have been minimized while still allowing for the safe and effective use of the site. The use of the 50' x 50' permanent easement has been minimized allowing for BMP 6.7.2 Landscape Restoration and BMP 6.7.3 Soils Amendment/Restoration in areas outside of the gravel pad area. Areas outside of the gravel pad will be protected with a 50' x 50' fence along the perimeter of the site. The gravel pad site has been moved as close as possible to the existing roadway to reduce the length of the gravel driveway to align with BMP 5.5.4 Cluster Uses at Each Site.*

See the Post-Construction Stormwater Management Plan drawing for location of infiltration trench on site.

(7) A sequence of PCSM BMP implementation or installation in relation to earth disturbance activities of the project site and a schedule of inspections for critical stages of PCSM BMP installation.

BMP construction and inspections will be performed based on recommendations from the Pennsylvania Stormwater BMP Manual. The overall sequence of BMP construction is as follows:

1. At least seven (7) days before starting any earth disturbance activities, the owner and/or operator shall notify the PADEP by either telephone or certified mail of the intent to commence earth disturbance activities. Attendance at a pre-construction conference is required upon request of the PADEP.
2. At least three (3) days before starting any earth disturbance activities, contractors involved in those activities shall notify the Pennsylvania One Call system at 1-800-242-1776 to determine the location of existing underground utilities.
3. Install the rock construction entrance.
4. Confirm compost filter sock placement downslope or proposed disturbed/excavated area and stockpiles
5. Perform clearing and grubbing to those areas described in each stage of work. Remove excess topsoil from the limits of disturbance and stockpile off-site. The contractor is responsible for ensuring that any off-site waste areas have an E&SC Plan approved by the local conservation district or PADEP prior to being activated. Snow fencing shall be installed to prevent compaction of infiltration areas.
6. The stone base and sub-surface infiltration facility shall be installed, care shall be taken to prevent sediment laden runoff from entering the stone infiltration base. The Engineer shall inspect the sub-surface infiltration facility prior to backfilling around it.
7. Perform grading activities detailed by proposed grading, notes, and details shown on the plan drawings. Per project specifications, additional temporary placement of compost filter sock may be necessary at the contractor's discretion, should accelerated erosion be observed during grading activities. Install subsurface stormwater infiltration system during bulk filling operations.
8. Construct pad and facilities according to specifications within these plan sheets including stabilization measures. Grades will be left 1 foot below catch basin inlet grate elevations to prevent silt-laden stormwater runoff from entering the subsurface piping. Once the site has been stabilized, grading shall be brought to final elevations.
9. Areas with minor soil compaction shall be ripped to a depth of 8″, and areas of major compaction shall be ripped to a depth of 20″.No ripping shall take place in the vicinity of the mainline piping or other underground utilities.
10. Place topsoil in proposed areas to be vegetated.
11. Apply seed and mulch to disturbed areas as specified and in accordance with this plan.
12. Temporary measures (such as compost filter sock, collection channel, riprap aprons, etc.) installed by contractor during grading shall remain in place until final stabilization has occurred with a minimum uniform 70% perennial vegetative cover or other permanent non-vegetative cover, with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding and other movements. The Engineer shall inspect final stabilization prior to removal of temporary measures.
13. Clean work area of any debris created during the construction sequence.

Vegetated Swale: Vegetated swales will be installed as described in the overall sequence above. This applies to the area east of the pad where the pad and existing grade effectively forms a swale. The contractor will be required to prevent the compaction of soils in areas that are occupied or to be occupied by PCSM BMPs. The swale will be rough graded, then fine graded, seeded and vegetated added, and protective lining will be installed. The swale will be inspected after each rainfall between rough grading and fine grading for sediment accumulation, erosion or obstructions. Vegetation will be established as soon as possible to prevent erosion and scour. Once tributary areas are sufficiently stabilized, temporary erosion and sediment controls will be removed. Immediately following site construction, the swale will be inspected to verify that runoff conveyance capacity meets the design capacity. If not, they will be regraded and reseeded and any damaged areas will be fully restored to verify functionality.

Infiltration Trench: The infiltration trench will be installed per the overall construction sequence above. Prior to construction, the area of the infiltration trench will be protected from compaction by installing orange safety fencing that will be used to protect the area throughout the project. The infiltration trench will be installed early in the project as the trench invert is approximately at existing grade. As the equipment pad is brought to final grade, the infiltration facility will be buried providing protection from compaction. In the event that compaction of the subgrade is unavoidable, see sequence 8. As the equipment pad is brought to final grade, additional stone will be added on top of the infiltration basin to provide protection from compaction.

The infiltration trench will not be put into service until stabilization of disturbed areas is complete to prevent sedimentation and/or damage from construction activity. Erosion and Sediment Control Measures will be installed as required during construction (refer to ESC Plan).

After completion of construction on site, the trench will be inspected after rainfall events (> 1 inch rainfall depth) to verify that runoff drains within 72 hours. The trench will also be inspected for accumulation of construction sediment, damage to outlet control structures, erosion control measures and signs of water contamination/spills. At this time, accumulated sediment will be removed from the trench if required.

(8) Supporting calculations.

See Appendix B for supporting calculations for hydraulic analysis and BMP design.

(9) Plan drawings.

See Post-Construction Stormwater Management Plan drawing.

(10) A long-term operation and maintenance schedule, which provides for inspection of PCSM BMPs, including the repair, replacement, or other routine maintenance of the PCSM BMPs to ensure proper function and operation. The program must provide for completion of a written report documenting each inspection and all BMP repair and maintenance activities and how access to the PCSM BMPs will be provided.

A maintenance program that provides for routine inspection, as well as repair and replacement as necessary, is essential to effective and efficient operation of the proposed stormwater BMPs. Implementation of the following maintenance plan is a key component in achieving the intent of this PCSM Plan and minimizing negative impacts of stormwater runoff from the proposed facilities. The permittee and any co-permittees shall be responsible for long-term operation and maintenance of the stormwater BMPs unless a different person is identified in the Notice of Termination and has agreed to long-term operation and maintenance of the stormwater BMPs. A formal long-term operation and maintenance plan will be provided in subsequent stages of the undertaking, outlining additional details of maintenance schedules, procedures and reporting requirements.

PennEast will be responsible for the proper construction, stabilization, and maintenance of erosion and sediment controls and post-construction stormwater management facilities which include the vegetated areas. Vegetated areas will be inspected for erosion, distressed vegetation and bare ground. General maintenance will include the regular removal of debris and litter to help prevent possible damage to vegetated areas. Growth of woody vegetation will be controlled by mowing (approximately two times per year) and clearing as appropriate.

Infiltration trench:

- *Inlet will be inspected and cleaned at least two times per year and after runoff events (> 1 inch rainfall depth)*
- *The trench will be inspected after runoff events to make sure that runoff drains down within 72 hours. The trench will also be inspected for accumulation of sediment, damage to outlet control structures, erosion control measures, signs of water contamination/spills. Accumulated sediment will be removed from the trench as required and sediment will be properly disposed of.*

Vegetated Swale:

Maintenance activities to be performed annually and within 48 hours after every major storm event (> 1 inch rainfall depth).

- *Inspect and correct erosion problems, damage to vegetation, and sediment and debris accumulation (address when > 3 inches at any spot or covering vegetation).*
- *Inspect vegetation on side slopes for erosion and formation of rills or gullies, correct as needed.*
- *Inspect for pools of standing water; dewater and discharge to an approved location and restore to design grade.*
- *Mow and trim vegetation to provide safety, aesthetics, proper swale operation, or to suppress weeds and invasive vegetation; dispose of cuttings in a local composting facility; mow only when swale is dry to avoid rutting.*
- *Inspect for litter; remove prior to mowing.*
- *Inspect for uniformity in cross-section and longitudinal slope, correct as needed.*
- *Inspect swale inlet (curb cuts, pipes, etc.) and outlet for signs of erosion or blockage, correct as needed.*

Maintenance activities to be performed as needed:

- Plant alternative grass species: Standard Upland ROW, Residential, Clover/Food Plot with ROW as listed in the E&S site restoration plans in the event of unsuccessful establishment
- *Reseed bare areas; install appropriate erosion control measures when native soil is exposed, or erosion channels are forming.*
- *Rototill and replant swale if draw down time is more than 48 hours.*
- *Inspect and correct check dams when signs of altered water flow (channelization, obstructions, erosion, etc.) are identified.*
- *Water during dry periods, fertilize, and apply pesticide only when absolutely necessary.*

Maintenance under winter conditions:

- *Inspect swale immediately after the spring melt, remove residuals (e.g. sand) and replace damaged vegetation without disturbing remaining vegetation.*
- *If roadside or parking lot runoff is directed to the swale, mulching and/or soil aeration/manipulation may be required in the spring to restore soil structure and moisture capacity and to reduce the impacts of de-icing agents.*
- *Use nontoxic, organic de-icing agents, applied either as blended, magnesium chloride-based liquid products or as pretreated salt.*

– *Use salt-tolerant vegetation in swales.*

(11) Procedures which ensure that the proper measures for recycling or disposal of materials associated with or from the PCSM BMPs are in accordance with Department laws, regulations and requirements.

The responsible party (construction contractor) for earth disturbance activities must verify that proper mechanisms are in place to control waste materials. Construction wastes include, but are not limited to, excess soil materials, damaged netting or matting, sanitary wastes, and general trash that could adversely affect or impact water quality. Measures for housekeeping of the site, materials management, and litter control should be planned and implemented throughout the life of the project. Wherever possible, recycling of excess materials is preferred, rather than disposal.

The contractor/operator will remove, recycle or dispose from the site excess construction materials and wastes in accordance with Pennsylvania's Solid Waste Management Regulations at 25 PA. Code 260.1 et seq., 271.1 et seq. The contractor/operator will not illegally bury, dump, or discharge any building material or wastes at the site.

Sediment removed from erosion control measures or facilities and other soils deemed unsuitable for use as fill shall be stabilized and disposed of offsite at a licensed disposal facility. Offsite disposal must comply with local, county, state and federal rules, regulations, and laws.

(12) An identification of naturally occurring geologic formations or soil conditions that may have the potential to cause pollution after earth disturbance activities are completed and PCSM BMPs are operational and development of a management plan to avoid or minimize potential pollution and its impacts.

Based on NRCS Web Soil Survey, the existing soils have a soil reaction of acidity or alkalinity (pH levels) of approximately 4.4. Upon review of PADCNR's "Geologic Units Containing Potentially Significant Acid-Producing Sulfide Minerals" map, this station site does not lie in a known region containing acid-producing soils.

(13) An identification of potential thermal impacts from post construction stormwater to surface waters of this Commonwealth including BMPs to avoid, minimize or mitigate potential pollution from thermal impacts.

Infiltration of runoff collected in the trench will mitigate thermal impacts from post-construction stormwater. Because the infiltration trench is sub-surface it will further mitigate thermal impacts. It is not expected that runoff collected in the trench and discharged overland to the receiving water will be retained in the trench for more than 24 hours, thus providing additional mitigation of potential thermal impacts of discharge from the trench. Existing shade trees are being preserved to the greatest extent possible, and excessive riprapping and concrete channels is being avoided, to minimize the transfer of heat to the runoff.

(14) A riparian forest buffer management plan when required under §102.14 (relating to riparian buffer requirements).

The project is not located within 150 feet of a perennial or intermittent river, stream, or creak, or lake, pond, or reservoir. The project is located within a watershed of an Exceptional Value or High Quality, however the project will eliminate the net change in stormwater volume, rate and quality for stormwater events up to and including the 2-year/24-hour storm. The project will use various structural and non-structural BMPs to meet the water quantity and quality requirements. The peak runoffs will be attenuated with an infiltration trench. The stormwater will be routed through structural and non-structural BMPs and discharged overland towards the stream which is greater than 150' away from the site. The project falls into the definition of a non-discharge alternative. See Section 4 for compliance calculations and descriptions. Therefore, a riparian forest buffer management plan is not required.

(15) Additional information requested by the Department.

Additional information requested by the Department will be provided.

3.1.2 Post Construction Stormwater Management Plan Stormwater Analysis

This section addresses the portion of the regulations pertaining to the site-specific stormwater analysis.

(g) PCSM Plan Stormwater analysis. Except for regulated activities that require site restoration or reclamation, and small earth disturbance activities identified in subsection (n), PCSM Plans for proposed activities requiring a permit under this chapter require the following additional information:

(1) Predevelopment site characterization and assessment of soil and geology including appropriate infiltration and geotechnical studies that identify location and depths of test sites and methods used.

A subsurface investigation consisting of two excavated test pits, MLV2-TP1 and WTP-2, was conducted May 2018. During the investigation, bedrock was encountered within the anticipated infiltration zone, therefore the infiltration test depth was decreased to provide the required 2' separation from bed rock. Tests utilizing a double-ring infiltrometer were performed within test pits MLV2-TP1 and MLV2-TP2 where soil was encountered.

The test pit elevations are summarized in Table 4:

Table 4: Test Pit Summary

Test Pit No.	Existing Grade Elevation (feet)	Proposed BMP Invert (feet)	Infiltration Test Elevation (feet)	Excavation Depth Elevation (feet)	Depth to High Groundwater (feet)
MLV2-TP1	1686.2	1685.0	1682.2	1679.7	No evidence of high groundwater observed
MLV2-TP2	1689.6	1685.0	1684.6	1683.1	No evidence of high groundwater observed

Test pit MLV2-TP-1 was excavated 6.5 feet below existing grade on May 22, 2018. Infiltration testing was performed at 4 feet below existing grade to maintain two feet of separation from the decomposed rock layer. Two tests were performed at this location.

Test pit MLV2-TP-2 was also excavated 6.5 feet below existing grade on May 22, 2018. Infiltrations testing was performed at 5 feet below existing grade. Two tests were performed at this location.

The results of the infiltration tests are summarized as follows:

Table 5: Infiltration Testing Summary

Test Pit	Test #1	Test #2	Final Rate Used
MLV2-TP1	3.0 inch/hr	0.0 inch/hr	1.5 inch/hr
MLV2-TP2	0.0 inch/hr	0.2 inch/hr	0.1 inch/hr
Observed Overall Rate			0.07 inch/hr
Design Rate (Factor of Safety of 2)			0.03 inch/hr

Based on the test pit logs for MLV 2 TP-1, field test was performed 4 feet below existing grade. As such, a portion of the new bed bottom will not be in native soils. However, the soil at the new bed elevation in TP-2 is consistent with the field-tested soil elevation. Therefore, we recommend that the same design rates should be used for MLV-2 as previously recommended for MLV 2.

(2) Analysis demonstrating that the PCSM BMPs will meet the volume reduction and water quality requirements specified in an applicable Department approved and current Act 167 stormwater management watershed plan; or manage the net change for storms up to and including the 2-year/24-hour storm event when compared to preconstruction runoff volume and water quality. The analysis for the 2-year/24-hour storm event shall be conducted using the following minimum criteria:

The project site is located in Luzerne County, in the Bear Creek watershed. Luzerne County has an Act 167 Stormwater Management Plan, which states that:

"For all regulated activities that require submission of a formal SWM Site Plan, both the Design Storm Method and the Simplified Method shall be calculated; the larger control volume based on the two calculations shall be controlled.

A. *The Design Storm Method (CG-1 in the BMP Manual): Do not increase the post-development total runoff volume for storms equal to or less than the 2-year 24-hour duration precipitation.*

B. *The Simplified Method (CG-2 in the BMP Manual): Accommodate 2" of permanently removed runoff volume. At least the first 0.5 inch of the permanently removed runoff should be infiltrated. Facilities, to the greatest extent possible and subject to the Municipal Engineer's discretion, shall be designed to drain the permanently removed runoff volume in a period no less than 24 hours and no greater than 72 hours. Runoff volume in excess of 2 inches shall be safely conveyed to existing stormwater collection systems or streams, in the direction of the existing drainage course." However, because very low infiltration rates were encountered and high bedrock elevation is present at the site, infiltration is not feasible. Because infiltration requirements cannot be met, water quality criteria is met by using a Stormceptor unit at the front of the BMP. Please see Section 4 of this report for details on the pre-development and post-development runoff volume and trench drain time calculations with detailed calculations provided in Appendix B.*

i. Existing predevelopment non-forested pervious areas must be considered meadow in good condition or its equivalent except for repair, reconstruction or restoration of roadways or rail lines, or construction, repair, reconstruction or restoration of utility infrastructure when the site will be returned to existing condition.

The existing pre-development site is mainly existing forest. For the purposes of hydraulic calculations, the existing ground surface was assumed to be wooded.

ii. When the existing project site contains impervious area, 20% of the existing impervious area to be disturbed must be considered meadow in good condition or better, except for repair, reconstruction or restoration of roadways or rail lines, or construction, repair, reconstruction, or restoration of utility infrastructure when the site will be returned to existing condition.

Not Applicable. The existing project site does not contain impervious area. There is a small impervious area representing part of an existing road, it is not being disturbed by this project.

iii. When the existing site contains impervious area and the existing site conditions have public health, safety or environmental limitations, the applicant may demonstrate to the Department that it is not practicable to satisfy the requirement in subparagraph (ii), but the stormwater volume reduction and water quality treatment will be maximized to the extent practicable to maintain and protect existing water quality and existing and designated uses.

Not applicable. The stormwater volume reduction and water quality treatment requirements are achieved.

iv. Approaches other than that required under paragraph (2) may be proposed by the applicant when the applicant demonstrates to the Department that the alternative will either be more protective than required under paragraph (2) or will maintain and protect existing water quality and existing and designated uses by maintaining the site hydrology, water quality, and erosive impacts of the conditions prior to initiation of any earth disturbance activities.

Not applicable.

(3) Analysis demonstrating that the PCSM BMPs will meet the rate requirements specified in an applicable Department approved and current Act 167 stormwater management watershed plan; or manage the net change in peak rate for the 2, 10, 50, and 100 year/24-hour storm events in a manner not to exceed preconstruction rates.

The project site is located in Luzerne County, in the Bear Creek watershed. Luzerne County has an Act 167 Stormwater Management Plan, which states that:

> *"Areas covered by a Stormwater Management District Map contained in Appendix F.1 of the Ordinance: For the 1 through 100 year storms, the post-development peak discharge rates will follow the applicable approved Stormwater Management District Maps."*

The peak runoff rate requirements are achieved, summarized in the table below. See Section 4 of this report for details on the pre-development and post-development peak runoff rate calculations.

i. Hydrologic computations or a routing analysis are required to demonstrate that this requirement has been met.

See Section 4 of this report for details on hydrologic computations that demonstrate that runoff rate requirements have been met.

ii. Exempt from this requirement are Department- approved direct discharges to tidal areas or Department-approved no detention areas.

Not applicable. Project site does not discharge to tidal areas or no-detention areas.

iii. Approaches other than that required under paragraph (3) may be proposed by the applicant when the applicant demonstrates to the Department that the alternative will either be more protective than required under paragraph (3) or will maintain and protect existing water quality and existing and designated uses by maintaining the preconstruction site hydrologic impact.

Not applicable. The requirements of paragraph (3) have been met.

(4) Identification of the methodologies for calculating the total runoff volume and peak rate of runoff and provide supporting documentation and calculations.

See Section 4 of this report for details on the pre-development and post-development peak runoff rate and total runoff volume calculation methodology, which was completed using TR-55 methodology implemented by Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2019. See Appendix B for calculation documentation.

(5) Identification of construction techniques or special considerations to address soil and geologic limitations.

Methods to address potential soil limitations have been provided on the PCSM plans.

(h) PCSM implementation for special protection waters. To satisfy the anti-degradation implementation requirements in §93.4c(b) (relating to implementation of anti-degradation requirements), an earth disturbance activity that requires a permit under this chapter and for which any receiving water that is classified as High Quality or Exceptional Value under Chapter 93, the person proposing the activity shall, in the permit application, do the following:

(1) Evaluate and include non-discharge alternatives in the PCSM Plan unless a person demonstrates that non-discharge alternatives do not exist for the project.

(2) If the person makes the demonstration in paragraph (1) that non-discharge alternatives do not exist for the project, the PCSM Plan must include ABACT, except as provided in §93.4c(b)(1)(iii).

(3) For purposes of this chapter, non-discharge alternatives and ABACT and their design standards are listed in the Pennsylvania Stormwater Best Management Practices Manual Commonwealth of Pennsylvania, Department of Environmental Protection, No. 363-0300-002 (December 2006), as amended and updated.

The project will eliminate the net change in stormwater volume, rate and quality for stormwater events up to and including the 2-year/24-hour storm. The project will use various structural and non-structural BMPs to meet the water quantity and quality requirements. The peak runoffs will be attenuated with an infiltration trench. The stormwater will be routed through a series of structural and non-structural BMPs and discharged overland towards the stream. Therefore, the project falls into the definition of a nondischarge alternative. See Section 4 for compliance calculations and description.

4 Hydrologic and Hydraulic Analysis

This Section outlines the hydrologic calculations that were performed in order to design the stormwater BMPs for the MLV 2 site, and to verify that requirements for stormwater runoff volume and peak rate would be met.

4.1 Existing Conditions

The total drainage area to the point of analysis including site and offsite areas is 0.33 acres of forest and grassed land adjacent to an existing improved road, of which 0.09 acres are the project site itself. In general, the ground slopes to the south. An area north of the site drains through the site. The onsite soils were identified using the USDA's Web Soil Survey. The project site consists of primarily Lackawanna channery, which is Hydrologic Soil Group C. The site also consists of Wellsboro channery silt loam, which is Hydrologic Soil Group D (see Appendix E for a breakdown of existing condition soils type and curve numbers). Existing condition curve numbers were assigned as per Table 2-2a from USDA's TR-55 "Urban Hydrology for Small Watersheds" (see Appendix B). The time of concentration was calculated using TR-55 methodology, and the routing is shown in the Existing Conditions figure in Appendix E. For times of concentration less than 5 minutes, a minimum time of concentration of 5 minutes was assumed.

Under existing conditions, the land use breakdown is given in Table 6. The drainage area boundaries are shown in the Existing Conditions figure in Appendix E.

Table 6: Existing Conditions Land Use

DA	Cover	Soils	HSG	Area (sq ft)	Area (acres)	CN	CN*A	Weighted CN
Site								
SITE-BYPASS	WO	WmB	D	275	0.0063	77	21,175	77
SITE-BYPASS	WO	WmB	D	79	0.0018	77	6,096	77
SITE-BYPASS	WO	WmB	D	61	0.0014	77	4,724	77
SITE-BYPASS	WO	LcD	C	38	0.0009	70	2,656	70
SITE-BYPASS	WO	LcD	C	123	0.0028	70	8,632	70
SITE-TRENCH	WO	WmB	D	907	0.0208	77	69,811	77
SITE-TRENCH	WO	WmB	D	401	0.0092	77	30,867	77
SITE-TRENCH	WO	WmB	D	255	0.0059	77	19,654	77
SITE-TRENCH	WO	WmB	D	135	0.0031	77	12,689	94
SITE-TRENCH	WO	LcD	C	47	0.0011	70	3,305	70
SITE-TRENCH	WO	LcD	C	43	0.0010	70	2,982	70
SITE-TRENCH	WO	LcD	C	22	0.0005	70	1,549	70
SITE-TRENCH	WO	LcD	C	1,270	0.0291	70	88,884	70
SITE-TRENCH	IMP	LcD	C	268	0.0062	98	26,275	98
Total					**0.0901**		**290,907**	**76**
Off-Site								
OFFSITE-BYPASS	MEAD	WmB	D	760	0.0174	78	59,280	78
OFFSITE-BYPASS	WO	WmB	D	5,865	0.1346	77	451,605	77
OFFSITE-BYPASS	WO	WmB	D	2,315	0.0531	70	162,042	98
OFFSITE-BYPASS	IMP	LcD	D	236	0.0054	98	23,101	70
OFFSITE-TRENCH	WO	WmB	D	1,450	0.0333	77	111,650	77
Total					**0.2439**		**807,678**	**76**
Grand Total					**0.3340**		**1,104,681**	**76**

Precipitation data was obtained from NOAA Atlas 14. The rainfall data is summarized in Table 7 and these rainfall depths were applied to the model as a NRCS Type II rainfall.

Table 7: 24-Hour Design Rainfall Depths

Recurrence Interval (years)	Rainfall (inches)
1	2.67
2	3.20
5	3.99
10	4.68
25	5.78
50	6.82
100	8.07

4.2 Proposed Conditions

The proposed site will consist mostly of gravel (compacted crushed stone). The location that will be used for vehicular traffic has been considered to be impervious by PADEP, thus it has been modelled as such in the hydraulic calculations. Gravel areas that will be protected from vehicular traffic will be considered pervious and modelled as such in hydraulic calculations. For design purposes, it was assumed that the entire permanent gravel driveway has been considered compact and impervious. An infiltration trench was designed to meet the regulatory stormwater requirements. The outflow from the trench will be discharged to a ditch which will over land flow along its natural pathways.

Under proposed conditions, the land use breakdown is given in Table 8. The drainage area boundaries are shown in the Proposed Conditions figure in Appendix F.

Table 8: Proposed Condition Land Use

DA	Cover	Soils	HSG	Area (sq ft)	Area (acres)	CN	CN*A	Weighted CN
Site								
SITE-BYPASS	WO	WmB	D	275	0.0063	78	21,450	78
SITE-BYPASS	WO	WmB	D	79	0.0018	78	6,175	77
SITE-BYPASS	WO	WmB	D	61	0.0014	78	4,785	77
SITE-BYPASS	WO	LcD	C	38	0.0009	71	2,694	78
SITE-BYPASS	WO	LcD	C	123	0.0028	71	8,755	78
SITE-TRENCH	MEAD	WmB	D	907	0.0208	78	70,717	94
SITE-TRENCH	GRV	WmB	D	401	0.0092	94	37,682	98
SITE-TRENCH	IMP	WmB	D	255	0.0059	98	25,015	94
SITE-TRENCH	GRV	WmB	D	135	0.0031	94	12,689	94
SITE-TRENCH	GRV	LcD	C	47	0.0011	91	4,296	78
SITE-TRENCH	IMP	LcD	C	43	0.0010	98	4,175	78
SITE-TRENCH	GRV	LcD	C	22	0.0005	91	2,014	91
SITE-TRENCH	IMP	LcD	C	1,270	0.0291	98	124,437	98
SITE-TRENCH	IMP	LcD	C	268	0.0062	91	26,275	91
Total					**0.0901**		**351,159**	**89**
Off-Site								
OFFSITE-BYPASS	MEAD	WmB	D	760	0.0174	78	59,280	78
OFFSITE-BYPASS	WO	WmB	D	5,865	0.1346	77	451,605	77
OFFSITE-BYPASS	WO	WmB	D	2,315	0.0531	70	162,050	70
OFFSITE-BYPASS	IMP	LcD	D	236	0.0054	98	23,101	98
OFFSITE-TRENCH	WO	WmB	D	1,450	0.0333	77	111,650	77
Total					**0.2439**		**807,678**	**76**
Grand Total					**0.3340**		**1,158,837**	**80**

4.3 Model Development

A model was developed in the Hydraflow Hydrographs extension for AutoCAD Civil 3D v2019 to simulate existing and proposed flow. This model was used to determine the existing and proposed runoff volumes and peak runoff rates. The trench's outlet control structure will be constructed with the lowest opening 0.5' above the trench invert, to drain completely in 72 hours at the design infiltration rate of 0.03 inches/hour, based on the observed rate of 0.07 in/hr with a factor of safety of 2 applied. The proposed flows were routed through the trench and the attenuated flow rates calculated. Model inputs and summary and output reports can be found in Appendix H.

4.4 Stormwater Management Rules Compliance

The project meets the requirements under the Pennsylvania code for Post-Construction Stormwater Management (PCSM) Section 102.8, and the Luzern County Act 167 Stormwater Management Plan requirements for runoff volume and peak rate.

4.4.1 Volume Control

A sub-surface stormwater infiltration trench is utilized to provide storage and infiltration to prevent any increases in stormwater runoff volume, up to and including the 2-year/24-hour storm event using the prescribed land use characteristics, thus it meets the PADEP requirements.

The project is subject to two volume controls, the first is the Design Storm Method that requires for storms up to the 2-year storm there be no increase in runoff volume as a result of this project. The second is to remove 2" of runoff from new impervious areas, including compacted crushed stone. The larger of the two was used. Because there is no other mechanism such as irrigation or rainwater harvesting, for releasing the required retention volume, infiltration will be employed to remove the required runoff volume.

This was accomplished by providing the required volume below the low outlet of the trench's outlet control structure, as shown in Table 9 below. Trench drain time is shown in Table 10 below.

The low orifice in the infiltration trench was placed above the invert, providing the required infiltration volume. As such, regulatory volume control requirements are met. The required volume was achieved as follows:

Table 9: Total Volume Summary

Recurrence Interval (yrs)	Existing Volume (cf)	Proposed Unmitigated Volume from Model (cf)	Difference between Proposed and Existing (cf)	Proposed Trench Infiltration Capacity (cf)	Adequate Infiltration Volume? (Y/N)
1	376	684	308	430	Yes
2	533	879	347	430	Yes
Act 167 2" Capture			306	430	Yes

Table 10: Trench Drain Time

Trench Infiltration Depth (ft)	Design Infiltration Rate (in/hr)	Drain Time (hrs)	Allowable Drain Time (hrs)	Drain Time less than allowable
0.5	0.03	72	72	Yes

The Contractor is to test the site infiltration rate prior to the construction of the infiltration trench and amend the soils as necessary until reaching a minimum infiltration rate of 0.25 in/hr and/or a maximum rate of 7.00 in/hr per PADEP requirements. Soils below infiltration trench to a depth of two feet to be amended and infiltration testing redone until an acceptable infiltration rate has been achieved.

4.4.2 Peak Flow Control

A stormwater trench is utilized to provide storage attenuation to prevent any increases in the rate of stormwater runoff, thus it meets the PADEP requirements. The model indicates that the trench will result in a peak runoff rate under the 1-, 2-, 10-, 50-, and 100-year/24-hour storm events that does not exceed preconstruction rates. The attenuated flows are summarized in Table 11.

Table 11: Peak Flow Summary

Recurrence Interval (yrs)	Existing Disturbed Conditions Site Q (cfs)	Existing Undisturbed Conditions Offsite Q (cfs)	Maximum Allowable Proposed Peak Flow (cfs)	Proposed Q (cfs)	Proposed Less than Allowable? (Y/N)
1	0.119	0.175	0.271	0.185	Yes
2	0.172	0.260	0.403	0.297	Yes
5	0.258	0.399	0.618	0.525	Yes
10	0.338	0.529	0.819	0.718	Yes
25	0.471	0.746	1.154	1.025	Yes
50	0.599	0.959	1.481	1.308	Yes
100	0.757	1.221	1.882	1.630	Yes

4.4.3 Water Quality

The soil classifications were obtained from the USDA Web Soil Survey to estimate if there would be adequate infiltration. The water quality requirements were met through trench infiltration of a minimum of 2" of runoff from the impervious area, equivalent to 306 cf (1836*0.167' = 306 CF). This was accomplished by providing more than the required volume, below the low outlet of the trench's outlet control structure. compliance with water quality requirements is demonstrated using BMP Worksheet 10 in Appendix C.

BMPs utilized to comply with water quality requirements:

- 5.5.4 Cluster Uses at Each Site; Build on the Smallest Area Possible. The project site footprint minimized to fit within permanent easement within ESCGP-3 boundary. The site footprint was sized to contain all of the necessary pipeline equipment to safely and adequately perform pipeline operations while limiting the total disturbed area. The sites were laid out so that the equipment can be fully accessed and utilized with as little impact on the existing conditions as possible during construction and operations. Because of this, the land disturbed due to the equipment pad and access road is merely a portion of the total area that will be occupied within the permanent easement by the project.
- 6.7.2 Landscape Restoration, disturbed area outside the proposed gravel pad and access drive will be replanted with native vegetation.
- 6.7.3 Soil Amendment/ Restoration. The top layer of soil will be scarified for site infiltration berm contributory areas.

4.4.4 Pipe Design and Swale Design

Pipe capacities were sized based on output flows from the model, and the Mannings equation was used to select the appropriate size for each location. Sizing calculations are provided in Appendix B. Swale capacities were sized based on output flows the model, and the Rational Method was used to select appropriate size of each locations. Sizing calculations are provided in Appendix B.

5 Offsite Discharge Analysis

Attenuated peak flows from the infiltration trench are routed out an inlet. The dispersed flow will be discharged overland and eventually discharges to the Lehigh River, which in turn drains to Bear Creek and from there into the Lehigh River as shown in the Off-site Stormwater Discharge Plan (see Appendix J). The point of discharge from the site has been designed to be stable so as not to impact offsite areas, see calculations in Appendix B. Increases in stormwater runoff and volume are not anticipated. Therefore, the project falls into definition of nondischarge alternative. The nondischarge alternative is defined in §102.1 as environmentally sound and cost-effective BMPs that individually or collectively eliminate the net change in stormwater volume, rate and quality for storm events up to and including the 2-year/24-hour storm when compared to the stormwater rate, volume and quality prior to the earth disturbance activities to maintain and protect the existing quality of the receiving surface waters of this Commonwealth.

Because the MLV 2 project falls into definition of nondischarge alternative, no downstream properties are affected by the proposed work and there is no downstream erosion. Proper construction and maintenance requirements are in place to support continued performance of BMPs. The overall peak flow and runoff volume has been reduced while maintaining the overall existing drainage patterns, thus fulfilling PADEP off-site discharge requirements.

6 Conclusion

As demonstrated in the sections above, the design of the proposed stormwater BMPs for the MLV 2 Site for the PennEast pipeline will allow the proposed project to comply with the applicable regulatory requirements under Pennsylvania Code Section 102.8.

Appendices

A. Rainfall Data

NOAA Atlas 14, Volume 2, Version 3
Location name: Wilkes Barre, Pennsylvania, USA*
Latitude: 41.1807°, Longitude: -75.6969°
Elevation: 1679.33 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.333** (0.300-0.369)	**0.398** (0.359-0.443)	**0.479** (0.431-0.533)	**0.545** (0.490-0.606)	**0.635** (0.565-0.706)	**0.715** (0.630-0.797)	**0.800** (0.699-0.894)	**0.898** (0.775-1.01)	**1.05** (0.889-1.18)	**1.18** (0.981-1.34)
10-min	**0.519** (0.468-0.575)	**0.622** (0.561-0.692)	**0.745** (0.670-0.830)	**0.843** (0.757-0.937)	**0.976** (0.869-1.09)	**1.09** (0.960-1.21)	**1.21** (1.06-1.35)	**1.35** (1.16-1.51)	**1.55** (1.31-1.74)	**1.72** (1.44-1.95)
15-min	**0.637** (0.574-0.706)	**0.763** (0.688-0.849)	**0.918** (0.826-1.02)	**1.04** (0.935-1.16)	**1.21** (1.08-1.34)	**1.35** (1.19-1.51)	**1.51** (1.32-1.68)	**1.68** (1.45-1.88)	**1.93** (1.64-2.18)	**2.15** (1.79-2.44)
30-min	**0.845** (0.761-0.936)	**1.02** (0.924-1.14)	**1.26** (1.13-1.40)	**1.45** (1.30-1.61)	**1.71** (1.53-1.91)	**1.94** (1.71-2.16)	**2.19** (1.91-2.44)	**2.46** (2.13-2.76)	**2.88** (2.45-3.25)	**3.25** (2.71-3.68)
60-min	**1.03** (0.932-1.15)	**1.26** (1.14-1.40)	**1.59** (1.43-1.77)	**1.85** (1.66-2.05)	**2.23** (1.98-2.48)	**2.56** (2.26-2.86)	**2.93** (2.56-3.27)	**3.35** (2.89-3.75)	**4.00** (3.39-4.51)	**4.58** (3.82-5.19)
2-hr	**1.22** (1.11-1.37)	**1.49** (1.35-1.67)	**1.88** (1.69-2.11)	**2.21** (1.98-2.48)	**2.72** (2.42-3.06)	**3.19** (2.82-3.59)	**3.74** (3.28-4.22)	**4.40** (3.80-4.96)	**5.45** (4.63-6.19)	**6.43** (5.37-7.36)
3-hr	**1.34** (1.21-1.50)	**1.62** (1.47-1.81)	**2.03** (1.83-2.26)	**2.37** (2.13-2.64)	**2.91** (2.60-3.24)	**3.41** (3.02-3.80)	**4.00** (3.49-4.47)	**4.70** (4.05-5.26)	**5.82** (4.92-6.56)	**6.86** (5.71-7.78)
6-hr	**1.71** (1.55-1.92)	**2.06** (1.85-2.31)	**2.53** (2.27-2.83)	**2.95** (2.64-3.30)	**3.62** (3.21-4.05)	**4.25** (3.73-4.75)	**4.98** (4.33-5.58)	**5.87** (5.03-6.60)	**7.31** (6.15-8.27)	**8.66** (7.15-9.85)
12-hr	**2.14** (1.93-2.42)	**2.58** (2.32-2.91)	**3.19** (2.86-3.60)	**3.74** (3.34-4.21)	**4.62** (4.08-5.20)	**5.44** (4.76-6.12)	**6.42** (5.54-7.23)	**7.59** (6.46-8.58)	**9.50** (7.94-10.8)	**11.3** (9.28-12.9)
24-hr	**2.67** (2.43-3.00)	**3.20** (2.91-3.61)	**3.99** (3.61-4.48)	**4.68** (4.22-5.24)	**5.78** (5.17-6.45)	**6.82** (6.05-7.58)	**8.07** (7.08-8.91)	**9.56** (8.30-10.5)	**12.0** (10.3-13.2)	**14.3** (12.1-15.6)
2-day	**3.13** (2.86-3.50)	**3.76** (3.42-4.21)	**4.66** (4.23-5.21)	**5.46** (4.94-6.09)	**6.75** (6.05-7.49)	**7.96** (7.07-8.79)	**9.40** (8.27-10.3)	**11.1** (9.69-12.2)	**14.0** (12.0-15.3)	**16.7** (14.1-18.1)
3-day	**3.31** (3.03-3.68)	**3.97** (3.63-4.42)	**4.89** (4.46-5.44)	**5.72** (5.19-6.34)	**7.02** (6.33-7.75)	**8.25** (7.38-9.07)	**9.70** (8.60-10.6)	**11.4** (10.0-12.5)	**14.3** (12.4-15.6)	**17.0** (14.5-18.4)
4-day	**3.49** (3.20-3.86)	**4.18** (3.83-4.62)	**5.13** (4.70-5.67)	**5.97** (5.44-6.59)	**7.30** (6.61-8.01)	**8.54** (7.69-9.35)	**10.0** (8.93-10.9)	**11.8** (10.4-12.8)	**14.6** (12.7-15.9)	**17.3** (14.9-18.8)
7-day	**4.16** (3.83-4.59)	**4.97** (4.57-5.48)	**6.05** (5.56-6.67)	**7.01** (6.41-7.70)	**8.51** (7.73-9.32)	**9.89** (8.93-10.8)	**11.5** (10.3-12.6)	**13.4** (11.9-14.6)	**16.5** (14.4-17.9)	**19.4** (16.7-21.0)
10-day	**4.82** (4.45-5.28)	**5.74** (5.29-6.28)	**6.91** (6.37-7.56)	**7.93** (7.28-8.66)	**9.51** (8.68-10.3)	**10.9** (9.92-11.9)	**12.6** (11.3-13.6)	**14.5** (13.0-15.7)	**17.6** (15.5-19.0)	**20.3** (17.7-21.9)
20-day	**6.50** (6.07-7.04)	**7.67** (7.15-8.30)	**8.99** (8.36-9.71)	**10.1** (9.38-10.9)	**11.8** (10.9-12.7)	**13.3** (12.2-14.3)	**15.0** (13.7-16.1)	**16.9** (15.4-18.1)	**19.9** (17.9-21.3)	**22.5** (20.1-24.1)
30-day	**8.11** (7.63-8.70)	**9.53** (8.96-10.2)	**11.0** (10.3-11.7)	**12.2** (11.4-13.0)	**14.0** (13.1-15.0)	**15.6** (14.5-16.7)	**17.4** (16.1-18.5)	**19.3** (17.8-20.6)	**22.3** (20.4-23.7)	**24.8** (22.6-26.5)
45-day	**10.3** (9.70-10.9)	**12.0** (11.3-12.7)	**13.6** (12.8-14.4)	**14.9** (14.1-15.8)	**16.9** (15.9-17.9)	**18.6** (17.4-19.7)	**20.4** (19.1-21.6)	**22.4** (20.9-23.8)	**25.4** (23.5-26.9)	**27.9** (25.6-29.6)
60-day	**12.4** (11.7-13.1)	**14.4** (13.7-15.3)	**16.2** (15.4-17.2)	**17.7** (16.8-18.8)	**19.9** (18.8-21.1)	**21.8** (20.5-23.0)	**23.8** (22.4-25.2)	**26.1** (24.4-27.5)	**29.3** (27.2-31.0)	**32.0** (29.6-33.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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B. Calculation Sheet

PENNEAST- MLV - 2

PROPOSED CONDITIONS RUNOFF COEFFICIENT CALCULATIONS FOR PROPOSED INLETS

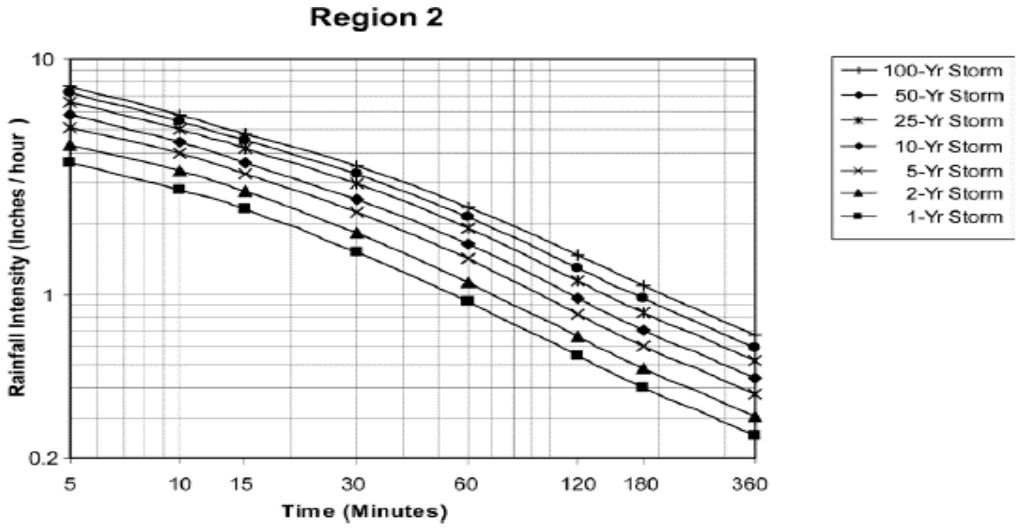
***Note: Rational C Coefficients adopted from PA Erosion and Sediment Pollution Control Program Manual, Mar 2012, Table 5.2**

DA	Land Use	Soils	HSG	Area	Area (Acres)	C	C*A	RC
INLET1	MEAD	WmB	D	275	0.006	0.16	0.001	0.16
INLET1	MEAD	WmB	D	907	0.021	0.16	0.003	0.16
INLET1	GRV	WmB	D	401	0.009	0.86	0.008	0.86
INLET1	IMP	WmB	D	255	0.006	0.86	0.005	0.86
INLET1	GRV	WmB	D	135	0.003	0.86	0.003	0.86
INLET1	MEAD	WmB	D	79	0.002	0.16	0.000	0.16
INLET1	MEAD	WmB	D	61	0.001	0.16	0.000	0.16
INLET1	GRV	LcD	C	47	0.001	0.86	0.001	0.86
INLET1	IMP	LcD	C	43	0.001	0.86	0.001	0.86
INLET1	GRV	LcD	C	22	0.001	0.86	0.000	0.86
INLET1	MEAD	LcD	C	38	0.001	0.28	0.000	0.28
INLET1	MEAD	LcD	C	123	0.003	0.28	0.001	0.28
INLET1	IMP	LcD	C	1270	0.029	0.86	0.025	0.86
INLET1	IMP	LcD	C	268	0.006	0.86	0.005	0.86
INLET1 Total					**0.090**		**0.054**	**0.60**

The "RC" value is an area averaged runoff coefficient value (arithmatic mean) calculated as:

$$RC = \frac{\sum_{i=1}^{n} C_i \, x \, Area_i}{\sum_{i=1}^{n} Area_i}$$

Rainfall Intensity Curve*



PENNEAST- MLV-2

RATIONAL METHOD PEAK FLOW CALCULATIONS FOR PROPOSED INLETS

Return Period (Yrs) 2

DA	Area (Acres)	RC	Tc (mins)	Rainfall Intensity (in/hr)	Q (cfs)
INLET1	0.090	0.60	5.00	4.3	0.23

Return Period (Yrs) 10

DA	Area (Acres)	RC	Tc (mins)	Rainfall Intensity (in/hr)	Q (cfs)
INLET1	0.090	0.60	5.00	5.8	0.31

Return Period (Yrs) 100

DA	Area (Acres)	RC	Tc (mins)	Rainfall Intensity (in/hr)	Q (cfs)
INLET1	0.090	0.60	5.00	7.7	0.42

INLET CAPACITY CHECK

Inlet ID	Inlet Type	Design Flow, cfs	Grate Open Area, sq ft	Depth of Flow, ft	Inlet Perimeter, ft	Grate Flow Capacity, cfs	Inlet Collection Capacity, cfs
IN-1	Type M	0.42	4.4	0.17	12.3	8.74	2.85

EXISTING BYPASS-Tc CALCULATIONS

SHEET FLOW	
Manning's n	0.4
Flow length, ft	100
2-Yr 24-Hr rainfall, in	3.2
Land slope, %	2.00
Sheet flow time, min	**21.47**
SHALLOW CONC. FLOW	
Flow length, ft	285.68
Watercourse slope, %	5.95
Surface Description	unpaved
Velocity, ft/s	3.94
Sh. Conc. Flow time, min	**1.21**
TIME OF CONC., mins	**22.7**

EXISTING TRENCH-Tc CALCULATIONS

SHEET FLOW	
Manning's n	0.4
Flow length, ft	100
2-Yr 24-Hr rainfall, in	3.2
Land slope, %	276.00
Sheet flow time, min	**2.99**
SHALLOW CONC. FLOW	
Flow length, ft	6.62
Watercourse slope, %	7.55
Surface Description	unpaved
Velocity, ft/s	4.43
Sh. Conc. Flow time, min	**0.02**
TIME OF CONC., mins	**3.0**

PROPOSED BYPASS -Tc CALCULATIONS

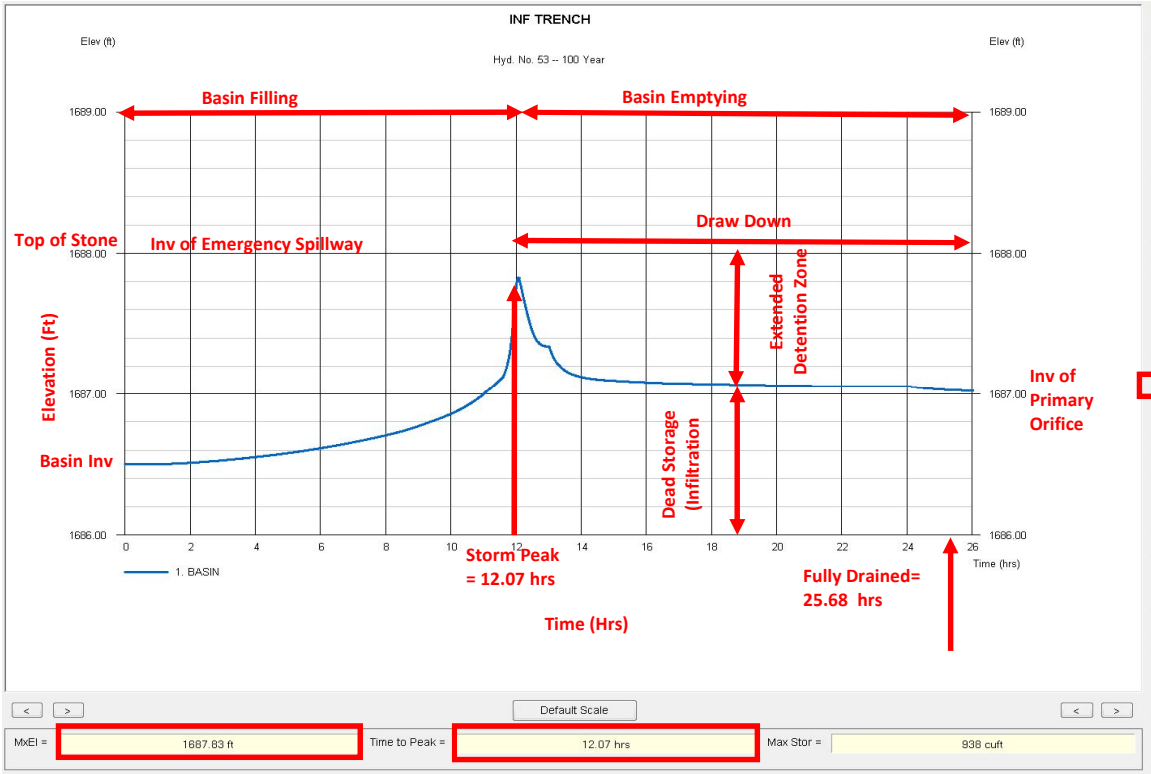
SHEET FLOW	
Manning's n	0.4
Flow length, ft	100
2-Yr 24-Hr rainfall, in	3.2
Land slope, %	2.00
Sheet flow time, min	**21.47**
SHALLOW CONC. FLOW	
Flow length, ft	204
Watercourse slope, %	5.88
Surface Description	unpaved
Velocity, ft/s	3.91
Sh. Conc. Flow time, min	**0.87**
TIME OF CONC., mins	**22.3**

PROPOSED TRENCH-Tc CALCULATIONS

SHEET FLOW	
Flow length, ft	69.88
Watercourse slope, %	2.15
Surface Description	paved
Velocity, ft/s	2.98
Sh. Conc. Flow time, min	**0.39**
TIME OF CONC., mins	**0.39**

BASIN DEWATERING TIME CALCULATIONS

BASIN NAME	UG-BASIN	
MLV-2 TP-1, Test 1, IN/HR	3	
MLV-2 TP-1, Test 2, IN/HR	0	
MLV-2 TP-2, Test 1, IN/HR	0	
MLV-2 TP-2, Test 2, IN/HR	0.2	
AVERAGE, IN/HR	0.07	
FOS	**2.00**	***BASIN FLOOD TEST HAS SAFETY FACTOR BUILT IN***
DESIGN RATE, IN/HR	**0.03**	
INFILTRATION OF STORAGE VOLUME BELOW PRIMARY ORIFICE		
Bed Bottom Area	1760.00	
Storage Volume	352.00	
DRAIN TIME (1)	**72.00**	***DRAIN TIME FOR DEAD STORAGE BELOW PRIMARY ORIFICE***
INFILTRATION OF STORAGE VOLUME ABOVE PRIMARY ORIFICE (THROUGH OUTLET STR)		



Time (hrs)	Elev (ft)
25.42	1687.03
25.43	1687.03
25.45	1687.03
25.47	1687.03
25.48	1687.03
25.50	1687.03
25.52	1687.03
25.53	1687.03
25.55	1687.03
25.57	1687.03
25.58	1687.03
25.60	1687.03
25.62	1687.03
25.63	1687.03
25.65	1687.03
25.67	1687.03
25.68	1687.02
25.70	1687.02
25.72	1687.02
25.73	1687.02
25.75	1687.02
25.77	1687.02
25.78	1687.02
25.80	1687.02
25.82	1687.02
25.83	1687.02
25.85	1687.02
25.87	1687.02
25.88	1687.02
25.90	1687.02
25.92	1687.02
25.93	1687.02
25.95	1687.02
25.97	1687.02
25.98	1687.02
26.00	1687.02

DRAIN TIME (2)	**13.61**	***DRAIN TIME FROM 100-YEAR STORM PEAK TO DEAD STORAGE ELEVATION***
TOTAL DRAIN TIME (1>2)	**72.00**	

Pond Report

CALCULATION FOR VOLUME STORAGE
FOR INFILTRATION TRENCH

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Monday, 07 / 2 / 2018

Pond No. 1 - BASIN

Pond Data

UG Chambers -Invert elev. = 1687.00 ft, Rise x Span = 0.50 x 0.50 ft, Barrel Len = 44.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 1686.50 ft, Width = 40.00 ft, Height = 1.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1686.50	n/a	0	0
0.15	1686.65	n/a	106	106
0.30	1686.80	n/a	106	211
0.45	1686.95	n/a	106	317
0.60	1687.10	n/a	106	423
0.75	1687.25	n/a	107	531
0.90	1687.40	n/a	107	638
1.05	1687.55	n/a	106	745
1.20	1687.70	n/a	106	850
1.35	1687.85	n/a	106	956
1.50	1688.00	n/a	106	1,061

Lowest orifice elevation at 1687.00
(40' x 44' x .5' x .40 = 352)

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	Inactive	0.00	0.00
Span (in)	= 4.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1687.00	1682.00	0.00	0.00
Length (ft)	= 0.25	0.25	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 1688.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1686.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.15	106	1686.65	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	211	1686.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.45	317	1686.95	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.60	423	1687.10	0.02 ic	0.00	---	---	0.00	---	---	---	---	---	0.024
0.75	531	1687.25	0.12 ic	0.00	---	---	0.00	---	---	---	---	---	0.120
0.90	638	1687.40	0.15 oc	0.00	---	---	0.00	---	---	---	---	---	0.146
1.05	745	1687.55	0.26 ic	0.00	---	---	0.00	---	---	---	---	---	0.260
1.20	850	1687.70	0.31 ic	0.00	---	---	0.00	---	---	---	---	---	0.307
1.35	956	1687.85	0.35 ic	0.00	---	---	0.00	---	---	---	---	---	0.347
1.50	1,061	1688.00	0.38 ic	0.00	---	---	0.00	---	---	---	---	---	0.384

PENNEAST-MLV - 2

PROPOSED DRAINAGE PIPES CAPACITY ANALYSIS

Pipe ID	P-1	
Upstream Str	OS-1	
Downstream Str	IN-1	
peak Discharge, cfs	0.34	100-Year Flow
Pipe Diamater, in	8.00	
Manning's N	0.011	
% Slope	1.00	
diameter of pipe, d, ft	0.66666667	
wetted area, sf =	0.35	
wetted perimeter, P, ft =	2.09	
R =	0.17	
Slope, ft/ft =	0.01	
Full Flow Velocity, ft/s =	**4.10**	
Full Flow Q, cfs =	**1.43**	**Capacity Ok**

Hydrograph Report

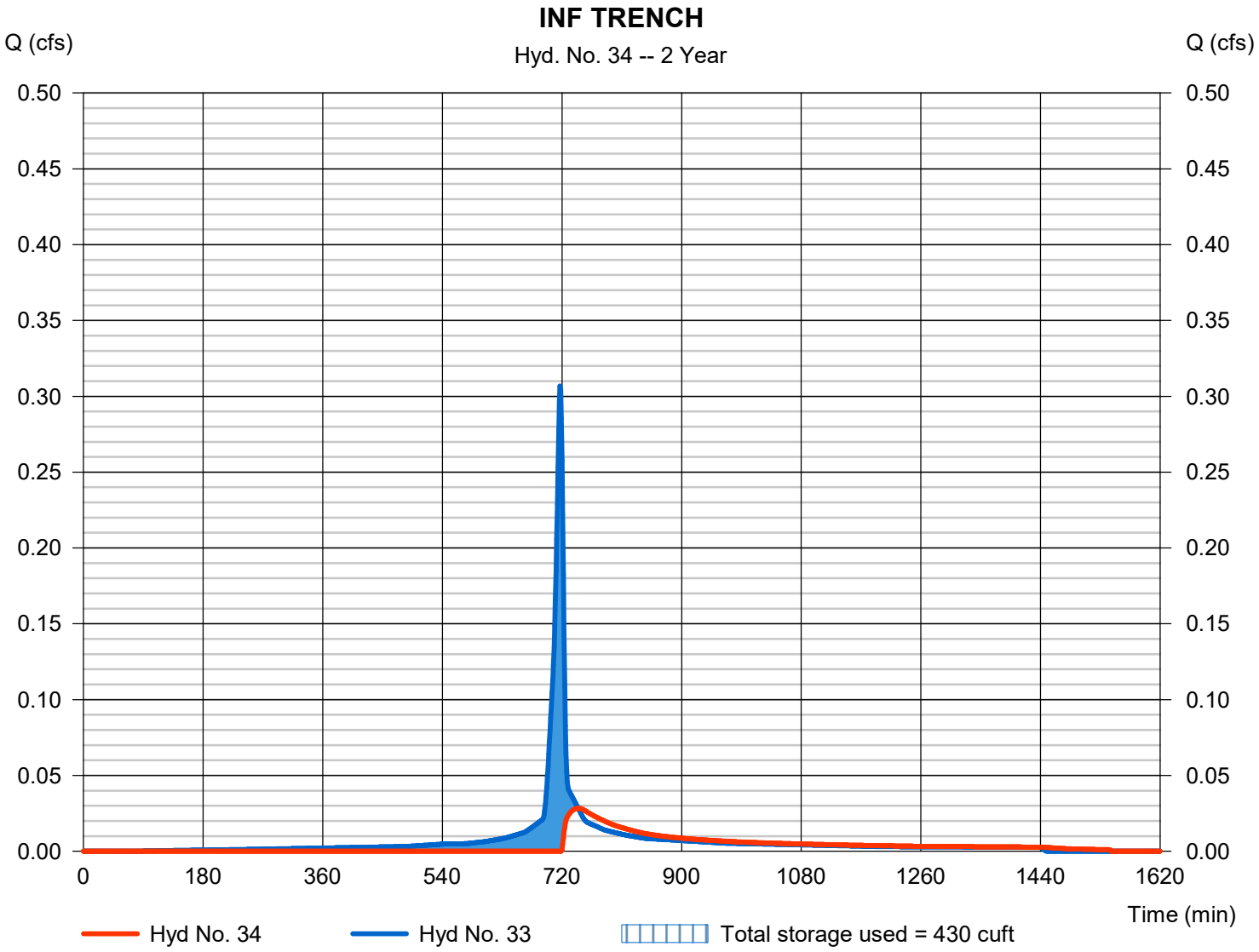
2-YR INFILTRATION TRENCH POND REPORT

Hyd. No. 34

INF TRENCH

Hydrograph type	=	Reservoir	Peak discharge	=	0.028 cfs
Storm frequency	=	2 yrs	Time to peak	=	744 min
Time interval	=	1 min	Hyd. volume	=	333 cuft
Inflow hyd. No.	=	33 - PR-TO-TRENCH	Max. Elevation	=	1687.11 ft
Reservoir name	=	BASIN	Max. Storage	=	430 cuft

Storage Indication method used.



PENNEAST-MLV 2
INLET DISCHARGE

OUTLET ID	IN-1	
Discharge Type	Surface	
10-YR Peak Discharge, cfs	0.17	10-Year Basin Discharge from Model Hydrograph 34
DS Ground Cover	Grass	
Crest Elev.	1687	
Design Criteria cfs/lf	13.0	
Calculated Crest Length, ft	2.2	
Design Crest Length, ft	**4**	
Weir Coefficient	3.33	Use sharp crested value to calculate higher velocity
Weir Head (H)	0.05	to be conservative.
Flow Area	0.22	
Velocity	0.00	
Velocity Non-Erosive	YES	

PENNEAST-MLV -2
PROPOSED CONDITIONS RUNOFF COEFFICIENT CALCULATIONS FOR PROPOSED SWALES

***Note: Rational C Coefficients adopted from PA Erosion and Sediment Pollution Control Program Manual, Mar 2012, Table 5.2**

DA	Land Use	Soils	HSG	Area	Area (Acres)	C	C*A	RC
SWALE1	Grass	WmB	D	760	0.017	0.30	0.005	0.30
	Woods	WmB	D	5865	0.135	0.16	0.022	0.16
	Grass	WmB	D	275	0.006	0.30	0.002	0.30
SWALE1 Total					**0.158**		**0.029**	**0.18**

The "RC" value is an area averaged runoff coefficient value (arithmatic mean) calculated as:

$$RC = \frac{\sum_{i=1}^{n} C_i \; x \; Area_i}{\sum_{i=1}^{n} Area_i}$$

PENNEAST- MLV - 2
RATIONAL METHOD PEAK FLOW CALCULATIONS FOR PROPOSED SWALES

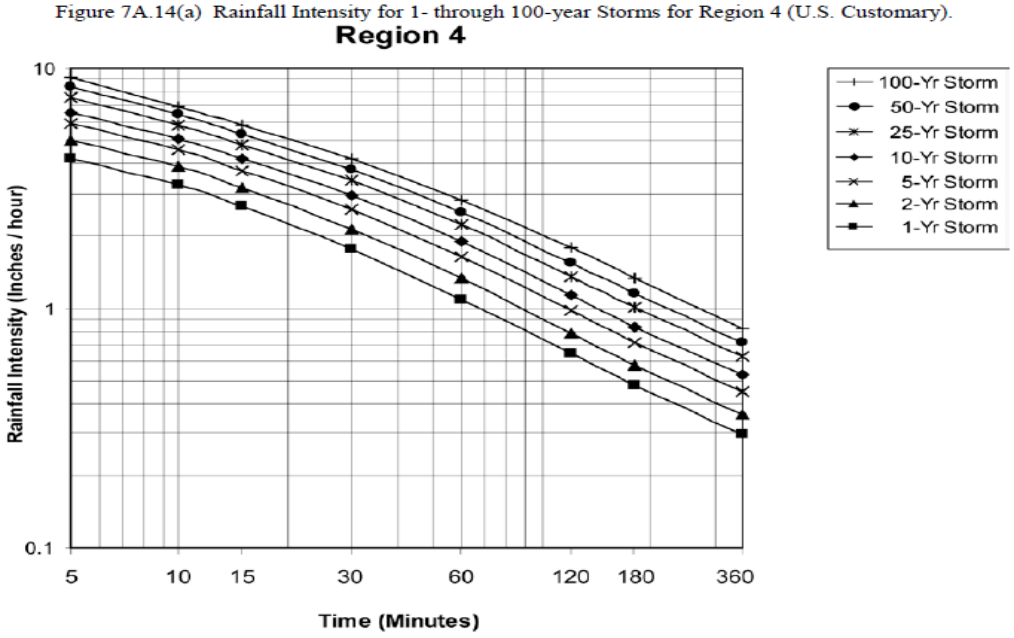
Return Period (Yrs) 10

DA	Area (Acres)	RC	Tc (mins)	Rainfall Intensity (in/hr)	Q (cfs)
SWALE1	0.158	0.18	22	4.68	0.1

Return Period (Yrs) 100

DA	Area (Acres)	RC	Tc (mins)	Rainfall Intensity (in/hr)	Q (cfs)
SWALE1	0.158	0.18	22	8.07	0.2

Figure 7A.14(a) Rainfall Intensity for 1- through 100-year Storms for Region 4 (U.S. Customary).



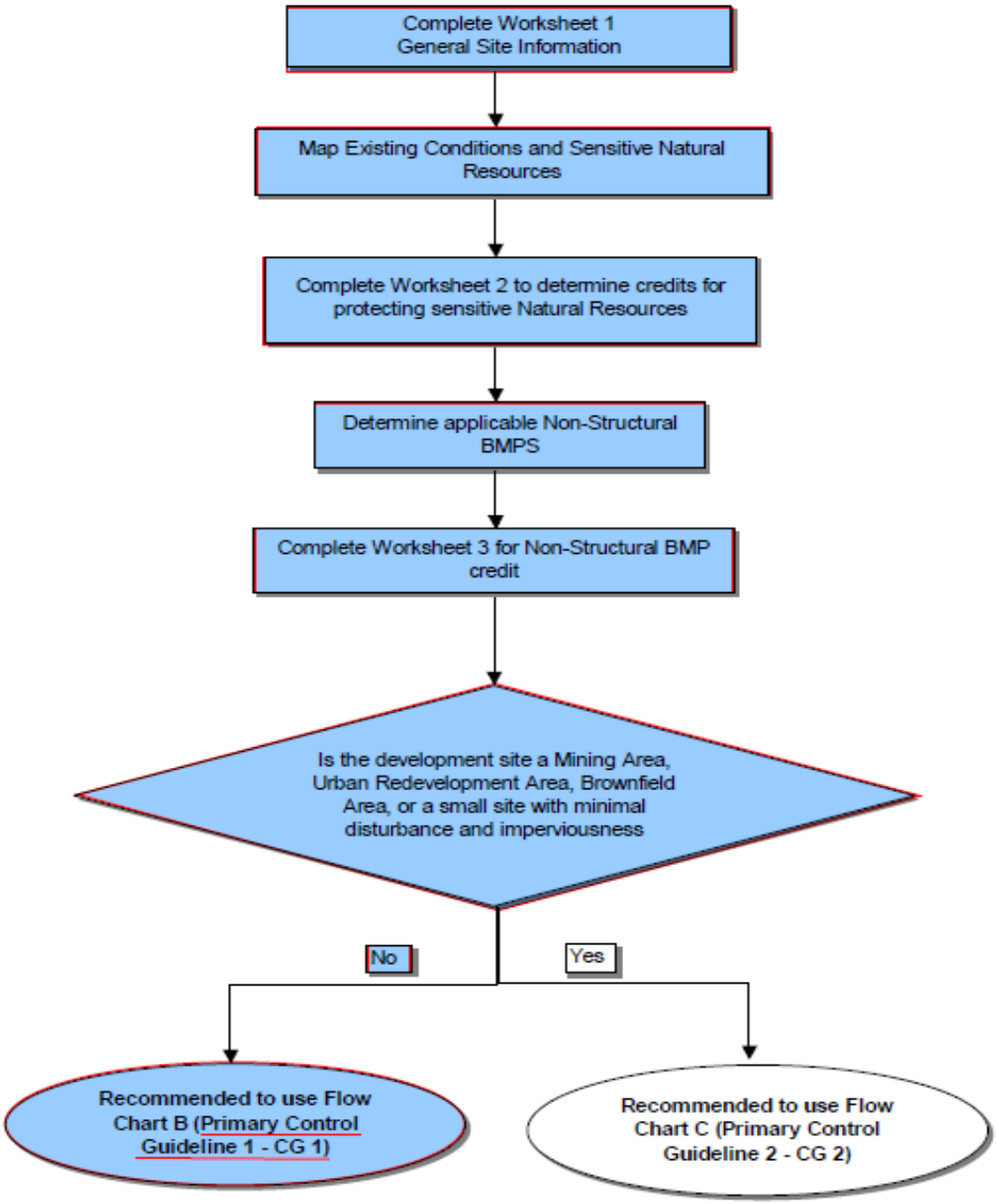
PROJECT NAME:	**SWALE1**	
LOCATION:	**Luzerne County**	
PREPARED BY:	**DATE:**	**6/29/2018**
CHECKED BY:	**DATE:**	**7/2/2018**

CHANNEL OR CHANNEL SECTION		
Temporary or Permanent (T or P)	P	
Required Capacity, Qr (cfs)	0.20	**See attached Rational Peak Flow Calculations**
Left side slope, %	33.33	
Right side slope, %	20.00	
Bottom width, ft	0	
Channel Depth provided, ft	1	
Channel bed slope, %	3	
Mannings N	0.15	
Accn. Due to gravity, ft/sec2	32.2	

DESIGN METHOD FOR LINING - SHEAR STRESS

CHECK FOR SHEAR STRESS		
H:V, left	3.00	
H:V, right	5.00	
bed slope, ft/ft	0.03	
Calculated channel flow depth, ft	0.32	
top width at flow depth, ft	2.55	
Bottom Width:Flow Depth Ratio	0.00	**Ratio Ok**
wetted area, sq. ft	0.40	
wetted peri, ft	2.63	
hyd. Radius, ft	0.15	
velocity, ft/s	0.49	
Discharge, cfs	0.20	
Theta, rad	0.030	
Froudes Number	0.15	
Flow type	subcritical	
Shear Stress, Lb/Sq.Ft	0.60	
Protective Lining	**Vegetated**	
Lining required	**TRM-435**	
D_{50}, inches		
Placement Thickness, inches		
Adjusted Mannings N	0.08	
Calculated Critical Slope,Sc ft/ft	0.17	
0.7 Sc, ft/ft	0.12	
1.3 Sc, ft/ft	0.22	
Stable Flow?	Stable	
Calculated Freeboard, ft	0.50	
Freeboard Provided, ft	0.68	**Freeboard Ok, Calculated<Provided**

C. BMP Worksheets


Complete Worksheet 1
General Site Information
Map Existing Conditions and Sensitive Natural Resources
Complete Worksheet 2 to determine credits for protecting sensitive Natural Resources
Determine applicable Non-Structural BMPS
Complete Worksheet 3 for Non-Structural BMP credit
Is the development site a Mining Area, Urban Redevelopment Area, Brownfield Area, or a small site with minimal disturbance and imperviousness
No
Yes
Recommended to use Flow Chart B (Primary Control Guideline 1 - CG 1)
Recommended to use Flow Chart C (Primary Control Guideline 2 - CG 2)

Worksheet 1. General Site Information

Date: Oct-19

Project Name: PennEast Pipeline - MLV-2

Municipality: Bear Creek Township

County: Luzerne

Total Area (acres): 0.09

Major River Basin: Delaware River Basin
http://www.dep.state.pa.us/dep/deputate/watermgt/wc/default.htm - newtopics

Watershed: Upper Susquehanna-Lackawanna

Sub-Basin: Lehigh

Nearest Surface Water(s) to Receive Runoff: Shades Creek

Chapter 93 - Designated Water Use: HQ-CWF, MF
http://www.pacode.com/secure/data/025/chapter93/chap93toc.html

Impaired according to Chapter 303(d) List ? Yes ☐ No ☑
http://www.dep.state.pa.us/dep/deputate/watermgt/wqp/wqstandards/303d-Report.htm

List Causes of Impairment:

Is project subject to, or part of:

Municipal Separate Storm Sewer System (MS4) Requirements? Yes ☐ No ☑
http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Subjects/StormwaterManagement/GeneralPermits/default.htm

Existing or planned drinking water supply? Yes ☐ No ☑

If yes, distance from proposed discharge (miles):

Approved Act 167 Plan? Yes ☑ No ☐
http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Subjects/StormwaterManagement/Approved_1.html

Existing River Conservation Plan? Yes ☐ No ☑
http://www.dcnr.state.pa.us/brc/rivers/riversconservation/planningprojects/

Worksheet 2. Sensitive Natural Resources

INSTRUCTIONS:

1. Provide Sensitive Resources Map according to non-structural BMP 5.4.1 in Chapter 5. This map should identify wetlands, woodlands, natural drainage ways, steep slopes, and other sensitive natural areas.

2. Summarize the existing extent of each sensitive resource in the Existing Sensitive Resources Table (below, using Acres). If none present, insert 0.

3. Summarize Total Protected Area as defined under BMPs in Chapter 5.

4. Do not count any area twice. For example, an area that is both a floodplain and a wetland may only be considered once.

EXISTING NATURAL SENSITIVE RESOURCE	MAPPED? yes/no/n/a	TOTAL AREA (Ac.)	PROTECTED AREA (Ac.)
Waterbodies	no		
Floodplains	no		
Riparian Areas	no		
Wetlands	no		
Woodlands	no		
Natural Drainage Ways	no		
Steep Slopes, 15%-25%	no		
Steep Slopes, over 25%	no		
Other:	no		
Other:	no		
TOTAL EXISTING:		**0.00**	**0.00**

Worksheet 3. Nonstructural BMP Credits

PROTECTED AREA

1.1 Area of Protected Sensitive/Special Value Features (see WS 2) 0.00 Ac.

1.2 Area of Riparian Forest Buffer Protection 0.00 Ac.

1.3 Area of Minimum Disturbance/Reduced Grading 0.00 Ac.

TOTAL 0.00 Ac.

Site Area	*minus*	Protected Area	=	Stormwater Management Area
0.09	-	0.00	=	0.09

VOLUME CREDITS

3.1 Minimum Soil Compaction

Lawn 0 sq. ft x 1/4" x 1/12 = 0 cubic ft

Meadow 0 sq. ft x 1/3" x 1/12 = 0 cubic ft

3.3 Protect Existing Trees

For Trees within 100 feet of impervious area:

Tree Canopy 0 sq. ft x 1/2" x 1/12 = 0 cubic ft

For Trees within 20 feet of impervious area:

Tree Canopy 0 sq. ft x 1" x 1/12 = 0 cubic ft

5.1 Disconnect Roof Leaders to Vegetated Areas

For runoff directed to areas protected under 5.8.1 and 5.8.2

Roof Area 0 sq. ft x 1/3" x 1/12 = 0 cubic ft

For all other disconnected roof areas

Roof Area 0 sq. ft x 1/4" x 1/12 = 0 cubic ft

5.2 Disconnect Non-Roof Impervious to Vegetated Areas

For runoff directed to areas protected under 5.8.1 and 5.8.2

Impervious Area 0 sq. ft x 1/3" x 1/12 = 0 cubic ft

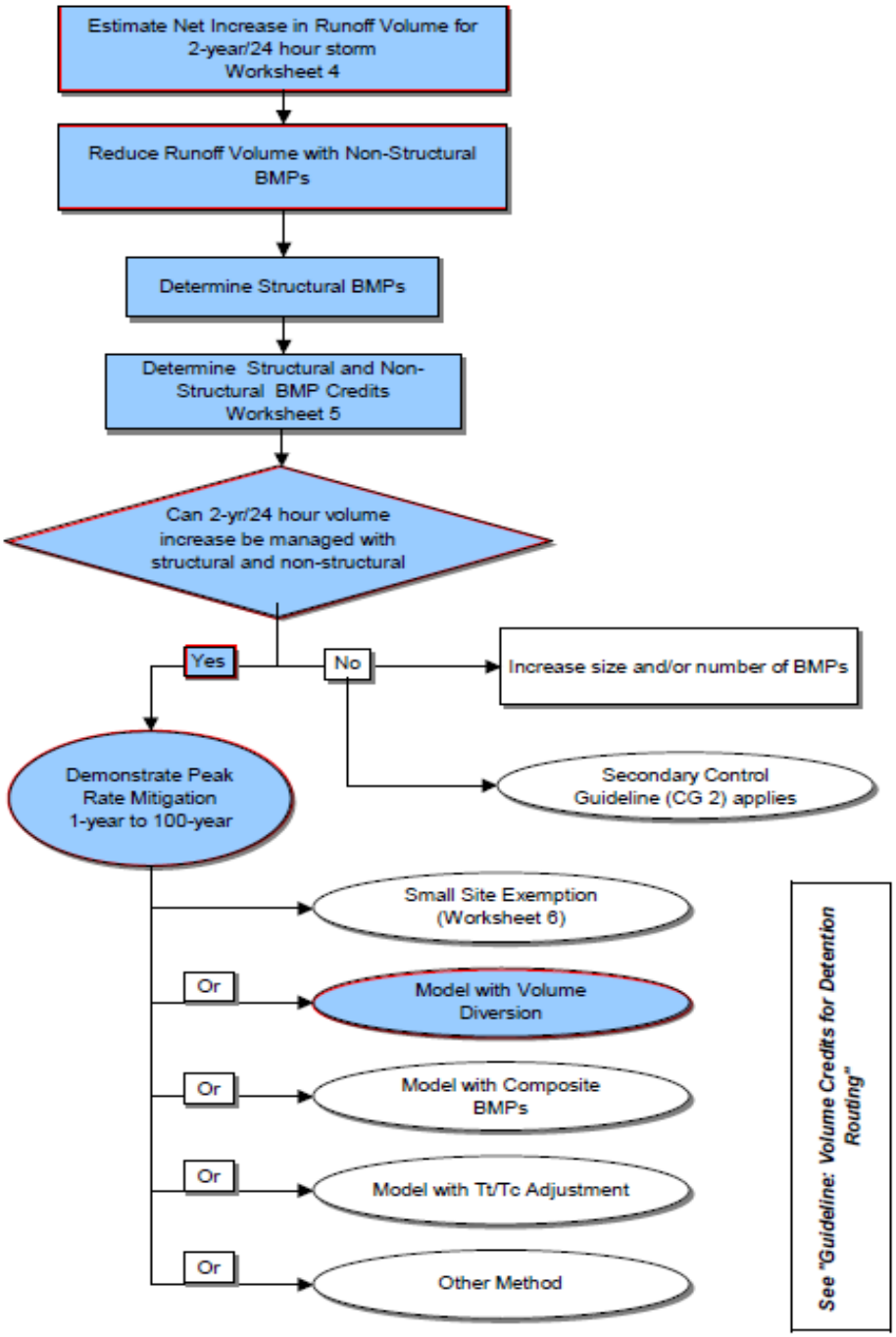
For all other disconnected areas

Impervious Area 0 sq. ft x 1/4" x 1/12 = 0 cubic ft

TOTAL NON-STRUCTURAL VOLUME CREDIT* 0 cubic ft

* For use on Worksheet 5

FLOW CHART B
Control Guideline 1 Process



Worksheet 4A. Change in Runoff Volume for 1-Yr Storm Event

PROJECT: PennEast Pipeline - MLV-2
Drainage Area: 0.33 acres
1-Year Rainfall: 2.67 in

Total Site Area: 0.09 acres
Protected Site Area: 0.00 acres
Managed Area: 0.09 acres

Existing Conditions:

Cover Type/ Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (cubic ft)
Wooded	WmB	1,450	0.03	77	2.99	0.60	0.85	103
Wooded	WmB	275	0.01	77	2.99	0.60	0.85	19
Wooded	WmB	907	0.02	77	2.99	0.60	0.85	64
Wooded	WmB	401	0.01	77	2.99	0.60	0.85	28
Wooded	WmB	255	0.01	77	2.99	0.60	0.85	18
Wooded	WmB	135	0.00	77	2.99	0.60	0.85	10
Wooded	WmB	79	0.00	77	2.99	0.60	0.85	6
Wooded	WmB	61	0.00	77	2.99	0.60	0.85	4
Wooded	LcD	47	0.00	70	4.29	0.86	0.54	2
Wooded	LcD	43	0.00	70	4.29	0.86	0.54	2
Wooded	LcD	22	0.00	70	4.29	0.86	0.54	1
Wooded	LcD	38	0.00	70	4.29	0.86	0.54	2
Wooded	LcD	123	0.00	70	4.29	0.86	0.54	6
Wooded	LcD	1,270	0.03	70	4.29	0.86	0.54	57
Access Road	LcD	268	0.01	98	0.20	0.04	2.44	54
TOTAL:		**5,374**	**0.12**				**12.47**	**376**

Developed Conditions:

Cover Type/ Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (cubic ft)
Wooded	WmB	1450	0.03	77	2.99	0.60	0.85	103
Grass	WmB	275	0.01	78	2.82	0.56	0.90	21
Grass	WmB	907	0.02	78	2.82	0.56	0.90	68
Gravel Roadway	WmB	401	0.01	94	0.64	0.13	2.03	68
Gravel	WmB	255	0.01	98	0.20	0.04	2.44	52
Gravel Roadway	WmB	135	0.00	94	0.64	0.13	2.03	23
Grass	WmB	79	0.00	78	2.82	0.56	0.90	6
Grass	WmB	61	0.00	78	2.82	0.56	0.90	5
Gravel	LcD	47	0.00	91	0.99	0.20	1.77	7
Gravel Roadway	LcD	43	0.00	98	0.20	0.04	2.44	9
Gravel	LcD	22	0.00	91	0.99	0.20	1.77	3
Grass	LcD	38	0.00	71	4.08	0.82	0.58	2
Grass	LcD	123	0.00	71	4.08	0.82	0.58	6
Gravel Roadway	LcD	1270	0.03	98	0.20	0.04	2.44	258
Gravel Roadway	LcD	268	0.01	98	0.20	0.04	2.44	55
TOTAL:		**5,374**	**0.12**				**22.96**	**684**

1-Year Volume Increase (cubic ft): 308

1-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = Q = (P - 0.2S)^2 / (P + 0.8S) where

P = 2-Year Rainfall (in)

S = (1000/CN) - 10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.

Worksheet 4B. Change in Runoff Volume for 2-Yr Storm Event

PROJECT: PennEast Pipeline - MLV-2
Drainage Area: 0.33 acres
2-Year Rainfall: 3.20 in

Total Site Area: 0.09 acres
Protected Site Area: 0.00 acres
Managed Area: 0.09 acres

Existing Conditions:

Cover Type/ Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (cubic ft)
Wooded	WmB	1,450	0.03	77	2.99	0.60	1.21	146
Wooded	WmB	275	0.01	77	2.99	0.60	1.21	28
Wooded	WmB	907	0.02	77	2.99	0.60	1.21	92
Wooded	WmB	401	0.01	77	2.99	0.60	1.21	40
Wooded	WmB	255	0.01	77	2.99	0.60	1.21	26
Wooded	WmB	135	0.00	77	2.99	0.60	1.21	14
Wooded	WmB	79	0.00	77	2.99	0.60	1.21	8
Wooded	WmB	61	0.00	77	2.99	0.60	1.21	6
Wooded	LcD	47	0.00	70	4.29	0.86	0.83	3
Wooded	LcD	43	0.00	70	4.29	0.86	0.83	3
Wooded	LcD	22	0.00	70	4.29	0.86	0.83	2
Wooded	LcD	38	0.00	70	4.29	0.86	0.83	3
Wooded	LcD	123	0.00	70	4.29	0.86	0.83	8
Wooded	LcD	1,270	0.03	70	4.29	0.86	0.83	88
Access Road	LcD	268	0.01	98	0.20	0.04	2.97	66
TOTAL:		**5,374**	**0.12**				**17.63**	**533**

Developed Conditions:

Cover Type/ Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (cubic ft)
Wooded	WmB	1450	0.03	77	2.99	0.60	1.21	146
Grass	WmB	275	0.01	78	2.82	0.56	1.27	29
Grass	WmB	907	0.02	78	2.82	0.56	1.27	96
Gravel Roadway	WmB	401	0.01	94	0.64	0.13	2.54	85
Gravel	WmB	255	0.01	98	0.20	0.04	2.97	63
Gravel Roadway	WmB	135	0.00	94	0.64	0.13	2.54	29
Grass	WmB	79	0.00	78	2.82	0.56	1.27	8
Grass	WmB	61	0.00	78	2.82	0.56	1.27	7
Gravel	LcD	47	0.00	91	0.99	0.20	2.26	9
Gravel Roadway	LcD	43	0.00	98	0.20	0.04	2.97	11
Gravel	LcD	22	0.00	91	0.99	0.20	2.26	4
Grass	LcD	38	0.00	71	4.08	0.82	0.88	3
Grass	LcD	123	0.00	71	4.08	0.82	0.88	9
Gravel Roadway	LcD	1270	0.03	98	0.20	0.04	2.97	314
Gravel Roadway	LcD	268	0.01	98	0.20	0.04	2.97	66
TOTAL:		**5,374**	**0.12**				**29.54**	**879**

2-Year Volume Increase (cubic ft):	347

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = Q = (P - 0.2S)^2 / (P + 0.8S) where

P = 2-Year Rainfall (in)

S = (1000/CN) - 10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.

Note to be consistent with Act 167 Requirements Calculations are provided for the 1-year and 2-year storms.

Worksheet 5. Structural BMP Volume Credits

PROJECT: PennEast Pipeline - MLV-2
SUB-BASIN: Lehigh

Required Control Volume (cubic ft) - from Worksheet 4:		347
Non-structural Volume Credit (cubic ft) - from Worksheet 3:	-	0
Structural Volume Requirement (cubic ft) *(Required Control Volume minus Non-structural Credit)*		347

Proposed BMP		Area (sq. ft)	Storage Volume (cubic ft)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench	1760	352
6.4.5	Rain Garden / Bioretention		
6.4.6	Dry Well / Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond / Retention Basin		
6.6.3	Dry Extended Detention Basin		
6.6.4	Water Quality Filters		
6.7.1	Riparian Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
Other			

Total Structural Volume (cubic ft): 352

Structural Volume Requirement (cubic ft): 347

DIFFERENCE 5 cubic ft

Worksheet 6. Small Site / Small Impervious Area Exception for Peak Rate Mitigation Calculations

The following conditions must be met for exemption from peak rate analysis for small sites under CG-1:

Y The 2-Year Runoff Volume increase must be met in BMPs designed in accordance with Manual Standards.

Y Total Site Impervious Area may not exceed **1 acre.**

Y Maximum Development Area is **5 acres.**

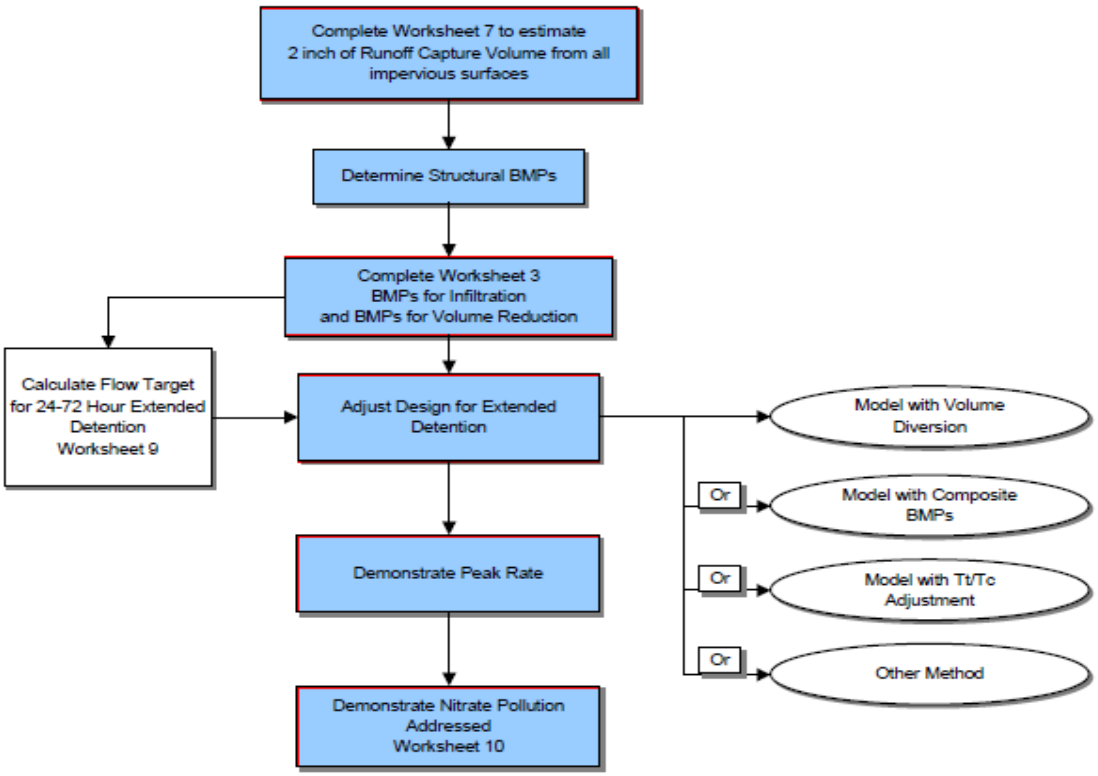
Y Maximum site impervious cover is 50%.

Y No more than 25% Volume Control can be in Non-structural BMPs.

N Infiltration BMPs must have an infiltration of at least 0.5 in/hr.

Site Area	Percent Impervious	Total Impervious
5 acre	20%	1 acre
2 acre	50%	1 acre
1 acre	50%	0.5 acre
0.5 acre	50%	0.25 acre

FLOW CHART C
Control Guideline 2 Process



Since the Act 167 Plan requires complinace with CG1 and CG2 Flow Chart C and Worksheets 7 and 8 have been included.

Worksheet 7. Calculation of Runoff Volume (PRV and EDV) for CG-2 Only

PROJECT: PennEast Pipeline - MLV-2
DRAINAGE AREA: 0.33

Total Site Area: 0.09 acres
Protected Site Area: 0.00 acres
Managed Area: 0.09 acres
Total Impervious Area: 0.04 acres

2 Inch Runoff - Multiply Total Impervious Area by 2 inc

Cover Type	Area (ac)	Runoff Capture Volume (cubic ft)
Roof	0.000	0
Pavement	0.042	305
Other Impervious	0.000	0
TOTAL:	0.042	305

1 Inch Rainfall ·

Cover Type	Area (square ft)	Area (ac)	Runoff (in)	Runoff Volumes (cubic ft)
Gravel Pad	605	0.014	0.79	40
IMP Gravel Pad	298	0.007	0.79	20
Access Road	1,538	0.035	0.79	101
TOTAL:	2,441	0.056		161

1. Total Runoff Capture Volume (cu ft) = Total Impervious Area (sq ft x 2 inch x 1/12

2. PRV (cu ft) = Total Impervious Area (sq ft) x 1 inch x 1/12

3. EDV (cu ft) = Total Area (sq ft) x 1 inch x 1/12

Water quality volume requirements for land areas with existing cover consisting of meadow, brush, wood-grass combination, or woods proposed for conversion to any other non-equivalent type of pervious cover shall be sized for one-half (1/2) the volume required for impervious surfaces as mentioned in this worksheet and calculated in items 1 through 3 above

Worksheet 8. Structural BMP Volume Credits

PROJECT: PennEast Pipeline - MLV-2
SUB-BASIN: Lehigh

Required Control Volume (cubic ft) - *from Worksheet 7:*		305
Non-structural Volume Credit (cubic ft) - *from Worksheet 3:*	-	0
Structural Volume Reqmt (cubic ft) *(Required Control Volume minus Non-structural Credit)*		305

	Proposed BMP*	Area (square ft)	Storage Volume (cubic ft)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench	1760	430
6.4.5	Rain Garden / Bioretention		
6.4.6	Dry Well / Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond / Retention Basin		
6.6.3	Dry Extended Detention Basin		
6.6.4	Water Quality Filters		
6.7.1	Riparian Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
Other			

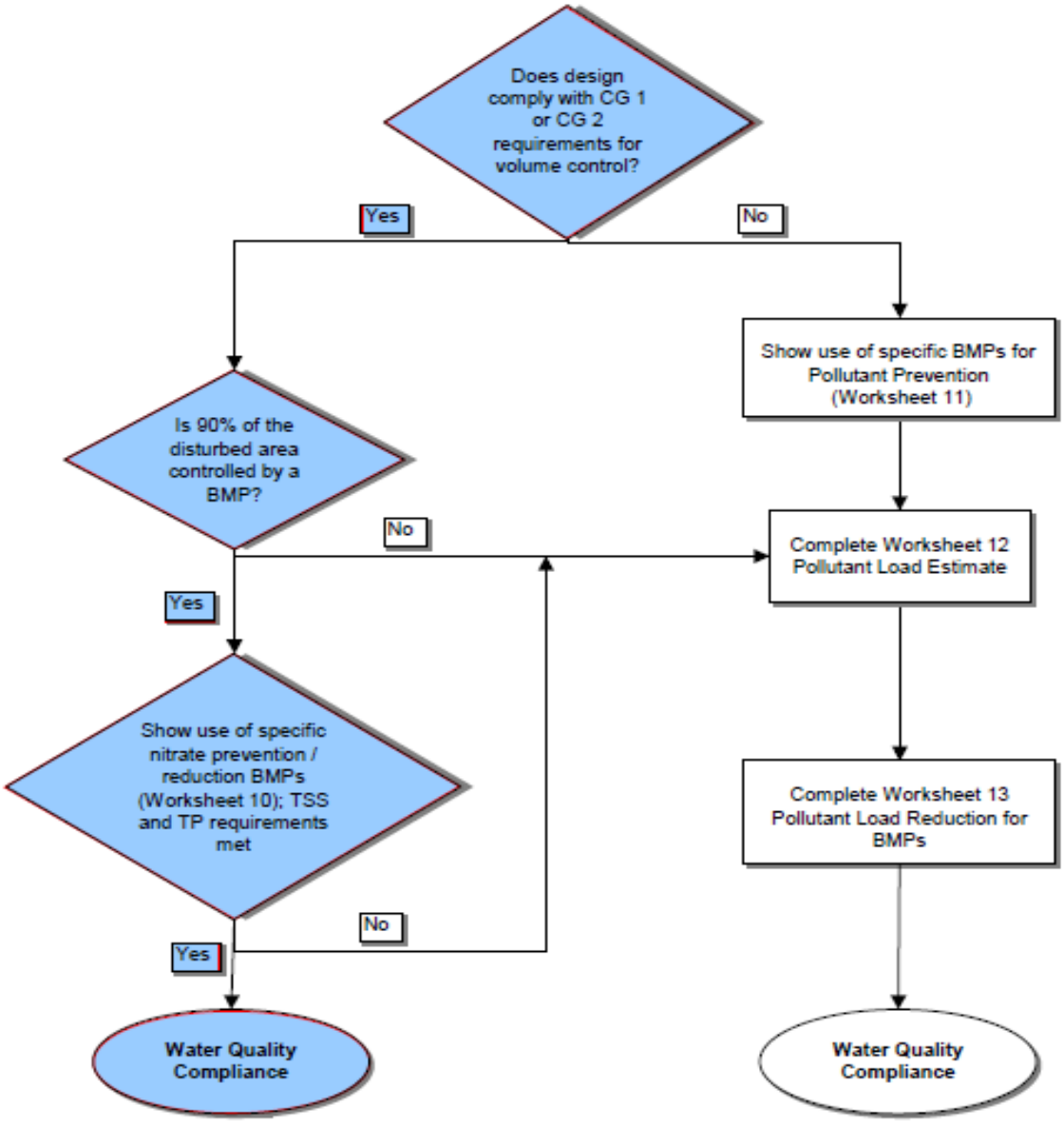
Total Structural Volume (cubic ft): 430

Structural Volume Requirement (cubic ft): 305

DIFFERENCE 125

Since the Act 167 Plan requires complinace with CG1 and CG2 Flow Chart C and Worksheets 7 and 8 have been included.

Flow Chart D
Water Quality Process



Worksheet 10. Water Quality Compliance for Nitrate

Does the site design incorporate the following BMPs to address nitrate pollution? A summary "yes" rating is achieved if at least 2 Primary BMPs for nitrate are provided across the site or 4 secondary BMPs for nitrate are provided across the site (or 1 primary and 2 secondary).

PRIMARY BMPs FOR NITRATE:

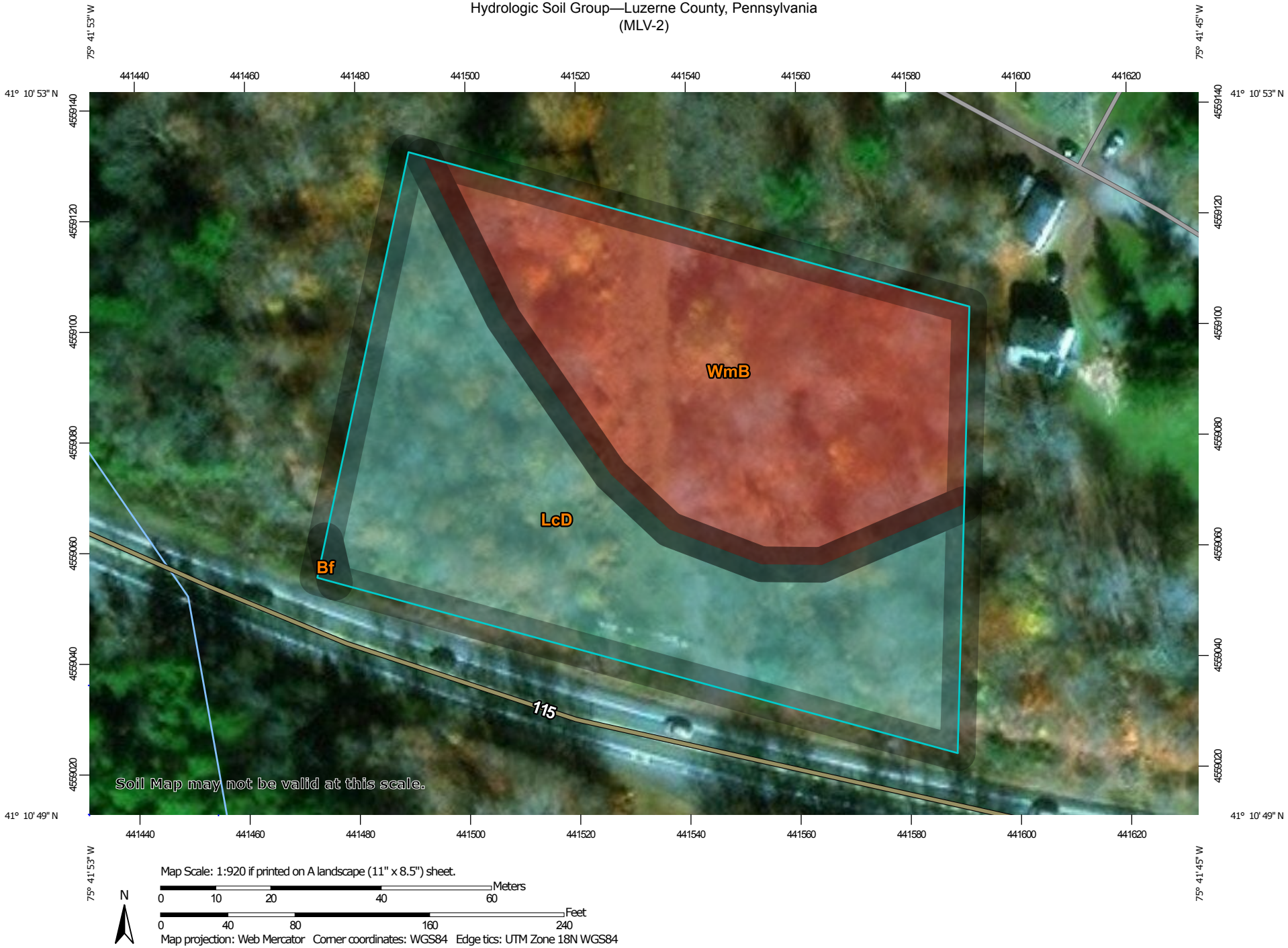
	YES	NO
NS BMP 5.4.2 - Protect / Conserve / Enhance Riparian Buffers		X
NS BMP 5.5.4 - Cluster Uses at Each Site	X	
NS BMP 5.6.1 - Minimize Total Disturbed Area		X
NS BMP 5.6.3 - Re-Vegetate / Re-Forest Disturbed Areas		X
NS BMP 5.9.1 - Street Sweeping / Vacuuming		X
Structural BMP 6.7.1 - Riparian Buffer Restoration		X
Structural BMP 6.7.2 - Landscape Restoration	X	

SECONDARY BMPs FOR NITRATE:

NS BMP 5.4.1 - Protect Sensitive / Special Value Features		X
NS BMP 5.4.3 - Protect / Utilize Natural Drainage Features		X
NS BMP 5.6.2 - Minimize Soil Compaction		X
Structural BMP 6.4.5 - Rain Garden / Bioretention		X
Structural BMP 6.4.8 - Vegetated Swale		X
Structural BMP 6.4.9 - Vegetated Filter Strip		X
Structural BMP 6.6.1 - Constructed Wetland		X
Structural BMP 6.7.1 - Riparian Buffer Restoration		X
Structural BMP 6.7.2 - Landscape Restoration		X
Structural BMP 6.7.3 - Soils Amendment / Restoration	X	

D. Soil Report

Hydrologic Soil Group—Luzerne County, Pennsylvania
(MLV-2)



Map Scale: 1:920 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Luzerne County, Pennsylvania
Survey Area Data: Version 11, Nov 27, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 20, 2010—Jul 7, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bf	Basher soils	C	0.0	0.1%
LcD	Lackawanna channery silt loam, 8 to 25 percent slopes, extremely stony	C	1.2	52.8%
WmB	Wellsboro channery silt loam, 3 to 8 percent slopes, extremely stony	D	1.0	47.1%
Totals for Area of Interest			**2.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

E. Existing Conditions Stormwater Management Map

WmB

N/A

N/A

NAT_VEG

INF_BAS

N/A

LcD

LaB

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Tc Path
- LOD
- Drainage Area
- WO
- Mainline Easement
- MEAD
- IMP
- 2ft Contours

0 12.5 25 50 75 100 Feet

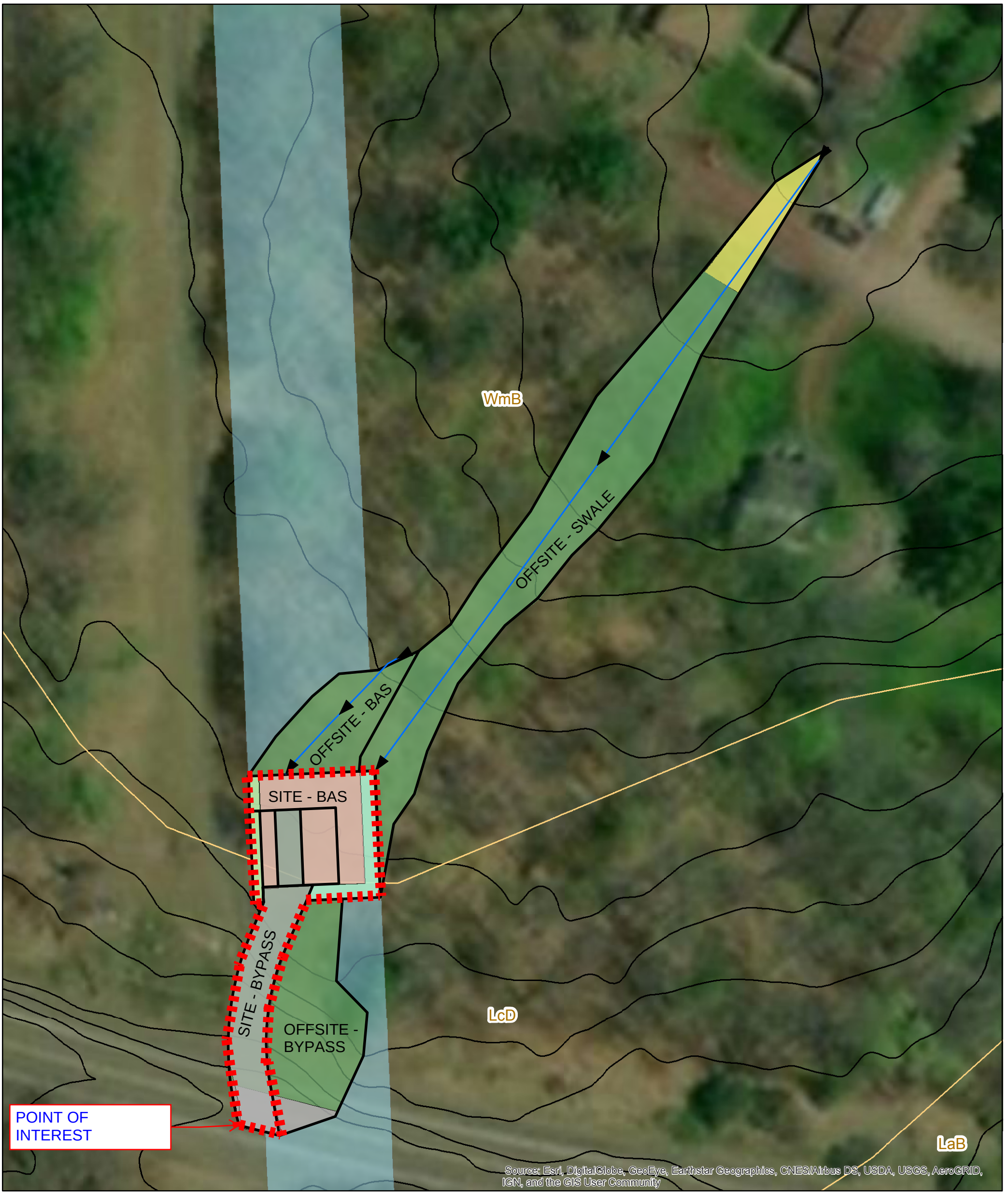
N

W E

S

MLV - 2 EXISTING CONDITIONS DRAINAGE AREA MAP

F. Proposed Conditions Stormwater Management Map



Legend

- Tc Path
- Drainage Area
- BYPASS
- GRV
- SWALE
- WO
- MEAD
- IMP
- Mainline Easement
- 2ft Contours
- LOD

0 12.5 25 50 75 100 Feet

N W E S

MLV - 2 PROPOSED CONDITIONS DRAINAGE AREA MAP

G. Infiltration Memo

MOTT MACDONALD

Technical Note

Project:	PennEast Pipeline Project		
Our reference:	353754-GT-SW-02	**Your reference:**	353754-GT-SW-02
Prepared by:	E. Vigliorolo, EIT	**Date:**	May 24, 2018
Approved by:	V. Shah, PE, PhD	**Checked by:**	E. Pauli, EIT
Subject:	Test Pit and Infiltration Testing – Main Line Valve Site 2		

1 Introduction

This technical note addresses the geotechnical considerations of the suitability of native soils for stormwater design of the Main Line Valve Site 2 located in Bear Creek Township, Luzerne County, Pennsylvania (site). A subsurface investigation consisting of two test pits, MLV2-TP1 and MLV2-TP2, were excavated by Craig Test Boring Co., Inc. of Mays Landing, New Jersey on May 22, 2018. Infiltration testing using double-ring infiltrometers was subsequently performed within each test pit. A Locus Map depicting the area of our investigation is provided in Attachment A.

2 Subsurface Investigation and Infiltration Testing Results

Given the presence of suitable soils and absence of competent bedrock within testing zones, all infiltration tests were performed using a double-ring infiltrometer. The double-ring infiltrometer was placed on level ground within the excavated test pits, and driven a minimum of two inches below the excavated surface. Two 30-minute presoaks were conducted prior to start of infiltration testing. Both the outer and inner rings were filled with 4 inches of water, beginning with the outer ring. The drop in the water level during the second 30-minute presoaking period was used to determine the timed intervals to be used during testing. The timed interval between readings was determined based on the following criteria:

• If water level drop is two inches or more, 10-minute intervals were used for recording measurements.

• If water level drop is less than two inches, 30-minute intervals were used for recording measurements.

After each reading, both rings were refilled with water to the four-inch level in an iterative manner. Water level depths at the determined timed interval were recorded until a minimum of eight readings were completed or, a stabilized rate of drop was obtained, whichever occurred first. A stabilized rate of drop is defined as a maximum difference of a 0.25-inch drop between the highest and lowest reading of four consecutive readings. The drop that occurs in the center ring during the final period or the average stabilized rate is expressed in inches per hour and represents the infiltration rate for that test location. At the completion of the infiltration

test, each test pit was excavated an additional 2 feet to observe the subsurface conditions below the test depth. The test pit and infiltration test results are summarized below:

MLV2-TP1

Test pit MLV2-TP-1 was excavated 6.5 feet below existing grade on May 22, 2018. Two infiltration tests were performed at 4 feet below existing grade within this test pit. The first test yielded an infiltration rate of 3.0 inches per hour (in/hr), and the second test yielded an infiltration rate of 0.0 in/hr. It is recommended that an average infiltration rate of 1.5 in/hr be considered at this location. No restrictive zones or bedrock were encountered within two feet of the testing depth. In accordance with the Pennsylvania Stormwater Best Management Practices Manual (PA BMP), a minimum factor of safety of 2.0 is recommended in relation to soils encountered at this location. Therefore, the recommended design infiltration rate is 0.75 in/hr.

The general description of the soil profile observed within the excavated test pit is provided below:

- **0 – 2 inches:** Topsoil
- **2 – 18 inches:** Red-yellowish brown clayey Silt, some boulders, coarse to fine sand, moist
- **18 – 20 inches:** Yellowish brown silty Clay, some boulders, moist
- **20 – 72 inches:** Yellowish brown clayey Silt, some boulders, little coarse to fine sand, moist
- **72 – 78 inches:** Reddish brown Silt with Decomposed Rock, moist

Mottling was not observed and groundwater was not encountered within this test pit.

MLV2-TP2

Test pit MLV2-TP-2 was also excavated 6.5 feet below existing grade on May 22, 2018. Two infiltration tests were performed at 5 feet below existing grade within this test pit. The first test yielded an infiltration rate of 0.0 in/hr, and the second test yielded an infiltration rate of 0.2 in/hr. It is recommended that an average infiltration rate of 0.1 in/hr be considered at this location. No restrictive zones or bedrock were encountered within two feet of the testing depth. In accordance with the PA BMP, a minimum factor of safety of 2.0 is recommended in relation to soils encountered at this location. Therefore, the recommended design infiltration rate is 0.05 in/hr.

The general description of the soil profile observed within the excavated test pit is provided below:

- **0 – 2 inches:** Topsoil and roots, moist
- **2 – 66 inches:** Yellowish brown Silt, some boulders, little clay, little coarse to fine sand, moist
- **66 – 78 inches:** Reddish brown Decomposed Rock and Silt, moist

Mottling was not observed and groundwater was not encountered within this test pit.

Table 1- Infiltration Test Result

Test Pit No.	Existing Grade El. (feet)	Infiltration Test El. (feet)	Infiltration Test Results (Average) (in/hr)	Recommended Safety Factor	Recommended Design Infiltration Rate* (in/hr)
MLV2-TP1	1686.2	1682.2	1.5	2.0	0.75
MLV2-TP2	1689.6	1684.6	0.1	2.0	0.05

*Based on the existing subsurface conditions encountered in the test pits, it is recommended that the lower of the design infiltration rates should be used.

Infiltration rates observed during our investigation were dependent on the subsurface conditions encountered within each test pit. Test locations which resulted in low infiltration rates consisted of predominately low permeable soils such as silt and clays, whereas test locations resulting in high infiltration rates contained more permeable soils such as sands, gravel, cobbles, and boulders. The test pit logs and infiltration test forms are provided in Attachment B.

Pennsylvania Stormwater Best Management Practices Manual. Department of Environmental Protection. Bureau of Watershed Management. December 30, 2006 was utilized as a reference for this scope of work.

Attachments:

- Attachment A – Locus Map
- Attachment B – Test Pit Logs and Infiltration Test Forms

Appendices

A. Locus Map

NAME	LATITUDE	LONGITUDE	ELEVATION (ft)
MLV2-TP1	14957491	1448653	1686.185
MLV2-TP2	14957573	1448646	1689.557

NOTES:
1. SCALE IS APPROXIMATE
2. GOOGLE EARTH AERIAL IMAGERY DATED 04/17/2017

200 0 200 400
SCALE IN FEET

MOTT MACDONALD
Certificate No. 24GA28016600
111 Wood Avenue South
Iselin, New Jersey 08830-4112

PENNEAST PIPELINE PROJECT
MAIN LINE VALVE SITE 2
LUZERNE COUNTY, PA

Designed	Drawn	Checked	Approved	Date
EAV	EAV	EWP	TR	05-23-2018

B. Test Pit Logs and Infiltration Test Forms

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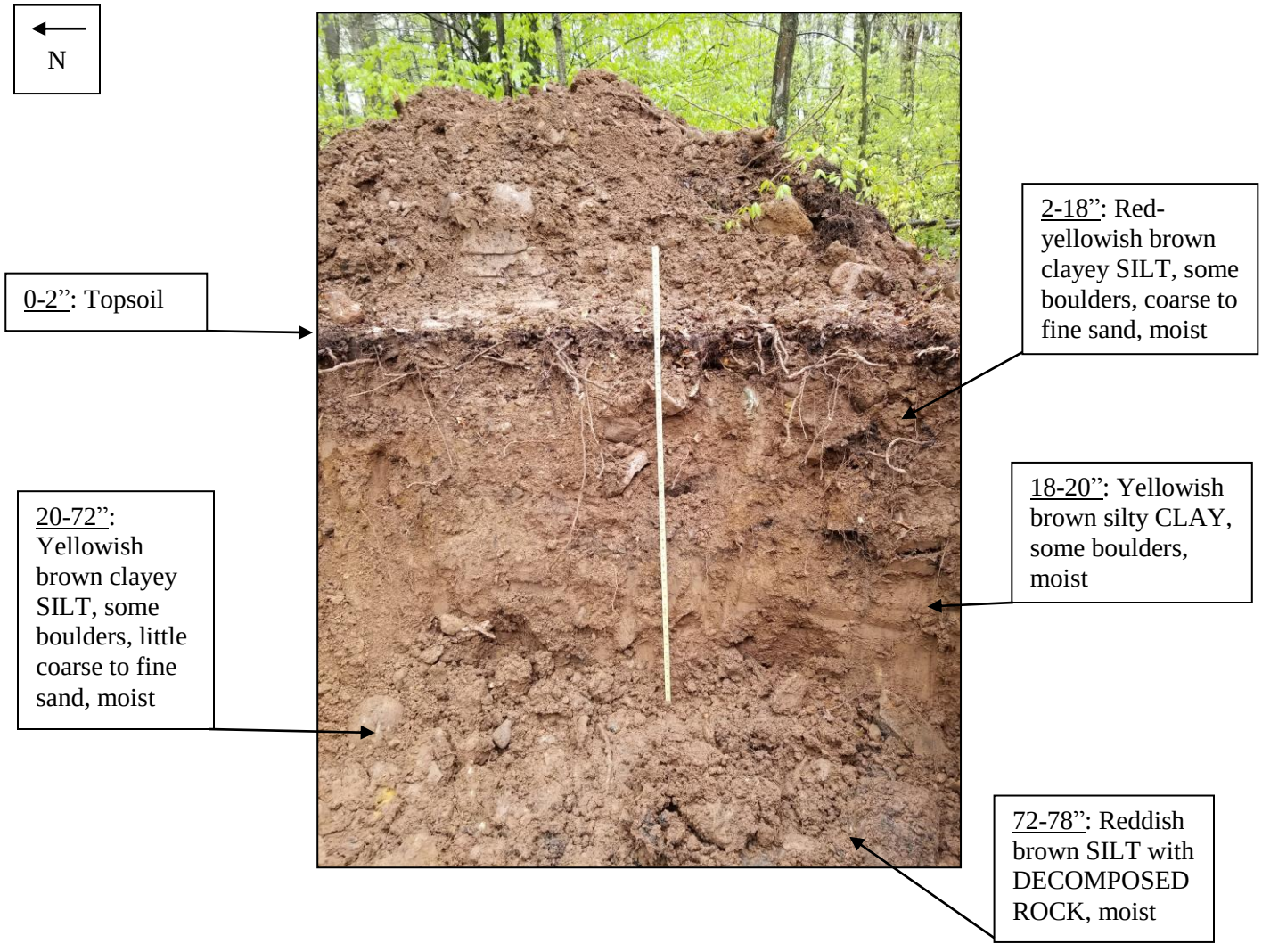
TEST PIT LOG

SITE LOCATION	Main Line Valve 2 (MLV2)	**TEST PIT NUMBER**	**MLV2-TP1**
PROJECT NUMBER	353754	**MOTT MACDONALD REPRESENTATIVE**	T. Rajah
GENERAL LOCATION	Bear Creek Township, PA	**CONTRACTOR**	Craig Test Boring Co. Inc.
TIME OPENED	10:00 AM	**TIME CLOSED**	1:00 PM
DEPTH TO WATER (Feet BGS)	Not Encountered	**EQUIPMENT**	Backhoe excavator
TESTING DEPTH (Feet BGS)	4	**FINAL EXCAVATION DEPTH (Feet BGS)**	6.5
DATE	5/22/2018		



Note: All classifications and descriptions in this log are solely based on visual field observations. They were developed to generally characterize soils for environmental purposes only. They are not to be relied for any other purpose.

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TEST PIT LOG

SITE LOCATION	Main Line Valve 2 (MLV2)	**TEST PIT NUMBER**	**MLV2-TP2**
PROJECT NUMBER	353754	**MOTT MACDONALD REPRESENTATIVE**	T. Rajah
GENERAL LOCATION	Bear Creek Township, PA	**CONTRACTOR**	Craig Test Boring Co. Inc.
TIME OPENED	11:30 AM	**TIME CLOSED**	2:30 PM
DEPTH TO WATER (feet BGS)	Not Encountered	**EQUIPMENT**	Backhoe excavator
TESTING DEPTH (feet BGS)	5	**FINAL EXCAVATION DEPTH (feet BGS)**	6.5
DATE	5/22/2018		

N

0-2": Topsoil and Roots, moist

2-66": Yellowish brown SILT, some boulders, little clay, little coarse to fine sand, moist

66-78": Reddish brown DECOMPOSED ROCK and SILT, moist

Note: All classifications and descriptions in this log are solely based on visual field observations. They were developed to generally characterize soils for environmental purposes only. They are not to be relied for any other purpose.

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Infiltration Test Form

Geotechnical Investigation:

■ Project Name:	**PennEast Pipeline**	■ Date:	5/22/18
■ Job Number:	**353754**	■ Site Location :	MLV 2
■ Contractor:	Craig Test Boring, Inc.	■ Weather/Temp:	Cloudy 70°
■ Infiltration Test ID :	MLV2 TP-1	■ Report by:	T. Rajah
■ Testing Depth :	4'	■ Infiltration Test Method :	Double-Ring Infiltrometer

Infiltration Test Pit Soil Description:

Depth Range (inches)		Description of Soil/Rock Layers
0"	2"	TOPSOIL with Roots, moist
2"	18"	Red-yellowish brown Clayey SILT, some Boulders, little C-f Sand, moist
18"	20"	yellowish brown Silty CLAY, some Boulders, moist
20"	72"	yellowish brown Clayey SILT, some Boulders, little C-f Sand, moist
72"	78"	Reddish brown SILT with DECOMPOSE ROCK, moist

Percolation Test:

Test #1

Time (min.)	~~30~~ 10 pre-soak	~~30~~ 10 pre-soak	10	10	10	10	10	10	
Test Depth (feet)	**Reading No. 1**	**Reading No. 2**	**Reading No. 3**	**Reading No. 4**	**Reading No. 5**	**Reading No. 6**	**Reading No. 7**	**Reading No. 8**	**Infil. Rate (in. / hour)**
4'	4"	2.75"	2.25	2.125	1.75	1.5	1.5	1.5	3.0

Test #2

Time (min.)	30 pre-soak	30 pre-soak	30	30	30	30	X	X	
Test Depth (feet)	**Reading No. 1**	**Reading No. 2**	**Reading No. 3**	**Reading No. 4**	**Reading No. 5**	**Reading No. 6**	**Reading No. 7**	**Reading No. 8**	**Infil. Rate (in. / hour)**
4'6"	0.125"	0.125"	0	0	0	0			0

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Infiltration Test Form

Geotechnical Investigation:

■ Project Name:	**PennEast Pipeline**	■ Date:	5/22/18
■ Job Number:	**353754**	■ Site Location :	MLV2
■ Contractor:	Craig Test Boring, Inc.	■ Weather/Temp:	
■ Infiltration Test ID :	MLV2 TP-2	■ Report by:	T. Rajah
■ Testing Depth :	5'	■ Infiltration Test Method :	Double-Ring Infiltrometer

Infiltration Test Pit Soil Description:

Depth Range (inches)		Description of Soil/Rock Layers
0"	2"	TOPSOIL / Roots Moist
2"	66"	Yellowish brown SILT, Some Boulders, little Clay, little C-F Sand, Moist.
66"	78"	Reddish brown Decomposed Rock and SILT, Moist

Percolation Test:

Test #1

Time (min.)	30 pre-soak	30 pre-soak	30	30	30	30	X	X	X
Test Depth (feet)	**Reading No. 1**	**Reading No. 2**	**Reading No. 3**	**Reading No. 4**	**Reading No. 5**	**Reading No. 6**	**Reading No. 7**	**Reading No. 8**	**Infil. Rate (in. / hour)**
5'	0	0	0	0	0	0	X	X	0

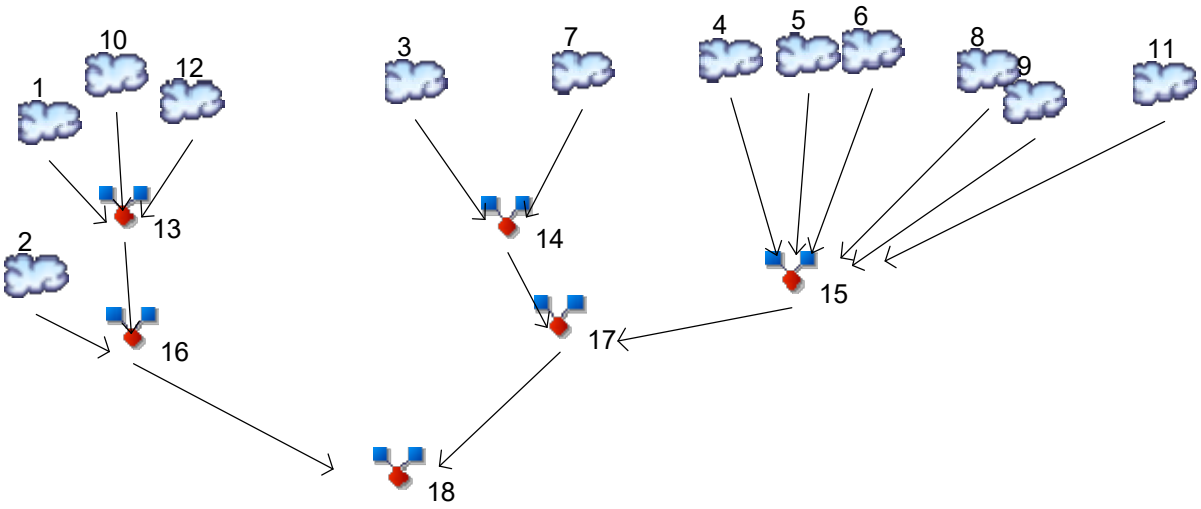
Test #2

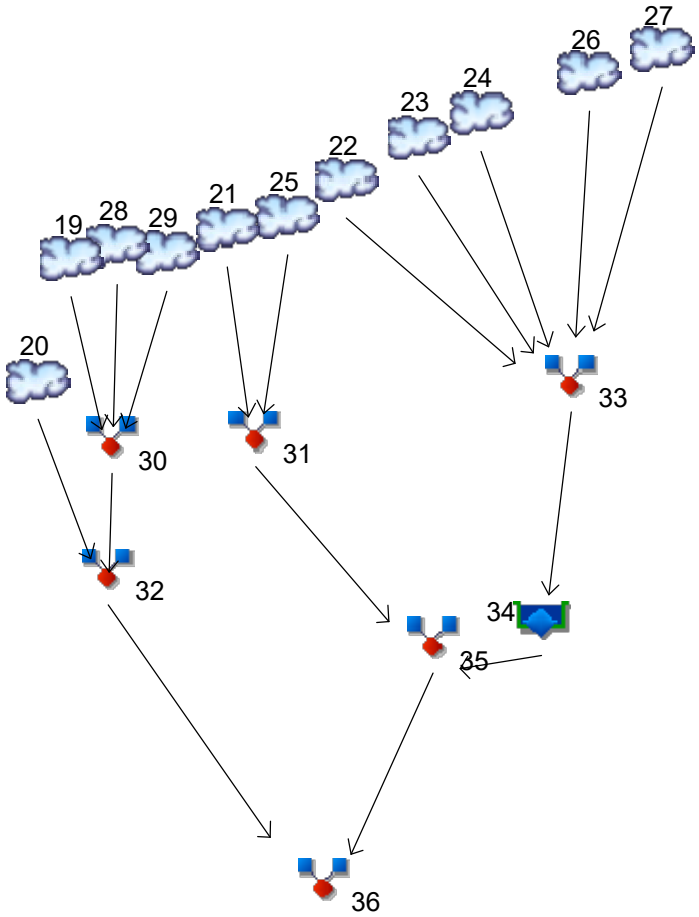
Time (min.)	30 pre-soak	30 pre-soak	30	30	30	30	X	X	
Test Depth (feet)	**Reading No. 1**	**Reading No. 2**	**Reading No. 3**	**Reading No. 4**	**Reading No. 5**	**Reading No. 6**	**Reading No. 7**	**Reading No. 8**	**Infil. Rate (in. / hour)**
5'	0.25	0.25	0.125	0.125	0.125	0.100	X	X	0.2

H. Model Input and Output Report

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020





Legend

Hyd.	Origin	Description
1	SCS Runoff	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	EX-SITE-TRENCH-IMP-ROAD-LcD-18
12	SCS Runoff	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	EX-OFFSITE - BYPASS
14	Combine	EX-SITE-BYPASS
15	Combine	EX-SITE-BASIN COMBINE
16	Combine	EX-OFFSITE-TOTAL
17	Combine	EX-SITE-TOTAL
18	Combine	TOTAL EXISTING
19	SCS Runoff	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	PR-SITE-TRENCH-IMP-LcD-12,16,18
28	SCS Runoff	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	PR-OFFSITE-BYPASS-LcD-19
30	Combine	PR-OFFSITE-BYPASS
31	Combine	PR-SITE-BYPASS
32	Combine	PR-OFFSITE-TOTAL
33	Combine	PR-TO-TRENCH
34	Reservoir	INF TRENCH
35	Combine	PR-SITE-TOTAL
36	Combine	TOTAL PROPOSED

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	------	0.129	0.189	-------	0.288	0.379	0.530	0.676	0.855	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	------	0.052	0.075	-------	0.112	0.145	0.201	0.254	0.319	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	------	0.007	0.010	-------	0.015	0.020	0.028	0.036	0.046	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	------	0.033	0.047	-------	0.070	0.091	0.125	0.159	0.199	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	------	0.019	0.028	-------	0.041	0.054	0.074	0.094	0.118	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	------	0.009	0.013	-------	0.020	0.026	0.036	0.045	0.057	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	------	0.002	0.004	-------	0.007	0.009	0.014	0.019	0.025	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	------	0.001	0.002	-------	0.004	0.005	0.008	0.010	0.013	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	------	0.028	0.045	-------	0.074	0.101	0.147	0.193	0.250	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	------	0.025	0.042	-------	0.071	0.099	0.147	0.195	0.255	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	------	0.024	0.029	-------	0.036	0.043	0.053	0.063	0.074	EX-SITE-TRENCH-IMP-ROAD-LcD-1
12	SCS Runoff	------	0.013	0.015	-------	0.019	0.023	0.028	0.033	0.039	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	1, 10, 12	0.166	0.246	-------	0.377	0.500	0.704	0.904	1.148	EX-OFFSITE - BYPASS
14	Combine	3, 7,	0.009	0.014	-------	0.022	0.030	0.042	0.055	0.070	EX-SITE-BYPASS
15	Combine	4, 5, 6,	0.114	0.164	-------	0.245	0.319	0.442	0.562	0.710	EX-SITE-BASIN COMBINE
16	Combine	8, 9, 11, 2, 13,	0.175	0.260	-------	0.399	0.529	0.746	0.959	1.221	EX-OFFSITE-TOTAL
17	Combine	14, 15,	0.119	0.172	-------	0.258	0.338	0.471	0.599	0.757	EX-SITE-TOTAL
18	Combine	16, 17	0.271	0.403	-------	0.618	0.819	1.154	1.481	1.882	TOTAL EXISTING
19	SCS Runoff	------	0.129	0.189	-------	0.288	0.379	0.530	0.676	0.855	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	------	0.052	0.075	-------	0.112	0.145	0.201	0.254	0.319	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	------	0.007	0.011	-------	0.016	0.021	0.029	0.037	0.047	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	------	0.035	0.049	-------	0.073	0.094	0.129	0.162	0.203	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	------	0.043	0.054	-------	0.069	0.082	0.102	0.122	0.145	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	------	0.023	0.028	-------	0.035	0.041	0.050	0.060	0.071	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	------	0.003	0.004	-------	0.007	0.010	0.015	0.019	0.025	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	------	0.005	0.006	-------	0.008	0.010	0.013	0.015	0.018	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	------	0.142	0.171	-------	0.214	0.251	0.311	0.367	0.434	PR-SITE-TRENCH-IMP-LcD-12,16,1
28	SCS Runoff	------	0.025	0.042	-------	0.071	0.099	0.147	0.195	0.255	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	------	0.013	0.015	-------	0.019	0.023	0.028	0.033	0.039	PR-OFFSITE-BYPASS-LcD-19
30	Combine	19, 28, 29	0.166	0.246	-------	0.377	0.500	0.704	0.904	1.148	PR-OFFSITE-BYPASS
31	Combine	21, 25,	0.010	0.015	-------	0.023	0.031	0.044	0.056	0.072	PR-SITE-BYPASS
32	Combine	20, 30,	0.175	0.260	-------	0.399	0.529	0.746	0.959	1.221	PR-OFFSITE-TOTAL
33	Combine	22, 23, 24,	0.247	0.307	-------	0.397	0.477	0.604	0.726	0.871	PR-TO-TRENCH
34	Reservoir	26, 27, 33	0.009	0.028	-------	0.103	0.166	0.237	0.295	0.341	INF TRENCH

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	
35	Combine	31, 34	0.010	0.039	-------	0.125	0.193	0.279	0.349	0.410	PR-SITE-TOTAL
36	Combine	32, 35	0.185	0.297	-------	0.524	0.718	1.025	1.308	1.630	TOTAL PROPOSED

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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	0.129	1	728	464	------	------	------	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	0.052	1	718	106	------	------	------	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	0.007	1	728	25	------	------	------	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	0.033	1	718	66	------	------	------	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	0.019	1	718	39	------	------	------	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	0.009	1	718	19	------	------	------	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	0.002	1	729	10	------	------	------	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	0.001	1	718	3	------	------	------	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	0.028	1	718	61	------	------	------	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	0.025	1	729	103	------	------	------	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	0.024	1	717	57	------	------	------	EX-SITE-TRENCH-IMP-ROAD-LcD-1
12	SCS Runoff	0.013	1	726	47	------	------	------	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	0.166	1	728	615	1, 10, 12	------	------	EX-OFFSITE - BYPASS
14	Combine	0.009	1	728	35	3, 7,	------	------	EX-SITE-BYPASS
15	Combine	0.114	1	718	245	4, 5, 6,	------	------	EX-SITE-BASIN COMBINE
16	Combine	0.175	1	727	720	8, 9, 11, 2, 13,	------	------	EX-OFFSITE-TOTAL
17	Combine	0.119	1	718	279	14, 15,	------	------	EX-SITE-TOTAL
18	Combine	0.271	1	719	1,000	16, 17	------	------	TOTAL EXISTING
19	SCS Runoff	0.129	1	728	464	------	------	------	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	0.052	1	718	106	------	------	------	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	0.007	1	728	26	------	------	------	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	0.035	1	718	70	------	------	------	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	0.043	1	717	94	------	------	------	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	0.023	1	717	54	------	------	------	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	0.003	1	729	11	------	------	------	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	0.005	1	717	11	------	------	------	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	0.142	1	717	332	------	------	------	PR-SITE-TRENCH-IMP-LcD-12,16,1
28	SCS Runoff	0.025	1	729	103	------	------	------	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	0.013	1	726	47	------	------	------	PR-OFFSITE-BYPASS-LcD-19
30	Combine	0.166	1	728	615	19, 28, 29	------	------	PR-OFFSITE-BYPASS
31	Combine	0.010	1	728	37	21, 25,	------	------	PR-SITE-BYPASS
32	Combine	0.175	1	727	720	20, 30,	------	------	PR-OFFSITE-TOTAL
33	Combine	0.247	1	717	560	22, 23, 24,	------	------	PR-TO-TRENCH
34	Reservoir	0.009	1	812	194	26, 27, 33	1687.06	395	INF TRENCH

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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
35	Combine	0.010	1	728	231	31, 34	------	------	PR-SITE-TOTAL
36	Combine	0.185	1	727	952	32, 35	------	------	TOTAL PROPOSED

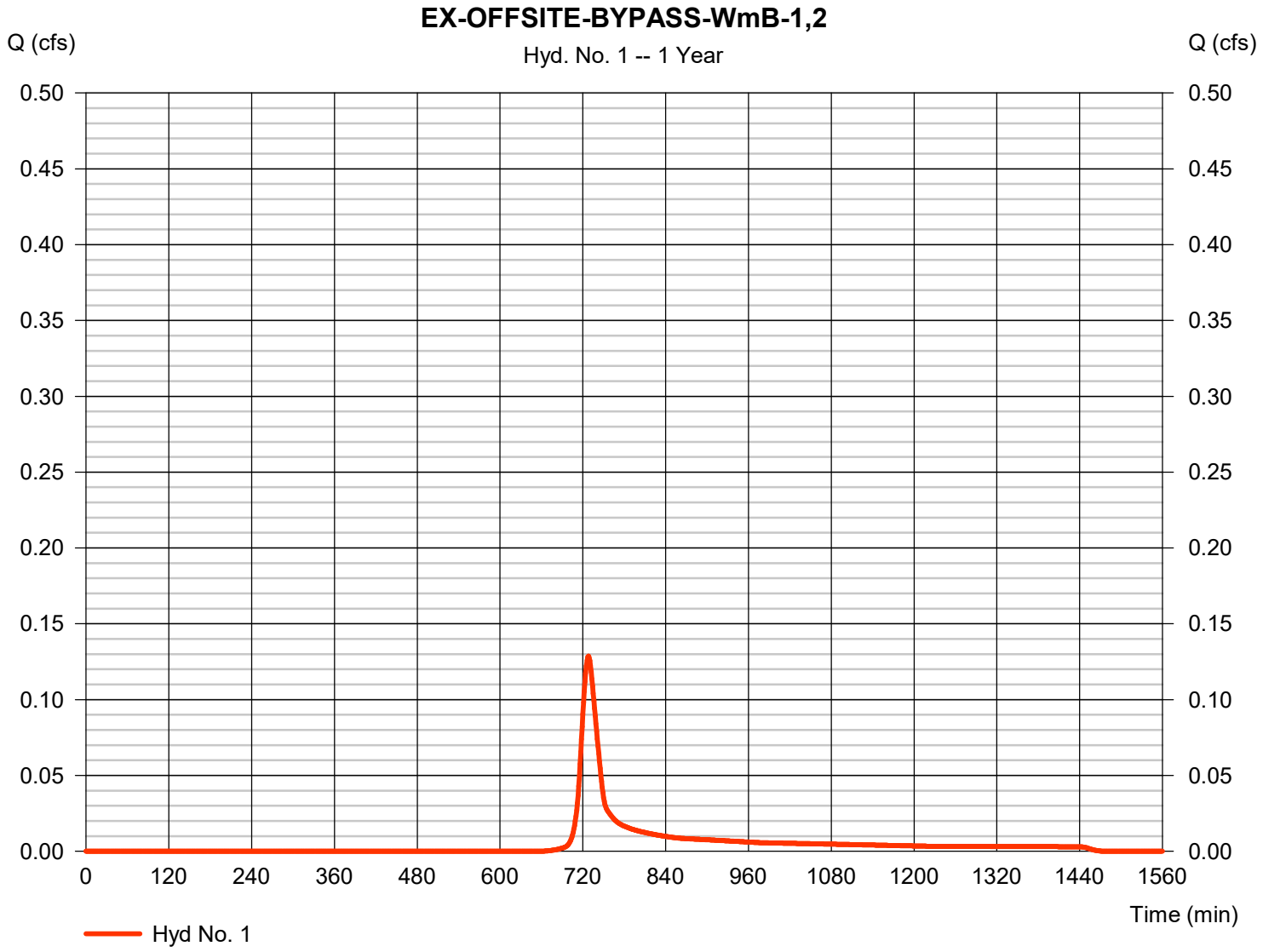
Hydrograph Report

Hyd. No. 1

EX-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.129 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 464 cuft
Drainage area	= 0.152 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 78) + (0.253 x 77)] / 0.152



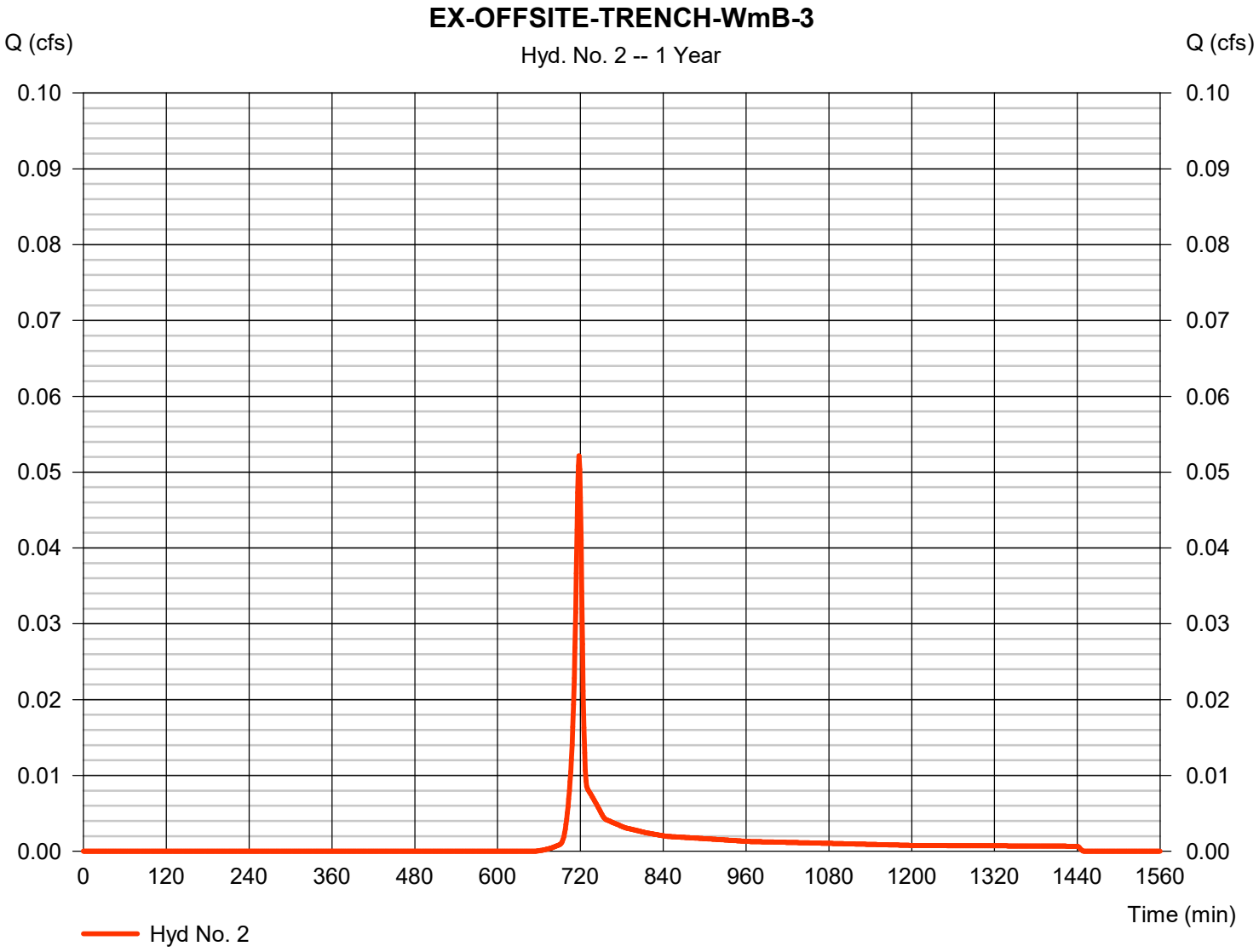
Hydrograph Report

Hyd. No. 2

EX-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.052 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 106 cuft
Drainage area	= 0.033 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 98)] / 0.033



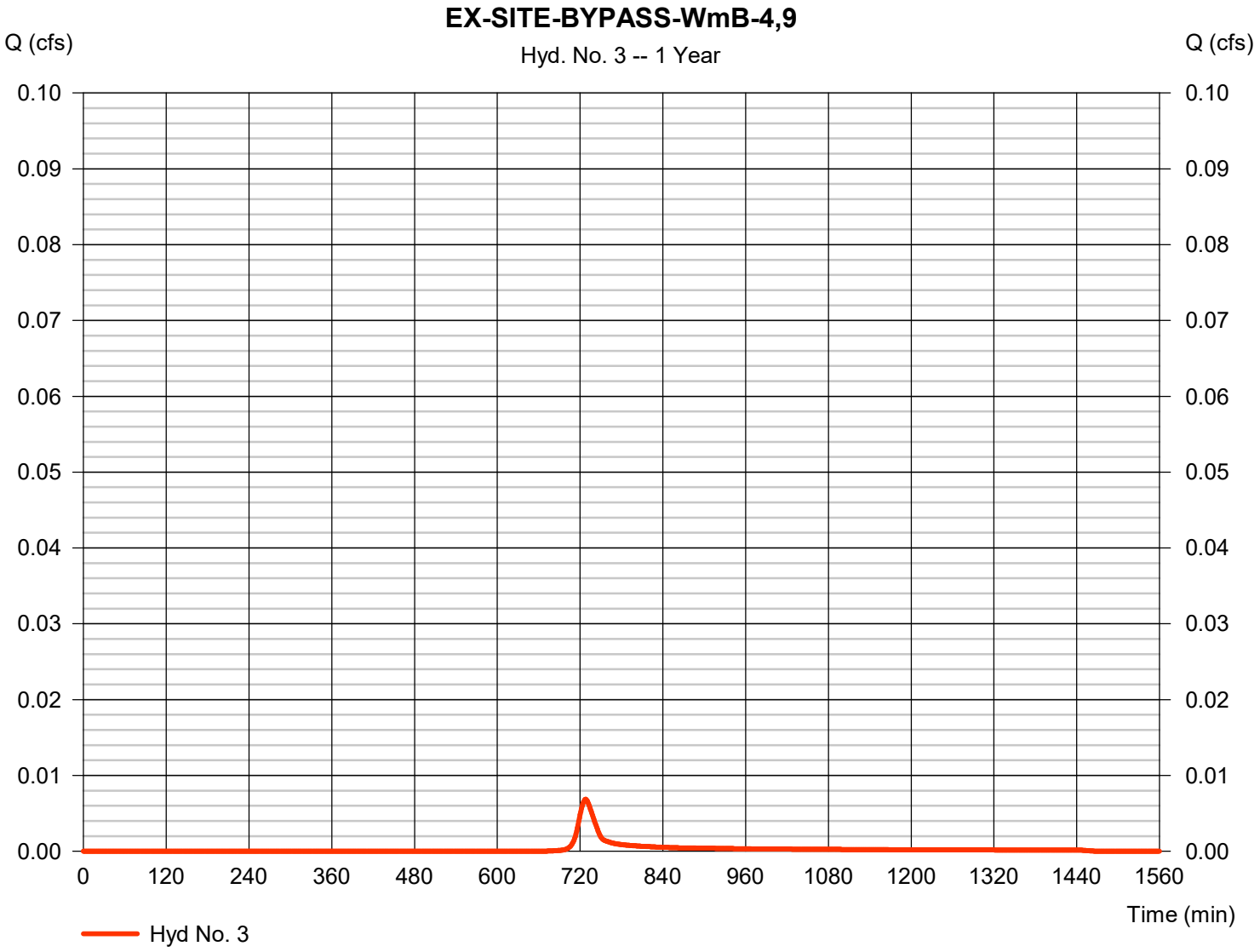
Hydrograph Report

Hyd. No. 3

EX-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.007 cfs
Storm frequency	=	1 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	25 cuft
Drainage area	=	0.008 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 77)] / 0.008



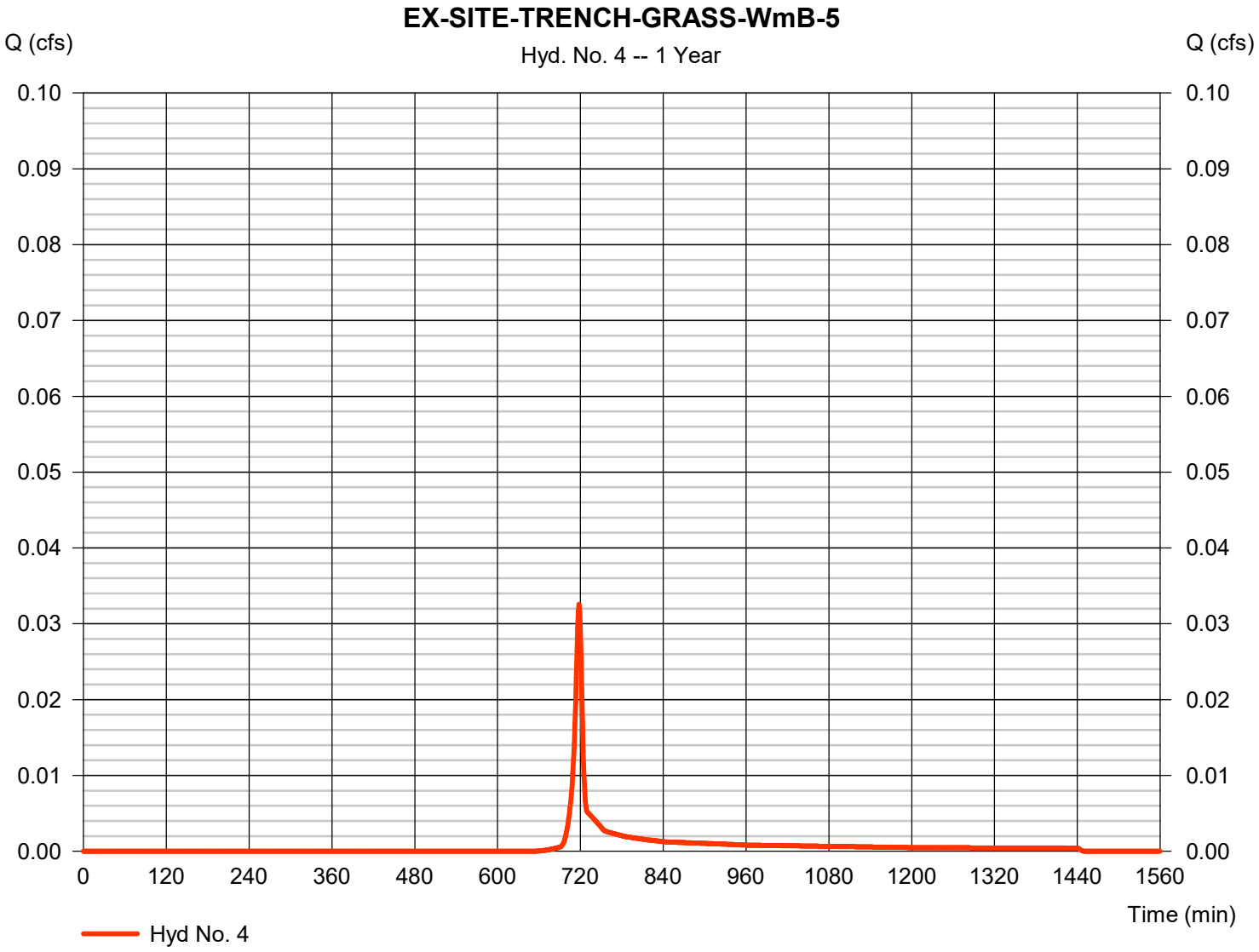
Hydrograph Report

Hyd. No. 4

EX-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.033 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 66 cuft
Drainage area	= 0.021 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70)] / 0.021

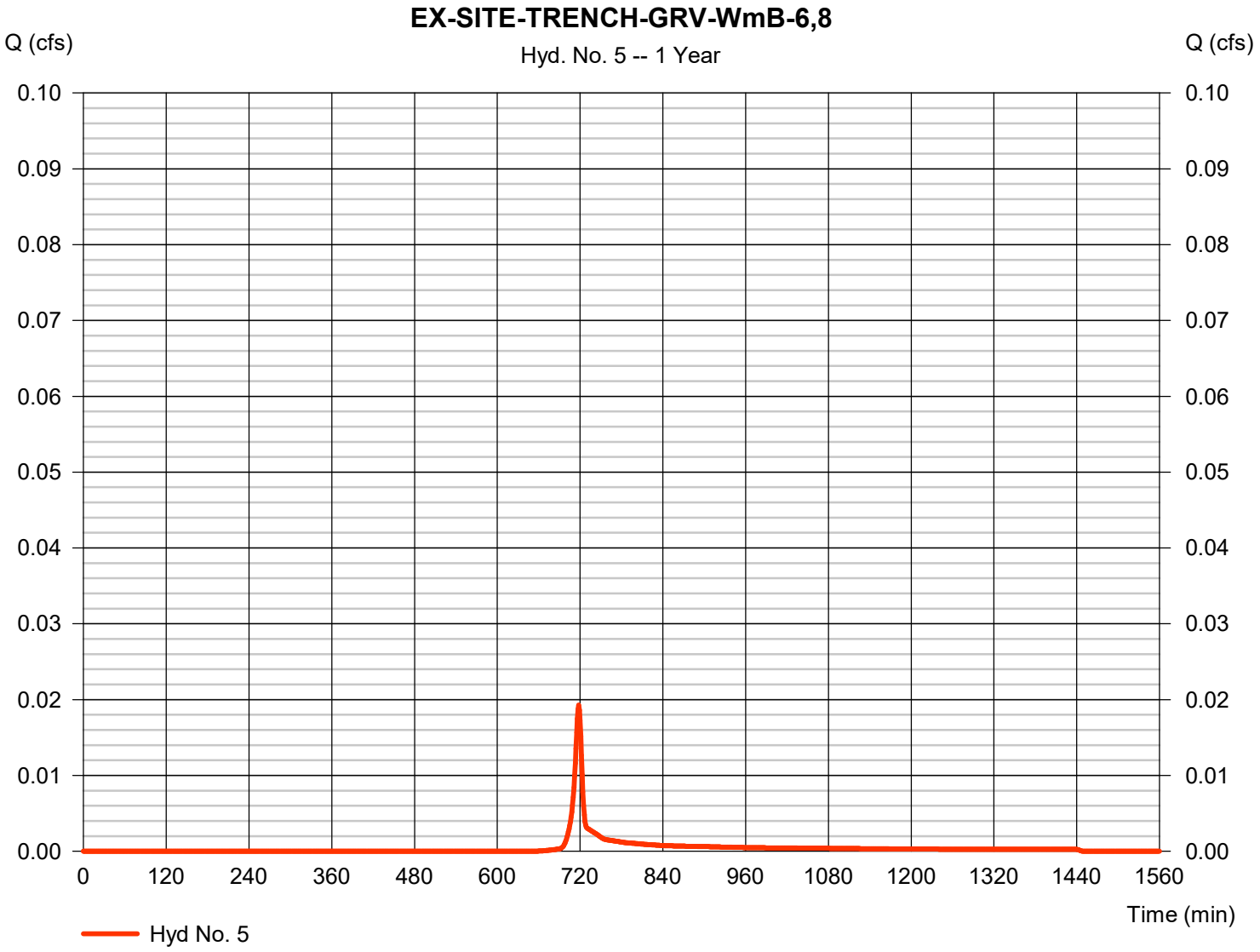


Hydrograph Report

Hyd. No. 5

EX-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.019 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 39 cuft
Drainage area	= 0.012 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

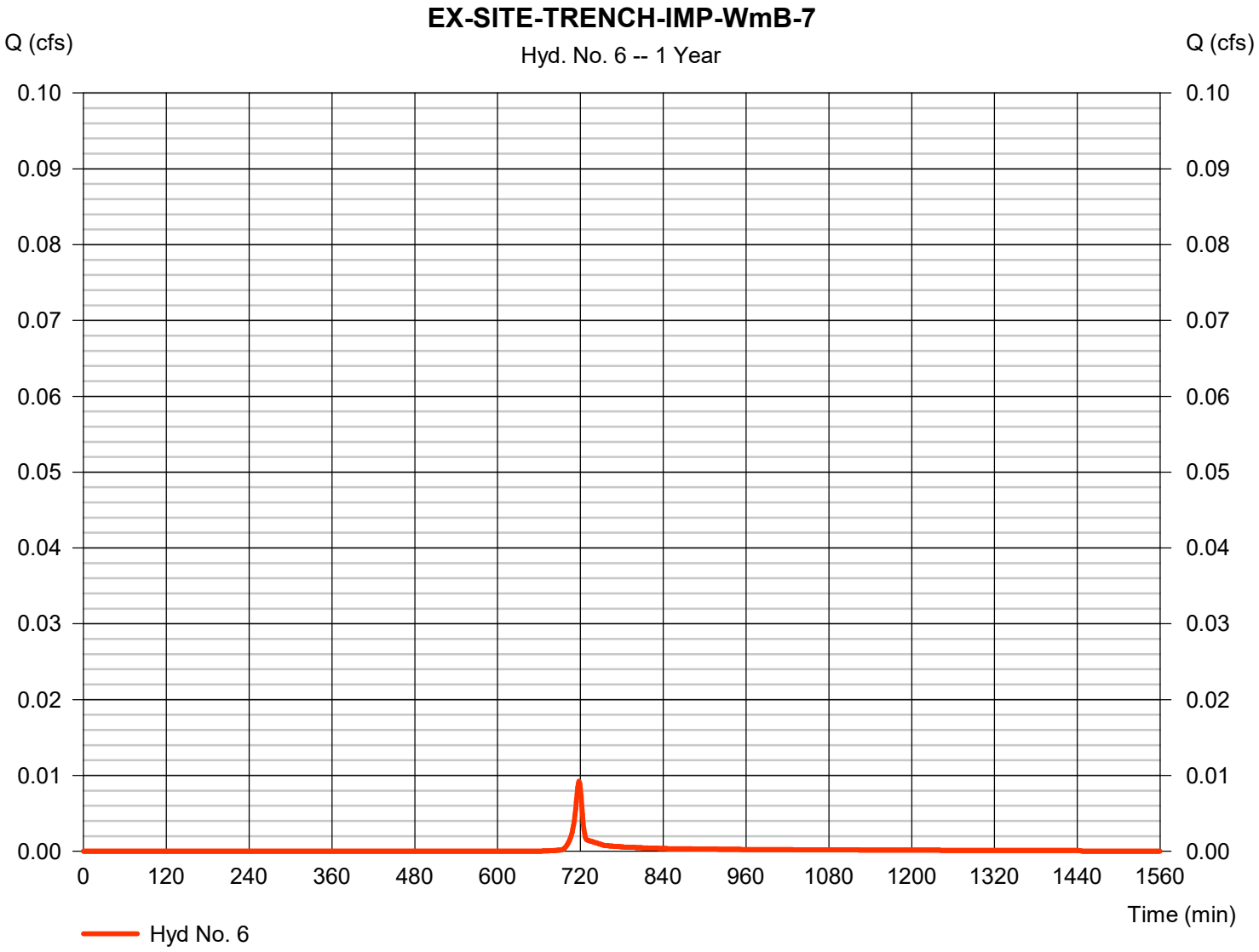


Hydrograph Report

Hyd. No. 6

EX-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.009 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 19 cuft
Drainage area	= 0.006 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

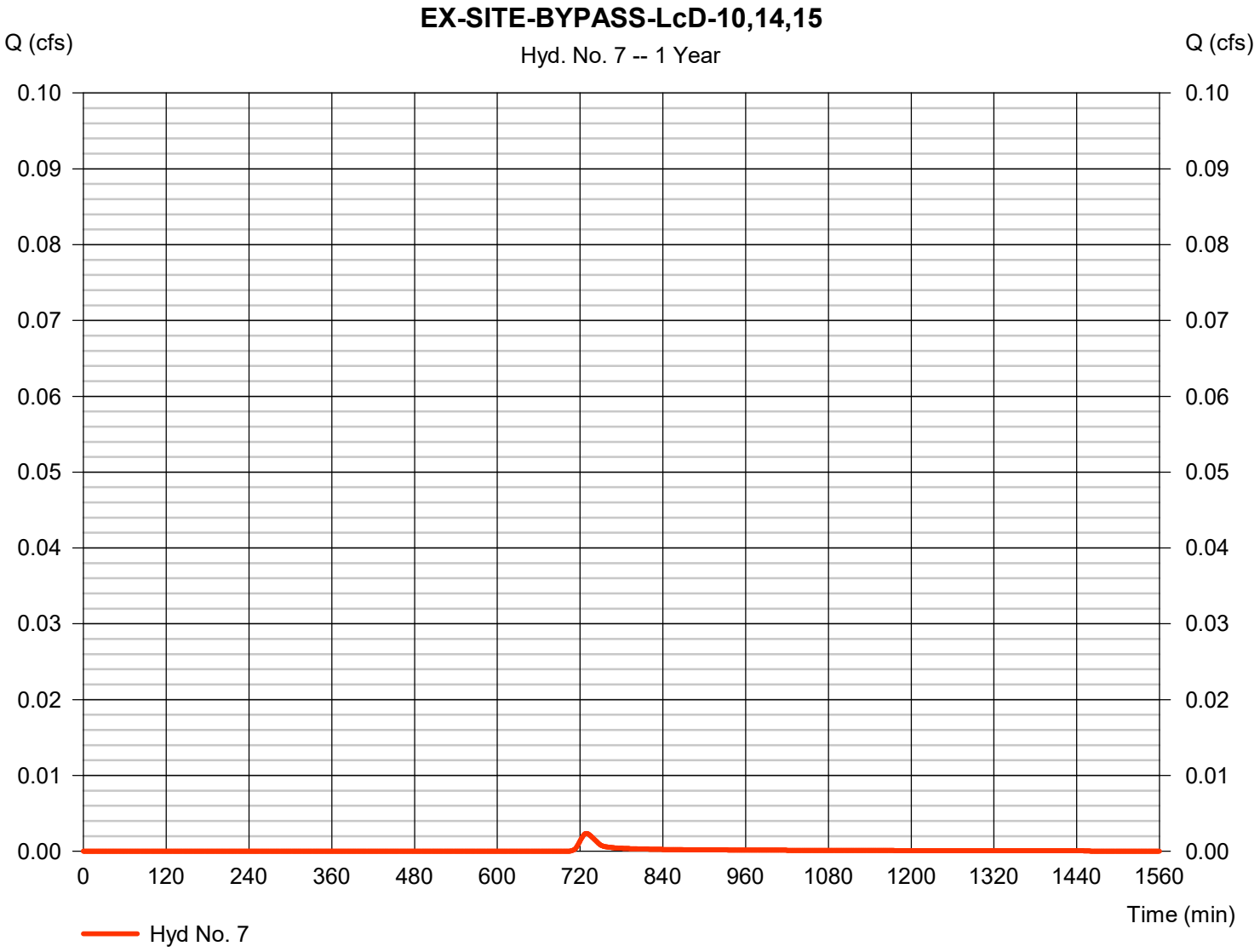


Hydrograph Report

Hyd. No. 7

EX-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 1 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 10 cuft
Drainage area	= 0.005 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

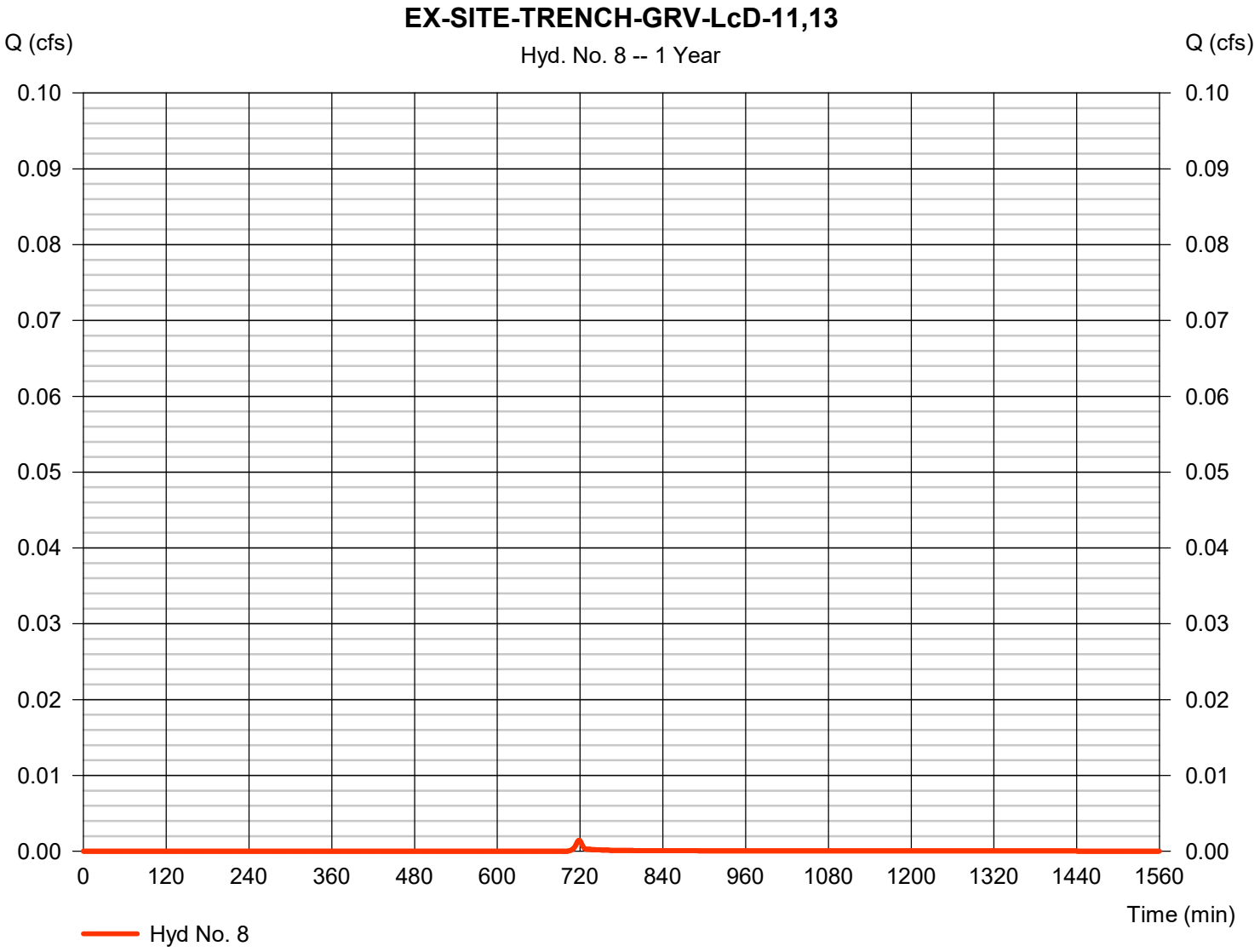


Hydrograph Report

Hyd. No. 8

EX-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 3 cuft
Drainage area	= 0.002 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

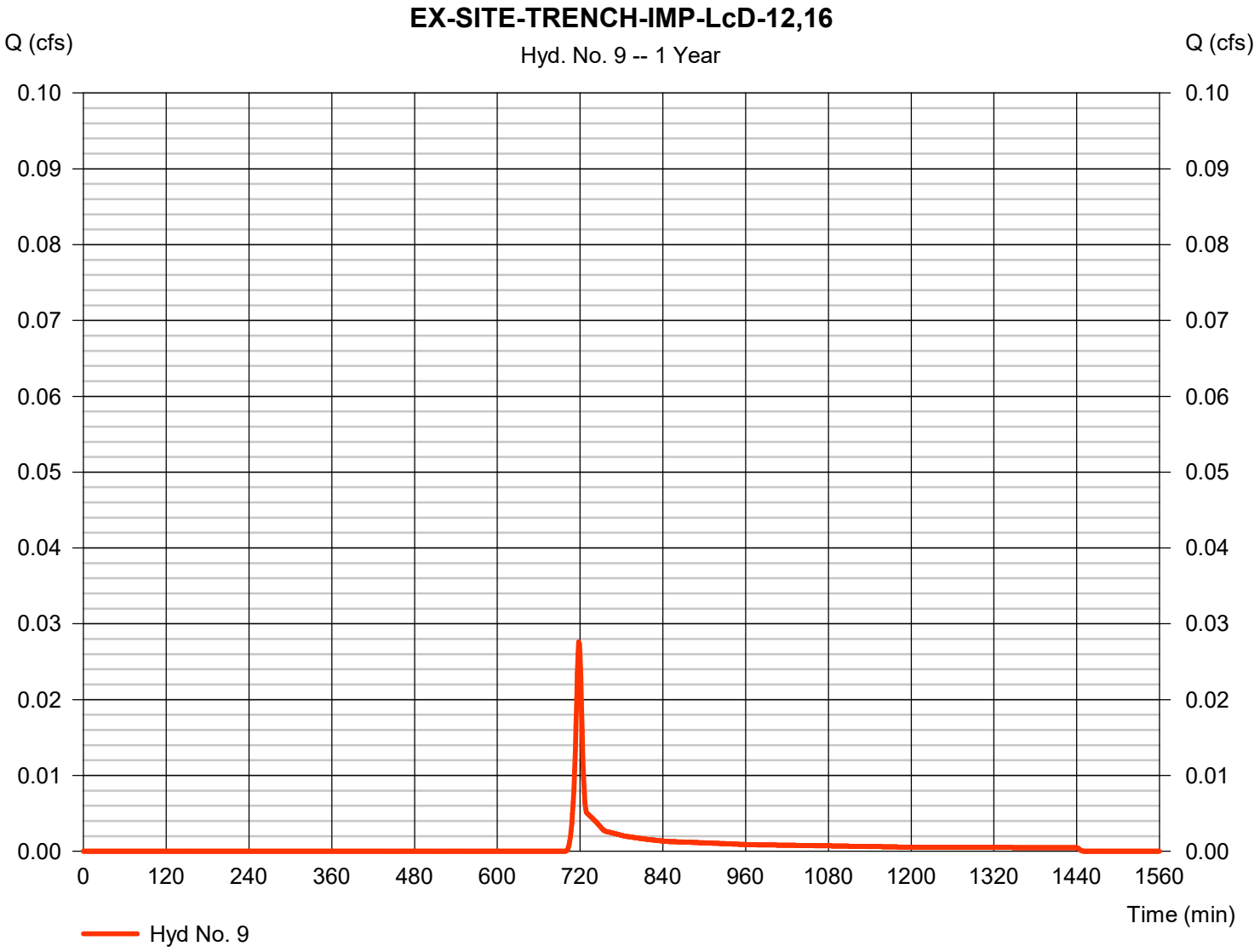


Hydrograph Report

Hyd. No. 9

EX-SITE-TRENCH-IMP-LcD-12,16

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.028 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	61 cuft
Drainage area	=	0.030 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

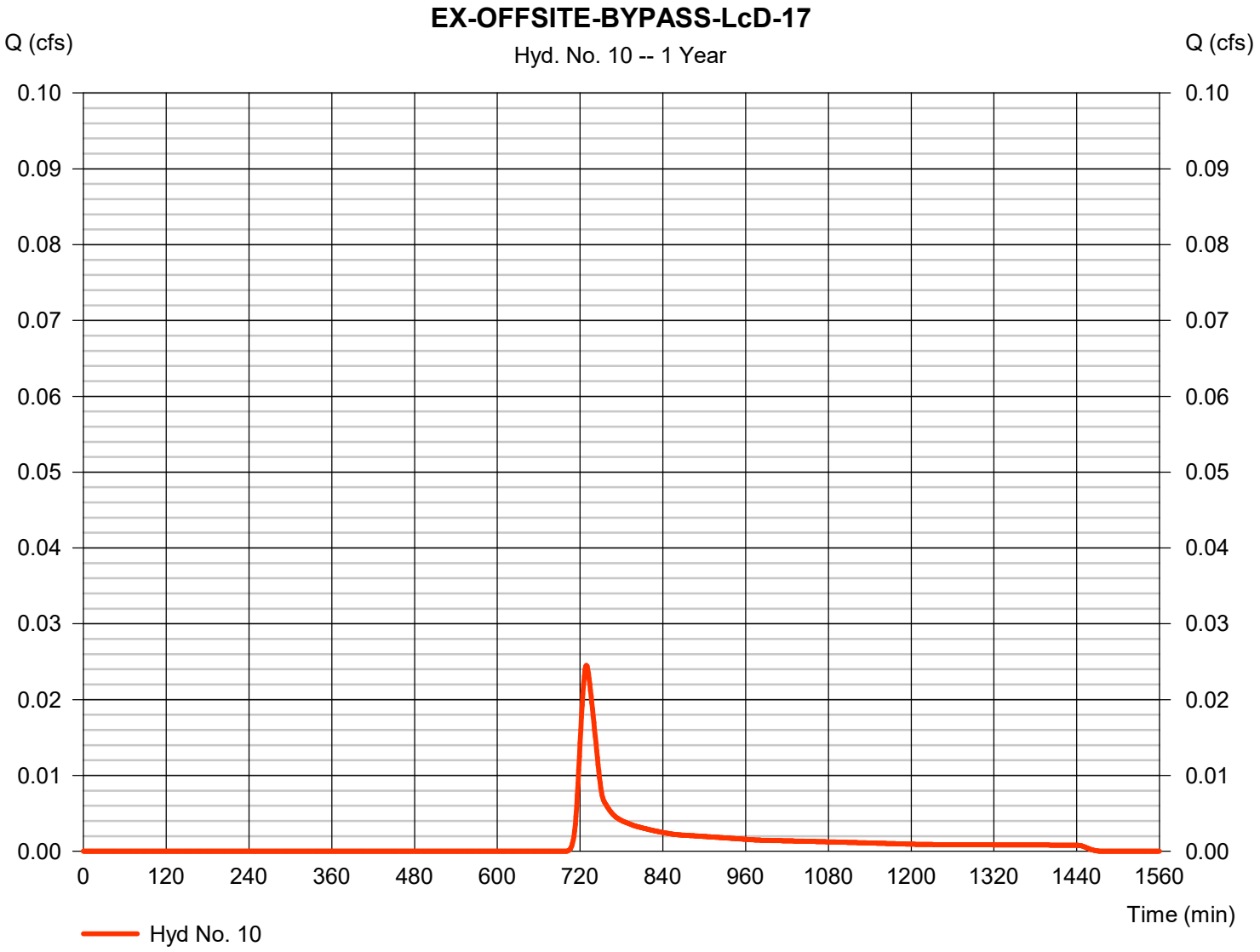


Hydrograph Report

Hyd. No. 10

EX-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.025 cfs
Storm frequency	=	1 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	103 cuft
Drainage area	=	0.053 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

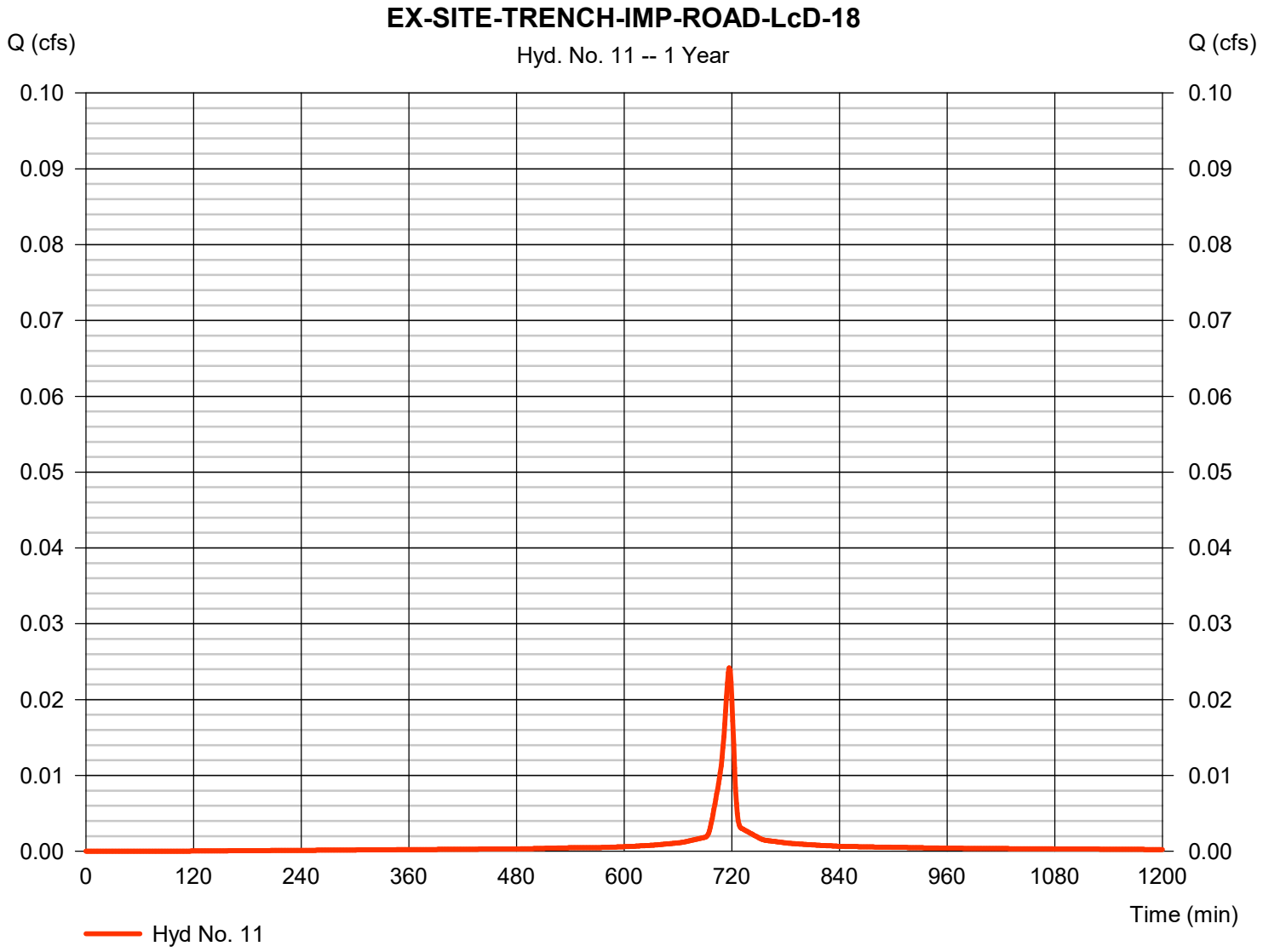


Hydrograph Report

Hyd. No. 11

EX-SITE-TRENCH-IMP-ROAD-LcD-18

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.024 cfs
Storm frequency	=	1 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	57 cuft
Drainage area	=	0.006 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

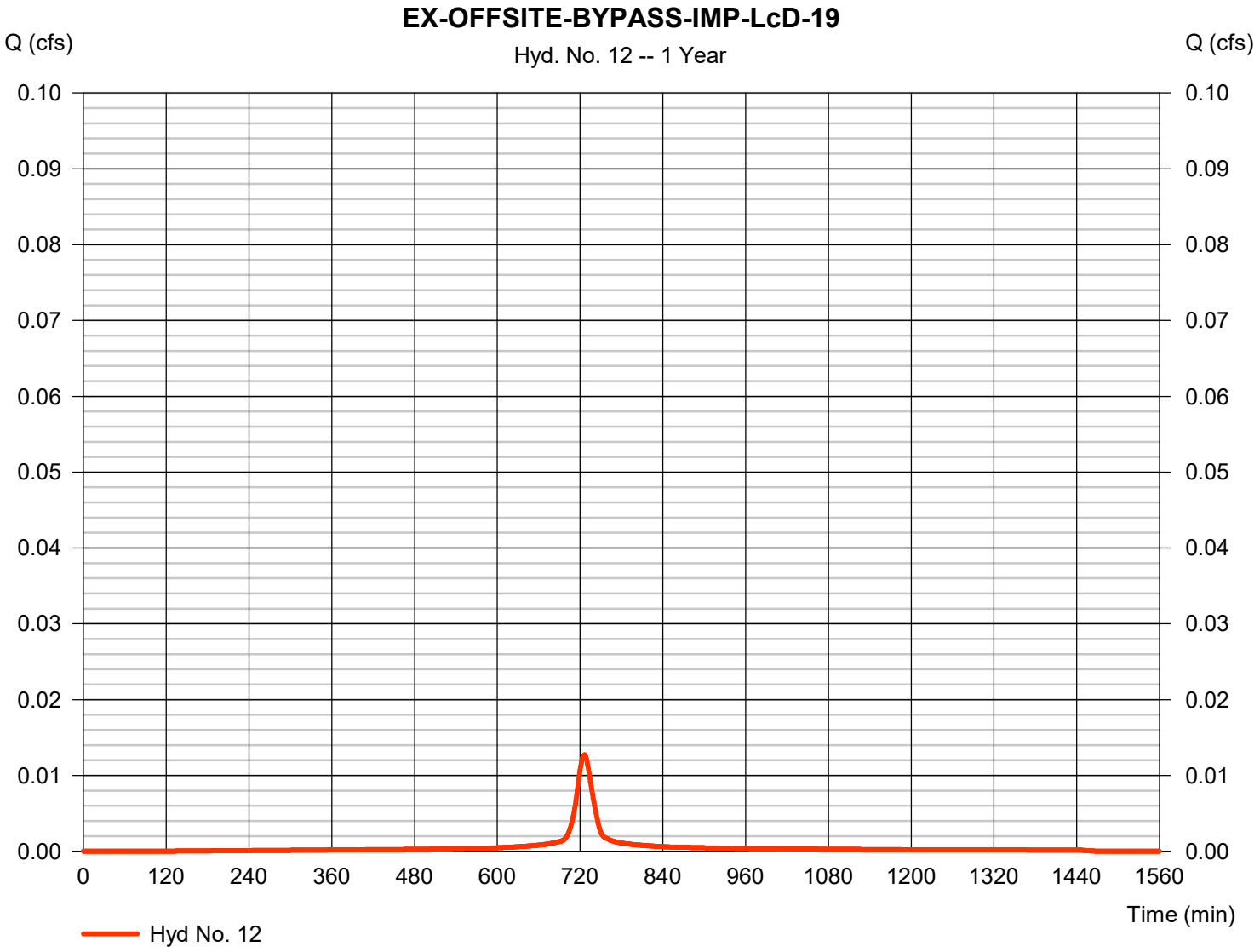


Hydrograph Report

Hyd. No. 12

EX-OFFSITE-BYPASS-IMP-LcD-19

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.013 cfs
Storm frequency	=	1 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	47 cuft
Drainage area	=	0.005 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

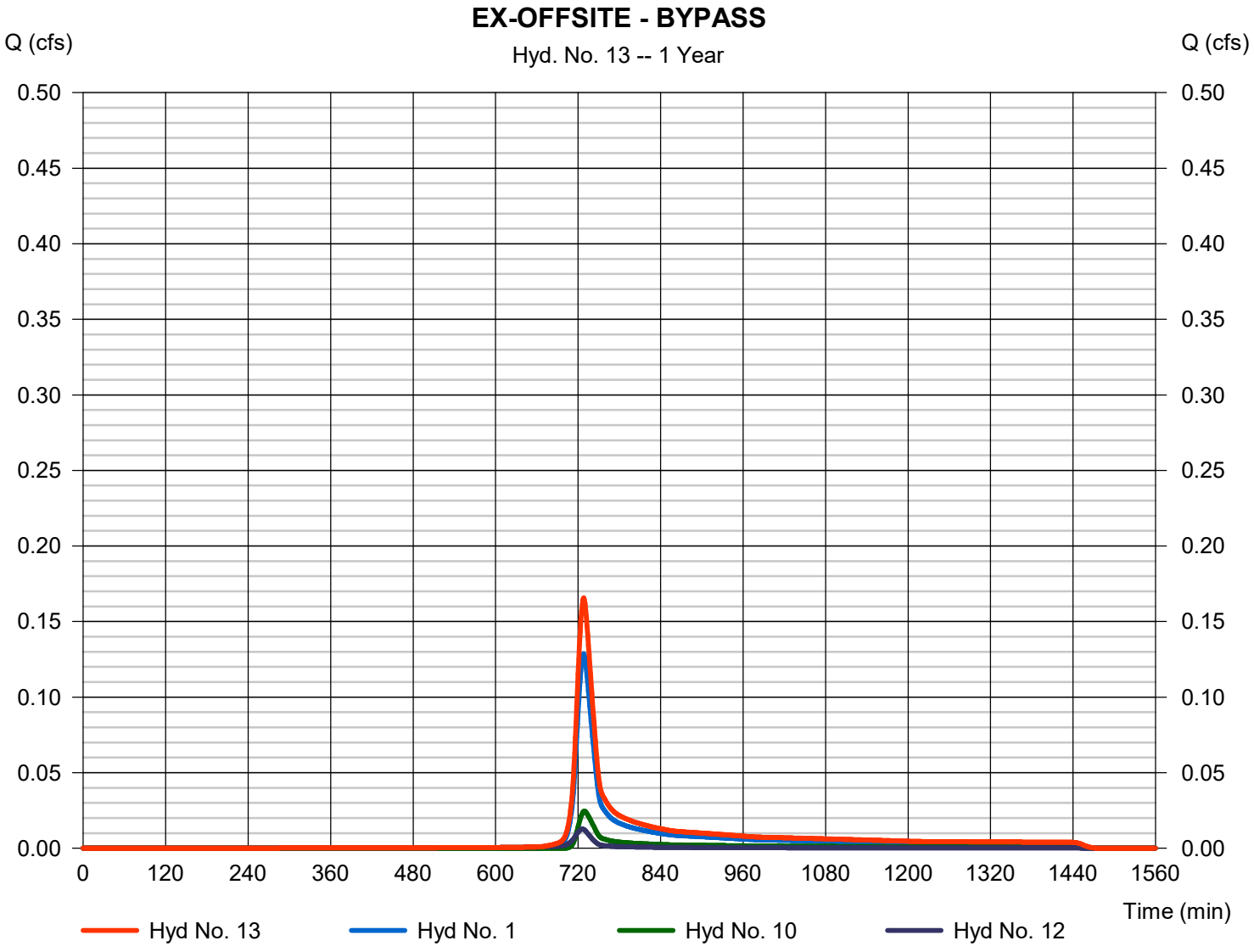


Hydrograph Report

Hyd. No. 13

EX-OFFSITE - BYPASS

Hydrograph type	= Combine	Peak discharge	= 0.166 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 615 cuft
Inflow hyds.	= 1, 10, 12	Contrib. drain. area	= 0.211 ac

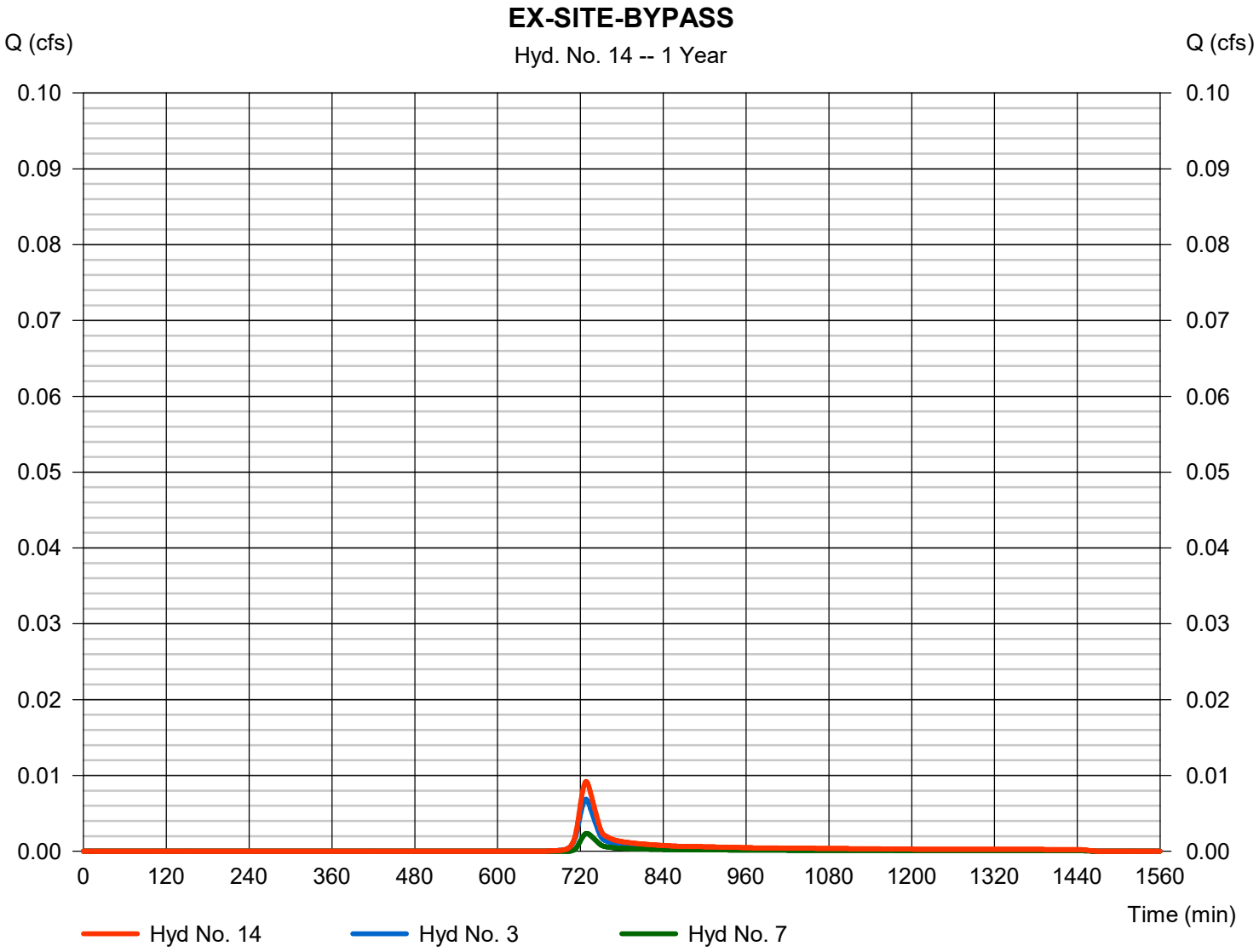


Hydrograph Report

Hyd. No. 14

EX-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.009 cfs
Storm frequency	=	1 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	35 cuft
Inflow hyds.	=	3, 7	Contrib. drain. area	=	0.013 ac

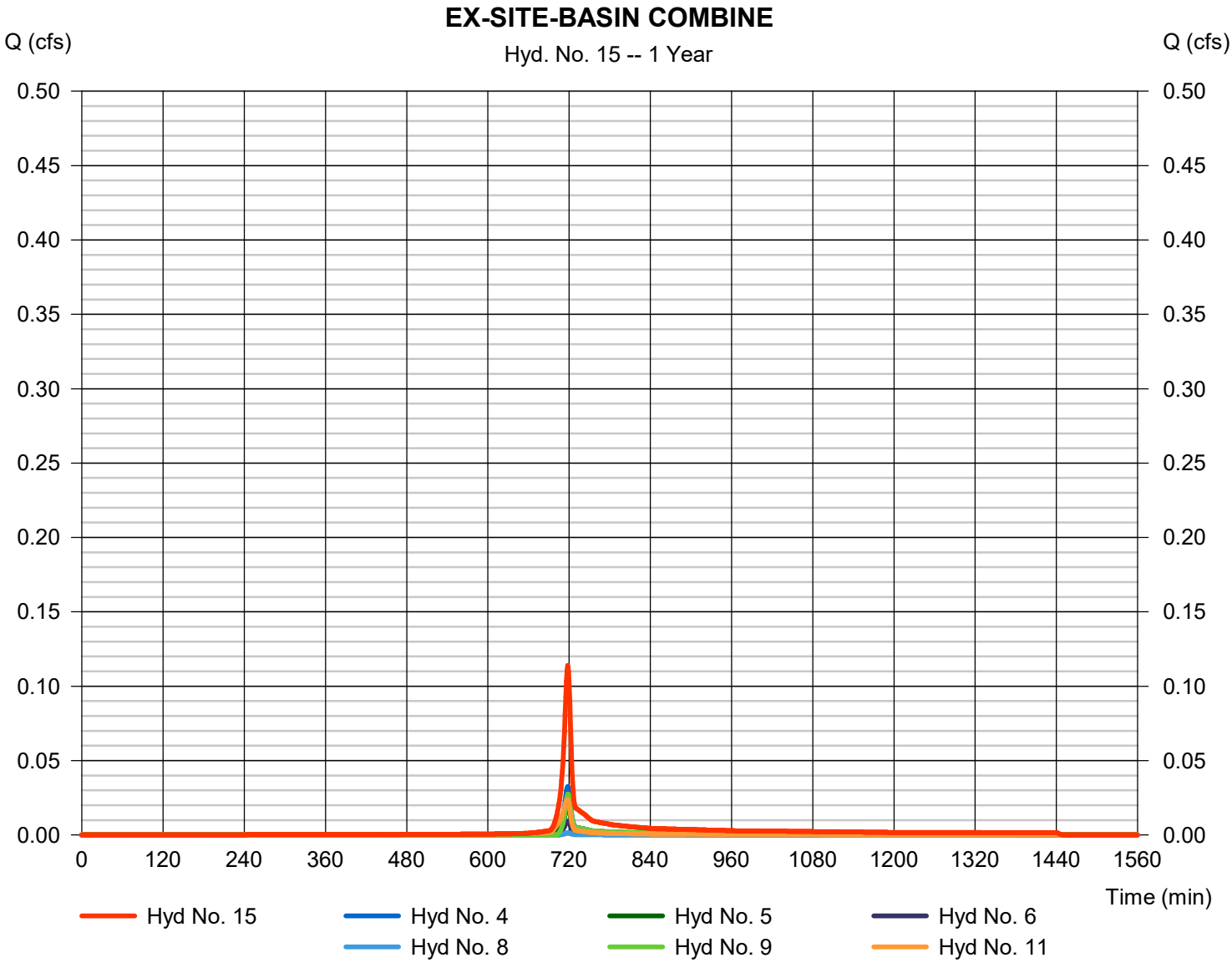


Hydrograph Report

Hyd. No. 15

EX-SITE-BASIN COMBINE

Hydrograph type	= Combine	Peak discharge	= 0.114 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 245 cuft
Inflow hyds.	= 4, 5, 6, 8, 9, 11	Contrib. drain. area	= 0.077 ac

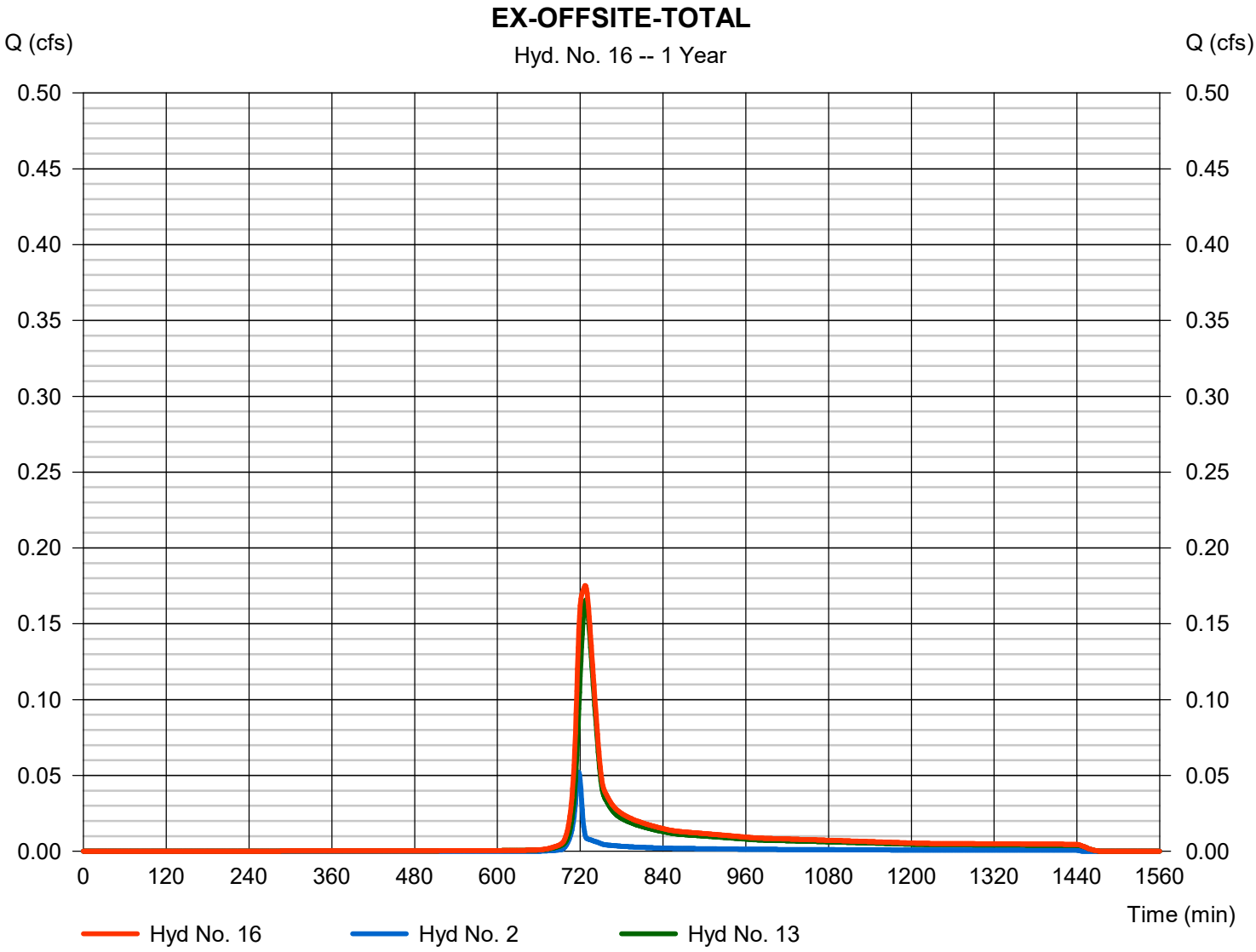


Hydrograph Report

Hyd. No. 16

EX-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.175 cfs
Storm frequency	= 1 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 720 cuft
Inflow hyds.	= 2, 13	Contrib. drain. area	= 0.033 ac

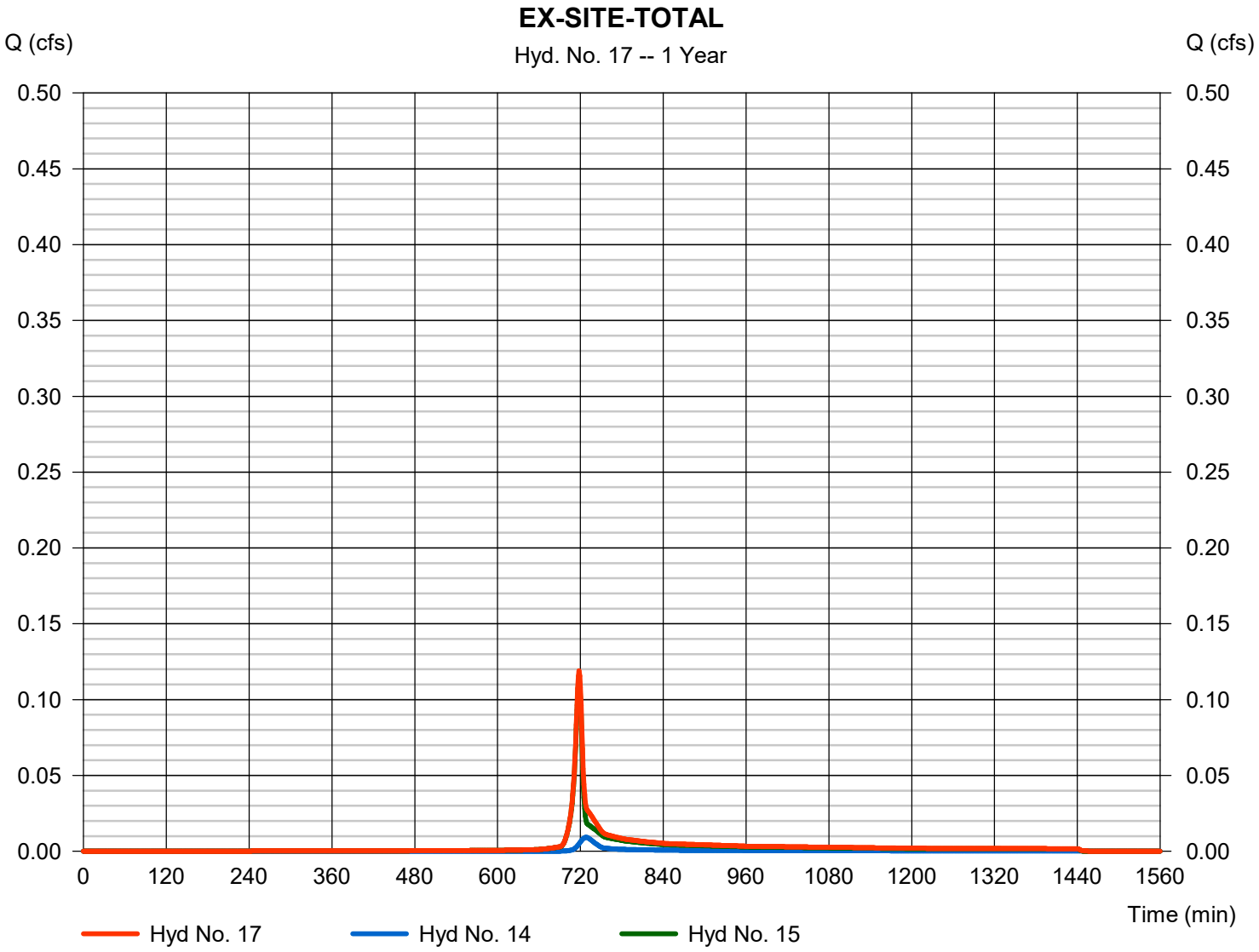


Hydrograph Report

Hyd. No. 17

EX-SITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.119 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 279 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.000 ac

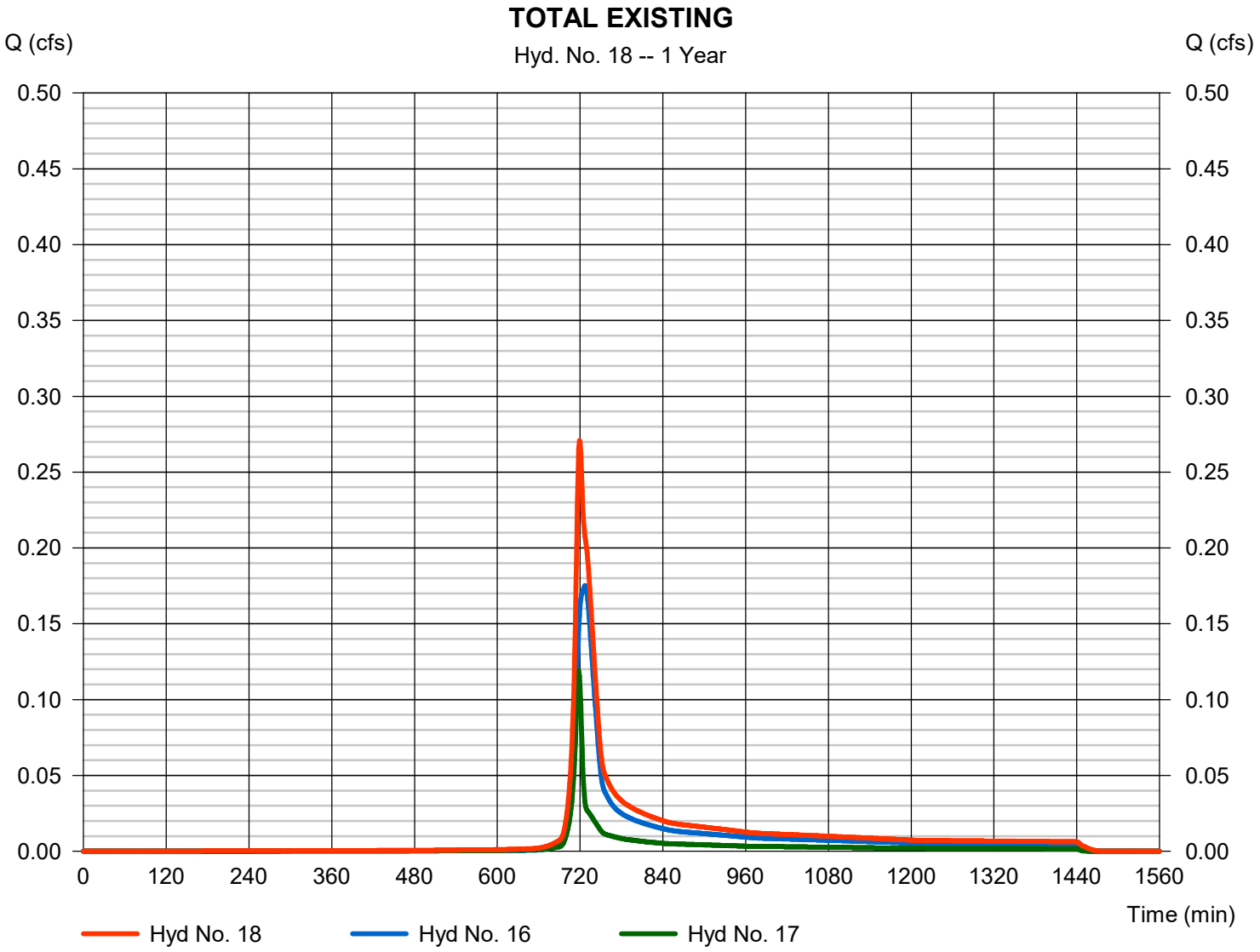


Hydrograph Report

Hyd. No. 18

TOTAL EXISTING

Hydrograph type	= Combine	Peak discharge	= 0.271 cfs
Storm frequency	= 1 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 1,000 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 0.000 ac

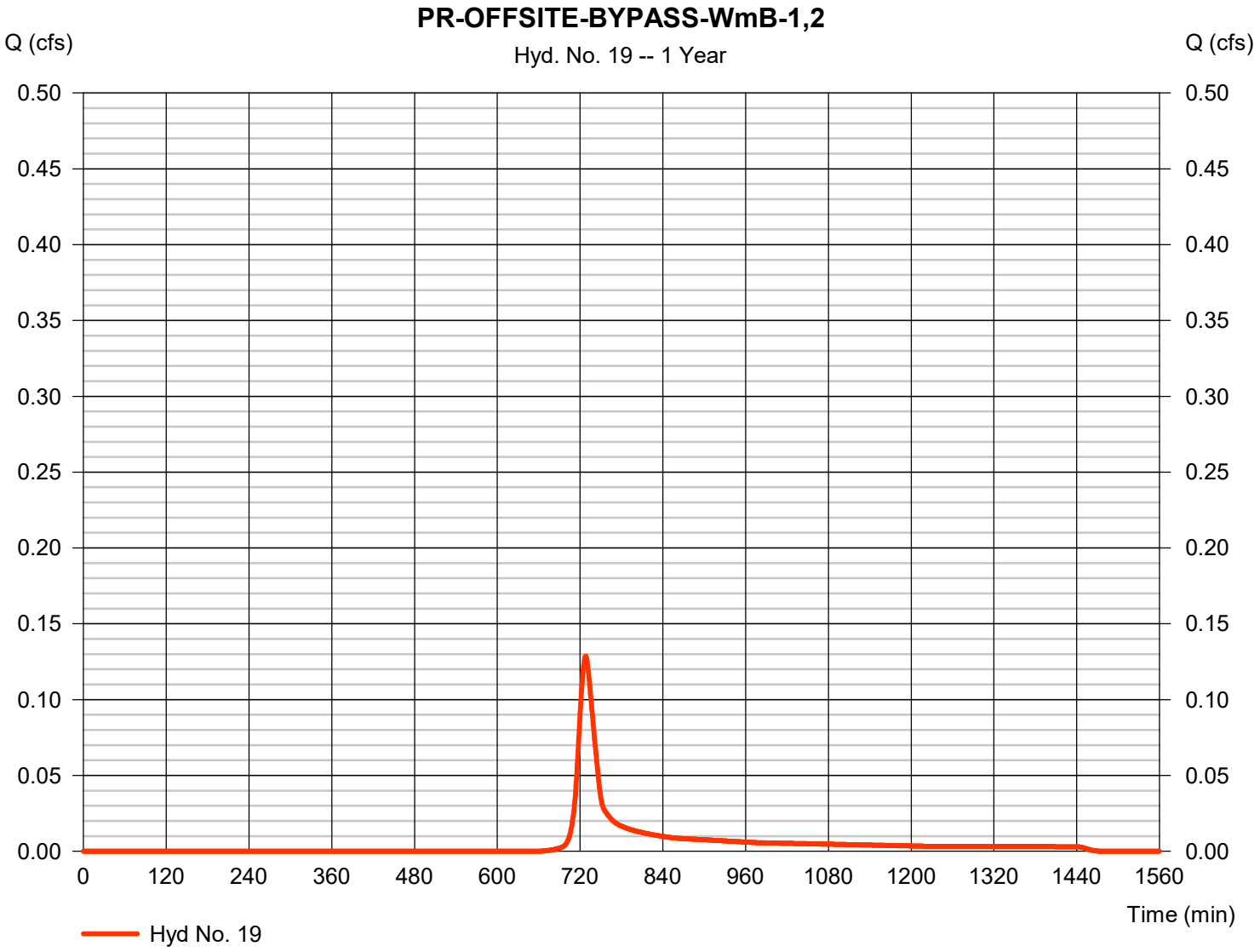


Hydrograph Report

Hyd. No. 19

PR-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.129 cfs
Storm frequency	=	1 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	464 cuft
Drainage area	=	0.152 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

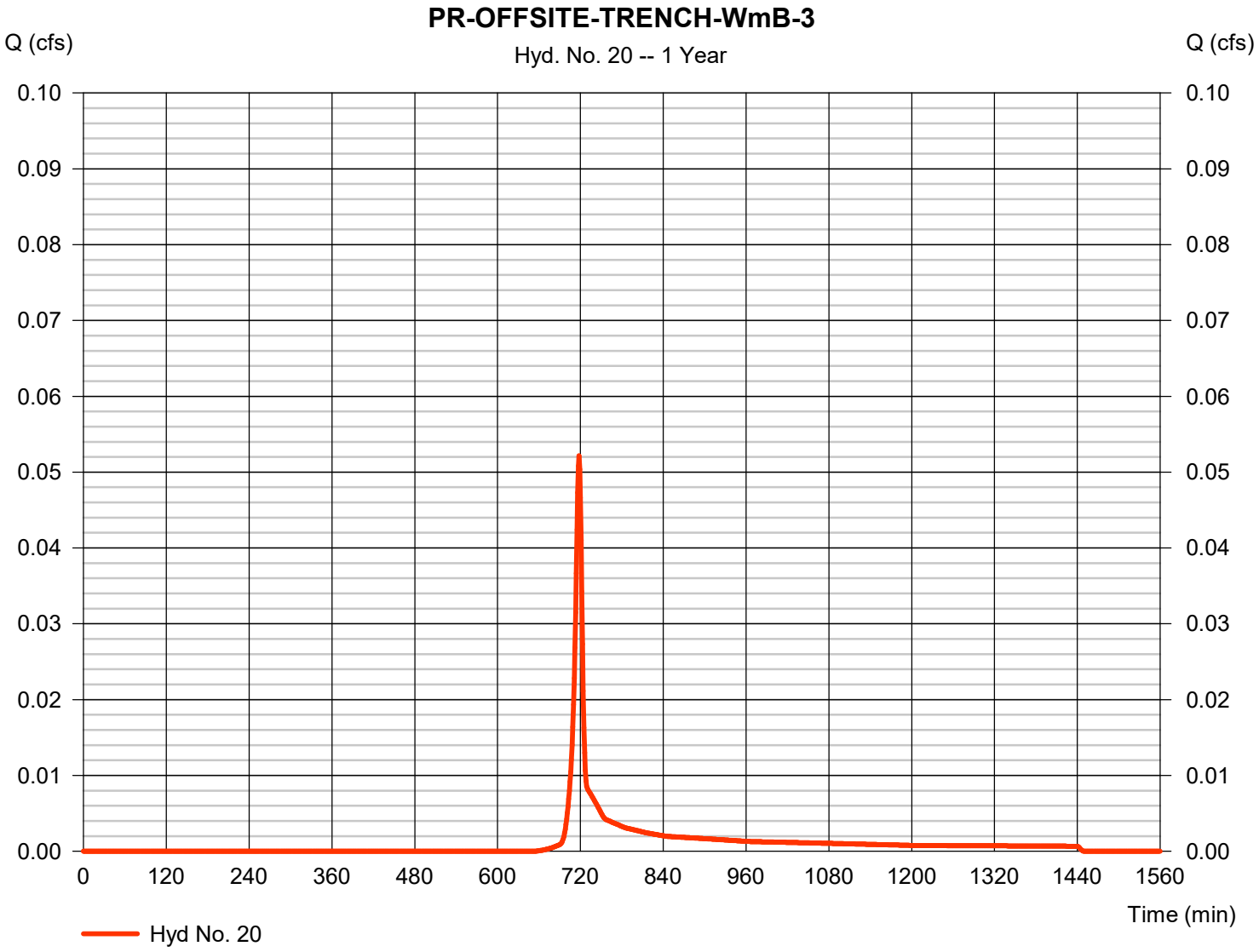


Hydrograph Report

Hyd. No. 20

PR-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.052 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 106 cuft
Drainage area	= 0.033 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

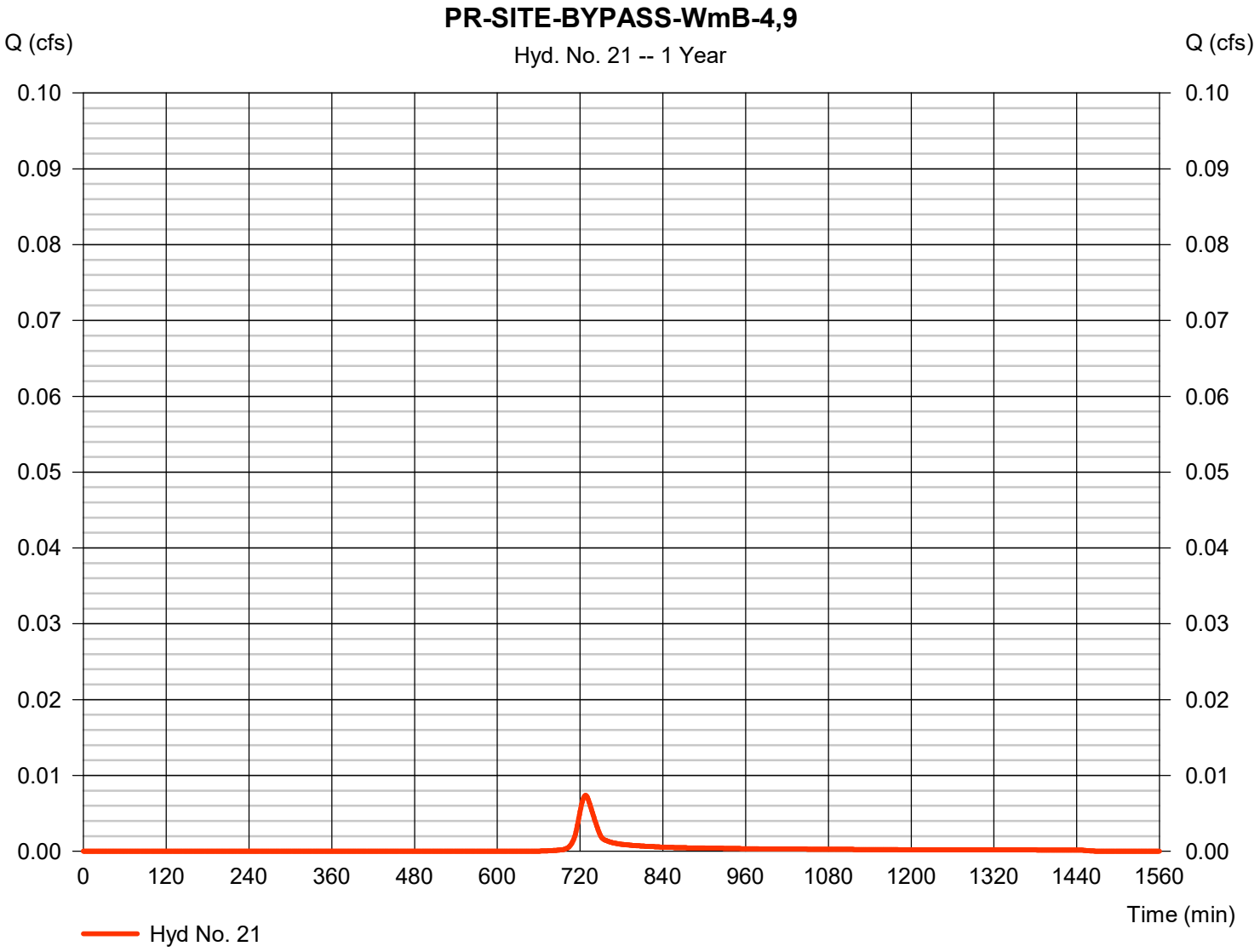


Hydrograph Report

Hyd. No. 21

PR-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.007 cfs
Storm frequency	=	1 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	26 cuft
Drainage area	=	0.008 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

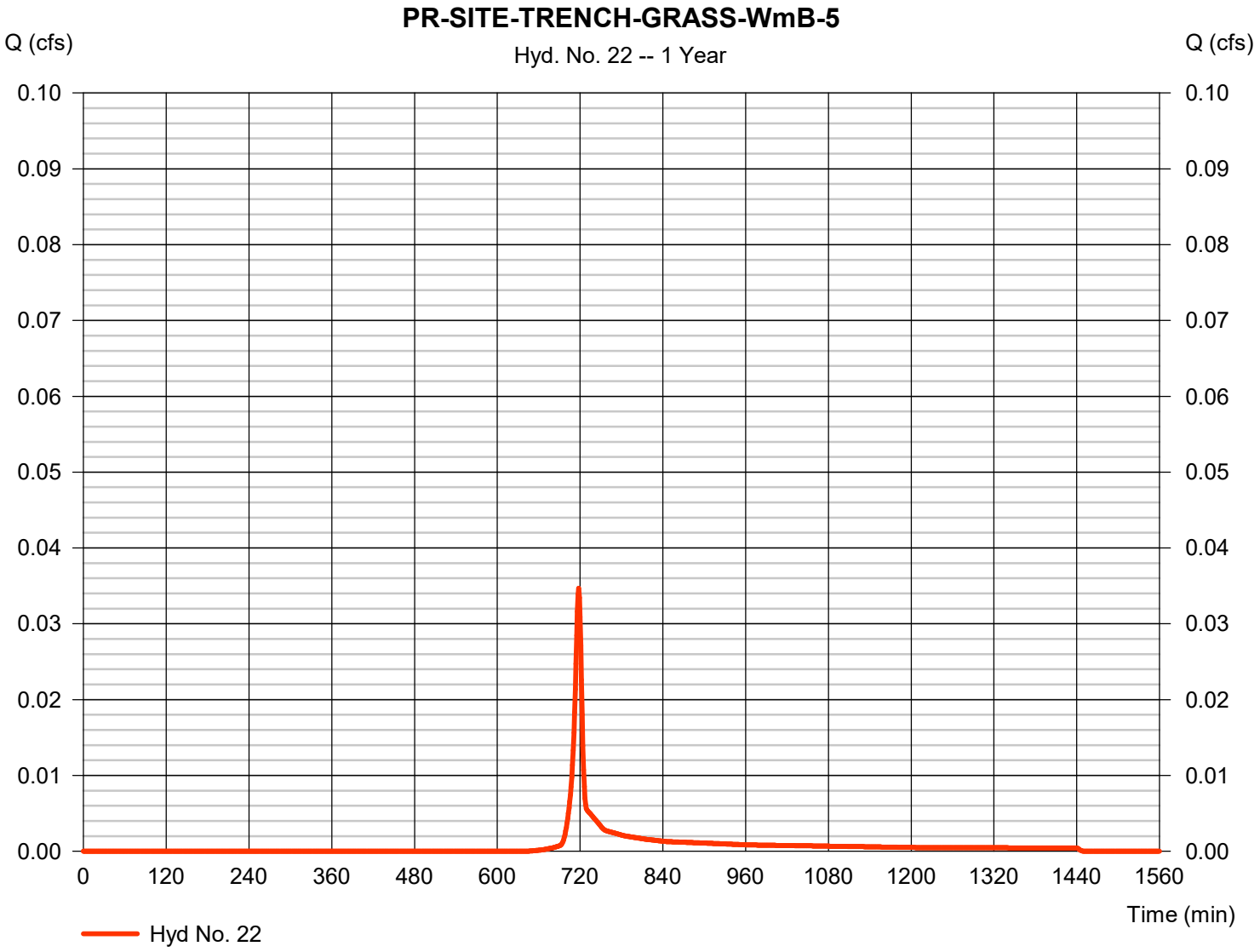


Hydrograph Report

Hyd. No. 22

PR-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.035 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 70 cuft
Drainage area	= 0.021 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

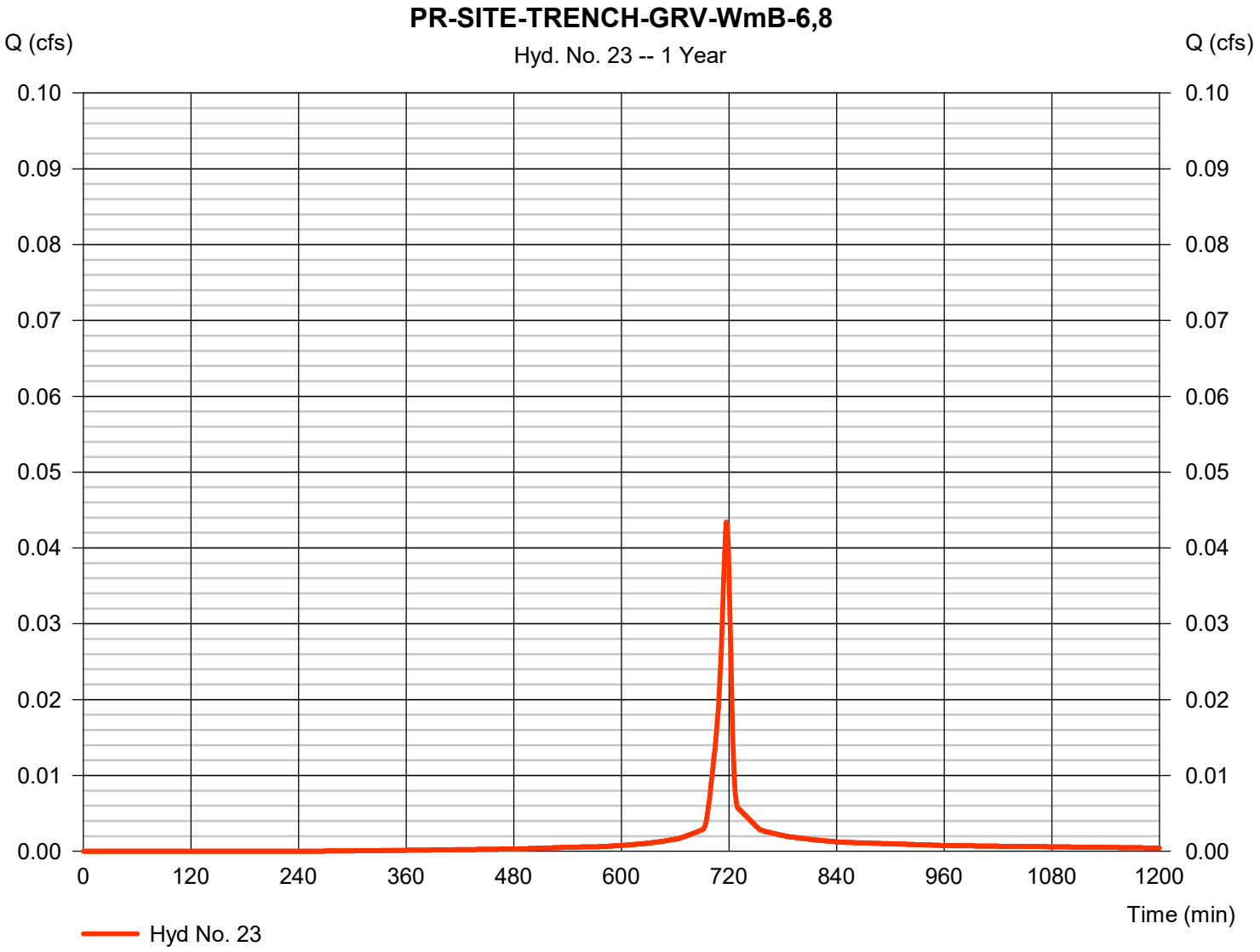


Hydrograph Report

Hyd. No. 23

PR-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.043 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 94 cuft
Drainage area	= 0.012 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

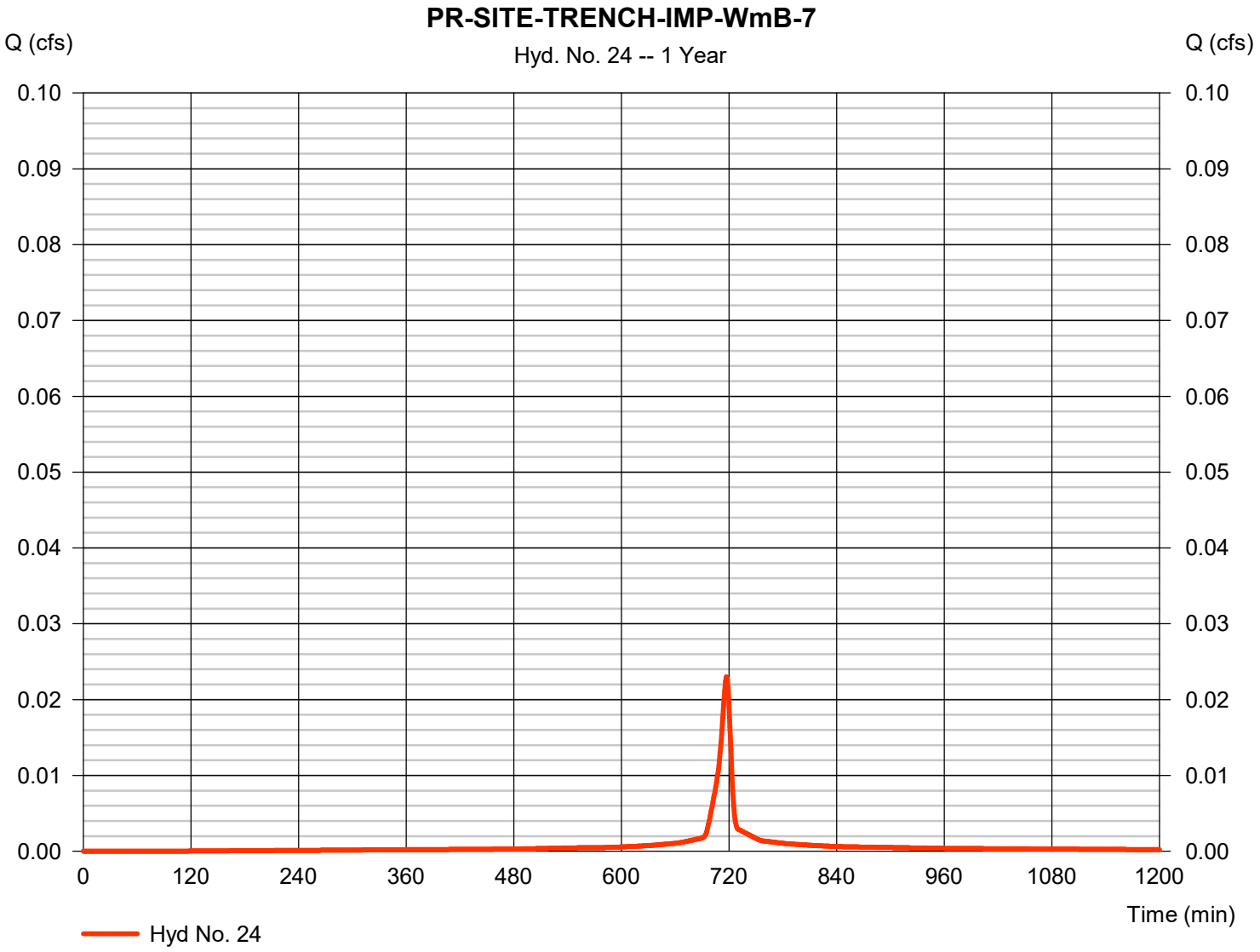


Hydrograph Report

Hyd. No. 24

PR-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.023 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 54 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

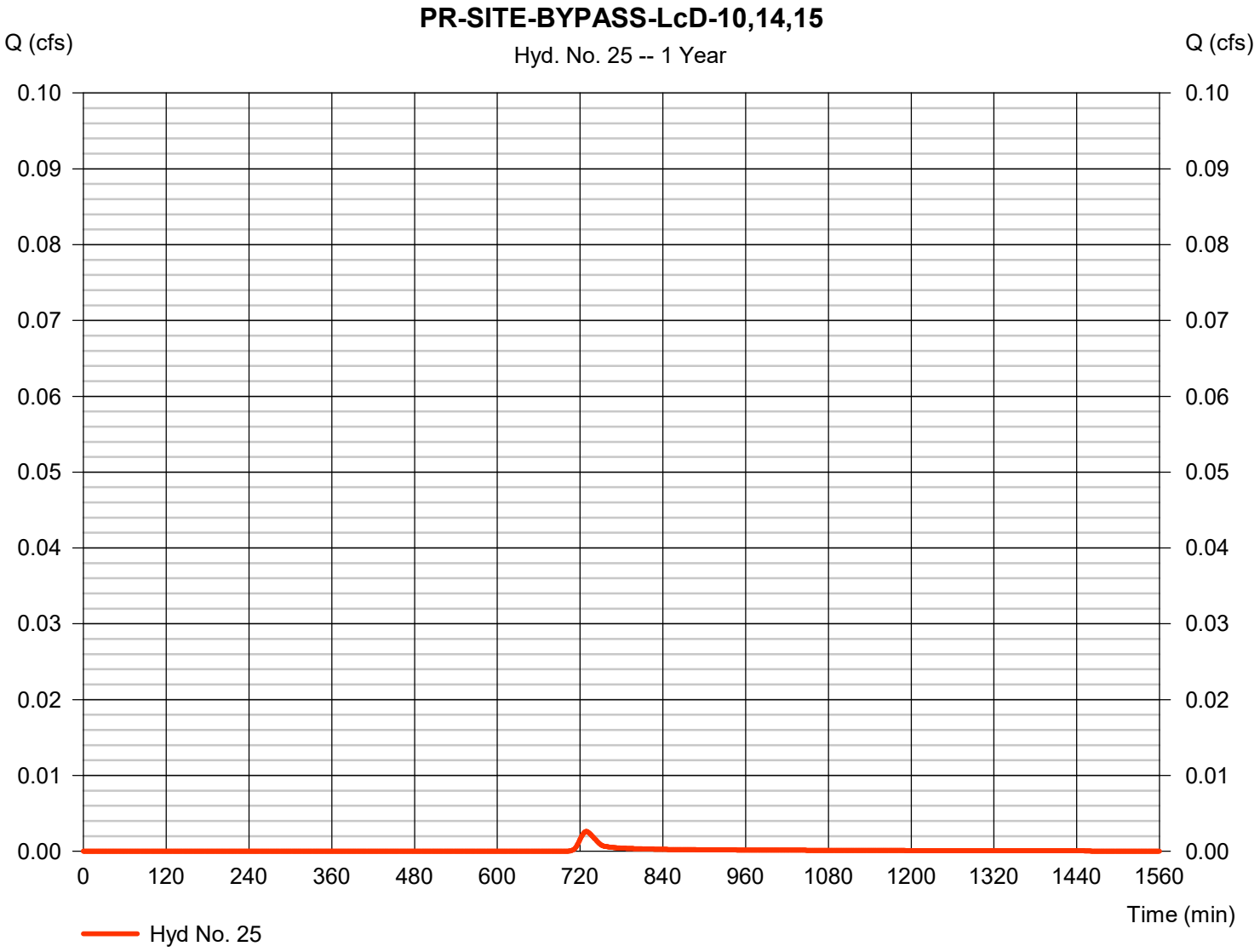


Hydrograph Report

Hyd. No. 25

PR-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.003 cfs
Storm frequency	= 1 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 11 cuft
Drainage area	= 0.005 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

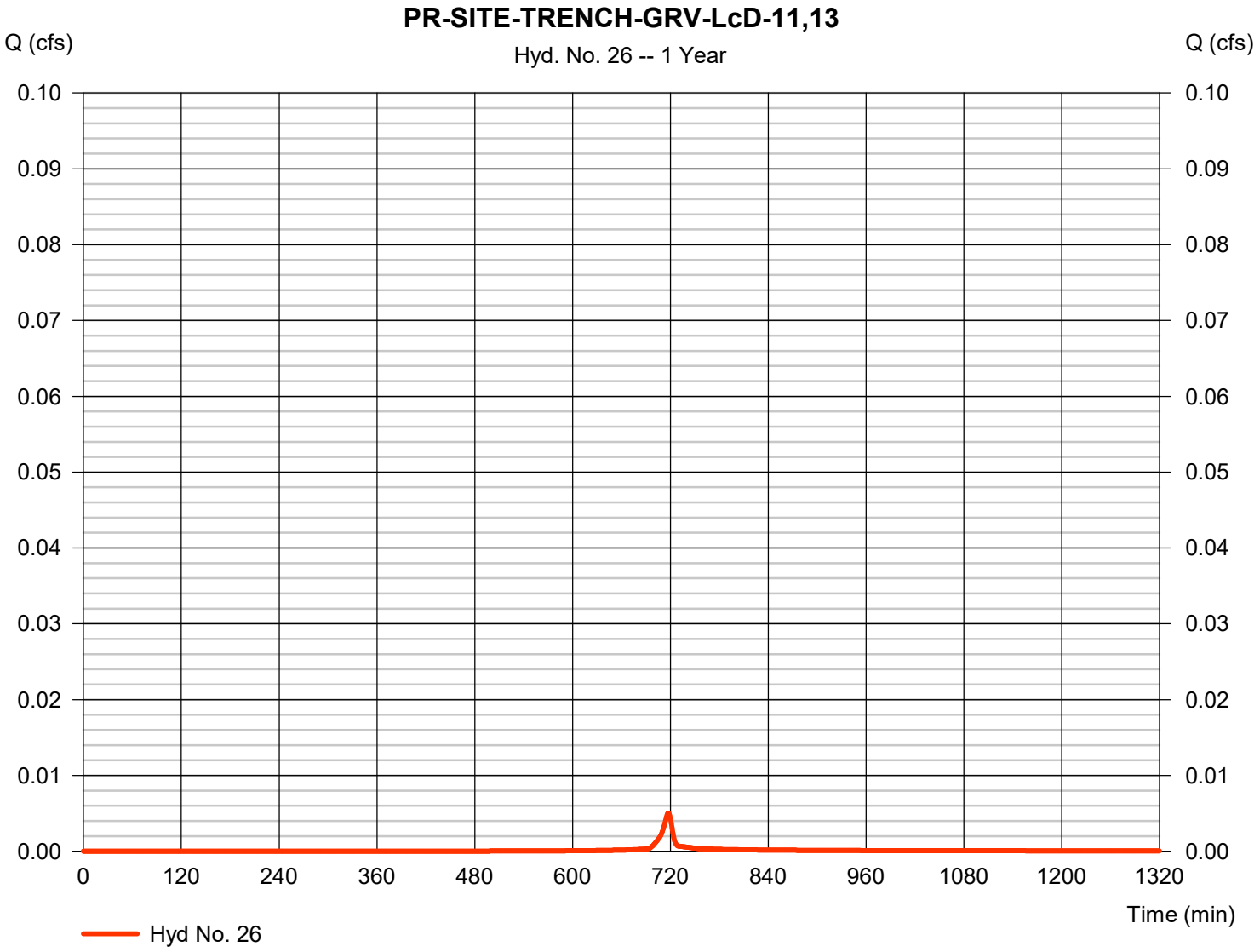


Hydrograph Report

Hyd. No. 26

PR-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 11 cuft
Drainage area	= 0.002 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

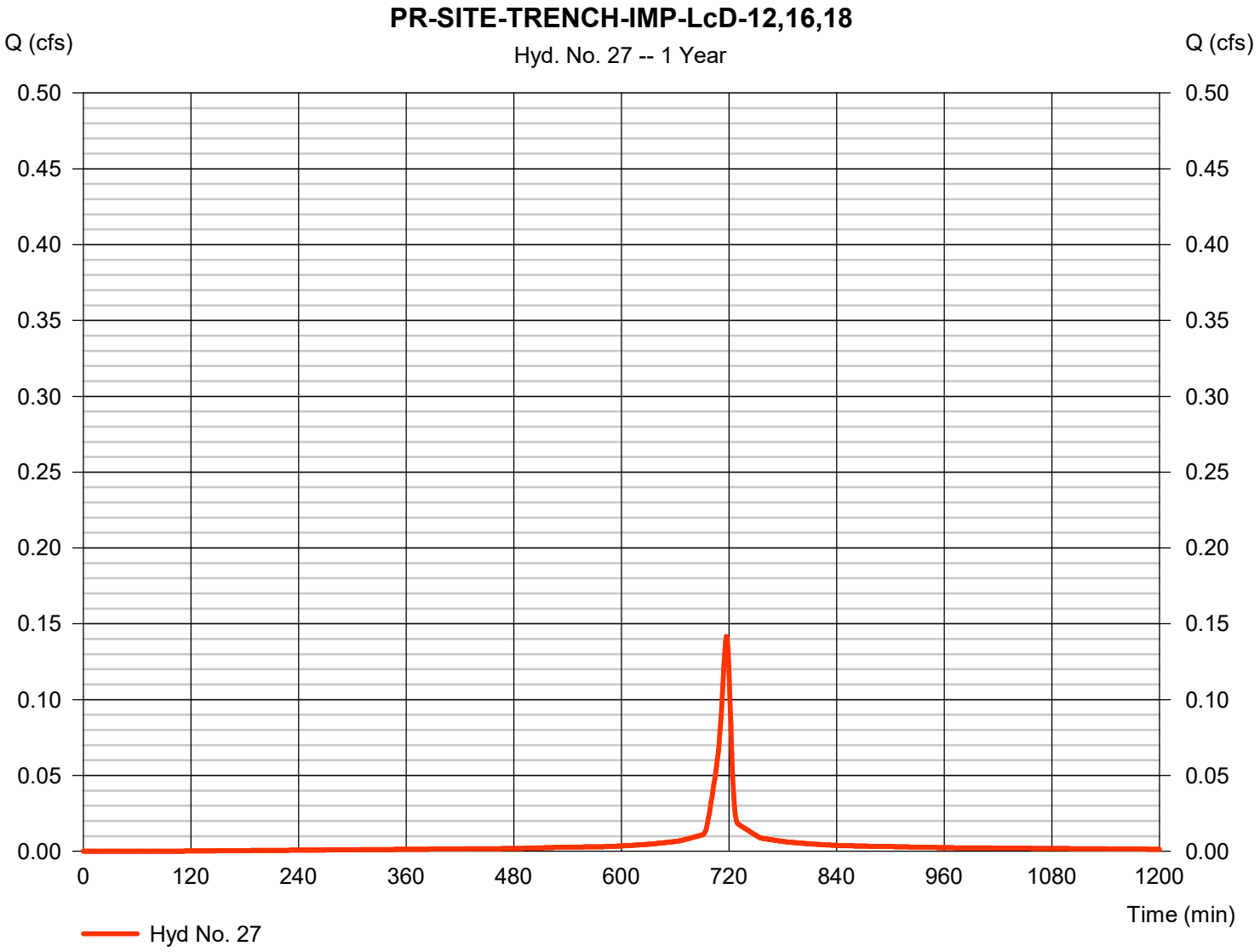


Hydrograph Report

Hyd. No. 27

PR-SITE-TRENCH-IMP-LcD-12,16,18

Hydrograph type	= SCS Runoff	Peak discharge	= 0.142 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 332 cuft
Drainage area	= 0.036 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



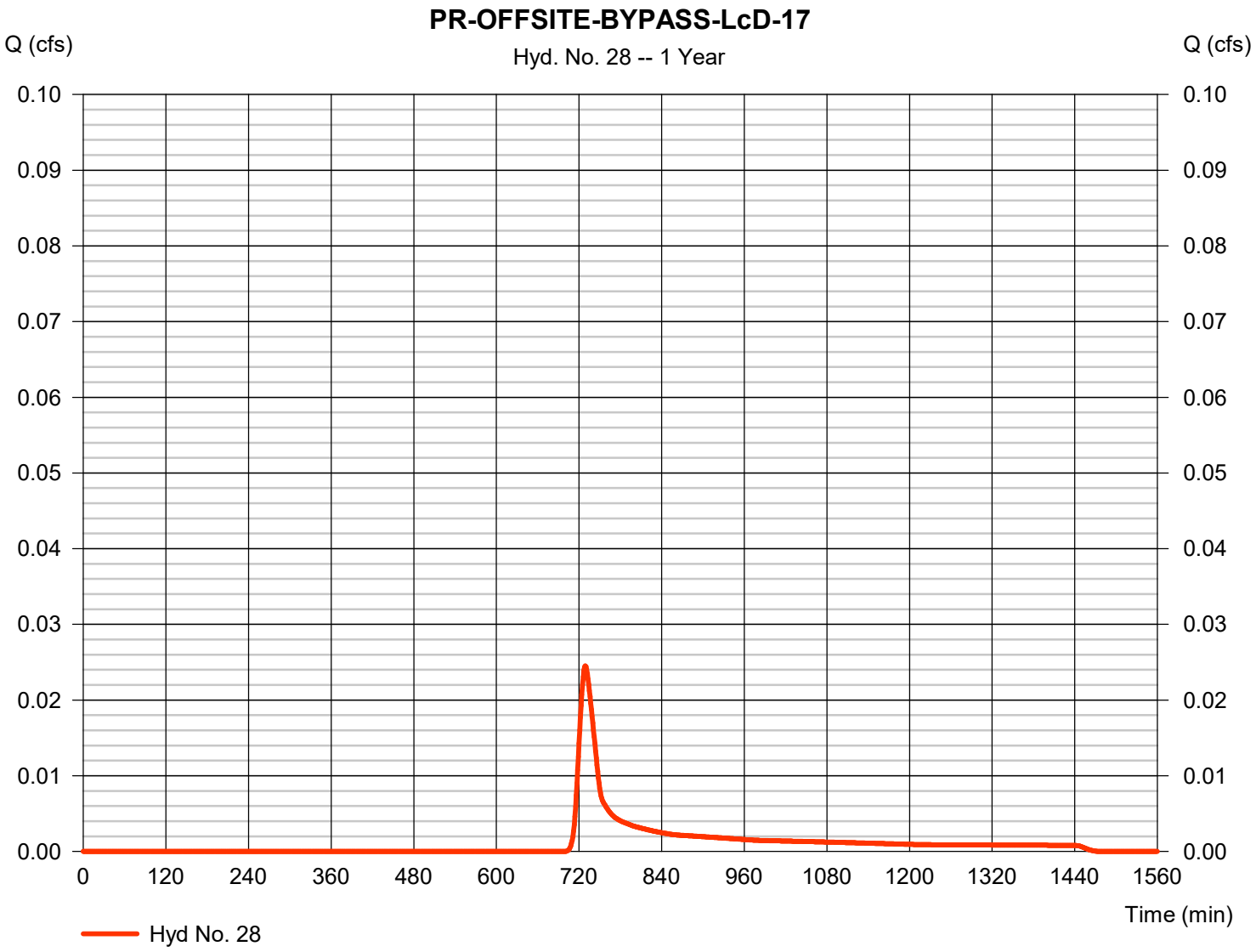
Hydrograph Report

Hyd. No. 28

PR-OFFSITE-BYPASS-LcD-17

Hydrograph type	= SCS Runoff	Peak discharge	= 0.025 cfs
Storm frequency	= 1 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 103 cuft
Drainage area	= 0.053 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 2.67 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.045 x 98) + (0.043 x 98)] / 0.053

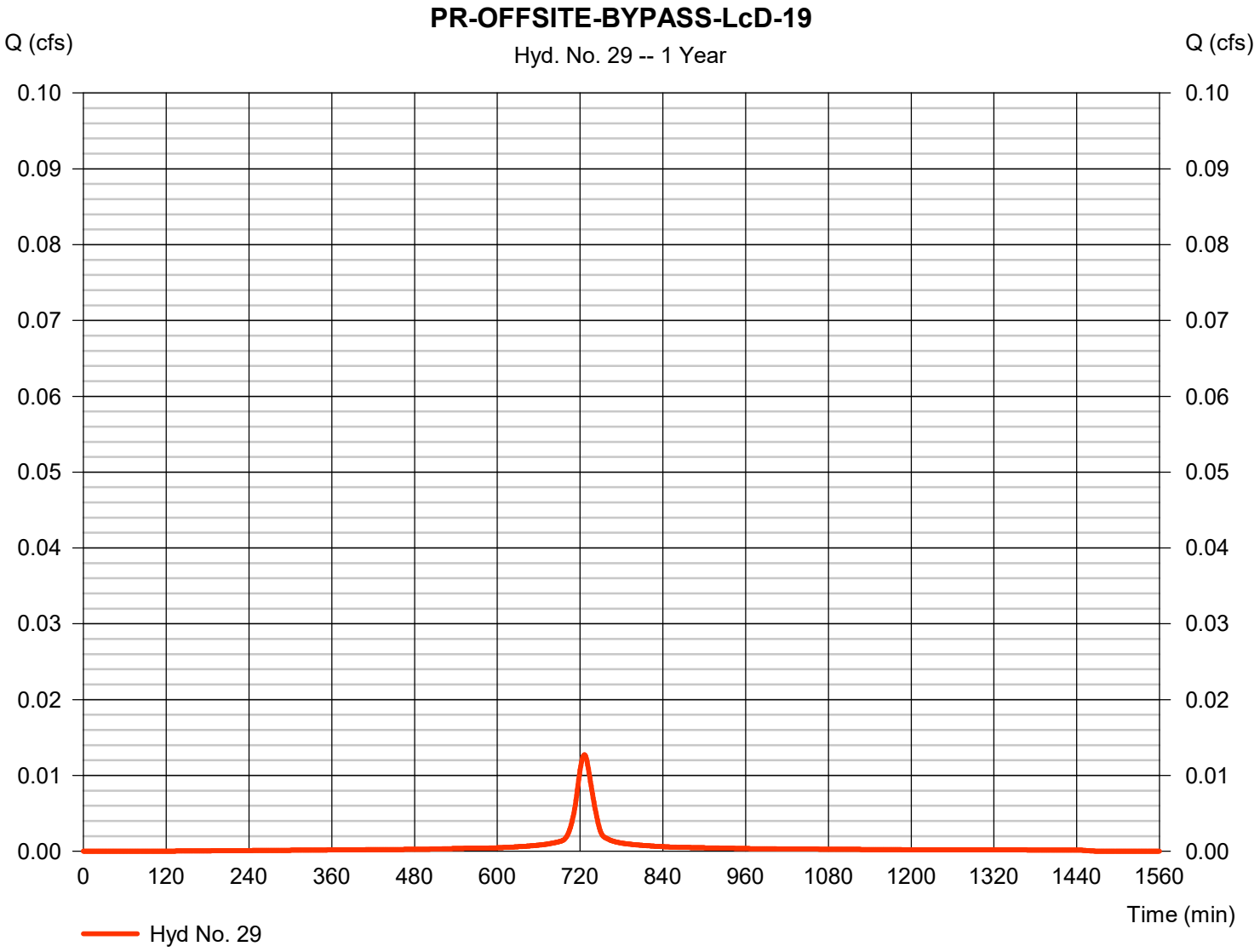


Hydrograph Report

Hyd. No. 29

PR-OFFSITE-BYPASS-LcD-19

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.013 cfs
Storm frequency	=	1 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	47 cuft
Drainage area	=	0.005 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	2.67 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

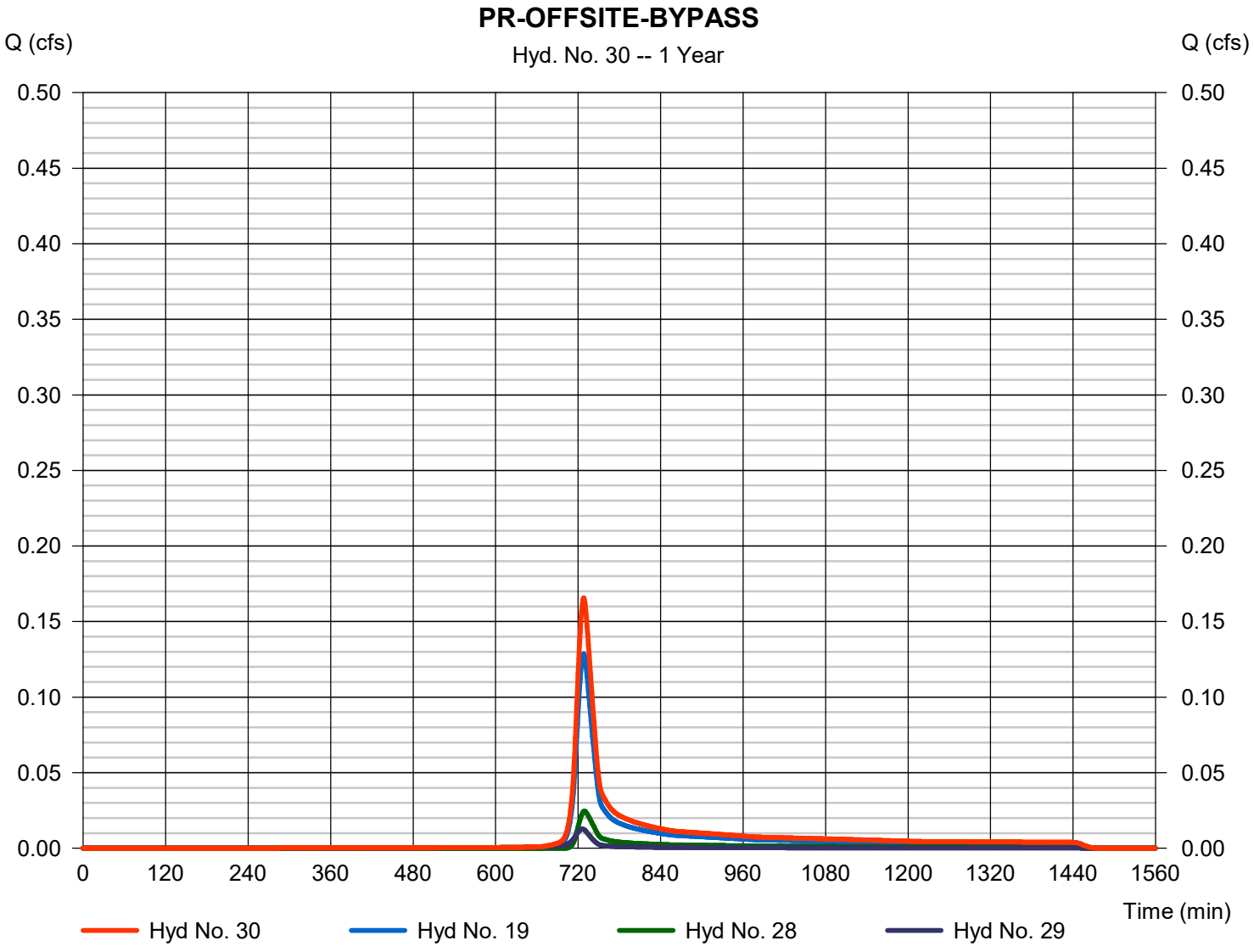


Hydrograph Report

Hyd. No. 30

PR-OFFSITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.166 cfs
Storm frequency	=	1 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	615 cuft
Inflow hyds.	=	19, 28, 29	Contrib. drain. area	=	0.211 ac

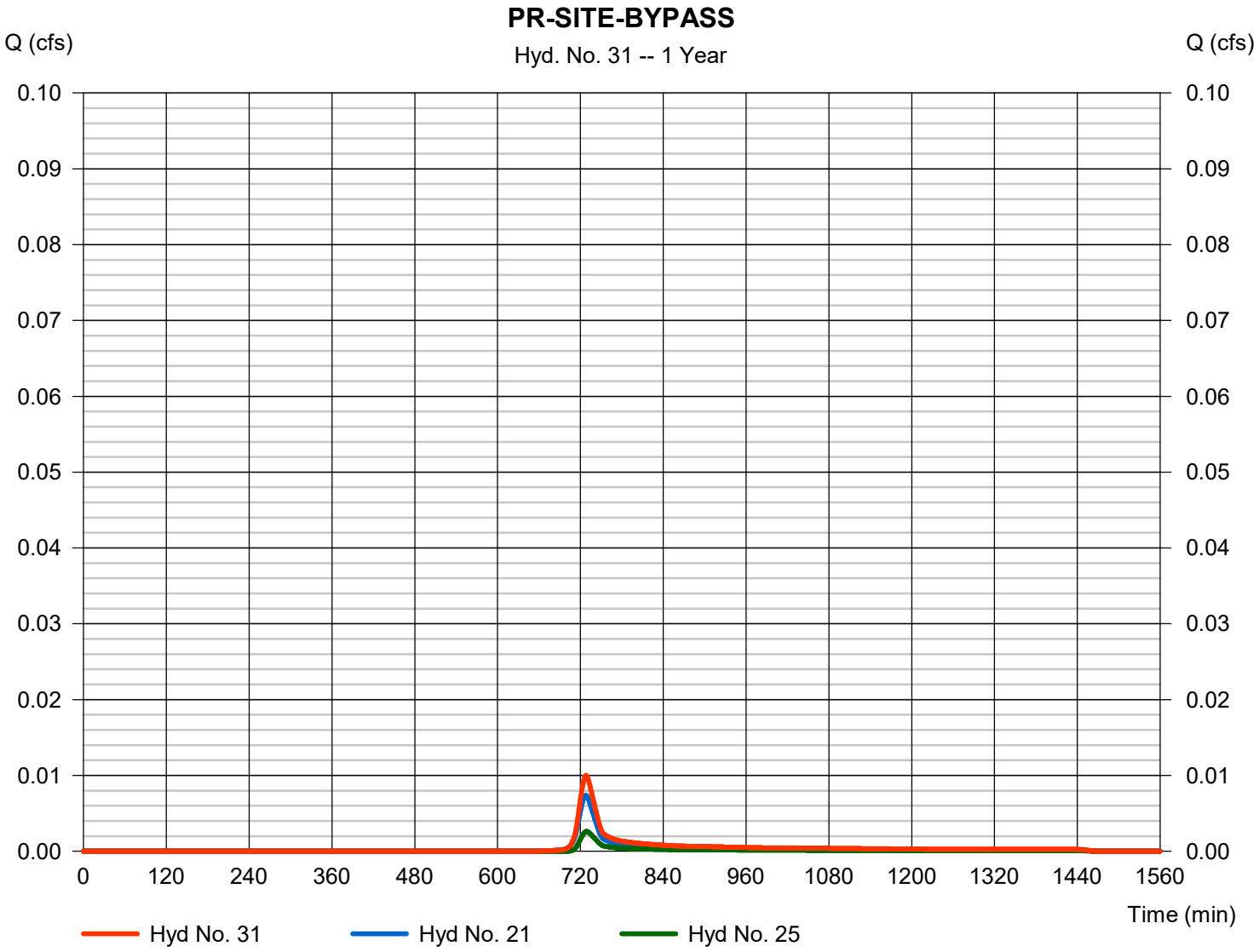


Hydrograph Report

Hyd. No. 31

PR-SITE-BYPASS

Hydrograph type	= Combine	Peak discharge	= 0.010 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 37 cuft
Inflow hyds.	= 21, 25	Contrib. drain. area	= 0.013 ac

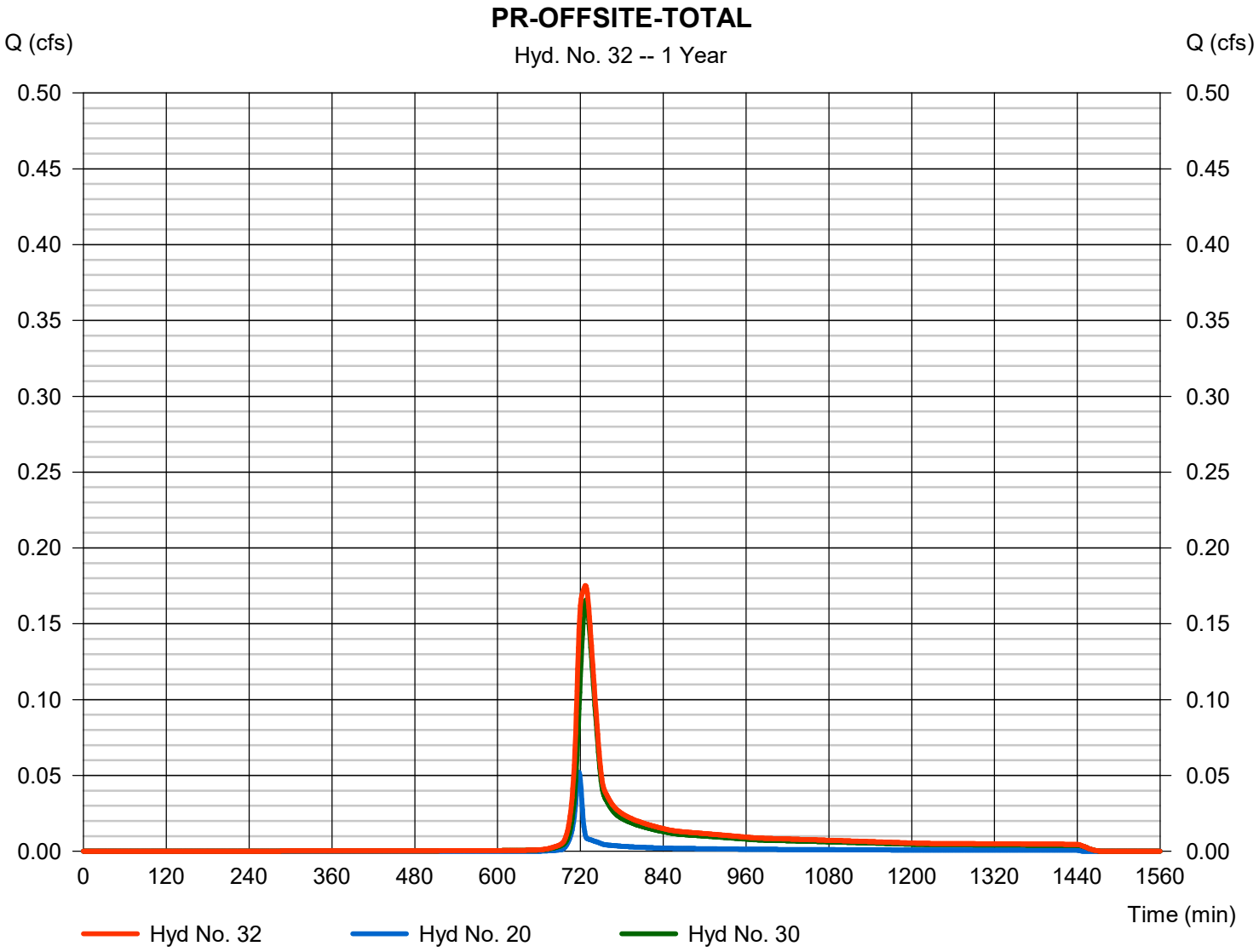


Hydrograph Report

Hyd. No. 32

PR-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.175 cfs
Storm frequency	= 1 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 720 cuft
Inflow hyds.	= 20, 30	Contrib. drain. area	= 0.033 ac

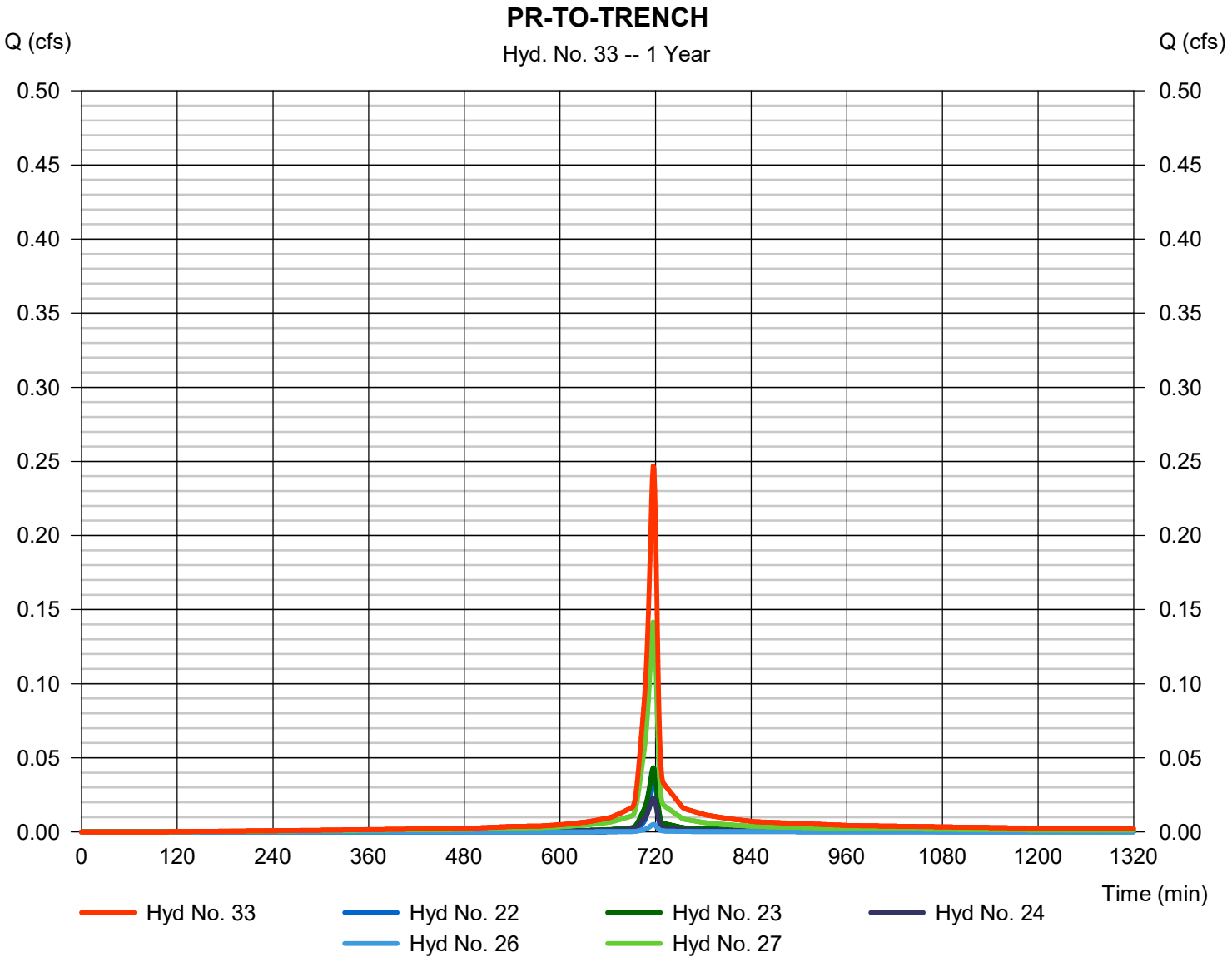


Hydrograph Report

Hyd. No. 33

PR-TO-TRENCH

Hydrograph type	= Combine	Peak discharge	= 0.247 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 560 cuft
Inflow hyds.	= 22, 23, 24, 26, 27	Contrib. drain. area	= 0.077 ac



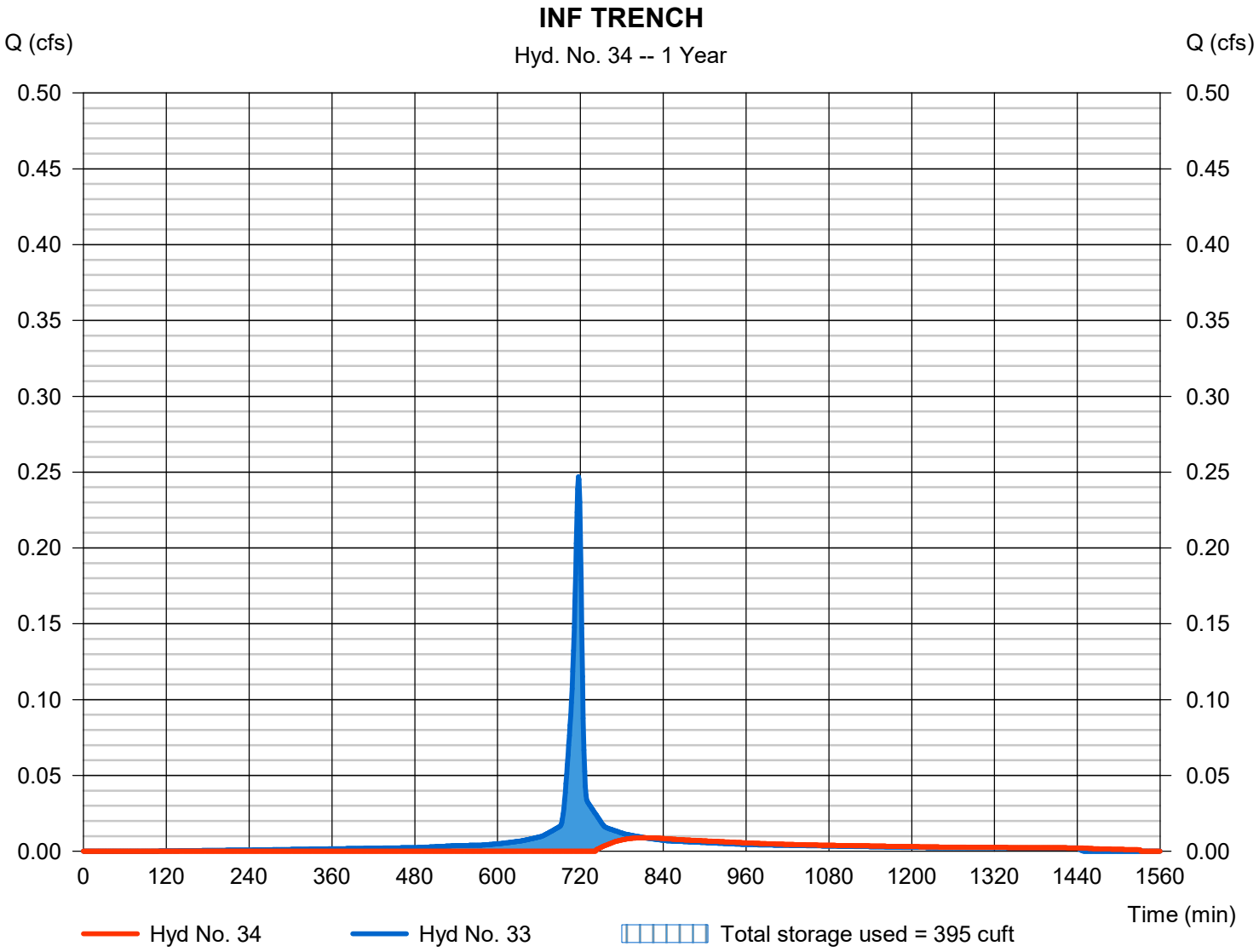
Hydrograph Report

Hyd. No. 34

INF TRENCH

Hydrograph type	=	Reservoir	Peak discharge	=	0.009 cfs
Storm frequency	=	1 yrs	Time to peak	=	812 min
Time interval	=	1 min	Hyd. volume	=	194 cuft
Inflow hyd. No.	=	33 - PR-TO-TRENCH	Max. Elevation	=	1687.06 ft
Reservoir name	=	BASIN	Max. Storage	=	395 cuft

Storage Indication method used.



Pond No. 1 - BASIN

Pond Data

UG Chambers -Invert elev. = 1687.00 ft, Rise x Span = 0.50 x 0.50 ft, Barrel Len = 44.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 1686.50 ft, Width = 40.00 ft, Height = 1.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1686.50	n/a	0	0
0.15	1686.65	n/a	106	106
0.30	1686.80	n/a	106	211
0.45	1686.95	n/a	106	317
0.60	1687.10	n/a	106	423
0.75	1687.25	n/a	107	531
0.90	1687.40	n/a	107	638
1.05	1687.55	n/a	106	745
1.20	1687.70	n/a	106	850
1.35	1687.85	n/a	106	956
1.50	1688.00	n/a	106	1,061

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	Inactive	0.00	0.00
Span (in)	= 4.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1687.00	1682.00	0.00	0.00
Length (ft)	= 0.25	0.25	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 1688.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1686.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.01	11	1686.52	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.03	21	1686.53	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.05	32	1686.55	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.06	42	1686.56	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.08	53	1686.57	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.09	63	1686.59	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.10	74	1686.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.12	84	1686.62	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.14	95	1686.64	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.15	106	1686.65	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.17	116	1686.67	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.18	127	1686.68	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.19	137	1686.69	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.21	148	1686.71	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.22	158	1686.72	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.24	169	1686.74	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.25	180	1686.76	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.27	190	1686.77	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.28	201	1686.79	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	211	1686.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.31	222	1686.81	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.33	232	1686.83	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.34	243	1686.84	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.36	253	1686.86	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.37	264	1686.88	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.39	275	1686.89	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.40	285	1686.91	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.42	296	1686.92	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.43	306	1686.94	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.45	317	1686.95	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.47	327	1686.96	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000

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BASIN

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.48	338	1686.98	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	349	1686.99	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.51	359	1687.01	0.00 ic	0.00	---	---	0.00	---	---	---	---	---	0.000
0.52	370	1687.03	0.00 ic	0.00	---	---	0.00	---	---	---	---	---	0.002
0.54	381	1687.04	0.00 ic	0.00	---	---	0.00	---	---	---	---	---	0.004
0.55	391	1687.06	0.01 ic	0.00	---	---	0.00	---	---	---	---	---	0.008
0.57	402	1687.07	0.01 ic	0.00	---	---	0.00	---	---	---	---	---	0.012
0.58	413	1687.08	0.02 ic	0.00	---	---	0.00	---	---	---	---	---	0.017
0.60	423	1687.10	0.02 ic	0.00	---	---	0.00	---	---	---	---	---	0.024
0.62	434	1687.11	0.03 ic	0.00	---	---	0.00	---	---	---	---	---	0.031
0.63	445	1687.13	0.04 ic	0.00	---	---	0.00	---	---	---	---	---	0.039
0.64	455	1687.15	0.05 ic	0.00	---	---	0.00	---	---	---	---	---	0.047
0.66	466	1687.16	0.06 ic	0.00	---	---	0.00	---	---	---	---	---	0.056
0.68	477	1687.18	0.07 ic	0.00	---	---	0.00	---	---	---	---	---	0.066
0.69	488	1687.19	0.08 ic	0.00	---	---	0.00	---	---	---	---	---	0.076
0.70	498	1687.20	0.09 ic	0.00	---	---	0.00	---	---	---	---	---	0.087
0.72	509	1687.22	0.10 ic	0.00	---	---	0.00	---	---	---	---	---	0.098
0.73	520	1687.23	0.11 ic	0.00	---	---	0.00	---	---	---	---	---	0.109
0.75	531	1687.25	0.12 ic	0.00	---	---	0.00	---	---	---	---	---	0.120
0.76	541	1687.27	0.13 ic	0.00	---	---	0.00	---	---	---	---	---	0.130
0.78	552	1687.28	0.14 ic	0.00	---	---	0.00	---	---	---	---	---	0.141
0.80	563	1687.30	0.15 ic	0.00	---	---	0.00	---	---	---	---	---	0.151
0.81	574	1687.31	0.16 ic	0.00	---	---	0.00	---	---	---	---	---	0.160
0.82	584	1687.32	0.17 ic	0.00	---	---	0.00	---	---	---	---	---	0.168
0.84	595	1687.34	0.05 oc	0.00	---	---	0.00	---	---	---	---	---	0.046
0.85	606	1687.35	0.08 oc	0.00	---	---	0.00	---	---	---	---	---	0.083
0.87	617	1687.37	0.11 oc	0.00	---	---	0.00	---	---	---	---	---	0.108
0.88	627	1687.39	0.13 oc	0.00	---	---	0.00	---	---	---	---	---	0.129
0.90	638	1687.40	0.15 oc	0.00	---	---	0.00	---	---	---	---	---	0.146
0.92	649	1687.42	0.16 oc	0.00	---	---	0.00	---	---	---	---	---	0.162
0.93	659	1687.43	0.18 oc	0.00	---	---	0.00	---	---	---	---	---	0.176
0.94	670	1687.44	0.19 oc	0.00	---	---	0.00	---	---	---	---	---	0.189
0.96	681	1687.46	0.20 oc	0.00	---	---	0.00	---	---	---	---	---	0.201
0.97	691	1687.47	0.21 oc	0.00	---	---	0.00	---	---	---	---	---	0.213
0.99	702	1687.49	0.22 oc	0.00	---	---	0.00	---	---	---	---	---	0.224
1.00	713	1687.51	0.23 oc	0.00	---	---	0.00	---	---	---	---	---	0.234
1.02	723	1687.52	0.24 oc	0.00	---	---	0.00	---	---	---	---	---	0.244
1.03	734	1687.54	0.25 oc	0.00	---	---	0.00	---	---	---	---	---	0.254
1.05	745	1687.55	0.26 ic	0.00	---	---	0.00	---	---	---	---	---	0.260
1.07	755	1687.56	0.27 ic	0.00	---	---	0.00	---	---	---	---	---	0.265
1.08	766	1687.58	0.27 ic	0.00	---	---	0.00	---	---	---	---	---	0.270
1.10	776	1687.59	0.27 ic	0.00	---	---	0.00	---	---	---	---	---	0.275
1.11	787	1687.61	0.28 ic	0.00	---	---	0.00	---	---	---	---	---	0.280
1.13	797	1687.63	0.28 ic	0.00	---	---	0.00	---	---	---	---	---	0.284
1.14	808	1687.64	0.29 ic	0.00	---	---	0.00	---	---	---	---	---	0.289
1.15	818	1687.66	0.29 ic	0.00	---	---	0.00	---	---	---	---	---	0.294
1.17	829	1687.67	0.30 ic	0.00	---	---	0.00	---	---	---	---	---	0.298
1.18	840	1687.69	0.30 ic	0.00	---	---	0.00	---	---	---	---	---	0.302
1.20	850	1687.70	0.31 ic	0.00	---	---	0.00	---	---	---	---	---	0.307
1.22	861	1687.71	0.31 ic	0.00	---	---	0.00	---	---	---	---	---	0.311
1.23	871	1687.73	0.32 ic	0.00	---	---	0.00	---	---	---	---	---	0.315
1.25	882	1687.74	0.32 ic	0.00	---	---	0.00	---	---	---	---	---	0.320
1.26	892	1687.76	0.32 ic	0.00	---	---	0.00	---	---	---	---	---	0.324
1.27	903	1687.78	0.33 ic	0.00	---	---	0.00	---	---	---	---	---	0.328
1.29	914	1687.79	0.33 ic	0.00	---	---	0.00	---	---	---	---	---	0.332
1.30	924	1687.81	0.34 ic	0.00	---	---	0.00	---	---	---	---	---	0.336
1.32	935	1687.82	0.34 ic	0.00	---	---	0.00	---	---	---	---	---	0.340
1.34	945	1687.83	0.34 ic	0.00	---	---	0.00	---	---	---	---	---	0.343
1.35	956	1687.85	0.35 ic	0.00	---	---	0.00	---	---	---	---	---	0.347
1.37	966	1687.86	0.35 ic	0.00	---	---	0.00	---	---	---	---	---	0.351
1.38	977	1687.88	0.35 ic	0.00	---	---	0.00	---	---	---	---	---	0.355
1.39	987	1687.90	0.36 ic	0.00	---	---	0.00	---	---	---	---	---	0.359
1.41	998	1687.91	0.36 ic	0.00	---	---	0.00	---	---	---	---	---	0.362
1.42	1,009	1687.93	0.37 ic	0.00	---	---	0.00	---	---	---	---	---	0.366
1.44	1,019	1687.94	0.37 ic	0.00	---	---	0.00	---	---	---	---	---	0.369
1.46	1,030	1687.95	0.37 ic	0.00	---	---	0.00	---	---	---	---	---	0.373
1.47	1,040	1687.97	0.38 ic	0.00	---	---	0.00	---	---	---	---	---	0.377
1.49	1,051	1687.98	0.38 ic	0.00	---	---	0.00	---	---	---	---	---	0.380
1.50	1,061	1688.00	0.38 ic	0.00	---	---	0.00	---	---	---	---	---	0.384

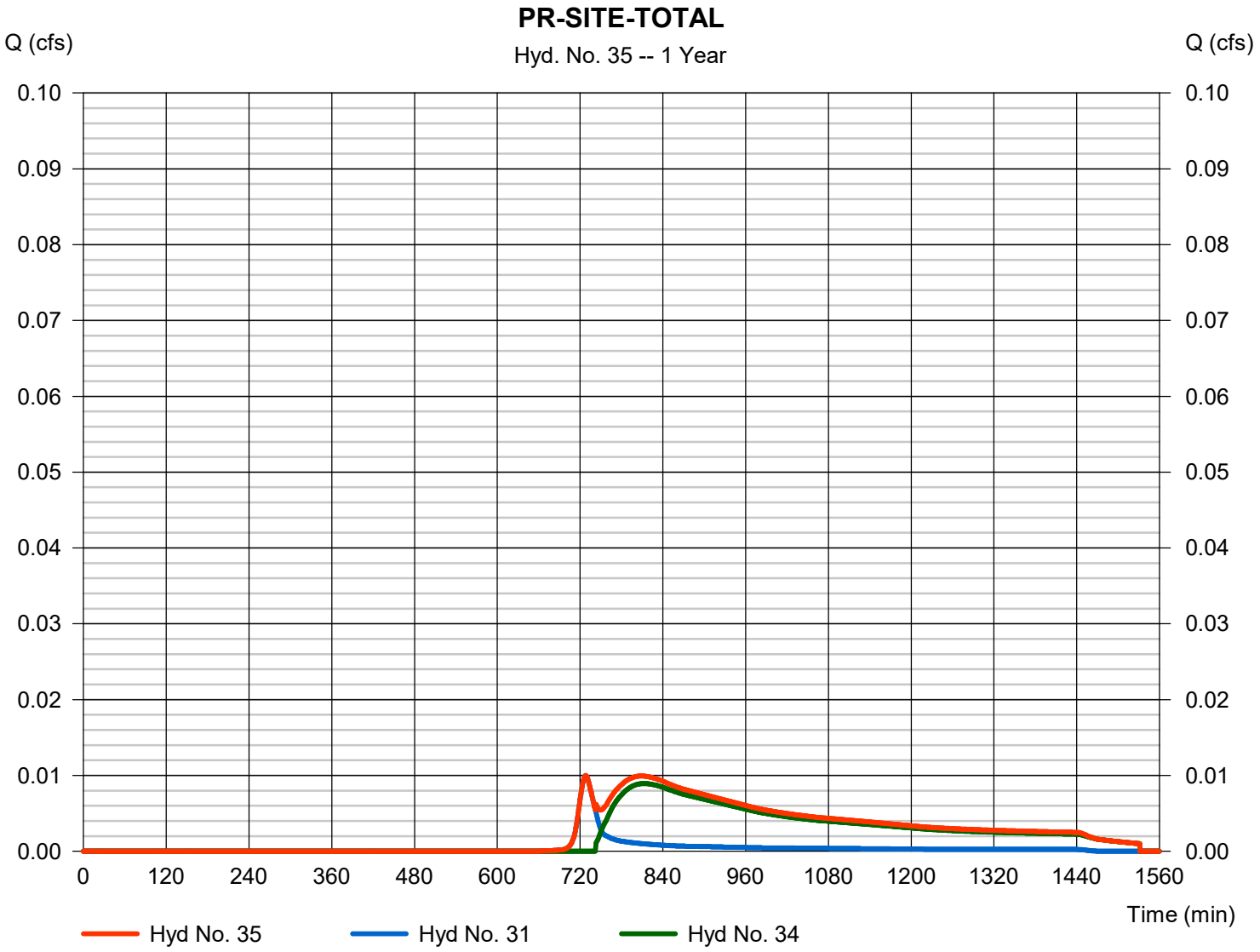
...End

Hydrograph Report

Hyd. No. 35

PR-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.010 cfs
Storm frequency	=	1 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	231 cuft
Inflow hyds.	=	31, 34	Contrib. drain. area	=	0.000 ac

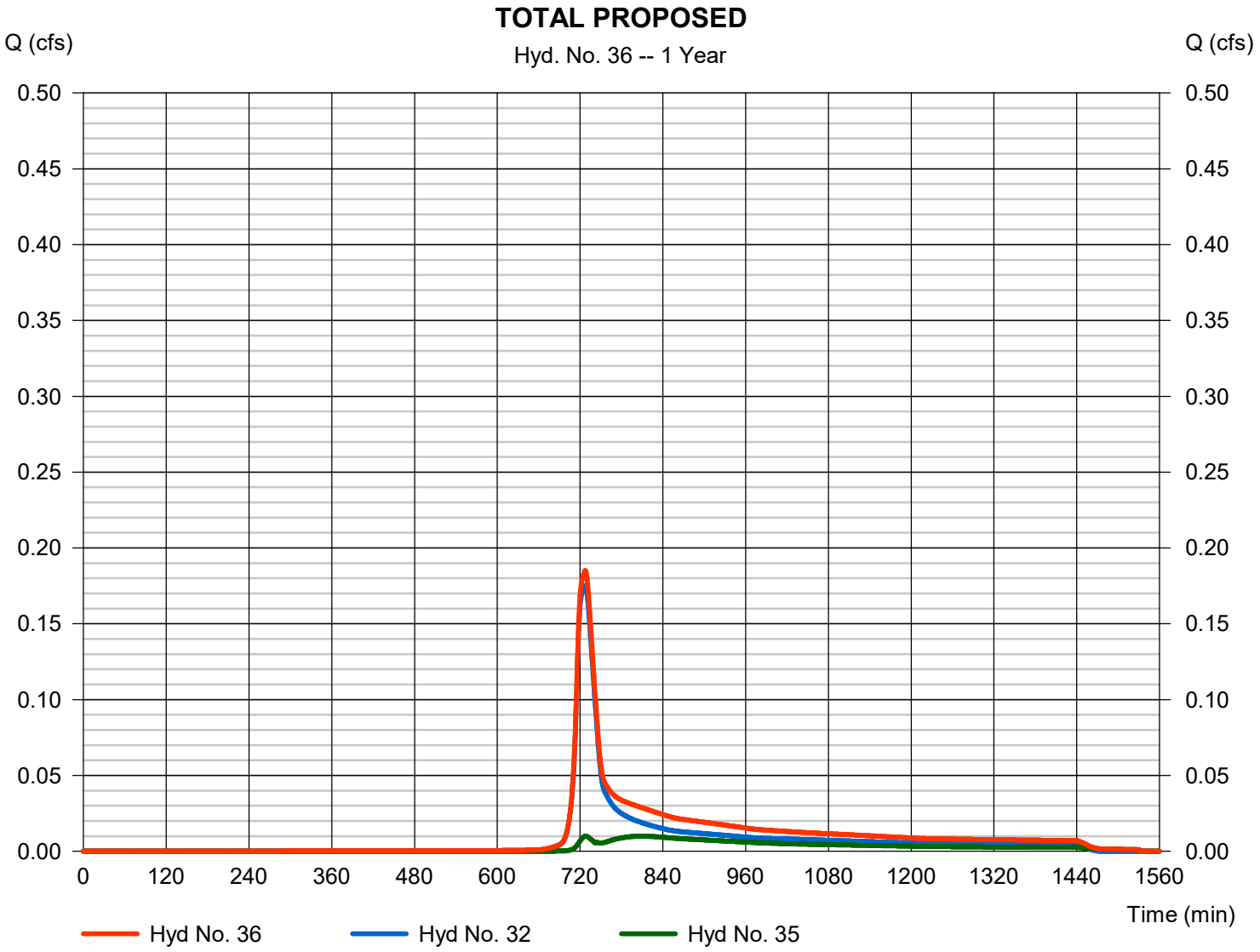


Hydrograph Report

Hyd. No. 36

TOTAL PROPOSED

Hydrograph type	= Combine	Peak discharge	= 0.185 cfs
Storm frequency	= 1 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 952 cuft
Inflow hyds.	= 32, 35	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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	0.189	1	728	663	------	------	------	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	0.075	1	718	151	------	------	------	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	0.010	1	728	35	------	------	------	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	0.047	1	718	94	------	------	------	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	0.028	1	718	56	------	------	------	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	0.013	1	718	27	------	------	------	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	0.004	1	728	15	------	------	------	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	0.002	1	718	5	------	------	------	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	0.045	1	718	93	------	------	------	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	0.042	1	728	158	------	------	------	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	0.029	1	717	69	------	------	------	EX-SITE-TRENCH-IMP-ROAD-LcD-1
12	SCS Runoff	0.015	1	726	58	------	------	------	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	0.246	1	728	878	1, 10, 12	------	------	EX-OFFSITE - BYPASS
14	Combine	0.014	1	728	51	3, 7,	------	------	EX-SITE-BYPASS
15	Combine	0.164	1	718	344	4, 5, 6,	------	------	EX-SITE-BASIN COMBINE
16	Combine	0.260	1	727	1,030	8, 9, 11, 2, 13,	------	------	EX-OFFSITE-TOTAL
17	Combine	0.172	1	718	395	14, 15,	------	------	EX-SITE-TOTAL
18	Combine	0.403	1	719	1,424	16, 17	------	------	TOTAL EXISTING
19	SCS Runoff	0.189	1	728	663	------	------	------	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	0.075	1	718	151	------	------	------	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	0.011	1	728	37	------	------	------	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	0.049	1	718	99	------	------	------	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	0.054	1	717	117	------	------	------	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	0.028	1	717	66	------	------	------	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	0.004	1	728	16	------	------	------	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	0.006	1	717	13	------	------	------	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	0.171	1	717	403	------	------	------	PR-SITE-TRENCH-IMP-LcD-12,16,1
28	SCS Runoff	0.042	1	728	158	------	------	------	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	0.015	1	726	58	------	------	------	PR-OFFSITE-BYPASS-LcD-19
30	Combine	0.246	1	728	878	19, 28, 29	------	------	PR-OFFSITE-BYPASS
31	Combine	0.015	1	728	53	21, 25,	------	------	PR-SITE-BYPASS
32	Combine	0.260	1	727	1,030	20, 30,	------	------	PR-OFFSITE-TOTAL
33	Combine	0.307	1	717	699	22, 23, 24, 26, 27,	------	------	PR-TO-TRENCH
34	Reservoir	0.028	1	744	333	33	1687.11	430	INF TRENCH

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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
35	Combine	0.039	1	732	387	31, 34	------	------	PR-SITE-TOTAL
36	Combine	0.297	1	727	1,416	32, 35	------	------	TOTAL PROPOSED

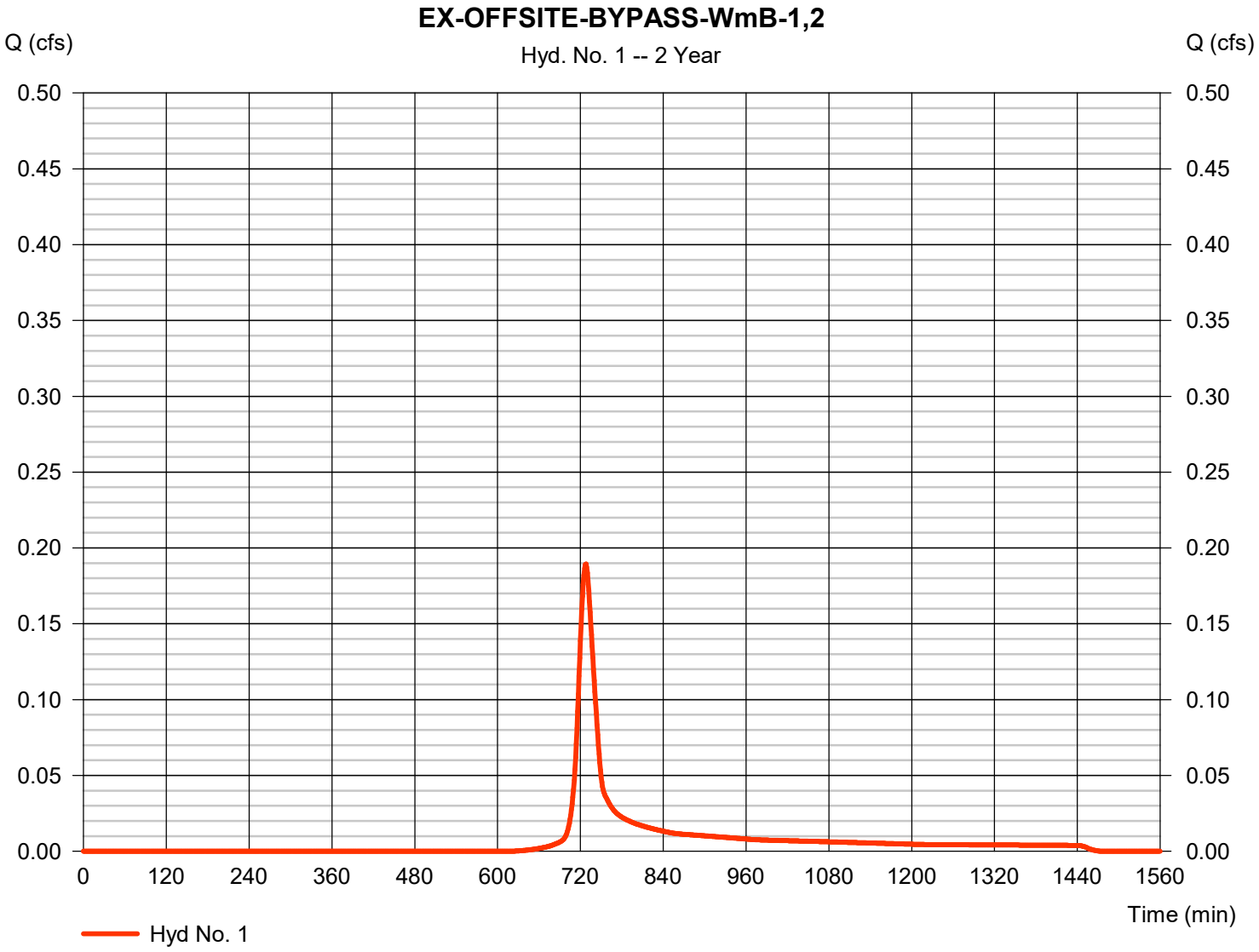
Hydrograph Report

Hyd. No. 1

EX-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.189 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 663 cuft
Drainage area	= 0.152 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 78) + (0.253 x 77)] / 0.152



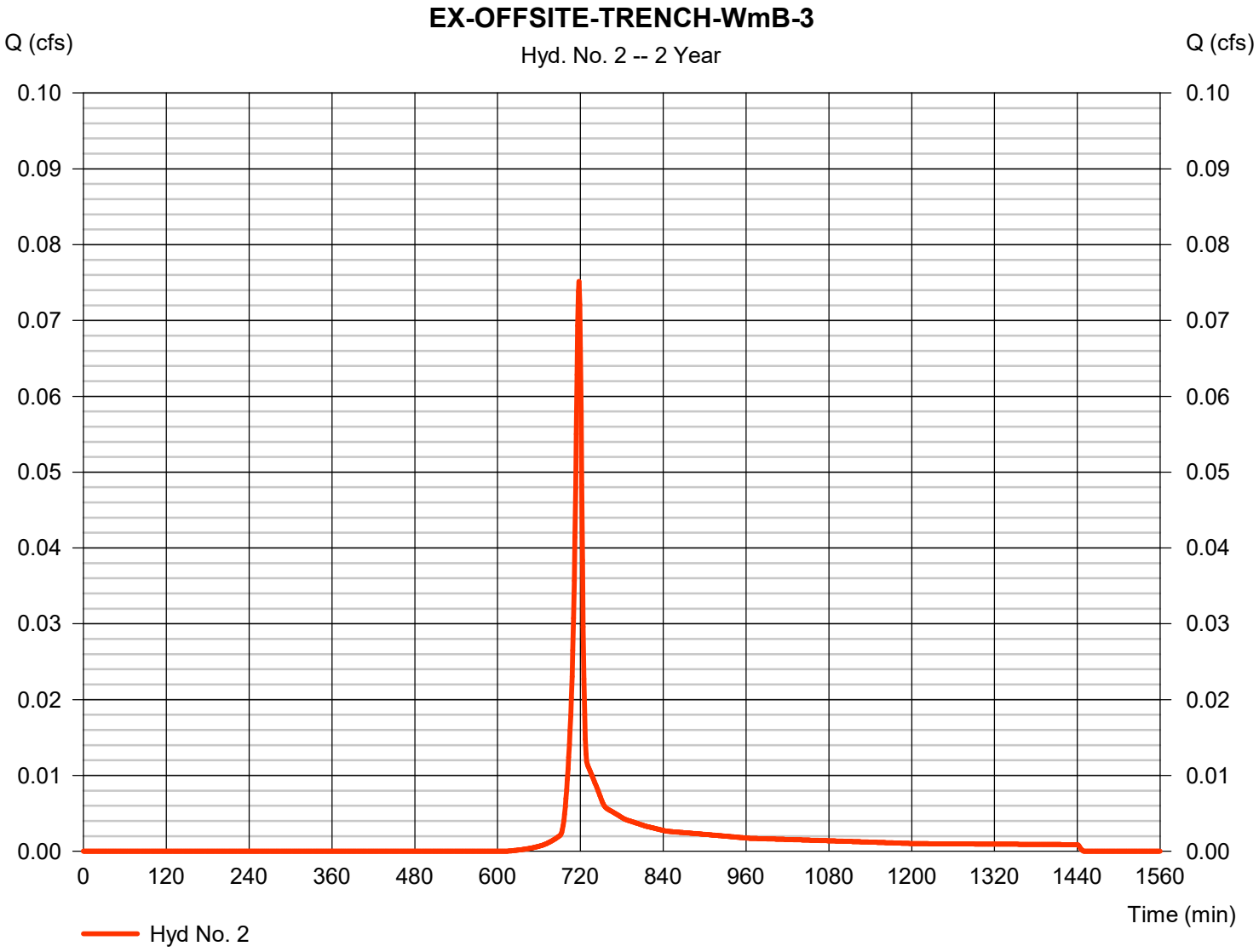
Hydrograph Report

Hyd. No. 2

EX-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.075 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 151 cuft
Drainage area	= 0.033 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 98)] / 0.033



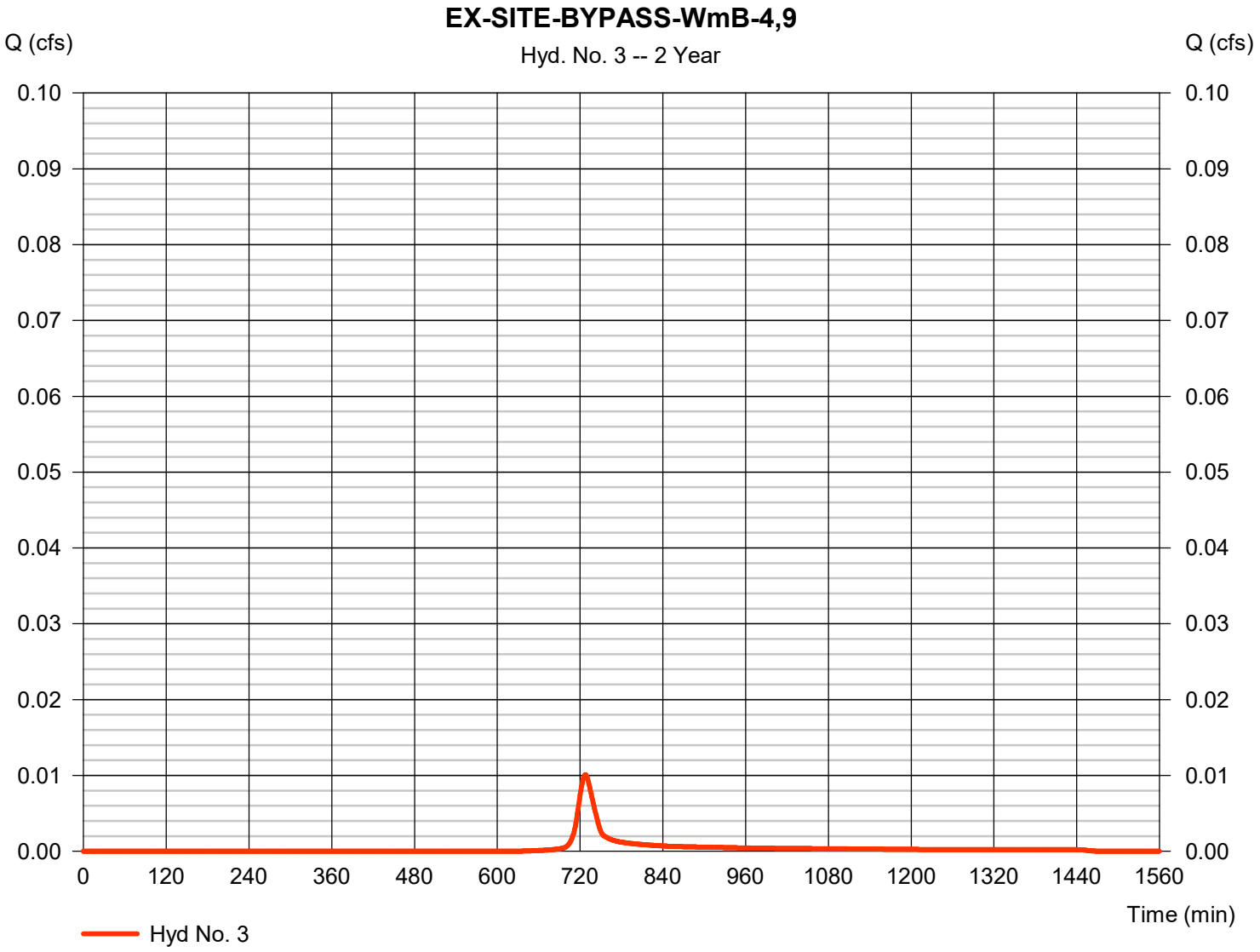
Hydrograph Report

Hyd. No. 3

EX-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.010 cfs
Storm frequency	=	2 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	35 cuft
Drainage area	=	0.008 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 77)] / 0.008



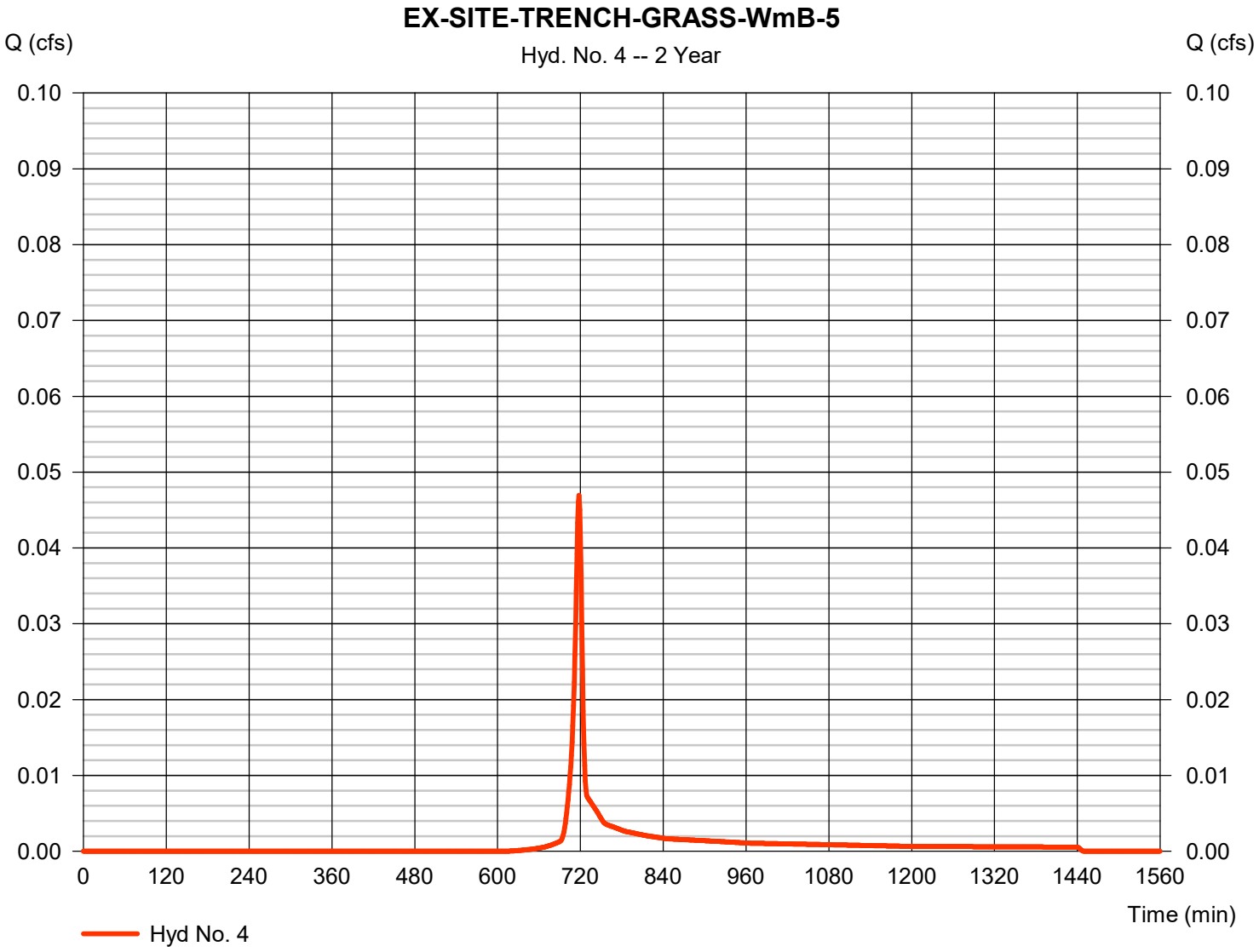
Hydrograph Report

Hyd. No. 4

EX-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.047 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 94 cuft
Drainage area	= 0.021 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70)] / 0.021

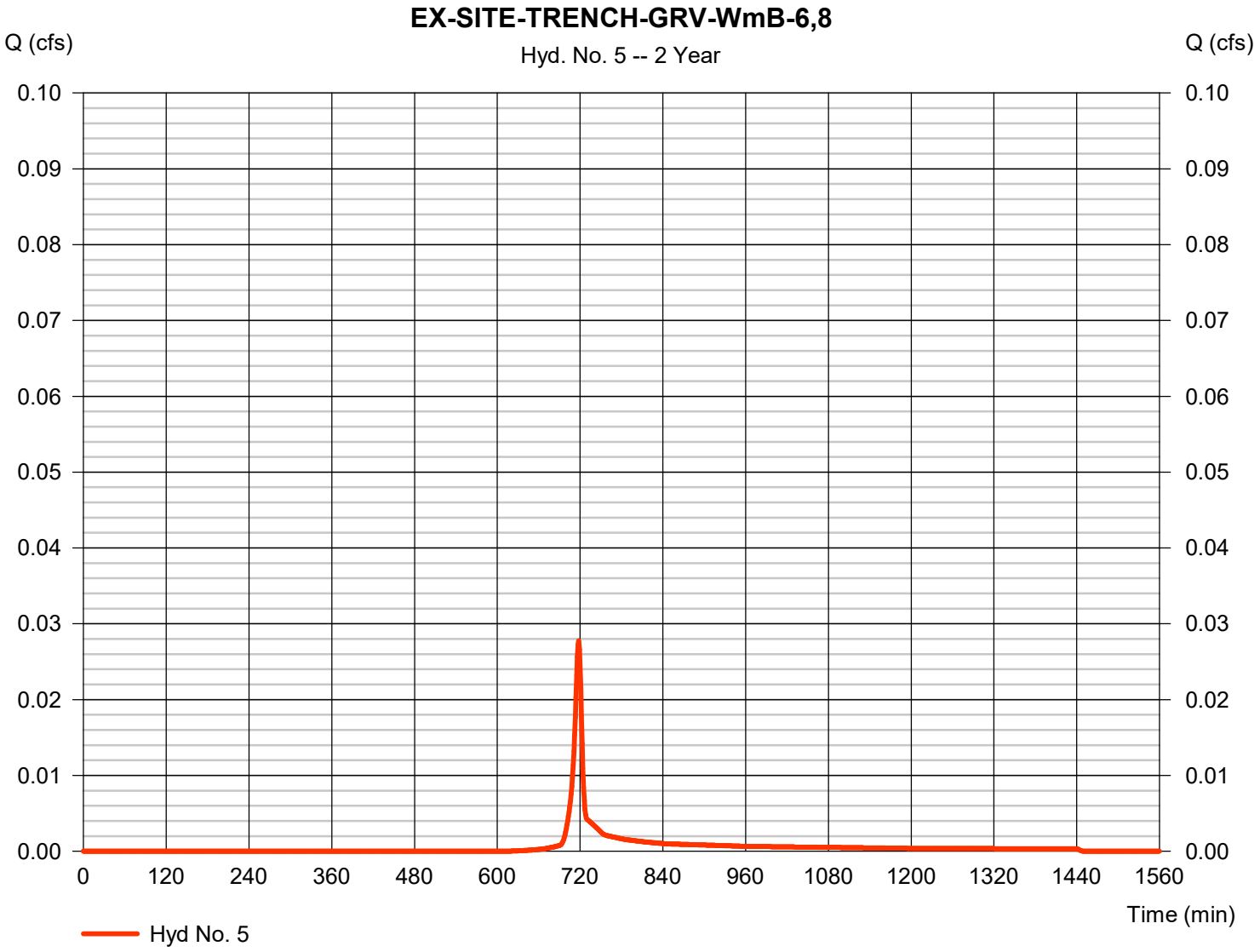


Hydrograph Report

Hyd. No. 5

EX-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.028 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 56 cuft
Drainage area	= 0.012 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

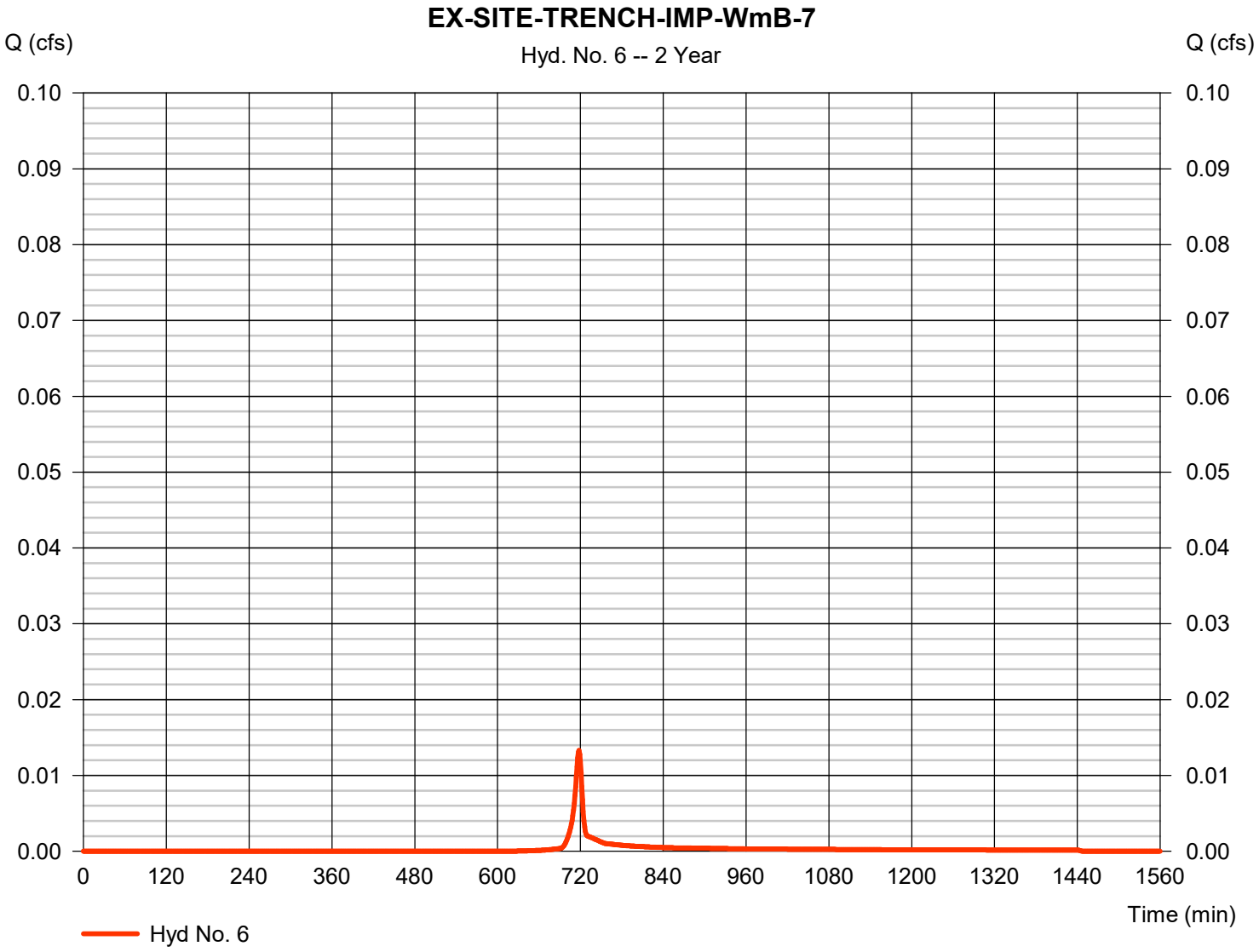


Hydrograph Report

Hyd. No. 6

EX-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.013 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 27 cuft
Drainage area	= 0.006 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

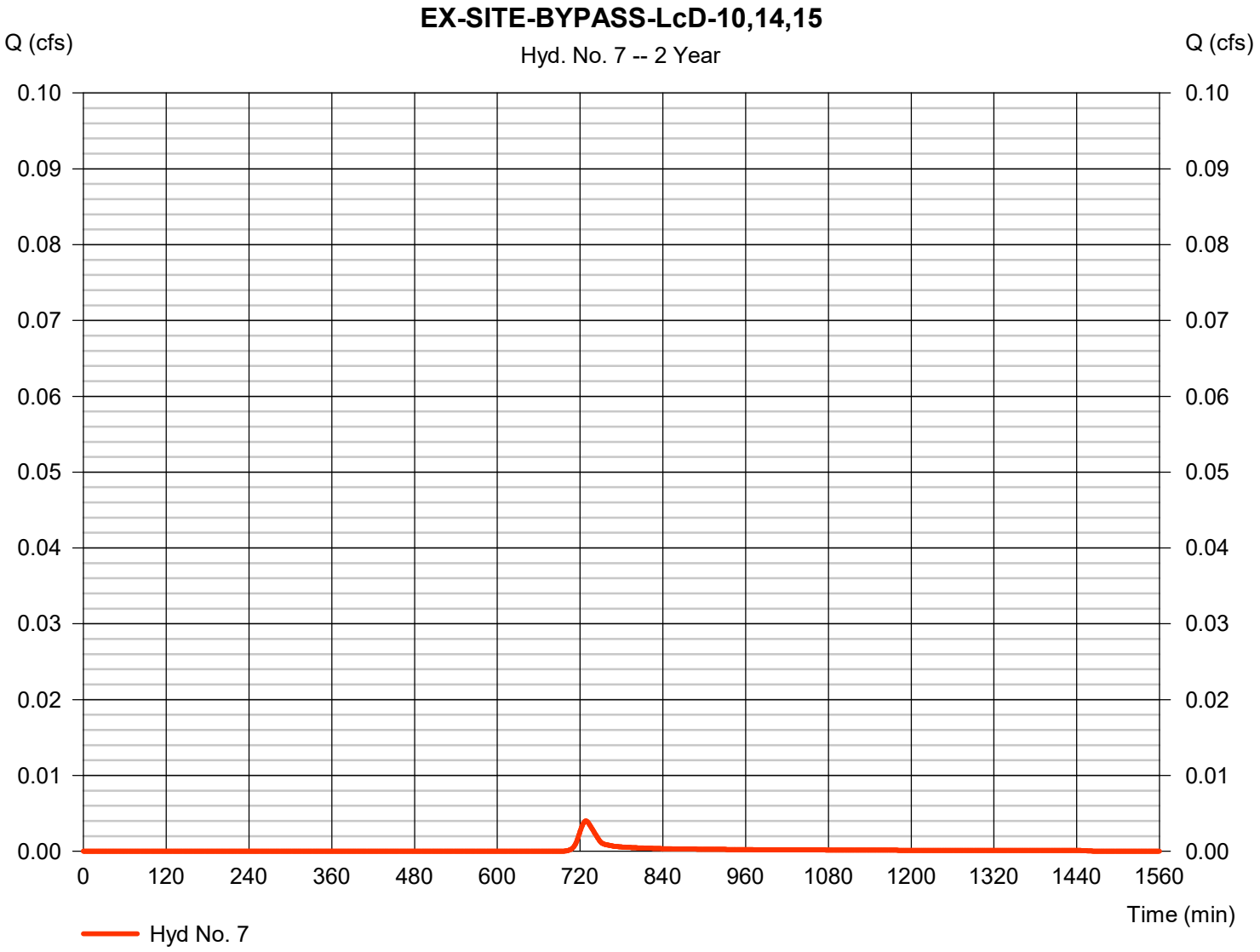


Hydrograph Report

Hyd. No. 7

EX-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.004 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 15 cuft
Drainage area	= 0.005 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

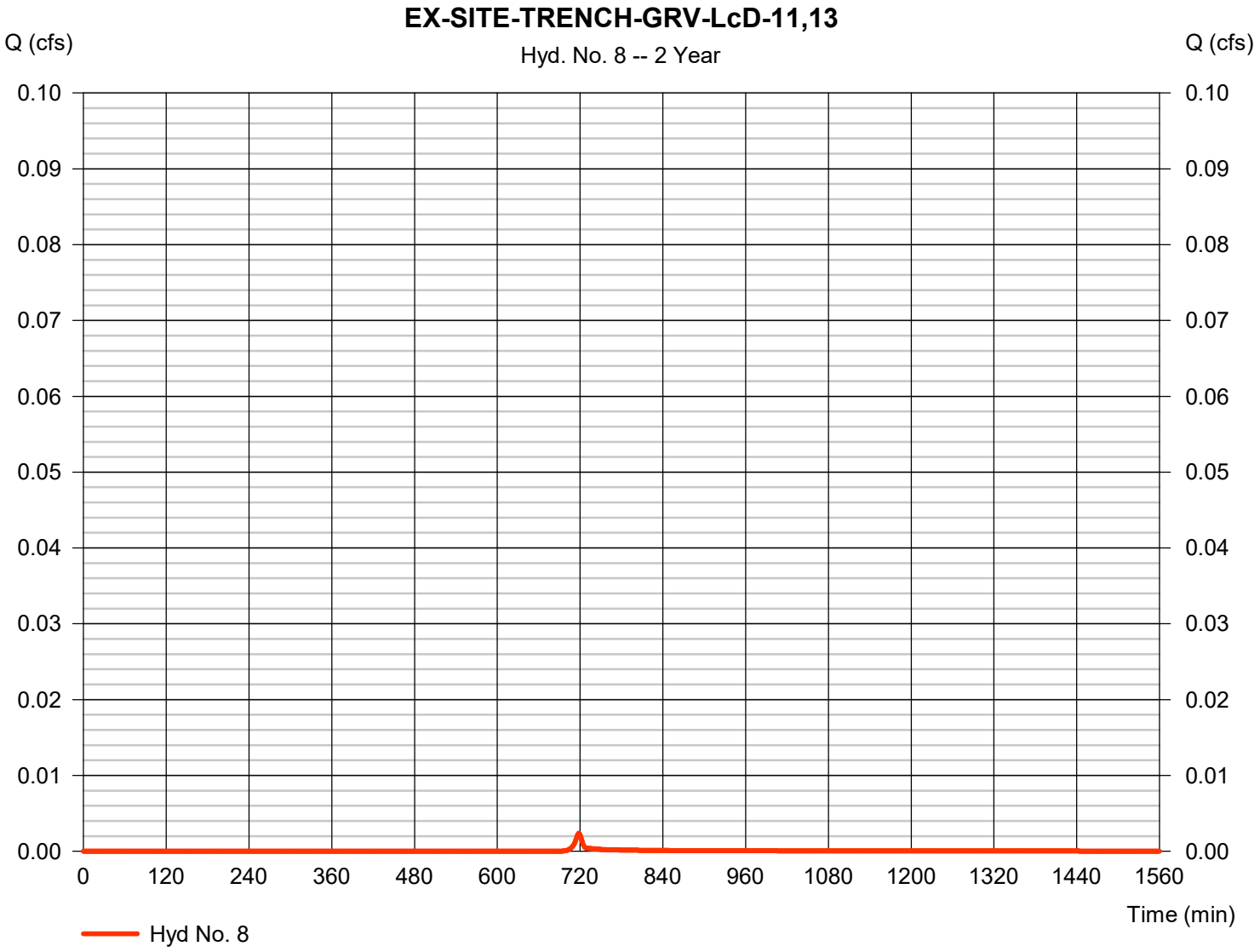


Hydrograph Report

Hyd. No. 8

EX-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 5 cuft
Drainage area	= 0.002 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

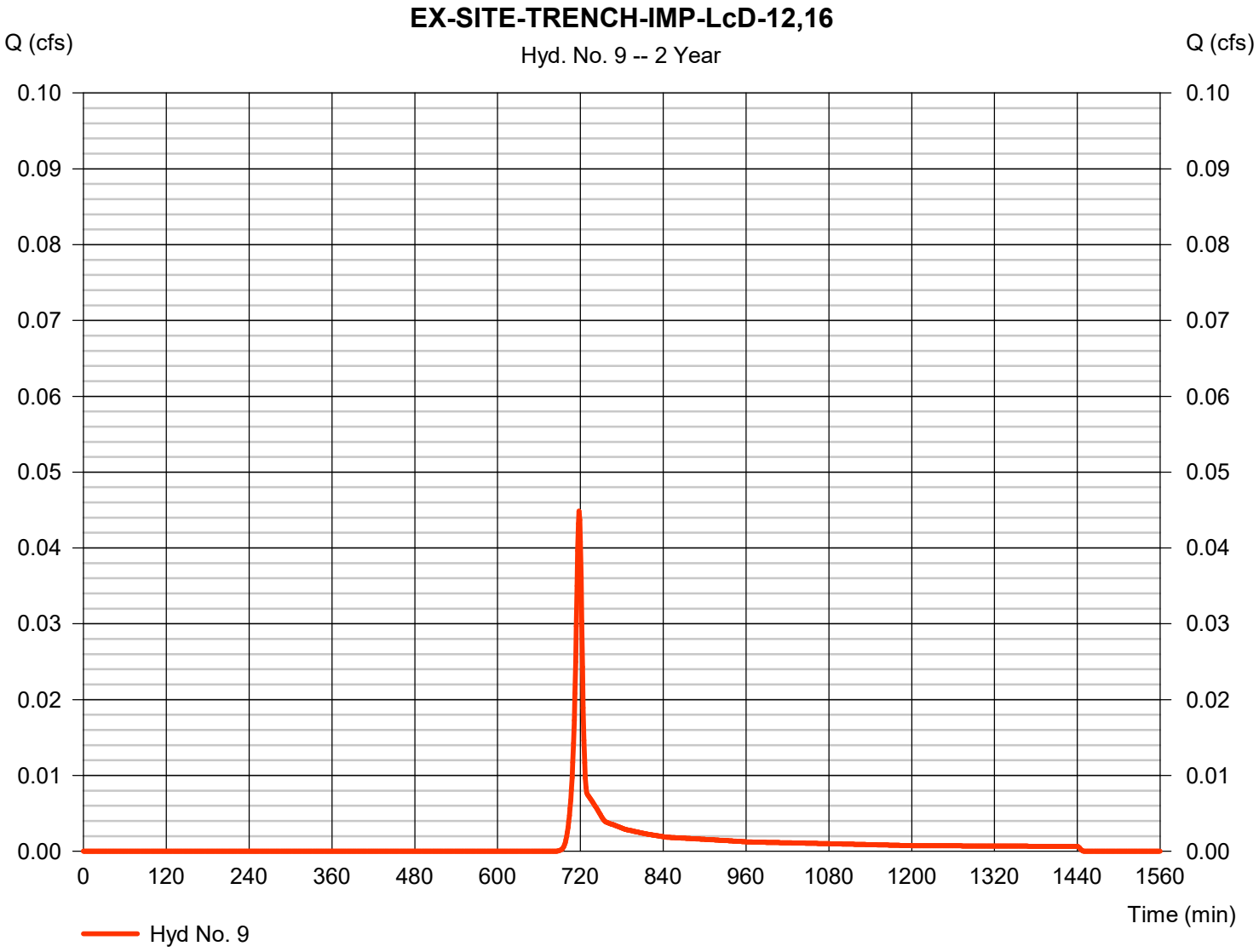


Hydrograph Report

Hyd. No. 9

EX-SITE-TRENCH-IMP-LcD-12,16

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.045 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	93 cuft
Drainage area	=	0.030 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

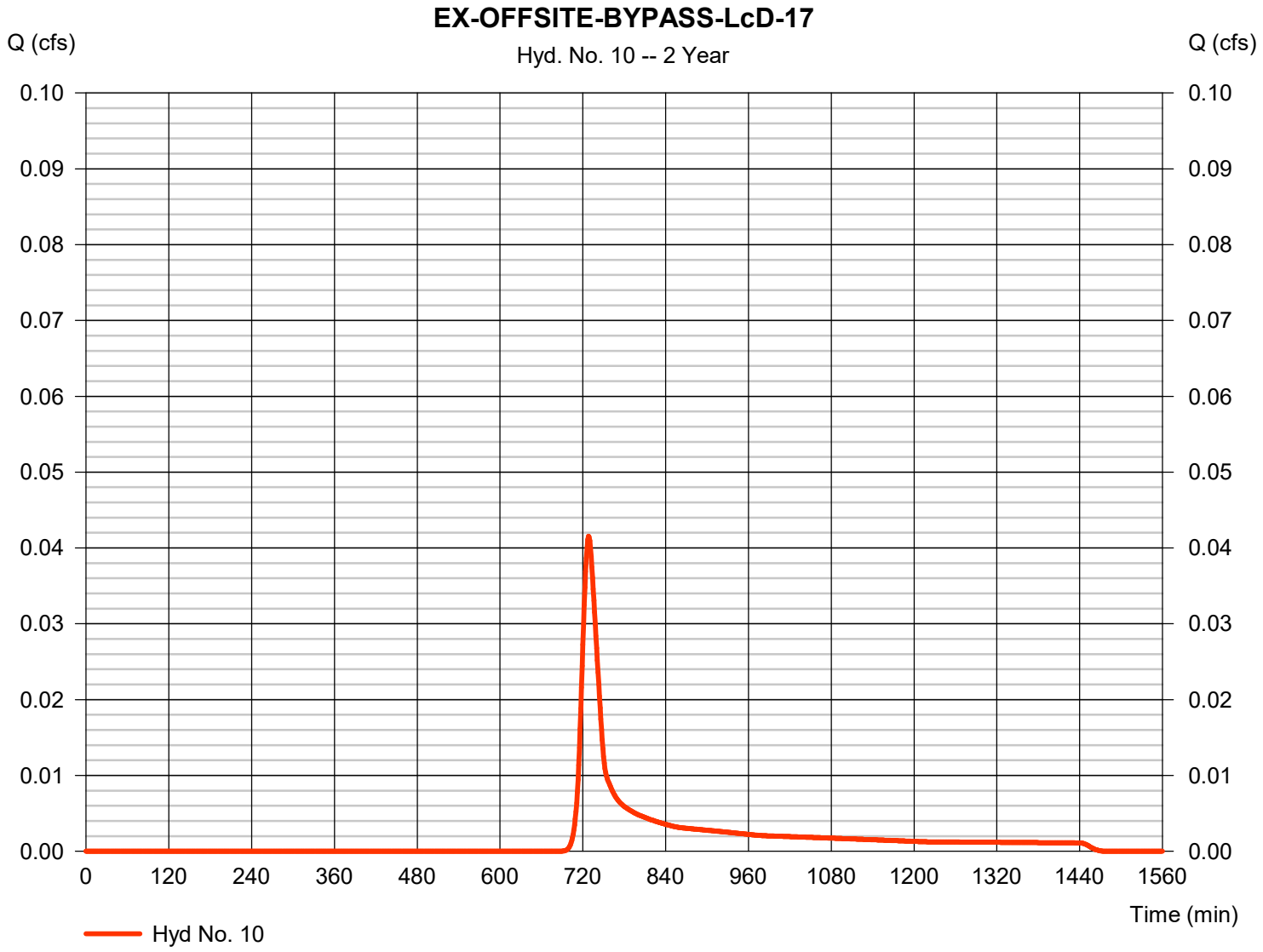


Hydrograph Report

Hyd. No. 10

EX-OFFSITE-BYPASS-LcD-17

Hydrograph type	= SCS Runoff	Peak discharge	= 0.042 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 158 cuft
Drainage area	= 0.053 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

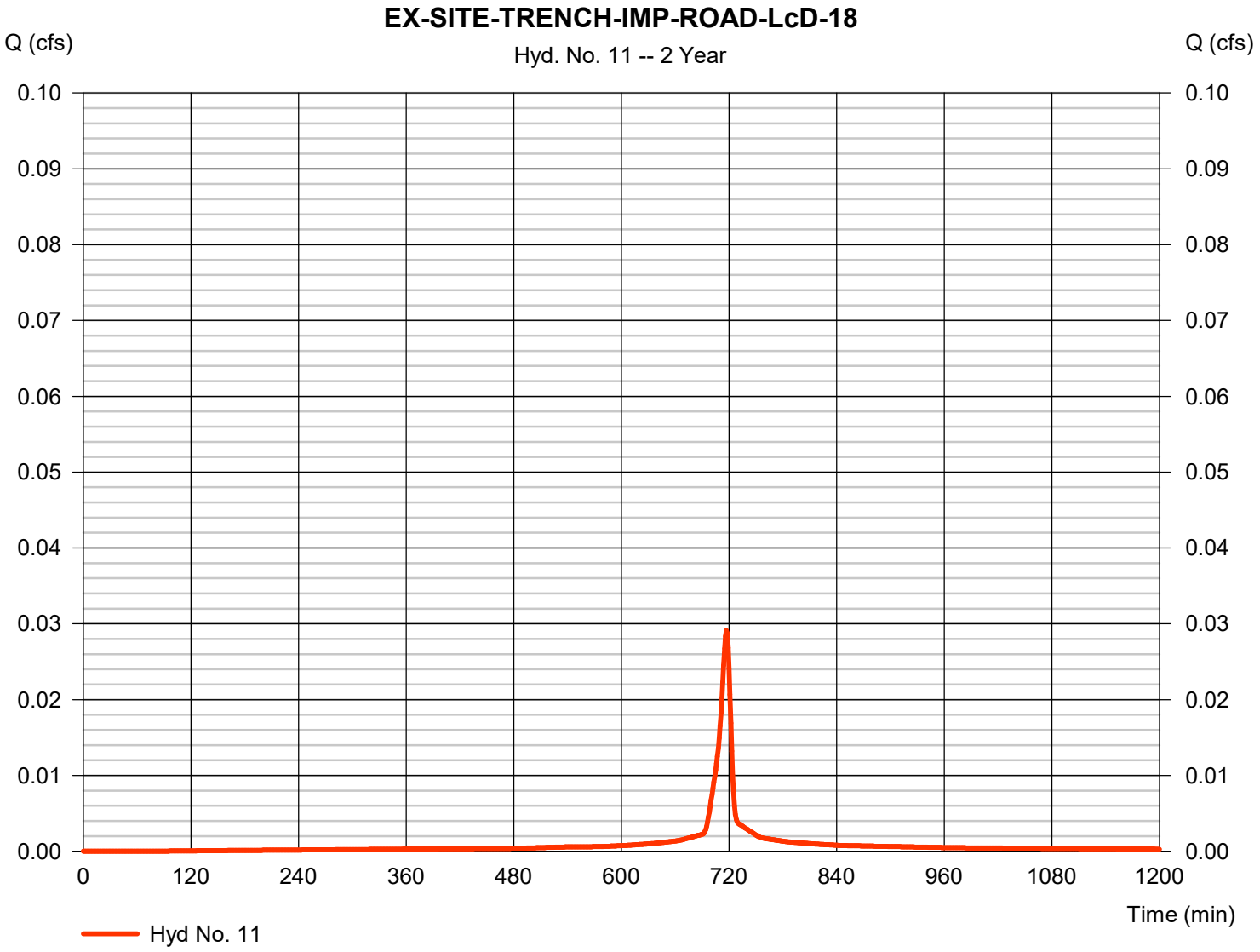


Hydrograph Report

Hyd. No. 11

EX-SITE-TRENCH-IMP-ROAD-LcD-18

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.029 cfs
Storm frequency	=	2 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	69 cuft
Drainage area	=	0.006 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

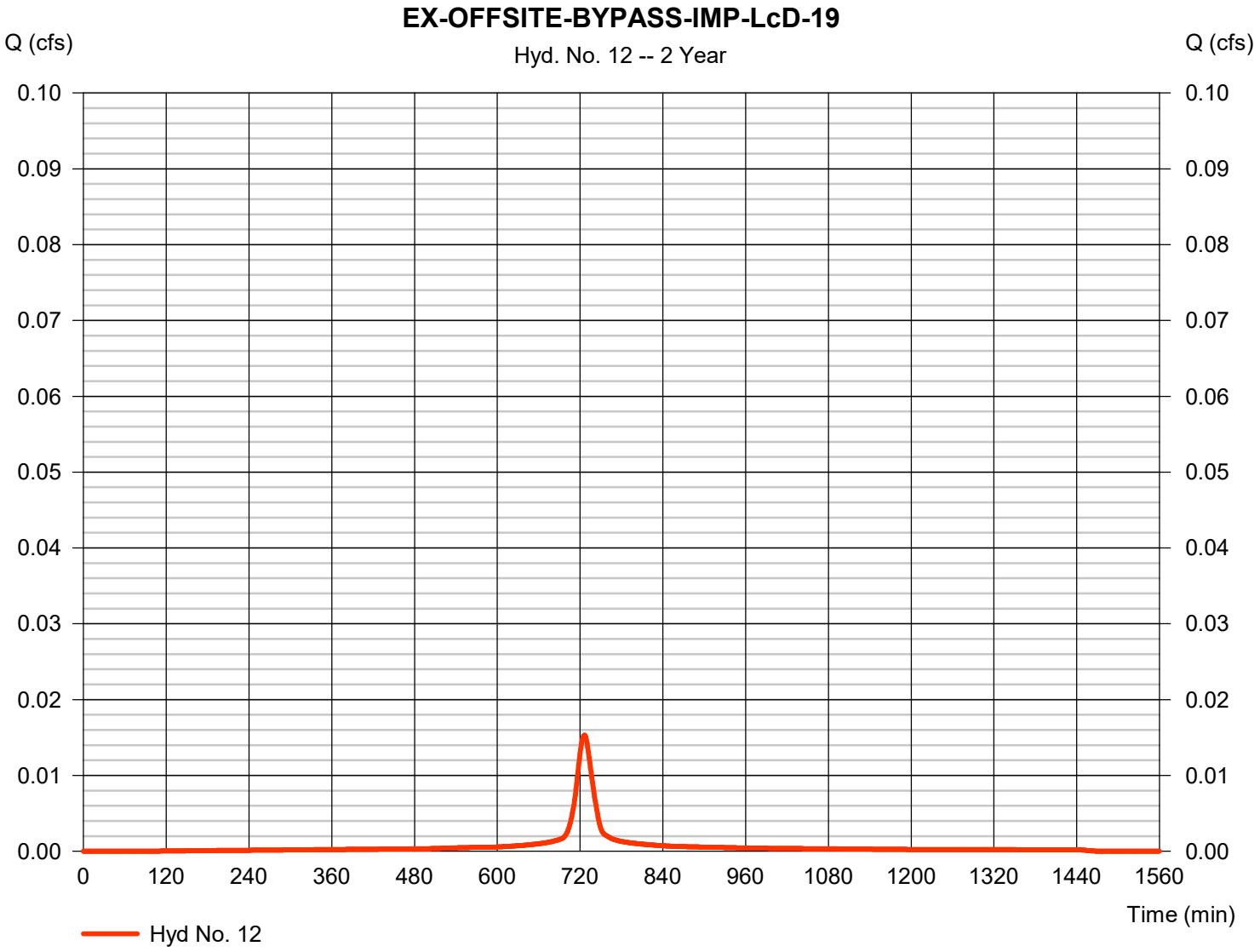


Hydrograph Report

Hyd. No. 12

EX-OFFSITE-BYPASS-IMP-LcD-19

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.015 cfs
Storm frequency	=	2 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	58 cuft
Drainage area	=	0.005 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

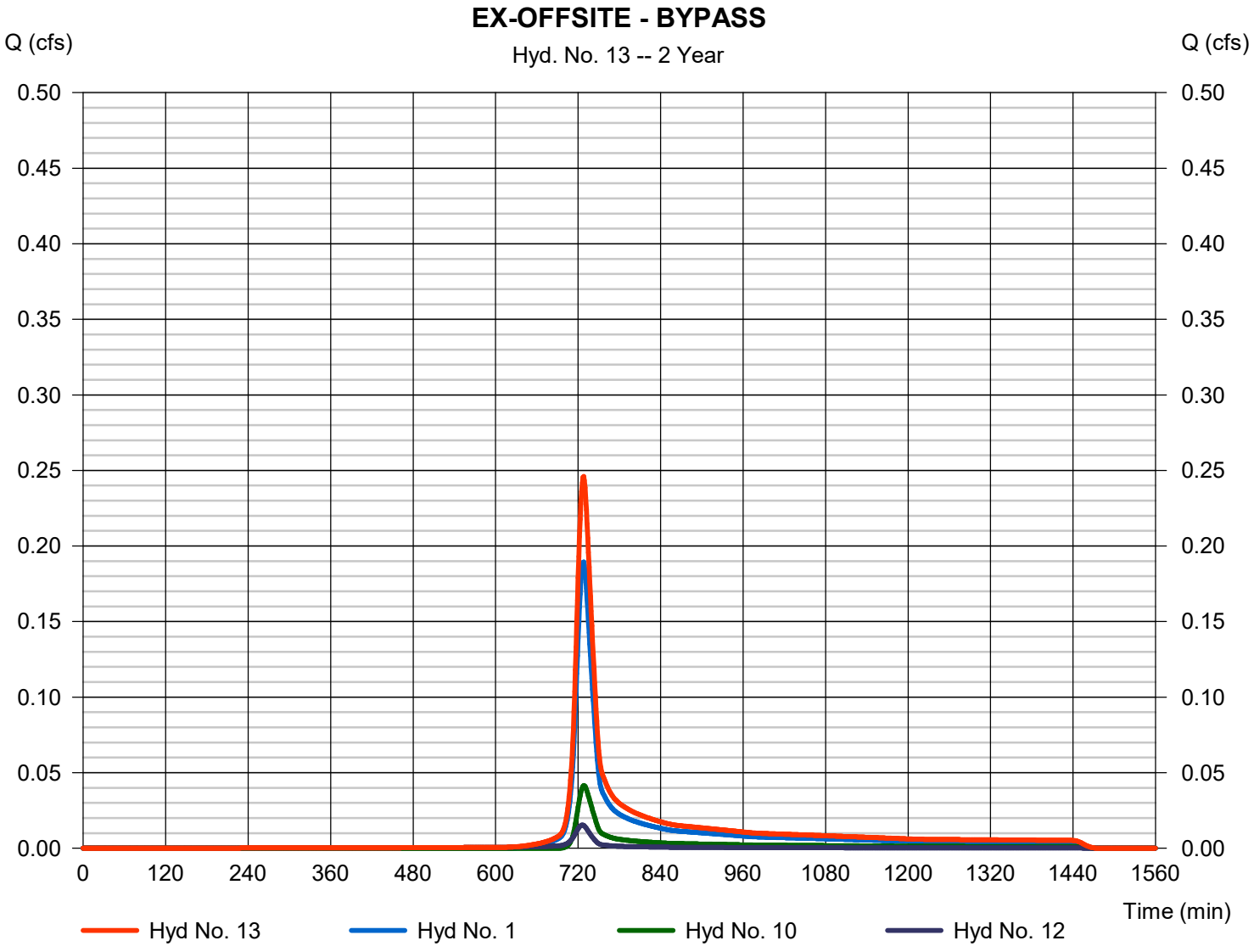


Hydrograph Report

Hyd. No. 13

EX-OFFSITE - BYPASS

Hydrograph type	= Combine	Peak discharge	= 0.246 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 878 cuft
Inflow hyds.	= 1, 10, 12	Contrib. drain. area	= 0.211 ac

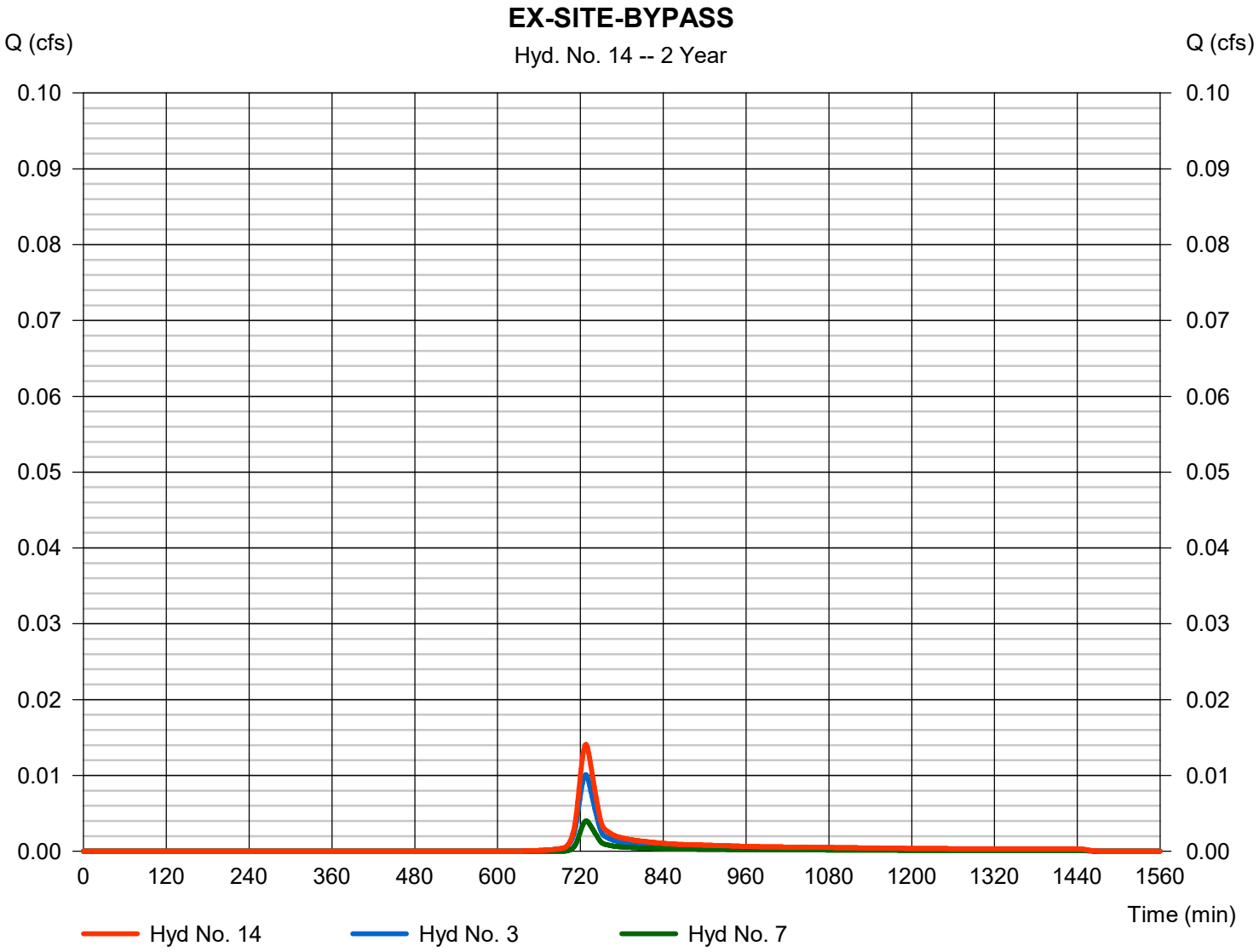


Hydrograph Report

Hyd. No. 14

EX-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.014 cfs
Storm frequency	=	2 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	51 cuft
Inflow hyds.	=	3, 7	Contrib. drain. area	=	0.013 ac

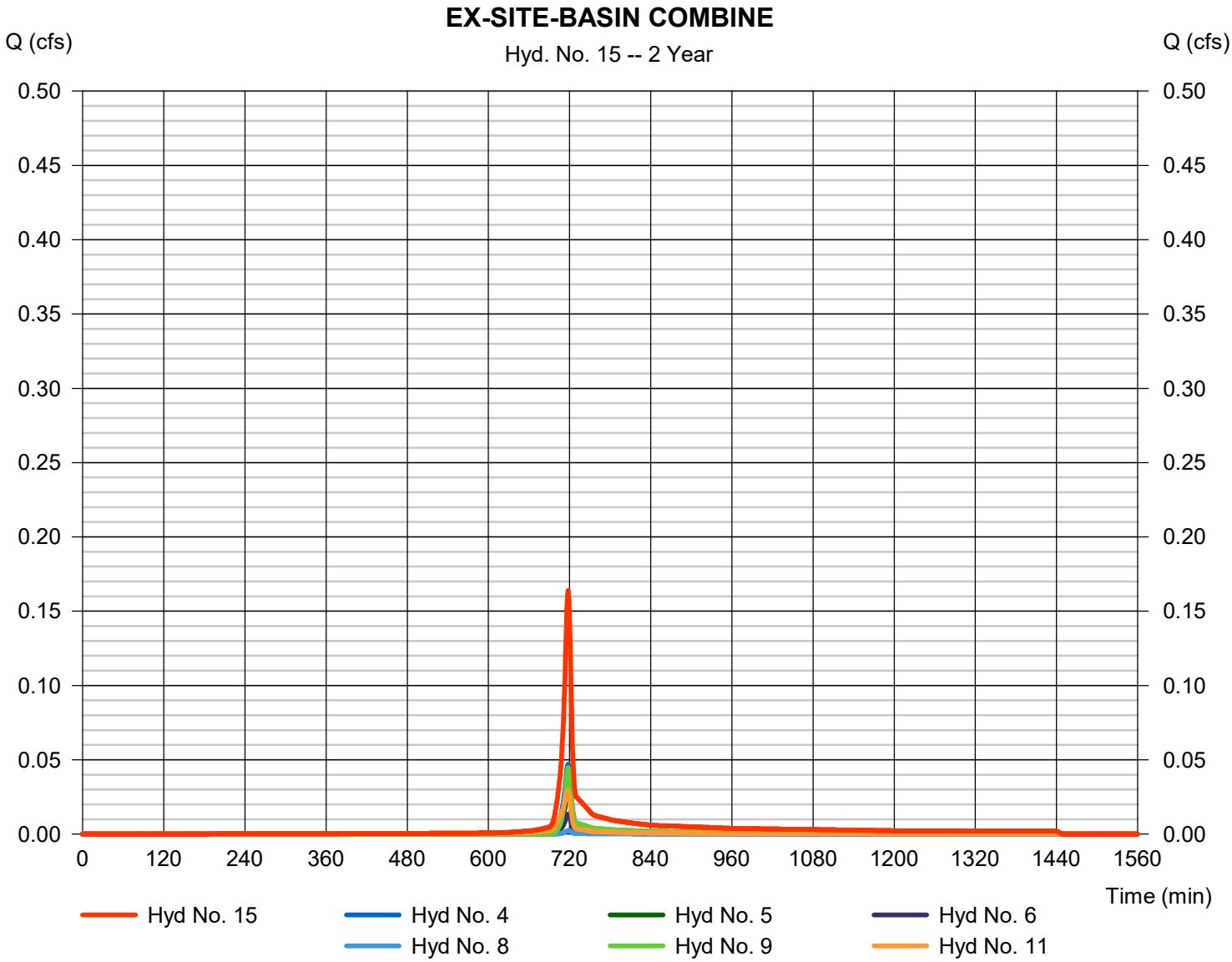


Hydrograph Report

Hyd. No. 15

EX-SITE-BASIN COMBINE

Hydrograph type	=	Combine	Peak discharge	=	0.164 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	344 cuft
Inflow hyds.	=	4, 5, 6, 8, 9, 11	Contrib. drain. area	=	0.077 ac

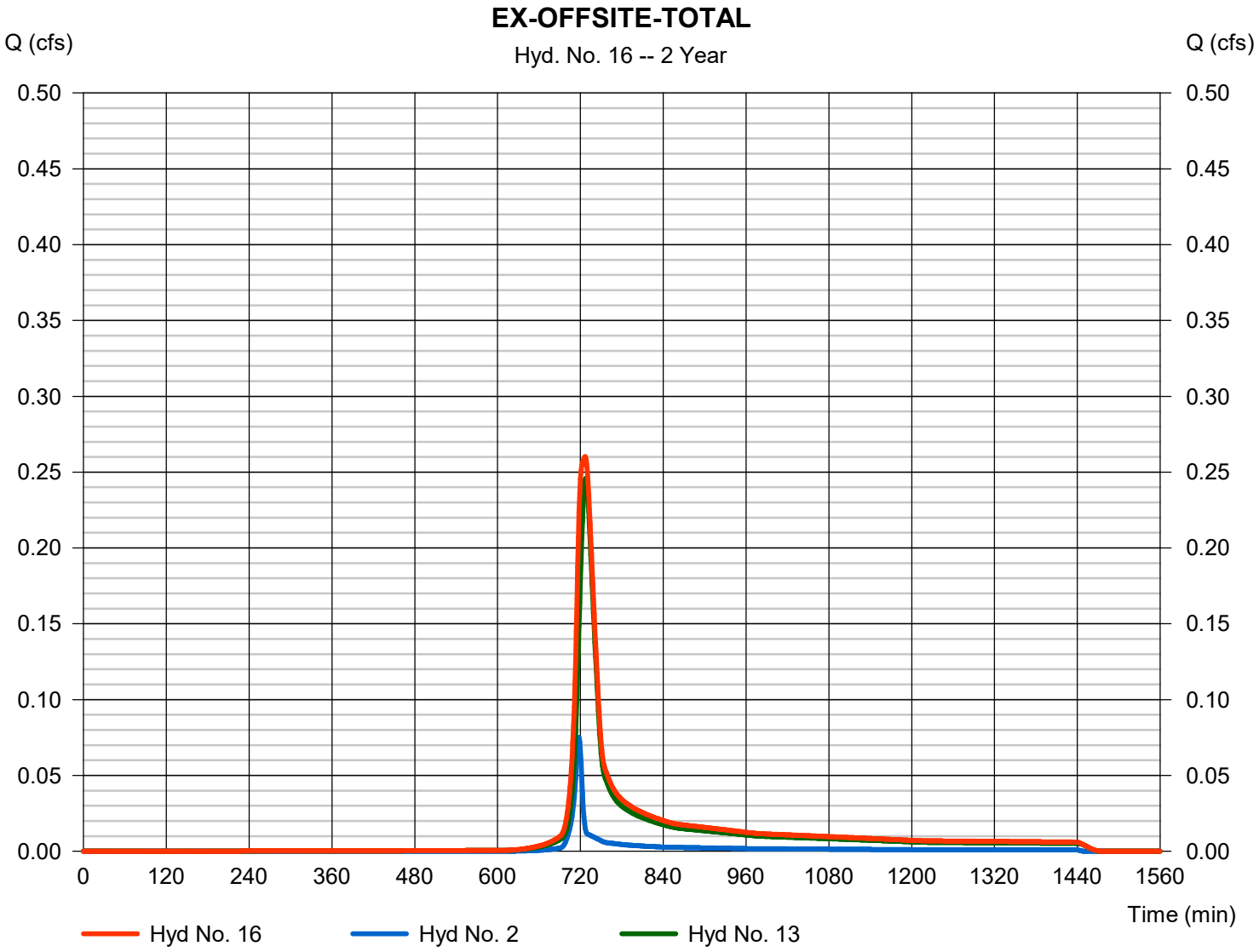


Hydrograph Report

Hyd. No. 16

EX-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.260 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,030 cuft
Inflow hyds.	= 2, 13	Contrib. drain. area	= 0.033 ac

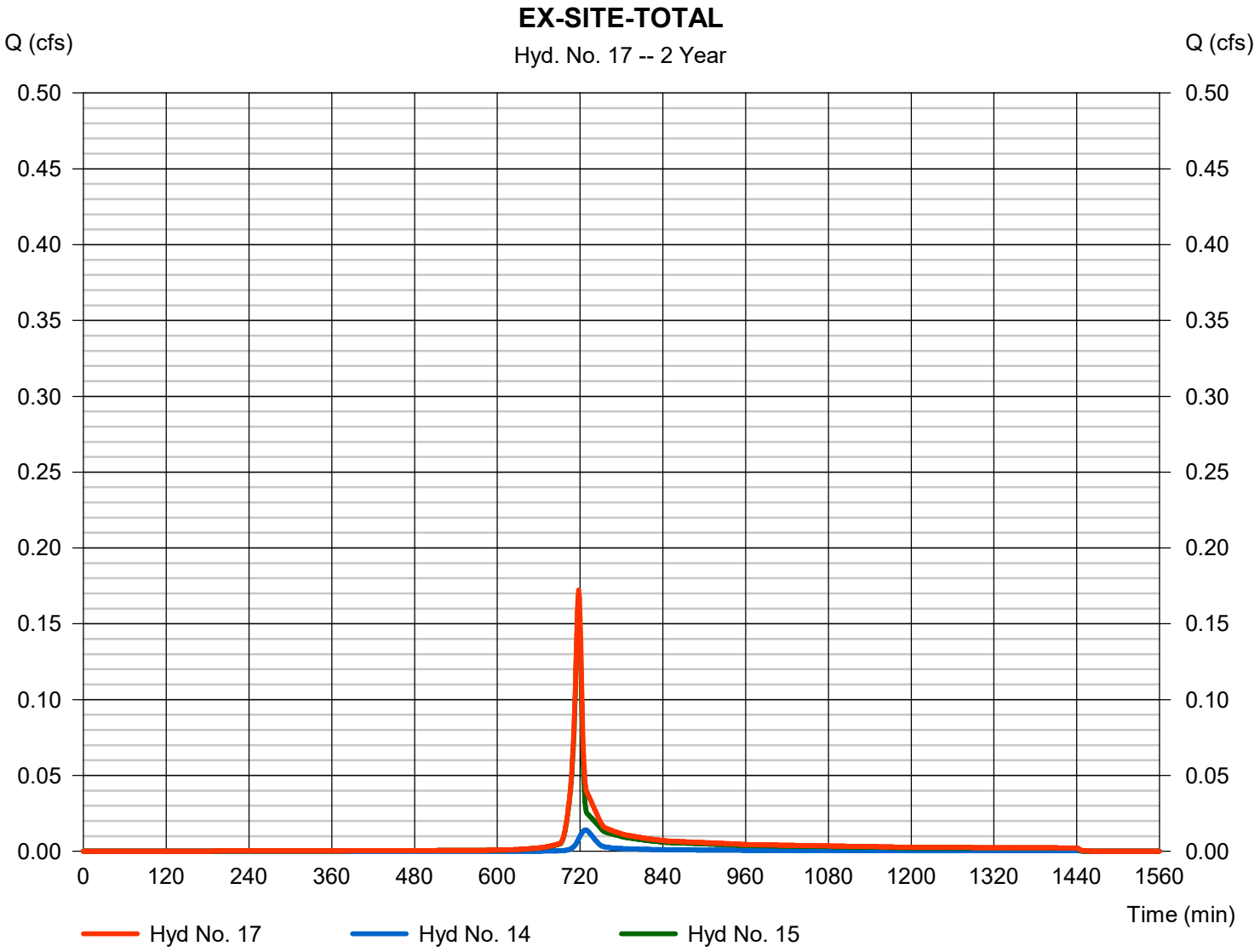


Hydrograph Report

Hyd. No. 17

EX-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.172 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	395 cuft
Inflow hyds.	=	14, 15	Contrib. drain. area	=	0.000 ac

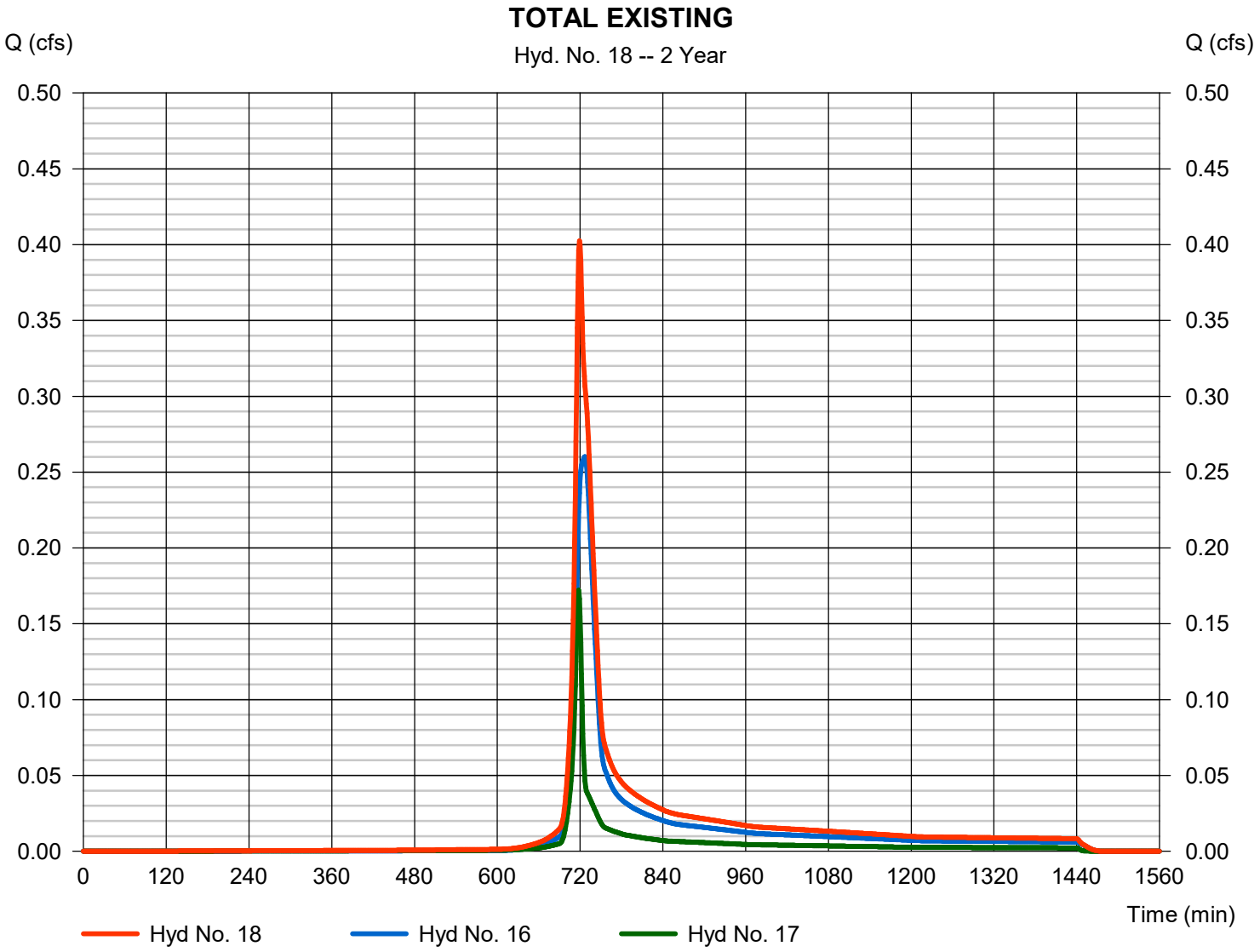


Hydrograph Report

Hyd. No. 18

TOTAL EXISTING

Hydrograph type	=	Combine	Peak discharge	=	0.403 cfs
Storm frequency	=	2 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	1,424 cuft
Inflow hyds.	=	16, 17	Contrib. drain. area	=	0.000 ac

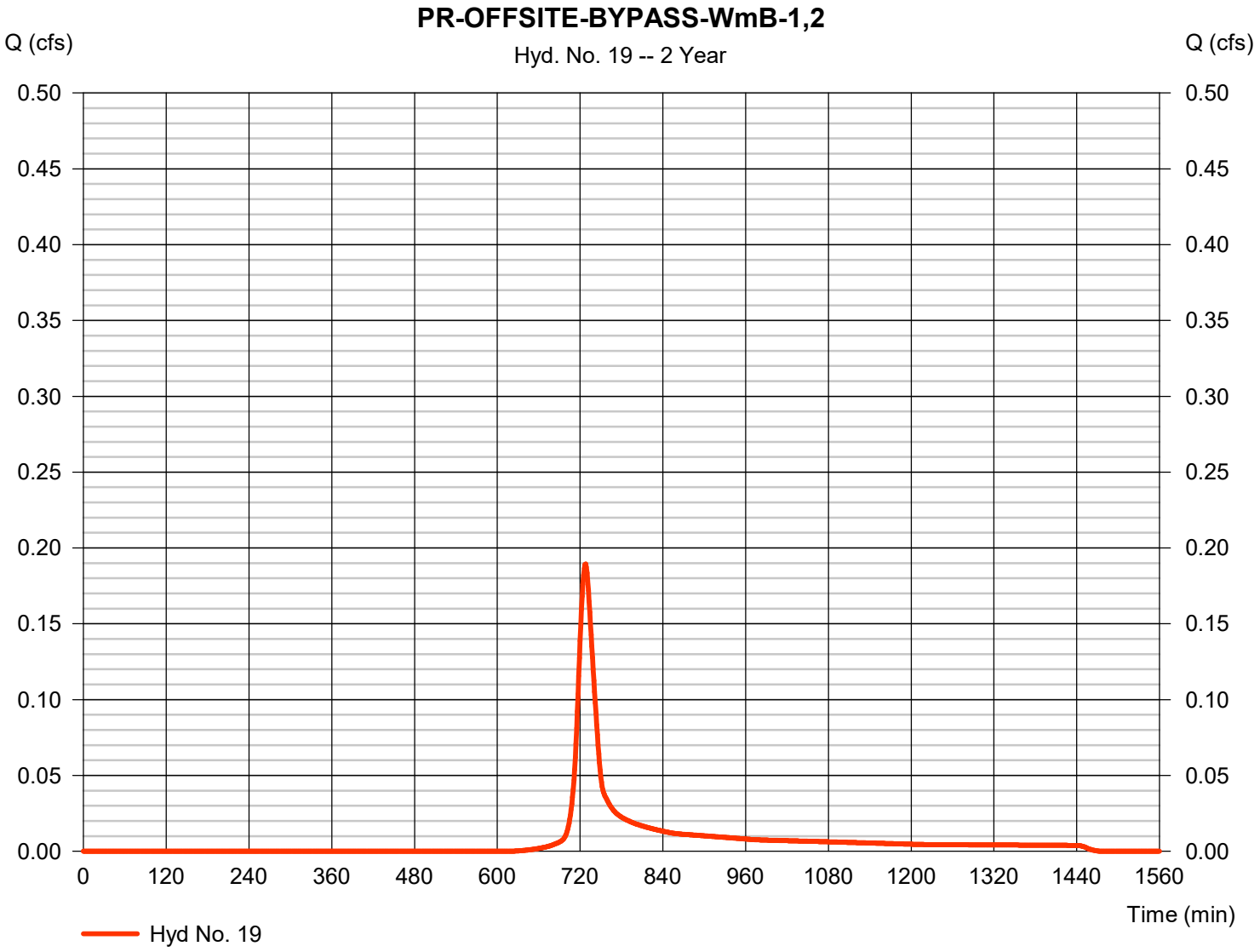


Hydrograph Report

Hyd. No. 19

PR-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.189 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 663 cuft
Drainage area	= 0.152 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

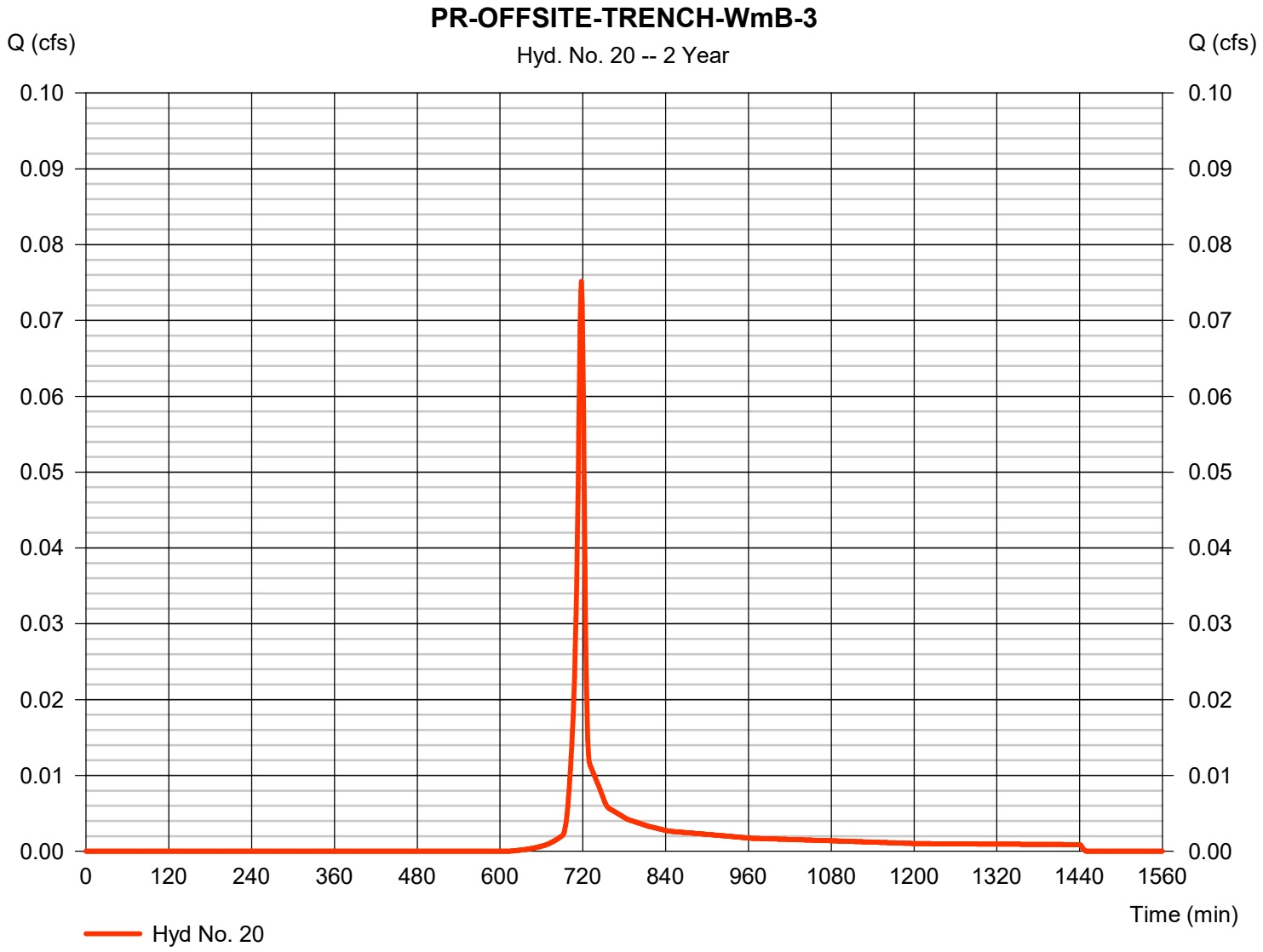


Hydrograph Report

Hyd. No. 20

PR-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.075 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 151 cuft
Drainage area	= 0.033 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

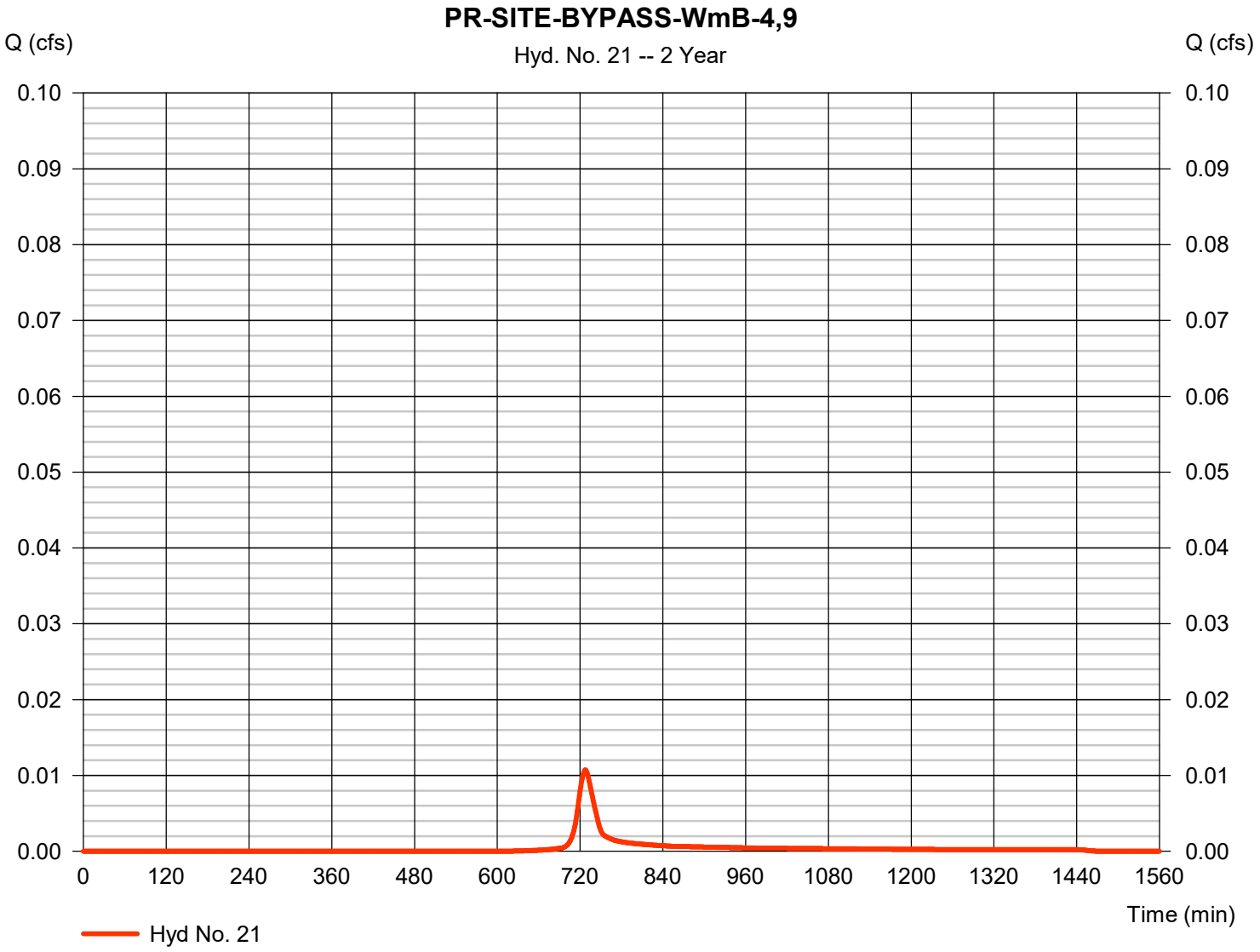


Hydrograph Report

Hyd. No. 21

PR-SITE-BYPASS-WmB-4,9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.011 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 37 cuft
Drainage area	= 0.008 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

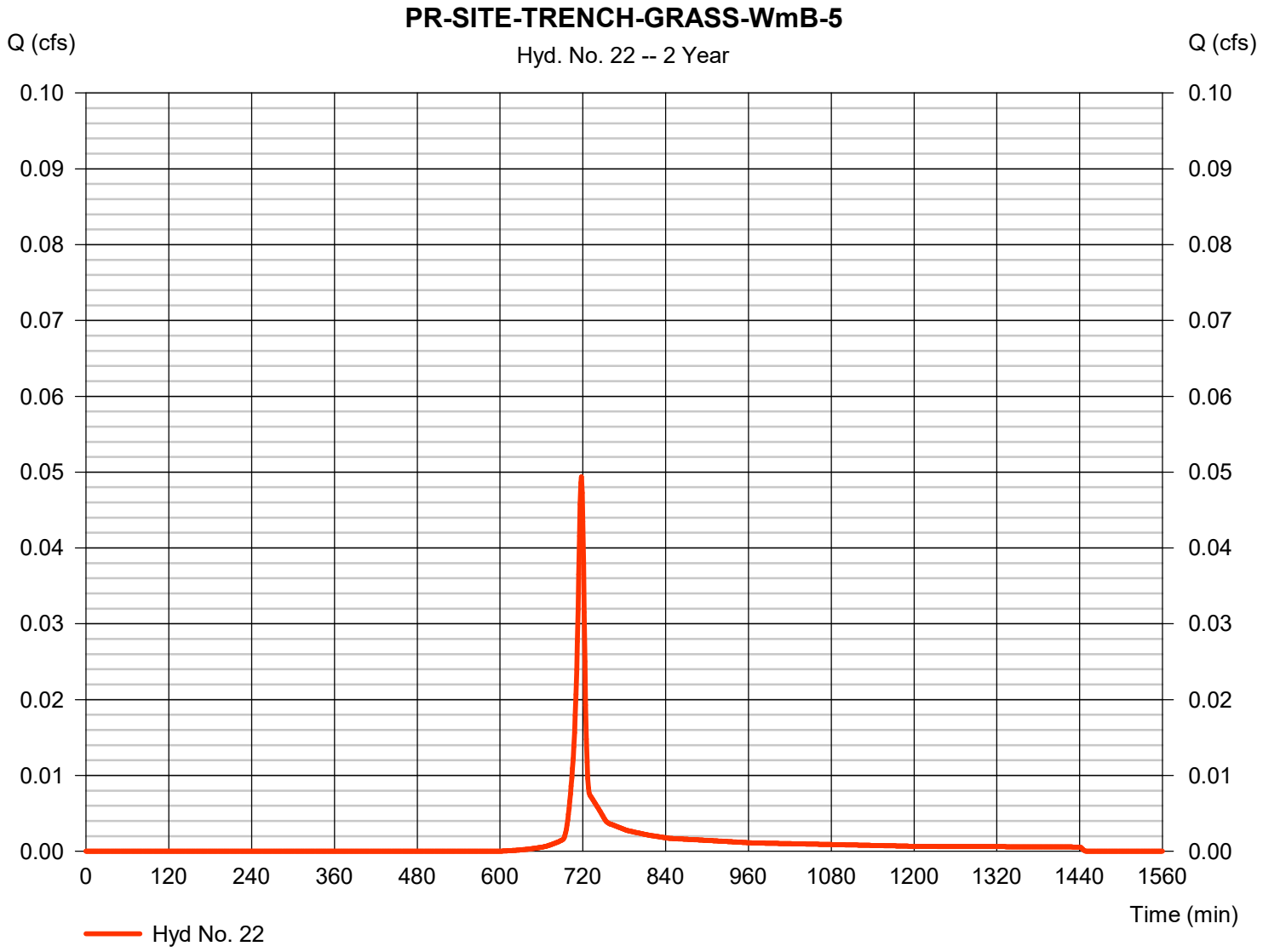


Hydrograph Report

Hyd. No. 22

PR-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.049 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 99 cuft
Drainage area	= 0.021 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

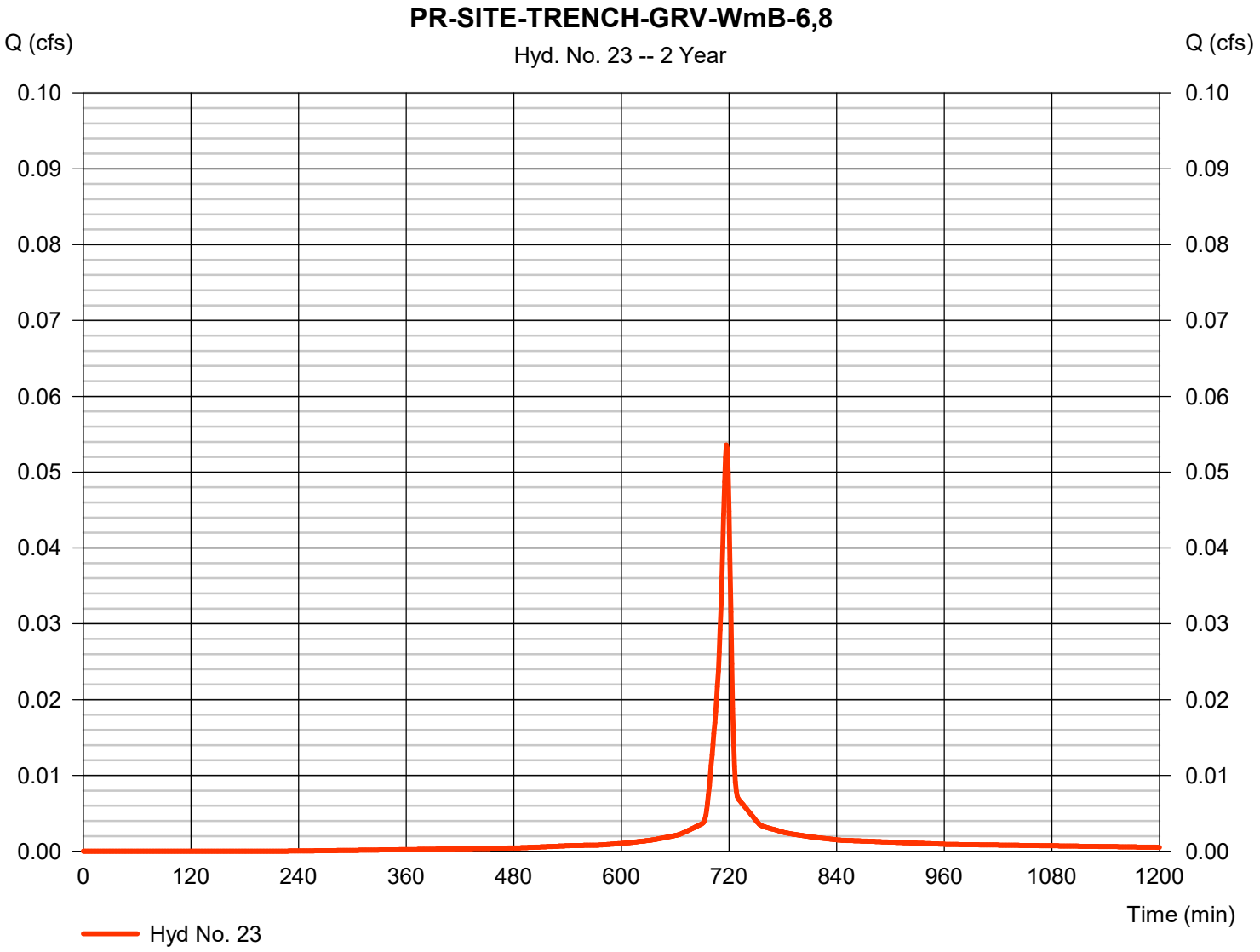


Hydrograph Report

Hyd. No. 23

PR-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.054 cfs
Storm frequency	= 2 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 117 cuft
Drainage area	= 0.012 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

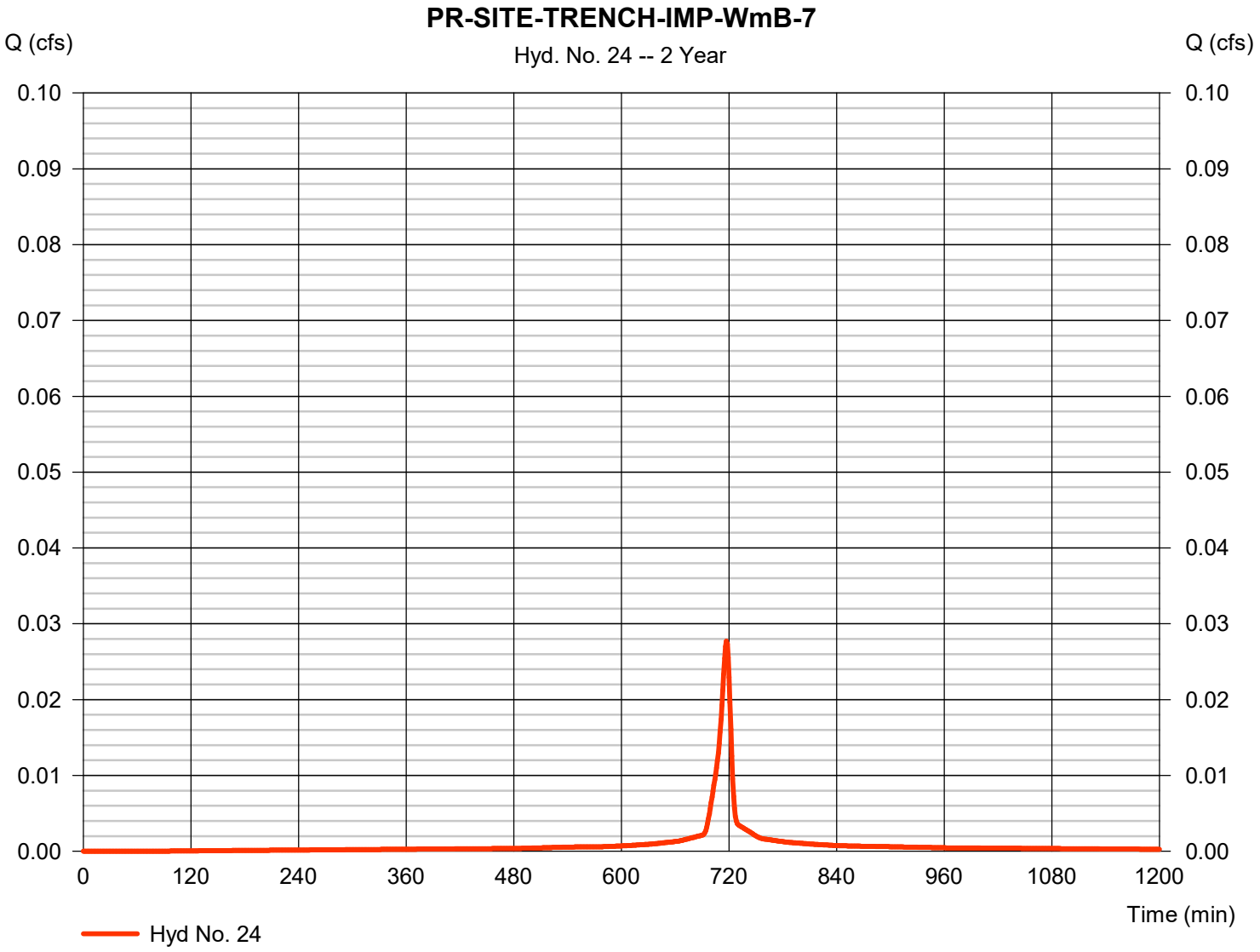


Hydrograph Report

Hyd. No. 24

PR-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.028 cfs
Storm frequency	= 2 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 66 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

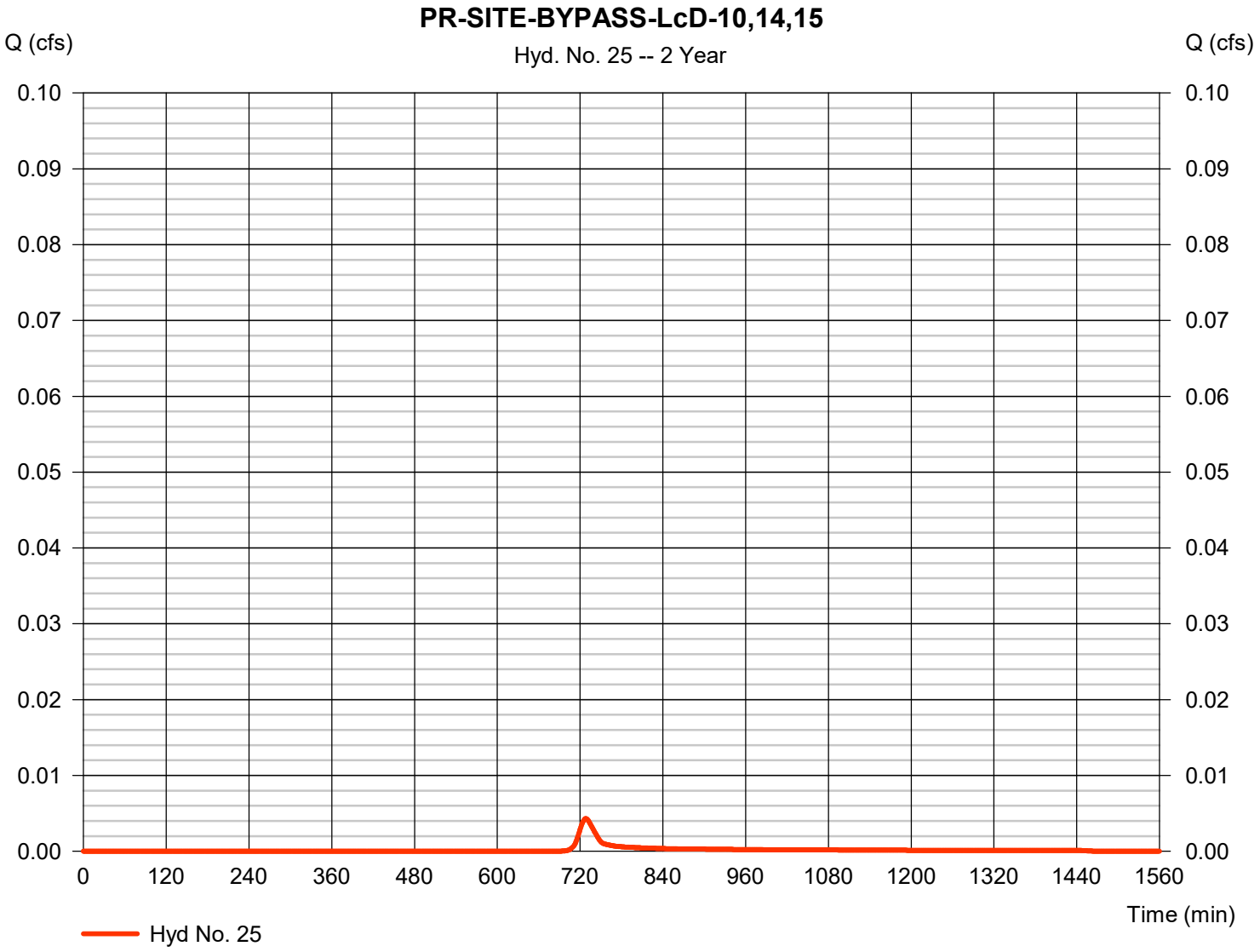


Hydrograph Report

Hyd. No. 25

PR-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.004 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 16 cuft
Drainage area	= 0.005 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

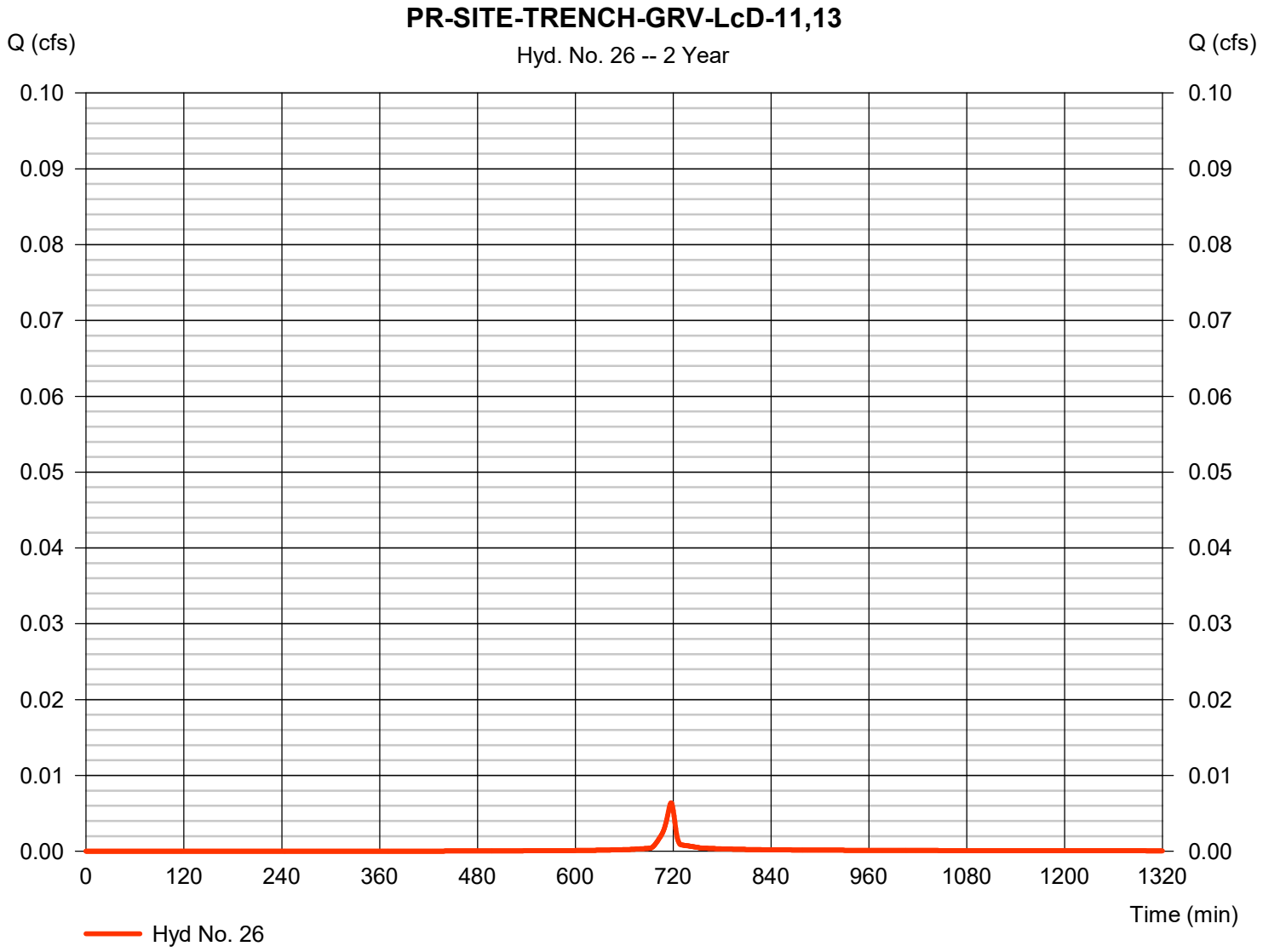


Hydrograph Report

Hyd. No. 26

PR-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.006 cfs
Storm frequency	= 2 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 13 cuft
Drainage area	= 0.002 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

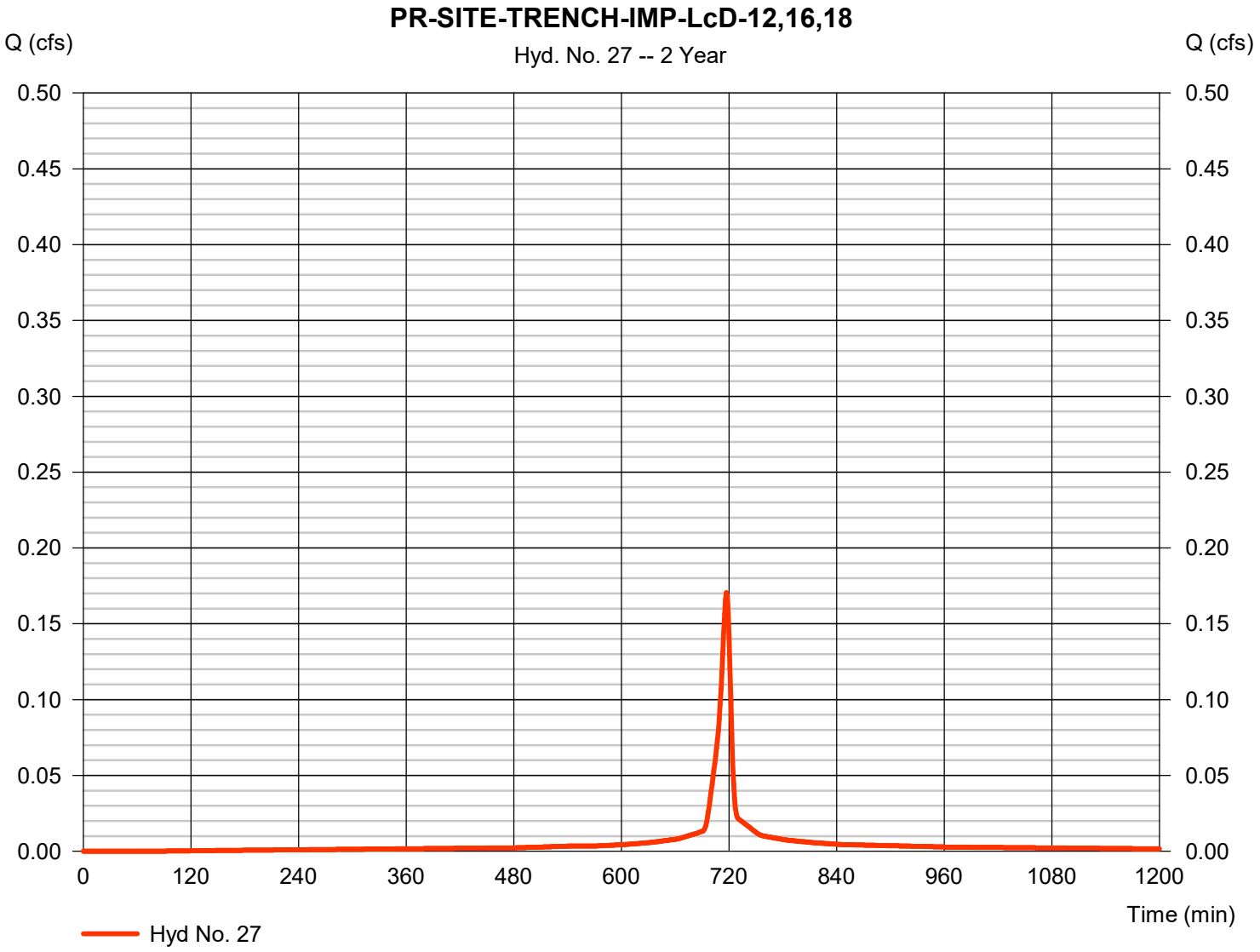


Hydrograph Report

Hyd. No. 27

PR-SITE-TRENCH-IMP-LcD-12,16,18

Hydrograph type	= SCS Runoff	Peak discharge	= 0.171 cfs
Storm frequency	= 2 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 403 cuft
Drainage area	= 0.036 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



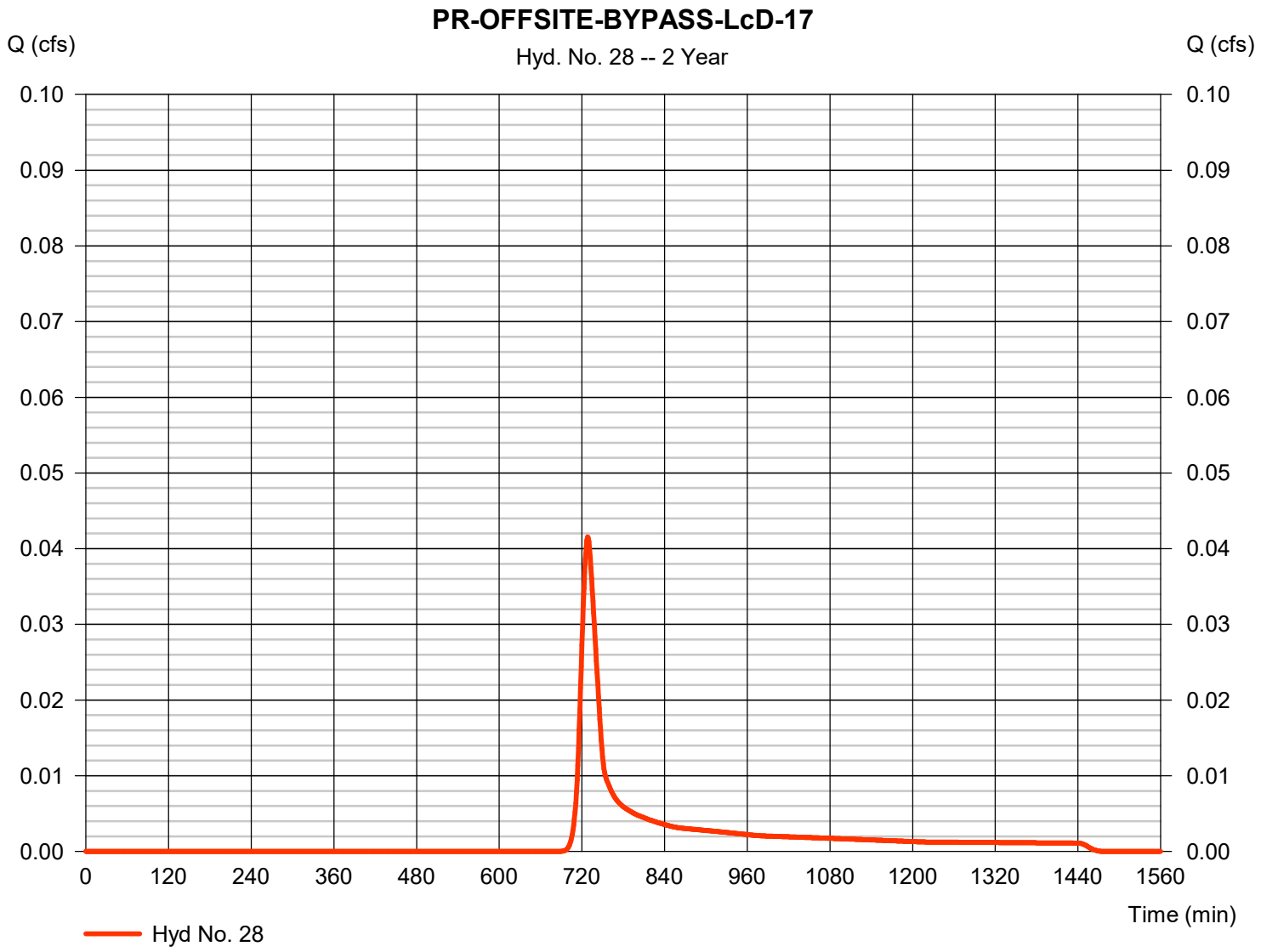
Hydrograph Report

Hyd. No. 28

PR-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.042 cfs
Storm frequency	=	2 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	158 cuft
Drainage area	=	0.053 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.045 x 98) + (0.043 x 98)] / 0.053

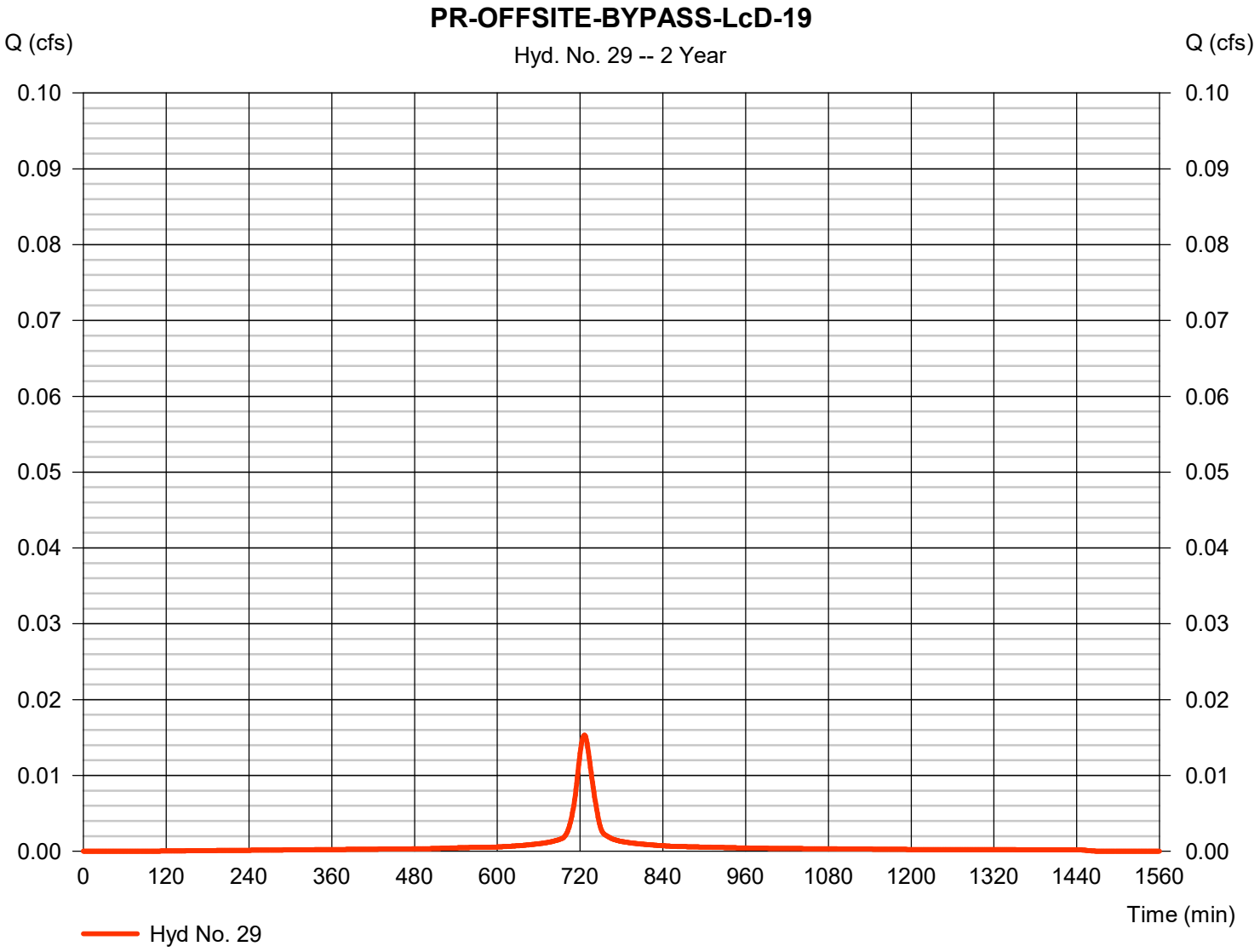


Hydrograph Report

Hyd. No. 29

PR-OFFSITE-BYPASS-LcD-19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.015 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 58 cuft
Drainage area	= 0.005 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

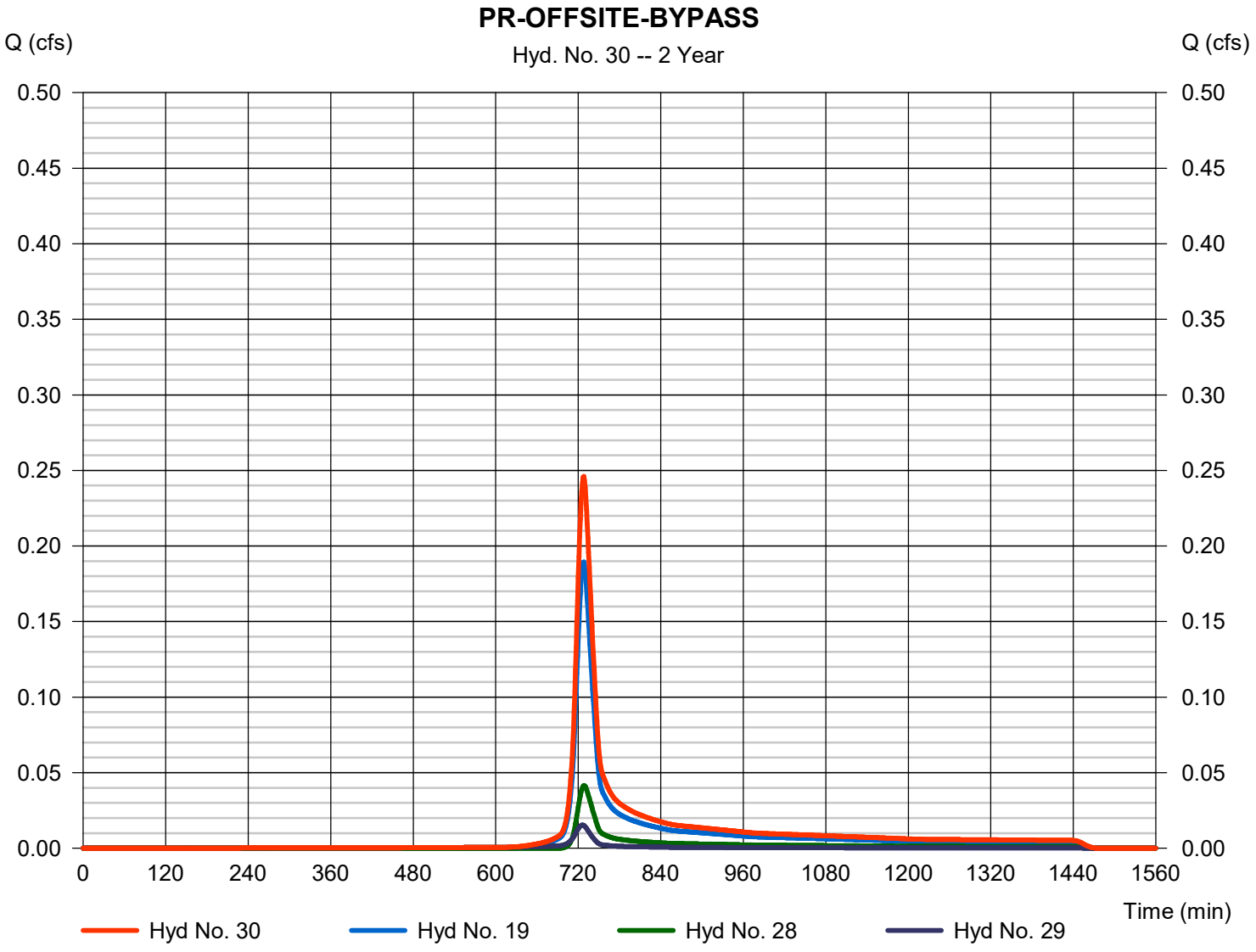


Hydrograph Report

Hyd. No. 30

PR-OFFSITE-BYPASS

Hydrograph type	= Combine	Peak discharge	= 0.246 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 878 cuft
Inflow hyds.	= 19, 28, 29	Contrib. drain. area	= 0.211 ac

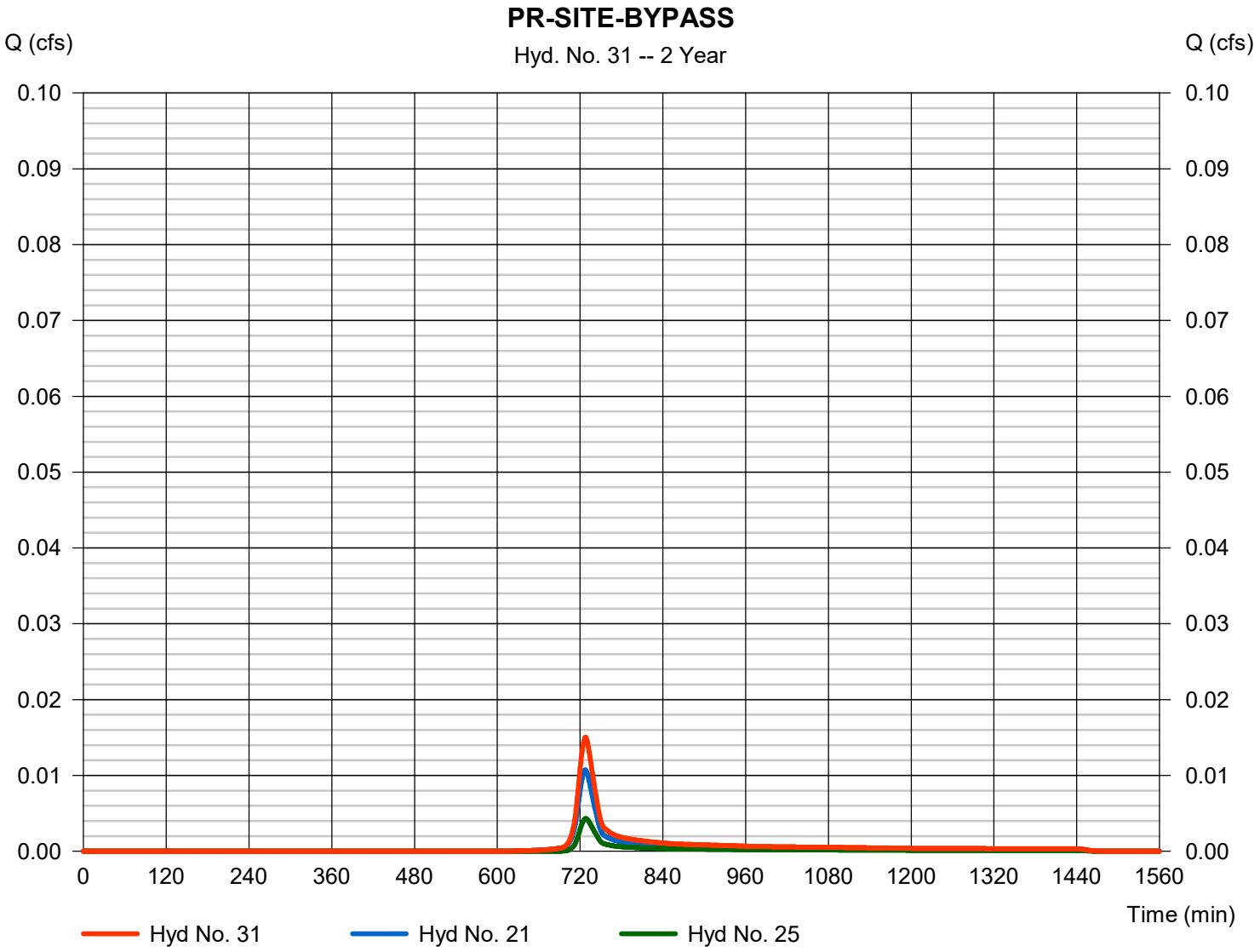


Hydrograph Report

Hyd. No. 31

PR-SITE-BYPASS

Hydrograph type	= Combine	Peak discharge	= 0.015 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 53 cuft
Inflow hyds.	= 21, 25	Contrib. drain. area	= 0.013 ac

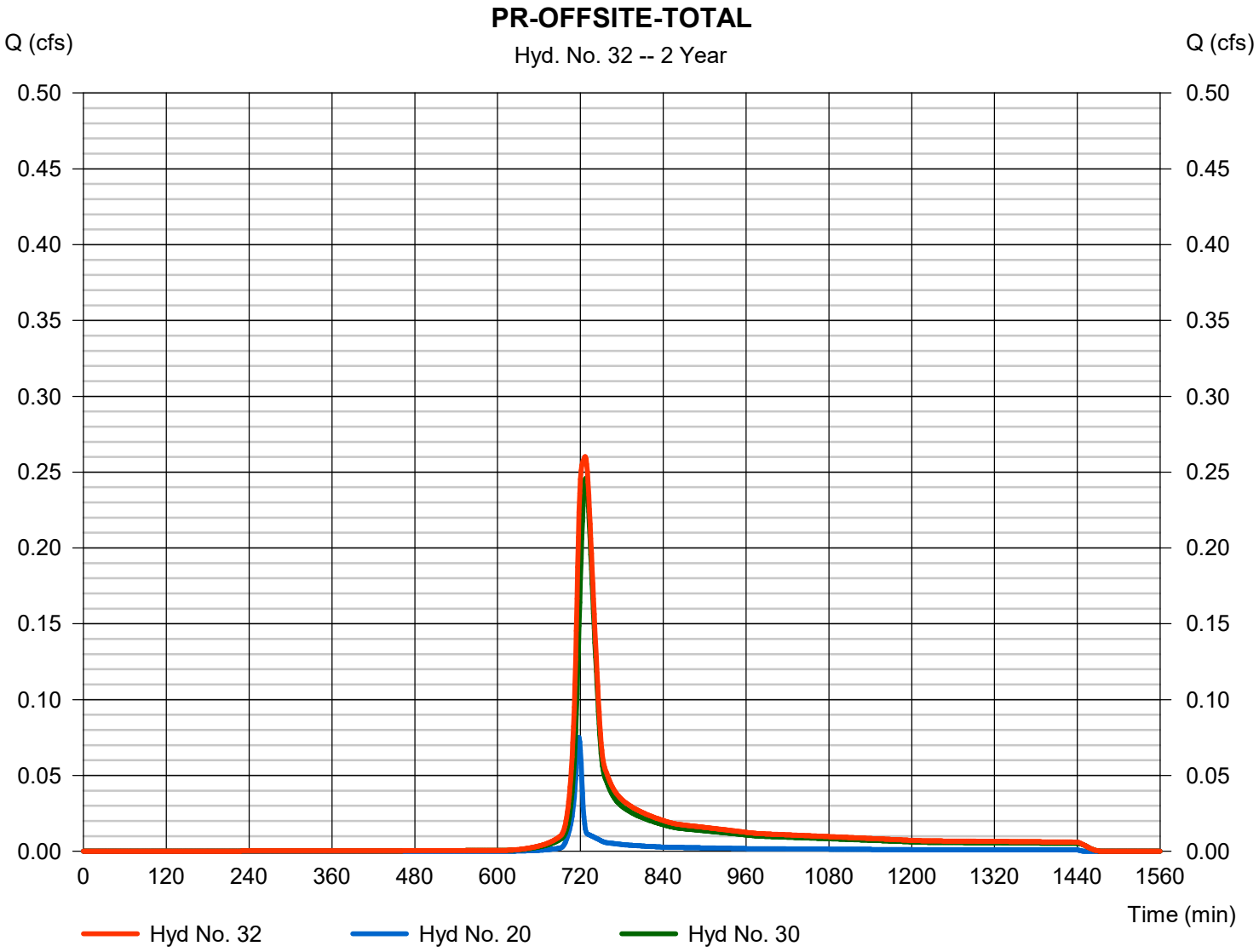


Hydrograph Report

Hyd. No. 32

PR-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.260 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,030 cuft
Inflow hyds.	= 20, 30	Contrib. drain. area	= 0.033 ac

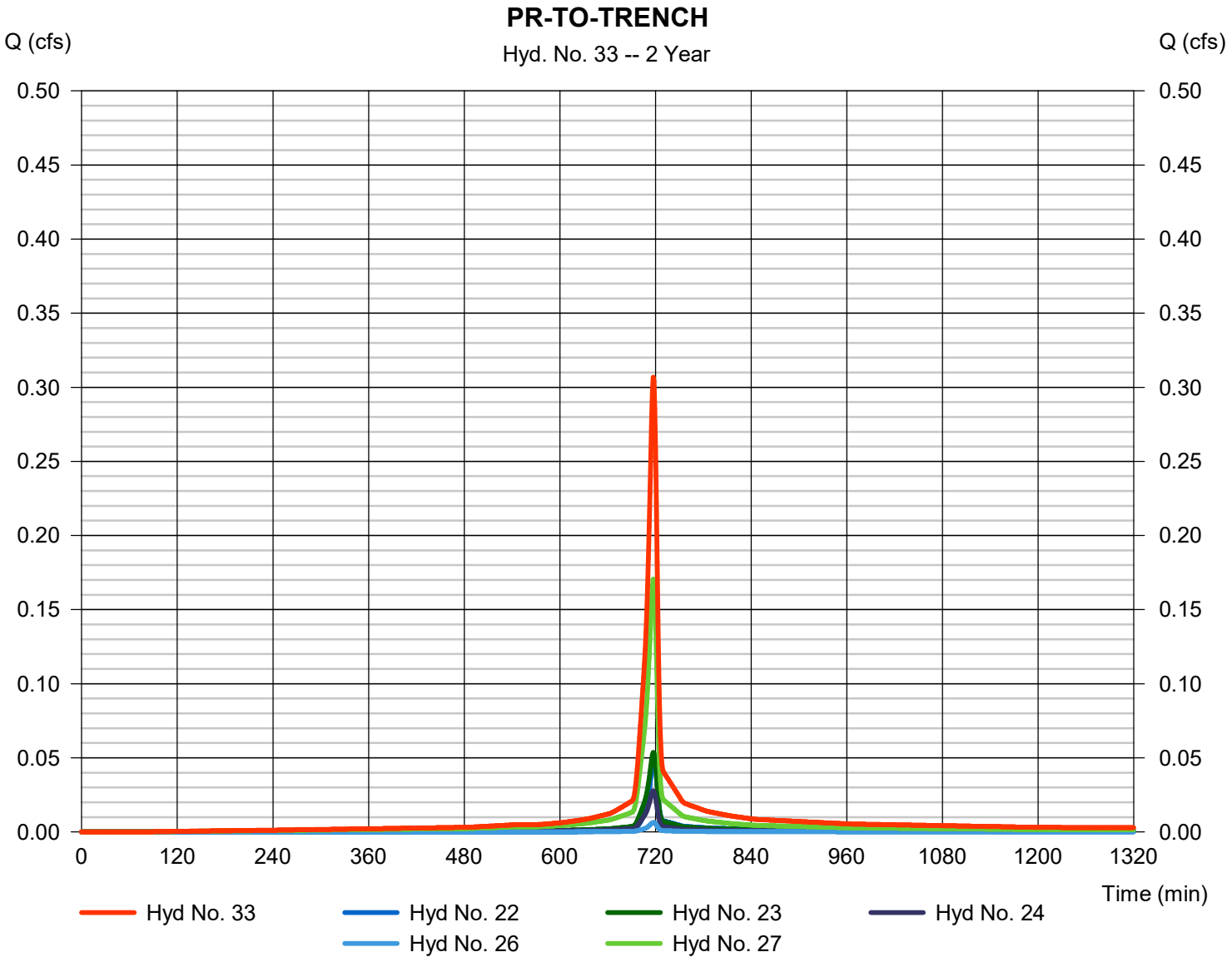


Hydrograph Report

Hyd. No. 33

PR-TO-TRENCH

Hydrograph type	=	Combine	Peak discharge	=	0.307 cfs
Storm frequency	=	2 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	699 cuft
Inflow hyds.	=	22, 23, 24, 26, 27	Contrib. drain. area	=	0.077 ac



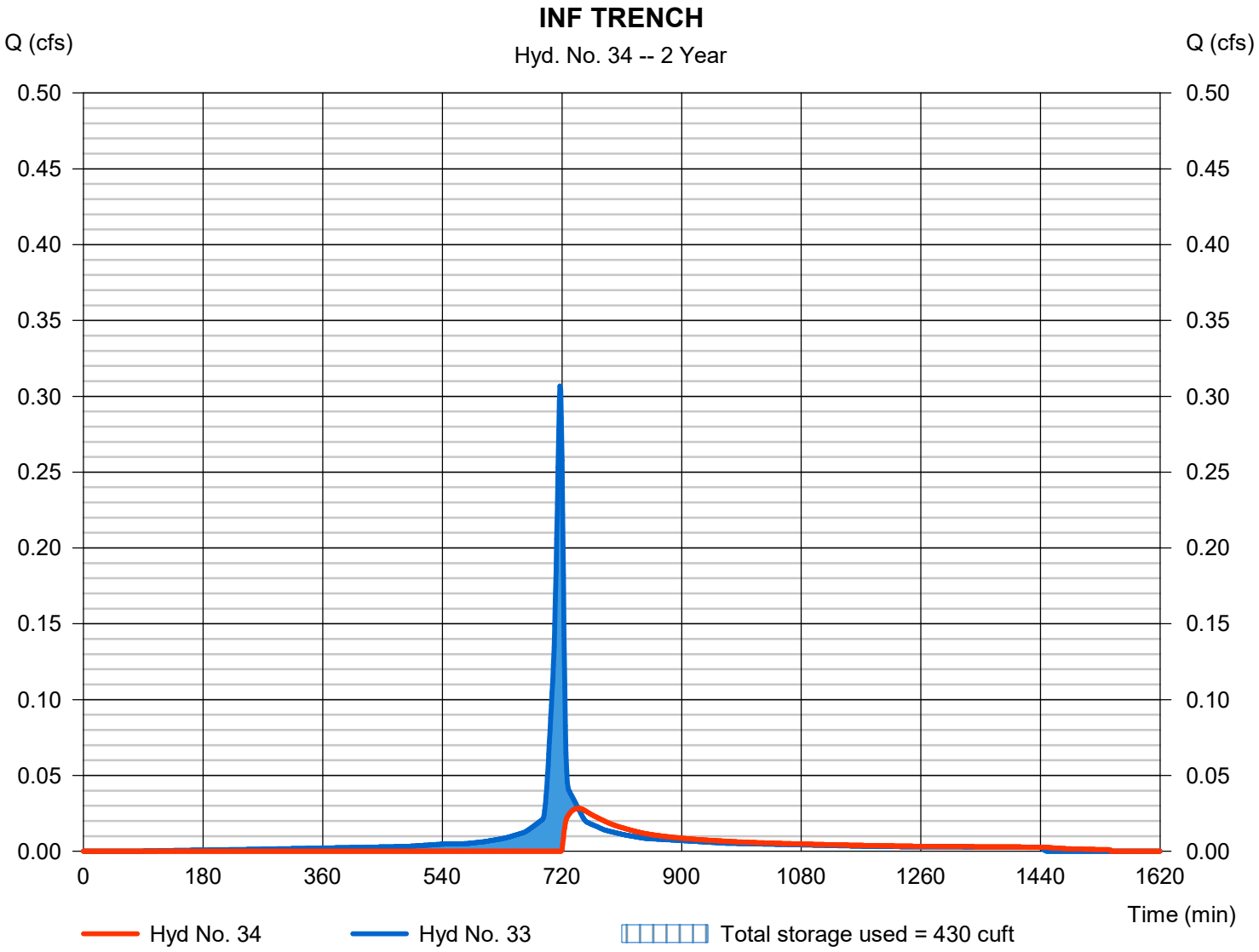
Hydrograph Report

Hyd. No. 34

INF TRENCH

Hydrograph type	=	Reservoir	Peak discharge	=	0.028 cfs
Storm frequency	=	2 yrs	Time to peak	=	744 min
Time interval	=	1 min	Hyd. volume	=	333 cuft
Inflow hyd. No.	=	33 - PR-TO-TRENCH	Max. Elevation	=	1687.11 ft
Reservoir name	=	BASIN	Max. Storage	=	430 cuft

Storage Indication method used.

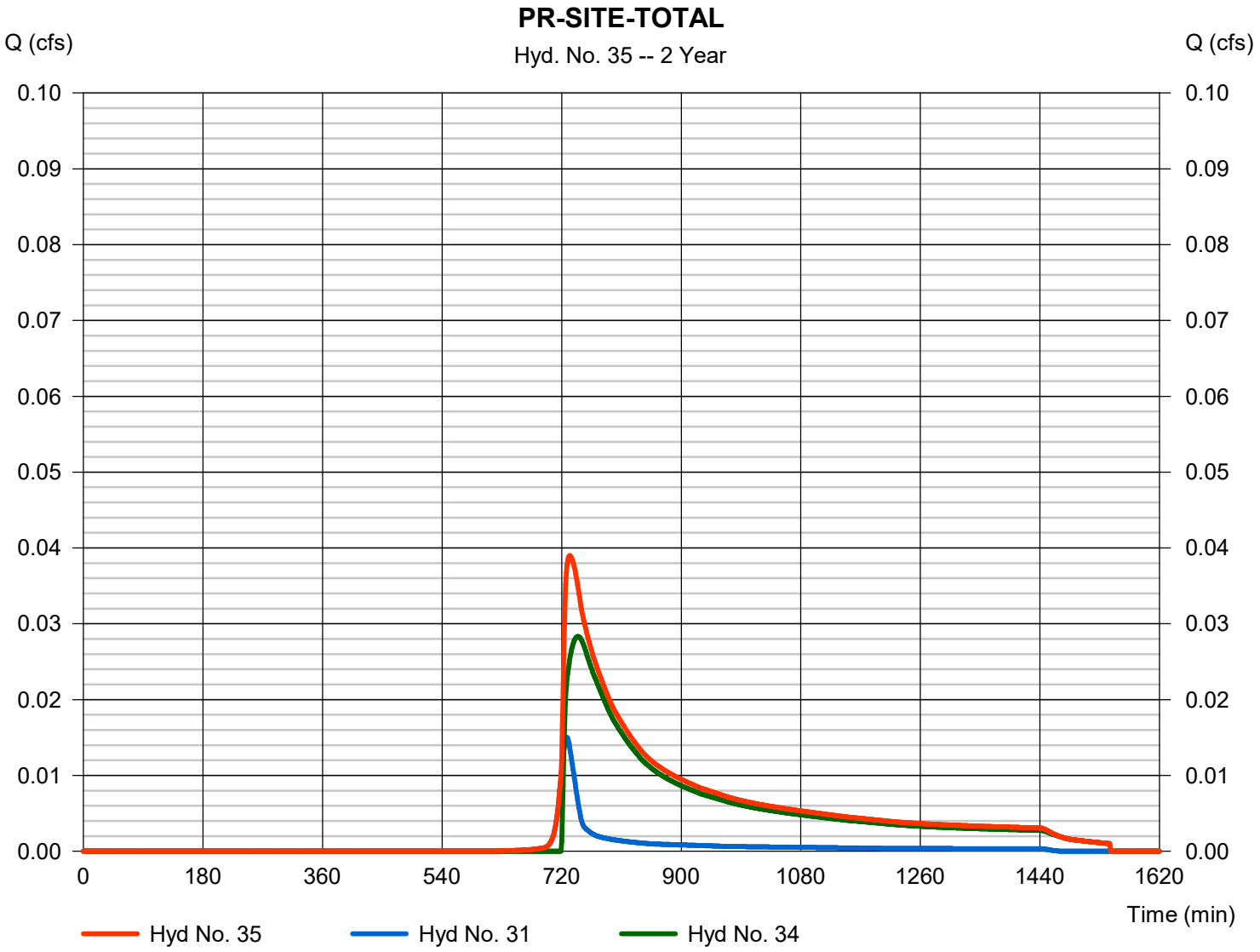


Hydrograph Report

Hyd. No. 35

PR-SITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.039 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 387 cuft
Inflow hyds.	= 31, 34	Contrib. drain. area	= 0.000 ac

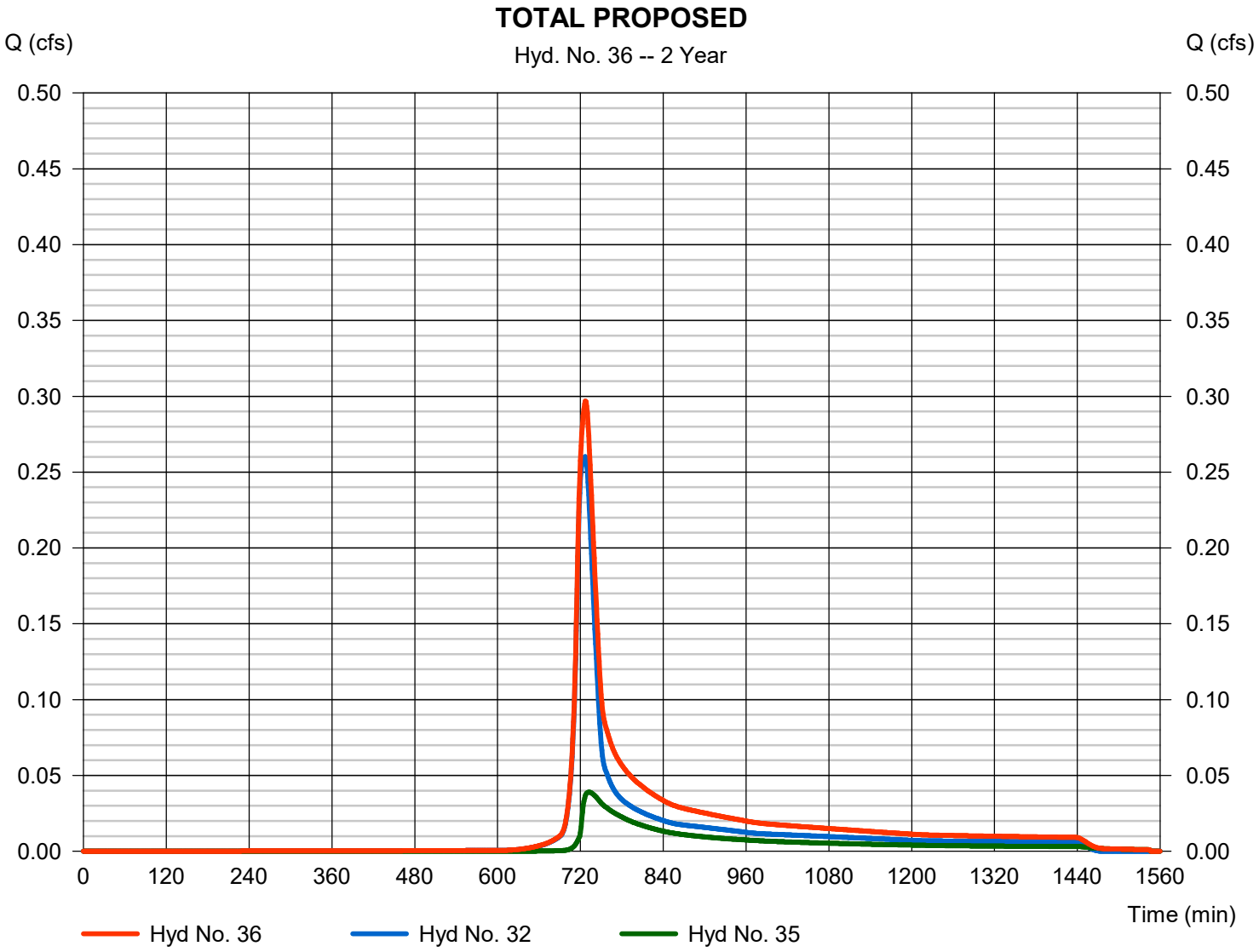


Hydrograph Report

Hyd. No. 36

TOTAL PROPOSED

Hydrograph type	= Combine	Peak discharge	= 0.297 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,416 cuft
Inflow hyds.	= 32, 35	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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	0.288	1	727	987	------	------	------	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	0.112	1	718	225	------	------	------	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	0.015	1	727	53	------	------	------	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	0.070	1	718	140	------	------	------	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	0.041	1	718	83	------	------	------	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	0.020	1	718	40	------	------	------	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	0.007	1	728	24	------	------	------	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	0.004	1	718	8	------	------	------	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	0.074	1	718	149	------	------	------	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	0.071	1	728	253	------	------	------	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	0.036	1	717	87	------	------	------	EX-SITE-TRENCH-IMP-ROAD-LcD-1
12	SCS Runoff	0.019	1	726	73	------	------	------	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	0.377	1	727	1,312	1, 10, 12	------	------	EX-OFFSITE - BYPASS
14	Combine	0.022	1	728	77	3, 7,	------	------	EX-SITE-BYPASS
15	Combine	0.245	1	718	507	4, 5, 6,	------	------	EX-SITE-BASIN COMBINE
16	Combine	0.399	1	726	1,537	8, 9, 11, 2, 13,	------	------	EX-OFFSITE-TOTAL
17	Combine	0.258	1	718	584	14, 15,	------	------	EX-SITE-TOTAL
18	Combine	0.618	1	719	2,122	16, 17	------	------	TOTAL EXISTING
19	SCS Runoff	0.288	1	727	987	------	------	------	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	0.112	1	718	225	------	------	------	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	0.016	1	727	55	------	------	------	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	0.073	1	718	146	------	------	------	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	0.069	1	717	153	------	------	------	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	0.035	1	717	83	------	------	------	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	0.007	1	728	26	------	------	------	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	0.008	1	717	18	------	------	------	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	0.214	1	717	510	------	------	------	PR-SITE-TRENCH-IMP-LcD-12,16,1
28	SCS Runoff	0.071	1	728	253	------	------	------	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	0.019	1	726	73	------	------	------	PR-OFFSITE-BYPASS-LcD-19
30	Combine	0.377	1	727	1,312	19, 28, 29	------	------	PR-OFFSITE-BYPASS
31	Combine	0.023	1	727	80	21, 25,	------	------	PR-SITE-BYPASS
32	Combine	0.399	1	726	1,537	20, 30,	------	------	PR-OFFSITE-TOTAL
33	Combine	0.397	1	717	910	22, 23, 24,	------	------	PR-TO-TRENCH
34	Reservoir	0.103	1	725	545	26, 27, 33	1687.23	514	INF TRENCH

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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
35	Combine	0.125	1	726	625	31, 34	------	------	PR-SITE-TOTAL
36	Combine	0.524	1	726	2,162	32, 35	------	------	TOTAL PROPOSED

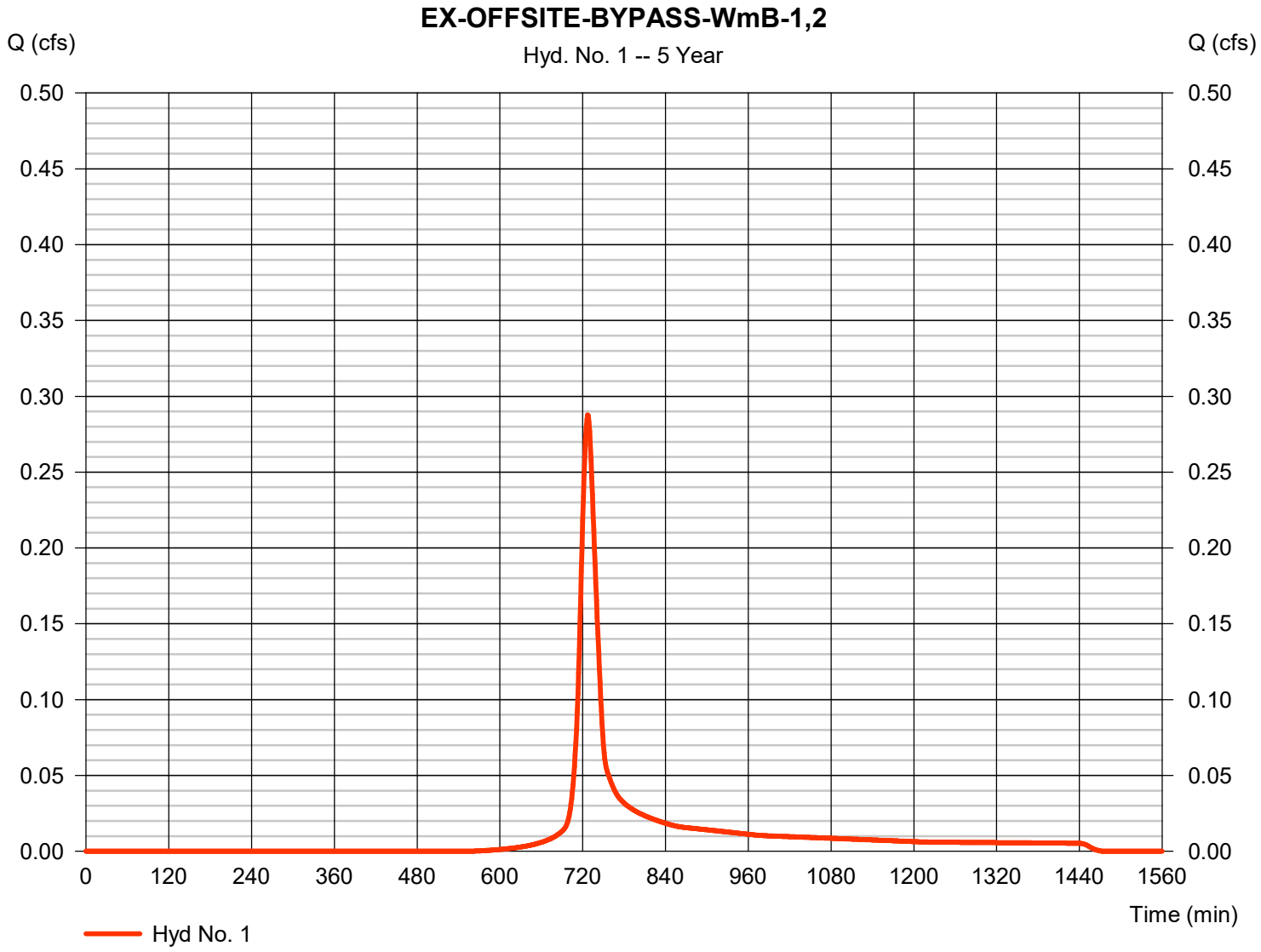
Hydrograph Report

Hyd. No. 1

EX-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.288 cfs
Storm frequency	= 5 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 987 cuft
Drainage area	= 0.152 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 78) + (0.253 x 77)] / 0.152



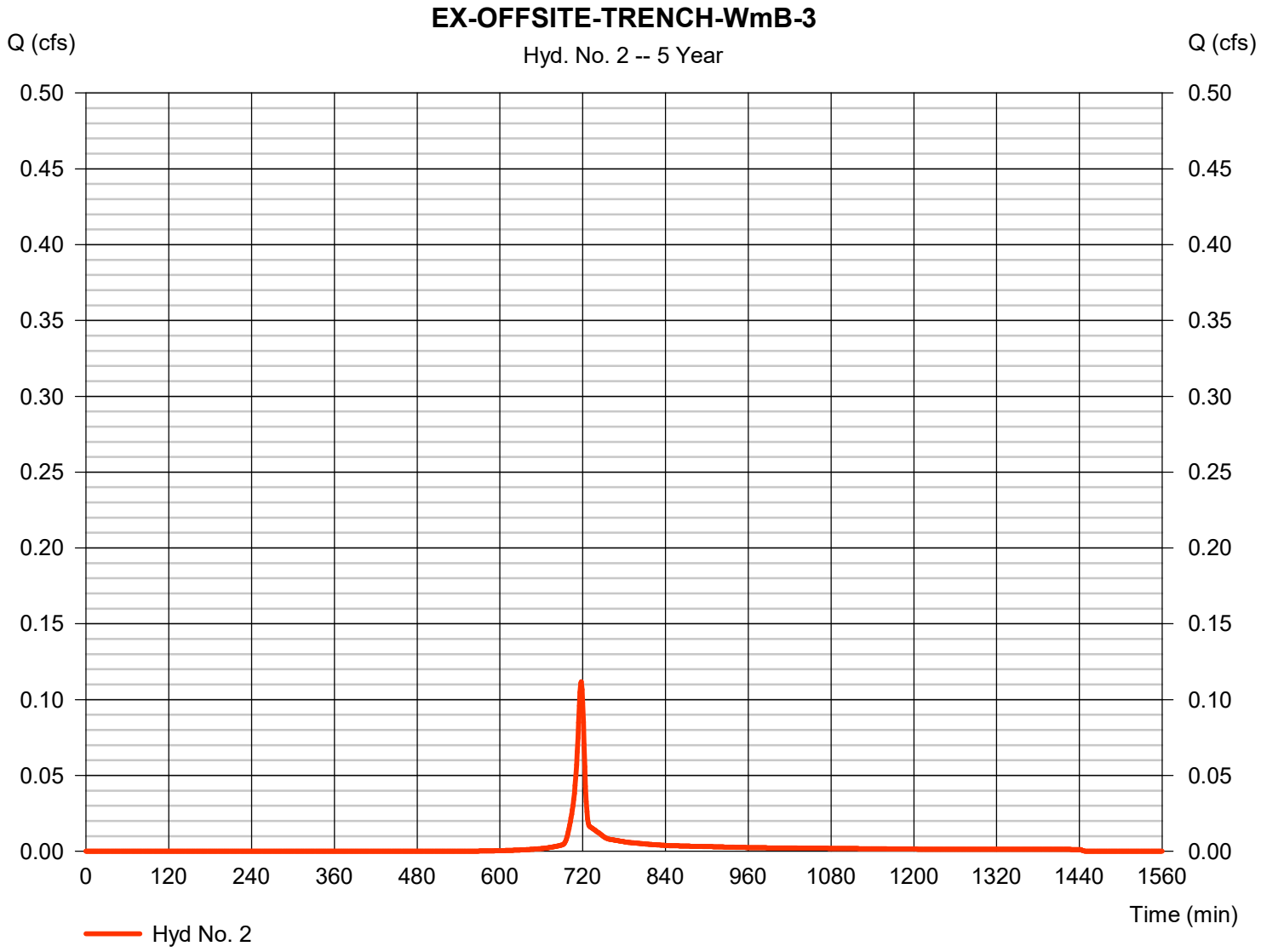
Hydrograph Report

Hyd. No. 2

EX-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.112 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 225 cuft
Drainage area	= 0.033 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 98)] / 0.033



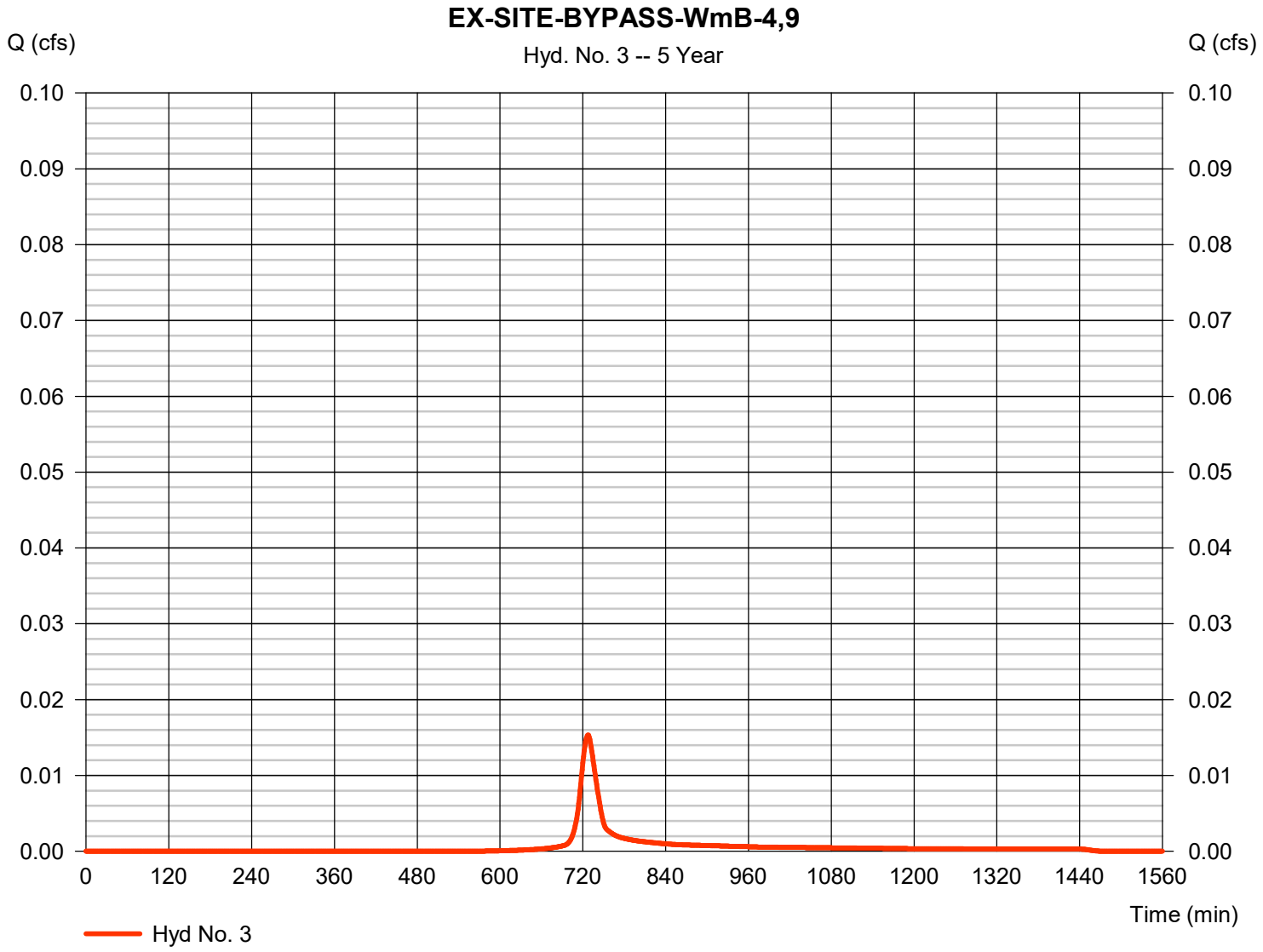
Hydrograph Report

Hyd. No. 3

EX-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.015 cfs
Storm frequency	=	5 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	53 cuft
Drainage area	=	0.008 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	3.99 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 77)] / 0.008



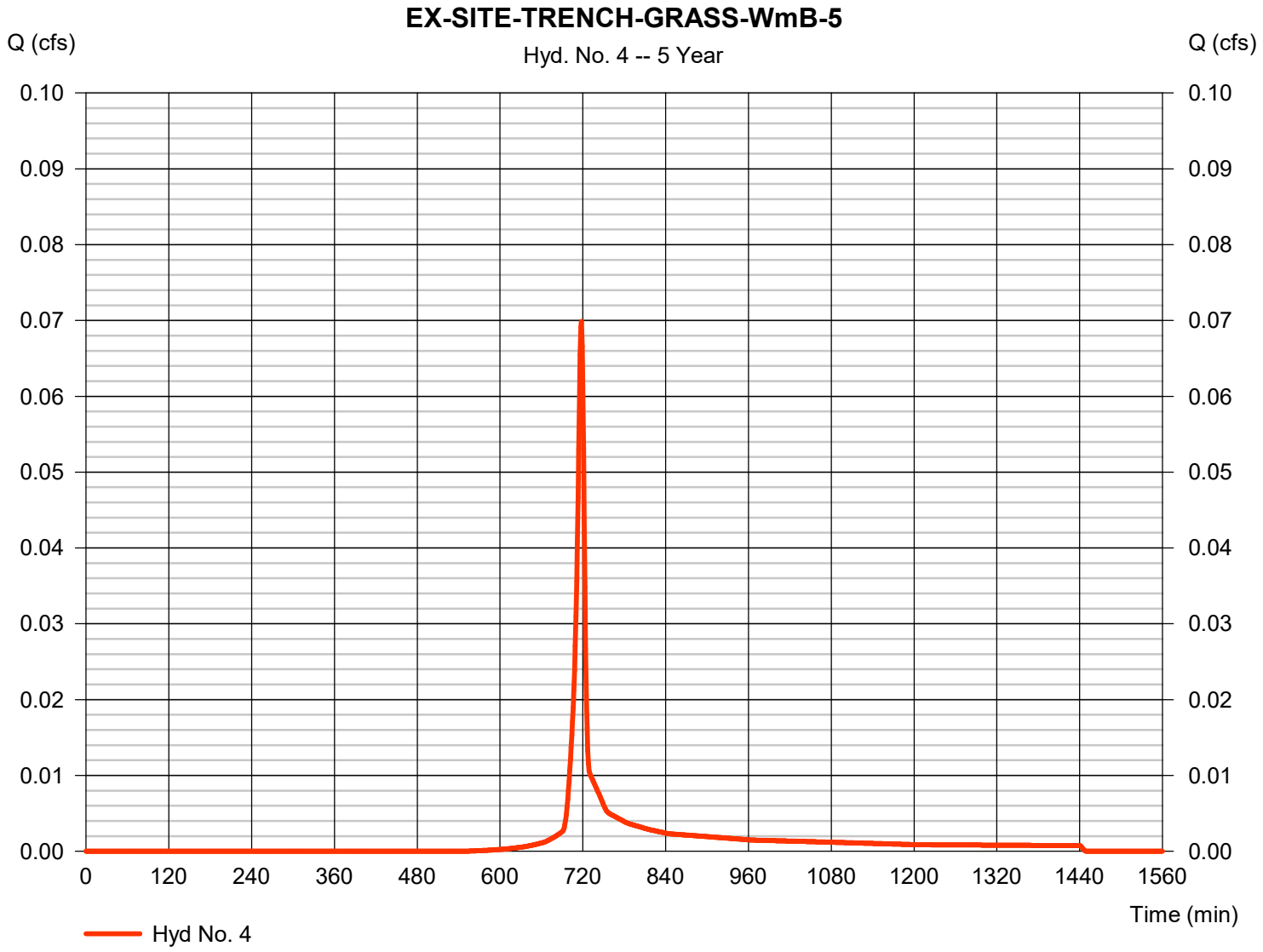
Hydrograph Report

Hyd. No. 4

EX-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.070 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	140 cuft
Drainage area	=	0.021 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.99 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.010 x 70)] / 0.021

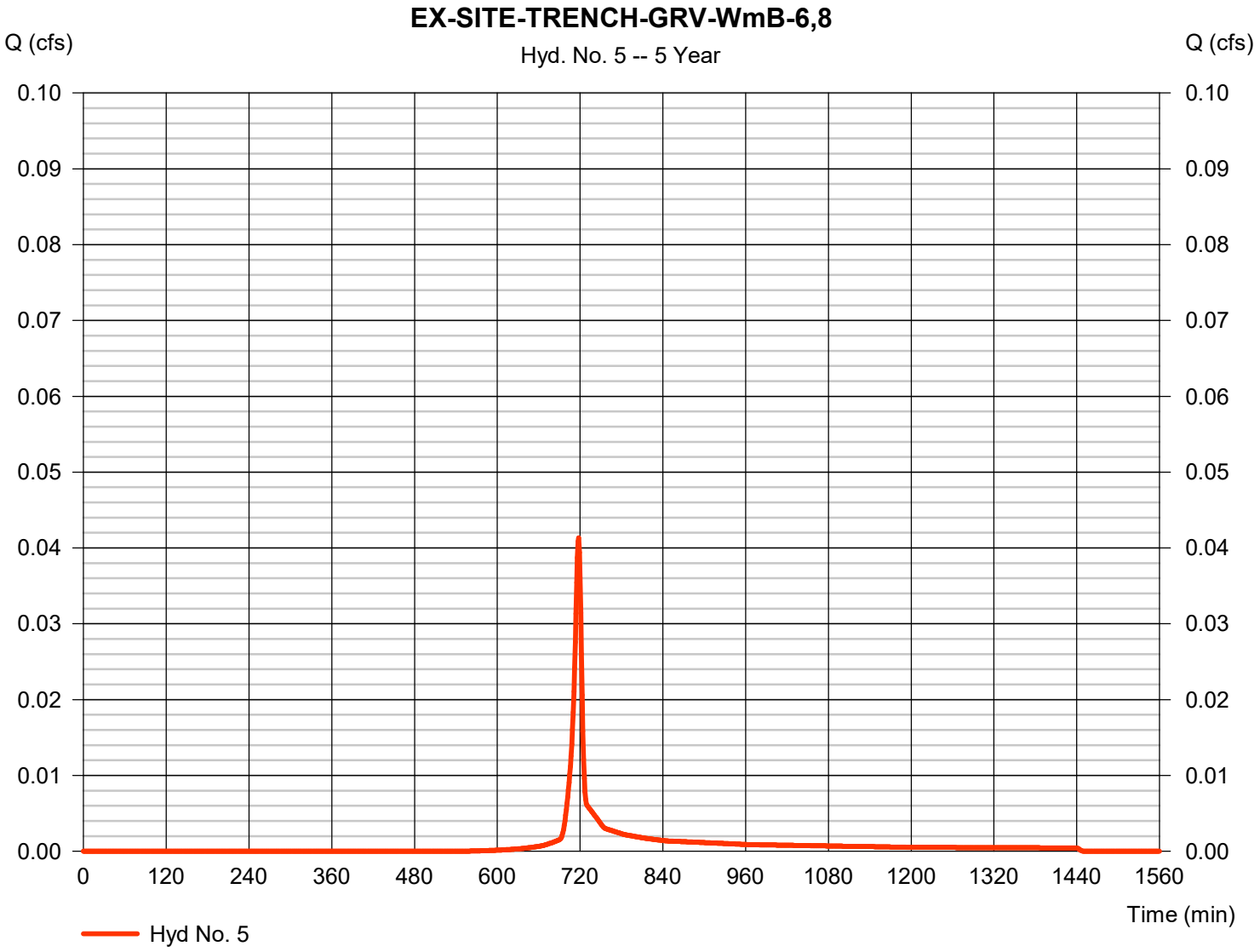


Hydrograph Report

Hyd. No. 5

EX-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.041 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 83 cuft
Drainage area	= 0.012 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

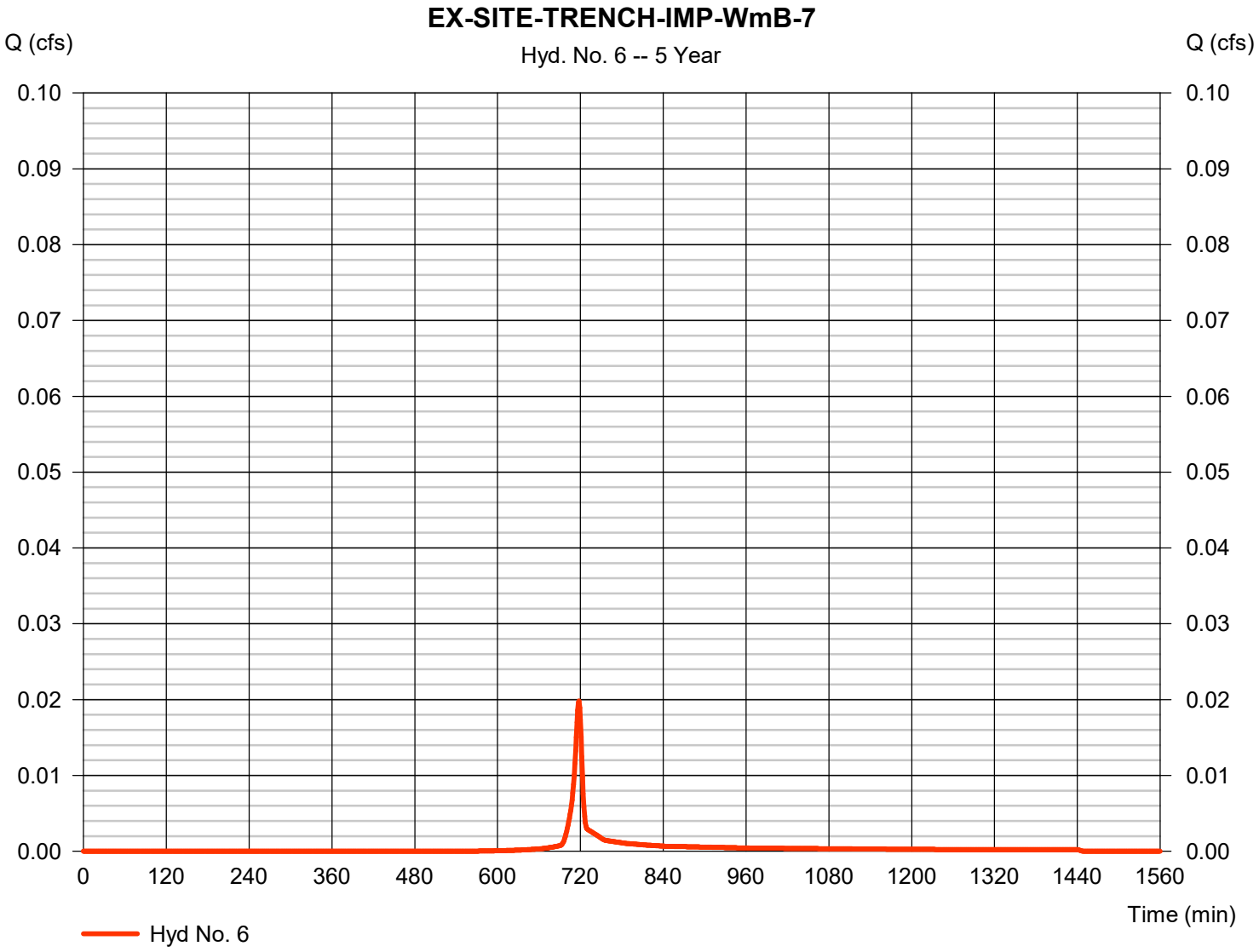


Hydrograph Report

Hyd. No. 6

EX-SITE-TRENCH-IMP-WmB-7

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.020 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	40 cuft
Drainage area	=	0.006 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.99 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

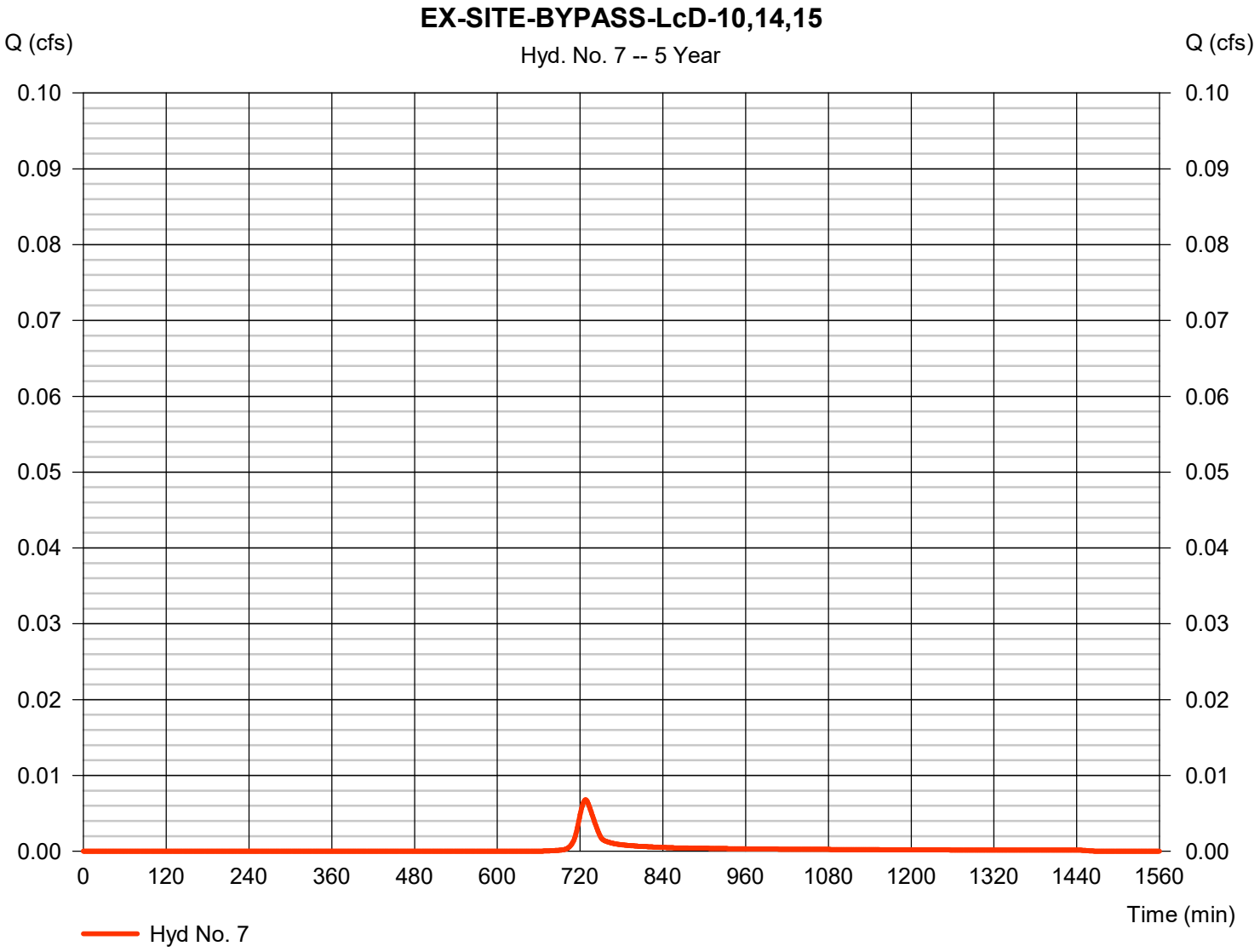


Hydrograph Report

Hyd. No. 7

EX-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.007 cfs
Storm frequency	= 5 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 24 cuft
Drainage area	= 0.005 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

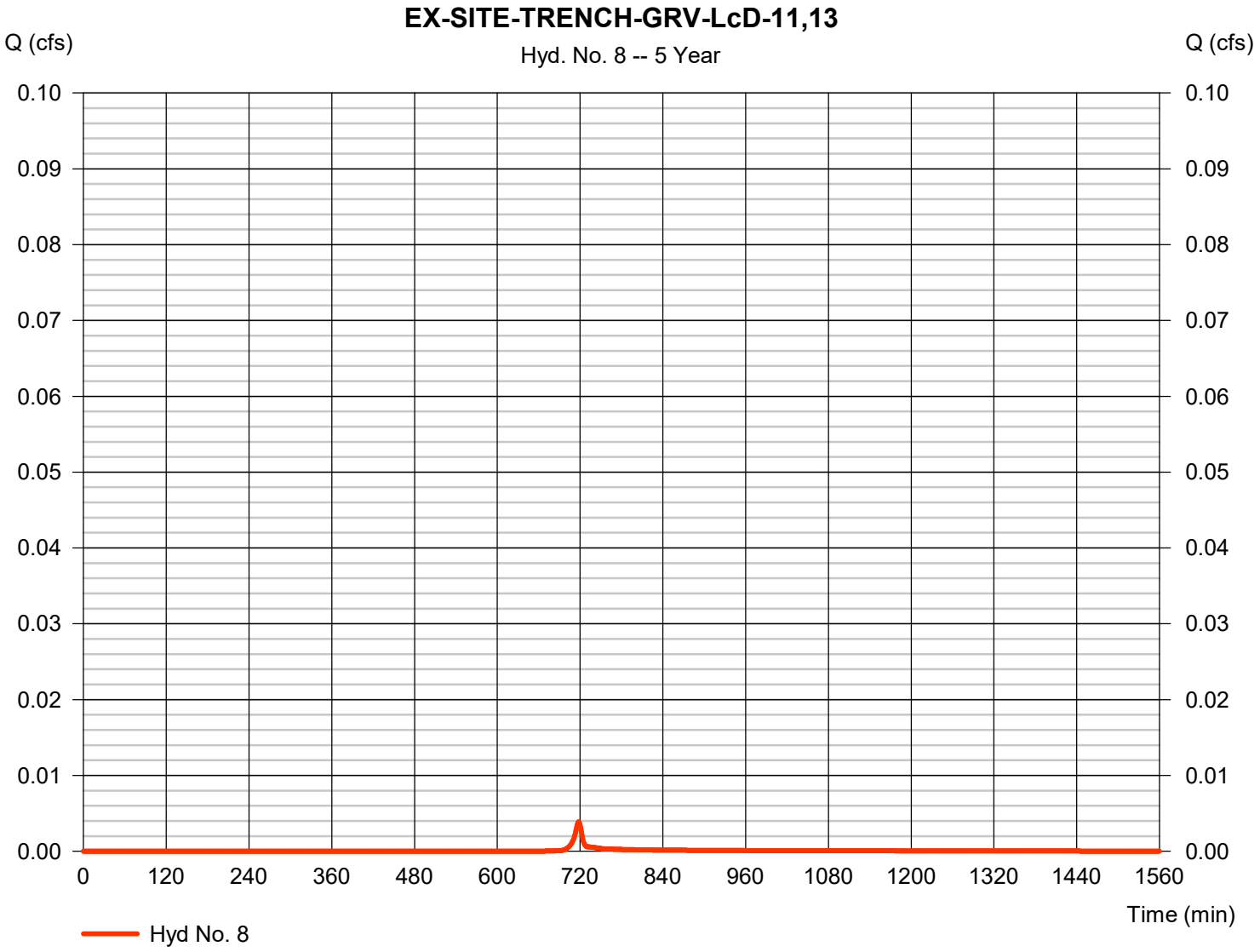


Hydrograph Report

Hyd. No. 8

EX-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.004 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 8 cuft
Drainage area	= 0.002 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

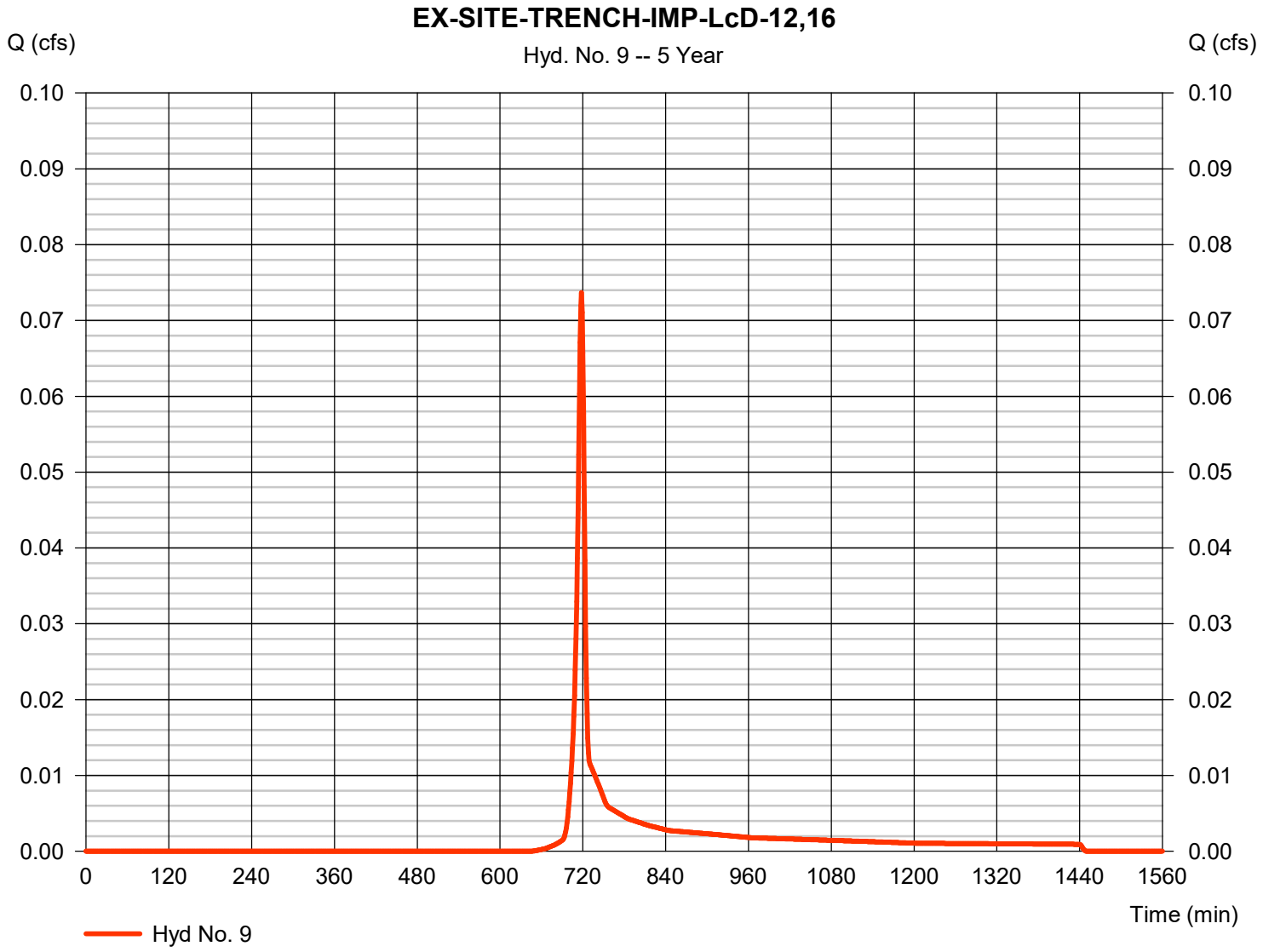


Hydrograph Report

Hyd. No. 9

EX-SITE-TRENCH-IMP-LcD-12,16

Hydrograph type	= SCS Runoff	Peak discharge	= 0.074 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 149 cuft
Drainage area	= 0.030 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

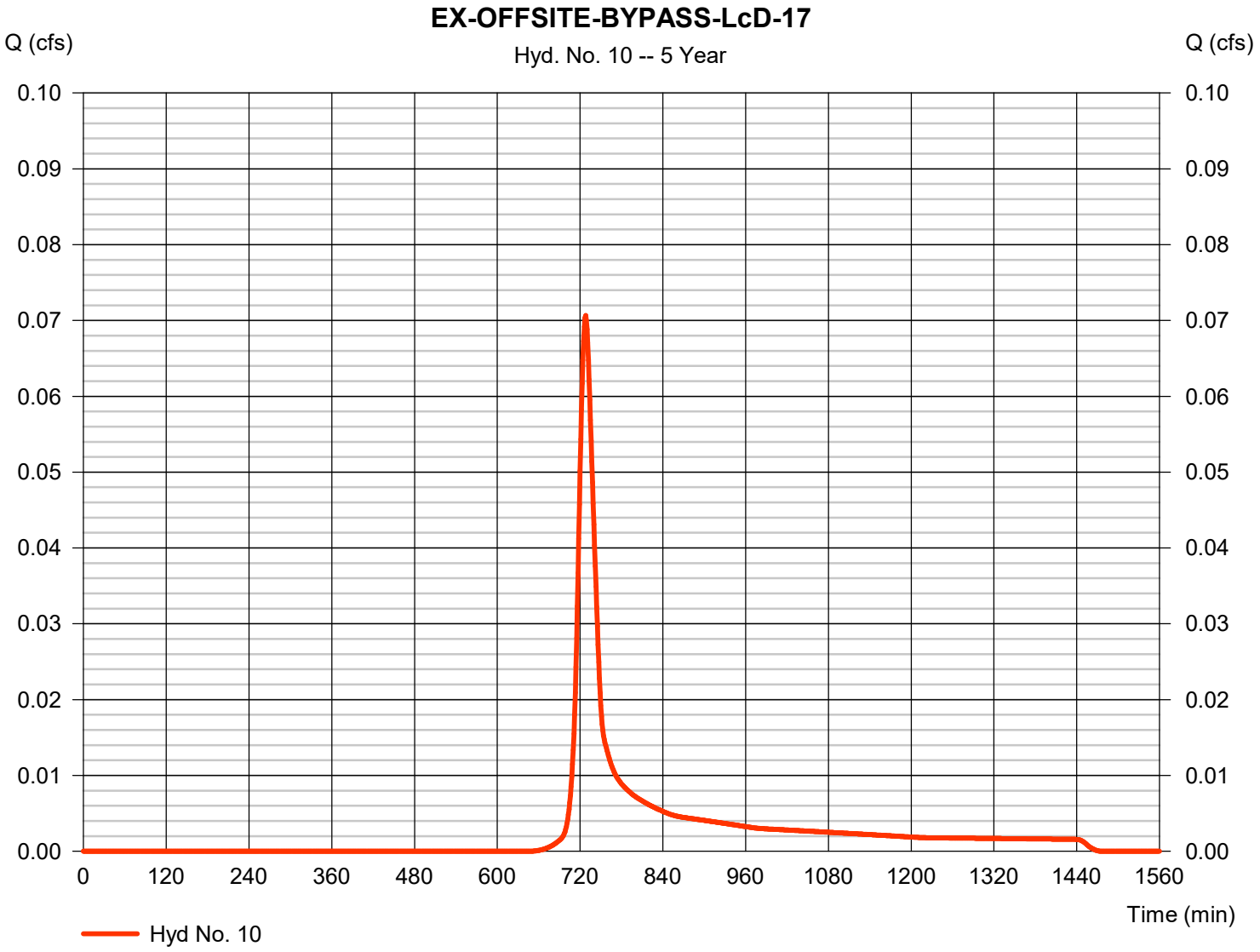


Hydrograph Report

Hyd. No. 10

EX-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.071 cfs
Storm frequency	=	5 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	253 cuft
Drainage area	=	0.053 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	3.99 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

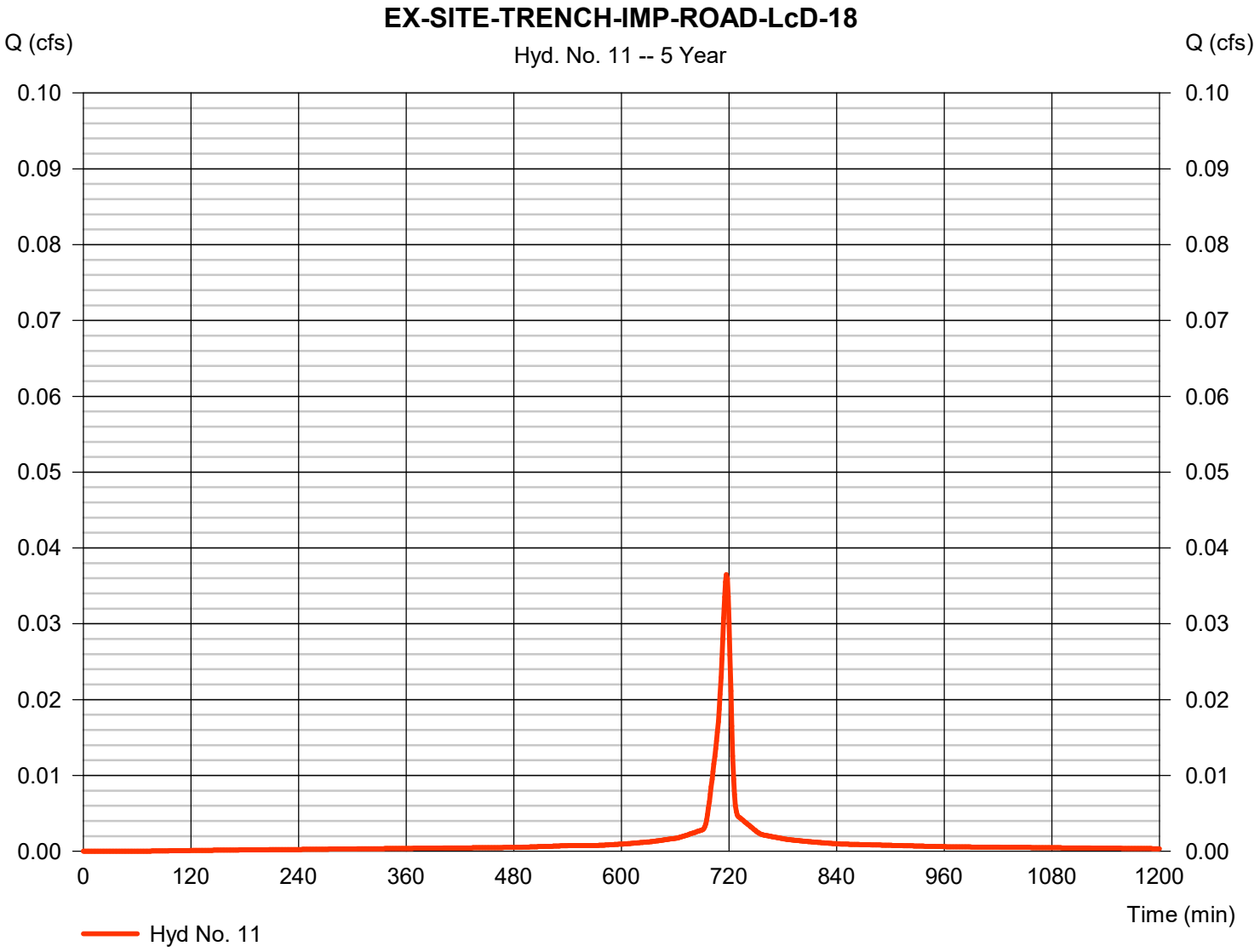


Hydrograph Report

Hyd. No. 11

EX-SITE-TRENCH-IMP-ROAD-LcD-18

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.036 cfs
Storm frequency	=	5 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	87 cuft
Drainage area	=	0.006 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.99 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

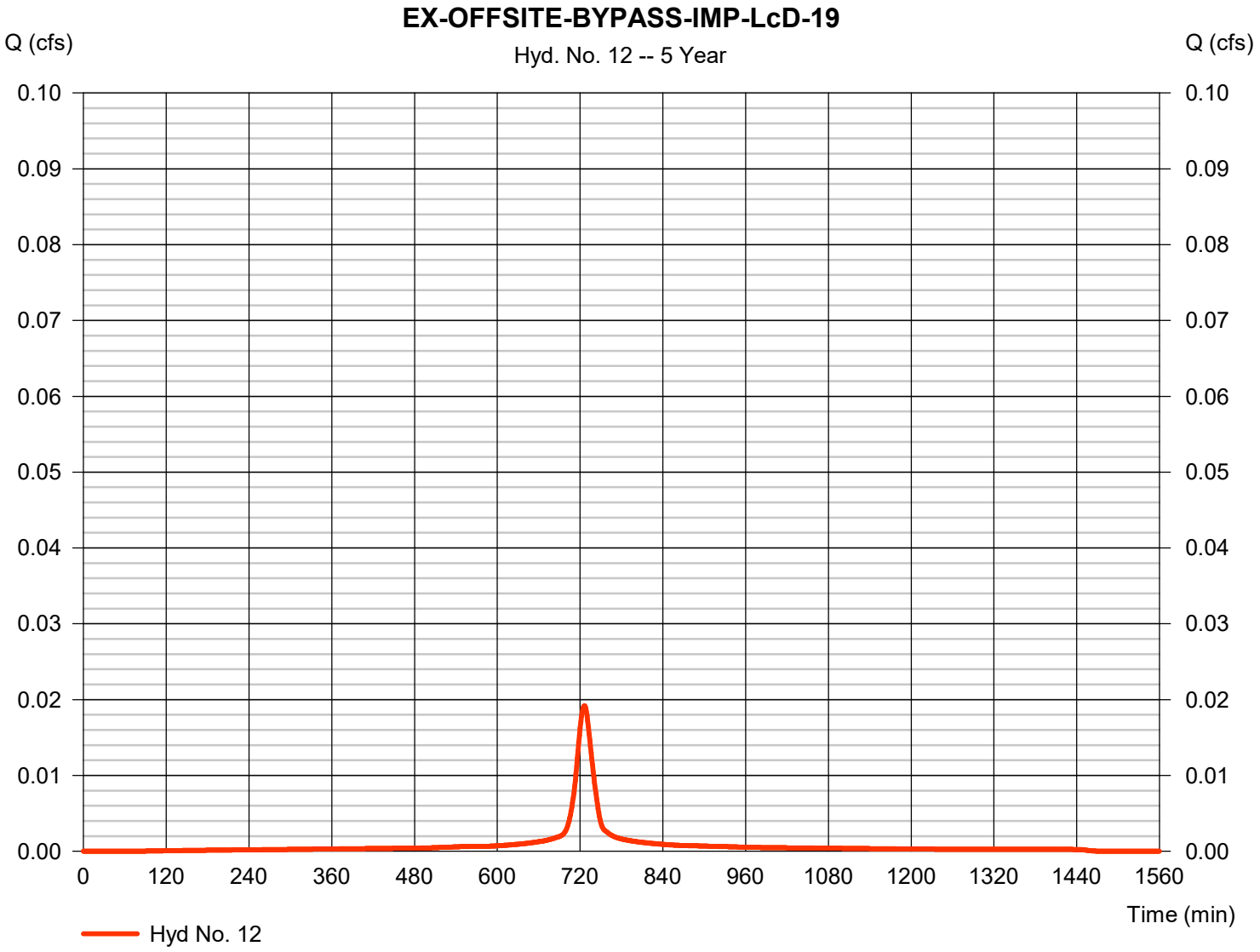


Hydrograph Report

Hyd. No. 12

EX-OFFSITE-BYPASS-IMP-LcD-19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.019 cfs
Storm frequency	= 5 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 73 cuft
Drainage area	= 0.005 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

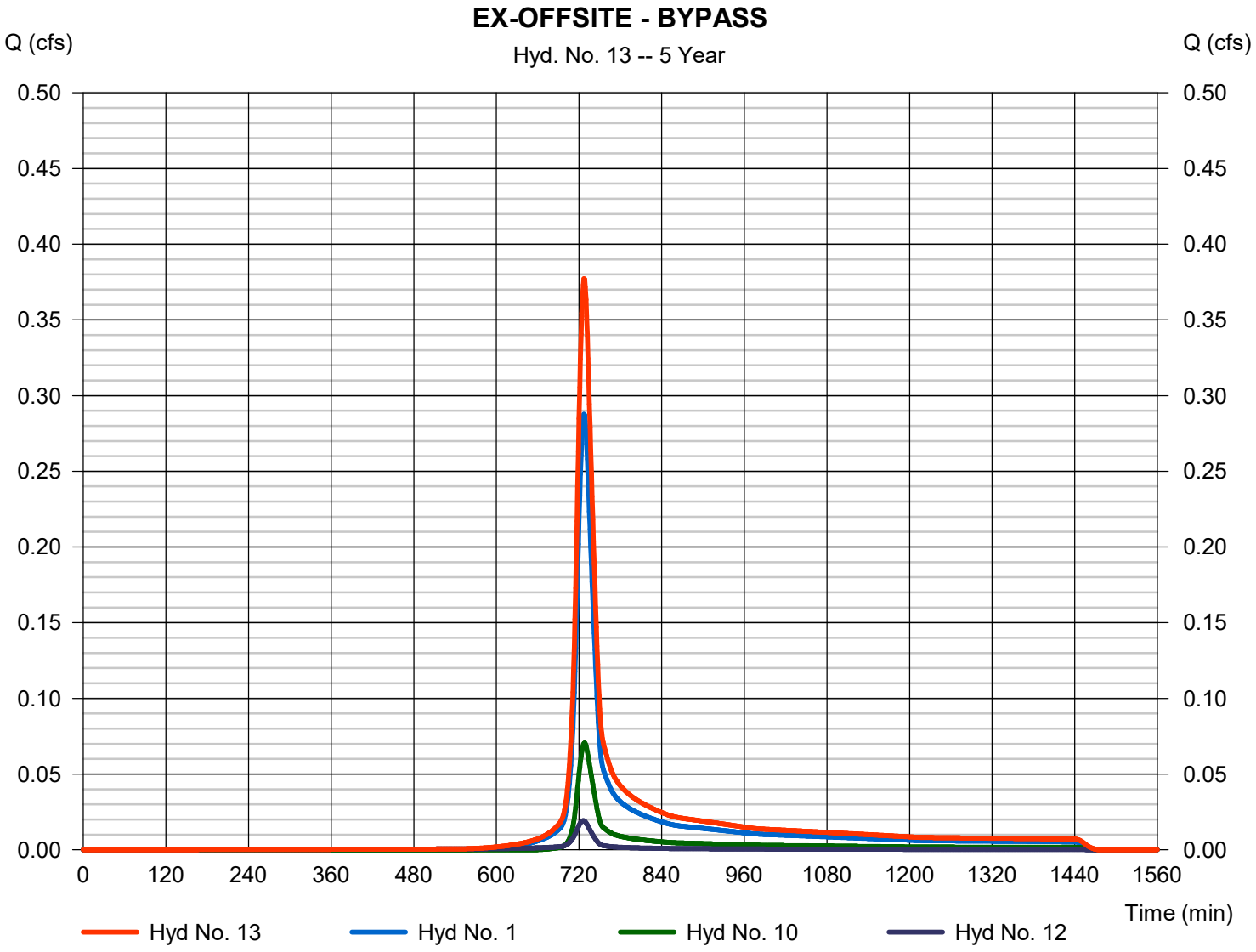


Hydrograph Report

Hyd. No. 13

EX-OFFSITE - BYPASS

Hydrograph type	= Combine	Peak discharge	= 0.377 cfs
Storm frequency	= 5 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,312 cuft
Inflow hyds.	= 1, 10, 12	Contrib. drain. area	= 0.211 ac

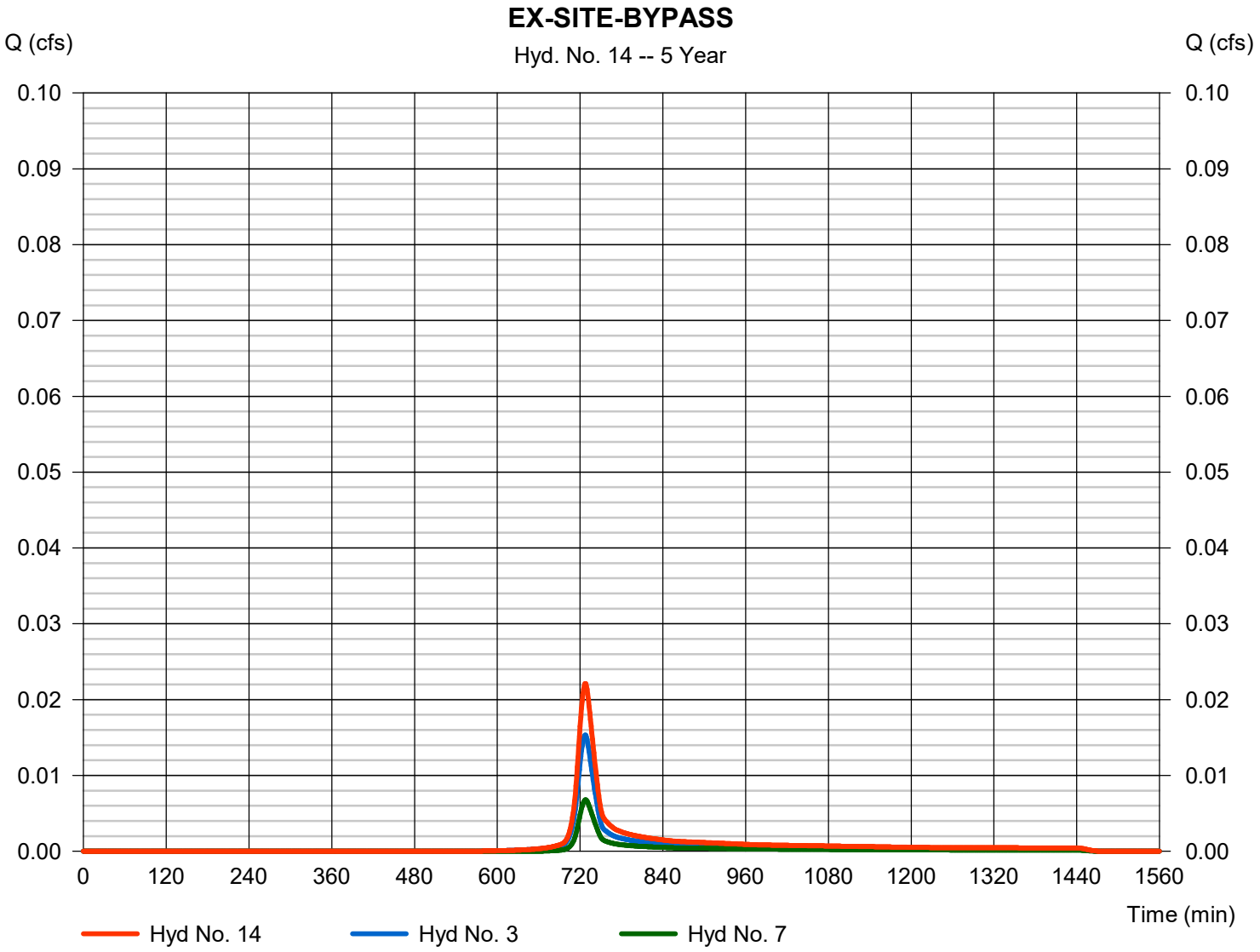


Hydrograph Report

Hyd. No. 14

EX-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.022 cfs
Storm frequency	=	5 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	77 cuft
Inflow hyds.	=	3, 7	Contrib. drain. area	=	0.013 ac

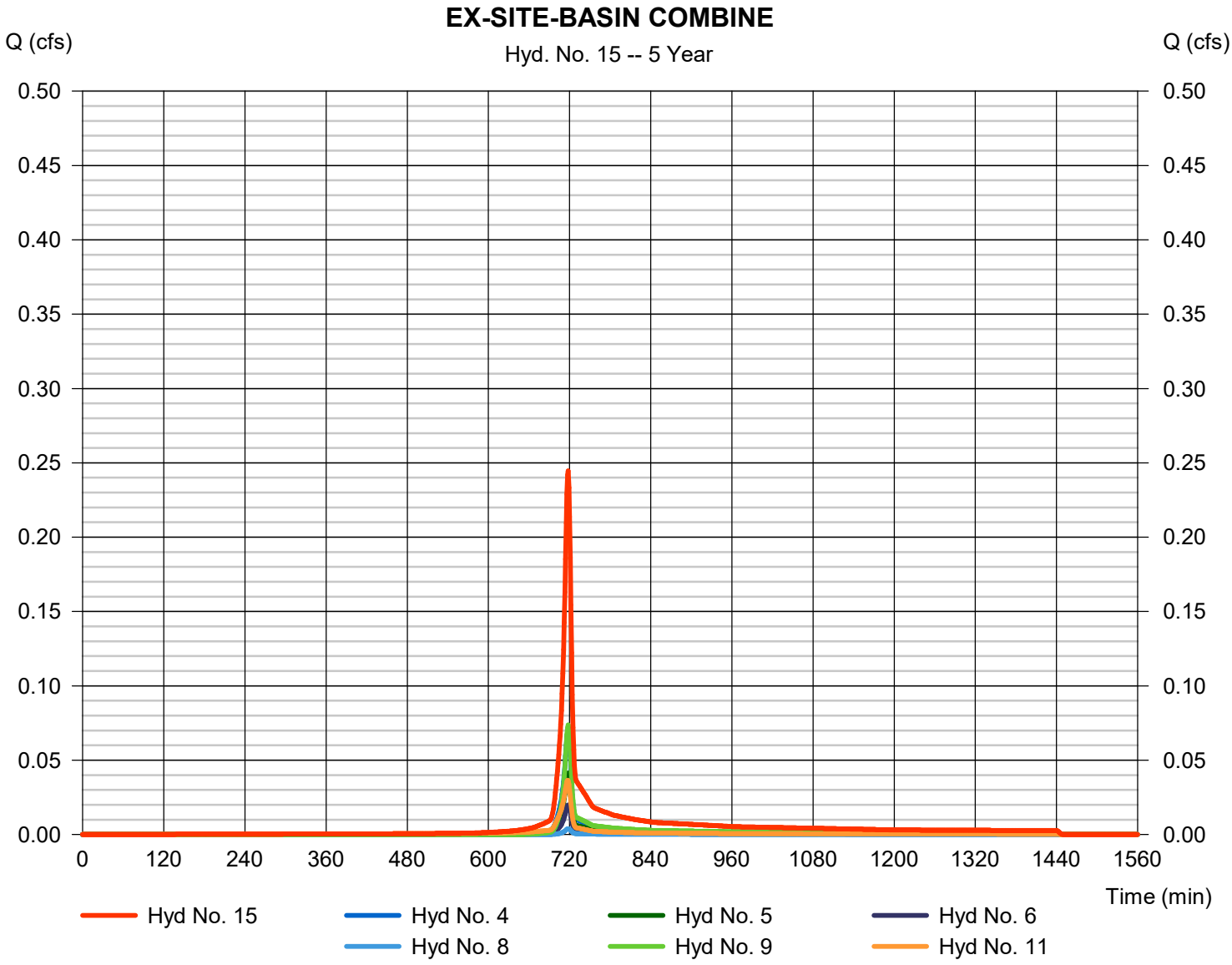


Hydrograph Report

Hyd. No. 15

EX-SITE-BASIN COMBINE

Hydrograph type	=	Combine	Peak discharge	=	0.245 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	507 cuft
Inflow hyds.	=	4, 5, 6, 8, 9, 11	Contrib. drain. area	=	0.077 ac

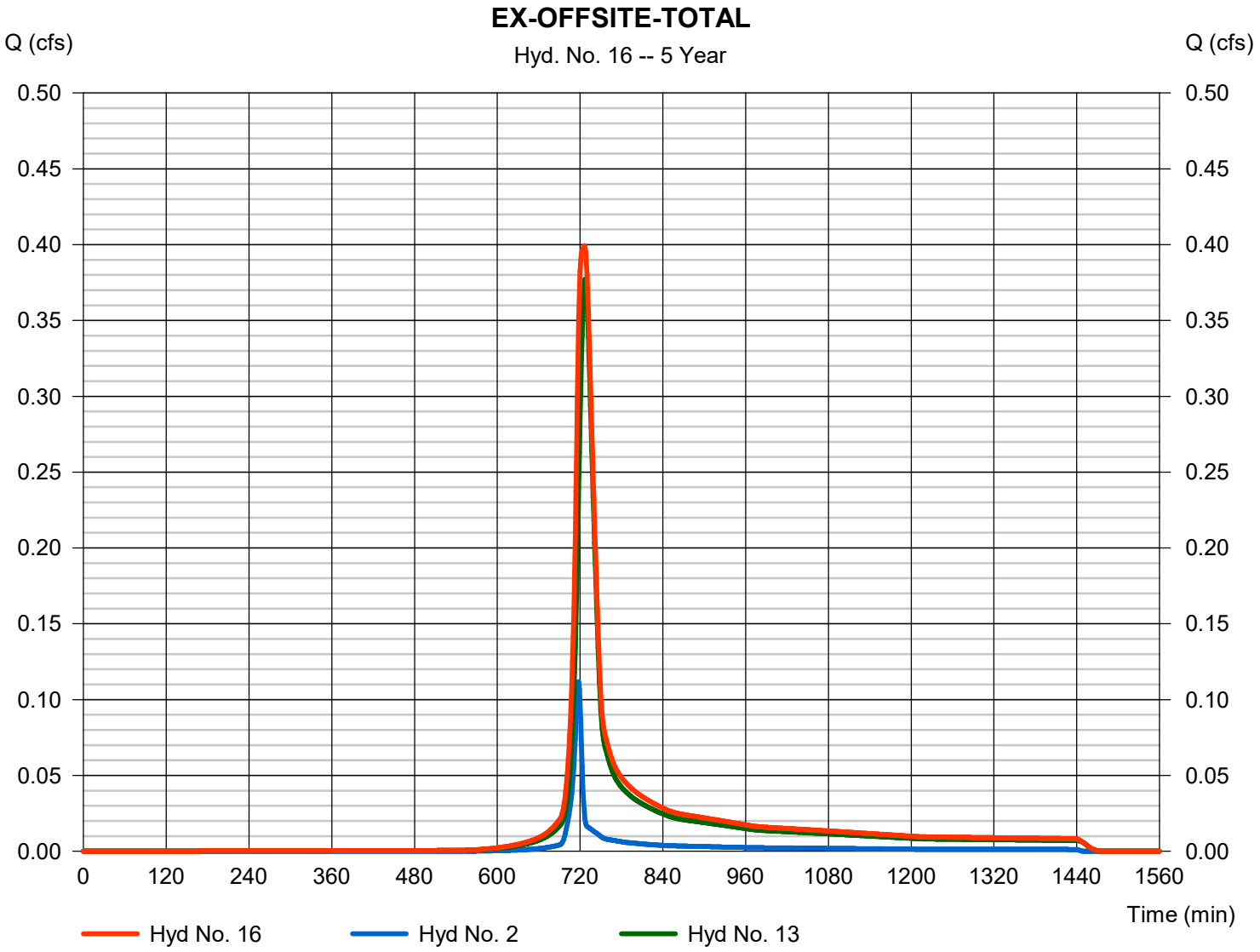


Hydrograph Report

Hyd. No. 16

EX-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.399 cfs
Storm frequency	= 5 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,537 cuft
Inflow hyds.	= 2, 13	Contrib. drain. area	= 0.033 ac

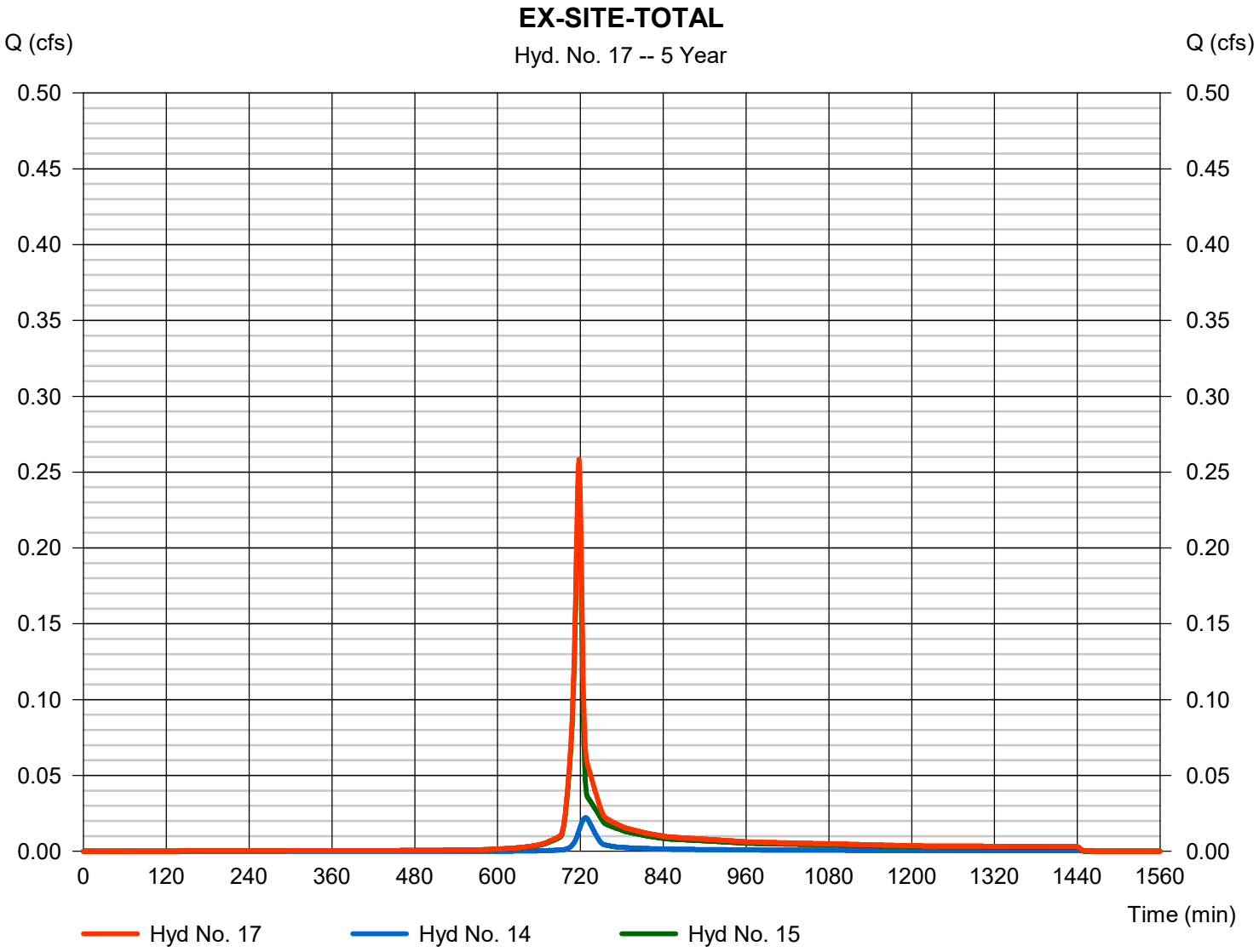


Hydrograph Report

Hyd. No. 17

EX-SITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.258 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 584 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.000 ac

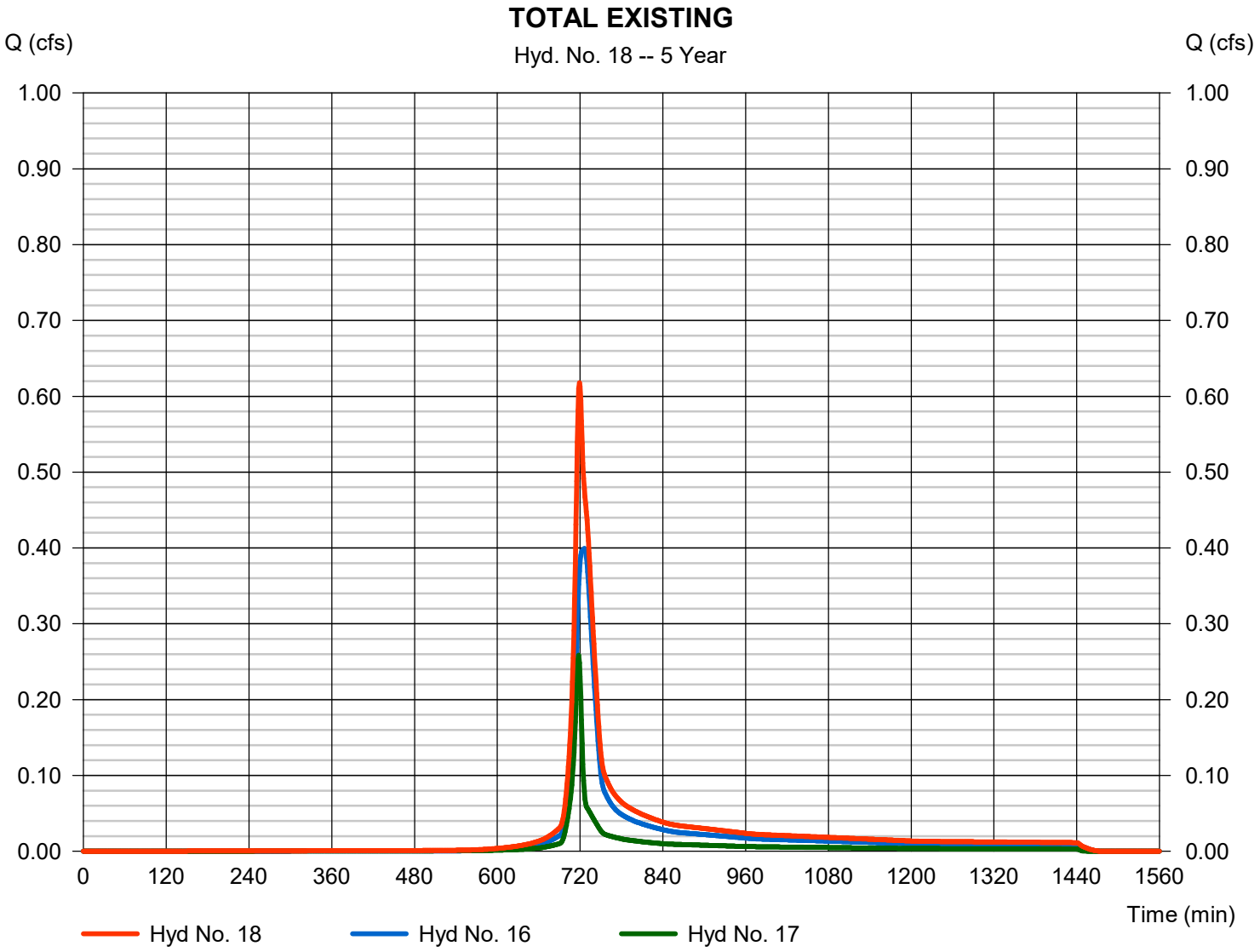


Hydrograph Report

Hyd. No. 18

TOTAL EXISTING

Hydrograph type	= Combine	Peak discharge	= 0.618 cfs
Storm frequency	= 5 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 2,122 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 0.000 ac

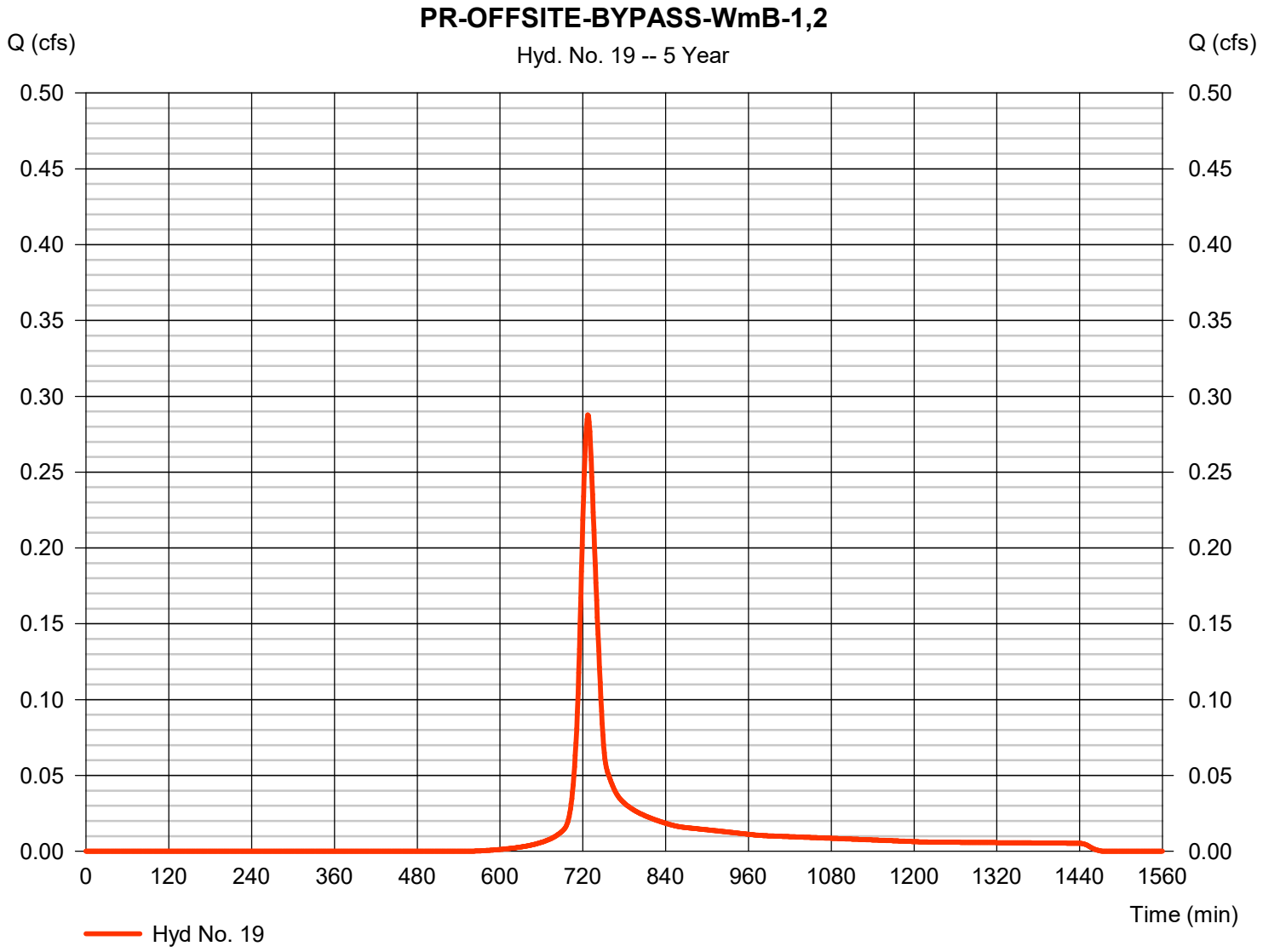


Hydrograph Report

Hyd. No. 19

PR-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.288 cfs
Storm frequency	= 5 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 987 cuft
Drainage area	= 0.152 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

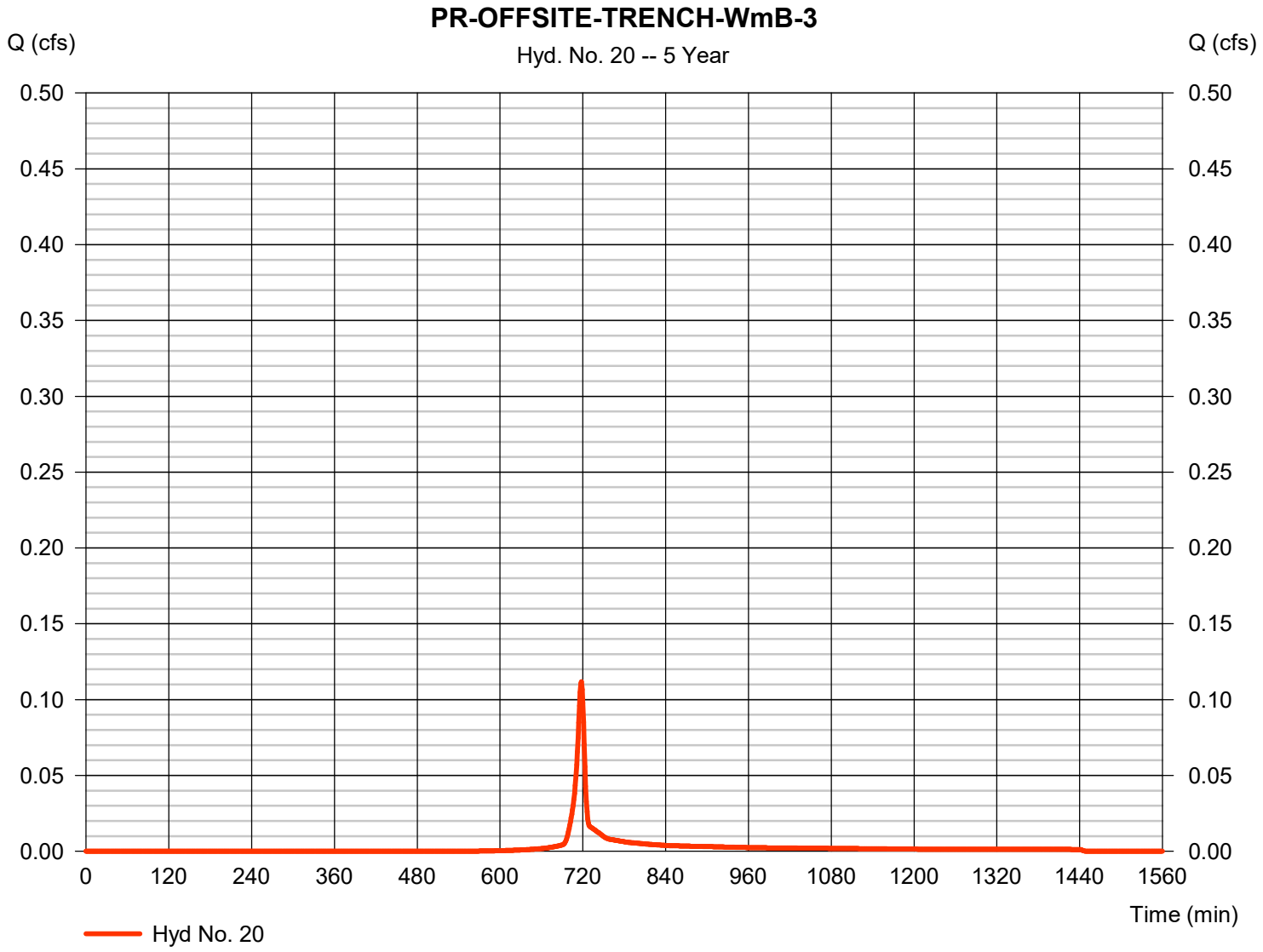


Hydrograph Report

Hyd. No. 20

PR-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.112 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 225 cuft
Drainage area	= 0.033 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

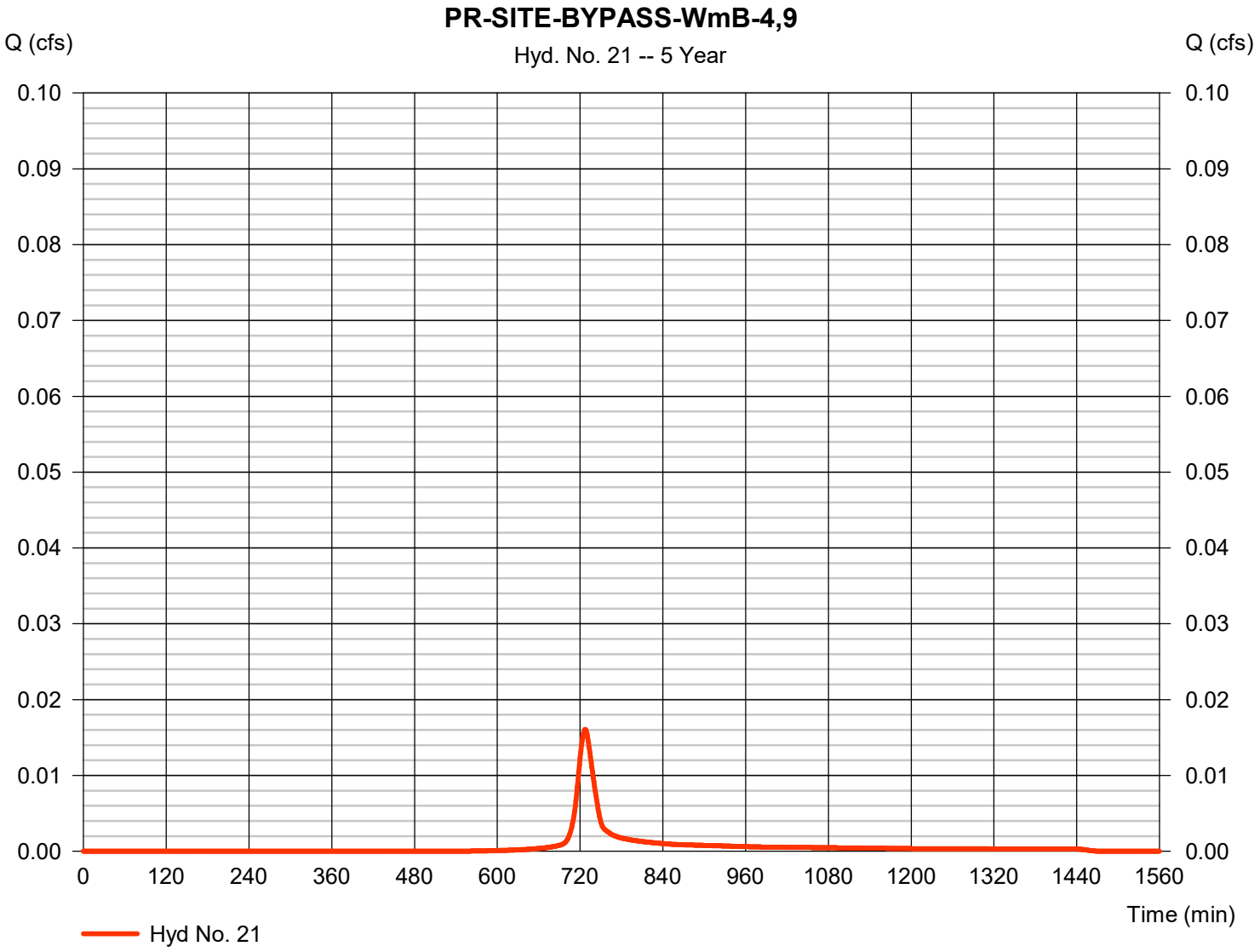


Hydrograph Report

Hyd. No. 21

PR-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.016 cfs
Storm frequency	=	5 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	55 cuft
Drainage area	=	0.008 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	3.99 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

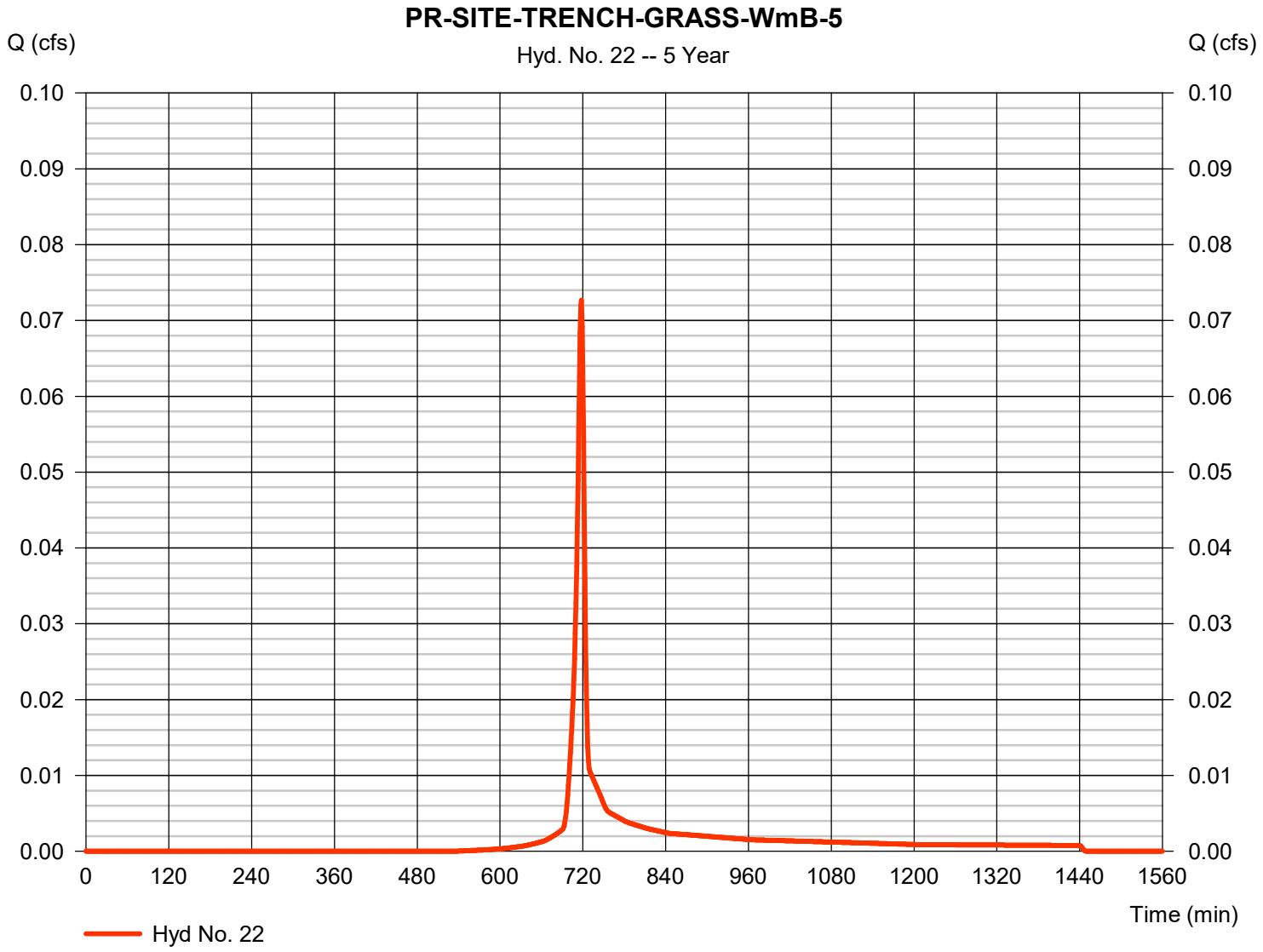


Hydrograph Report

Hyd. No. 22

PR-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.073 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 146 cuft
Drainage area	= 0.021 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

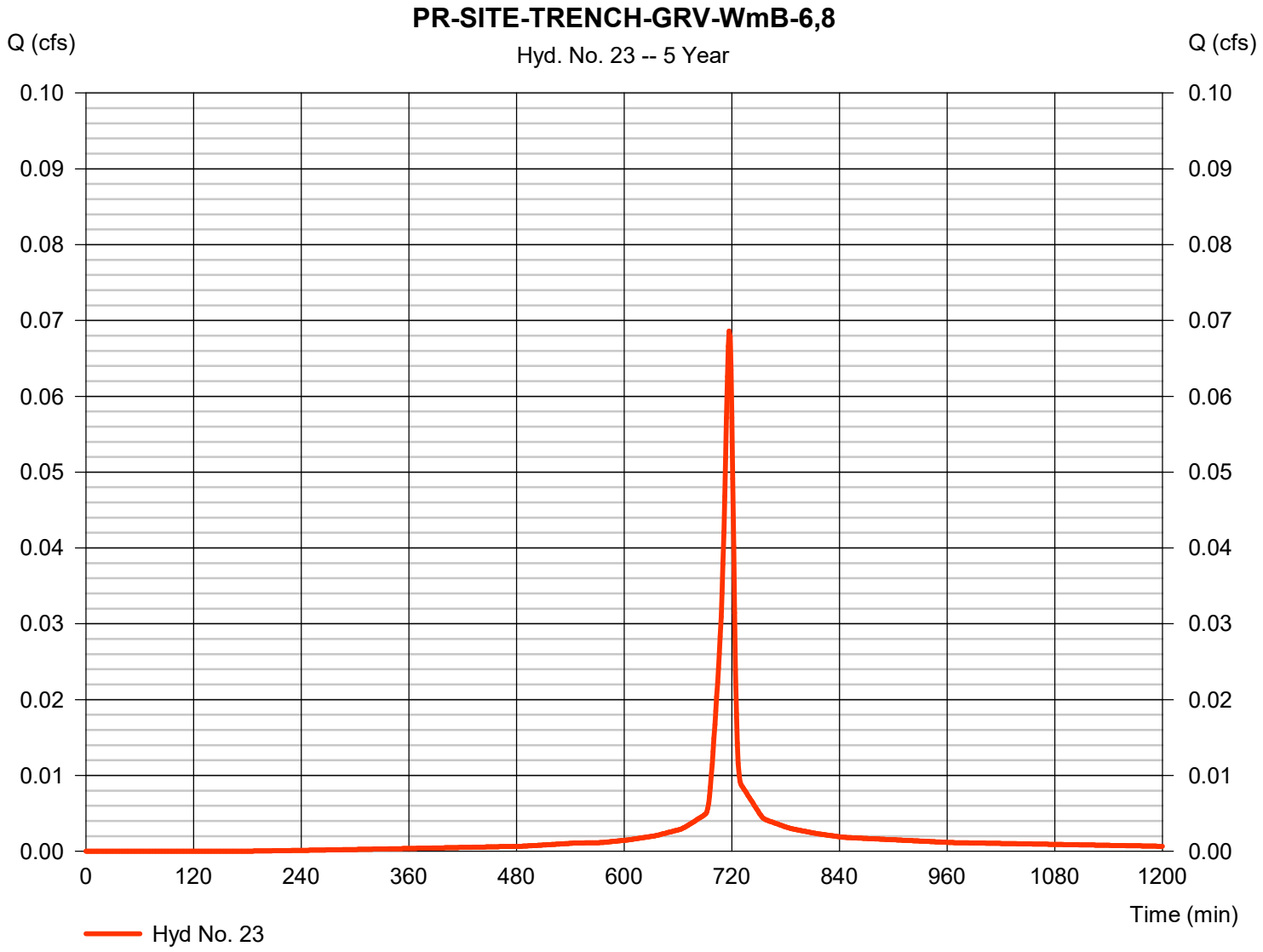


Hydrograph Report

Hyd. No. 23

PR-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.069 cfs
Storm frequency	= 5 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 153 cuft
Drainage area	= 0.012 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

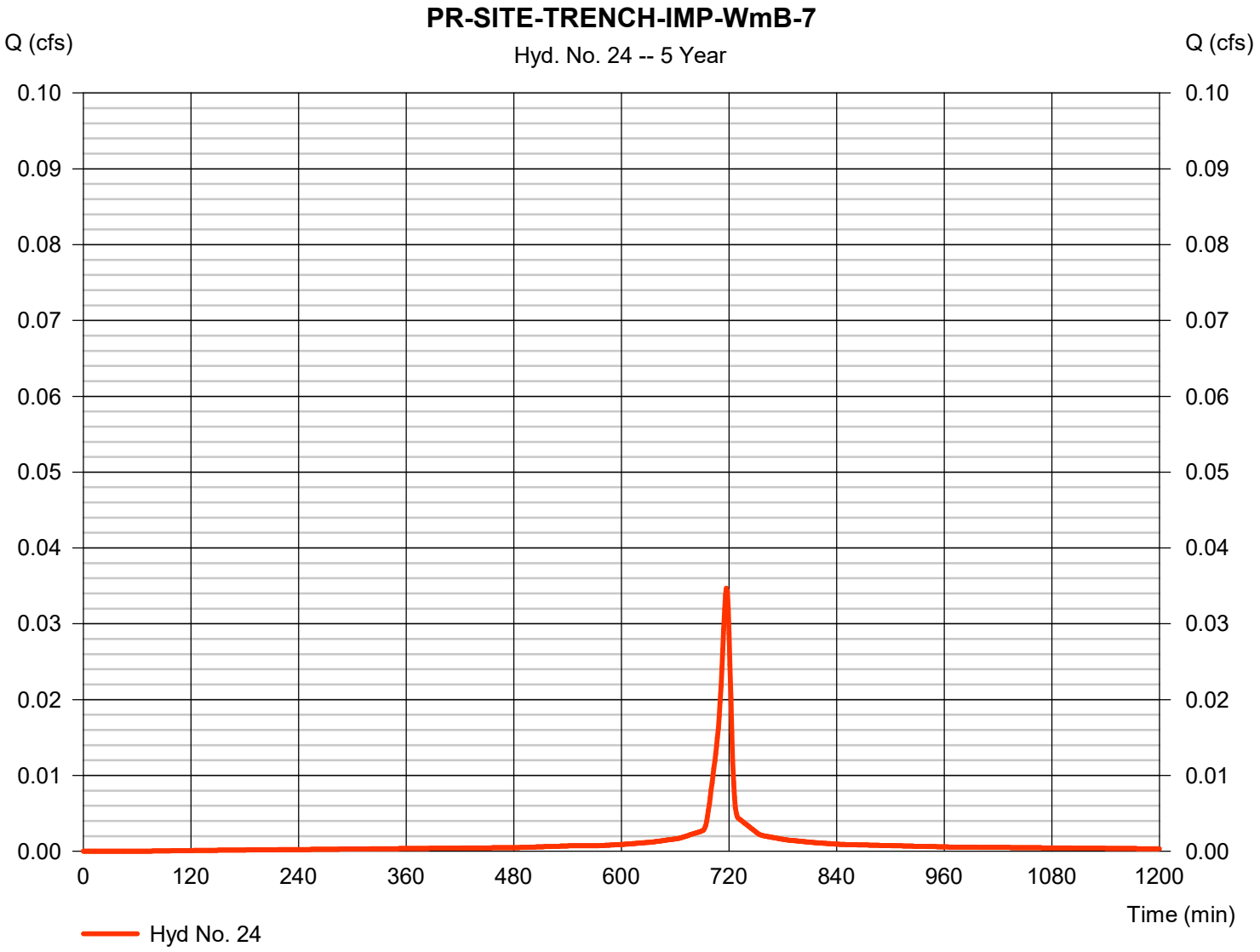


Hydrograph Report

Hyd. No. 24

PR-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.035 cfs
Storm frequency	= 5 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 83 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

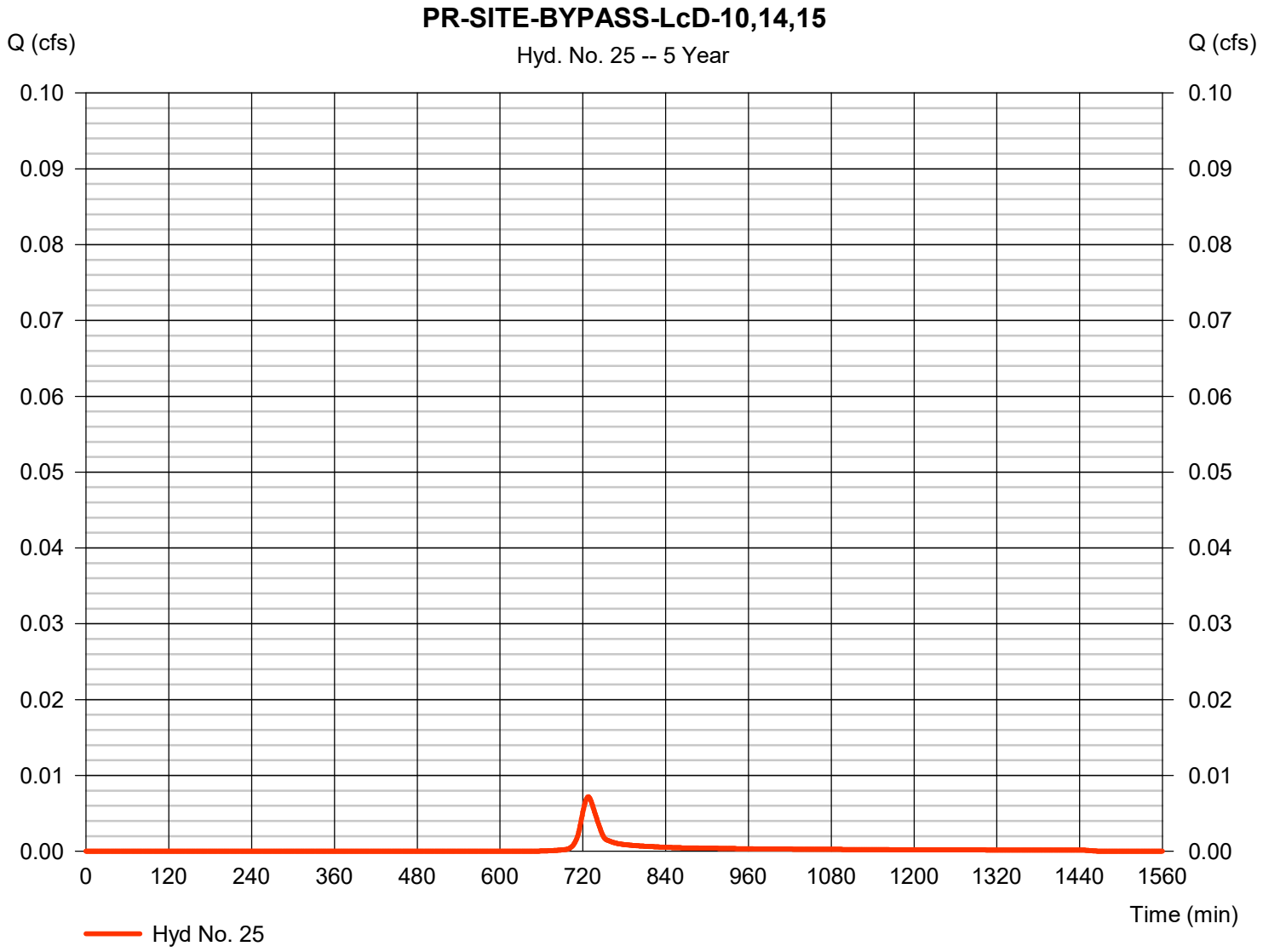


Hydrograph Report

Hyd. No. 25

PR-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.007 cfs
Storm frequency	= 5 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 26 cuft
Drainage area	= 0.005 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

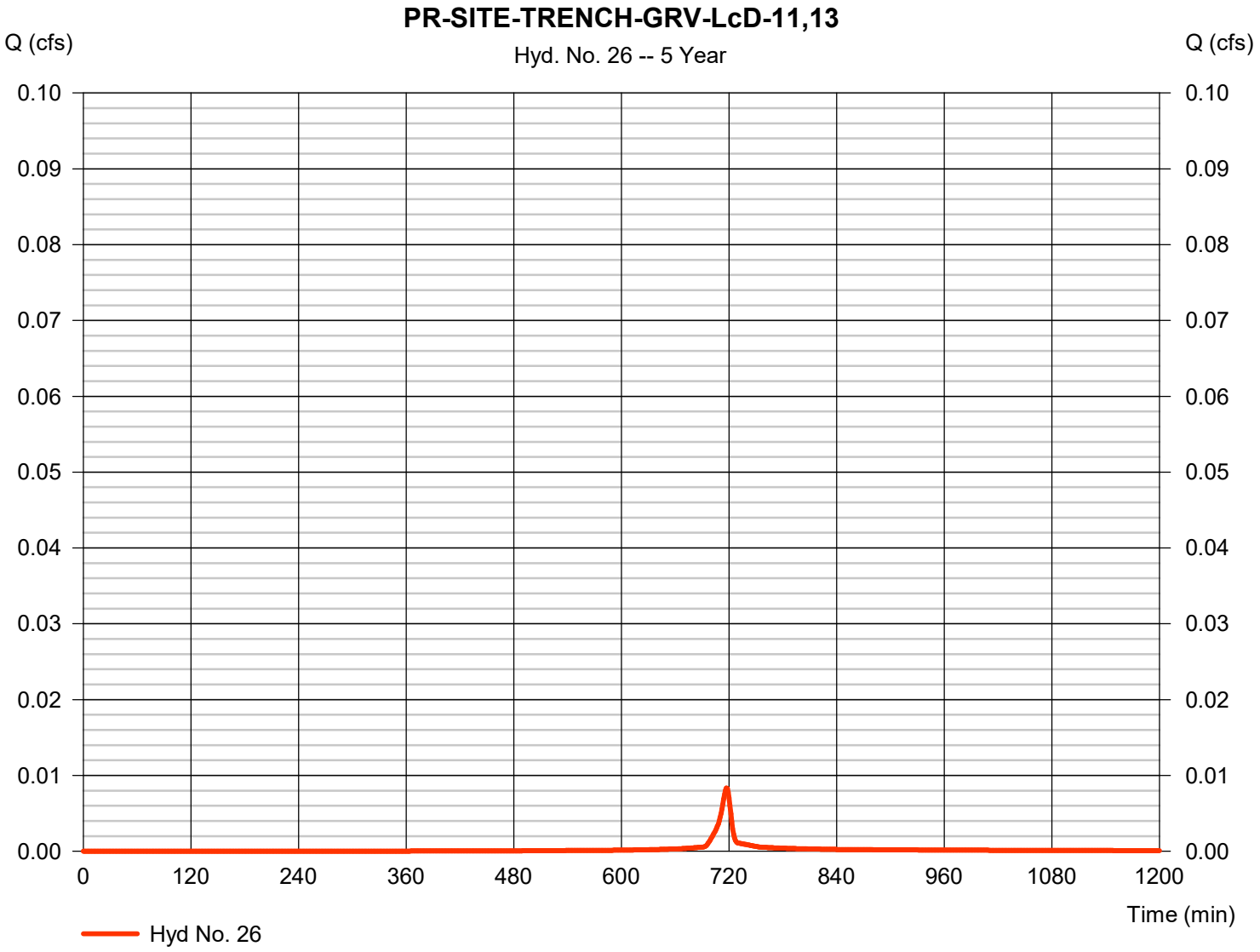


Hydrograph Report

Hyd. No. 26

PR-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 5 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 18 cuft
Drainage area	= 0.002 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

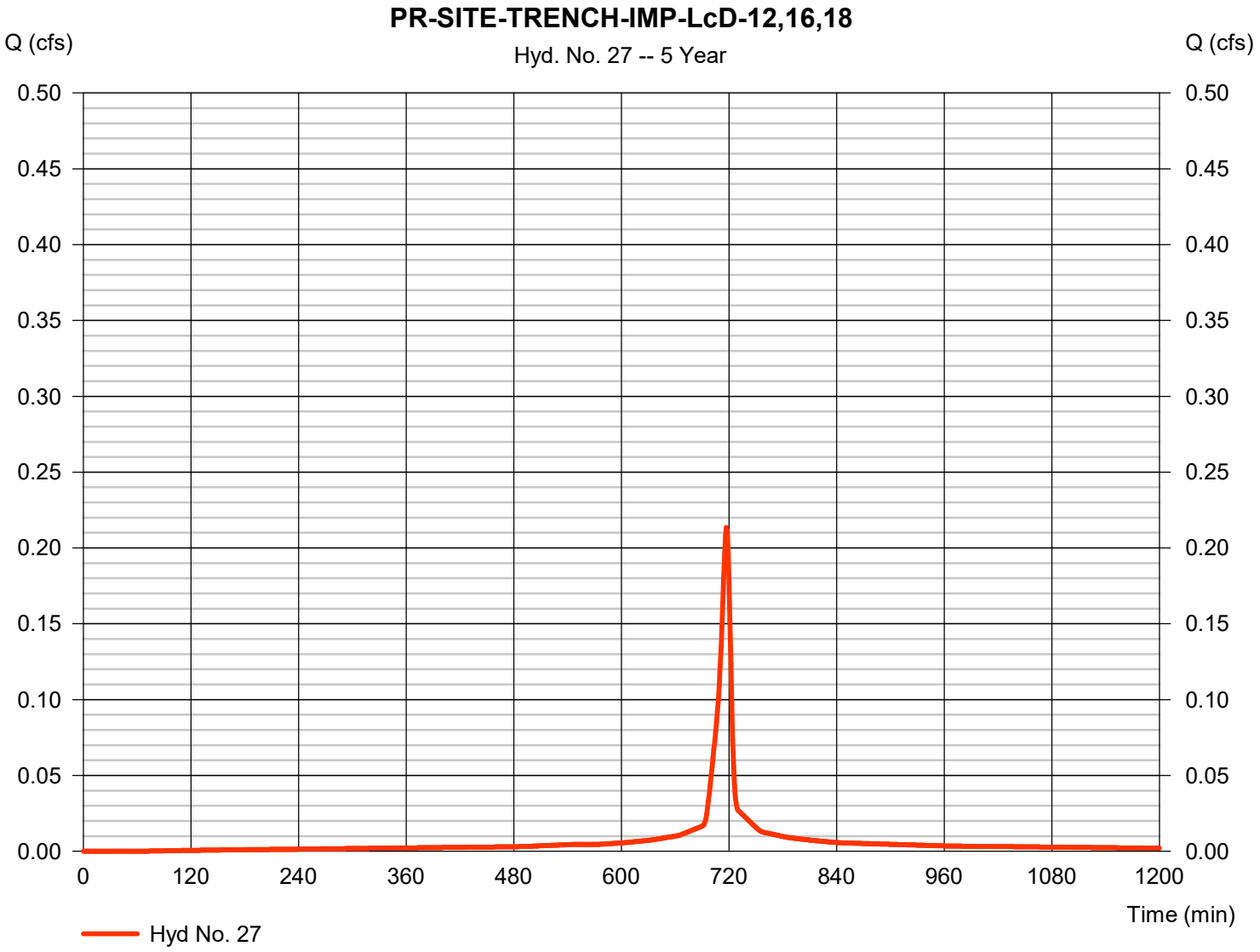


Hydrograph Report

Hyd. No. 27

PR-SITE-TRENCH-IMP-LcD-12,16,18

Hydrograph type	= SCS Runoff	Peak discharge	= 0.214 cfs
Storm frequency	= 5 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 510 cuft
Drainage area	= 0.036 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

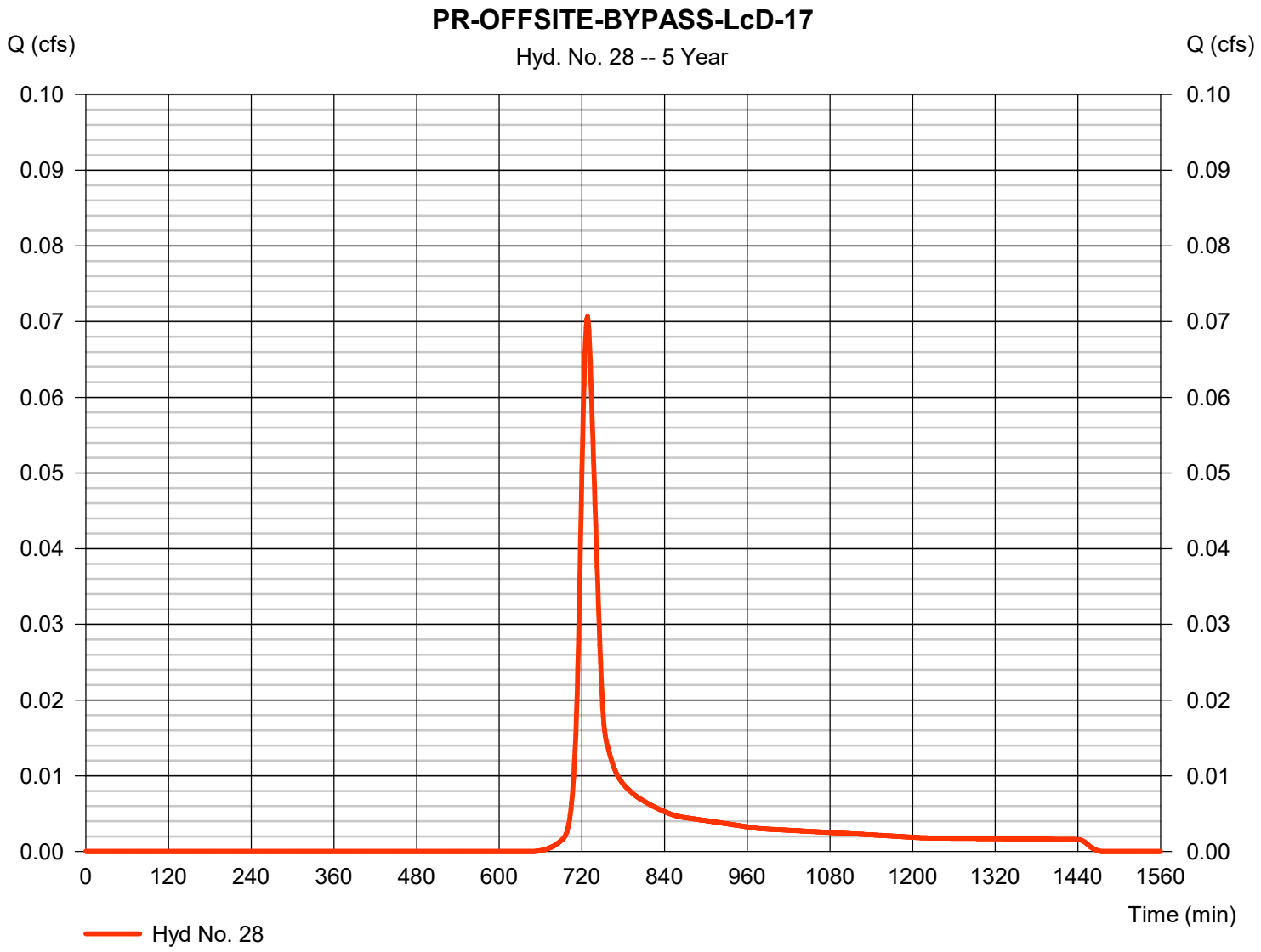
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 28

PR-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.071 cfs
Storm frequency	=	5 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	253 cuft
Drainage area	=	0.053 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	3.99 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.045 x 98) + (0.043 x 98)] / 0.053

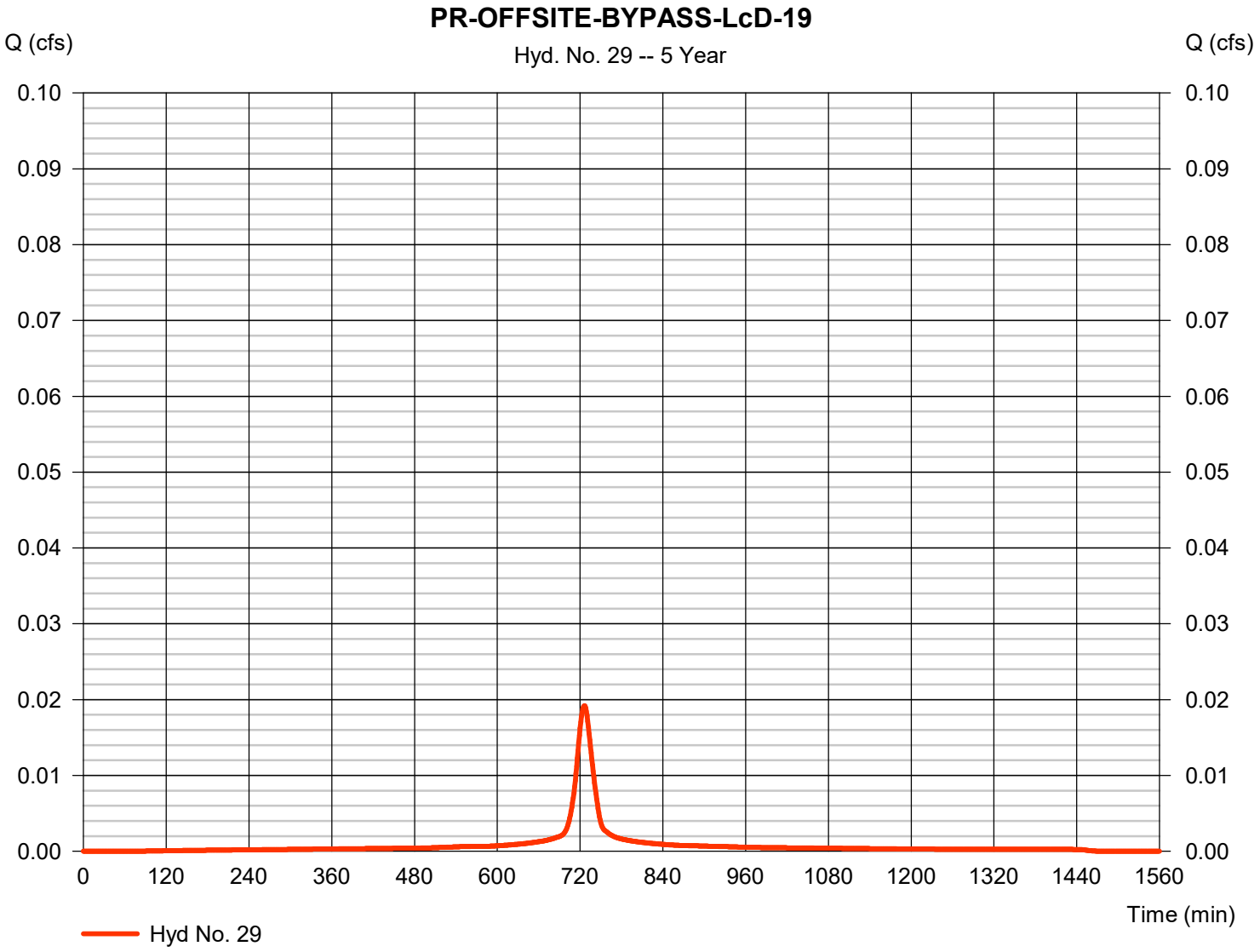


Hydrograph Report

Hyd. No. 29

PR-OFFSITE-BYPASS-LcD-19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.019 cfs
Storm frequency	= 5 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 73 cuft
Drainage area	= 0.005 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 3.99 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

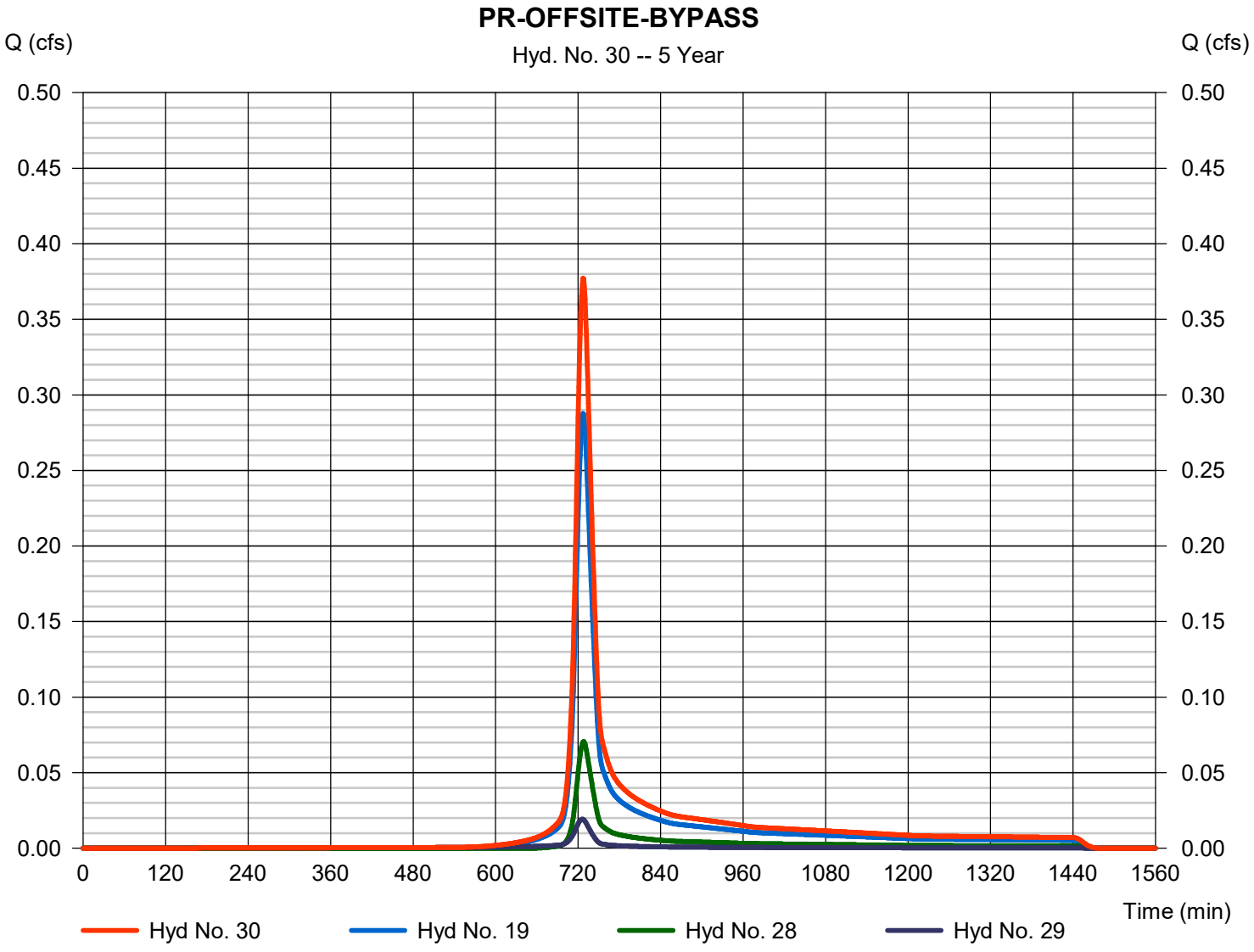


Hydrograph Report

Hyd. No. 30

PR-OFFSITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.377 cfs
Storm frequency	=	5 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	1,312 cuft
Inflow hyds.	=	19, 28, 29	Contrib. drain. area	=	0.211 ac

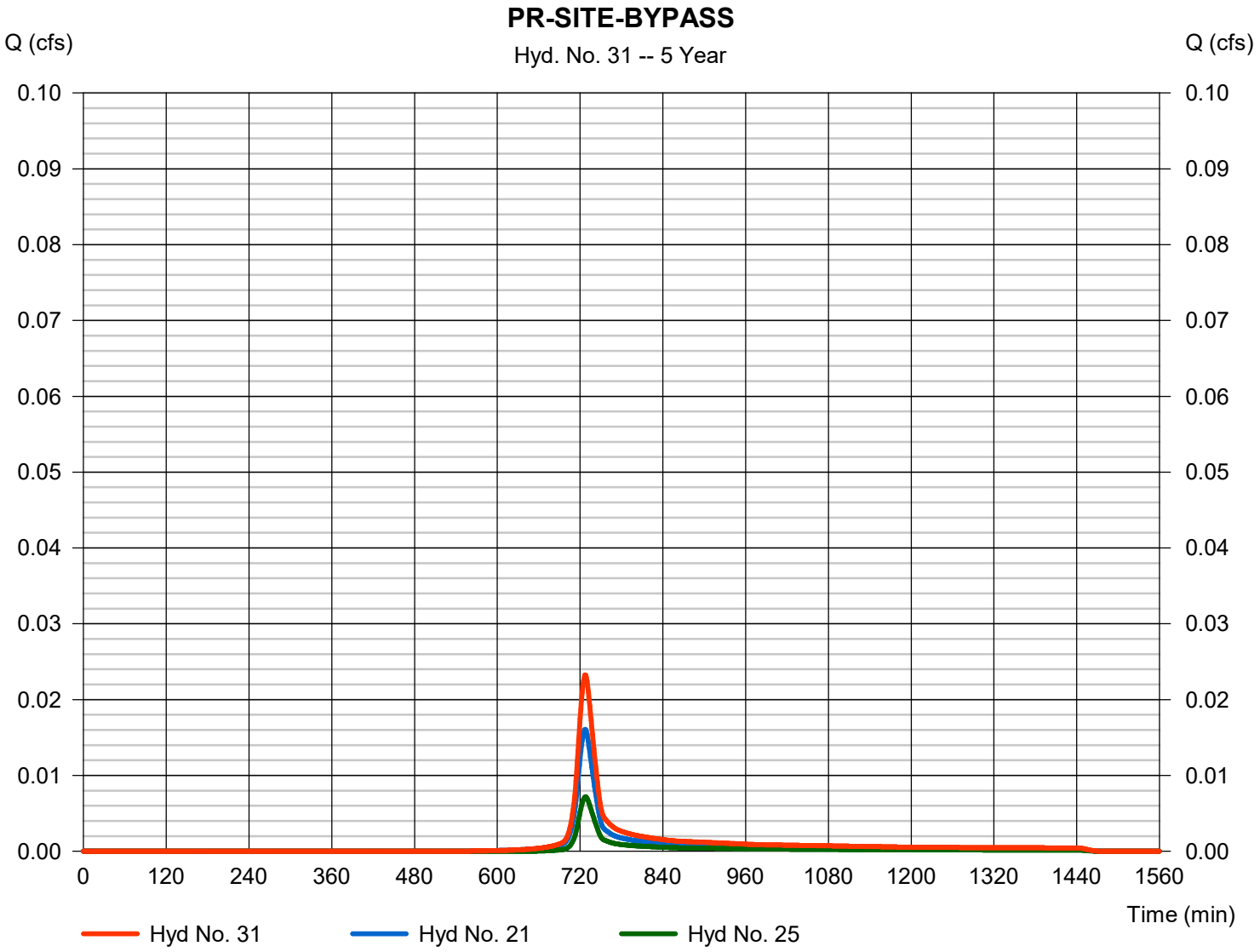


Hydrograph Report

Hyd. No. 31

PR-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.023 cfs
Storm frequency	=	5 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	80 cuft
Inflow hyds.	=	21, 25	Contrib. drain. area	=	0.013 ac

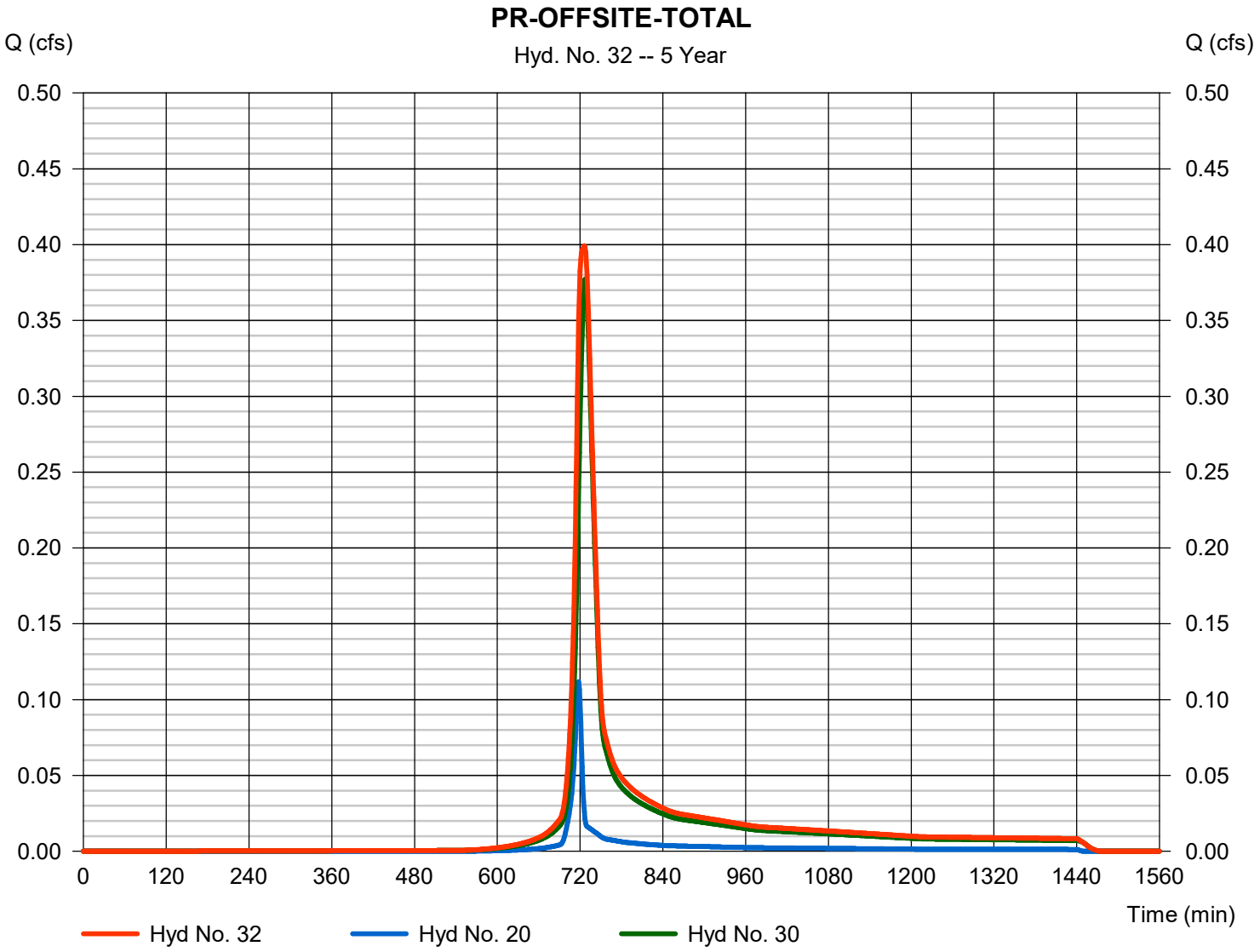


Hydrograph Report

Hyd. No. 32

PR-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.399 cfs
Storm frequency	= 5 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,537 cuft
Inflow hyds.	= 20, 30	Contrib. drain. area	= 0.033 ac

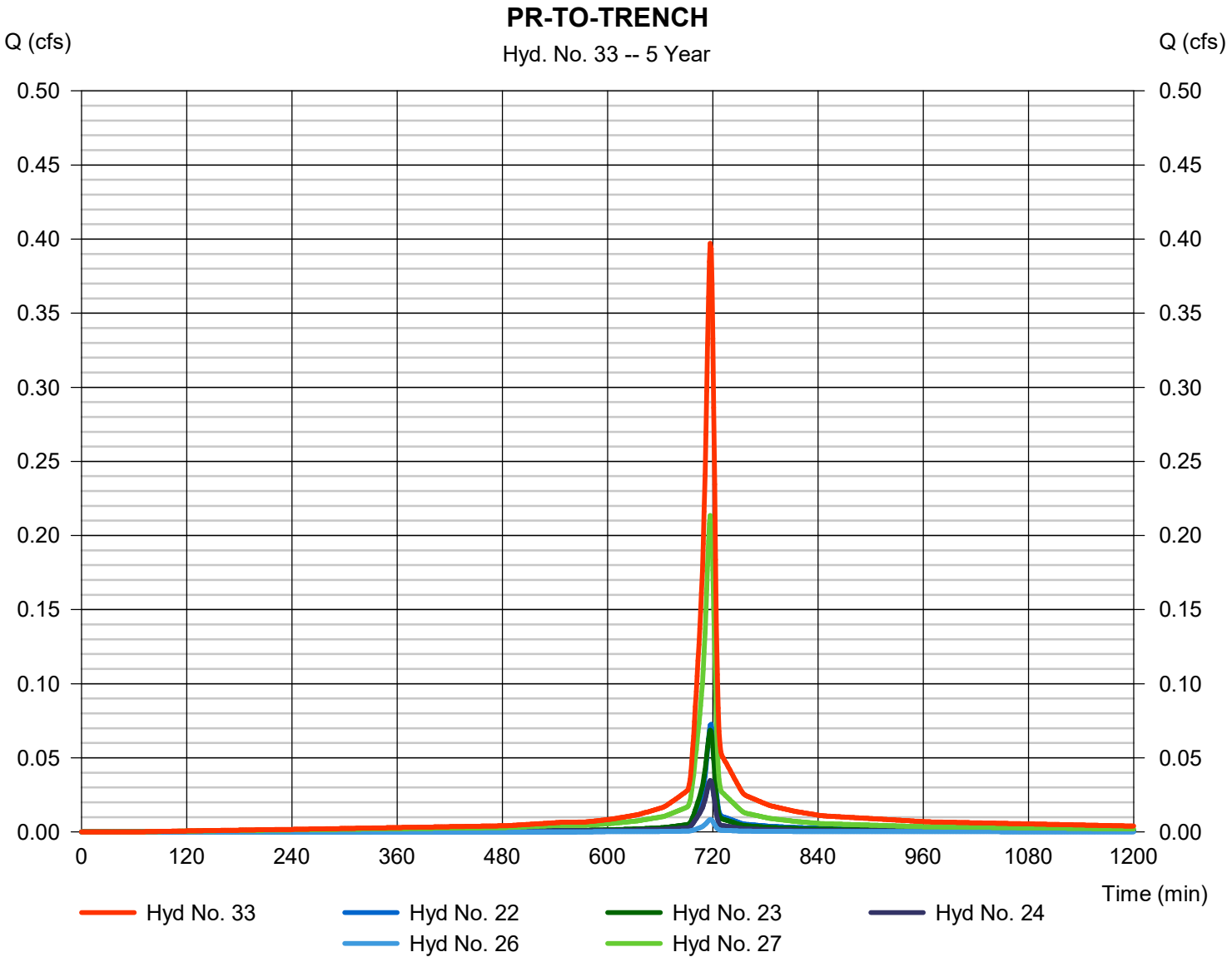


Hydrograph Report

Hyd. No. 33

PR-TO-TRENCH

Hydrograph type	= Combine	Peak discharge	= 0.397 cfs
Storm frequency	= 5 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 910 cuft
Inflow hyds.	= 22, 23, 24, 26, 27	Contrib. drain. area	= 0.077 ac



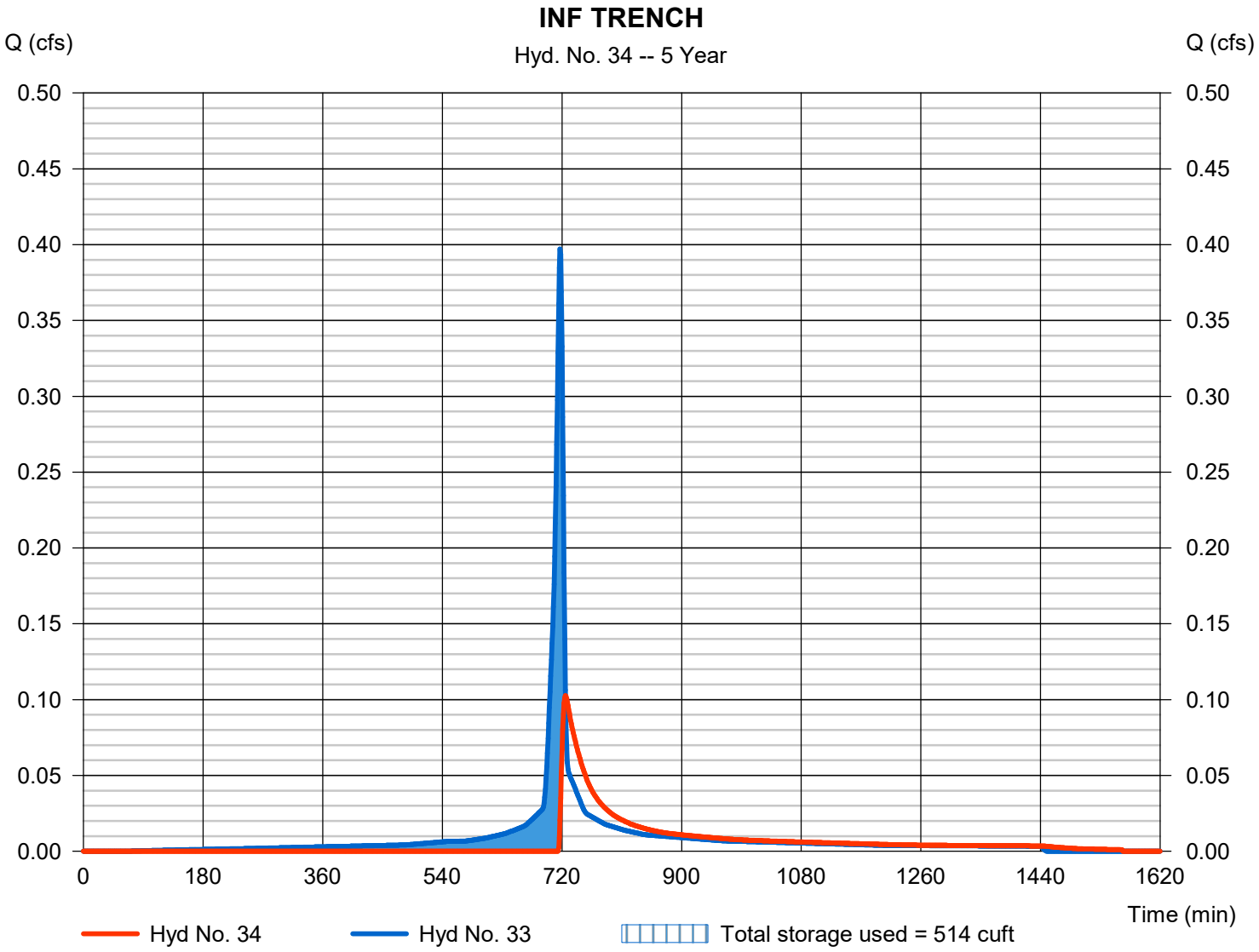
Hydrograph Report

Hyd. No. 34

INF TRENCH

Hydrograph type	=	Reservoir	Peak discharge	=	0.103 cfs
Storm frequency	=	5 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	545 cuft
Inflow hyd. No.	=	33 - PR-TO-TRENCH	Max. Elevation	=	1687.23 ft
Reservoir name	=	BASIN	Max. Storage	=	514 cuft

Storage Indication method used.

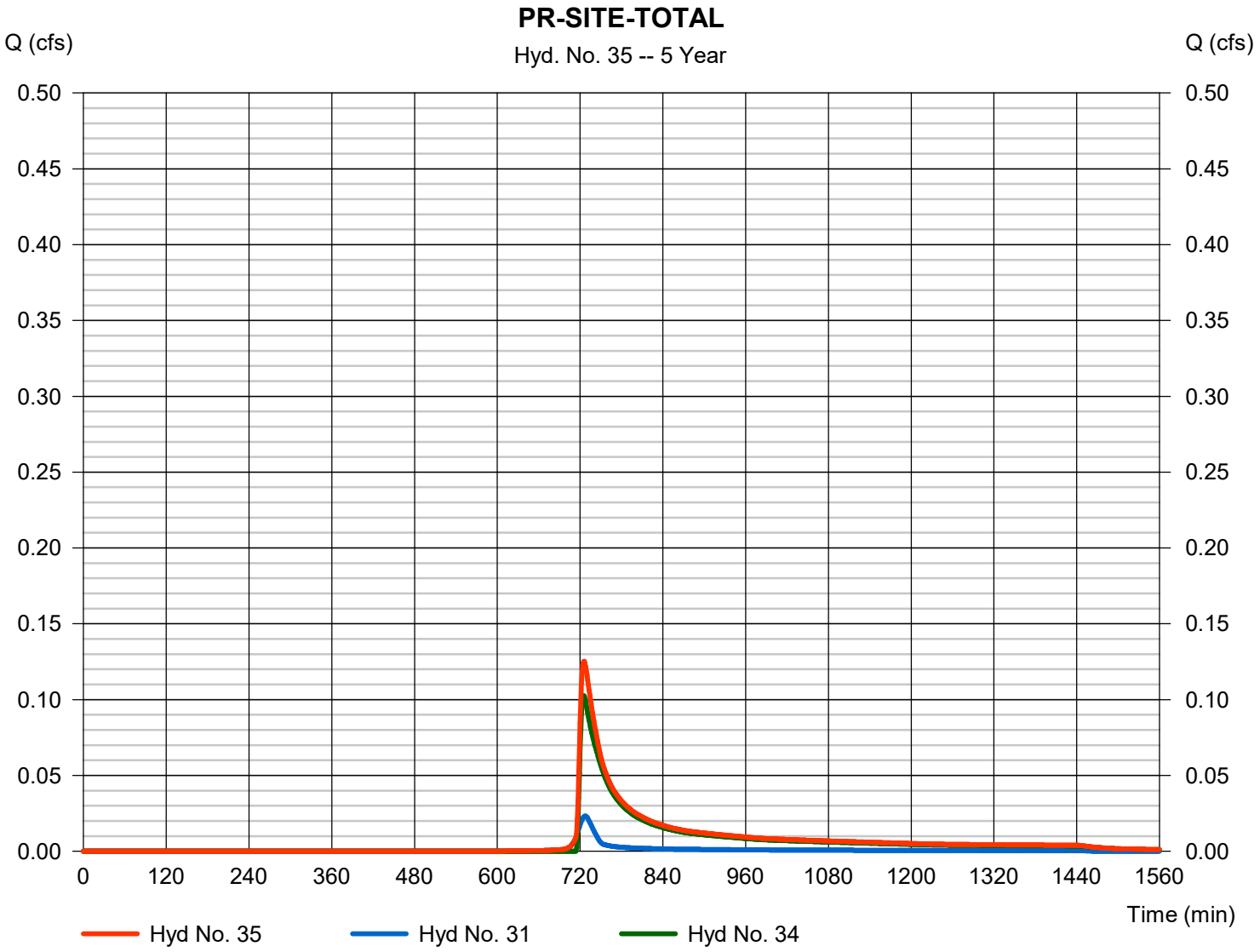


Hydrograph Report

Hyd. No. 35

PR-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.125 cfs
Storm frequency	=	5 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	625 cuft
Inflow hyds.	=	31, 34	Contrib. drain. area	=	0.000 ac

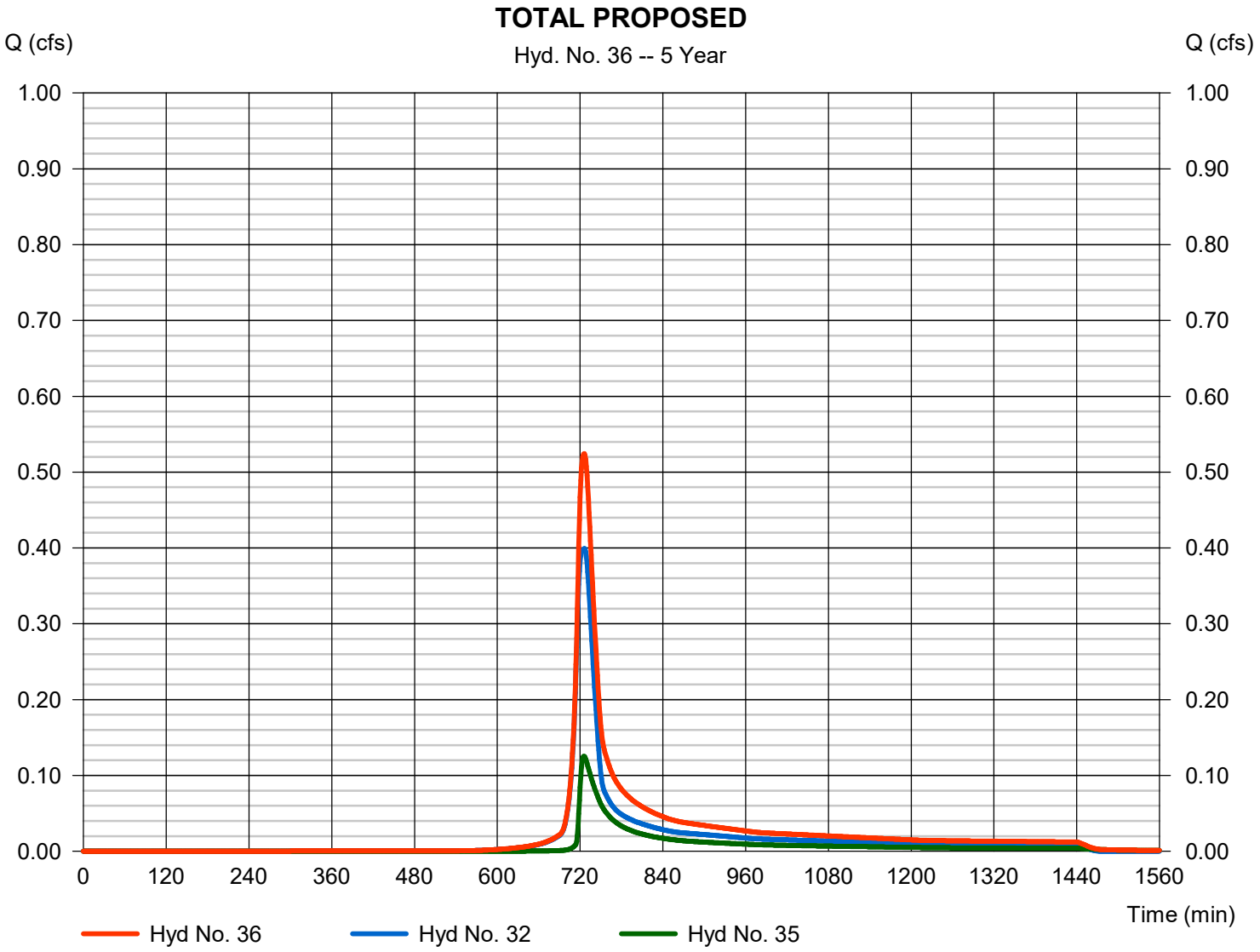


Hydrograph Report

Hyd. No. 36

TOTAL PROPOSED

Hydrograph type	= Combine	Peak discharge	= 0.524 cfs
Storm frequency	= 5 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,162 cuft
Inflow hyds.	= 32, 35	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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	0.379	1	727	1,289	------	------	------	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	0.145	1	718	294	------	------	------	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	0.020	1	727	69	------	------	------	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	0.091	1	718	184	------	------	------	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	0.054	1	718	109	------	------	------	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	0.026	1	718	52	------	------	------	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	0.009	1	728	33	------	------	------	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	0.005	1	718	11	------	------	------	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	0.101	1	718	203	------	------	------	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	0.099	1	728	344	------	------	------	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	0.043	1	717	103	------	------	------	EX-SITE-TRENCH-IMP-ROAD-LcD-1
12	SCS Runoff	0.023	1	726	86	------	------	------	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	0.500	1	727	1,720	1, 10, 12	------	------	EX-OFFSITE - BYPASS
14	Combine	0.030	1	727	102	3, 7,	------	------	EX-SITE-BYPASS
15	Combine	0.319	1	718	661	4, 5, 6,	------	------	EX-SITE-BASIN COMBINE
16	Combine	0.529	1	726	2,014	8, 9, 11, 2, 13,	------	------	EX-OFFSITE-TOTAL
17	Combine	0.338	1	718	763	14, 15,	------	------	EX-SITE-TOTAL
18	Combine	0.819	1	719	2,777	16, 17	------	------	TOTAL EXISTING
19	SCS Runoff	0.379	1	727	1,289	------	------	------	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	0.145	1	718	294	------	------	------	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	0.021	1	727	71	------	------	------	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	0.094	1	718	190	------	------	------	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	0.082	1	717	184	------	------	------	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	0.041	1	717	98	------	------	------	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	0.010	1	728	35	------	------	------	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	0.010	1	717	22	------	------	------	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	0.251	1	717	604	------	------	------	PR-SITE-TRENCH-IMP-LcD-12,16,1
28	SCS Runoff	0.099	1	728	344	------	------	------	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	0.023	1	726	86	------	------	------	PR-OFFSITE-BYPASS-LcD-19
30	Combine	0.500	1	727	1,720	19, 28, 29	------	------	PR-OFFSITE-BYPASS
31	Combine	0.031	1	727	106	21, 25,	------	------	PR-SITE-BYPASS
32	Combine	0.529	1	726	2,014	20, 30,	------	------	PR-OFFSITE-TOTAL
33	Combine	0.477	1	717	1,098	22, 23, 24, 26, 27,	------	------	PR-TO-TRENCH
34	Reservoir	0.166	1	722	733	33	1687.35	599	INF TRENCH

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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
35	Combine	0.193	1	722	839	31, 34	------	------	PR-SITE-TOTAL
36	Combine	0.718	1	722	2,852	32, 35	------	------	TOTAL PROPOSED

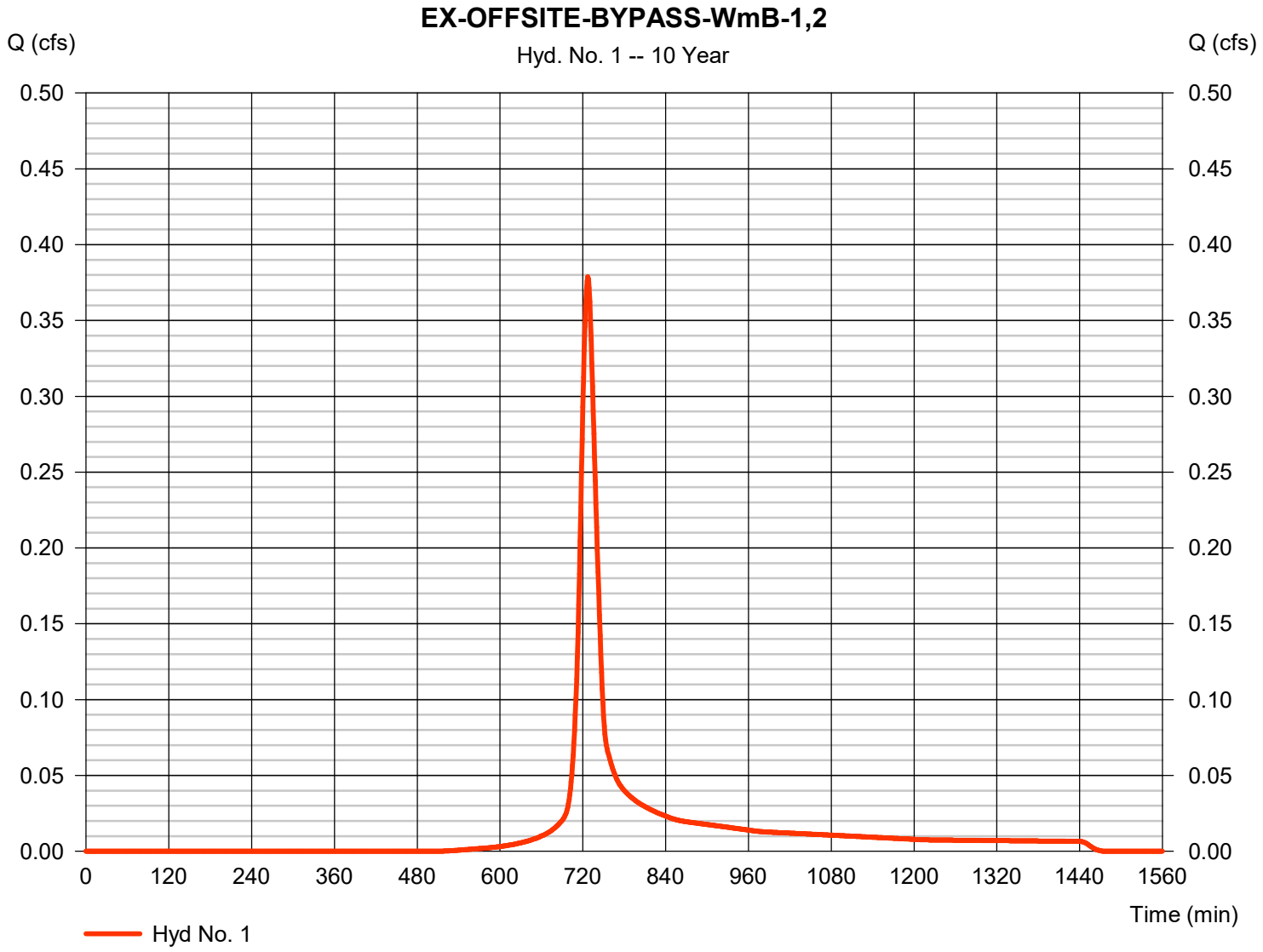
Hydrograph Report

Hyd. No. 1

EX-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.379 cfs
Storm frequency	=	10 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	1,289 cuft
Drainage area	=	0.152 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.020 x 78) + (0.253 x 77)] / 0.152



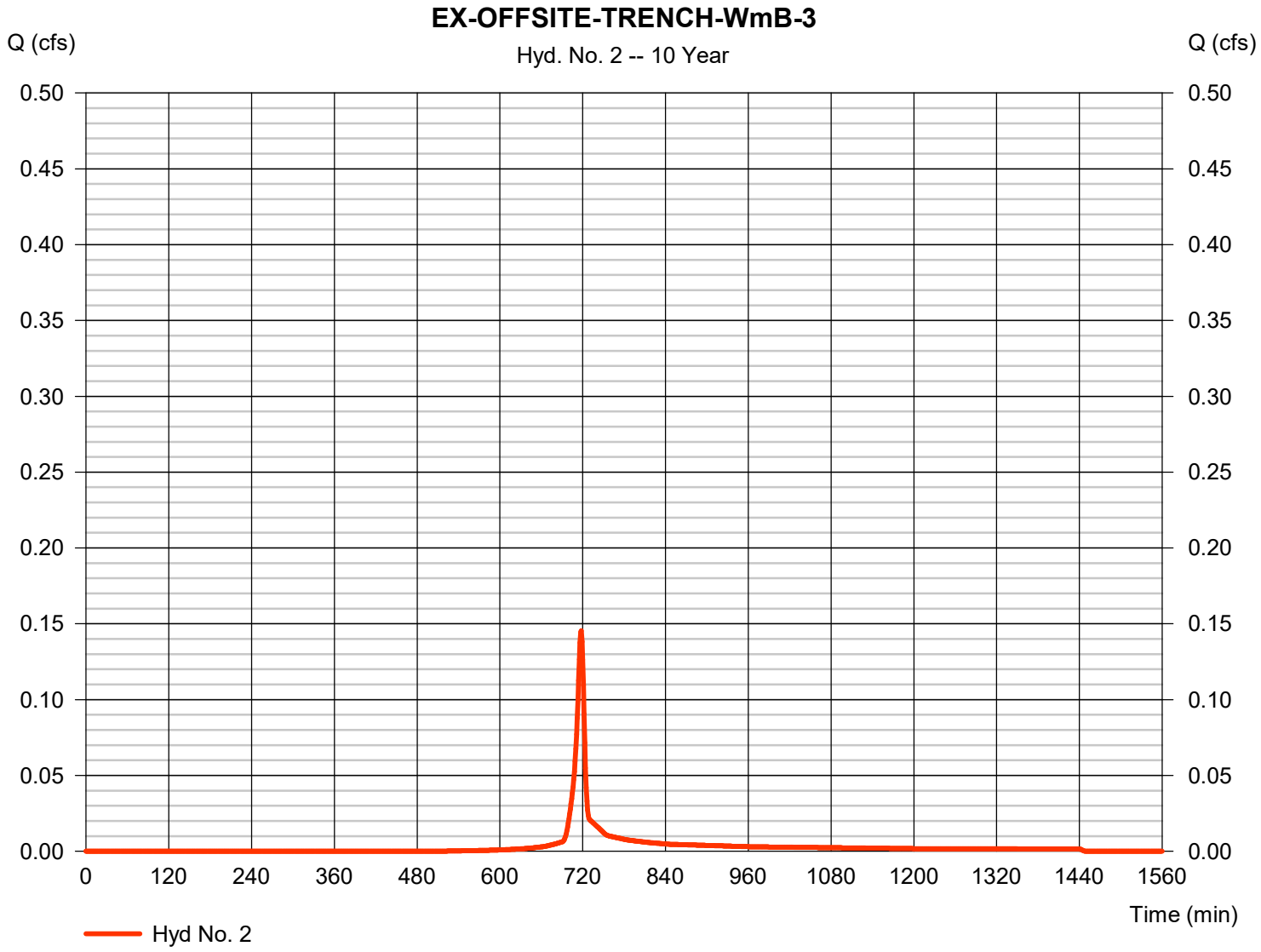
Hydrograph Report

Hyd. No. 2

EX-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.145 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 294 cuft
Drainage area	= 0.033 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 98)] / 0.033



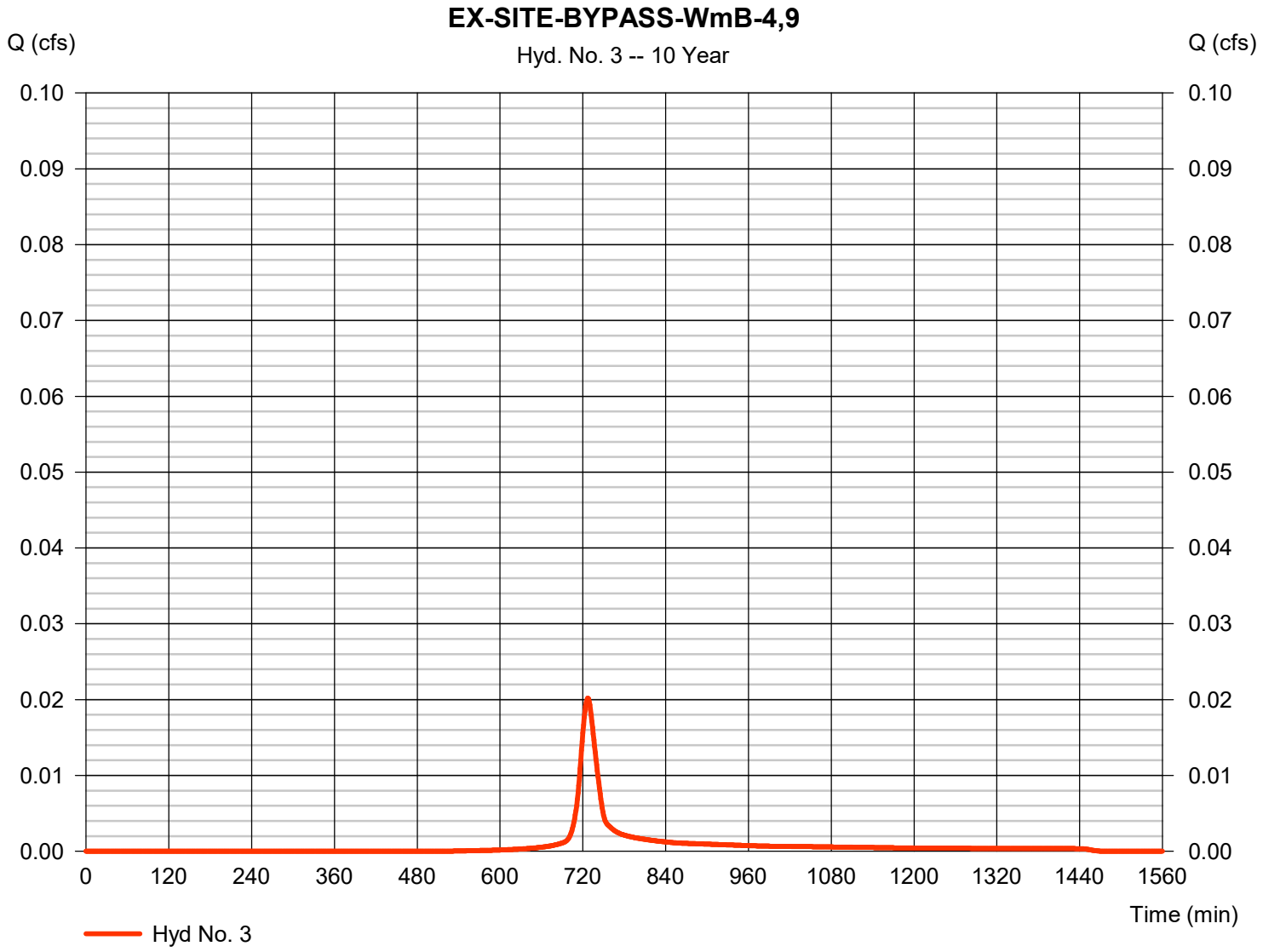
Hydrograph Report

Hyd. No. 3

EX-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.020 cfs
Storm frequency	=	10 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	69 cuft
Drainage area	=	0.008 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 77)] / 0.008



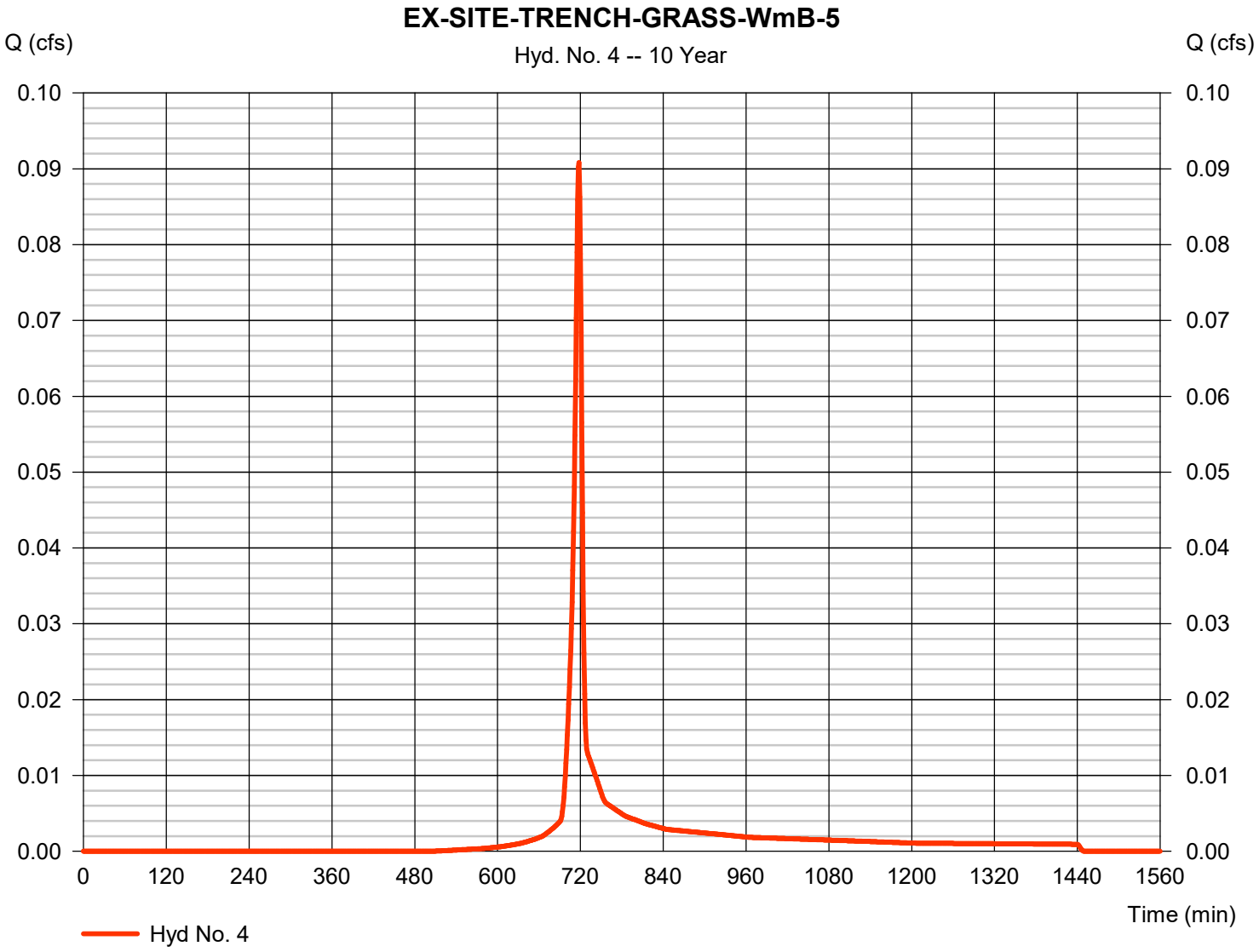
Hydrograph Report

Hyd. No. 4

EX-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.091 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 184 cuft
Drainage area	= 0.021 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70)] / 0.021

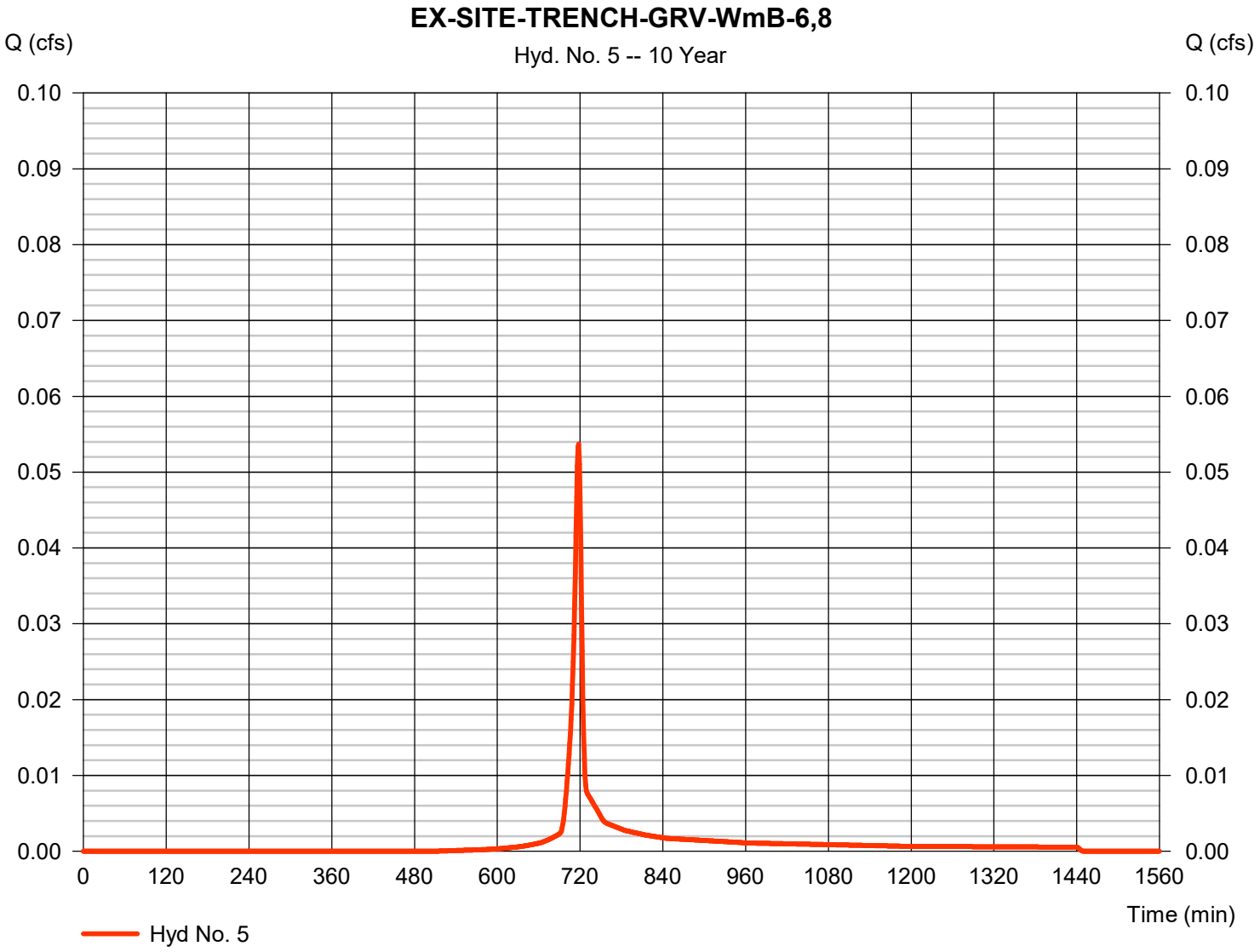


Hydrograph Report

Hyd. No. 5

EX-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.054 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 109 cuft
Drainage area	= 0.012 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

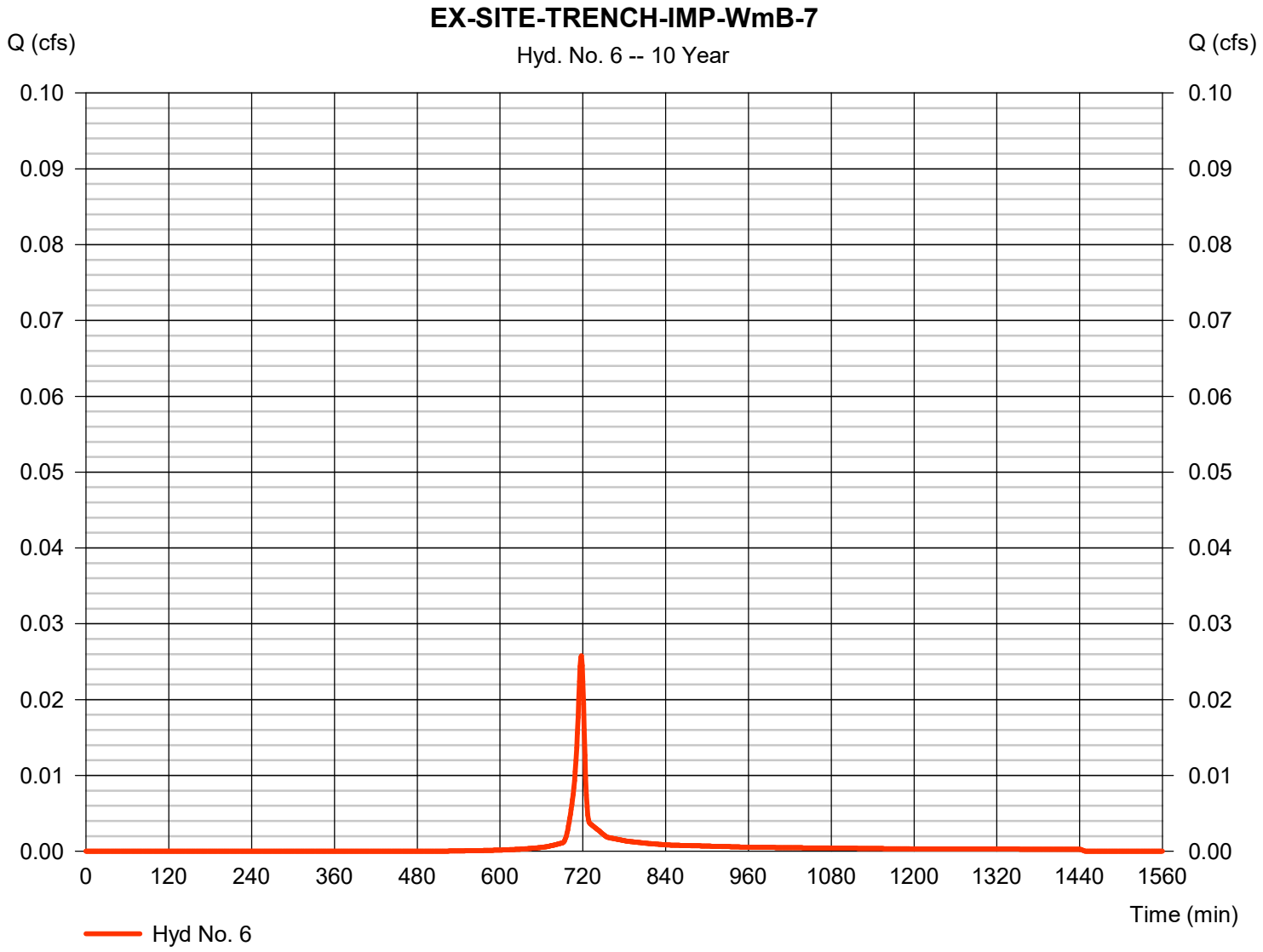


Hydrograph Report

Hyd. No. 6

EX-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.026 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 52 cuft
Drainage area	= 0.006 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

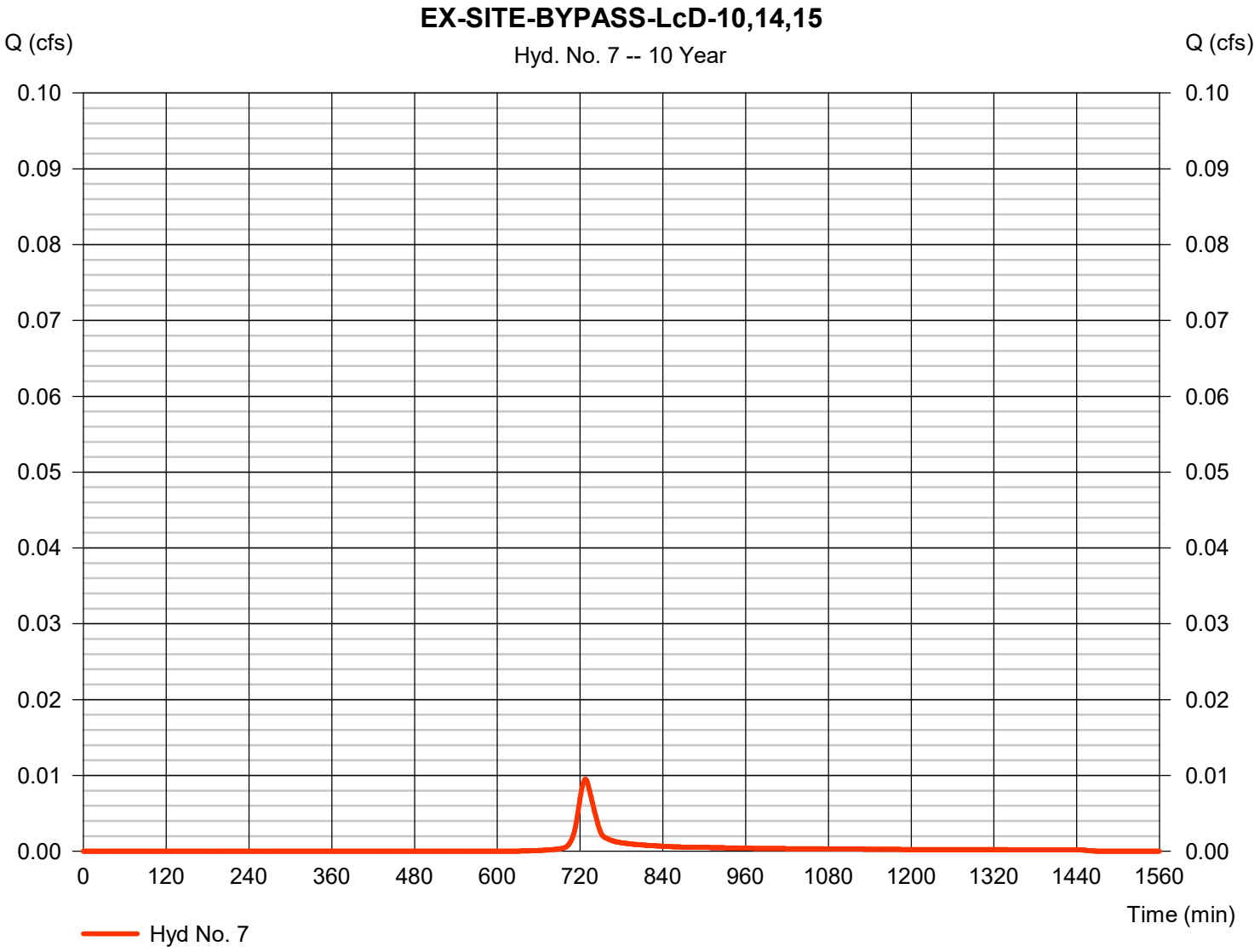


Hydrograph Report

Hyd. No. 7

EX-SITE-BYPASS-LcD-10,14,15

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.009 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	33 cuft
Drainage area	=	0.005 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

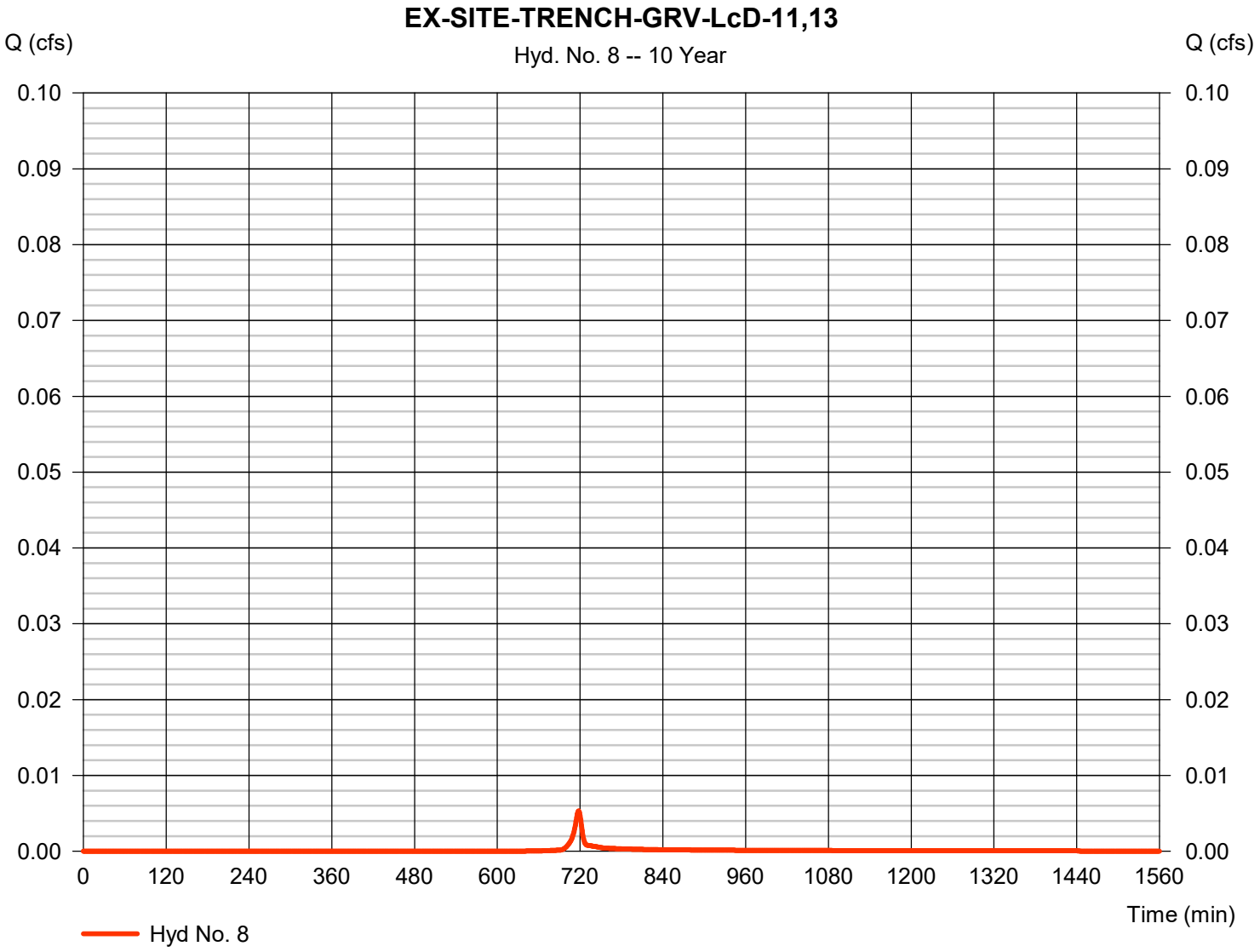


Hydrograph Report

Hyd. No. 8

EX-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 11 cuft
Drainage area	= 0.002 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

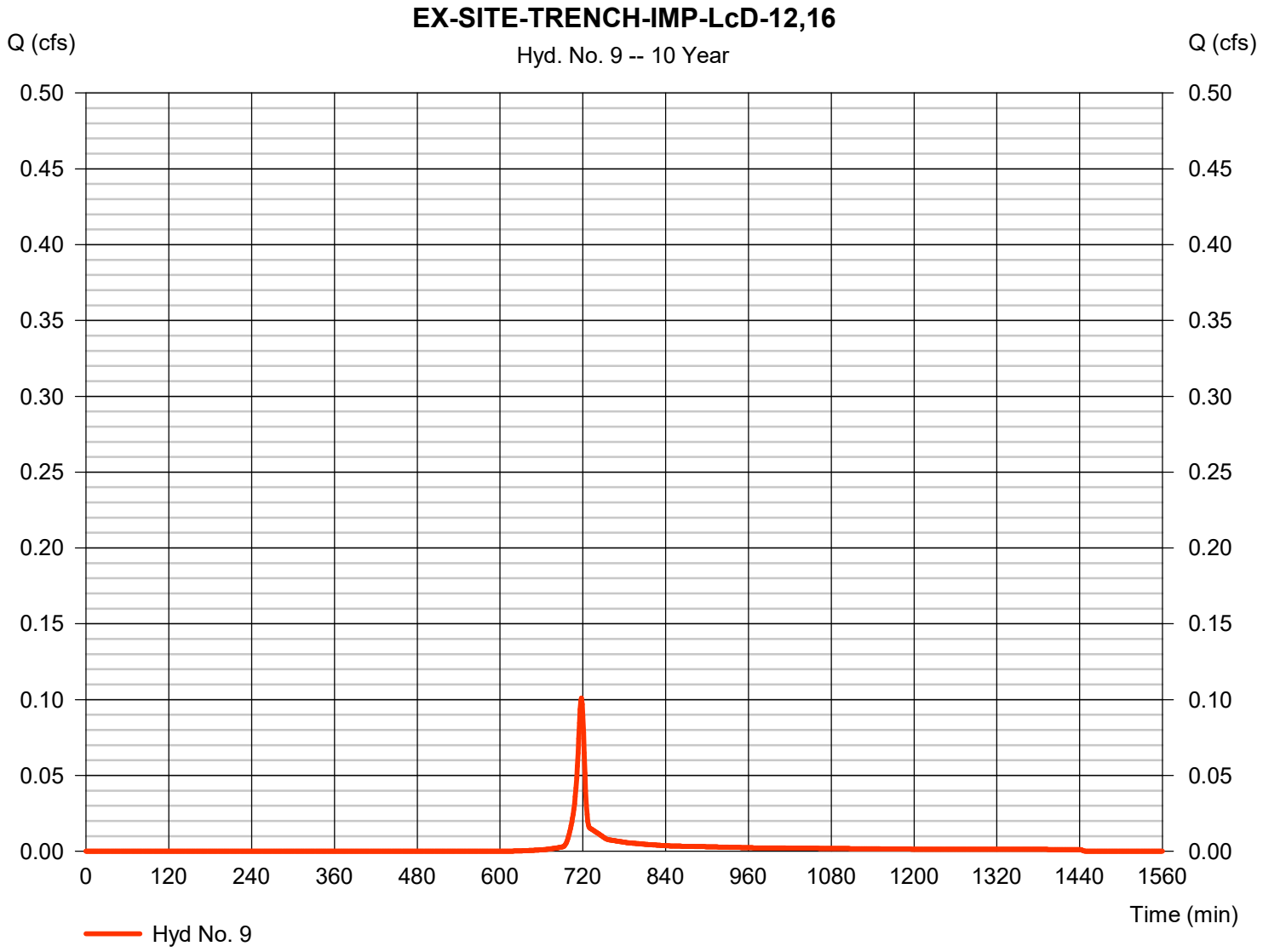


Hydrograph Report

Hyd. No. 9

EX-SITE-TRENCH-IMP-LcD-12,16

Hydrograph type	= SCS Runoff	Peak discharge	= 0.101 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 203 cuft
Drainage area	= 0.030 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

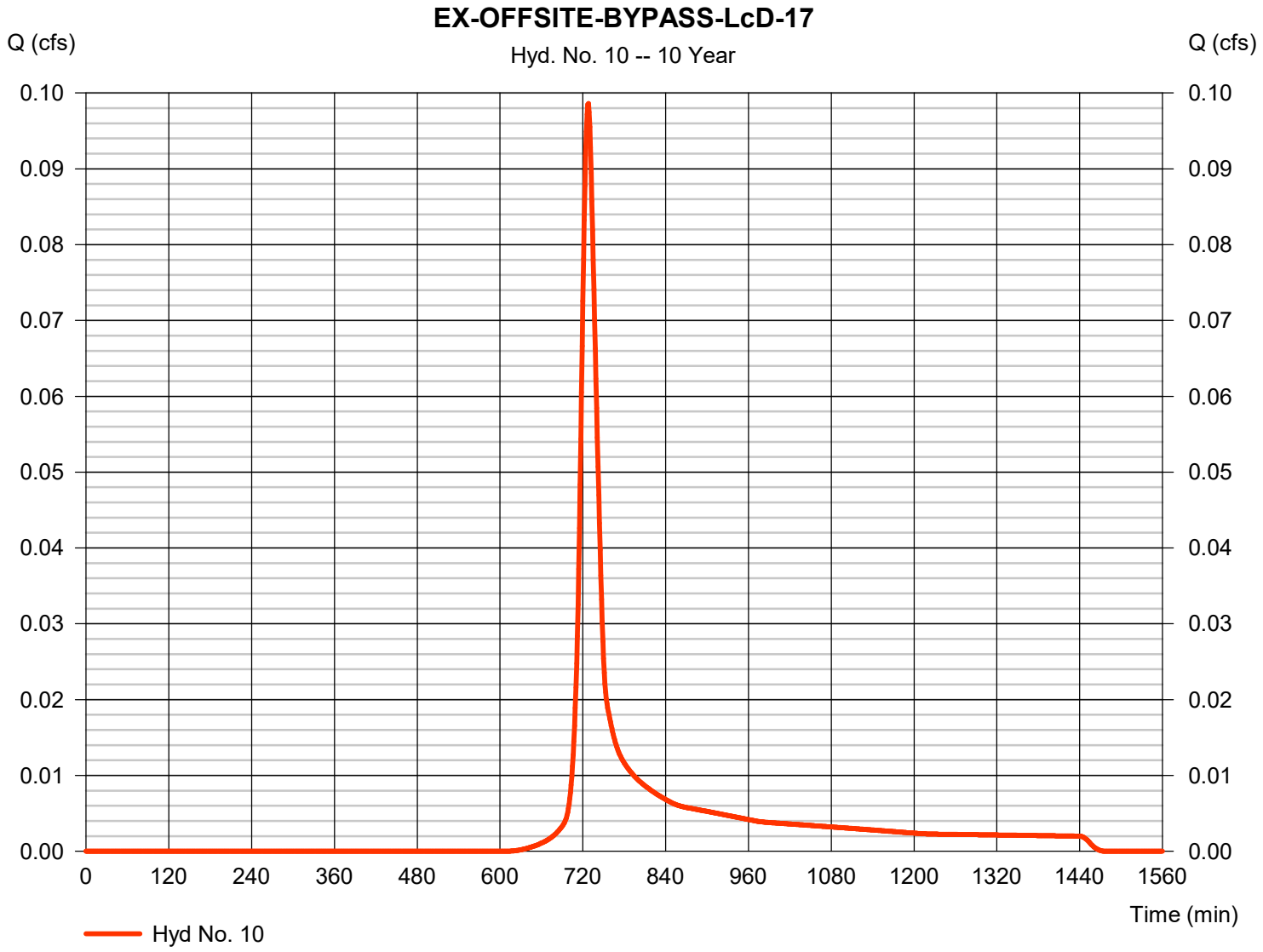


Hydrograph Report

Hyd. No. 10

EX-OFFSITE-BYPASS-LcD-17

Hydrograph type	= SCS Runoff	Peak discharge	= 0.099 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 344 cuft
Drainage area	= 0.053 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

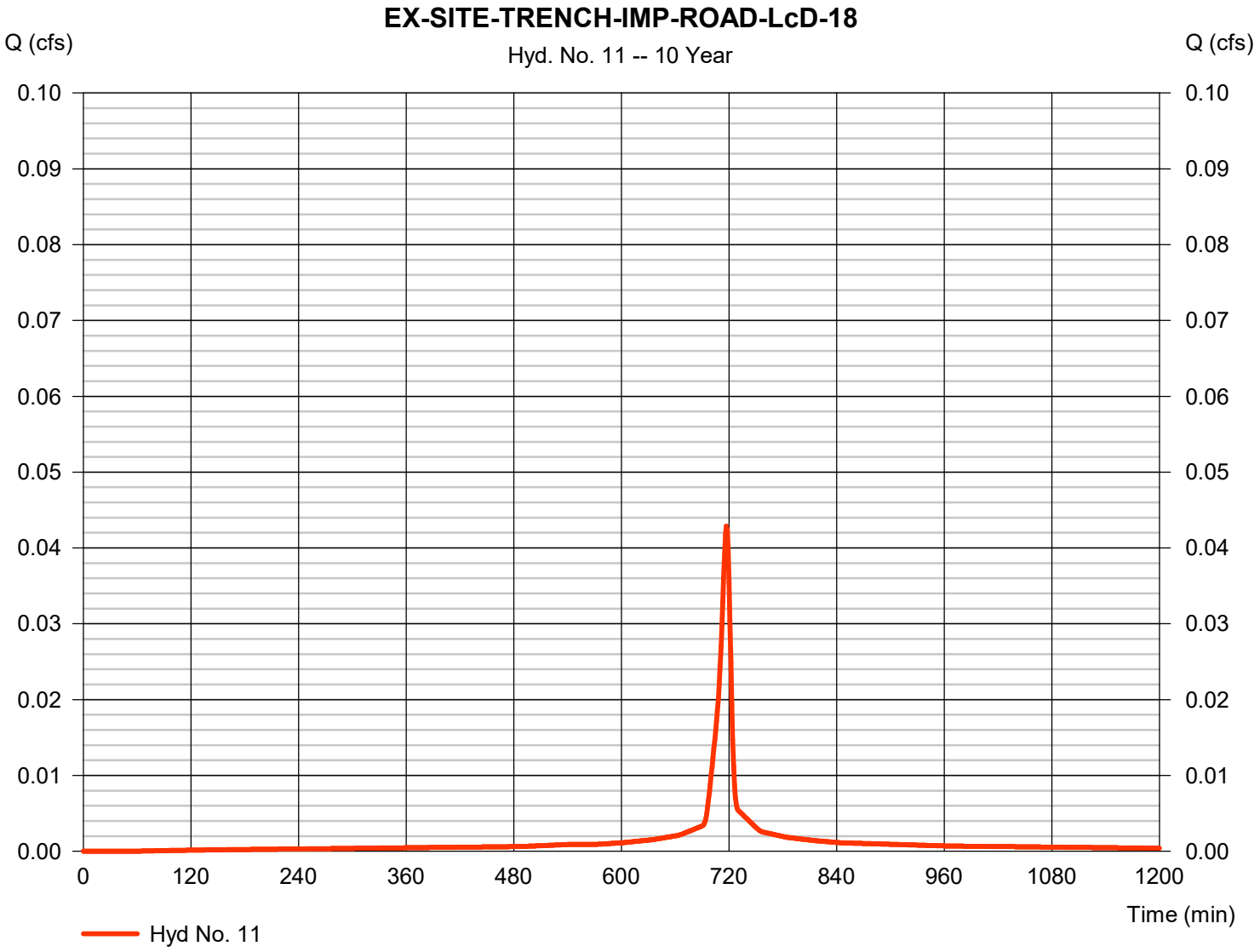


Hydrograph Report

Hyd. No. 11

EX-SITE-TRENCH-IMP-ROAD-LcD-18

Hydrograph type	= SCS Runoff	Peak discharge	= 0.043 cfs
Storm frequency	= 10 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 103 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

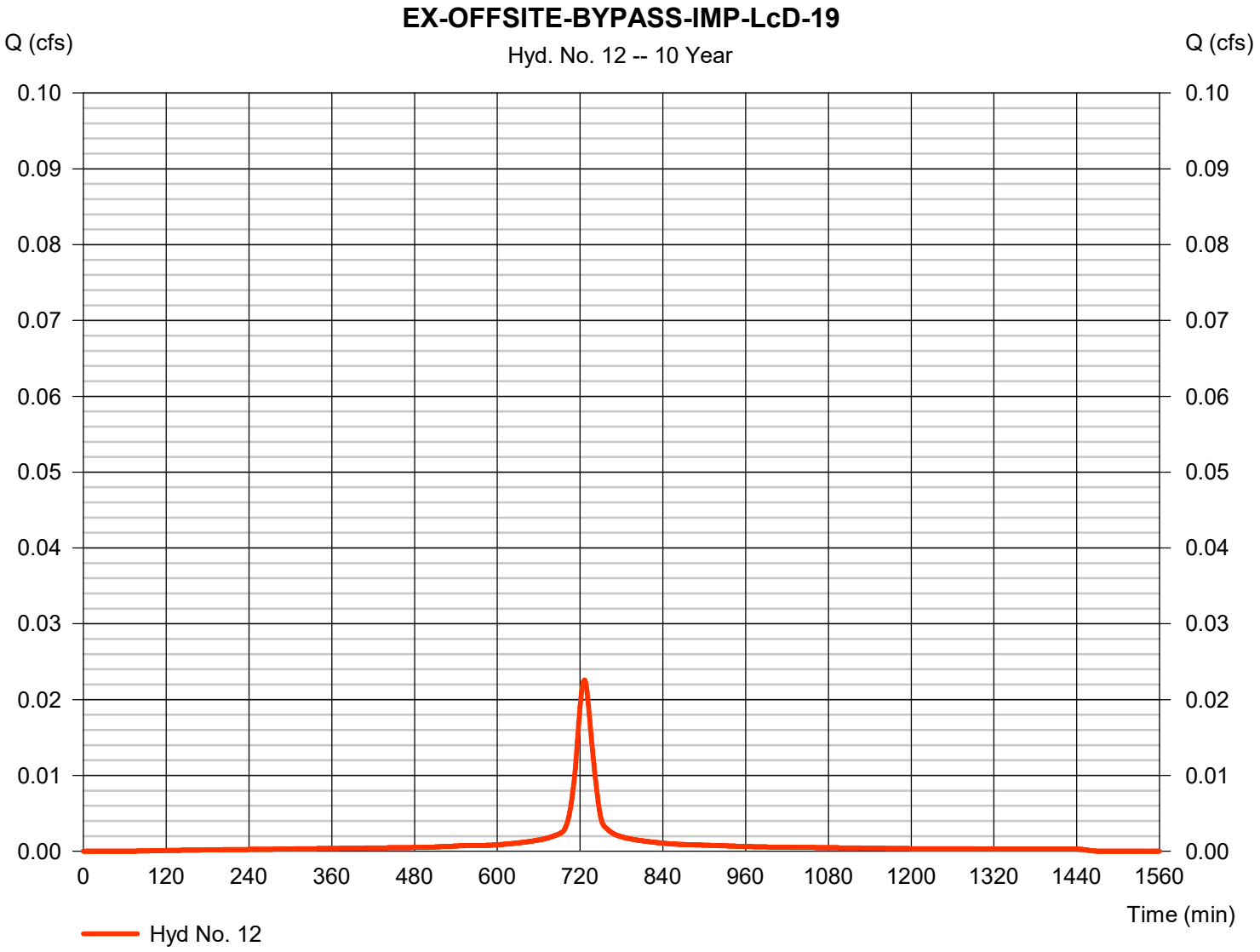


Hydrograph Report

Hyd. No. 12

EX-OFFSITE-BYPASS-IMP-LcD-19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.023 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 86 cuft
Drainage area	= 0.005 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

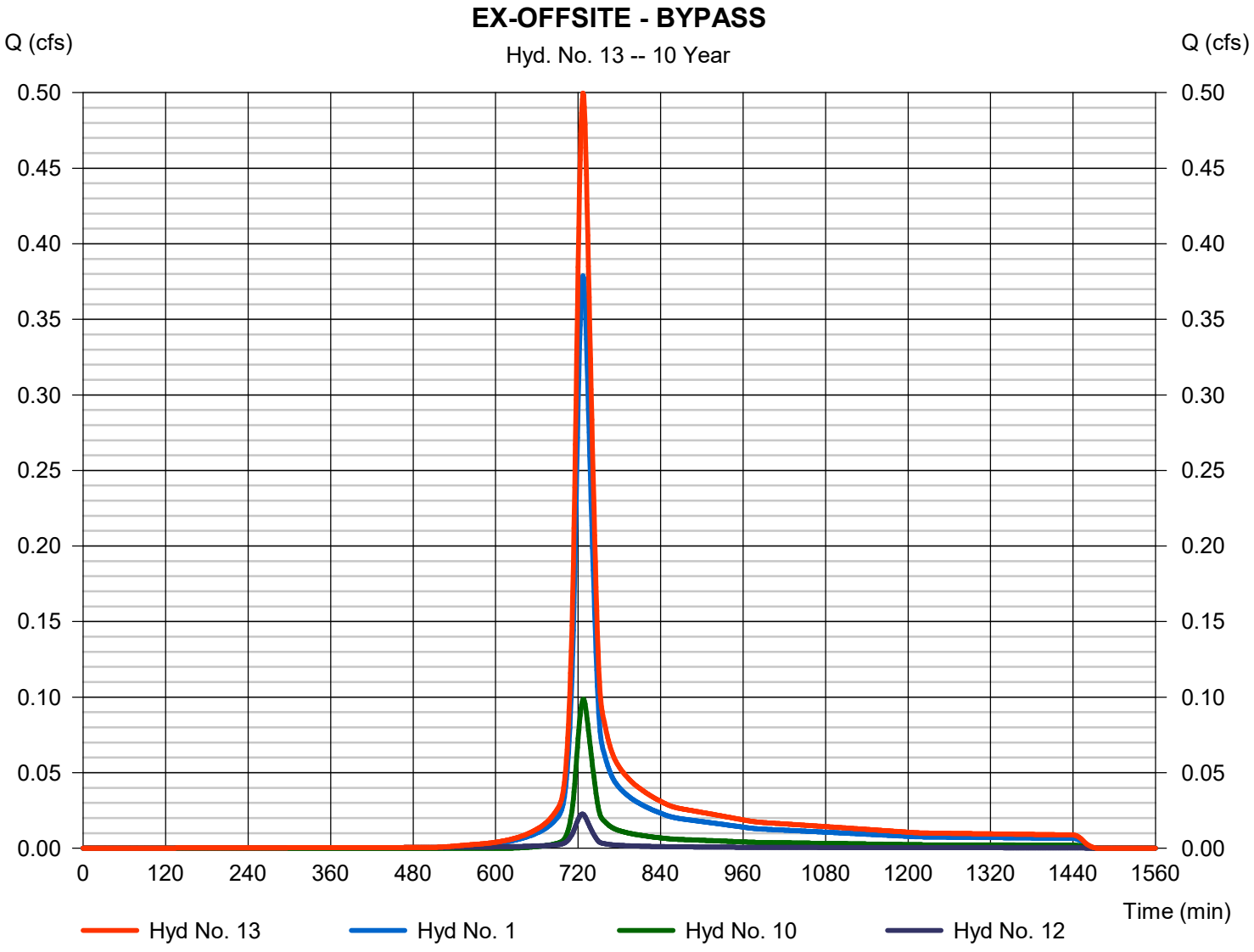


Hydrograph Report

Hyd. No. 13

EX-OFFSITE - BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.500 cfs
Storm frequency	=	10 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	1,720 cuft
Inflow hyds.	=	1, 10, 12	Contrib. drain. area	=	0.211 ac

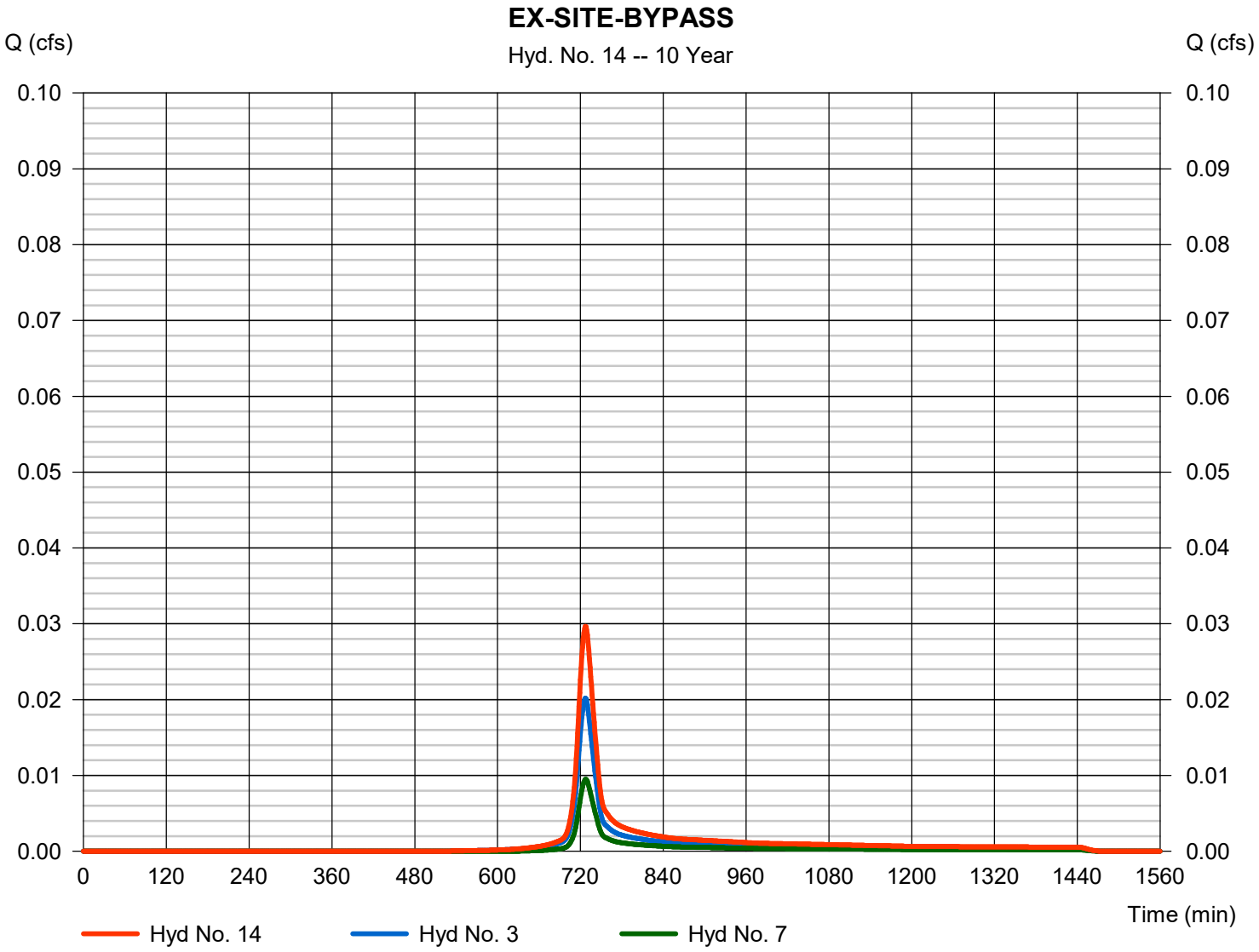


Hydrograph Report

Hyd. No. 14

EX-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.030 cfs
Storm frequency	=	10 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	102 cuft
Inflow hyds.	=	3, 7	Contrib. drain. area	=	0.013 ac

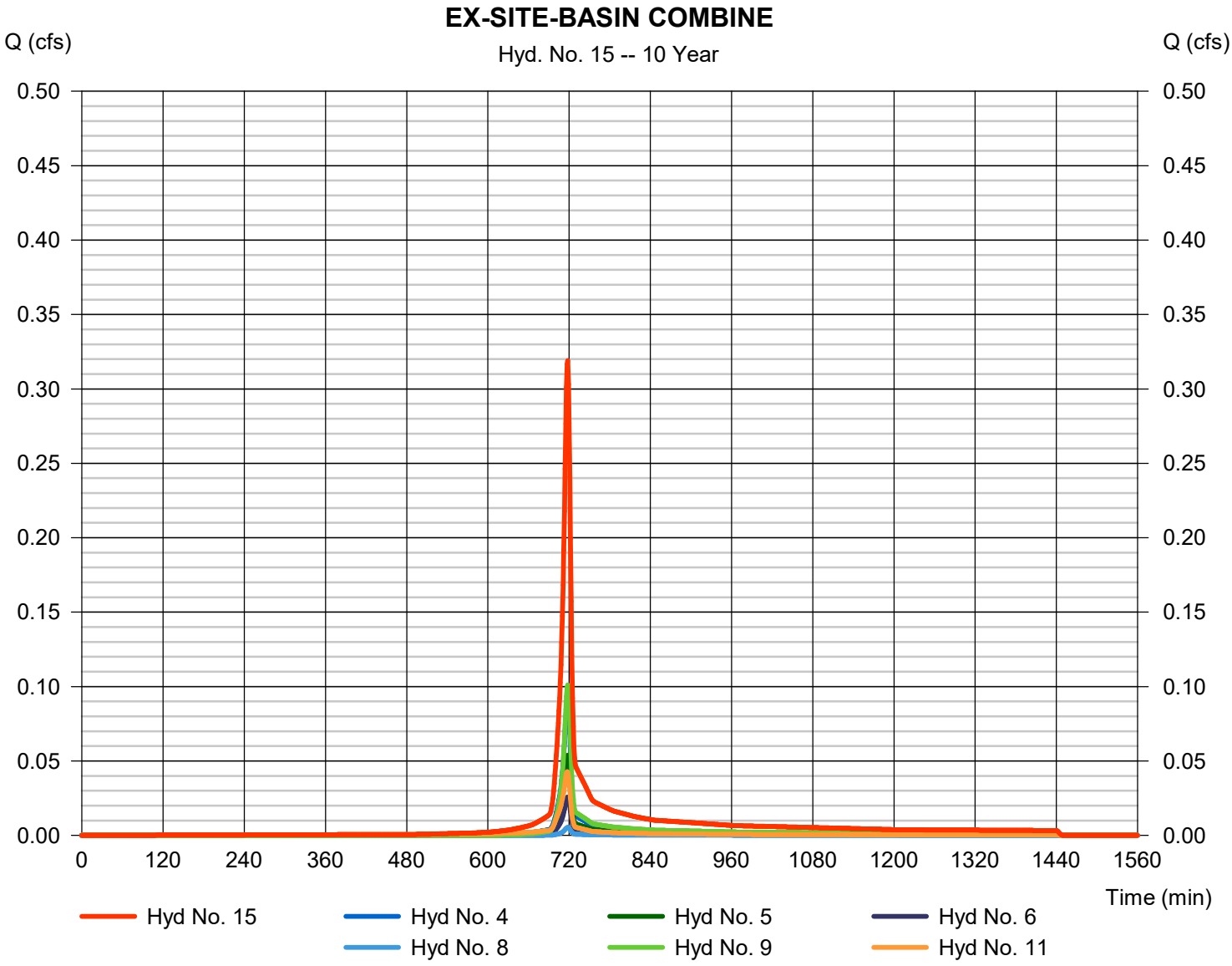


Hydrograph Report

Hyd. No. 15

EX-SITE-BASIN COMBINE

Hydrograph type	= Combine	Peak discharge	= 0.319 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 661 cuft
Inflow hyds.	= 4, 5, 6, 8, 9, 11	Contrib. drain. area	= 0.077 ac

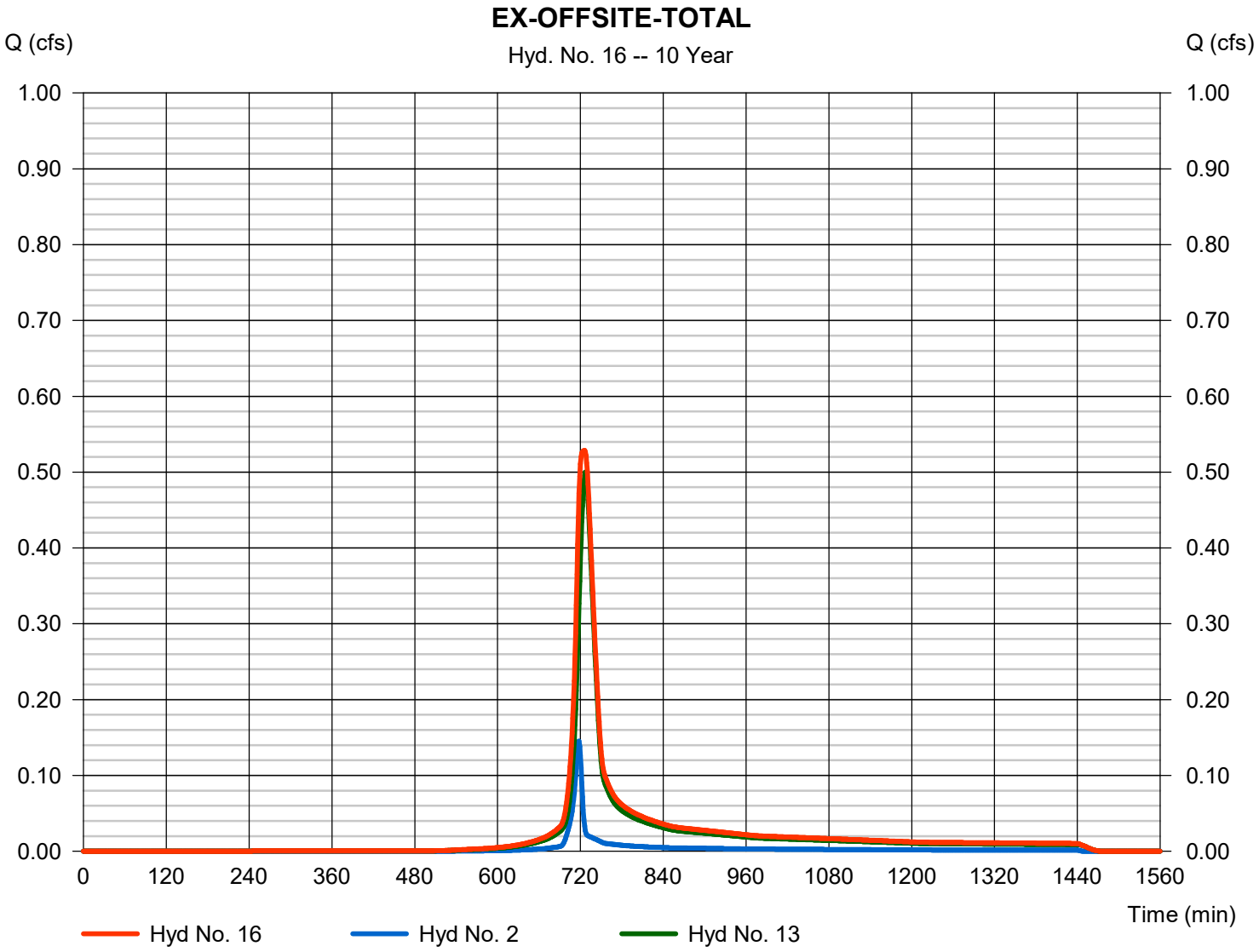


Hydrograph Report

Hyd. No. 16

EX-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.529 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,014 cuft
Inflow hyds.	= 2, 13	Contrib. drain. area	= 0.033 ac

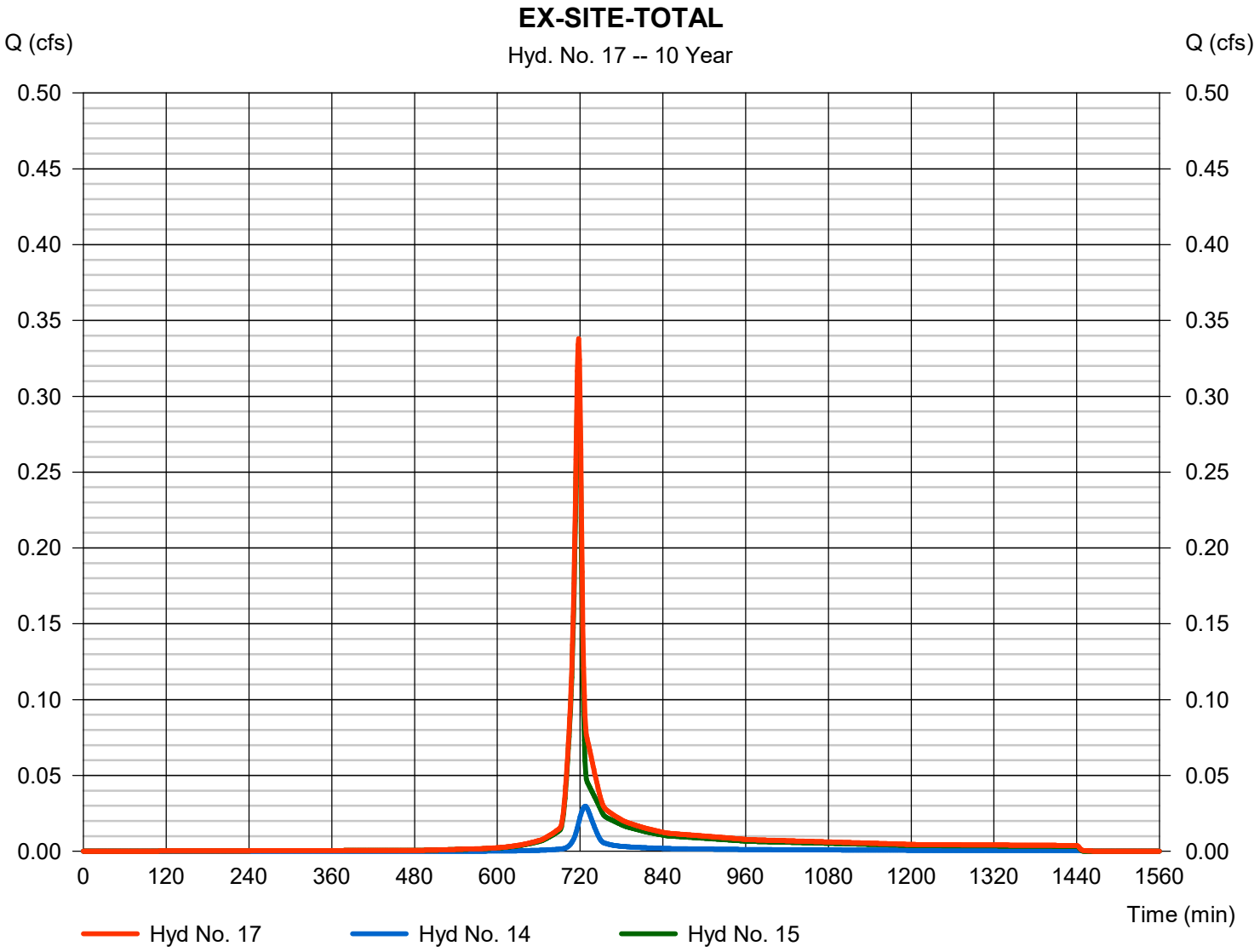


Hydrograph Report

Hyd. No. 17

EX-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.338 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	763 cuft
Inflow hyds.	=	14, 15	Contrib. drain. area	=	0.000 ac

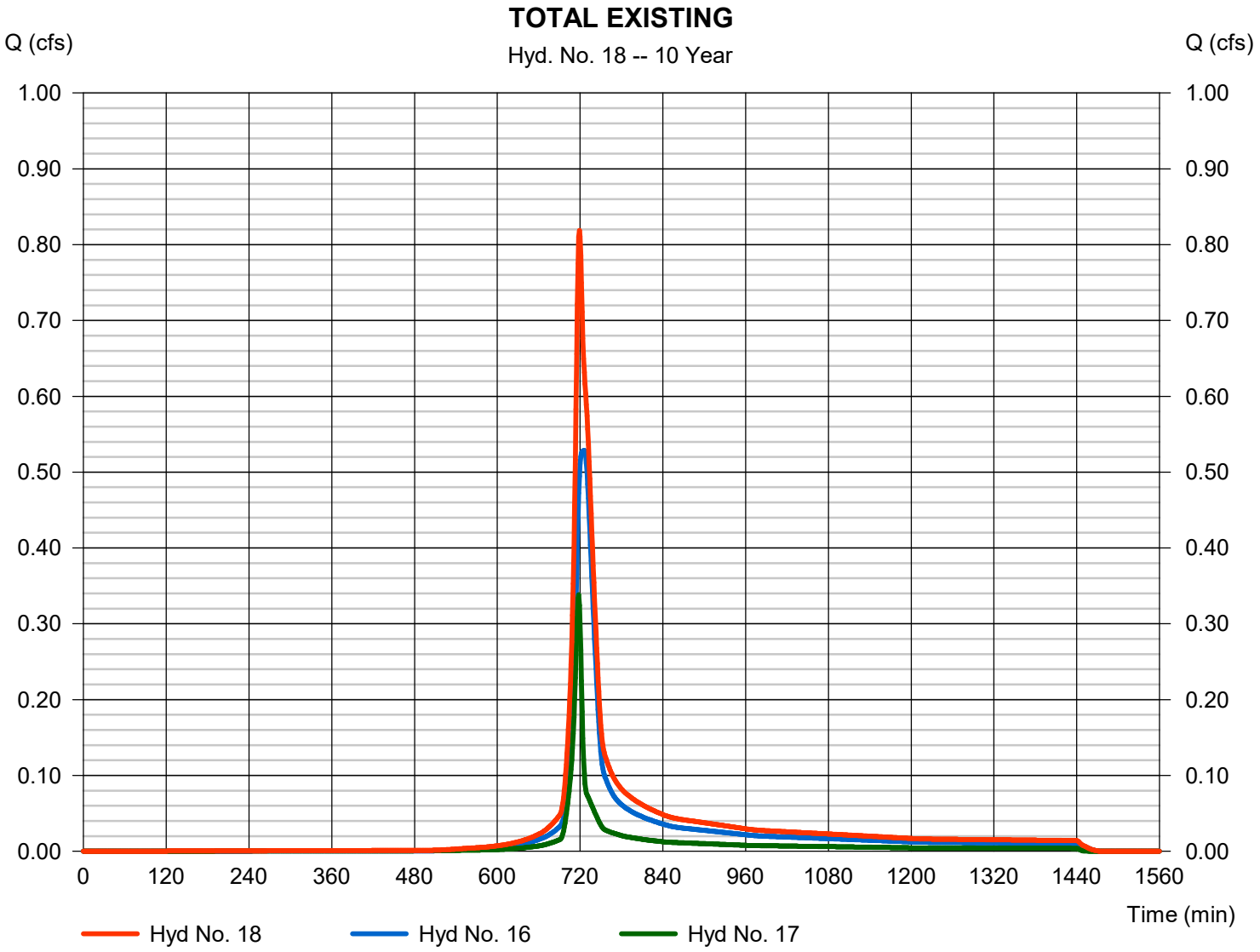


Hydrograph Report

Hyd. No. 18

TOTAL EXISTING

Hydrograph type	= Combine	Peak discharge	= 0.819 cfs
Storm frequency	= 10 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 2,777 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 0.000 ac

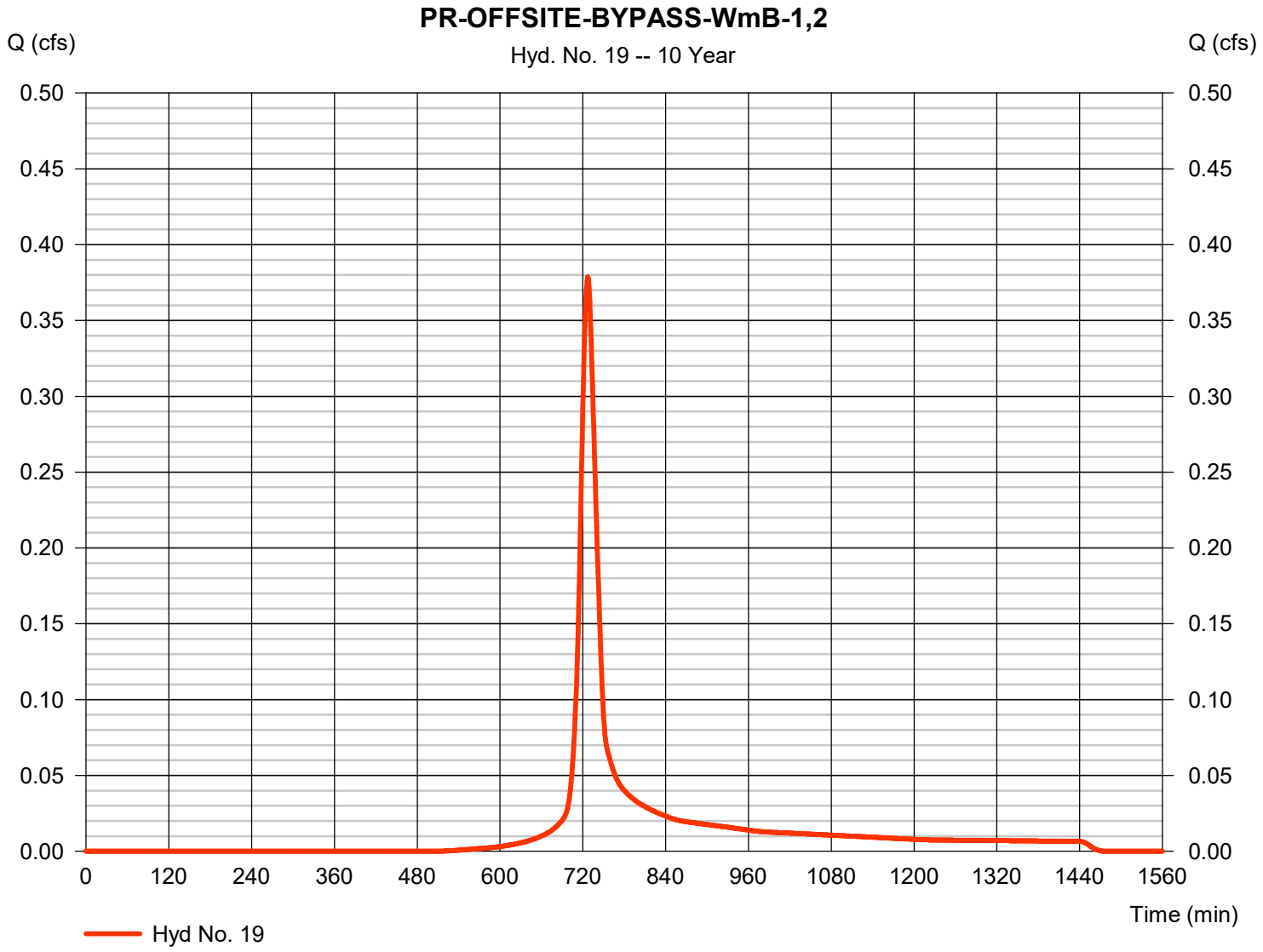


Hydrograph Report

Hyd. No. 19

PR-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.379 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,289 cuft
Drainage area	= 0.152 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

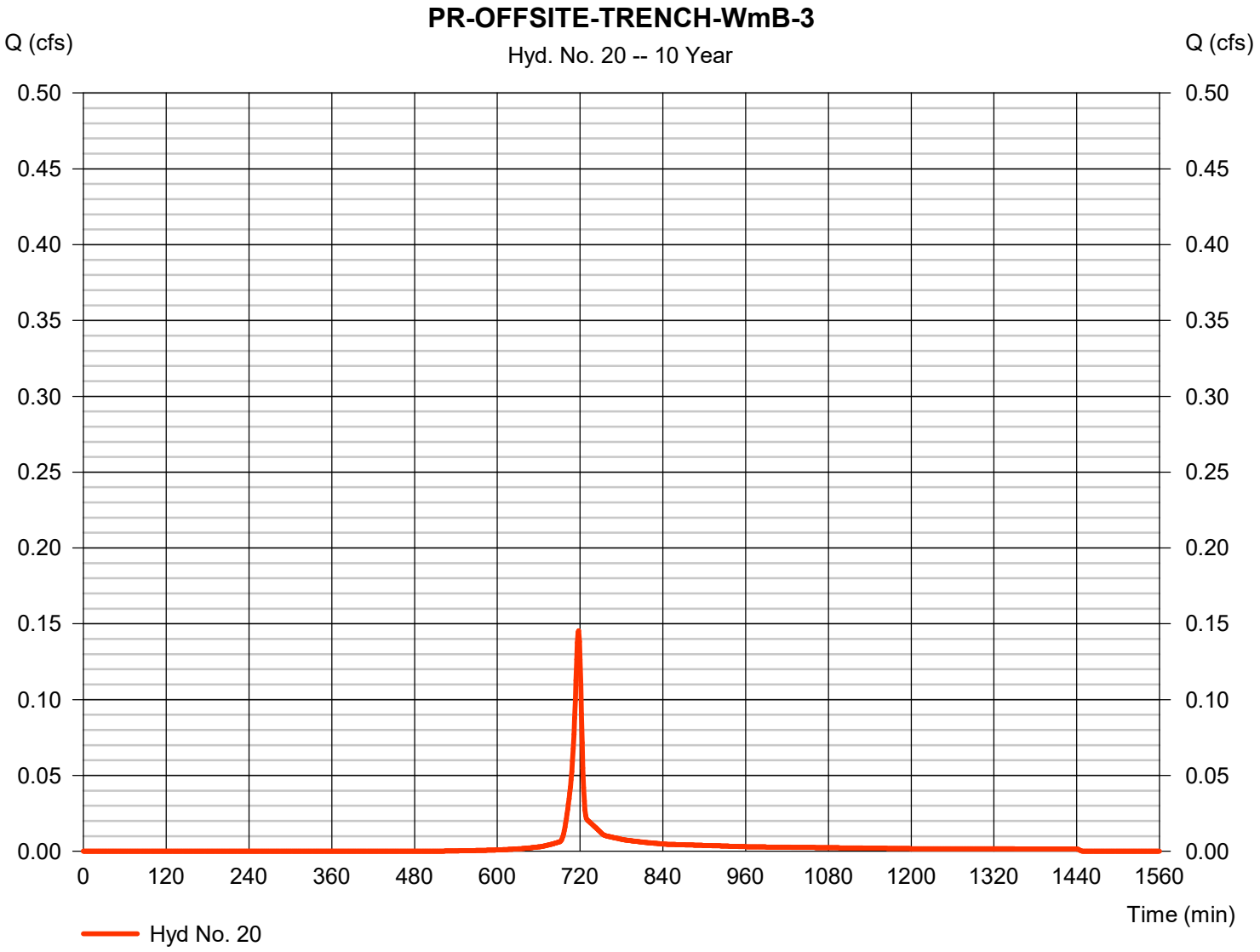


Hydrograph Report

Hyd. No. 20

PR-OFFSITE-TRENCH-WmB-3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.145 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	294 cuft
Drainage area	=	0.033 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

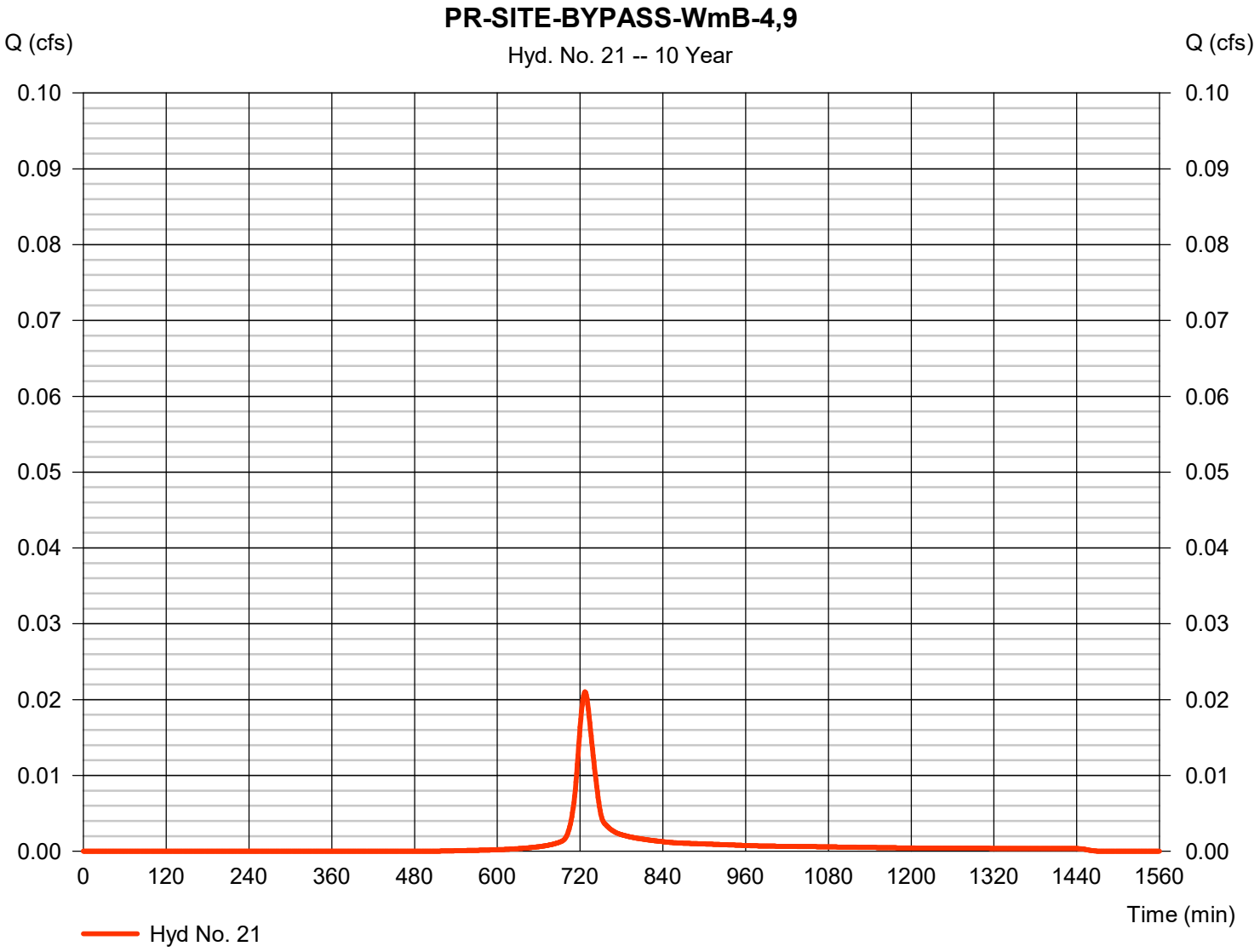


Hydrograph Report

Hyd. No. 21

PR-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.021 cfs
Storm frequency	=	10 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	71 cuft
Drainage area	=	0.008 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

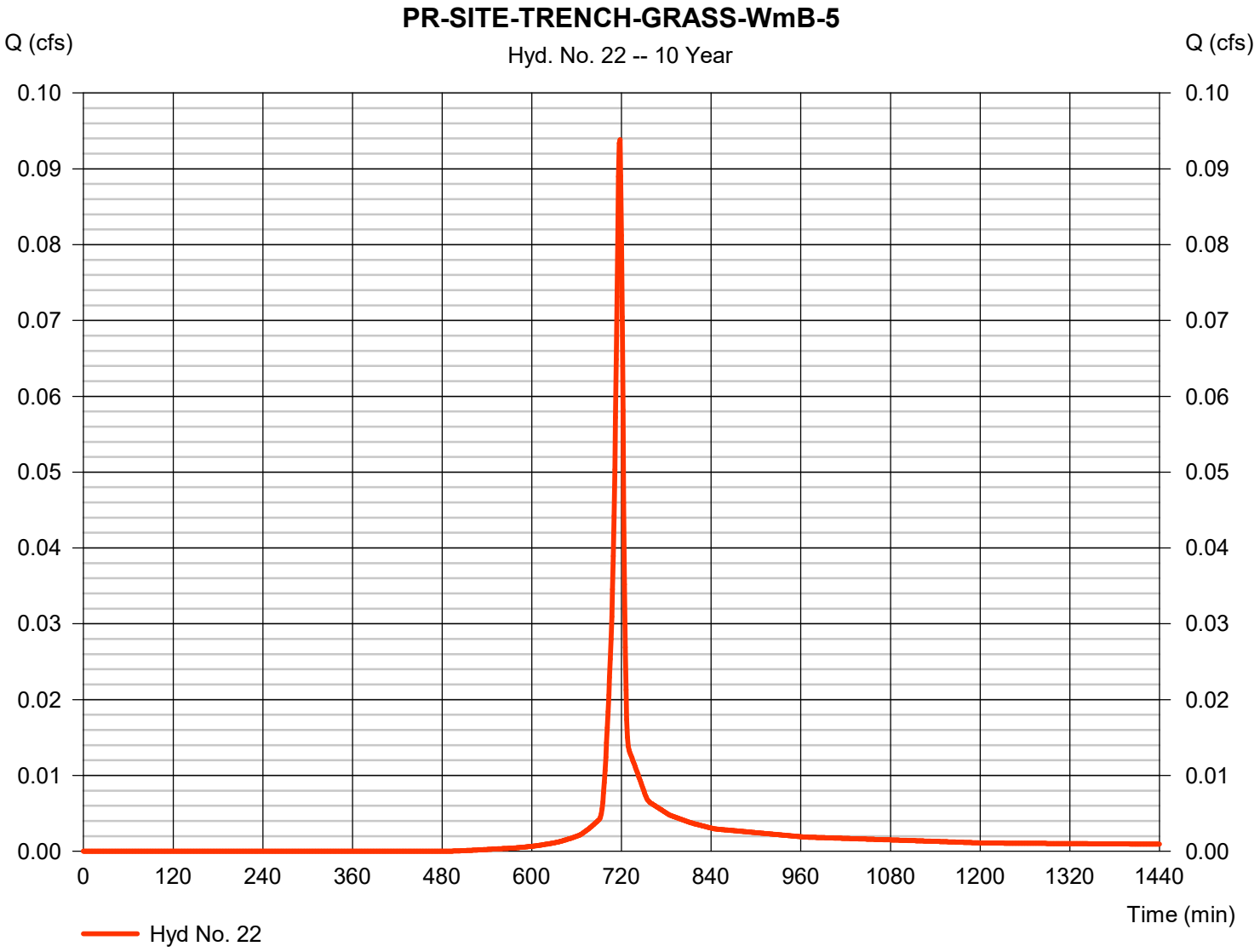


Hydrograph Report

Hyd. No. 22

PR-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.094 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 190 cuft
Drainage area	= 0.021 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

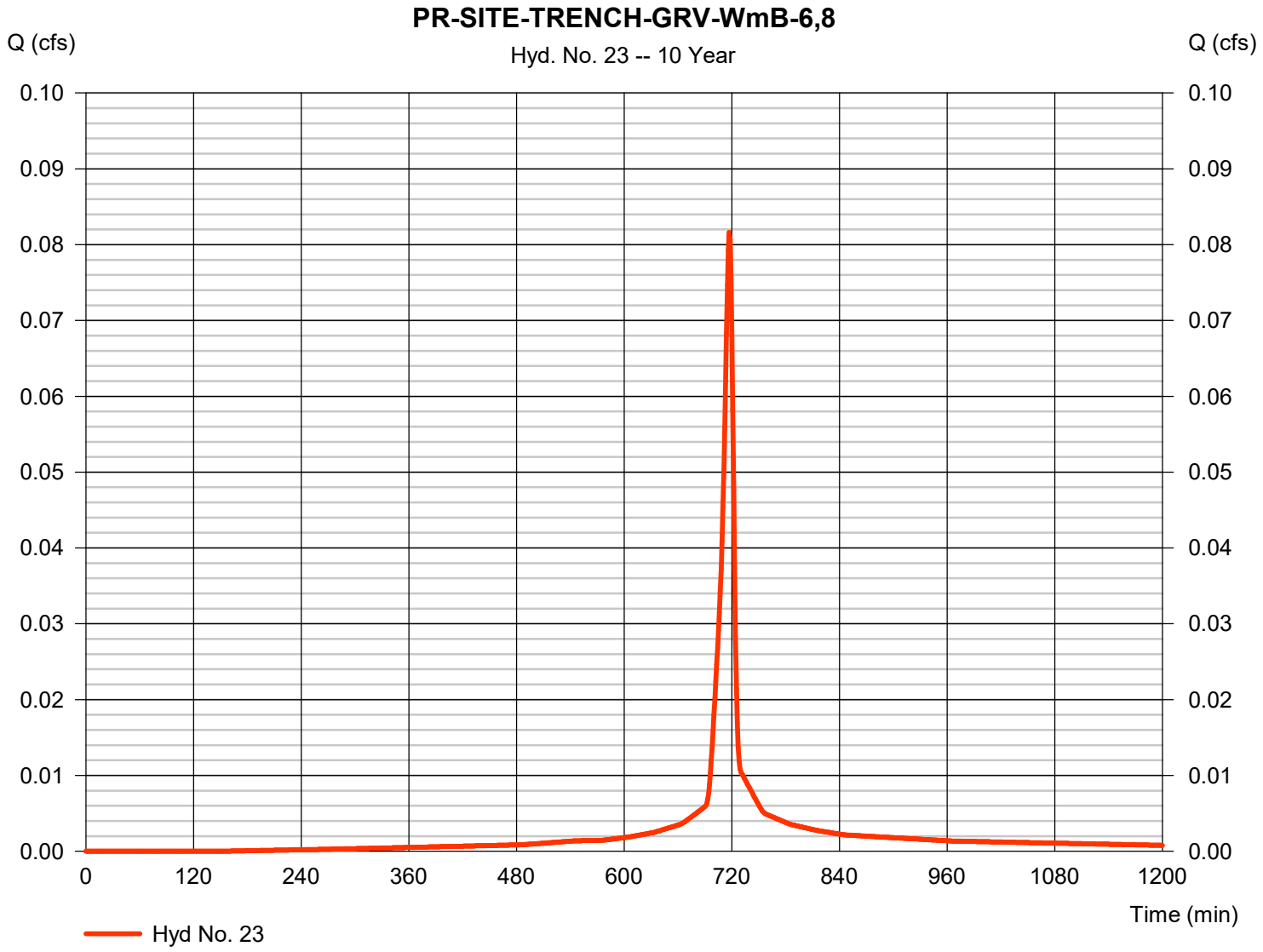


Hydrograph Report

Hyd. No. 23

PR-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.082 cfs
Storm frequency	= 10 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 184 cuft
Drainage area	= 0.012 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

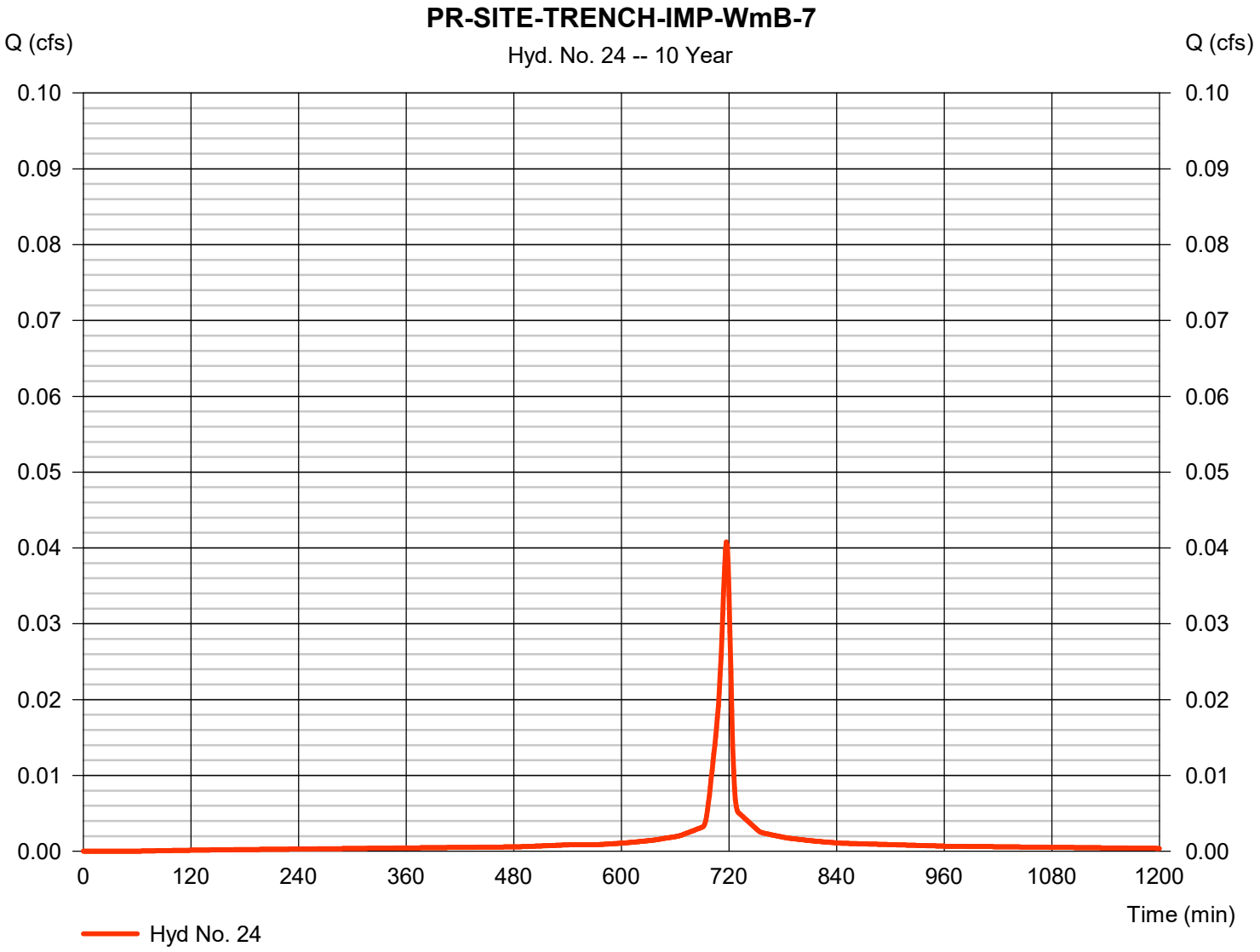


Hydrograph Report

Hyd. No. 24

PR-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.041 cfs
Storm frequency	= 10 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 98 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

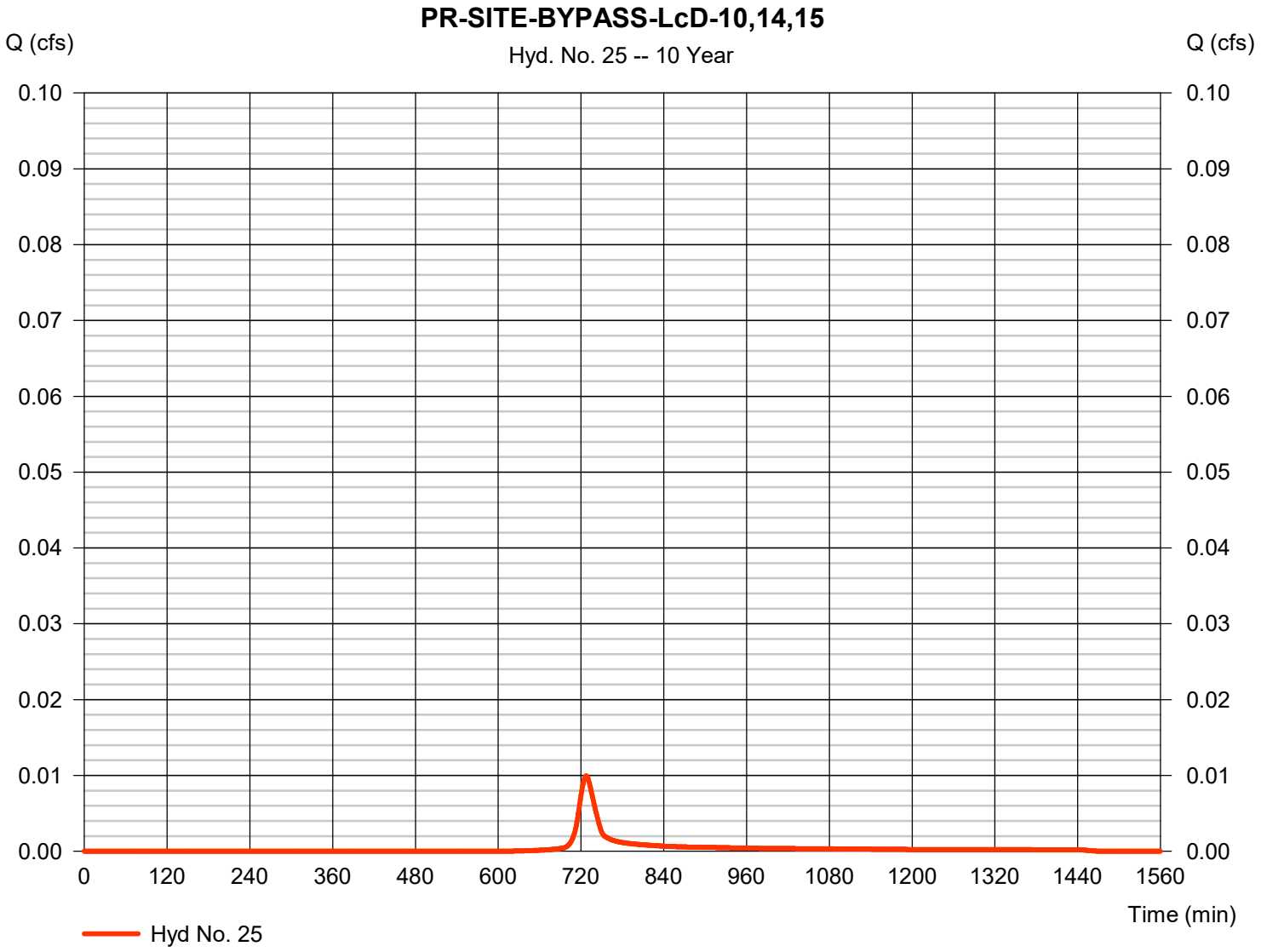


Hydrograph Report

Hyd. No. 25

PR-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 35 cuft
Drainage area	= 0.005 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

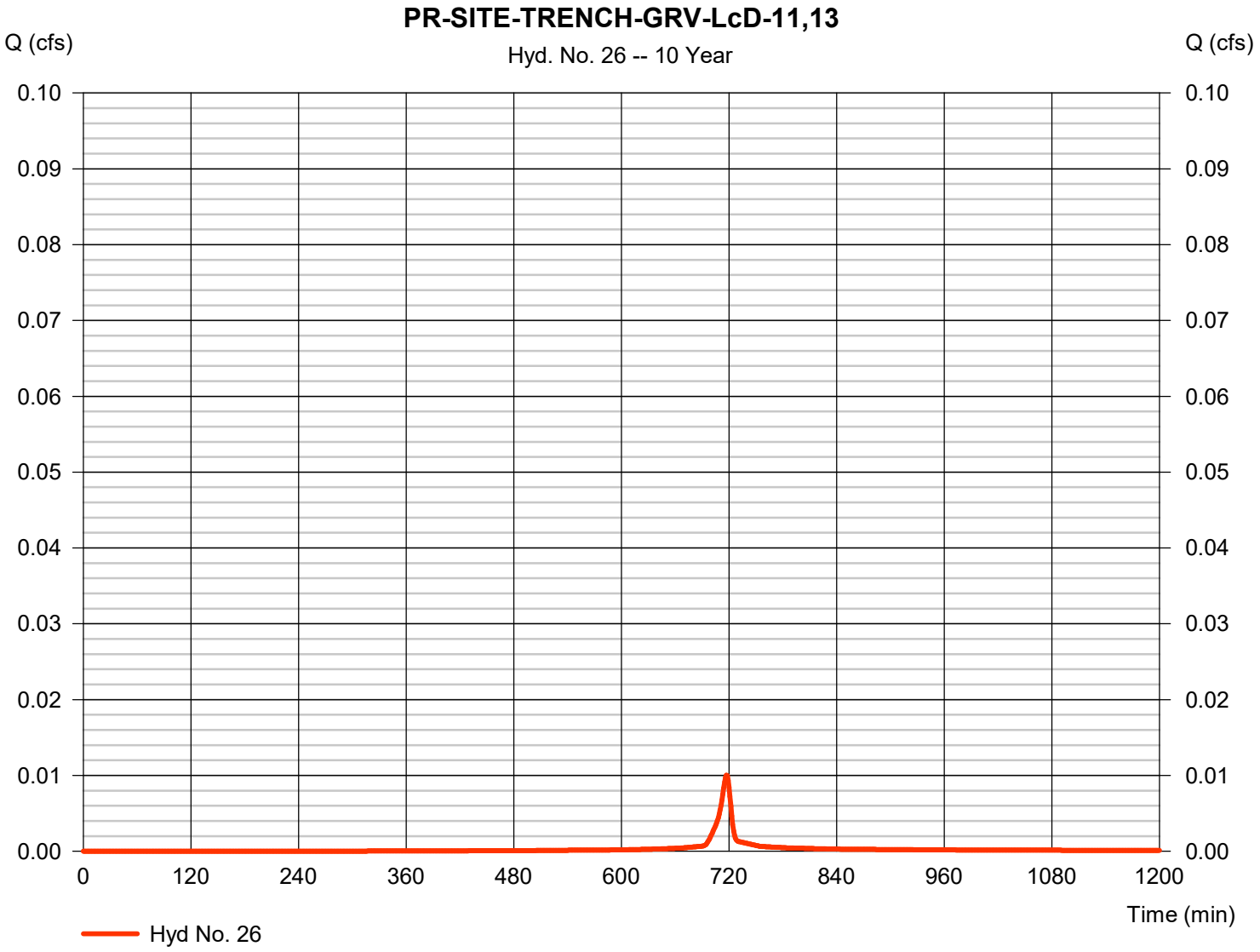


Hydrograph Report

Hyd. No. 26

PR-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 10 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 22 cuft
Drainage area	= 0.002 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

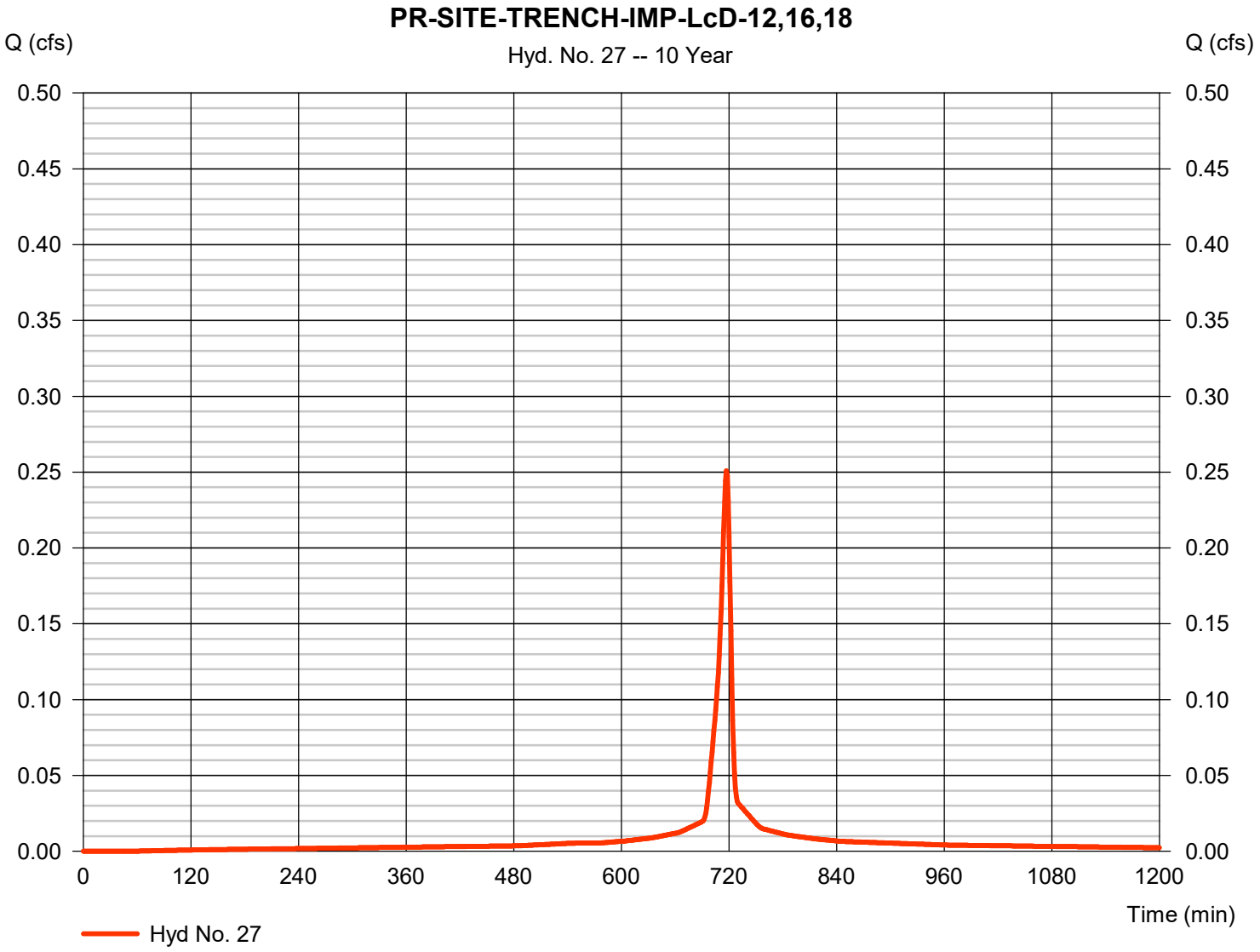


Hydrograph Report

Hyd. No. 27

PR-SITE-TRENCH-IMP-LcD-12,16,18

Hydrograph type	= SCS Runoff	Peak discharge	= 0.251 cfs
Storm frequency	= 10 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 604 cuft
Drainage area	= 0.036 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



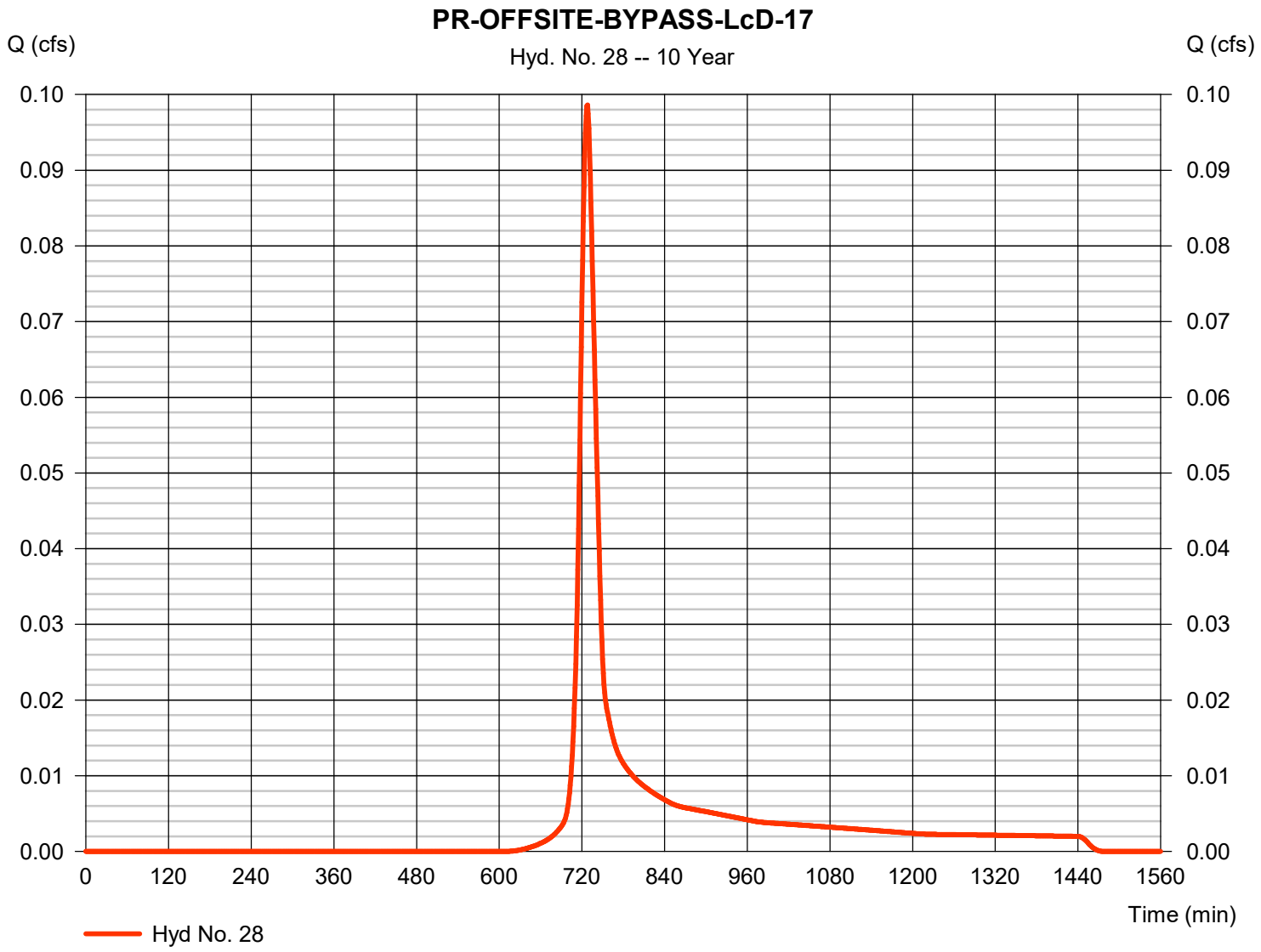
Hydrograph Report

Hyd. No. 28

PR-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.099 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	344 cuft
Drainage area	=	0.053 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.045 x 98) + (0.043 x 98)] / 0.053

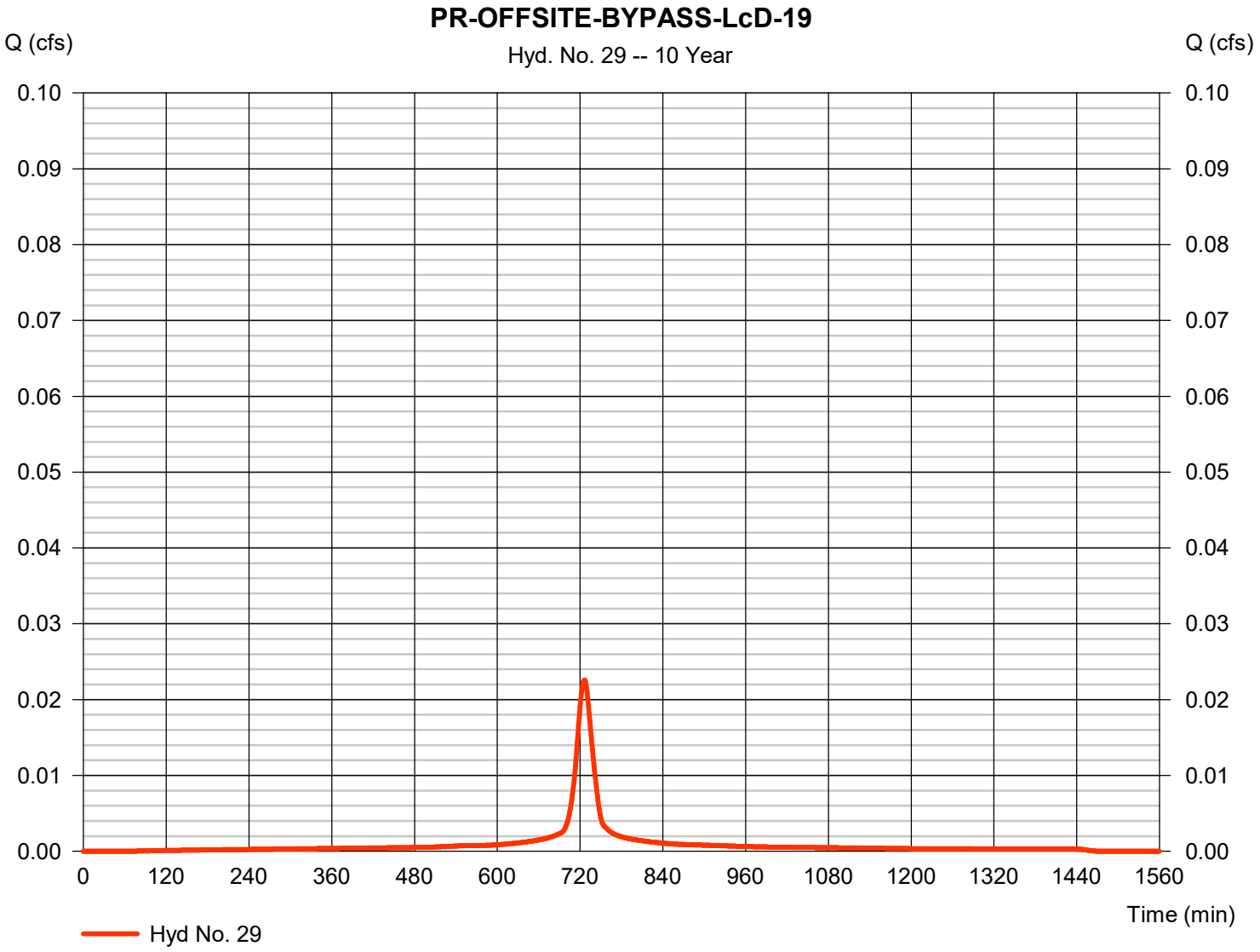


Hydrograph Report

Hyd. No. 29

PR-OFFSITE-BYPASS-LcD-19

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.023 cfs
Storm frequency	=	10 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	86 cuft
Drainage area	=	0.005 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

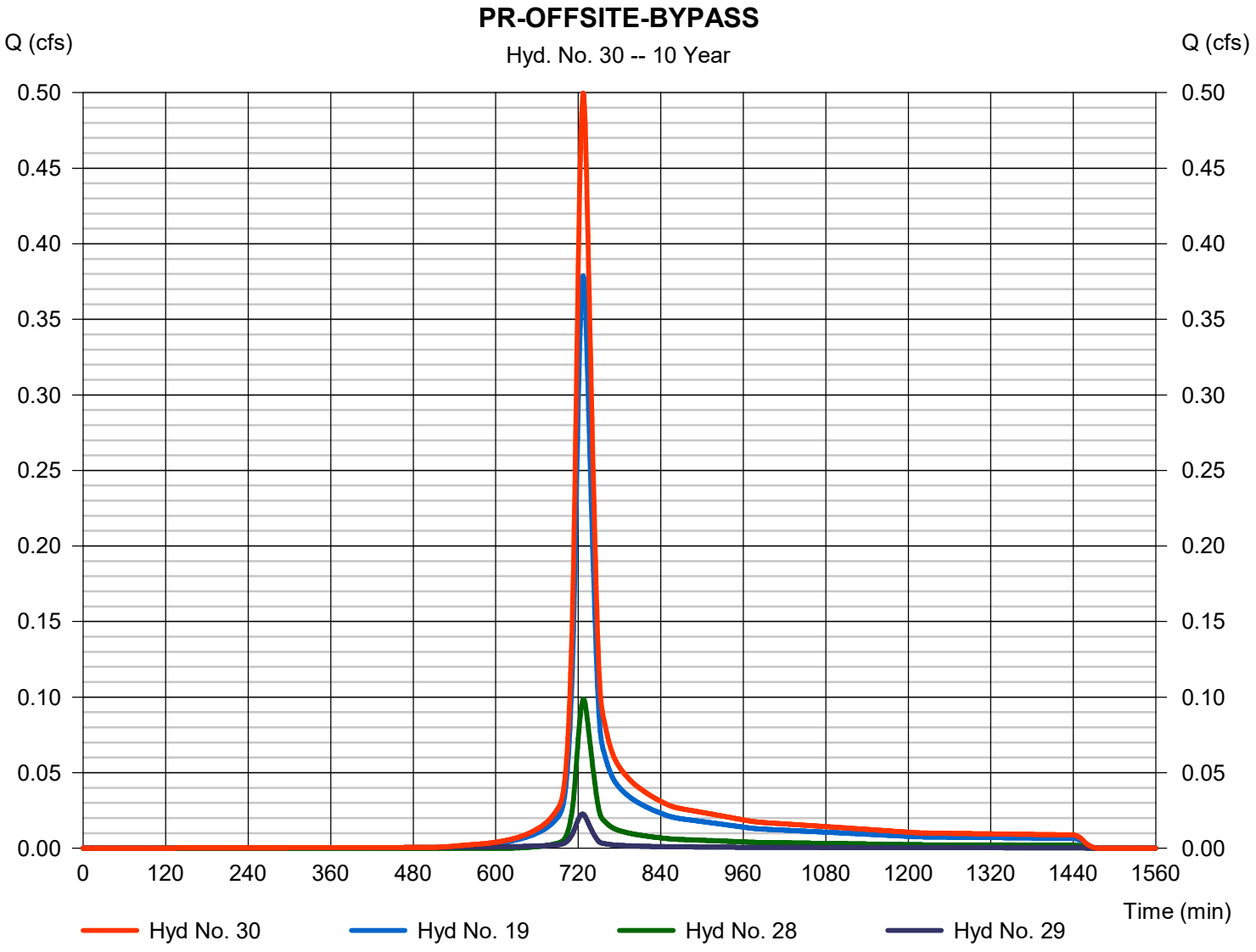


Hydrograph Report

Hyd. No. 30

PR-OFFSITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.500 cfs
Storm frequency	=	10 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	1,720 cuft
Inflow hyds.	=	19, 28, 29	Contrib. drain. area	=	0.211 ac

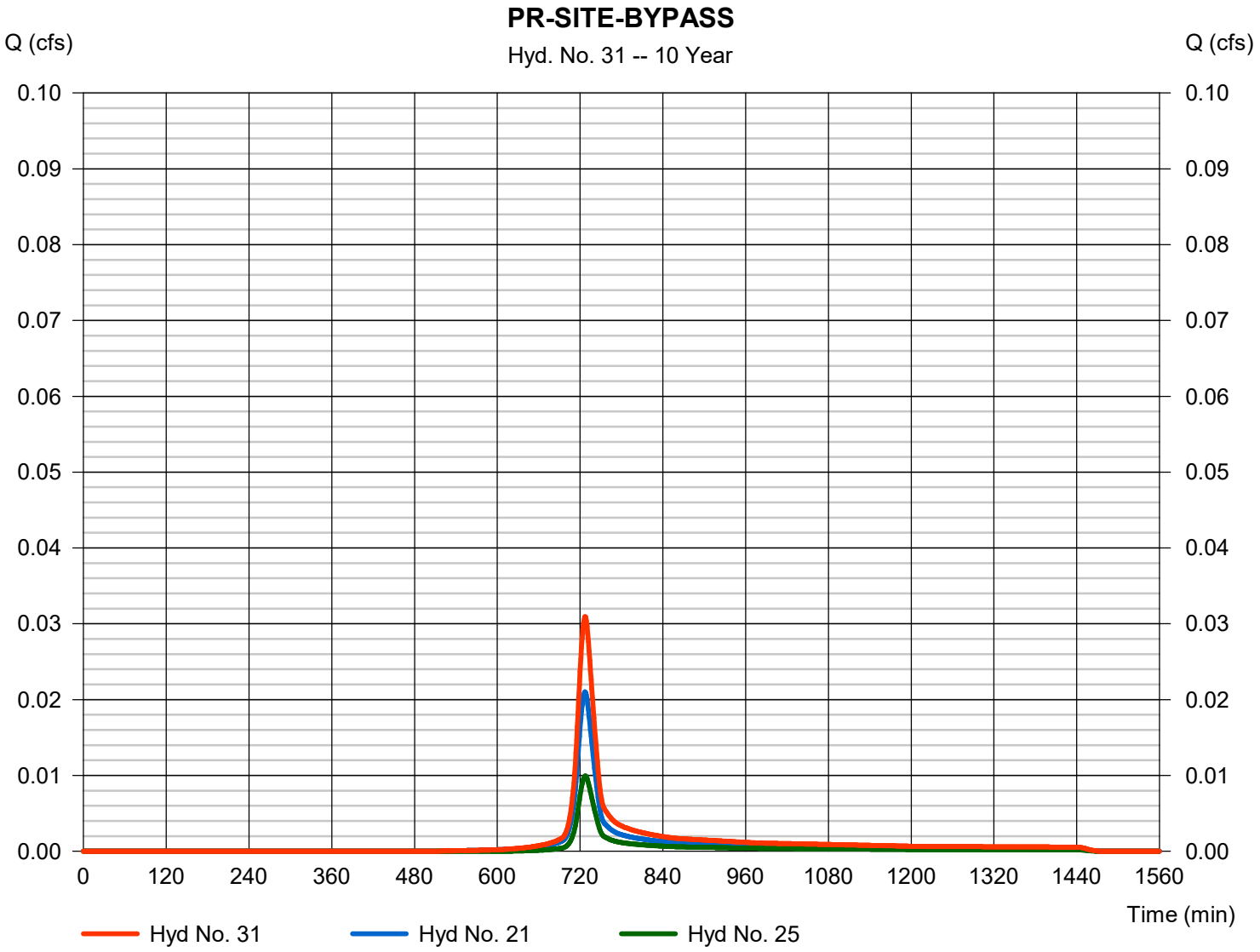


Hydrograph Report

Hyd. No. 31

PR-SITE-BYPASS

Hydrograph type	= Combine	Peak discharge	= 0.031 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 106 cuft
Inflow hyds.	= 21, 25	Contrib. drain. area	= 0.013 ac

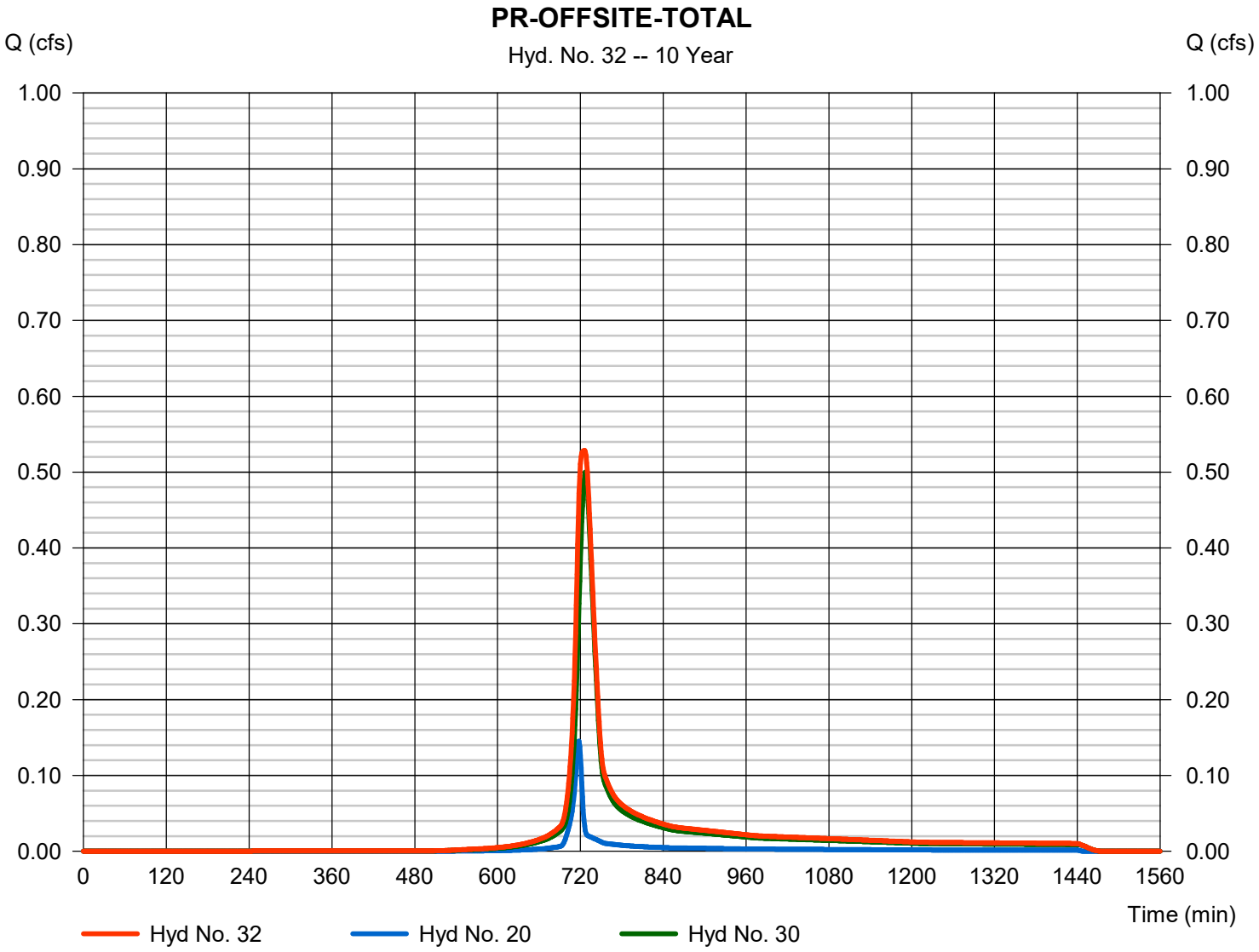


Hydrograph Report

Hyd. No. 32

PR-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.529 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,014 cuft
Inflow hyds.	= 20, 30	Contrib. drain. area	= 0.033 ac

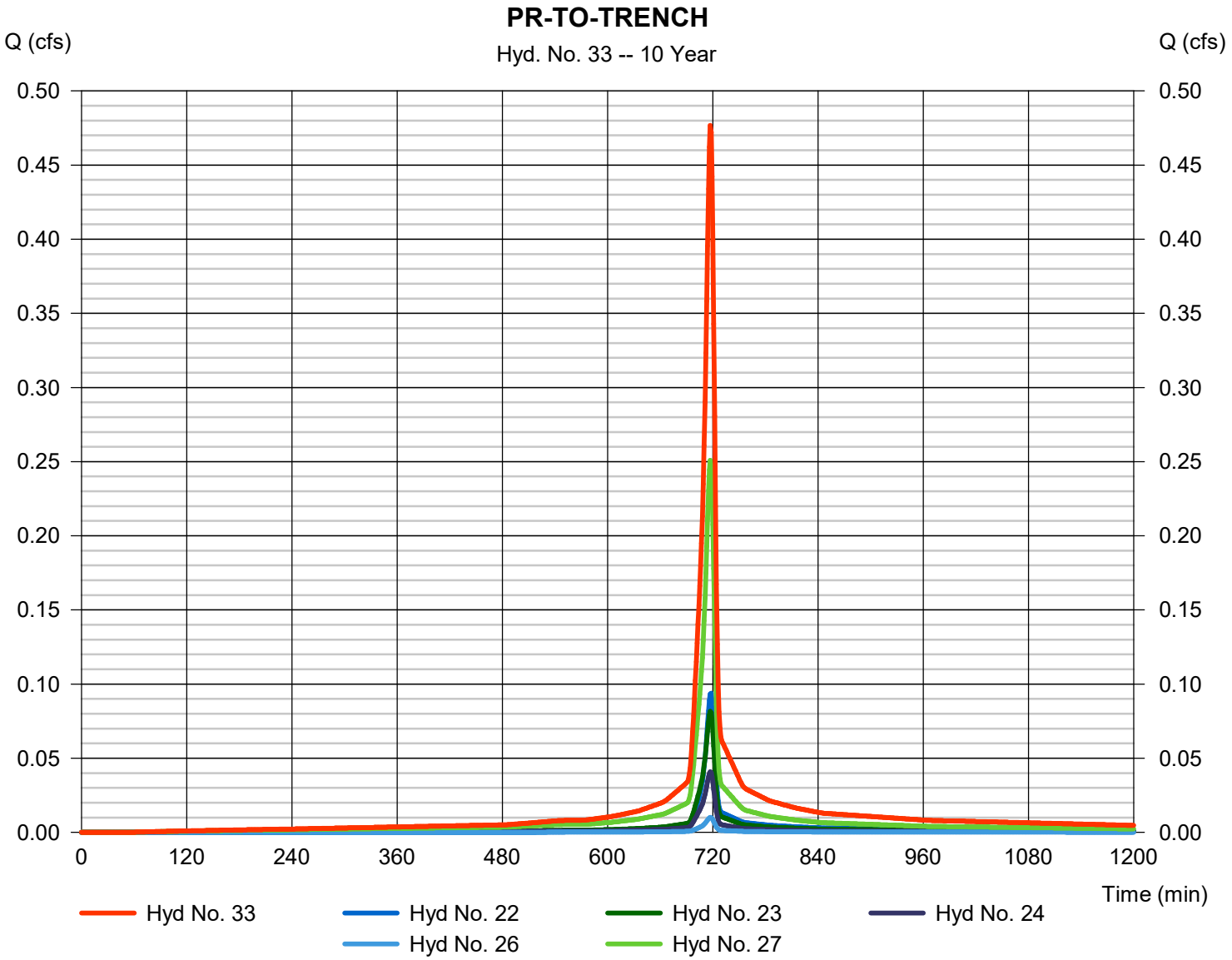


Hydrograph Report

Hyd. No. 33

PR-TO-TRENCH

Hydrograph type	=	Combine	Peak discharge	=	0.477 cfs
Storm frequency	=	10 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	1,098 cuft
Inflow hyds.	=	22, 23, 24, 26, 27	Contrib. drain. area	=	0.077 ac



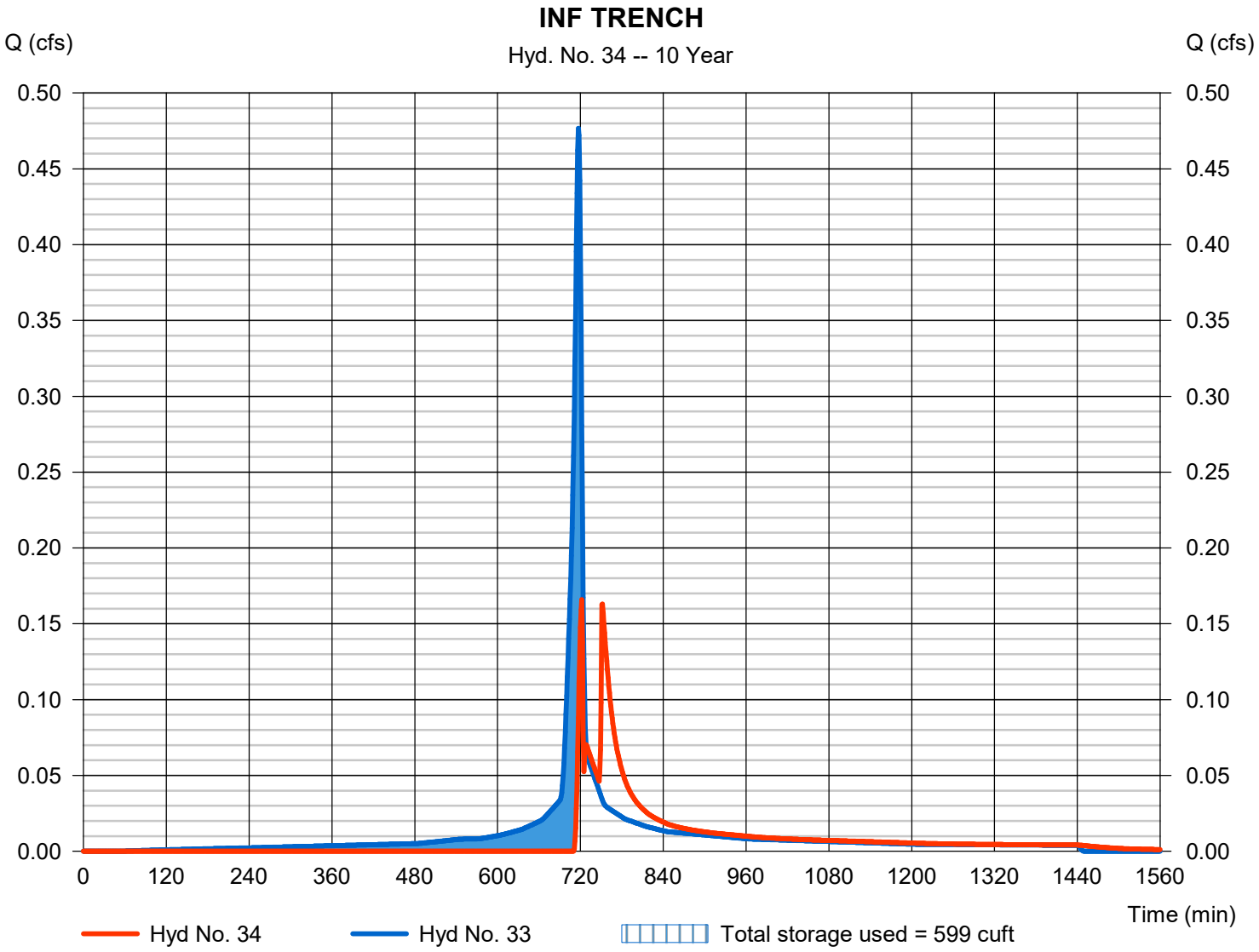
Hydrograph Report

Hyd. No. 34

INF TRENCH

Hydrograph type	=	Reservoir	Peak discharge	=	0.166 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	1 min	Hyd. volume	=	733 cuft
Inflow hyd. No.	=	33 - PR-TO-TRENCH	Max. Elevation	=	1687.35 ft
Reservoir name	=	BASIN	Max. Storage	=	599 cuft

Storage Indication method used.

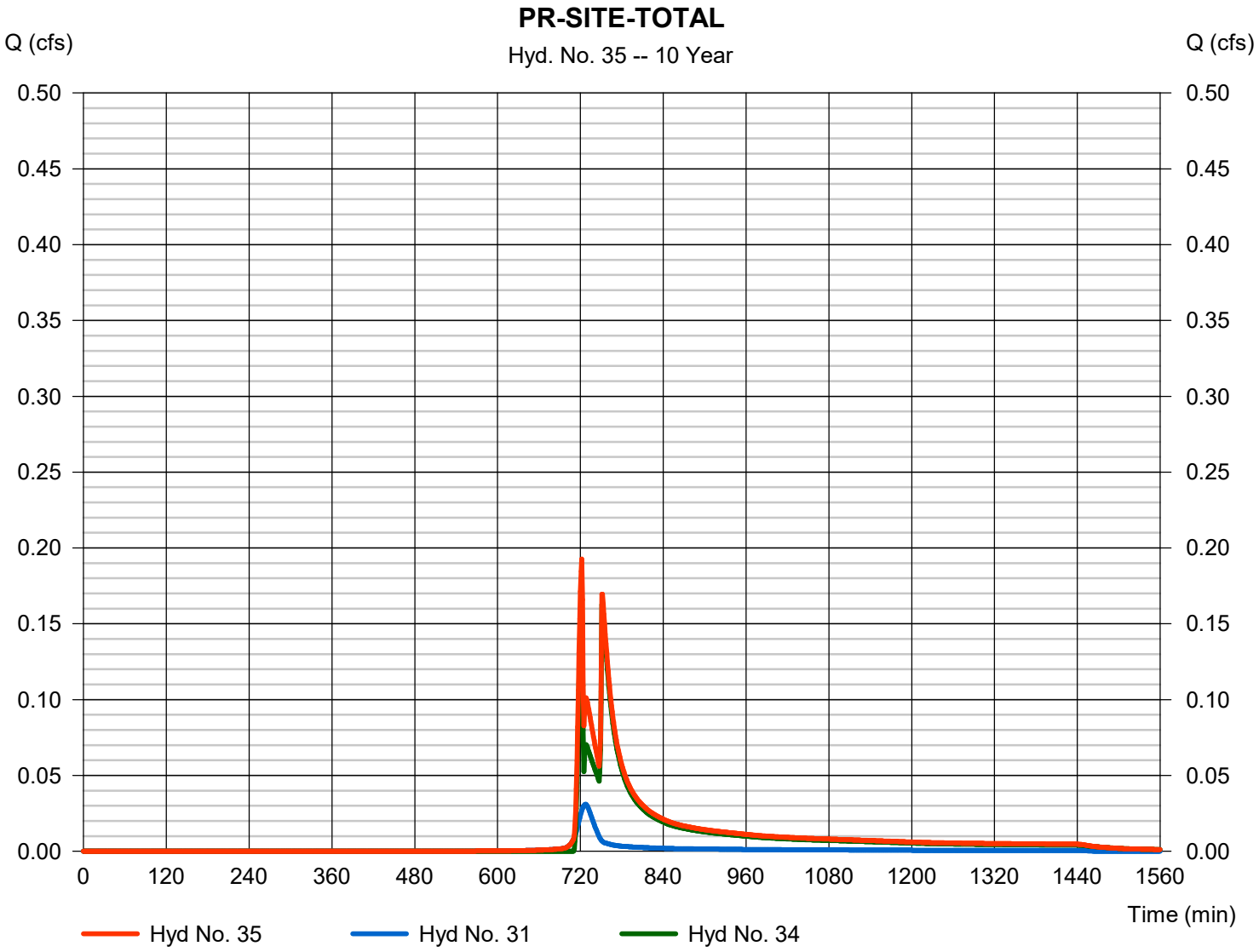


Hydrograph Report

Hyd. No. 35

PR-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.193 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	1 min	Hyd. volume	=	839 cuft
Inflow hyds.	=	31, 34	Contrib. drain. area	=	0.000 ac

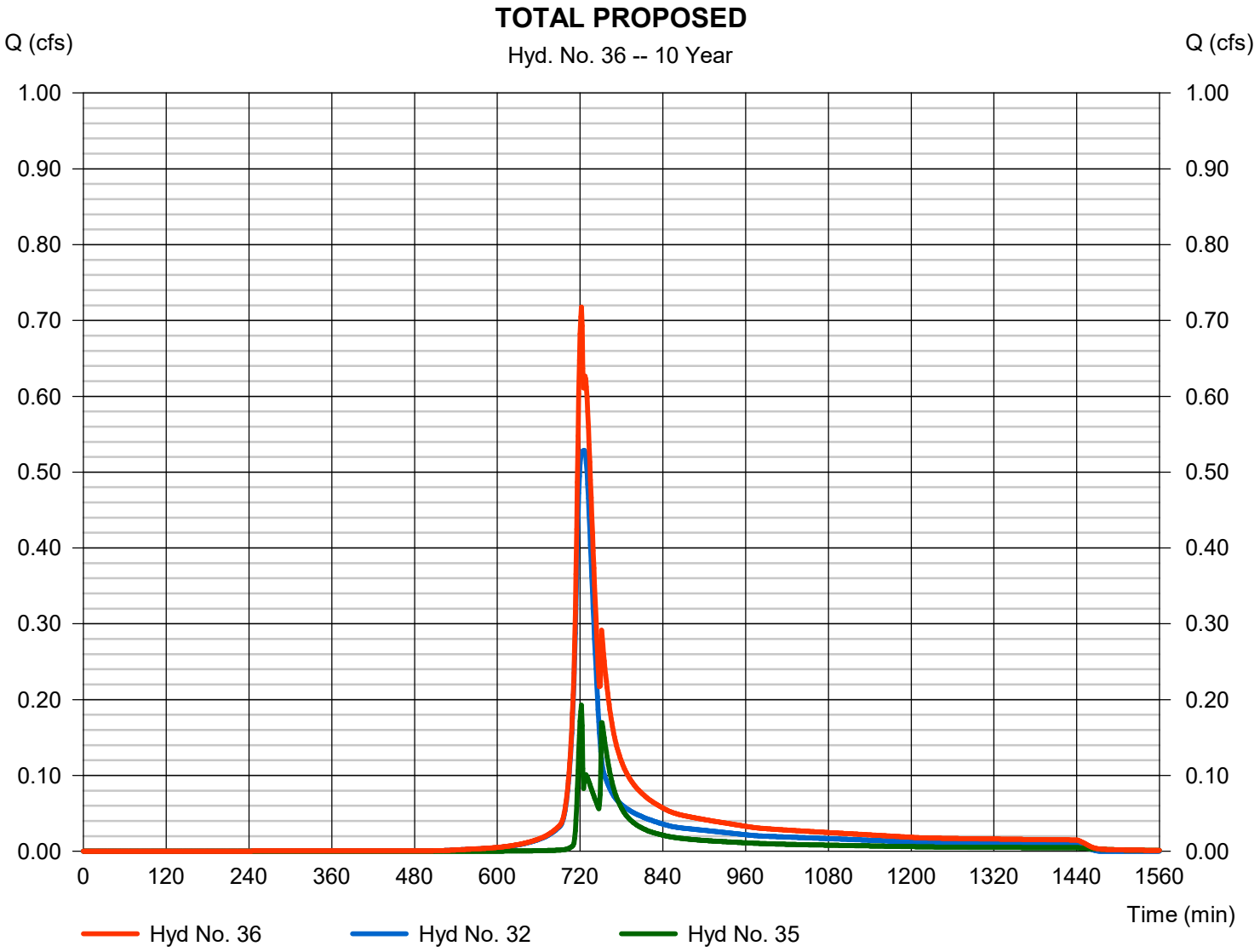


Hydrograph Report

Hyd. No. 36

TOTAL PROPOSED

Hydrograph type	= Combine	Peak discharge	= 0.718 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 2,852 cuft
Inflow hyds.	= 32, 35	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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	0.530	1	727	1,798	------	------	------	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	0.201	1	718	410	------	------	------	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	0.028	1	727	96	------	------	------	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	0.125	1	718	256	------	------	------	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	0.074	1	718	151	------	------	------	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	0.036	1	718	73	------	------	------	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	0.014	1	727	48	------	------	------	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	0.008	1	718	16	------	------	------	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	0.147	1	718	297	------	------	------	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	0.147	1	727	503	------	------	------	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	0.053	1	717	129	------	------	------	EX-SITE-TRENCH-IMP-ROAD-LcD-1
12	SCS Runoff	0.028	1	726	108	------	------	------	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	0.704	1	727	2,408	1, 10, 12	------	------	EX-OFFSITE - BYPASS
14	Combine	0.042	1	727	144	3, 7,	------	------	EX-SITE-BYPASS
15	Combine	0.442	1	718	921	4, 5, 6,	------	------	EX-SITE-BASIN COMBINE
16	Combine	0.746	1	724	2,818	8, 9, 11, 2, 13,	------	------	EX-OFFSITE-TOTAL
17	Combine	0.471	1	718	1,065	14, 15,	------	------	EX-SITE-TOTAL
18	Combine	1.154	1	719	3,883	16, 17	------	------	TOTAL EXISTING
19	SCS Runoff	0.530	1	727	1,798	------	------	------	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	0.201	1	718	410	------	------	------	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	0.029	1	727	99	------	------	------	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	0.129	1	718	264	------	------	------	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	0.102	1	717	234	------	------	------	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	0.050	1	717	122	------	------	------	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	0.015	1	727	50	------	------	------	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	0.013	1	717	28	------	------	------	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	0.311	1	717	753	------	------	------	PR-SITE-TRENCH-IMP-LcD-12,16,1
28	SCS Runoff	0.147	1	727	503	------	------	------	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	0.028	1	726	108	------	------	------	PR-OFFSITE-BYPASS-LcD-19
30	Combine	0.704	1	727	2,408	19, 28, 29	------	------	PR-OFFSITE-BYPASS
31	Combine	0.044	1	727	149	21, 25,	------	------	PR-SITE-BYPASS
32	Combine	0.746	1	724	2,818	20, 30,	------	------	PR-OFFSITE-TOTAL
33	Combine	0.604	1	717	1,401	22, 23, 24,	------	------	PR-TO-TRENCH
34	Reservoir	0.237	1	724	1,036	26, 27, 33	1687.51	716	INF TRENCH

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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
35	Combine	0.279	1	724	1,185	31, 34	------	------	PR-SITE-TOTAL
36	Combine	1.025	1	724	4,003	32, 35	------	------	TOTAL PROPOSED

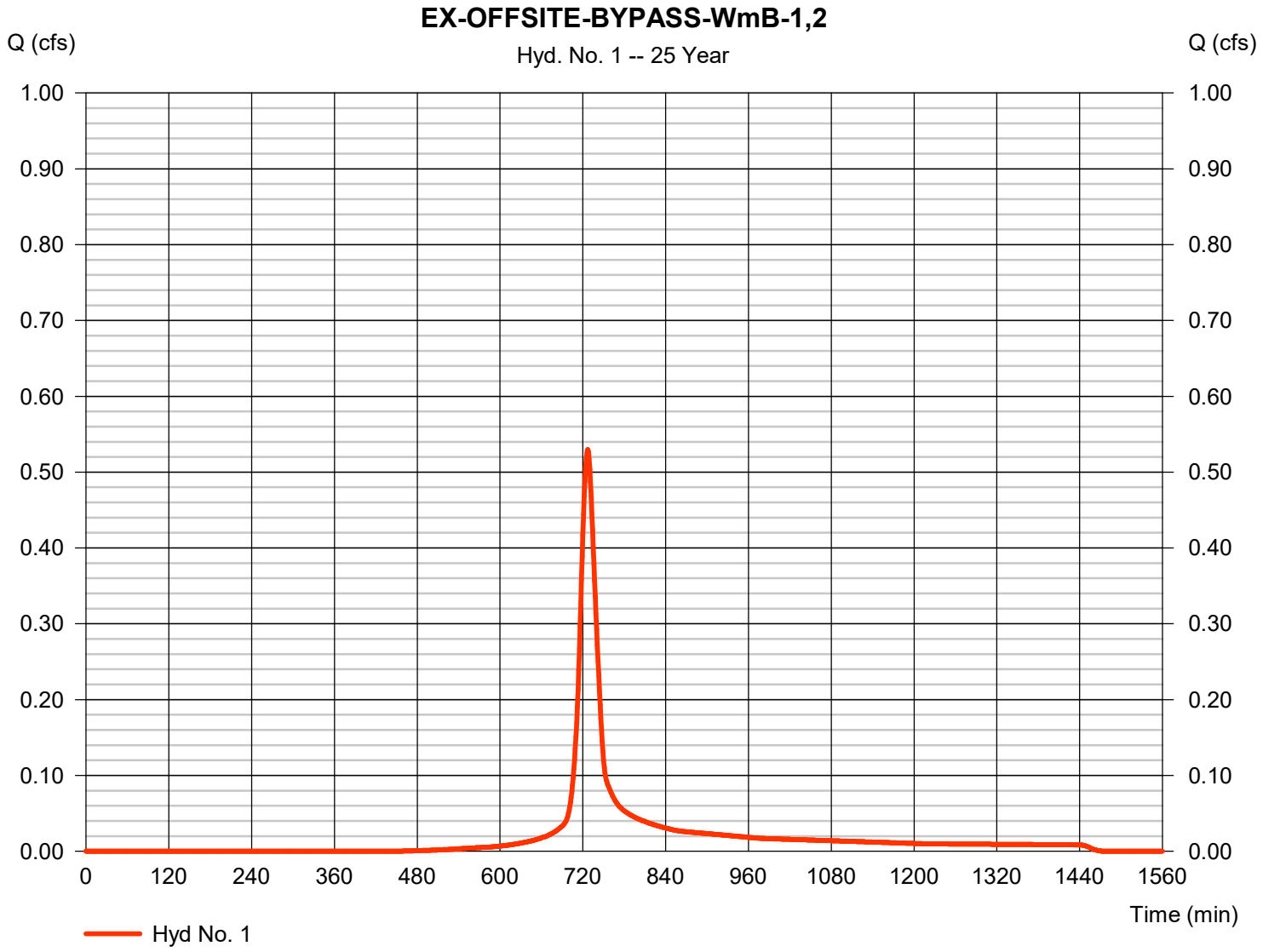
Hydrograph Report

Hyd. No. 1

EX-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.530 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	1,798 cuft
Drainage area	=	0.152 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.020 x 78) + (0.253 x 77)] / 0.152



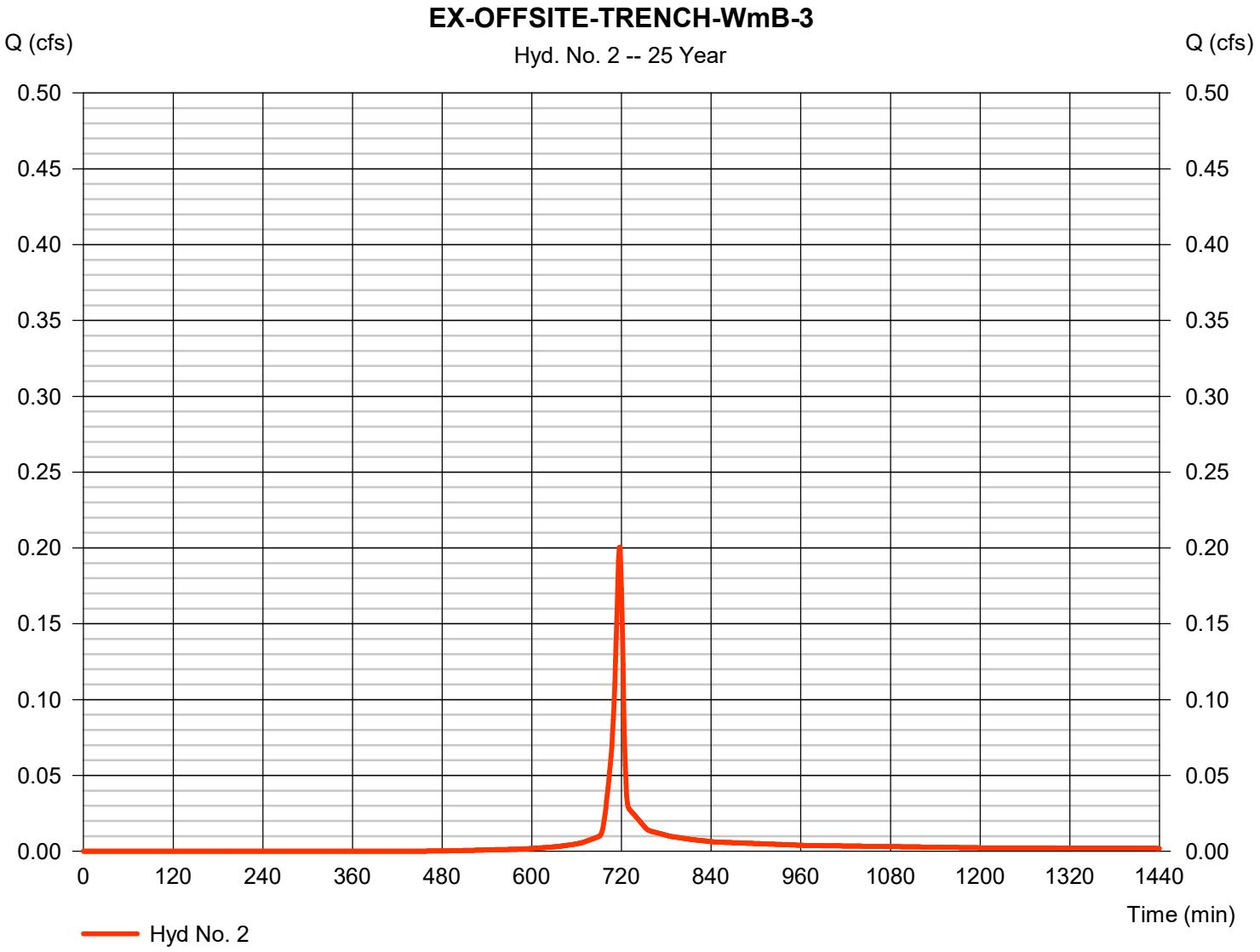
Hydrograph Report

Hyd. No. 2

EX-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.201 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 410 cuft
Drainage area	= 0.033 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 98)] / 0.033



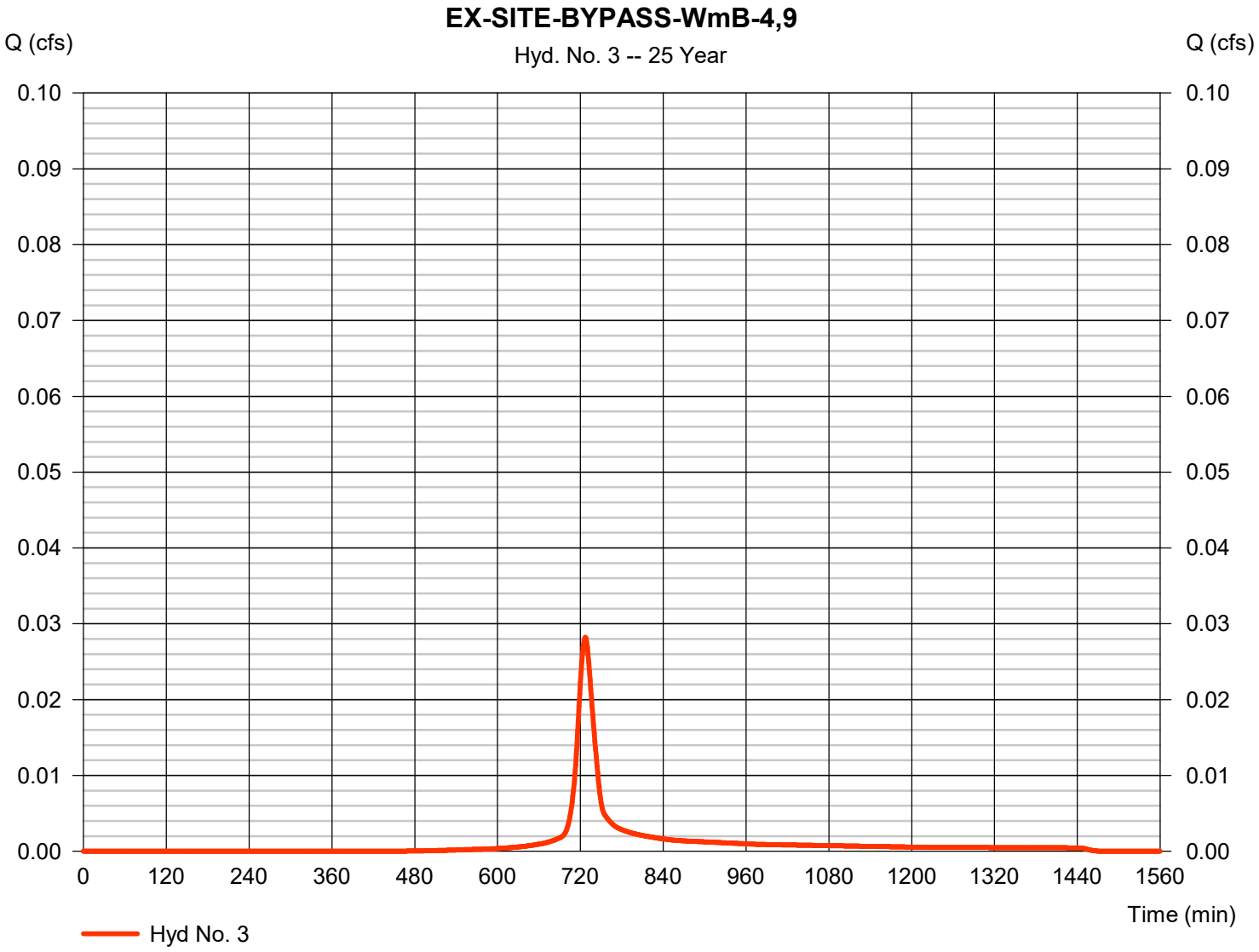
Hydrograph Report

Hyd. No. 3

EX-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.028 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	96 cuft
Drainage area	=	0.008 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 77)] / 0.008



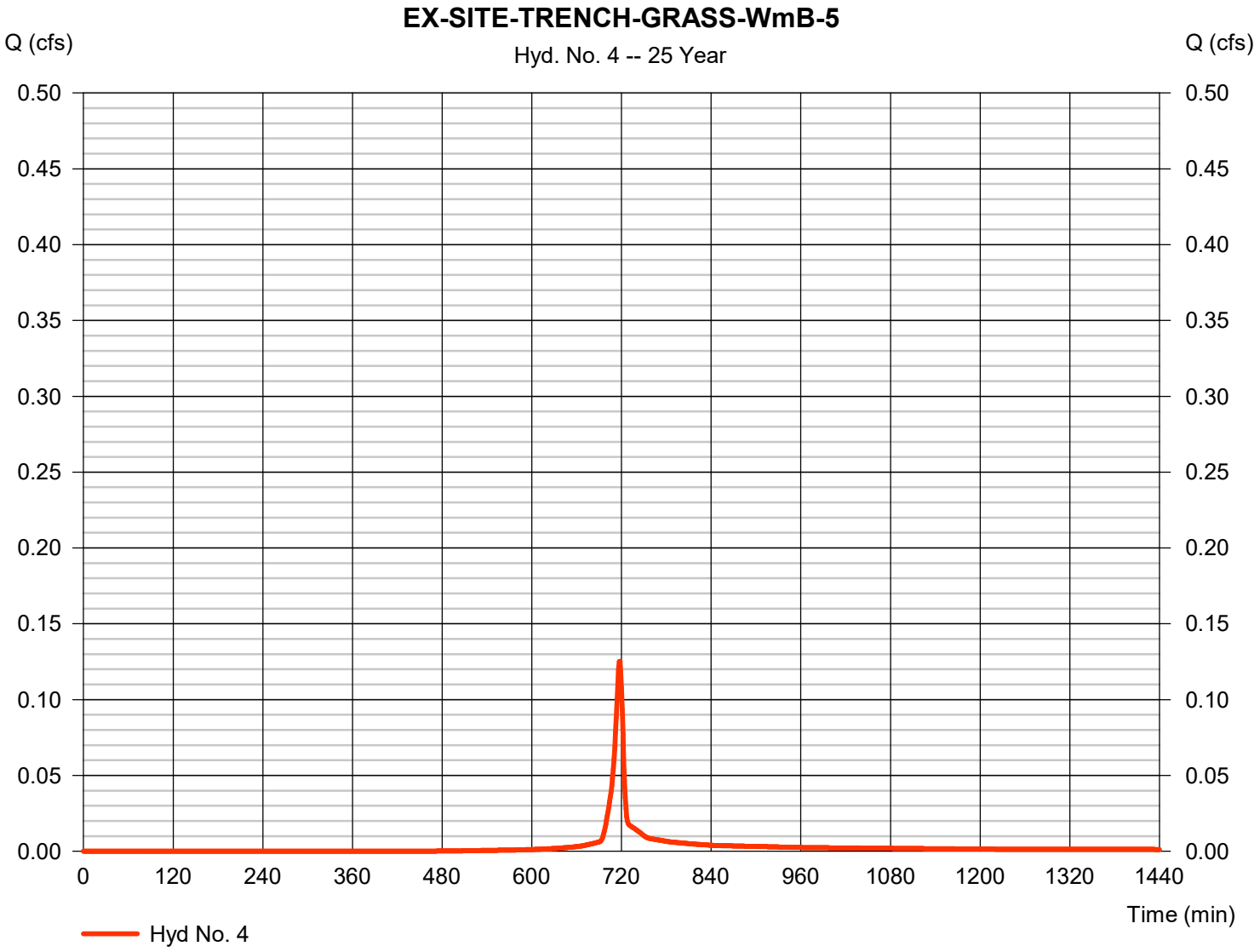
Hydrograph Report

Hyd. No. 4

EX-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.125 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 256 cuft
Drainage area	= 0.021 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70)] / 0.021

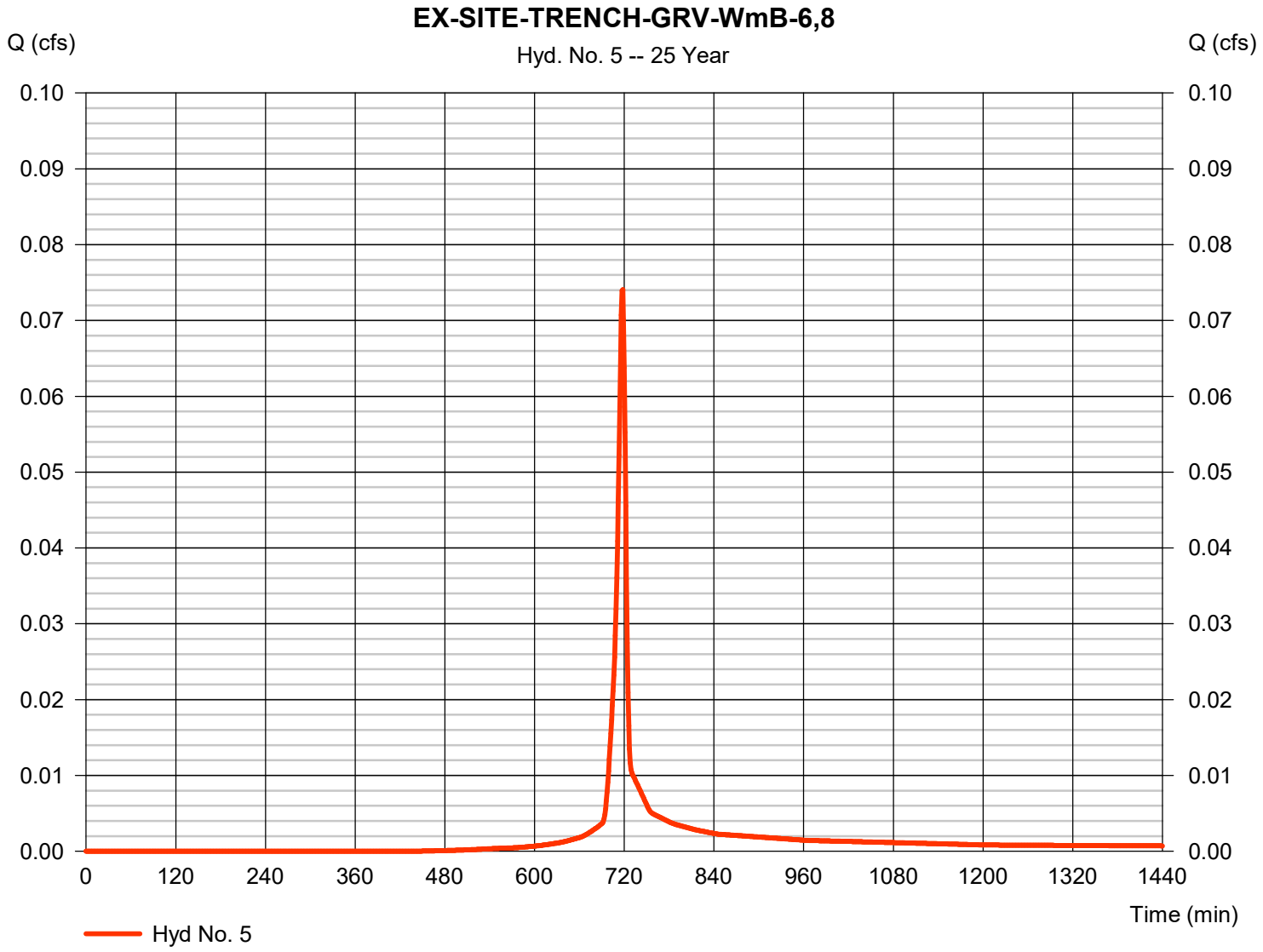


Hydrograph Report

Hyd. No. 5

EX-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.074 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 151 cuft
Drainage area	= 0.012 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

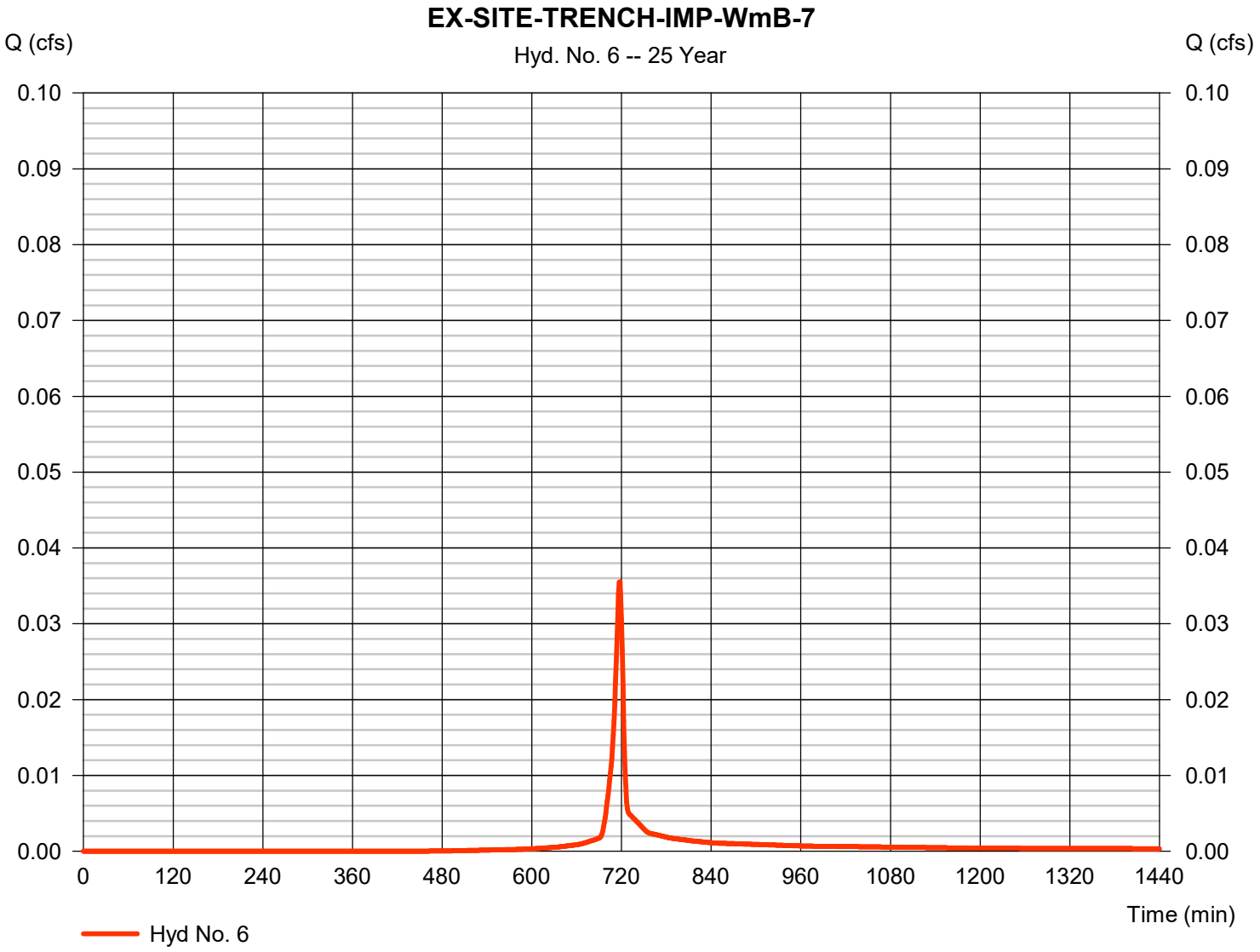


Hydrograph Report

Hyd. No. 6

EX-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.036 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 73 cuft
Drainage area	= 0.006 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

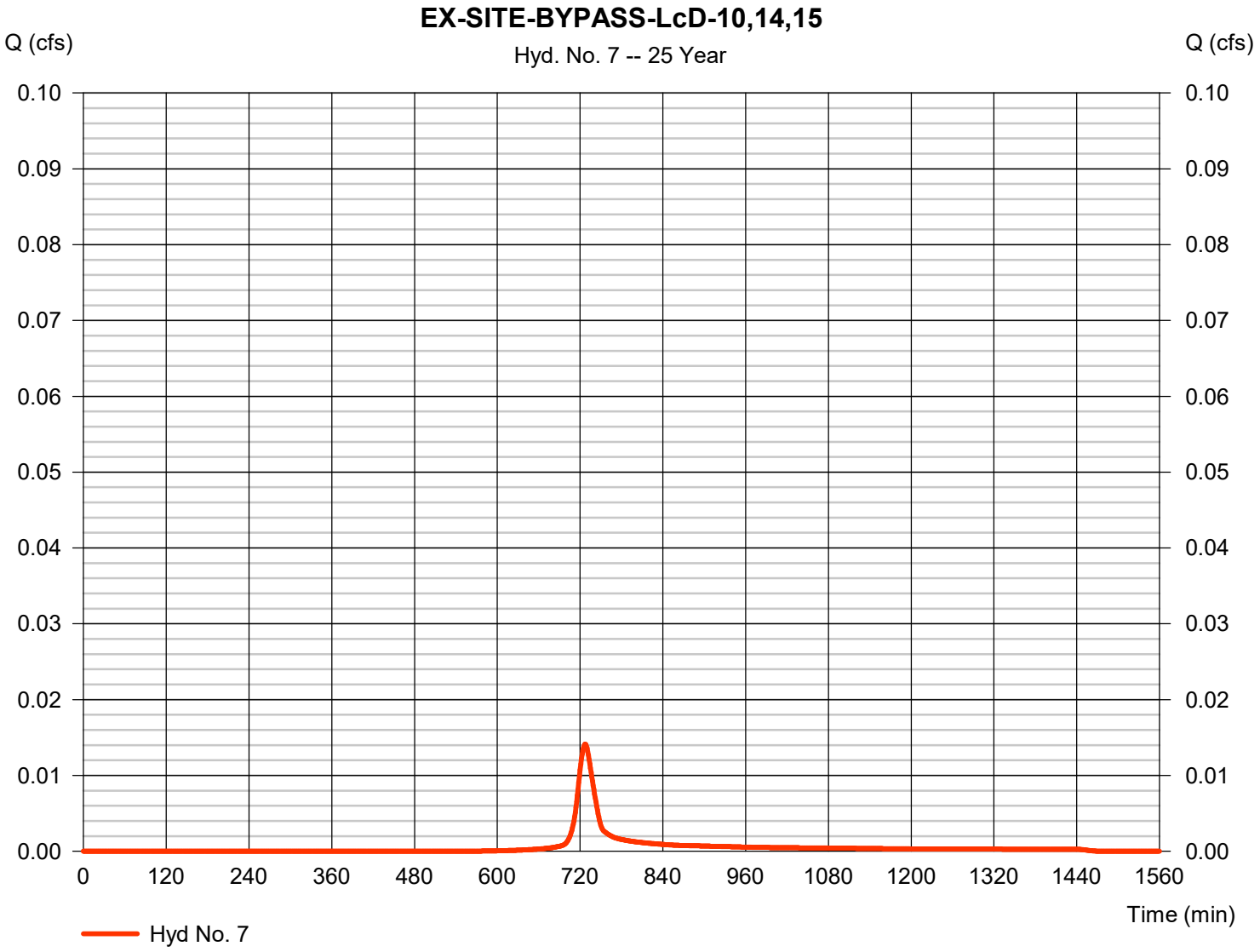


Hydrograph Report

Hyd. No. 7

EX-SITE-BYPASS-LcD-10,14,15

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.014 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	48 cuft
Drainage area	=	0.005 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

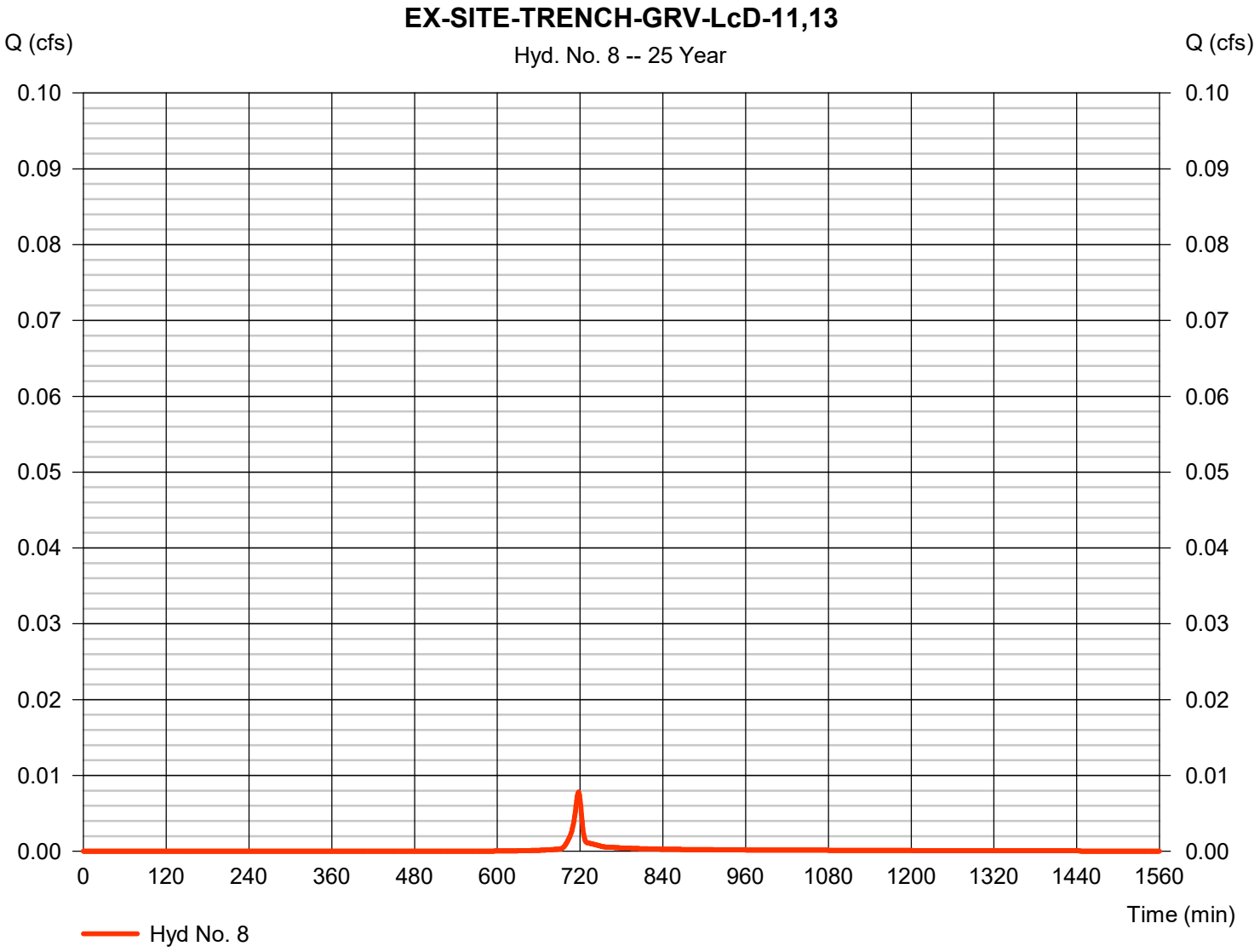


Hydrograph Report

Hyd. No. 8

EX-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 16 cuft
Drainage area	= 0.002 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

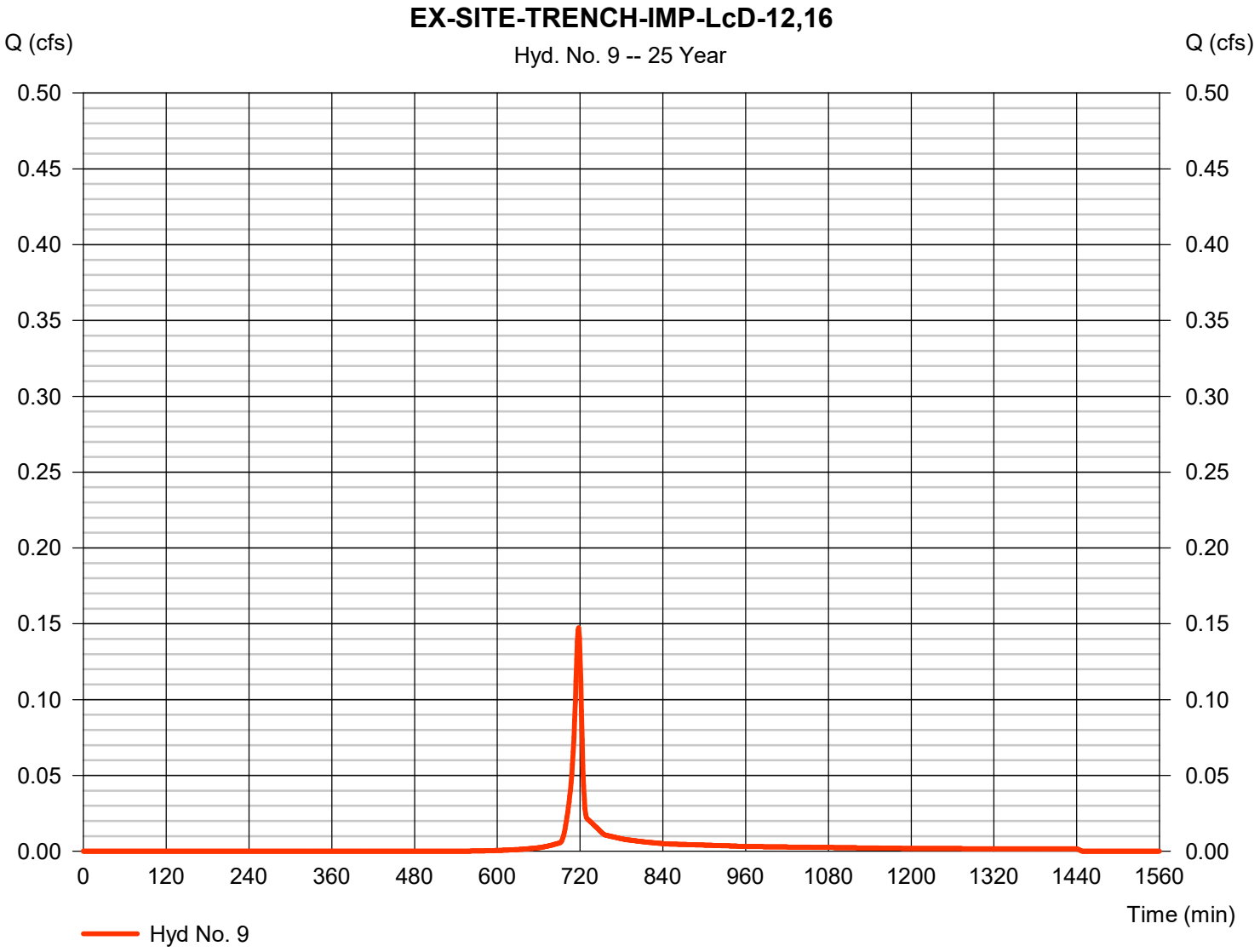


Hydrograph Report

Hyd. No. 9

EX-SITE-TRENCH-IMP-LcD-12,16

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.147 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	297 cuft
Drainage area	=	0.030 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

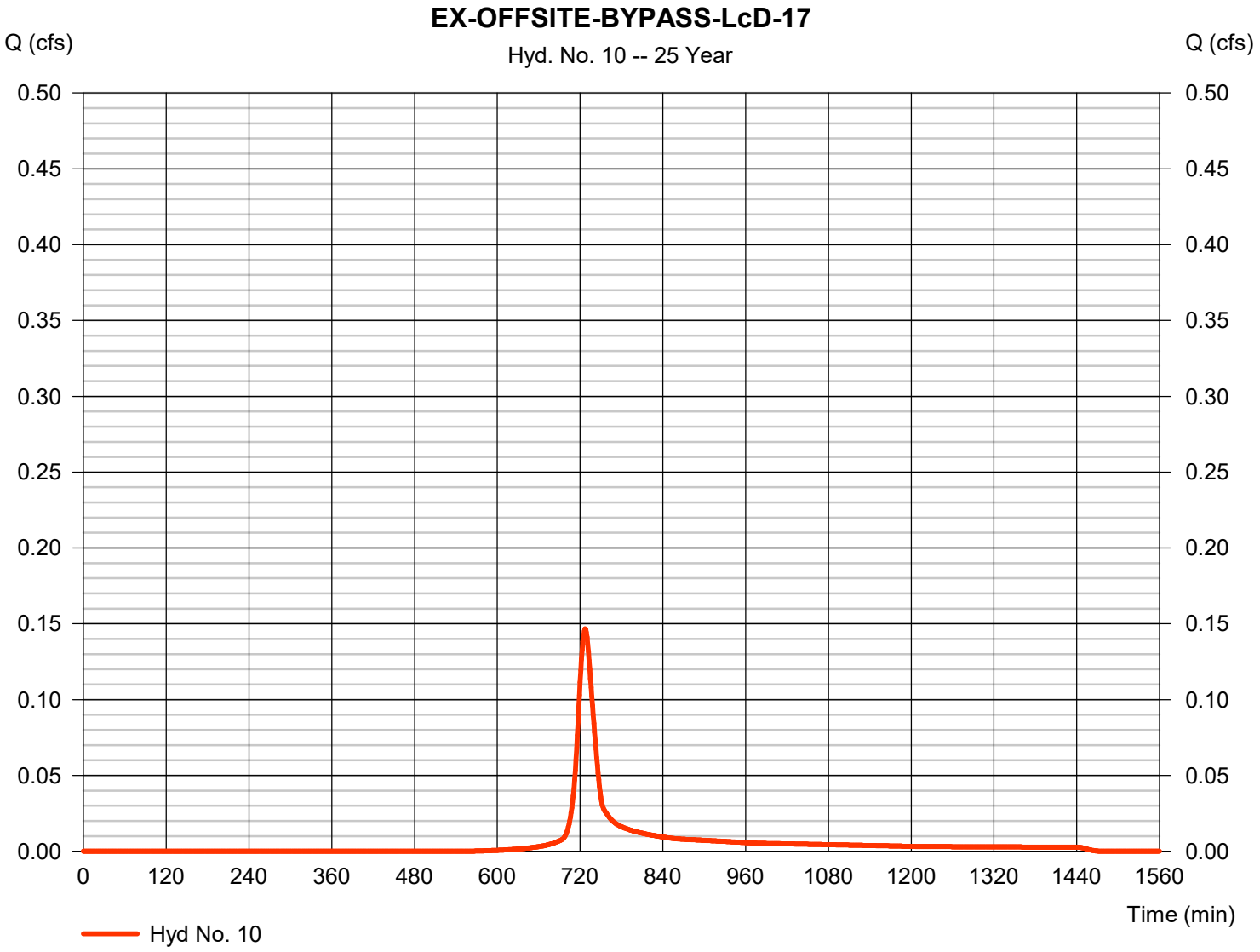


Hydrograph Report

Hyd. No. 10

EX-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.147 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	503 cuft
Drainage area	=	0.053 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

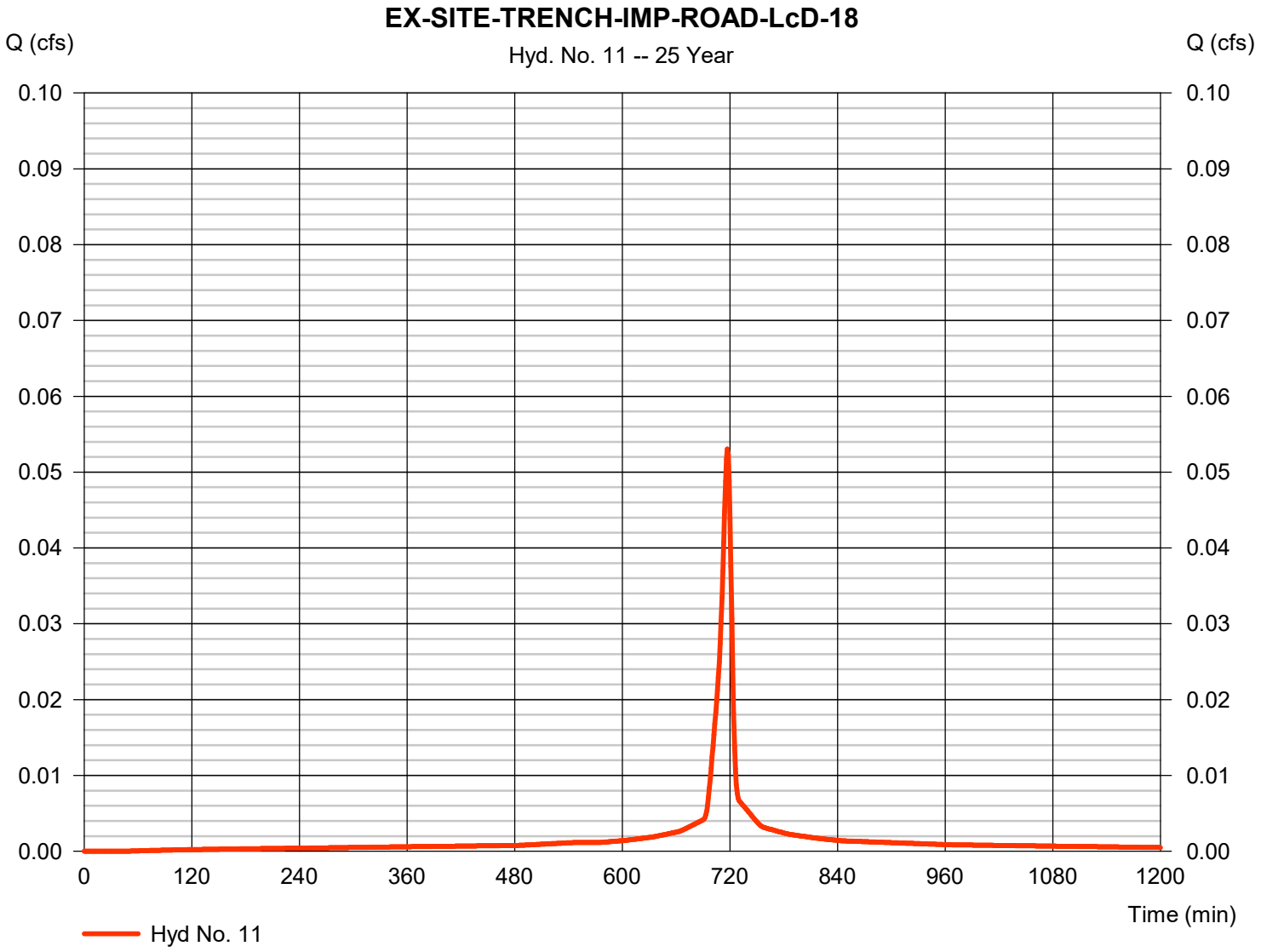


Hydrograph Report

Hyd. No. 11

EX-SITE-TRENCH-IMP-ROAD-LcD-18

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.053 cfs
Storm frequency	=	25 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	129 cuft
Drainage area	=	0.006 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

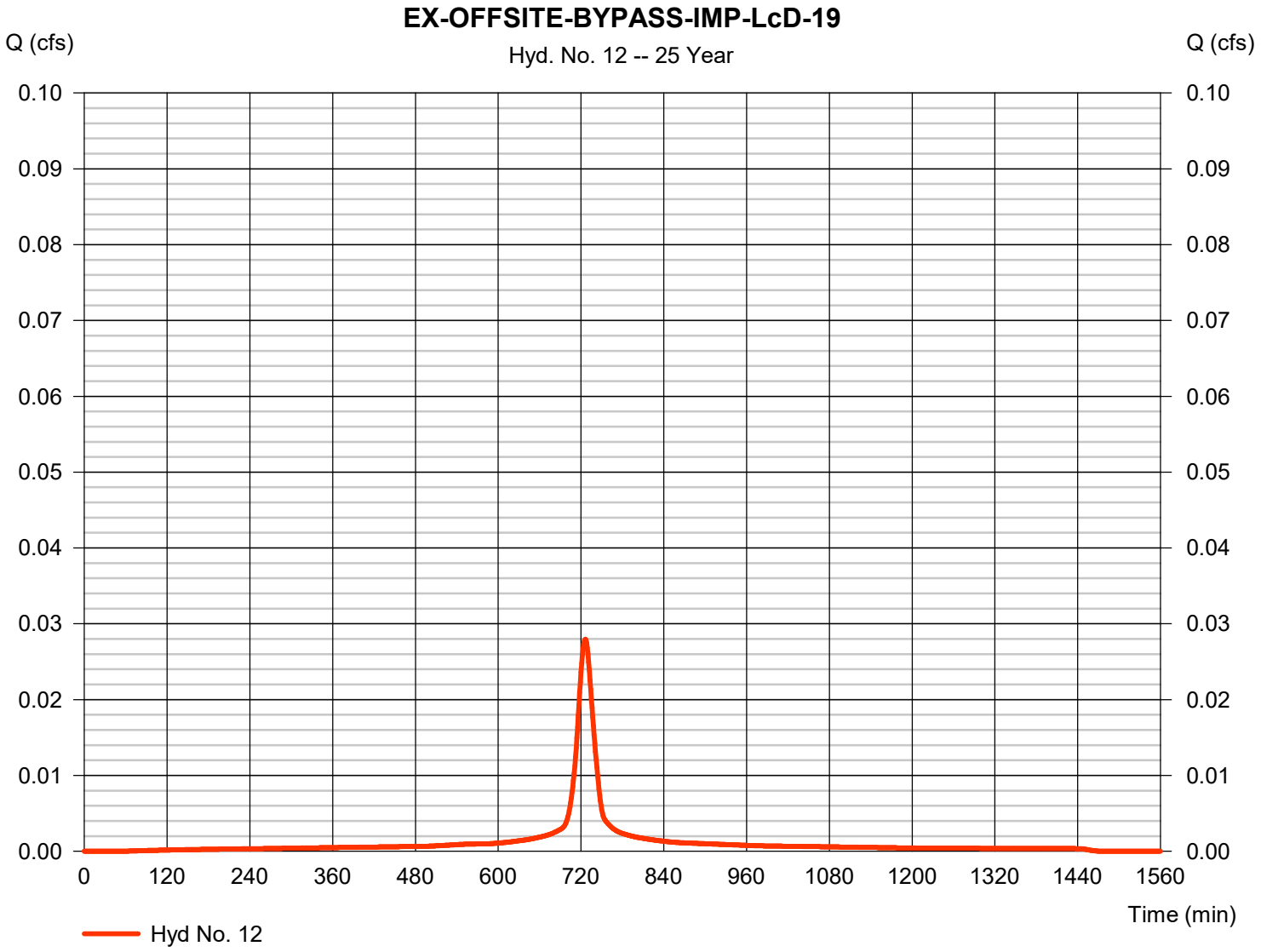


Hydrograph Report

Hyd. No. 12

EX-OFFSITE-BYPASS-IMP-LcD-19

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.028 cfs
Storm frequency	=	25 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	108 cuft
Drainage area	=	0.005 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

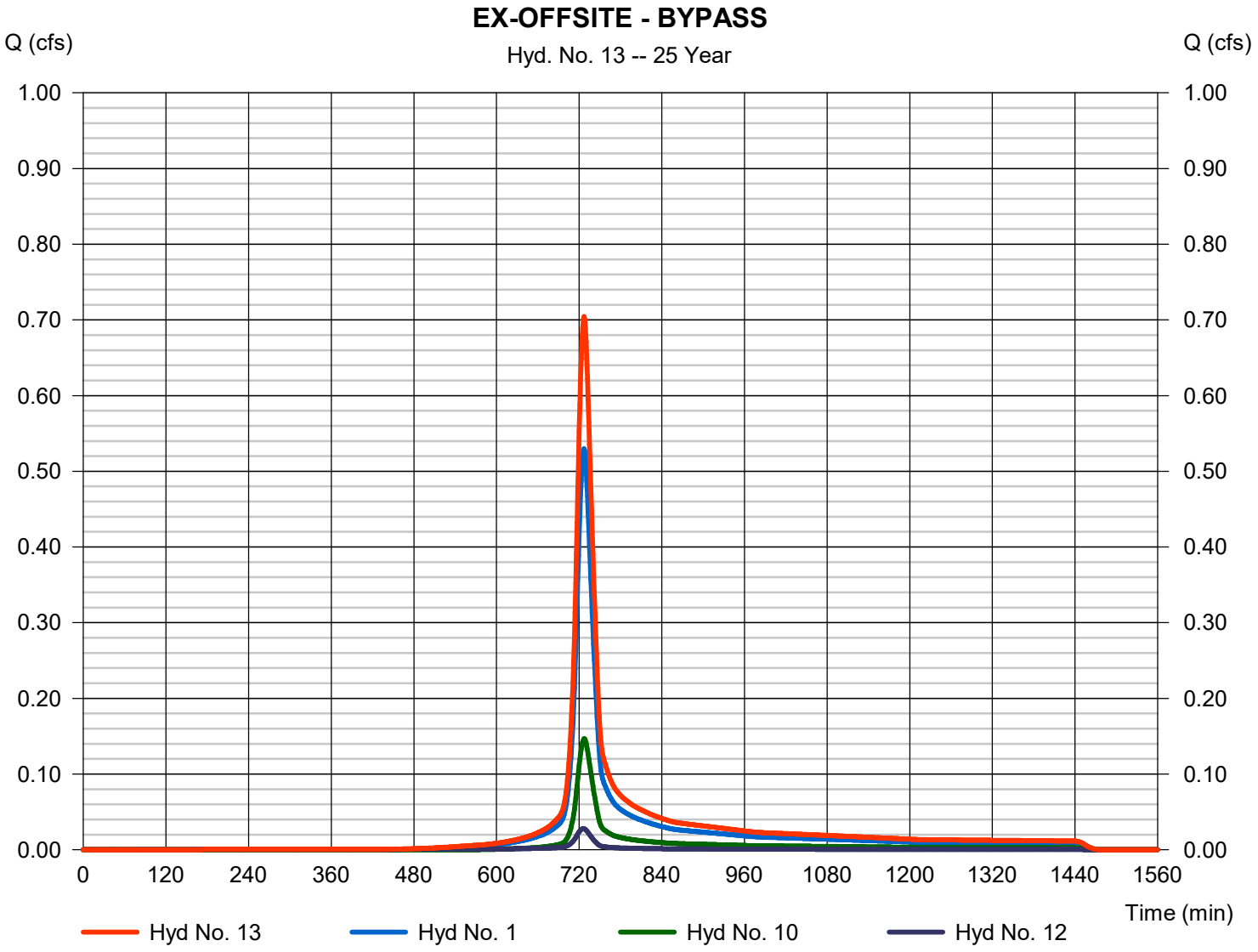


Hydrograph Report

Hyd. No. 13

EX-OFFSITE - BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.704 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	2,408 cuft
Inflow hyds.	=	1, 10, 12	Contrib. drain. area	=	0.211 ac

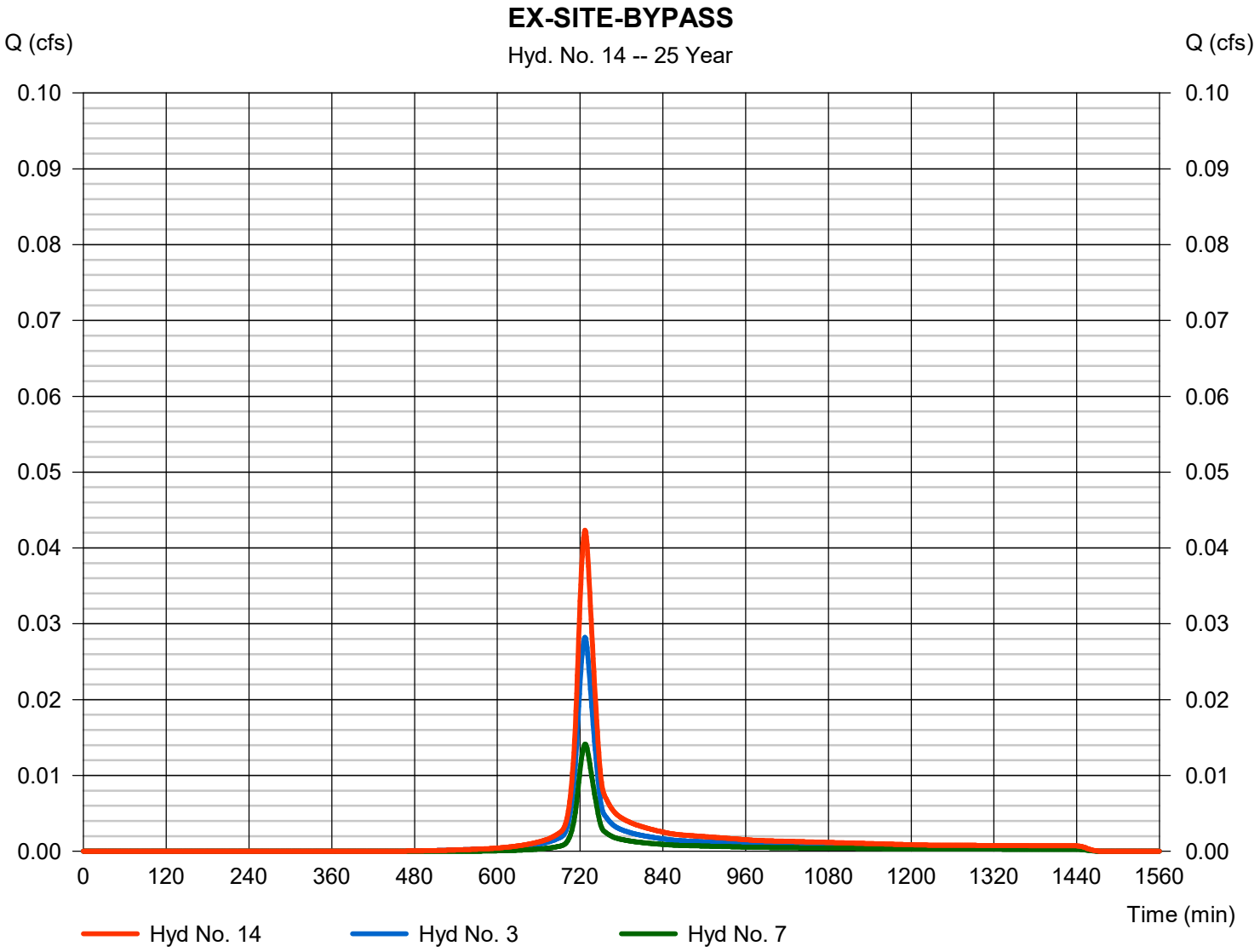


Hydrograph Report

Hyd. No. 14

EX-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.042 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	144 cuft
Inflow hyds.	=	3, 7	Contrib. drain. area	=	0.013 ac

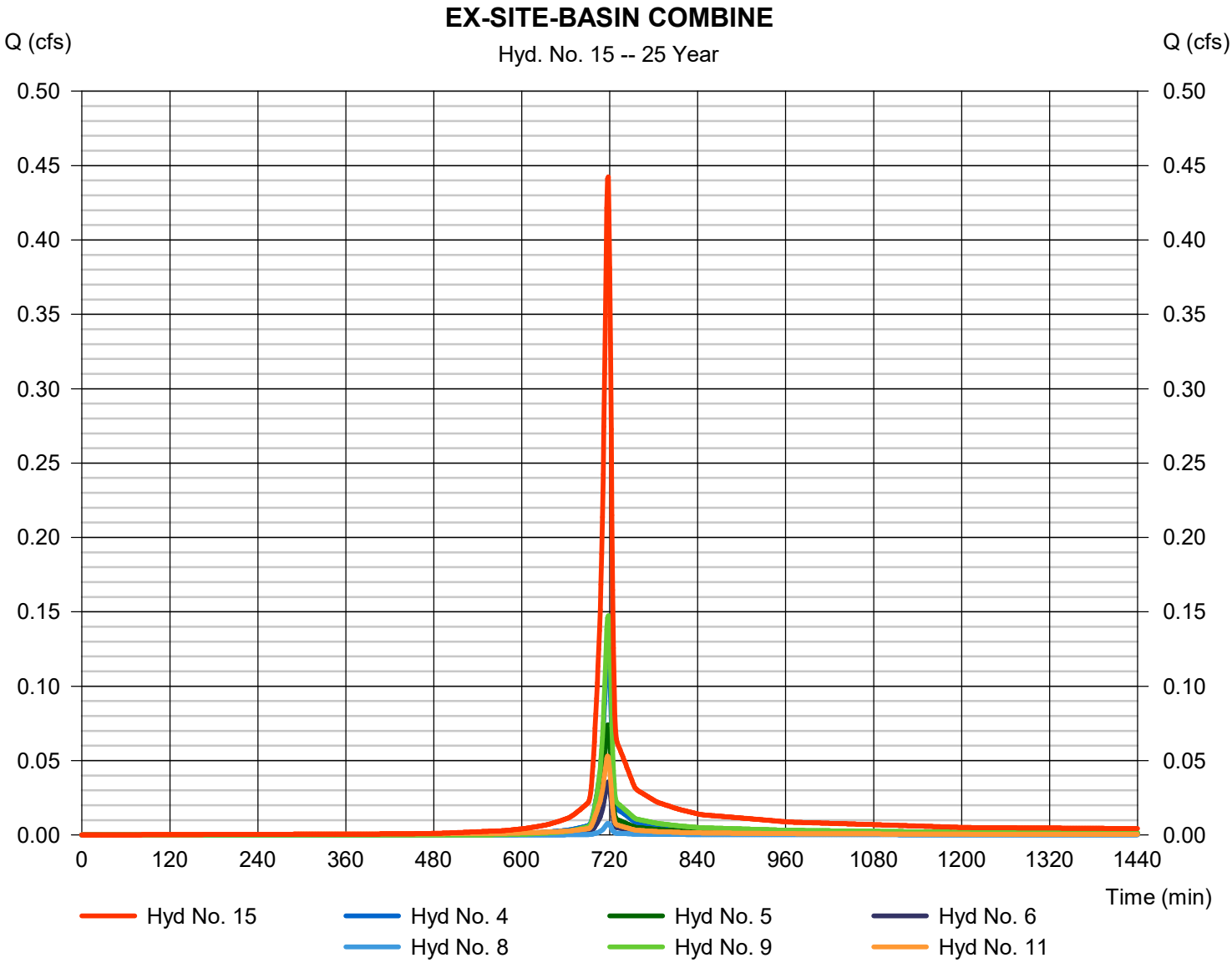


Hydrograph Report

Hyd. No. 15

EX-SITE-BASIN COMBINE

Hydrograph type	=	Combine	Peak discharge	=	0.442 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	921 cuft
Inflow hyds.	=	4, 5, 6, 8, 9, 11	Contrib. drain. area	=	0.077 ac

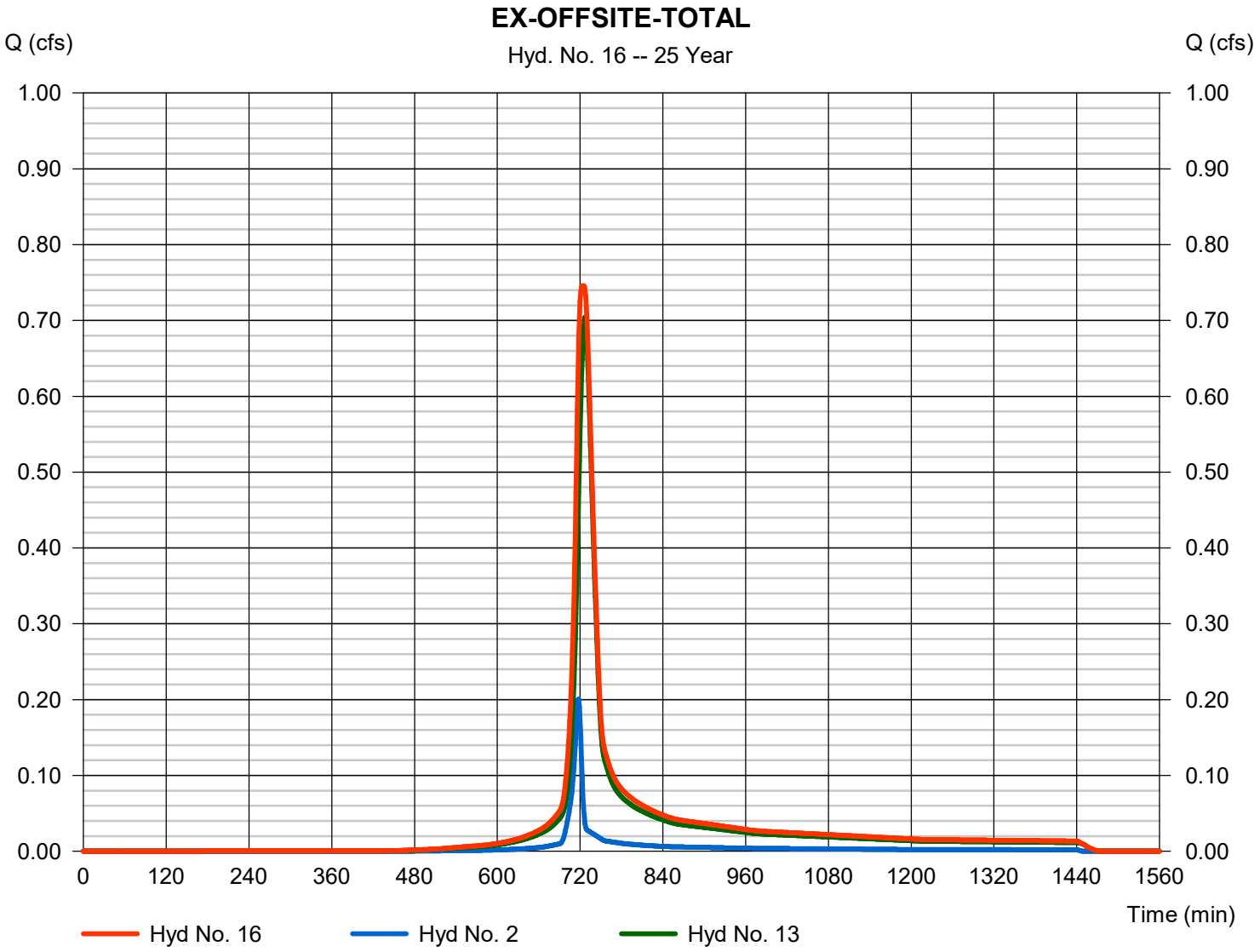


Hydrograph Report

Hyd. No. 16

EX-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.746 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 2,818 cuft
Inflow hyds.	= 2, 13	Contrib. drain. area	= 0.033 ac

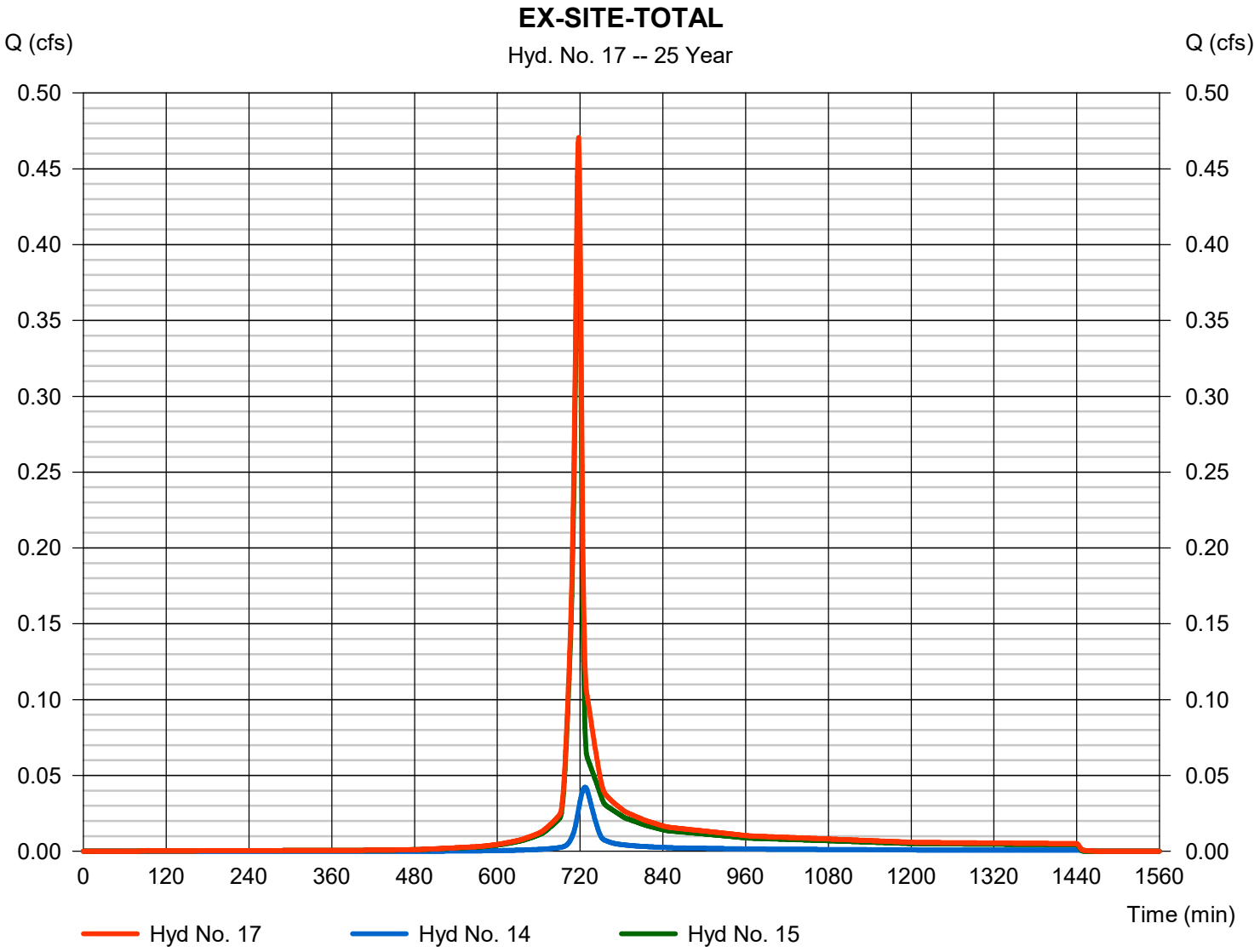


Hydrograph Report

Hyd. No. 17

EX-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.471 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	1,065 cuft
Inflow hyds.	=	14, 15	Contrib. drain. area	=	0.000 ac

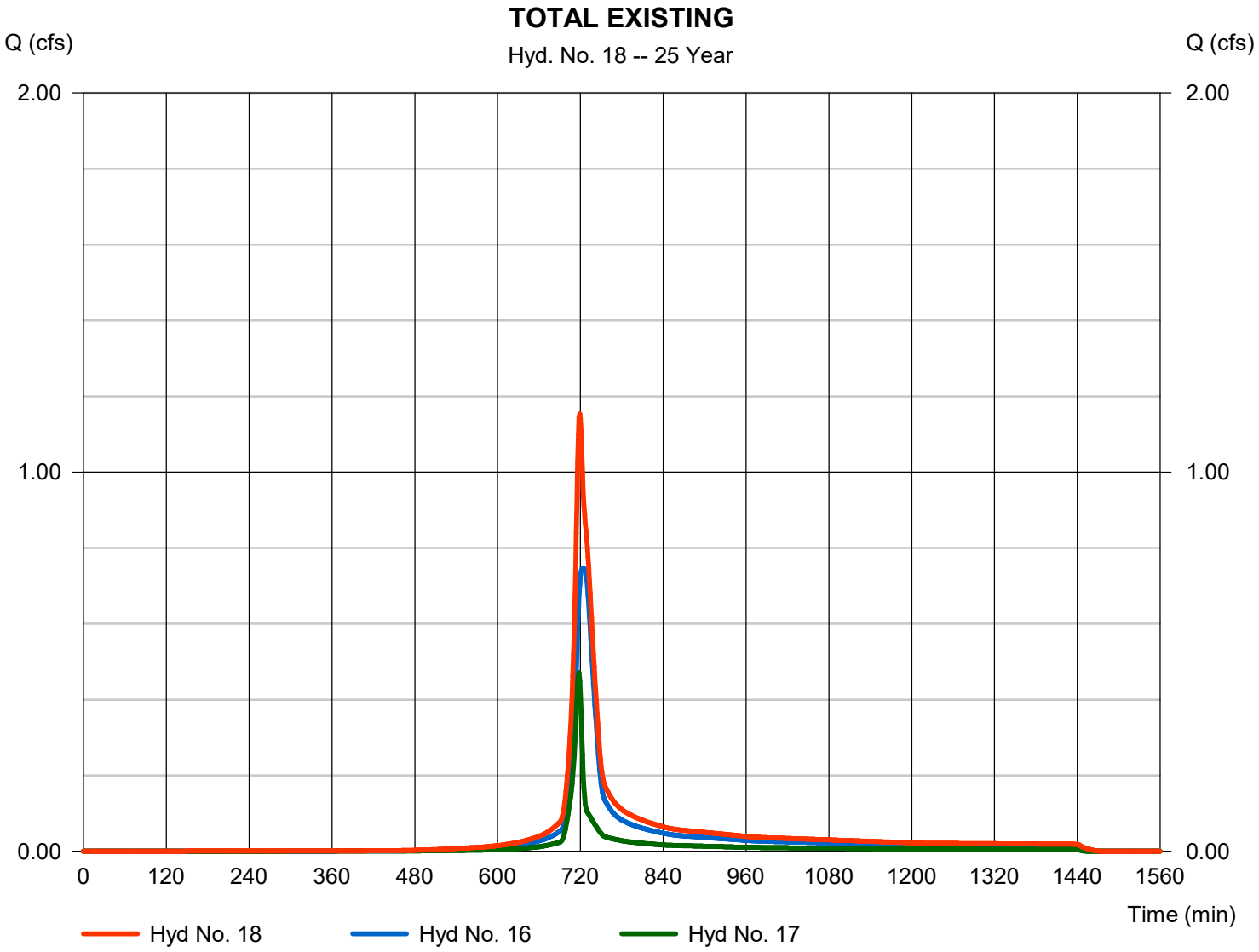


Hydrograph Report

Hyd. No. 18

TOTAL EXISTING

Hydrograph type	=	Combine	Peak discharge	=	1.154 cfs
Storm frequency	=	25 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	3,883 cuft
Inflow hyds.	=	16, 17	Contrib. drain. area	=	0.000 ac

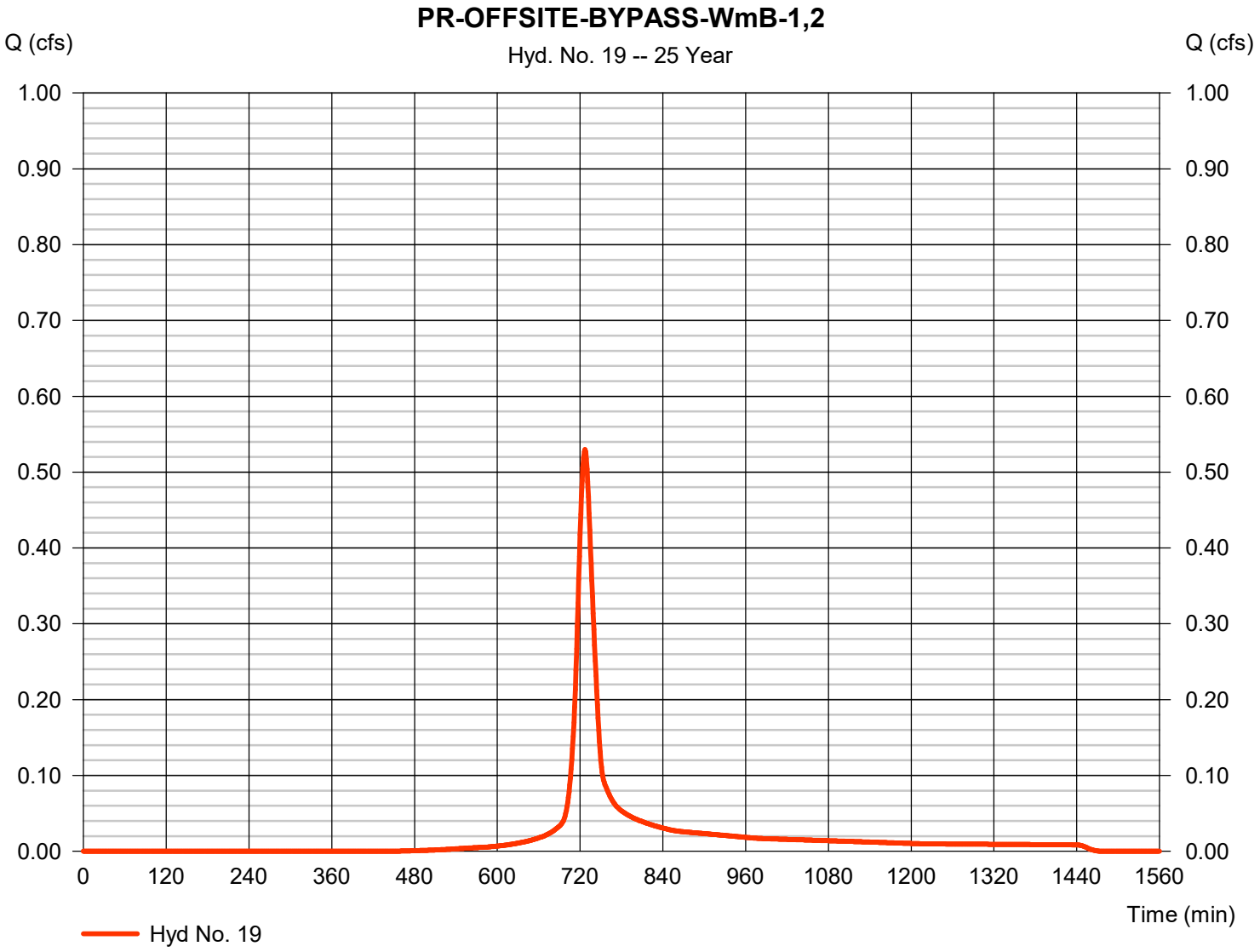


Hydrograph Report

Hyd. No. 19

PR-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.530 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	1,798 cuft
Drainage area	=	0.152 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

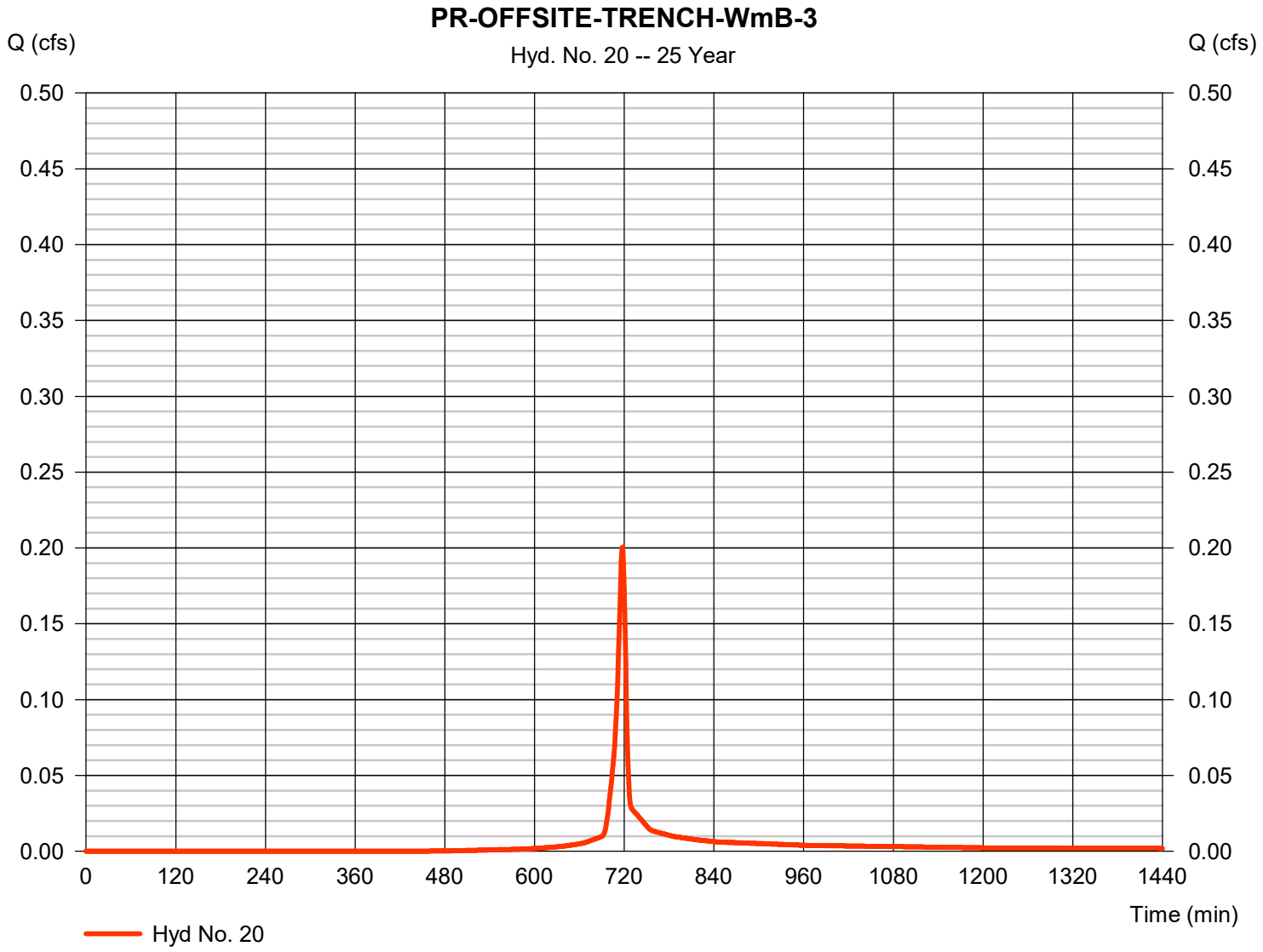


Hydrograph Report

Hyd. No. 20

PR-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.201 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 410 cuft
Drainage area	= 0.033 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

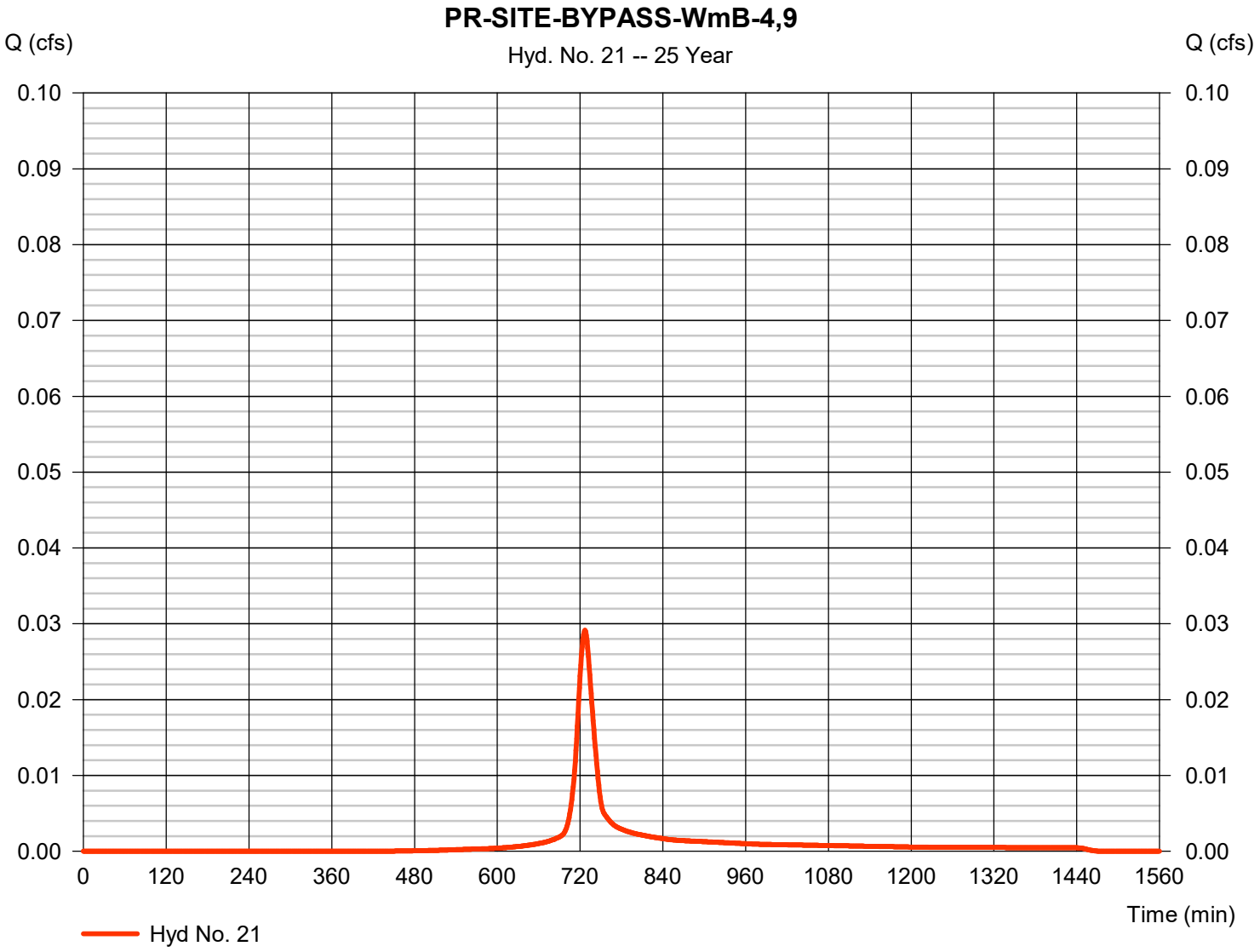


Hydrograph Report

Hyd. No. 21

PR-SITE-BYPASS-WmB-4,9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.029 cfs
Storm frequency	= 25 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 99 cuft
Drainage area	= 0.008 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

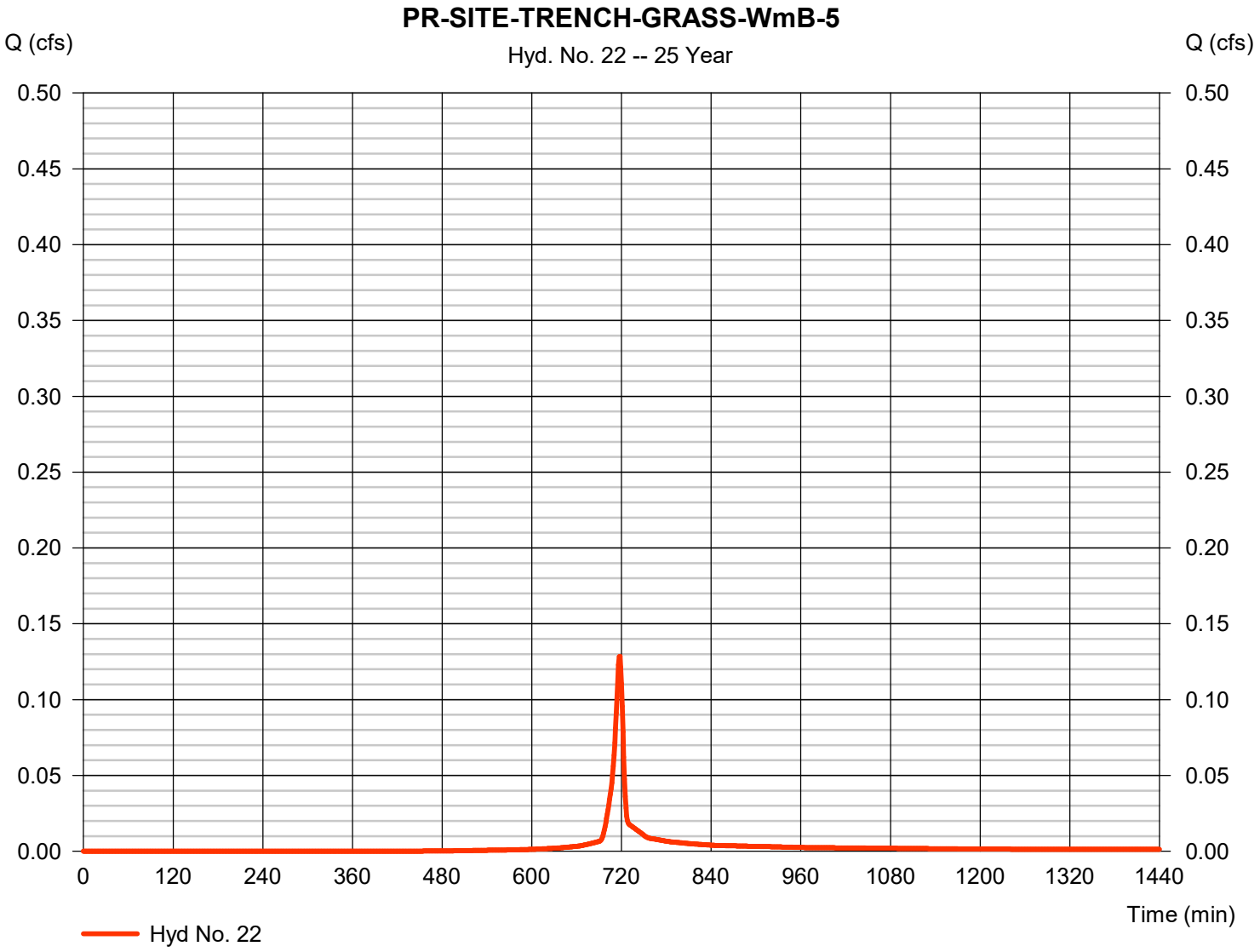


Hydrograph Report

Hyd. No. 22

PR-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.129 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 264 cuft
Drainage area	= 0.021 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

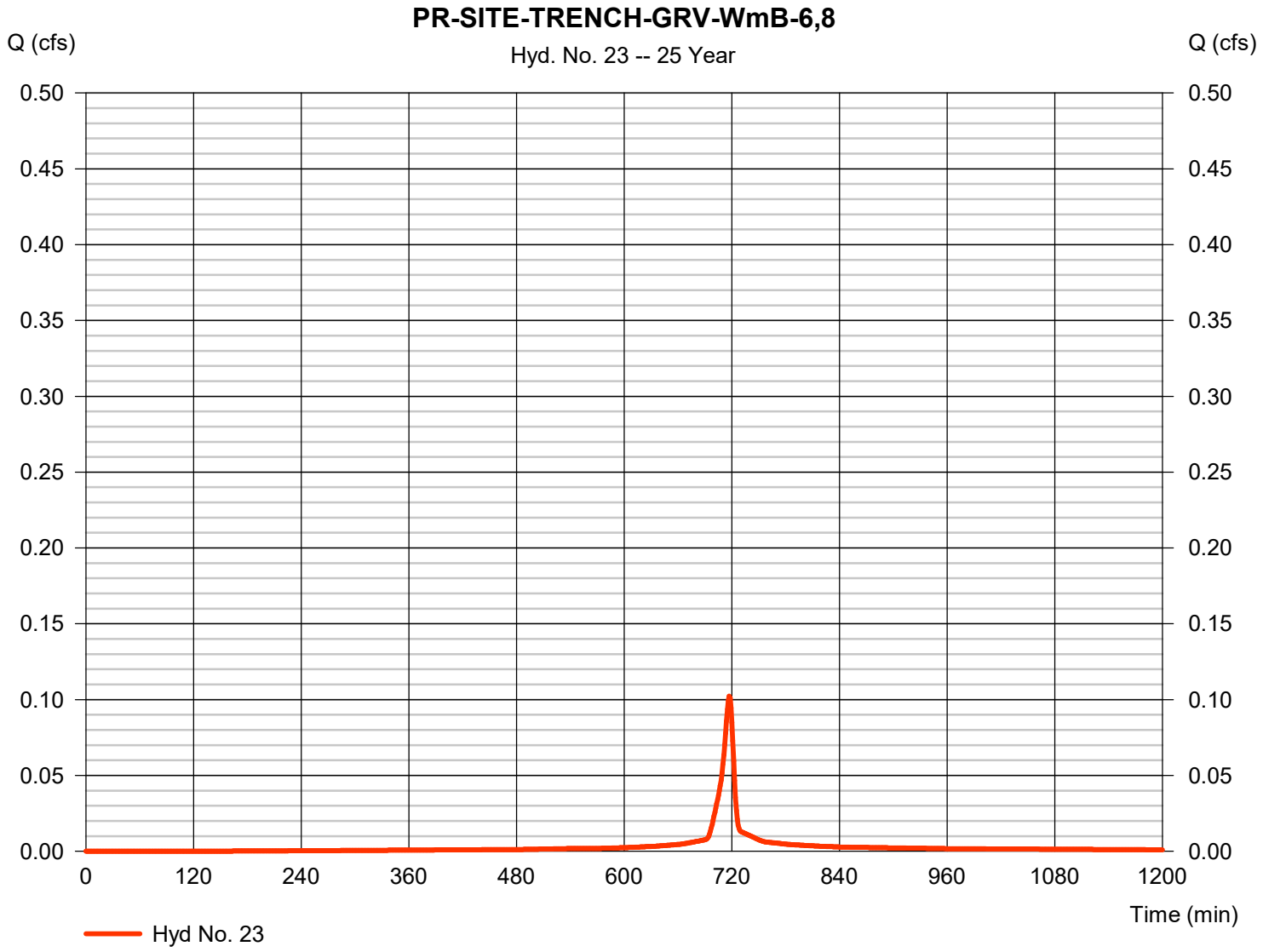


Hydrograph Report

Hyd. No. 23

PR-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.102 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 234 cuft
Drainage area	= 0.012 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

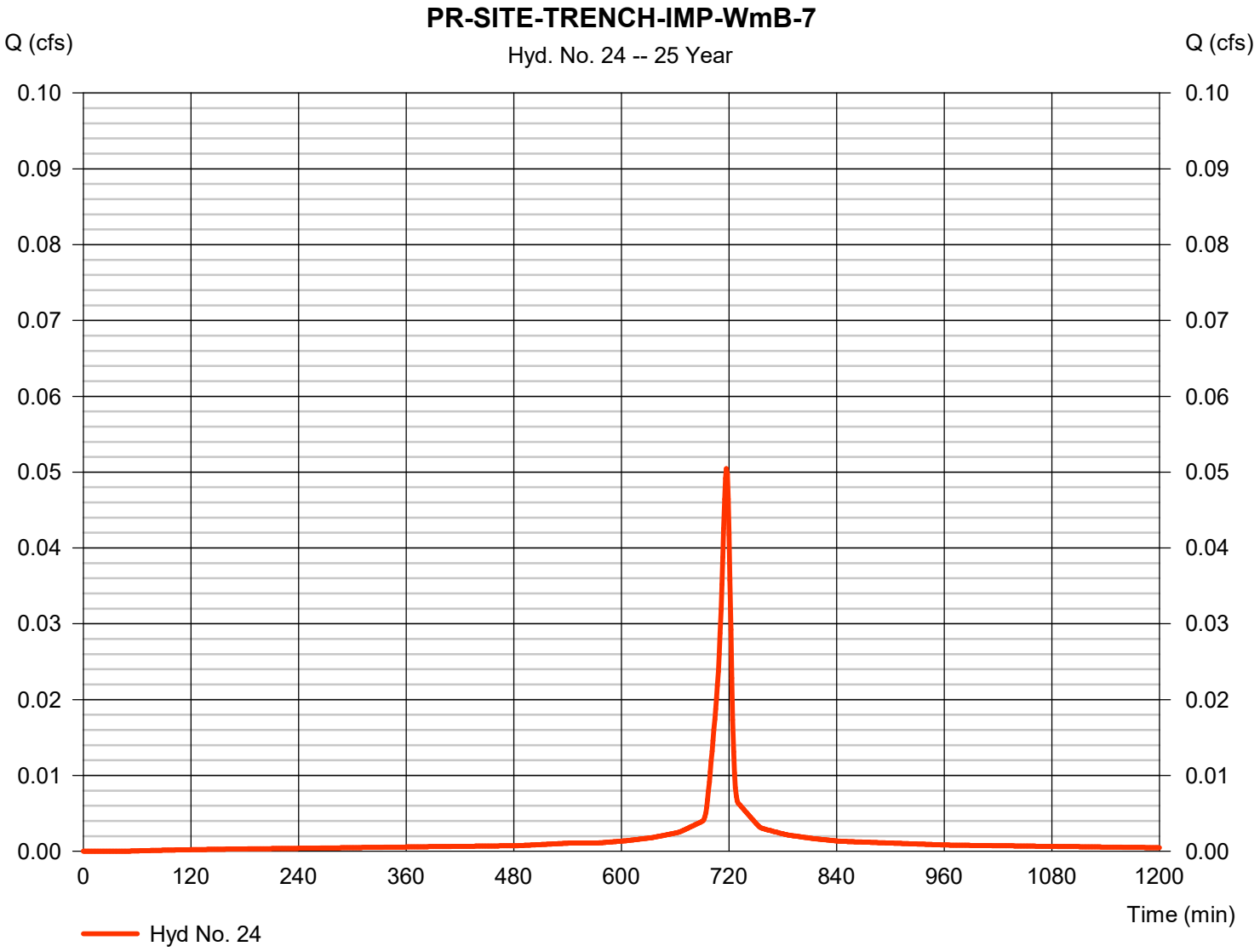


Hydrograph Report

Hyd. No. 24

PR-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.050 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 122 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

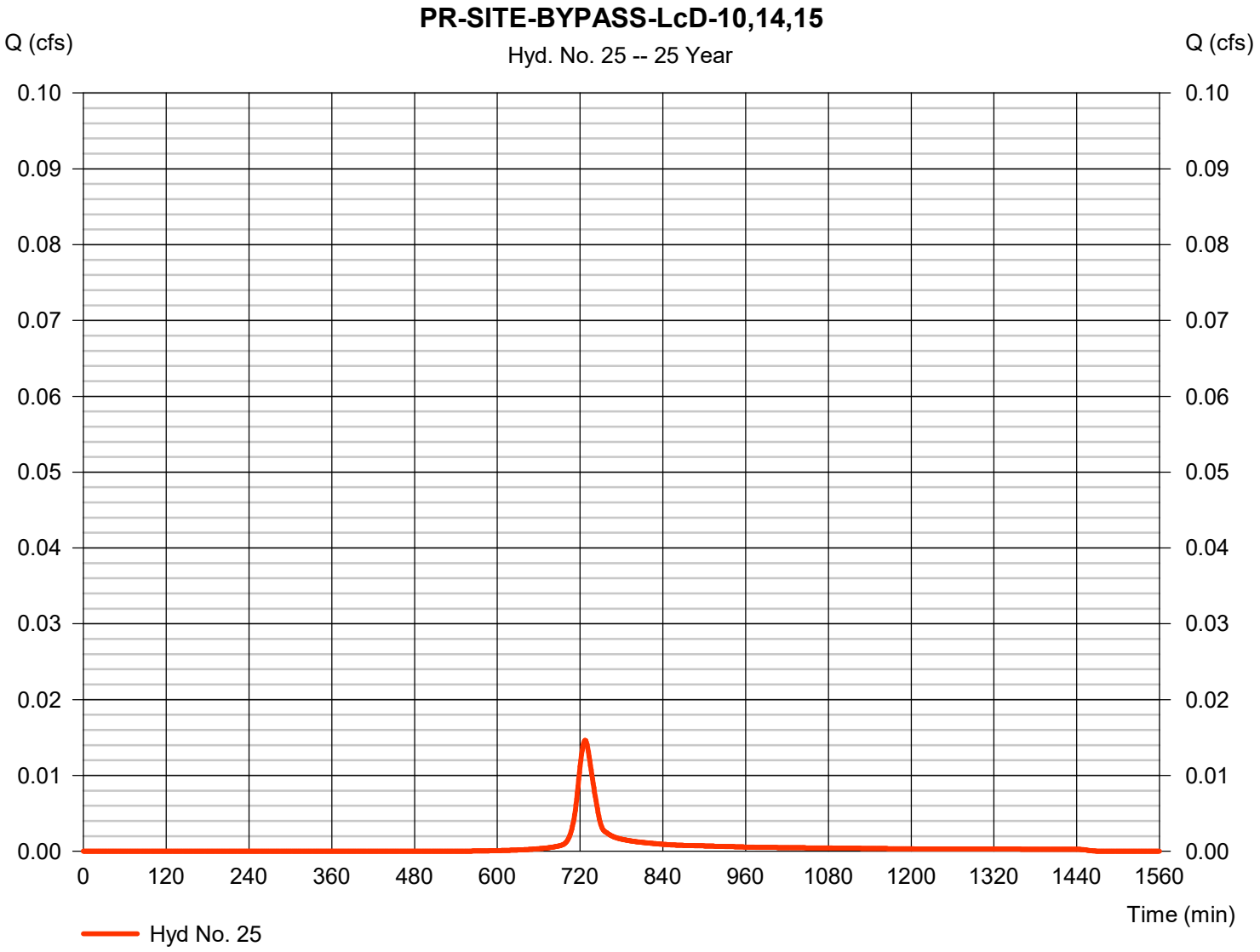


Hydrograph Report

Hyd. No. 25

PR-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.015 cfs
Storm frequency	= 25 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 50 cuft
Drainage area	= 0.005 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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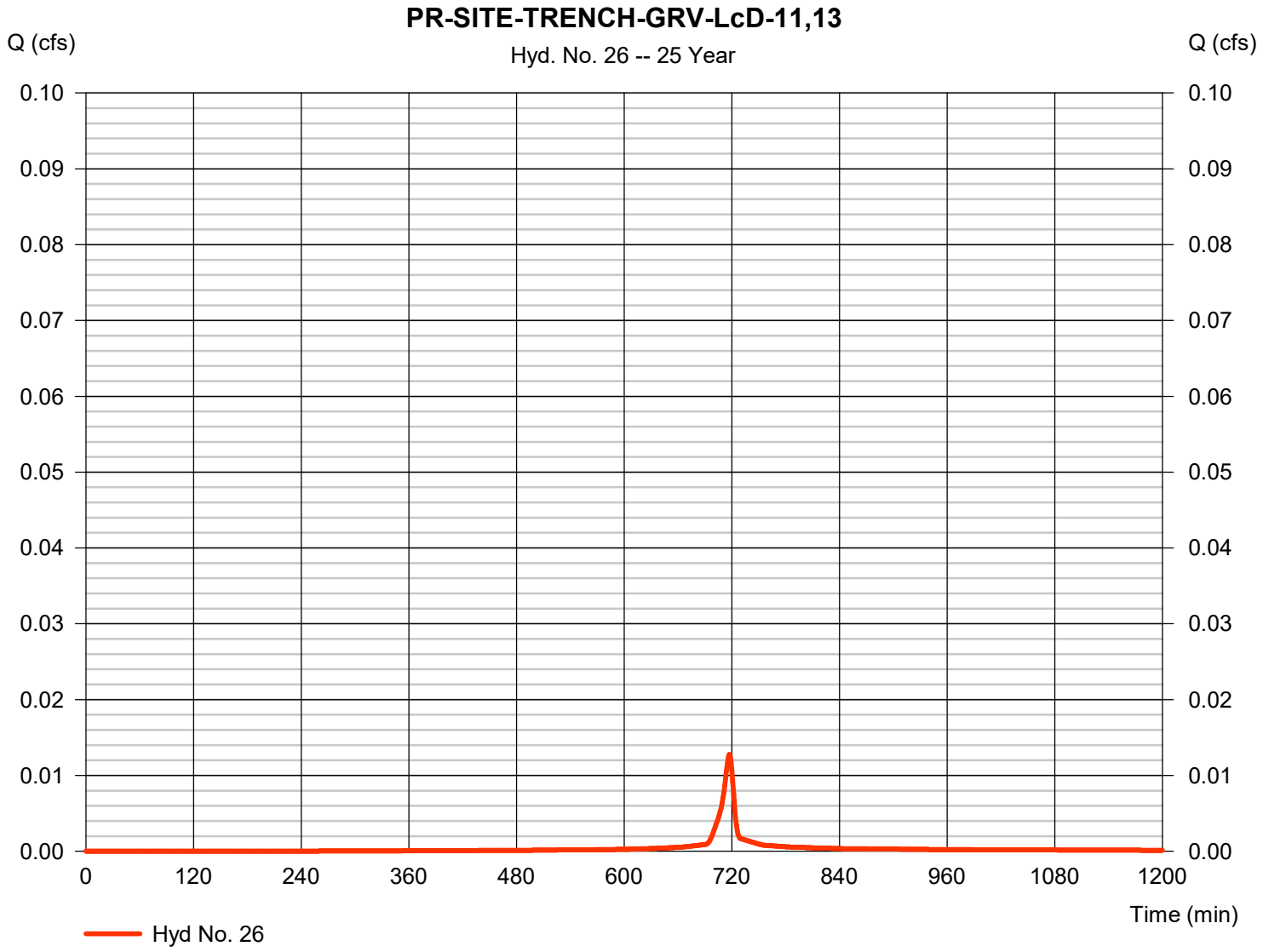
Hyd. No. 26

PR-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.013 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 28 cuft
Drainage area	= 0.002 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

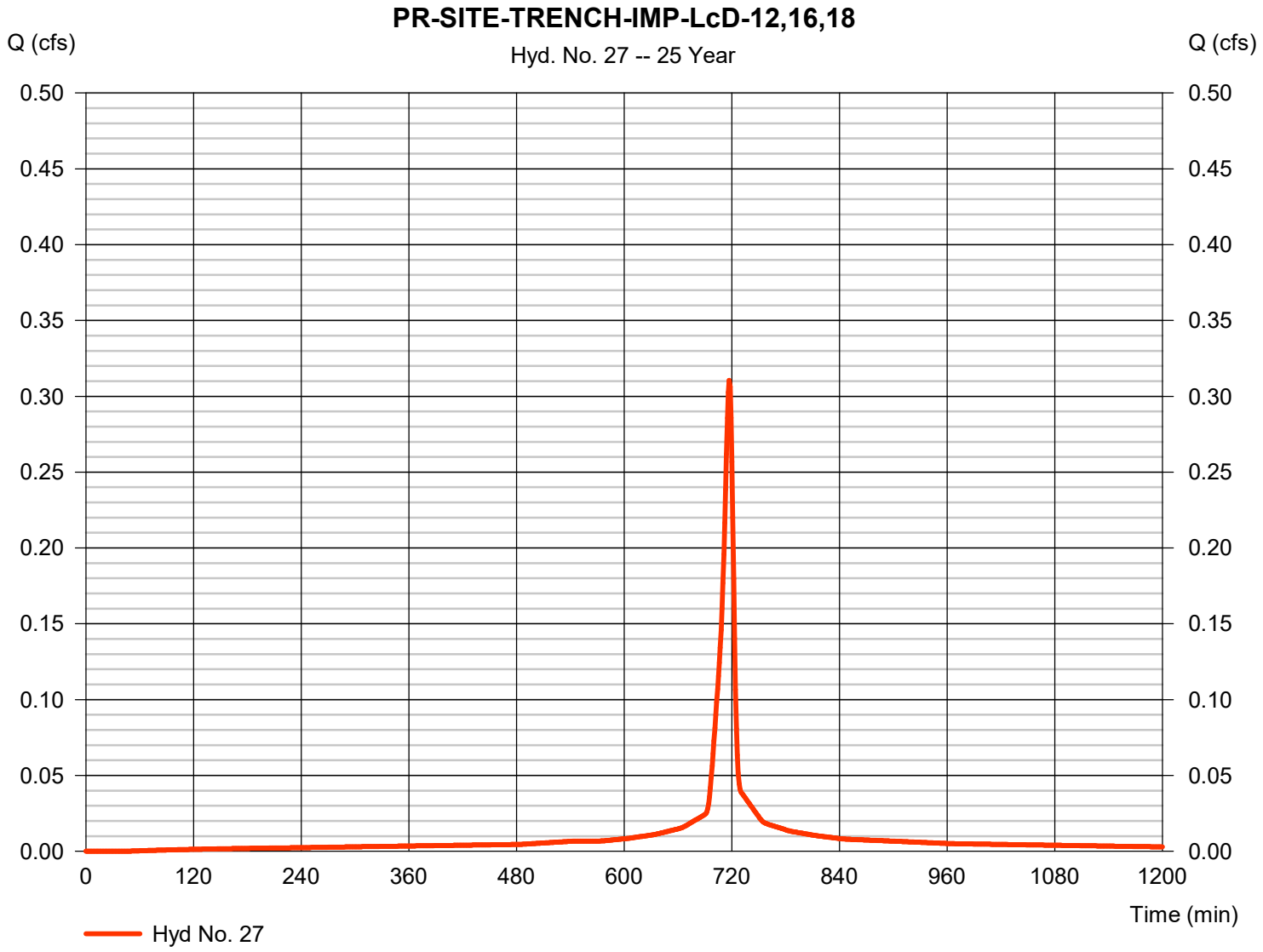


Hydrograph Report

Hyd. No. 27

PR-SITE-TRENCH-IMP-LcD-12,16,18

Hydrograph type	= SCS Runoff	Peak discharge	= 0.311 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 753 cuft
Drainage area	= 0.036 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



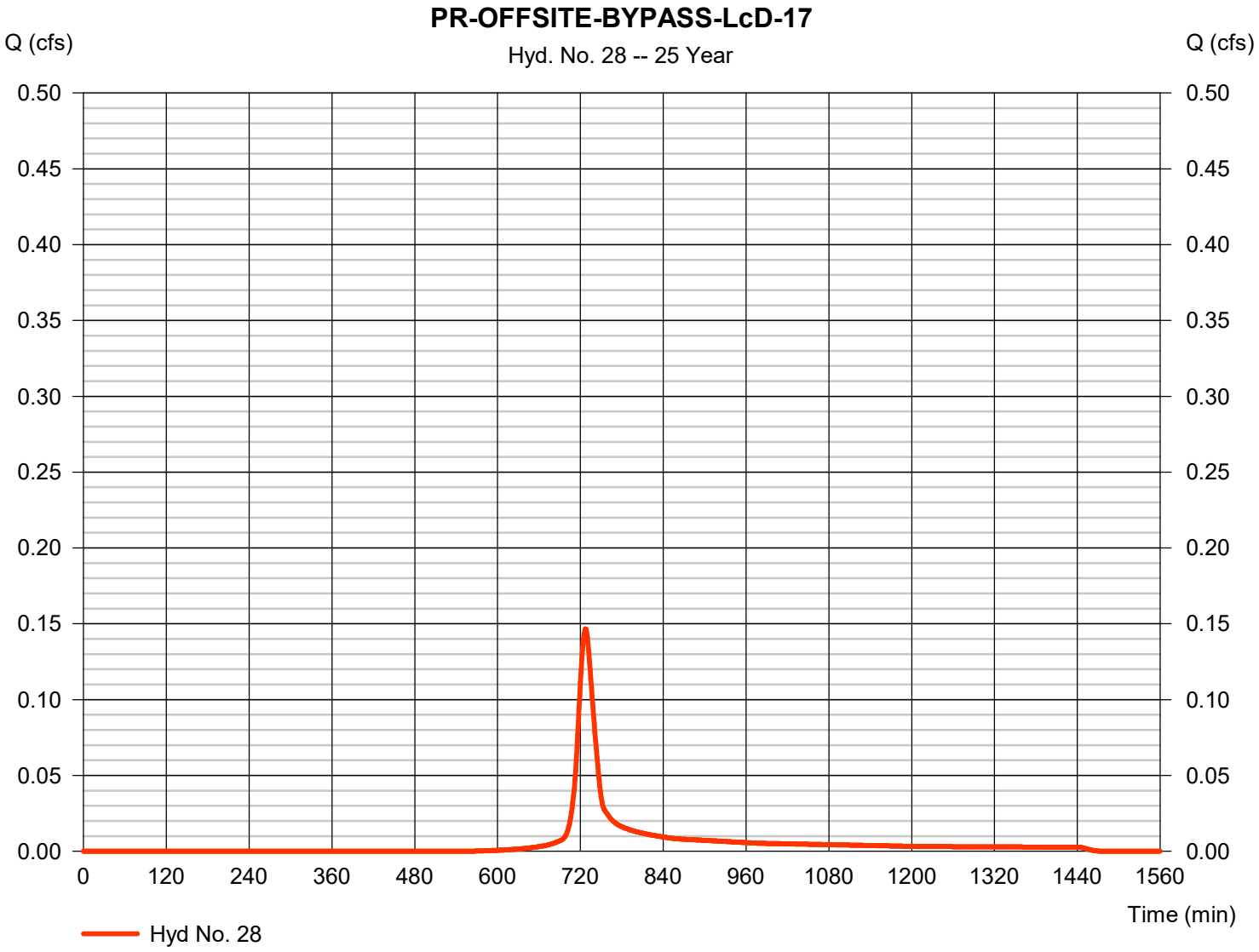
Hydrograph Report

Hyd. No. 28

PR-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.147 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	503 cuft
Drainage area	=	0.053 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	5.78 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.045 x 98) + (0.043 x 98)] / 0.053

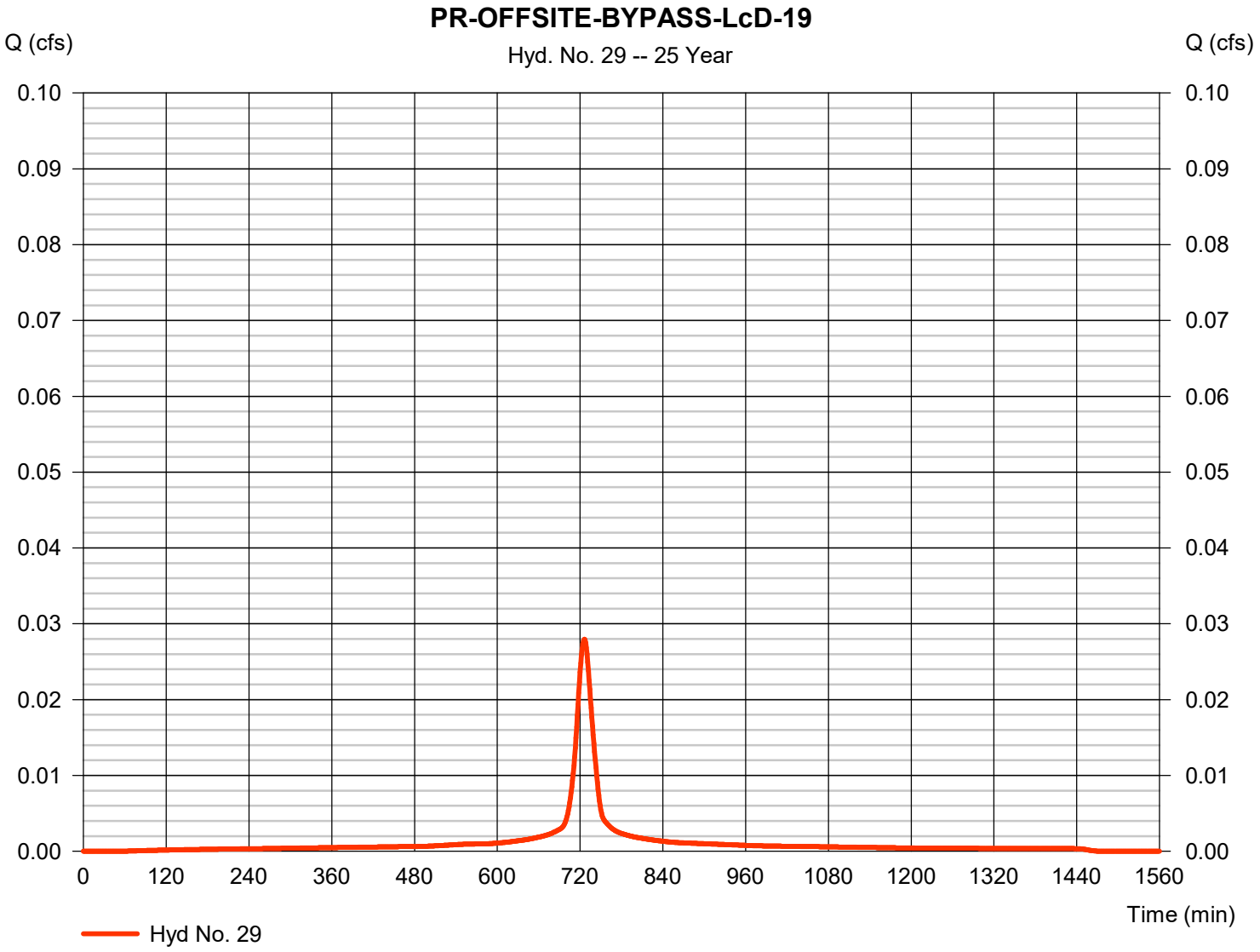


Hydrograph Report

Hyd. No. 29

PR-OFFSITE-BYPASS-LcD-19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.028 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 108 cuft
Drainage area	= 0.005 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 5.78 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

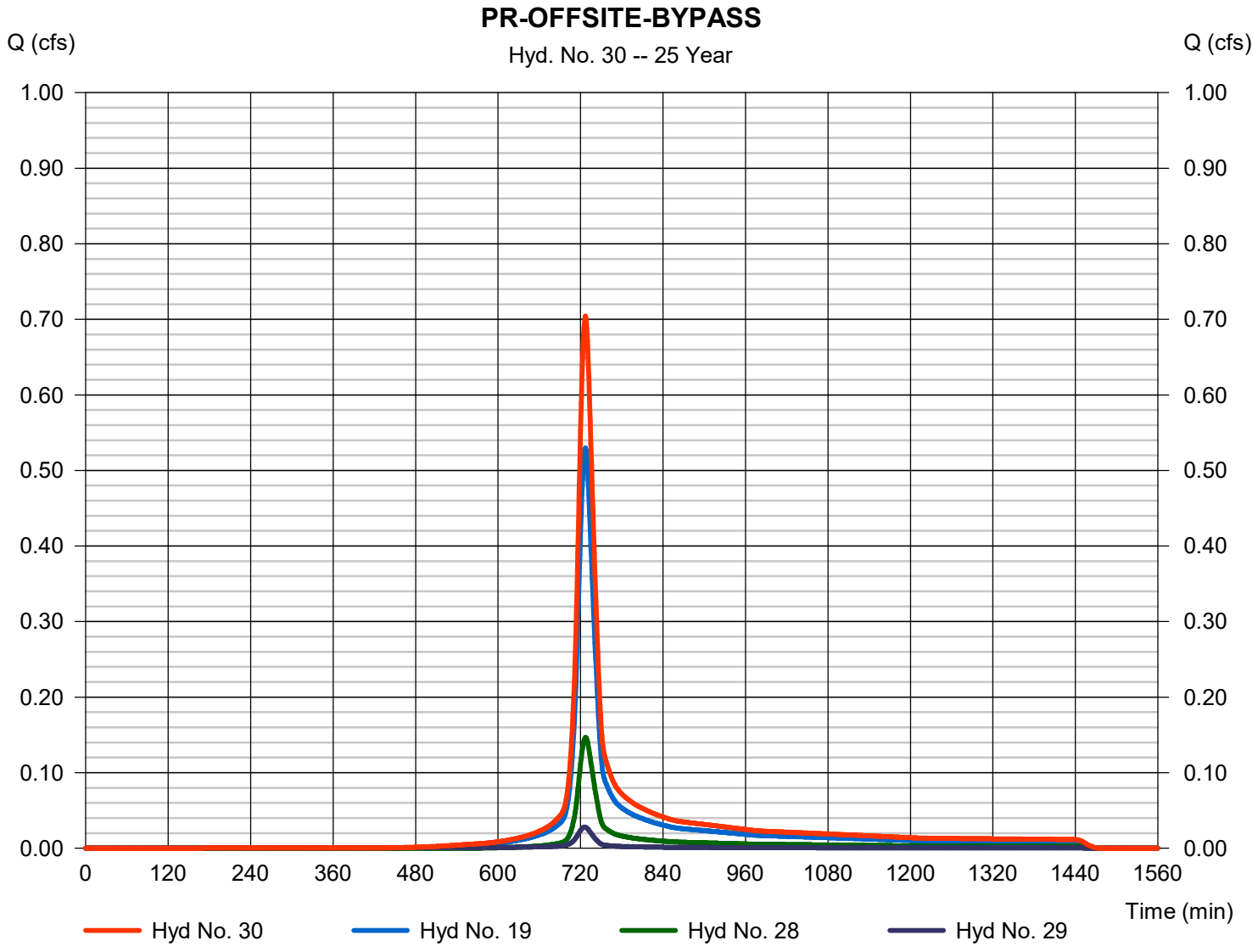


Hydrograph Report

Hyd. No. 30

PR-OFFSITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.704 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	2,408 cuft
Inflow hyds.	=	19, 28, 29	Contrib. drain. area	=	0.211 ac

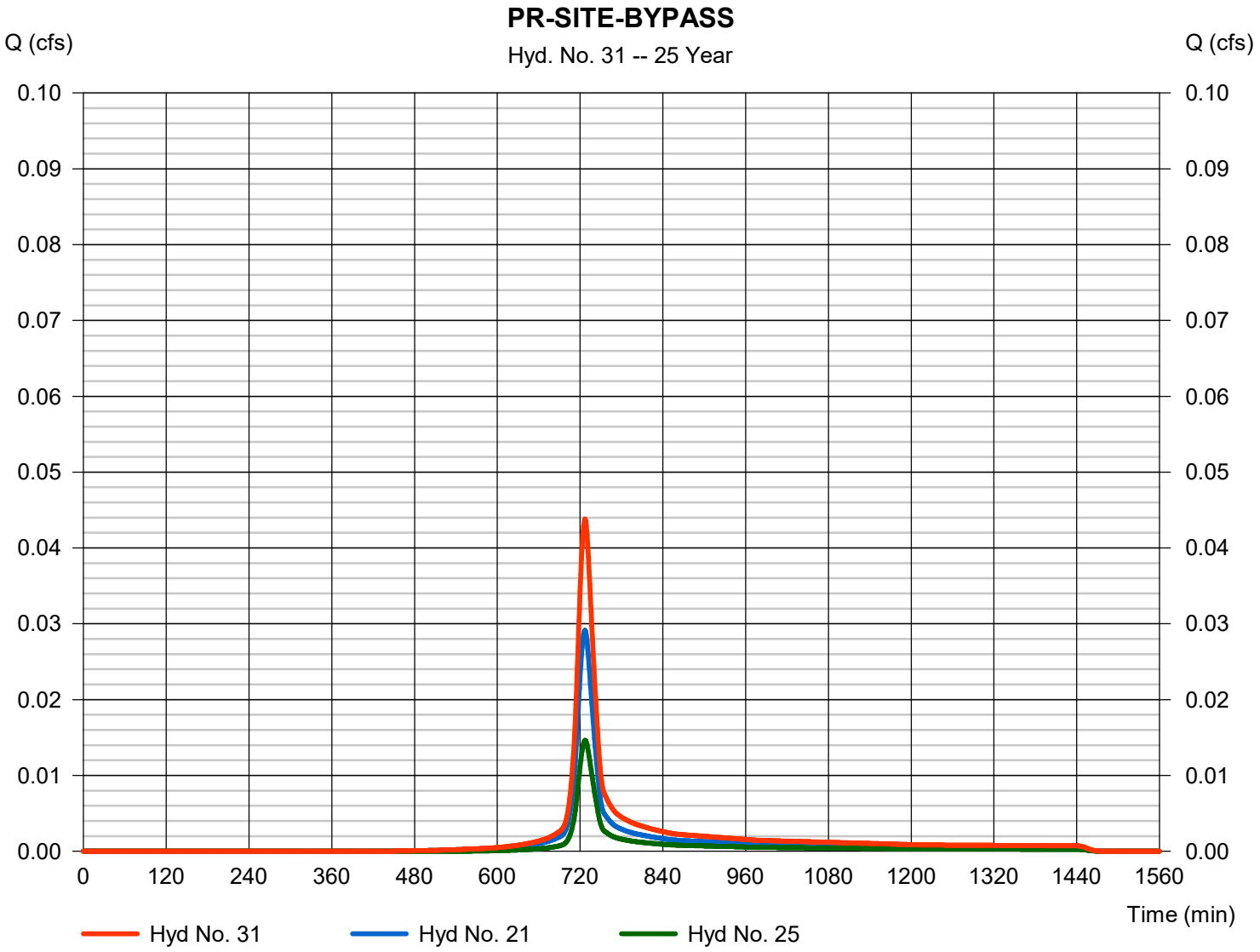


Hydrograph Report

Hyd. No. 31

PR-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.044 cfs
Storm frequency	=	25 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	149 cuft
Inflow hyds.	=	21, 25	Contrib. drain. area	=	0.013 ac

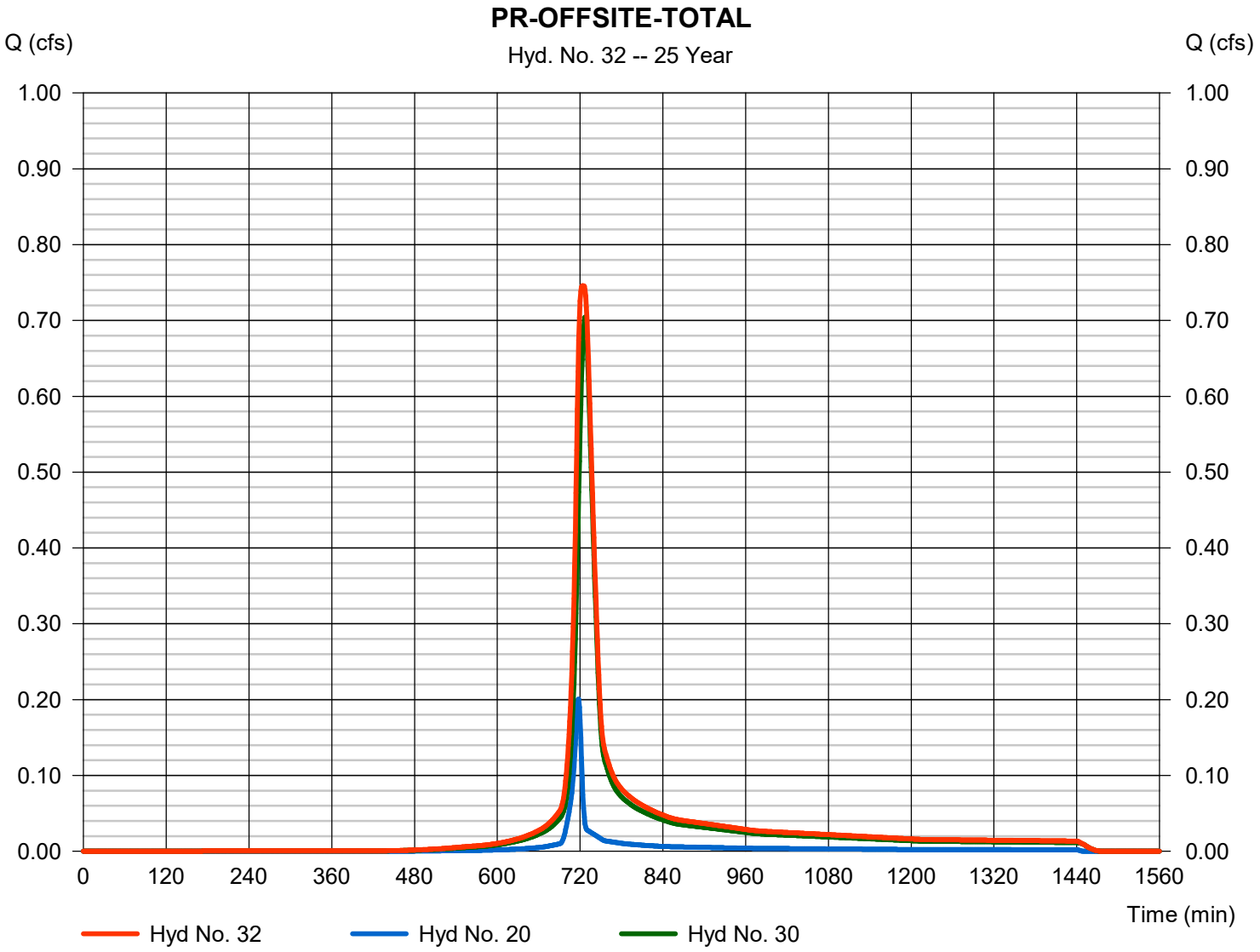


Hydrograph Report

Hyd. No. 32

PR-OFFSITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.746 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	2,818 cuft
Inflow hyds.	=	20, 30	Contrib. drain. area	=	0.033 ac

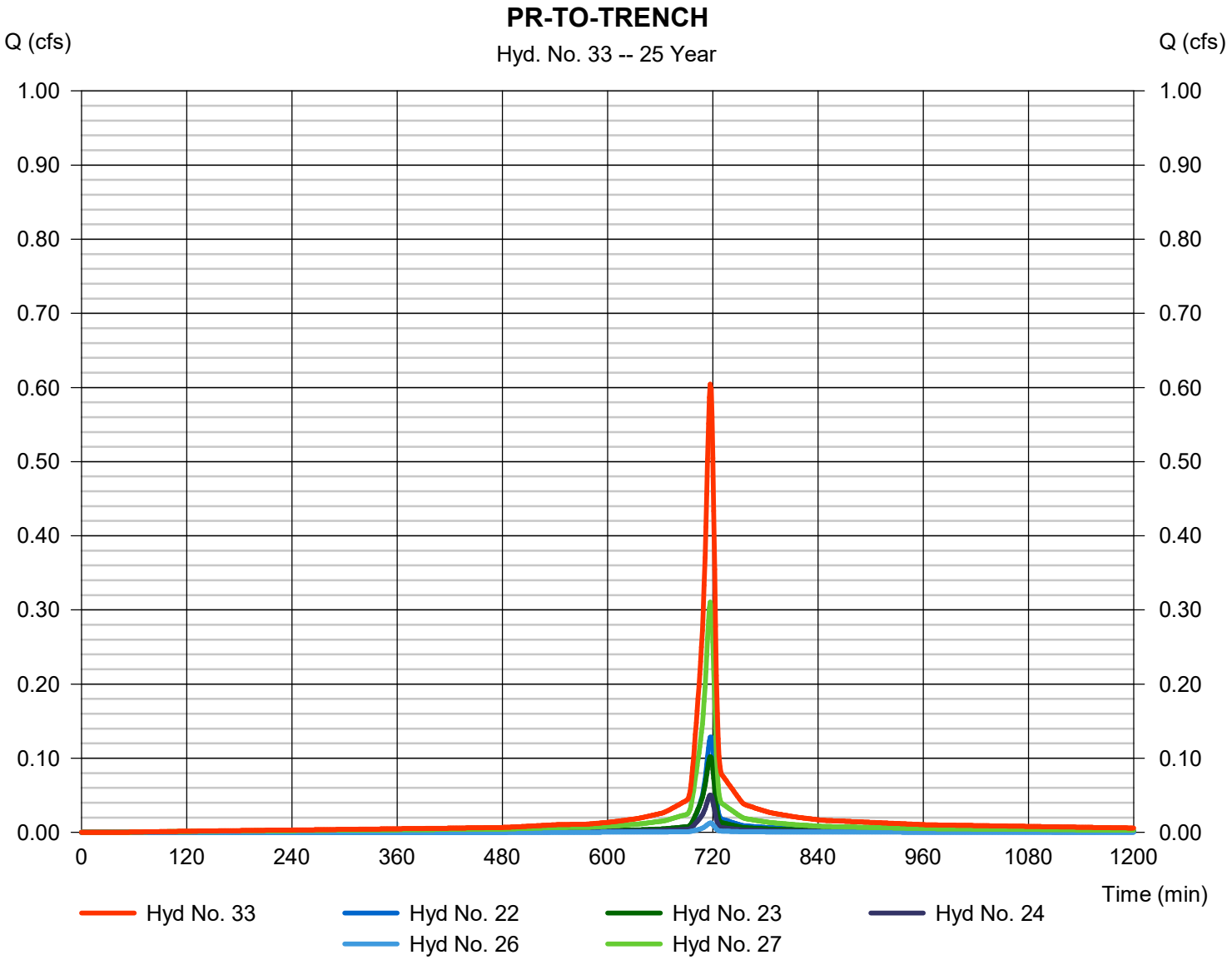


Hydrograph Report

Hyd. No. 33

PR-TO-TRENCH

Hydrograph type	=	Combine	Peak discharge	=	0.604 cfs
Storm frequency	=	25 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	1,401 cuft
Inflow hyds.	=	22, 23, 24, 26, 27	Contrib. drain. area	=	0.077 ac



Hydrograph Report

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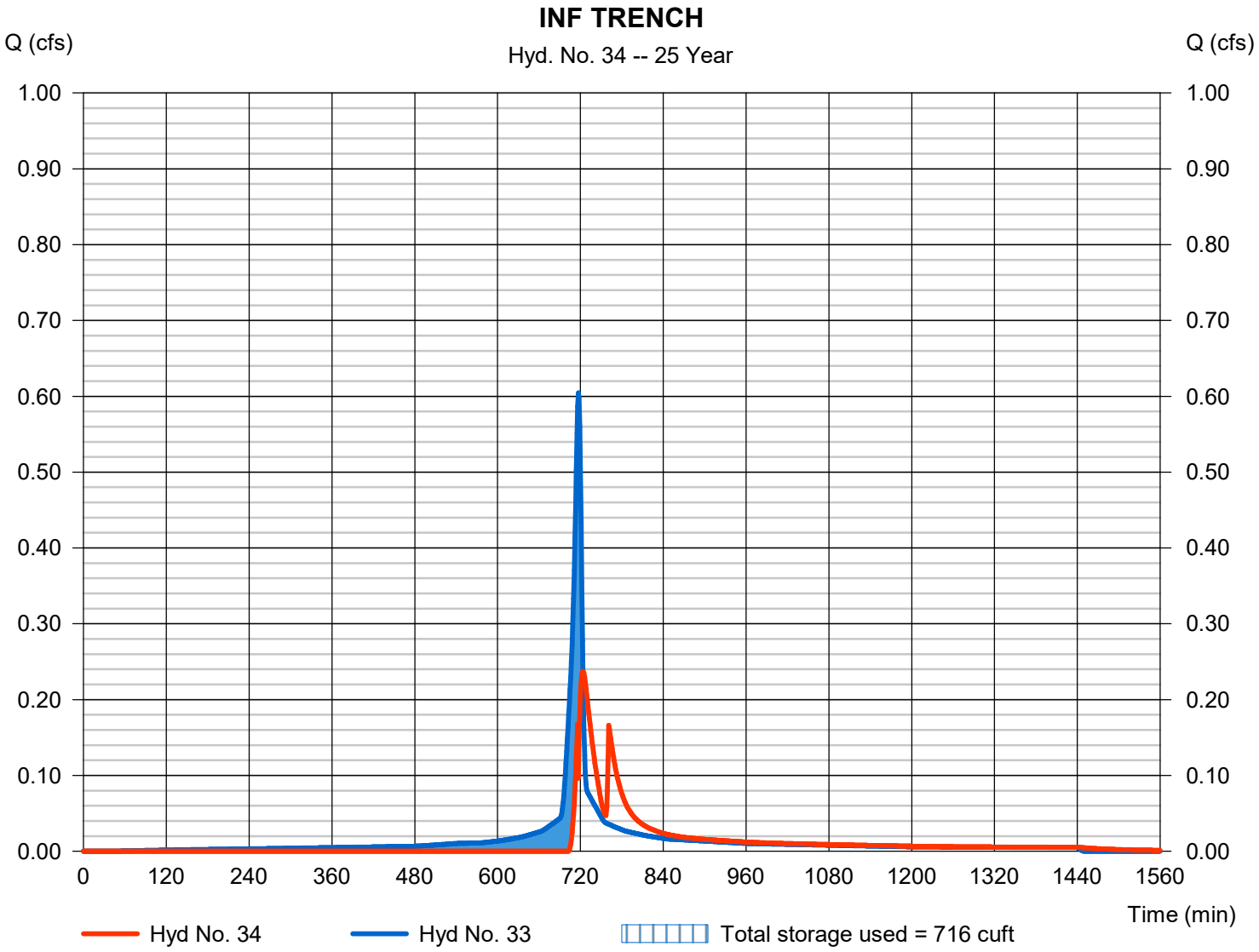
Hyd. No. 34

INF TRENCH

Hydrograph type	=	Reservoir	Peak discharge	=	0.237 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	1,036 cuft
Inflow hyd. No.	=	33 - PR-TO-TRENCH	Max. Elevation	=	1687.51 ft
Reservoir name	=	BASIN	Max. Storage	=	716 cuft

Storage Indication method used.

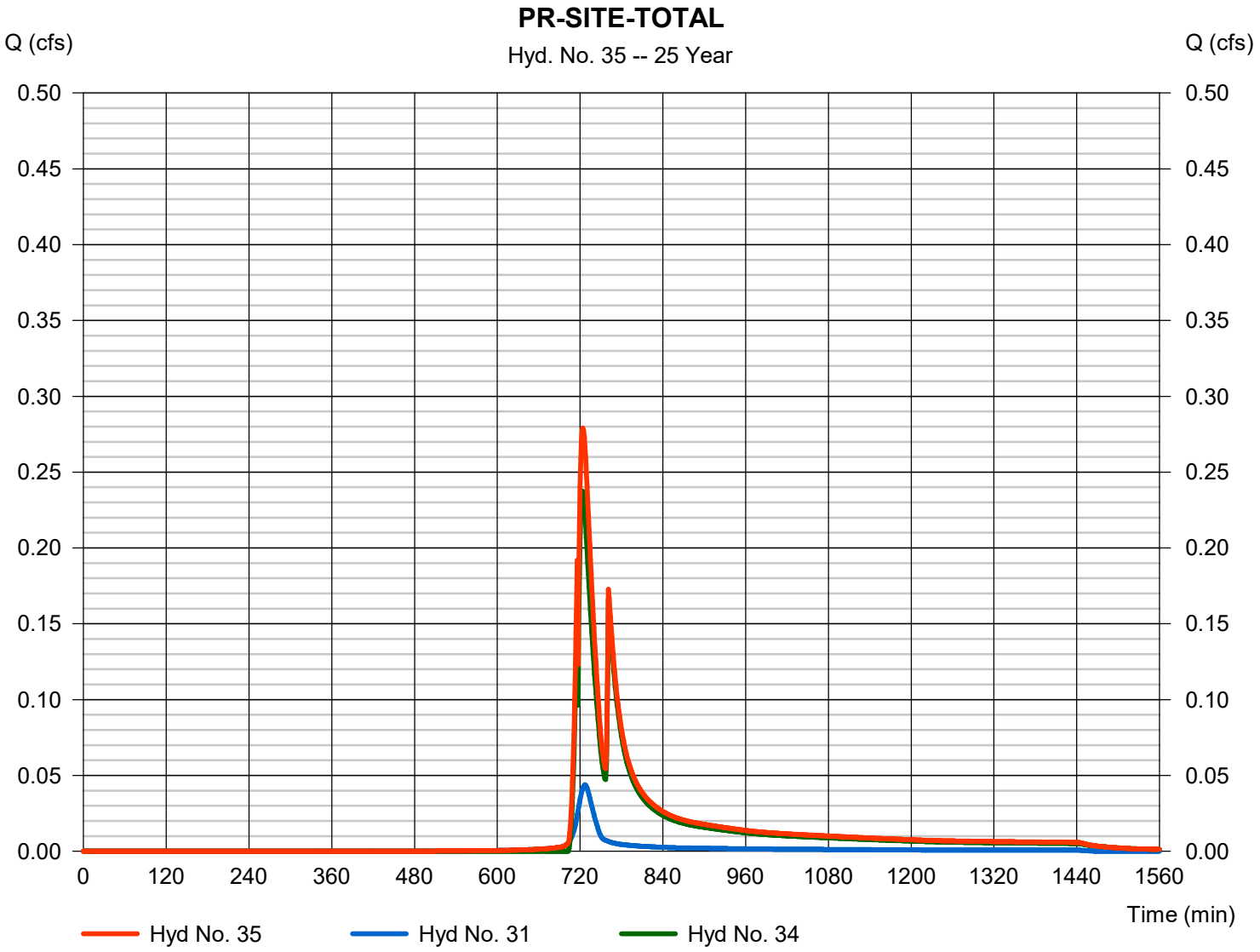


Hydrograph Report

Hyd. No. 35

PR-SITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.279 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 1,185 cuft
Inflow hyds.	= 31, 34	Contrib. drain. area	= 0.000 ac

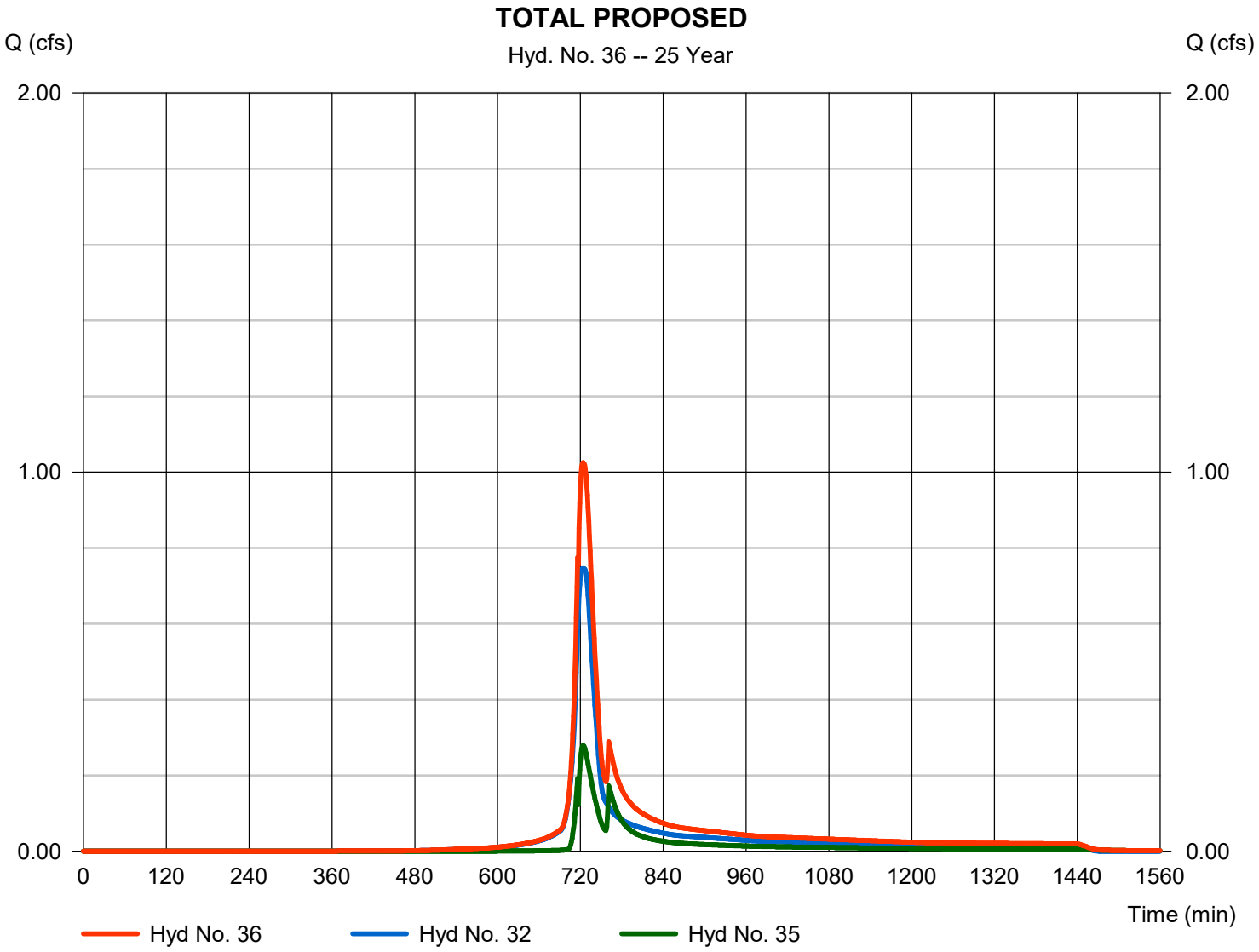


Hydrograph Report

Hyd. No. 36

TOTAL PROPOSED

Hydrograph type	= Combine	Peak discharge	= 1.025 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 4,003 cuft
Inflow hyds.	= 32, 35	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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	0.676	1	727	2,299	------	------	------	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	0.254	1	717	524	------	------	------	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	0.036	1	727	123	------	------	------	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	0.159	1	717	327	------	------	------	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	0.094	1	717	194	------	------	------	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	0.045	1	717	93	------	------	------	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	0.019	1	727	64	------	------	------	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	0.010	1	718	21	------	------	------	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	0.193	1	718	391	------	------	------	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	0.195	1	727	663	------	------	------	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	0.063	1	717	153	------	------	------	EX-SITE-TRENCH-IMP-ROAD-LcD-1
12	SCS Runoff	0.033	1	726	128	------	------	------	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	0.904	1	727	3,090	1, 10, 12	------	------	EX-OFFSITE - BYPASS
14	Combine	0.055	1	727	186	3, 7,	------	------	EX-SITE-BYPASS
15	Combine	0.562	1	718	1,178	4, 5, 6,	------	------	EX-SITE-BASIN COMBINE
16	Combine	0.959	1	723	3,614	8, 9, 11, 2, 13,	------	------	EX-OFFSITE-TOTAL
17	Combine	0.599	1	718	1,364	14, 15,	------	------	EX-SITE-TOTAL
18	Combine	1.481	1	719	4,978	16, 17	------	------	TOTAL EXISTING
19	SCS Runoff	0.676	1	727	2,299	------	------	------	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	0.254	1	717	524	------	------	------	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	0.037	1	727	126	------	------	------	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	0.162	1	717	336	------	------	------	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	0.122	1	717	281	------	------	------	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	0.060	1	717	145	------	------	------	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	0.019	1	727	66	------	------	------	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	0.015	1	717	34	------	------	------	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	0.367	1	717	894	------	------	------	PR-SITE-TRENCH-IMP-LcD-12,16,1
28	SCS Runoff	0.195	1	727	663	------	------	------	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	0.033	1	726	128	------	------	------	PR-OFFSITE-BYPASS-LcD-19
30	Combine	0.904	1	727	3,090	19, 28, 29	------	------	PR-OFFSITE-BYPASS
31	Combine	0.056	1	727	192	21, 25,	------	------	PR-SITE-BYPASS
32	Combine	0.959	1	723	3,614	20, 30,	------	------	PR-OFFSITE-TOTAL
33	Combine	0.726	1	717	1,691	22, 23, 24,	------	------	PR-TO-TRENCH
34	Reservoir	0.295	1	723	1,326	26, 27, 33	1687.66	821	INF TRENCH

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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
35	Combine	0.349	1	724	1,518	31, 34	------	------	PR-SITE-TOTAL
36	Combine	1.308	1	724	5,131	32, 35	------	------	TOTAL PROPOSED

Hydrograph Report

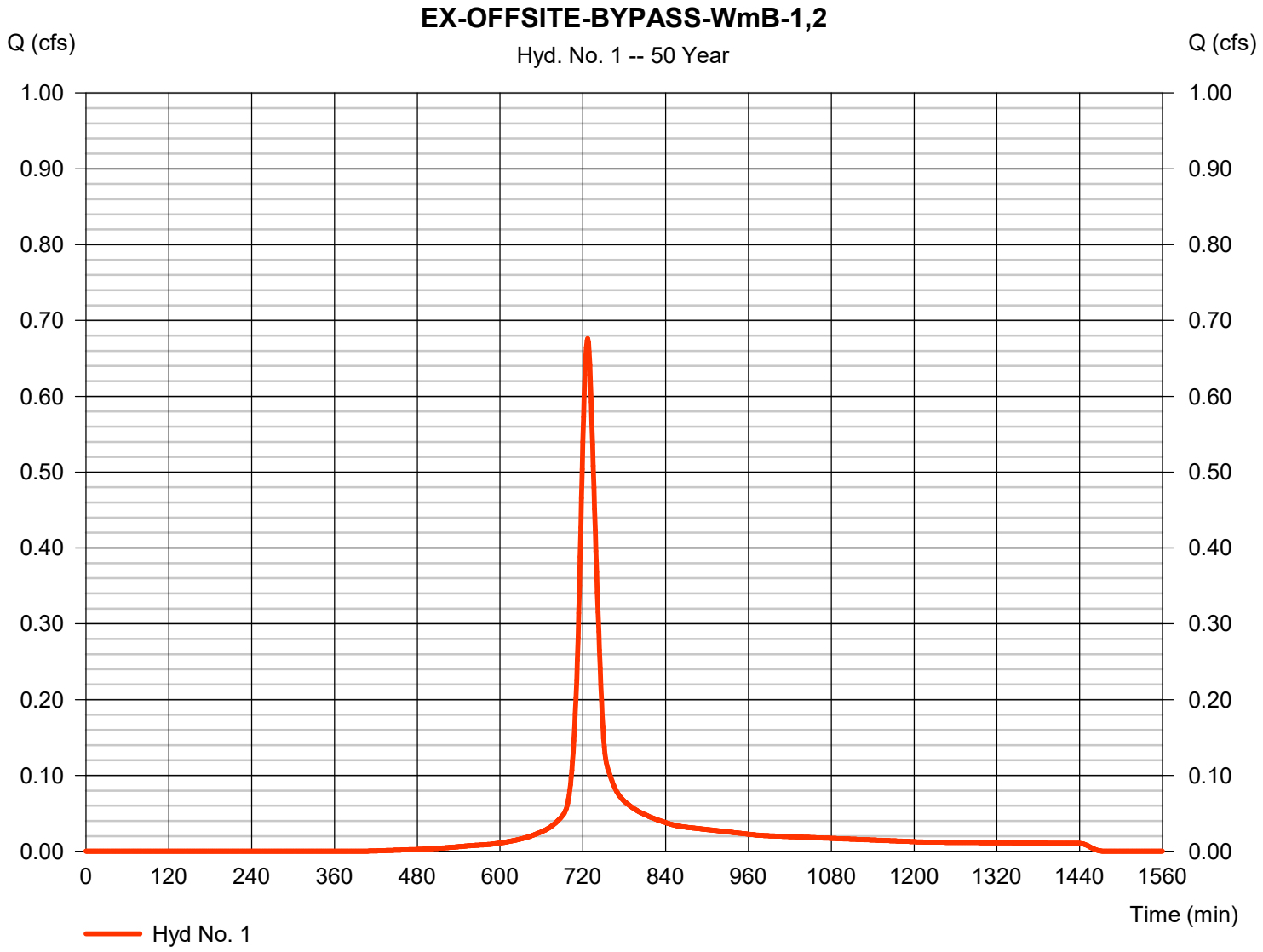
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 1

EX-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.676 cfs
Storm frequency	= 50 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 2,299 cuft
Drainage area	= 0.152 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 78) + (0.253 x 77)] / 0.152



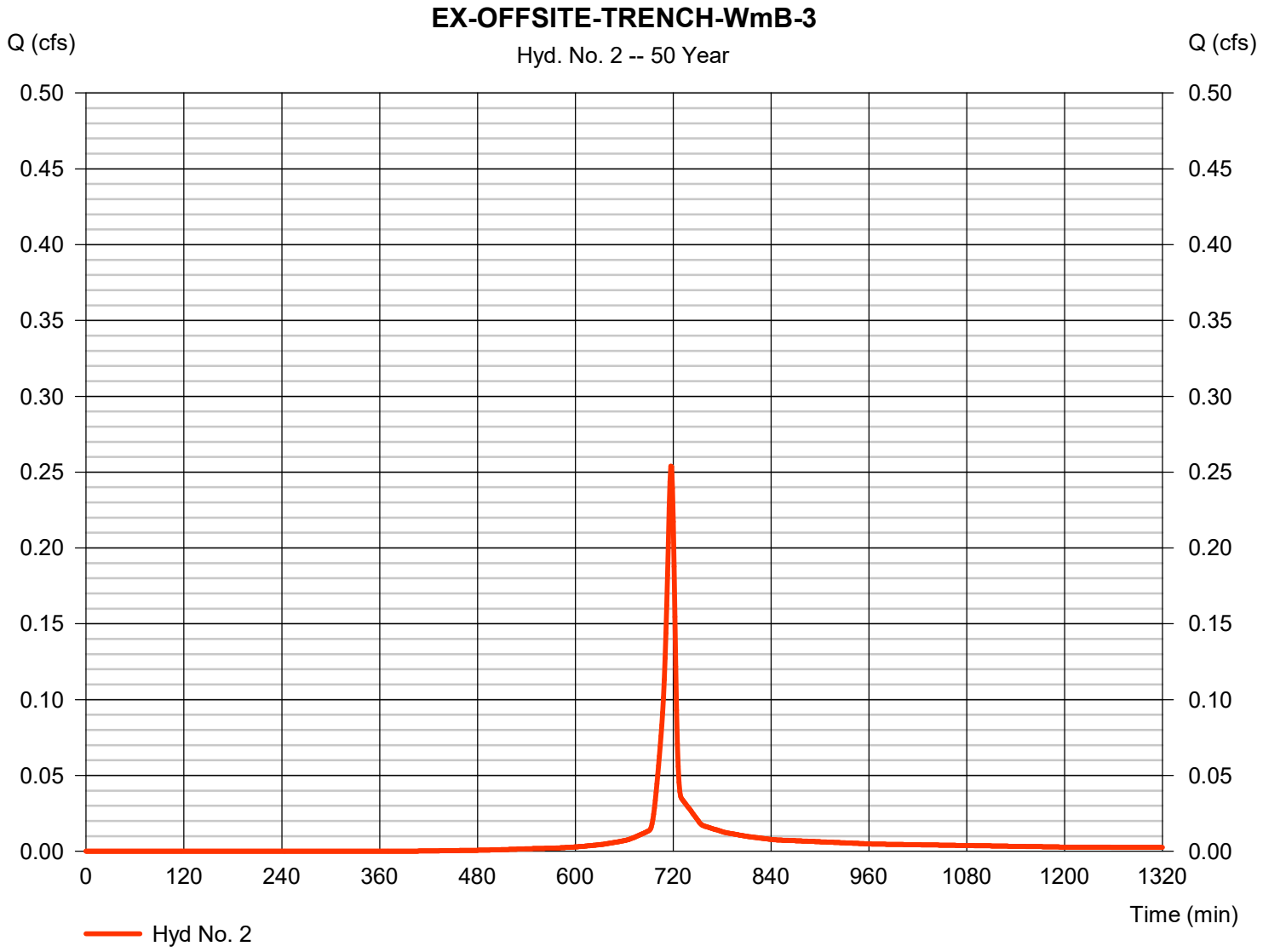
Hydrograph Report

Hyd. No. 2

EX-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.254 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 524 cuft
Drainage area	= 0.033 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 98)] / 0.033



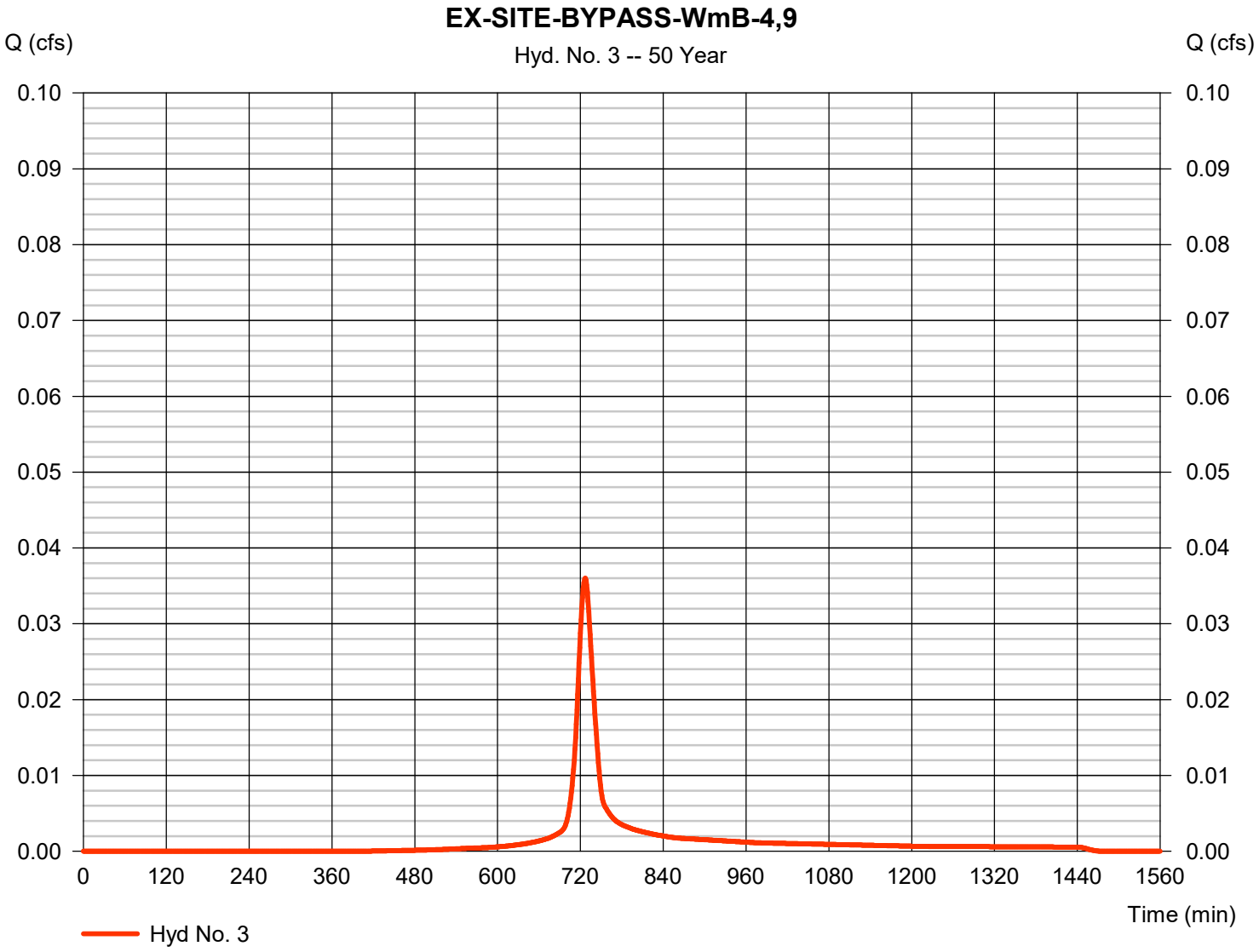
Hydrograph Report

Hyd. No. 3

EX-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.036 cfs
Storm frequency	=	50 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	123 cuft
Drainage area	=	0.008 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	6.82 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 77)] / 0.008



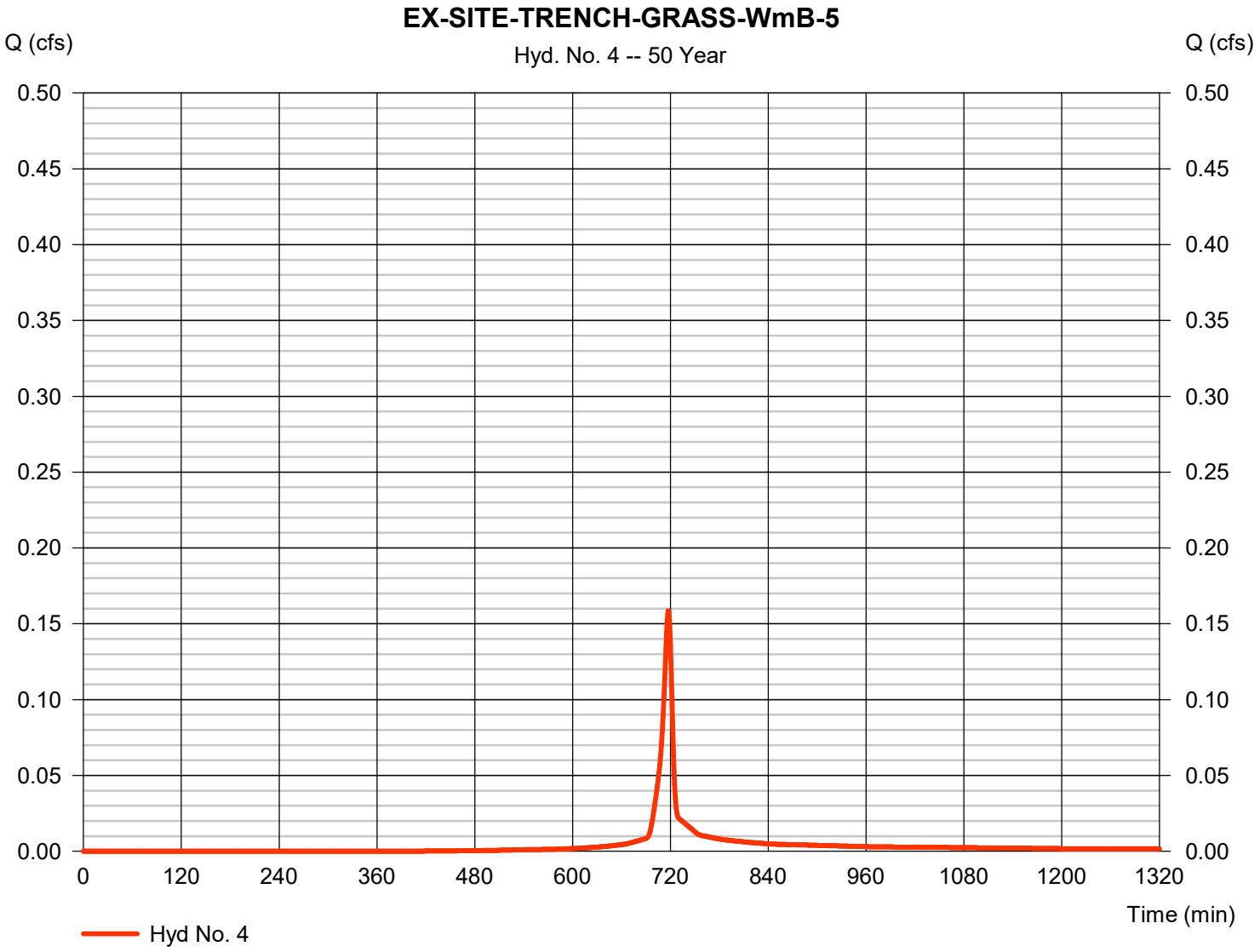
Hydrograph Report

Hyd. No. 4

EX-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.159 cfs
Storm frequency	=	50 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	327 cuft
Drainage area	=	0.021 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.82 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.010 x 70)] / 0.021

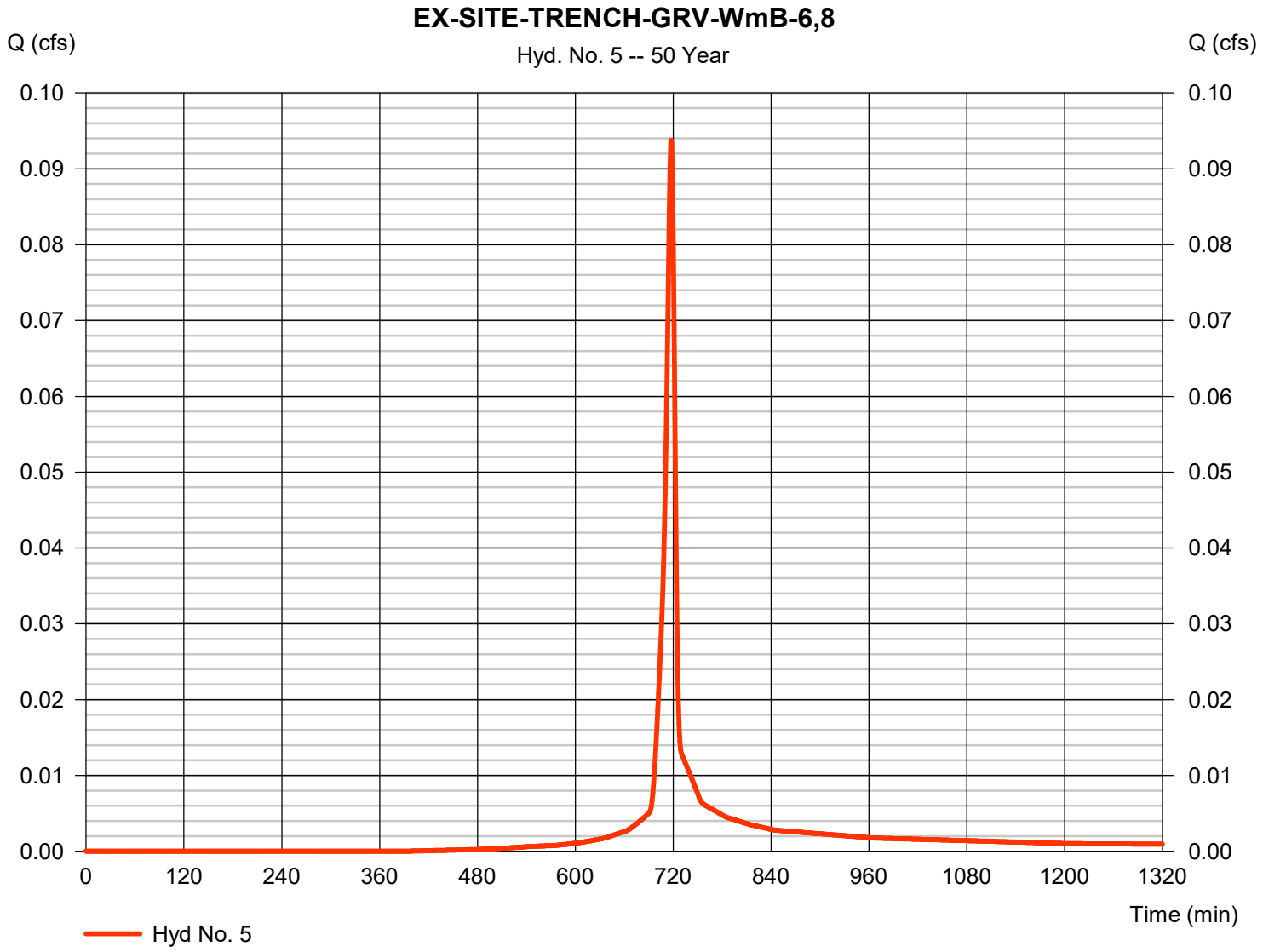


Hydrograph Report

Hyd. No. 5

EX-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.094 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 194 cuft
Drainage area	= 0.012 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

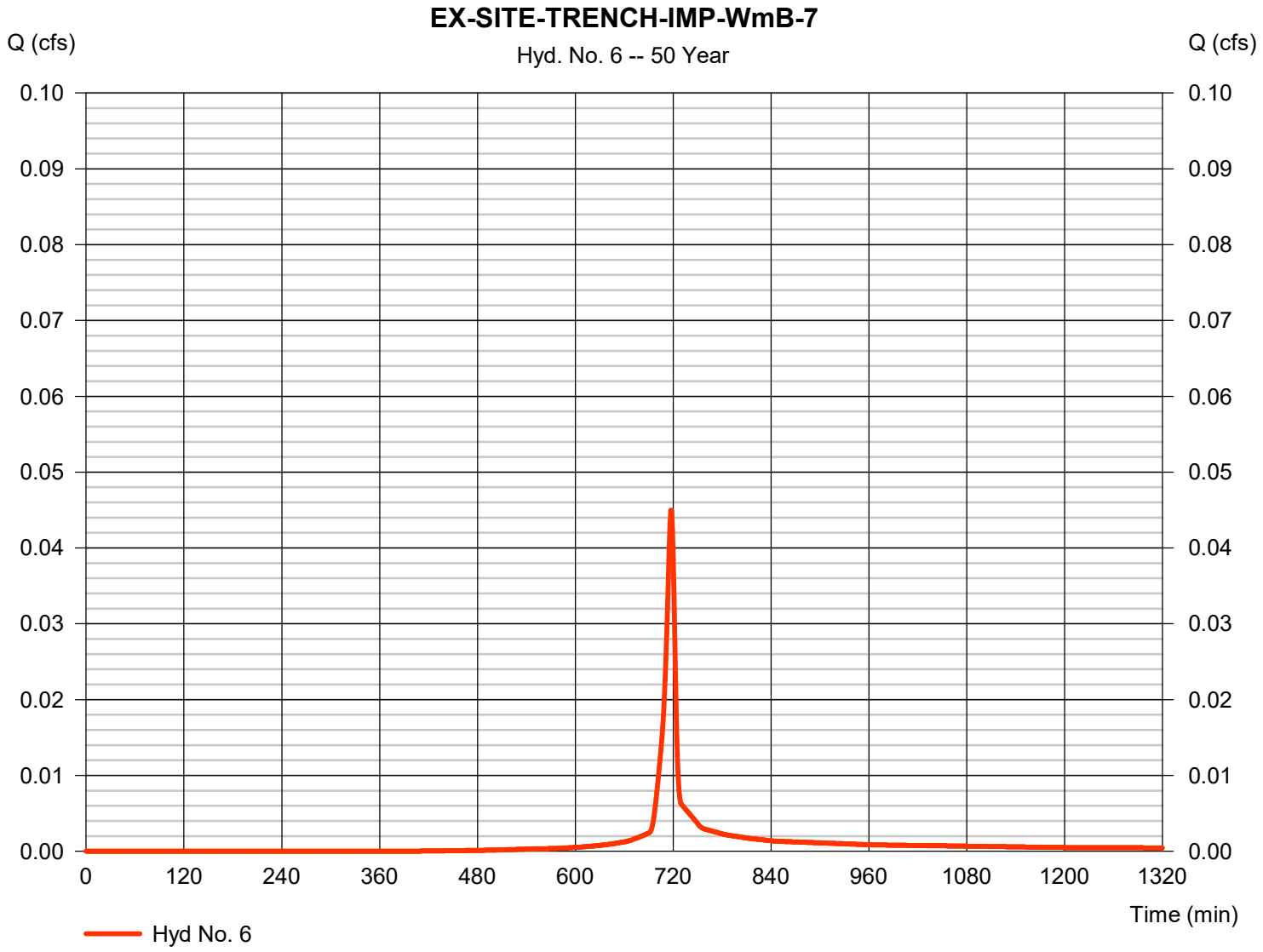


Hydrograph Report

Hyd. No. 6

EX-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.045 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 93 cuft
Drainage area	= 0.006 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

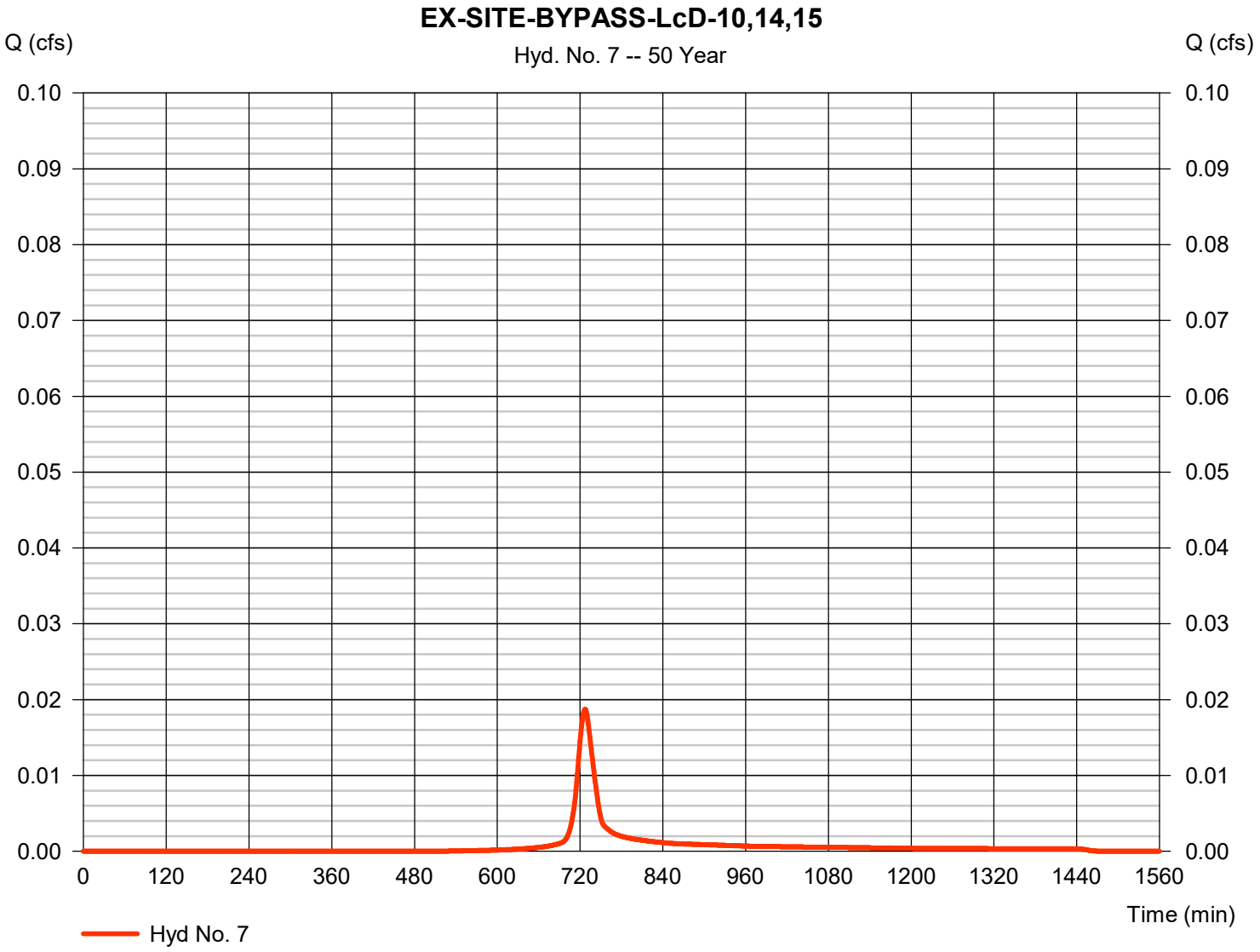


Hydrograph Report

Hyd. No. 7

EX-SITE-BYPASS-LcD-10,14,15

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.019 cfs
Storm frequency	=	50 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	64 cuft
Drainage area	=	0.005 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	6.82 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

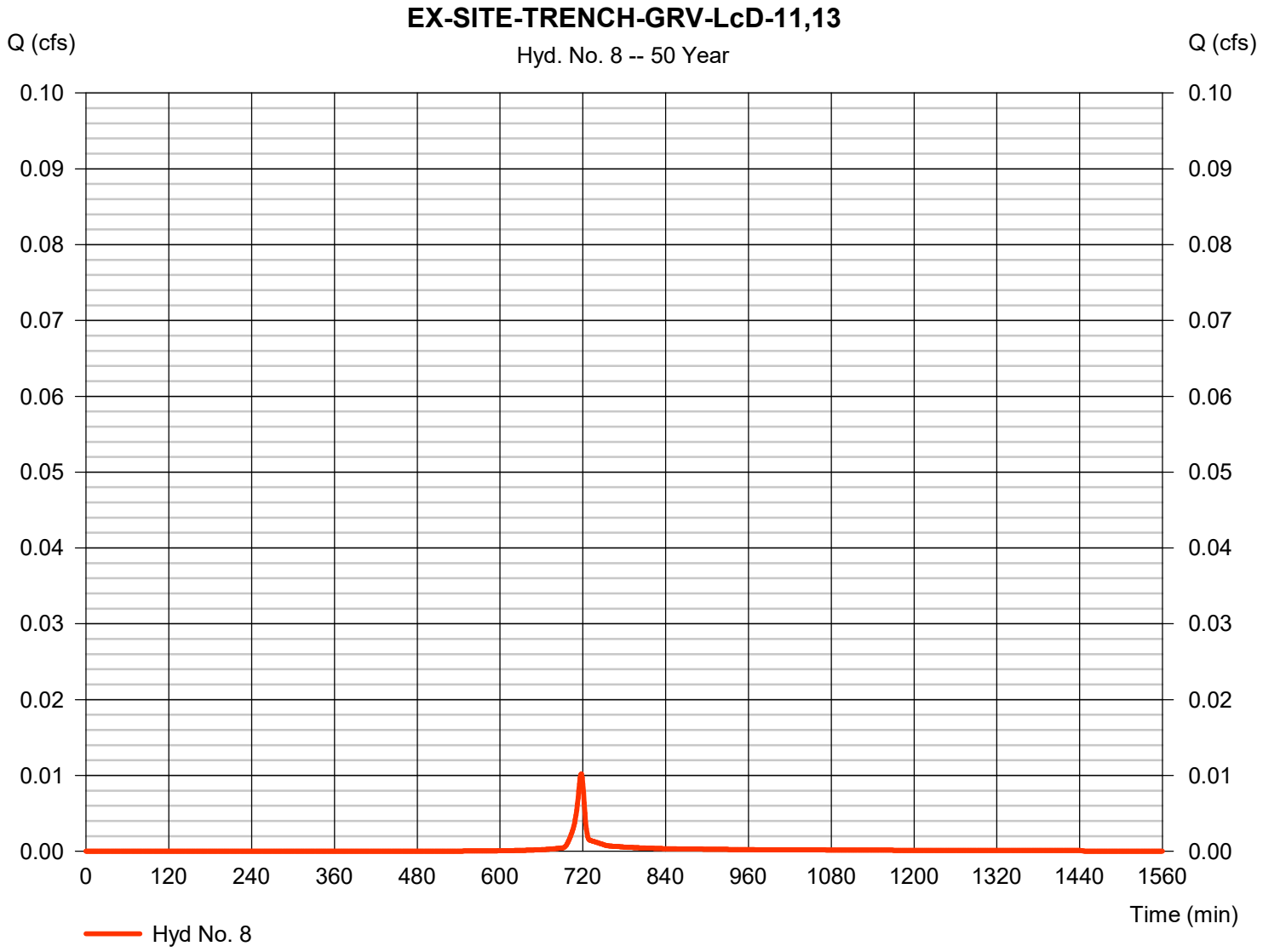


Hydrograph Report

Hyd. No. 8

EX-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 21 cuft
Drainage area	= 0.002 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



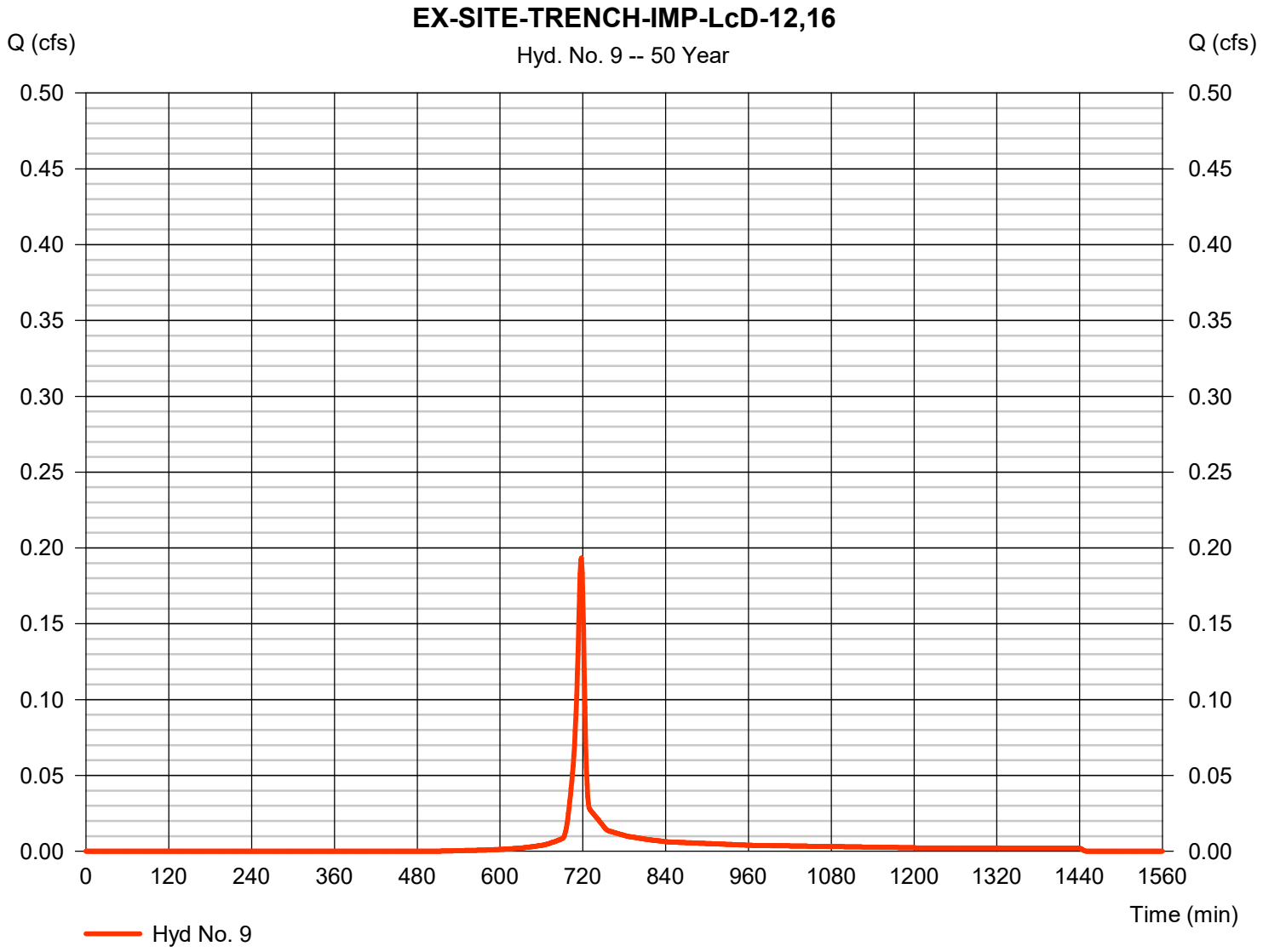
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 9

EX-SITE-TRENCH-IMP-LcD-12,16

Hydrograph type	= SCS Runoff	Peak discharge	= 0.193 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 391 cuft
Drainage area	= 0.030 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



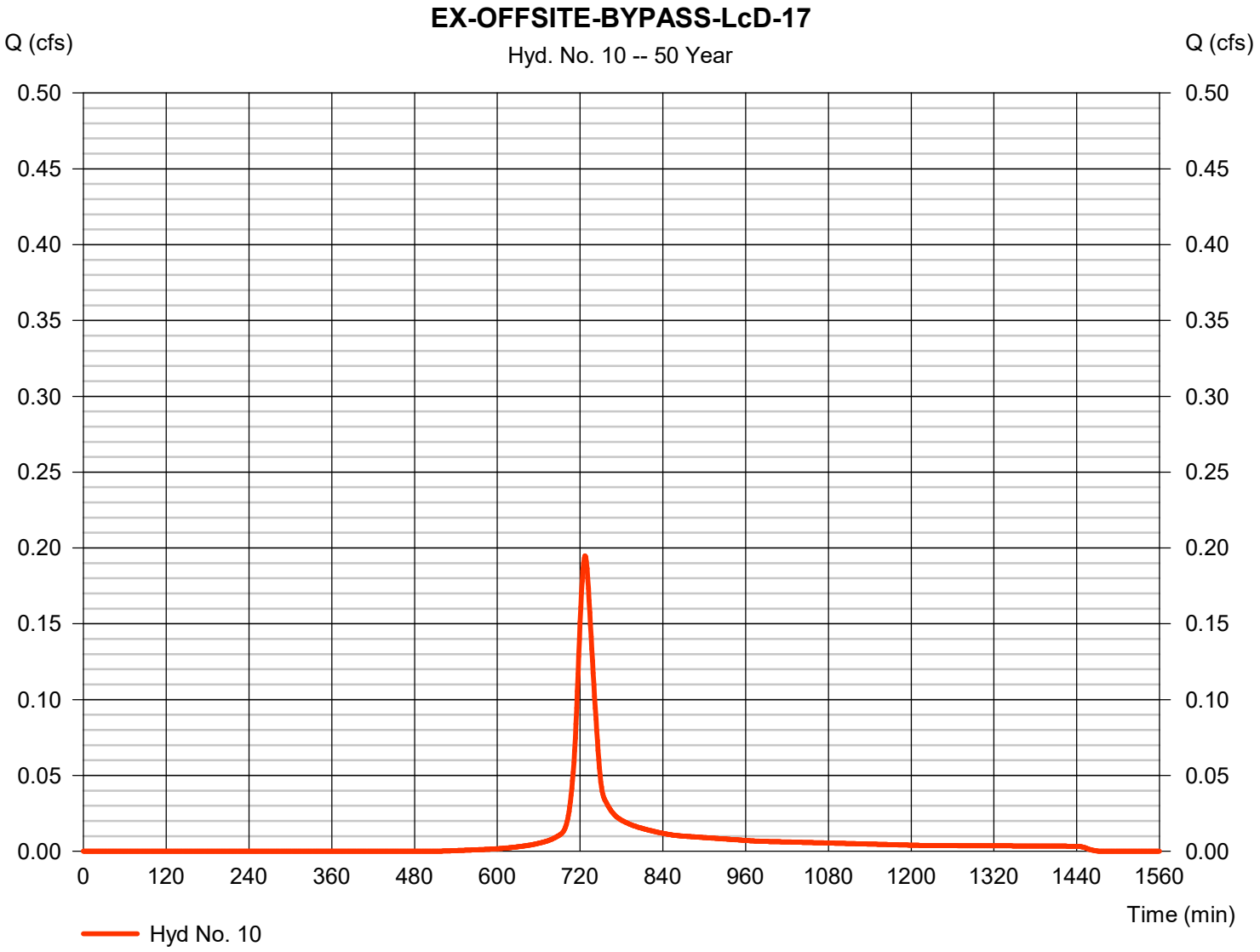
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 10

EX-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.195 cfs
Storm frequency	=	50 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	663 cuft
Drainage area	=	0.053 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	6.82 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



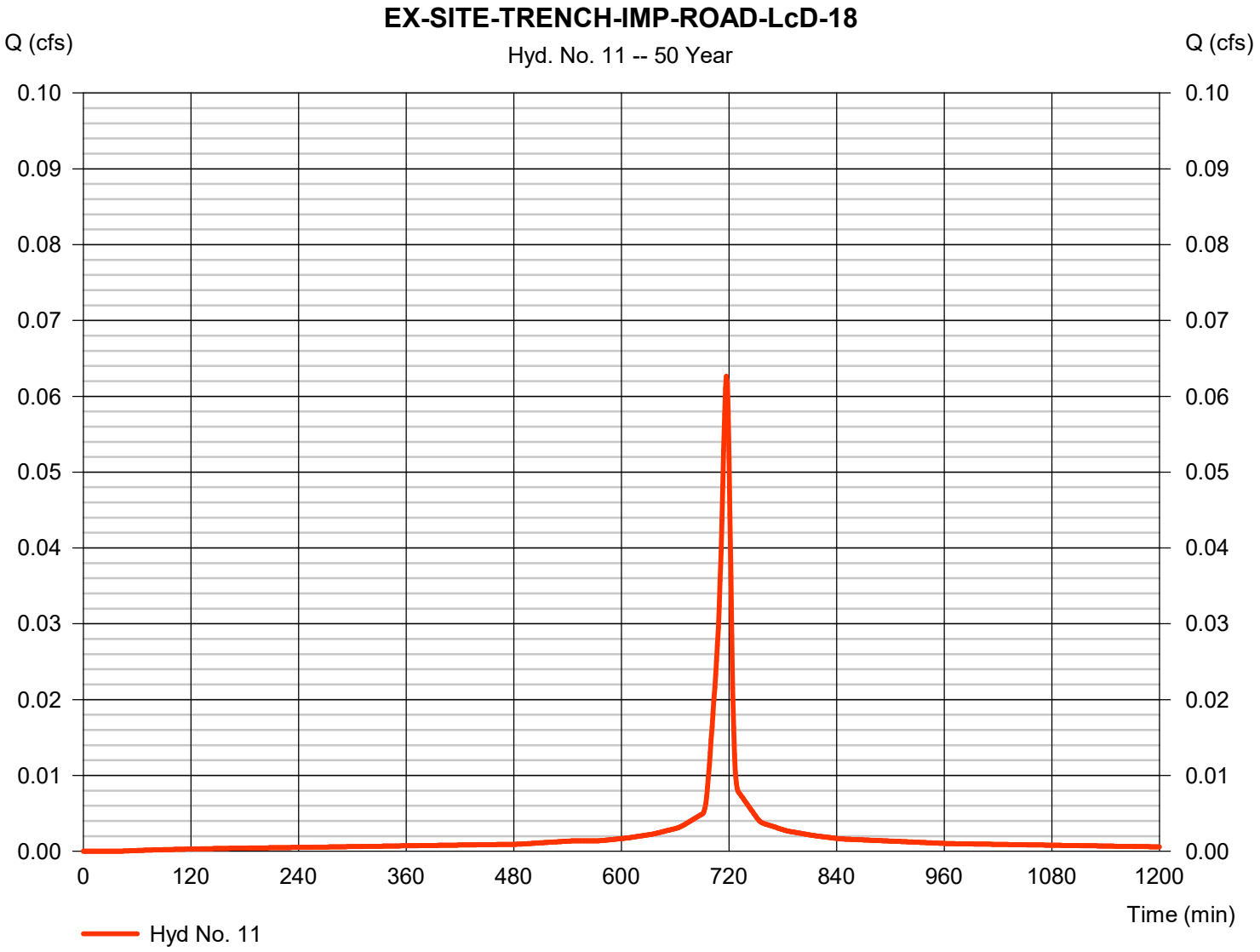
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 11

EX-SITE-TRENCH-IMP-ROAD-LcD-18

Hydrograph type	= SCS Runoff	Peak discharge	= 0.063 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 153 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

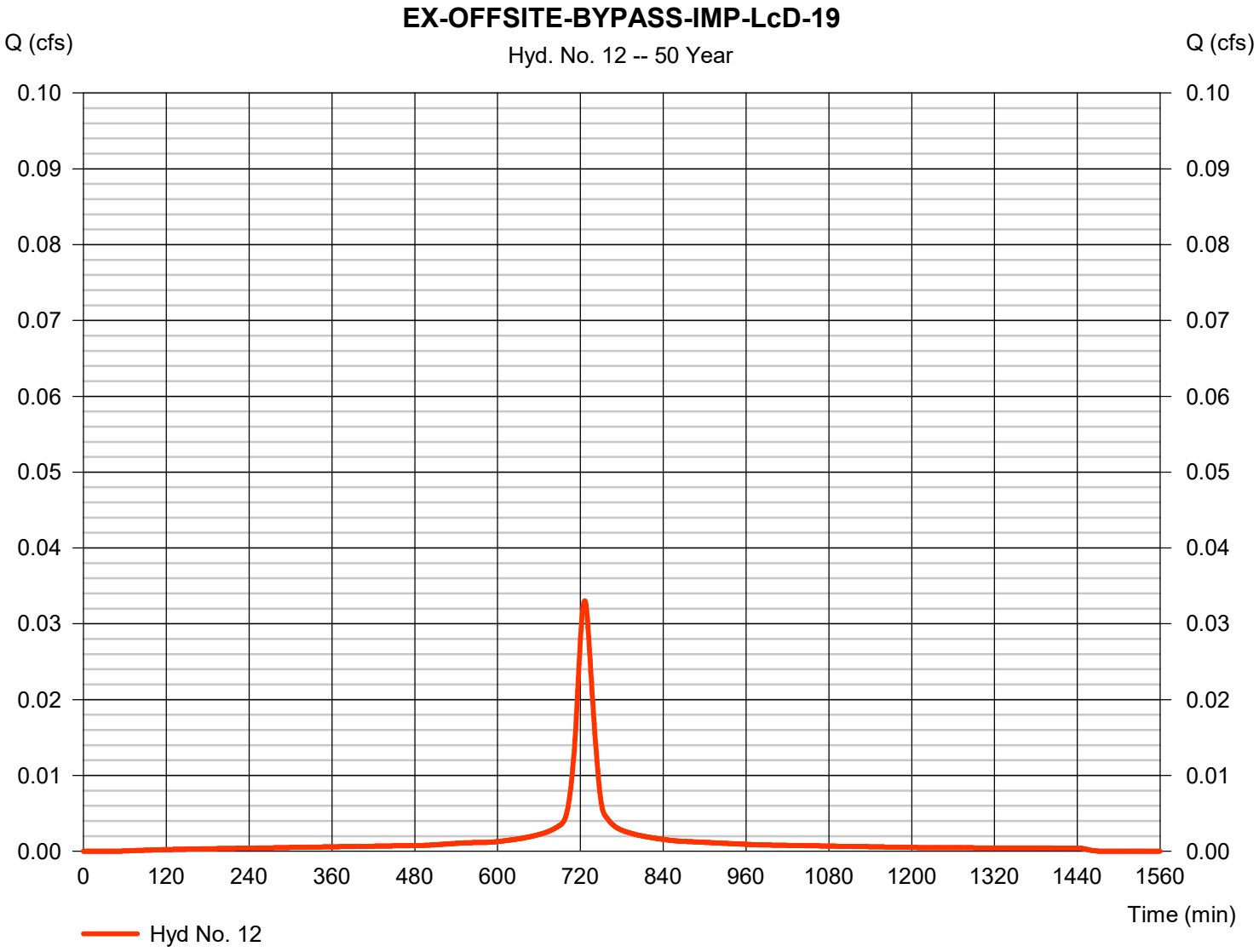


Hydrograph Report

Hyd. No. 12

EX-OFFSITE-BYPASS-IMP-LcD-19

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.033 cfs
Storm frequency	=	50 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	128 cuft
Drainage area	=	0.005 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	6.82 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

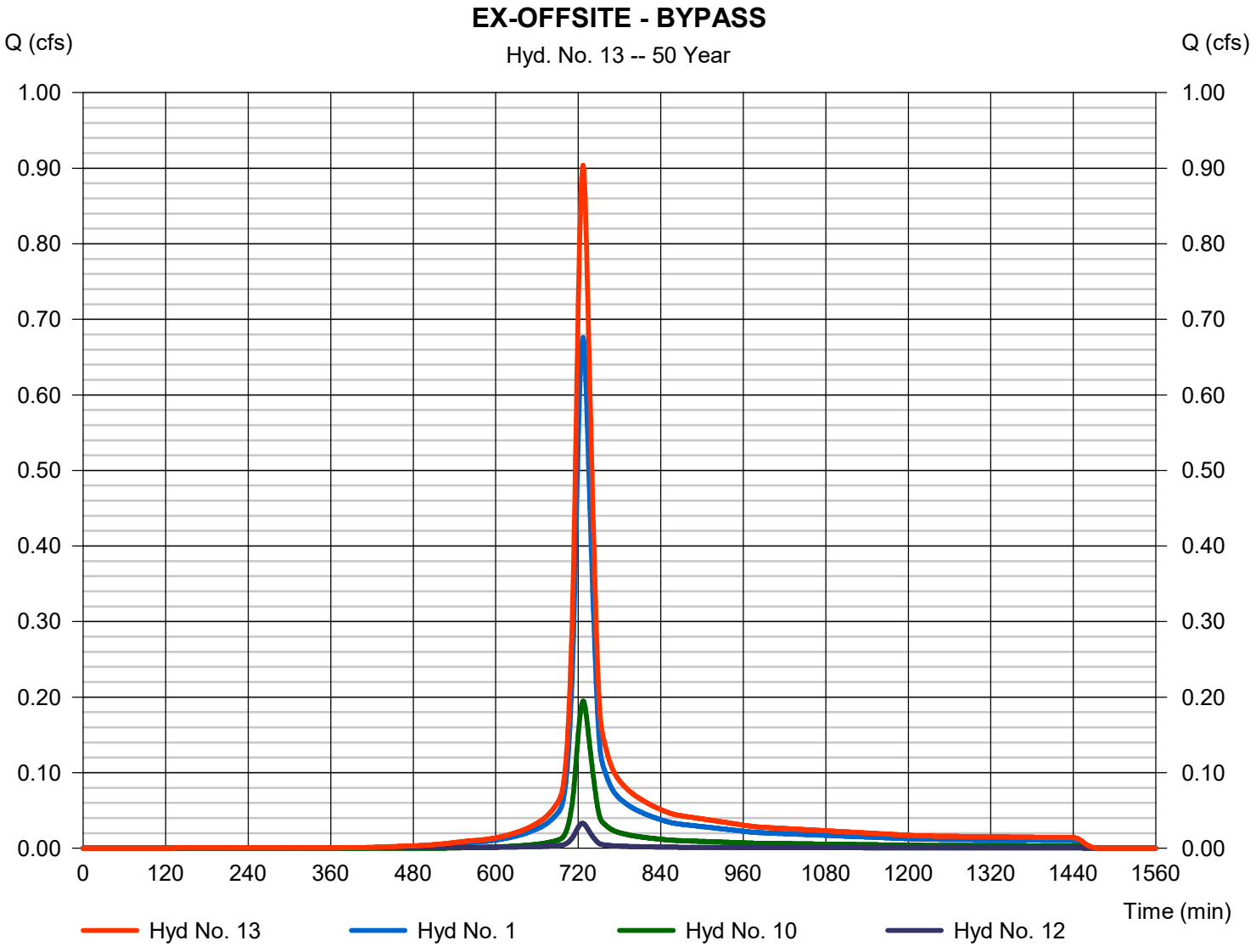


Hydrograph Report

Hyd. No. 13

EX-OFFSITE - BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.904 cfs
Storm frequency	=	50 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	3,090 cuft
Inflow hyds.	=	1, 10, 12	Contrib. drain. area	=	0.211 ac

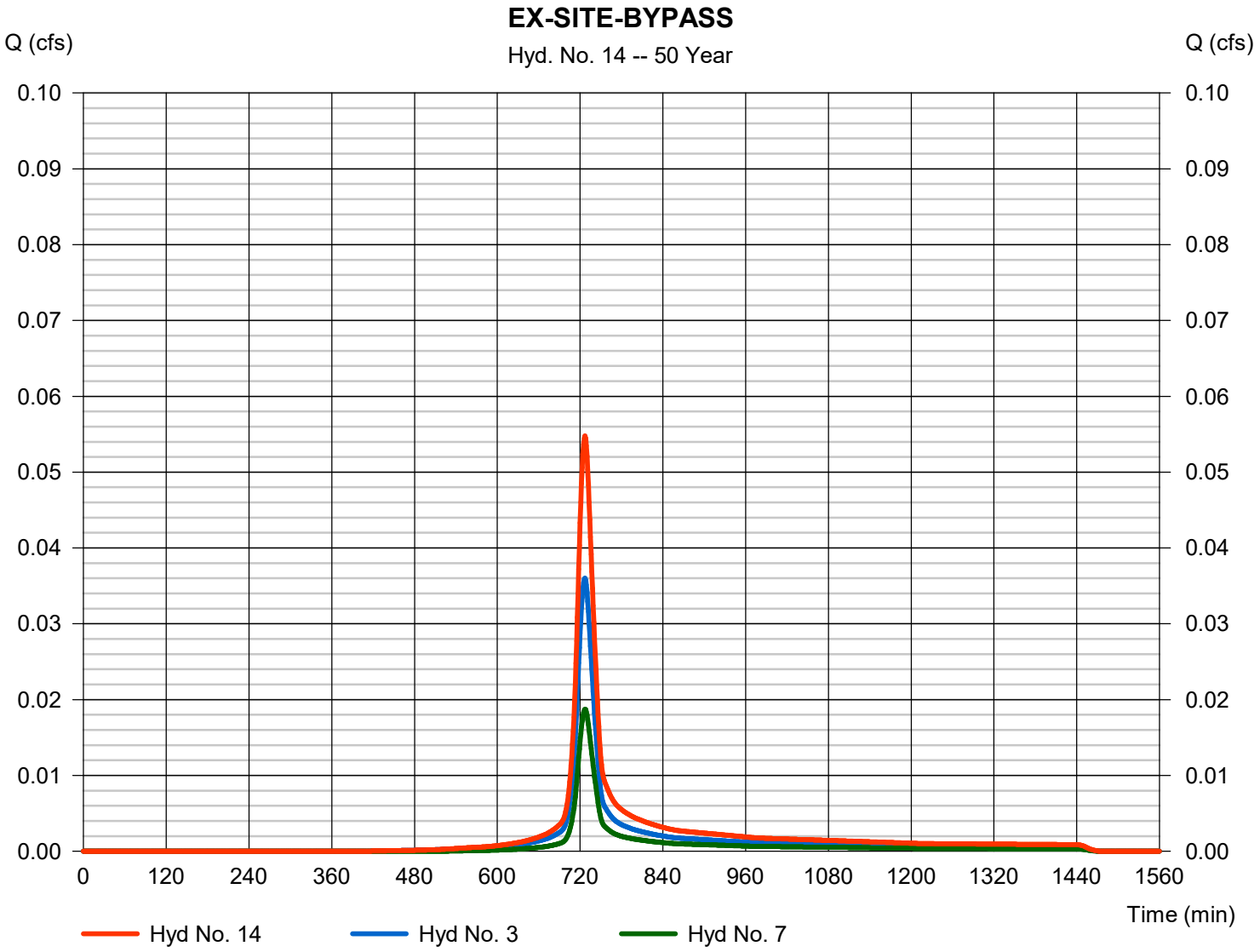


Hydrograph Report

Hyd. No. 14

EX-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.055 cfs
Storm frequency	=	50 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	186 cuft
Inflow hyds.	=	3, 7	Contrib. drain. area	=	0.013 ac

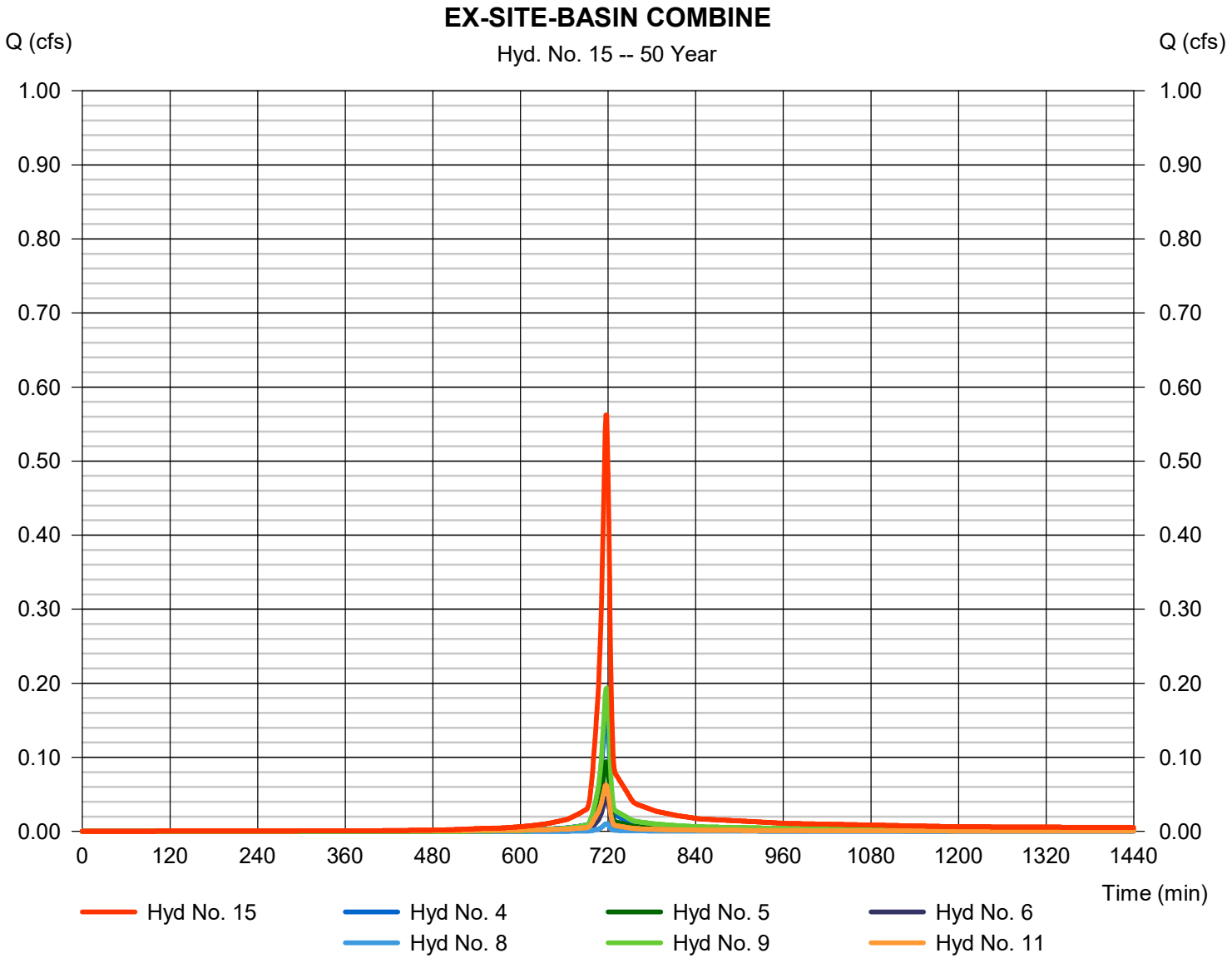


Hydrograph Report

Hyd. No. 15

EX-SITE-BASIN COMBINE

Hydrograph type	=	Combine	Peak discharge	=	0.562 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	1,178 cuft
Inflow hyds.	=	4, 5, 6, 8, 9, 11	Contrib. drain. area	=	0.077 ac

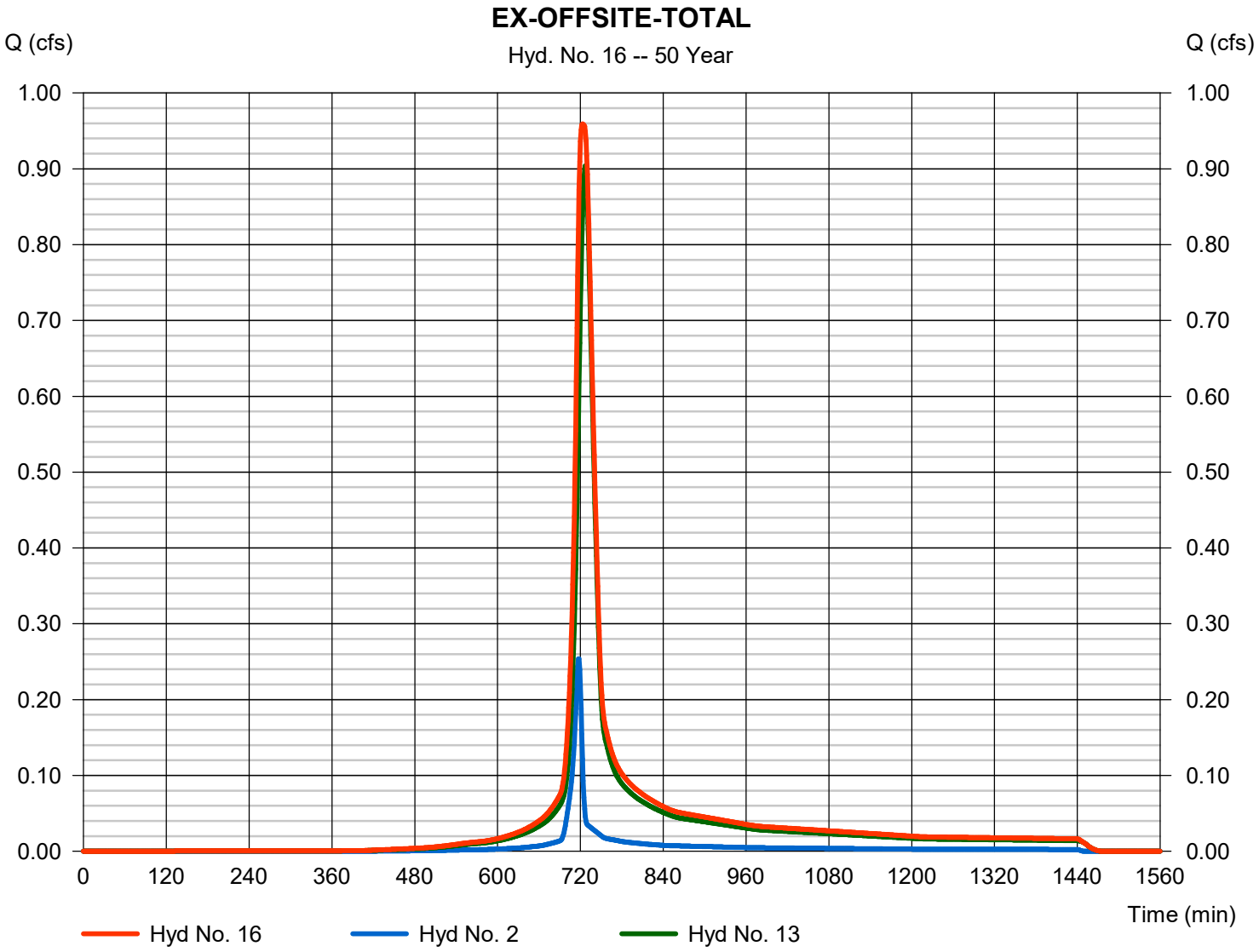


Hydrograph Report

Hyd. No. 16

EX-OFFSITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.959 cfs
Storm frequency	=	50 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	3,614 cuft
Inflow hyds.	=	2, 13	Contrib. drain. area	=	0.033 ac

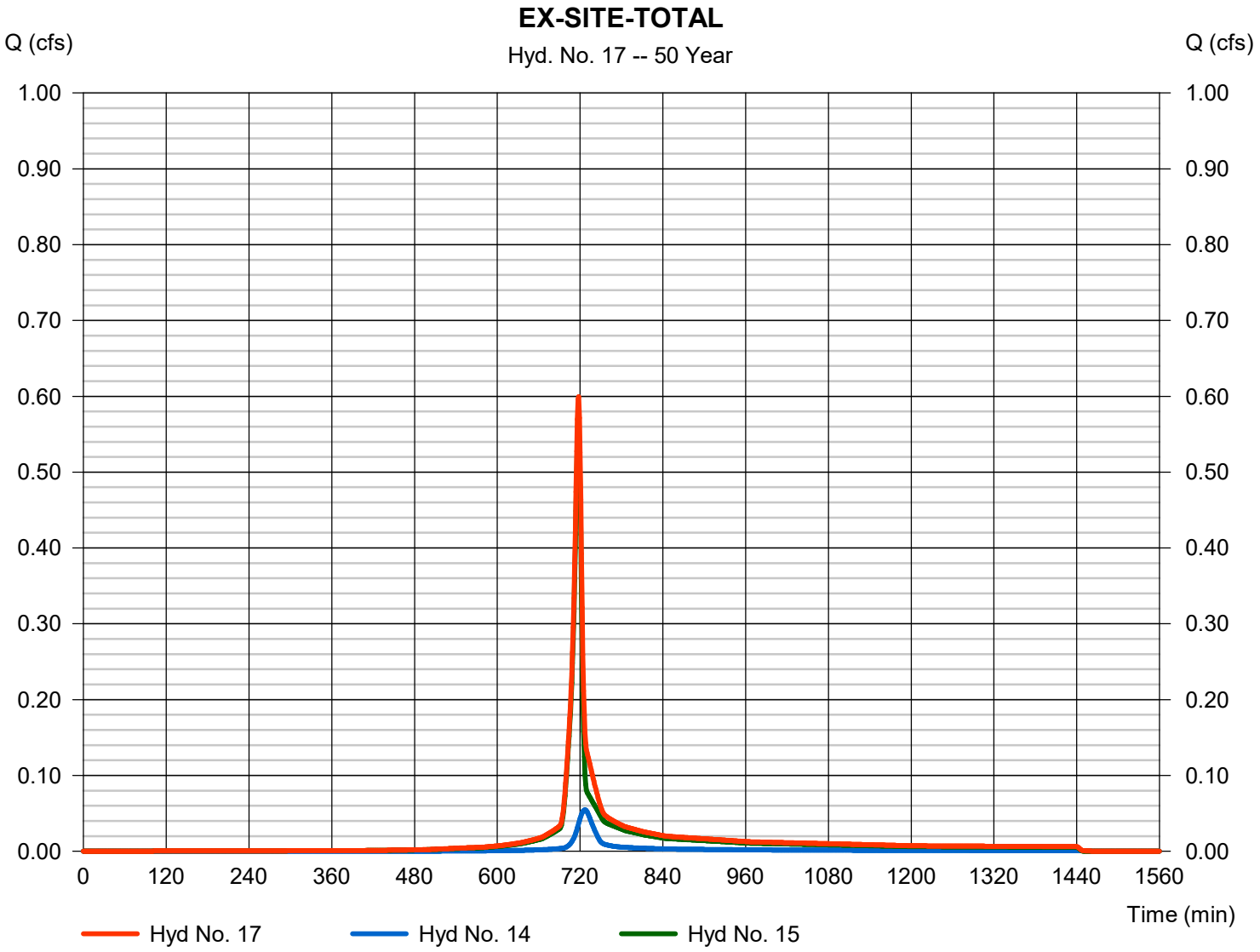


Hydrograph Report

Hyd. No. 17

EX-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.599 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	1,364 cuft
Inflow hyds.	=	14, 15	Contrib. drain. area	=	0.000 ac

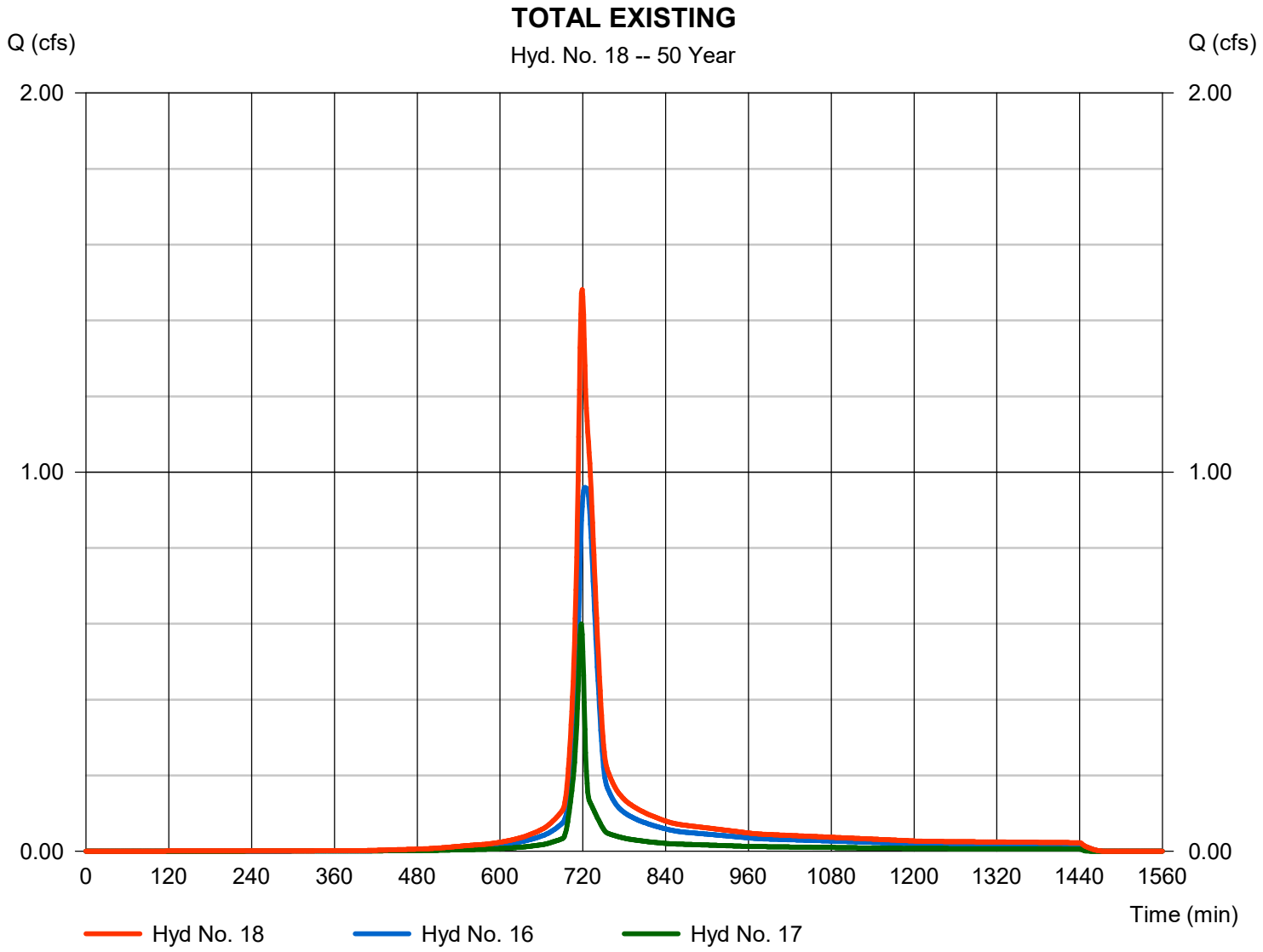


Hydrograph Report

Hyd. No. 18

TOTAL EXISTING

Hydrograph type	=	Combine	Peak discharge	=	1.481 cfs
Storm frequency	=	50 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	4,978 cuft
Inflow hyds.	=	16, 17	Contrib. drain. area	=	0.000 ac

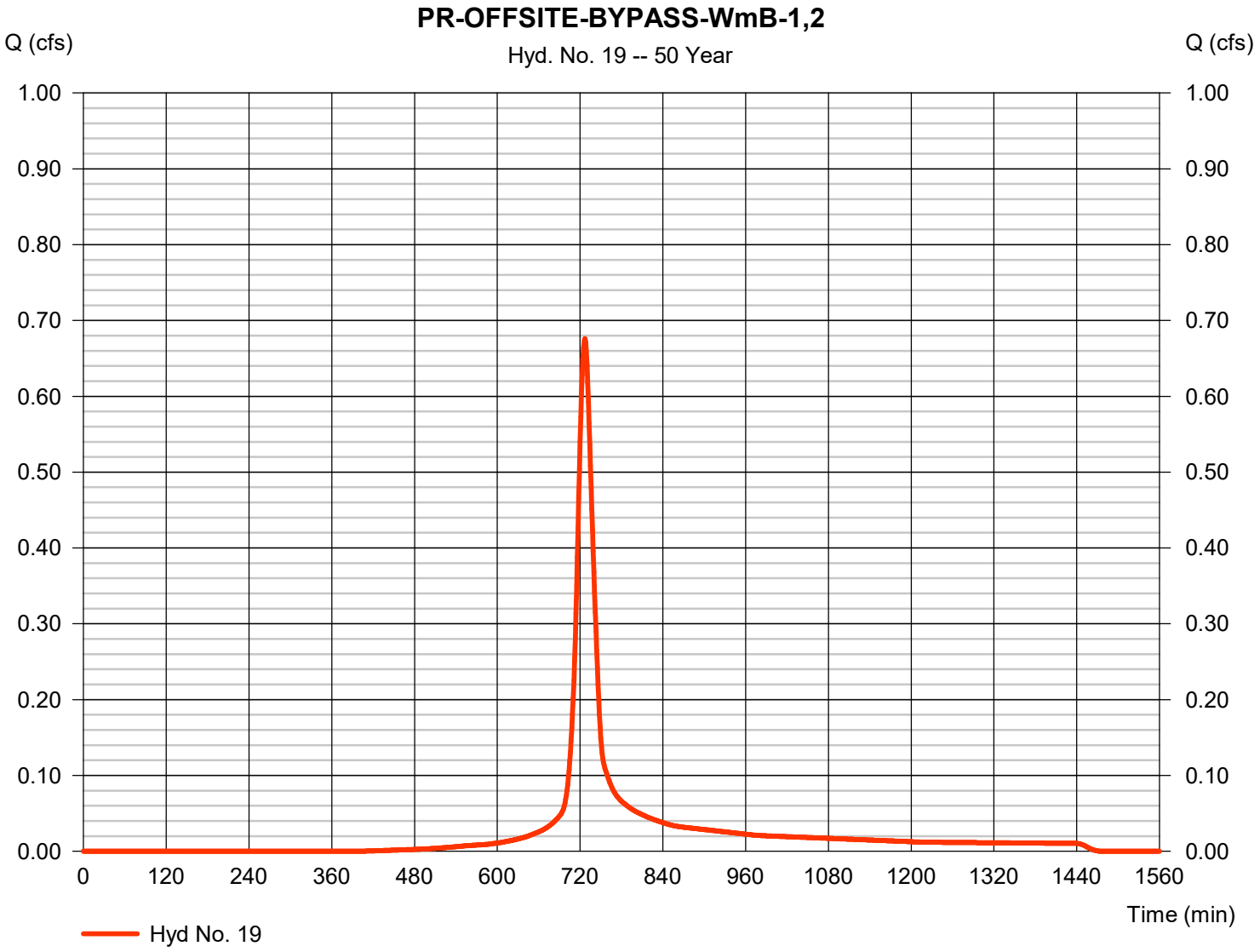


Hydrograph Report

Hyd. No. 19

PR-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.676 cfs
Storm frequency	=	50 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	2,299 cuft
Drainage area	=	0.152 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	6.82 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

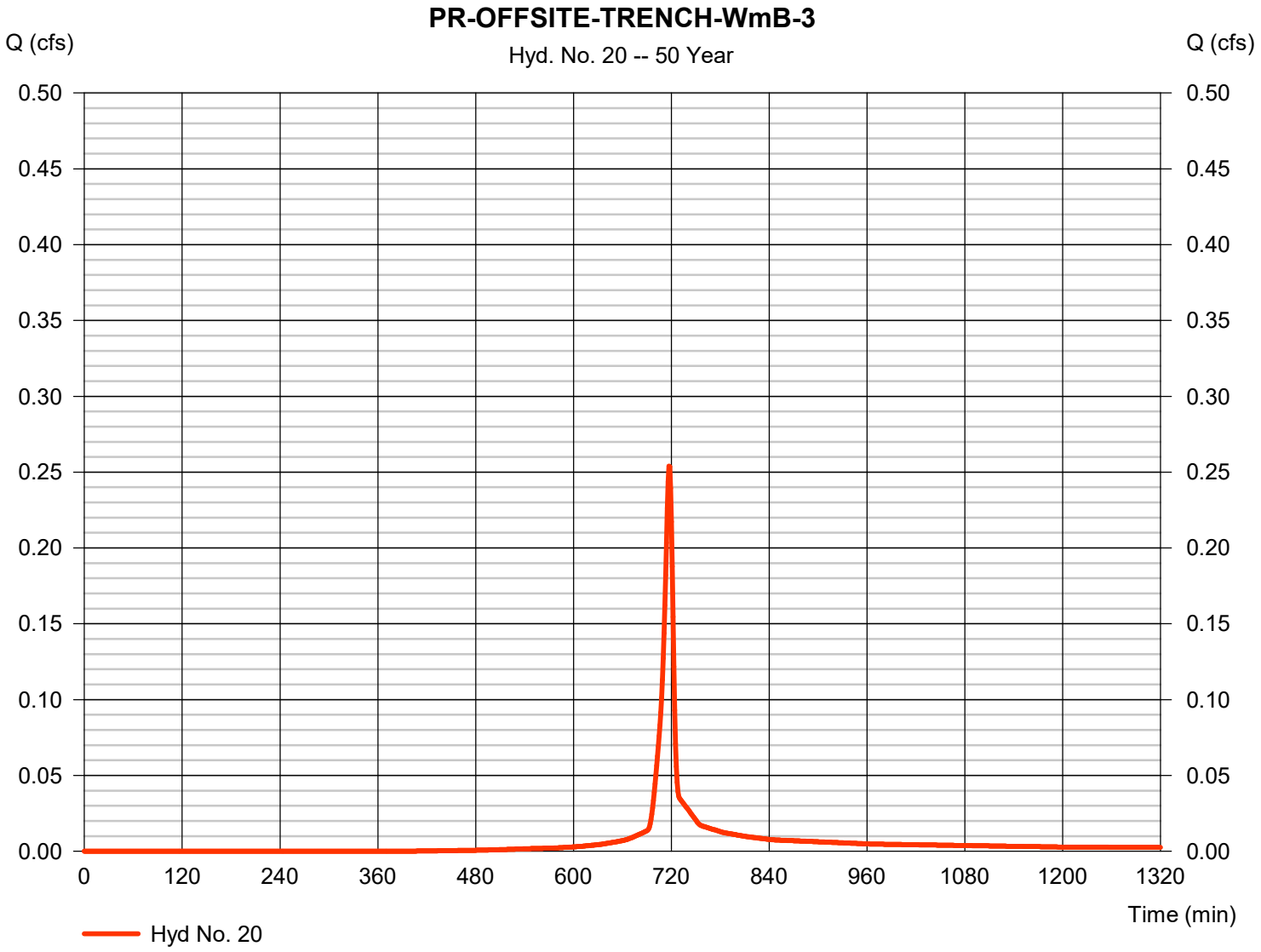


Hydrograph Report

Hyd. No. 20

PR-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.254 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 524 cuft
Drainage area	= 0.033 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

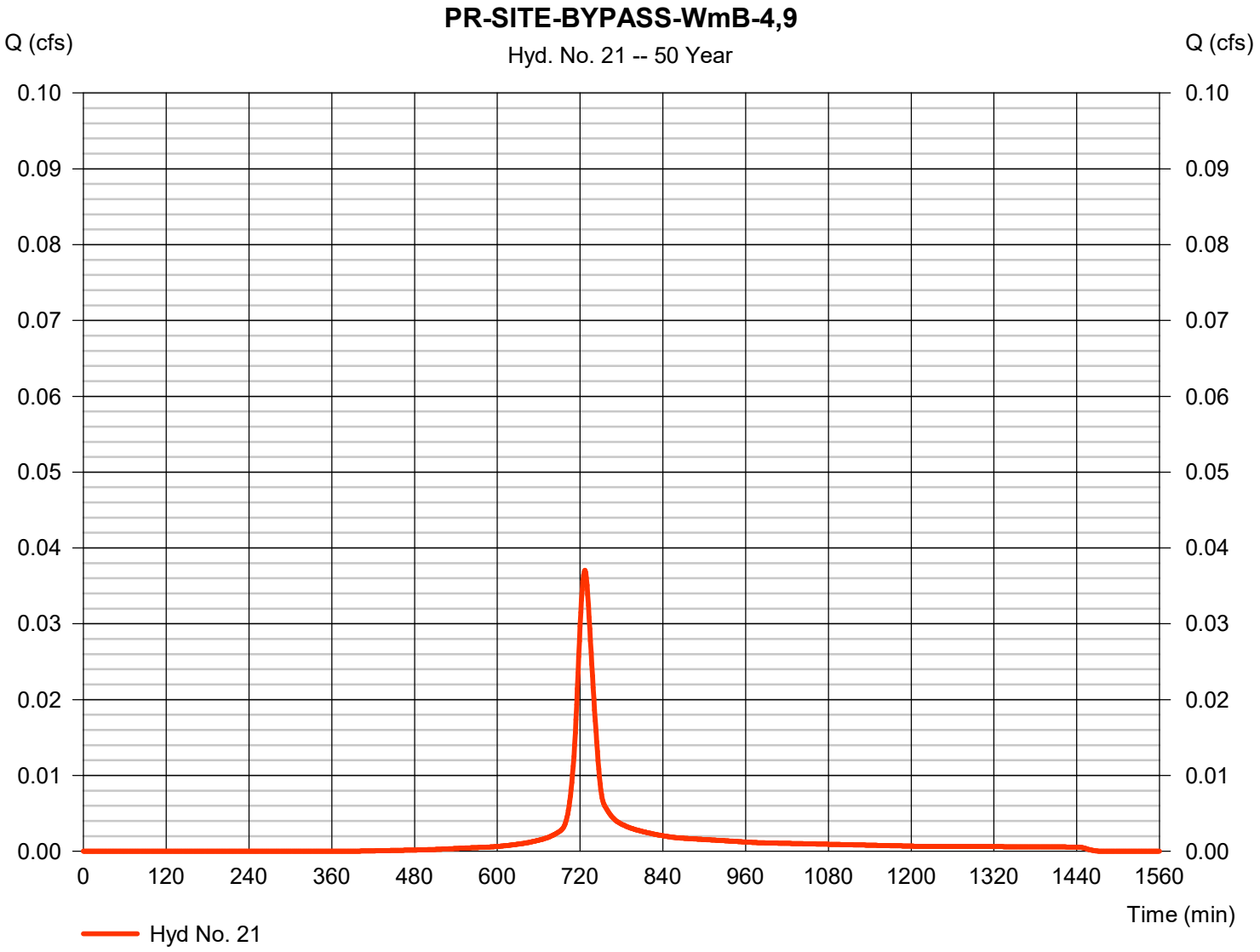


Hydrograph Report

Hyd. No. 21

PR-SITE-BYPASS-WmB-4,9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.037 cfs
Storm frequency	= 50 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 126 cuft
Drainage area	= 0.008 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

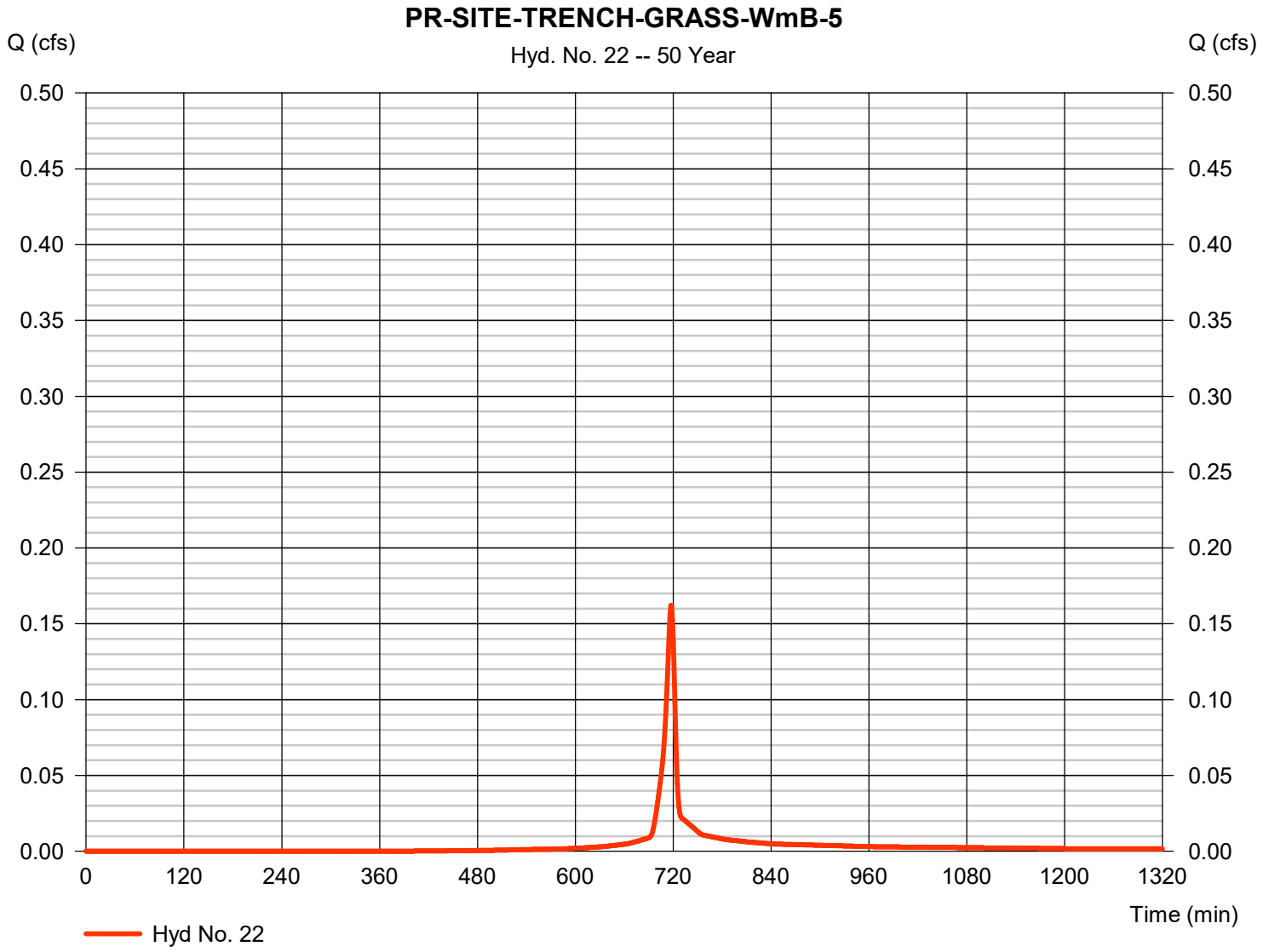


Hydrograph Report

Hyd. No. 22

PR-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.162 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 336 cuft
Drainage area	= 0.021 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

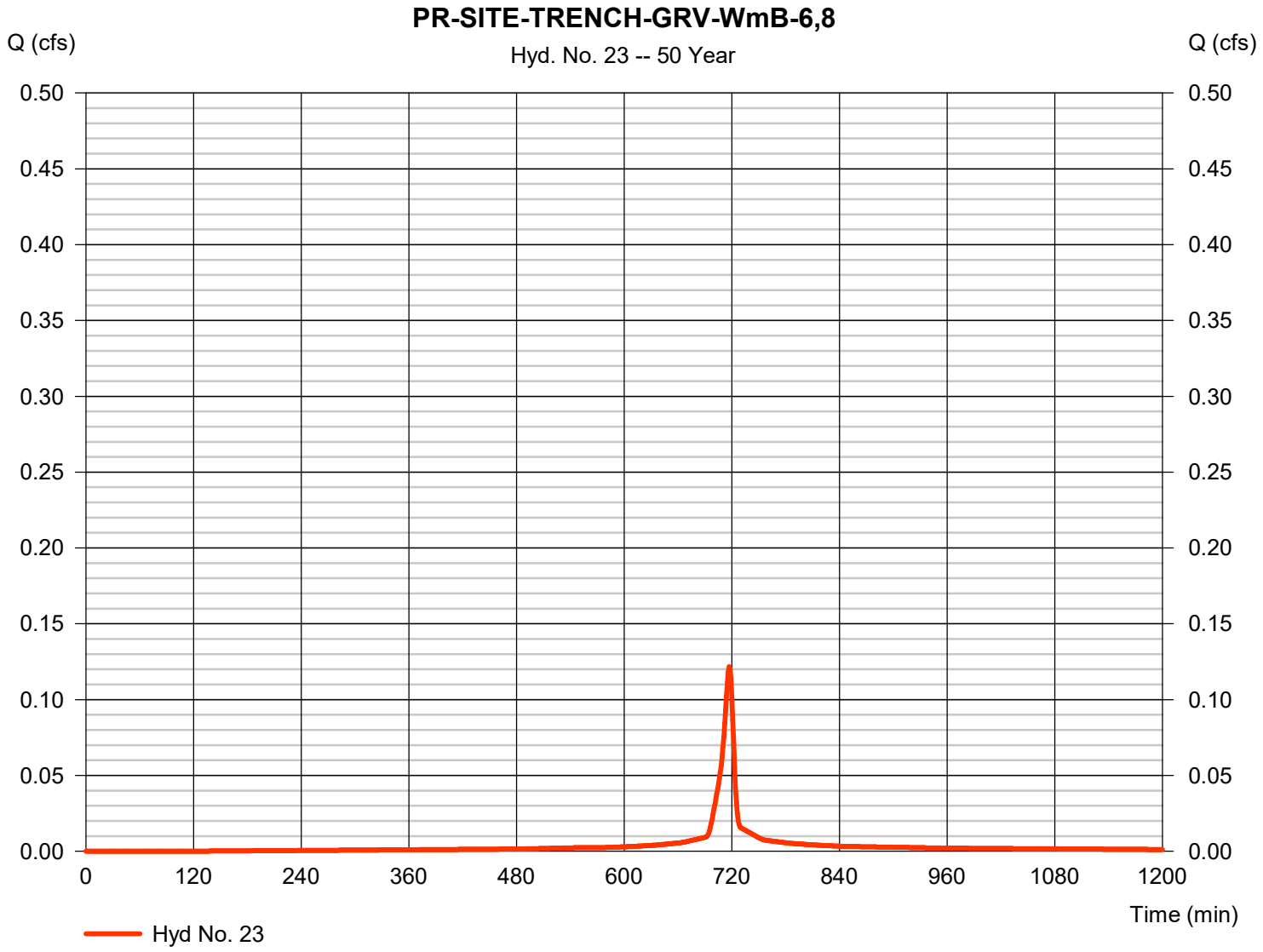


Hydrograph Report

Hyd. No. 23

PR-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.122 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 281 cuft
Drainage area	= 0.012 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

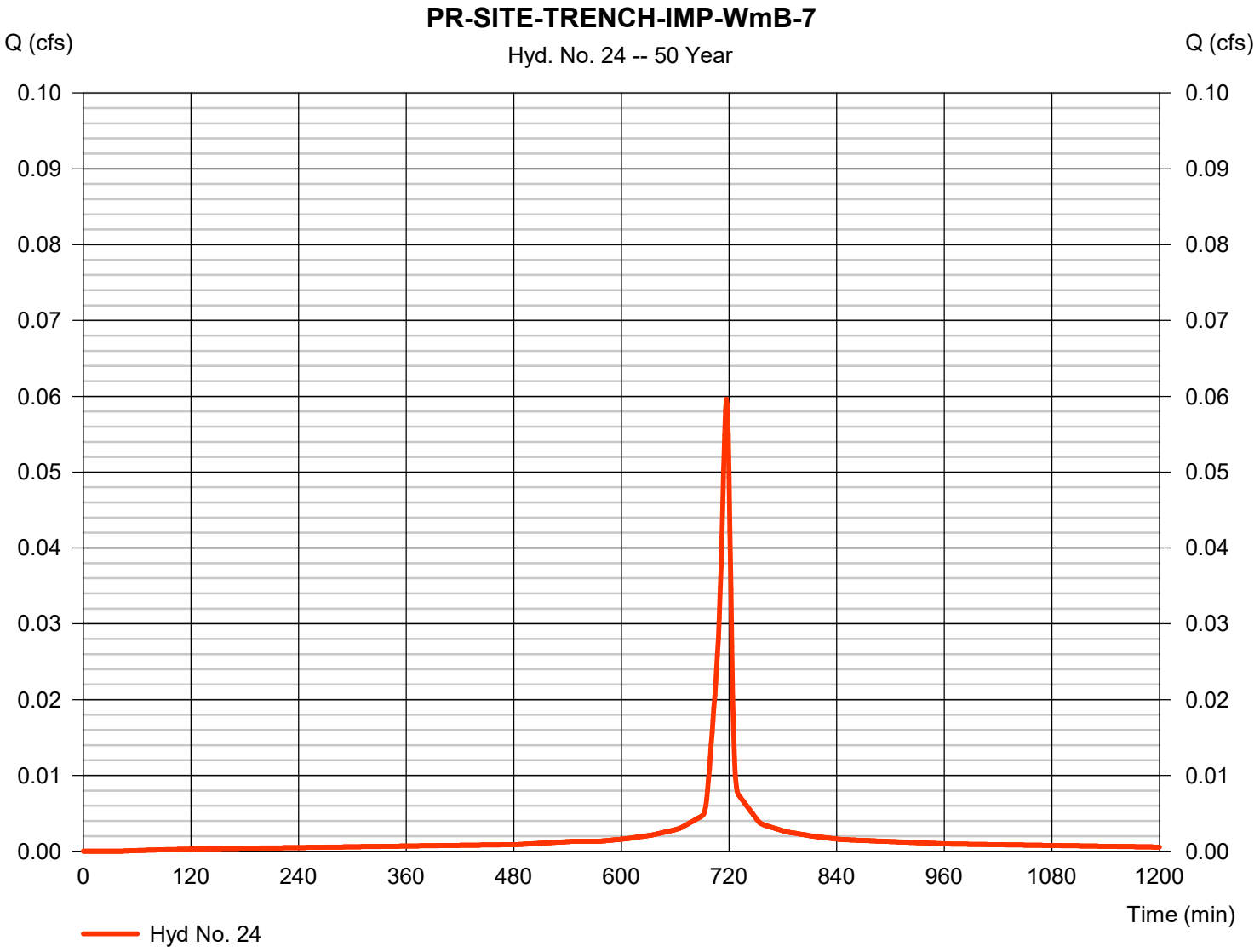


Hydrograph Report

Hyd. No. 24

PR-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.060 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 145 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



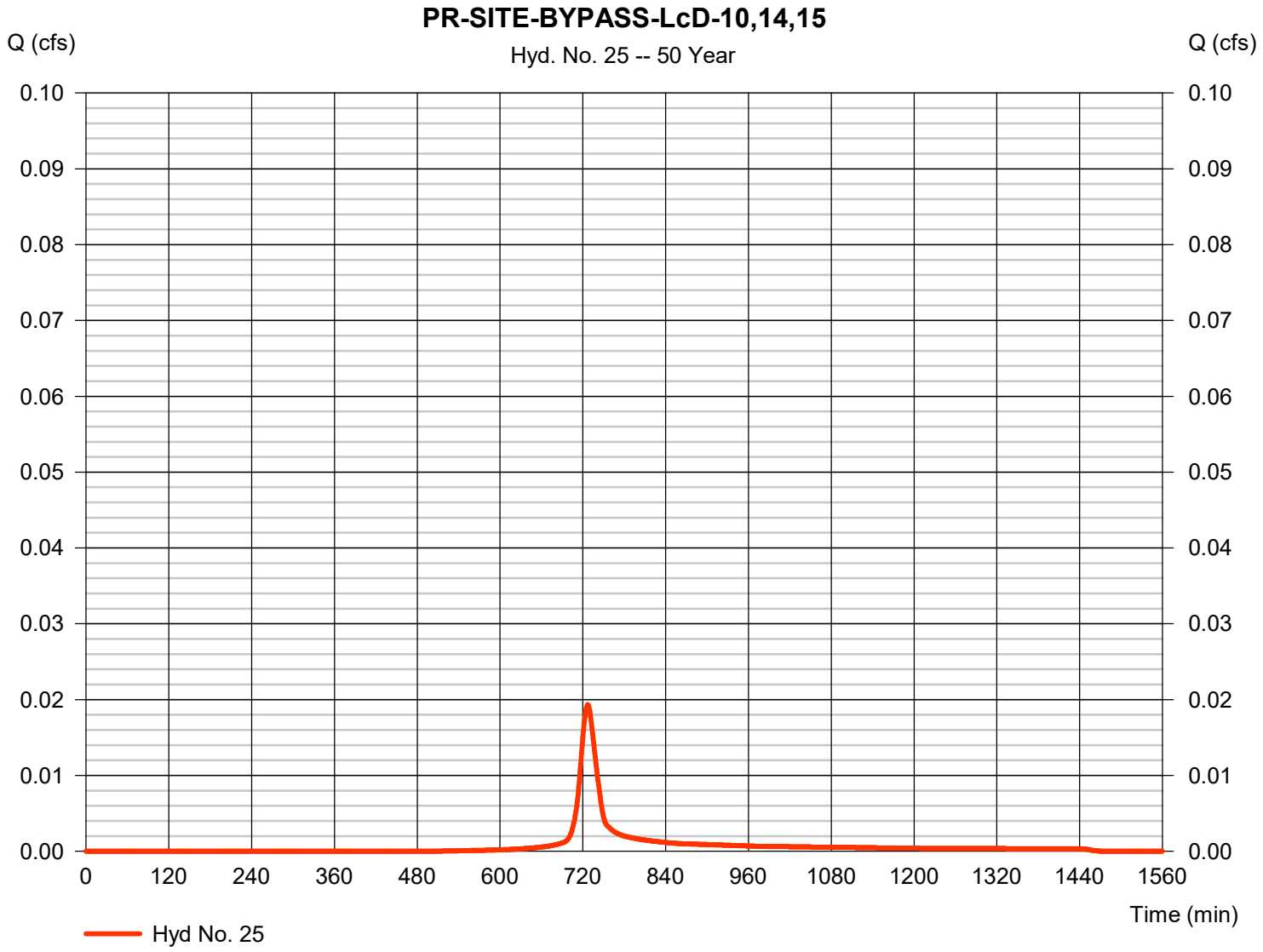
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 25

PR-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.019 cfs
Storm frequency	= 50 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 66 cuft
Drainage area	= 0.005 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

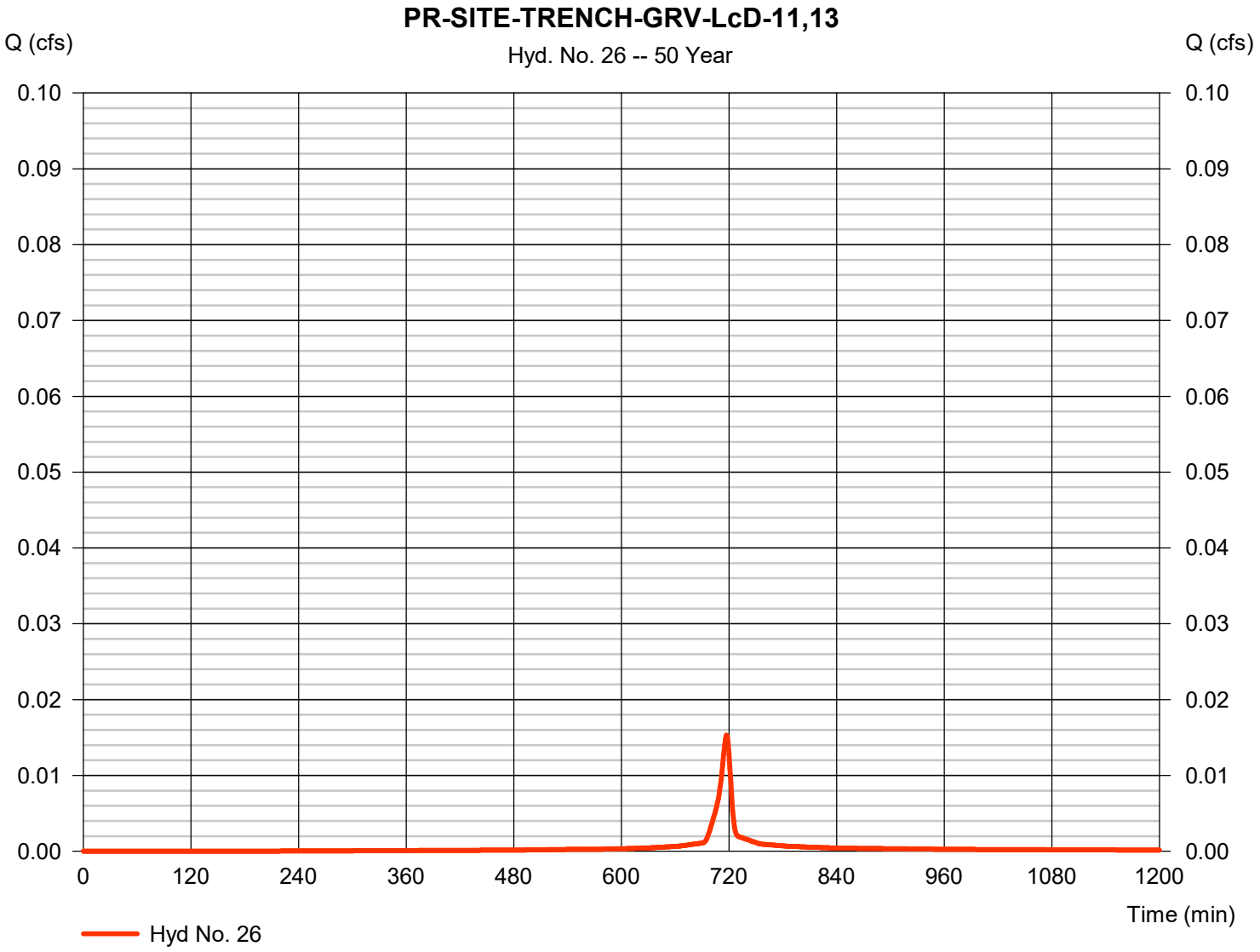


Hydrograph Report

Hyd. No. 26

PR-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.015 cfs
Storm frequency	= 50 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 34 cuft
Drainage area	= 0.002 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

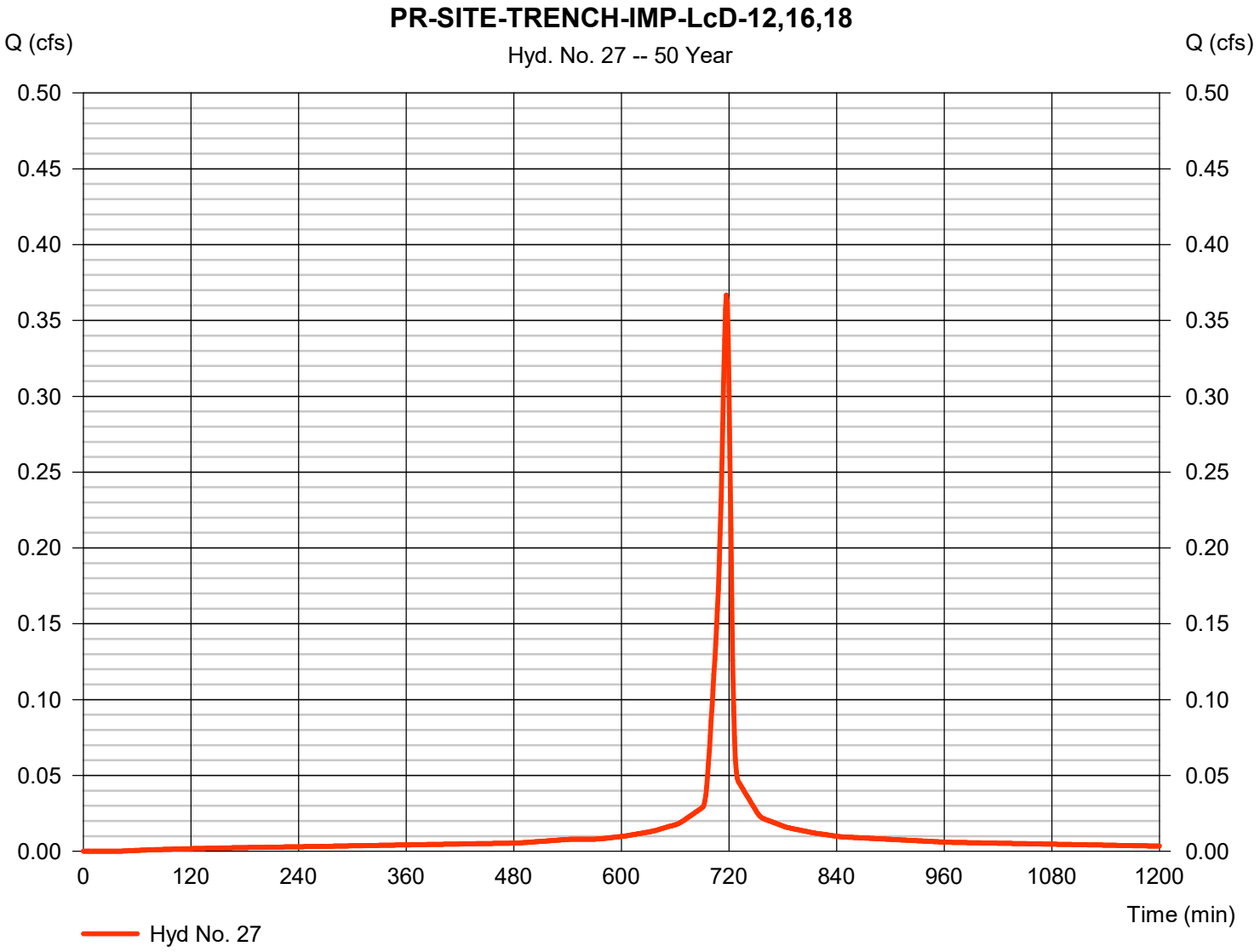


Hydrograph Report

Hyd. No. 27

PR-SITE-TRENCH-IMP-LcD-12,16,18

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.367 cfs
Storm frequency	=	50 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	894 cuft
Drainage area	=	0.036 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.82 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

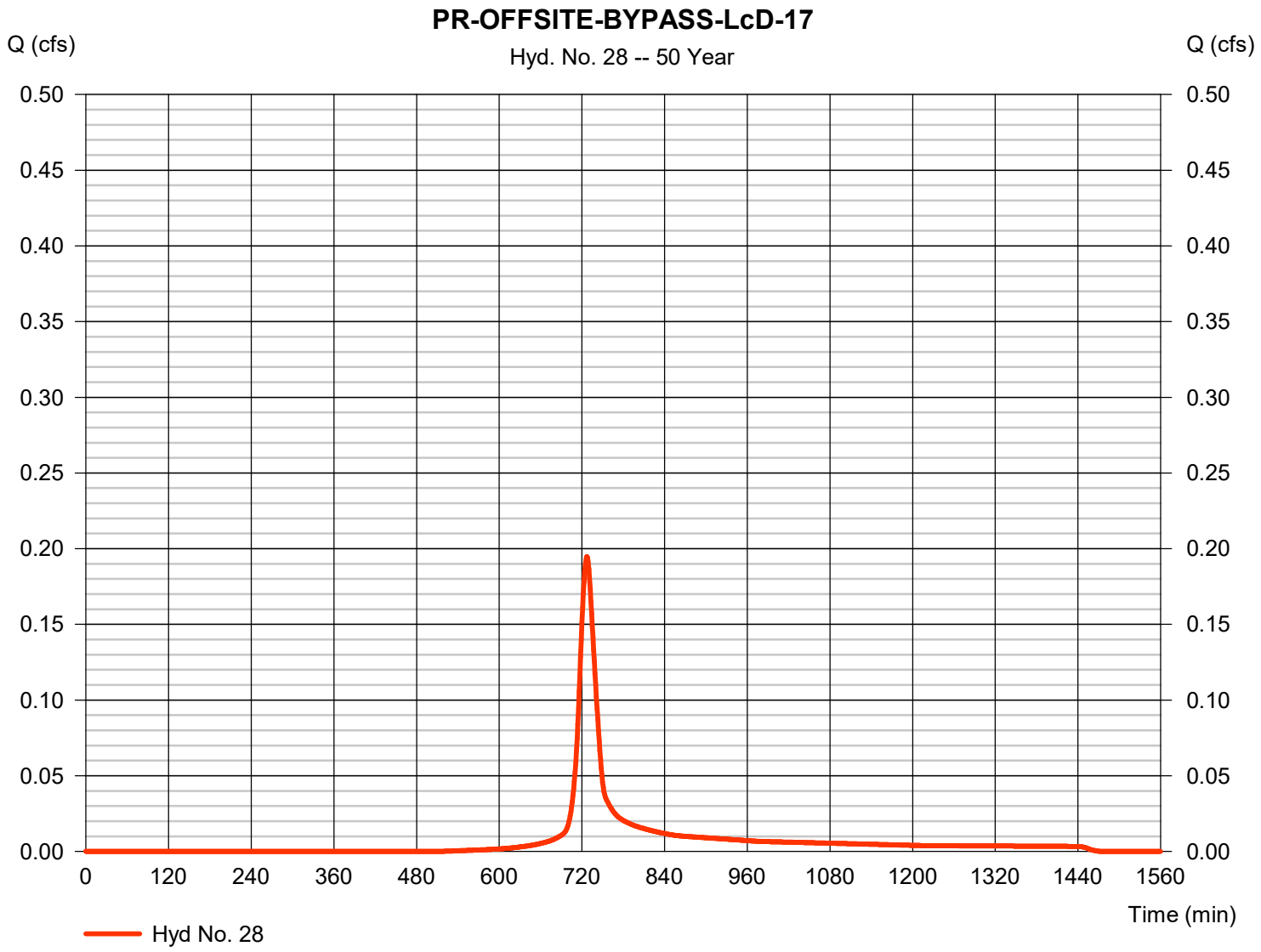
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 28

PR-OFFSITE-BYPASS-LcD-17

Hydrograph type	= SCS Runoff	Peak discharge	= 0.195 cfs
Storm frequency	= 50 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 663 cuft
Drainage area	= 0.053 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.045 x 98) + (0.043 x 98)] / 0.053

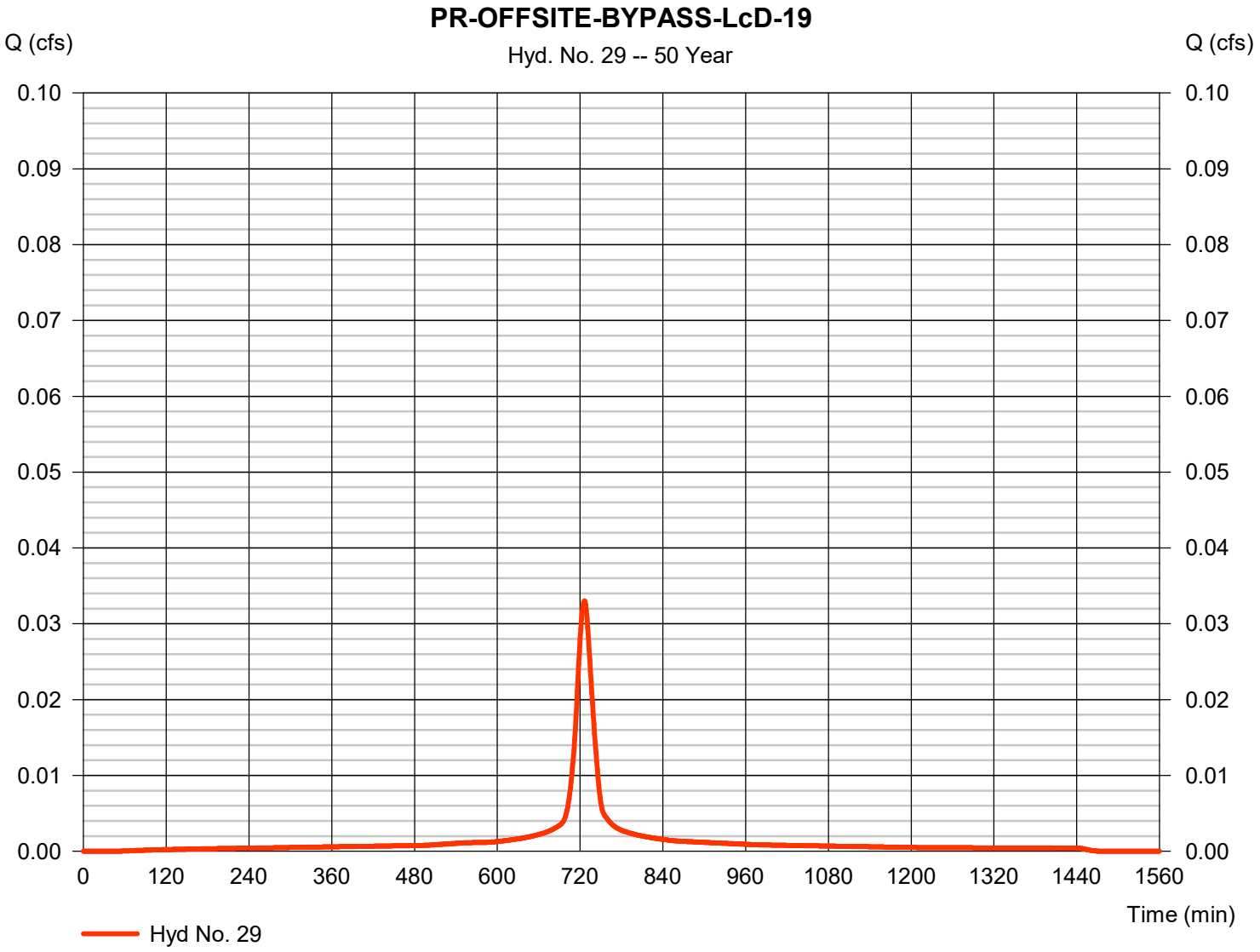


Hydrograph Report

Hyd. No. 29

PR-OFFSITE-BYPASS-LcD-19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.033 cfs
Storm frequency	= 50 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 128 cuft
Drainage area	= 0.005 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 6.82 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

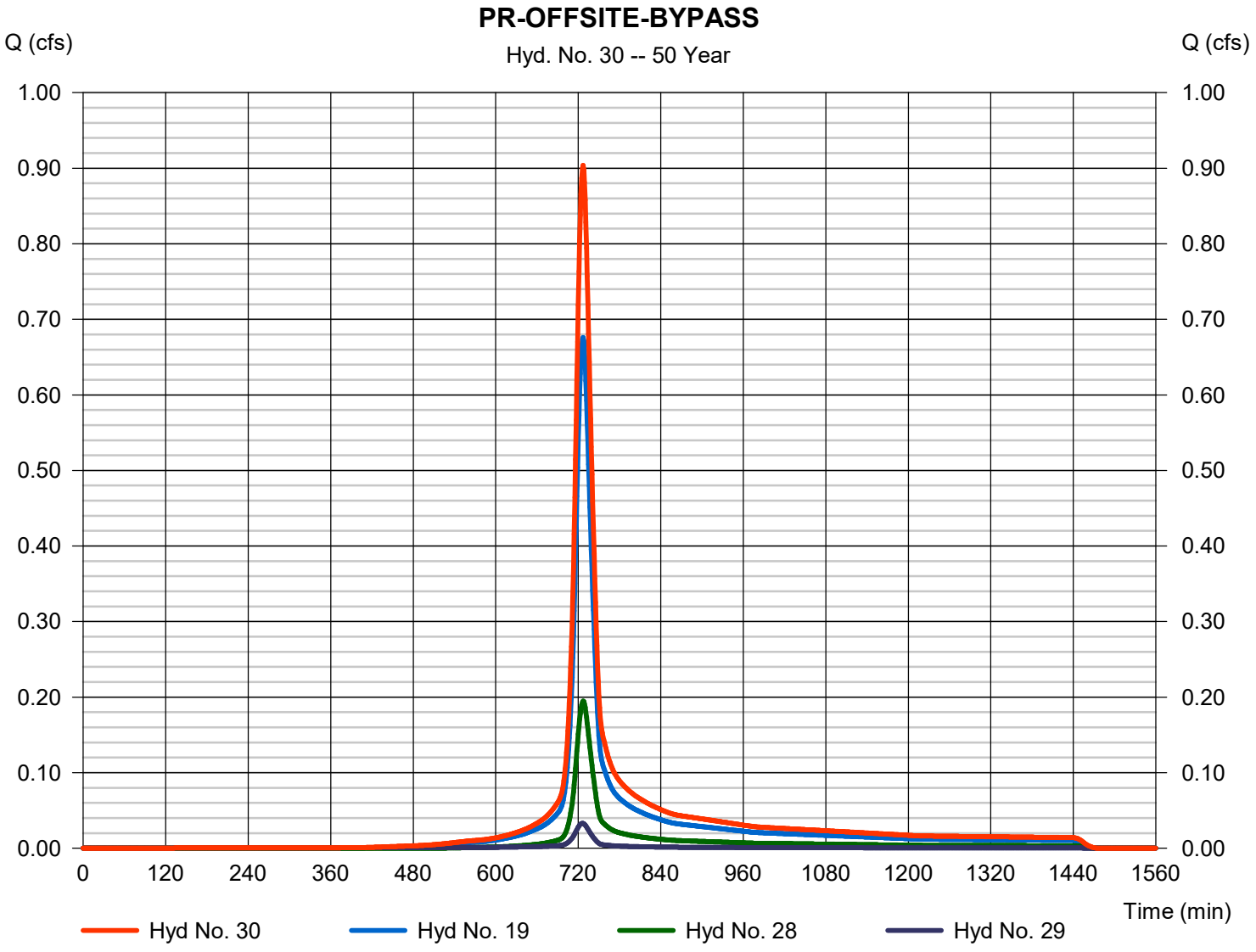


Hydrograph Report

Hyd. No. 30

PR-OFFSITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.904 cfs
Storm frequency	=	50 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	3,090 cuft
Inflow hyds.	=	19, 28, 29	Contrib. drain. area	=	0.211 ac

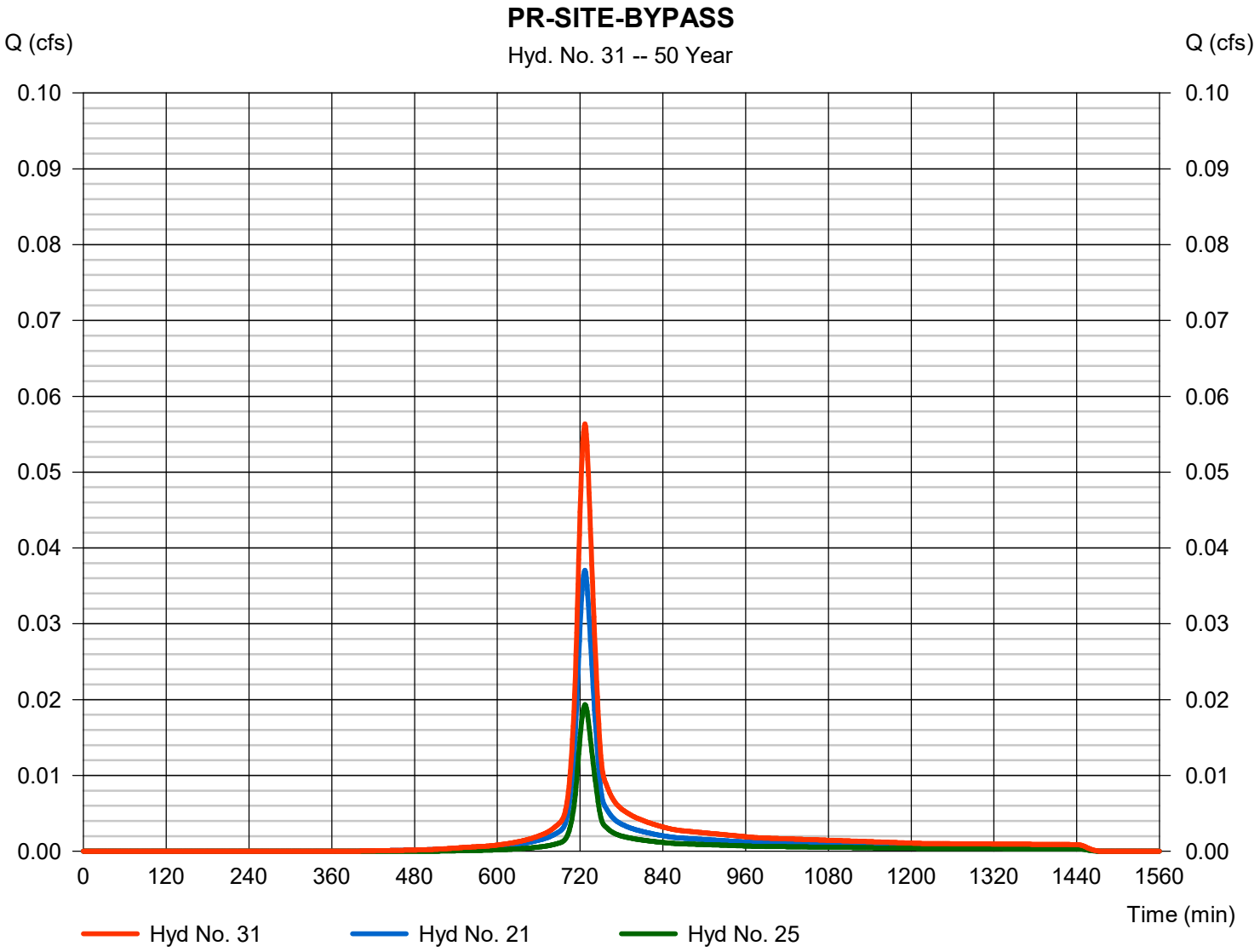


Hydrograph Report

Hyd. No. 31

PR-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.056 cfs
Storm frequency	=	50 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	192 cuft
Inflow hyds.	=	21, 25	Contrib. drain. area	=	0.013 ac

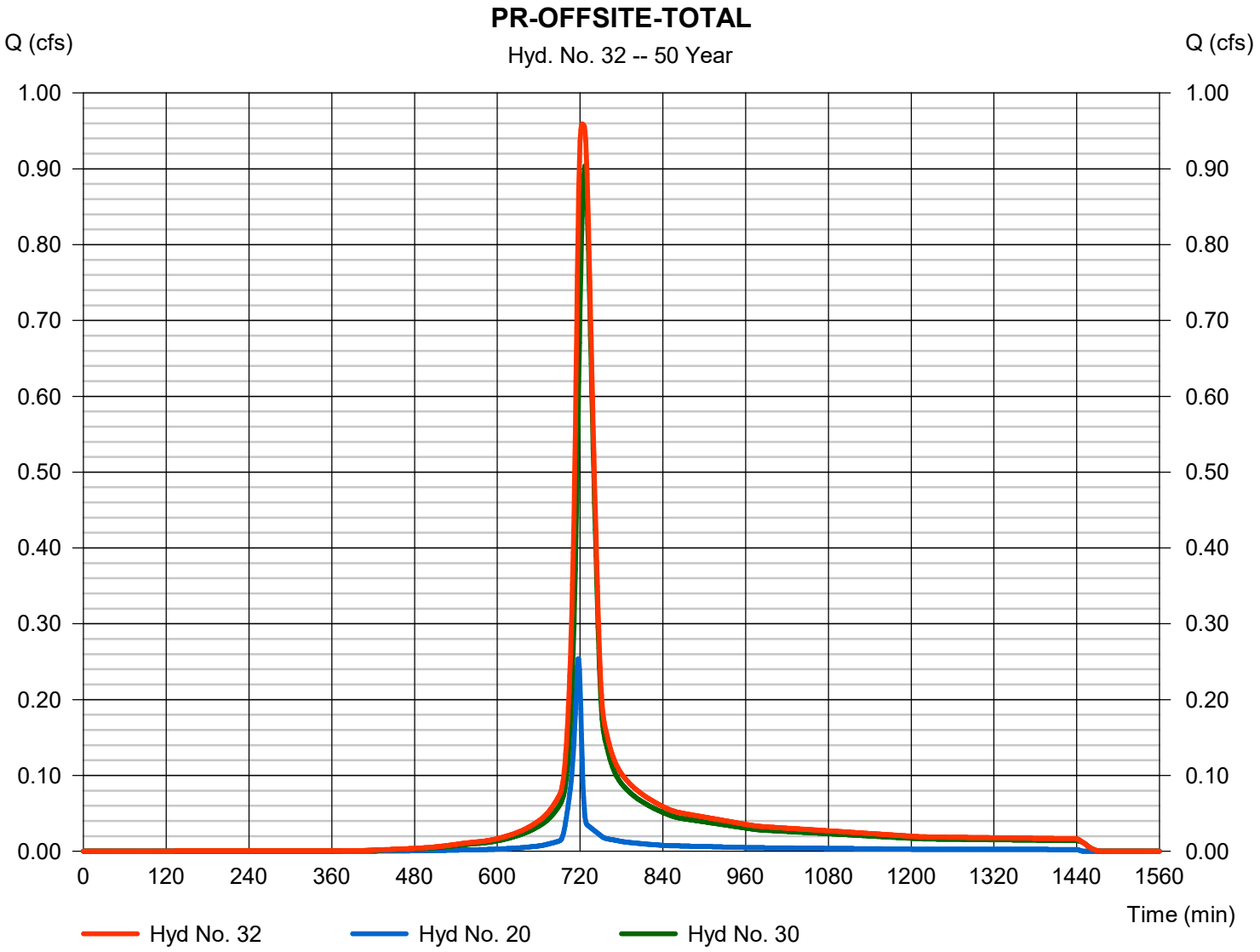


Hydrograph Report

Hyd. No. 32

PR-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.959 cfs
Storm frequency	= 50 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 3,614 cuft
Inflow hyds.	= 20, 30	Contrib. drain. area	= 0.033 ac

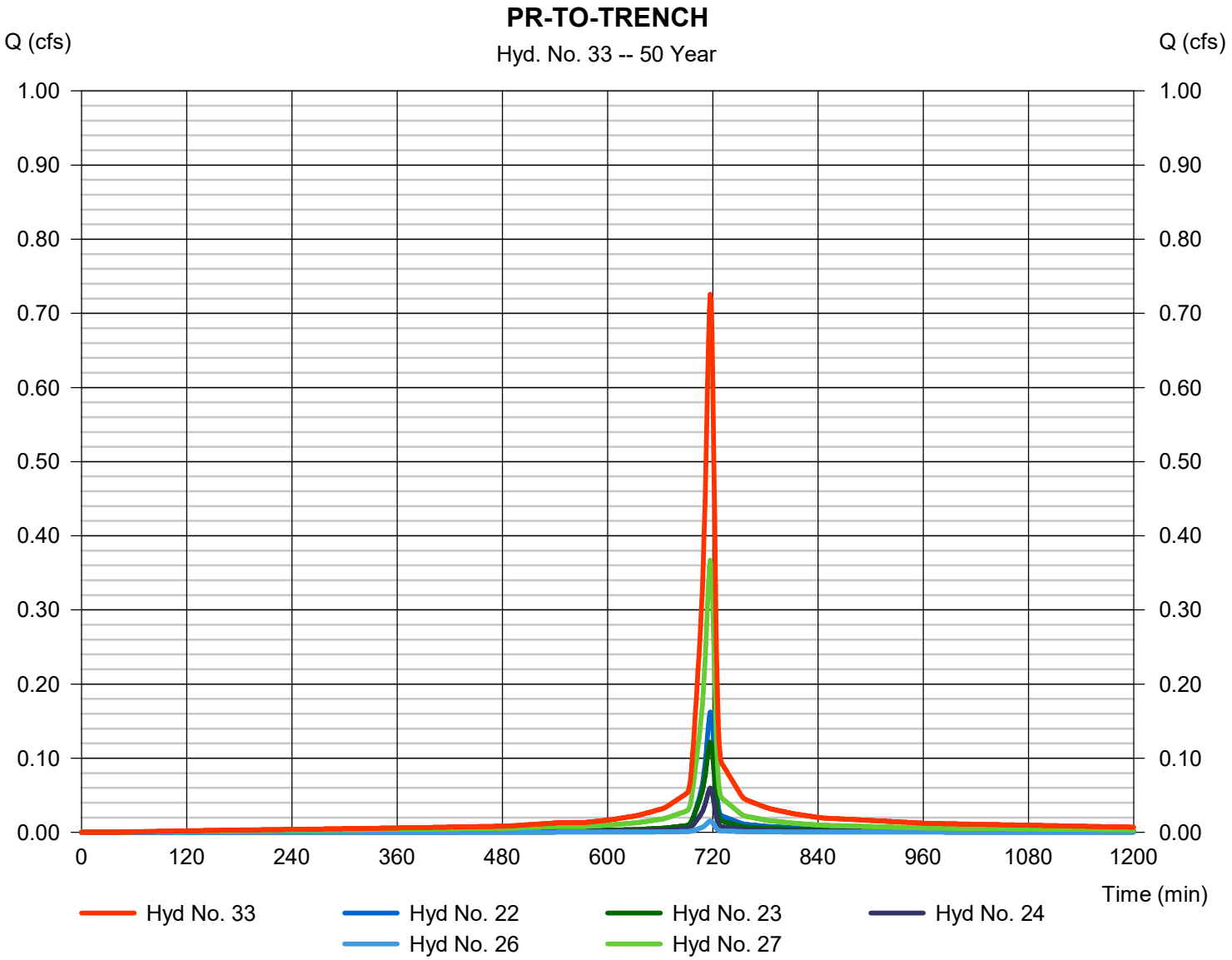


Hydrograph Report

Hyd. No. 33

PR-TO-TRENCH

Hydrograph type	=	Combine	Peak discharge	=	0.726 cfs
Storm frequency	=	50 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	1,691 cuft
Inflow hyds.	=	22, 23, 24, 26, 27	Contrib. drain. area	=	0.077 ac



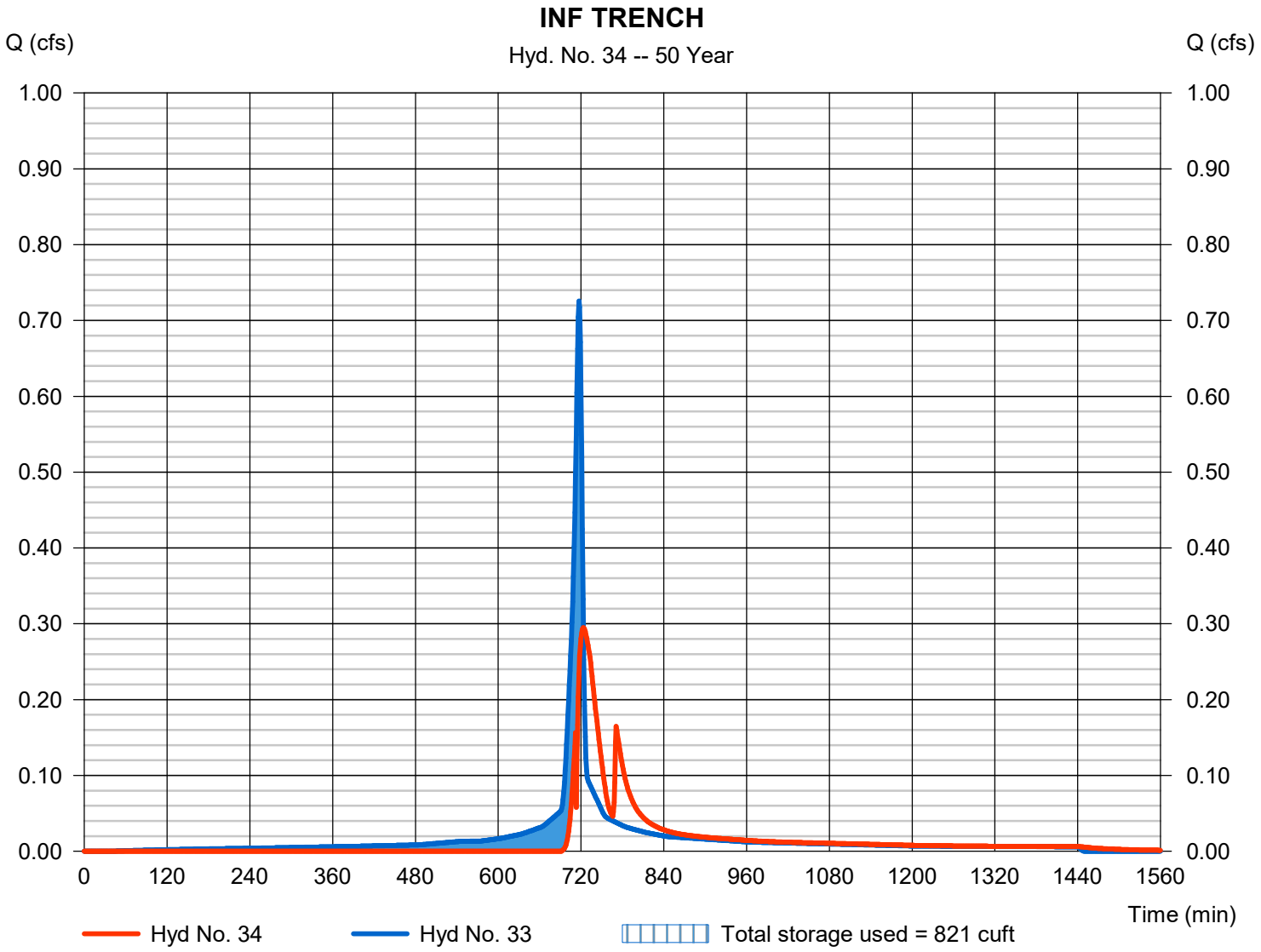
Hydrograph Report

Hyd. No. 34

INF TRENCH

Hydrograph type	=	Reservoir	Peak discharge	=	0.295 cfs
Storm frequency	=	50 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	1,326 cuft
Inflow hyd. No.	=	33 - PR-TO-TRENCH	Max. Elevation	=	1687.66 ft
Reservoir name	=	BASIN	Max. Storage	=	821 cuft

Storage Indication method used.

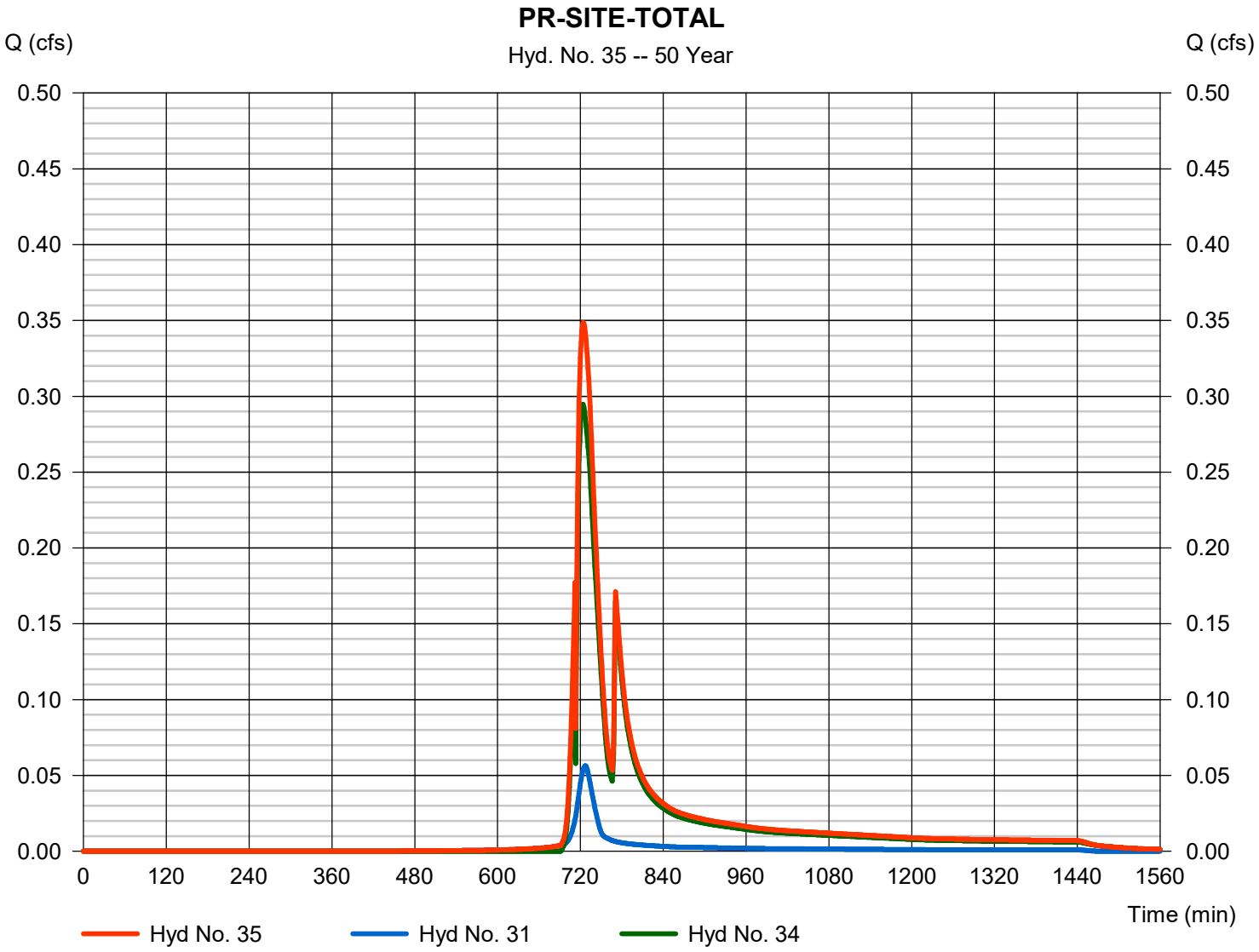


Hydrograph Report

Hyd. No. 35

PR-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.349 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	1,518 cuft
Inflow hyds.	=	31, 34	Contrib. drain. area	=	0.000 ac

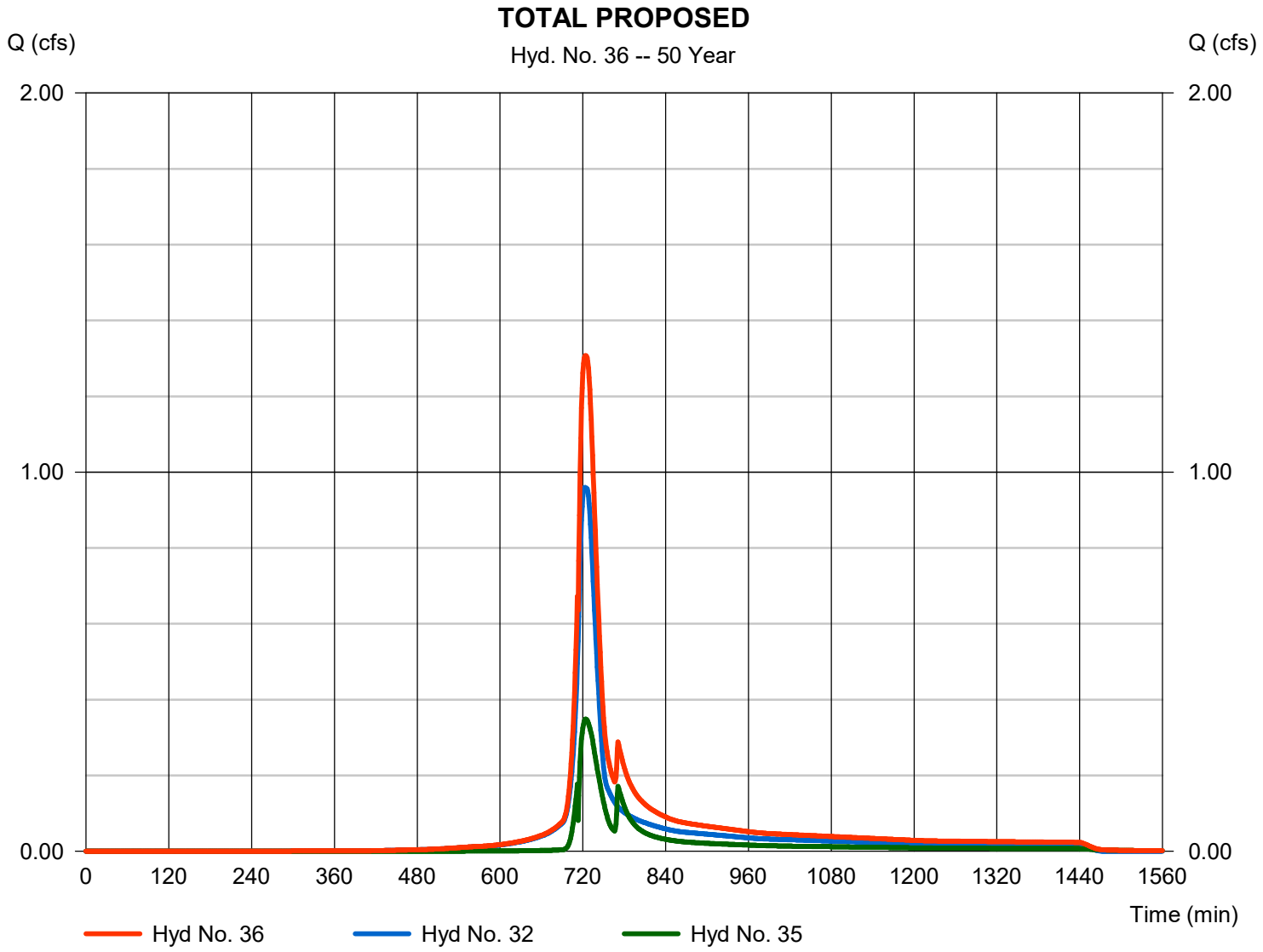


Hydrograph Report

Hyd. No. 36

TOTAL PROPOSED

Hydrograph type	=	Combine	Peak discharge	=	1.308 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	5,131 cuft
Inflow hyds.	=	32, 35	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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	0.855	1	727	2,919	------	------	------	EX-OFFSITE-BYPASS-WmB-1,2
2	SCS Runoff	0.319	1	717	665	------	------	------	EX-OFFSITE-TRENCH-WmB-3
3	SCS Runoff	0.046	1	727	156	------	------	------	EX-SITE-BYPASS-WmB-4,9
4	SCS Runoff	0.199	1	717	416	------	------	------	EX-SITE-TRENCH-GRASS-WmB-5
5	SCS Runoff	0.118	1	717	246	------	------	------	EX-SITE-TRENCH-GRV-WmB-6,8
6	SCS Runoff	0.057	1	717	118	------	------	------	EX-SITE-TRENCH-IMP-WmB-7
7	SCS Runoff	0.025	1	727	83	------	------	------	EX-SITE-BYPASS-LcD-10,14,15
8	SCS Runoff	0.013	1	718	27	------	------	------	EX-SITE-TRENCH-GRV-LcD-11,13
9	SCS Runoff	0.250	1	718	510	------	------	------	EX-SITE-TRENCH-IMP-LcD-12,16
10	SCS Runoff	0.255	1	727	864	------	------	------	EX-OFFSITE-BYPASS-LcD-17
11	SCS Runoff	0.074	1	717	182	------	------	------	EX-SITE-TRENCH-IMP-ROAD-LcD-1
12	SCS Runoff	0.039	1	726	152	------	------	------	EX-OFFSITE-BYPASS-IMP-LcD-19
13	Combine	1.148	1	727	3,936	1, 10, 12	------	------	EX-OFFSITE - BYPASS
14	Combine	0.070	1	727	239	3, 7,	------	------	EX-SITE-BYPASS
15	Combine	0.710	1	717	1,498	4, 5, 6,	------	------	EX-SITE-BASIN COMBINE
16	Combine	1.221	1	723	4,601	8, 9, 11, 2, 13,	------	------	EX-OFFSITE-TOTAL
17	Combine	0.757	1	718	1,737	14, 15,	------	------	EX-SITE-TOTAL
18	Combine	1.882	1	719	6,338	16, 17	------	------	TOTAL EXISTING
19	SCS Runoff	0.855	1	727	2,919	------	------	------	PR-OFFSITE-BYPASS-WmB-1,2
20	SCS Runoff	0.319	1	717	665	------	------	------	PR-OFFSITE-TRENCH-WmB-3
21	SCS Runoff	0.047	1	727	160	------	------	------	PR-SITE-BYPASS-WmB-4,9
22	SCS Runoff	0.203	1	717	425	------	------	------	PR-SITE-TRENCH-GRASS-WmB-5
23	SCS Runoff	0.145	1	717	338	------	------	------	PR-SITE-TRENCH-GRV-WmB-6,8
24	SCS Runoff	0.071	1	717	173	------	------	------	PR-SITE-TRENCH-IMP-WmB-7
25	SCS Runoff	0.025	1	727	85	------	------	------	PR-SITE-BYPASS-LcD-10,14,15
26	SCS Runoff	0.018	1	717	42	------	------	------	PR-SITE-TRENCH-GRV-LcD-11,13
27	SCS Runoff	0.434	1	717	1,064	------	------	------	PR-SITE-TRENCH-IMP-LcD-12,16,1
28	SCS Runoff	0.255	1	727	864	------	------	------	PR-OFFSITE-BYPASS-LcD-17
29	SCS Runoff	0.039	1	726	152	------	------	------	PR-OFFSITE-BYPASS-LcD-19
30	Combine	1.148	1	727	3,936	19, 28, 29	------	------	PR-OFFSITE-BYPASS
31	Combine	0.072	1	727	245	21, 25,	------	------	PR-SITE-BYPASS
32	Combine	1.221	1	723	4,601	20, 30,	------	------	PR-OFFSITE-TOTAL
33	Combine	0.871	1	717	2,042	22, 23, 24,	------	------	PR-TO-TRENCH
34	Reservoir	0.341	1	724	1,677	26, 27, 33	1687.83	938	INF TRENCH

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

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
35	Combine	0.410	1	724	1,922	31, 34	------	------	PR-SITE-TOTAL
36	Combine	1.630	1	724	6,523	32, 35	------	------	TOTAL PROPOSED

Hydrograph Report

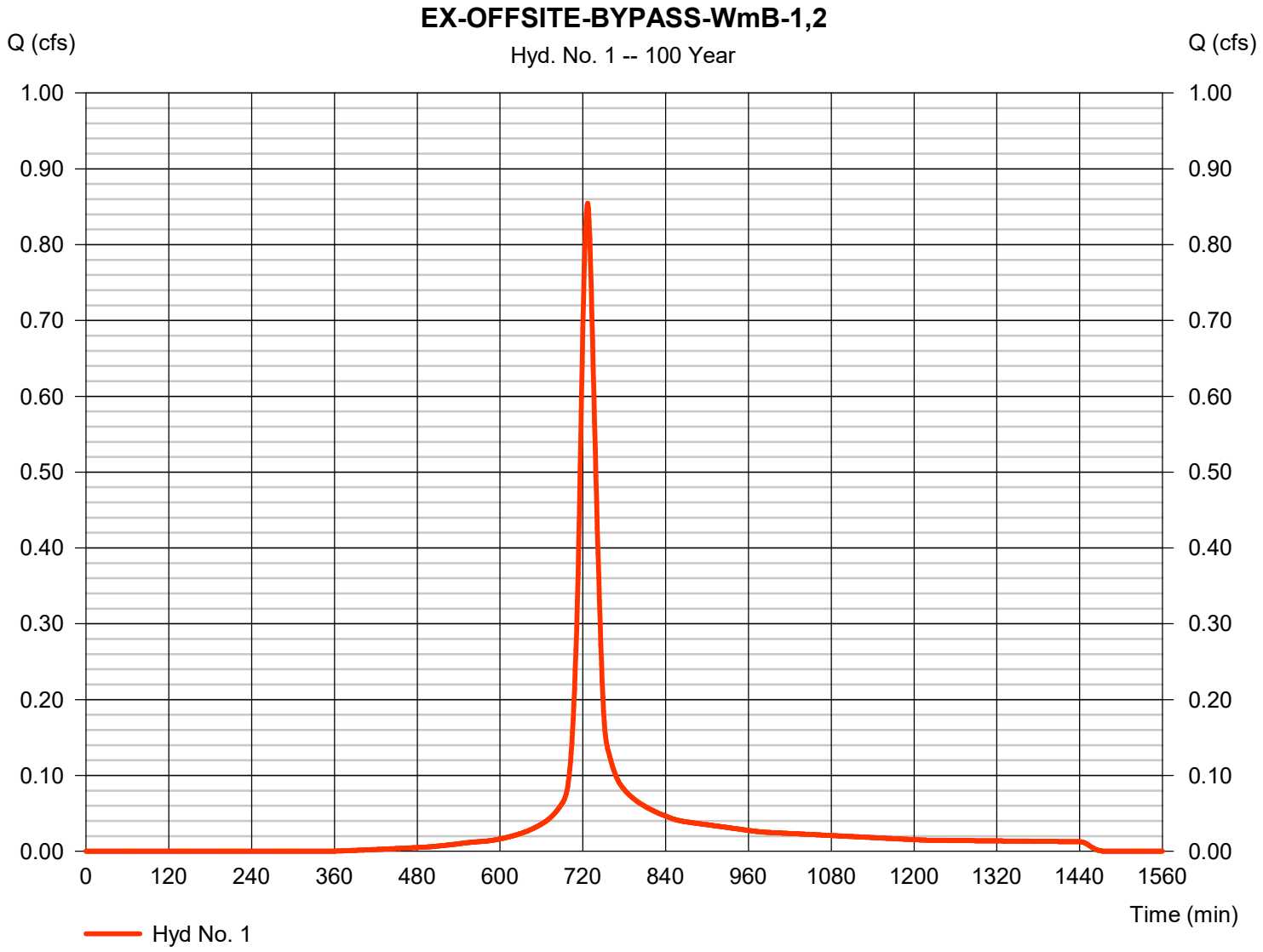
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 1

EX-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.855 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 2,919 cuft
Drainage area	= 0.152 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 78) + (0.253 x 77)] / 0.152



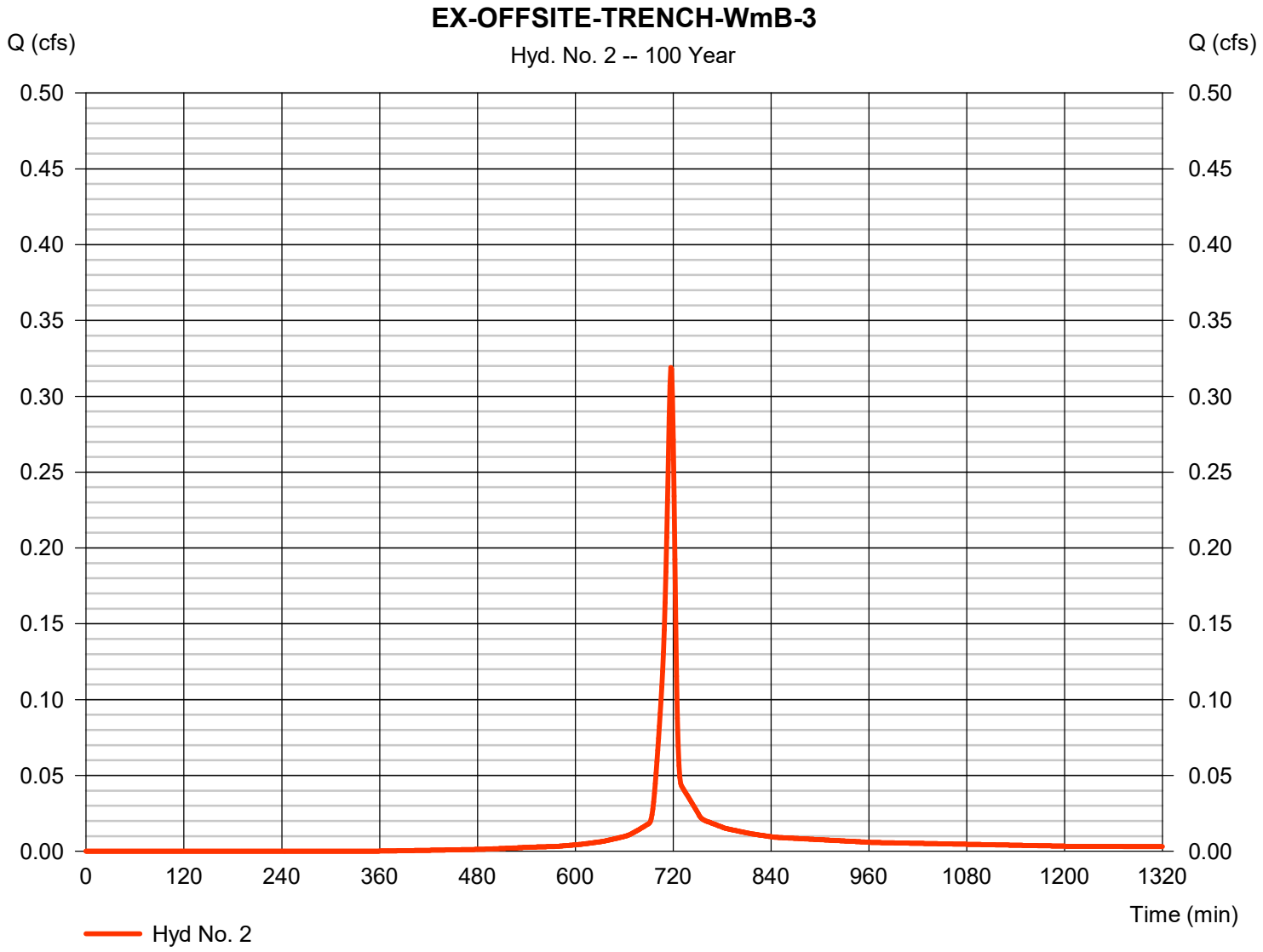
Hydrograph Report

Hyd. No. 2

EX-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.319 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 665 cuft
Drainage area	= 0.033 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 98)] / 0.033



Hydrograph Report

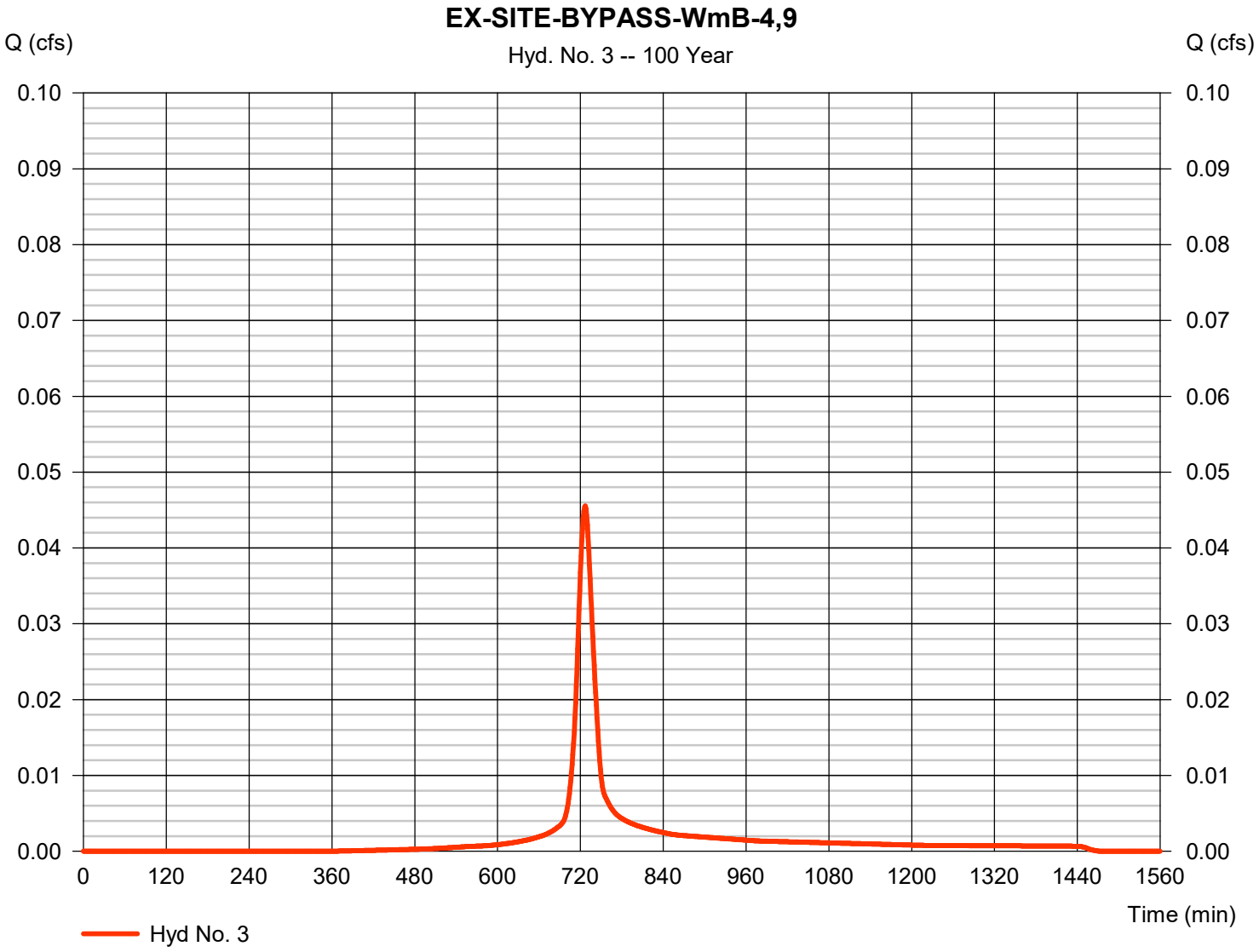
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 3

EX-SITE-BYPASS-WmB-4,9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.046 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	156 cuft
Drainage area	=	0.008 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	8.07 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 77)] / 0.008



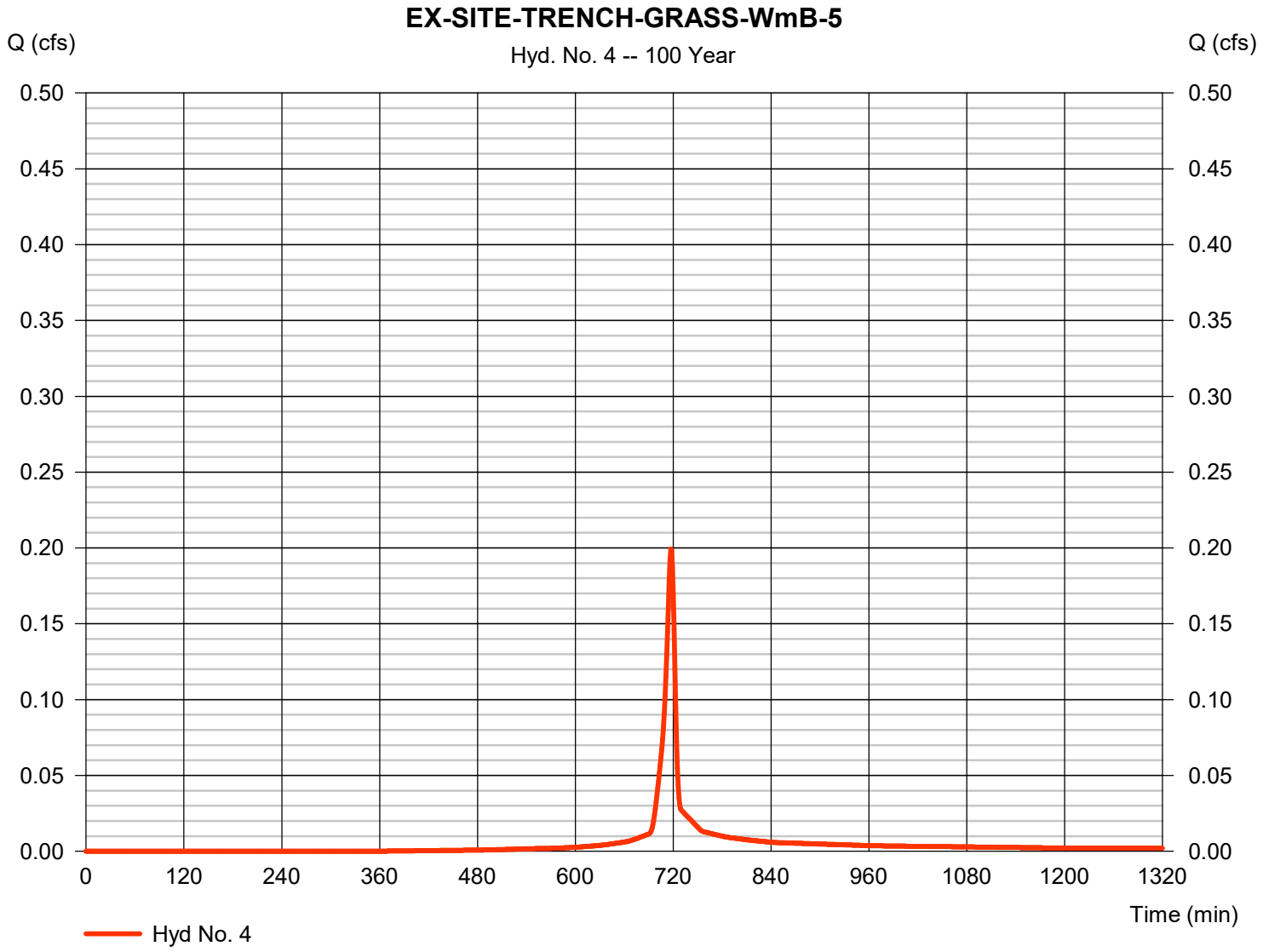
Hydrograph Report

Hyd. No. 4

EX-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.199 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 416 cuft
Drainage area	= 0.021 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70)] / 0.021

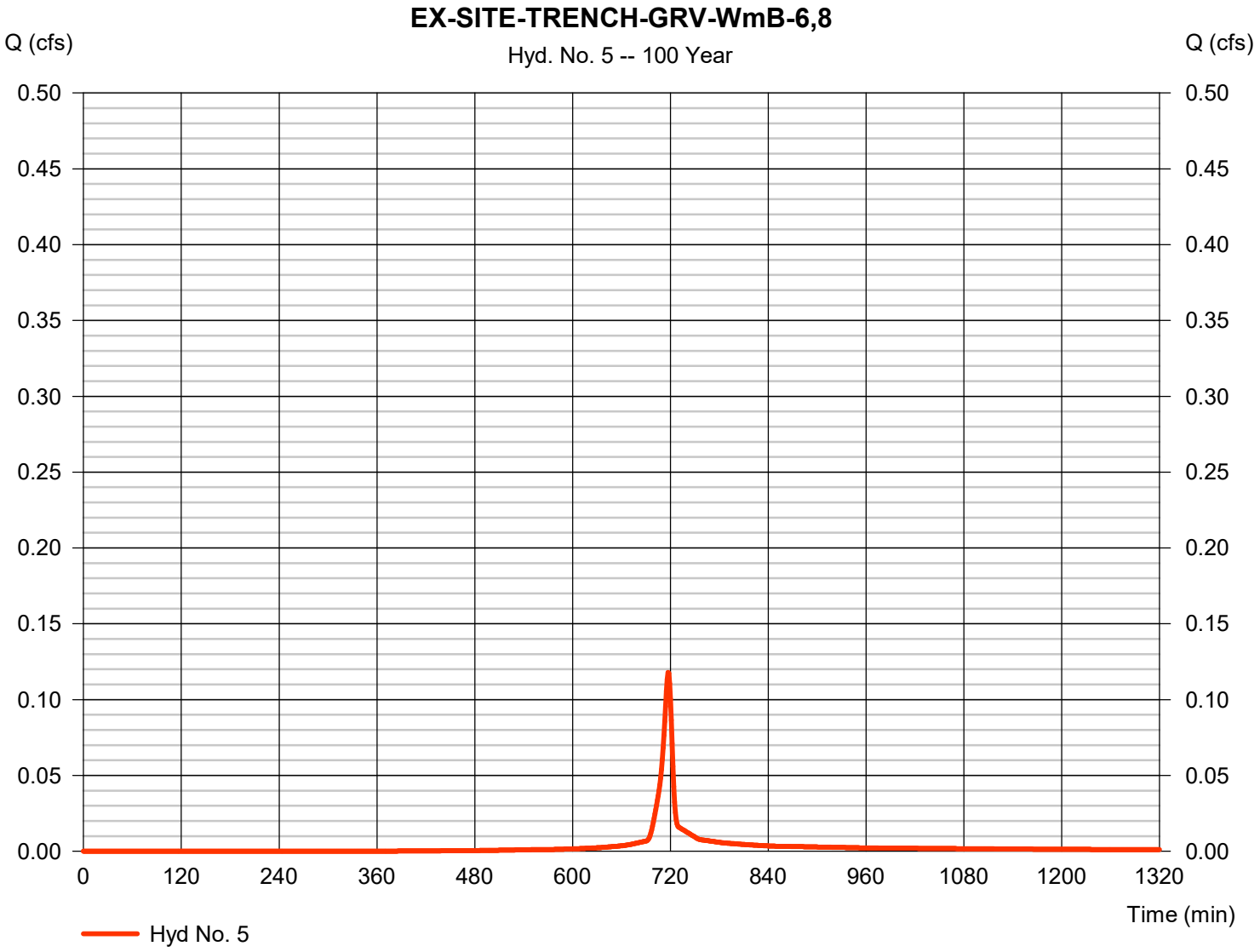


Hydrograph Report

Hyd. No. 5

EX-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.118 cfs
Storm frequency	=	100 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	246 cuft
Drainage area	=	0.012 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.07 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

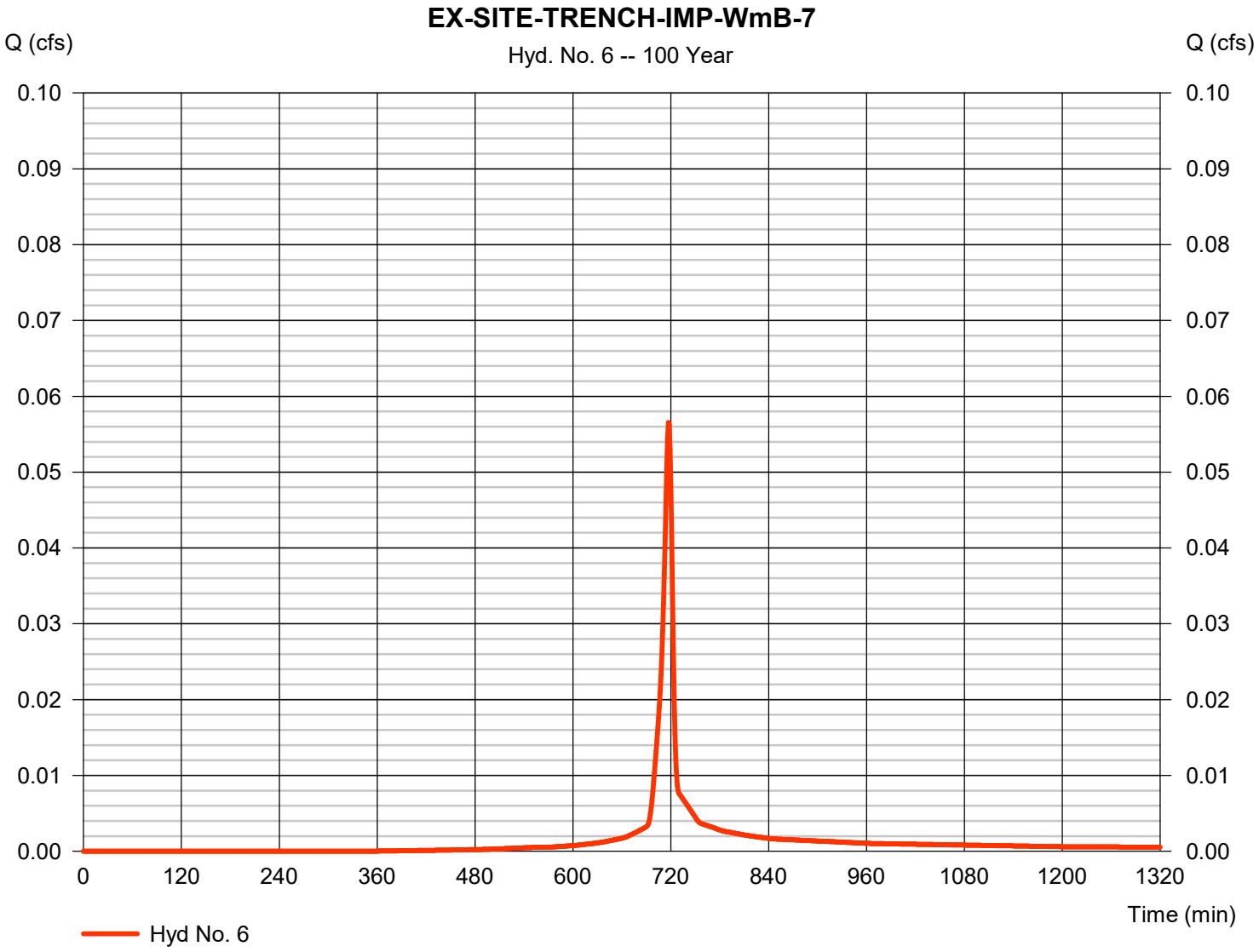


Hydrograph Report

Hyd. No. 6

EX-SITE-TRENCH-IMP-WmB-7

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.057 cfs
Storm frequency	=	100 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	118 cuft
Drainage area	=	0.006 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.07 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

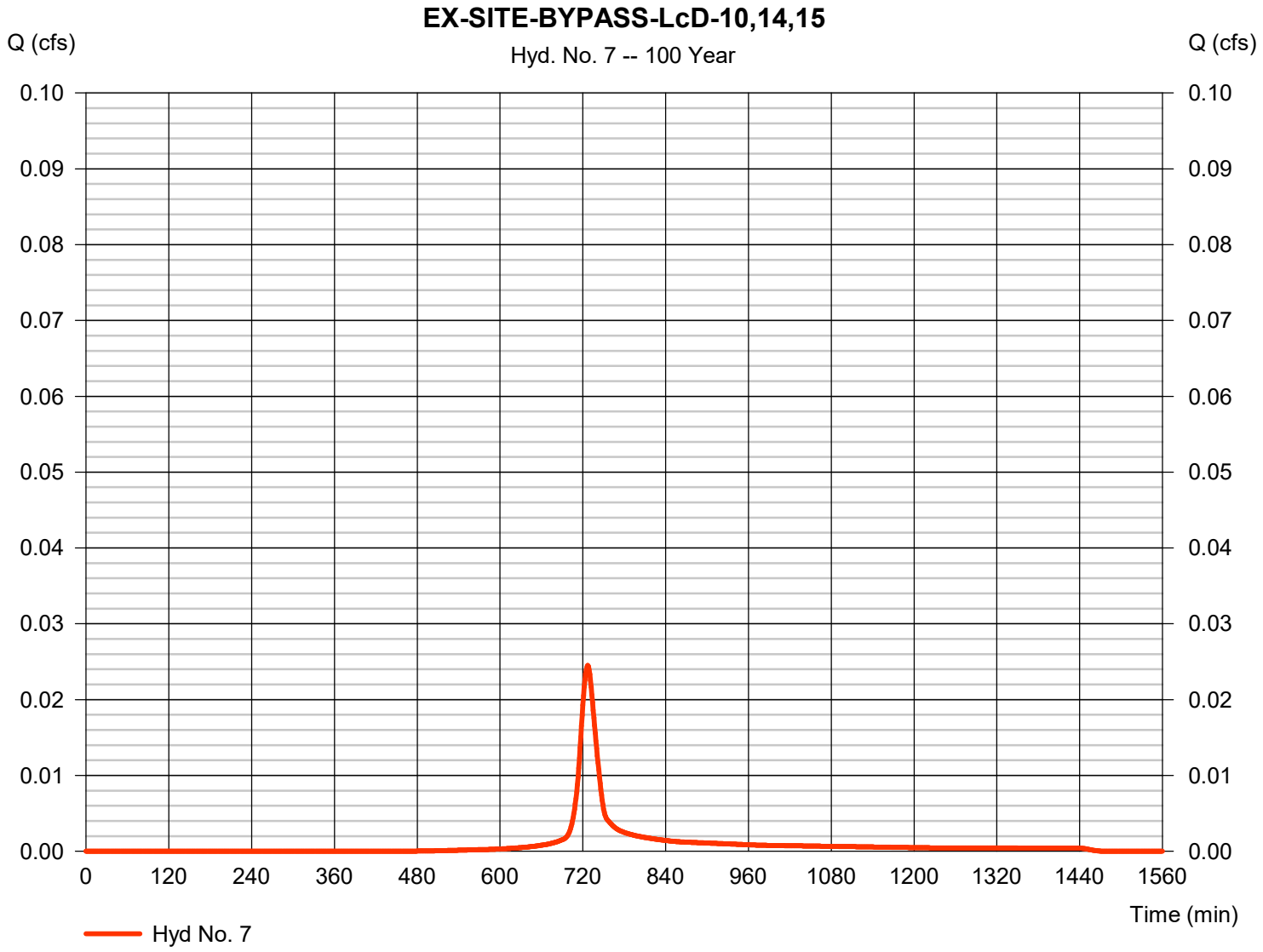


Hydrograph Report

Hyd. No. 7

EX-SITE-BYPASS-LcD-10,14,15

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.025 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	83 cuft
Drainage area	=	0.005 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	8.07 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

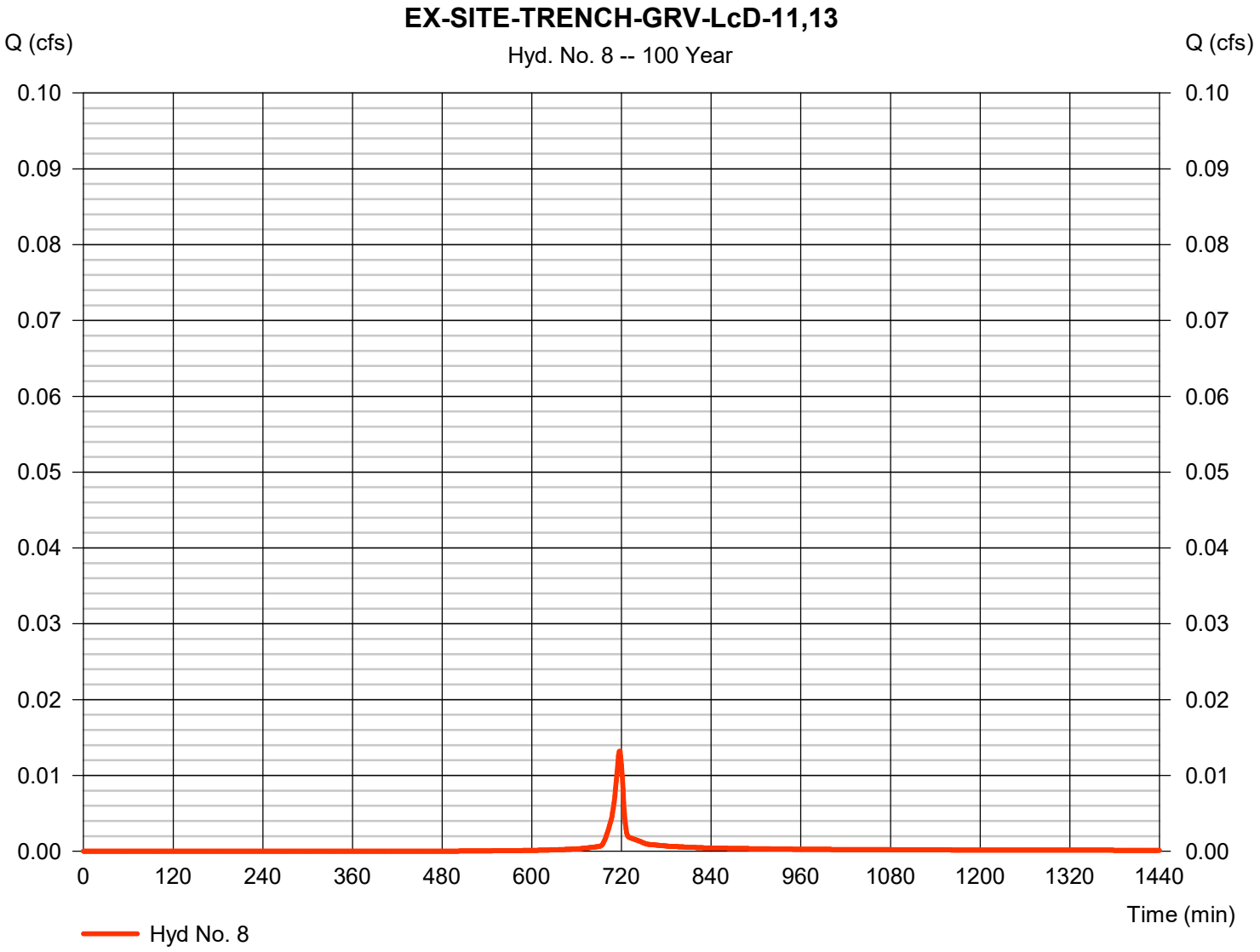


Hydrograph Report

Hyd. No. 8

EX-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.013 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 27 cuft
Drainage area	= 0.002 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

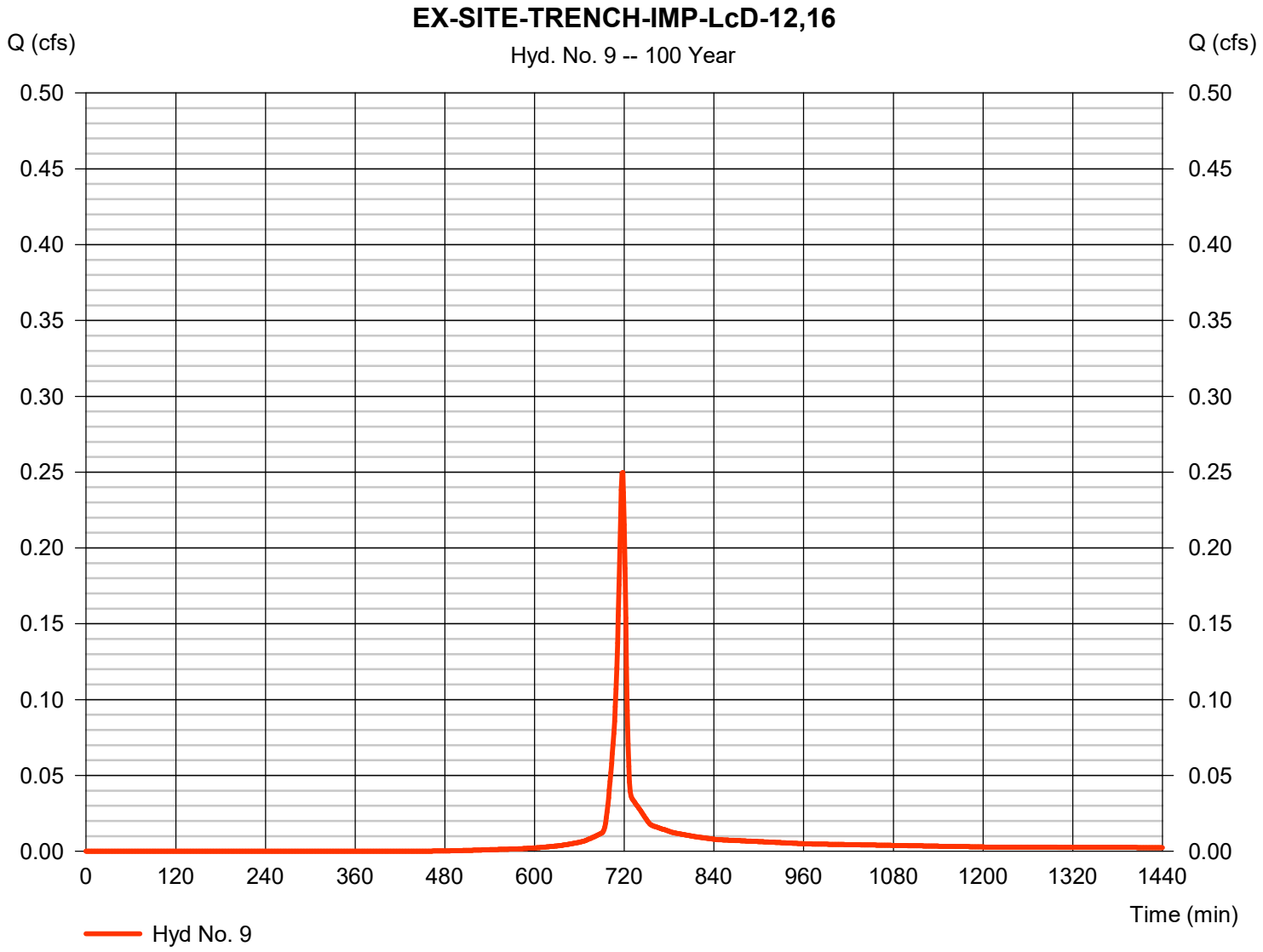


Hydrograph Report

Hyd. No. 9

EX-SITE-TRENCH-IMP-LcD-12,16

Hydrograph type	= SCS Runoff	Peak discharge	= 0.250 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 510 cuft
Drainage area	= 0.030 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

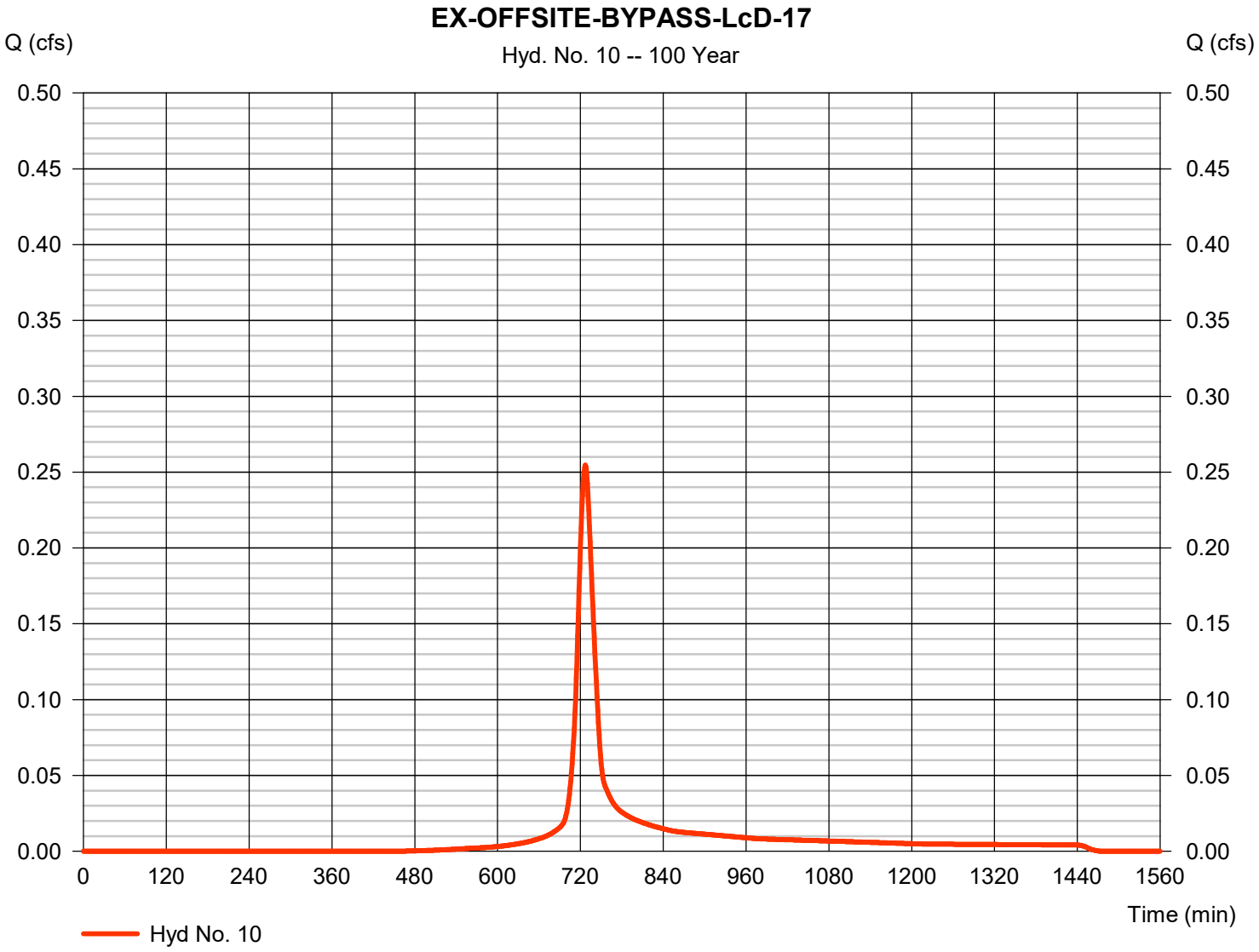


Hydrograph Report

Hyd. No. 10

EX-OFFSITE-BYPASS-LcD-17

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.255 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	864 cuft
Drainage area	=	0.053 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.70 min
Total precip.	=	8.07 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

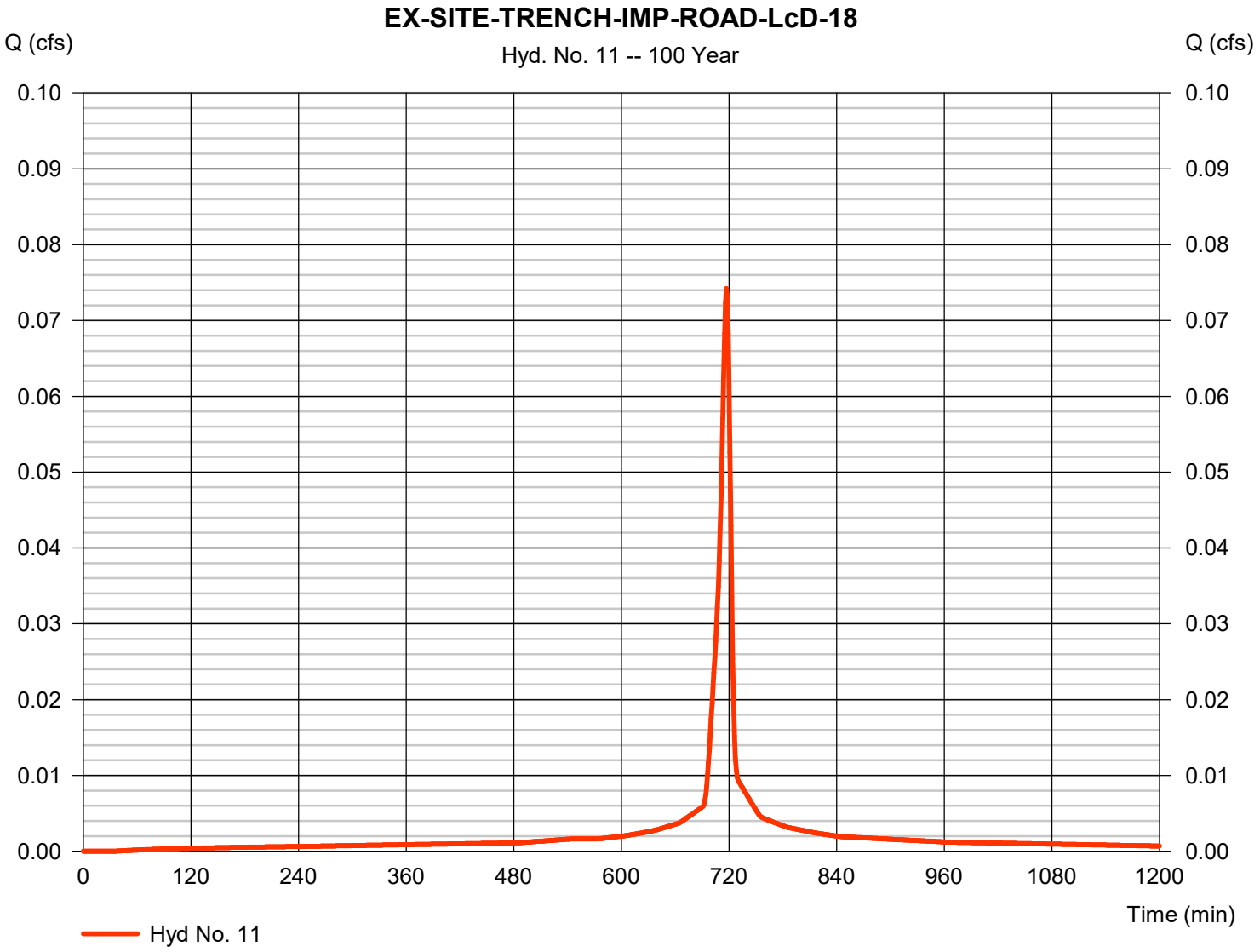


Hydrograph Report

Hyd. No. 11

EX-SITE-TRENCH-IMP-ROAD-LcD-18

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.074 cfs
Storm frequency	=	100 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	182 cuft
Drainage area	=	0.006 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.07 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

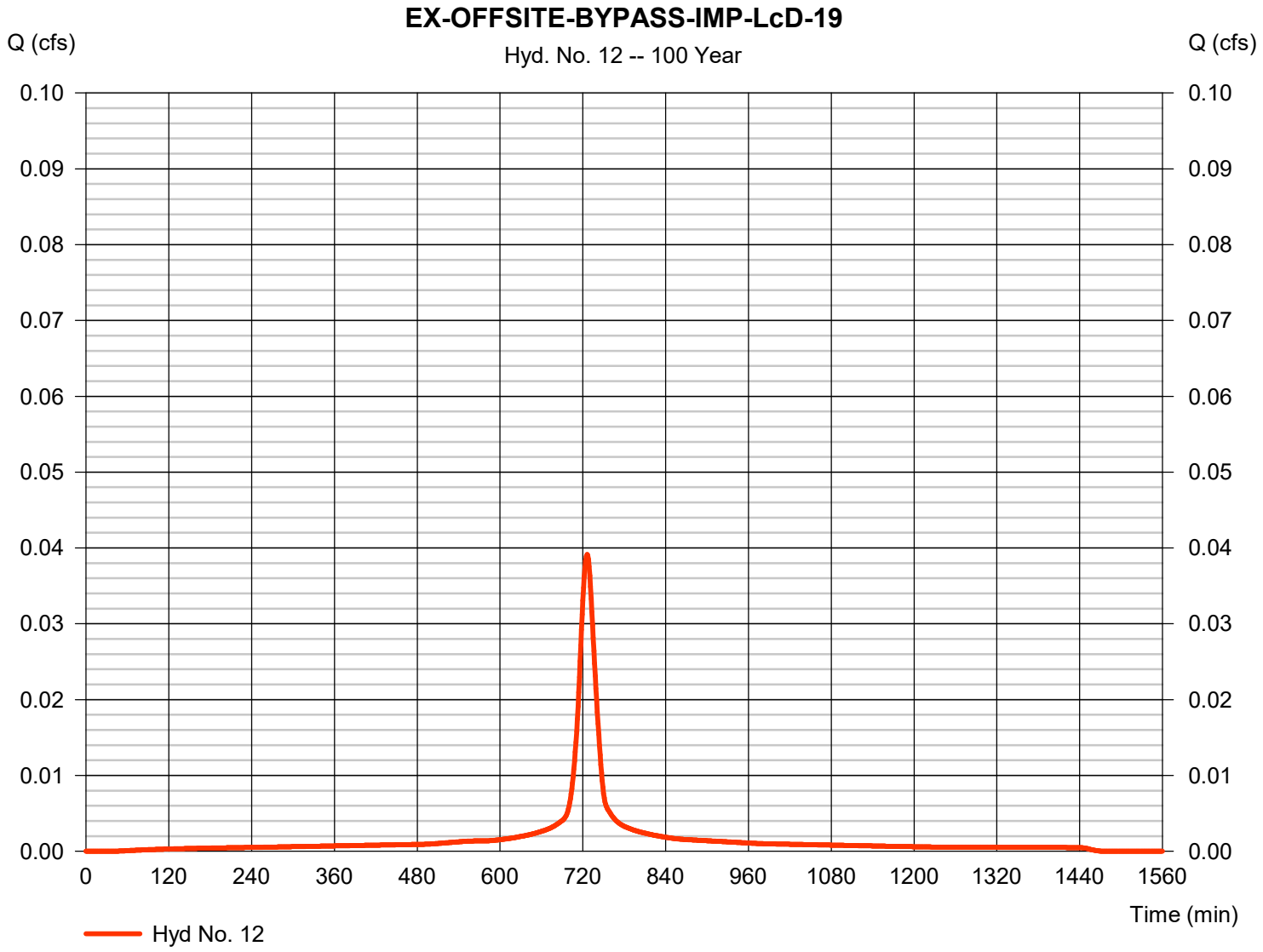


Hydrograph Report

Hyd. No. 12

EX-OFFSITE-BYPASS-IMP-LcD-19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.039 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 152 cuft
Drainage area	= 0.005 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.70 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

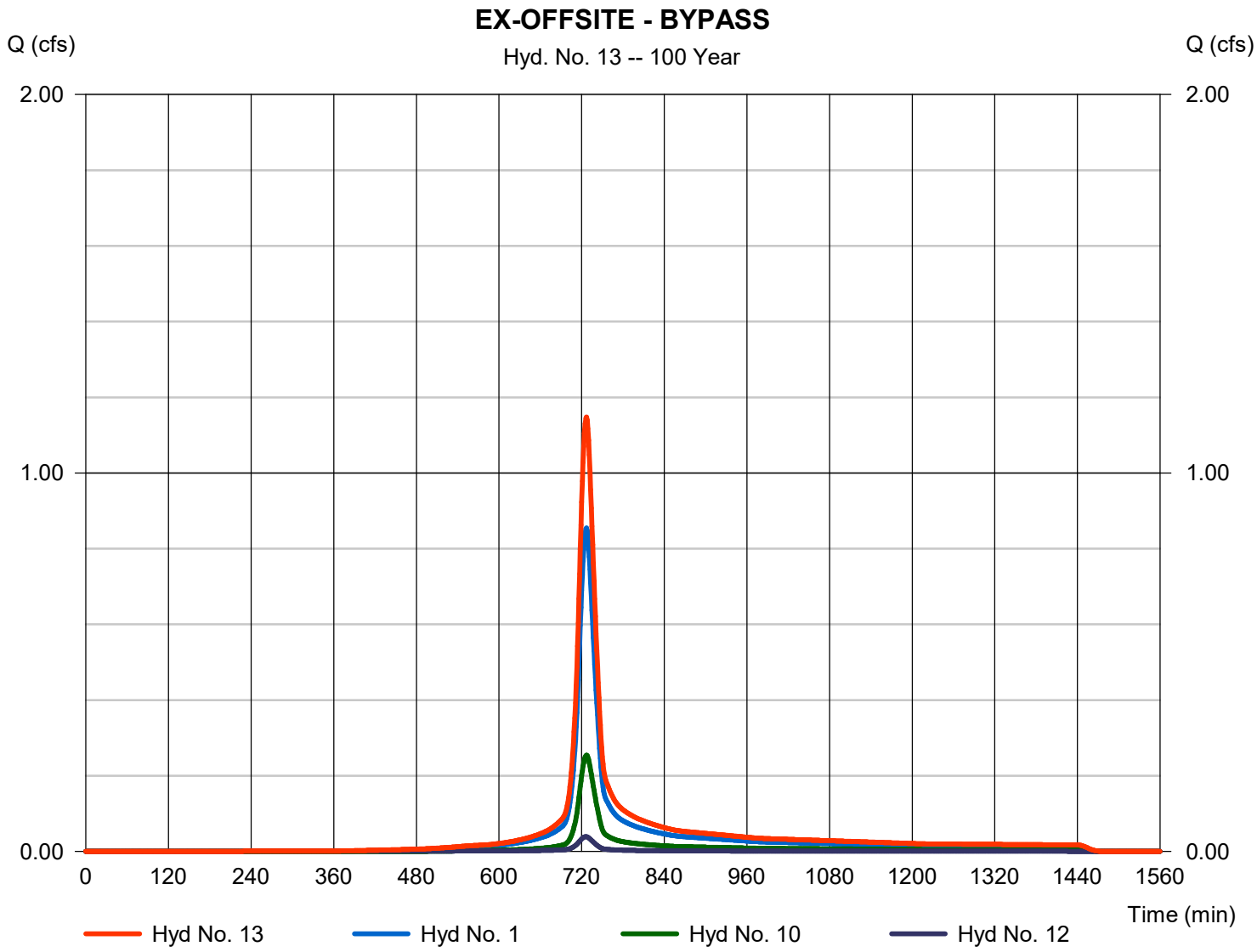


Hydrograph Report

Hyd. No. 13

EX-OFFSITE - BYPASS

Hydrograph type	=	Combine	Peak discharge	=	1.148 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	3,936 cuft
Inflow hyds.	=	1, 10, 12	Contrib. drain. area	=	0.211 ac

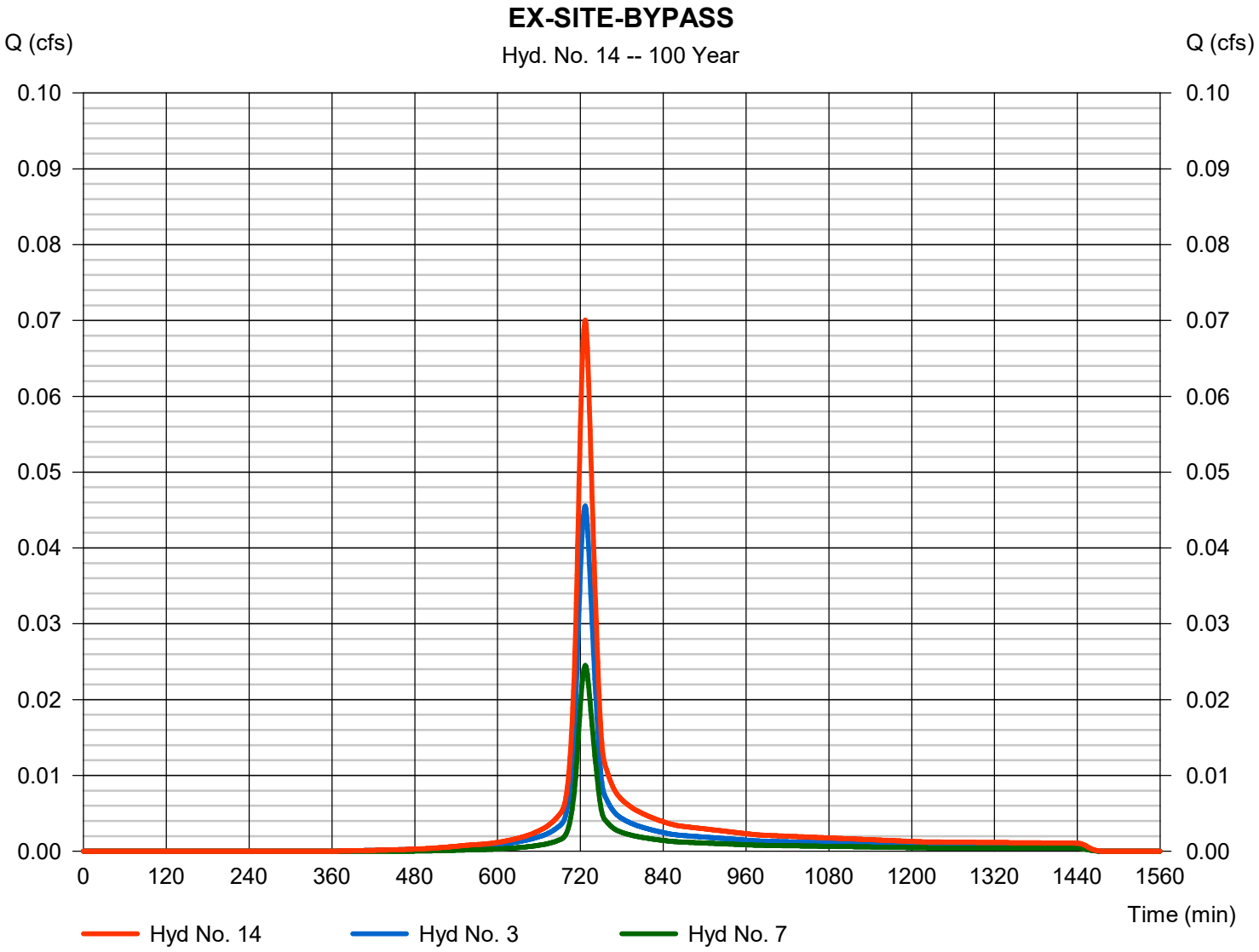


Hydrograph Report

Hyd. No. 14

EX-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.070 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	239 cuft
Inflow hyds.	=	3, 7	Contrib. drain. area	=	0.013 ac

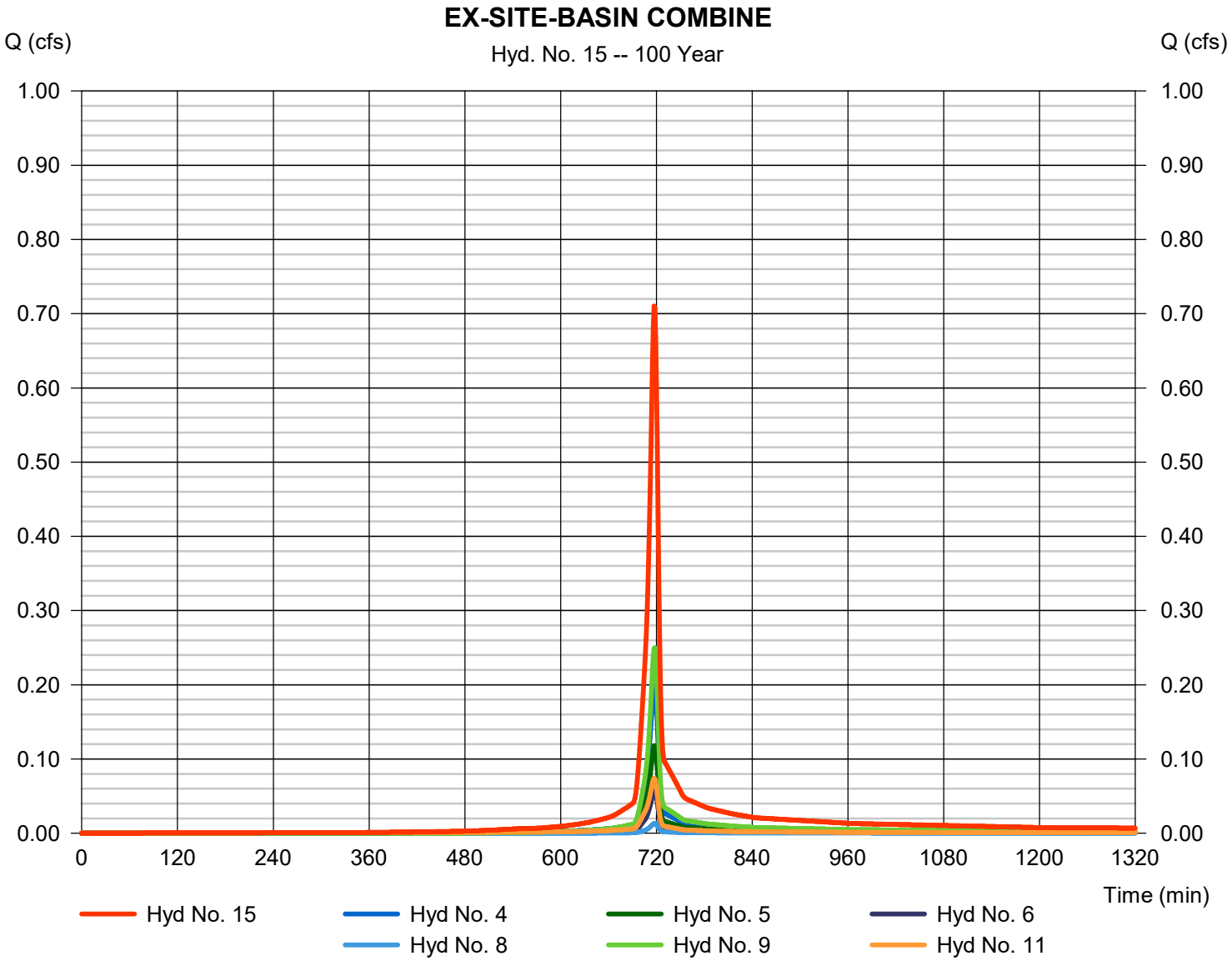


Hydrograph Report

Hyd. No. 15

EX-SITE-BASIN COMBINE

Hydrograph type	= Combine	Peak discharge	= 0.710 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 1,498 cuft
Inflow hyds.	= 4, 5, 6, 8, 9, 11	Contrib. drain. area	= 0.077 ac

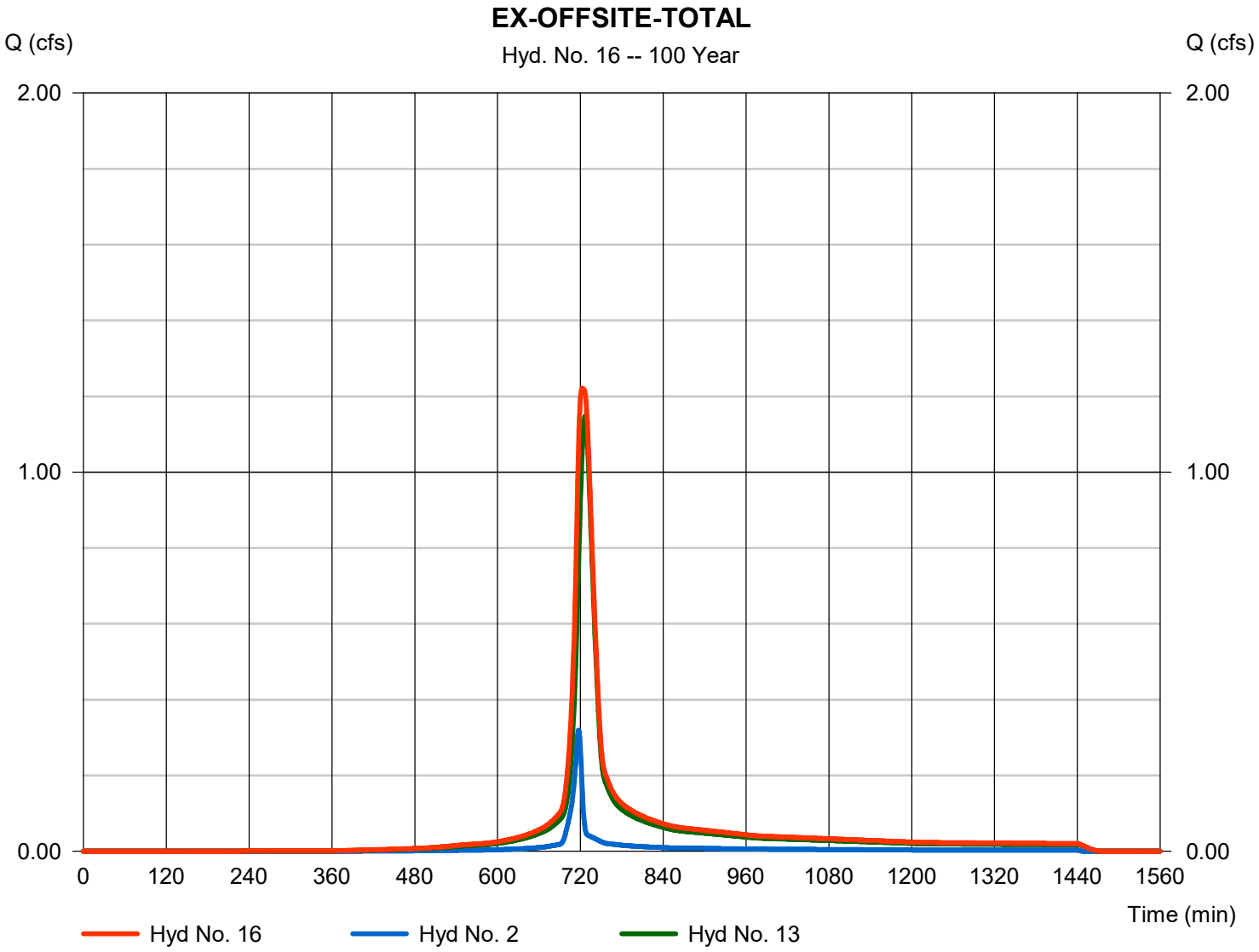


Hydrograph Report

Hyd. No. 16

EX-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 1.221 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 4,601 cuft
Inflow hyds.	= 2, 13	Contrib. drain. area	= 0.033 ac

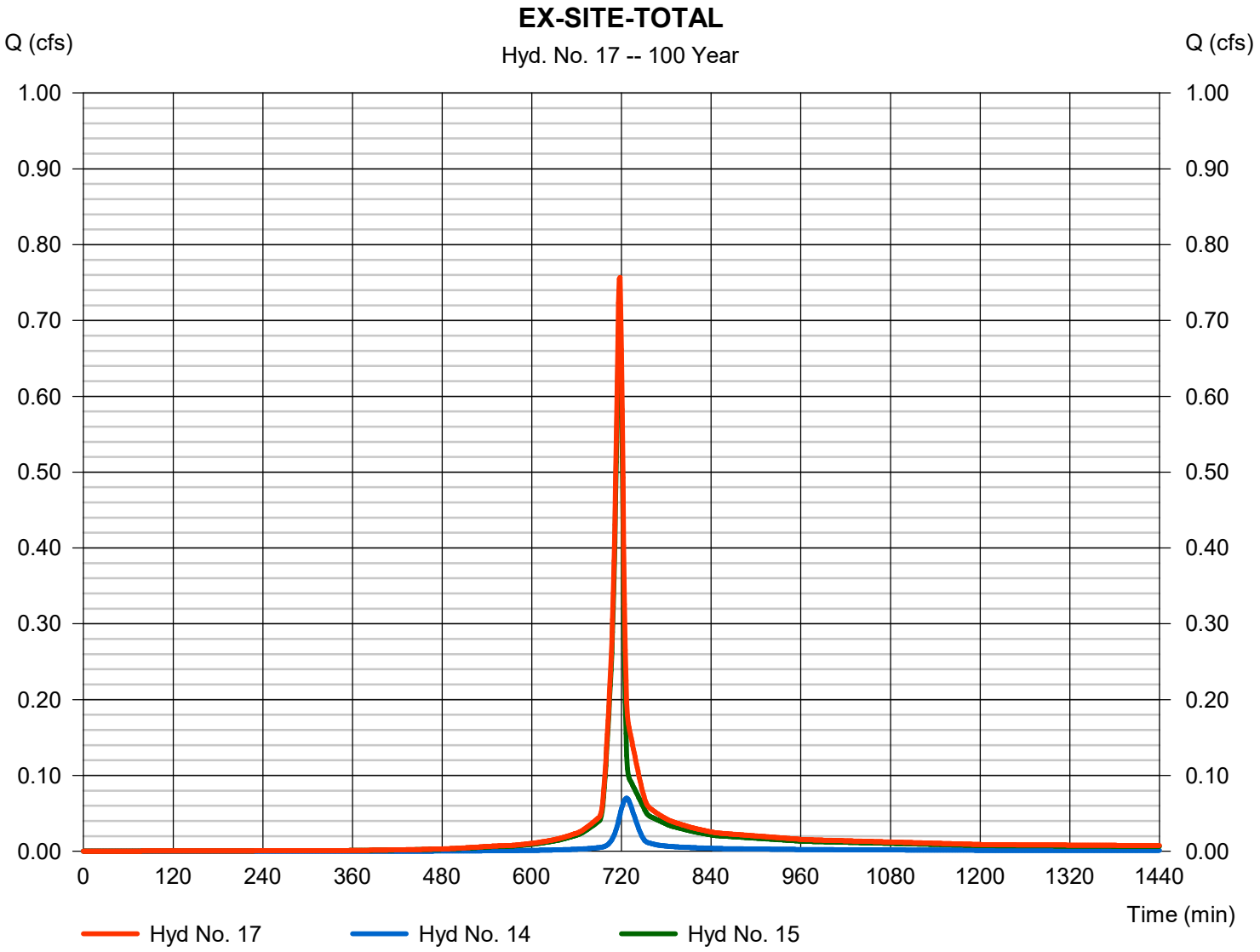


Hydrograph Report

Hyd. No. 17

EX-SITE-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	0.757 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	1,737 cuft
Inflow hyds.	=	14, 15	Contrib. drain. area	=	0.000 ac

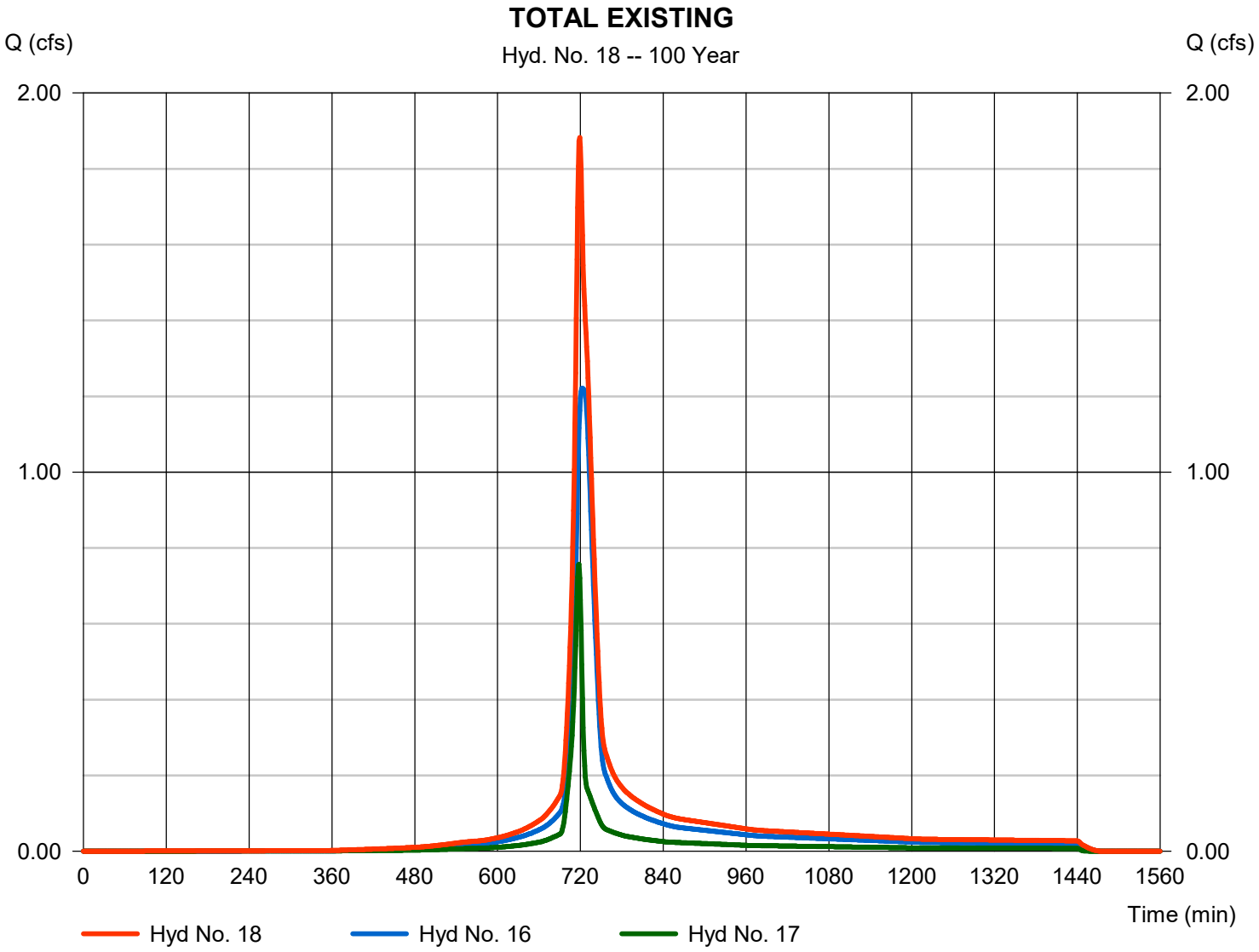


Hydrograph Report

Hyd. No. 18

TOTAL EXISTING

Hydrograph type	= Combine	Peak discharge	= 1.882 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 6,338 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 0.000 ac

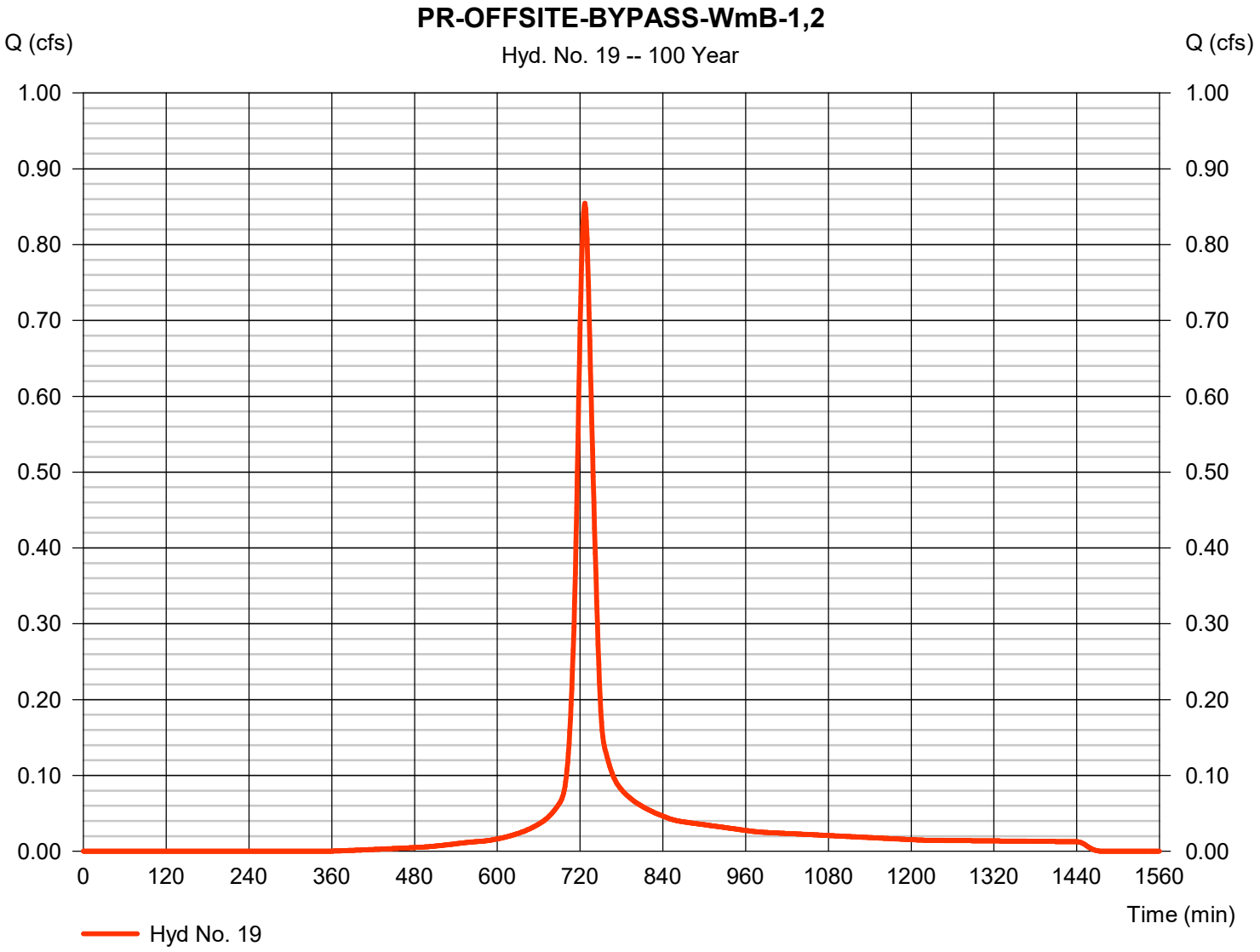


Hydrograph Report

Hyd. No. 19

PR-OFFSITE-BYPASS-WmB-1,2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.855 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	2,919 cuft
Drainage area	=	0.152 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.20 min
Total precip.	=	8.07 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

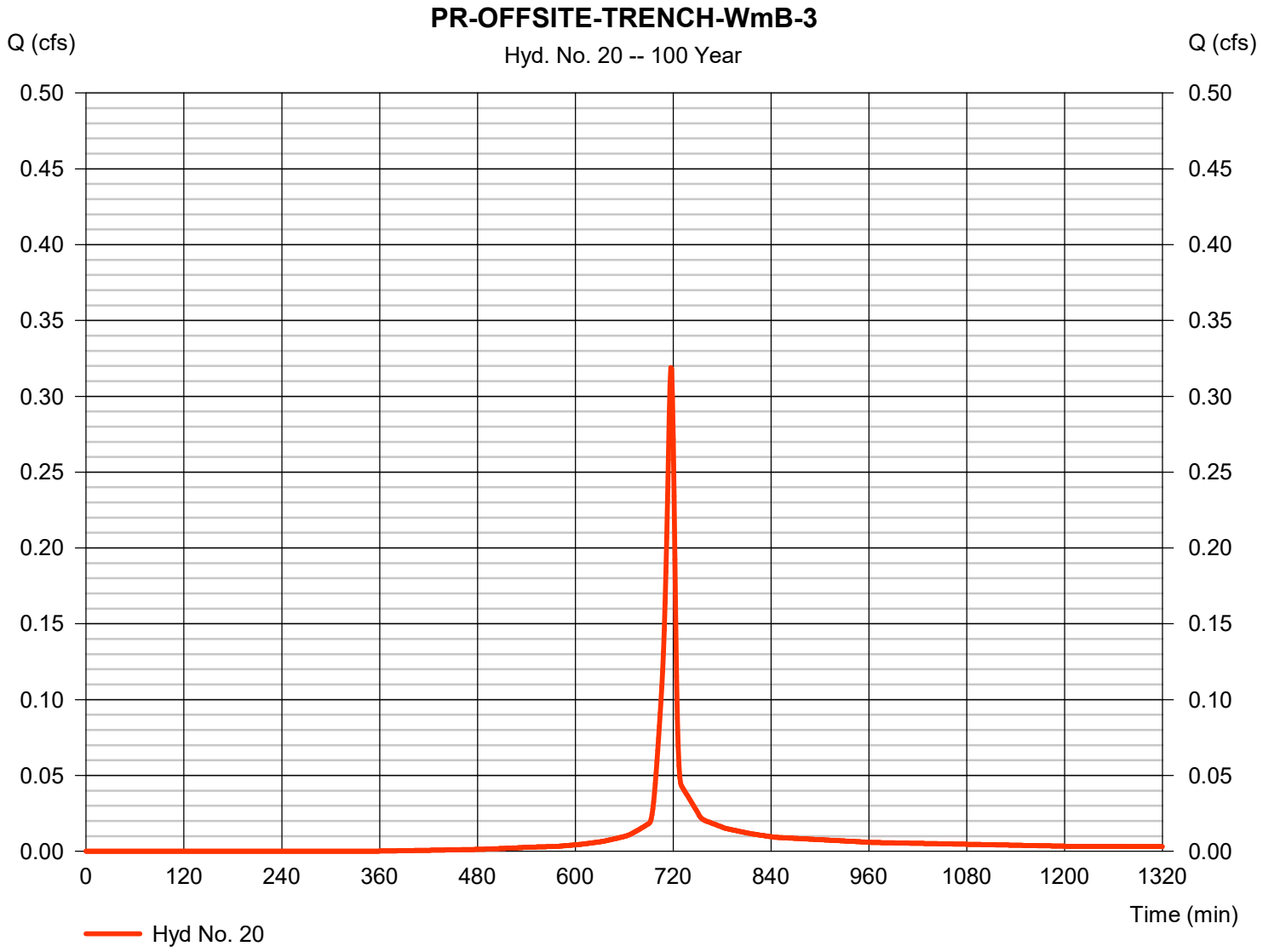


Hydrograph Report

Hyd. No. 20

PR-OFFSITE-TRENCH-WmB-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.319 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 665 cuft
Drainage area	= 0.033 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



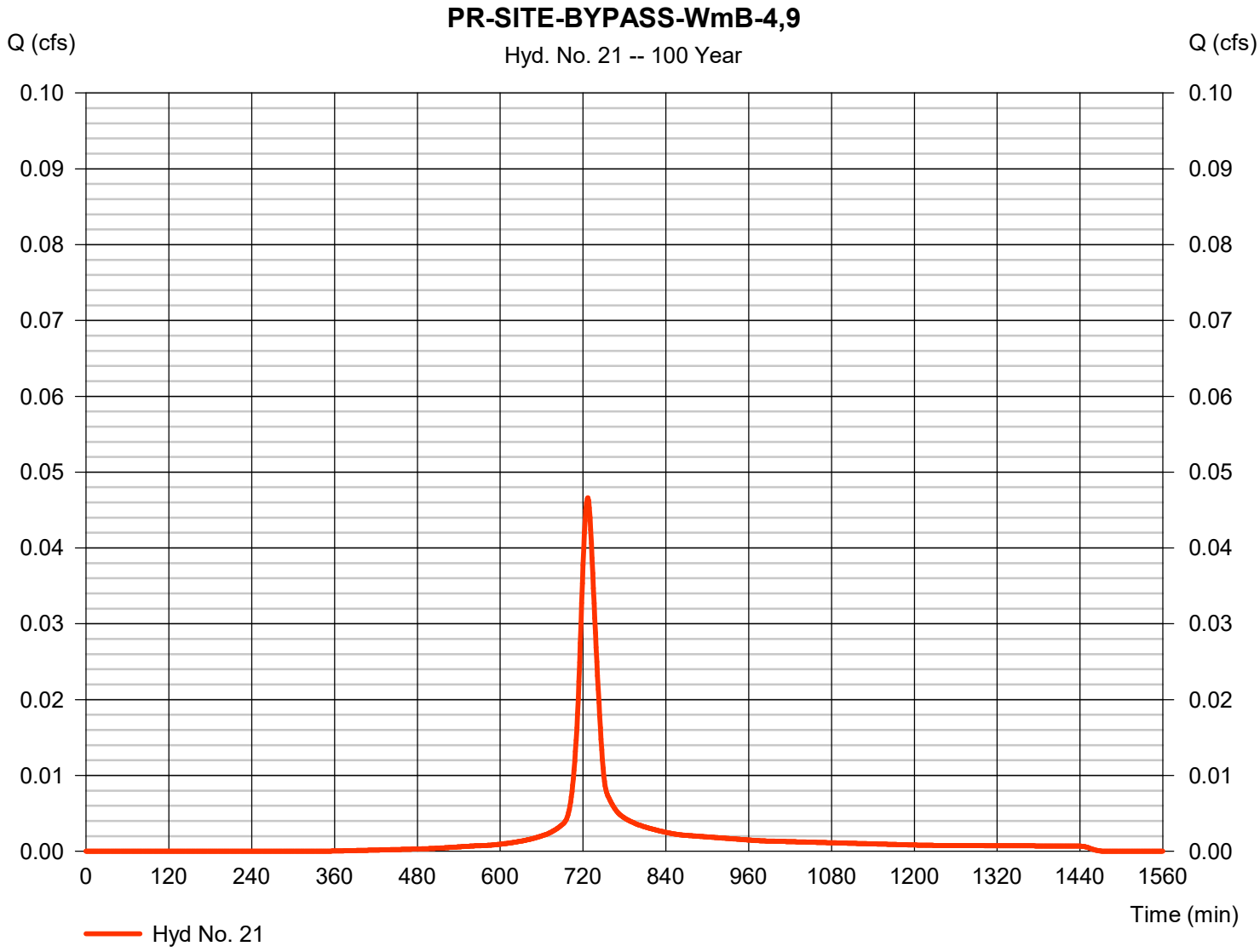
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 21

PR-SITE-BYPASS-WmB-4,9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.047 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 160 cuft
Drainage area	= 0.008 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

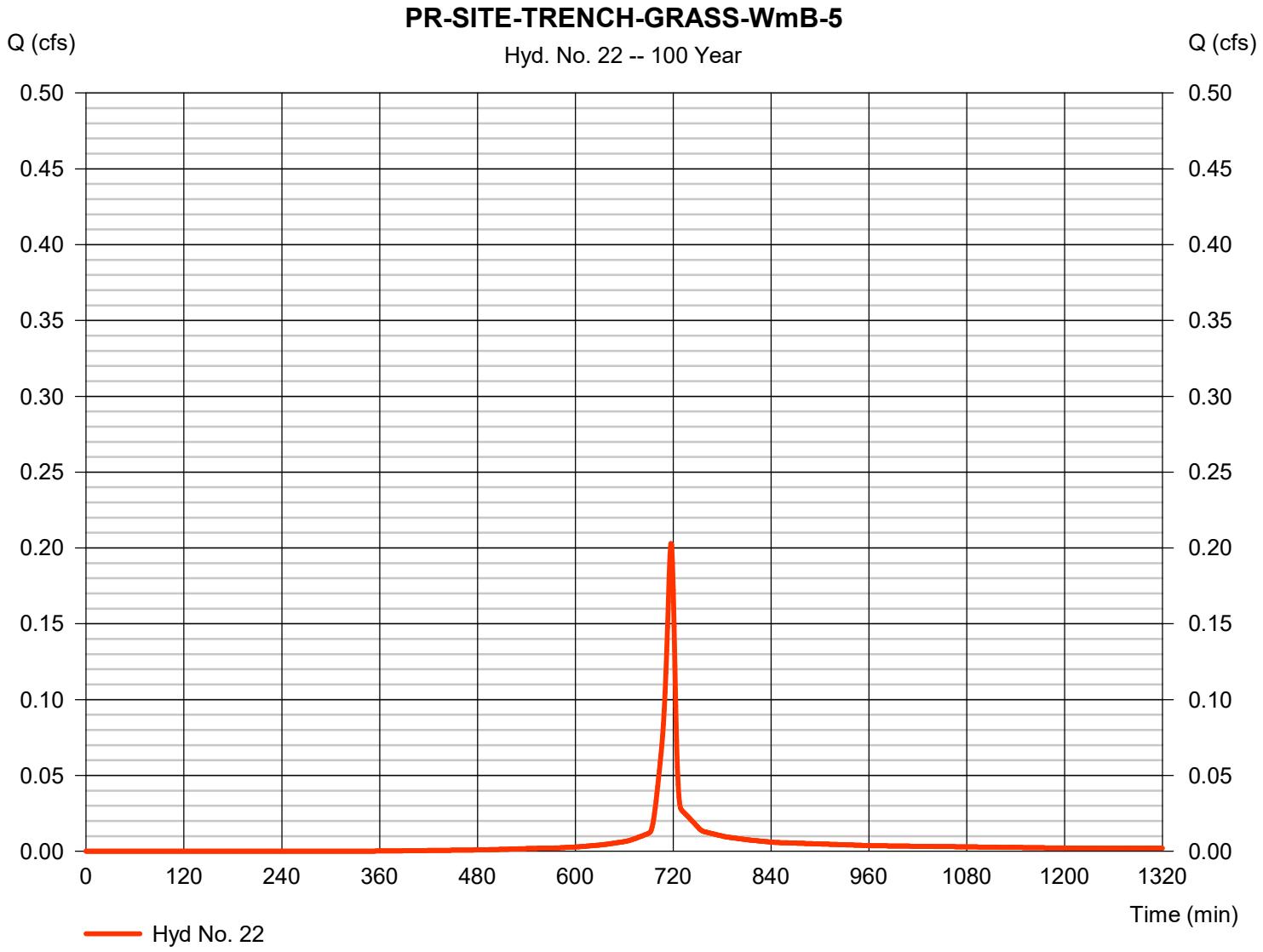


Hydrograph Report

Hyd. No. 22

PR-SITE-TRENCH-GRASS-WmB-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.203 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 425 cuft
Drainage area	= 0.021 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

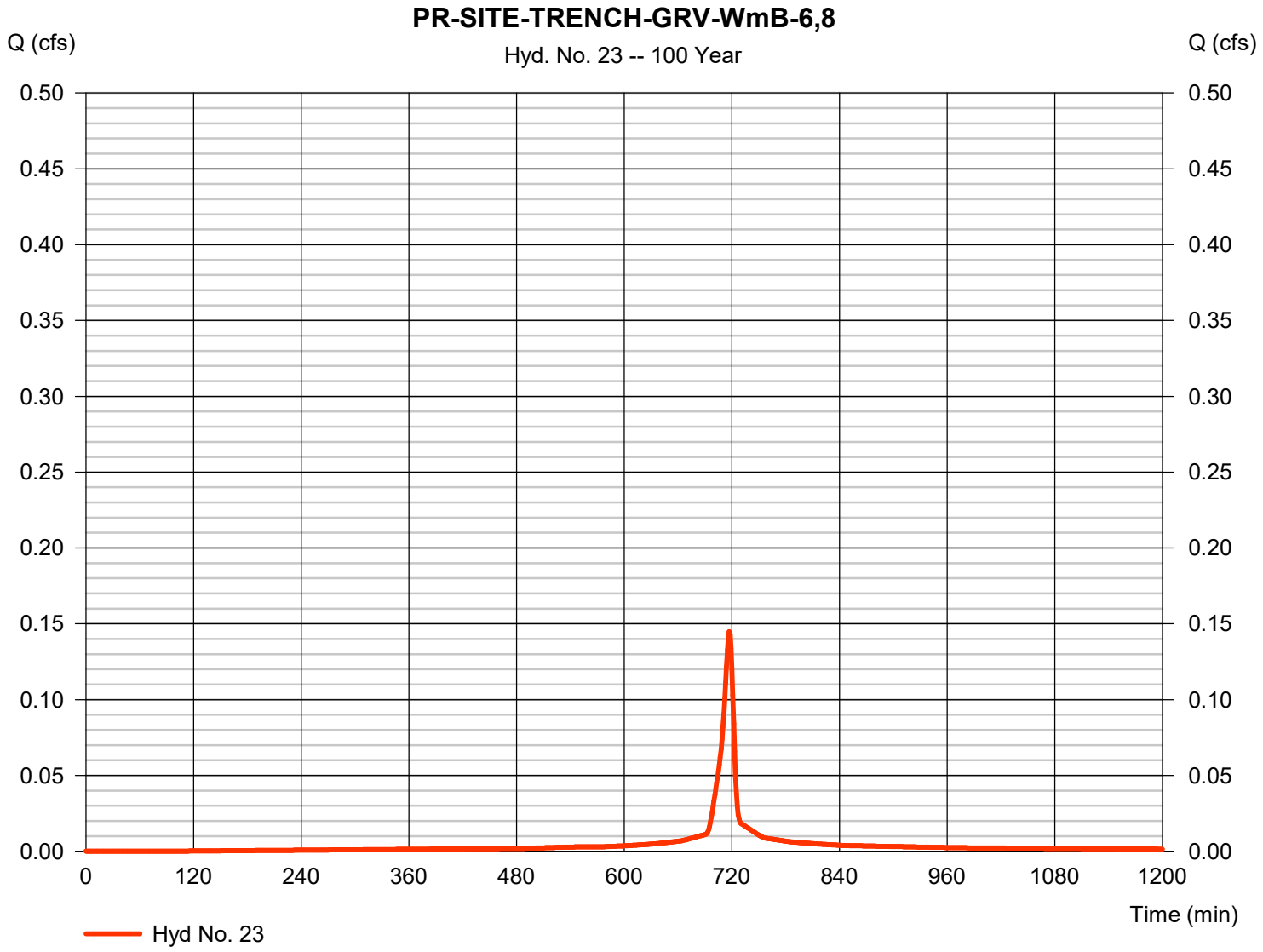


Hydrograph Report

Hyd. No. 23

PR-SITE-TRENCH-GRV-WmB-6,8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.145 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 338 cuft
Drainage area	= 0.012 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

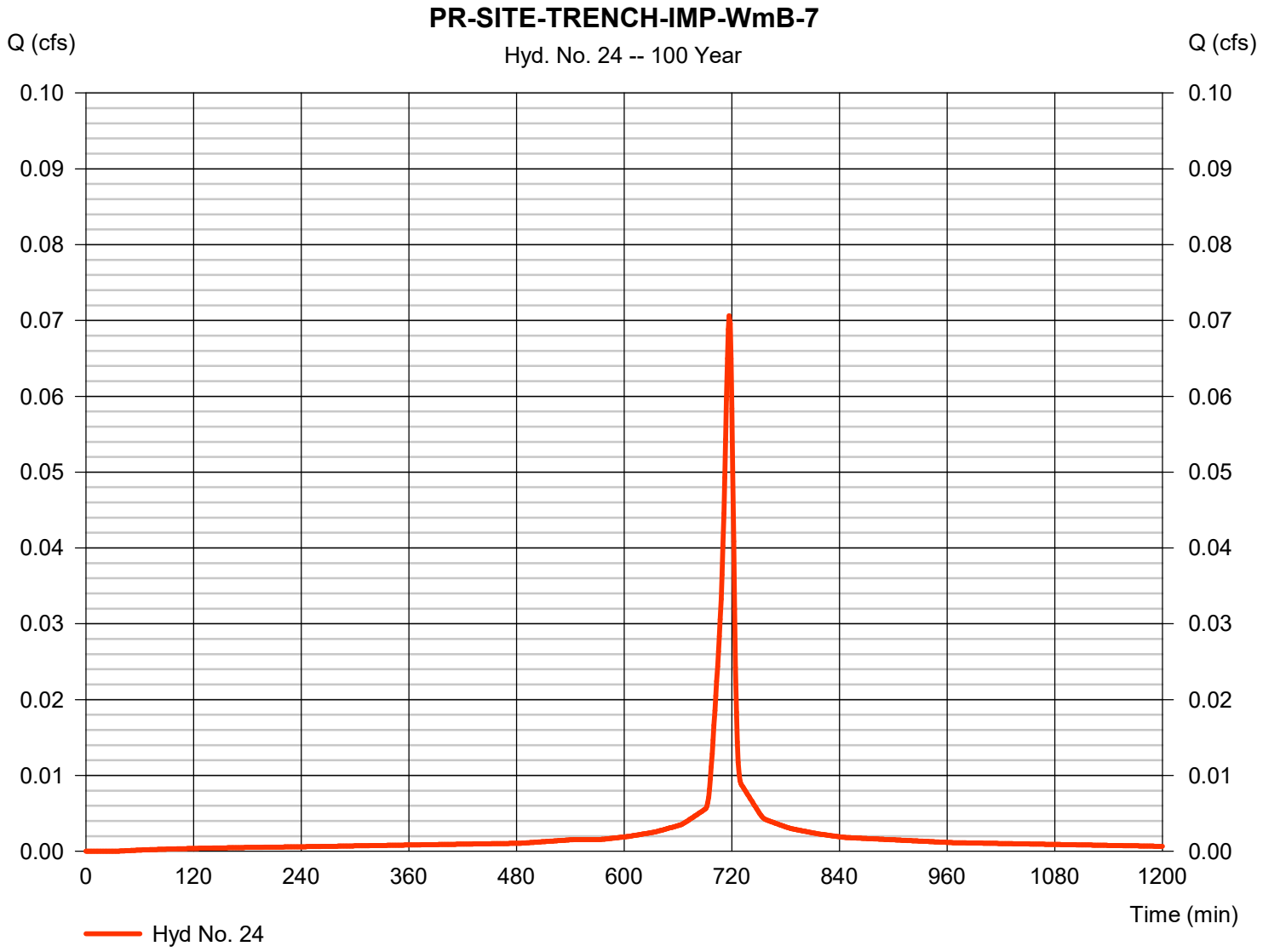


Hydrograph Report

Hyd. No. 24

PR-SITE-TRENCH-IMP-WmB-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.071 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 173 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

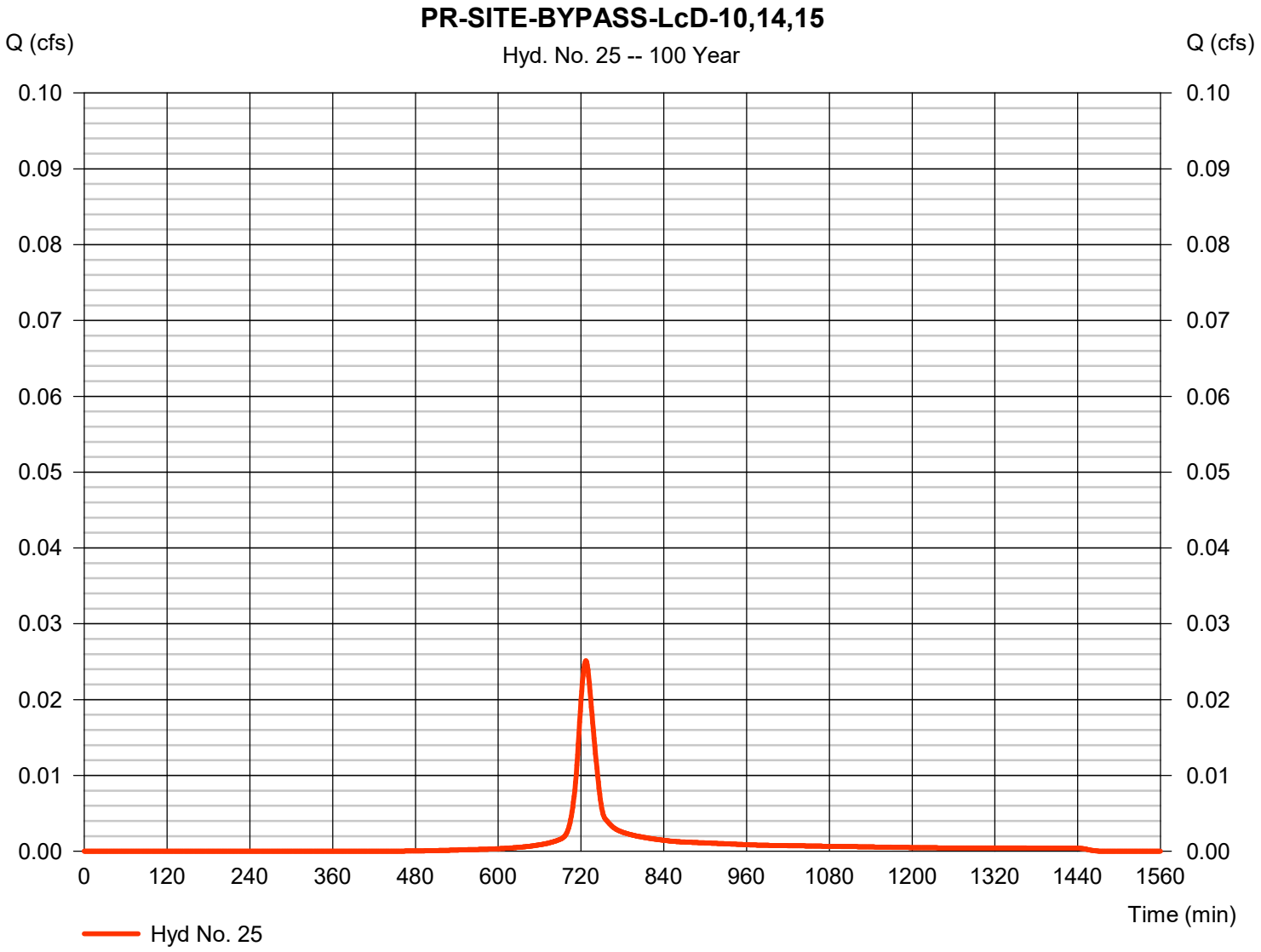


Hydrograph Report

Hyd. No. 25

PR-SITE-BYPASS-LcD-10,14,15

Hydrograph type	= SCS Runoff	Peak discharge	= 0.025 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 85 cuft
Drainage area	= 0.005 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

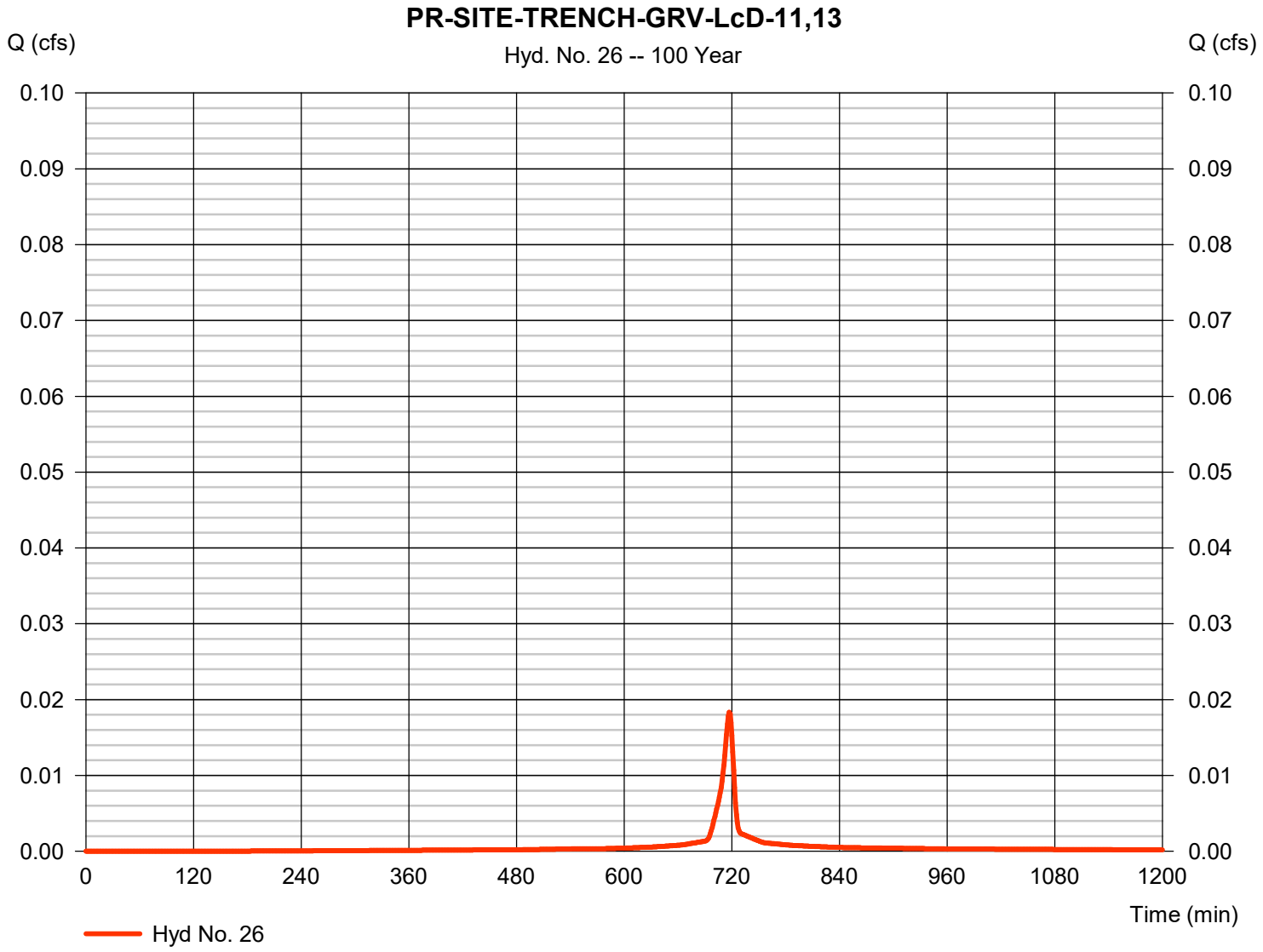


Hydrograph Report

Hyd. No. 26

PR-SITE-TRENCH-GRV-LcD-11,13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.018 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 42 cuft
Drainage area	= 0.002 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

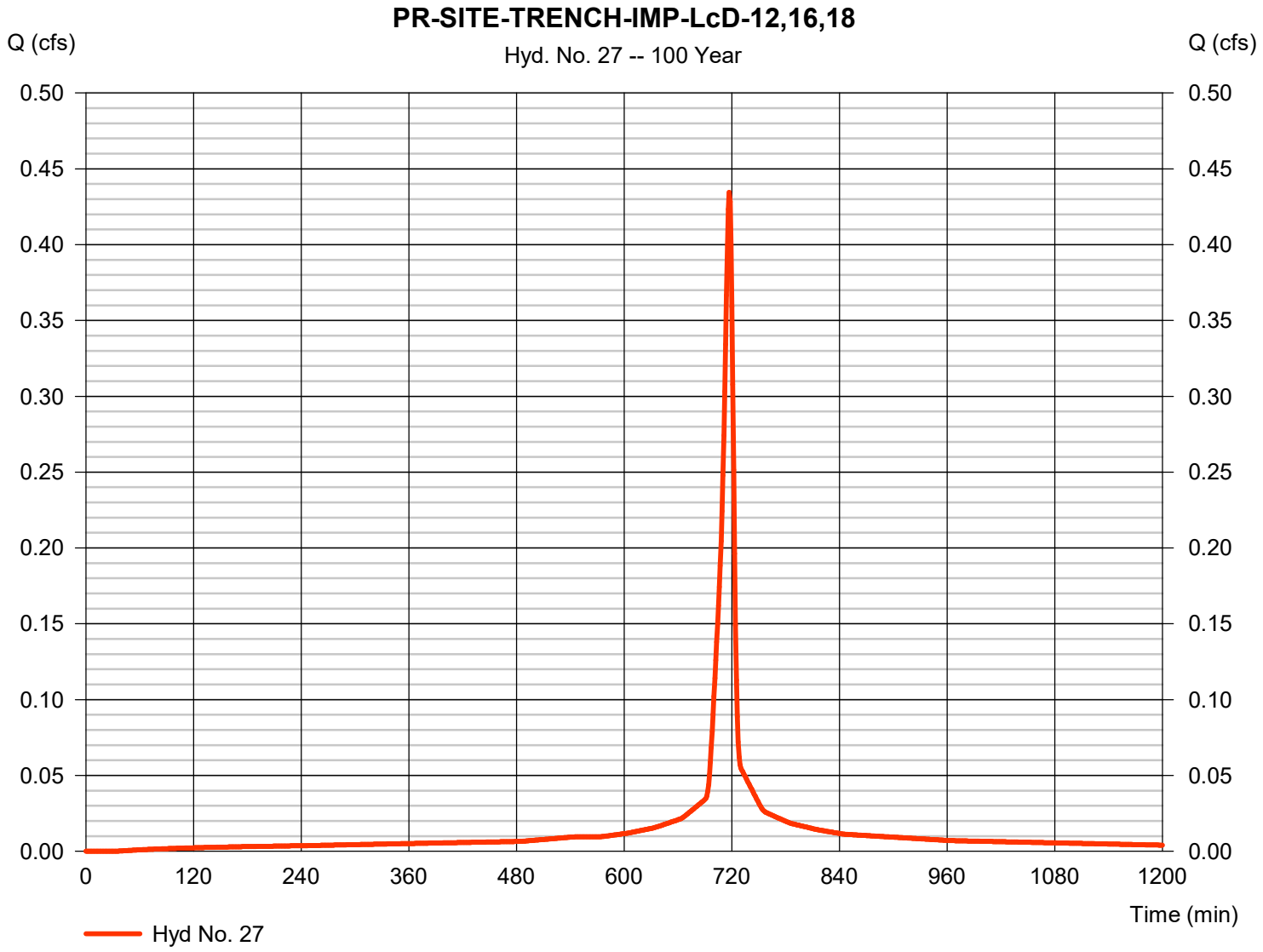


Hydrograph Report

Hyd. No. 27

PR-SITE-TRENCH-IMP-LcD-12,16,18

Hydrograph type	= SCS Runoff	Peak discharge	= 0.434 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 1,064 cuft
Drainage area	= 0.036 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

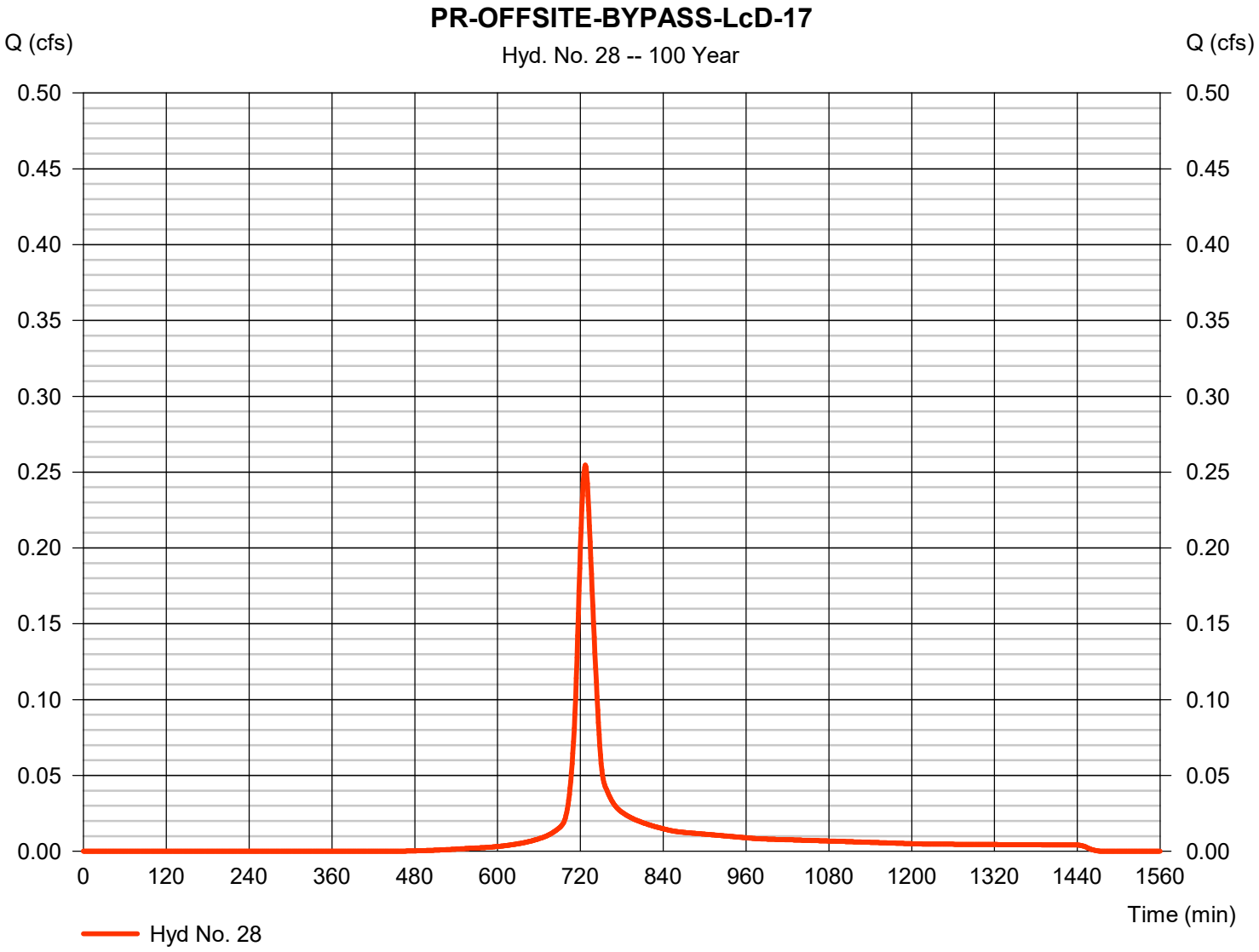
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Monday, 08 / 12 / 2019

Hyd. No. 28

PR-OFFSITE-BYPASS-LcD-17

Hydrograph type	= SCS Runoff	Peak discharge	= 0.255 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 864 cuft
Drainage area	= 0.053 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.045 x 98) + (0.043 x 98)] / 0.053

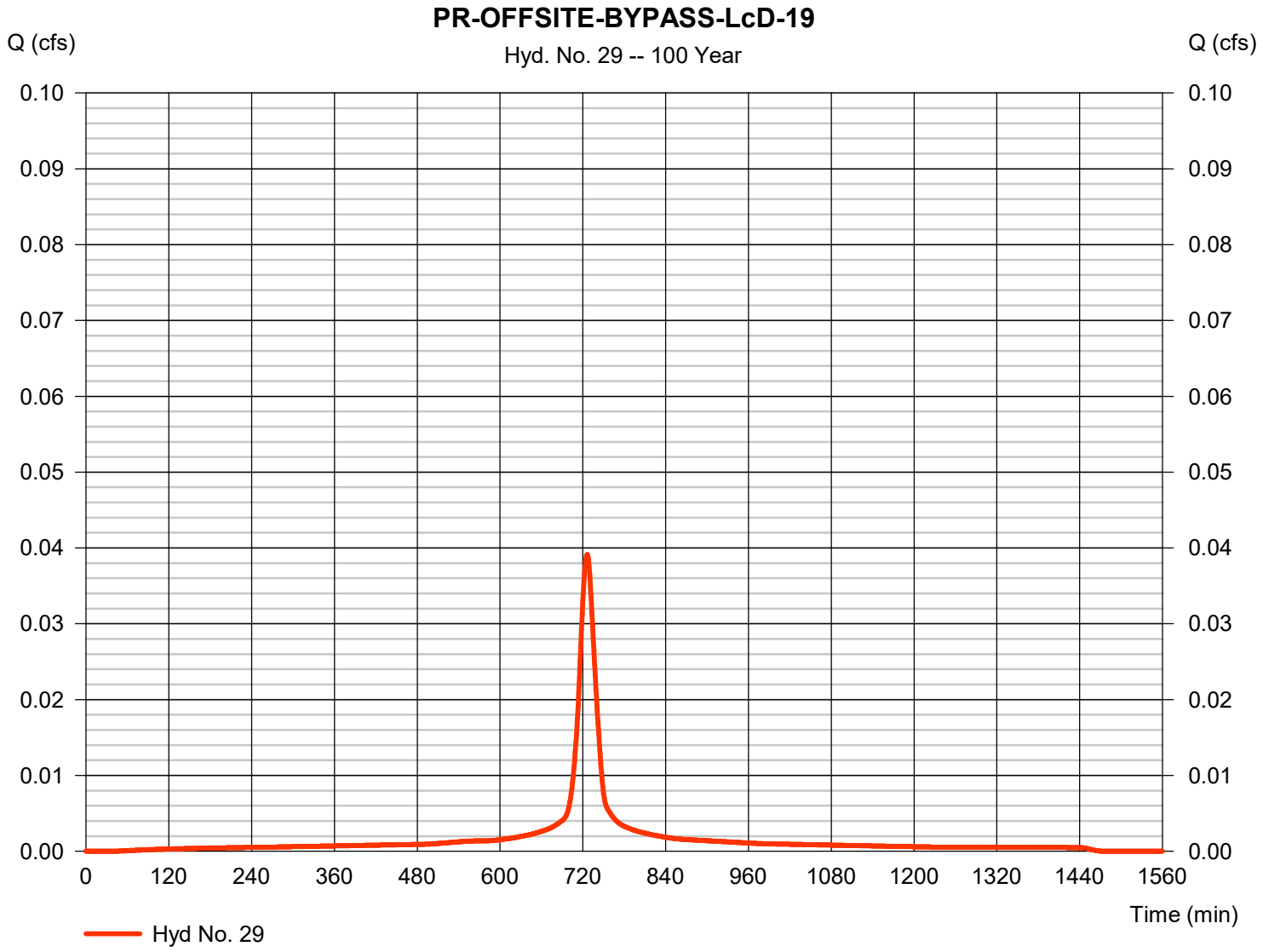


Hydrograph Report

Hyd. No. 29

PR-OFFSITE-BYPASS-LcD-19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.039 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 152 cuft
Drainage area	= 0.005 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 22.20 min
Total precip.	= 8.07 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

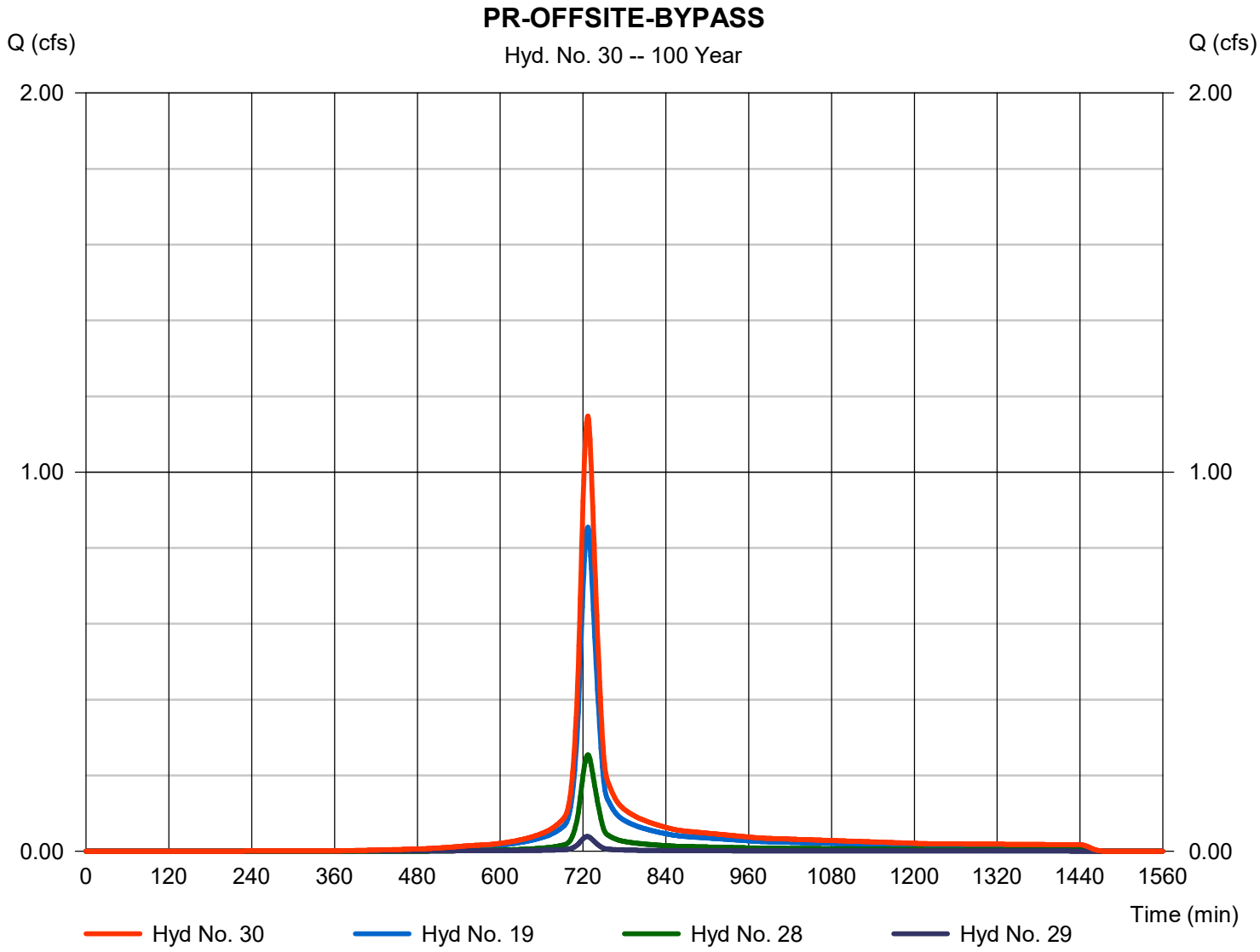


Hydrograph Report

Hyd. No. 30

PR-OFFSITE-BYPASS

Hydrograph type	= Combine	Peak discharge	= 1.148 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 3,936 cuft
Inflow hyds.	= 19, 28, 29	Contrib. drain. area	= 0.211 ac

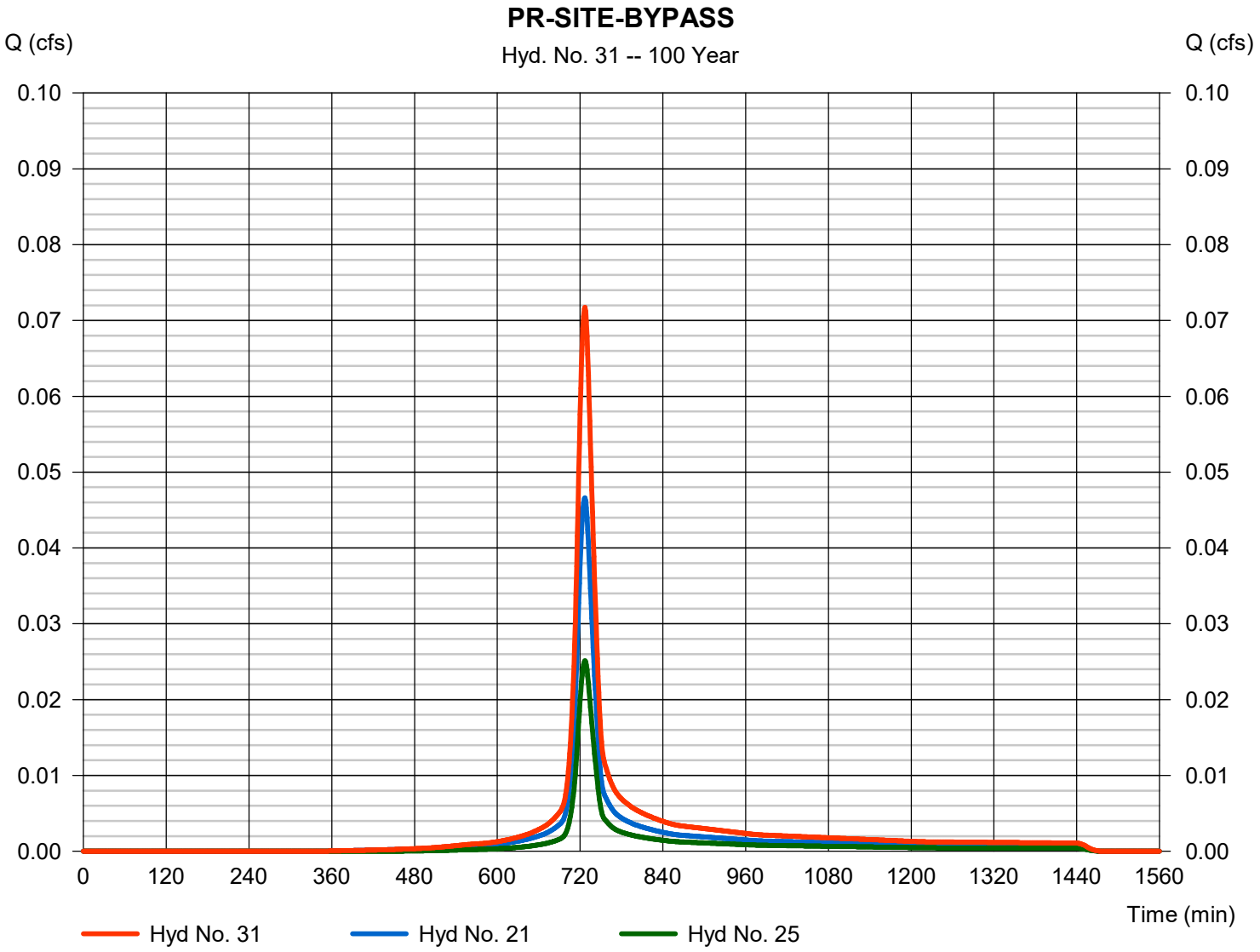


Hydrograph Report

Hyd. No. 31

PR-SITE-BYPASS

Hydrograph type	=	Combine	Peak discharge	=	0.072 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	245 cuft
Inflow hyds.	=	21, 25	Contrib. drain. area	=	0.013 ac

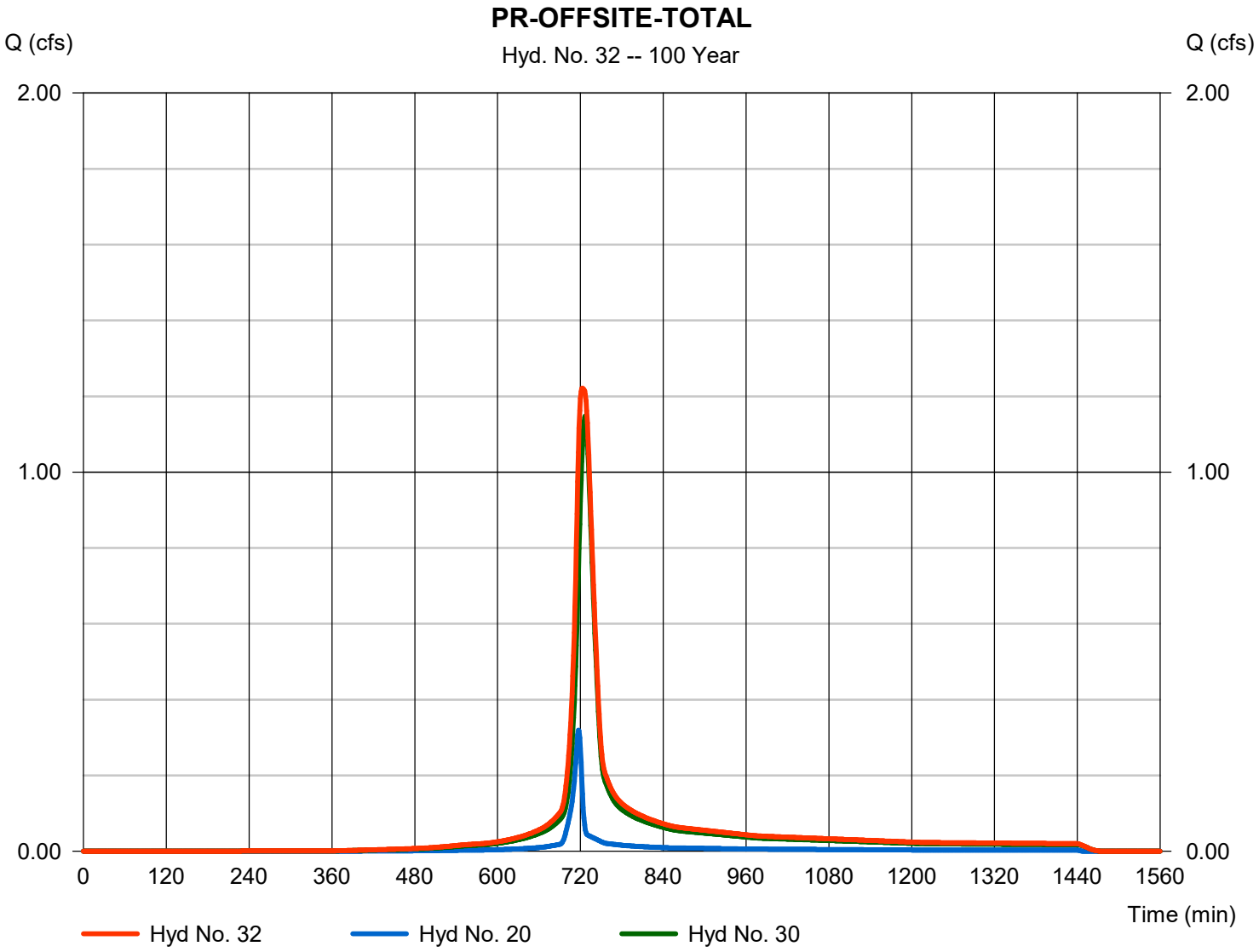


Hydrograph Report

Hyd. No. 32

PR-OFFSITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 1.221 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 4,601 cuft
Inflow hyds.	= 20, 30	Contrib. drain. area	= 0.033 ac

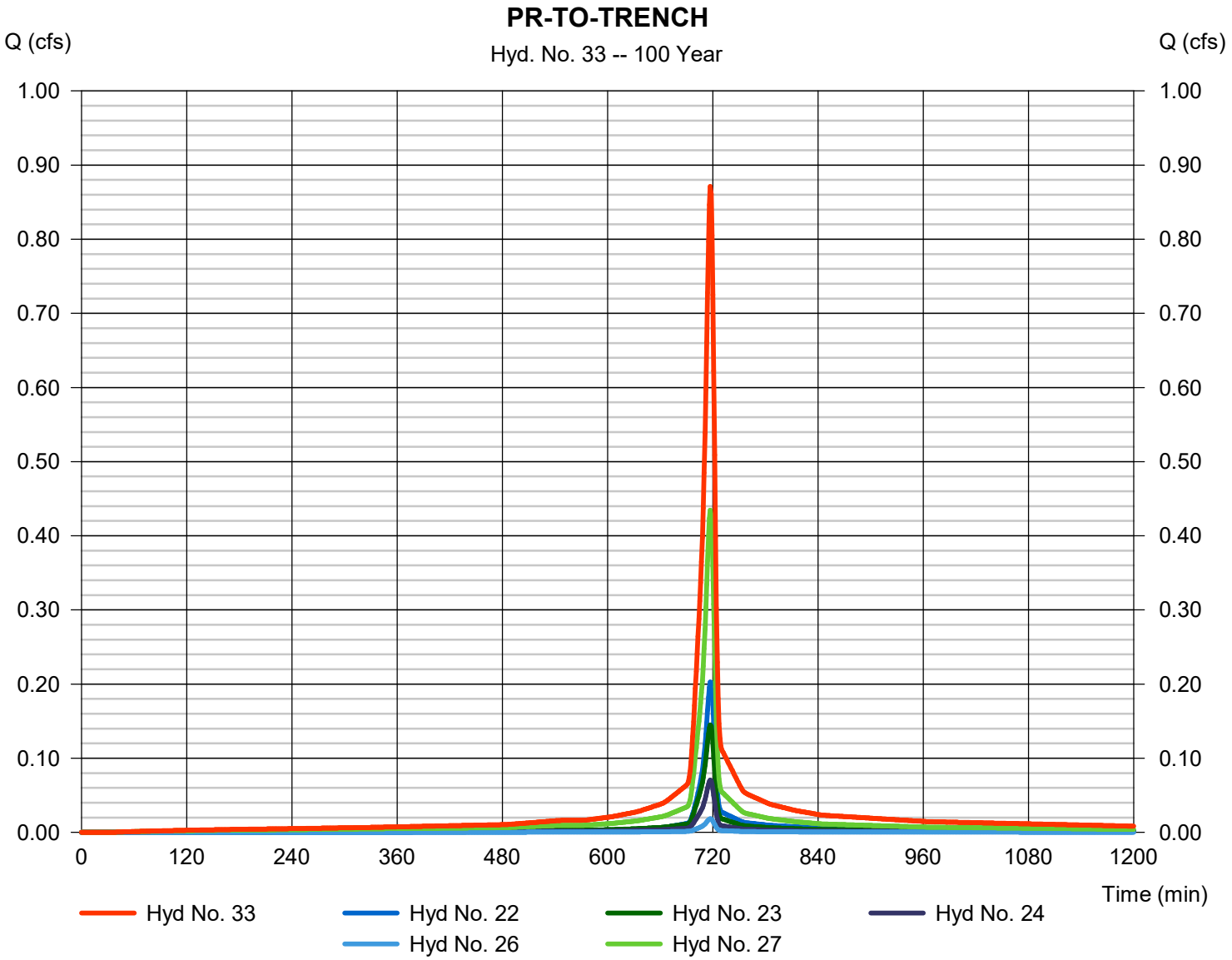


Hydrograph Report

Hyd. No. 33

PR-TO-TRENCH

Hydrograph type	= Combine	Peak discharge	= 0.871 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 2,042 cuft
Inflow hyds.	= 22, 23, 24, 26, 27	Contrib. drain. area	= 0.077 ac



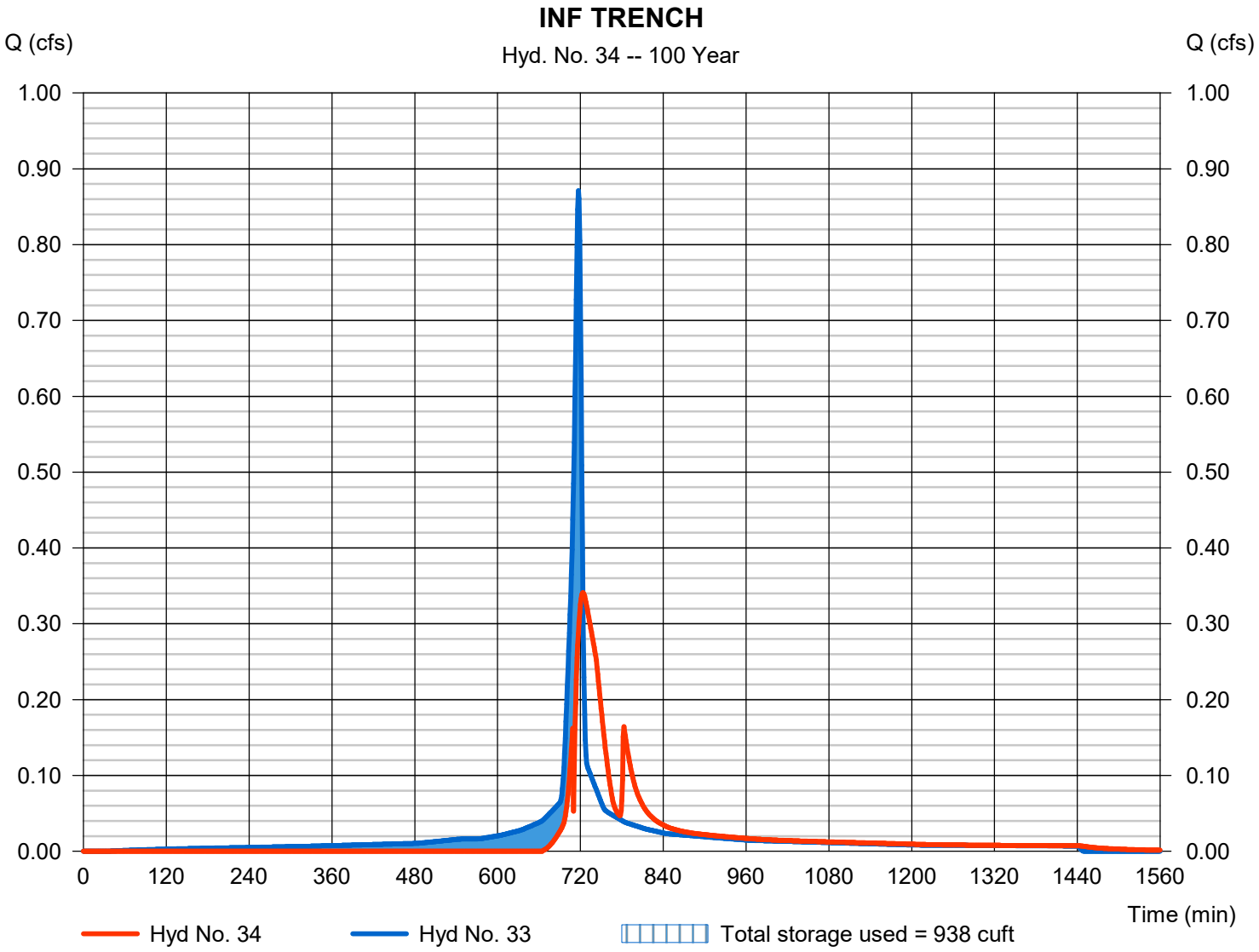
Hydrograph Report

Hyd. No. 34

INF TRENCH

Hydrograph type	=	Reservoir	Peak discharge	=	0.341 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	1,677 cuft
Inflow hyd. No.	=	33 - PR-TO-TRENCH	Max. Elevation	=	1687.83 ft
Reservoir name	=	BASIN	Max. Storage	=	938 cuft

Storage Indication method used.

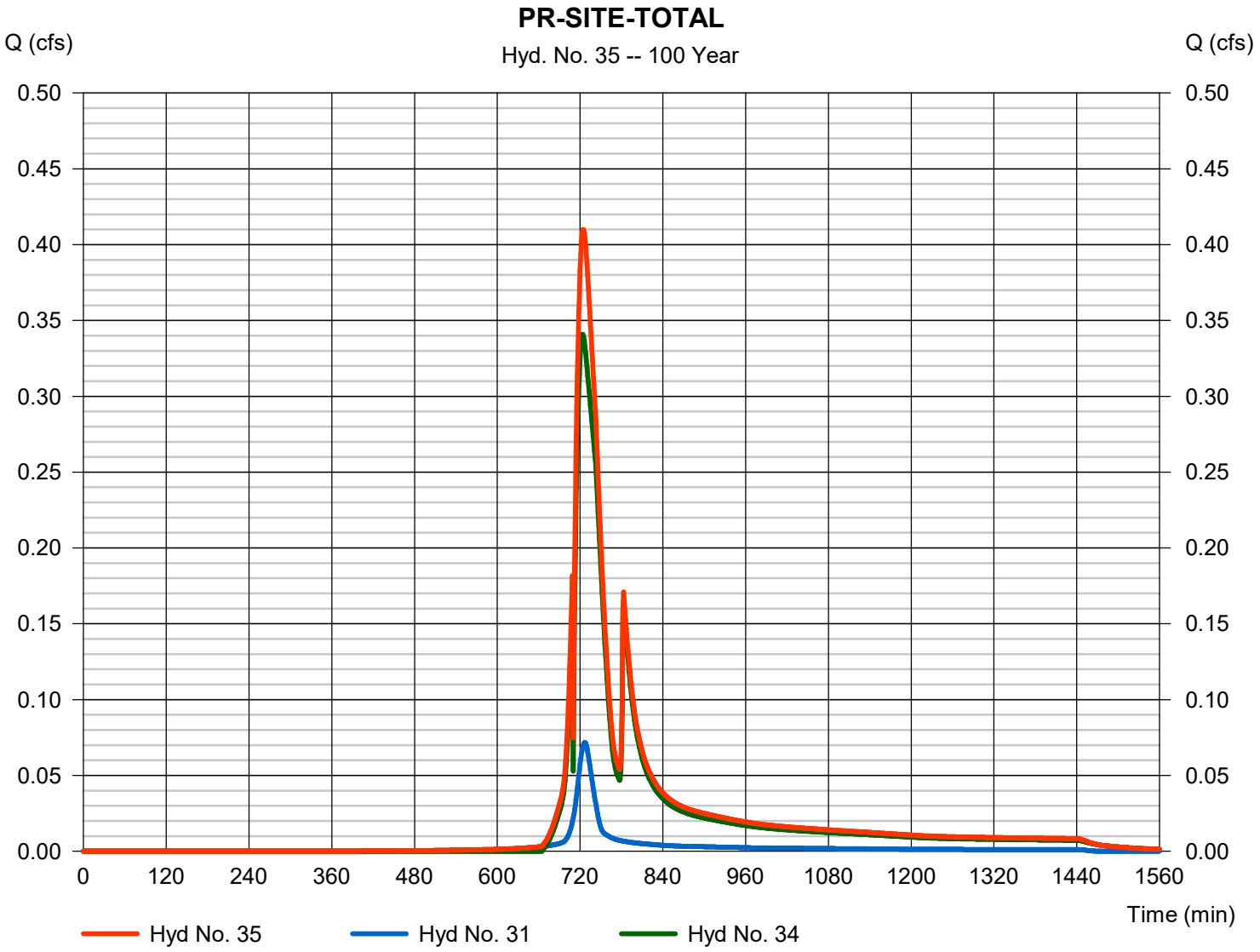


Hydrograph Report

Hyd. No. 35

PR-SITE-TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.410 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 1,922 cuft
Inflow hyds.	= 31, 34	Contrib. drain. area	= 0.000 ac

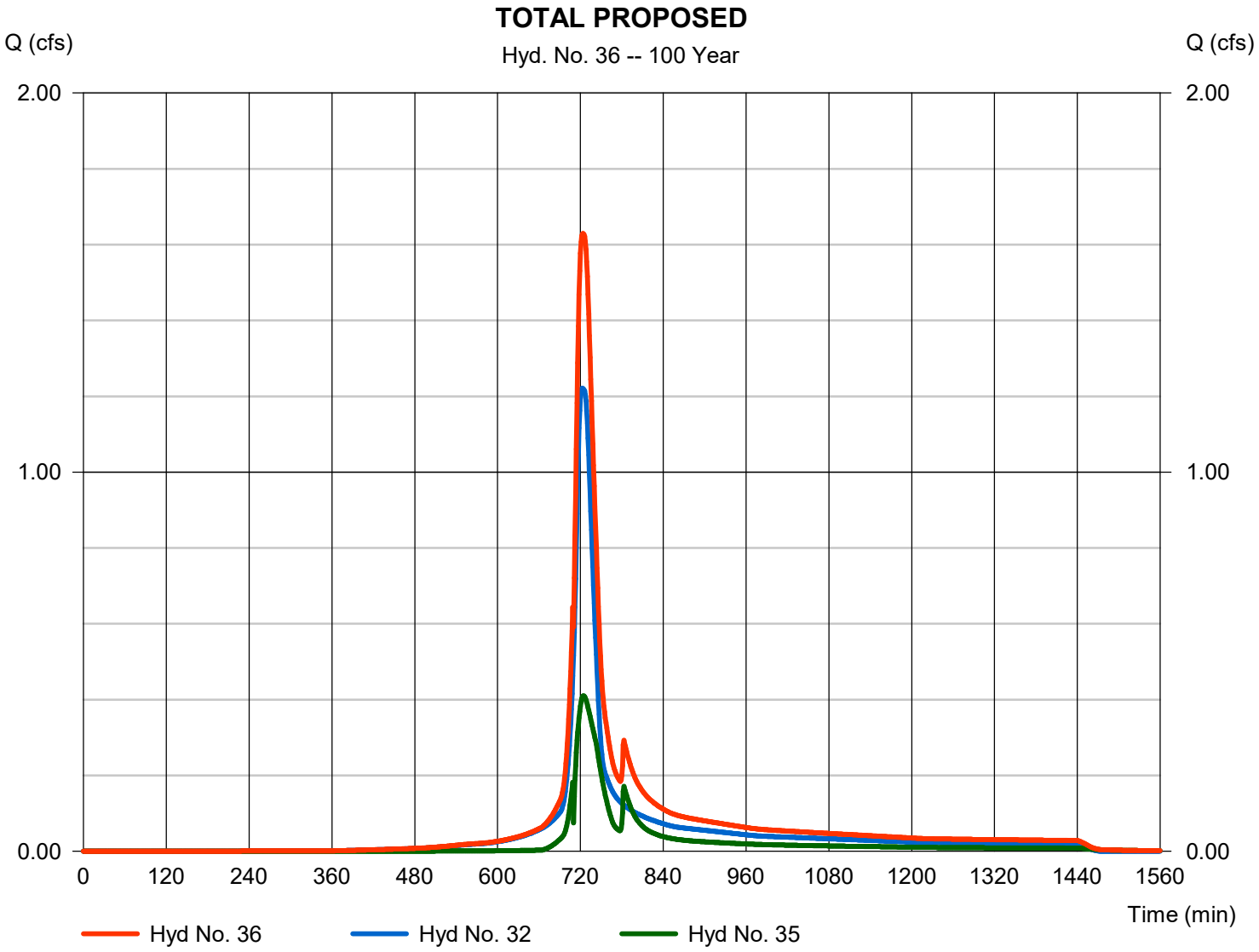


Hydrograph Report

Hyd. No. 36

TOTAL PROPOSED

Hydrograph type	=	Combine	Peak discharge	=	1.630 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	6,523 cuft
Inflow hyds.	=	32, 35	Contrib. drain. area	=	0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	36.9738	16.1000	0.7641	--------
2	94.4784	24.8001	0.9391	--------
3	0.0000	0.0000	0.0000	--------
5	176.2795	30.1001	1.0248	--------
10	317.8354	35.8000	1.1154	--------
25	309.7854	36.4000	1.0685	--------
50	1324.7950	53.7998	1.3207	--------
100	68.0213	20.7000	0.7186	--------

File name: Irvington.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	3.60	3.06	2.67	2.39	2.16	1.98	1.83	1.70	1.60	1.50	1.42	1.35
2	3.90	3.37	2.97	2.66	2.41	2.20	2.03	1.88	1.75	1.64	1.55	1.46
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	4.60	4.01	3.56	3.19	2.90	2.65	2.44	2.26	2.11	1.97	1.86	1.75
10	5.08	4.46	3.98	3.58	3.25	2.98	2.75	2.54	2.37	2.22	2.08	1.96
25	5.80	5.13	4.60	4.17	3.81	3.50	3.24	3.01	2.82	2.64	2.49	2.35
50	6.10	5.48	4.96	4.52	4.14	3.82	3.54	3.29	3.07	2.88	2.71	2.55
100	6.60	5.81	5.21	4.74	4.36	4.05	3.79	3.56	3.36	3.19	3.04	2.90

Tc = time in minutes. Values may exceed 60.

Precip. file name: P:\353754 PennEast\Stormwater\Site 10 - Transco\SW Model\Site10.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	2.67	3.20	0.00	3.99	4.68	5.78	6.82	8.07
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

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I. PCSM Drawings (Attached)

J. Offsite Stormwater Discharge Plan (Attached)