Preliminary Drainage Report
for
Wildcreek Meadows Tentative Map

Prepared for:

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Introduction

This report presents the Preliminary Hydrology / Drainage Report for the Wildcreek Meadows Development Tentative Map Application. It includes the design criteria, flow analysis and initial design of the facilities proposed to serve the development.

The purpose of this report is to address the drainage issues that result from the development of the proposed project site and that it adheres to the requirements and prescriptions from the Truckee Meadows Regional Drainage Manual (TMRDM) and City of Sparks development standards. This report is preliminary and thus a more detailed study will need to be conducted to size pipes, inlets, street conveyance, detention control structures and other infrastructure needs. A final technical drainage and hydrology / hydraulics report will need to be submitted with the final improvement plans for the project to incorporated to meet these needs.

The proposed Wildcreek Meadows community will be a single family, small lot development with a maximum unit count of 39. The project is located in an infill area with surrounding homes to the north, south and east. An existing church facility is located to the southwest of the project. The project incorporates 3 parcels (APNs 026-341-13, - 51 and -55) grossing in area of 5.38 acres and utilizes a private ingress / egress through a fourth parcel (026-341-56).

The proposed subdivision is generally located south of Wedekind Road, east of El Rancho Road, west of Sullivan Road and north of Greenbrae Drive. The proposed development will utilize existing roadways and will have privately maintained onsite streets.

The site is an aggregation of three parcels that currently have single family residences, with over half of the parcels' area being undeveloped. The site has a sloping topography that has an elevation drop from 4485 in the northeast corner to 4446 in the southeast corner, and drainage flows generally from the northwest to southeast. The site has slopes ranging from 0-10 percent on average and the site does not require any hillside development standards as prescribed in the City of Sparks Code.

The property will have access from Garfield Drive via a fifty-five foot (55') ingress / egress easement which will include easements for wet and dry utilities. A ten foot (10') landscape buffer easement abuts the eastern portion of the easement and the western portion of the existing homes to the east. An emergency access road is provided with access to Wedekind Road. The emergency access road will be gated.

Floodplain Information

The FEMA mapping designation for the site is located on FEMA FIRM maps 32031C3045G, dated March 16 ,2009. The site is located in an unshaded Zone X which means that the site is subject to minimal flooding and is outside of the 500-year flood zone. A copy of the FEMA map is included in the Appendix.

Methodology (Rational Method)

The Rational Method Formula is based on the formula:

$$Q = c*i*A$$

The value "Q" is defined as the maximum rate of runoff in cubic feet per second (cfs). The value "c" is a runoff coefficient and represents the runoff-producing conditions of the subject land. The value "i" is the average intensity of rainfall in inches per hour for a duration equal to the time of concentration. The value "A" is the contribution basin area measured in acres.

All time of concentrations were set to a minimum of 10 minutes as the TR-55 calculations for the small sub-basins calculated to a smaller time of concentration. The intensity – duration – frequency values used were from the City of Sparks Region 1 values table.

Refer to the appendix for all calculations, supporting coefficient data, City of Sparks Drainage Region Map and IDF curves.

SCS hydrographs were also generated for the existing and proposed conditions to get a preliminary detention pond volume sizing. This data is also found in the appendix.

Location and Existing Drainage Patterns

Both a Vicinity and Location Map are included in the Appendix of this report for reference.

The project parcels are currently grassed areas with single family structures (built in the 1940's and 1950's era), sheds and other miscellaneous improvements (small retaining walls, gravel and paved roads and dry and wet utilities and appurtenances). The site drains in a pattern of northwest to southeast and receives offsite drainage from the west and north (southside of Wedekind Road). The site has two master existing drainage areas:

Existing Area 1 (EX1) drains via overland flow into an offsite detention pond structure (southeast corner of the site) that meters flow into the existing storm drainage system in Garfield Drive that drains to the east. The site area for this basin is 6.51 acres. The storm drain pipe exiting the detention pond is an existing 15" pipe.

Existing Area 1 (EX2) drains via overland flow into a drainage swale that ultimately drains under a sidewalk drain and discharging into Garfield Drive (and subsequently is collected in the storm drainage system via existing roadside catch basins). The site area for this

basin is 2.12 acres. The street catch basin is located at the northwest corner of the Garfield Drive and Delaware Court intersection.

The Rational Method was utilized to determine the 5-year and 100-year peak flow rates in both the existing and proposed conditions. Output and a hydrologic basin map are included in the Appendix.

The 5-year and 100-year storm peak flows generated for EX1 are 1.97 cubic feet per second (cfs) and 10.21 cfs, respectively.

The 5-year and 100-year storm peak flows generated for EX2 are 1.10 cubic feet per second (cfs) and 4.21 cfs, respectively.

Proposed Drainage Patterns

The proposed drainage system for the project site consists of sheet flow from the lots and streets into roll curb gutters, subsequently collecting into an underground piped system, with the storm water collected vial curb catch basins and drop inlets. In addition, rear yard swales collect and convey drainage that travels through lots. Per drainage standards, these swales will only collect up to six lots.

The site has two master proposed drainage areas:

Proposed Area 1 (P1) drains Lots 4-38 and half of Lot 39, as well as existing offsite drainage to the east. Offsite drainage from the southside of Wedekind Road will be collected via a drainage swale located above the proposed rockery walls in Lots 10-14, being collected in a drop inlet at the bottom of the emergency access road. Offsite drainage, conveyed via overland flow, will be collected via a drainage swale located above the proposed rockery walls in Lots 4-9, being collected into a drop inlet. Rear lot drainage for Lots 15-20 are collected via a rear yard swale and then collected via a drop inlet. Rear lot drainage for Lots 30-31 and Lots 32-36 are collected vial rear lot swales and drain directly into the existing detention pond located offsite to the southeast. All drop inlets collect into the underground storm drain system, as well as all street curb inlets. The underground storm drain system drains to the detention pond.

The 5-year and 100-year storm peak flows generated for P1 are 4.56 cubic feet per second (cfs) and 15.44 cfs, respectively. The preliminary estimated detention volume needed for the increased runoff is 15,700 cubic feet or 0.36 ac-ft (based on SCS hydrograph calculations). The existing detention pond area has enough volume, with new grading, to accommodate over 0.5 ac-ft of storage volume.

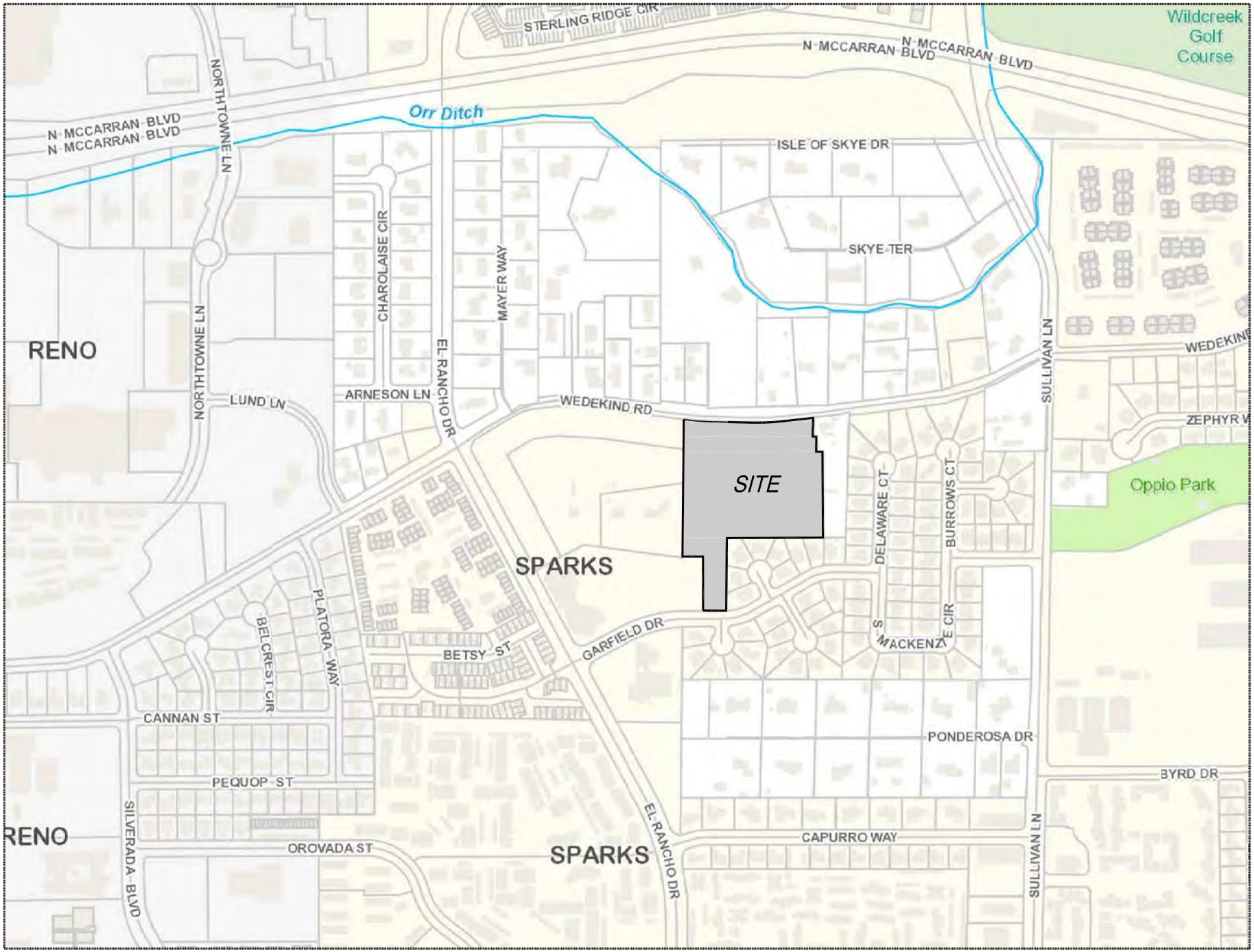
Proposed Area 2 (P2) drains Lots 1-3 and half of Lot 39 as well as existing offsite drainage to the west. Offsite drainage, conveyed via overland flow, will be collected via a drainage swale located above the proposed rockery walls in Lots 1-3, being drained directly to the

detention pond between the existing church parking lot and the proposed entrance road. Lot drainage from Lots 1-3 and half of Lot 39 will drain into the street and will be collected via a curb inlet that will drain, via an underground storm drain system, to the detention pond. The detention pond will also collect existing parking lot sheet drainage from the west. The detention pond outlet will be a sidewalk underdrain that will drain into Garfield Drive.

The 5-year and 100-year storm peak flows generated for P1 are 1.30 cubic feet per second (cfs) and 4.67 cfs, respectively. The preliminary estimated detention volume needed for the increased runoff is 1,370 cubic feet or 0.03 ac-ft (based on SCS hydrograph calculations).

Conclusion

The preliminary design of the proposed drainage facilities that will be constructed with the Wildcreek Meadows project have been designed to capture and perpetuate the design storm event flows to the drainage area outlets. The conveyance of flows is in conformance with the TMRDM. There will be no negative impacts to any adjacent or downstream properties as a result of development during the 5-year and 100- year storms due to the implementation of the proposed storm water management system, which includes a newly constructed detention pond for Area P2 and the increase in volume and adjustment to the outlet structure of the existing detention pond draining Area P1. As previously stated, this report is preliminary in nature and a more detailed study will need to be conducted and a final technical drainage report will need to be submitted with the final improvement plans for the project.



Vicinity Map

Not to Scale

Project Location

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood **control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was State Plane Nevada West FIPS Zone 2703. The **horizontal datum** was NAD 83, GRS80. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NOS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map road centerline information shown on this FIRM was provided by the Washoe County GIS Program. This data, dated 2005 or later, was provided in digital format, at a scale of 1" 200 ft urban areas and 1:2,400 in rural areas.

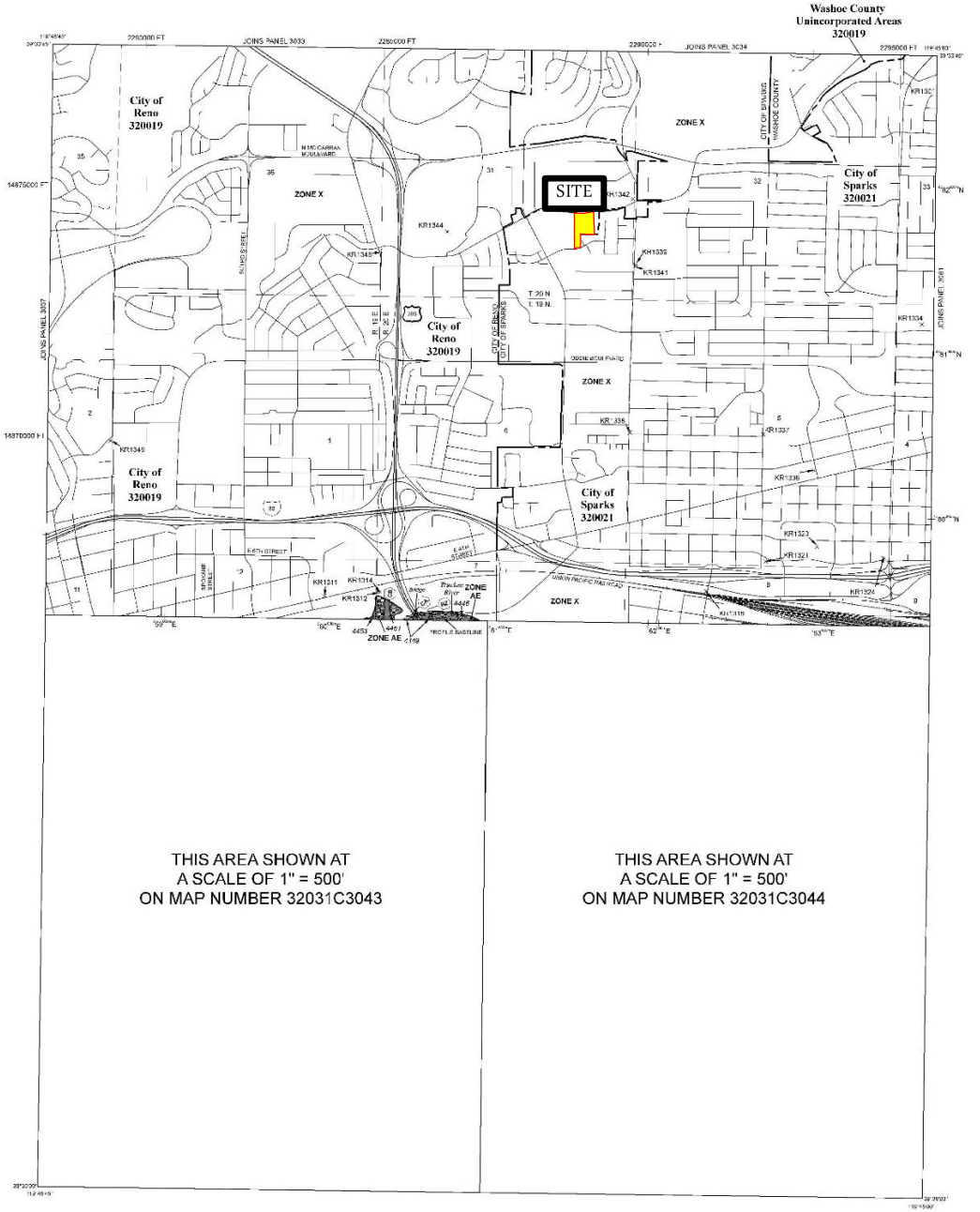
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov



THIS AREA SHOWN AT
A SCALE OF 1" = 500'
ON MAP NUMBER 32031C3043

THIS AREA SHOWN AT
A SCALE OF 1" = 500'
ON MAP NUMBER 32031C3044

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100 year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, A1-30, AO, AH, AR, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A — No base flood elevations determined.
- ZONE AE — Base flood elevations determined.
- ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base flood elevations determined.
- ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

1°26'15" — 1000-meter Universal Transverse Mercator grid values, zone 11

600000 FT — 5000-foot grid ticks: Nevada State Plane coordinate system, West zone (FIPSZONE 2703), Transverse Mercator projection

DX5510 — Bench mark (see explanation in Notes to Users section of this panel)

M1.5 — Map line

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 30, 1994

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
March 16, 2009 – to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update roads, hydrology, hydraulics, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 3045G

FIRM

FLOOD INSURANCE RATE MAP

WASHOE COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 3045 OF 3475
(See MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
RENO, CITY OF	320020	3045	G
SPARKS, CITY OF	320021	3045	G
WASHOE COUNTY	320019	3045	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32031C3045G

MAP REVISED
MARCH 16, 2009

Federal Emergency Management Agency

Rational Method
5-Year

Watershed Model Schematic

Legend

Hyd.	Origin	Description
1	Rational	Existing Drainage West
2	Rational	Existing Drainage West
3	Rational	Existing Drainage East
4	Rational	Existing Drainage East

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	Rational	------	-------	0.802	-------	1.096	1.377	1.862	2.329	2.911	Existing Drainage West
2	Rational	------	-------	0.949	-------	1.298	1.631	2.205	2.758	3.447	Existing Drainage West
3	Rational	------	-------	1.439	-------	1.967	2.471	3.342	4.180	5.225	Existing Drainage East
4	Rational	------	-------	3.335	-------	4.559	5.729	7.748	9.690	12.11	Existing Drainage East

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

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	Rational	1.096	1	10	657	------	------	------	Existing Drainage West
2	Rational	1.298	1	10	779	------	------	------	Existing Drainage West
3	Rational	1.967	1	10	1,180	------	------	------	Existing Drainage East
4	Rational	4.559	1	10	2,735	------	------	------	Existing Drainage East

Hydrograph Report

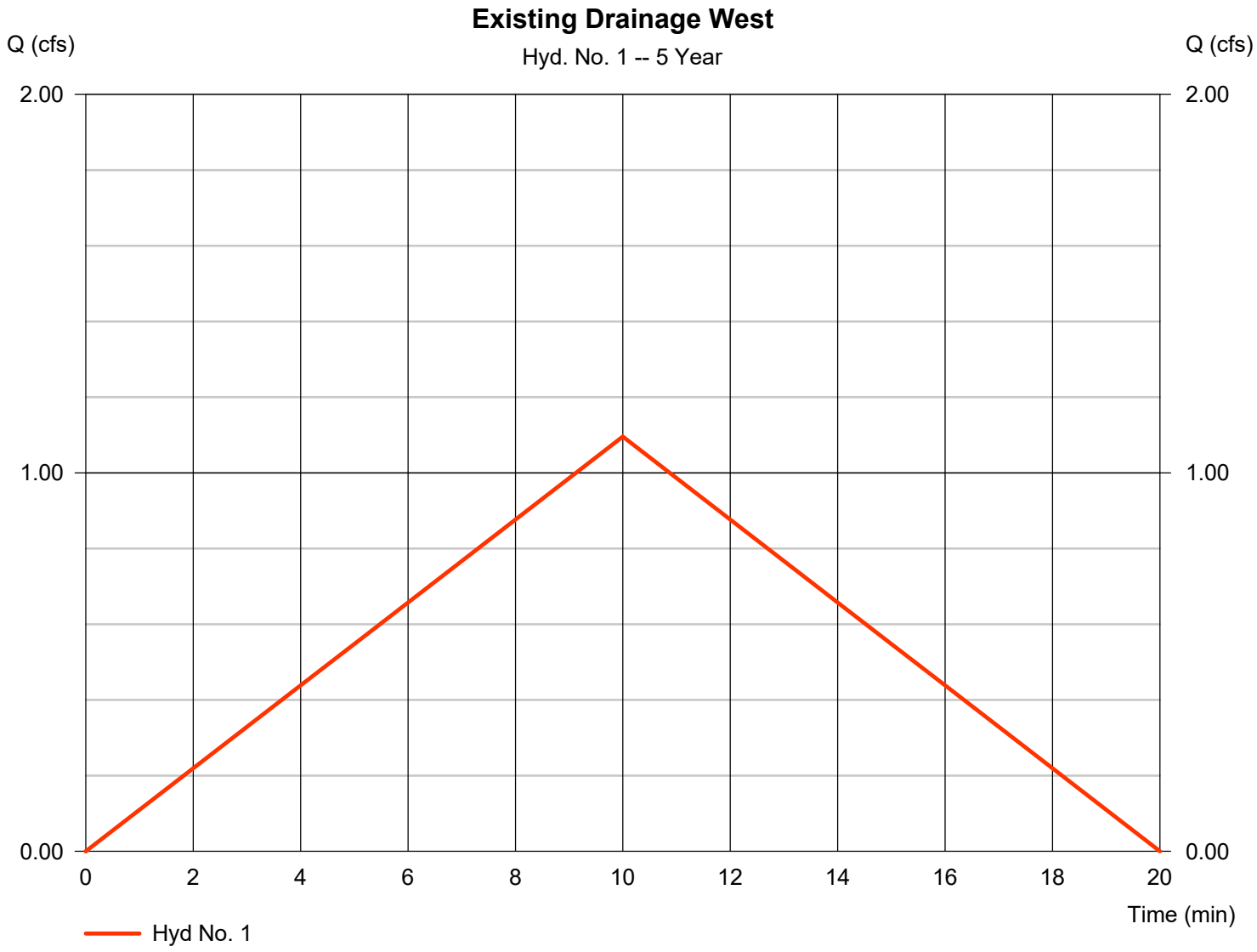
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 1

Existing Drainage West

Hydrograph type	=	Rational	Peak discharge	=	1.096 cfs
Storm frequency	=	5 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	657 cuft
Drainage area	=	2.100 ac	Runoff coeff.	=	0.38*
Intensity	=	1.373 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Region 1 IDF Curves.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(1.260 x 0.05) + (0.840 x 0.88)] / 2.100



Hydrograph Report

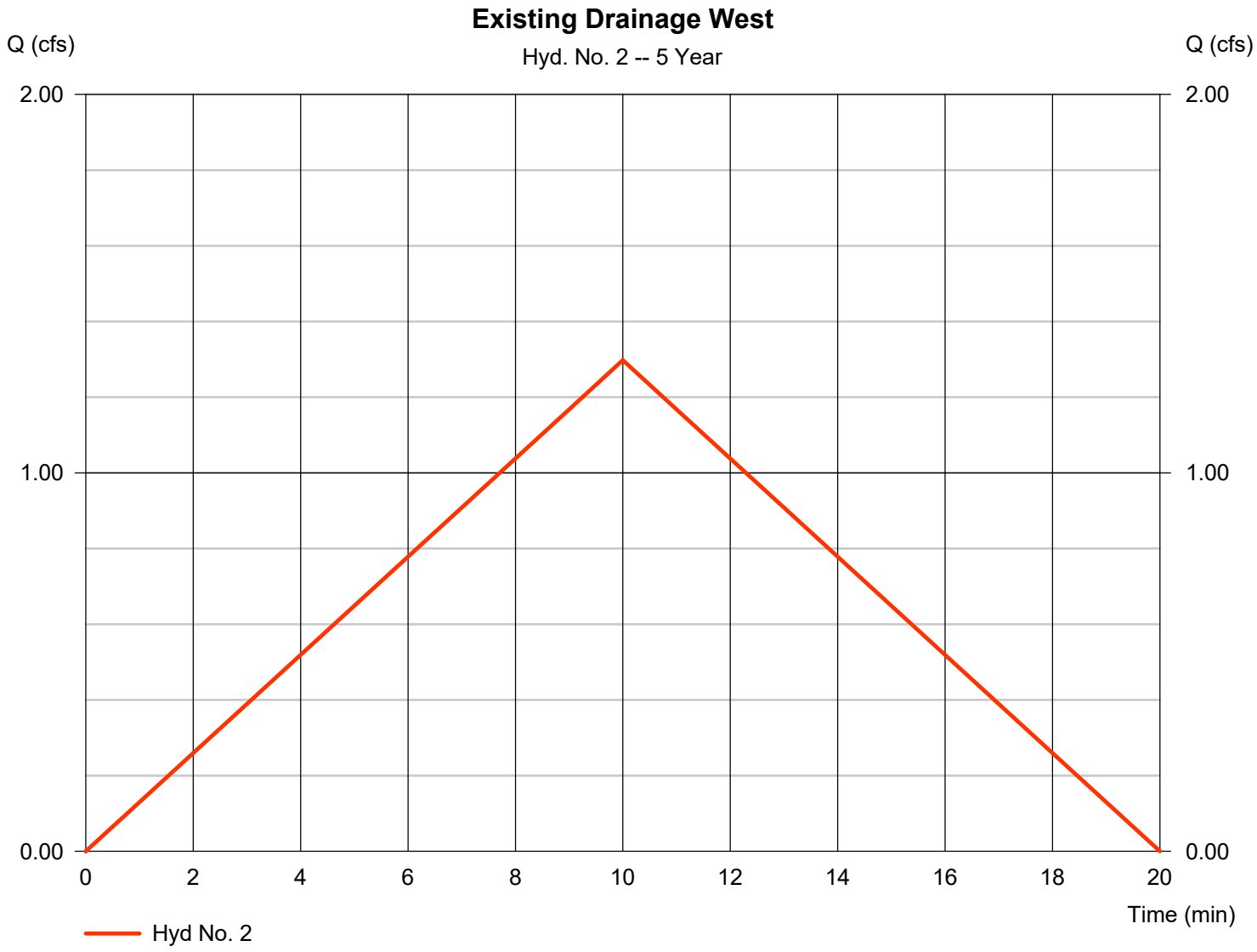
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 2

Existing Drainage West

Hydrograph type	=	Rational	Peak discharge	=	1.298 cfs
Storm frequency	=	5 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	779 cuft
Drainage area	=	2.100 ac	Runoff coeff.	=	0.45*
Intensity	=	1.373 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Region 1 IDF Curves.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(1.080 x 0.05) + (1.020 x 0.88)] / 2.100



Hydrograph Report

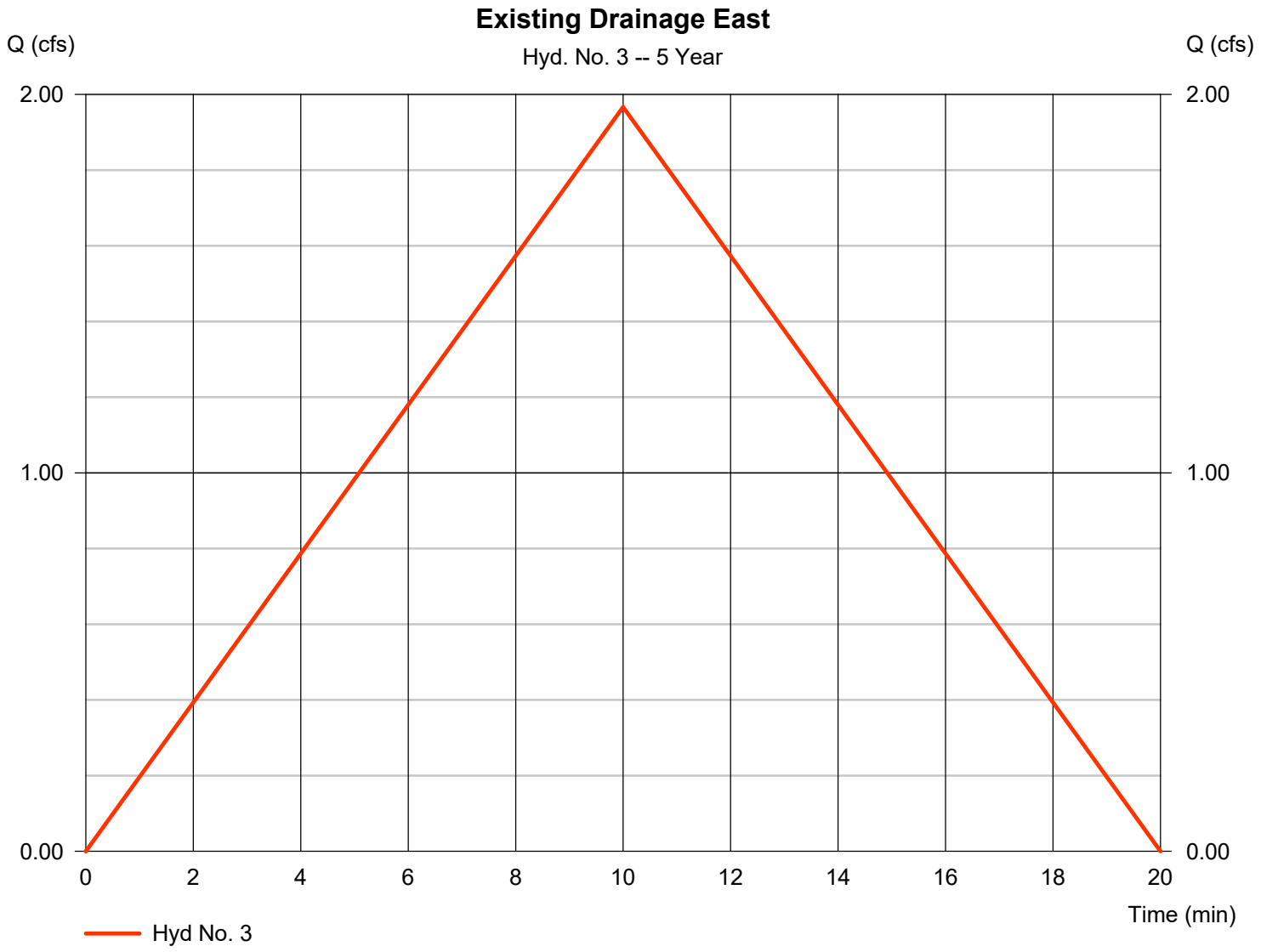
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 3

Existing Drainage East

Hydrograph type	=	Rational	Peak discharge	=	1.967 cfs
Storm frequency	=	5 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	1,180 cuft
Drainage area	=	6.510 ac	Runoff coeff.	=	0.22*
Intensity	=	1.373 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Region 1 IDF Curves.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(5.140 x 0.05) + (1.370 x 0.88)] / 6.510



Hydrograph Report

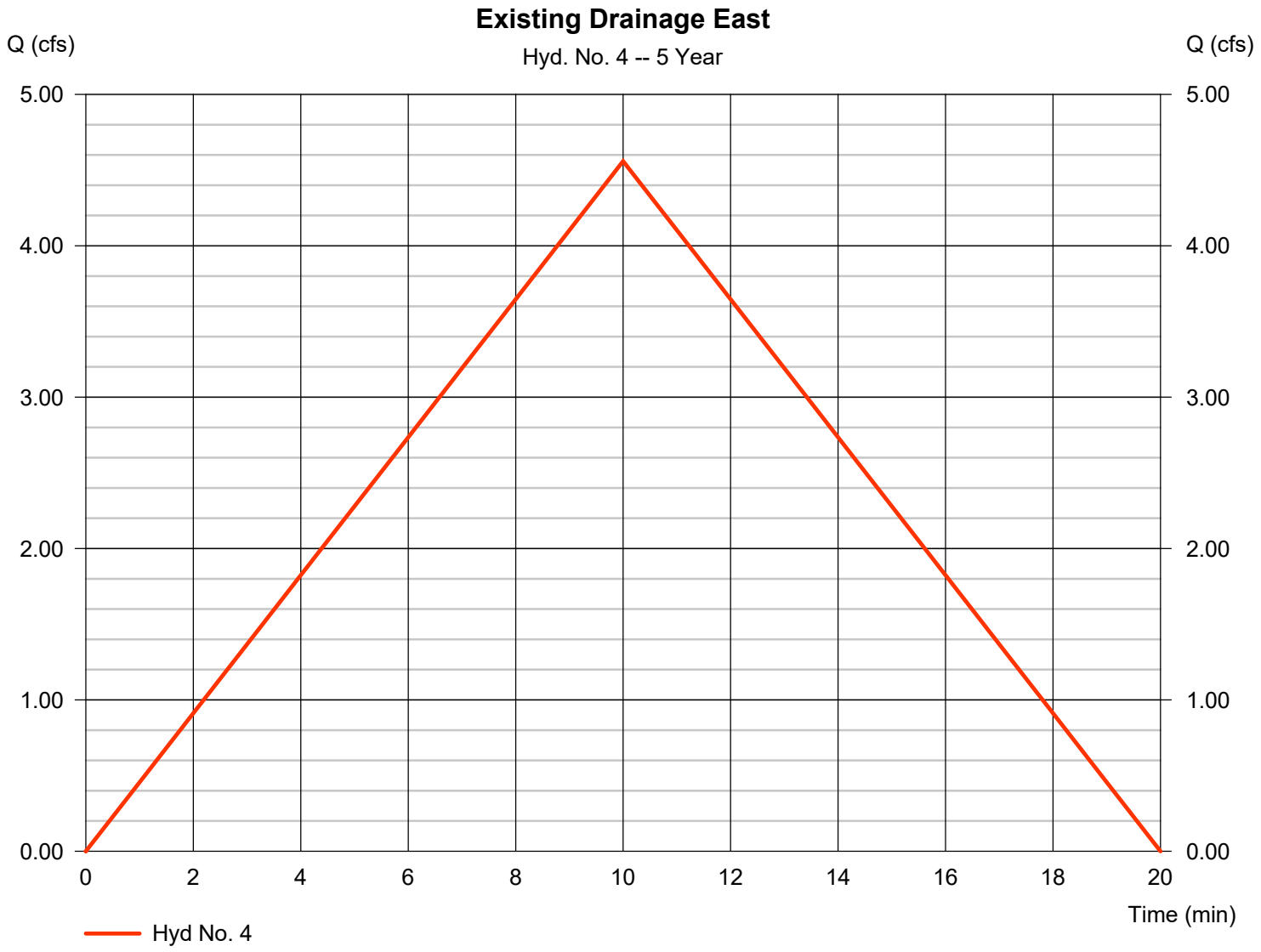
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 4

Existing Drainage East

Hydrograph type	=	Rational	Peak discharge	=	4.559 cfs
Storm frequency	=	5 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	2,735 cuft
Drainage area	=	6.510 ac	Runoff coeff.	=	0.51*
Intensity	=	1.373 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Region 1 IDF Curves.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.880 x 0.05) + (3.630 x 0.88)] / 6.510



Rational Method
100-Year

Watershed Model Schematic

Legend

Hyd.	Origin	Description
1	Rational	Existing Drainage West
2	Rational	Proposed Drainage West
3	Rational	Existing Drainage East
4	Rational	Proposed Drainage East

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	Rational	------	-------	1.160	-------	1.586	1.993	2.695	3.371	4.213	Existing Drainage West
2	Rational	------	-------	1.287	-------	1.759	2.211	2.989	3.739	4.673	Proposed Drainage West
3	Rational	------	-------	2.812	-------	3.844	4.830	6.533	8.170	10.21	Existing Drainage East
4	Rational	------	-------	4.251	-------	5.810	7.302	9.875	12.35	15.44	Proposed Drainage East

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

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	Rational	4.213	1	10	2,528	------	------	------	Existing Drainage West
2	Rational	4.673	1	10	2,804	------	------	------	Proposed Drainage West
3	Rational	10.21	1	10	6,127	------	------	------	Existing Drainage East
4	Rational	15.44	1	10	9,262	------	------	------	Proposed Drainage East

Hydrograph Report

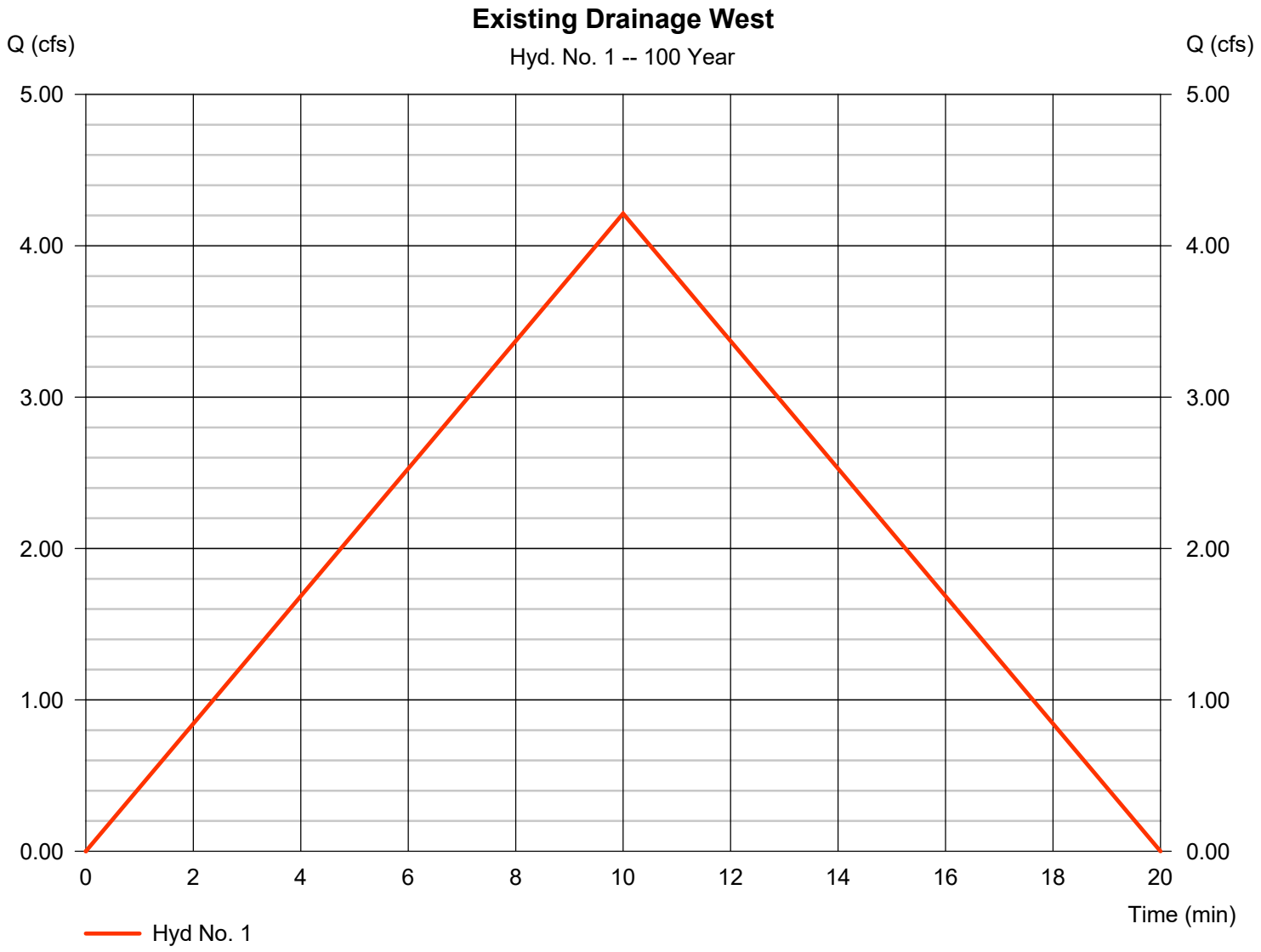
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 1

Existing Drainage West

Hydrograph type	=	Rational	Peak discharge	=	4.213 cfs
Storm frequency	=	100 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	2,528 cuft
Drainage area	=	2.100 ac	Runoff coeff.	=	0.55*
Intensity	=	3.648 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Region 1 IDF Curves.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(1.260 x 0.30) + (0.840 x 0.93)] / 2.100



Hydrograph Report

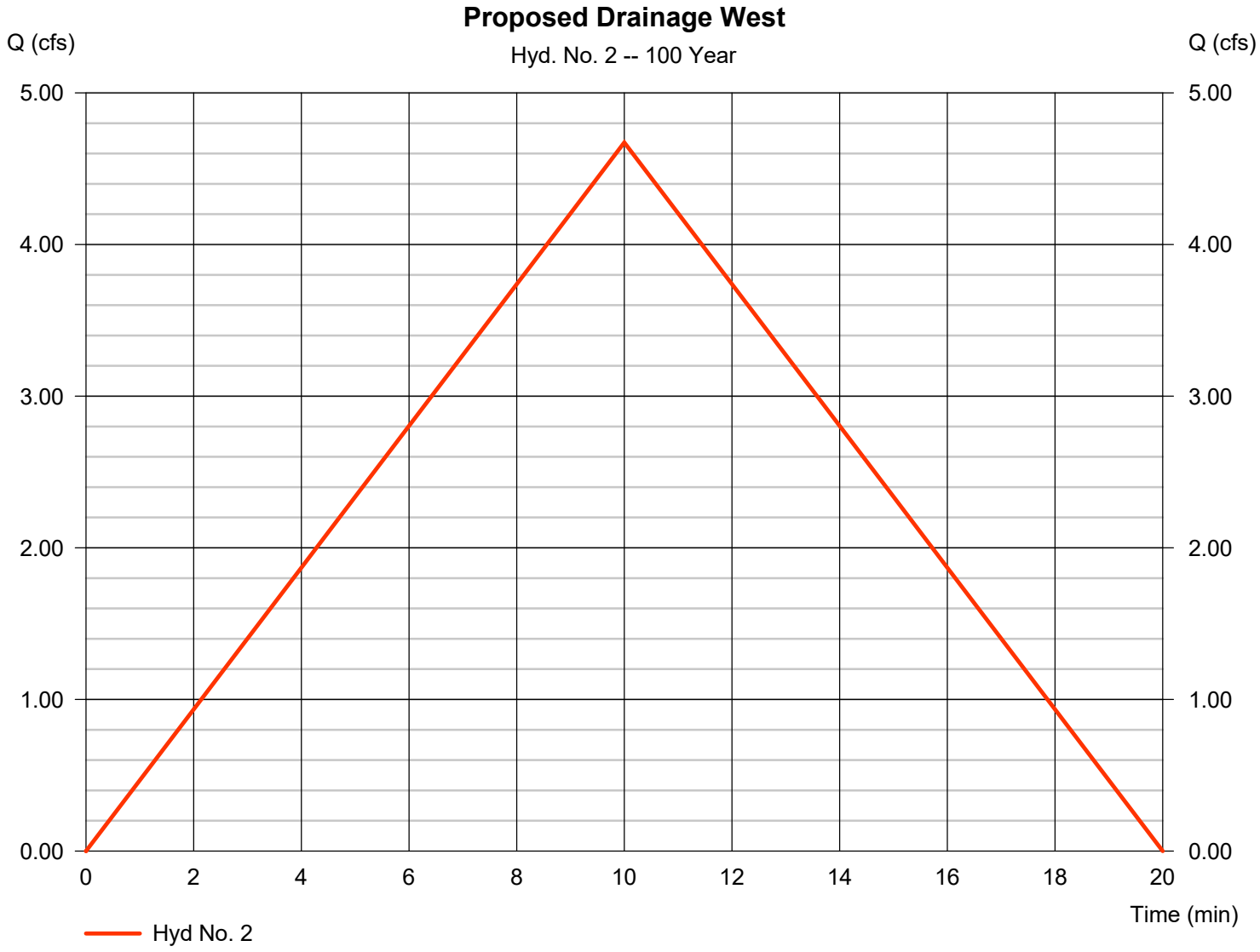
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 2

Proposed Drainage West

Hydrograph type	=	Rational	Peak discharge	=	4.673 cfs
Storm frequency	=	100 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	2,804 cuft
Drainage area	=	2.100 ac	Runoff coeff.	=	0.61*
Intensity	=	3.648 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Region 1 IDF Curves.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(1.080 x 0.30) + (1.020 x 0.93)] / 2.100



Hydrograph Report

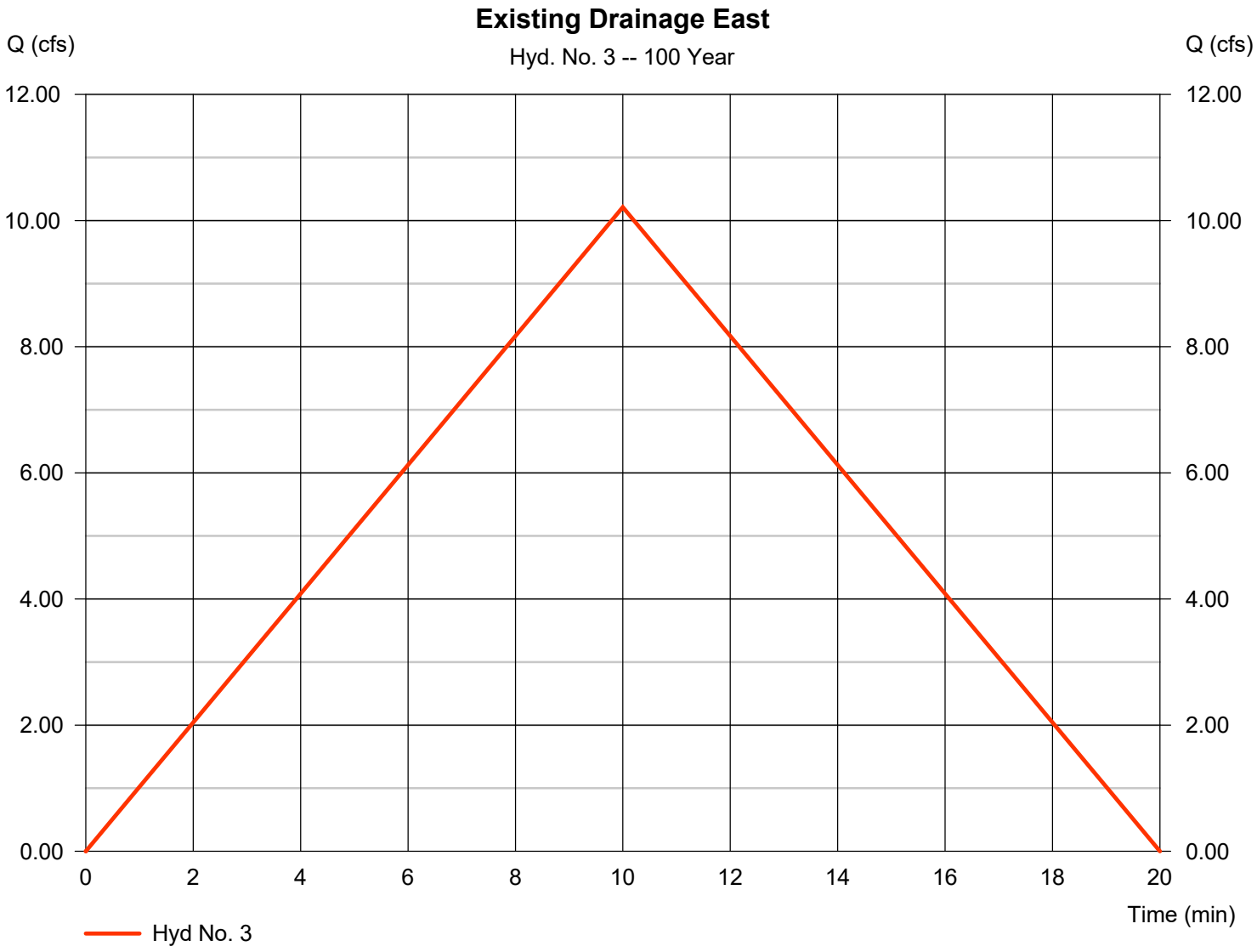
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 3

Existing Drainage East

Hydrograph type	=	Rational	Peak discharge	=	10.21 cfs
Storm frequency	=	100 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	6,127 cuft
Drainage area	=	6.510 ac	Runoff coeff.	=	0.43*
Intensity	=	3.648 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Region 1 IDF Curves.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(5.140 x 0.30) + (1.370 x 0.93)] / 6.510



Hydrograph Report

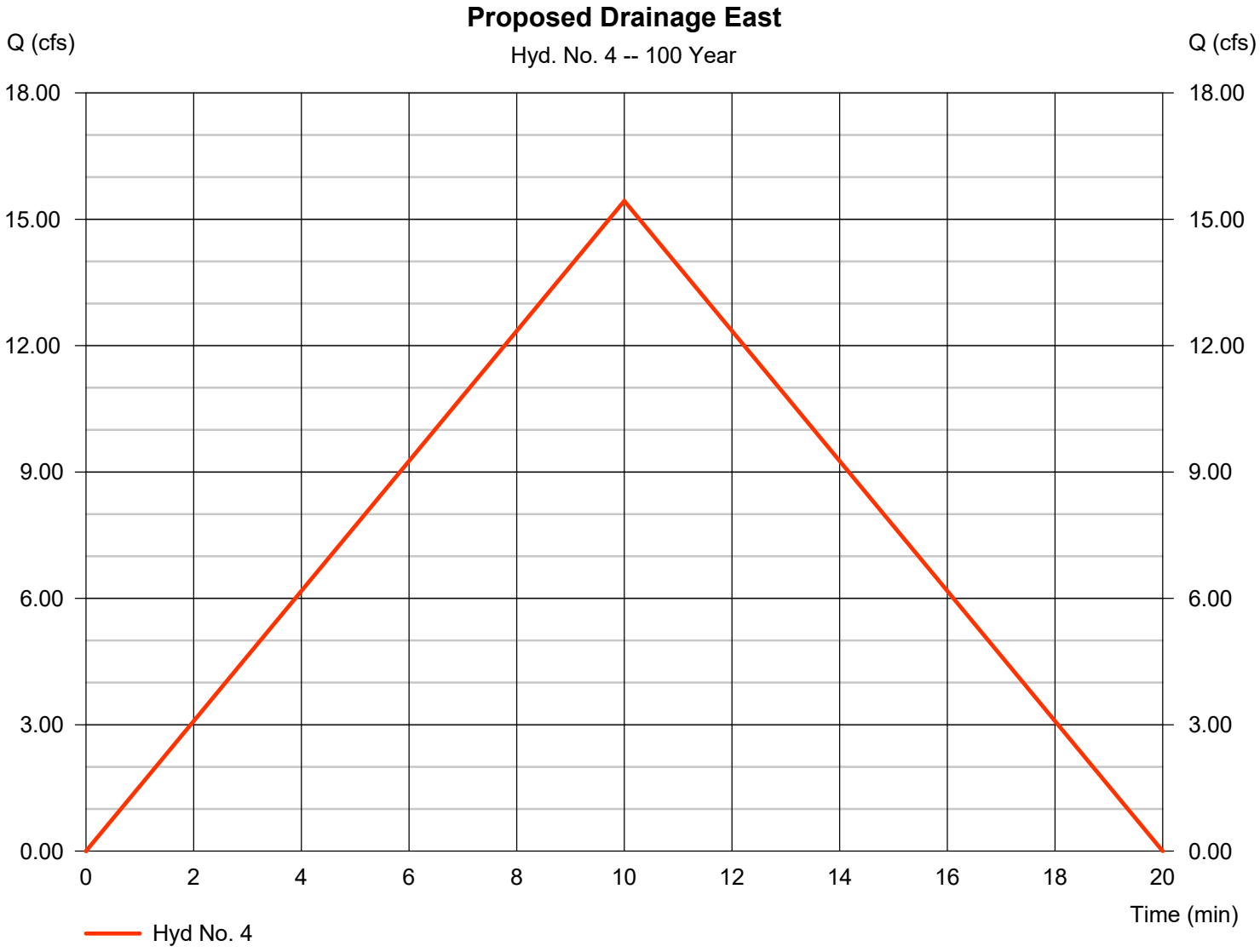
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 4

Proposed Drainage East

Hydrograph type	=	Rational	Peak discharge	=	15.44 cfs
Storm frequency	=	100 yrs	Time to peak	=	10 min
Time interval	=	1 min	Hyd. volume	=	9,262 cuft
Drainage area	=	6.510 ac	Runoff coeff.	=	0.65*
Intensity	=	3.648 in/hr	Tc by User	=	10.00 min
IDF Curve	=	Region 1 IDF Curves.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.880 x 0.30) + (3.630 x 0.93)] / 6.510



Watershed Model Schematic

Legend

Hyd.	Origin	Description
1	SCS Runoff	Existing Drainage - West
2	SCS Runoff	Proposed Drainage - West
3	SCS Runoff	Existing Drainage - East
4	SCS Runoff	Proposed Drainage - East

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	------	-------	2.810	-------	-------	7.497	-------	-------	16.12	Existing Drainage - West
2	SCS Runoff	------	-------	3.166	-------	-------	7.920	-------	-------	16.51	Proposed Drainage - West
3	SCS Runoff	------	-------	7.168	-------	-------	21.21	-------	-------	47.98	Existing Drainage - East
4	SCS Runoff	------	-------	10.38	-------	-------	25.18	-------	-------	51.72	Proposed Drainage - East

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

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	7.497	5	720	20,489	------	------	------	Existing Drainage - West
2	SCS Runoff	7.920	5	720	21,857	------	------	------	Proposed Drainage - West
3	SCS Runoff	21.21	5	720	57,439	------	------	------	Existing Drainage - East
4	SCS Runoff	25.18	5	720	69,939	------	------	------	Proposed Drainage - East

Hydrograph Report

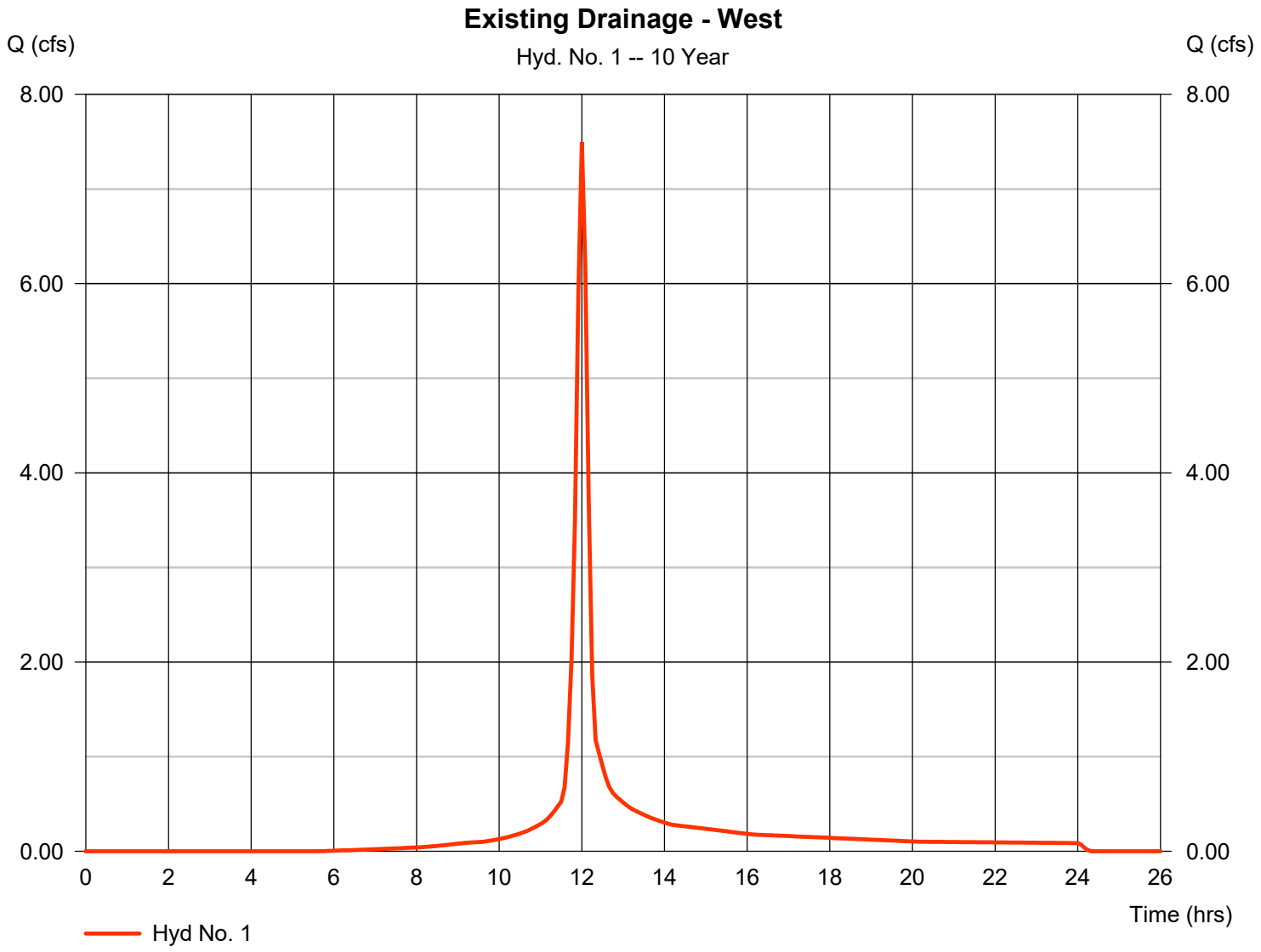
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 1

Existing Drainage - West

Hydrograph type	= SCS Runoff	Peak discharge	= 7.497 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 5 min	Hyd. volume	= 20,489 cuft
Drainage area	= 2.100 ac	Curve number	= 87*
Basin Slope	= 10.0 %	Hydraulic length	= 750 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.25 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.260 x 80) + (0.840 x 98)] / 2.100



Hydrograph Report

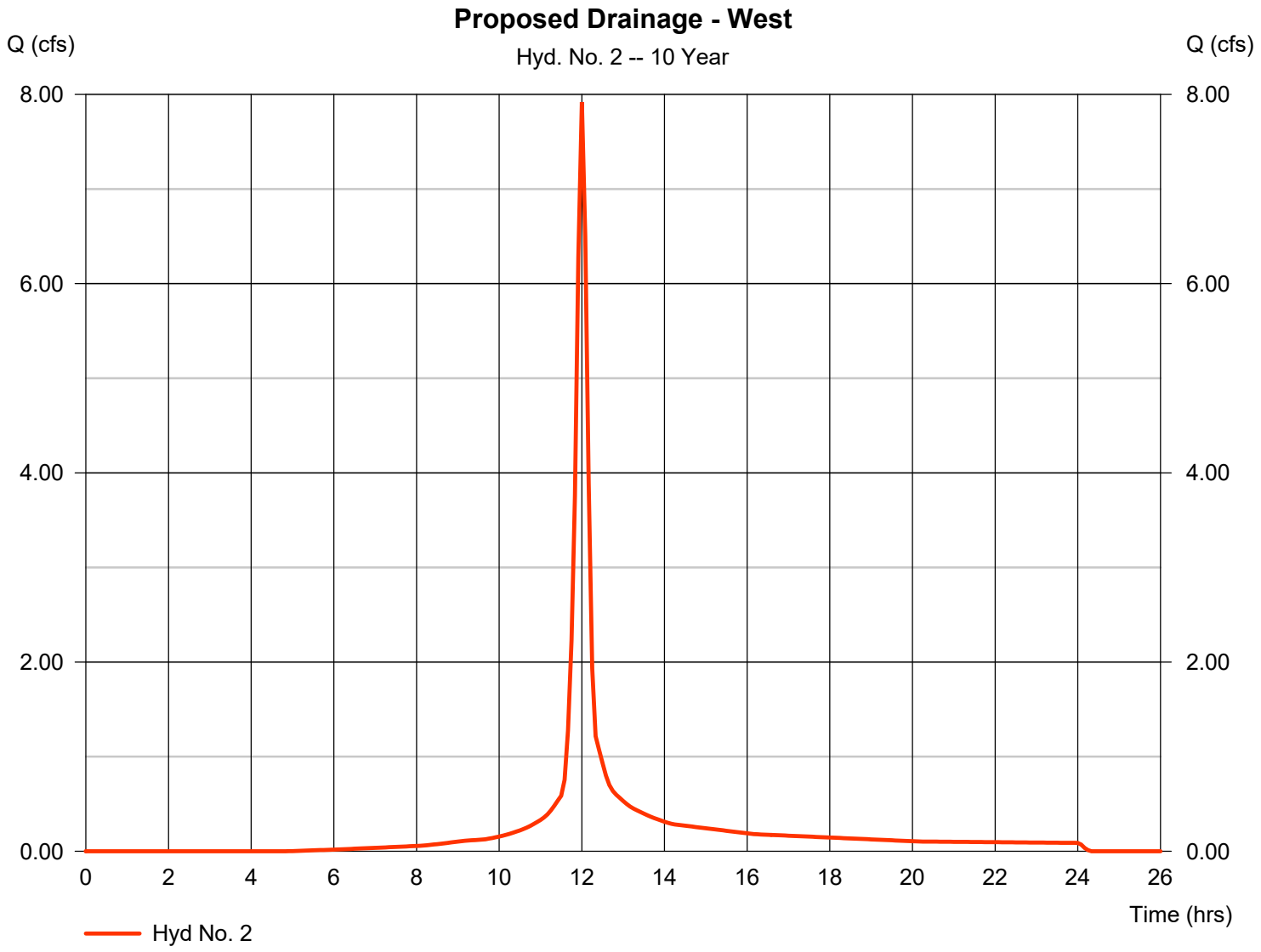
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 2

Proposed Drainage - West

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.920 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	5 min	Hyd. volume	=	21,857 cuft
Drainage area	=	2.100 ac	Curve number	=	89*
Basin Slope	=	10.0 %	Hydraulic length	=	750 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	4.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.080 x 80) + (1.020 x 98)] / 2.100



Hydrograph Report

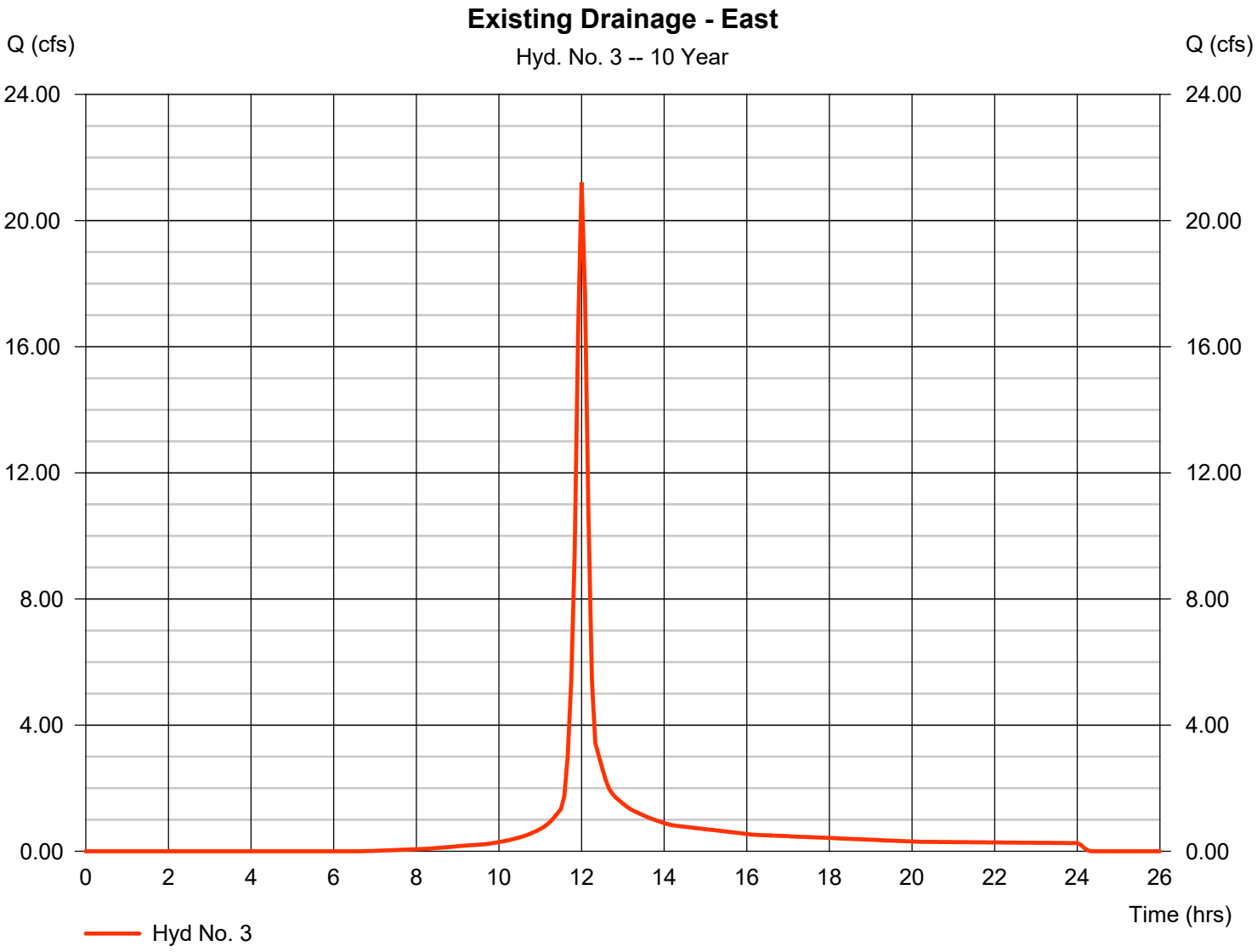
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 3

Existing Drainage - East

Hydrograph type	= SCS Runoff	Peak discharge	= 21.21 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 5 min	Hyd. volume	= 57,439 cuft
Drainage area	= 6.510 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.25 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.140 x 80) + (1.370 x 98)] / 6.510



Hydrograph Report

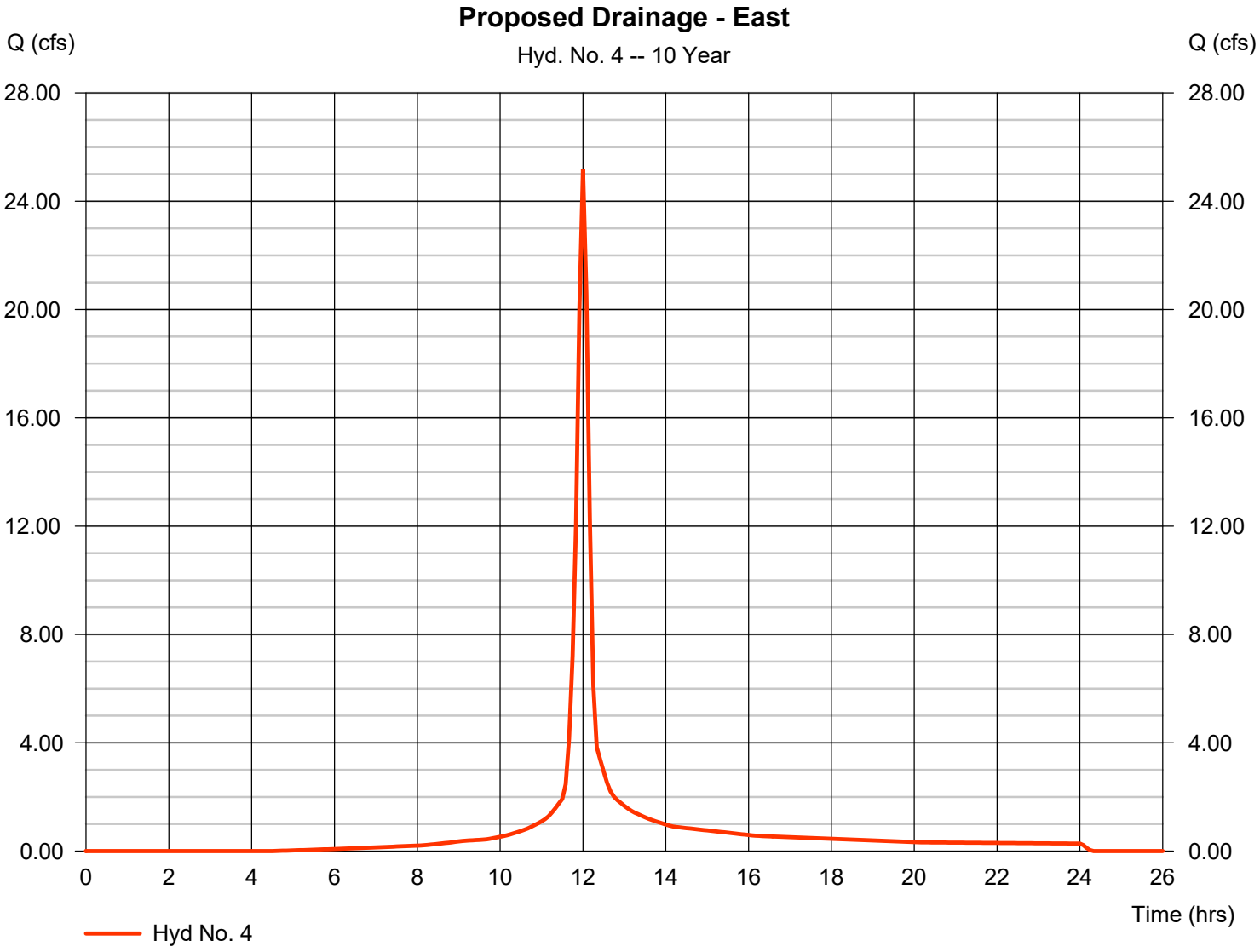
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 4

Proposed Drainage - East

Hydrograph type	= SCS Runoff	Peak discharge	= 25.18 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 5 min	Hyd. volume	= 69,939 cuft
Drainage area	= 6.510 ac	Curve number	= 90*
Basin Slope	= 10.0 %	Hydraulic length	= 750 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.25 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.880 x 80) + (3.630 x 98)] / 6.510



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

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	16.12	5	720	45,745	------	------	------	Existing Drainage - West
2	SCS Runoff	16.51	5	720	47,437	------	------	------	Proposed Drainage - West
3	SCS Runoff	47.98	5	720	133,973	------	------	------	Existing Drainage - East
4	SCS Runoff	51.72	5	720	149,682	------	------	------	Proposed Drainage - East

Hydrograph Report

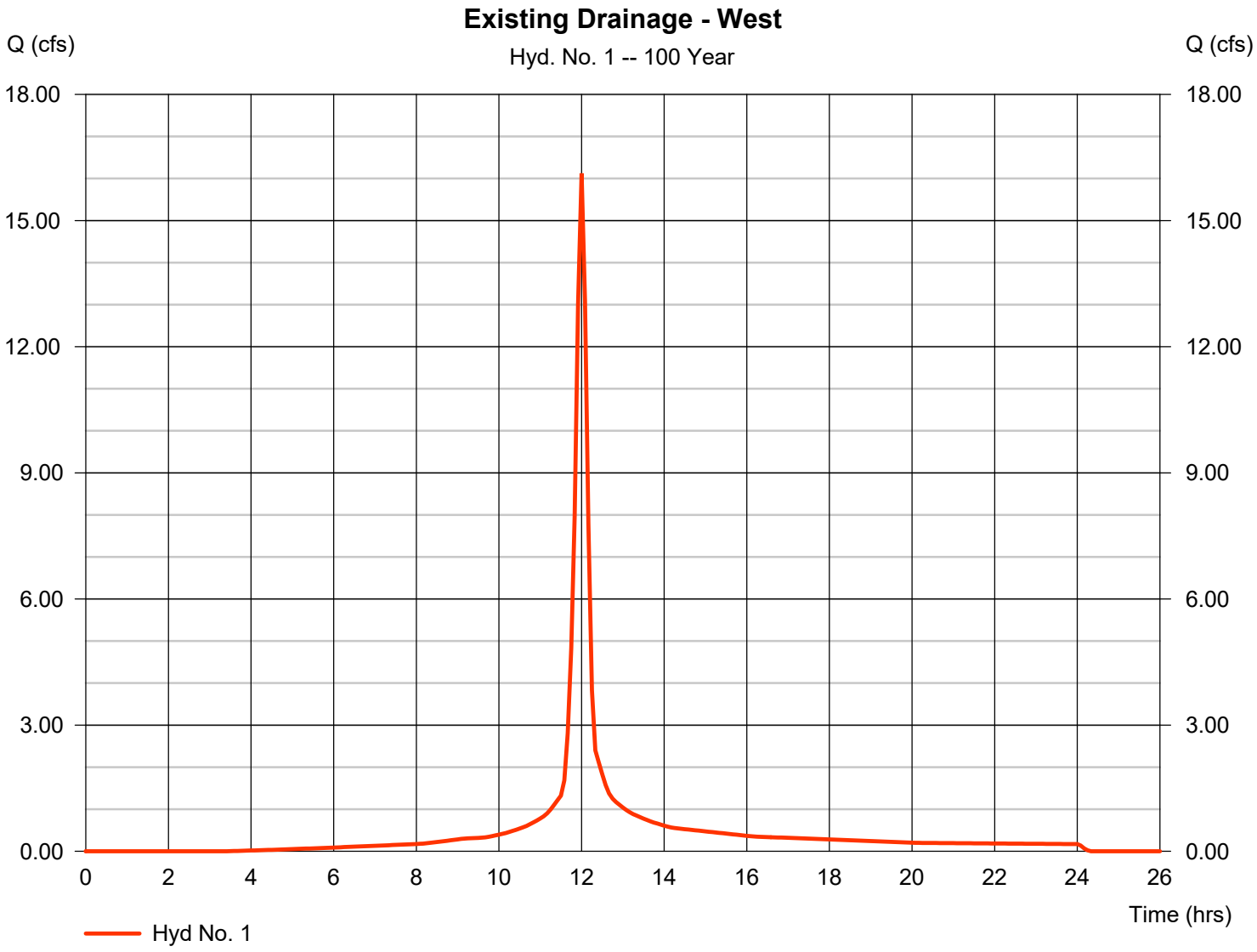
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 1

Existing Drainage - West

Hydrograph type	= SCS Runoff	Peak discharge	= 16.12 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 5 min	Hyd. volume	= 45,745 cuft
Drainage area	= 2.100 ac	Curve number	= 87*
Basin Slope	= 10.0 %	Hydraulic length	= 750 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.95 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.260 x 80) + (0.840 x 98)] / 2.100



Hydrograph Report

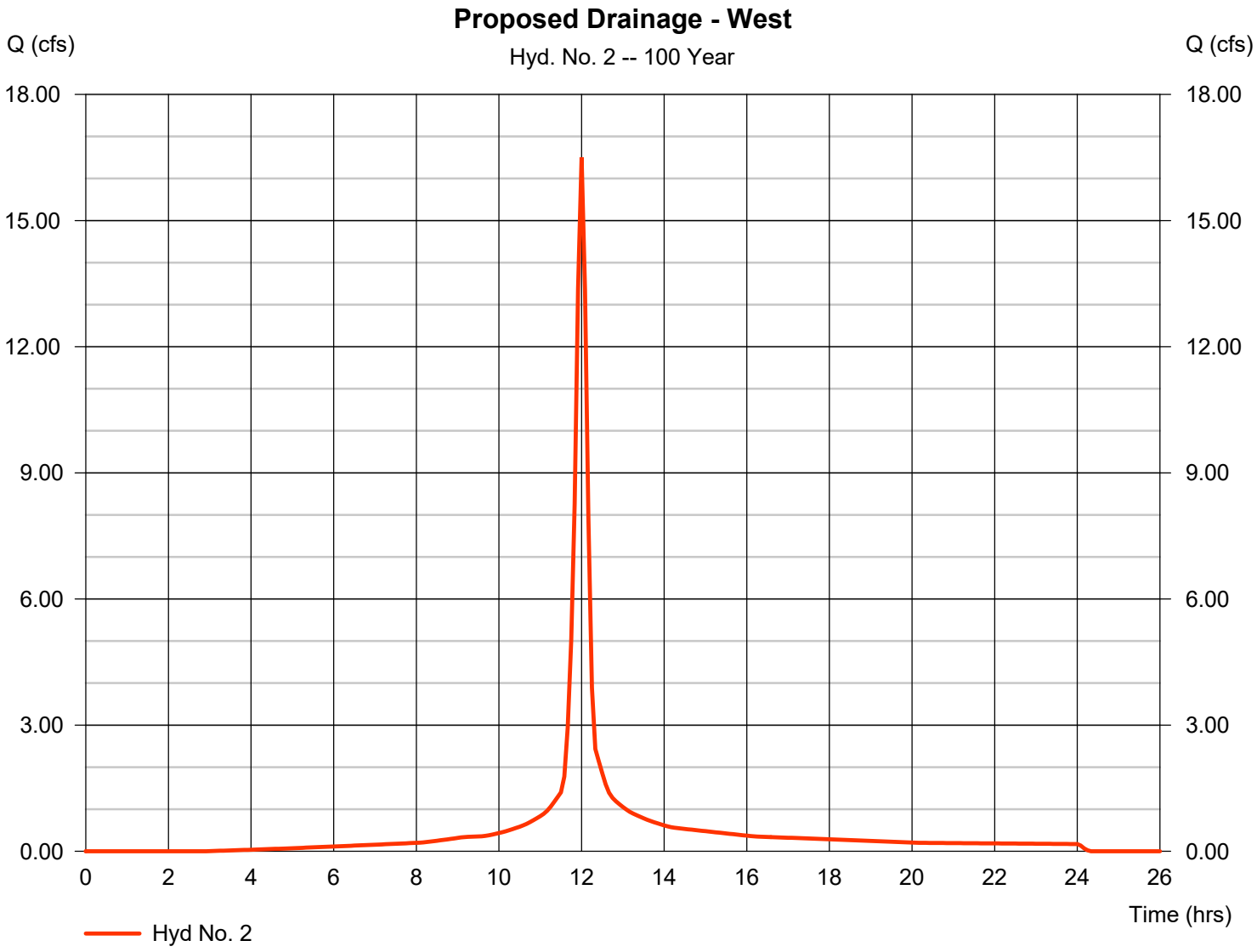
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 2

Proposed Drainage - West

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.51 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	5 min	Hyd. volume	=	47,437 cuft
Drainage area	=	2.100 ac	Curve number	=	89*
Basin Slope	=	10.0 %	Hydraulic length	=	750 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.95 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.080 x 80) + (1.020 x 98)] / 2.100



Hydrograph Report

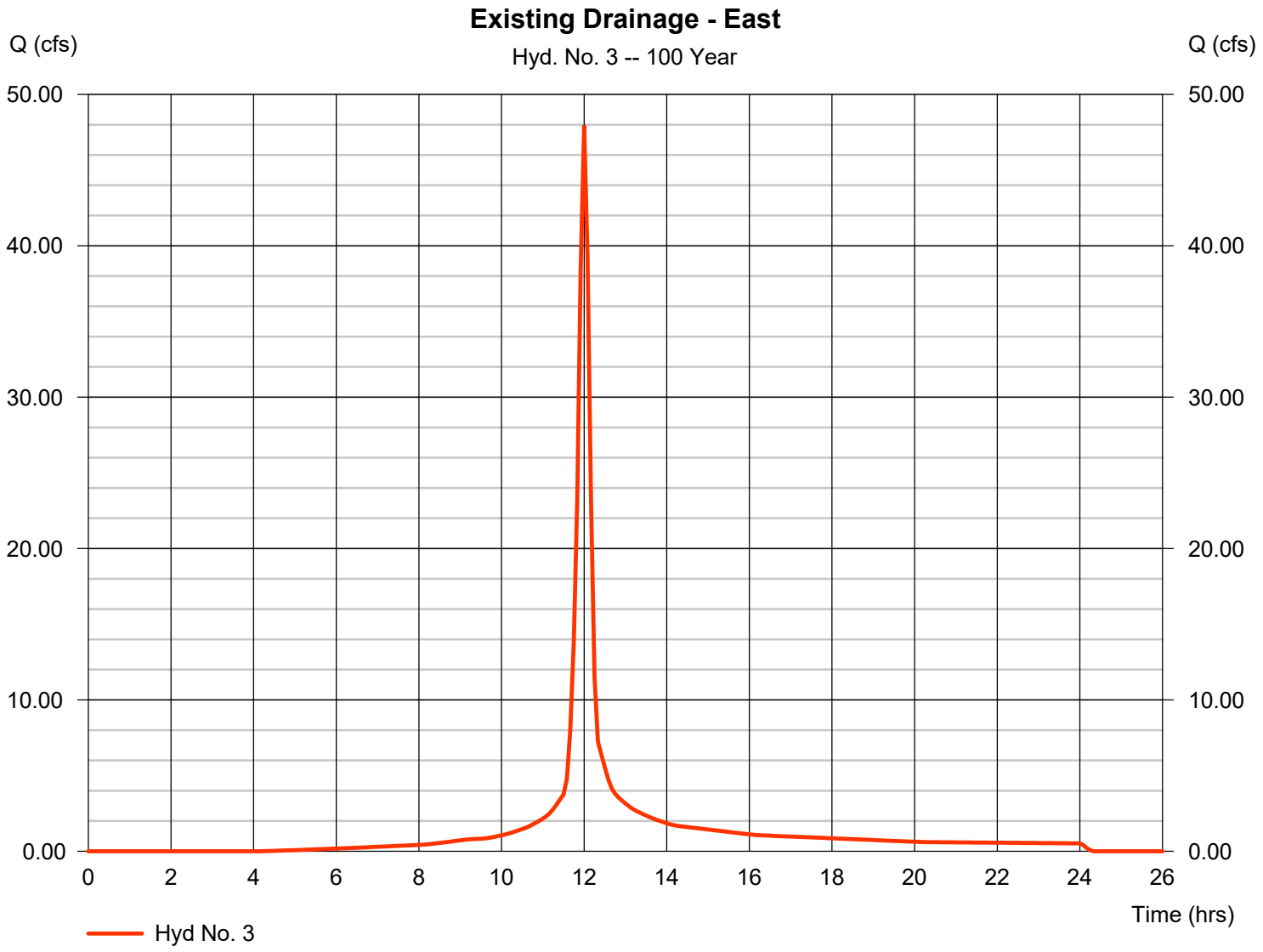
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 3

Existing Drainage - East

Hydrograph type	= SCS Runoff	Peak discharge	= 47.98 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 5 min	Hyd. volume	= 133,973 cuft
Drainage area	= 6.510 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.95 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.140 x 80) + (1.370 x 98)] / 6.510



Hydrograph Report

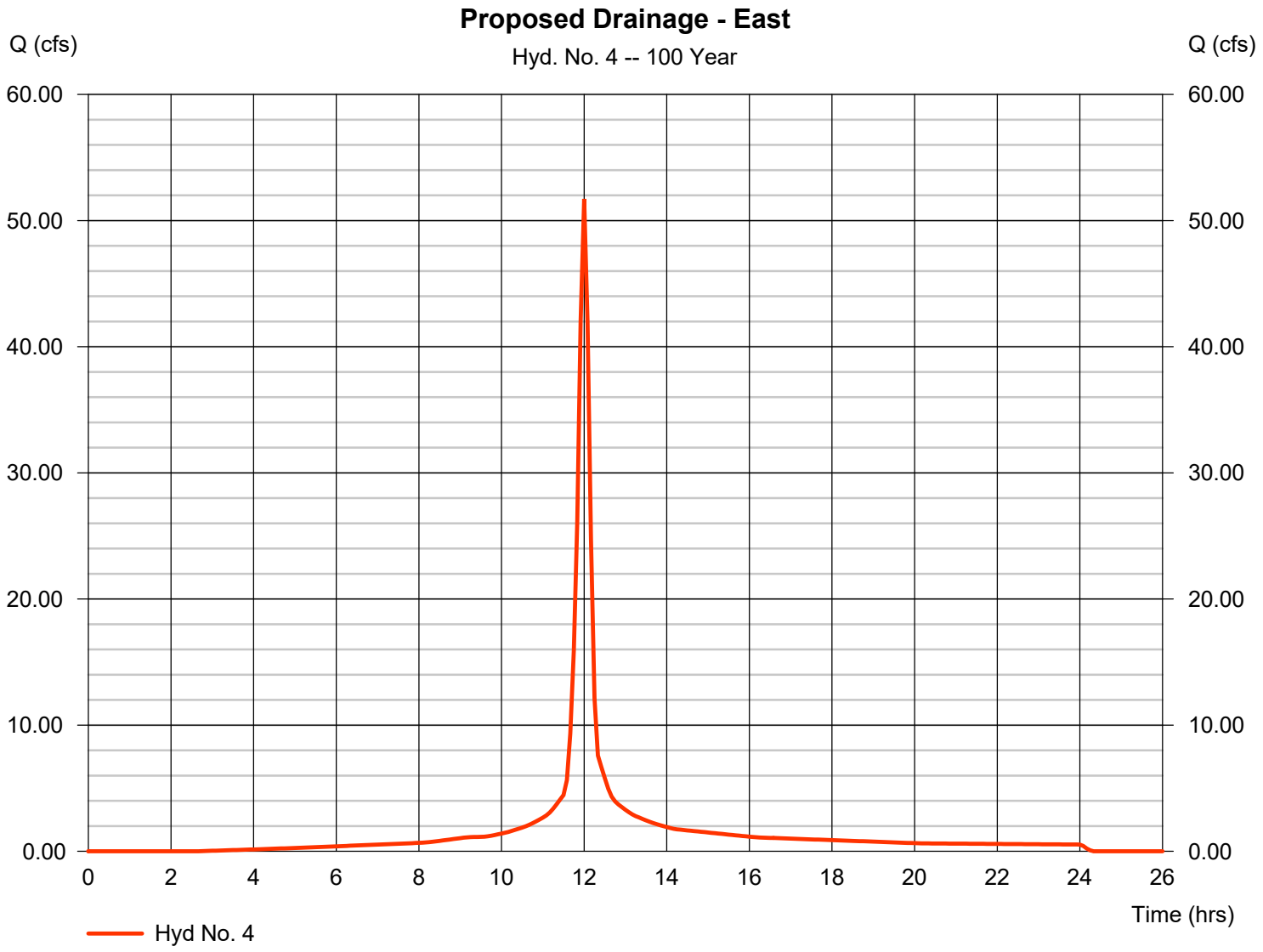
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 4

Proposed Drainage - East

Hydrograph type	=	SCS Runoff	Peak discharge	=	51.72 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	5 min	Hyd. volume	=	149,682 cuft
Drainage area	=	6.510 ac	Curve number	=	90*
Basin Slope	=	10.0 %	Hydraulic length	=	750 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.95 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

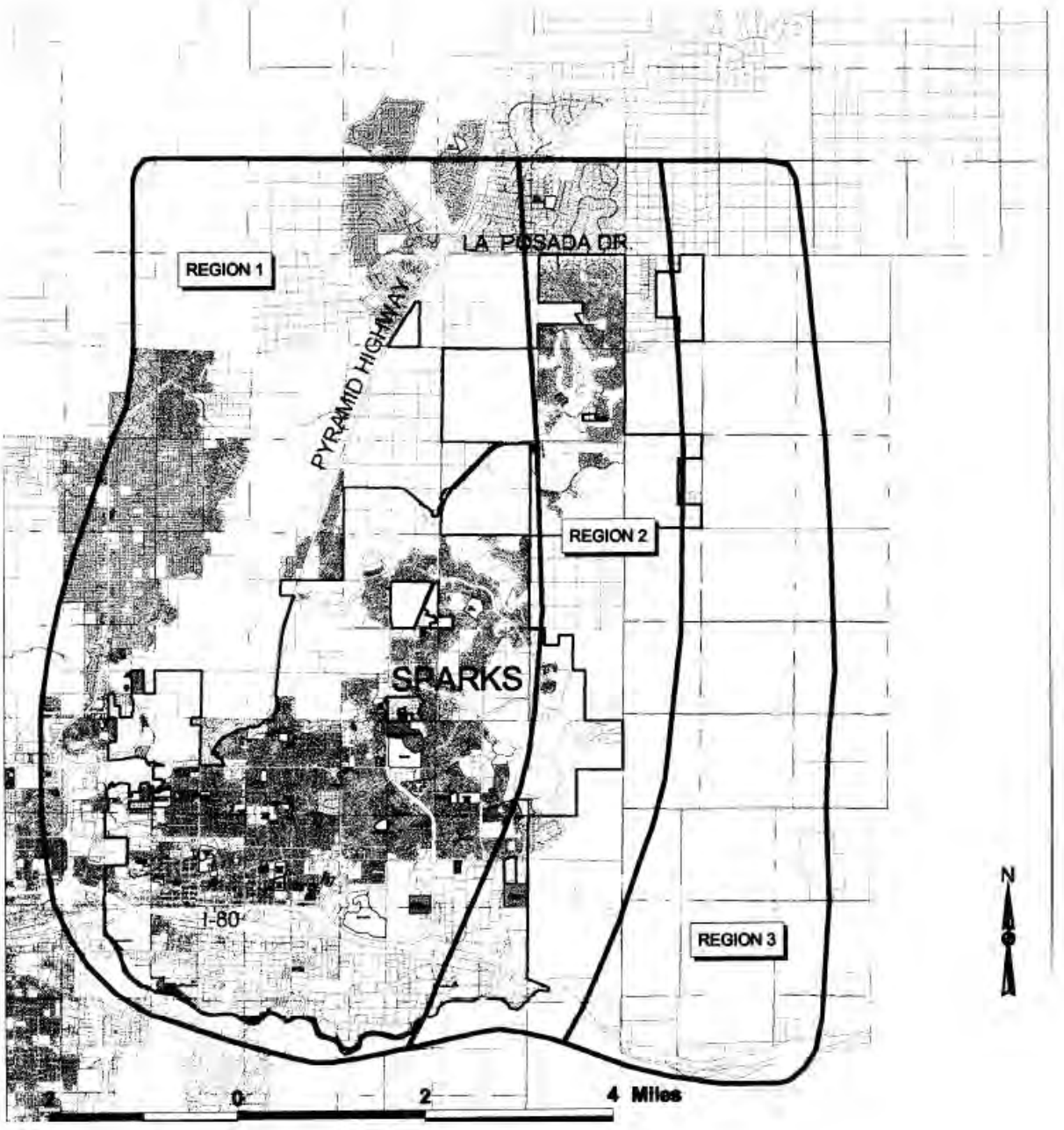
* Composite (Area/CN) = [(2.880 x 80) + (3.630 x 98)] / 6.510



Project Data Input Values

1. **Drainage Regions Map**
2. **Region 1 – Depth – Duration - Frequency**
3. **Rational Coefficients Table**
4. **Curve Numbers Table**
5. **Soil Map**
6. **Soil Number for Curve Number**
7. **Soil Number Properties**

CITY OF SPARKS - REGION BOUNDARIES



VERSION: April 30, 2009	REFERENCE: NOAA Semi-arid Precipitation Study – Nevada 1997	FIGURE 601
WRC ENGINEERING, INC		

CITY OF SPARKS
RAINFALL DEPTH - DURATION - FREQUENCY DATA
REGION 1

DEPTH (inches)

Return Period (Yr.)	5 min	10 min	15 min	30 min	1 hr	2 hr	3 hr	6 hr	12 hr	24 hr
2 yr	0.11	0.16	0.20	0.27	0.33	0.44	0.52	0.70	0.88	1.06
5 yr	0.15	0.22	0.27	0.37	0.45	0.59	0.69	0.91	1.13	1.36
10 yr	0.19	0.28	0.34	0.47	0.57	0.72	0.83	1.06	1.33	1.59
25 yr	0.25	0.38	0.46	0.63	0.77	0.92	1.03	1.27	1.58	1.90
50 yr	0.32	0.47	0.58	0.79	0.96	1.10	1.21	1.43	1.78	2.13
100 yr	0.39	0.59	0.72	0.98	1.19	1.31	1.40	1.58	1.97	2.35

INTENSITY (in/hr)

Return Period (Yr.)	5 min	10 min	15 min	30 min	1 hr	2 hr	3 hr	6 hr	12 hr	24 hr
2 yr	1.31	0.97	0.79	0.54	0.33	0.22	0.17	0.12	0.07	0.04
5 yr	1.78	1.32	1.08	0.74	0.45	0.29	0.23	0.15	0.09	0.06
10 yr	2.25	1.67	1.36	0.93	0.57	0.36	0.28	0.18	0.11	0.07
25 yr	3.03	2.25	1.84	1.26	0.77	0.46	0.34	0.21	0.13	0.08
50 yr	3.80	2.82	2.30	1.57	0.96	0.55	0.40	0.24	0.15	0.09
100 yr	4.73	3.51	2.87	1.96	1.19	0.66	0.47	0.26	0.16	0.10

VERSION: April 30, 2009	REFERENCE: NOAA Semi-arid Precipitation Study - Nevada, 1997	TABLE 601
WRC ENGINEERING, INC.		

RATIONAL FORMULA METHOD
RUNOFF COEFFICIENTS

Land Use or Surface Characteristics	Aver. % Impervious Area	Runoff Coefficients 5-Year (C_5)	Runoff Coefficients 100-Year (C_{100})
Business/Commercial:			
Downtown Areas	85	.82	.85
Neighborhood Areas	70	.65	.80
Residential:			
(Average Lot Size)			
⅛ Acre or Less (Multi-Unit)	65	.60	.78
¼ Acre	38	.50	.65
⅛ Acre	30	.45	.60
½ Acre	25	.40	.55
1 Acre	20	.35	.50
Industrial:	72	.68	.82
Open Space:			
(Lawns, Parks, Golf Courses)	5	.05	.30
Undeveloped Areas:			
Range	0	.20	.50
Forest	0	.05	.30
Streets/Roads:			
Paved	100	.88	.93
Gravel	20	.25	.50
Drives/Walks:	95	.87	.90
Roof:	90	.85	.87

Notes:

1. Composite runoff coefficients shown for Residential, Industrial, and Business/Commercial Areas assume irrigated grass landscaping for all pervious areas. For development with landscaping other than irrigated grass, the designer must develop project specific composite runoff coefficients from the surface characteristics presented in this table.

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Soil Map – From USGS

Exhibit A: Hydrologic Soil Groups for the United States

HOLCOMB ..... D
HOLDEN ..... B
HOLDERMAN C
HOLDERTON ..... B
HOLDINGFORD C
HOLINROCK C
HOLKAT ..... B
HOLLACE ..... D
HOLLANDLAKE ..... B
HOLLISTER ..... D
HOLLOMEX ..... B
HOLLOW C
HOLLOWTREE C
HOLLY ..... B/D
HOLLYBROOK C
HOLLYWOOD ..... D
HOLMAN ..... A
HOLMDEL C
HOLMQUIST ..... D
HOLMZIE C
HOLOHAN ..... B
HOLOMUA ..... B
HOLSINE ..... B
HOLSTEIN ..... B
HOLSTON ..... B
HOLT ..... B
HOLTER ..... B
HOLTVILLE ..... D
HOMA C
HOMELAKE ..... B
HOMELAND C
HOMEN ..... B
HOMESTEAD ..... B
HOMEWOOD C
HOMME, Moderately Wet ..... B
HOMME C
HOMOSASSA ..... D
HONAUNAU C
HONDEE ..... B
HONEYCREEK ..... B
HONEYDEW C
HONEYVILLE C
HONGA ..... D
HONLAK C
HONOBIA C
HONOKAA ..... A
HONOLUA ..... B
HONOMANU ..... A
HONONEGAH ..... A
HONOULIULI ..... D
HONTAS ..... B
HONTOON ..... B/D
HONUAULU ..... A
HOOD ..... B
HOOD CANAL C
HOODVIEW ..... B
HOOGDAL C
HOOKSAN ..... A
HOOKTON C
HOOLEHUA ..... B
HOOLY C
HOOP ..... B
HOOPAL ..... D
HOOPPOLE ..... B/D
HOOSAN ..... B
HOOSEGOW ..... B
HOOSIERVILLE C
HOOSKANADEN ..... D
HOOTEN ..... D
HOOTENTOWN ..... B
HOOTER C
HOOVERS ..... D
HOOVERTON C
HOPBURN ..... B
HOPCO C
HOPDRAW ..... A
HOPKINS ..... B
HOPLAND ..... B
HOPLEY ..... B
HOPPERS C
HOPPS ..... D
HOPPSWELL ..... B
HOQUIAM ..... B
HORCADO ..... A
HOREB, Gravelly Substratum ..... B
HOREB C
HORNBECK ..... D
HORNELL ..... D
HORNELLSVILLE ..... D
HORNER ..... A
HORNER, Graavelly Substratum . B
HORNEYBUCK C
HORNICK C
HORNING ..... A
HORNITOS ..... D
HORNSBORO ..... D
HORNSBY C
HORNSVILLE C
HORROCKS C
HORSECAMP ..... D
HORSEHEAD ..... A
HORSEPRAIRIE ..... B
HORSLEY ..... D
HORTONVILLE, Limestone Substratum ..... B
HORTONVILLE C
HOSFORD ..... D
HOSKAY C
HOSLEY ..... D
HOSMER C
HOSPAH ..... D
HOSSICK ..... B
HOSTA, Loamy Surface C
HOSTA ..... D
HOSTAGE ..... B
HOT LAKE C
HOTAW ..... B
HOTCREEK ..... D
HOTEL C
HOTSPOT ..... D
HOTSPRINGS ..... B
HOTTIS ..... D
HOUCKTOWN ..... B
HOUGHTON ..... D
HOUK C
HOULA ..... B
HOULKA ..... D
HOURGLASS C
HOUSEROCK ..... D
HOUSTENADER ..... D
HOUSTON ..... D
HOUSTON BLACK ..... D
HOVDE ..... D
HOVEN ..... D
HOVERT ..... D
HOWARD ..... A
HOWARDSVILLE ..... A
HOWCREE C
HOWE C
HOWELL C
HOWMEADOWS ..... D
HOWSON C
HOXIE ..... D
HOYLETON C
HOYLETON, Mines Sinks ..... D
HOZHO ..... D
HOZOMEEN ..... D
HUACHUCA ..... D
HUALAPAI C
HUB ..... B
HUBBELL ..... B
HUBERLY ..... D
HUBERT ..... B
HUBLERSBURG ..... B
HUCKLEBERRY, High Rainfall .... B
HUCKLEBERRY C
HUCKRIDGE ..... B
HUDDLE ..... B
HUDNUT ..... B
HUDSPETH C
HUECO C
HUEL ..... A
HUEY ..... D
HUFFLING ..... D
HUFFMAN ..... B
HUFFTON ..... B
HUFMAN ..... D
HUGGINS C
HUGHES ..... B
HUGHESVILLE C
HUGUSTON ..... D
HUICHICA ..... C/D
HUILEPASS ..... B
HULDA ..... D
HULDERMAN ..... D
HULETT ..... B
HULLIGAN ..... B/D
HULLS C
HULLSGULCH ..... B
HULLT ..... B
HULUA ..... D
HUMACAO ..... B
HUMATAS C
HUMBARGER ..... B
HUMBARSPRINGS ..... B
HUMBUG ..... B
HUME C
HUMMINGTON C
HUMSKEL C
HUNCHBACK ..... D
HUNDRAW ..... D
HUNGRY C
HUNGRYGULCH ..... B
HUNSINGER ..... B
HUNTDALE ..... B
HUNTERS ..... B
HUNTERSCOVE C
HUNTIMER C
HUNTLEY ..... D
HUNTMOUNT ..... B
HUNTROCK ..... B
HUNTSBURG ..... D
HUOT ..... B
HURDS ..... B
HURLBUT C
HURLOCK ..... B/D
HURRYBACK ..... B
HUSE ..... D
HUSKA ..... D
HUSSA ..... B/C
HUSSELL ..... B
HUSSEY ..... B
HUSTONTOWN C
HUSUM ..... B
HUTCHINSON C
HUTSON ..... B
HUTT ..... D
HUXLEY C
HUYSINK ..... B
HYALL C
HYANNIS ..... B
HYAS ..... B
HYATTS C
HYATTSTOWN ..... D
HYATTVILLE C
HYDABURG ..... D
HYDE ..... B/D
HYDELAND ..... B/D
HYDRO C
HYE ..... B
HYLOC ..... D
HYNES ..... B
HYPRAIRIE C
HYSHAM ..... D
HYSHOT ..... D
HYZEN ..... D
IAO ..... B
IARGO C
IBERIA ..... D
IBEX ..... B
IBOLA C
ICACOS ..... D
ICARIA ..... D
ICEBERG ..... D
ICESLEW, Cool C
ICESLEW ..... D
ICHBOD ..... D
ICHETUCKNEE ..... D
IDABEL ..... B
IDAHOME ..... B
IDAMONT ..... B
IDEE C
IDLEWILD ..... C/D
IDMON ..... B
IDMONTON C
IDWAY ..... B
IFFGULCH ..... D
IFTEEN ..... B
IGERT C
IGNORD C
IGUALDAD ..... D
IHLEN ..... B
IJAM ..... D
IKE ..... D
IKIT ..... D
IKSGIZA ..... D
ILACHETOMEL ..... D
ILDECARB ..... B
ILIILI ..... D
ILLABOT C
ILLAHEE ..... B
ILLER ..... B
ILLIANO ..... D
ILLITO ..... D
ILTON C
ILWACO ..... B
IMBLER ..... B
IMLAY ..... D
IMMANUEL C
IMMIANT C
IMMOKALEE ..... D
IMNAHA C
INCELL ..... D
INCHELIUM ..... B
INCY ..... A
INDART C
INDEX ..... A
INDIAHOMA ..... D
INDIANOLA ..... A
INDIANPASS ..... B
INDIANTOWN ..... D
INDLETON ..... B
INEL ..... D
INEZ ..... D
INFERNO C
INGALLS ..... B
INGENIO ..... B
INGERSOLL ..... B
INGLEDOVE ..... B
INGLESIDE ..... B
INKOM ..... C/D
INKOSR ..... D
INLOW C
INMACHUK ..... D
INPENDENCE ..... B
INSAK ..... D
INSIDERT ..... D
INSKIP C
INVERNESS ..... B
INVERSHIEL C
IO ..... B
IOGOON ..... B
IOLEAU C
ION ..... B
IONA ..... B
IONIA ..... B
IOTA ..... D
IOTLA ..... B
IPANO C
IPAVA ..... B
IPISH C
IPSOOT ..... A
IRAAN ..... B
IRAK ..... D
IRASBURG C
IRENE ..... B
IRIS ..... B
IRMA ..... B
IROCK C
IRON BLOSSOM C
IRONA ..... D
IRONBRIDGE ..... D
IRONCITY ..... B
IRONDALE C
IRONDYKE ..... B
IRONGATE ..... B
IRONGOLD ..... D
IRONRUN ..... B
IRONSPRINGS ..... B
IROQUOIS ..... B/D

Exhibit A: Hydrologic Soil Groups for the United States

FATTIG C
FAUNCE ..... A
FAUNSDALE ..... D
FAVORETTA ..... D
FAVRET C
FAWCETT ..... B
FAWIN ..... B
FAWNSPRING C
FAYETTEVILLE ..... B
FE ..... D
FEAGINRANCH ..... D
FEARS ..... B
FEATHER ..... B
FEATHERSTONE ..... D
FEDJI ..... A
FEDORA ..... B/D
FELDA ..... D
FELDHAUSER ..... B
FELDTMAN ..... A
FELICIANA ..... B
FELICITY ..... A
FELIPE ..... D
FELIX ..... D
FELKER C
FELLA ..... B/D
FELOR ..... B
FELT ..... B
FELTA C
FELTNER ..... D
FENELON C
FEPS ..... D
FERA C
FERBALL C
FERD C
FERDELFORD C
FEREBEE ..... D
FERGIE C
FERGUS ..... B
FERGUSON ..... B
FERN ..... B
FERN CLIFF ..... B
FERNCREEK ..... D
FERNDALE ..... B
FERNHAVEN ..... B
FERNOW ..... B
FERNPOINT ..... B
FERNWOOD ..... B
FERRELO ..... B
FERROBURRO ..... D
FERTEG C
FESSLER ..... B
FESTINA ..... B
FETCH ..... D
FETERITA ..... D
FETT ..... D
FETZER C
FEZ C
FEZIP ..... D
FIANDER ..... C/D
FIAT C
FIBRE ..... B/D
FICO ..... B
FIDALGO C
FIDDLETOWN ..... B
FIDDYMENT ..... D
FIDISIX ..... B
FIELDCREEK ..... B
FIELDING ..... B
FIELDON ..... B/D
FIFESRIDGE ..... B
FIFIELD C
FIG ..... B
FIGARO C
FIKEL C
FILBERT ..... D
FILION ..... D
FILIRAN ..... D
FINAL ..... D
FINCHFORD ..... A
FINDOUT ..... D
FINLAND C
FINN ..... D
FINNEY ..... B
FINOL C
FINROD C

FIRCREEK C
FIREBALL ..... B
FIREBAUGH C
FIRESTEEL ..... B
FIRESTONE C
FIRETOWER ..... B
FIRMAGE C
FIROKE ..... B
FIRTH ..... B/C
FISHAVEN C
FISHBERRY ..... D
FISHERHILL ..... B
FISHERMAN ..... D
FISHHOOK ..... D
FISHLAKE ..... D
FISHPOT C
FISHROCK ..... D
FISHWAY ..... B
FISK ..... B
FITZHUGH ..... B
FITZWIL ..... B
FIVEBLOCK C
FIVEMILE ..... B
FIVEMILE, Saline C
FIVES ..... B
FIVESPRINGS C
FLACKVILLE C
FLAGG ..... B
FLAGSTAFF ..... D
FLAMBEAU ..... B
FLAMEN C
FLAMING ..... A
FLANAGAN ..... B
FLANDREAU ..... B
FLANE C
FLANK ..... D
FLANLY ..... B
FLANNERY ..... B
FLARM C
FLAT HORN ..... B
FLATCREEK ..... D
FLATHEAD ..... B
FLATIRONS C
FLATONIA ..... D
FLATSTONE C
FLATTOP ..... D
FLATWOODS C
FLAXTON ..... B
FLEAK C
FLEAK, cool ..... D
FLEENER ..... B
FLEER ..... D
FLEISCHMANN ..... D
FLEMING C
FLEMINGTON ..... D
FLETCHER ..... B
FLEWSIE ..... B
FLINK ..... B
FLINTCREEK ..... D
FLO ..... A
FLOER ..... D
FLOKE C
FLOMATON ..... A
FLOMOT ..... B
FLOODWOOD ..... B
FLORAHOME ..... A
FLORALA C
FLORAS C
FLORAVILLE ..... D
FLORENCE C
FLORESVILLE C
FLORIDANA ..... B/D
FLORIN C
FLORIS ..... B
FLOTAG ..... B
FLOTT ..... B
FLOUTIER ..... B
FLOYD ..... B
FLUE C
FLUE, Gravelly ..... D
FLUETSCH ..... B
FLUKER C
FLUMECREEK ..... B
FLUMEVILLE ..... D
FLUVAQUENTS ..... D

FLYCREEK C
FLYNN ..... B
FLYVALLEY C
FOAD C
FOARD ..... D
FOGGYFLAT ..... B
FOGLAKE C
FOLAVAR, Elevation 6000-7400 .. A
FOLAVAR ..... B
FOLDAHL ..... B
FOLEY ..... D
FOLLET ..... D
FOMSENG C
FONDA ..... D
FONDILLAS ..... D
FONNER ..... B
FONS ..... B
FONTAFLORA ..... A
FONTAINE ..... B
FONTANA ..... B
FOOLHEN, Stony, Cool ..... B
FOOLHEN ..... D
FOOTHILL C
FOPIANO ..... D
FORAKER ..... D
FORBAR ..... D
FORBES C
FORBESVILLE C
FORBING ..... D
FORDBUTTE ..... B
FORDCREEK ..... B
FORDICE ..... B
FORDNEY ..... A/C
FORDSTERROR C
FORDTOWN ..... B
FORDTRAN C
FORELAND ..... D
FORELEFT ..... B
FORESTBURG ..... A
FORESTCITY ..... B/D
FORESTDALE ..... D
FORESTER C
FORESTON C
FORK C
FORKHORN ..... B
FORLORN ..... B
FORMADER C
FORMDALE ..... B
FORNOR ..... B
FORSEER C
FORSGREN ..... B
FORSGREN C
FORT MEADE ..... A
FORT MOTT ..... A
FORT ROCK ..... A
FORTBENTON C
FORTBOIS ..... A
FORTESCUE ..... C/D
FORTRAN ..... B
FORTSAGE ..... B
FORTUNA ..... D
FORTYONE ..... B
FOSS ..... B
FOSSILON ..... D
FOSTERBURG ..... D
FOSTORIA ..... B
FOUNTAIN ..... D
FOUNTAINVILLE C
FOUR STAR ..... B/C
FOURCHE ..... B
FOURCORNERS ..... D
FOURLOG ..... D
FOURME ..... B
FOURSIXES C
FOURWHEEL ..... D
FOXCAN ..... D
FOXCREEK ..... C/D
FOXHOME ..... B
FOXLAKE C
FOXMOUNT C
FOXVILLE ..... D
FOXVIRE ..... B
FOXWORTH ..... A
FRADDLE ..... B
FRAGUNI ..... B

FRAILEY ..... B
FRAILTON ..... D
FRANCIS ..... A
FRANCISQUITO C
FRANCITAS ..... D
FRANCONIA ..... B
FRANEAU ..... D
FRANKCREEK ..... B
FRANKENMUTH C
FRANKENSTEIN C
FRANKFORT C
FRANKIRK C
FRANKLIN ..... B
FRANKTOWN ..... D
FRAVAL, Gravelly ..... B
FRAVAL C
FRAZERTON ..... B
FRED C
FREDA ..... D
FREDENSBORG C
FREDERICKTOWN ..... B
FREDONYER C
FREDRIKSDAL ..... D
FREE ..... B/D
FREEBURG C
FREECE ..... D
FREEHOLD ..... B
FREELAND C
FREELS ..... B
FREEMAN C
FREEMANVILLE ..... B
FREEON ..... B
FREER C
FREESOIL ..... B
FREEST C
FREESTONE C
FREETPEAK ..... B
FREEWATER ..... B
FREEZENER ..... B
FREEZEOUT ..... B
FRELSBURG ..... D
FREMKLE C
FRENCH C
FRENCHJOHN C
FRENCHMAN ..... B
FRENCHMILL ..... B
FRENCHOLLOW, Moist C
FRENCHOLLOW ..... D
FRESHWATER ..... D
FRESNO, Thick Solum C
FRESNO, Saline Alkali ..... D
FREWA ..... B
FREWSBURG C
FREYA ..... A/D
FRIANA ..... D
FRIBERG ..... B/D
FRICABA ..... B
FRIEDLANDER C
FRIENDLY ..... D
FRIENDS C
FRIES ..... D
FRINDLE C
FRINES C
FRINT C
FRIO ..... B
FRIONA C
FRIOTON C
FRIPP ..... A
FRISITE ..... B
FRITSLAND ..... B
FRIZZELL C
FRODO ..... D
FROHMAN C
FROLIC ..... B
FRONDORF ..... B
FRONTENAC ..... B
FRONTIER C
FRONTON ..... D
FROZARD C
FRUITA ..... B
FRUITFIELD ..... A
FRUITLAND ..... B/C
FRUITVALE C
FRYINGPAN ..... D
FRYMIRE C

Washoe County, Nevada, South Part

600—Idlewild clay loam, drained

Map Unit Setting

National map unit symbol: hxl0
Elevation: 4,300 to 4,600 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 100 to 110 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Idlewild, drained, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Idlewild, Drained

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 13 inches: clay loam
H2 - 13 to 36 inches: clay
H3 - 36 to 62 inches: stratified sandy clay loam to silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C
Ecological site: MOIST FLOODPLAIN (R026XY001NV)
Other vegetative classification: MOIST FLOODPLAIN (026XY001NV_2)
Hydric soil rating: No

Minor Components

Orr

Percent of map unit: 5 percent
Landform: Fan remnants
Down-slope shape: Linear

Across-slope shape: Convex
Ecological site: LOAMY 10-12 P.Z. (R026XY010NV)
Hydric soil rating: No

Truckee

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: MOIST FLOODPLAIN (R026XY001NV)
Other vegetative classification: MOIST FLOODPLAIN (026XY001NV_2)
Hydric soil rating: No

Fleischmann

Percent of map unit: 5 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: CLAYPAN 8-10 P.Z. (R026XY025NV)
Hydric soil rating: No

631—Fleischmann gravelly clay loam, 4 to 8 percent slopes

Map Unit Setting

National map unit symbol: hxlf
Elevation: 4,300 to 5,200 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 100 to 110 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Fleischmann and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fleischmann

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 4 inches: gravelly clay loam
H2 - 4 to 20 inches: clay
H3 - 20 to 43 inches: cemented material
H4 - 43 to 60 inches: variable

Properties and qualities

Slope: 4 to 8 percent
Depth to restrictive feature: 20 to 30 inches to duripan
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: CLAYPAN 8-10 P.Z. (R026XY025NV)
Hydric soil rating: No

Minor Components

Orr

Percent of map unit: 5 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: LOAMY 10-12 P.Z. (R026XY010NV)
Hydric soil rating: No

Idlewild

Percent of map unit: 5 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: MOIST FLOODPLAIN (R026XY001NV)
Other vegetative classification: MOIST FLOODPLAIN (026XY001NV_2)
Hydric soil rating: No

Reno

Percent of map unit: 5 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: CLAYPAN 10-12 P.Z. (R026XY023NV)
Hydric soil rating: No