STORM WATER MANAGEMENT REPORT

Home Acres Estates

Proposed 15-Lot Residential Subdivision

Map 26/ Block 87/ Lot 6
Flanders Road
East Hampton, Connecticut

Applicant/ Owner:
Flanders Road Estates, LLC
244 Middletown Avenue
East Hampton, CT 06424

Prepared By:
Robert V. Baltramaitis, P.E.
27 Tammy Hill Road
Wallingford, CT 06492
(203) 915-8301
baltro@aol.com

August 2023

The Applicant, Home Acres Estates, LLC proposes to develop its property along Flanders Road in East Hampton. The parcel is known as M26B87L6 and is 52.9 acres in size. The parcel is located along the south side of Flanders Road east of Smith Street and just west of Bear Swamp Road (southern portion). The site location is depicted in attached Figure 1.

The parcel is currently zoned R-4 residential. The applicant proposes to subdivide the parcel into fifteen (15) conforming residential building lots. Three (3) of the lots will have access from the end of Pecausett Trail at the east side of the parcel. The remining twelve (12) lots will have access from a new 1,400-foot long paved roadway from Flanders Road; proposed to be privately owned. The private road will be 22-feet in width and be constructed with enough drainage amenities to collect and contain anticipated storm water runoff flows. Utilities serving the proposed lots will be installed below ground.

STORM WATER ANALYSIS

Hydraflow Hydrographs® (HH) software was used to generate computer models of the pre- and post-development scenarios. HH utilizes the methodologies set forth in the Technical Release No. 55 (TR-55) and Technical Release No. 20 (TR-20) computer model, originally developed by the Soil Conservation Service (SCS) now called the Natural Resources Conservation Service (NRCS). The HH software predicts runoff rates based upon several factors including land use, hydrologic soil type, vegetative cover, watershed area, time of concentration rainfall data and the attenuation effects due to ponds and structures.

While the parcel is 52.9 acres in size, it is part of a slightly larger watershed that extends easterly and includes a small portion of the Pecausett Drive subdivision. The watershed studied as part of this report, includes this area and totals 59.8 acres in size.

Presently, under *pre-development conditions*, almost the entire site is wooded with exception of approximately 2 acres that is cleared adjacent to the entrance at Flanders Road. The site presently drains primarily from east to west towards a large off-site wetland system adjacent to the linear trail. Based on existing topography, the site has two main drainage divides. Drainage Divide #1 consists of 25.9 acres and drains westerly and northwesterly through an on-site wetland system (wetland flags 14A through 49A) until it leaves the site.

The second Drainage Divide #2 consists of 33.9 acres and drains westerly. Based on the site topography, for analysis purposes, this drainage divide is further broken into smaller sub-watersheds. Existing sub-watershed area 'ex-da-2a' drains westerly through a second on-site wetland system (wetland flags 1 through 32) until it leaves the site. Other drainage areas 'ex-da-2b' through 'ex-da-2e' all drain westerly to wetlands off-site adjacent to the linear trail.

After leaving the site, storm water from Drainage Divide #1 flows northerly and storm water from Drainage Divide #2 flows southerly. While heading in opposite directions, these drainage divides BOTH eventually flow to the Salmon River. Storm water from Drainage Divide #1 flows northerly through the Bear Swamp area via Cattle Lot Brook, to Dickinson Creek in

Marlborough, and ultimately to the Salmon River. Storm water from Drainage Divide #2 flows more directly to the Salmon River via Flat Brook to the south. The Salmon River of course drains to the Connecticut River in Moodus.

The Inland Wetlands and Watercourses Investigation report prepared by James Sipperly, Certified Soil Scientist, is attached as Appendix Sheets A-1 and A-2.

The drainage divides are depicted graphically in Figure 2, an excerpt from the USGS Quad topographic map.

Under *post-development conditions*, most of the existing sub-watershed areas will be altered. In Drainage Divide #1, proposed drainage area 'PR-DA-1A' is the very northmost part of the site and drains towards Flanders Road. While this sub-watershed will contain a very small portion of the proposed paved roadway, the overall area is drastically reduced to 1.1 acres. The remaining 25.8 acres of Drainage Divide #1 is labeled 'PR-DA-1B' will continue to flow towards the onsite wetlands before leaving the site at the northwest corner. This drainage area will see the largest change in land use cover as it includes approximately 1,300 feet of the proposed paved roadway and includes the developed lots #1 through #6, #11, #14, #15 and part of #12. This sub-watershed is further broken down into the portion that is routed through the proposed detention basin (PR-DA-1B-1) and the smaller portion (PR-DA-1B-2) that is left to flow unimpeded towards the on-site wetlands.

In proposed Drainage Divide #2, PR-DA-2A will see the largest change in land use cover as it includes the last 150 feet of paved roadway, and the developed lots of #7, #9, #13 and part of #12. This sub-watershed is further broken down into the portion that is routed through the proposed detention basin (PR-DA-2A-1) and the smaller portion (PR-DA-2A-2) that is left to flow unimpeded towards the on-site wetlands before leaving the site. The proposed sub-watershed labeled PR-DA-2C contains the oversized rear lot #8 which consists of 11.5 acres. As demonstrated by the calculations, this lot does not necessitate its own storm water attenuation as it is made up for by the effectiveness of Detention Basin #2.

Proposed sub-watersheds 'PR-DA-2C', 'PR-DA-2D' and 'PR-DA-2E 'remain essentially unaltered under post-development conditions.

Based on existing land coverage in the sub-watersheds and the underlying soils, as identified in the official soil survey information on the Web Soil website published by the NRCS, runoff curve numbers (CN) were developed for each sub-watershed area for existing and post-development conditions. Soil Survey data is attached as Appendix Sheets B-1 through B-7. The following runoff coefficients were used based on the hydrologic classification of area soils which include hydrologic class B, C, D and some E soils:

Land Cover	CN
Roofs	98
Pavements	98
Gravel Areas	89
Grass (B)	61
Grass (C)	74
Grass (D/E)	80
Woods (B)	60
Woods (C)	73
Woods (D/E)	79
Residential-2 acres	66
Open Land (B)	67
Open Land (D)	79

The sub-watersheds for pre- and post-development scenarios are depicted on maps WS-1 'Existing Watershed Map' and WS-2 'Proposed Watershed Map' contained at the back of this report. These drainage area maps include existing and proposed topography, depict site coverage features such as pavements and buildings, and also depict the underlying soil types.

The times-of-concentration (Tc) for each sub-watershed were determined for both the pre- and post-development conditions using the SCS Lag Method given parameters of the watershed affecting overland sheet flow, shallow concentrated flow, and channel or pipe flow, where applicable. Storm water hydrographs were developed using SCS TR-55 methodology to ascertain flow rates and volumes, utilizing NOAA 14 published rainfall values for this area within East Hampton. The associated 24-hour rainfall totals utilized are 3.38", 5.18", 6.30", 7.13" and 8.04" for the 2-, 10-, 25-, 50- and 100-year storms, respectively. Rainfall data is attached as Appendix Sheets C-1 and C-2.

Not surprisingly, the developed site is anticipated to increase the peak runoff flow rates from the site. To mitigate this impact, two storm water detention ponds are proposed, one in each drainage divide. Each detention basin will be outfitted with an outlet control structure to meter the discharge flow rates. Each detention basin will provide adequate holding volume for storm water to be retained as it is metered out. The following tables summarize the detention basin stage/ storage relationship:

Detention Basin 1				Detention Basin 2		
Stage	Elevation (ft)	Total Storage (cu ft)		Stage	Elevation (ft)	Total Storage (cu ft)
0	436.5	0		0	420.0	0
0.5	437.0	7,317		1.0	421.0	6,774
2.5	438.0	23,736		2.0	422.0	16,453
2.5	439.0	42,615		3.0	423.0	28,504
3.5	440.0	64,038		4.0	424.0	42,365
4.5	441.0	88,182		5.0	425.0	58,106
5.5	442.0	115,219		6.0	426.0	75,802

The following table summarizes the overall site runoff at the two analysis points for pre-, post-developed, and post-developed with storm water mitigation (detention basins) for the design storms:

Storm	Pre-Developed		Post-Developed (no Detention)		Post-Developed (w/ Detention)	
	Drainage Divide 1	Drainage Divide 2	Drainage Divide 1	Drainage Divide 2	Drainage Divide 1	Drainage Divide 2
2-year	13.7 cfs	27.1 cfs	18.6 cfs	30.0 cfs	11.5 cfs	25.2 cfs
10-year	30.8 cfs	56.7 cfs	39.7 cfs	60.8 cfs	28.2 cfs	50.5 cfs
25-year	42.4 cfs	76.2 cfs	53.8 cfs	81.0 cfs	36.9 cfs	66.8 cfs
50-year	51.2 cfs	90.9 cfs	64.4 cfs	96.1 cfs	42.8 cfs	79.1 cfs
100-year	61.1 cfs	107.1 cfs	76.2 cfs	112.8 cfs	48.5 cfs	93.2 cfs

As summarized above and in the calculations contained in the Appendix, with provision of the proposed storm water detention basins, the post-development peak runoff flows will be effectively reduced to BELOW pre-development levels in both Drainage Divides for all storm events.

Considering the 100-year storm, pre-development flows from Drainage Divide #1 will be reduced from 61.1 cfs to 48.5 cfs considering the effectiveness of Detention Basin #1.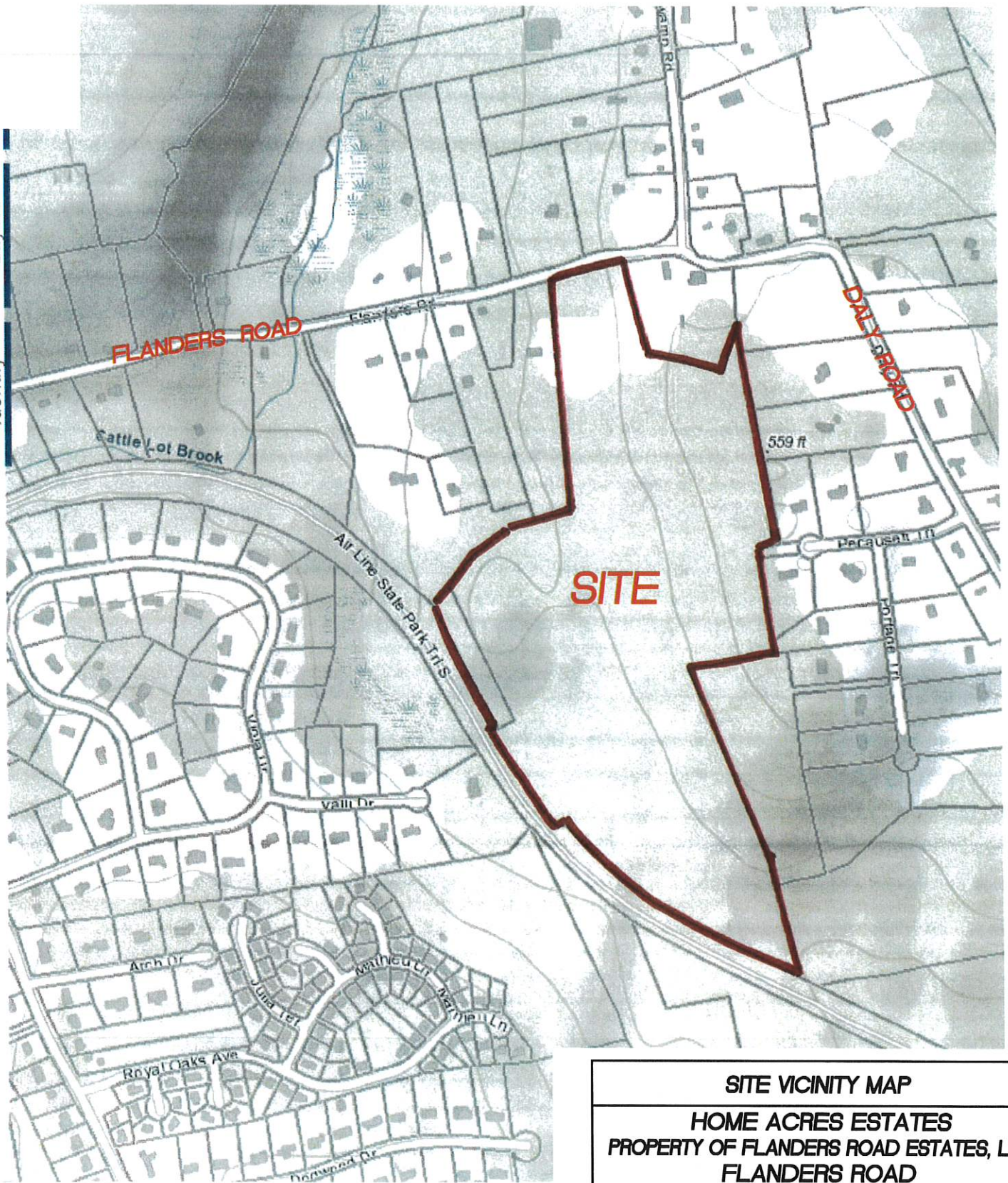 Similarly, pre-development flows from Drainage Divide #2 will be reduced from 107.1 cfs to 93.2 cfs considering the effectiveness of Detention Basin #2.

Drainage calculations are attached in the Appendix as sheets D-1 through D-50 and existing and proposed drainage area maps are attached as Maps WS-1 and WS-2.

APPENDIX

FLANDERS ROAD

DALY ROAD

Cattle Lot Brook

Air Line State Park Trl S

559 ft

Pegausall Ln

Portage Trl

SITE

Vista Trl

Vault Dr

Arch Dr

Mathieu Ln

Juna Ter

Mathieu Ln

Royal Oaks Ave

Dogwood Dr

SITE VICINITY MAP
HOME ACRES ESTATES
PROPERTY OF FLANDERS ROAD ESTATES, LLC
FLANDERS ROAD
EAST HAMPTON, CONNECTICUT
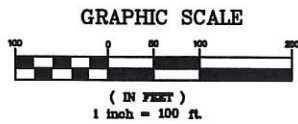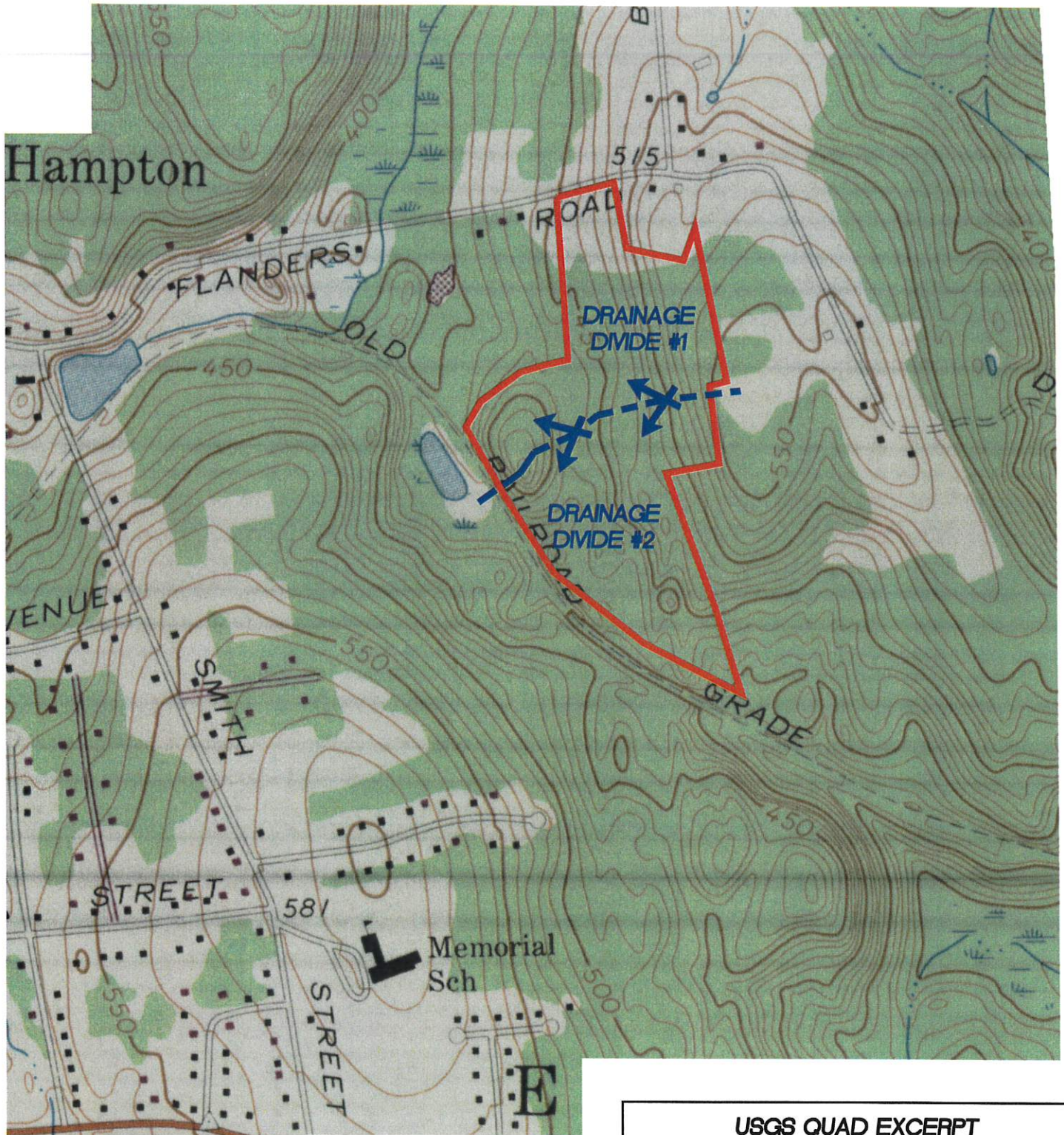
Robert V. Baltramaitis, P.E.
27 Tammy Hill Road
Wallingford, Connecticut 06492
(203) 915-8301

DATE:	SCALE:	FIGURE:
8/21/2023	NTS	1

Hampton

FLANDERS

ROAD

515

OLD

450

DRAINAGE DIVIDE #1

DRAINAGE DIVIDE #2

RAILROAD

GRADE

550

450

AVENUE

SMITH

500

STREET

581

STREET

550

Memorial Sch

550

E

JAMES SIPPERLY
CERTIFIED SOIL SCIENTIST
CONNECTICUT WETLAND SCIENTIST
401 SALEM TURNPIKE
BOZRAH, CT 06334
860-334-7073
james.sipperly.js@gmail.com

Joshua Wilson, Chairman   July 22, 2023
Inland Wetlands and Watercourses Commission
Town of East Hampton, CT
East Hampton Town Hall
1 Community Drive
East Hampton, CT 06424

RE: INLAND WETLANDS AND WATERCOURSES INVESTIGATION
    AND DELINEATION- FLANDERS ROAD ESTATES LLC, MAP 26
    BLOCK 87 LOT 6

Dear Chairman Wilson:

On October 22, 2023 I conducted a field site visitation to the property referenced above
to delineate any inland wetland soils and/or watercourses that may exist on the site.

I sampled the soils throughout the site using a soil auger to a depth of 2-3 feet.
Based on my field observations and using the guidelines established by the National
Cooperative Soil Survey and as defined by the Connecticut General Statutes, I delineated
the inland wetland soils and watercourses on the site.

I delineated the inland wetland soils using blue flagging numbered 1-32, 1A-53A, 1B-9B
respectively.

The inland wetland soils delineated by flags 1-32 are classified as a very poorly drained
Saco silt loam. These soils are formed in alluvial stratified sand and silt loams. These
soils are on low flood plains along streams and rivers and are frequently flooded. This
area is adjacent to the existing airline trail and has had some grading and deposition from
the work along the trail for drainage improvements.

For the inland wetland flag series 1A-53A, only flags 14A-49A are shown on the plans
because when I conducted my soil investigation the property lines were not clear and the
adjacent property removed the other flags that were advertently placed on his property.
We spoke in the field to resolve that issue. These wetland soils are classified as a
Ridgebury, Leicester Whitman extremely stony fine sandy loam. These soils are mapped
together as a complex because of their similar physical characteristics, use ad
management. They are found in drainage ways in glacial till uplands.

Inland wetland flags 1B-9B are also classified as a Ridgebury, Leicester Whitman fine sandy loam located in an isolated depression in the glacial till uplands.

The upland soils are classified as a moderately well drained Woodbridge fine sandy loam and transition into a well drained Paxton fine sandy loam and well drained Canton and Charlton fine sandy loam.

All of the wetland areas located on the site are classified as a forested wetland general classification. This wetland area has functions that include: groundwater recharge and discharge, sediment stabilization, nutrient removal and transformation, product export, and wildlife diversity and habitat. The vegetative over-story includes maples, ash, black cherry and poplar. Shrub species include, winterberry, spice bush, silky dogwood. The herbaceous layer includes sensitive fern, poison ivy, wild grape, jack in the pulpit and skunk cabbage.

The wetland area has a diverse native vegetation population at the herbaceous, shrub and tree layers. No evidence of invasive species was observed. I expect that an abundance of wildlife utilizes this wetland corridor as a source of food, water and shelter.

The proposed development in the upland review area will not be disturbing any wetlands and/or watercourses on or adjacent to the site. For that reason, the inland wetlands will continue to perform their functions as they currently do.

With any proposed project a comprehensive erosion and sedimentation control plan well designed and properly installed and maintained is the key to a successful project. Regular inspections should occur, especially after storm events of more than 1.5" of rain.

After reviewing the erosion and sedimentation control plans and the storm water design features, it is my professional opinion that the proposed construction activities will not have a significant adverse effect on the adjacent inland wetlands and/or watercourse on or off the site.

If you have any questions or require additional information, please contact me at the telephone number referenced above.

Very truly yours,

James Sipperly

James Sipperly
Certified Soil Scientist, Society of Soil Scientists
Connecticut Wetland Scientist, Connecticut Association of Wetland Scientists

Soil Map—State of Connecticut

Flat Brook

Viola Dr

Arch Dr

72E · 17 · 3 · 71E · 3 · 72E · 73C · 62D · 85B · 46C · 72C · 72C · 84C · 84B · 45C · 72C · 73C · 46C · 72C · 85B · 72E · 61C · 45B · 46B · 85C · 71E · 46C · 72C · 45C · 84D · 62C · 72C · 46C · 46B · 3 · 62D · 72C · 46C · 61C · 45B · 3 · 3 · 62D · 46C · 71E · 3 · 72E · 36B · W · 86D · 60D · 71E · 46C · 85C · 71E · 60C · 72C · 3 · 45B · 84B · 61B · 3

Map Scale: 1:10,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0   100   200   400   600

Feet
0   450   900   1800   2700

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

USDA Natural Resources
       Conservation Service

Web Soil Survey
National Cooperative Soil Survey

8/2/2023
Page 1 of 4

B-1

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	14.3	3.6%
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	12.5	3.2%
36B	Windsor loamy sand, 3 to 8 percent slopes	7.3	1.9%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	13.3	3.4%
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	6.6	1.7%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	11.5	2.9%
46C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	24.1	6.1%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	2.2	0.6%
60D	Canton and Charlton soils, 15 to 25 percent slopes	4.3	1.1%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	1.0	0.2%
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	4.8	1.2%
62C	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	2.5	0.6%
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	12.0	3.1%
71E	Nipmuck-Brimfield-Rock outcrop complex, 15 to 45 percent slopes	51.2	13.0%
72C	Nipmuck-Brookfield complex, 3 to 15 percent slopes, very rocky	22.5	5.7%
72E	Nipmuck-Brookfield complex, 15 to 45 percent slopes, very rocky	127.4	32.4%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	5.9	1.5%

Handwritten annotations: "Wx" bracketing 45B, 45C, 46B, 46C; "Ca" bracketing 62C, 62D; "Ni" bracketing 71E, 72C, 72E.

B-2

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	17.0	4.3%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	8.9	2.3%
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	3.4	0.9%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	9.7	2.5%
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	14.8	3.8%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	14.6	3.7%
W	Water	1.3	0.3%
Totals for Area of Interest		**393.1**	**100.0%**

Pd

B-3

NOAA Atlas 14, Volume 10, Version 3
Location name: Town of East Hampton, Connecticut, USA*
Latitude: 41.5811°, Longitude: -72.4811°
Elevation: 490 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

	Average recurrence interval (years)
Duration	1	2	5	10	25	50	100	200	500	1000
5-min	0.334 (0.259-0.421)	0.405 (0.314-0.511)	0.521 (0.402-0.659)	0.617 (0.474-0.784)	0.750 (0.558-0.994)	0.850 (0.619-1.15)	0.954 (0.677-1.34)	1.07 (0.720-1.53)	1.24 (0.803-1.83)	1.38 (0.872-2.07)
10-min	0.474 (0.367-0.596)	0.574 (0.445-0.724)	0.738 (0.569-0.933)	0.874 (0.670-1.11)	1.06 (0.790-1.41)	1.20 (0.878-1.63)	1.35 (0.958-1.89)	1.52 (1.02-2.17)	1.76 (1.14-2.59)	1.95 (1.24-2.94)
15-min	0.557 (0.432-0.702)	0.676 (0.523-0.851)	0.870 (0.670-1.10)	1.03 (0.791-1.31)	1.25 (0.930-1.66)	1.42 (1.03-1.92)	1.59 (1.13-2.23)	1.79 (1.20-2.55)	2.07 (1.34-3.05)	2.30 (1.45-3.46)
30-min	0.761 (0.590-0.958)	0.923 (0.714-1.16)	1.19 (0.916-1.50)	1.40 (1.08-1.78)	1.71 (1.27-2.26)	1.93 (1.41-2.61)	2.17 (1.54-3.04)	2.44 (1.64-3.48)	2.82 (1.83-4.16)	3.13 (1.98-4.71)
60-min	0.965 (0.748-1.22)	1.17 (0.905-1.47)	1.50 (1.16-1.90)	1.78 (1.37-2.26)	2.16 (1.61-2.86)	2.45 (1.78-3.31)	2.75 (1.95-3.85)	3.09 (2.08-4.41)	3.57 (2.31-5.27)	3.97 (2.51-5.97)
2-hr	1.27 (0.994-1.59)	1.53 (1.19-1.91)	1.95 (1.52-2.45)	2.30 (1.78-2.90)	2.78 (2.08-3.66)	3.14 (2.31-4.22)	3.52 (2.52-4.91)	3.96 (2.68-5.62)	4.62 (3.00-6.76)	5.17 (3.28-7.71)
3-hr	1.48 (1.16-1.85)	1.78 (1.40-2.22)	2.26 (1.77-2.83)	2.66 (2.07-3.34)	3.21 (2.42-4.22)	3.62 (2.68-4.86)	4.06 (2.92-5.65)	4.58 (3.10-6.46)	5.36 (3.49-7.80)	6.01 (3.82-8.92)
6-hr	1.90 (1.50-2.35)	2.27 (1.80-2.82)	2.89 (2.28-3.59)	3.40 (2.66-4.24)	4.10 (3.11-5.35)	4.62 (3.44-6.16)	5.18 (3.75-7.17)	5.85 (3.98-8.19)	6.86 (4.48-9.91)	7.72 (4.92-11.4)
12-hr	2.36 (1.88-2.90)	2.84 (2.26-3.49)	3.63 (2.88-4.47)	4.28 (3.38-5.30)	5.17 (3.96-6.70)	5.84 (4.38-7.72)	6.56 (4.78-9.00)	7.41 (5.06-10.3)	8.70 (5.70-12.5)	9.79 (6.27-14.3)
24-hr	2.78 (2.24-3.39)	3.38 (2.72-4.13)	4.36 (3.50-5.34)	5.18 (4.12-6.38)	6.30 (4.86-8.12)	7.13 (5.39-9.38)	8.04 (5.91-11.0)	9.13 (6.26-12.6)	10.8 (7.11-15.4)	12.2 (7.86-17.7)
2-day	3.12 (2.53-3.78)	3.85 (3.12-4.66)	5.04 (4.07-6.13)	6.03 (4.84-7.36)	7.39 (5.74-9.47)	8.38 (6.39-11.0)	9.48 (7.05-13.0)	10.9 (7.48-14.9)	13.0 (8.60-18.4)	14.9 (9.62-21.4)
3-day	3.38 (2.76-4.08)	4.18 (3.41-5.05)	5.49 (4.46-6.65)	6.57 (5.30-8.00)	8.06 (6.30-10.3)	9.15 (7.01-12.0)	10.4 (7.73-14.1)	11.9 (8.20-16.2)	14.3 (9.46-20.1)	16.4 (10.6-23.4)
4-day	3.63 (2.97-4.37)	4.48 (3.66-5.39)	5.86 (4.78-7.08)	7.02 (5.68-8.51)	8.60 (6.74-10.9)	9.76 (7.50-12.7)	11.0 (8.26-15.0)	12.7 (8.75-17.2)	15.2 (10.1-21.3)	17.5 (11.3-24.8)
7-day	4.31 (3.56-5.16)	5.26 (4.33-6.30)	6.81 (5.59-8.18)	8.10 (6.60-9.77)	9.87 (7.78-12.5)	11.2 (8.62-14.4)	12.6 (9.45-16.9)	14.4 (9.98-19.4)	17.2 (11.4-23.8)	19.6 (12.7-27.7)
10-day	5.00 (4.14-5.96)	6.01 (4.97-7.16)	7.65 (6.30-9.15)	9.01 (7.37-10.8)	10.9 (8.60-13.7)	12.3 (9.48-15.7)	13.8 (10.3-18.3)	15.6 (10.9-20.9)	18.5 (12.3-25.5)	20.9 (13.6-29.3)
20-day	7.17 (5.99-8.48)	8.25 (6.88-9.77)	10.0 (8.32-11.9)	11.5 (9.48-13.7)	13.5 (10.7-16.7)	15.0 (11.6-18.9)	16.6 (12.4-21.6)	18.4 (12.9-24.4)	21.0 (14.1-28.7)	23.1 (15.0-32.2)
30-day	9.00 (7.56-10.6)	10.1 (8.49-11.9)	11.9 (9.98-14.1)	13.5 (11.2-16.0)	15.6 (12.4-19.1)	17.1 (13.3-21.4)	18.8 (14.0-24.1)	20.5 (14.4-27.0)	22.8 (15.3-31.0)	24.6 (16.1-34.1)
45-day	11.3 (9.53-13.2)	12.5 (10.5-14.6)	14.3 (12.0-16.9)	15.9 (13.3-18.8)	18.1 (14.5-22.0)	19.8 (15.4-24.5)	21.4 (15.9-27.2)	23.0 (16.3-30.2)	25.1 (16.9-33.9)	26.6 (17.4-36.6)
60-day	13.2 (11.2-15.4)	14.4 (12.2-16.9)	16.4 (13.8-19.2)	18.0 (15.1-21.2)	20.2 (16.2-24.5)	22.0 (17.1-27.0)	23.7 (17.6-29.8)	25.2 (17.9-32.9)	27.1 (18.3-36.4)	28.4 (18.5-38.9)

[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 (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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PF graphical

C-1

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.5811°, Longitude: -72.4811°

Average recurrence interval (years)
- 1
- 2
- 5
- 10
- 25
- 50
- 100
- 200
- 500
- 1000

Duration
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Fri Aug 18 20:28:12 2023
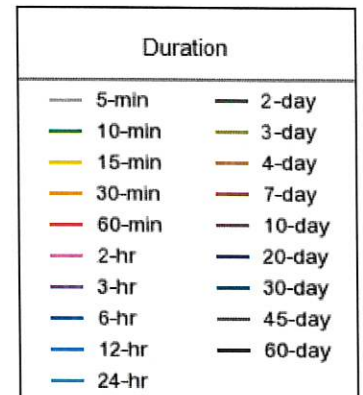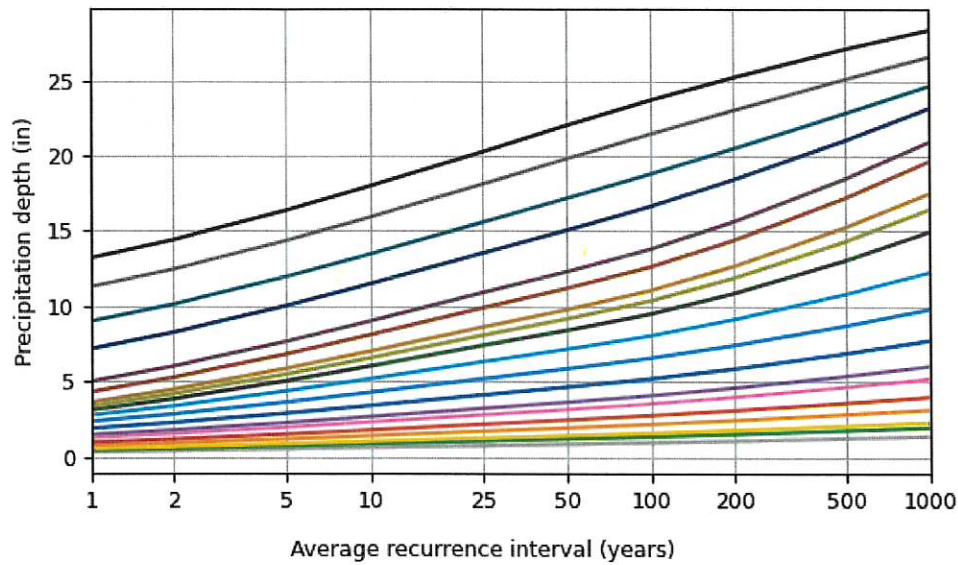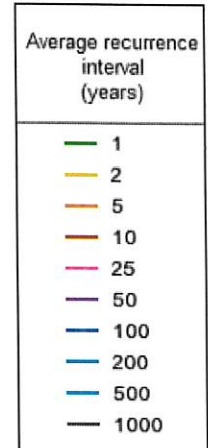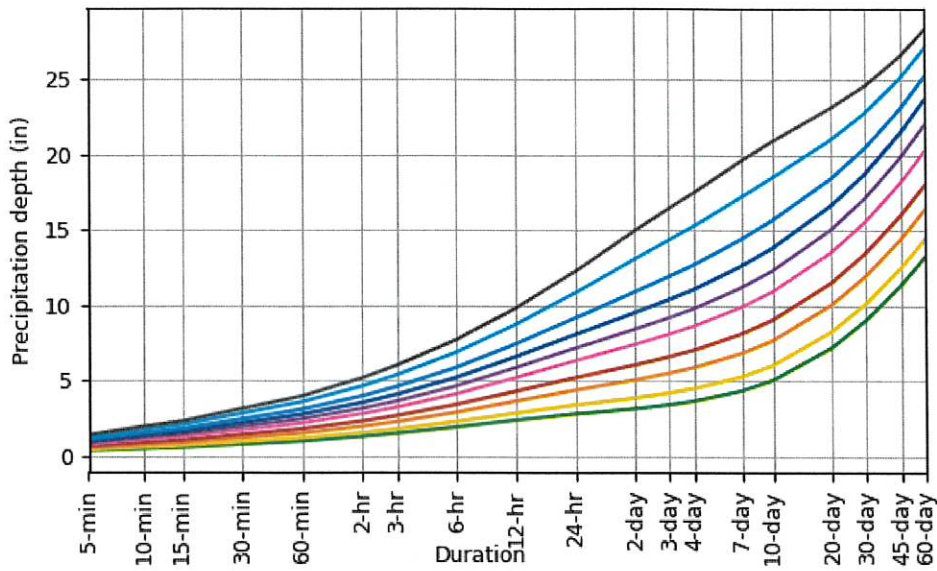
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Maps & aerials

Small scale terrain

C-2

Hydraflow Hydrographs by Intelisolve v9.02

2 - ex-da-1b

1 - ex-da-1a

3 - exist runoff to side 1
(drainage divide 1)

4 - ex-da-2a

23 - exist total site runoff

5 - ex-da-2b

6 - ex-da-2c

7 - ex-da-2d

9 - exist runoff to side 2
(drainage divide 2)

8 - ex-da-2e

(DRAINAGE DIVIDE 1)

13 - POST RUNOFF TO SIDE 1

10 - PR-DA-1A

12 - PR-DA-1B-2

11 - PR-DA-1B-1

21 - DETENTION BASIN 1

(DRAINAGE DIVIDE 1 with Detention Basin 1)

22 - POST TO SIDE 1 W DETENT

14 - PR-DA-2A-1

24 - DETENTION BASIN 2

26 - POST TOTAL SIT

15 - PR-DA-2A-2

16 - PR-DA-2B

17 - PR-DA-2C

25 - POST TO SIDE 2 W DETENTION

18 - PR-DA-2D

(DRAINAGE DIVIDE 2 with Detention Basin 2)

19 - PR-DA-2E

20 - POST RUNOFF TO SIDE 2

(DRAINAGE DIVIDE 2)

Legend

Hyd.	Origin	Description
1	SCS Runoff	ex-da-1a
2	SCS Runoff	ex-da-1b
3	Combine	exist runoff to side 1
4	SCS Runoff	ex-da-2a
5	SCS Runoff	ex-da-2b
6	SCS Runoff	ex-da-2c
7	SCS Runoff	ex-da-2d
8	SCS Runoff	ex-da-2e
9	Combine	exist runoff to side 2
10	SCS Runoff	PR-DA-1A
11	SCS Runoff	PR-DA-1B-1
12	SCS Runoff	PR-DA-1B-2
13	Combine	POST RUNOFF TO SIDE 1 (no detention)
14	SCS Runoff	PR-DA-2A-1
15	SCS Runoff	PR-DA-2A-2
16	SCS Runoff	PR-DA-2B
17	SCS Runoff	PR-DA-2C
18	SCS Runoff	PR-DA-2D
19	SCS Runoff	PR-DA-2E
20	Combine	POST RUNOFF TO SIDE 2 (no detention)
21	Reservoir	DETENTION BASIN 1
22	Combine	POST TO SIDE 1 W DETENTION
23	Combine	exist total site runoff
24	Reservoir	DETENTION BASIN 2
25	Combine	POST TO SIDE 2 W DETENTION
26	Combine	POST TOTAL SITE RUNOFF W/ DETENTION

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	-------	-------	5.871	-------	-------	11.95	15.90	18.86	22.12	ex-da-1a
2	SCS Runoff	-------	-------	12.56	-------	-------	28.46	39.27	47.50	56.67	ex-da-1b
3	Combine	1, 2	-------	13.67	-------	-------	30.79	42.40	51.25	61.09	exist runoff to side 1
4	SCS Runoff	-------	-------	11.25	-------	-------	24.36	33.11	39.76	47.14	ex-da-2a
5	SCS Runoff	-------	-------	2.498	-------	-------	5.083	6.766	8.028	9.418	ex-da-2b
6	SCS Runoff	-------	-------	11.89	-------	-------	24.26	32.33	38.38	45.05	ex-da-2c
7	SCS Runoff	-------	-------	1.769	-------	-------	3.600	4.798	5.696	6.685	ex-da-2d
8	SCS Runoff	-------	-------	2.515	-------	-------	5.102	6.794	8.070	9.476	ex-da-2e
9	Combine	4, 5, 6, 7, 8	-------	27.15	-------	-------	56.68	76.19	90.88	107.13	exist runoff to side 2
10	SCS Runoff	-------	-------	1.317	-------	-------	2.672	3.559	4.227	4.964	PR-DA-1A
11	SCS Runoff	-------	-------	15.30	-------	-------	33.13	45.02	54.06	64.10	PR-DA-1B-1
12	SCS Runoff	-------	-------	4.403	-------	-------	8.763	11.61	13.74	16.09	PR-DA-1B-2
13	Combine	10, 11, 12	-------	18.57	-------	-------	39.69	53.76	64.42	76.22	POST RUNOFF TO SIDE 1
14	SCS Runoff	-------	-------	9.811	-------	-------	19.62	26.02	30.82	36.10	PR-DA-2A-1
15	SCS Runoff	-------	-------	4.325	-------	-------	8.802	11.72	13.91	16.31	PR-DA-2A-2
16	SCS Runoff	-------	-------	2.498	-------	-------	5.083	6.766	8.028	9.418	PR-DA-2B
17	SCS Runoff	-------	-------	11.59	-------	-------	23.64	31.51	37.40	43.90	PR-DA-2C
18	SCS Runoff	-------	-------	1.769	-------	-------	3.600	4.798	5.696	6.685	PR-DA-2D
19	SCS Runoff	-------	-------	2.515	-------	-------	5.102	6.794	8.070	9.476	PR-DA-2E
20	Combine	14, 15, 16, 17, 18, 19	30.01	-------	-------	60.83	80.99	96.11	112.76		POST RUNOFF TO SIDE 2
21	Reservoir	11	-------	10.37	-------	-------	25.67	33.70	39.18	44.50	DETENTION BASIN 1
22	Combine	10, 12, 21	-------	11.51	-------	-------	28.20	36.92	42.79	48.52	POST TO SIDE 1 W DETENTION
23	Combine	3, 9,	-------	39.79	-------	-------	85.20	115.40	138.25	163.56	exist total site runoff
24	Reservoir	14	-------	5.950	-------	-------	11.78	16.88	20.97	25.37	DETENTION BASIN 2
25	Combine	15, 16, 17, 18, 19, 24	25.20	-------	-------	50.46	66.82	79.13	93.18		POST TO SIDE 2 W DETENTION
26	Combine	22, 25	-------	33.21	-------	-------	72.17	97.98	117.87	139.39	POST TOTAL SITE RUNOFF

D-2

Hydrograph Summary Report

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	5.871	2	726	20,323	----	------	------	ex-da-1a
2	SCS Runoff	12.56	2	760	93,610	----	------	------	ex-da-1b
3	Combine	13.67	2	754	113,934	1, 2	------	------	exist runoff to side 1
4	SCS Runoff	11.25	2	754	75,458	----	------	------	ex-da-2a
5	SCS Runoff	2.498	2	736	11,976	----	------	------	ex-da-2b
6	SCS Runoff	11.89	2	742	63,109	----	------	------	ex-da-2c
7	SCS Runoff	1.769	2	732	7,300	----	------	------	ex-da-2d
8	SCS Runoff	2.515	2	734	11,231	----	------	------	ex-da-2e
9	Combine	27.15	2	744	169,076	4, 5, 6, 7, 8	------	------	exist runoff to side 2
10	SCS Runoff	1.317	2	734	5,883	----	------	------	PR-DA-1A
11	SCS Runoff	15.30	2	754	102,604	----	------	------	PR-DA-1B-1
12	SCS Runoff	4.403	2	734	19,587	----	------	------	PR-DA-1B-2
13	Combine	18.57	2	748	128,075	10, 11, 12	------	------	POST RUNOFF TO SIDE 1
14	SCS Runoff	9.811	2	752	64,339	----	------	------	PR-DA-2A-1
15	SCS Runoff	4.325	2	738	21,585	----	------	------	PR-DA-2A-2
16	SCS Runoff	2.498	2	736	11,976	----	------	------	PR-DA-2B
17	SCS Runoff	11.59	2	742	61,505	----	------	------	PR-DA-2C
18	SCS Runoff	1.769	2	732	7,300	----	------	------	PR-DA-2D
19	SCS Runoff	2.515	2	734	11,231	----	------	------	PR-DA-2E
20	Combine	30.01	2	742	177,937	14, 15, 16, 17, 18, 19	------	------	POST RUNOFF TO SIDE 2
21	Reservoir	10.37	2	774	70,036	11	437.82	20,778	DETENTION BASIN 1
22	Combine	11.51	2	772	95,507	10, 12, 21	------	------	POST TO SIDE 1 W DETENTION
23	Combine	39.79	2	748	283,009	3, 9,	------	------	exist total site runoff
24	Reservoir	5.950	2	776	51,932	14	421.68	13,298	DETENTION BASIN 2
25	Combine	25.20	2	740	165,530	15, 16, 17, 18, 19, 24	------	------	POST TO SIDE 2 W DETENTION
26	Combine	33.21	2	742	261,037	22, 25	------	------	POST TOTAL SITE RUNOFF

flanders storm water.gpw	Return Period: 2 Year	Tuesday, Aug 22, 2023

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Hydrograph Summary Report

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	11.95	2	726	40,792	----	------	------	ex-da-1a
2	SCS Runoff	28.46	2	756	202,824	----	------	------	ex-da-1b
3	Combine	30.79	2	754	243,616	1, 2	------	------	exist runoff to side 1
4	SCS Runoff	24.36	2	752	158,391	----	------	------	ex-da-2a
5	SCS Runoff	5.083	2	736	24,038	----	------	------	ex-da-2b
6	SCS Runoff	24.26	2	740	126,670	----	------	------	ex-da-2c
7	SCS Runoff	3.600	2	730	14,653	----	------	------	ex-da-2d
8	SCS Runoff	5.102	2	734	22,543	----	------	------	ex-da-2e
9	Combine	56.68	2	742	346,295	4, 5, 6, 7, 8	------	------	exist runoff to side 2
10	SCS Runoff	2.672	2	734	11,808	----	------	------	PR-DA-1A
11	SCS Runoff	33.13	2	752	215,373	----	------	------	PR-DA-1B-1
12	SCS Runoff	8.763	2	734	38,756	----	------	------	PR-DA-1B-2
13	Combine	39.69	2	748	265,937	10, 11, 12	------	------	POST RUNOFF TO SIDE 1
14	SCS Runoff	19.62	2	750	127,303	----	------	------	PR-DA-2A-1
15	SCS Runoff	8.802	2	738	43,325	----	------	------	PR-DA-2A-2
16	SCS Runoff	5.083	2	736	24,038	----	------	------	PR-DA-2B
17	SCS Runoff	23.64	2	740	123,449	----	------	------	PR-DA-2C
18	SCS Runoff	3.600	2	730	14,653	----	------	------	PR-DA-2D
19	SCS Runoff	5.102	2	734	22,543	----	------	------	PR-DA-2E
20	Combine	60.83	2	740	355,310	14, 15, 16, 17, 18, 19	------	------	POST RUNOFF TO SIDE 2
21	Reservoir	25.67	2	768	169,860	11	438.75	37,934	DETENTION BASIN 1
22	Combine	28.20	2	766	220,424	10, 12, 21	------	------	POST TO SIDE 1 W DETENTION
23	Combine	85.20	2	746	589,911	3, 9,	------	------	exist total site runoff
24	Reservoir	11.78	2	776	108,655	14	423.03	28,860	DETENTION BASIN 2
25	Combine	50.46	2	738	336,663	15, 16, 17, 18, 19, 24	------	------	POST TO SIDE 2 W DETENTION
26	Combine	72.17	2	742	557,086	22, 25	------	------	POST TOTAL SITE RUNOFF

flanders storm water.gpw	Return Period: 10 Year	Tuesday, Aug 22, 2023

D-4

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

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	15.90	2	726	54,468	----	------	------	ex-da-1a
2	SCS Runoff	39.27	2	756	278,022	----	------	------	ex-da-1b
3	Combine	42.40	2	752	332,490	1, 2	------	------	exist runoff to side 1
4	SCS Runoff	33.11	2	752	214,783	----	------	------	ex-da-2a
5	SCS Runoff	6.766	2	736	32,097	----	------	------	ex-da-2b
6	SCS Runoff	32.33	2	740	169,138	----	------	------	ex-da-2c
7	SCS Runoff	4.798	2	730	19,566	----	------	------	ex-da-2d
8	SCS Runoff	6.794	2	732	30,101	----	------	------	ex-da-2e
9	Combine	76.19	2	742	465,685	4, 5, 6, 7, 8	------	------	exist runoff to side 2
10	SCS Runoff	3.559	2	732	15,767	----	------	------	PR-DA-1A
11	SCS Runoff	45.02	2	752	292,053	----	------	------	PR-DA-1B-1
12	SCS Runoff	11.61	2	732	51,494	----	------	------	PR-DA-1B-2
13	Combine	53.76	2	746	359,313	10, 11, 12	------	------	POST RUNOFF TO SIDE 1
14	SCS Runoff	26.02	2	750	169,141	----	------	------	PR-DA-2A-1
15	SCS Runoff	11.72	2	738	57,850	----	------	------	PR-DA-2A-2
16	SCS Runoff	6.766	2	736	32,097	----	------	------	PR-DA-2B
17	SCS Runoff	31.51	2	740	164,838	----	------	------	PR-DA-2C
18	SCS Runoff	4.798	2	730	19,566	----	------	------	PR-DA-2D
19	SCS Runoff	6.794	2	732	30,101	----	------	------	PR-DA-2E
20	Combine	80.99	2	740	473,592	14, 15, 16, 17, 18, 19	------	------	POST RUNOFF TO SIDE 2
21	Reservoir	33.70	2	770	239,854	11	439.38	50,728	DETENTION BASIN 1
22	Combine	36.92	2	764	307,115	10, 12, 21	------	------	POST TO SIDE 1 W DETENTION
23	Combine	115.40	2	746	798,175	3, 9,	------	------	exist total site runoff
24	Reservoir	16.88	2	774	147,275	14	423.66	37,651	DETENTION BASIN 2
25	Combine	66.82	2	738	451,726	15, 16, 17, 18, 19, 24	------	------	POST TO SIDE 2 W DETENTION
26	Combine	97.98	2	740	758,840	22, 25	------	------	POST TOTAL SITE RUNOFF

flanders storm water.gpw	Return Period: 25 Year	Tuesday, Aug 22, 2023

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Hydrograph Summary Report

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	18.86	2	726	64,880	----	------	------	ex-da-1a
2	SCS Runoff	47.50	2	756	335,980	----	------	------	ex-da-1b
3	Combine	51.25	2	752	400,860	1, 2	------	------	exist runoff to side 1
4	SCS Runoff	39.76	2	750	258,024	----	------	------	ex-da-2a
5	SCS Runoff	8.028	2	736	38,233	----	------	------	ex-da-2b
6	SCS Runoff	38.38	2	740	201,470	----	------	------	ex-da-2c
7	SCS Runoff	5.696	2	730	23,306	----	------	------	ex-da-2d
8	SCS Runoff	8.070	2	732	35,855	----	------	------	ex-da-2e
9	Combine	90.88	2	742	556,886	4, 5, 6, 7, 8	------	------	exist runoff to side 2
10	SCS Runoff	4.227	2	732	18,781	----	------	------	PR-DA-1A
11	SCS Runoff	54.06	2	750	350,849	----	------	------	PR-DA-1B-1
12	SCS Runoff	13.74	2	732	61,169	----	------	------	PR-DA-1B-2
13	Combine	64.42	2	746	430,799	10, 11, 12	------	------	POST RUNOFF TO SIDE 1
14	SCS Runoff	30.82	2	750	200,921	----	------	------	PR-DA-2A-1
15	SCS Runoff	13.91	2	738	68,908	----	------	------	PR-DA-2A-2
16	SCS Runoff	8.028	2	736	38,233	----	------	------	PR-DA-2B
17	SCS Runoff	37.40	2	740	196,348	----	------	------	PR-DA-2C
18	SCS Runoff	5.696	2	730	23,306	----	------	------	PR-DA-2D
19	SCS Runoff	8.070	2	732	35,855	----	------	------	PR-DA-2E
20	Combine	96.11	2	740	563,570	14, 15, 16, 17, 18, 19	------	------	POST RUNOFF TO SIDE 2
21	Reservoir	39.18	2	772	294,192	11	439.91	62,011	DETENTION BASIN 1
22	Combine	42.79	2	764	374,142	10, 12, 21	------	------	POST TO SIDE 1 W DETENTION
23	Combine	138.25	2	746	957,747	3, 9,	------	------	exist total site runoff
24	Reservoir	20.97	2	772	176,890	14	424.07	43,391	DETENTION BASIN 2
25	Combine	79.13	2	738	539,538	15, 16, 17, 18, 19, 24	------	------	POST TO SIDE 2 W DETENTION
26	Combine	117.87	2	742	913,680	22, 25	------	------	POST TOTAL SITE RUNOFF

flanders storm water.gpw	Return Period: 50 Year	Tuesday, Aug 22, 2023

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Hydrograph Summary Report

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	22.12	2	726	76,490	----	------	------	ex-da-1a
2	SCS Runoff	56.67	2	756	401,133	----	------	------	ex-da-1b
3	Combine	61.09	2	752	477,623	1, 2	------	------	exist runoff to side 1
4	SCS Runoff	47.14	2	750	306,467	----	------	------	ex-da-2a
5	SCS Runoff	9.418	2	736	45,075	----	------	------	ex-da-2b
6	SCS Runoff	45.05	2	740	237,522	----	------	------	ex-da-2c
7	SCS Runoff	6.685	2	730	27,476	----	------	------	ex-da-2d
8	SCS Runoff	9.476	2	732	42,271	----	------	------	ex-da-2e
9	Combine	107.13	2	742	658,810	4, 5, 6, 7, 8	------	------	exist runoff to side 2
10	SCS Runoff	4.964	2	732	22,142	----	------	------	PR-DA-1A
11	SCS Runoff	64.10	2	750	416,719	----	------	------	PR-DA-1B-1
12	SCS Runoff	16.09	2	732	71,942	----	------	------	PR-DA-1B-2
13	Combine	76.22	2	746	510,804	10, 11, 12	------	------	POST RUNOFF TO SIDE 1
14	SCS Runoff	36.10	2	750	236,308	----	------	------	PR-DA-2A-1
15	SCS Runoff	16.31	2	738	81,239	----	------	------	PR-DA-2A-2
16	SCS Runoff	9.418	2	736	45,075	----	------	------	PR-DA-2B
17	SCS Runoff	43.90	2	740	231,483	----	------	------	PR-DA-2C
18	SCS Runoff	6.685	2	730	27,476	----	------	------	PR-DA-2D
19	SCS Runoff	9.476	2	732	42,271	----	------	------	PR-DA-2E
20	Combine	112.76	2	740	663,851	14, 15, 16, 17, 18, 19	------	------	POST RUNOFF TO SIDE 2
21	Reservoir	44.50	2	772	355,632	11	440.50	75,997	DETENTION BASIN 1
22	Combine	48.52	2	764	449,716	10, 12, 21	------	------	POST TO SIDE 1 W DETENTION
23	Combine	163.56	2	746	1,136,432	3, 9,	------	------	exist total site runoff
24	Reservoir	25.37	2	772	210,043	14	424.46	49,503	DETENTION BASIN 2
25	Combine	93.18	2	738	637,586	15, 16, 17, 18, 19, 24	------	------	POST TO SIDE 2 W DETENTION
26	Combine	139.39	2	740	1,087,302	22, 25	------	------	POST TOTAL SITE RUNOFF

flanders storm water.gpw	Return Period: 100 Year	Tuesday, Aug 22, 2023

D-7

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02   Tuesday, Aug 22, 2023
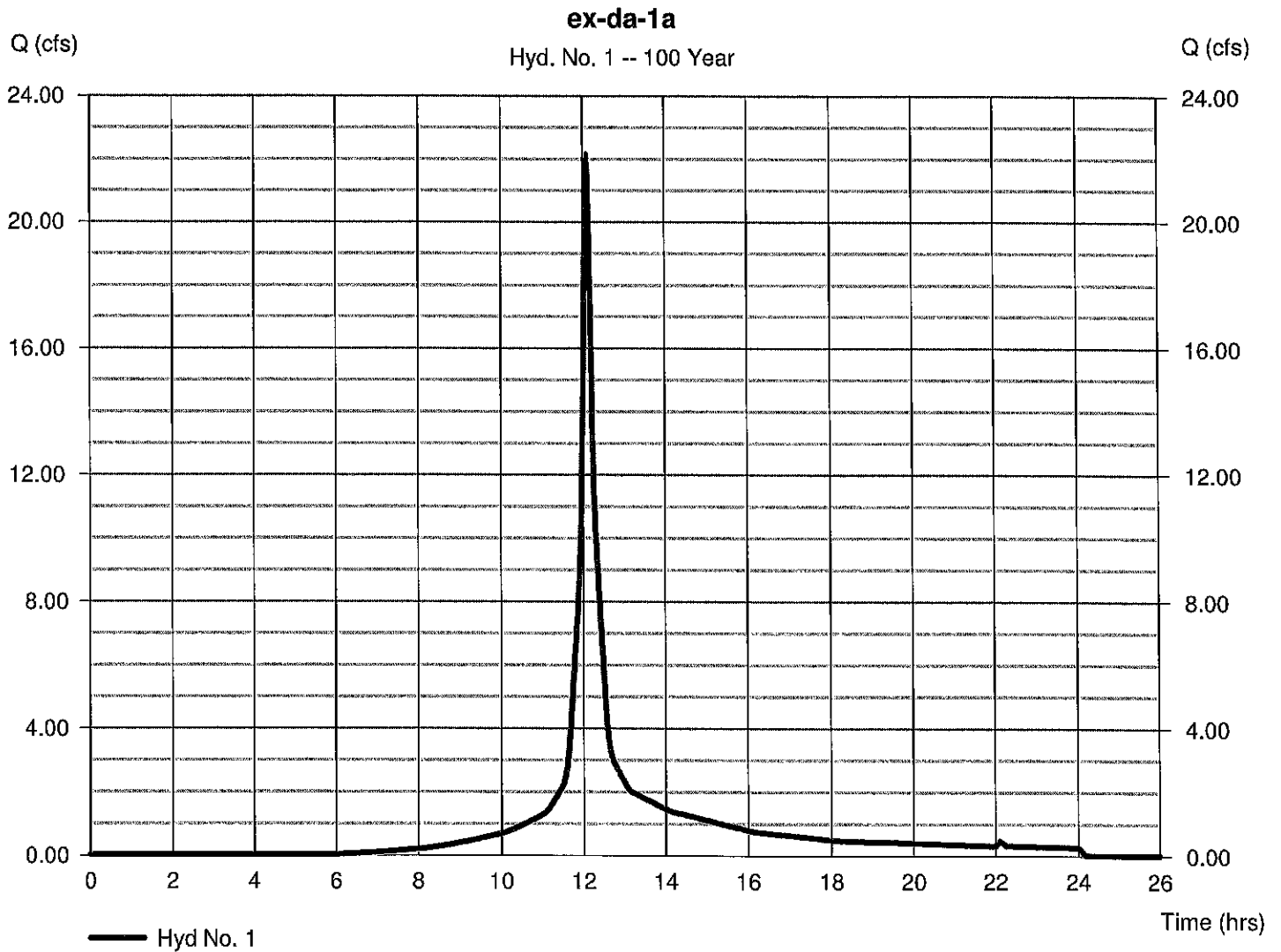
Hyd. No. 1

ex-da-1a

Hydrograph type	= SCS Runoff	Peak discharge	= 22.12 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 76,490 cuft
Drainage area	= 3.800 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.00 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.100 x 77) + (0.400 x 83) + (0.700 x 79) + (0.600 x 84)] / 3.800

ex-da-1a

Hyd. No. 1 -- 100 Year

TR55 Tc Worksheet

Hyd. No. 1

ex-da-1a

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 150.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.34		0.00		0.00		
Land slope (%)	= 55.00		0.00		0.00		
Travel Time (min)	= 7.72	+	0.00	+	0.00	=	7.72
Shallow Concentrated Flow							
Flow length (ft)	= 445.00		0.00		0.00		
Watercourse slope (%)	= 13.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 5.82		0.00		0.00		
Travel Time (min)	= 1.27	+	0.00	+	0.00	=	1.27
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	= 0.00		0.00		0.00		
Flow length (ft)	= 0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00

Total Travel Time, Tc .... **9.00 min**

D-9

Hydrograph Report

Hyd. No. 2

ex-da-1b

Hydrograph type	= SCS Runoff	Peak discharge	= 56.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 401,133 cuft
Drainage area	= 22.100 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.80 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.100 x 66) + (0.200 x 67) + (1.400 x 60) + (9.800 x 73) + (8.600 x 79)] / 22.100

ex-da-1b

Hyd. No. 2 -- 100 Year

Hyd No. 2

D-10
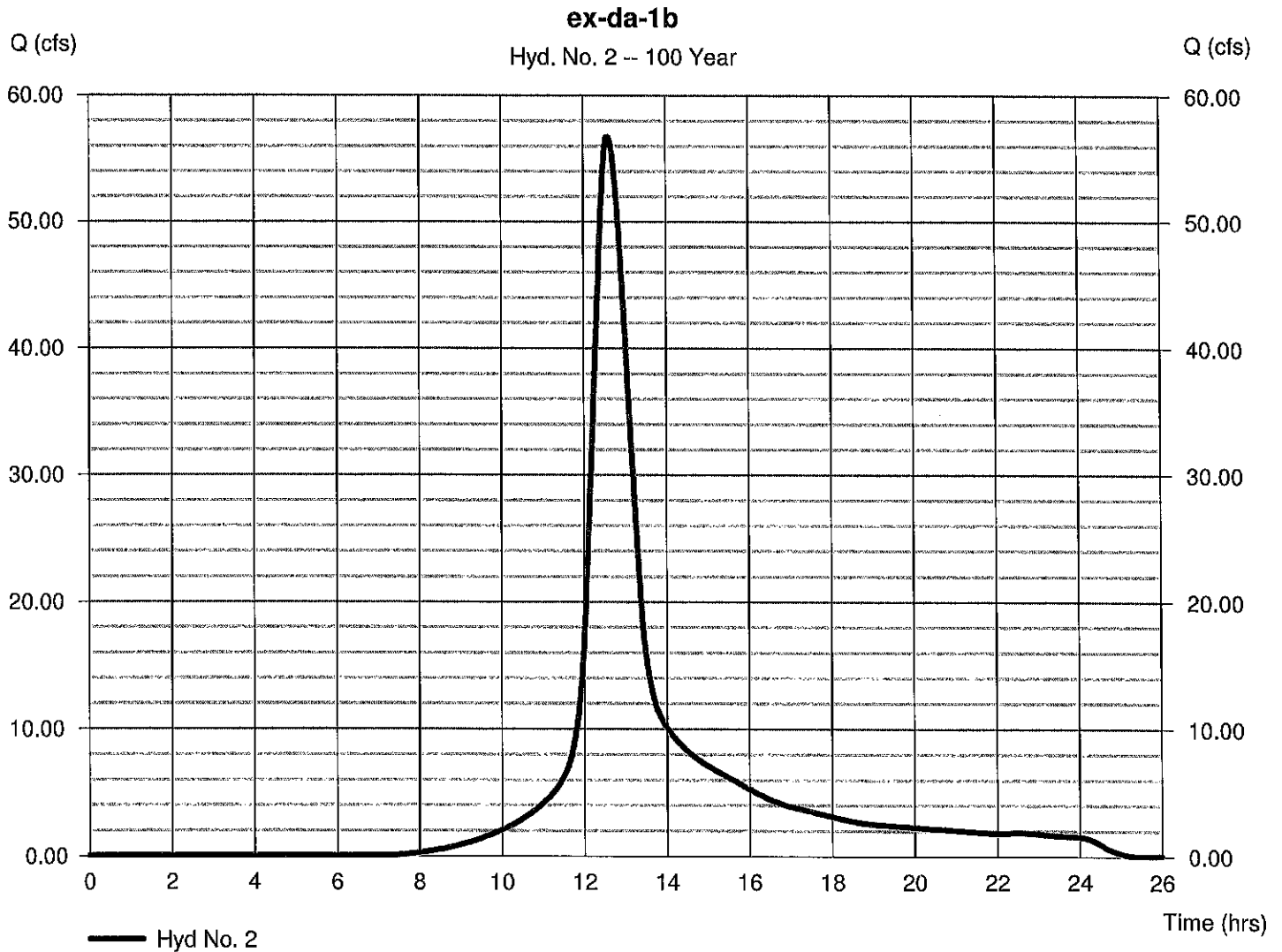
TR55 Tc Worksheet

Hyd. No. 2

ex-da-1b

Description	A	B			C		Totals
Sheet Flow							
Manning's n-value	= 0.400	0.011			0.011		
Flow length (ft)	= 300.0	0.0			0.0		
Two-year 24-hr precip. (in)	= 3.34	0.00			0.00		
Land slope (%)	= 2.30	0.00			0.00		
Travel Time (min)	= 47.87	+ 0.00	+		0.00	=	47.87
Shallow Concentrated Flow							
Flow length (ft)	= 1205.00	0.00			0.00		
Watercourse slope (%)	= 9.80	0.00			0.00		
Surface description	= Unpaved	Paved			Paved		
Average velocity (ft/s)	= 5.05	0.00			0.00		
Travel Time (min)	= 3.98	+ 0.00	+		0.00	=	3.98
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00			0.00		
Wetted perimeter (ft)	= 0.00	0.00			0.00		
Channel slope (%)	= 0.00	0.00			0.00		
Manning's n-value	= 0.015	0.015			0.015		
Velocity (ft/s)	= 0.00	0.00			0.00		
Flow length (ft)	= 0.0	0.0			0.0		
Travel Time (min)	= 0.00	+ 0.00	+		0.00	=	0.00

Total Travel Time, Tc .... 51.80 min

Hydrograph Report

Hyd. No. 3

exist runoff to side 1

Hydrograph type	= Combine	Peak discharge	= 61.09 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 477,623 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 25.900 ac

exist runoff to side 1

Hyd. No. 3 -- 100 Year

Legend: Hyd No. 3, Hyd No. 1, Hyd No. 2

D-12
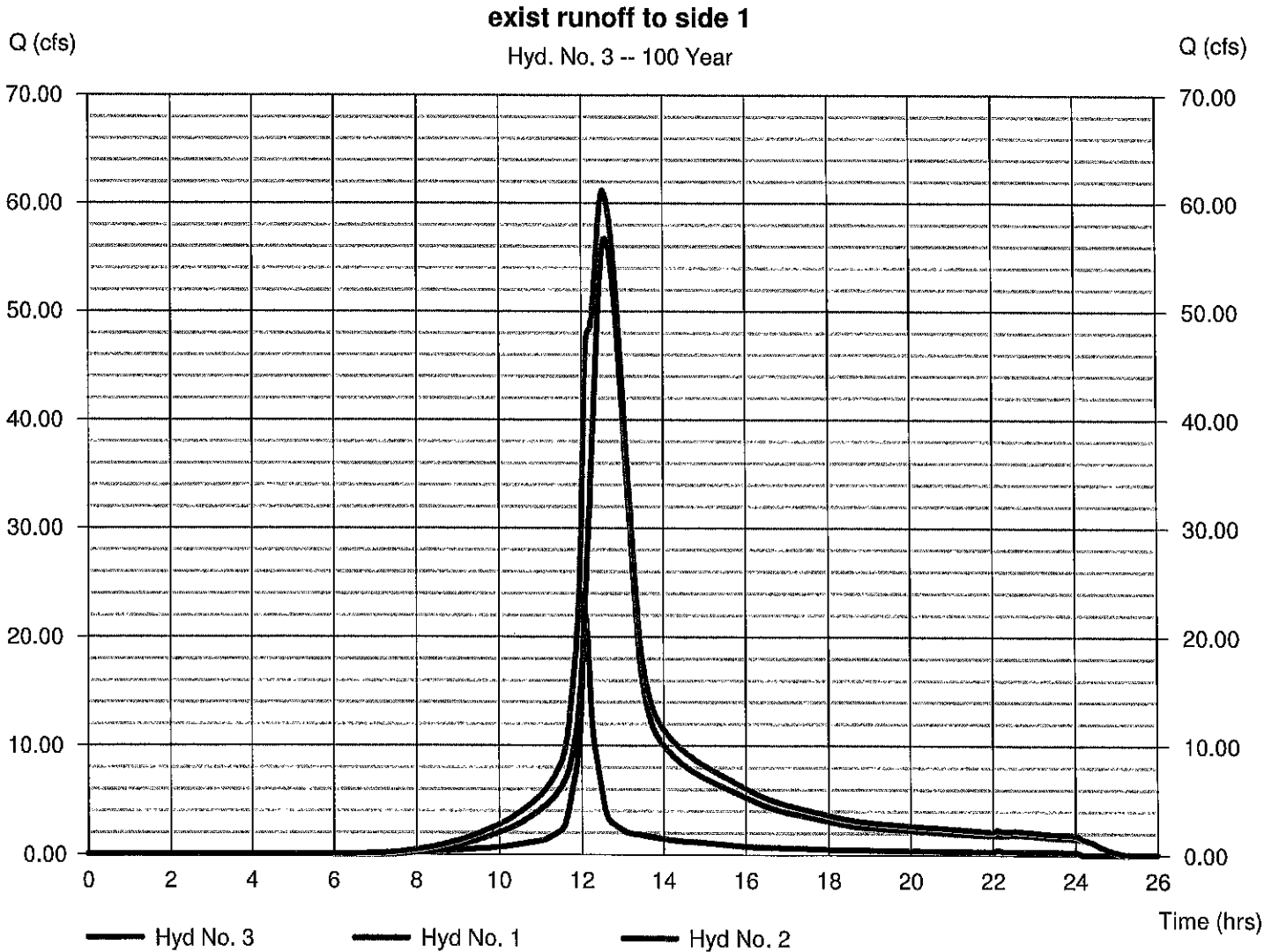
Hydrograph Report

Tuesday, Aug 22, 2023

Hyd. No. 4

ex-da-2a

Hydrograph type	= SCS Runoff		Peak discharge	= 47.14 cfs	
Storm frequency	= 100 yrs		Time to peak	= 12.50 hrs	
Time interval	= 2 min		Hyd. volume	= 306,467 cuft	
Drainage area	= 16.400 ac		Curve number	= 76*	
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft	
Tc method	= TR55		Time of conc. (Tc)	= 46.90 min	
Total precip.	= 8.04 in		Distribution	= Type III	
Storm duration	= 24 hrs		Shape factor	= 484	

* Composite (Area/CN) = [(1.200 x 73) + (1.700 x 60) + (11.900 x 79) + (1.200 x 66) + (0.400 x 77)] / 16.400

ex-da-2a

Hyd. No. 4 -- 100 Year
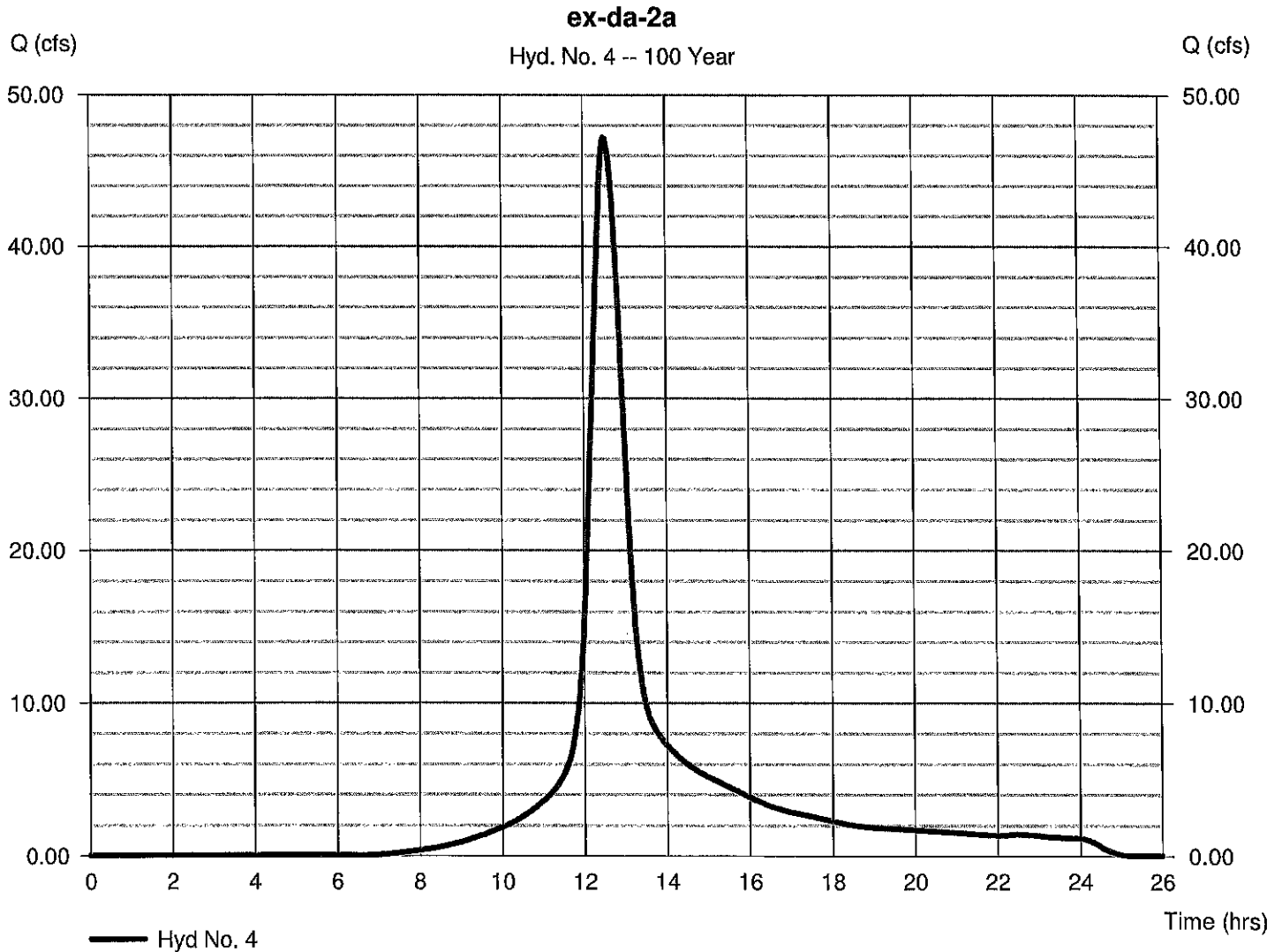
Hyd No. 4

TR55 Tc Worksheet

Hyd. No. 4

ex-da-2a

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 3.30	0.00	0.00	
Travel Time (min)	= 41.43 +	0.00 +	0.00 =	41.43
Shallow Concentrated Flow				
Flow length (ft)	= 1570.00	0.00	0.00	
Watercourse slope (%)	= 8.80	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 4.79	0.00	0.00	
Travel Time (min)	= 5.47 +	0.00 +	0.00 =	5.47
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00 +	0.00 +	0.00 =	0.00

Total Travel Time, Tc .... **46.90 min**

D-14

Hydrograph Report

Hyd. No. 5

ex-da-2b

Hydrograph type	= SCS Runoff	Peak discharge	= 9.418 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 45,075 cuft
Drainage area	= 2.200 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.70 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.200 x 79)] / 2.200

ex-da-2b

Hyd. No. 5 -- 100 Year
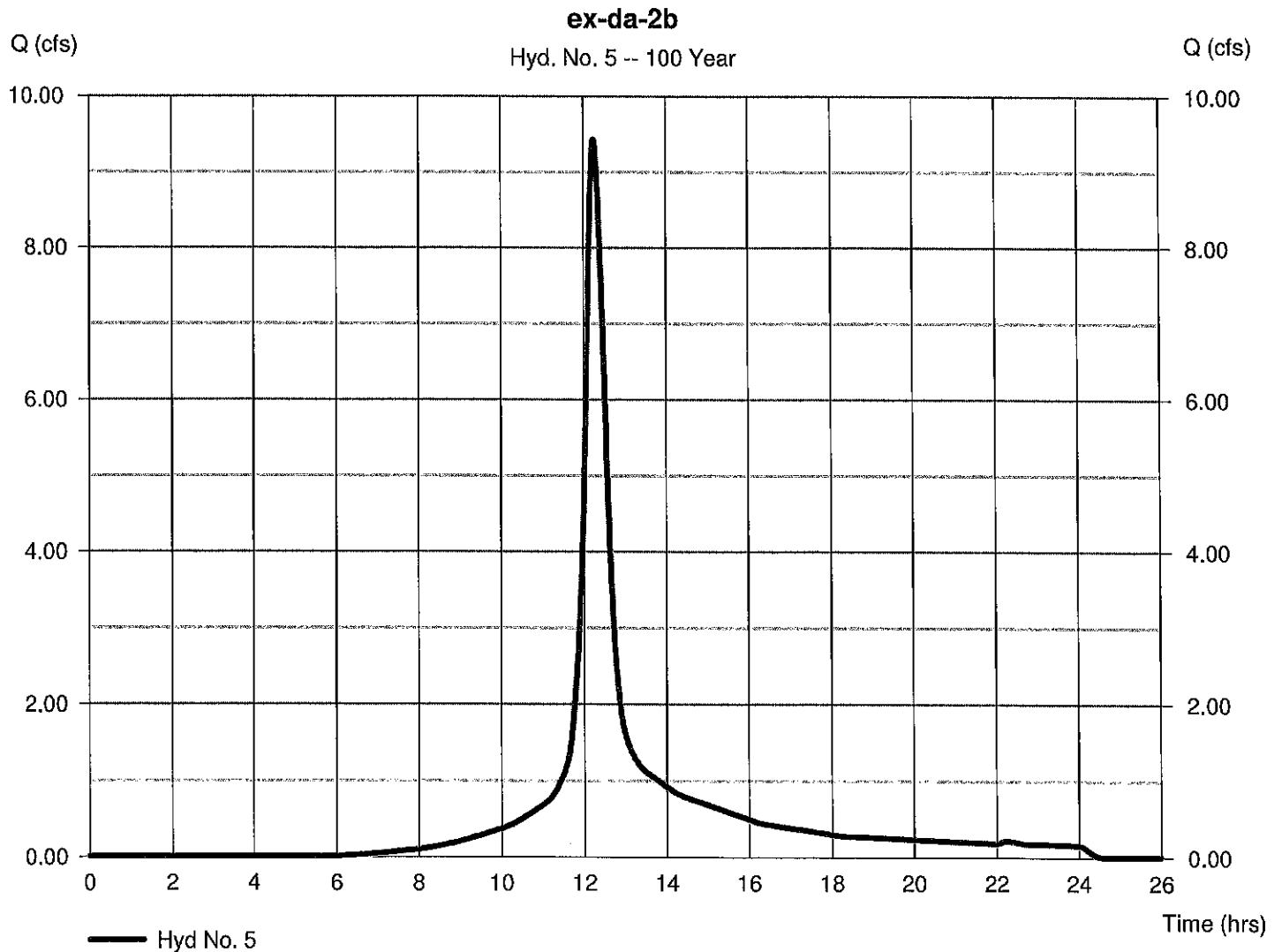
TR55 Tc Worksheet

Hyd. No. 5

ex-da-2b

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 5.30	0.00	0.00	
Travel Time (min)	= 19.69 +	0.00 +	0.00 =	19.69
Shallow Concentrated Flow				
Flow length (ft)	= 278.00	0.00	0.00	
Watercourse slope (%)	= 2.10	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 2.34	0.00	0.00	
Travel Time (min)	= 1.98 +	0.00 +	0.00 =	1.98
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00 +	0.00 +	0.00 =	0.00

Total Travel Time, Tc .... **21.70 min**

Hydrograph Report

Hyd. No. 6

ex-da-2c

Hydrograph type	= SCS Runoff	Peak discharge	= 45.05 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 237,522 cuft
Drainage area	= 11.800 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29.30 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.500 x 73) + (11.300 x 79)] / 11.800

ex-da-2c

Hyd. No. 6 -- 100 Year

D-17
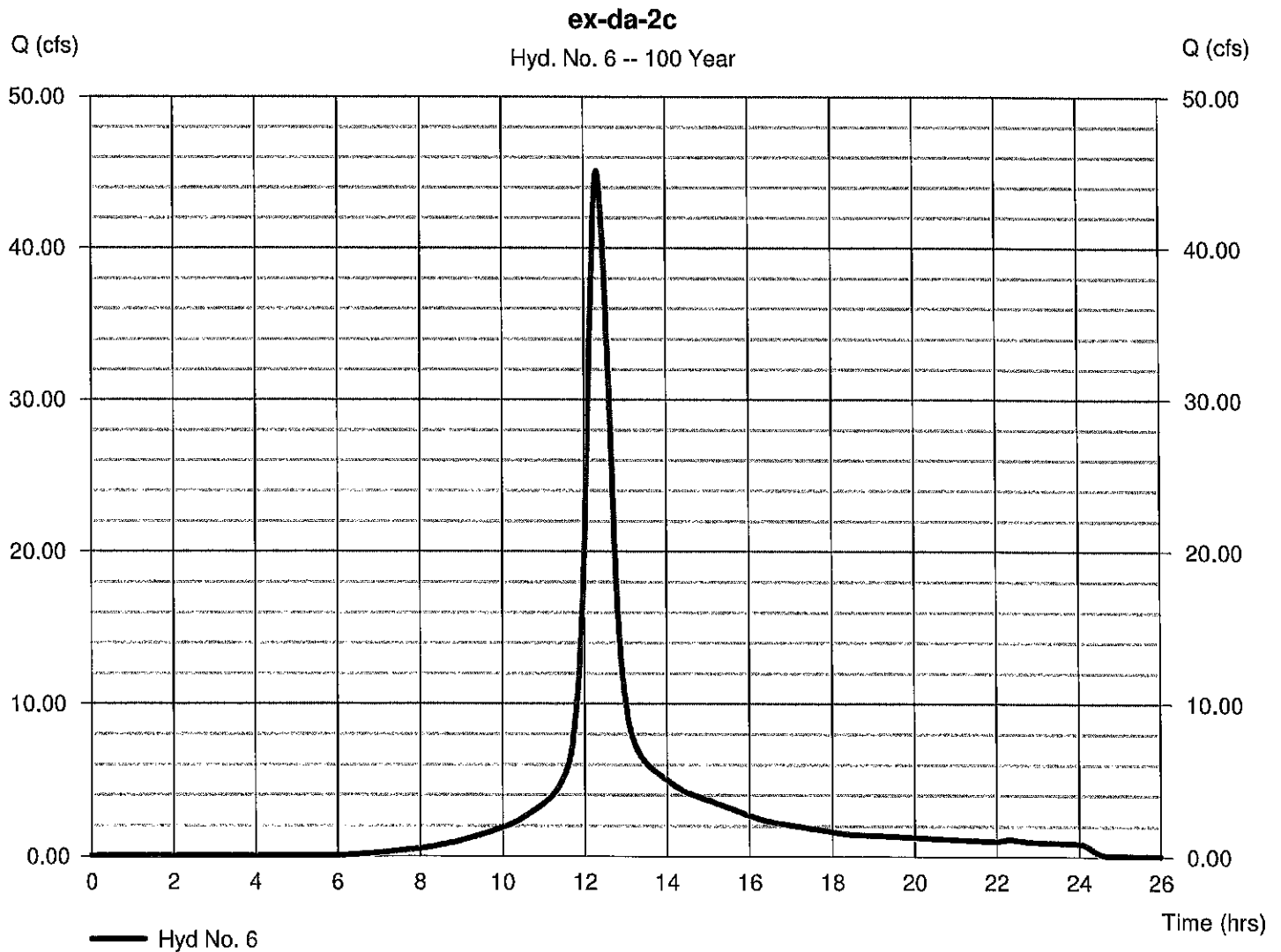
TR55 Tc Worksheet

Hyd. No. 6

ex-da-2c

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.34		0.00		0.00		
Land slope (%)	= 11.30		0.00		0.00		
Travel Time (min)	= 25.32	+	0.00	+	0.00	=	25.32
Shallow Concentrated Flow							
Flow length (ft)	= 1110.00		0.00		0.00		
Watercourse slope (%)	= 8.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 4.70		0.00		0.00		
Travel Time (min)	= 3.93	+	0.00	+	0.00	=	3.93
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	= 0.00		0.00		0.00		
Flow length (ft)	= 0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00

Total Travel Time, Tc .... **29.30 min**

D-18

Hydrograph Report

Hyd. No. 7

ex-da-2d

Hydrograph type	= SCS Runoff		Peak discharge	= 6.685 cfs
Storm frequency	= 100 yrs		Time to peak	= 12.17 hrs
Time interval	= 2 min		Hyd. volume	= 27,476 cuft
Drainage area	= 1.400 ac		Curve number	= 79*
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft
Tc method	= TR55		Time of conc. (Tc)	= 15.80 min
Total precip.	= 8.04 in		Distribution	= Type III
Storm duration	= 24 hrs		Shape factor	= 484

* Composite (Area/CN) = [(1.400 x 79)] / 1.400

ex-da-2d

Hyd. No. 7 -- 100 Year

Hyd No. 7

TR55 Tc Worksheet

Hyd. No. 7

ex-da-2d

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 10.60	0.00	0.00	
Travel Time (min)	= **14.92** +	**0.00** +	**0.00** =	**14.92**
Shallow Concentrated Flow				
Flow length (ft)	= 325.00	0.00	0.00	
Watercourse slope (%)	= 13.80	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 5.99	0.00	0.00	
Travel Time (min)	= **0.90** +	**0.00** +	**0.00** =	**0.90**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= **0.00** +	**0.00** +	**0.00** =	**0.00**

Total Travel Time, Tc .... **15.80 min**

Hydrograph Report

Hyd. No. 8

ex-da-2e

Hydrograph type	= SCS Runoff		Peak discharge	= 9.476 cfs
Storm frequency	= 100 yrs		Time to peak	= 12.20 hrs
Time interval	= 2 min		Hyd. volume	= 42,271 cuft
Drainage area	= 2.100 ac		Curve number	= 79*
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft
Tc method	= TR55		Time of conc. (Tc)	= 18.00 min
Total precip.	= 8.04 in		Distribution	= Type III
Storm duration	= 24 hrs		Shape factor	= 484

* Composite (Area/CN) = [(2.100 x 79)] / 2.100

ex-da-2e

Hyd. No. 8 -- 100 Year
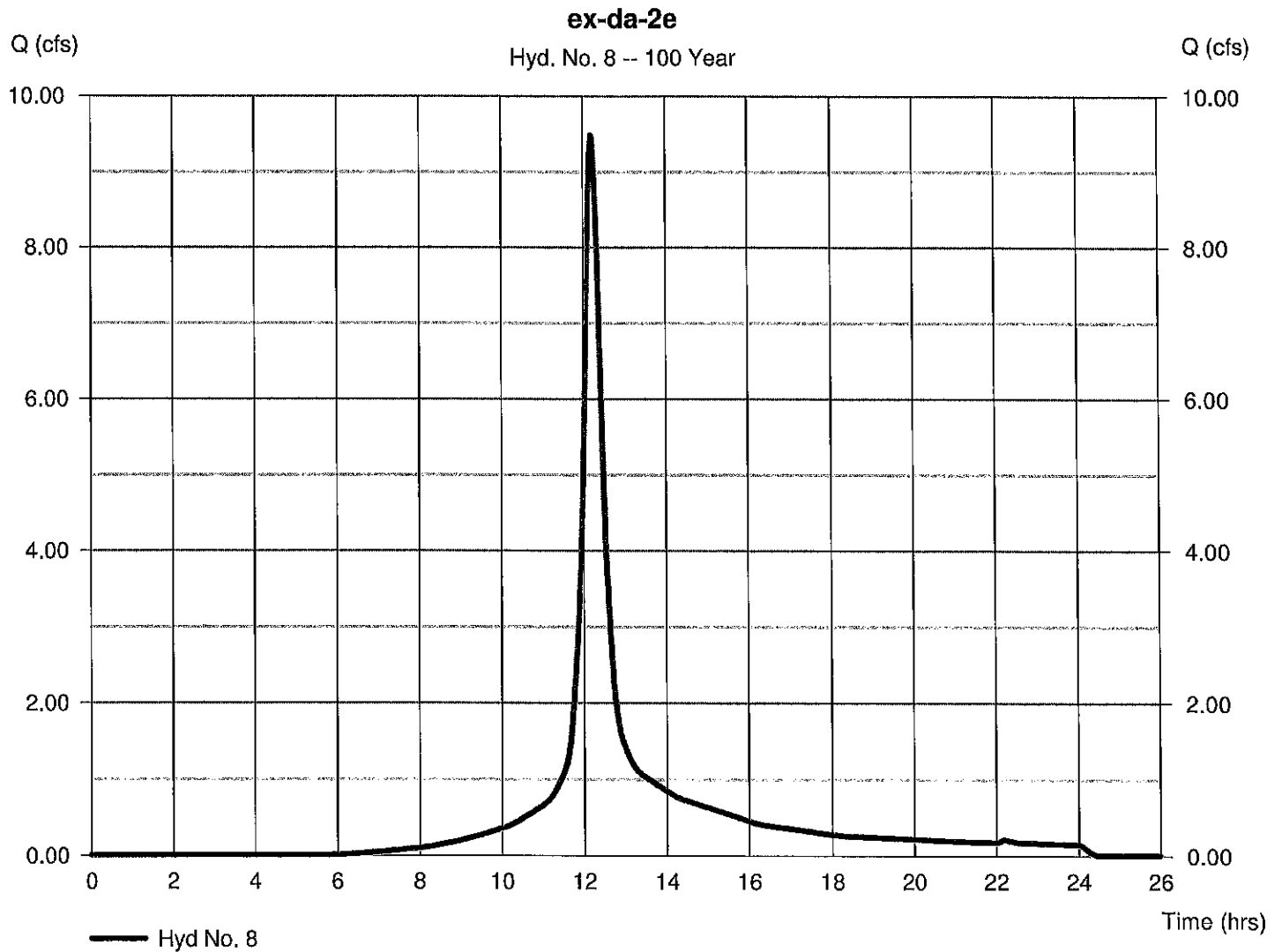
Hyd No. 8

TR55 Tc Worksheet

Hyd. No. 8

ex-da-2e

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 150.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.34		0.00		0.00		
Land slope (%)	= 8.00		0.00		0.00		
Travel Time (min)	**= 16.70**	**+**	**0.00**	**+**	**0.00**	**=**	**16.70**
Shallow Concentrated Flow							
Flow length (ft)	= 500.00		0.00		0.00		
Watercourse slope (%)	= 16.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 6.45		0.00		0.00		
Travel Time (min)	**= 1.29**	**+**	**0.00**	**+**	**0.00**	**=**	**1.29**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	= 0.00		0.00		0.00		
Flow length (ft)	= 0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... **18.00 min**

Hydrograph Report

Hyd. No. 9

exist runoff to side 2

Hydrograph type	= Combine		Peak discharge	= 107.13 cfs
Storm frequency	= 100 yrs		Time to peak	= 12.37 hrs
Time interval	= 2 min		Hyd. volume	= 658,810 cuft
Inflow hyds.	= 4, 5, 6, 7, 8		Contrib. drain. area	= 33.900 ac
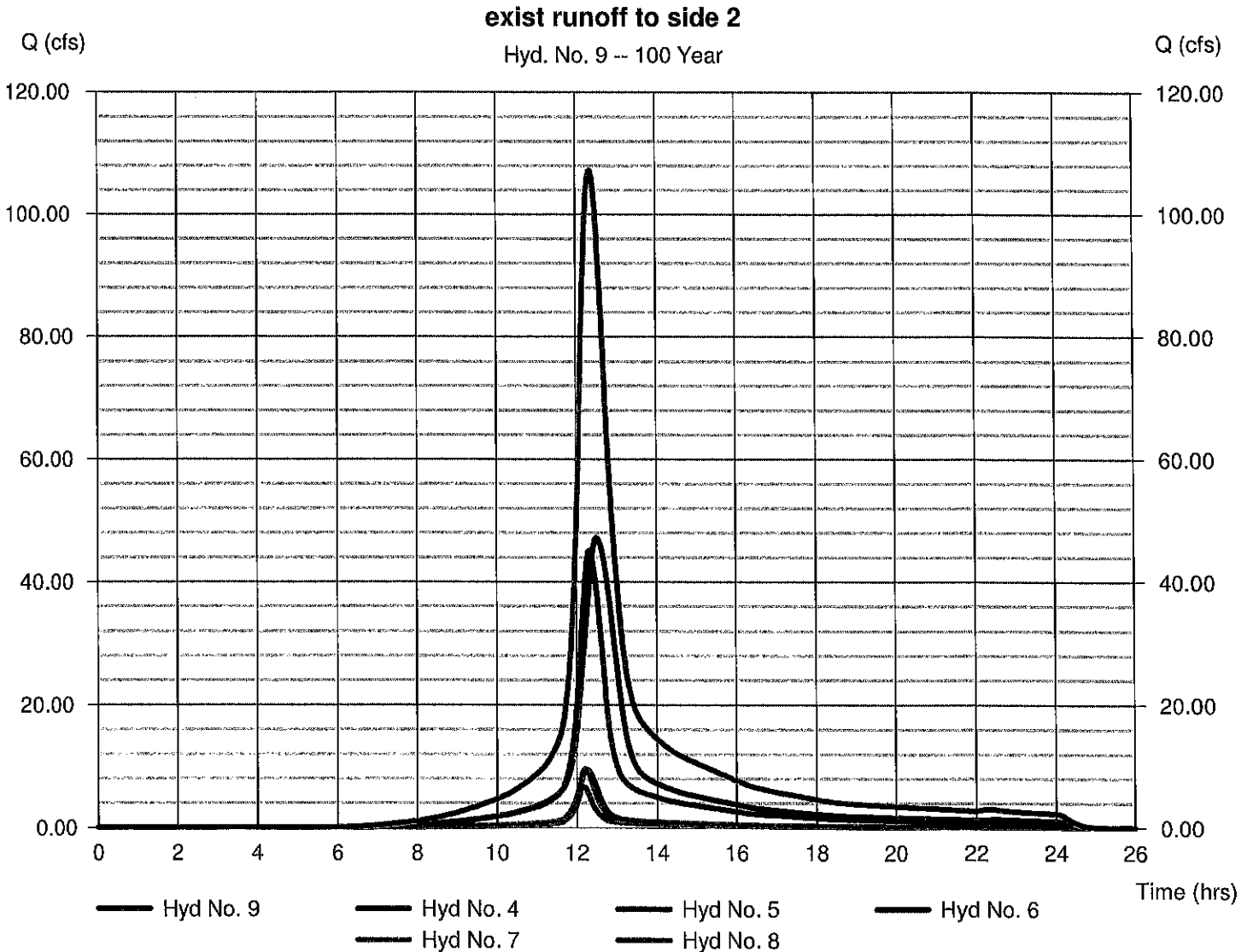
exist runoff to side 2

Hyd. No. 9 -- 100 Year

Legend: Hyd No. 9, Hyd No. 4, Hyd No. 5, Hyd No. 6, Hyd No. 7, Hyd No. 8

D-23

Hydrograph Report

Hyd. No. 10

PR-DA-1A

Hydrograph type	= SCS Runoff		Peak discharge	= 4.964 cfs
Storm frequency	= 100 yrs		Time to peak	= 12.20 hrs
Time interval	= 2 min		Hyd. volume	= 22,142 cuft
Drainage area	= 1.100 ac		Curve number	= 79*
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft
Tc method	= TR55		Time of conc. (Tc)	= 17.70 min
Total precip.	= 8.04 in		Distribution	= Type III
Storm duration	= 24 hrs		Shape factor	= 484

* Composite (Area/CN) = [(0.200 x 98) + (0.260 x 79) + (0.640 x 73)] / 1.100

PR-DA-1A

Hyd. No. 10 -- 100 Year

Hyd No. 10

D-24
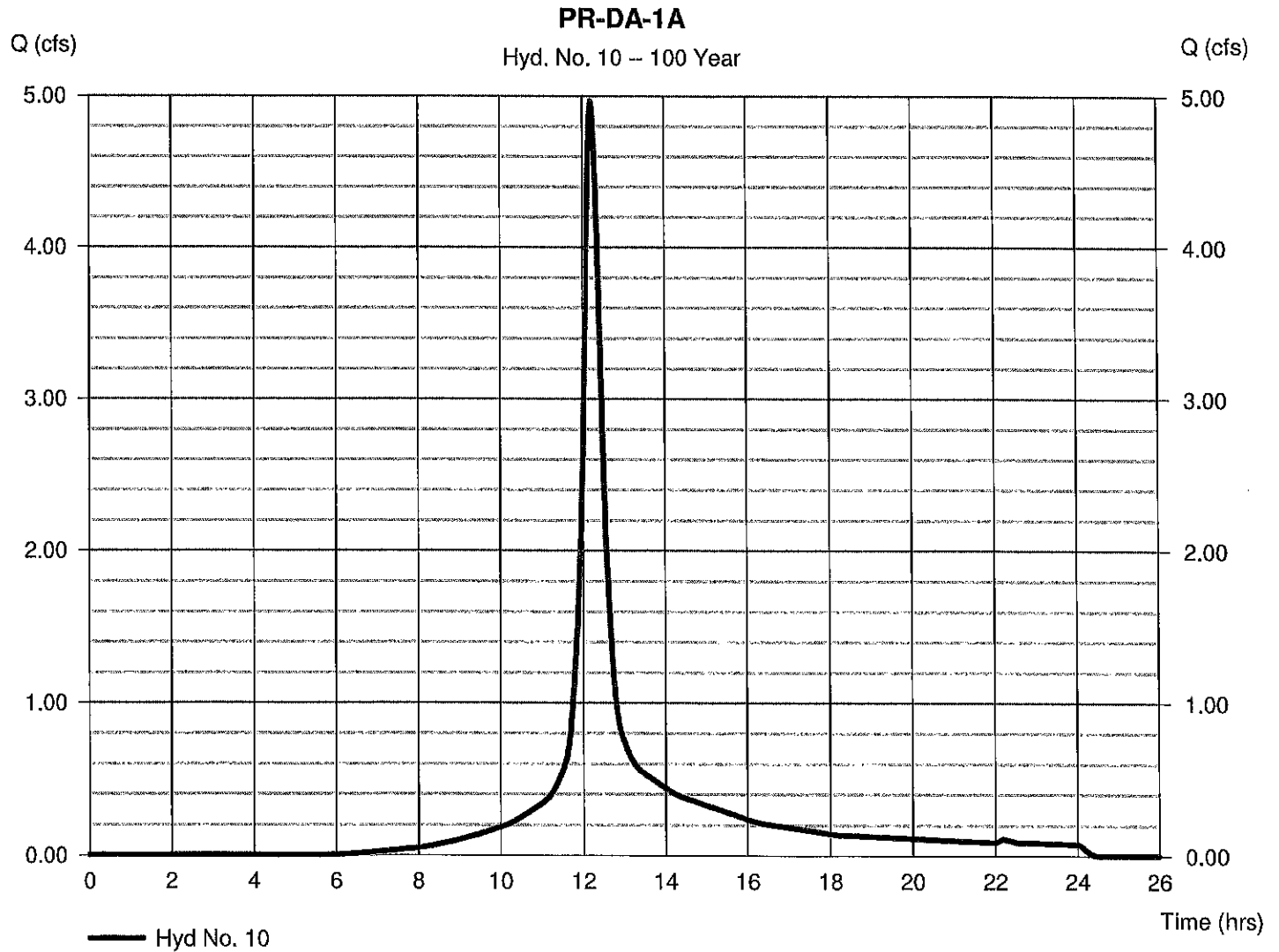
TR55 Tc Worksheet

Hyd. No. 10

PR-DA-1A

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 8.00	0.00	0.00	
Travel Time (min)	= 16.70 +	0.00 +	0.00 =	16.70
Shallow Concentrated Flow				
Flow length (ft)	= 350.00	22.00	0.00	
Watercourse slope (%)	= 16.00	2.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 6.45	2.87	0.00	
Travel Time (min)	= 0.90 +	0.13 +	0.00 =	1.03
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00 +	0.00 +	0.00 =	0.00

Total Travel Time, Tc .... **17.70 min**

Hydrograph Report

Hyd. No. 11

PR-DA-1B-1

Hydrograph type	= SCS Runoff		Peak discharge	= 64.10 cfs
Storm frequency	= 100 yrs		Time to peak	= 12.50 hrs
Time interval	= 2 min		Hyd. volume	= 416,719 cuft
Drainage area	= 22.300 ac		Curve number	= 76*
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft
Tc method	= TR55		Time of conc. (Tc)	= 44.50 min
Total precip.	= 8.04 in		Distribution	= Type III
Storm duration	= 24 hrs		Shape factor	= 484

* Composite (Area/CN) = [(3.300 x 98) + (2.630 x 61) + (4.000 x 80) + (0.770 x 79) + (9.500 x 73) + (2.100 x 66)] / 22.300

PR-DA-1B-1

Hyd. No. 11 -- 100 Year
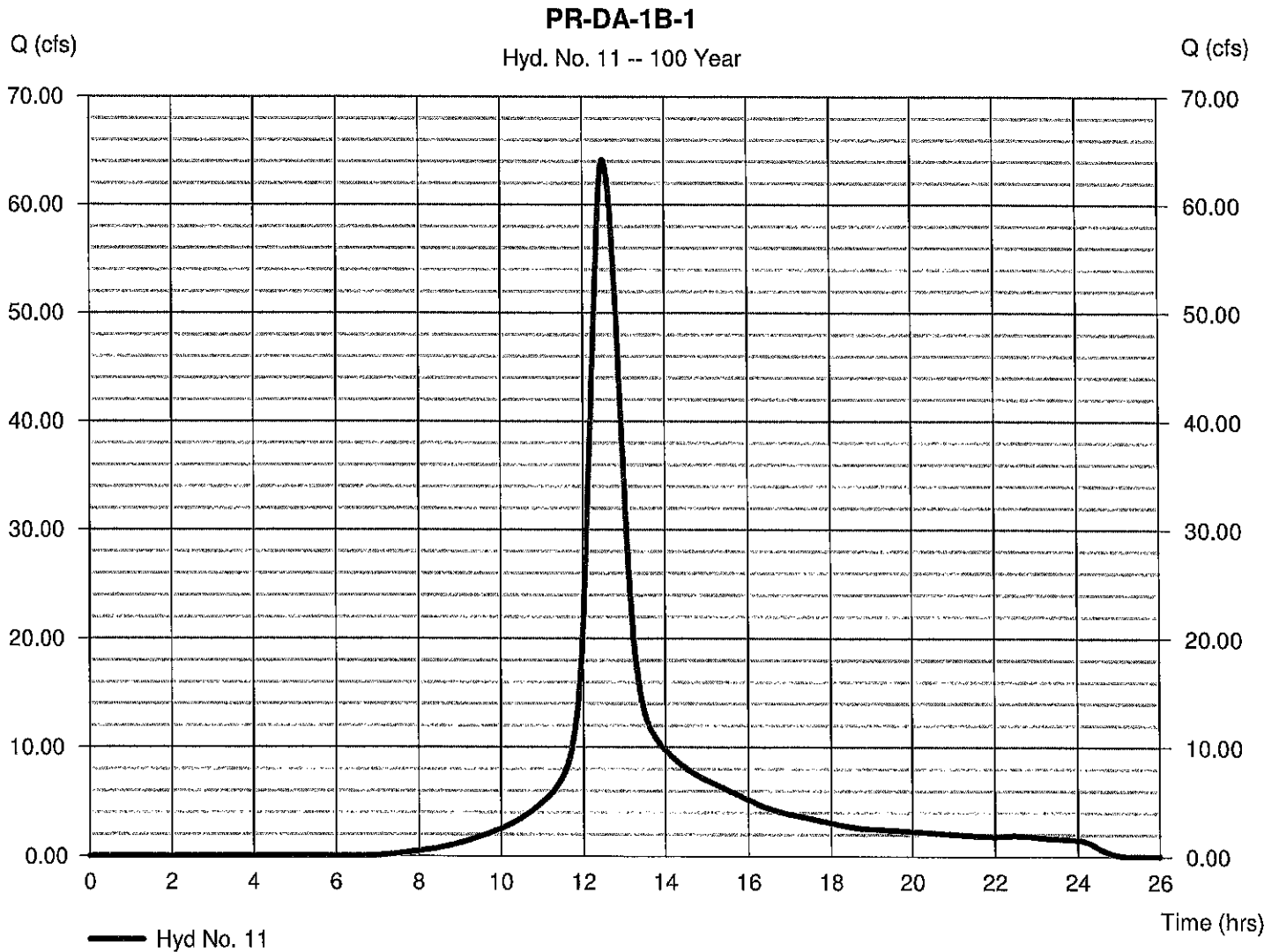
—— Hyd No. 11

TR55 Tc Worksheet

Hyd. No. 11

PR-DA-1B-1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.34		0.00		0.00		
Land slope (%)	= 3.60		0.00		0.00		
Travel Time (min)	= 40.01	+	0.00	+	0.00	=	40.01
Shallow Concentrated Flow							
Flow length (ft)	= 1253.00		22.00		0.00		
Watercourse slope (%)	= 8.90		2.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 4.81		2.87		0.00		
Travel Time (min)	= 4.34	+	0.13	+	0.00	=	4.47
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	= 0.00		0.00		0.00		
Flow length (ft)	= 0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00

Total Travel Time, Tc .... **44.50 min**

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02   Tuesday, Aug 22, 2023

Hyd. No. 12

PR-DA-1B-2

Hydrograph type	= SCS Runoff		Peak discharge	= 16.09 cfs
Storm frequency	= 100 yrs		Time to peak	= 12.20 hrs
Time interval	= 2 min		Hyd. volume	= 71,942 cuft
Drainage area	= 3.500 ac		Curve number	= 80*
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft
Tc method	= TR55		Time of conc. (Tc)	= 16.80 min
Total precip.	= 8.04 in		Distribution	= Type III
Storm duration	= 24 hrs		Shape factor	= 484

* Composite (Area/CN) = [(0.080 x 98) + (0.510 x 80) + (2.910 x 79)] / 3.500

PR-DA-1B-2
Hyd. No. 12 -- 100 Year

D-28
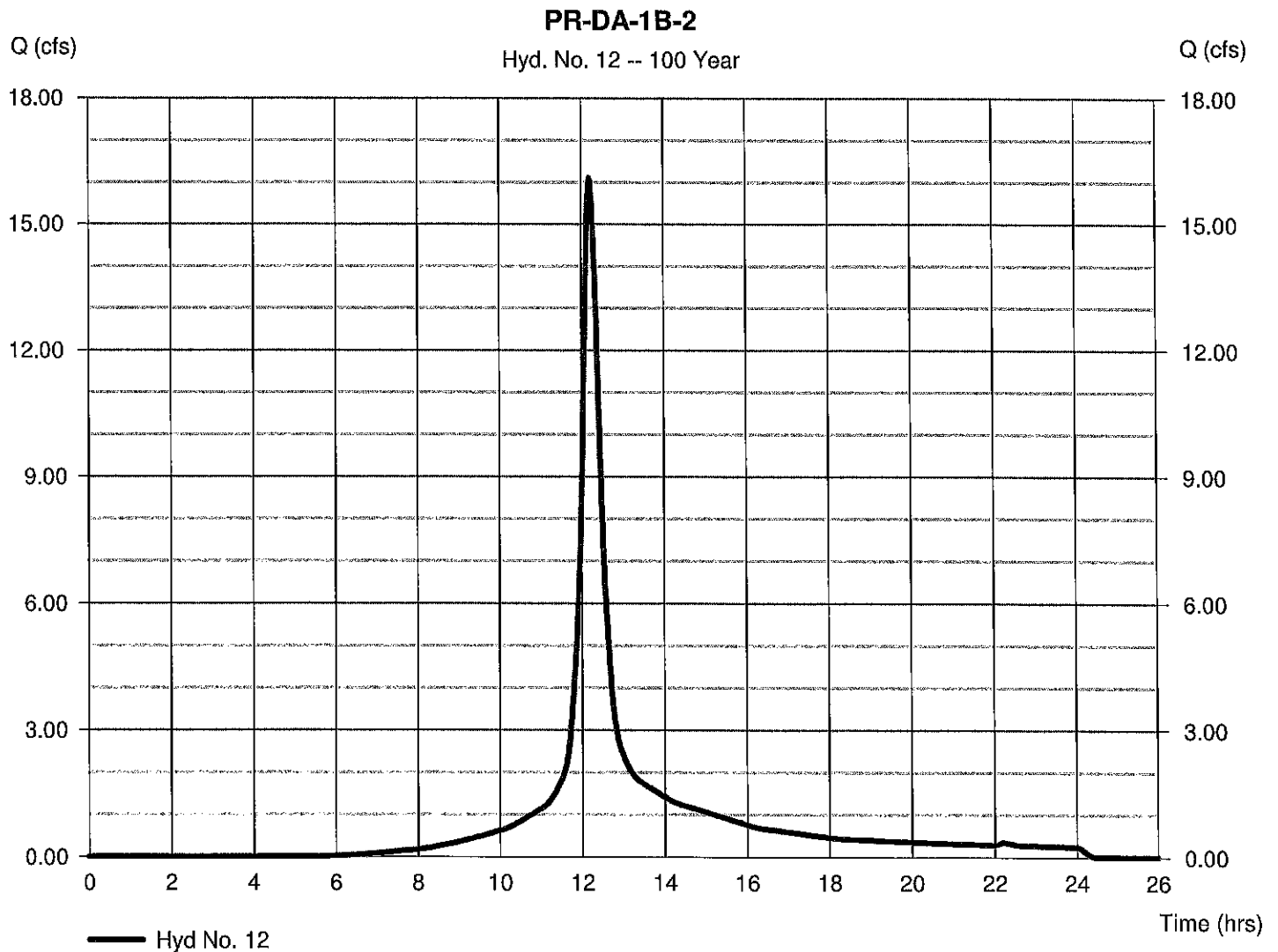
TR55 Tc Worksheet

Hyd. No. 12

PR-DA-1B-2

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 11.30	0.00	0.00	
Travel Time (min)	= 14.54 +	0.00 +	0.00 =	14.54
Shallow Concentrated Flow				
Flow length (ft)	= 555.00	0.00	0.00	
Watercourse slope (%)	= 6.60	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 4.15	0.00	0.00	
Travel Time (min)	= 2.23 +	0.00 +	0.00 =	2.23
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00 +	0.00 +	0.00 =	0.00

Total Travel Time, Tc .... **16.80 min**

Hydrograph Report

Tuesday, Aug 22, 2023

Hyd. No. 13

POST RUNOFF TO SIDE 1

Hydrograph type	= Combine	Peak discharge	= 76.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 510,804 cuft
Inflow hyds.	= 10, 11, 12	Contrib. drain. area	= 26.900 ac
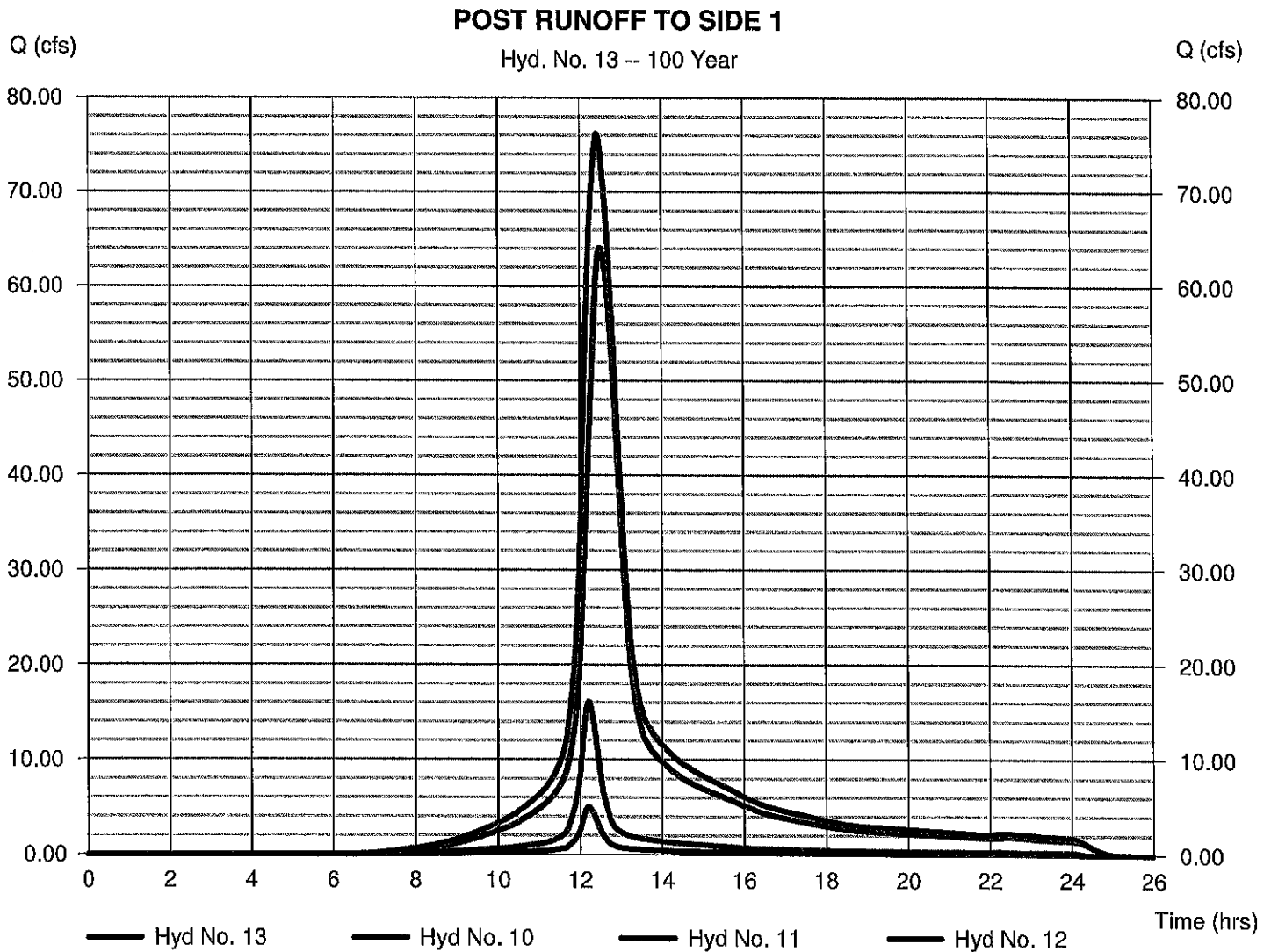
POST RUNOFF TO SIDE 1

Hyd. No. 13 -- 100 Year

D-30

Hydrograph Report

Hyd. No. 14

PR-DA-2A-1

Hydrograph type	= SCS Runoff	Peak discharge	= 36.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 2 min	Hyd. volume	= 236,308 cuft
Drainage area	= 11.600 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 47.10 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.000 x 98) + (0.310 x 60) + (6.600 x 79) + (1.090 x 73) + (0.400 x 77) + (1.200 x 66)] / 11.600

PR-DA-2A-1

Hyd. No. 14 -- 100 Year

Hyd No. 14

Time (hrs)

D--31
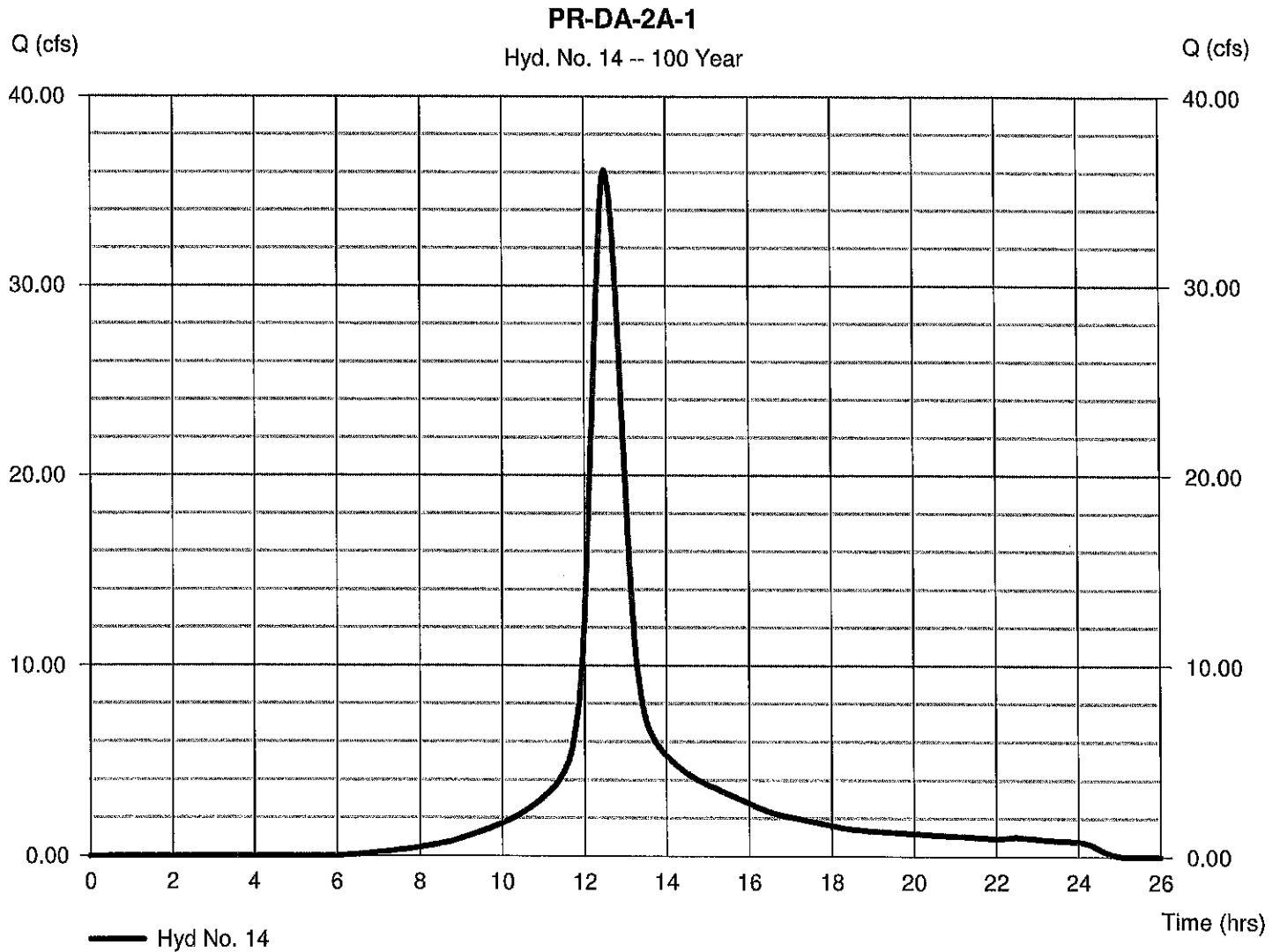
TR55 Tc Worksheet

Hyd. No. 14

PR-DA-2A-1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.34		0.00		0.00		
Land slope (%)	= 3.30		0.00		0.00		
Travel Time (min)	= 41.43	+	0.00	+	0.00	=	41.43
Shallow Concentrated Flow							
Flow length (ft)	= 1578.00		22.00		0.00		
Watercourse slope (%)	= 8.60		2.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 4.73		2.87		0.00		
Travel Time (min)	= 5.56	+	0.13	+	0.00	=	5.69
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	= 0.00		0.00		0.00		
Flow length (ft)	= 0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00

Total Travel Time, Tc .... **47.10 min**

Hydrograph Report

Hyd. No. 15

PR-DA-2A-2

Hydrograph type	= SCS Runoff	Peak discharge	= 16.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 81,239 cuft
Drainage area	= 4.100 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.00 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.190 x 74) + (0.060 x 80) + (0.220 x 73) + (3.440 x 79) + (0.090 x 98) + (0.100 x 89)] / 4.100

PR-DA-2A-2

Hyd. No. 15 -- 100 Year

— Hyd No. 15

Time (hrs)

D-33
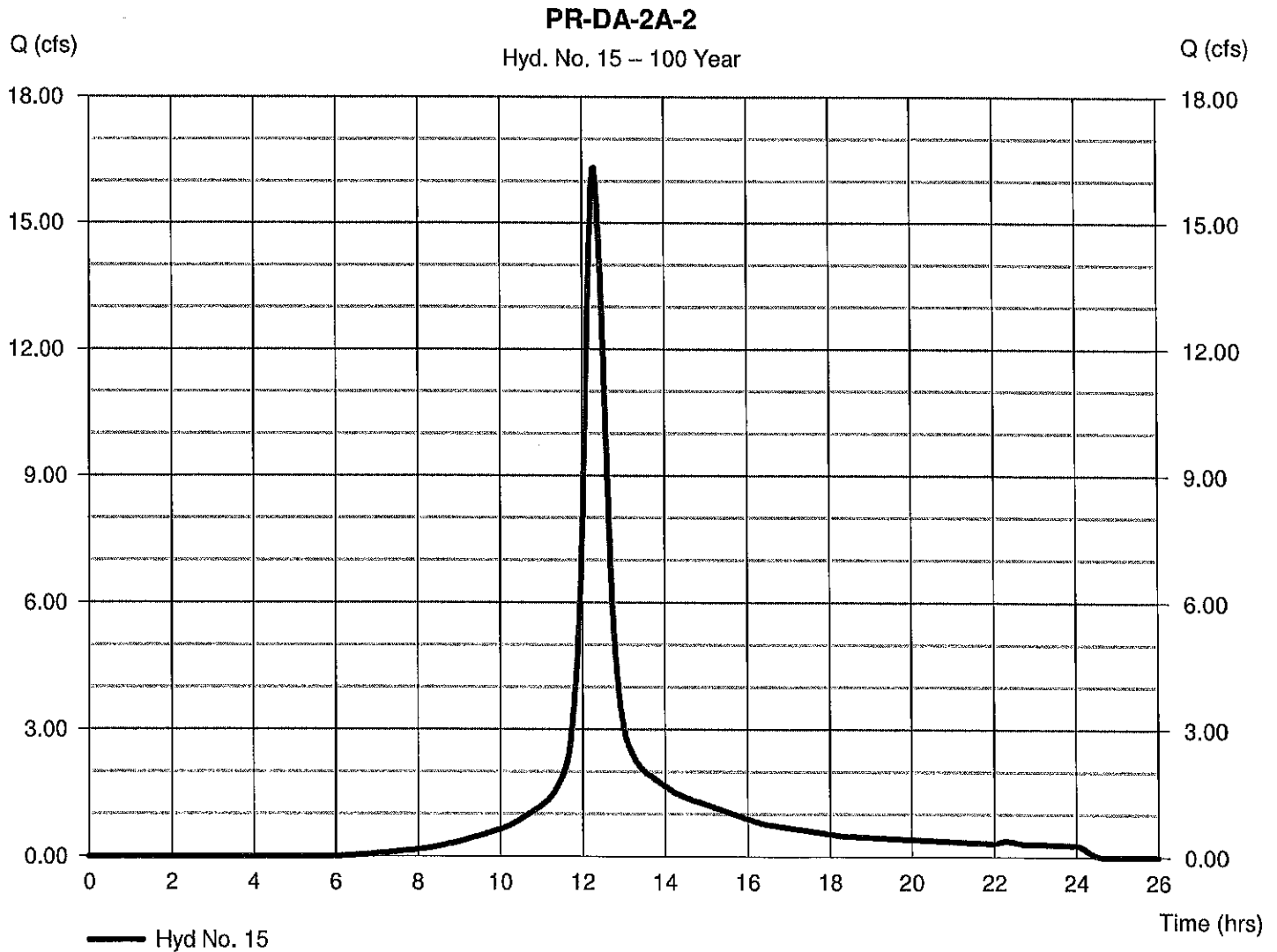
TR55 Tc Worksheet

Hyd. No. 15

PR-DA-2A-2

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 16.00	0.00	0.00	
Travel Time (min)	= 22.03 +	0.00 +	0.00 =	22.03
Shallow Concentrated Flow				
Flow length (ft)	= 430.00	0.00	0.00	
Watercourse slope (%)	= 5.10	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 3.64	0.00	0.00	
Travel Time (min)	= 1.97 +	0.00 +	0.00 =	1.97
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00 +	0.00 +	0.00 =	0.00

Total Travel Time, Tc .... **24.00 min**

Hydrograph Report

Hyd. No. 16

PR-DA-2B

Hydrograph type	= SCS Runoff	Peak discharge	= 9.418 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 45,075 cuft
Drainage area	= 2.200 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.80 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.000 x 79) + (0.200 x 84)] / 2.200
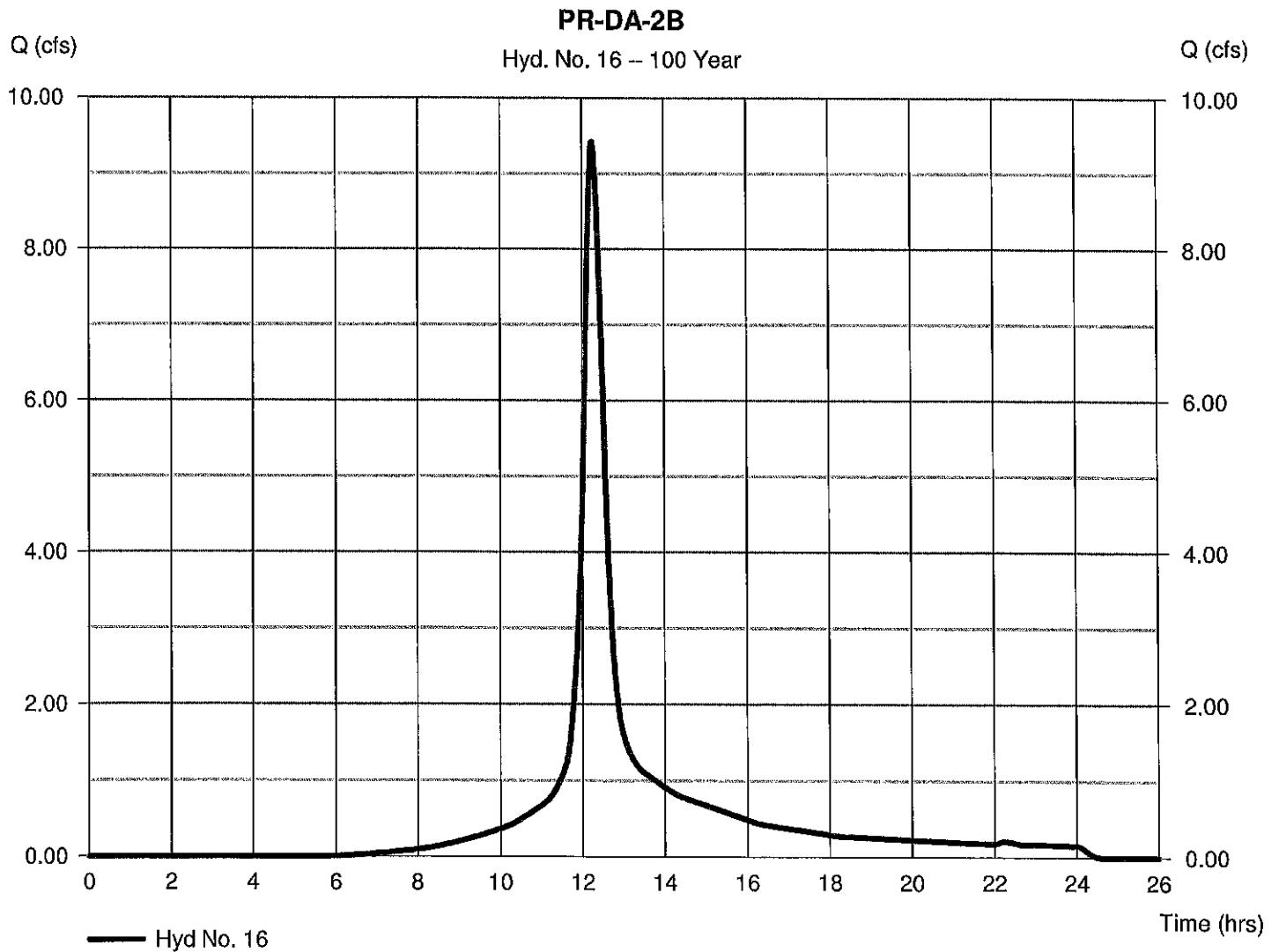
PR-DA-2B
Hyd. No. 16 -- 100 Year

TR55 Tc Worksheet

Hyd. No. 16

PR-DA-2B

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 6.60	0.00	0.00	
Travel Time (min)	= 18.03 +	0.00 +	0.00 =	18.03
Shallow Concentrated Flow				
Flow length (ft)	= 640.00	0.00	0.00	
Watercourse slope (%)	= 3.10	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 2.84	0.00	0.00	
Travel Time (min)	= 3.75 +	0.00 +	0.00 =	3.75
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00 +	0.00 +	0.00 =	0.00

Total Travel Time, Tc .... **21.80 min**

Hydrograph Report

Tuesday, Aug 22, 2023

Hyd. No. 17

PR-DA-2C

Hydrograph type	= SCS Runoff	Peak discharge	= 43.90 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 231,483 cuft
Drainage area	= 11.500 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29.30 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 98) + (0.760 x 80) + (1.070 x 73) + (9.500 x 79)] / 11.500

PR-DA-2C

Hyd. No. 17 -- 100 Year

Hyd No. 17

D-36
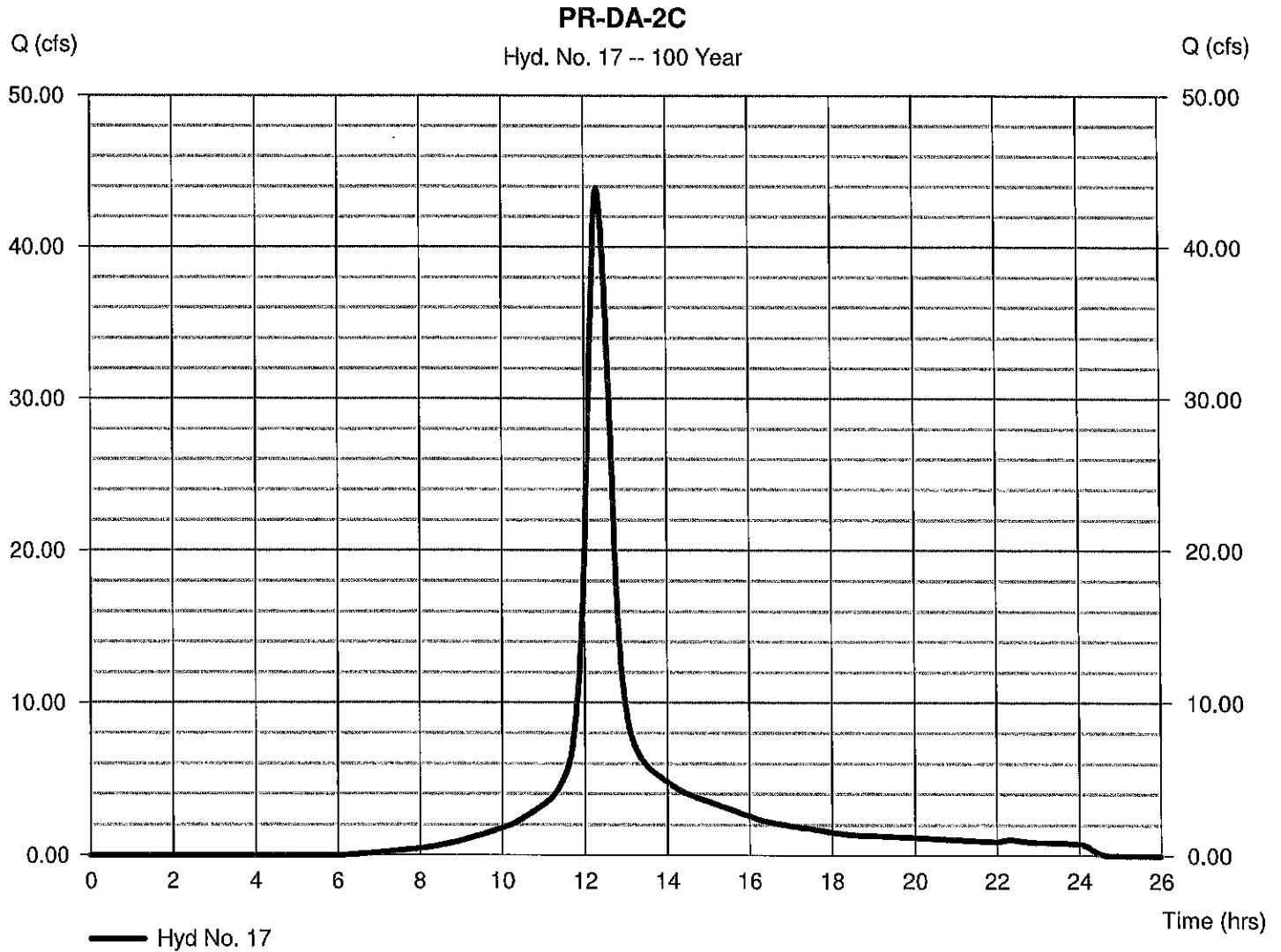
TR55 Tc Worksheet

Hyd. No. 17

PR-DA-2C

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.34		0.00		0.00		
Land slope (%)	= 11.30		0.00		0.00		
Travel Time (min)	= 25.32	+	0.00	+	0.00	=	25.32
Shallow Concentrated Flow							
Flow length (ft)	= 1110.00		0.00		0.00		
Watercourse slope (%)	= 8.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 4.70		0.00		0.00		
Travel Time (min)	= 3.93	+	0.00	+	0.00	=	3.93
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	= 0.00		0.00		0.00		
Flow length (ft)	= 0.0		0.0		0.0		
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00

Total Travel Time, Tc .... **29.30 min**

Hydrograph Report

Hyd. No. 18

PR-DA-2D

Hydrograph type	= SCS Runoff		Peak discharge	= 6.685 cfs
Storm frequency	= 100 yrs		Time to peak	= 12.17 hrs
Time interval	= 2 min		Hyd. volume	= 27,476 cuft
Drainage area	= 1.400 ac		Curve number	= 79*
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft
Tc method	= TR55		Time of conc. (Tc)	= 15.80 min
Total precip.	= 8.04 in		Distribution	= Type III
Storm duration	= 24 hrs		Shape factor	= 484

* Composite (Area/CN) = [(1.400 x 79)] / 1.400

PR-DA-2D

Hyd. No. 18 -- 100 Year

Hyd No. 18

D-38
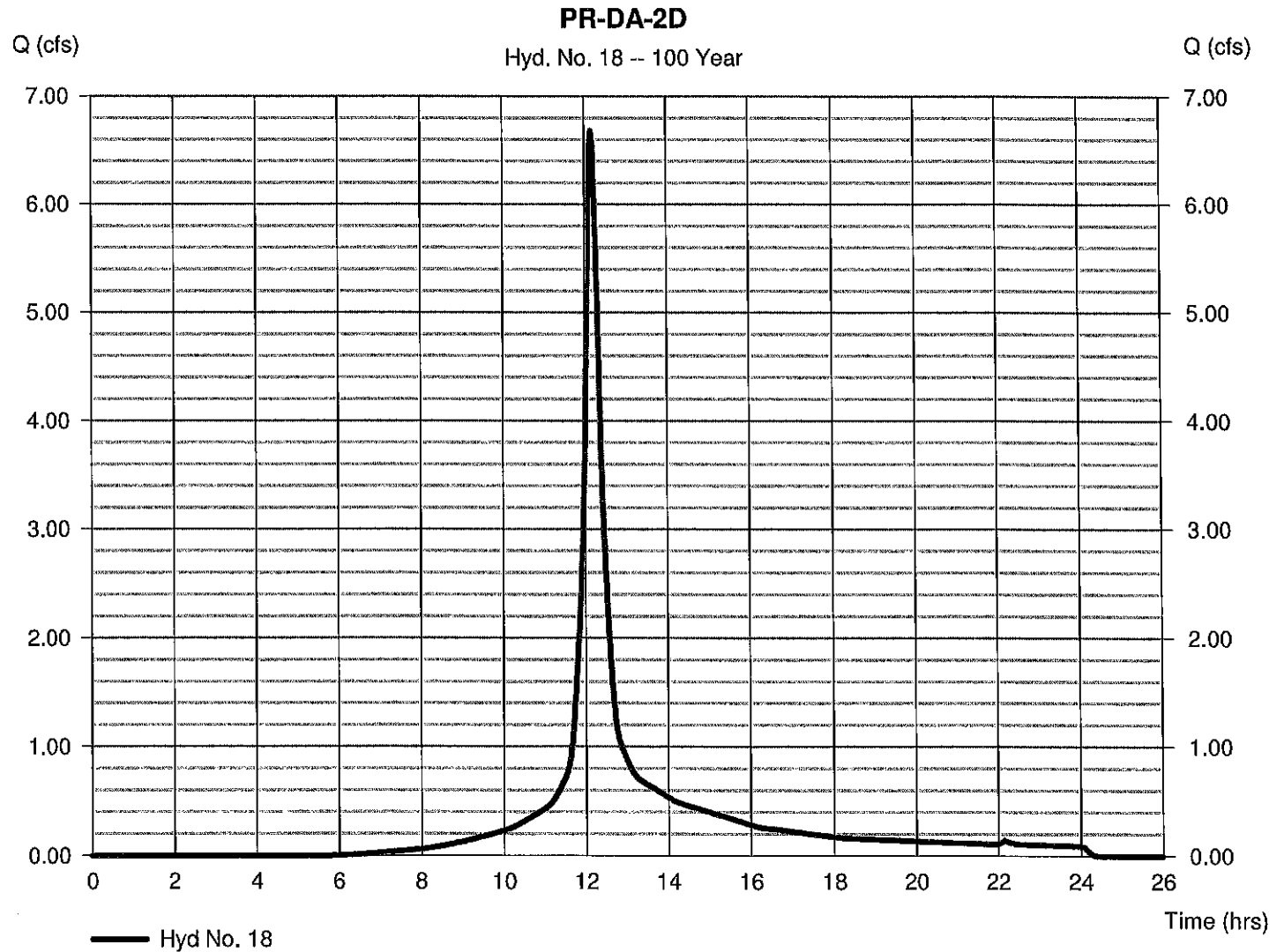
TR55 Tc Worksheet

Hyd. No. 18

PR-DA-2D

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 10.60	0.00	0.00	
Travel Time (min)	= 14.92 +	0.00 +	0.00 =	14.92
Shallow Concentrated Flow				
Flow length (ft)	= 325.00	0.00	0.00	
Watercourse slope (%)	= 13.80	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 5.99	0.00	0.00	
Travel Time (min)	= 0.90 +	0.00 +	0.00 =	0.90
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00 +	0.00 +	0.00 =	0.00

Total Travel Time, Tc .... **15.80 min**

Hydrograph Report

Hyd. No. 19

PR-DA-2E

Hydrograph type	= SCS Runoff	Peak discharge	= 9.476 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 42,271 cuft
Drainage area	= 2.100 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.00 min
Total precip.	= 8.04 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.100 x 79)] / 2.100

PR-DA-2E

Hyd. No. 19 -- 100 Year

D-40
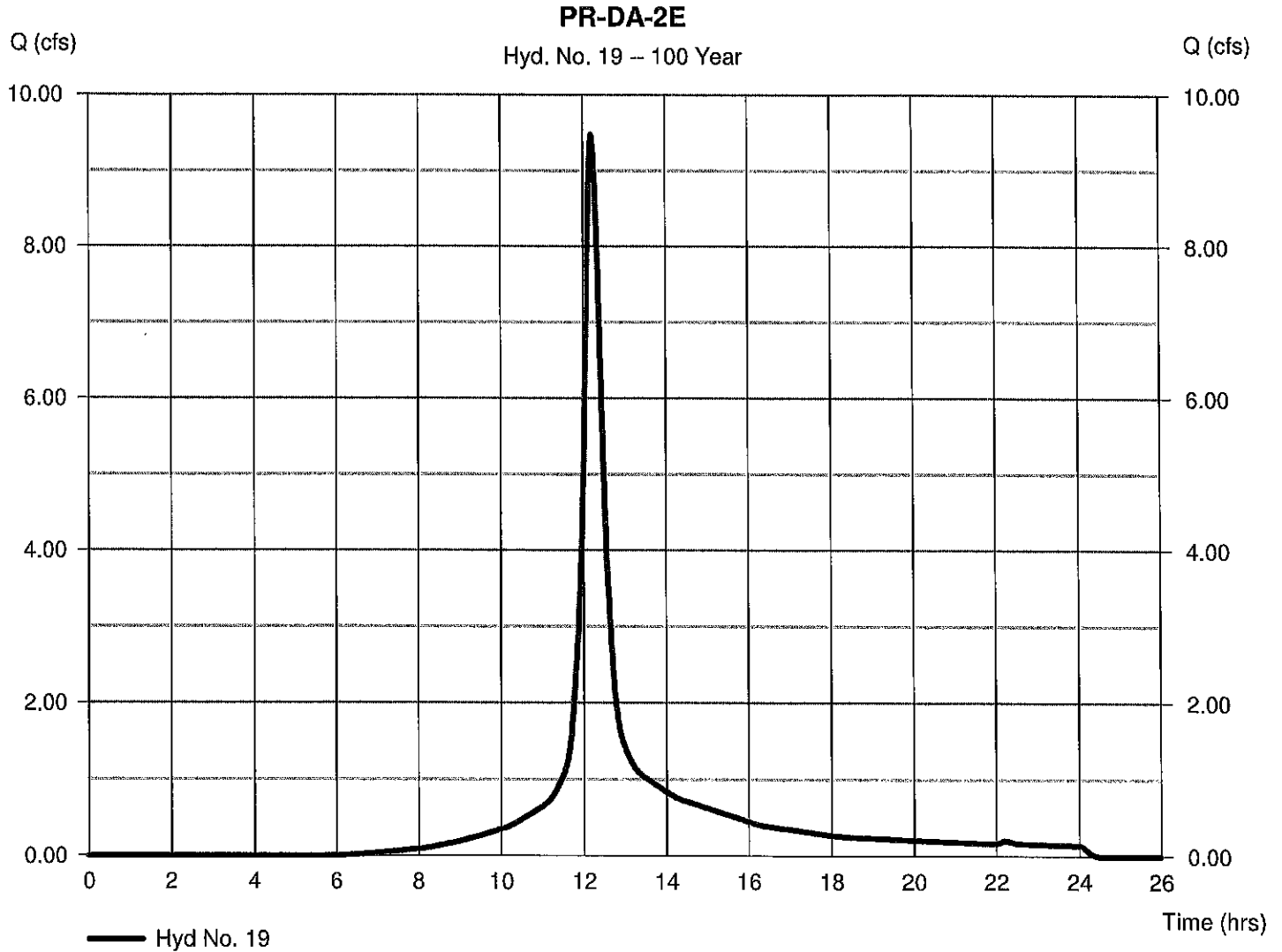
TR55 Tc Worksheet

Hyd. No. 19

PR-DA-2E

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 8.00	0.00	0.00	
Travel Time (min)	= 16.70 +	0.00 +	0.00 =	16.70
Shallow Concentrated Flow				
Flow length (ft)	= 500.00	0.00	0.00	
Watercourse slope (%)	= 16.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 6.45	0.00	0.00	
Travel Time (min)	= 1.29 +	0.00 +	0.00 =	1.29
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00 +	0.00 +	0.00 =	0.00

Total Travel Time, Tc .... **18.00 min**

Hydrograph Report

Hyd. No. 20

POST RUNOFF TO SIDE 2

Hydrograph type	= Combine	Peak discharge	= 112.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 663,851 cuft
Inflow hyds.	= 14, 15, 16, 17, 18, 19	Contrib. drain. area	= 32.900 ac

POST RUNOFF TO SIDE 2

Hyd. No. 20 -- 100 Year
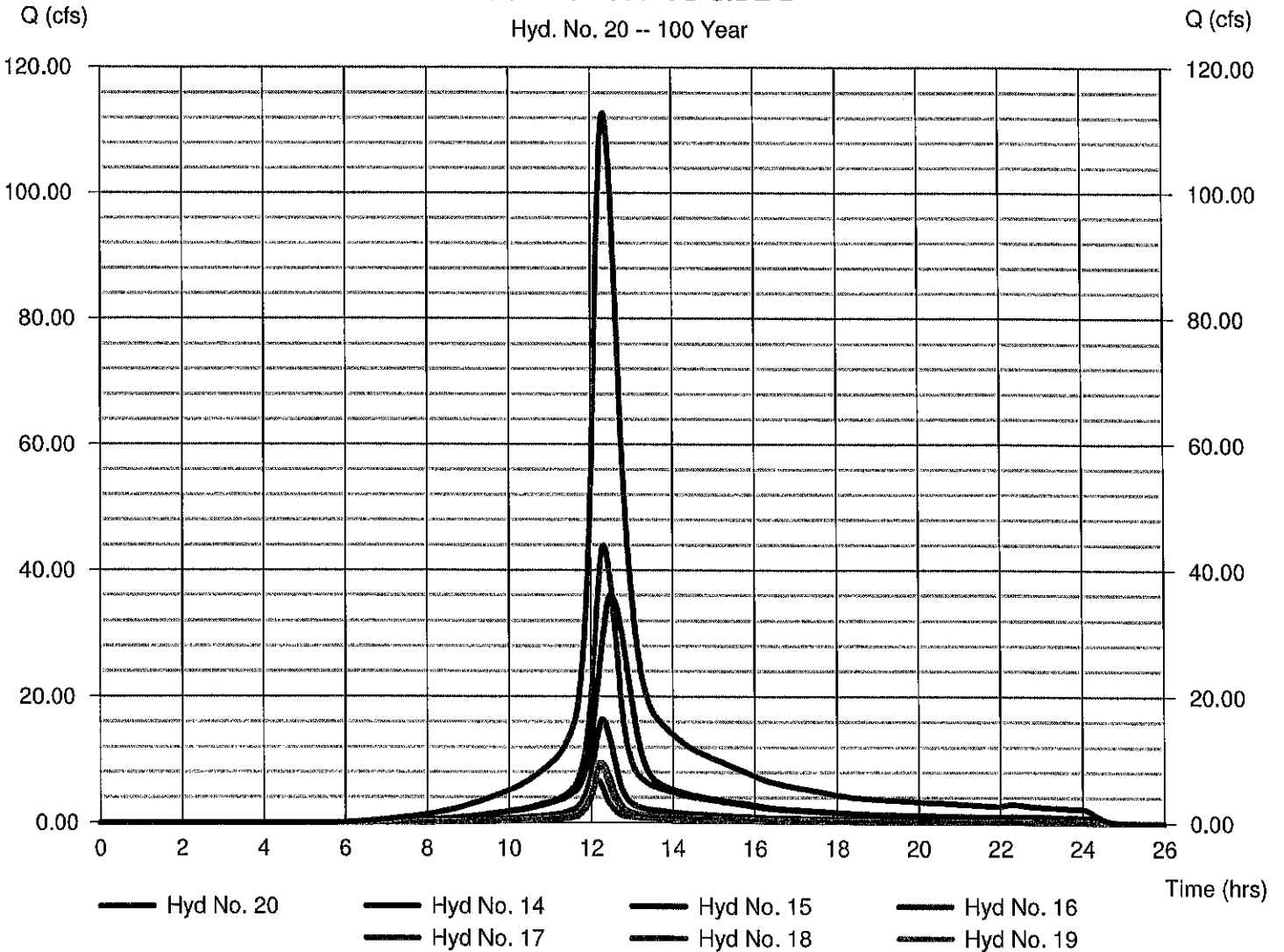
D-42

Hydrograph Report

Hyd. No. 21

DETENTION BASIN 1

Hydrograph type	= Reservoir	Peak discharge	= 44.50 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.87 hrs
Time interval	= 2 min	Hyd. volume	= 355,632 cuft
Inflow hyd. No.	= 11 - PR-DA-1B-1	Max. Elevation	= 440.50 ft
Reservoir name	= POND 1	Max. Storage	= 75,997 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

DETENTION BASIN 1

Hyd. No. 21 -- 100 Year

Hyd No. 21   Hyd No. 11   Total storage used = 75,997 cuft

D-43
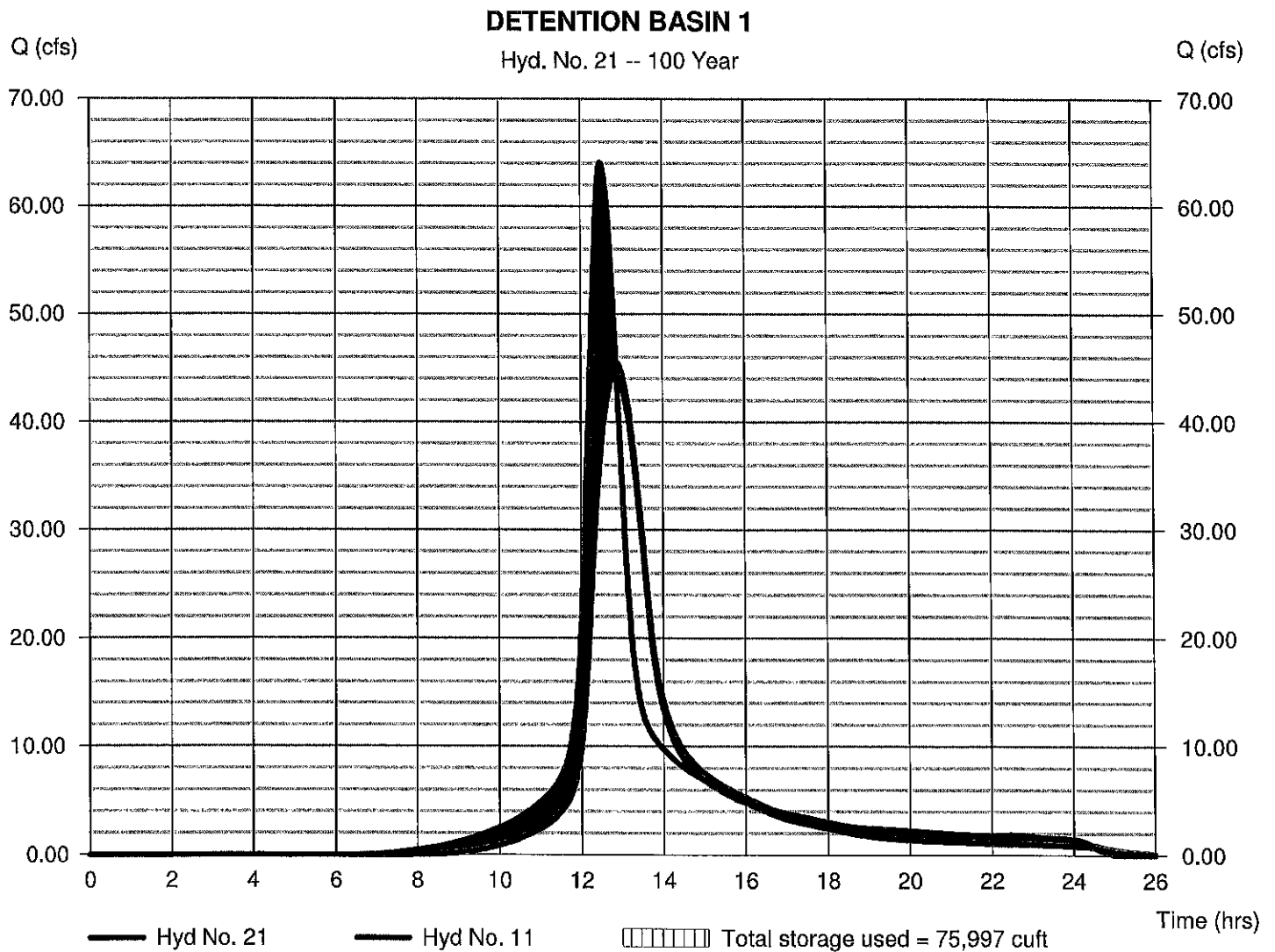
Hydraflow Hydrographs by Intelisolve v9.02   Tuesday, Aug 22, 2023

Pond No. 1 - POND 1
Pond Data
Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 436.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	436.50	14,061	0	0
0.50	437.00	15,208	7,317	7,317
1.50	438.00	17,630	16,419	23,736
2.50	439.00	20,127	18,879	42,615
3.50	440.00	22,720	21,424	64,038
4.50	441.00	25,567	24,144	88,182
5.50	442.00	28,507	27,037	115,219

Culvert / Orifice Structures   ### Weir Structures

	[A]	[B]	[C]	[PrfRsr]			[A]	[B]	[C]	[D]
Rise (in)	= 30.00	12.00	12.00	0.00	Crest Len (ft)		Inactive	10.00	0.00	0.00
Span (in)	= 30.00	12.00	12.00	0.00	Crest El. (ft)		= 440.00	441.50	0.00	0.00
No. Barrels	= 1	2	1	0	Weir Coeff.		= 3.33	2.60	3.33	3.33
Invert El. (ft)	= 436.50	436.50	438.00	0.00	Weir Type		= Rect	Broad	---	---
Length (ft)	= 60.00	0.00	0.00	0.00	Multi-Stage		= Yes	Yes	No	No
Slope (%)	= 2.00	0.00	0.00	n/a						
N-Value	= .013	.013	.013	n/a						
Orifice Coeff.	= 0.60	0.60	0.60	0.60	Exfil.(in/hr)		= 3.000 (by Contour)			
Multi-Stage	= n/a	Yes	No	No	TW Elev. (ft)		= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet and outlet control. Weir risers are checked for orifice conditions.

Stage (ft)   **Stage / Discharge**   Elev (ft)

——— Total Q

Discharge (cfs)

D-44

Hydrograph Report

Hyd. No. 22

POST TO SIDE 1 W DETENTION

Hydrograph type	= Combine	Peak discharge	= 48.52 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 449,716 cuft
Inflow hyds.	= 10, 12, 21	Contrib. drain. area	= 4.600 ac

POST TO SIDE 1 W DETENTION

Hyd. No. 22 -- 100 Year

Legend: Hyd No. 22 — Hyd No. 10 — Hyd No. 12 — Hyd No. 21

D-45

Hydrograph Report

Hyd. No. 23

exist total site runoff

Hydrograph type	= Combine	Peak discharge	= 163.56 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.43 hrs
Time interval	= 2 min	Hyd. volume	= 1,136,432 cuft
Inflow hyds.	= 3, 9	Contrib. drain. area	= 0.000 ac
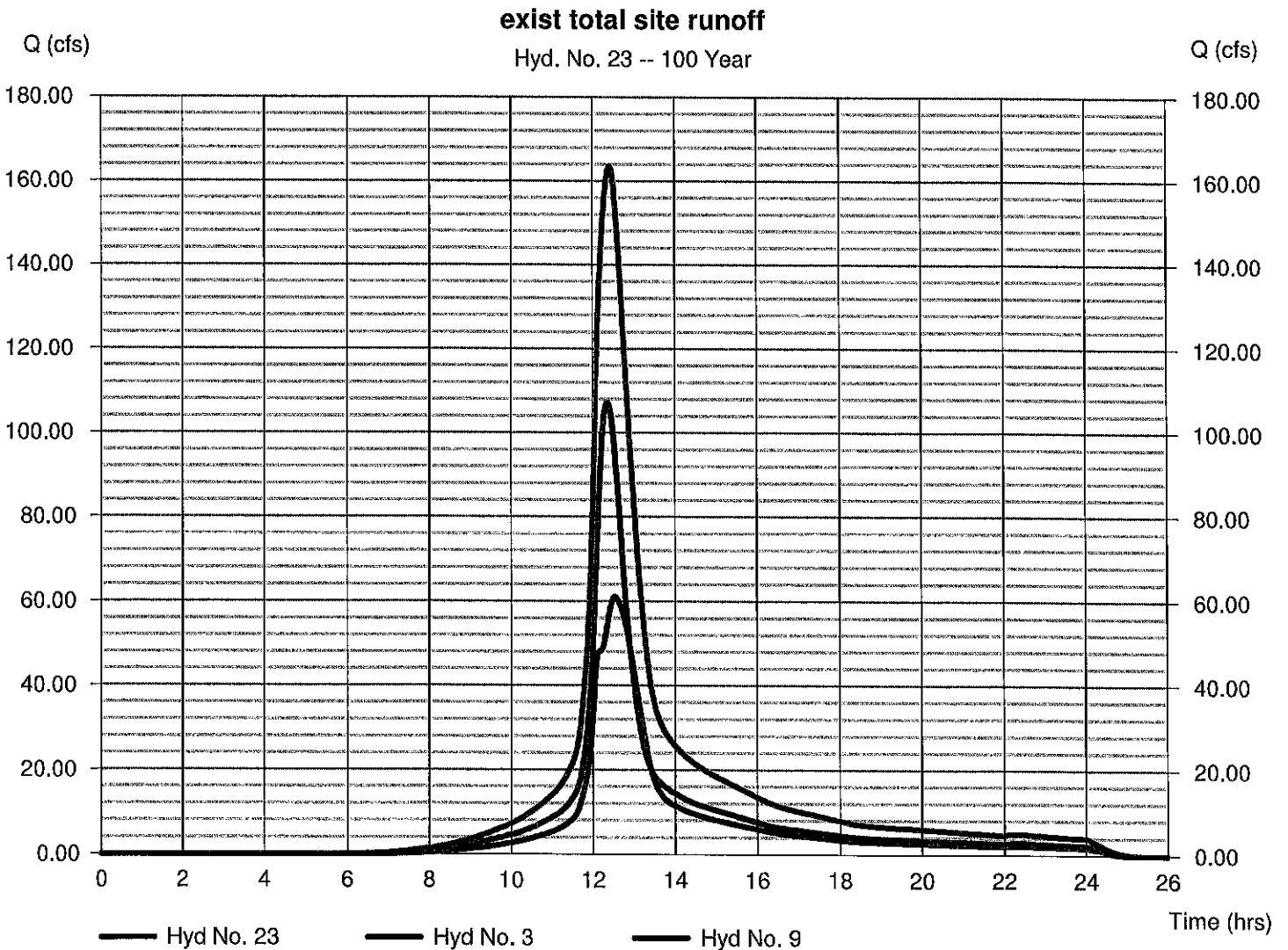
exist total site runoff

Hyd. No. 23 -- 100 Year

Legend: Hyd No. 23 — Hyd No. 3 — Hyd No. 9

D-46

Hydrograph Report

Hyd. No. 24

DETENTION BASIN 2

Hydrograph type	= Reservoir	Peak discharge	= 25.37 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.87 hrs
Time interval	= 2 min	Hyd. volume	= 210,043 cuft
Inflow hyd. No.	= 14 - PR-DA-2A-1	Max. Elevation	= 424.46 ft
Reservoir name	= POND 2	Max. Storage	= 49,503 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

DETENTION BASIN 2

Hyd. No. 24 -- 100 Year

Hyd No. 24   Hyd No. 14   Total storage used = 49,503 cuft

Time (hrs)

D-47
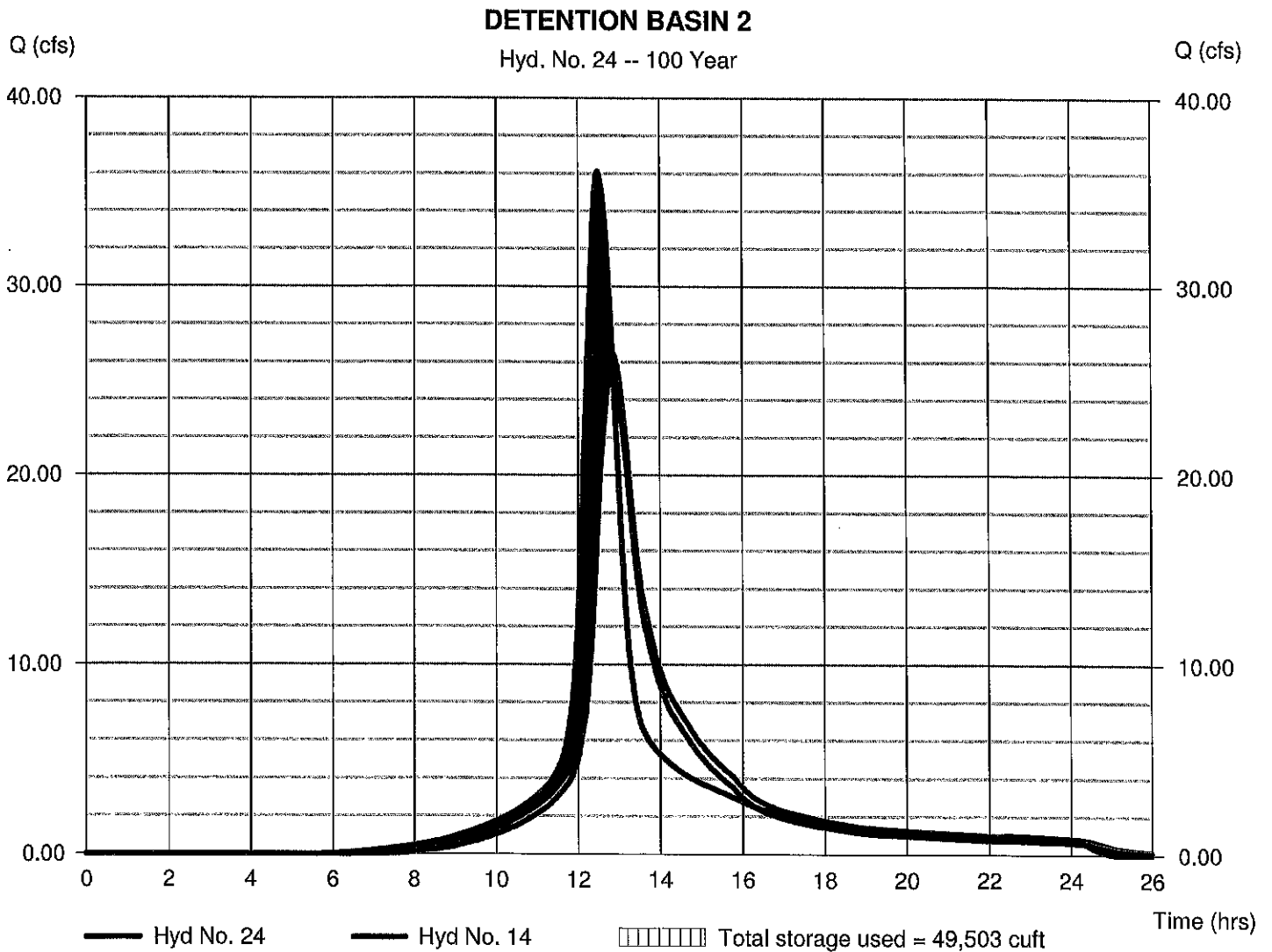
Hydraflow Hydrographs by Intelisolve v9.02   Tuesday, Aug 22, 2023

Pond No. 2 - POND 2
Pond Data
Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 420.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	420.00	5,382	0	0
1.00	421.00	8,271	6,774	6,774
2.00	422.00	11,160	9,679	16,453
3.00	423.00	12,968	12,051	28,504
4.00	424.00	14,776	13,861	42,365
5.00	425.00	16,730	15,741	58,106
6.00	426.00	18,683	17,696	75,802

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	12.00	12.00	0.00
Span (in)	= 24.00	12.00	12.00	0.00
No. Barrels	= 1	2	1	0
Invert El. (ft)	= 420.00	420.00	422.00	0.00
Length (ft)	= 60.00	0.00	0.00	0.00
Slope (%)	= 2.00	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	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.50	10.00	0.00	0.00
Crest El. (ft)	= 423.00	425.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= No	Yes	No	No
Exfil.(in/hr)	= 3.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet and outlet control. Weir risers are checked for orifice conditions.

Stage / Discharge
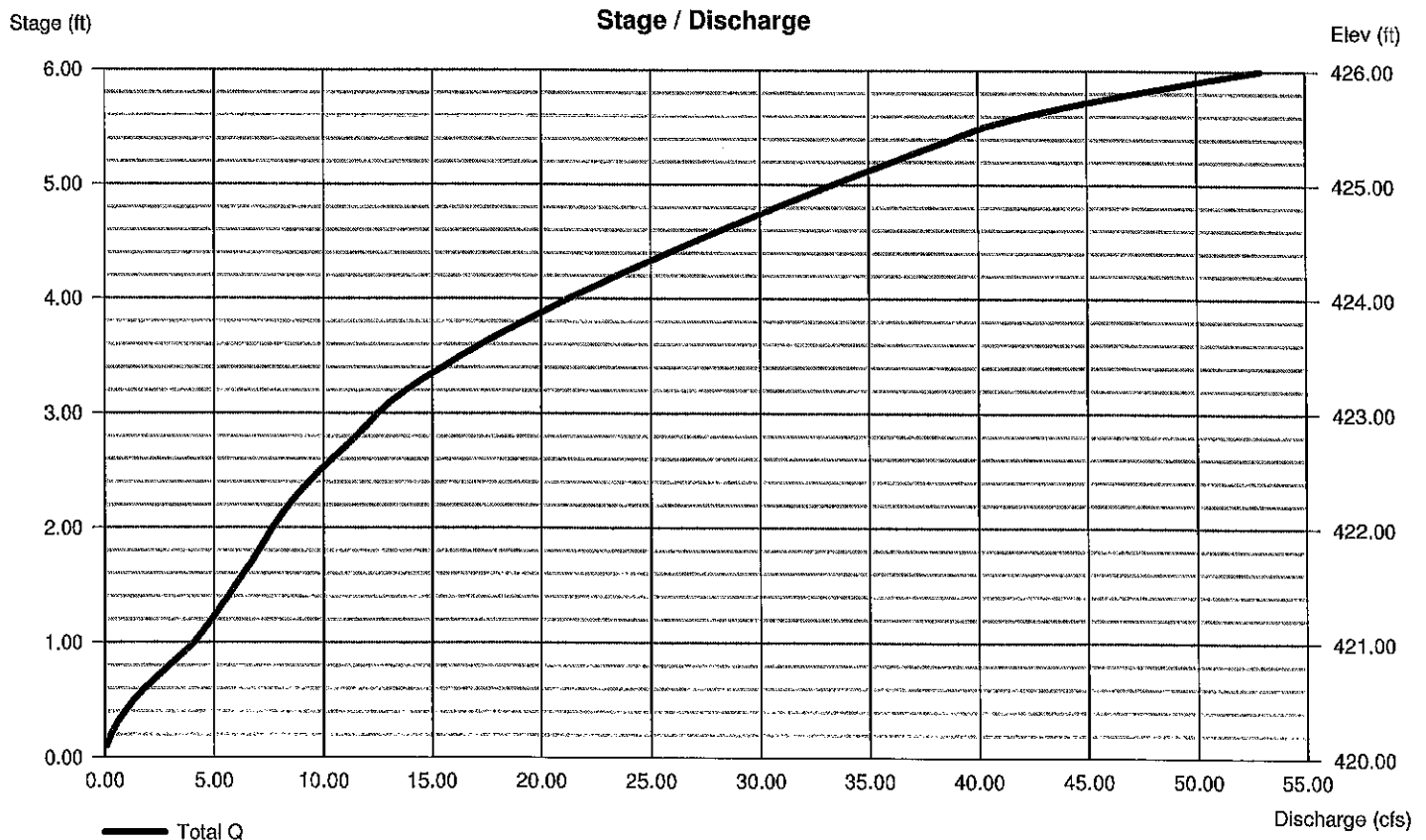
Hydrograph Report

Hyd. No. 25

POST TO SIDE 2 W DETENTION

Hydrograph type	= Combine	Peak discharge	= 93.18 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 637,586 cuft
Inflow hyds.	= 15, 16, 17, 18, 19, 24	Contrib. drain. area	= 21.300 ac

POST TO SIDE 2 W DETENTION

Hyd. No. 25 -- 100 Year

Legend: Hyd No. 25, Hyd No. 15, Hyd No. 16, Hyd No. 17, Hyd No. 18, Hyd No. 19, Hyd No. 24

D-49
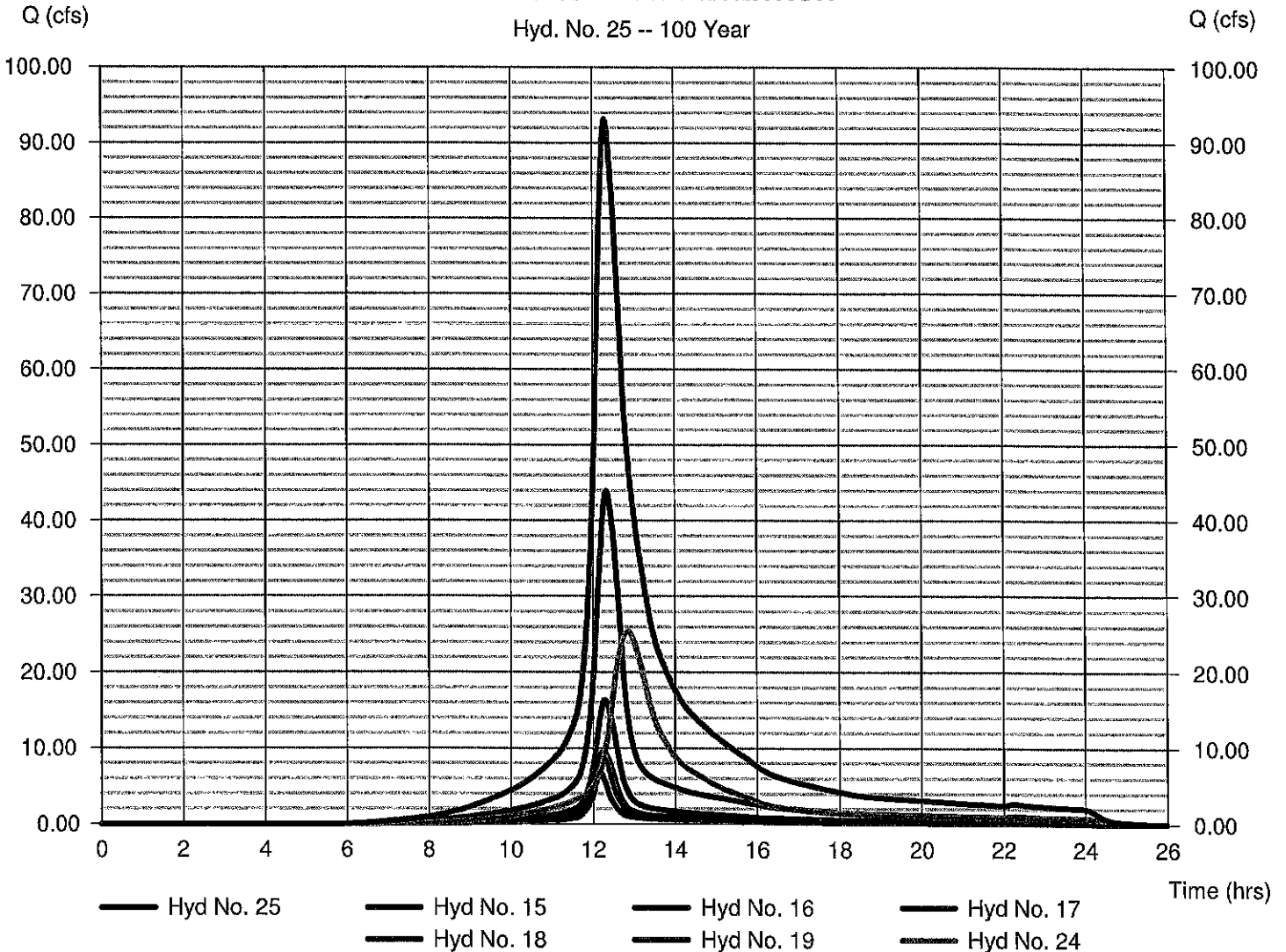
Hydrograph Report

Tuesday, Aug 22, 2023

Hyd. No. 26

POST TOTAL SITE RUNOFF

Hydrograph type	= Combine	Peak discharge	= 139.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 1,087,302 cuft
Inflow hyds.	= 22, 25	Contrib. drain. area	= 0.000 ac

POST TOTAL SITE RUNOFF

Hyd. No. 26 -- 100 Year

Legend: Hyd No. 26   Hyd No. 22   Hyd No. 25

Q (cfs) / Time (hrs)

D-50

EXISTING WATERSHED MAP
HOME ACRES ESTATES
PROPERTY OF FLANDERS ROAD ESTATES, LLC
FLANDERS ROAD
EAST HAMPTON, CONNECTICUT

Drainage Area Data:

ex-da-1a
3.8 Ac
Wtd CN=79
Tc=9.0 Min

ex-da-1b
22.1 Ac
Wtd CN=74
Tc=51.8 Min

ex-da-2a
16.4 Ac
Wtd CN=76
Tc=46.9 Min

ex-da-2b
2.2 Ac
Wtd CN=79
Tc=21.7 Min

ex-da-2c
11.8 Ac
Wtd CN=79
Tc=29.3 Min

ex-da-2d
1.4 Ac
Wtd CN=79
Tc=15.8 Min

ex-da-2e
2.1 Ac
Wtd CN=79
Tc=18.0 Min

Map area labels:
- ex-da-1a 3.8 Ac
- ex-da-1b 22.1 Ac
- ex-da-2a 16.4 Ac
- ex-da-2b 2.2 Ac
- ex-da-2c 11.8 Ac
- ex-da-2d 1.4 Ac
- ex-da-2e 2.1 Ac

Discharge points:
- DISCHARGE FROM 1-A
- DISCHARGE FROM 1-B
- DISCHARGE FROM 2-A
- DISCHARGE FROM 2-B
- DISCHARGE FROM 2-C
- DISCHARGE FROM 2-D
- DISCHARGE FROM 2-E

DRAINAGE DIVIDE 1
DRAINAGE DIVIDE 2

EXTENT OF DRAINAGE AREA DETERMINED FROM TOWN GIS TOPOGRAPHY

FLANDERS ROAD
PECAUSETT TRAIL

Soil type labels on map: Wx(B), Wx(C), Pd(C), Pd(B), Pd(D), Ca(C), Ca(D), Ni(E), Ni(C), Ri, Sa

Travel path

Catch basin notes (Flanders Road):

EX. CB
TF 481.7
INV EL. 479.2±

EX. CB
TF 478.1±
12" PVC INV 476.6±
(W) 12" PVC INV 478.4±
(N)

EX. CB
TF 450.7
12" RCP INV 446.8±

EX. CB
TF 448.5
(E) 12" RCP INV 443.7±
(N) 15" RCP INV 443.8±
(N) 12" PVC INV 445.3±

EX. CB
TF 428.2
(E) 12" RCP INV 425.3±
(N) 15" RCP INV 425.3±
(N) 12" PVC INV 425.3±

12" RCP FILLED WITH DIRT

Robert V. Baltramaitis, P.E.
27 Tammy Hill Road
Wallingford, Connecticut 06492
(203) 915-8301

DATE: 8/21/2023
SCALE: 1" = 100'
SHT #: WS-1

LEGEND

UPLAND SOIL TYPES:
Ca - Canton/ Charlton fine sandy loams
Ni - Nipmuck/ Brookfield complex (rocky)
Pd - Paxton/ Montauk fine sandy loams
Wx - Woodbridge fine sandy loam

WETLAND SOIL TYPES:
Sa - Saco silt loam
Ri - Ridgebury/ Leicester/ Whitman extremely stony fine sandy loam

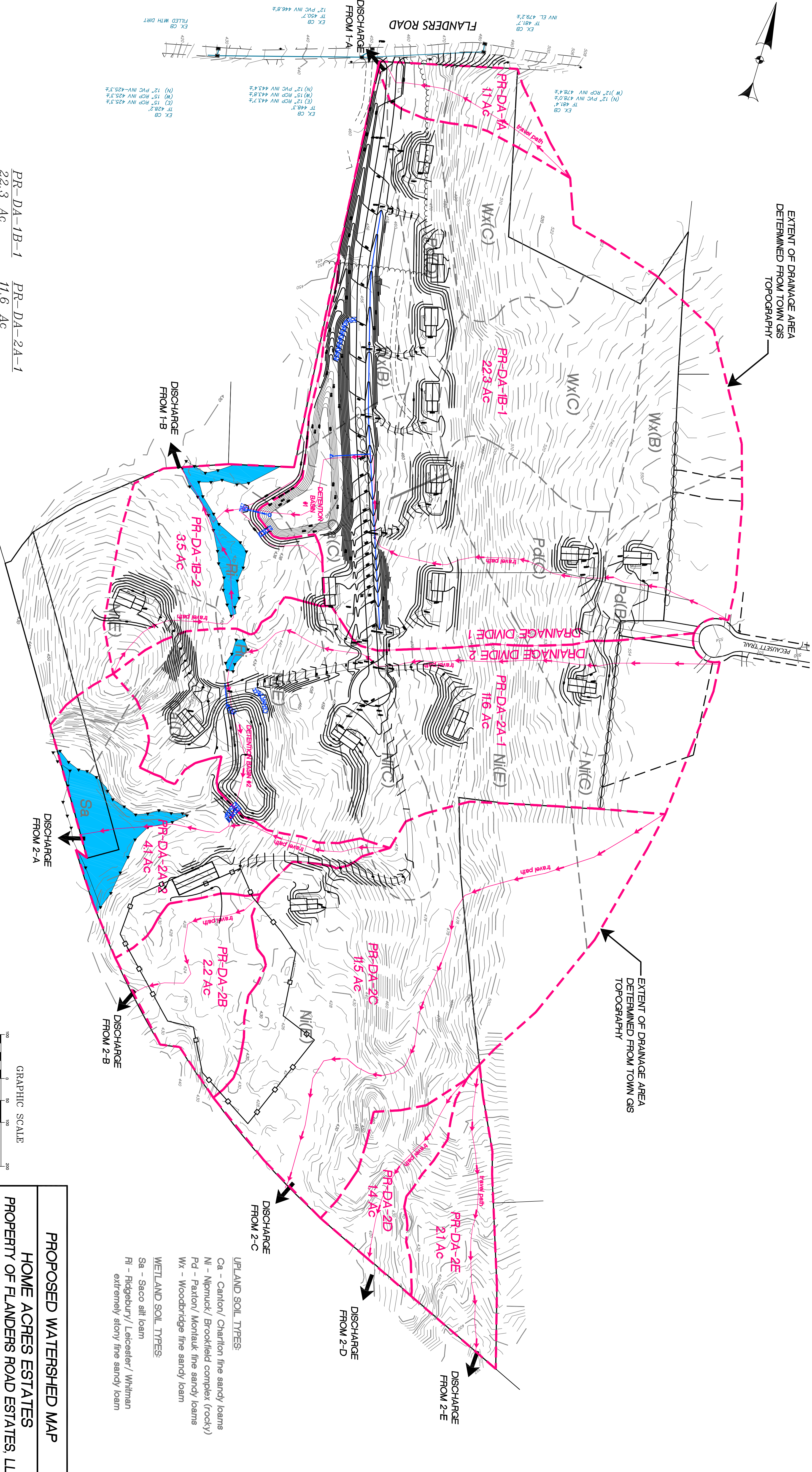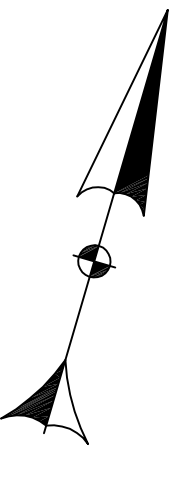**GRAPHIC SCALE**
(IN FEET)
1 inch = 100 ft.

REVISIONS
#	DATE	DESCRIPTION

PROPOSED WATERSHED MAP

HOME ACRES ESTATES
PROPERTY OF FLANDERS ROAD ESTATES, LLC
FLANDERS ROAD
EAST HAMPTON, CONNECTICUT

Robert V. Baltramaitis, P.E.
27 Tammy Hill Road
Wallingford, Connecticut 06492
(203) 915-8301

DATE:	8/21/2023
SCALE:	1" = 100'
SHT #:	WS-2

Drainage Area Summary

PR-DA-1A	PR-DA-1B-1	PR-DA-2A-1
1.1 Ac	22.3 Ac	11.6 Ac
Wtd CN=79	Wtd CN=76	Wtd CN=80
Tc=17.7 Min	Tc=44.5 Min	Tc=47.1 Min

PR-DA-1B-2	PR-DA-2A-2	PR-DA-2B
3.5 Ac	4.1 Ac	2.2 Ac
Wtd CN=80	Wtd CN=79	Wtd CN=79
Tc=16.8 Min	Tc=24.0 Min	Tc=21.8 Min

PR-DA-2C	PR-DA-2D	PR-DA-2E
11.5 Ac	1.4 Ac	2.1 Ac
Wtd CN=79	Wtd CN=79	Wtd CN=79
Tc=29.3 Min	Tc=15.8 Min	Tc=18.0 Min

UPLAND SOIL TYPES:
Ca - Canton/ Charlton fine sandy loams
Ni - Nipmuck/ Brookfield complex (rocky)
Pd - Paxton/ Montauk fine sandy loams
Wx - Woodbridge fine sandy loam

WETLAND SOIL TYPES:
Sa - Saco silt loam
Ri - Ridgebury/ Leicester/ Whitman extremely stony fine sandy loam

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

REVISIONS

#	DATE	DESCRIPTION

Map annotations:
EXTENT OF DRAINAGE AREA DETERMINED FROM TOWN GIS TOPOGRAPHY
FLANDERS ROAD
PECAUSETT TRAIL
DRAINAGE DIVIDE 1
DETENTION BASIN #1
DETENTION BASIN #2
DISCHARGE FROM 1-A
DISCHARGE FROM 1-B
DISCHARGE FROM 2-A
DISCHARGE FROM 2-B
DISCHARGE FROM 2-C
DISCHARGE FROM 2-D
DISCHARGE FROM 2-E

PR-DA-1A 1.1 Ac
PR-DA-1B-1 22.3 Ac
PR-DA-1B-2 3.5 Ac
PR-DA-2A-1 11.6 Ac
PR-DA-2A-2 4.1 Ac
PR-DA-2B 2.2 Ac
PR-DA-2C 11.5 Ac
PR-DA-2D 1.4 Ac
PR-DA-2E 2.1 Ac

Soil labels on map: Wx(C), Wx(B), Pd(C), Pd(B), Ni(C), Ni(E), Sa, Ri

EX. CB annotations (Flanders Road):
EX. CB / TF 450.7 / INV 446.8± / 12" RCP INV 446.8± / filled with dirt
EX. CB / TF 448.7 / 12" RCP INV 443.7± / 15" RCP INV 443.7± / 12" RCP INV 425.3±
EX. CB / TF 428.2 / 12" RCP INV 425.3± / 15" RCP INV 425.3± / 12" PVC INV 425.3±
EX. CB / TF 481.7 / INV EL. 479.2± / 12" PVC INV 478.4± / 12" RCP INV 478.4±