Baughman

TRANSMITTAL

TO:	FROM:
Vickie Huang	Trevor Kurth
COMPANY:	DATE:
City of Wichita	4-17-07
ADDRESS:	PROJECT:
7th Floor City Hall	Rennick Commercial Add
CITY/ STATE:	PROJECT NUMBER:
Wichita, Kansas	

RE:
Rennick Commercial Addition Drain/Grade

VIA: DELIVERY

We are sending you ☒ ATTACHED ☐ UNDER SEPARATE COVER

☒ PLANS ☐ PRINTS ☐ SHOP DRAWINGS ☐ SAMPLES ☐ SPECS
☐ COPY OF LETTER ☐ CHANGE ORDER ☐ DISK ☐ OTHER

COPIES	DATE	DESCRIPTION
1	**4-17-07**	Rennick Commercial Addition Drain/Grade

☐ URGENT ☒ FOR APPROVAL ☐ FOR YOUR INFO ☒ FOR REVIEW & COMMENT
☐ APPROVED, AS NOTED ☐ REVISE AS NOTED ☐ REVISE AND RETURN
☐ AS REQUESTED ☐ PLEASE REPLY ☐ FOR BIDS DUE ☐

NOTES/ COMMENTS:

SIGNED: _____
Trevor R. Kurth, I.E.

Copy: file

ENGINEERING
SURVEYING
PLANNING
LANDSCAPE ARCHITECTURE

Baughman Company, P.A.
315 Ellis Street
Wichita, Kansas 67203
P 316.262.7271
F 316.262.0149

DRAINAGE PLAN

RENNICK COMMERCIAL ADDITION

TO

WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY

Baughman
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

16 APRIL 2007

ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

DRAINAGE PLAN
RENNICK COMMERCIAL ADDITION

FINAL REPORT

Prepared by Baughman Company, P.A.
16 April 2007

By N. Brent Wooten, P.E.
Trevor R. Kurth, I.E.
Nicholas H. Jefferson, I.E.

REPORT CONTENTS

Adopted: February 23, 2007

WICHITA

Public Works, Engineering Division
Final Drainage Plan Submittal Checklist

Reviewer:_____ Date:_____

Subdivision Name: RENNICK COMMERCIAL ADD Location: 45th & HOOVER

Total Land Area Of Ownership: ±4.5 Acres

Type: ____Residential __X__Commercial ____Industrial ____Recreation ____Municipal ____Other

Applicant: George Rennick, etal Contact:_____ Phone #:_____

Engineer: BAUGHMAN CO. PA Contact: TREVOR KURTH Phone # 262-7271

Please check the appropriate box: I = Included; NA = Non-Applicable; R= Required prior to development
(If "NA" is checked, an explanation must be entered)

	Applicant			Engr	
Tab 1. Project Narrative	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Site Location Map, using USGS Map	X				
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain	X				
C. Discussion of offsite conditions	X				
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series	X				
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design	X				
F. Copy of the plat	X				
G. Preliminary grading plan (The final grading plan shall be sealed, signed and dated prior to Engineering receiving the final sanitary sewer plans. One plan sheet and PDF shall be submitted to the Subdivision Engineer.)	X				
H. Professional Engineer seal, signature and date on cover of report	X				
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover	X				

	Applicant			Engr	
Tab 2. Existing Conditions Runoff Calculations	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)	X				
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)	X				
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)	X				
D. Total Site Area and Total Impervious Area (acres)	X				
E. Benchmarks used for site control	X				
F. Streams, creeks, and waterway labeled	X				
G. Predominant soils from USDA soil surveys, and/or on site soil borings	X				
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted	X				
I. Location of existing roads, buildings, parking lots and other impervious areas.	X				

Consulting Engineer Initials TRK

J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements		X	None on site		
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	X				
L. Flow paths	X				
M. Location and dimensions of existing channels, bridges or culvert crossings	X				
N. Existing conditions hydrologic analysis for runoff rates, volumes and velocities showing methodologies used and supporting calculations (2, 5, 10, 25 & 100 year, 24-hour storm events) or Critical Duration	X				
O. Assumed pre-developed runoff curve numbers	X				
P. Existing time of concentrations used in calculations	X				
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site	X				
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)	X				
S. Cross-section data for open channels	X				
T. Ground water elevations, if applicable		X	NA		

	Applicant			Engr	
Tab 3. Post-Development Hydrologic Analysis	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Proposed (post-development) conditions hydrologic and hydraulic analysis for runoff rates, volumes, HGL, and velocities showing the methodologies used and supporting calculations for all applicable design storms (2, 5, 10, 25 & 100 year, 24-hour storm events)	X				
B. Proposed time of concentrations used in calculations	X				
C. Assumed post-developed runoff curve numbers	X				
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)	X				
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration	X				
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities		X	None proposed on site		
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary	X				
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)	X				
I. Design water surface elevations and normal pool elevation for ponds.		X	No pond proposed		
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.	X				
K. Proposed limits of clearing and grading	X				
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.	X				
M. Location of existing and proposed utilities (e.g., water, sewer) and easements	X				
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	X				
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings	X				

Consulting Engineer Initials TRK

P. Preliminary selection and location of stormwater controls	x				
Q. Emergency overflow structure's flow path	x				
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)		x	No detention on site		
S. The 100-year 24-hour HWL delineated on the plan for detention pond		x	" "		
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds		x	" "		
U. Stormwater Management Facilities located within a Reserve		x	" "		
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)		x	" "		
W. Off-site drainage easements or agreements required, where necessary	x				

	Applicant			Engr	
Tab 4. Floodplain Submittal	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Provide source of flood profile	x				
B. Nearest base flood elevations		x	No FEMA on property		
C. Delineation of pre-developed regulatory floodplain/floodway limits		x			
D. Delineation of post-developed regulatory floodplain and floodway limits		x			
E. Floodplain boundary determination per elevation (project limits shown)		x			
F. Provide source of floodway data table and discharges		x			
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions or required permits		x			
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions		x			
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)		x			
J. Flood plains and floodways located within a Reserve, where necessary		x			

	Applicant			Engr	
Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	**I/R**	**NA**	**Explanation / Location in Plan**	**I/R**	**NA**
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)		x	None expected		
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)		x	" "		
C. Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.) Shall be included and approved when project modifies the limits of the floodway.		x	" "		
D. Kansas Department of Transportation		x	" "		
E. Sedgwick County Right-of-way Permit	x				

Consulting Engineer Initials TPK

PROJECT NARRATIVE

EXISTING CONDITIONS

The site is located at the northwest corner of the intersection of 45th Street North and Hoover Road. The site consists of approximately 4.3 acres of open space and is generally flat. The site appears to drain to the southwest into a roadside ditch.

PROPOSED CONDITIONS

The site is proposed to be developed into a commercial site. The site will consist of three commercial lots with associated paving, storm sewer, and utilities. The site will drain via storm sewer into a system proposed in the adjacent residential development. This system will drain into a proposed detention pond within the residential development.

OFFSITE CONDITIONS

The site is generally flat and drains to the southwest. There is no significant amount of offsite drainage encroaching upon the site. Currently, the adjacent roadside barrow ditches convey the site's runoff as well as the street runoff. The ditches have been recently re-graded, but do not appear to have conveyance to any structure. Upon multiple site visits after storm events, the ditches appear to hold water and have little or no positive drainage.

EXISTING CONDITIONS RUNOFF CALCULATIONS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in calculating the existing conditions runoff values.

- STORM SERIES
  - Rational Method utilized for site runoff
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, 100-yr Storm Events

- DRAINAGE AREAS
  - Areas per existing topography and site visits
  - Hydraflow Hydrograph utilized for flow calculations
  - Time of Concentration using City of Wichita minimum 15 min

SITE CHARACTERISTICS

The proposed site is currently open space with grass cover. A rational 'C' factor of 0.65 was used for these conditions. This was for Agricultural Pasture Area with slopes less than 1%. The site runoff generally flows to the southwest and into the drainage ditch along 45th Street N. A time of concentration of 15 minutes was used. The soil type for the area is Type D (Appendix A).

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The 4.3 acre site produces a 100-yr flow of 20 cfs under existing conditions. This runoff appears to flow to the southwest into the roadside ditch along 45th Street.

DOWNSTREAM DRAINAGE CAPACITY

As stated above, the site is very flat, but generally drains to the southwest into the ditch along 45th Street North. There is no visible outlet for the ditch and it appears water collects in both the north and south ditches along 45th Street. Based on site visits the water does not drain once entering the newly graded ditch sections.

POST-DEVELOPMENT HYDROLOGIC ANALYSIS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in developing the drainage and grading plans.

- STORM SERIES
  - Rational Method utilized for site runoff
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, 100-yr Storm Events

- DRAINAGE AREAS
  - Areas per existing topography and site visits
  - Hydraflow Hydrograph utilized for flow calculations
  - Time of Concentration using City of Wichita minimum 15 min

DETENTION FACILITIES

There is no detention provided on the proposed site. The site will utilize regional detention ponds which will be constructed in the adjacent residential subdivision. The proposed site's runoff will be conveyed via a storm water sewer system which will run through the proposed subdivision to the west, into the detention ponds. The detention ponds are designed to have a static water surface elevation of 1325.0 and a 100-yr WSE of 1330.0.

PROPOSED CONDITIONS HYDROLOGIC ANALYSIS

The 4.3 acre developed site will produce 25 cfs in the 100-yr storm event. This flow is based on

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

No potential upstream impacts are expected with this development. The site will convey runoff via storm water sewers into a proposed detention pond within the future adjacent subdivison. The site should be allowed to sheet flow to the west prior to development of the proposed subdivision. No downstream impacts are expected upon development.

SOURCE OF FLOODPLAIN INFORMATION

The site lies within a FEMA Zone X. The site is not located within a mapped FEMA floodplain. The location of the property, on FEMA FIRM Panel 195 of 700, map 20173C0195E, is attached as Exhibit 6 (for Sedgwick County, effective February 2, 2007).

FEDERAL, STATE, & LOCAL PERMITTING

US ARMY CORPS OF ENGINEERS
There does not appear to be any USACOE permitting needed on the proposed project.

KANSAS DEPT OF AGRICULTURE – DWR PERMITTING
There does not appear to be any DWR permitting needed on the proposed site at this time.

FEMA
There is no mapped floodplain located upon the proposed site. Therefore, no FEMA permitting is expected at this time.

KANSAS DEPT OF TRANSPORTATION
There does not appear to be any KDOT permitting needed on the proposed project.

SEDGWICK COUNTY ROW
There does not appear to be any Sedgwick County Permitting on the proposed project.

SUPPORTING CALCULATIONS

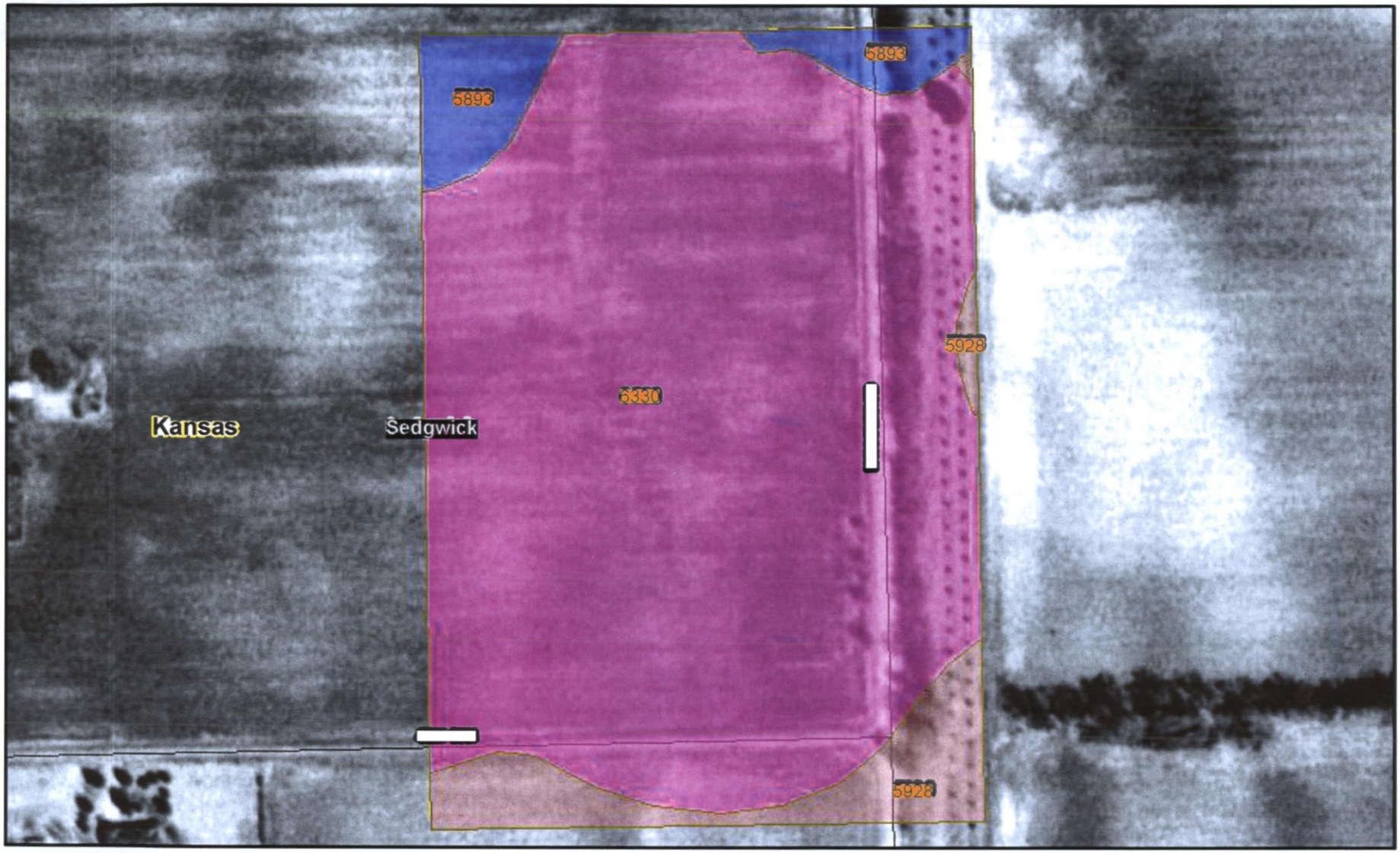
APPENDIX A: USGS Soils Survey

APPENDIX B: HydraFlow Hydrograph
- -Existing Conditions
- -Post Conditions

APPENDIX C: HydraFlow Storm Sewers
- -SWS System

USGS Soils Survey

HYDROLOGIC SOIL GROUP RATING FOR SEDGWICK COUNTY, KANSAS



Meters
0 25 50 100

Feet
0 50 100 200 300 400

MAP LEGEND

Hydrologic Soil Group

{Dominant Condition, <}

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available
- Soil Map Units
- Cities
- Detailed Counties
- Detailed States
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 14

Soil Survey Area: Sedgwick County, Kansas
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:24000

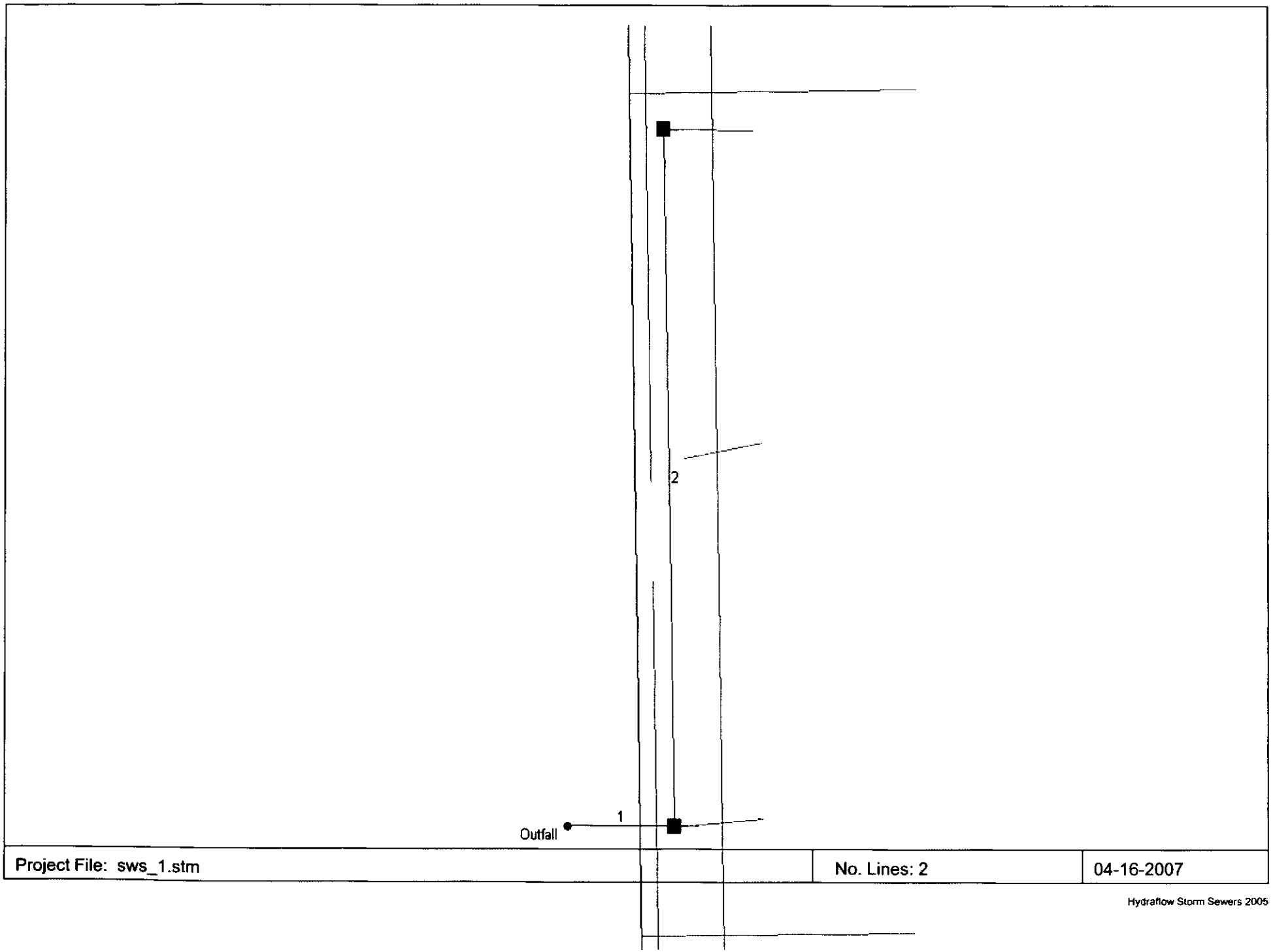
Map comprised of aerial images photographed on these dates:
3/20/1996; 3/31/1996

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

HydraFlow Hydrograph

-Existing Conditions
-Post Development Conditions

Hydraflow Plan View



Project File: sws_1.stm	No. Lines: 2	04-16-2007

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	32.3	0.0	DrGrt	0.00	1.90	0.80	15.0	1328.00	0.49	1328.16	24	Cir	0.013	1.50	1332.10	
2	1	189.8	-91.1	DrGrt	0.00	2.40	0.80	15.0	1328.66	0.71	1330.00	18	Cir	0.013	1.00	1332.70	

Project File: sws_1.stm | Number of lines: 2 | Date: 04-16-2007

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1		17.65	24 c	32.3	1328.00	1328.16	0.495	1329.72	1329.92	n/a	1330.51 i	End
2		10.00	18 c	189.8	1328.66	1330.00	0.708	1330.51*	1332.23*	0.50	1332.73	1

Project File: sws_1.stm	Number of lines: 2	Run Date: 04-16-2007

NOTES: c = cir; e = ellip; b = box; Return period = 10 Yrs. ; *Surcharged (HGL above crown). ; i - Inlet control.

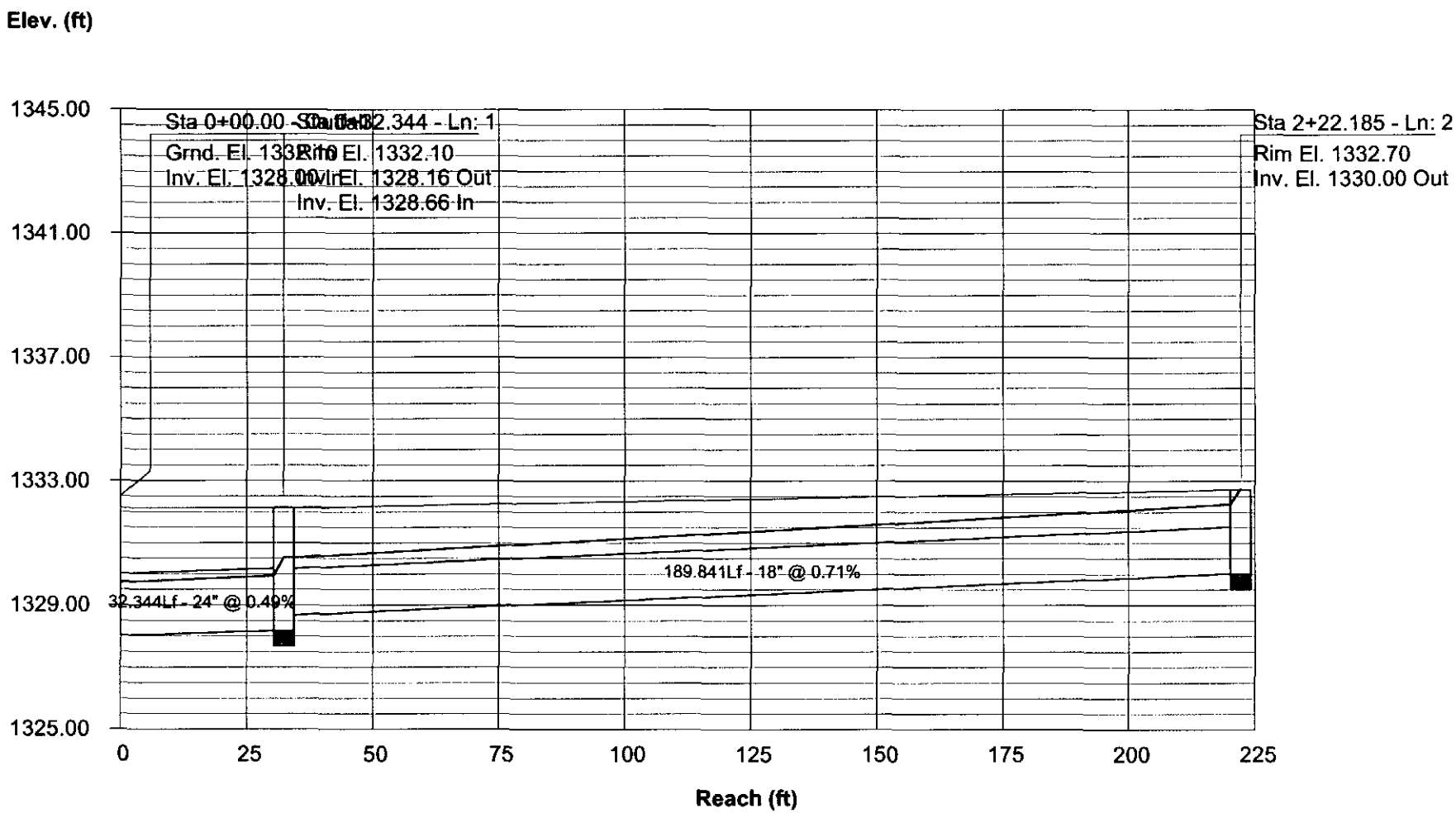
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	24	17.65	1328.00	1329.72	1.72	2.87	6.14	0.59	1330.31	n/a	32.3	1328.16	1329.92	1.76	2.93	6.03	0.56	1330.49i	n/a	n/a	-0.385	1.50	n/a
2	18	10.00	1328.66	1330.51	1.50	1.77	5.66	0.50	1331.01	0.908	190	1330.00	1332.23	1.50	1.77	5.66	0.50	1332.73	0.907	0.907	1.723	1.00	0.50

Project File: sws_1.stm | Number of lines: 2 | Run Date: 04-16-2007

Storm Sewer Profile

Proj. file: sws_1.stm



HydraFlow StormSewers

Main SWS System

Watershed Model Schematic

Legend

Hyd.	Origin	Description
1	Rational	Rennick Exist
2	Rational	Rennick Prop

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.02

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	-------	-------	10.56	-------	12.60	14.11	16.33	18.06	19.76	Rennick Exist
2	Rational	-------	-------	13.41	-------	15.99	17.92	20.74	22.93	25.10	Rennick Prop

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

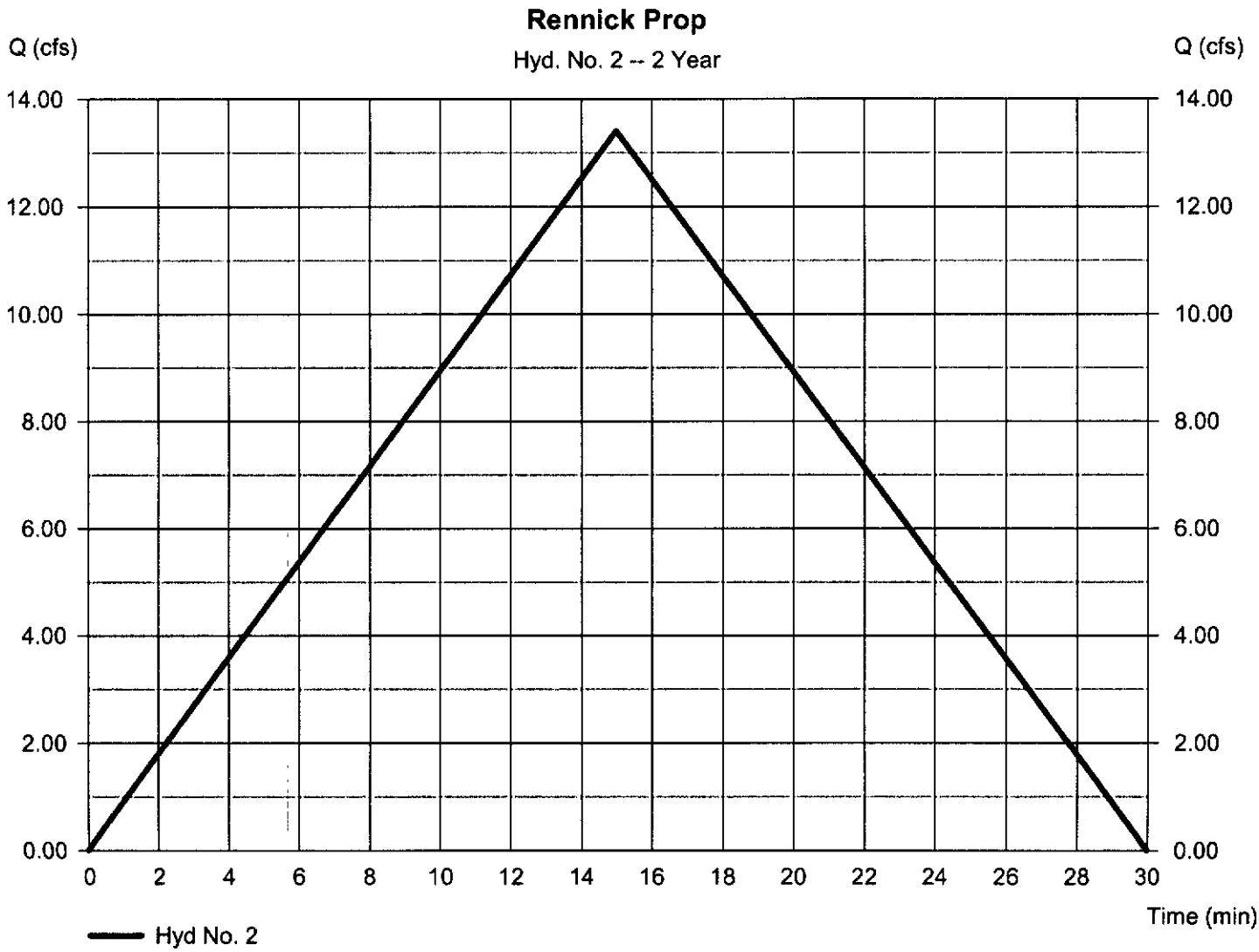
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	Rational	10.56	1	15	0.218	----	------	------	Rennick Exist
2	Rational	13.41	1	15	0.277	----	------	------	Rennick Prop

Hydrograph Report

Hyd. No. 2

Rennick Prop

Hydrograph type	= Rational	Peak discharge	= 13.41 cfs
Storm frequency	= 2 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 0.277 acft
Drainage area	= 4.300 ac	Runoff coeff.	= 0.8
Intensity	= 3.897 in/hr	Tc by User	= 15.00 min
IDF Curve	= wich15min.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

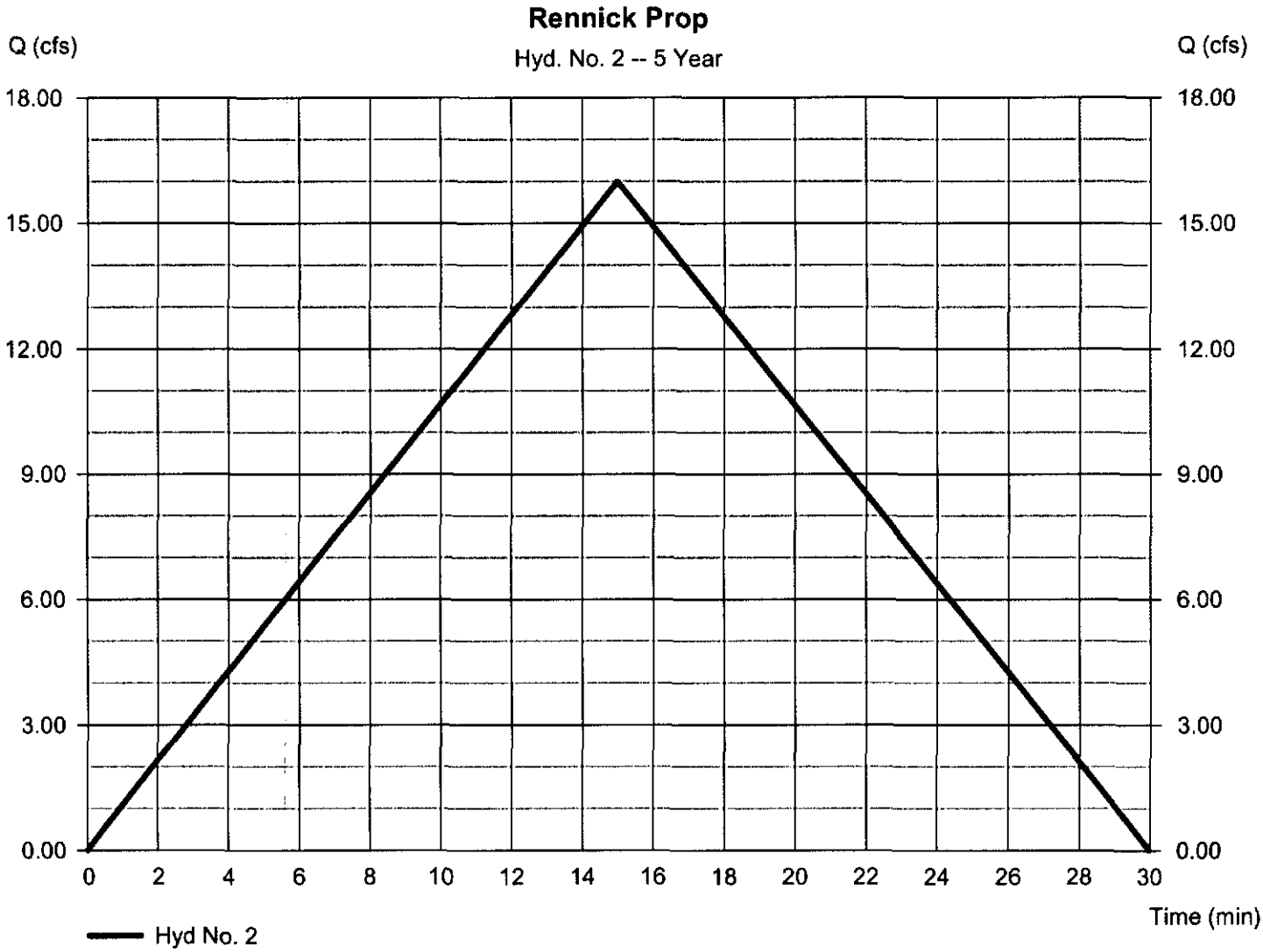
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	Rational	12.60	1	15	0.260	---	------	------	Rennick Exist
2	Rational	15.99	1	15	0.330	---	------	------	Rennick Prop

Hydrograph Report

Hyd. No. 2

Rennick Prop

Hydrograph type	= Rational	Peak discharge	= 15.99 cfs
Storm frequency	= 5 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 0.330 acft
Drainage area	= 4.300 ac	Runoff coeff.	= 0.8
Intensity	= 4.650 in/hr	Tc by User	= 15.00 min
IDF Curve	= wich15min.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

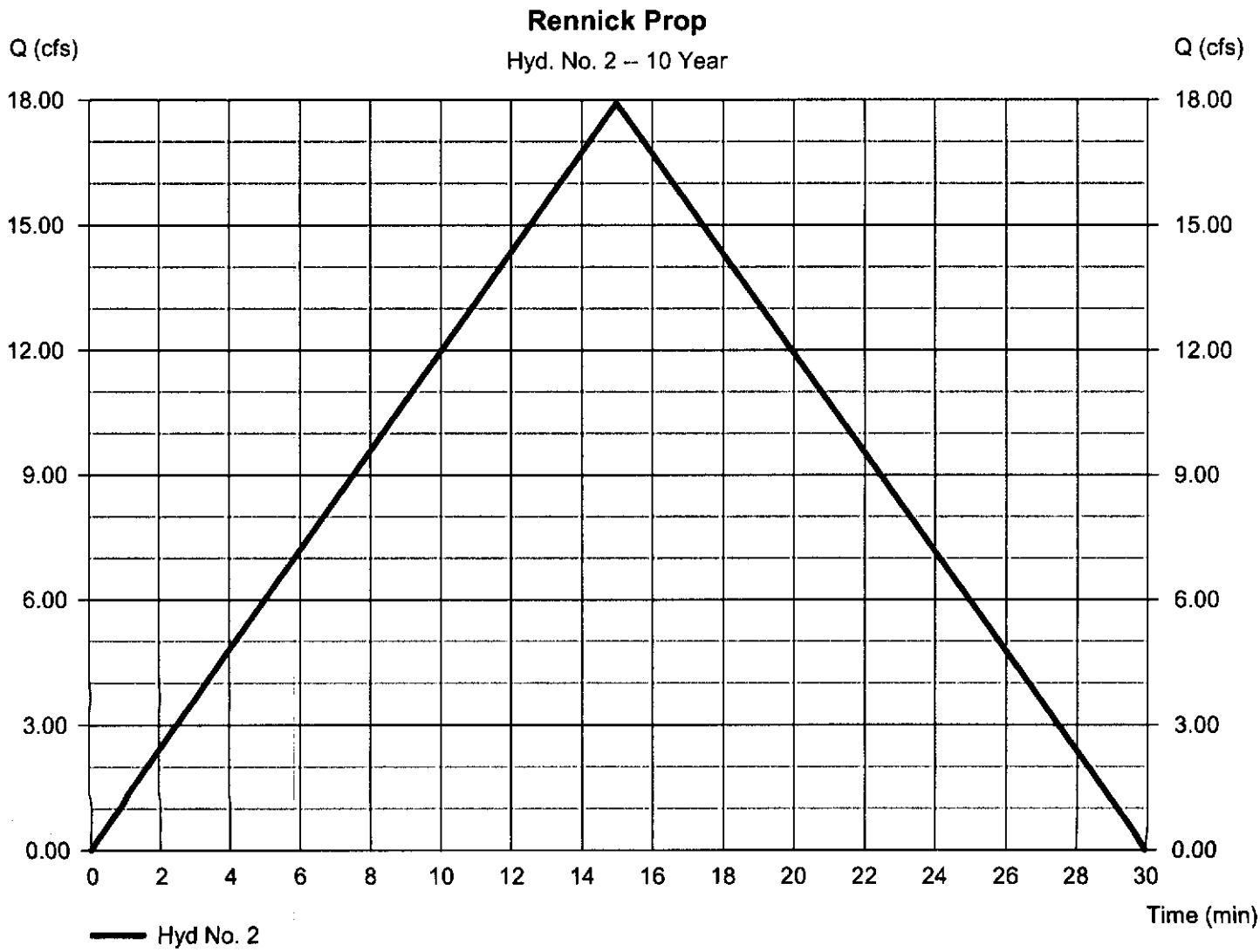
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	Rational	14.11	1	15	0.292	----	------	------	Rennick Exist
2	Rational	17.92	1	15	0.370	----	------	------	Rennick Prop

Hydrograph Report

Hyd. No. 2

Rennick Prop

Hydrograph type	= Rational	Peak discharge	= 17.92 cfs
Storm frequency	= 10 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 0.370 acft
Drainage area	= 4.300 ac	Runoff coeff.	= 0.8
Intensity	= 5.210 in/hr	Tc by User	= 15.00 min
IDF Curve	= wich15min.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

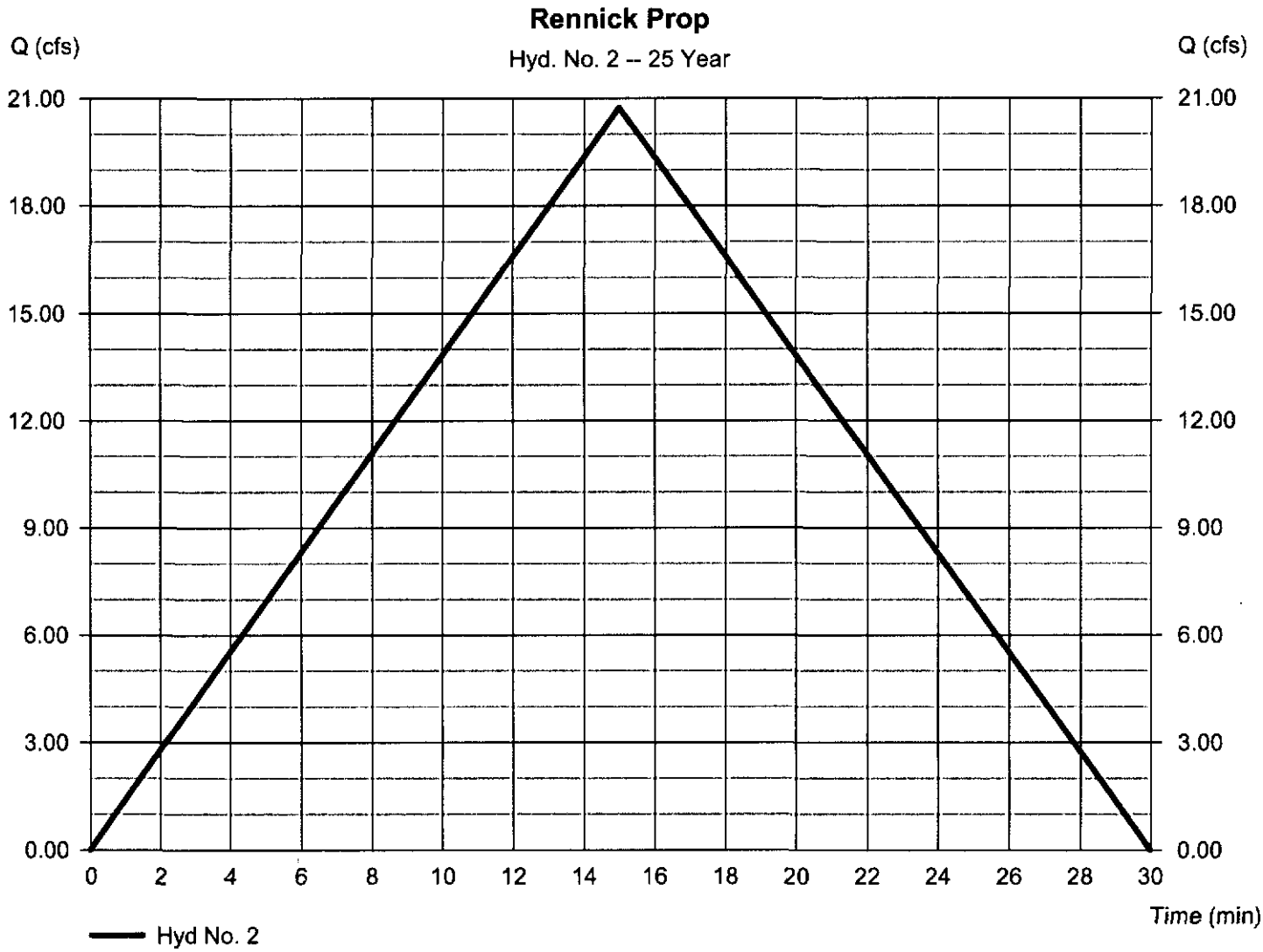
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	Rational	16.33	1	15	0.337	---	-----	-----	Rennick Exist
2	Rational	20.74	1	15	0.429	---	-----	-----	Rennick Prop

Hydrograph Report

Hyd. No. 2

Rennick Prop

Hydrograph type	= Rational	Peak discharge	= 20.74 cfs
Storm frequency	= 25 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 0.429 acft
Drainage area	= 4.300 ac	Runoff coeff.	= 0.8
Intensity	= 6.029 in/hr	Tc by User	= 15.00 min
IDF Curve	= wich15min.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

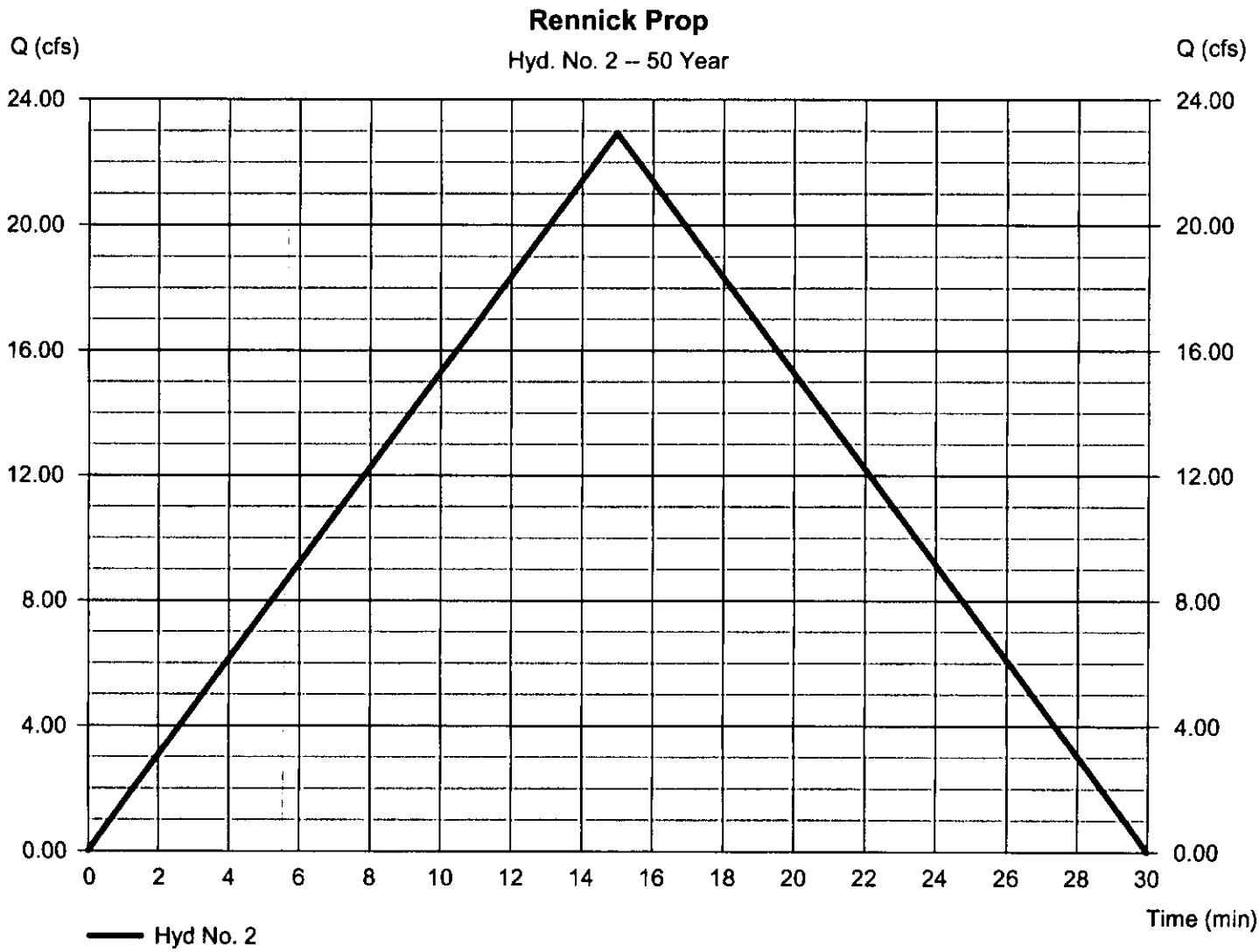
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	Rational	18.06	1	15	0.373	----	------	------	Rennick Exist
2	Rational	22.93	1	15	0.474	----	------	------	Rennick Prop

Hydrograph Report

Hyd. No. 2

Rennick Prop

Hydrograph type	= Rational	Peak discharge	= 22.93 cfs
Storm frequency	= 50 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 0.474 acft
Drainage area	= 4.300 ac	Runoff coeff.	= 0.8
Intensity	= 6.667 in/hr	Tc by User	= 15.00 min
IDF Curve	= wich15min.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

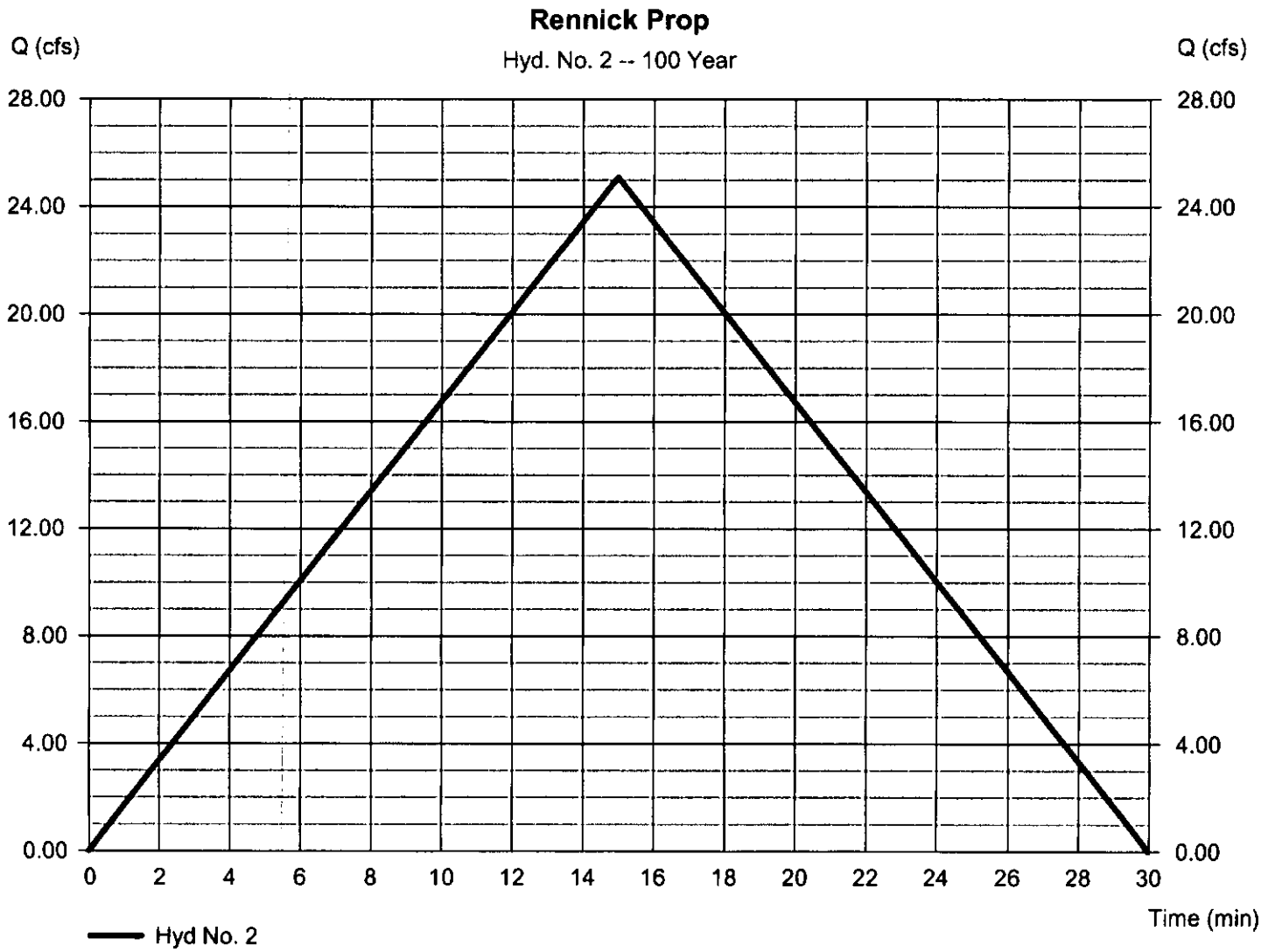
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	Rational	19.76	1	15	0.408	----	------	------	Rennick Exist
2	Rational	25.10	1	15	0.519	----	------	------	Rennick Prop

Hydrograph Report

Hyd. No. 2

Rennick Prop

Hydrograph type	= Rational	Peak discharge	= 25.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 15 min
Time interval	= 1 min	Hyd. volume	= 0.519 acft
Drainage area	= 4.300 ac	Runoff coeff.	= 0.8
Intensity	= 7.295 in/hr	Tc by User	= 15.00 min
IDF Curve	= wich15min.IDF	Asc/Rec limb fact	= 1/1



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	71.8477	13.3000	0.8718	--------
3	0.0000	0.0000	0.0000	--------
5	75.7517	14.2000	0.8271	--------
10	86.7192	15.3000	0.8244	--------
25	103.3028	16.6000	0.8227	--------
50	116.5747	17.3000	0.8234	--------
100	124.5734	17.6000	0.8144	--------

File name: wich15min.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.70	4.62	3.90	3.38	2.99	2.69	2.45	2.24	2.08	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.58	5.43	4.65	4.08	3.64	3.30	3.02	2.79	2.59	2.42	2.28	2.15
10	7.25	6.05	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.81	4.38	4.03	3.73	3.48	3.26	3.08	2.91
50	9.05	7.66	6.67	5.92	5.34	4.87	4.48	4.16	3.88	3.64	3.43	3.25
100	9.83	8.35	7.30	6.49	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: SCS_24HR.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.50	0.00	4.50	5.20	6.00	7.00	7.80
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Hydraflow Table of Contents

rennick_DA.gpw

Hydraflow Hydrographs by Intelisolve v9.02

Monday, Apr 16, 2007

DRAINAGE/GRADING PLAN Scale 1:50