

Benton County Planning Board

Mark Curtis, Chair
Starr Leyva, Vice Chair
Ashley Tucker, Member
Jim Cole, Member
Rick Williams, Member
Ron Homeyer, Member
Sean Collyge, Member



Benton County Development

Department

Planning Division

905 NW 8th Street
Bentonville, AR 72712
Phone: (479) 464-6166
Fax: (479) 464-6170
E-mail: taylor.reamer@bentoncountyar.gov

SITE PLAN REVIEW PLANNER’S PUBLIC HEARING REPORT
Reeves (Reeves Heating and Cooling) Site Plan Review
15875 Hwy. 62, Garfield AR 72732

EXECUTIVE SUMMARY

Larry Steven Reeves, subject property owner, proposes to construct a new 6,000 sq. ft. professional contractor’s office / warehouse on site. The proposed 6,000 sq. ft. structure would contain professional office space totaling 1,200 sq. ft. and 4,800 sq. ft. of warehouse/storage space. The submitted site plan details the professional office to the front (north) end of the structure and the warehouse/storage to the rear (south) of the structure. The current site plan shows 4 standard parking spaces and 1 ADA compliant parking space.

Proposed hours of operation are 8:00am to 5:00pm Monday through Saturday (potential for Sunday hours too), one shift per day. Number of employees on site during regular business hours is 5 full-time staff. Three (3) company owned vehicles on site per day.

PROJECT INFORMATION

Owner: Steven Reeves – Reeves Heating and Cooling

Address of subject property (as assigned): 15875 Hwy. 62, Garfield 72732

Parcel IDs: 18-05668-003

Parcel Area: 3.75 +/- acres

Current Land Use: Un-Improved / Vacant

Proposed Land Use: Professional Office / Warehouse

Attachments: The following drawings and documents are attached:

1. Vicinity Graphic
2. Site Graphic
3. Site Plan

PLANNING ANALYSIS

Description of Property and Surrounding Area:

The subject property consists of one (1) parcel totaling 3.75 acres located on the south side of AR W. Hwy 62. Primary vehicular access would be provided via an existing paved drive extending south from the public ROW (AR W. Hwy 62). Sewerage and water service to the site is provided by private septic system and public water. The property is not located within the FEMA 100-yr. floodplain or County designated MS4 area. The immediately surrounding land uses area as follows:

- North: Arkansas Highway Transportation Department Right-of-Way
- East: Single Family Residential
- South: Single Family Residential
- West: Vacant / Un-Improved

Background information:

The applicant attended the Benton County Development Review Committee meeting on March 23rd, 2016. On April 19th, 2016, the applicant submitted Site Plan Review application and accompanying information meeting Staff's requirements. On 04/25/2016, an inter-departmental review form was sent to the following agencies: Planning Division, Health Dept., Road Dept., Building Dept., Fire Marshal, Administrator of General Services, Assessor's GIS Mapping Manager, Arkansas Highway Transportation Department, and Benton County 911 Administration.

The Site Plan Review application was therefore scheduled for the May 4th, 2016 Technical Advisory Committee meeting for the Benton County Planning Board.

TECHNICAL REVIEW OF SITE PLAN

Parcel Information:

Site inspection and research against State assessment records show that the property is currently an unimproved parcel. Based on the latest 2016 Aerial Imagery, the site's perimeter contains a series of mature vegetation. The interior of the

parcel is relatively flat with a centralized shallow drainage channel sloping to the south. The far south western portion of the parcel contains a natural detention pond.

Noticing Requirements:

On May 2nd, 2016, the applicant submitted USPS certified mail receipts showing that written notice was sent to surrounding property owners regarding the May 18th, 2016 Public Hearing.

The applicant submitted photographs on May 2nd, 2016 verifying that the required Public Hearing notice signage along the properties frontage with AR E. Hwy. 62 and Boundary Line Rd. has been conspicuously posted on site.

Standard Building Setbacks:

Required: A sixty-five (65) foot or fifty (50) foot setback measured from the center line of the fronting roads (AR W. Hwy. 62 and Boundary Line Road, respectively) or twenty-five (25) feet from the fronting property lines, whichever is greater, is required; A side and rear yard, building to property line setback of ten (10) feet is required.

Comments: Current site plan shows the proposed 6,000 sq. ft. Professional Office + Warehouse/Storage structure which is not within the County required building setbacks.

The applicant shall revise current site plan to accurately detail the front building setback.

Parking Requirements:

Required: Parking calculations shall be based upon the sum total of the use being proposed as part of the Site Plan Review application. For the subject property and proposal, parking calculations shall be based upon the ‘Office’ parking requirements: 3 parking spaces for every 1,000 sq. ft. totaling + Warehouse/Storage parking requirements: 1 space per employee per shift + 1 space per company owned vehicle OR 5 spaces per 2,000 sq. ft. totaling 16 standard parking spaces and 1 additional space that is ADA compliant.

Office: 1,200 sf (3 spaces per 1,000 sf)

$1,200/1,000 = 1.2 * 3 = 3.6$ spaces = 4 spaces

REQUIRED PARKING FOR OFFICE USE: 4 standard parking spaces

Warehouse/Storage: 4,800 sf (# company owned vehicles + # employees per shift OR 5 spaces per 2,000sf, (whichever is greater)

$4,800/2,000 = 2.4 * 5 = 12$ spaces = 12 parking spaces

Max. 5 Employees + 3 Vehicles = 8 parking spaces

REQUIRED PARKING FOR WAREHOUSE/STORAGE USE: 12 standard parking spaces

TOTAL Number of Required Parking: **16** parking spaces required (16 standard + 1 ADA).

Comment: **The current site plan shows 4 standard parking spaces + 1 ADA compliant, the site plan shall be revised to show the required number of standard and ADA spaces.**

Site Features - Loading area:

The current site plan details two overhead loading areas. **The site plan shall be revised show the loading area(s) as having minimum dimensions of 10ft by 25ft each.**

Site Features – Lighting:

Current site plan shows two (2) outdoor lights, one on the N and one on the W sides of the proposed structure.

The applicant shall revise the current site plan to include the ‘full cut-off’ lighting note and detail the total number of outdoor lights proposed.

Parking / Landscape Buffer:

Required: Adjoining incompatible uses should be screened with landscaping, walls, berms, or similar treatments. Section 4.6.16.c states that all required vegetative screening must have a minimum height of five (5) feet. All trees should be wire basket, B & B, or container grown. Smaller flowering trees and ornamentals will be centered at four (4') feet maximum. Coniferous trees will be centered at four (4') feet to five (5') feet depending on desired effect. All shrubs are to be planted in continuous planting beds. Planting beds will be mulched to a minimum depth of three (3") inches and will be maintained weed free. Plantings consisting of trees and shrubs will be a minimum of 50% coniferous plantings.

Comment: Land Use Compatibility analysis, per sec. 6.7, shows that the current use is classified as 'Professional Office' to 'General Commercial', and is immediately adjacent to single-family residential land uses to the east and south. This places the proposed use as being 'questionably compatible – 'Minor to Moderate', and as such, will require some level of mitigation efforts in order to buffer the proposed commercial use. Specifically, table 6.6 (Compatibility Levels and Criteria) indicates up to 15 ft. of additional setback, buffering up to 25 ft. in depth, 2-3 tier plantings.

The current site plan does not show any *proposed* vegetation. The site plan shows a series of existing trees on the eastern and western property line, some of which are contained on the subject property.

The site plan shall be revised to show all proposed vegetative screening measures as detailed above inclusive of all size requirements, per section 6.7 and table 6.6 of the Planning and Development Regulations.

Access Driveways:

Required: The design and construction shall be in accordance with the standards as presented in the Benton County Road Plan.

Comment: The site fronts along an Arkansas State Highway and County Road. The applicant proposes to utilize an existing paved access drive from the AHTD ROW along Hwy. 62.

Staff has not received comment from the County Roads Dept.
AHTD has provided comment on the project; any work in AHTD ROW requires permit.

Site Services - Drainage/ Stormwater Management Plan:

Required: Applicant is required to indicate on plan storm drainage infrastructure and to provide an off-site drainage study. If study indicates an increase in peak flow discharge downstream, the developer shall construct a detention facility or an alternative LID methodology that shall control the peak runoff rate. The County also recommends minimizing impervious surface to limit the need for such facilities.

Comment: The subject property is not located in an MS4 area. The site contains a small headwater tributary of Little Sugar Creek, shown as a natural shallow draw on the current site plan.

The applicant provided a site Drainage Report on April 29th, 2016.

Site Services - Solid Waste Disposal:

Applicant provided a service confirmation letter from Waste Management servicing the site.

Applicant shall detail the proposed location of dumpster or trash receptacle on site.

Site Services - Electrical Power Supply:

Applicant provided a service confirmation letter from Carroll Electric.

Site Services – Septic System:

Required: Regardless of development size, a state-approved septic disposal method is required of all commercial and industrial developments. All disposal system criteria must meet or exceed septic requirements as established by the Arkansas Department of Health (ADH) in accordance with Act 402 of 1977 as amended.

Comment: The applicant submitted the preliminary septic design for the site. The current site plan details the locations of both the primary lateral field and the alternate area. The soils of the property are described as Tonti Gravelly Silt Loam, 3-8 percent slope.

The applicant shall provide an Arkansas Department of Health approval septic permit.

Staff has not received comment from Arkansas Department of Health. Prior to issuance of Benton County Building Permit, the applicant shall provide an ADH approved septic permit.

Site Services - Water Service:

Applicant provided a service confirmation letter from Benton County Water District #1.

The site plan shall be revised to show the proposed water connection from Ben. Co. water main along Boundary Line Road.

Site Services - Fire & EMS:

Benton County E-911 Administration issued the proposed structure address as 15875 Hwy. 62, Garfield 72732.

Staff has received formal comment from Benton County Fire Marshal. (see associated comments page)

The applicant provided service confirmation letter from NEBCO Fire/EMS Department servicing the property.

Site Services – Hazardous Chemical Storage

In accordance with §4.6.B #5, all proposed commercial and industrial developments must submit written confirmation of hazardous materials to be used and stored on-site. Documentation is to be forwarded to the County Office of Emergency Services.

The applicant provided the required documentation stating the type and quantity of hazardous chemicals stored on site. Staff forwarded the documentation to Benton County Department of Emergency Management.

OUTSTANDING ITEMS:

1. Site Plan Revisions;
 - a. 25 ft. front property line setback notation
 - b. Full cut off lighting note
 - c. Signage for the business detailed on Site Plan
 - d. Proposed landscaping and size notations as required
 - e. Parking Table detailing Required Parking and Provided Parking
 - f. Water connections from Ben. Co. Water District #1
 - g. Dumpster Location
 - h. Loading areas with dimensional requirements noted

2. Adherence to the Benton County Fire Marshal's comments

CONCLUSION:

The proposal to construct the proposed 6,000 +/- sq. ft. Professional Office / Warehouse building was reviewed by Planning Staff to ensure compliance with the Planning and Development Regulation of Benton County. The applicant shall comply with items 1-2 detailed in Outstanding Items above in order to comply with Benton County Planning and Development Regulations.

CONSIDERATIONS FOR THE BOARD:

1. Approval of the Reeves Site Plan Review, case no. 16-066, 15875 Hwy. 62, Garfield conditioned upon the following;
 - a. Site Plan Revisions (items a-h) under 'Outstanding Item' no. 1
 - b. Adherence to Benton Co. Fire Marshal comments (dated May 10th, 2016)

Prepared by: Taylor Reamer, Planning Manager
Reviewed by: Kevin M. Gambrell, AICP - Planning Director

Vicinity Graphic – Reeves Site Plan Review



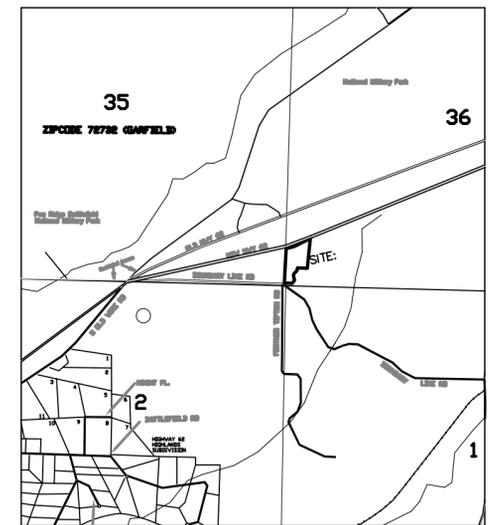
Site Graphic – Reeves Site Plan Review





SCALE 1"=40'
40 20 0 40

PEA RIDGE NATIONAL PARK
15930 HWY 62
GARFIELD, AR 72732



LEGEND

- F.I.P. FOUND IRON PIN (5/8" w/CAP)
- S.I.P. SET IRON PIN (5/8" REBAR)
- FOUND PIPE
- EX. WATER METER
- POWER POLE
- TELEPHONE
- CUTOFF LIGHT
- BOUNDARY LINE
- - - FENCE LINE
- - - UTILITY EASEMENT
- - - BUILDING SETBACK
- - - MAJOR EXIS. CONTOUR
- - - MINOR EXIS. CONTOUR

BASIS OF BEARING

ARKANSAS-NORTH STATE PLANE GRID

FLOOD CERTIFICATION

NO PART OF THIS PROPERTY LIES IN A ZONE "A" OR "AE" FLOOD ZONE AS SHOWN ON THE FIRM/FEMA FLOOD PANEL NO 05007C0110 J, EFFECTIVE DATE SEPTEMBER 28, 2007.

DANIEL COLF
16010 BOUNDARY LINE RD
GARFIELD, AR 72732

PROPERTY DESCRIPTION

PART OF THE SOUTHWEST QUARTER (SW¹/₄) OF THE SOUTHWEST QUARTER (SW¹/₄) OF SECTION 36, IN T-21-N, R-29-W, OF THE FIFTH PRINCIPAL MERIDIAN IN BENTON COUNTY, ARKANSAS, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE SOUTHWEST CORNER OF SAID SW ¹/₄, SW¹/₄. THENCE N 02°50'29" E 527.31 FEET TO THE SOUTH RIGHT-OF-WAY OF U.S. HIGHWAY 62. THENCE ALONG SAID RIGHT-OF-WAY N 75°25'01" E 131.49 FEET AND N 63°28'39" E 274.25 FEET; THENCE LEAVING SAID RIGHT-OF-WAY S 05°41'20" W 457.11 FEET; THENCE N 88°19'08" W 152.49 FEET; THENCE CONTINUE ALONG THE BOUNDARY, WHICH IS ALSO THE CENTERLINE OF A 20 FOOT WIDE INGRESS AND EGRESS EASEMENT AND DESCRIBED AS FOLLOWS: S 12°08'23" W 42.81 FEET, S 44°48'35" W 55.73 FEET, S 27°15'52" W 30.76 FEET, S 12°40'19" E 82.56 FEET AND S 35°33'01" W 56.75 FEET, THENCE LEAVING SAID EASEMENT, CONTINUING ALONG THE SOUTH BOUNDARY LINE N 88°19'44" W 123.83 FEET TO THE POINT OF BEGINNING; CONTAINING 3.74 ACRES MORE OR LESS AND SUBJECT TO THE RIGHT OF WAY OF BOUNDARY LINE ROAD AND ALSO SUBJECT TO A 30 FOOT ROAD EASEMENT ACROSS THE SOUTH SIDE OF THE PROPERTY AND SUBJECT ALSO TO ANY AND ALL OTHER EASEMENTS OF RECORD OR FACT.

THE BASIS OF BEARINGS FOR THIS SURVEY IS A BOUNDARY SURVEY DONE IN APRIL 15, 2015 FILED IN BENTON COUNTY BOOK 2015 PAGE 204.

TOTAL SITE DATA	
SITE SIZE	163,356.59 SQ FT (3.75 ACRES)
BUILDING AREA	6,600 SQ FT
PARKING (GRAVEL & PAVING)	9,389.81 SQ FT
GRASS & LANDSCAPE	147,386.78 SQ FT
PARCEL # = 18-05668-003 USE = PERSONAL / COMPANY WAREHOUSE/OFFICE	

NOTES

1). EASEMENTS FOUND IN BOOK 2011 PAGE 14097.

CONTRACTOR'S NOTICE

THE ARKANSAS UNDERGROUND FACILITIES DAMAGE PREVENTION ACT OF 1967 REQUIRES CONTRACTORS AND EXCAVATORS TO NOTIFY EACH UTILITY OPERATOR WHICH MIGHT HAVE LINES IN THE VICINITY OF A PLANNED EXCAVATION. THE REQUIREMENTS OF THE LAW CAN BE MET BY MAKING ONE TOLL-FREE CALL TO THE ARKANSAS ONE-CALL CENTER 1-800-482-8998, AT LEAST TWO (2), BUT NOT MORE THAN TEN (10), FULL WORKING DAYS BEFORE COMMENCING SUCH ACTIVITY.

REEVES HEATING & A/C
15875 HWY 62

DEVELOPMENT PLAN	REVISIONS		
	No.:	BY:	DATE:
OWNER: LARRY STEVE REEVES P.O. BOX 1367 ANDERSON, MO. 64831 (479) 619-6874			
DRAWN BY: DP/ZS			DATE: 3/12/16
CHECKED BY:			JOB No.: 2015201
SCALE: 1"=40'			SHEET: 1

DAMACO WILLIAMS, J&C INVESTMENT
P.O. BOX 1346
FAYETTEVILLE, AR 72702

DAYNE GALYEN
15813 BOUNDARY LINE RD
GARFIELD, AR 72732

SW CORNER
SW 1/4, SW 1/4
SEC 36, T-21-N,
R-29-W

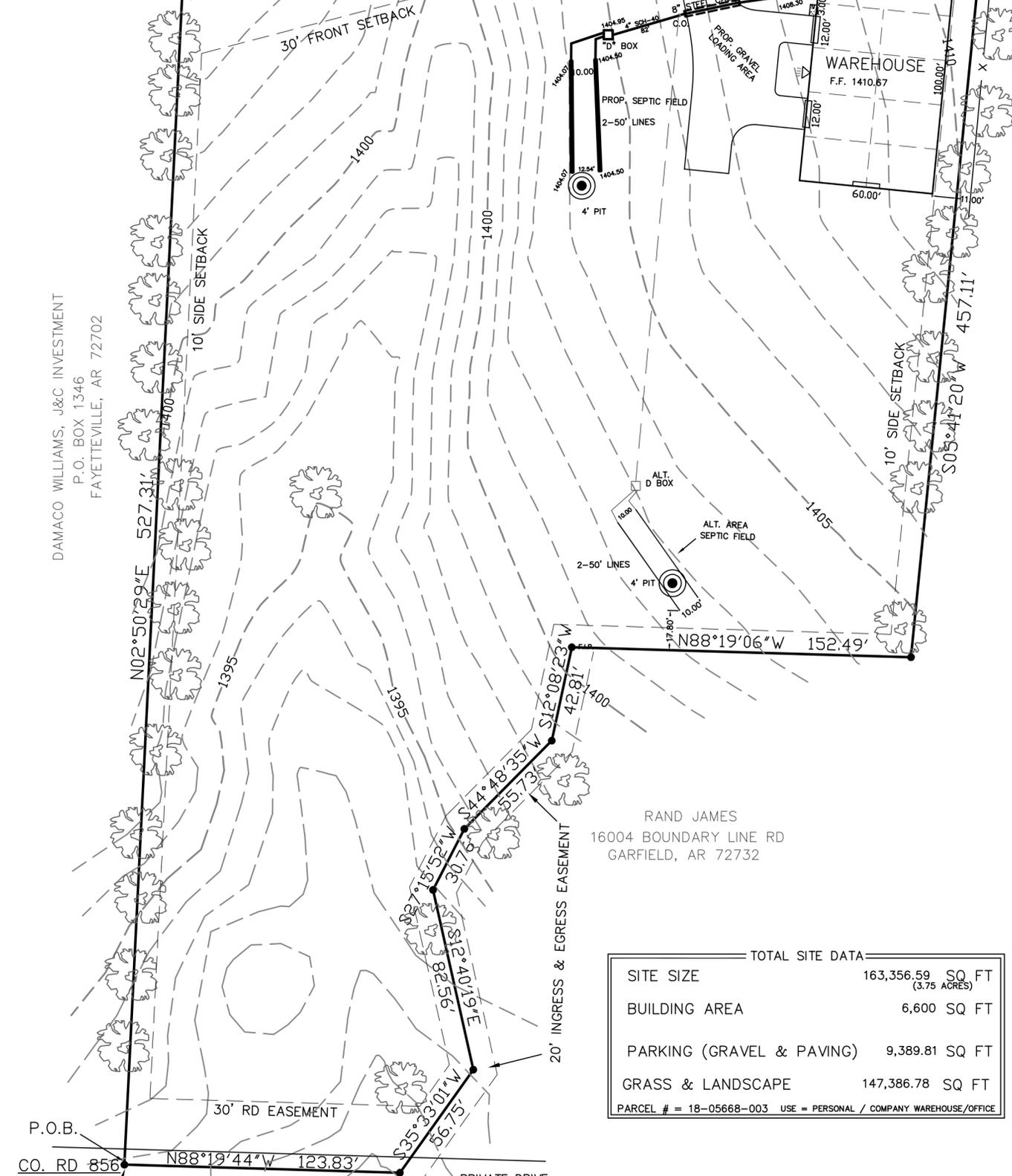
FORTNER
TIPTON ROAD

JOHN SKAGGS
BOUNDARY LINE RD
GARFIELD, AR 72732

BETTY LOU WARD
16106 BOUNDARY LINE RD
GARFIELD, AR 72732

CO. RD 856

PRIVATE DRIVE





**Benton County, AR
Development Department - Planning
Interagency Review Comment Form**

APPLICATION TYPE – Site Plan Review

DEPARTMENT/ AGENCIES CONTACTED

Health Department: Caroline Eastman, Environmental Health Specialist	Planning Director: Kevin Gambrill	GIS Mapping Manager: Michael Million
Road Department: Dean Klingman, Stephen Franklin	Administrator of General Services: John Sudduth	
Building Department: Glenn Tracy	Benton County 911 Admin: Judi Frigon	
Fire Marshal: Marc Trollinger	Administrator of Public Safety: Marshal Watson	
Arkansas Highway Transportation Dept: Doug Mears		

PROJECT INFORMATION

DATE: 4/25/2016
OWNER: Steven Reeves
APPLICANT: Steven Reeves, Reeves Heating and Cooling
LOCATION/ADDRESS: 15875 Hwy. 62, Garfield
PARCEL IDs: 18-05668-003

PROJECT DESCRIPTION: The applicant proposes to develop the subject property with a 6,000 sq. ft. professional contractor's office/warehouse(storage).

NOTE: The purpose of this form is to allow County Departments and Agencies with an interest in the development application to provide questions and comments to supplement Planning Division staff review. Please take the time to review the attached application and provide comments by e-mail. Attach additional pages if necessary. If you have no comments, please indicate by checking the "no comment" box below. Thank you very much for your assistance with this process.

NAME OF REVIEWER: Doug Mears

No Comments

Comments

Issue 1: If any work is done on R/W a permit will be required

Issue 2: _____

Issue 3: _____



BENTON COUNTY FIRE SERVICES

Marc Trollinger, Fire Marshal
215 E. Central Ave, Bentonville, AR 72712
Phone: 479-271-1004 Fax: 479-271-1084
Operations: 479-271-1005
bentoncountyar.gov

May 10, 2016

Reeves Heating and Cooling

1. A 1 Hour fire wall will need to be installed between the office and shop occupancy.
2. A Knox Box will need to be installed for fire department access. Contact NEBCO FD for ordering instructions.
3. Driveway and parking lot will need to be built to withstand a 75,000lb fire apparatus.

Marc Trollinger
Fire Marshal

March 10, 2016

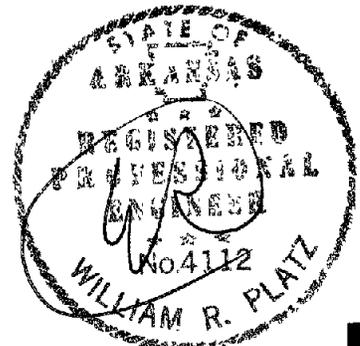
DRAINAGE REPORT

2015201

**Reeves Heating & Air
15875 Highway 62
Garfield, Arkansas 72732**

PREPARED FOR:

Steve Reeves



273-7989

OR

636-7989



**CONSULTING
INC.**

**1900 S. WALTON BLVD.
BENTONVILLE AR 72712**

**DRAINAGE REPORT
March 11, 2016
JOB # 2015201
Reeves Heat & Air
15875 Highway 62
Garfield, Arkansas 72732**

The location of the property for this study is on the South side of the new Highway 62 just South of Pea Ridge Military Park with an address at 15875 Highway 62.

The 3.75 acre site slopes Southernly at approximately 3% and is part a larger 69 acre basin from the military park. The type of soil located at the site is Tonti-cherty Silt Loam soil. The runoff flows from the site by sheet flow, shallow concentrated flow, and then channel flow into Little Sugar Creek. No portion of the area under study is within the Zone "A" or "AE" as shown on the FIRM/FEMA Flood map panel no. 05007C0095 K, effective date, June 5, 2012.

A 6,000 square feet office/warehouse is planned for the site, with the 9,234 square feet of proposed parking & drive.

Basin runoff flows for various frequency storms were computed and the increase between the pre-developed conditions and the proposed conditions for storms of the 2, 5, 10, 25, 50, and 100 year intensity were calculated for the site and are listed below.

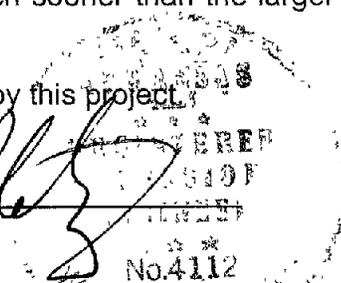
69 Acre - BASIN DISCHARGE						
Storm Number	1	2	3	4	5	6
Frequency (yrs)	2	5	10	25	50	100
24-Hr Rainfall (in)	4.08	5.25	6	6.96	7.92	8.64
Peak Discharge Existing	7.36	27.85	51.24	94.06	125.34	161.59
Discharge Developed Post	7.58	28.29	51.82	94.79	126.15	162.47
Discharge Increase	0.23	0.44	0.58	0.73	0.81	0.88

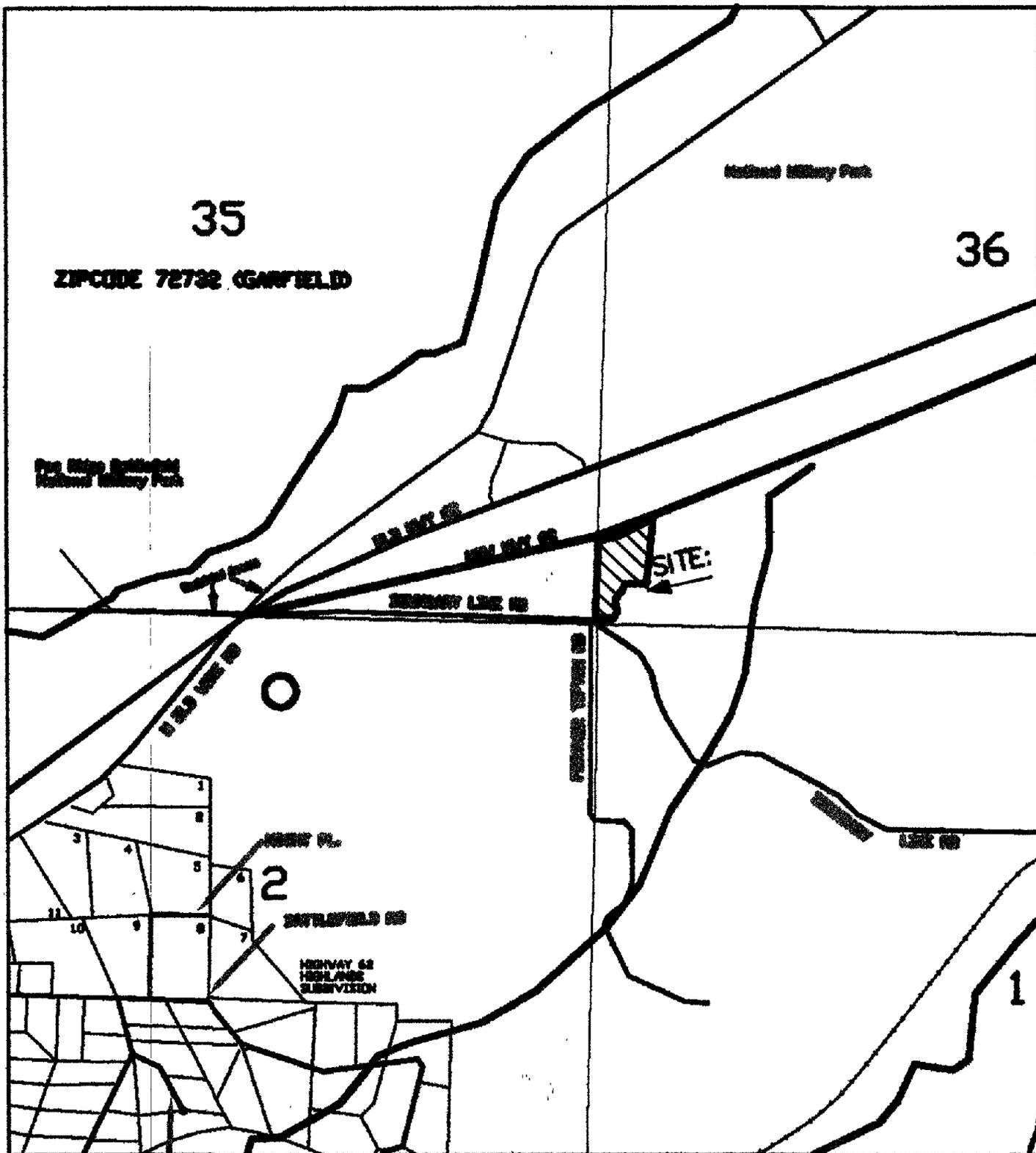
In conclusion, there has been a very minor increase in storm water runoff due to the proposed project.

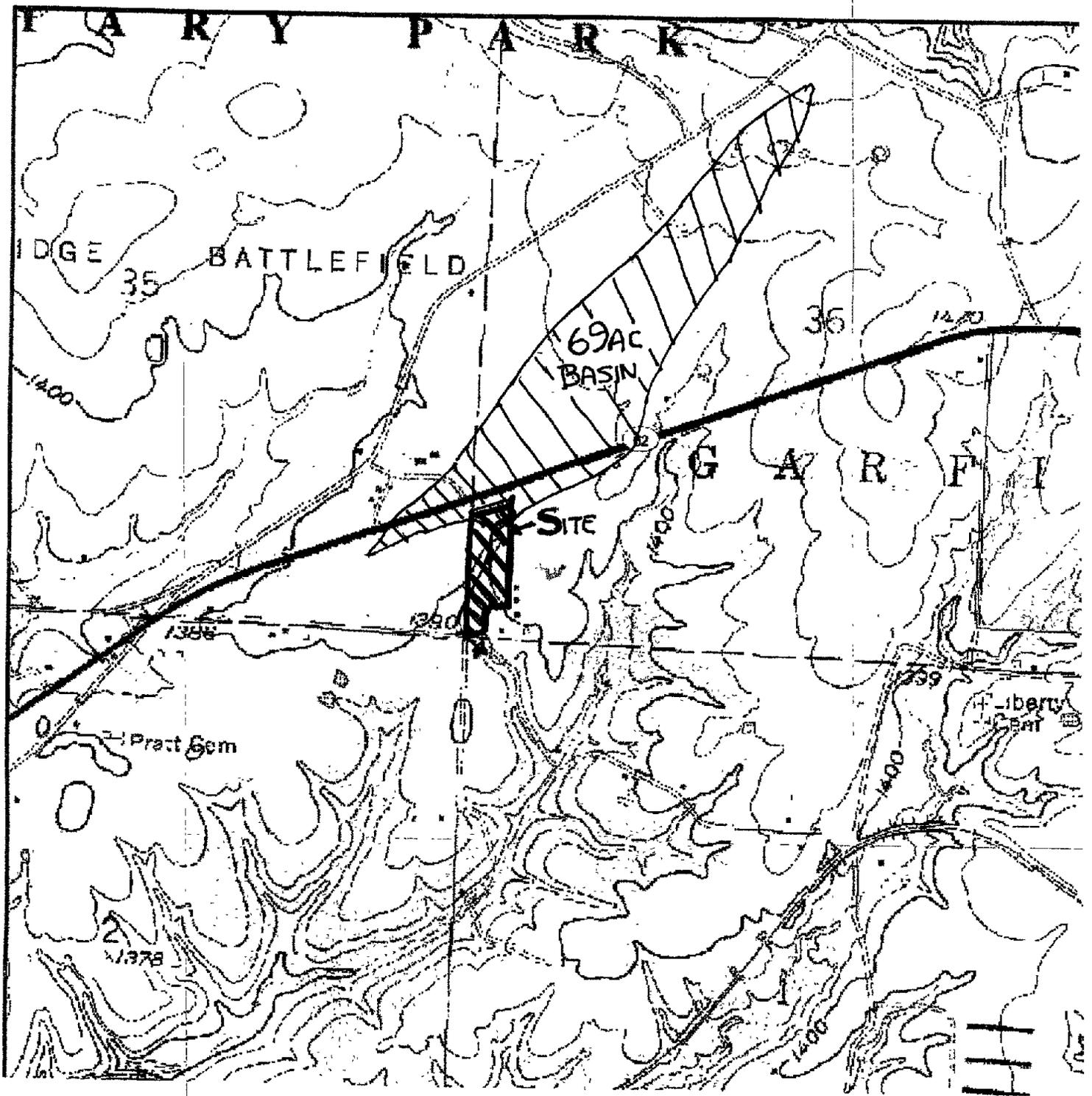
However, the t.c. (Time of concentration) of the larger 69 acre drainage basin is much longer than our 3.75 acre project. The stormwater peak of our site will occur much sooner than the larger basin will have already passed.

It is our opinion that no threat to life or limb will be created by this project.

William R. Platz, P.E.

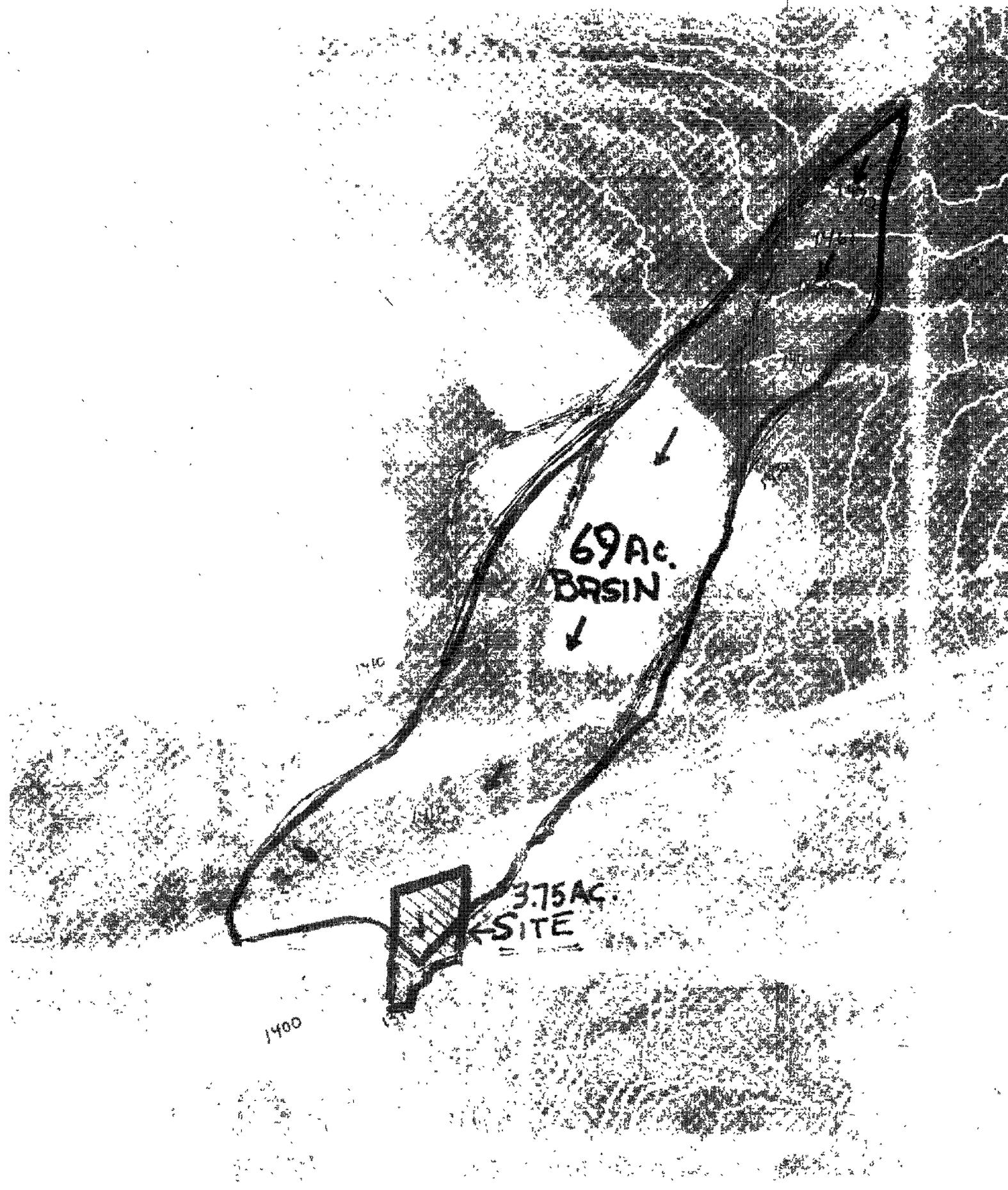






T 20 N R 21 N
775 000 FEET





69 AC.
BASIN

3.75 AC.
SITE

1410

1400

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	—	—	7.35	—	27.85	51.24	94.06	125.34	161.59	PRE DEV 69 AC BASIN
2	SCS Runoff	—	—	7.58	—	28.29	51.82	94.79	126.15	162.47	POST DEV " " "
9	SCS Runoff	—	—	1.10	—	3.55	6.17	11.12	14.70	18.83	PRE. DEV. 3.75 AC
10	SCS Runoff	—	—	1.56	—	4.26	7.19	12.36	16.06	20.28	POST DEV W 6000 SF BLDG

Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Mar 13 2016, 11:3 AM

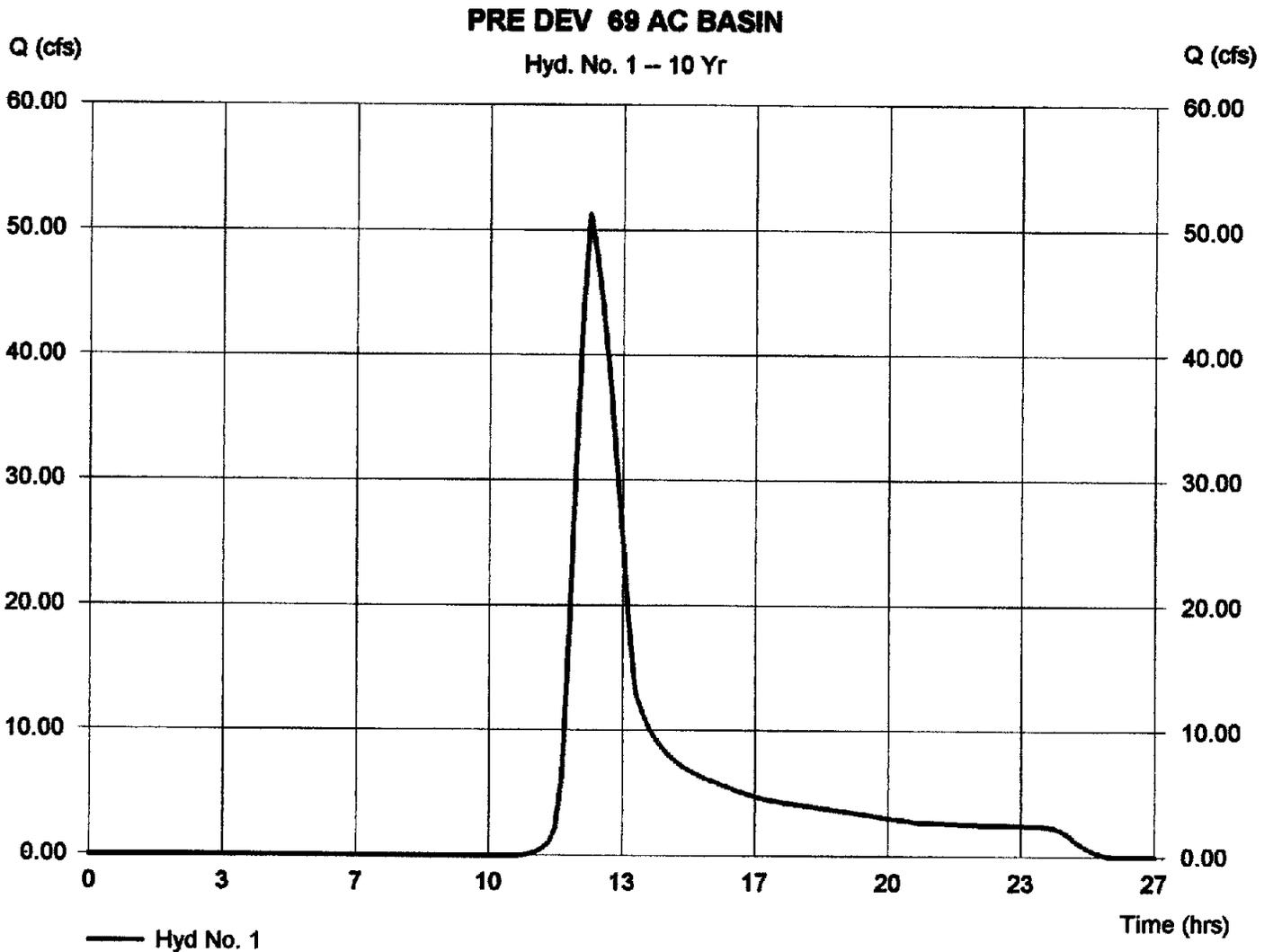
Hyd. No. 1

PRE DEV 69 AC BASIN

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 69.000 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.25 in
Storm duration = 24 hrs

Peak discharge = 51.24 cfs
Time interval = 10 min
Curve number = 70
Hydraulic length = 0 ft
Time of conc. (Tc) = 65.40 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 387,225 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelsolve

Sunday, Mar 13 2016, 11:4 AM

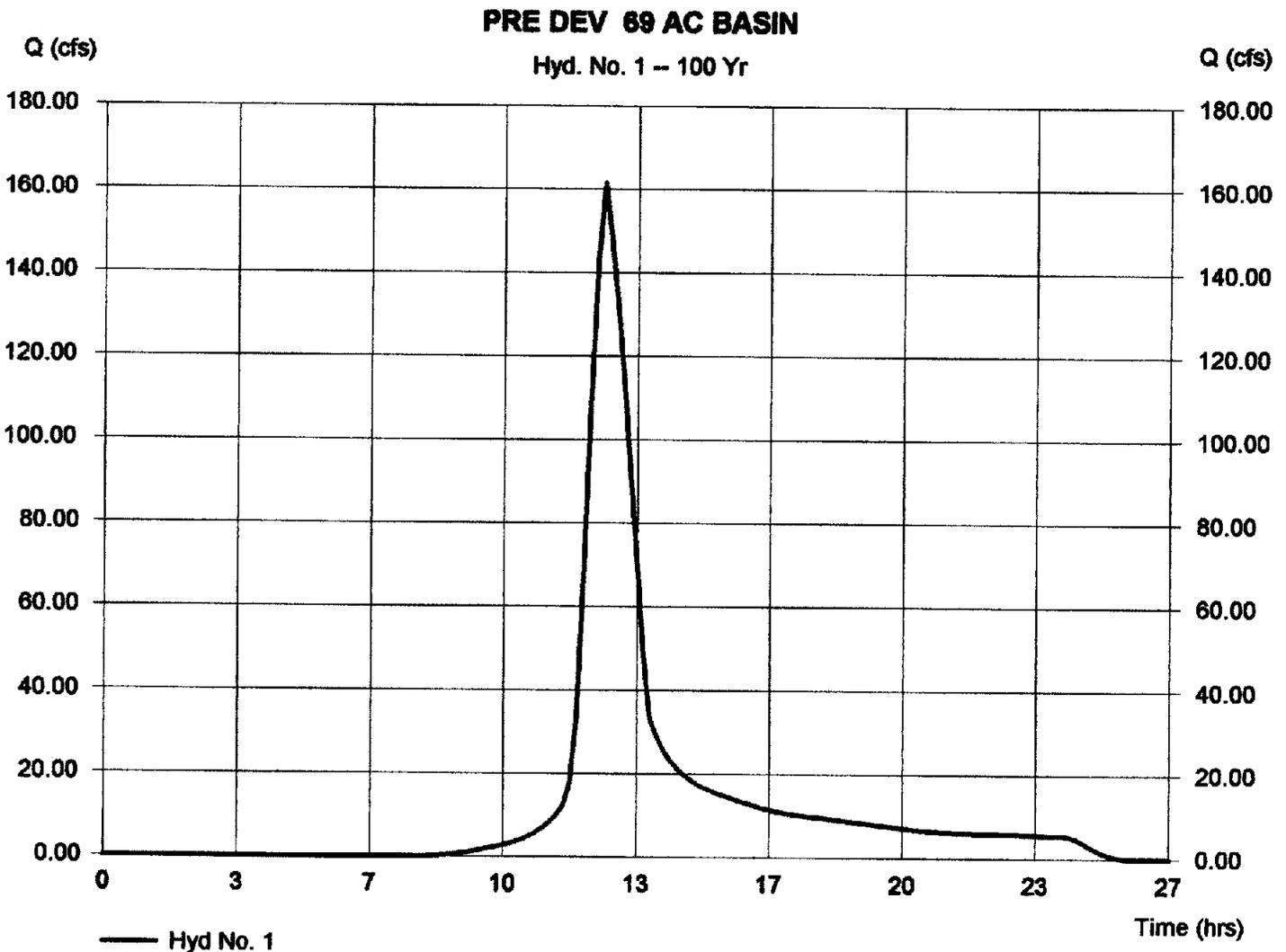
Hyd. No. 1

PRE DEV 69 AC BASIN

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 69.000 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.95 in
Storm duration = 24 hrs

Peak discharge = 161.59 cfs
Time interval = 10 min
Curve number = 70
Hydraulic length = 0 ft
Time of conc. (Tc) = 65.40 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 1,142,013 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelsolve

Hyd. No. 1

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
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)	= 4.08	0.00	0.00	
Land slope (%)	= 3.30	0.00	0.00	
Travel Time (min)	= 37.49	+ 0.00	+ 0.00	= 37.49
Shallow Concentrated Flow				
Flow length (ft)	= 3300.00	0.00	0.00	
Watercourse slope (%)	= 1.50	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 1.98	0.00	0.00	
Travel Time (min)	= 27.83	+ 0.00	+ 0.00	= 27.83
Channel Flow				
X sectional flow area (sqft)	= 25.00	0.00	0.00	
Wetted perimeter (ft)	= 15.00	0.00	0.00	
Channel slope (%)	= 0.50	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 9.89	0.00	0.00	
Flow length (ft)	= 60.0	0.0	0.0	
Travel Time (min)	= 0.10	+ 0.00	+ 0.00	= 0.10
Total Travel Time, Tc				65.42 min

Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Mar 13 2016, 11:10 AM

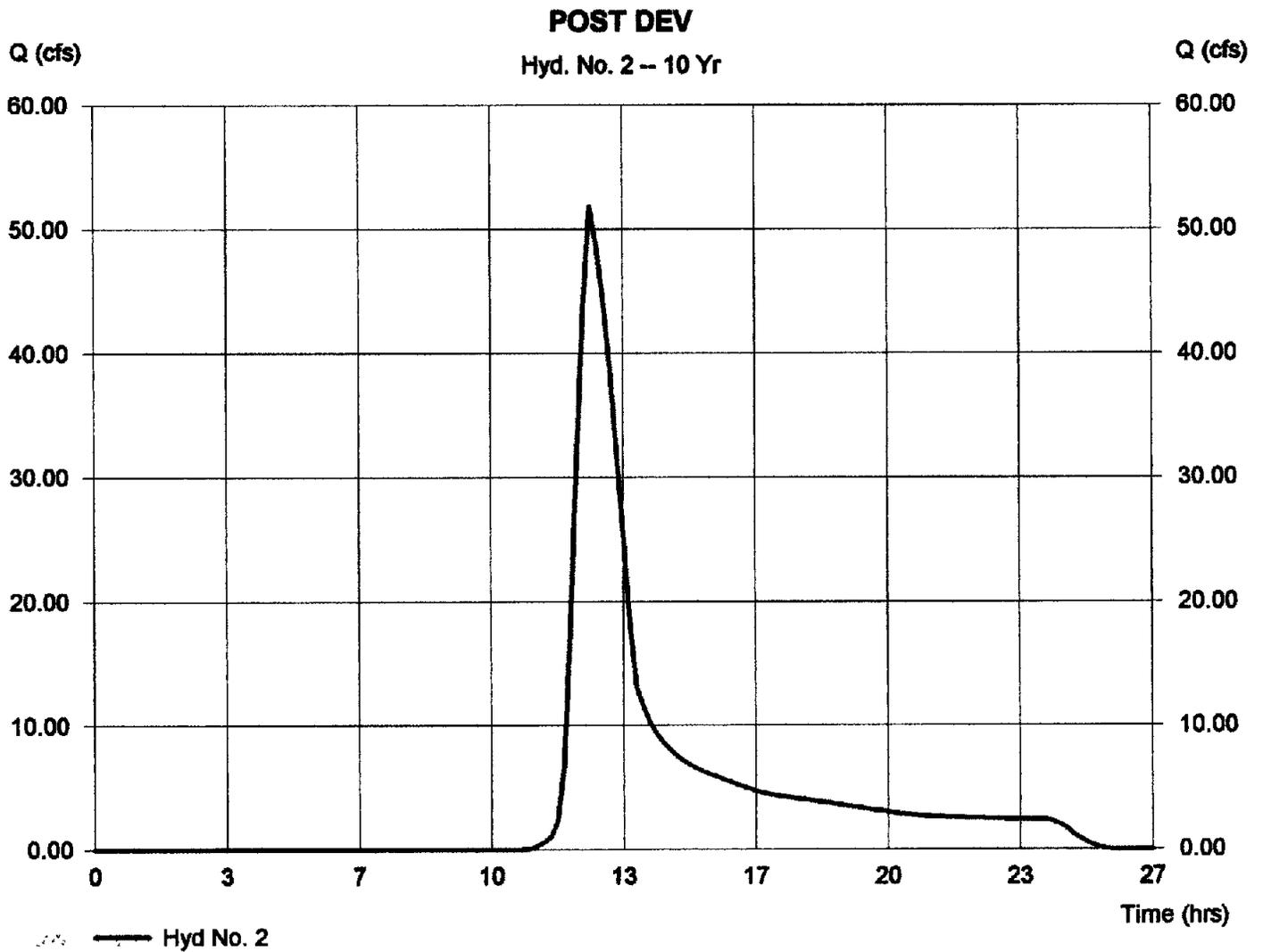
Hyd. No. 2

POST DEV

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 69.000 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.25 in
Storm duration = 24 hrs

Peak discharge = 51.82 cfs
Time interval = 10 min
Curve number = 70.2
Hydraulic length = 0 ft
Time of conc. (Tc) = 65.40 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 390,730 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Mar 13 2016, 11:5 AM

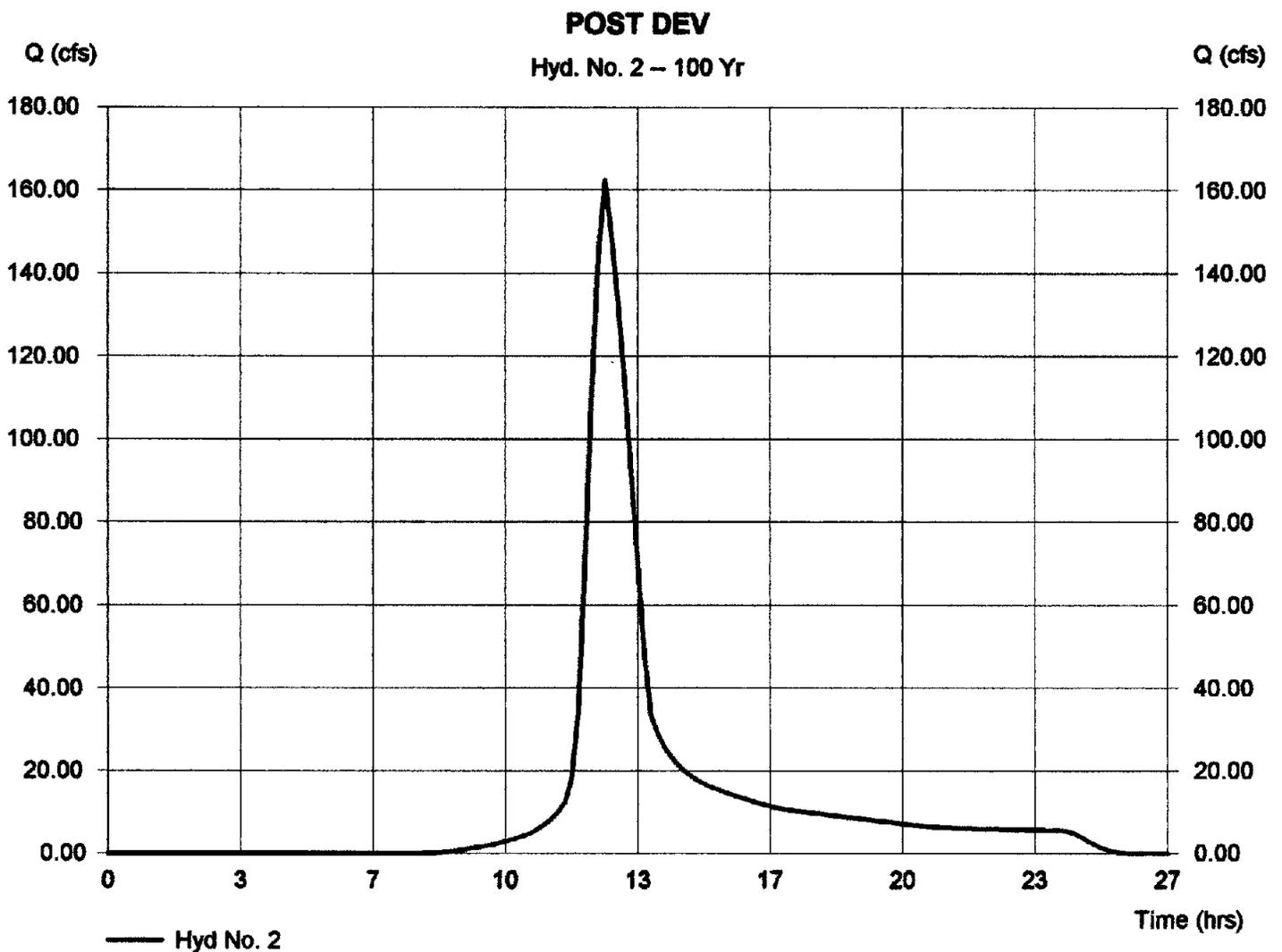
Hyd. No. 2

POST DEV

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 69.000 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.95 in
Storm duration = 24 hrs

Peak discharge = 162.47 cfs
Time interval = 10 min
Curve number = 70.2
Hydraulic length = 0 ft
Time of conc. (Tc) = 65.40 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 1,147,925 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Mar 13 2016, 11:46 AM

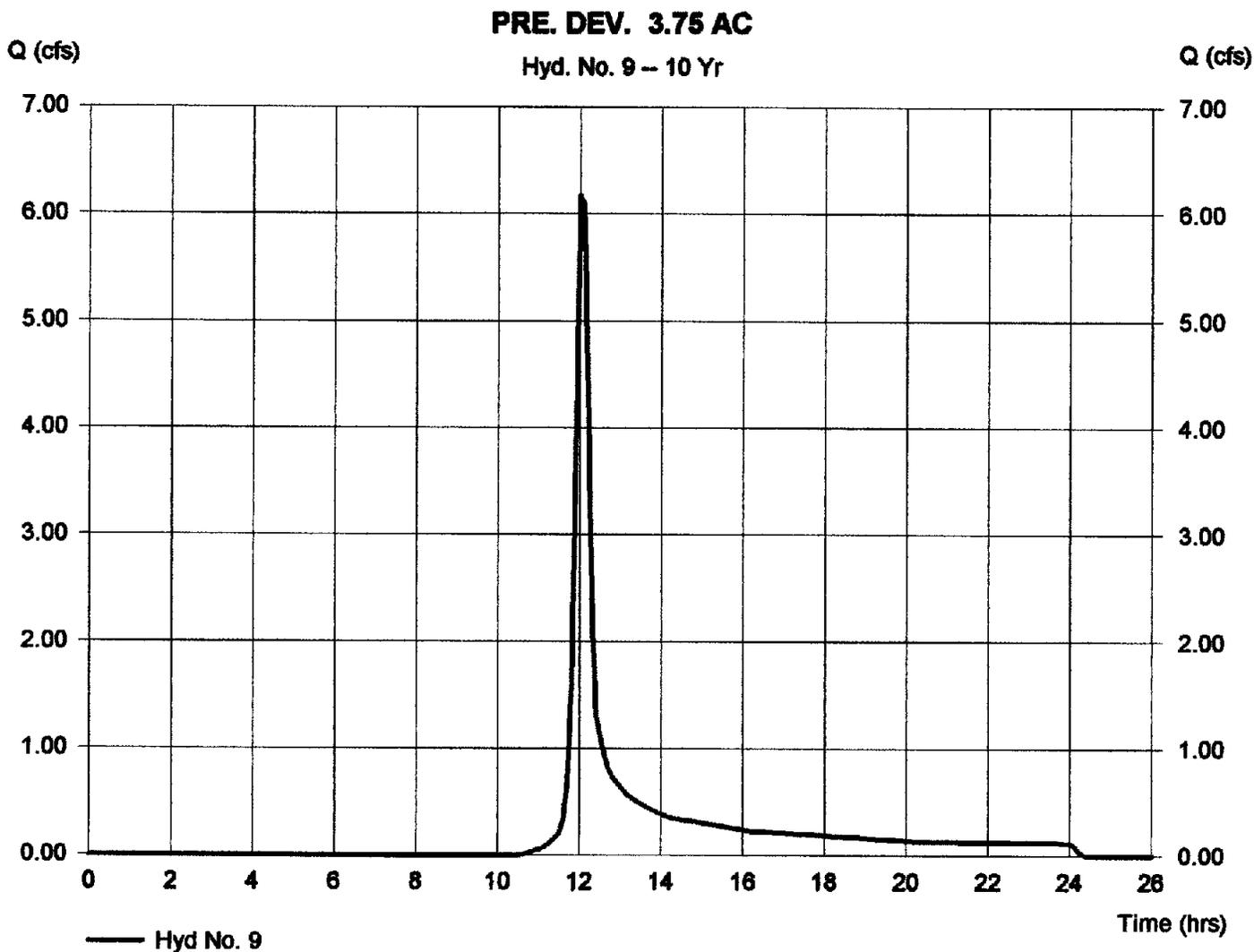
Hyd. No. 9

PRE. DEV. 3.75 AC

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 3.750 ac
Basin Slope = 3.1 %
Tc method = LAG
Total precip. = 4.25 in
Storm duration = 24 hrs

Peak discharge = 6.17 cfs
Time interval = 6 min
Curve number = 71
Hydraulic length = 750 ft
Time of conc. (Tc) = 18.66 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 20,008 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelliolve

Sunday, Mar 13 2016, 11:44 AM

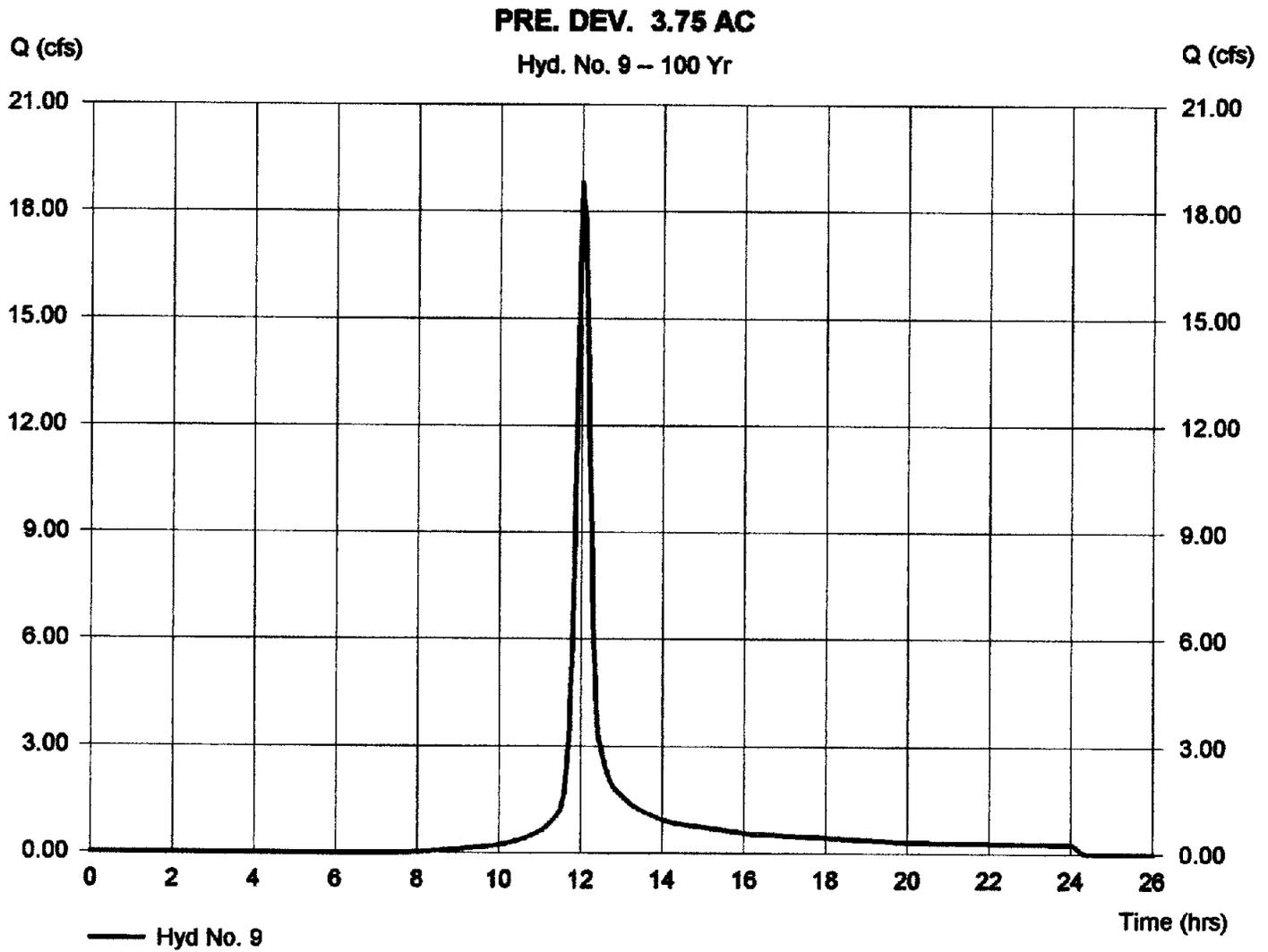
Hyd. No. 9

PRE. DEV. 3.75 AC

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 3.750 ac
Basin Slope = 3.1 %
Tc method = LAG
Total precip. = 7.95 in
Storm duration = 24 hrs

Peak discharge = 18.83 cfs
Time interval = 6 min
Curve number = 71
Hydraulic length = 750 ft
Time of conc. (Tc) = 18.66 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 57,885 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Mar 13 2016, 11:49 AM

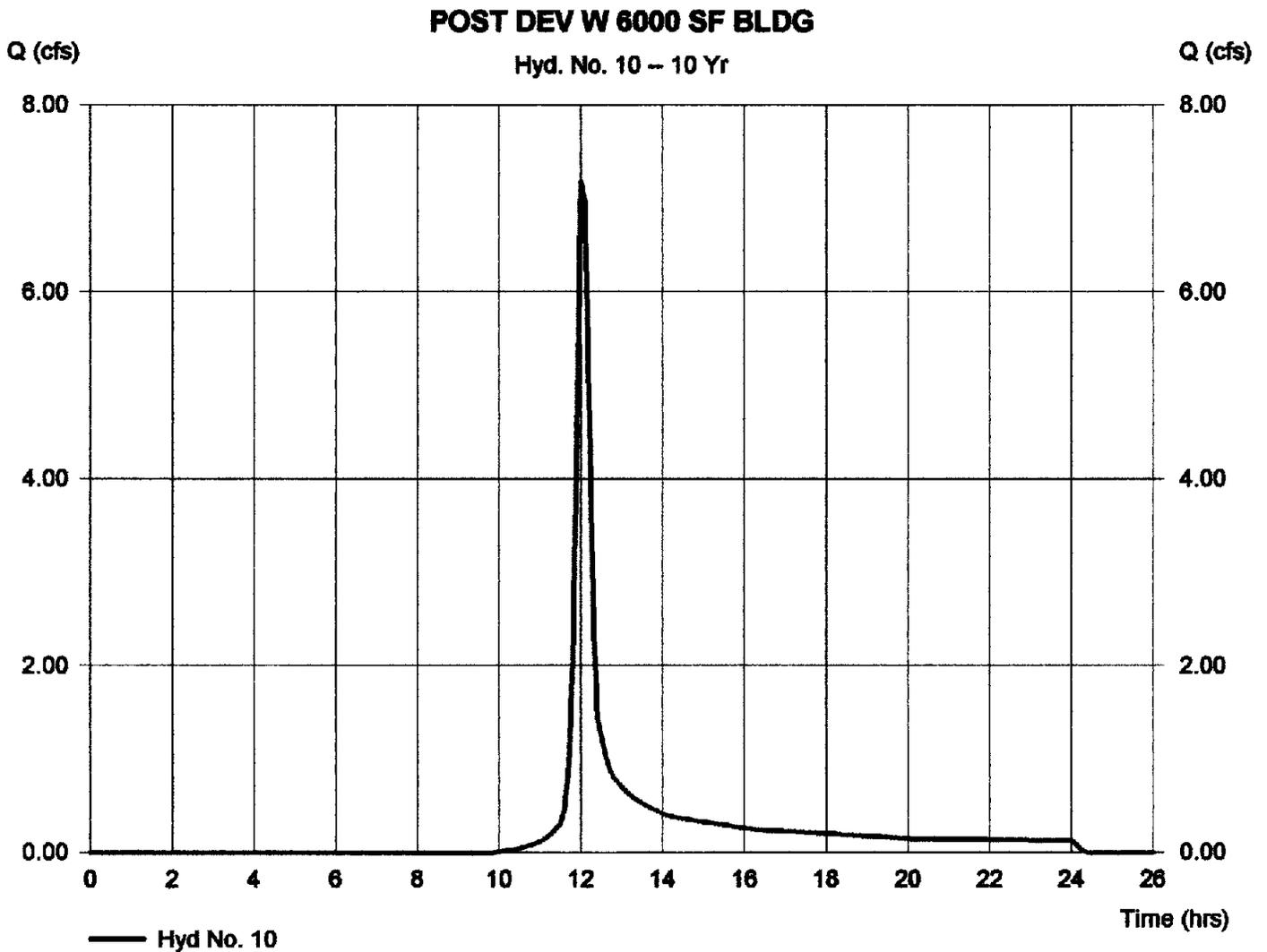
Hyd. No. 10

POST DEV W 6000 SF BLDG

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 3.750 ac
Basin Slope = 3.0 %
Tc method = LAG
Total precip. = 4.25 in
Storm duration = 24 hrs

Peak discharge = 7.19 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 750 ft
Time of conc. (Tc) = 17.45 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 22,743 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Mar 13 2016, 11:42 AM

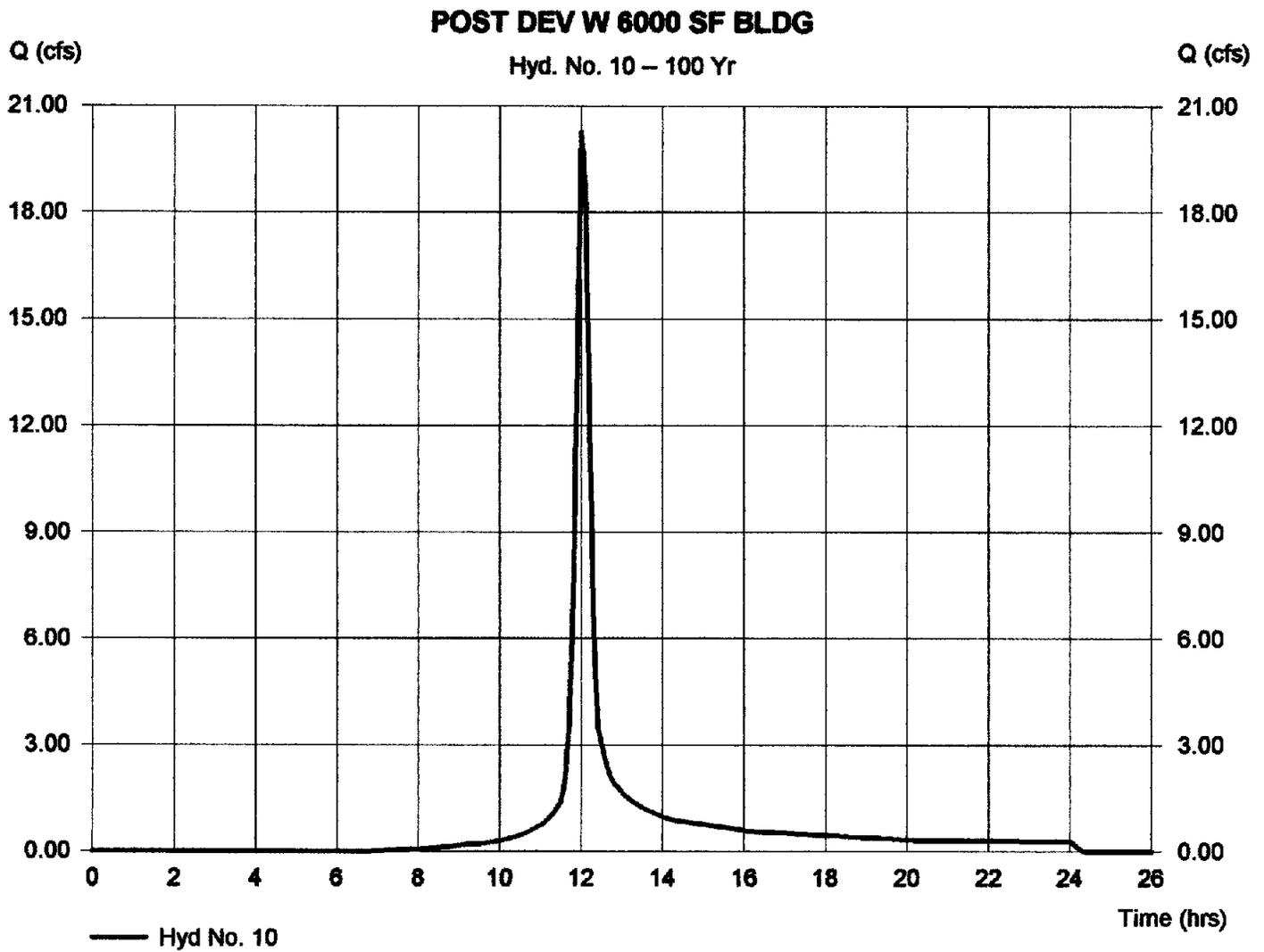
Hyd. No. 10

POST DEV W 6000 SF BLDG

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 3.750 ac
Basin Slope = 3.0 %
Tc method = LAG
Total precip. = 7.95 in
Storm duration = 24 hrs

Peak discharge = 20.28 cfs
Time interval = 6 min
Curve number = 74
Hydraulic length = 750 ft
Time of conc. (Tc) = 17.45 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 62,290 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intellisoave

Hyd. No. 9

PRE. DEV. 3.75 AC

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 250.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.08	0.00	0.00	
Land slope (%)	= 3.50	0.00	0.00	
Travel Time (min)	= 14.44	+ 0.00	+ 0.00	= 14.44
Shallow Concentrated Flow				
Flow length (ft)	= 575.00	0.00	0.00	
Watercourse slope (%)	= 2.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 2.28	0.00	0.00	
Travel Time (min)	= 4.20	+ 0.00	+ 0.00	= 4.20
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				18.64 min