Bryant Planning Commission Meeting
Monday, February 13, 2017
6:00 p.m.
Boswell Municipal Complex-City Hall Courtroom

AGENDA

CALL TO ORDER
Chairman to call the meeting to order.

APPROVAL OF MINUTES

. **Minutes**

Documents:

Bryant Planning Commission Meeting Mintues 1-9-17.pdf

ANNOUNCEMENTS

DRC REPORT

. **Cricket Wireless - 5311 HWY 5, Suite 210**
Cricket Wireless - Requesting Sign Permit Approval - **Approved**

Documents:

Cricket Wirless.pdf

. **CrossRoads Wine And Spirits - 2223 North Reynolds Road**
CrossRoads Wine and Spirit - Requesting Sign Permit Approval - **Approved**

Documents:

CrossRoads Win and Spirits.pdf

. **Crush Wine And Spirits - 3345 Hwy 5 North**
Crush Wine and Spirits - Requesting Sign Permit Approval - **Approved**

Documents:

Crush Wine and Spirits.pdf

. **Ferguson Properties Management - Market Place Ave**
Curtis Ferguson - Requesting Approval of Site Plan - **Recommend Approval**

Documents:

A.0 Site Plan.PC9 Revised.pdf
A1 Front elev.PC9.pdf
A2 Rear Elev. found Plan.PC9.pdf
A3 Side elev..PC9.pdf

. **EconoLodge - 210 Office Park Drive**
EconoLodge - Requesting Sign Permits Approval - **Approved**

Documents:

EconoLodge.pdf

. **CrossRoads Wine And Spirits - 2223 North Reynolds Road**
CrossRoads Wine and Spirits - Requesting Sign Permit Approval - **Approved**

Documents:

CrossRoads Wine and Spirits Pole Sign.pdf

. **T And B Auto Sign Permit - 25631 I-30**
T and B Auto - Requesting Sign Permit Approval - **Denied**

Documents:

T and B Auto Sign Permit.pdf

. **Fleming Electric Warehouse**
Josh Ruple - Requesting Site Plan Approval With Notes Required By Planning Commission - **Approved**

Documents:

Fleming Electric Warehouse - Final Site Plan.pdf

. **Crye - Leike Commerical: Hope Job #16.0380**
Jonathan Hope - Requesting Site Plan Approval - **Recommend Approval**

Documents:

Crye-Leike Commerical Retial - Revised.pdf

. **Benjamin Grove Phase II**
Vernon Williams - Requesting Preliminary Plat Approval - **Recommend Approval**

Documents:

Benjamin Grove Phase 2 - Responses to Comments dated 2-1-2017.pdf
Benjamin Grove Phase 2 - Subdivision Checklist.pdf
1 - 16025 Benjamin Grove Subd - Phase 2 - PRELIMINARY PLAT.pdf
2 - 16025 Benjamin Grove Subd - Phase 2 - OVERALL WATER and SEWER PLAN.pdf
7 - 16025 Benjamin Grove Subd - Phase 2 - LIFT STATION PLAN and DETAILS.pdf
16025 Benjamin Grove Phase 2 Summary of Hydrology.pdf
Benjamin Grove Phase 2 Drainage 25 year Report.pdf
Benjamin Grove Phase 2 Drainage 100 year Report.pdf
Benjamin Grove Phase 2 Drainage Map.pdf

lift station design calcs revised 2 3 2017.pdf
3 - 16025 Benjamin Grove Subd - Phase 2 - SEWER P and P.pdf
Bill of Assurance.pdf

PUBLIC HEARING

OLD BUSINESS

. **Walk, Bike, Drive: Bryant**
James Walden - Presentation and Discussion - Requesting Approval

Documents:

WalkBIKEDrive - BPP1.pdf
WalkBIKEDrive - MSP1.pdf
Walk Bike Drive - Bryant - UPDATED DRAFT2.pdf

NEW BUSINESS

. **Ferguson Properties Management - Market Place Ave**
Curtis Ferguson - Requesting Site Plan Approval

Documents:

A.0 Site Plan.PC9 Revised.pdf
A1 Front elev.PC9.pdf
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lift station design calcs revised 2 3 2017.pdf
Bill of Assurance.pdf

. **Crye - Leike Commerical: Hope Job #16.0380**
Jonathan Hope - Requesting Site Plan Approval

Documents:

Crye-Leike Commerical Retial - Revised.pdf

ADJOURNMENT

Bryant Planning Commission Meeting
Monday, February 13, 2017
6:00 p.m.
Boswell Municipal Complex-City Hall Courtroom

UNAPPROVED MINTUES
2 Pages

CALL TO ORDER:

- Chairman Lance Penfield Calls Meeting To Order
- Secretary Truett Smith Calls Roll
- Commissioners Present: Statton, Brunt, Johnson, Erwin, Penfield, Poe, Burgess, Mayfield.

APPROVAL OF MINTUES:

Approval of the January 9th, 2016 Planning Commission Minutes.
Action taken: Motion made to approve by Commissioner Johnson and seconded by Commissioner Brunt. Voice vote: 8 yeas and 0 nay. Passed

ANNOUNCEMENTS

DRC REPORT

Bryant Laundromat Addition - 110 Dell Drive
Chris Taylor - Bartlett Architecture - Requesting Site Plan Approval - **Approved**

Sally's Body Shop Expansion - 421 Roya Lane
Charlie Best Requesting Site Plan Approval - **Approved**

Ultimate Express Carwash - 1900 North Reynolds Road
Ace Sign Company - Requesting Sign Permit Approval - **Approved**

Dr. Fulks Dentistry - 3305 Highway 5
Requesting Site Plan Approval - **Approved**

Jiffy Lube Sign Permit - 1900 North Reynolds Road
Sign Studio LLC - Requesting Multiple Sign Permit Approval - **Approved**

Ultimate Express Carwash - 1900 North Reynolds Road
Mark MaCaslin - Requesting Site Plan Approval - **Approved**

PUBLIC HEARING

OLD BUSINESS

NEW BUSINESS

REQUESTING TO BE ADDED TO AGENDA - Fleming Electric Warehouse

Josh Ruple - Fleming Electric - Requesting Site Plan Approval

Action taken:

Motion made to add to agenda by Vice-Chairman Erwin, seconded by Commissioner Burgess. Voice vote: 8 yeas and 0 nay. Passed

Motion made to approve with contingence that Fleming add a notation affirming Flemings understanding of the use of the emergency access road, by Vice-Chairman Erwin, seconded by Commissioner Poe. Roll Call vote: 8 yeas and 0 nay. Passed

Walk, Bike, Drive: Bryant

James Walden - Discussion of Proposed Walk, Bike, Drive: Bryant

Action taken:

After extensive discussion on the topic, a motion was made to table the issue until next meeting. Motion made to table by Commissioner Statton, seconded by Vice-Chairman Erwin. Voice vote: 8 yeas and 0 nay. Tabled.

ADJOURNMENT

Motion made to adjourn by Commissioner Brunt, seconded by Commissioner Mayfield. Motion carried.

Approval of the minutes for January 9th Planning Commission meeting was approved on February 13th, 2017.

_____ Date: _____2017

Chairman Lance Penfield

_____ Date: _____2017

Secretary Truett Smith

City of Bryant, Arkansas
Code Enforcement, Permits and Inspections
312 Roya Lane
Bryant, Ar 72022
501-847-6031

TINA DAVIS-PLANNING
tdavis@cityofbryant.com

SIGN PERMIT APPLICATION

Applicants are advised to read the sign ordinance prior to completing and signing this form. The Sign Ordinance is available at www.cityofbryant.org.

Site plan showing placement of sign and any existing signs on the property. A rendering of sign showing correct dimensions of all signs are required with application. Additional documentation may be required by Sign Administrator.

Date: 01/17/17

Note: Electrical permits may be Required, Please contact the Permits Office at 847-6031 for more information.

SIGN CO. OR SIGN OWNER
Name ARKANSAS SIGN & NEON
Address 8525 DISTRIBUTION DR
City, State, Zip LITTLE ROCK, AR 72209
Phone 501-562-3942
Alternate Phone

PROPERTY OWNER
Name CRICKET
5311 HWY 5, SUITE 210
Address BRYANT, AR
City, State, Zip
Phone
Alternate Phone

GENERAL DETAILS
Name of Business CRICKET
Address/Location of sign 5311 HWY 5, SUITE 1210
Sign dimensions (height, length, width) 3' X 13'3"
Zoning Classification
Aggregate Surface Area (total all signs) 39.89 SIGNAGE ~~WALL 25 X 25'8"W~~
Height of sign from lot surface: Bottom 14' Top 17'

SIGN TYPE
____ Pole ____ Monument
W Wall
____ Other (type)
Total sq. ft. 39.89

READ CAREFULLY BEFORE SIGNING COSTS=5000.00

I, LORA A. RAND, do hereby certify that all information contained within this application is true and correct. I fully understand that the terms of the Sign Ordinance supersede the Sign Administrator's approval and that all signs must fully comply with all terms of the Sign Ordinance regardless of approval. I further certify that the proposed sign is authorized by the owner of the property and that I am authorized by the property owner to make this application. I understand that no sign may be placed in any public right of way. I understand that I must comply with all Building and Electrical Codes and that it is my responsibility to obtain all necessary permits.

Lora A. Rand — Applicant's Signature
01/17/17 — Date
Sign Administrator(or Designee) Approval
Date

cricket

principle

UID: 80079102

Client: Cricket

Project: BAU

Title: Exterior Signage

Site address: 5311 Highway 5 North, Suite 210
Bryant, AR

Project manager: Kyle Ericksen

Drawn by: EBD

Date: 01/05/17

Revision: Initial

As the Owner/Lessor/Mortgage or Security interest holder, I hereby acknowledge and accept the installation of signs as illustrated within the renderings shown within this brand proposal. By signing below I consent to the installation of signs at the premises and property address listed within this brand proposal and acknowledge that I have reviewed all details of this brand proposal in its entirety.

_____

Signature of (Owner/Lessor/Mortgage or Security Interest Holder)

_____

Print Name

_____

Date

NOTE: Quote does not include removal of any existing signage, patching or painting of the existing façade. Cricket requires that any existing signs be removed and that façade is patched and painted by the dealer, or landlord to match the color of existing fascia prior to the new Cricket signs being installed by Principle USA Inc. Please contact your Field Activity Manager if you would like Principle to quote removal of any existing signage, or patching and painting of the façade.

Exterior Site Plan | Summary

principle

Sign	Existing Sign	SF	Recommended Sign	SF
N-01	No Existing	N/A	Tenant Panel	7.73
N-02	No Existing	N/A	CR-FL-36B-R	39.89
N-03	No Existing		AR-DV-SD Transom Bar Hours of Operation	

2035 Lakeside Centre Way Suite 250
Knoxville, TN 37922
T+865 692 4058 F+865 692 4104

Revision notes:

cricket

		Drawn by:	EBD
Client:	Cricket	Checked by:	-
Project:	As Built	Scale:	NTS
Title:	TBD	Revision:	-
Date:	01.05.2017	Page:	2

Exterior Site Plan | Code Check

principle

Cricket Wireless Code Check Form

Customer Name: Biamilo Corporation Inc
Site ID #: 80079102
Address: 5311 Highway 5 N Ste 210
City: Bryant State: AR Zip: 72022

Zoning: PUD Planned Unit Development (Per Greg site follow C-2 sign standards)
Jurisdiction: City of Bryant
Contact Name: Greg Huggs , Building Official
Phone: 501-943-0488
Fax:
E-mail:

Ground Signs - Pylon (Pole) & Monument

☐ N/A - Existing Multi-Tenant Sign

Are ground signs allowed? Yes ☐ No ☐
Pole ☐ Monument ☐
Distance to adjacent ground signs: See Notes
Number of signs allowed: See Notes
Maximum SF allowed: See Notes, See Notes
Minimum setback: See Notes From: Visibility Triangle: See Notes
Maximum Overall Height: See Notes
Lighting Restrictions: See Notes
How many faces count toward sign area? See Notes

Notes
- Multi-tenant site. Contact LL to replace a panel on existing sign.

Wall Signs

Are wall signs allowed? Yes ☑ No ☐
Square footage based on: Street Frontage: ☑ Building Frontage: ☑ % of wall area ☑
Number of signs allowed: NTE 1/business.
Maximum Projection: 8 feet
Maximum SF allowed: NTE 2 SF linear feet of building frontage facing a street. NTE aggregate of 300 SF for all signs/establishment
Maximum Height: Not regulated Max. Letter Height: Not regulated Max. Logo Height: Not regulated Max. Sign Width: Not regulated
Can sign project above roof line? Yes ☐ No ☑ If yes, how much? N/A
Lighting Restrictions: No illuminated signs facing or w/in 50' of a residential lot.
UL Label required on sign? Yes ☑ No ☐ Is area transferable to another elevation? Yes ☐ No ☑
How is sign area calculated? Smallest rectangle to enclose entire sign face area.

Notes
- Corner lots are permitted 1 addt'l sign on a side wall facing a street and permitted an additional 100 SF added to the lot aggregate.
-No single sign can be >50% of aggregate area.
- Bottom of sign must be at least 10' above sidewalk and 14' above a vehicular way.

Face Replacements

Can grandfathered status remain if faces are replaced? Yes ☑ No ☐ Are permits required if only refacing the sign? Yes ☑ No ☐
Are permits required if remodeling or repainting the sign? Yes ☑ No ☐

Window Signs

Are window signs allowed? Yes ☑ No ☐ Distance setback from glass to not count as a window sign: Not regulated
Signs count towards allowed wall sign SF? N/A % of glass allowed Not regulated
Maximum SF allowed: Not regulated Permit required for illuminated window signs: Yes ☐ No ☑

Notes:
Window signs are exempt.

Permit Requirements

Permits can be applied for by: Mail ☑ Authorized Agent ☑ Contractor ☑
License Required: Business ☐ Contractors ☑
Signature Required on Application: Owner ☑ Agent ☑ Contractor ☑
Documents Required: Site Plan ☑ Elevations ☐ Sign Details ☐ Sealed Engineering ☐ Additional Professional Seals ☐
Number of Document Copies: 1 1 1
Document Size: Standard Cost of Permit: $35/sign
Length of time to secure permit: 1-2 weeks Other permit costs / fees: N/A
Is there a design review board that approves signs: Yes ☑ No ☐

Notes:
All signs must be approved by the Development Review Committee. Committee meets on Thursdays.

2035 Lakeside Centre Way Suite 250
Knoxville, TN 37922
T+865 692 4058 F+865 692 4104

Revision notes:

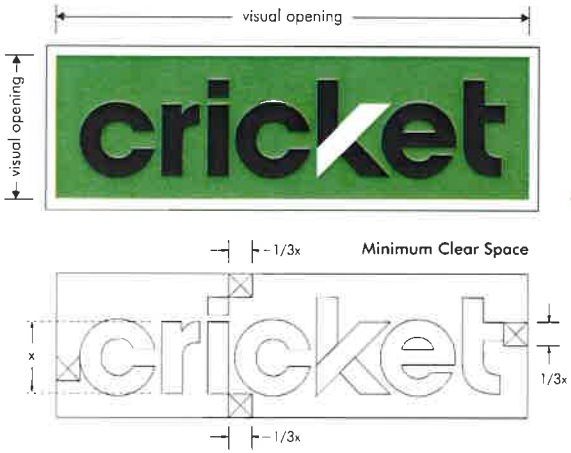
cricket

		Drawn by:	EBD
Client:	Cricket	Checked by:	-
Project:	As Built	Scale:	NTS
Title:	TBD	Revision:	-
Date:	01.05.2017	Page:	3

Exterior Site Plan | Tenant Panel

principle

N-01



Visual opening dimensions are 1'-6 3/4" x 4'-4 1/4".

Proposed

Existing

*Cut Size Dimensions Provided

2035 Lakeside Centre Way Suite 250
Knoxville, TN 37922
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Revision notes:

cricket

		Drawn by:	EBD
Client:	Cricket	Checked by:	-
Project:	As Built	Scale:	NTS
Title:	TBD	Revision:	-
Date:	01.05.2017	Page:	4

Exterior Site Plan | CR-FL-36B-R

principle

N-02

Product Code	A	B	C	SF
CR-FL-36B-R	3'-0"	13'-3 9/16"	2'-2 ¾"	39.89

Per land lord, it will be Cricket's responsibility to remove the TPB sign.

Sign band color is PMS Cool Gray 1u.

Proposed

Existing

NOTE: Quote does not include removal of any existing signage, patching or painting of the existing façade. Cricket requires that any existing signs be removed and that façade is patched and painted by the dealer, or landlord to match the color of existing fascia prior to the new Cricket signs being installed by Principle USA Inc. Please contact your Field Activity Manager if you would like Principle to quote removal of any existing signage, or patching and painting of the façade.

2035 Lakeside Centre Way Suite 250
Knoxville, TN 37922
T+865 692 4058 F+865 692 4104

Revision notes:

cricket

Client:	Cricket	Drawn by:	EBD
Project:	As Built	Checked by:	-
Title:	TBD	Scale:	NTS
Date:	01.05.2017	Revision:	-
		Page:	5

Exterior Site Plan | Logo Vinyl with Store Hours

principle

N-03

AR-DV-SDTB

2035 Lakeside Centre Way Suite 250
Knoxville, TN 37922
T+865 692 4058 F+865 692 4104

Revision notes:

cricket

		Drawn by:	EBD
Client:	Cricket	Checked by:	-
Project:	As Built	Scale:	NTS
Title:	TBD	Revision:	-
Date:	01.05.2017	Page:	6

City of Bryant, Arkansas
Code Enforcement, Permits and Inspections
312 Roya Lane
Bryant, Ar 72022
501-943-0943

SIGN PERMIT APPLICATION

Applicants are advised to read the sign ordinance prior to completing and signing this form. The Sign Ordinance is available at www.cityofbryant.com

Site plan showing placement of sign and any existing signs on the property. A rendering of sign showing correct dimensions of all signs are required with application. Additional documentation may be required by Sign Administrator.

Date: 1/12/2017

Note: Electrical permits may be Required, Please contact the Permits Office at 501-943-0943 for more information.

SIGN CO. OR SIGN OWNER
Name L. GRAPHICS indoor & outdoor signs
Address 701 N. Reynolds Rd
City, State, Zip Bryant, AR 72022
Phone 501-653-4444
Alternate Phone 501-773-0544

PROPERTY OWNER
Name Bill & Debbie Geosby
Address 2223 N. Reynold Rd
City, State, Zip Bryant, AR 72022
Phone 501-454-8162
Alternate Phone

GENERAL DETAILS
Name of Business CROSS ROAD WINE & SPIRITS

SIGN TYPE
___ Pole ___ Monument
Y Wall
___ Other (type)

Address/Location of sign 2223 N. Reynold Rd
Sign dimensions (height, length, width) 12'11" x 22" h, 18' x 18.5" h
Total sq. ft. 56 SQFT

Zoning Classification C3
Aggregate Surface Area (total all signs)

Height of sign from lot surface: Bottom 16' Top 20'6"

READ CAREFULLY BEFORE SIGNING

I JOE LAM, do hereby certify that all information contained within this application is true and correct. I fully understand that the terms of the Sign Ordinance supersede the Sign Administrator's approval and that all signs must fully comply with all terms of the Sign Ordinance regardless of approval. I further certify that the proposed sign is authorized by the owner of the property and that I am authorized by the property owner to make this application. I understand that no sign may be placed in any public right of way. I understand that I must comply with all Building and Electrical Codes and that it is my responsibility to obtain all necessary permits

Applicant's Signature — Date 1/12/2017 — Sign Administrator(or Designee) Approval — Date


12'11"
22.6"
CROSSROADS
19.5
WINE & SPIRITS
18' foot
HALE'S STEEL LLC
501-658-6177
www.hale-steel.com

City of Bryant, Arkansas
Code Enforcement, Permits and Inspections
312 Roya Lane
Bryant, Ar 72022
501-943-0943

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Date: Jan 17 2017

Note: Electrical permits may be Required, Please contact the Permits Office at 501-943-0943 for more information.

SIGN CO. OR SIGN OWNER
Name CUSTOM Advertising
Address 23478 I-30
City, State, Zip Bryant AR 72022
Phone 501-847-1000
Alternate Phone 501.209.2307

PROPERTY OWNER
Name Crush Wine & Spirits
Address 3345 Hwy 5N.
City, State, Zip Bryant AR 72022
Phone 501.841.1308
Alternate Phone

GENERAL DETAILS
Name of Business Crush Wine & Spirits
Address/Location of sign 3345 Hwy 5N.
Sign dimensions (height, length, width) 8'x8' GH Monument / 6'x20' wall
Zoning Classification C
Aggregate Surface Area (total all signs)
Height of sign from lot surface: Bottom 15' Top 21' (wall)

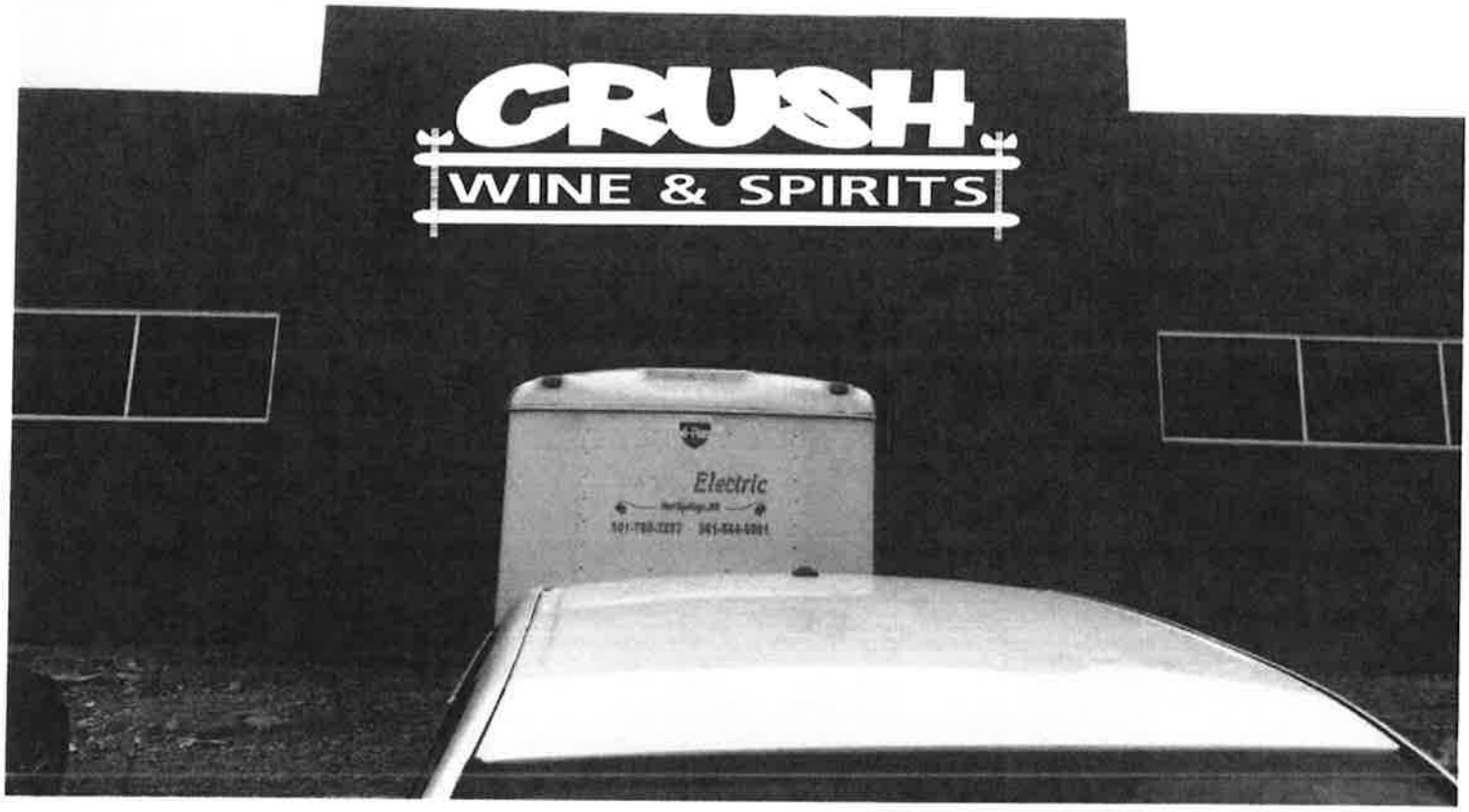
SIGN TYPE
___ Pole ✓ Monument
✓ Wall
___ Other (type)
Total sq. ft. 64 Sq Ft Monument / 120 Sq Ft wall

READ CAREFULLY BEFORE SIGNING

I, Jimmy Parker, do hereby certify that all information contained within this application is true and correct. I fully understand that the terms of the Sign Ordinance supersede the Sign Administrator's approval and that all signs must fully comply with all terms of the Sign Ordinance regardless of approval. I further certify that the proposed sign is authorized by the owner of the property and that I am authorized by the property owner to make this application. I understand that no sign may be placed in any public right of way. I understand that I must comply with all Building and Electrical Codes and that it is my responsibility to obtain all necessary permits.

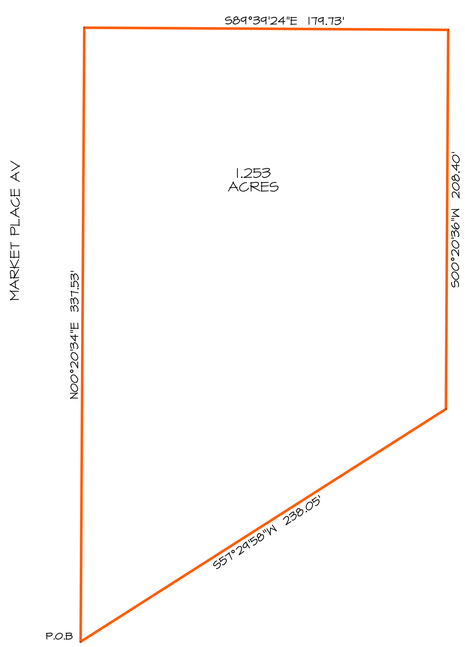
Applicant's Signature — Date: 1-17-17 — Sign Administrator(or Designee) Approval — Date


CRUSH
WINE & SPIRITS
4'
12'
4'
4'
8'



6' X 20'

3345 Hwy 5 N.
Bryant



LEGAL DESCRIPTION. (TRACT H)
THAT PORTION OF THE EAST HALF OF THE NW1/4, SECTION 22, T-1-S, R-14-W, SALINE COUNTY, ARKANSAS, DESCRIBED AS COMMENCING AT THE SOUTHWEST CORNER OF SAID E1/2 OF NW1/4, THENCE NORTH 00°19'42" EAST, A DISTANCE OF 311.79 FEET; THENCE NORTH 51°06'32" EAST, A DISTANCE OF 526.01 FEET; THENCE NORTH 71°53'28" WEST, A DISTANCE OF 45.18 FEET; THENCE NORTH 32°53'21" WEST, A DISTANCE OF 104.44 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE EAST HAVING A RADIUS OF 340.00 FEET AND A CENTRAL ANGLE OF 33°14'06" AND BEING SUBTENDED BY A CHORD WHICH BEARS NORTH 16°16'21" WEST 194.47 FEET; THENCE NORTHWESTERLY AND NORTHERLY ALONG SAID CURVE, A DISTANCE OF 197.22 FEET; THENCE NORTH 00°20'36" EAST TANGENT TO SAID CURVE, A DISTANCE OF 304.81 FEET TO THE POINT OF BEGINNING; THENCE NORTH 00°20'34" EAST, A DISTANCE OF 337.53 FEET; THENCE SOUTH 89°39'03" EAST, A DISTANCE OF 200.00 FEET; THENCE SOUTH 00°20'36" WEST, A DISTANCE OF 208.40 FEET; THENCE SOUTH 57°29'58" WEST, A DISTANCE OF 238.05 FEET TO THE POINT OF BEGINNING, CONTAINING 1.253 ACRES, MORE OR LESS.

CERTIFICATE OF AUTHORIZATION
REAL ESTATE SERVICES OF SALINE COUNTY INC.
No. 2023
ARKANSAS SURVEYOR

DATE: 6-2-16

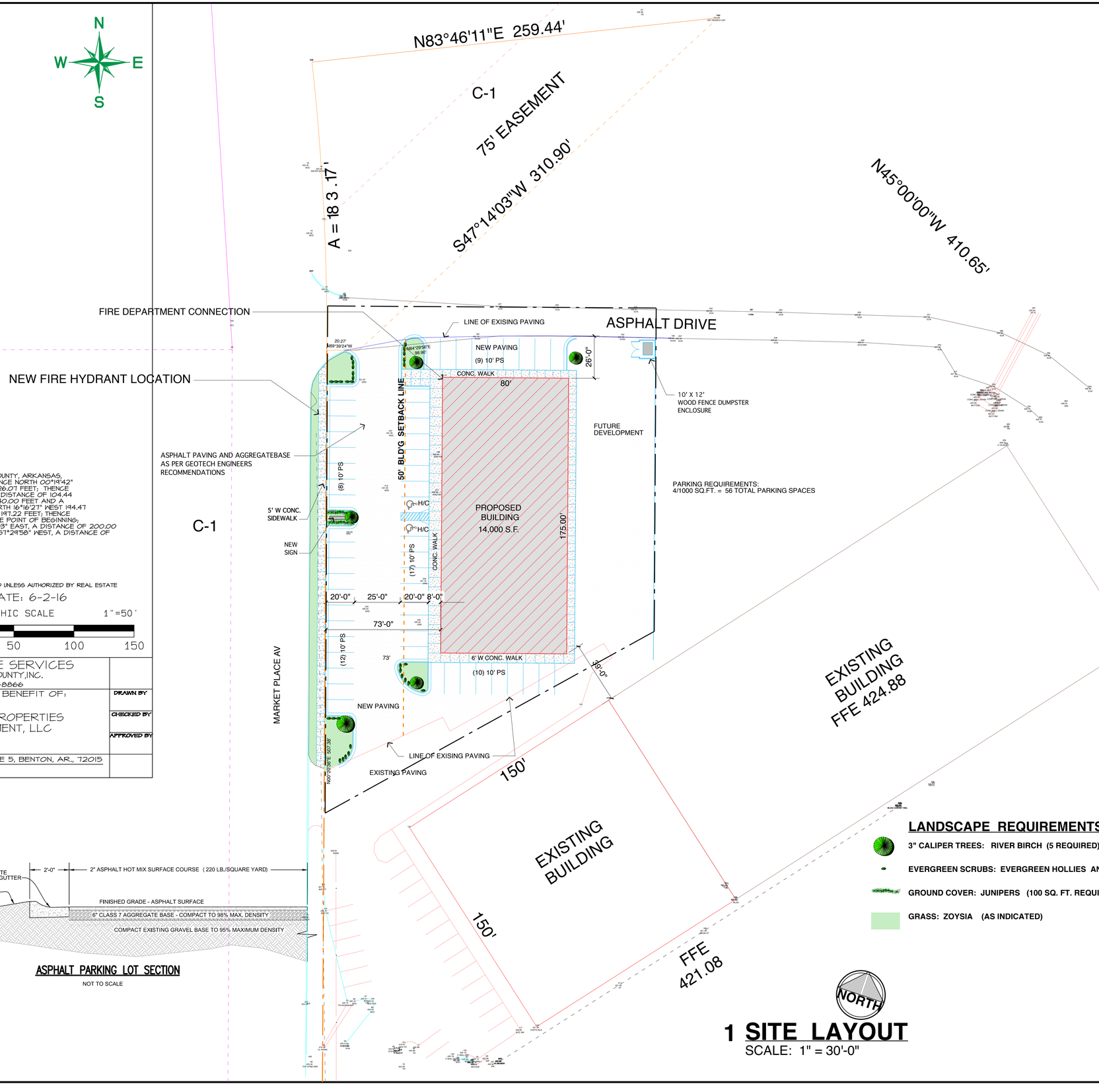
GRAPHIC SCALE 1"=50'

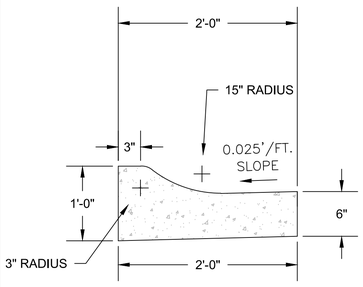
0 50 100 150

LEGEND
- ○ SET #5 BAR/CAP
- ● EXISTING MON.
- △ CALC. POINT
- X FENCE

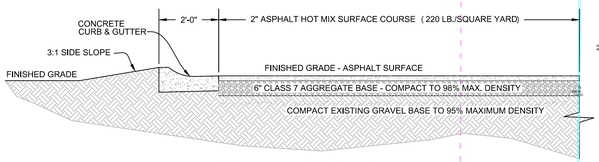
LICENSED PROFESSIONAL SURVEYOR
STATE OF ARKANSAS
No. 1141
JERRY D. LANE

DRAWING NO.	REAL ESTATE SERVICES OF SALINE COUNTY,INC. 501-315-8866	
REVISIONS BY	FOR USE AND BENEFIT OF:	DRAWN BY
DATE		CHECKED BY
	FERGUSON PROPERTIES MANAGEMENT, LLC	APPROVED BY
	1200 FERGUSON DR., SUITE 5, BENTON, AR., 72015	





CONCRETE CURB DETAIL
NOT TO SCALE



ASPHALT PARKING LOT SECTION
NOT TO SCALE

LANDSCAPE REQUIREMENTS:
- 3" CALIPER TREES: RIVER BIRCH (5 REQUIRED)
- EVERGREEN SCRUBS: EVERGREEN HOLLIES AND NANDINA (27 REQUIRED)
- GROUND COVER: JUNIPERS (100 SQ. FT. REQUIRED)
- GRASS: ZOYSIA (AS INDICATED)

1 SITE LAYOUT
SCALE: 1" = 30'-0"

BLACK CORLEY OWENS + HUGHES
ARCHITECTS
219 W SOUTH ST
BENTON, AR 72015
[501] 315-7686 PH
[501] 315-0487 FX

NEW RETAIL BUILDING
MARKET PLACE
BRYANT, AR

Sheet Revisions:

No.	Date/Reference
1	
2	
3	
4	
5	
6	

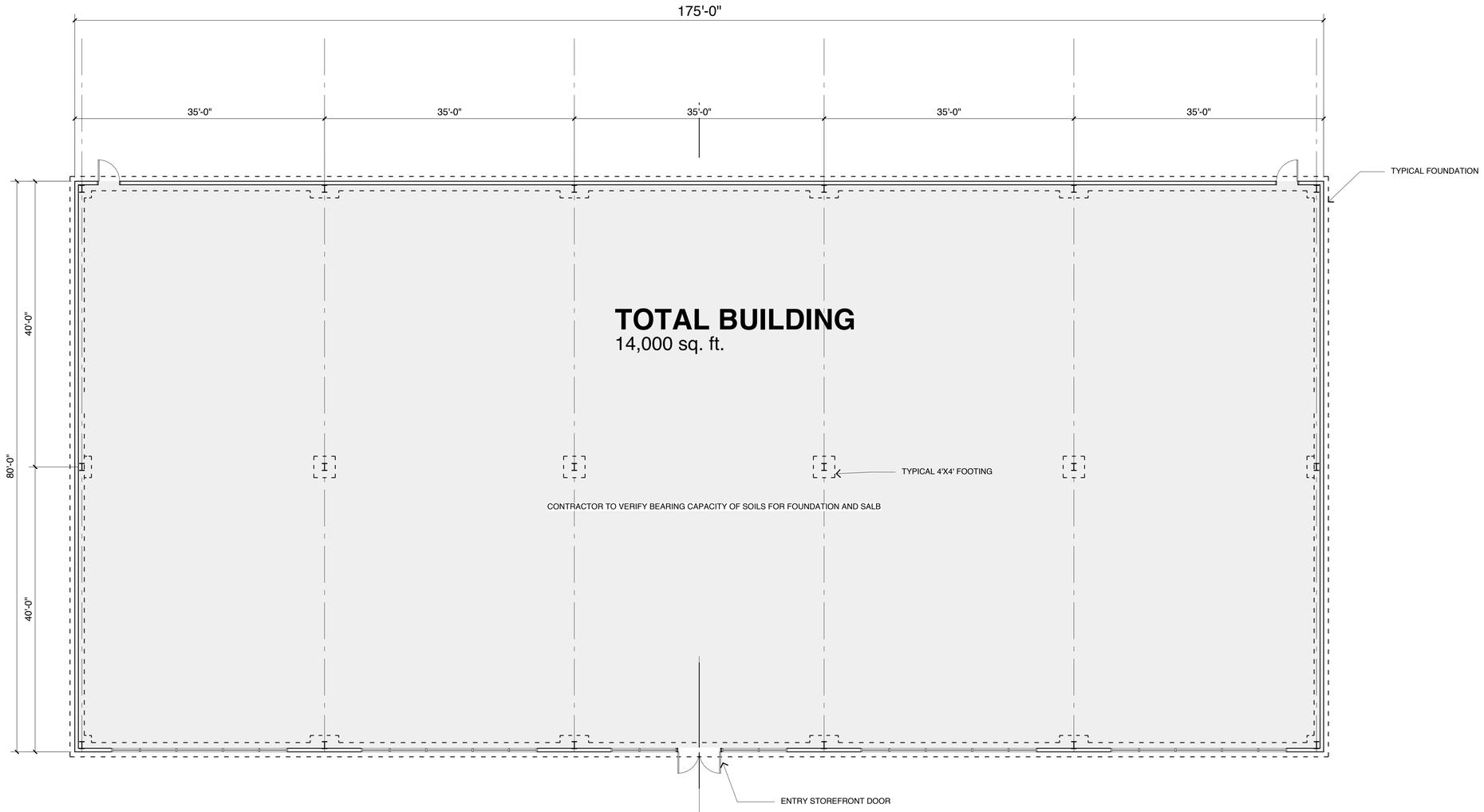
Professional Stamps:

Sheet Title:

Date: 06oct16

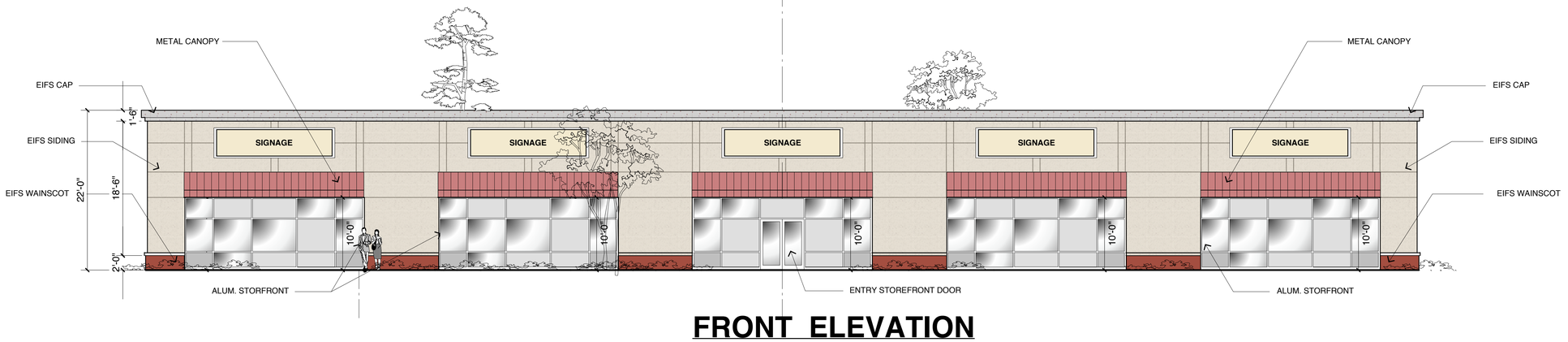
Sheet Number:

A0



PLAN

SC: 1/8" = 1'-0"



FRONT ELEVATION

SC: 1/8" = 1'-0"

BLACK CORLEY OWENS + HUGHES
ARCHITECTS
219 W SOUTH ST
BENTON, AR 72015
[501] 315-7686 PH
[501] 315-0487 FX

NEW RETAIL BUILDING
MARKET PLACE
BRYANT, AR

Sheet Revisions:	
No.	Date/Reference
1	
2	
3	
4	
5	
6	

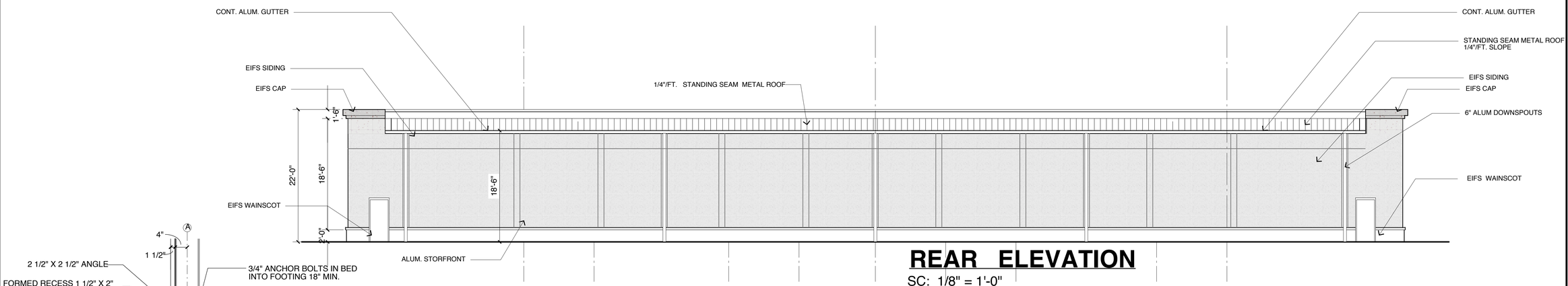
Professional Stamps:

Sheet Title:

Date: 6oct16

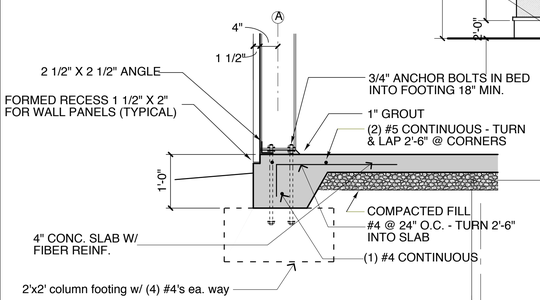
Sheet Number:

A1



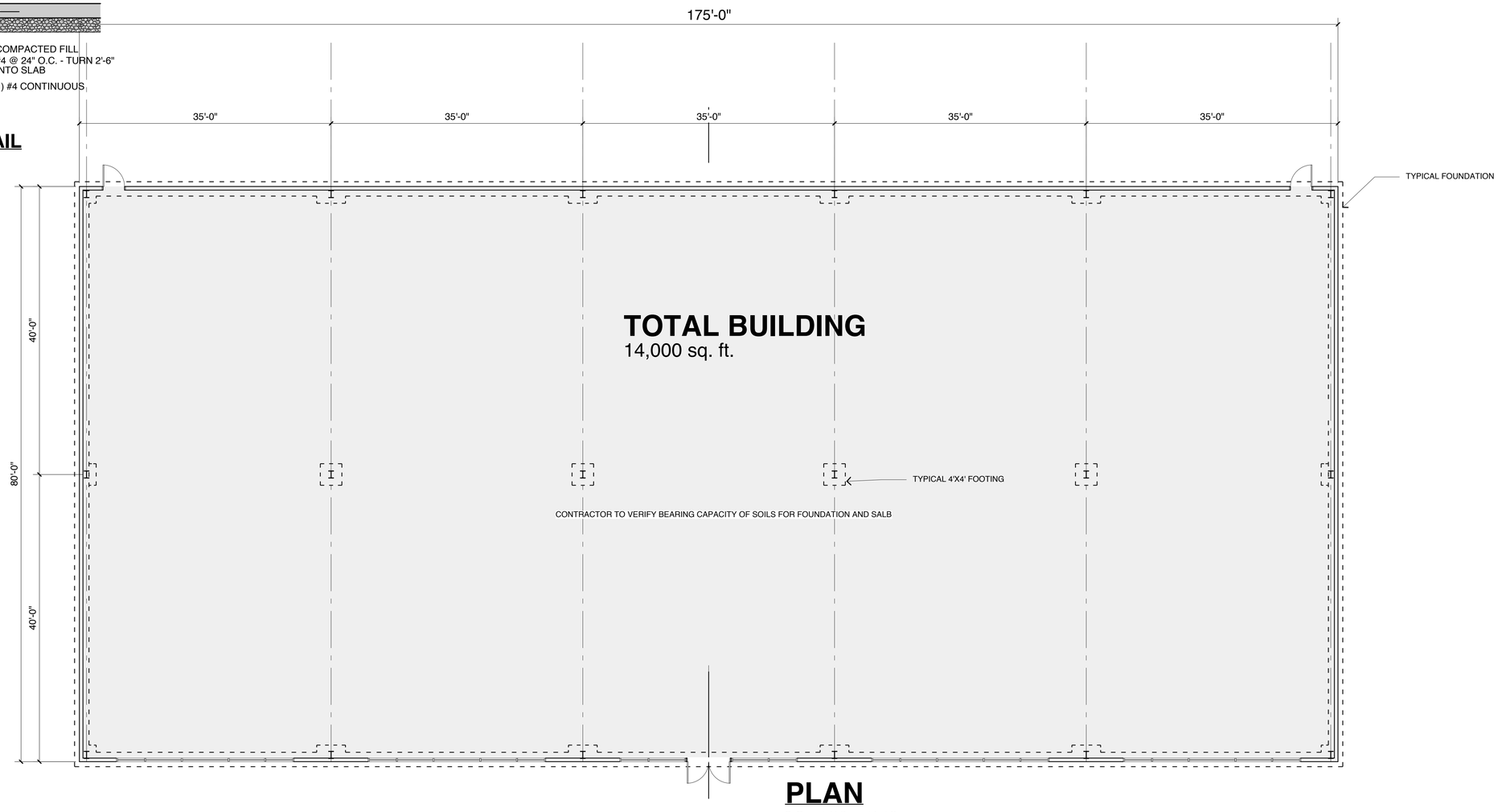
REAR ELEVATION

SC: 1/8" = 1'-0"



FOUNDATION DETAIL

3/4" = 1'-0"



PLAN

SC: 1/8" = 1'-0"

BLACK CORLEY OWENS + HUGHES
ARCHITECTS
219 W SOUTH ST
BENTON, AR 72015
[501] 315-7686 PH
[501] 315-0487 FX

NEW RETAIL BUILDING
MARKET PLACE
BRYANT, AR

Sheet Revisions:	
No.	Date/Reference
1	
2	
3	
4	
5	
6	

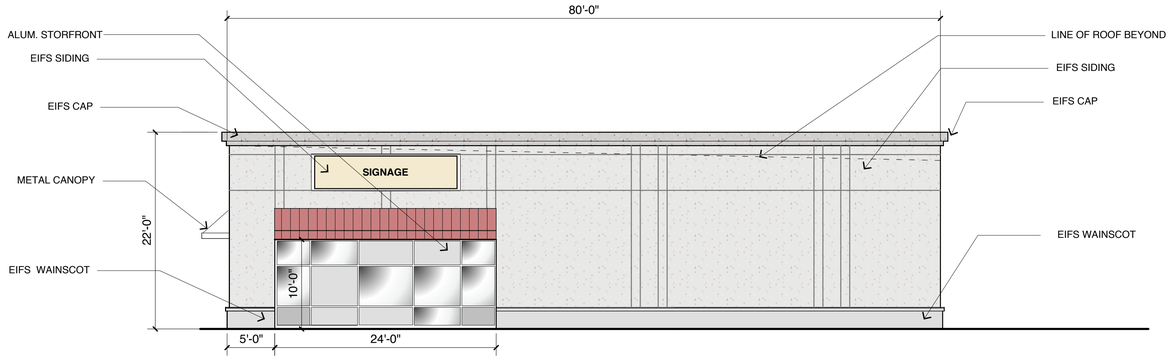
Professional Stamps:

Sheet Title:

Date: 6oct16

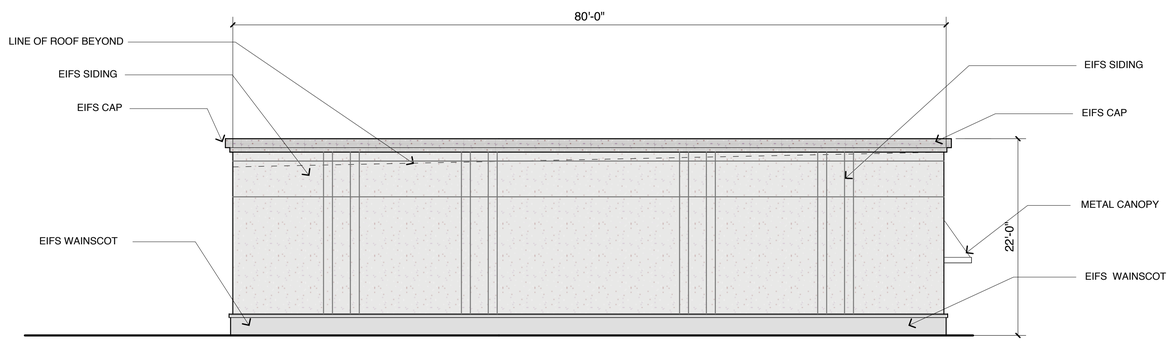
Sheet Number:

A2



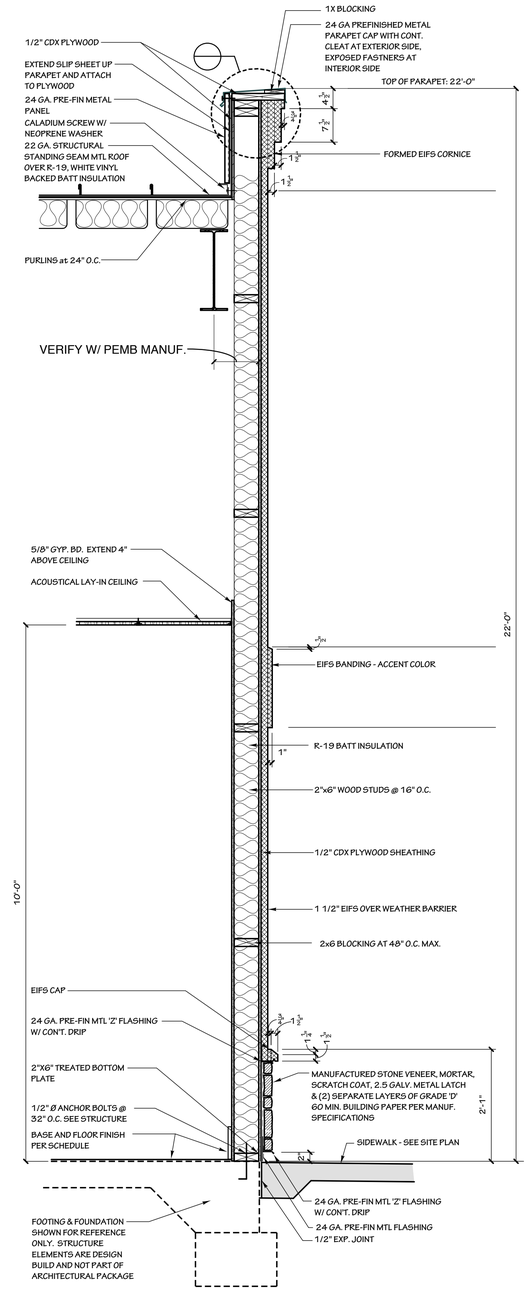
RIGHT SIDE ELEVATION

SC: 1/8" = 1'-0"



LEFT SIDE ELEVATION

SC: 1/8" = 1'-0"



1 WALL SECTION 1

3/4" = 1'-0"

BLACK CORLEY OWENS+ HUGHES
ARCHITECTS
219 W SOUTH ST
BENTON, AR 72015
[501] 315-7686 PH
[501] 315-0487 FX

NEW RETAIL BUILDING
MARKET PLACE
BRYANT, AR

Sheet Revisions:	
No.	Date/Reference
1	
2	
3	
4	
5	
6	

Professional Stamps:

Sheet Title:

Date: 06oct16

Sheet Number:

A3

Project cost
~~$7185.00~~
3592.00

FACE REPLACEMENT

City of Bryant, Arkansas
Code Enforcement, Permits and Inspections
312 Roya Lane
Bryant, Ar 72022
501-847-6031

SIGN PERMIT APPLICATION

Applicants are advised to read the sign ordinance prior to completing and signing this form. The Sign Ordinance is available at www.cityofbryant.org.

Site plan showing placement of sign and any existing signs on the property. A rendering of sign showing correct dimensions of all signs are required with application. Additional documentation may be required by Sign Administrator.

Date: 01/24/17

Note: Electrical permits may be Required, Please contact the Permits Office at 847-6031 for more information.

SIGN CO. OR SIGN OWNER
Name ACE SIGN COMPANY
Address 11935 I-30
City, State, Zip LITTLE ROCK, AR 72209
Phone (501)562-0800
Alternate Phone

PROPERTY OWNER
Name ECONOLODGE INN & SUITES
Address 210 OFFICE PARK DR.
City, State, Zip BRYANT, AR 72205
Phone
Alternate Phone

GENERAL DETAILS
Name of Business ECONOLODG INN & SUITES
Address/Location of sign 210 OFFICE PARK DR.
Sign dimensions (height, length, width) 8x6
Zoning Classification
Aggregate Surface Area (total all signs)
Height of sign from lot surface: Bottom Top

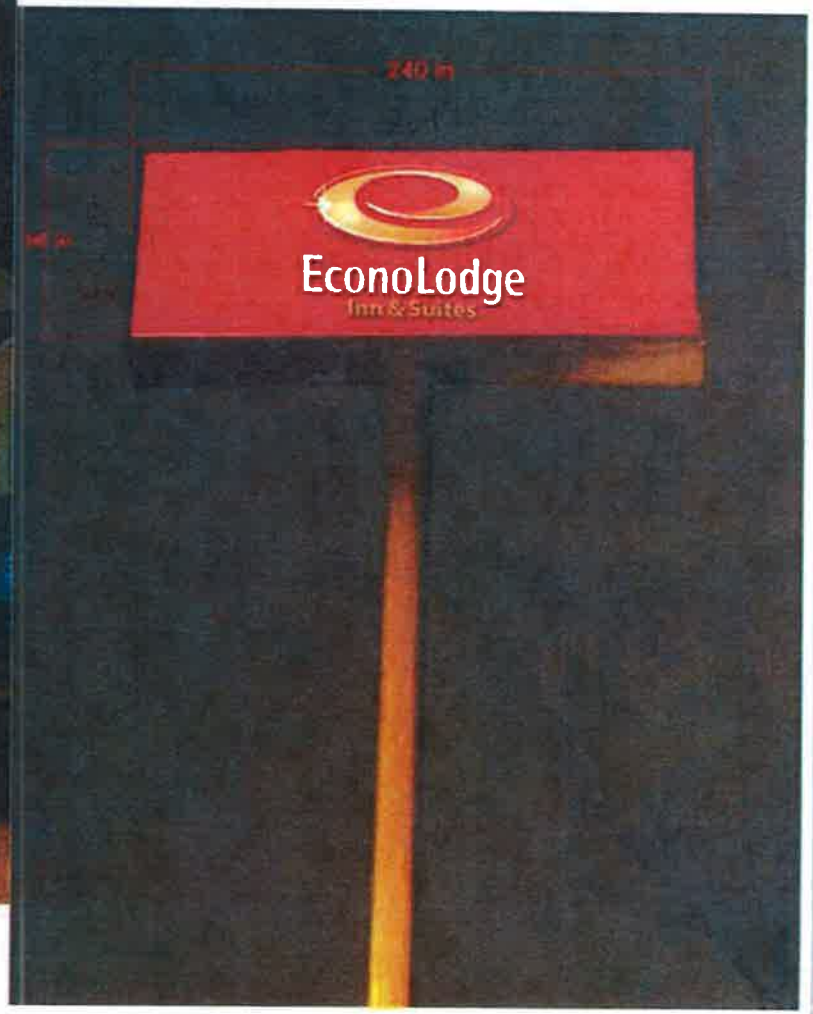
SIGN TYPE
√ Pole ___ Monument
___ Wall
___ Other (type)
Total sq. ft. 48

READ CAREFULLY BEFORE SIGNING

I ANGELA NUTT, do hereby certify that all information contained within this application is true and correct. I fully understand that the terms of the Sign Ordinance supersede the Sign Administrator's approval and that all signs must fully comply with all terms of the Sign Ordinance regardless of approval. I further certify that the proposed sign is authorized by the owner of the property and that I am authorized by the property owner to make this application. I understand that no sign may be placed in any public right of way. I understand that I must comply with all Building and Electrical Codes and that it is my responsibility to obtain all necessary permits.

Angela Nutt — 1/24/17
Applicant's Signature — Date

(Sign Administrator or Designee) Approval — Date



ACE
SIGN COMPANY
11935 I-30 Little Rock, AR 72209
Mon-Fri 8:00am - 5:00pm
P: 800-224-1366
F: 501-492-8268
www.acesigncompany.com/

CUSTOMER:
Econolodge Inn and Suites

LOCATION:
Bryant Ar

SALESPERSON:
.....
.....

PROJECT NAME:
Cabinet and high rise
PRODUCTION READY

REVISION / DATE:
Revision 0
01.23.17

DESIGNER:
Sarah Snyder

ARTWORK NOT TO SCALE. All measurements are approximate and not intended for production purposes. Site Survey may be required before production.

Customer must Sign and Date for artwork approval to confirm they are ready for production. **Please double check colors, sizes, placement, description, and spelling errors before signing.** After payments and signed approval, the artwork is now owned by the customer.

CUSTOMER APPROVAL & DATE:

COLOR SPECIFICS

☐ PMS	☐ PMS	☐ PMS	☐ PMS	☐ PMS
☐ PMS	☐ PMS	☐ PMS	☐ PMS	☐ PMS
☐ PMS	☐ PMS	☐ PMS	☐ PMS	☐ PMS

Project cost
~~7185.00~~
3592.00

FACE REPLACEMENT

City of Bryant, Arkansas
Code Enforcement, Permits and Inspections
312 Roya Lane
Bryant, Ar 72022
501-847-6031

SIGN PERMIT APPLICATION

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Date: 01/24/17

Note: Electrical permits may be Required, Please contact the Permits Office at 847-6031 for more information.

SIGN CO. OR SIGN OWNER
Name ACE SIGN COMPANY
Address 11935 I-30
City, State, Zip LITTLE ROCK, AR 72209
Phone (501) 562-0800
Alternate Phone _____

PROPERTY OWNER
Name ECONOLODGE INN & SUITES
Address 210 OFFICE PARK DR.
City, State, Zip BRYANT, AR 72205
Phone _____
Alternate Phone _____

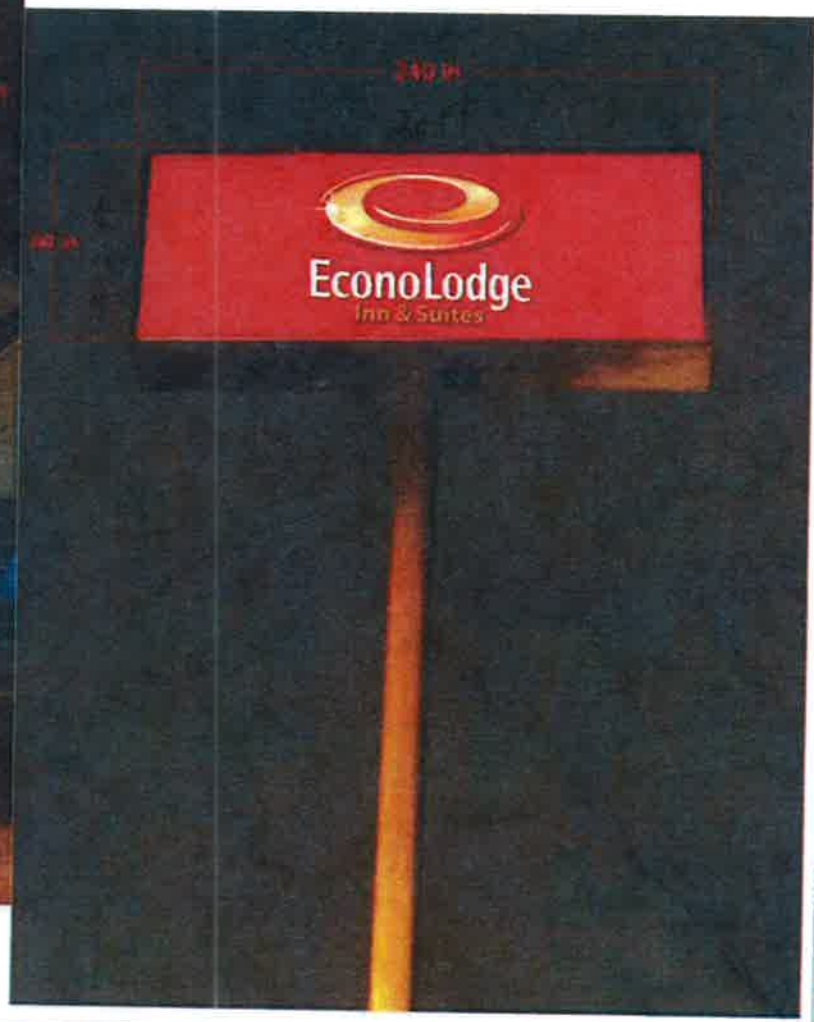
GENERAL DETAILS
Name of Business ECONOLODGE INN & SUITES
Address/Location of sign 210 OFFICE PARK DR.
Sign dimensions (height, length, width) 8ft X 20Ft
Zoning Classification _____
Aggregate Surface Area (total all signs) _____
Height of sign from lot surface: Bottom _____ Top _____

SIGN TYPE
✓ Pole ___ Monument
___ Wall
___ Other (type) _____
Total sq. ft. 160 Sq. Ft

READ CAREFULLY BEFORE SIGNING

I ANGELA NUTT, do hereby certify that all information contained within this application is true and correct. I fully understand that the terms of the Sign Ordinance supersede the Sign Administrator's approval and that all signs must fully comply with all terms of the Sign Ordinance regardless of approval. I further certify that the proposed sign is authorized by the owner of the property and that I am authorized by the property owner to make this application. I understand that no sign may be placed in any public right of way. I understand that I must comply with all Building and Electrical Codes and that it is my responsibility to obtain all necessary permits.

Angela Nutt — Applicant's Signature
1/24/17 — Date
Sign Administrator(or Designee) Approval — Date



ACE
SIGN COMPANY
11935 I-30, Little Rock, AR 72209
Mon-Fri 8:00am - 5:00pm
P. 800-234-1368
F. 501-432-8268
www.acesigncompany.com/

CUSTOMER:
Econolodge Inn and Suites

LOCATION:
Bryant Ar

SALESPERSON:
.....
.....

PROJECT NAME:
Cabinet and high rise
PRODUCTION READY

REVISION / DATE:
Revision 0
01.23.17

DESIGNER:
Sarah Snyder

ARTWORK NOT TO SCALE. All measurements are approximate and not intended for production purposes. Site Survey may be required before production.

Customer must Sign and Date for artwork approval to confirm they are ready for production. **Please double check colors, sizes, placement, description, and spelling errors before signing.** After payments and signed approval, the artwork is now owned by the customer.

CUSTOMER APPROVAL & DATE:

COLOR SPECIFICS

☐ PMS	☐ PMS	☐ PMS	☐ PMS	☐ PMS
☐ PMS	☐ PMS	☐ PMS	☐ PMS	☐ PMS
☐ PMS	☐ PMS	☐ PMS	☐ PMS	☐ PMS

City of Bryant, Arkansas
Code Enforcement, Permits and Inspections
312 Roya Lane
Bryant, Ar 72022
501-943-0943

SIGN PERMIT APPLICATION

Applicants are advised to read the sign ordinance prior to completing and signing this form. The Sign Ordinance is available at www.cityofbryant.com

Site plan showing placement of sign and any existing signs on the property. A rendering of sign showing correct dimensions of all signs are required with application. Additional documentation may be required by Sign Administrator.

Date: 1/12/2017

Note: Electrical permits may be Required, Please contact the Permits Office at 501-943-0943 for more information.

SIGN CO. OR SIGN OWNER LGRAPHICS INDOOR - outdoor signs
Name JO

Address 701 N. Reynold Rd

City, State, Zip Bryant, AR 72022

Phone 501-653-4444

Alternate Phone 501-773-0544

PROPERTY OWNER
Name Bill & Debbie Gosby

Address 2223 N. Reynolds Rd

City, State, Zip Bryant, AR 72022

Phone 501-454-8162

Alternate Phone _____

GENERAL DETAILS
Name of Business CROSSROAD WINE & SPIRITS

Address/Location of sign 2223 N. Reynolds Rd

Sign dimensions (height, length, width) 12 Feet x 12"

SIGN TYPE
___ Pole X Monument
___ Wall
___ Other (type) 96 Sqft.
Total sq. ft. _____

Zoning Classification C3 Aggregate Surface Area (total all signs) _____

Height of sign from lot surface: Bottom Monument Top 12'

Note: Removing "Bryant Cafe pole sign" and Removing "Farmer Union" sign.

READ CAREFULLY BEFORE SIGNING

I JOE LAM, do hereby certify that all information contained within this application is true and correct I fully understand that the terms of the Sign Ordinance supersede the Sign Administrator's approval and that all signs must fully comply with all terms of the Sign Ordinance regardless of approval. I further certify that the proposed sign is authorized by the owner of the property and that I am authorized by the property owner to make this application I understand that no sign may be placed in any public right of way. I understand that I must comply with all Building and Electrical Codes and that it is my responsibility to obtain all necessary permits

Applicant's Signature 1/12/2017 Date

Sign Administrator(or Designee) Approval Date


192w" x 48"h cabinet sign
BRYANT CAFE
OPEN EVERYDAY
CROSSROADS
WINE & SPIRITS
2223
FUMIC
ARMERS UNION
842-1518
2213
2213


139"
CROSSROADS
WINE & SPIRITS
2223
146"

City of Bryant, Arkansas
Code Enforcement, Permits and Inspections
312 Roya Lane
Bryant, Ar 72022
501-847-6031

SIGN PERMIT APPLICATION

Applicants are advised to read the sign ordinance prior to completing and signing this form. The Sign Ordinance is available at www.cityofbryant.org.

Site plan showing placement of sign and any existing signs on the property. A rendering of sign showing correct dimensions of all signs are required with application. Additional documentation may be required by Sign Administrator.

Date: 1/20/17

Note: Electrical permits may be Required, Please contact the Permits Office at 847-6031 for more information.

SIGN CO. OR SIGN OWNER
Name Ace Sign Company
Address 11935 I-30
City, State, Zip Little Rock, AR
Phone 501-562-0800
Alternate Phone 501-492-8252

PROPERTY OWNER
Name
Address
City, State, Zip
Phone
Alternate Phone

GENERAL DETAILS
Name of Business T & B Auto
Address/Location of sign 25631 I-30
Sign dimensions (height, length, width) 8' X 16'
Zoning Classification
Aggregate Surface Area (total all signs)
Height of sign from lot surface: Bottom Top

SIGN TYPE
____ Pole ____ Monument
____ Wall
____ Other (type)
Total sq. ft. 128 sq ft

READ CAREFULLY BEFORE SIGNING

I Wendy Reed, do hereby certify that all information contained within this application is true and correct. I fully understand that the terms of the Sign Ordinance supersede the Sign Administrator's approval and that all signs must fully comply with all terms of the Sign Ordinance regardless of approval. I further certify that the proposed sign is authorized by the owner of the property and that I am authorized by the property owner to make this application. I understand that no sign may be placed in any public right of way. I understand that I must comply with all Building and Electrical Codes and that it is my responsibility to obtain all necessary permits.

Wendy Reed 1/20/17
Applicant's Signature Date

Sign Administrator(or Designee) Approval Date

← Existing

← NEW LED
Display Addition

Service Road

Exit Entrance Existing

Existing Building

40'

N 00°00'00" E 530.55' (D)
N 00°04'06" E 530.55' (M)

Existing Asphalt

135'

New Asphalt

SOUTH 530.00'
SOUTH 530.19'

119229.51 SQ FT
2.74 ACRES

106919.80 SQ FT
2.45 ACRES

150'

Drainage Ditch

30'

CO

4" SS EXIT
(RE: ARCH)

PROPOSED
WAREHOUSE
FFE: 392.0(±)
221,500sq ft

8"FIRELINE ENTRY
(RE: SPRINKLER PLANS)

5' sidewalk

Existing Storage Connex's

35'

80'

35'

S 90°00'00" W 202.00' (D)
S 88°20'01" W 202.00' (M)

WEST 222.00' (D)
N 89°43'19" W 223.13' (M)

80'

33.10'

08°31" W
108.08'

8"GATE VALVE
w/8" MJ CAP
AND BLOCKING

8"x8"TEE w/ 8"
DEMARCATION
VALVE

60'

Purposed Parking

FDC (RE:
SPRINKLER PLANS)

8W

Fire Hydrant

4" SDR-26 PVC@
1% SLOPE, TYP.

4S

8W

NEW MANHOLE
TOP: 391.00

6" HEIGHT WOOD
PRIVACY FENCE

140.00' (P)
139.74' (M)

6" SDR-21
PVC, TYP.

8W

DRIVE 6" COMPACTED CLASS 7 -
Fire Access Road

30.00'

19.50' (P)
19.50' (M)

8S

8" SDR-26 PVC@
1% SLOPE, TYP.

270.00' (D) 269.05' (M)

288.30' (D) 287.88' (M)

140.00' (P)
139.29' (M)

SOUTH 540.00' (D)
S 00°07'12" E 536.81' (M)

125.51' (M)

128.20' (M)

162.00' (D) 162.57' (M)

60.00' (P)
60.00' (M)

177.80' (M)

206.47' (M)

EXISTING
MANHOLE

SAWCUT AND REPAIR
EXISTING ROADWAY FOR
WATERLINE INSTALLATION

WATER LINE
EASEMENT

8"x8" TAPPING
SLEEVE AND
VALVE

EXISTING
WATER MAIN

143.00' (D)
143.00' (M)

20'

SEWER
EASEMENT

Knox Box on Gate

Gas Line

EXISTING
MANHOLE
TOP: 386.82

811 Know what's below. Call before you dig.

N

30 30 0 30

Fleming Electric, Inc.

January 10, 2017

City of Bryant
Bryant, AR 72089

RE: Fleming Electric Secondary Emergency Entrance on Ridgecrest Road, Bryant, AR

To Whom It May Concern:

Regarding consideration for permit of our newly constructed warehouse project, we have been made aware should the construction drive on to Ridgecrest Road be made into a permanent entrance for use other than emergency, we will be required to make half street improvements to be engineered and brought to DRC for approval.

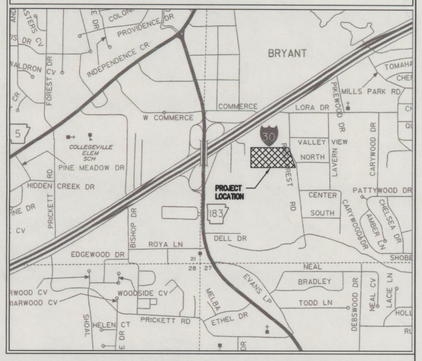
At this time, we do not plan to utilize Ridgecrest Road as a permanent entrance. It is intended merely as an emergency or construction entrance. At which time, if any we decide to utilize this as an entrance for normal traffic, we are aware those improvements will need to be engineered and constructed.

Sincerely,

C.Ann Fleming

C. Ann Fleming
Chief Executive Officer

VICINITY MAP:



LEGAL DESCRIPTION:

PART OF THE NW 1/4 OF SW 1/4, SECTION 22, TOWNSHIP 1 SOUTH, RANGE 14 WEST, DESCRIBED AS FOLLOWS: BEGINNING 540 FEET SOUTH OF THE NE CORNER OF SAID NW 1/4 SW 1/4, RUN THENCE SOUTH 540 FEET, THENCE WEST 222 FEET; THENCE NORTH 538 FEET; THENCE EAST 222 FEET TO THE POINT OF BEGINNING, CONTAINING 2.75 ACRES.

PART OF THE NW 1/4 OF SW 1/4, SECTION 22, TOWNSHIP 1 SOUTH, RANGE 14 WEST, DESCRIBED AS FOLLOWS: BEGINNING 540 FEET SOUTH AND 222 FEET WEST OF THE NE CORNER OF SAID NW 1/4 OF SW 1/4, RUNNING THENCE SOUTH 535 FEET; THENCE WEST 202 FEET; THENCE NORTH 530 FEET; THENCE EAST 202 FEET TO POINT OF BEGINNING, CONTAINING 2.45 ACRES, MORE OR LESS.

LOTS 98, 99 & 100, PIKEWOOD SUBDIVISION, PHASE 2, TO THE CITY OF BRYANT, SALINE COUNTY, ARKANSAS.

PSI

PROPERTY SPECIFICATIONS:

OWNER:	FLEMING ELECTRIC 212 McCLANAHAN DRIVE BRYANT, ARKANSAS 72022	BUILDING SETBACKS: FRONT-50' REAR-15' OR 55' ABUTTING RESIDENTIAL SIDE-0 OR 25' ABUTING RESIDENTIAL
DEVELOPER/: SUBDIVIDER	FLEMING ELECTRIC 212 McCLANAHAN DRIVE BRYANT, ARKANSAS 72022	LOT AREA: 276,668 SQ FT.
ENGINEER/SURVEYOR:	HOPE CONSULTING INC. 117 S. MARKET STREET BENTON, ARKANSAS 72015	
ZONING CLASSIFICATION:	C-2	

SEWER LEGEND:

SEWER SERVICE
SEWER MAIN
SEWER MANHOLE

TYPICAL WATER METER PLACEMENT:

WATER LEGEND:

WATER MAIN
4" BLOW OFF
GATE VALVE
REDUCER
FIRE HYDRANT
DOUBLE WATER SERVICE
SINGLE WATER SERVICE

NOTE:
ALL FIRE HYDRANT LEADERS HAVE A GATE VALVE BETWEEN MAIN AND FIRE HYDRANT.

TYPICAL FIRE HYDRANT:

4" BLOW OFF
REDUCER
6"
6"
GATE VALVE
FIRE HYDRANT
(2 TO 6 FEET FROM EDGE OF PAVEMENT)

CERTIFICATE OF AUTHORIZATION
HOPE CONSULTING, INC.
No. 1931
ARKANSAS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
NO. 14048
WILLIAM W. McFADDEN

HOPE CONSULTING
ENGINEERS - SURVEYORS
117 S. Market Street,
Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

FOR USE AND BENEFIT OF:
[redacted]FLEMING ELECTRIC

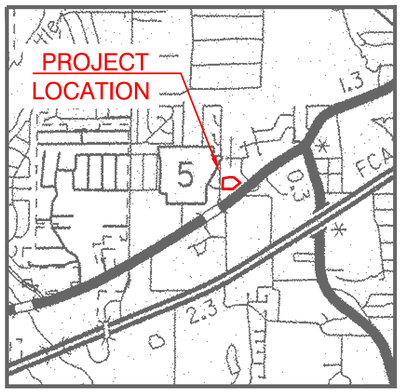
1-9-17 JWR

SITE / UTILITY PLAN

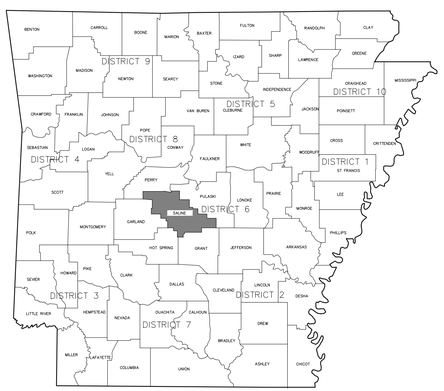
DATE: 4-10-2014		C.A.D. BY: W. MCFADDEN					DRAWING NUMBER:	
REVISED:		CHECKED BY:					13-0480	
SHEET:	2 OF 6	SCALE: 1"=30'						
500	1S	14W	0	22	SW	62	1762	

CONSTRUCTION PLANS
CRYE-LEIKE COMMERCIAL RETAIL

BRYANT, ARKANSAS



VICINITY MAP
SCALE: 1" = 2000'



PREPARED BY:

HOPE CONSULTING
ENGINEERS - SURVEYORS

117 S. Market Street,
Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

DRAWING INDEX

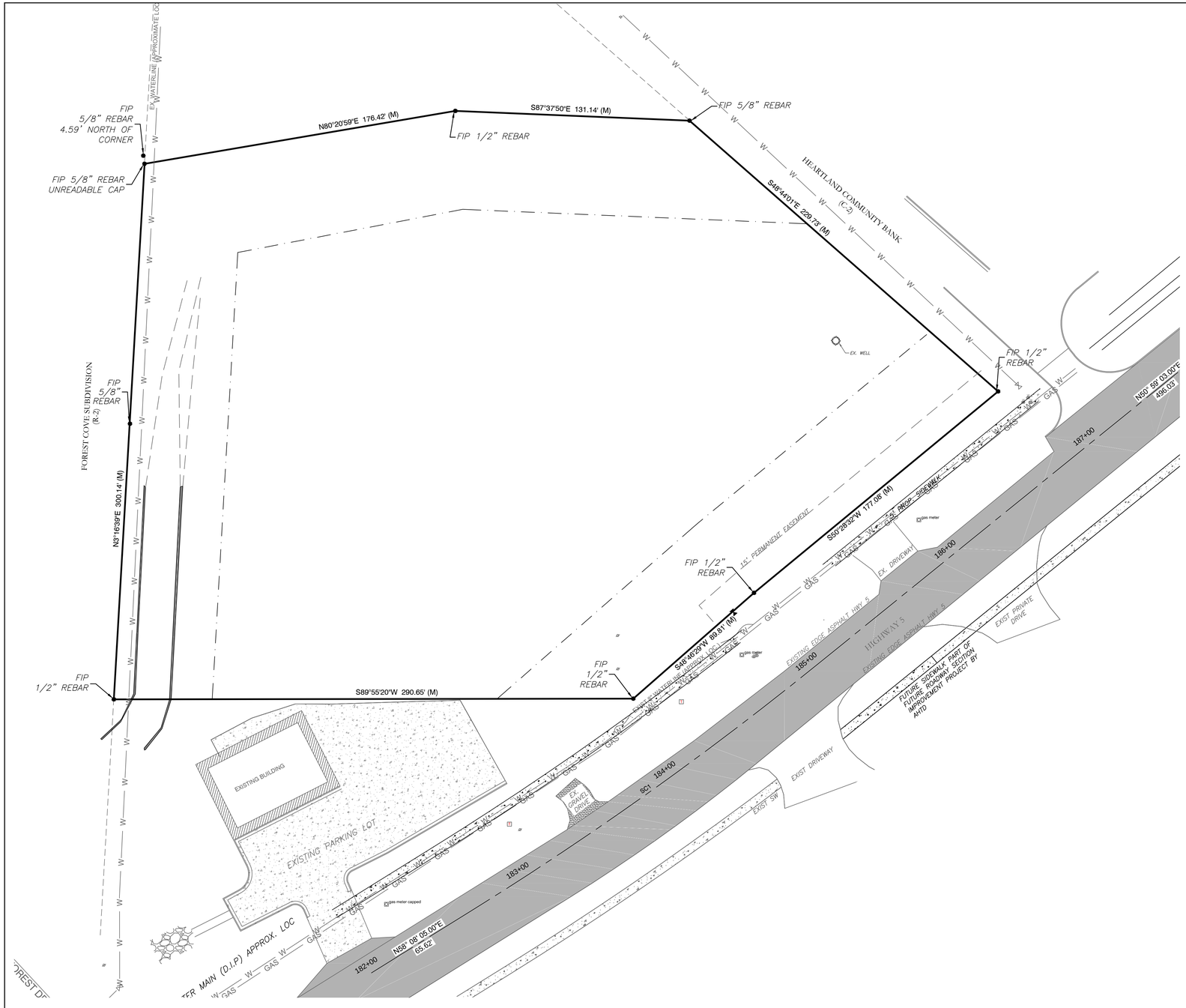
SHEET NO.	TITLE
	BOUNDARY & TOPO SURVEY
C-1.0	SITE PLAN
C-2.0	GRADING PLAN
C-3.0	UTILITY PLAN
C-4.0	CIVIL SPECIFICATIONS
C-5.0	TRENCH DETAILS
C-6.0	DRAINAGE PLAN AND DETENTION DETAILS
A-1.0	FLOOR PLAN
L-1.0	LANDSCAPE PLAN
P-1.0	NOT YET RECEIVED
P-1.1	NOT YET RECIEVED
P-1.2	NOT YET RECEIVED
S-1.0	NOT YET RECEIVED
S-1.1	NOT YET RECEIVED
S-2.0	NOT YET RECEIVED
S-3.0	NOT YET RECEIVED
S-3.1	NOT YET RECEIVED
S-4.0	NOT YET RECEIVED

CIVIL ENGINEER
HOPE CONSULTING INC
117 S. MARKET STREET
BENTON, AR 72015

OWNER
HAROLD E. CRYE
11600 KANIS RD SUITE 40
LITTLE ROCK, AR 72211

ARCHITECT
DON JOHNSON
JOHNSON ARCHITECTS, PLC
275 CANTRELL RD, SUITE 107
LITTLE ROCK, AR 72202

GEOTECHNICAL ENGINEER
MTA ENGINEERS
LITTLE ROCK, AR
P.O. BOX 23715
LITTLE ROCK, AR 72221



WATER NOTES

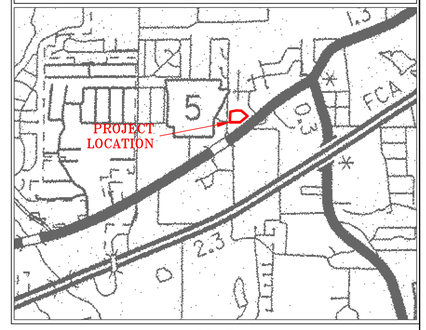
APPROX. LOCATION OF UTILITY EASEMENT AND PROPOSED 8" WATER LINE AND GATE VALVE ARE SHOWN ON PLANS AS PER CRIST ENGINEERS.

PROPOSED 8" MAIN AND GATE VALVE PART OF A SEPARATE WATER RELOCATION PROJECT AND ONLY SHOWN FOR PURPOSES OF TYING PROPOSED 1.5" SERVICE FOR THIS INTO WATER SYSTEM

GAS NOTES

MEP TO VERIFY PROP GAS LOCATION AND METER

VICINITY MAP:



SCALE:
1"=2000'

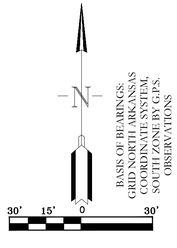
PROPERTY DETAILS

CURRENT ZONING: C-2 (HIGHWAY COMMERCIAL)
PARKING SPACE REQUIREMENTS
REQUIRED SPACES: 1 SPACE PER 300 SQUARE FEET OF OCCUPIED SPACE (70 SPACES)
PROPOSED SPACES: 96 (INCLUDES 4 HC SPACES)

Legal Description was taken from survey completed on June 16, 2016 by Scott Foster PLS # 1467

Property Description:

Part of the Southwest Quarter of the Northeast Quarter of Section 21, Township 1 South, Range 14 West, Saline County, Arkansas. Being more Particularly Described as Follows: Beginning at the Southwest Corner of the Said Southwest Quarter of the Northeast Quarter; Thence North 03 Degrees 16 Minutes 36 Seconds East Along the East Line of Forest Cove Subdivision 296.35 Feet to a Found Five Eights Inch Rebar; Thence Departing Said East Line North 79 Degrees 08 Minutes 23 Seconds East 177.43 Feet to a Point; Thence South 87 Degrees 35 Minutes 58 Seconds East 131.11 Feet to a Found Five Eights Inch Rebar; Thence South 48 Degrees 42 Minutes 58 Seconds East 229.78 Feet to a Set One Half Inch Rebar on the Northern Right of Way Line of Arkansas State Highway Number 5; Thence Along Said Right of Way Line the Following Two Courses and Distances; Thence South 50 Degrees 29 Minutes 58 Seconds West 177.09 Feet to a Set One Half Inch Rebar; Thence South 48 Degrees 48 Minutes 29 Seconds West 89.77 Feet to a Set One Half Inch Rebar; Thence Departing Said Right of Way Line South 89 Degrees 54 Minutes 56 Seconds West 290.66 Feet to the Point of Beginning Containing 124.648 Square Feet or 2.86 acres More or Less.



BASIS OF BEARINGS: GRID NORTH ARKANSAS COORDINATE SYSTEM, SOUTH ZONE BY G.P.S. OBSERVATIONS

UTILITY NOTES

1. EXISTING UTILITY LOCATIONS SHOWN ON PLANS ARE APPROXIMATE ONLY. CONTRACTOR SHOULD ALWAYS CALL ONE CALL BEFORE DIGGING.

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CERTIFICATE OF AUTHORIZATION — HOPE CONSULTING, INC. — No. 1931 — ARKANSAS

WATER LEGEND:	EXISTING UTILITY LEGEND:
PROP. GATE VALVE	EXIST POWER POLE
2" BLOW OFF	EXIST WATER MAIN — GATE VALVE
REDUCER	REDUCER
FIRE HYDRANT	GMET GAS METER
DOUBLE WATER SERVICE	TELEPHONE PED.
SINGLE WATER SERVICE	EXISTING WATER METER
	FIRE HYDRANT

NOTE: ALL FIRE HYDRANT LEADERS HAVE A GATE VALVE BETWEEN MAIN AND FIRE HYDRANT.

SURVEY LEGEND

- △ - Computed point
- ● - Found monument
- ⊙ - Set Iron Pipe
- (M) - Measured
- (P) - PLAT/DEED
- ∅ - Power Pole

HOPE CONSULTING
ENGINEERS - SURVEYORS
117 S. Market Street,
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FAX (501) 315-0024
www.hopeconsulting.com

FOR USE AND BENEFIT OF:
HAROLD CRYE

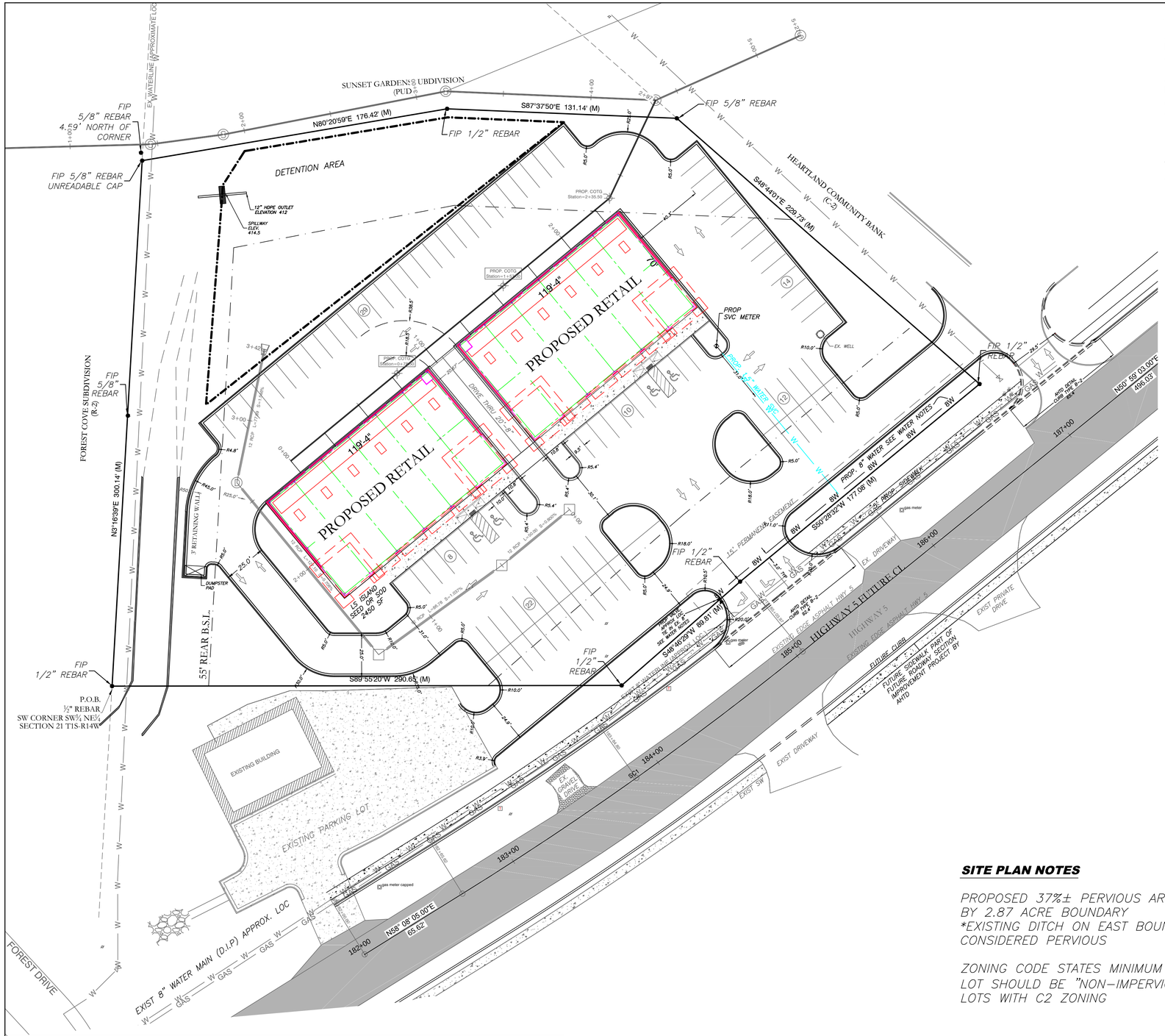
CRYE-LEIKE COMMERCIAL RETAIL BOUNDARY SURVEY

BRYANT, SALINE COUNTY, ARKANSAS

DATE:	1/19/2017	C.A.D. BY:	JNS	DRAWING NUMBER:	16-0380
REVISED:	n/a	CHECKED BY:			
SHEET:	BOUNDARY	SCALE: AS SHOWN			

500	01S	14W	0	19	440	62	1762

K:\LAND PROJECTS\2016\COMMERCIAL\2016\16-0380 JFIP HILL HWY 5\16-0380 BASE DRAWING (REV 1-26-17).DWG



WATER NOTES

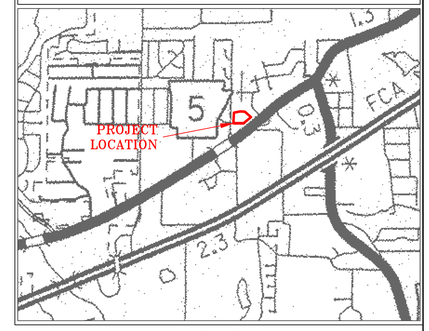
APPROX. LOCATION OF UTILITY EASEMENT AND PROPOSED 8" WATER LINE AND GATE VALVE ARE SHOWN ON PLANS AS PER CRIST ENGINEERS.

PROPOSED 8" MAIN AND GATE VALVE PART OF A SEPARATE WATER RELOCATION PROJECT AND ONLY SHOWN FOR PURPOSES OF TYING PROPOSED 1.5" SERVICE FOR THIS INTO WATER SYSTEM

GAS NOTES

MEP TO VERIFY PROP. GAS LOCATION AND METER

VICINITY MAP:



SCALE: 1"=2000'

SITE PLAN NOTES

PROPOSED 37%± PERVIOUS AREAS ENCLOSED BY 2.87 ACRE BOUNDARY
*EXISTING DITCH ON EAST BOUNDARY CONSIDERED PERVIOUS

ZONING CODE STATES MINIMUM OF 10% OF LOT SHOULD BE "NON-IMPERVIOUS" FOR LOTS WITH C2 ZONING

PROPERTY DETAILS

CURRENT ZONING: C-2 (HIGHWAY COMMERCIAL)
PARKING SPACE REQUIREMENTS
REQUIRED SPACES: 1 SPACE PER 300 SQUARE FEET OF OCCUPIED SPACE (70 SPACES)
PROPOSED SPACES: 96 (INCLUDES 4 HC SPACES)

Legal Description was taken from survey completed on June 16, 2016 by Scott Foster PLS # 1467

Property Description:

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SITE LEGEND

EXIST HIGHWAY 5 ASPHALT PAVEMENT

UTILITY NOTES

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EXISTING UTILITY LEGEND:

- EXIST POWER POLE
- EXIST WATER MAIN — GATE VALVE
- REDUCER
- GMET — GAS METER
- TELEPHONE PED.
- EXISTING WATER METER
- FIRE HYDRANT

SEWER LEGEND:

- SEWER MANHOLE

NOTE:
USE SDR-26 PVC SEWER PIPE EXCEPT WHERE DUCTILE IRON PIPE REQUIRED FOR COVER. USE DUCTILE IRON PIPE WHERE 30" MINIMUM COVER CANNOT BE MAINTAINED.

CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL BURIED UTILITIES PRIOR TO CONSTRUCTION.

WATER LEGEND:

- PROP. GATE VALVE
- 2" BLOW OFF
- REDUCER
- FIRE HYDRANT
- DOUBLE WATER SERVICE
- SINGLE WATER SERVICE

NOTE:
ALL FIRE HYDRANT LEADERS HAVE A GATE VALVE BETWEEN MAIN AND FIRE HYDRANT.

CERTIFICATE OF AUTHORIZATION — HOPE CONSULTING, INC. — No. 1931 — ARKANSAS

STATE OF ARKANSAS — REGISTERED PROFESSIONAL ENGINEER — NO. 14048 — WILLIAM W. McFADDEN

N

30' 15' 0 30'

BASIS OF BEARINGS: GRID NORTH ARKANSAS COORDINATE SYSTEM, SOUTH ZONE BY G.P.S. OBSERVATIONS

LEGEND
- Computed point
- Found monument
- Set Iron Pipe
(M) - Measured
(R) - Record
(D) - Deed
- Power Pole
- Overhead Power

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FOR USE AND BENEFIT OF:
HAROLD CRYE

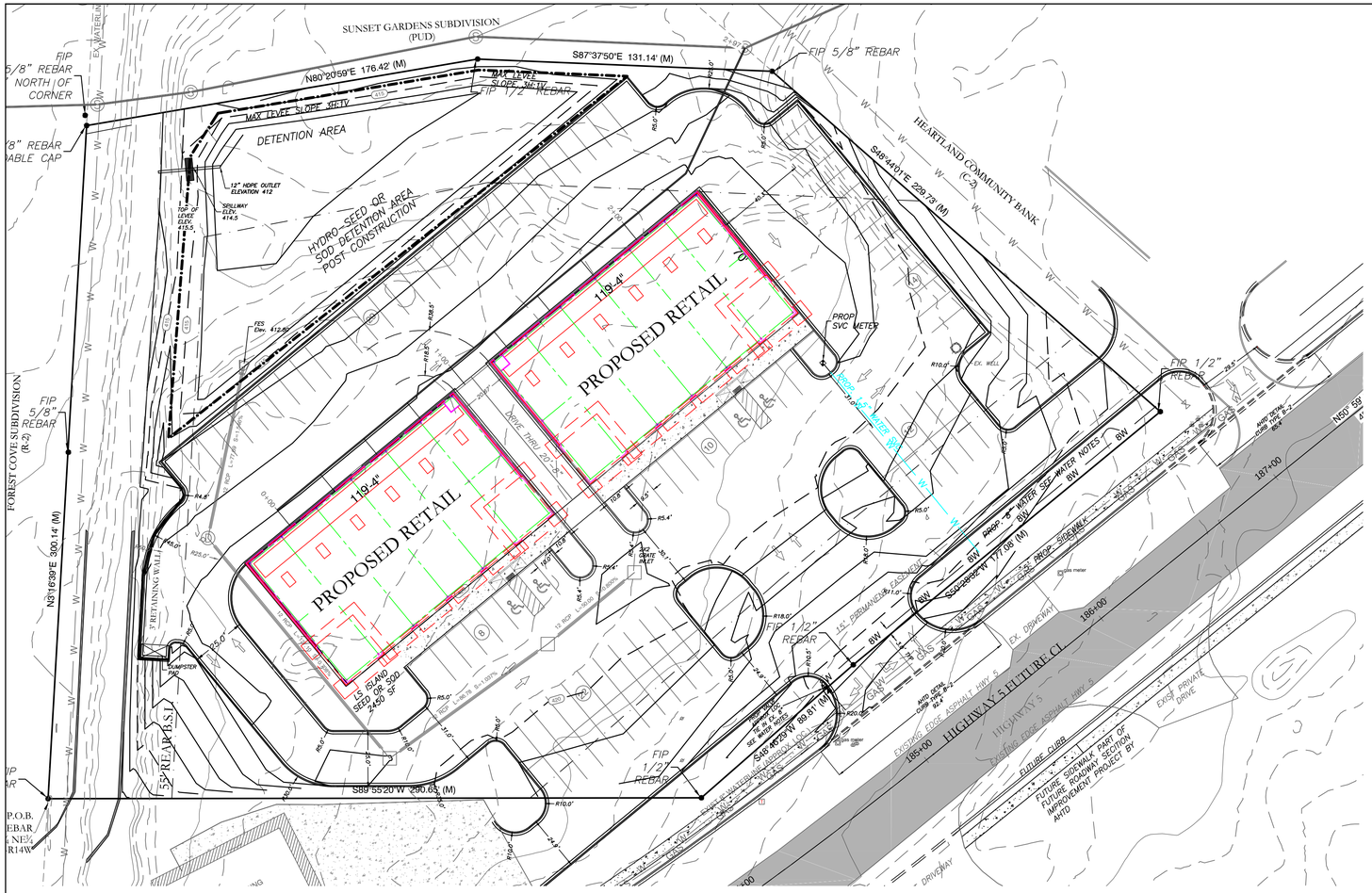
CRYE-LEIKE COMMERCIAL RETAIL SITE PLAN

BRYANT, SALINE COUNTY, ARKANSAS

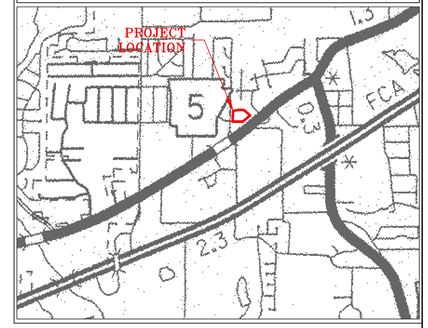
DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER:
REVISED:	1/26/2017	CHECKED BY:	16-0380
SHEET:	C-1.0	SCALE: AS SHOWN	

500	01S	14W	0	19	440	62	1762

K:\LAND PROJECTS 2016\COMMERCIAL\2016\16-0380\JEFF HILL HWY 5\16-0380 BASE DRAWING (REV 1-26-17).DWG



VICINITY MAP:



SCALE:
1"=2000'

UTILITY NOTES

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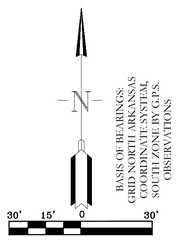
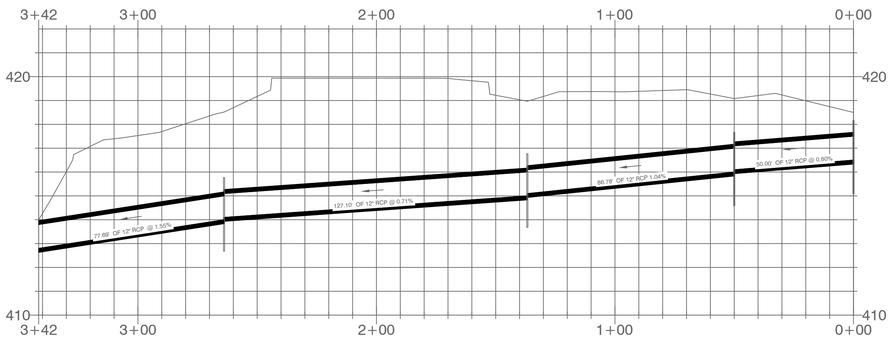


Storm pipe PROFILE



Drainage Structure	Unpaved Area (Acres)	Paved Area (Acres)	C_u	C_p	i	Discharge (Q = CiA)	Offsite Discharge	Cumulative Discharge	Pipe #	(RCP) Pipe Size(in.)	Slope	Velocity (V_{min}=3.0) (V_{max}=8.0)	PIPE CAPACITY (EACH)	PIPE CAPACITY (TOTAL)	% CAPACITY	Entrance Loss K_e	Assumed Length	Required Head	Elev Head from S_{pipe}	Required Additional Head
1_{100yr}		0.25		0.97	10.0	2.4		2.4	1	12	0.80%		3.5	3.5	70.2%	0.5	50	0.4	0.4	0.0
2_{100yr}		0.25		0.97	10.0	2.4		2.4	1	12	1.04%		3.9	3.9	61.6%	0.5	86	0.6	0.9	0.0
3_{100yr}		0.25		0.97	10.0	2.4		2.4	1	12	0.71%		3.3	3.3	74.6%	0.5	127	0.7	0.9	0.0
4_{100yr}		0.25		0.97	10.0	2.4		2.4	1	12	1.55%		4.8	4.8	50.5%	0.5	77	0.5	1.2	0.0

CERTIFICATE OF AUTHORIZATION
HOPE CONSULTING, INC.
No. 1931
ARKANSAS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
NO. 14048
WILLIAM W. McFADDEN

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ENGINEERS - SURVEYORS
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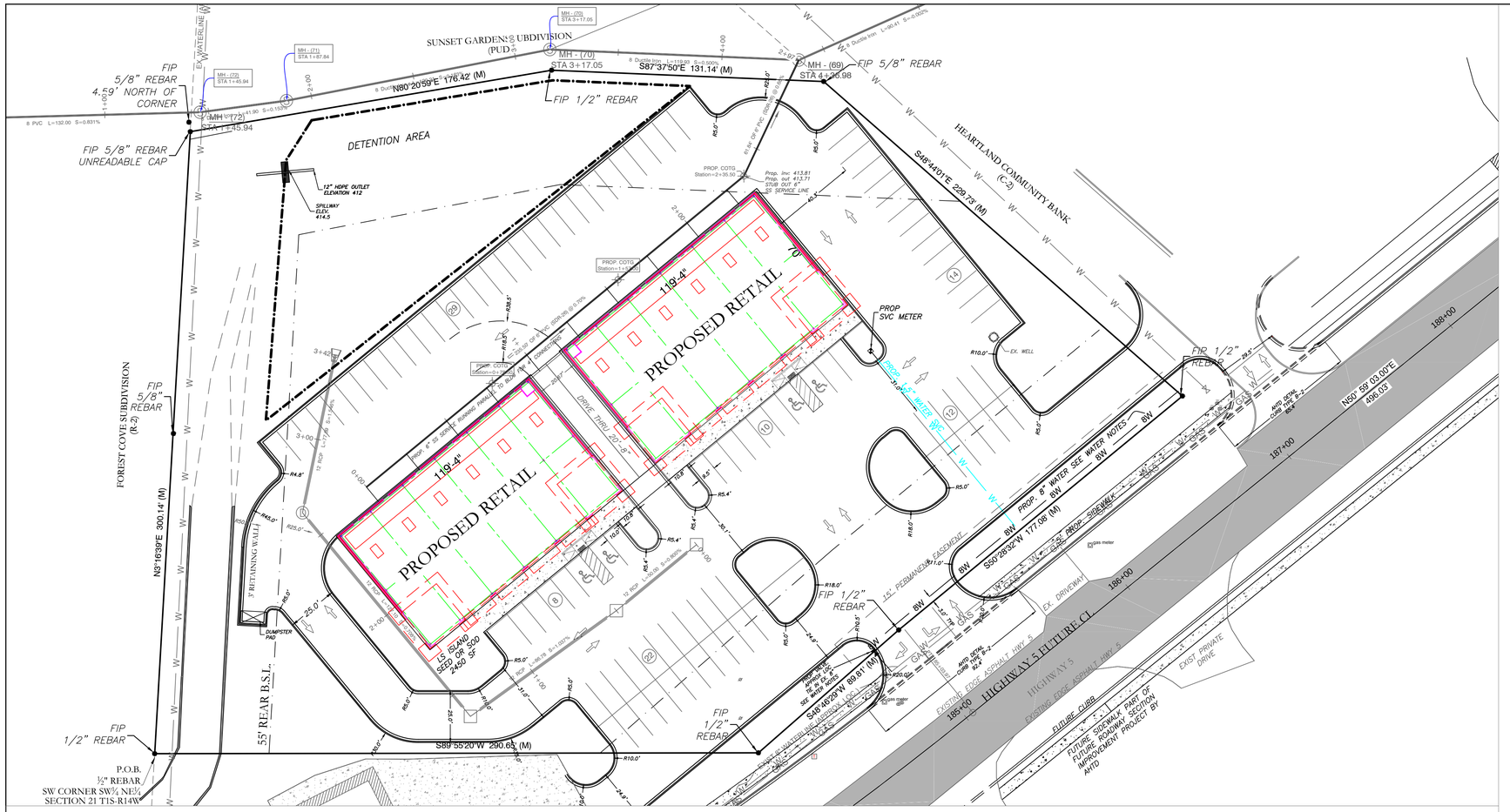
FOR USE AND BENEFIT OF:
HAROLD CRYE

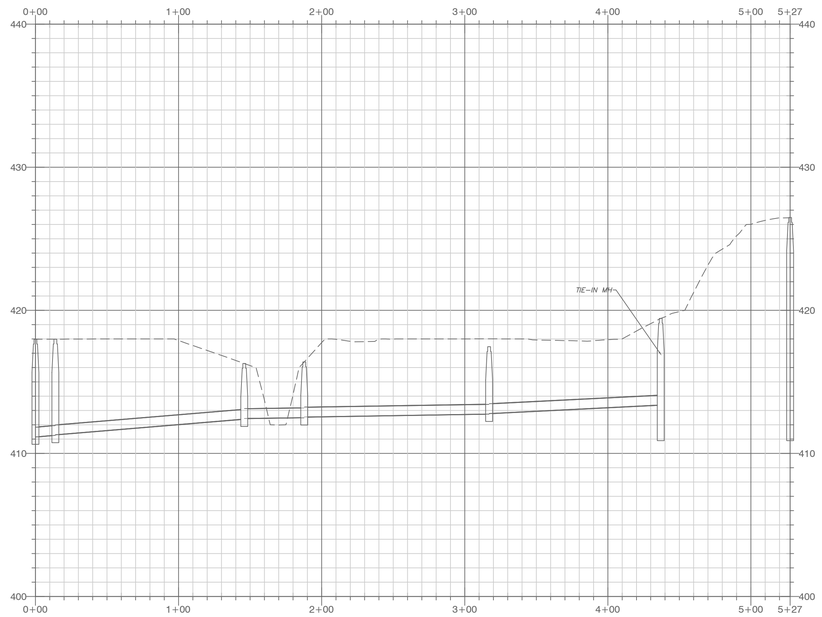
CRYE-LEIKE COMMERCIAL RETAIL
GRADING PLAN
BRYANT, SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER:
REVISED:	n/a	CHECKED BY:	16-0380
SHEET:	C-2.0	SCALE: AS SHOWN	

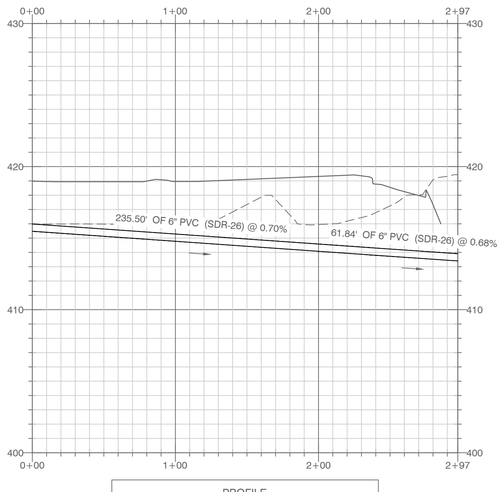
500	01S	14W	0	19	440	62	1762

K:\LAND PROJECTS\2016\COMMERCIAL\2016\16-0380 JEFF BELL HWY 5\16-0380 BASE DRAWING (REV 1-26-17).DWG



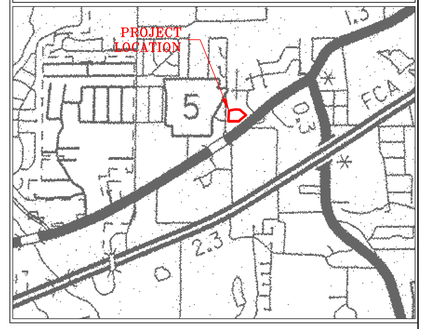


PROFILE
EXIST SANITARY SEWER
HORIZONTAL SCALE 1" = 50'



PROFILE
PROPOSED SEWER (MANHOLE North corner pin)
HORIZONTAL SCALE 1" = 50'
VERTICAL SCALE 1" = 5'

VICINITY MAP:



SCALE:
1"=2000'

SEWER NOTES

6" SEWER SERVICE SHOWN RUNNING PARALLEL TO PROPOSED BUILDING ON REAR SIDE OF BUILDING.

EACH INDIVIDUAL UNIT OF PROPOSED BUILDING WILL TIE INTO THIS 6" SEWER SERVICE

PROPOSED CLEANOUTS ALONG 6" SERVICE AS SHOWN

UTILITY NOTES

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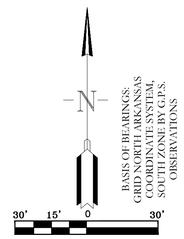

BASIS OF BEARINGS:
GRID NORTH ARKANSAS COORDINATE SYSTEM, SOUTH ZONE BY G.P.S. OBSERVATIONS

SEWER LEGEND:	WATER LEGEND:
EXISTING	2" BLOW OFF
PROPOSED	GATE VALVE
	REDUCER
	FIRE HYDRANT
	DOUBLE WATER SERVICE
	SINGLE WATER SERVICE

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FOR USE AND BENEFIT OF:
HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL
UTILITY PLAN/SEWER PROFILE
BRYANT, SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER:
REVISED:	N/A	CHECKED BY:	16-0380
SHEET:	C-3.0	SCALE: AS SHOWN	

500	01S	14W	0	19	440	62	1762

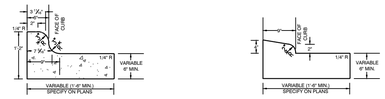
K:\LAND PROJECTS 2004\COMMERCIAL\2016\16-0380 JEFF BELL HWY 5\16-0380 BASE DRAWING REV 1-26-17.DWG

CURB NOTES:

1. PARKING LOT SHALL HAVE 18" STANDARD CURB AND GUTTER (TYPE A-1), EXCEPT WHERE PAVING ABUTS A SIDEWALK WITH INTEGRAL CURB & EXCEPT WHERE OTHERWISE SPECIFIED AS TYPE B-1.
2. CONCRETE FOR CURB AND GUTTER TO BE CLASS A, 4000 PSI, 6.0 BAG MIX WITH 4-7% AIR ENTRAINMENT
3. ALL CURB AND GUTTER SHALL HAVE A BROOMED FINISH UNLESS OTHERWISE SPECIFIED.
4. CONCRETE CURB TO BE SAWCUT AT 15' INTERVALS PERPENDICULAR TO THE GUTTER LINE AND SEALED WITH ONE PART COLD APPLIED SILICONE JOINT SEALER OR OTHER APPROVED SEALANT.
5. PROVIDE 1/2" PREFORMED EXPANSION JOINT MATERIAL BETWEEN CONCRETE CURB AND STATIONARY STRUCTURES, SUCH AS DROP INLETS, MANHOLES, ENDS OF CURB, DRIVEWAYS, ETC. (SEE DETAIL)
6. EXPANSION JOINTS SHALL BE PROVIDED AT APPROXIMATELY 50 FOOT SPACINGS IN CONCRETE PAVING AND WHERE CURB AND CONCRETE PAVING MEET.

PAVEMENT NOTES:

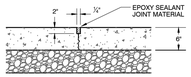
1. CONCRETE FOR HEAVY DUTY PAVING SHALL BE CLASS A, 4000 PSI, 6.0 BAG MIX WITH 4-7% AIR ENTRAINMENT.
2. ALL CONCRETE PAVEMENT SHALL HAVE A BROOMED FINISH UNLESS OTHERWISE SPECIFIED.
3. PROVIDE 1/2" PREFORMED EXPANSION JOINT MATERIAL BETWEEN CONCRETE PAVEMENT AND STATIONARY STRUCTURES, SUCH AS DROP INLETS, MANHOLES, ENDS OF CURB, DRIVEWAYS, ETC. (SEE DETAIL)
4. CONCRETE PAVEMENT SHALL HAVE 1- ½" DEEP SAW-CUT CONTROL JOINTS AT 10' SPACINGS, WHERE POSSIBLE, NOT TO EXCEED 15' IN ANY DIRECTION, AND SEALED WITH ONE PART COLD APPLIED SILICONE JOINT SEALER OR OTHER APPROVED SEALANT.
5. WHERE KEYWAY IS USED, CONTROL JOINTS SHALL STILL BE SAW CUT, AS NECESSARY, TO ACHIEVE THE REQUIRED SPACING.
6. EXPANSION JOINTS SHALL BE PROVIDED AT APPROXIMATELY 50 FOOT SPACINGS IN CONCRETE PAVING AND WHERE CURB AND CONCRETE PAVING MEET.

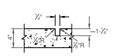


TYPE A

TYPE B-1

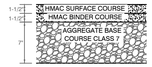
NOT TO SCALE





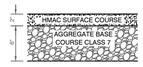
SAWED JOINT DETAIL

NOT TO SCALE



HEAVY-DUTY PARKING LOT PAVEMENT SECTION

NOT TO SCALE

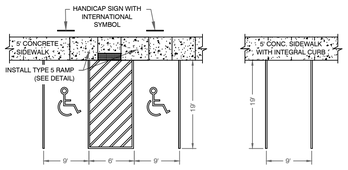


LIGHT-DUTY PARKING LOT PAVEMENT SECTION

NOT TO SCALE

CURB AND PAVEMENT DETAILS & NOTES

NOT TO SCALE



TYPICAL HANDICAP PARKING SPACE & RAMP

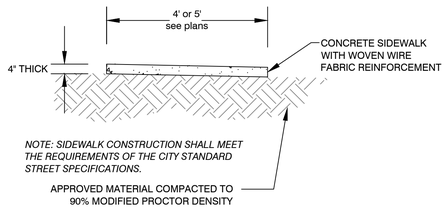
TYPICAL 9' x 19' PARKING SPACE

PARKING SPACE DETAILS - TYPICAL & HANDICAP-ACCESSIBLE

NOT TO SCALE

HEAVY-DUTY CONCRETE PAVEMENT SECTION

NOT TO SCALE



Typical Sidewalk Detail

SUBGRADE MATERIAL

A. Subgrade soils shall be all materials used for subgrade including in-situ materials and fill materials.
B. Subrades for pavement shall be stabilized by mechanical compaction. Stabilization methods such as fabrics and chemical stabilization may be submitted for approval when supported by engineering data and calculations to substantiate the adequacy of the stabilized procedure.
C. Subgrade shall be compacted to 95 percent modified proctor density minimum. Moisture content shall be +/- 3% of optimum moisture unless otherwise supported by the site specific geotechnical data and approved by City.
D. Subgrade shall be prepared in such a manner that the base course shall be placed on a firm foundation that is stable and free from soft spots, pumping, dust pockets, wheel ruts, or other defects.
E. The top 24 inches of the subgrade shall be a material not susceptible to frost action unless modified with cement, lime or another method approved specifically by the City to resist frost action. Soils classified as A-4 and A-5 including sandy silts, fine silty sand or lean clays are highly susceptible to frost action.
F. In-situ soils meeting the requirements outlined in these specifications may be utilized as subgrade material. In-situ soils used as subgrade shall be scarified to a minimum depth of 8-inches below finish subgrade, recompacted and tested as described below. Fill material for subgrade shall be placed in lifts not to exceed 8-inches compacted depth.
G. Methods and procedures for establishing the total depth of soil replacement and/or modification shall be as specified by the design engineer and geotechnical investigations. The adequacy of in-situ soils and fill materials as pavement subgrade shall be evaluated based upon the soils classification, liquid limit, and plasticity index.
H. Soils with a liquid limit greater than 40, or a plasticity index greater than 15 shall be undercut and removed from the street section or improved by a design method of stabilization approved by the City.
I. Quality control testing shall be as specified below.
J. Undercut 24" of soil below finished street base course. Proof roll to verify stability.
K. Backfill the undercut subgrade with Class 7 aggregate or soil meeting the requirements of this section and compact in lifts not exceeding 8".

BASE COURSE

A. Base course material shall be crushed stone meeting the requirements of AHTD Class 7 aggregate base course as specified in the latest edition of AHTD Standard Specifications.
B. Base course shall be compacted to 98 percent modified proctor density minimum. Moisture content shall be +/- 3% of optimum moisture.

SURFACE COURSE

A. Surface course for flexible pavement designs shall utilize plant mix bituminous base and binder courses conforming to AHTD Standard Specifications.

CURB AND GUTTER

A. Curb and gutter shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000 psi. Concrete shall be air-entrained with a maximum of 4-inch slump.
B. Compaction requirements under curb and gutter shall conform to the requirements for street subgrade materials. Compaction requirements shall extend to a minimum of 1 foot behond the back of curb and gutter removing all soft spots and replacing with suitable material.
C. Curb and gutter shall conform to the typical detail within these specifications or AHTD Standard Roadway Drawing Details for curbing.
D. Expansion joints shall be made with 1/2-inch preformed expansion joint filler of a non-extruding type. Expansion joints shall be placed at intervals not exceeding 195 feet, intersection radii, driveways, stationary structures, and sidewalks.
E. Contraction joints shall be sawed or fromed at intervals not greater than 20 feet. Depth of saw-cut hall be 1 1/2-inch and have a width of 1/4-inch. Contraction joints shall be sealed in accordance with AHTD Standard Specifications.
F. Forms shall be made of metal or wood and shall be properly braced. The minimum length of each section of form used shall be 10 feet. Each section of form shall be uniform and free from undesirable bends or warps. Forms shall be of such cross section and strength and so secured as to resist the pressure of the impact and vibration on any equipment which they support without springing or settlement.
G. Curb and gutter placed with slip form or extruding equipment will be acceptable providing it complies with all of the above requirements.
H. After curing, the curb shall be immediately backfilled to within 4 inches of the top curb to eliminatethe possibility of washing beneath the curb. The remaining 4 inches shall be topsoil.
I. Cold weather protection shall meet the requirements of the latest edition of AHTD Standard Specifications.

SIDEWALKS

General

A. Sidewalks shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000 psi.
B. Sidewalks shall be on both sides of streets in line with sidewalks on opposite corners of roads.
C. All sidewalks including ramps shall meet all current Federal Americans with Disabilities (ADA) design guidelines or requirements.
D. Traverse slopes shall not exceed 2 percent.
E. Subgrade under sidewalks shall be compacted to 90 percent modified proctor density minimum.
F. Sidewalks shall not be placed upon grassy or organic materials.
G. Sidewalks which extend or link existing sidewalks shall adjoin the existing sidewalks to form a continuous, even pathway.
H. Utility poles, utility boxes, mailboxes, fire hydrants, and other similar obstructions shall not be located in sidewalks Sidewalk location may vary at the discretion of the City to avoid such obstacles.

Minimum thickness and reinforcement

A. Sidewalks shall have a minimum thickness of 4 inches.
B. Sidewalks shall be reinforced, at a minimum, with woven wire fabric reinforcement.

Contraction and expansion joints

A. Contraction joints shall be provided perpendicular to the sidewalk at intervals equal to the sidewalk width.
B. Expansion joints shall be constructed perpendicular to the sidewalk at intervals equal to five times the sidewalk width. Expansion joints shall be made with 1/2-inch preformed expansion joint filler of a non-extruding type. Expansion joints shall be placed at driveways, drop inlets, and curbs.

Quality control testing and inspection by the City

A. Subgrade and formwork for sidewalks shall be inspected by the City prior to pouring of the sidewalk.
B. All testing of materials and construction shall be provided and paid for by the Developer/Owner.
C. All field tests required for a project shall be witnessed by the City, contractor, or their authorized representatives.
D. All testing shall be accomplished by a testing firm approved by the City and shall be performed under the supervision of a licensed Professional Engineer.
E. Sampling and testing locations shall be subject to approval by the City.
F. Density tests on subgrades shall be taken every 300 feet or portion thereof.
G. The City shall be notified at least one day in advance of the need to inspect subgrade and formwork of sidewalks.

Subgrade

A. Subgrade soils shall be all materials used for subgrade including in-situ materials and fill materials.
B. Subgrade shall be compacted to 90 percent modified proctor desnity minimum. Moisture content shall be +/- 3% of optimum moisture unless otherwise supported by the site specific geotechnical data and approved by City.
C. Subgrade shall be prepared in such a manner that the base course shall be placed on a firm foundation that is stable and free from soft spots, pumping, dust pockets, wheel ruts, or other defects.
D. The top 24 inches of the subgrade shall be a material not susceptible to frost action unless modified with cement, lime or another method approved specifically by the City to resist frost action. Soils classified as A-4 and A-5 including sandy silts, fine silty sand or lean clays are highly susceptible to frost action.

QUALITY CONTROL TESTING AND INSPECTIONS

General

A. Materials and construction employed in street improvements shall be subject to inspection and quality control testing. All testing of materials and construction shall be provided and paid for by the Developer/Owner.
B. The Developer/Owner shall provide for inspections of street improvements during construction. The inspections shall be accomplished under the supervision of the Engineer of Record. The Engineer of Record shall provide certification that all materials and construction conform to the approved plans and specifications and with these minimum street standards.
C. The Engineer of Record shall furnish inspection whenever a critical construction activity is taking place. This means that a representative of the Engineer of Record must be on-site whenever a critical construction activity is taking place.
D. All field tests required for a project shall be witnessed by the City, Engineer of Record, contractor, or other authorized representatives.
E. The City shall be notified at least one day in advance of any test(s). It is the responsibility of the contractor to coordinated the scheduling of all tests with the City.

UTILITY NOTES

1. *EXISTING UTILITY LOCATIONS SHOWN ON PLANS ARE APPROXIMATE ONLY. CONTRACTOR SHOULD ALWAYS CALL ONE CALL BEFORE DIGGING.*

811 Know what's below. Call before you dig.

CERTIFICATE OF AUTHORIZATION — HOPE CONSULTING, INC. — No. 1931 — ARKANSAS

STATE OF ARKANSAS — REGISTERED PROFESSIONAL ENGINEER — NO. 14048 — WILLIAM W. McFADDEN

HOPE CONSULTING ENGINEERS - SURVEYORS
117 S. Market Street,
Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

FOR USE AND BENEFIT OF:
HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL
GENERAL SPECIFICATIONS
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER: 16-0380
REVISED:		CHECKED BY:	
SHEET:	C-4.0	SCALE: AS SHOWN	

500	01S	14W	0	19	440	62	1762

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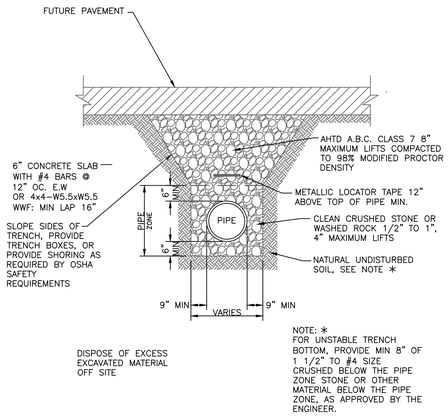
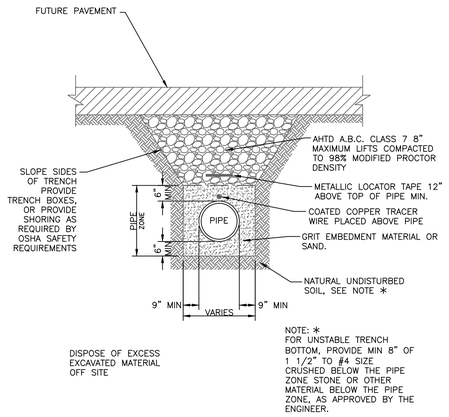


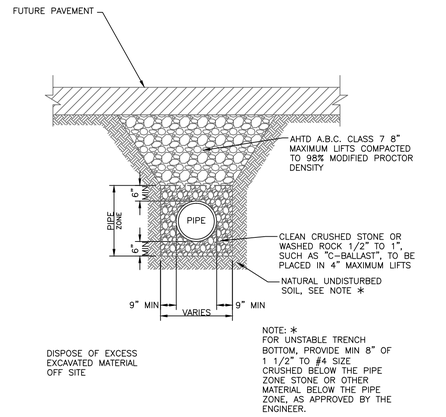
PVC SEWER TRENCH UNDER FUTURE ASPHALT STREET

N.T.S.



PVC WATER LINE TRENCH UNDER FUTURE ASPHALT STREET

N.T.S.

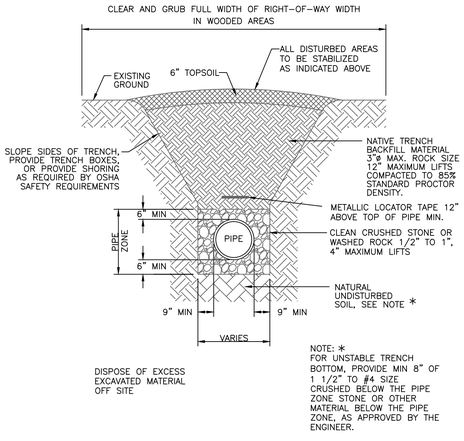


DRAINAGE PIPE TRENCH UNDER FUTURE ASPHALT STREET

N.T.S.

SOIL STABILIZATION REQUIREMENTS:

1. IN LAWN AREAS, DISTURBED SOIL SHALL BE STABILIZED BY PLACEMENT OF SOD TO MATCH EXISTING.
2. IN FIELDS OR WOODED AREAS, DISTURBED SOIL SHALL BE STABILIZED BY SEEDING.



PVC SEWER TRENCH IN UNPAVED AREAS

N.T.S.

SOIL STABILIZATION REQUIREMENTS:

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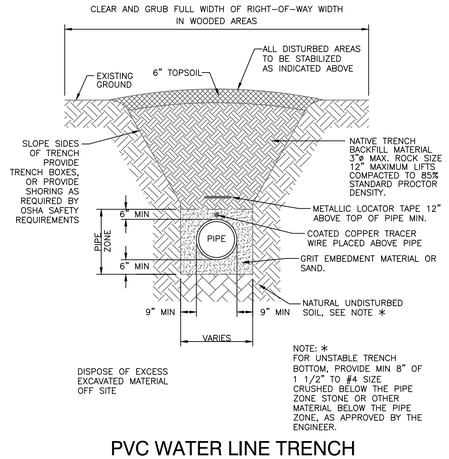

PVC WATER LINE TRENCH IN UNPAVED AREAS

N.T.S.

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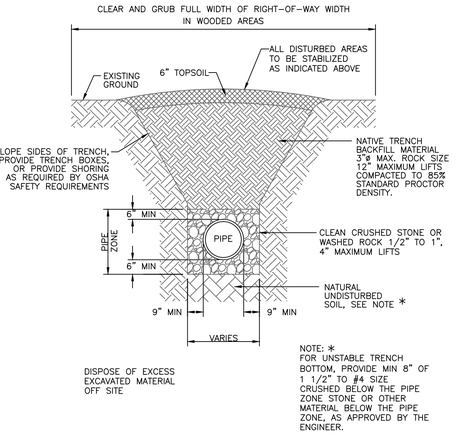

DRAINAGE PIPES IN UNPAVED AREAS

N.T.S.

Trench Details of Highway 5 Commercial Retail

HOPE CONSULTING, INC. No. 1931 — CERTIFICATE OF AUTHORIZATION — ARKANSAS

STATE OF ARKANSAS — REGISTERED PROFESSIONAL ENGINEER — No. 14048 — WILLIAM W. McFADDEN

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www.hopeconsulting.com

FOR USE AND BENEFIT OF:
HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL
TYPICAL TRENCH DETAILS
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER:
REVISED:		CHECKED BY:	16-0380
SHEET:	C-5.0	SCALE: AS SHOWN	

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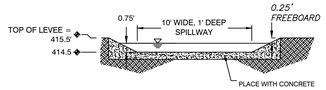


SPILLWAY END VIEW
NTS

$$Q=\frac{3.247*L*H^{1.48}-0.566*L^{1.9}}{1+2^{1.87}}$$

OVERFLOW SPILLWAY SIZED FOR HUNDRED YEAR FLOOD WITH 0.25' AVAILABLE FREEBOARD

H=0.75'
L=10'
Q=21 CFS

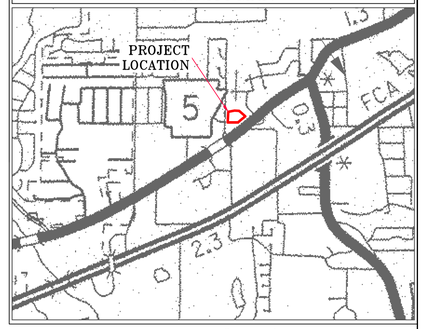
LEGEND

- DETENTION DRAINAGE AREA DELINEATION
- OVERALL STUDY AREA
- DETENTION AREA

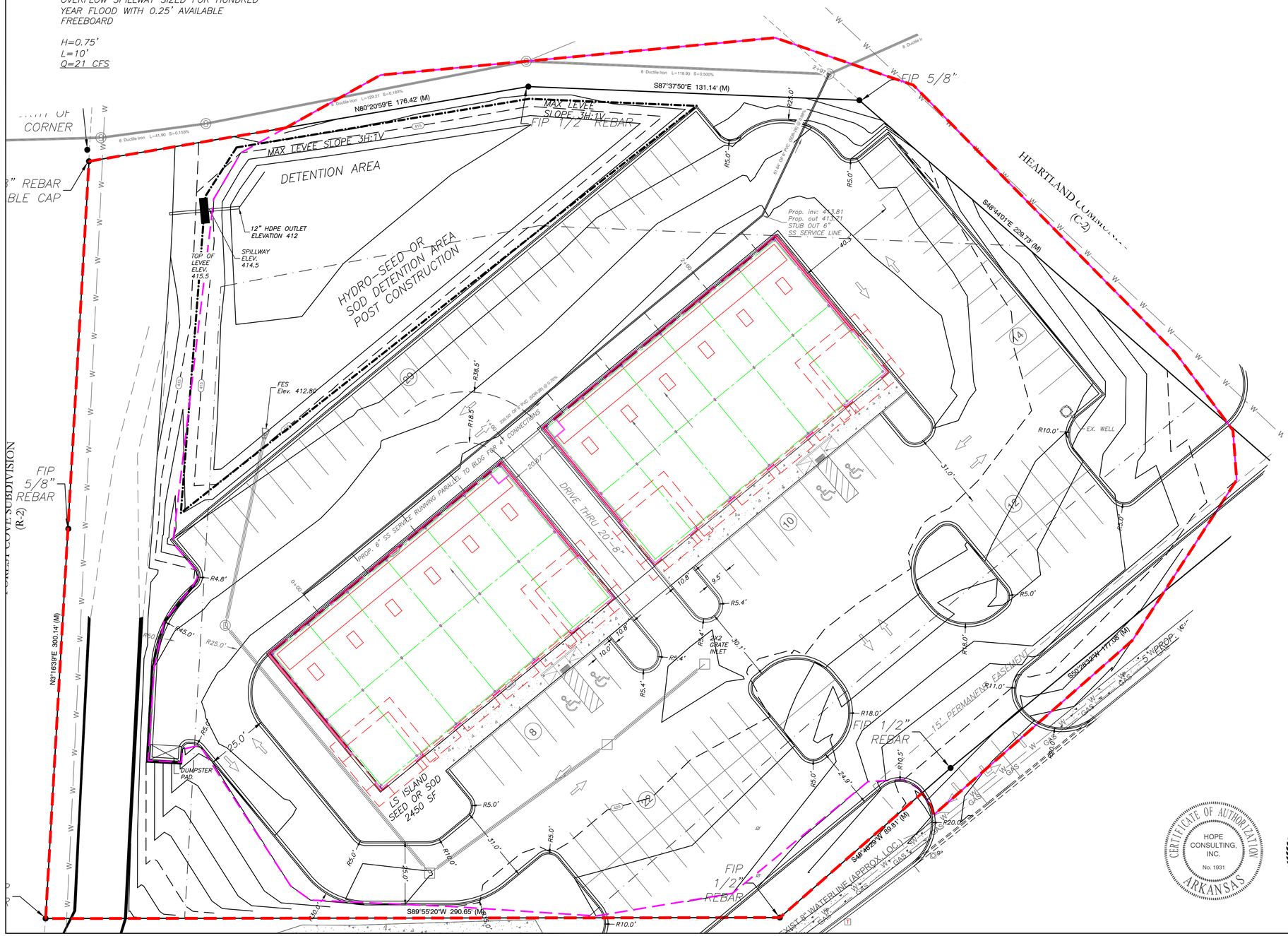
DRAINAGE/DETENTION NOTES

HYDRO-SEED OR SOD DETENTION AREA POST-CONSTRUCTION
MAXIMUM SLOPE OF 3H:1V ON DETENTION POND LEVEES
STUDY AREA LIMITED TO PROPERTY BOUNDARY 3.00 AC±
DRAINAGE DELINEATION AREA APPROX. 2.58 AC±

VICINITY MAP:



SCALE: 1"=2000'



DETENTION POND MAINTENANCE PLAN

Background
The detention pond is located at the northwest corner of the subject property. It is designed to temporarily detain stormwater to meet water quantity criteria before discharging off the property.

Routine Maintenance
The property owners association will maintain the detention pond. Routine maintenance will include but not be limited to:
-Mowing of the bottom, bank slopes and area around the pond on a monthly basis during the growing season and as needed during the cooler months.

-The outlet pipe from the pond and other areas will be inspected monthly for debris which could inhibit the proper flow of discharge. Any debris will be removed immediately and disposed of or placed in a location to prevent future maintenance and to not cause impact up or downstream of the structure.

-Trash will be removed from around the pond to prevent entering the pond. Generally, the site should be kept free of loose trash which could be carried off site by wind or rain.

-Inspect the pond and outlet pipe for non-routine maintenance need.

Periodic or Non-Routine Maintenance
The routine inspection of the pond area and discharge pipe will identify needed repairs and non-routine maintenance. These items may include but not be limited to:

-Re-growth of trees on or around the pond bank. These should be cut and removed from the pond area.

-Sediment from the site may accumulate in the pond bottom and reduce the pond to below design volume requirements. The pond should be excavated if the pond bottom elevation reached a level that allows excessive aquatic growth or reduces the pond efficiency such, that the sediments are passing the discharge structure and release off site.

-Stabilization or re-grading of side slopes may be required periodically or after excessive rain events. Any disturbance of slopes should be reseeded or may require installation of erosion control materials until seeding can reestablish adequate grasses to prevent future erosion.

-Any other maintenance or repairs which would minimize other maintenance to the pond or outfall structures.

For questions or concerns about the detention pond, contact at 501-.

UTILITY NOTES

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811 Know what's below. Call before you dig.

N

20' 10' 0 20'

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FAX (501) 315-0024
www.hopeconsulting.com

CERTIFICATE OF AUTHORIZATION
HOPE CONSULTING, INC.
No. 1931
ARKANSAS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
NO. 14048
WILLIAM W. McFADDEN

FOR USE AND BENEFIT OF:
HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL DRAINAGE PLAN

CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER: 16-0380
REVISED:		CHECKED BY:	
SHEET:	C-6.0	SCALE: AS SHOWN	

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WATER NOTES

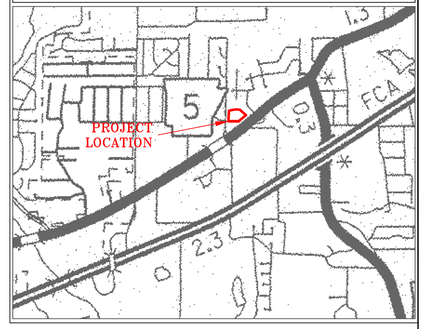
APPROX. LOCATION OF UTILITY EASEMENT AND PROPOSED 8" WATER LINE AND GATE VALVE ARE SHOWN ON PLANS AS PER CRIST ENGINEERS.

PROPOSED 8" MAIN AND GATE VALVE PART OF A SEPARATE WATER RELOCATION PROJECT AND ONLY SHOWN FOR PURPOSES OF TYING PROPOSED 1.5" SERVICE FOR THIS INTO WATER SYSTEM

GAS NOTES

MEP TO VERIFY PROP. GAS LOCATION AND METER

VICINITY MAP:



SCALE: 1"=2000'

UTILITY NOTES

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LS LEGEND

- 2" RED MAPLE – 4
- 2" WILLOW OAK – 4
- 2" FOSTER HOLLY – 2
- BERMUDA SOD
- MULCHED PLANTING BED (3 GAL AND GAL PLANTS)

LITTLEROCK LANDSCAPE, INC. Residential Commercial SINCE 1978

EXISTING UTILITY LEGEND:	
	EXIST POWER POLE
EXIST WATER MAIN	GATE VALVE
	REDUCER
GMET	GAS METER
	TELEPHONE PED.
	EXISTING WATER METER
	FIRE HYDRANT

SEWER LEGEND:	WATER LEGEND:
S SEWER MANHOLE	PROP. GATE VALVE
	2" BLOW OFF
	REDUCER
	FIRE HYDRANT
	DOUBLE WATER SERVICE
	SINGLE WATER SERVICE

NOTE: USE SDR-26 PVC SEWER PIPE EXCEPT WHERE DUCTILE IRON PIPE REQUIRED FOR COVER. USE DUCTILE IRON PIPE WHERE 30" MINIMUM COVER CANNOT BE MAINTAINED.

CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL BURIED UTILITIES PRIOR TO CONSTRUCTION.

NOTE: ALL FIRE HYDRANT LEADERS HAVE A GATE VALVE BETWEEN MAIN AND FIRE HYDRANT.

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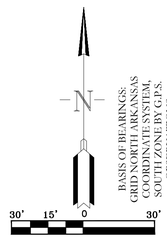
STATE OF ARKANSAS — REGISTERED PROFESSIONAL ENGINEER — NO. 14048 — WILLIAM W. McFADDEN



BASIS OF BEARINGS: GRID NORTH ARKANSAS COORDINATE SYSTEM, SOUTH ZONE BY G.P.S. OBSERVATIONS

LEGEND
- Computed point
- Found monument
- Set Iron Pipe
(M) - Measured
(R) - Record
(D) - Deed
- Power Pole
— E — - Overhead Power

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FOR USE AND BENEFIT OF: HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL LANDSCAPE PLAN

BRYANT, SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY:	WM	DRAWING NUMBER:
REVISED:		CHECKED BY:		16-0380
SHEET:	L-1.0	SCALE: AS SHOWN		

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GNE
Designing our client's success

GarNat Engineering, LLC
P.O. Box 116 (72018)
2909 Military Road
Benton, Arkansas 72015
PH: (501) 408-4650
FX: (888) 900-3068
garnatengineering@gmail.com

February 3, 2017

Mr. Truett Smith
Bryant Planning Coordinator/Planning Commission Secretary
210 SW 3rd Street
Bryant, AR 72022

Re: Preliminary Plat – Benjamin Grove Subdivision – Phase 2 (GNE #16025)
Responses to Comments dated 2-1-2017

Dear Mr. Smith:

The following are our responses to comments made in a letter from Les Price (Crist Engineers) to you dated 2-1-2017. The numbers of the comments match the comment numbers in the

1. This item will be addressed prior to final platting and after receipt of equipment pricing.
2. A summary of hydrology table was created and is included with this response
3. The pipe between lots 50 and 51 was checked for the 100-year storm and found to be adequate. A revised drainage report was prepared to show the 100-year storm flows.
4. The ditch on the north side of lot 51 was revised to have a 4 horz : 1 vert sideslopes. The drainage analysis was revised to also show this slope. Also, the 100-year storm analysis mention in note 3 above is included this change.
5. The preliminary plat (sheet 1) was revised to show a 25-ft drainage easement on the north side of lot 51 and a note regarding the existing 50-ft easement was added to the south of Amalie Drive. A note was also added stating that no fences will be constructed across open ditches.
6. This stub-out was extended from 60-ft to 125-ft and is shown on sheets 2 and 3.
7. A label for this easement was added on sheets 2 and 3.
8. This item will be addressed through a separate correspondence.
9. Sheet 7 was revised to show a 16-ft gate.
10. The 8-inch pipe between manhole A-1 and the wetwell was revised to show ductile iron.
11. The piping in the wetwell was revised on sheet 7 to stainless steel.
12. Note 10 was added to the section notes on sheet 7 to reflect that the piping inside of the valve vault is to be coated per City of Bryant specifications.
13. The details on sheet 7 were revised to show the correct elevations and spacings in the wetwell.

14. The controls were moved next to the valve vault on sheet 7. Lift station site note 4 was revised to provide concrete under the controls.
15. The valve vault dimensions were revised on sheet 7.
16. Refer to the new calculations which are included with this response.
17. No

We also addressed a separate comment regarding the addition of a metering pump. We also removed the half-street section for Zuber Road as it does not apply to Phase 2.

Revised or new documents included with this response include:

- Sheet 1 – Preliminary Plat (revised)
- Sheet 2 – Overall Water & Sewer Plan (revised)
- Sheet 3 – Sewer Plan and Profile (revised)
- Sheet 7 – Lift Station Plan and Details (revised)
- Summary of Hydrology table (new)
- 25-year drainage report (revised)
- 100-year drainage report (new)
- Lift station design calculations (revised)

If you have questions or need any additional information, please do not hesitate to contact me.

Sincerely,
GarNat Engineering, LLC

Vernon J. Williams, P.E., President

Attachments

Cc: Les Price, Crist Engineers, Inc.

City of Bryant Subdivision Checklist

Subdivision/Project Name Benjamin Grove Phase 2

Contact Person Kelly Vanlandingham **Phone** 501-408-4650

Mailing Address 2909 Military Rd, Benton, Ar 72015

I. Basic Information Needed On The Plat

- ✓ ▲ 1. Name of Subdivision/Project
- ✓ ▲ 2. Current zoning R1.5
- ✓ ▲ 3. Name and Address of owner of Record
- ✓ ▲ 4. Illustrate Source of Title giving deed record book and page number
- ✓ ▲ 5. Name & address of the sub-divider
- ✓ ▲ 6. Date of Survey
- ✓ ▲ 7. Vicinity map locating streets, highways, section lines, railroad, schools, & parks within ½ mile
- ✓ ▲ 8. Legal description of the property with exact boundary lines
- ✓ ▲ 9. Acreage of property
- ✓ ▲ 10. Number of Lots
- ✓ ▲ 11. Lot area in square feet
- ✓ ▲ 12. Lot lines with appropriate dimensions
- ✓ ▲ 13. Building setback lines
- ✓ ▲ 14. Preliminary Engineering certificate seal and signature on each page
- ✓ ▲ 15. Certificate of Engineering Accuracy
- ✓ ▲ 16. Certificate of Owner
- ✓ ▲ 17. Certificate of Final Plat Approval
- ✓ ▲ 18. Certificate of Recording
- ✓ ▲ 19. Show scale (not less than 1" = 100')
- ✓ ▲ 20. North Arrow
- ✓ ▲ 21. Show Title block
- ✓ ▲ 22. Show adjoining property owners
- ✓ ▲ 23. Layout of all proposed streets including traffic control devices (stop signs, speed limit, etc.)
- ✓ 24. Layout of all subdivision entrance street upgrades
- N/A ▲ 25. Layout of all proposed alleys
- ✓ ▲ 26. Layout of all proposed sidewalk systems
- N/A ▲ 27. Layout identifies any FEMA flood plain and flood way property within the 100-year flood elevation. (Provide Corp of Engineers 404 Permit if required) Not
- ✓ ▲ 28. Drainage easements for stormwater run-off and detention giving dimensions, locations, and purpose
- ✓ ▲ 29. Layout accommodates Master Street Plan segments within the boundaries
- ✓ ▲ 30. Street layout ties to existing adjoining subdivision stub-out streets and provides stub-out streets for future adjoining subdivisions.
- ✓ ▲ 31. Street width and right-of-way properly shown for each functional classification
- ✓ ▲ 32. Street centerlines showing angles of deflection, intersection, radii, length oftangents and arcs, and degree of curvature with basis of curve data
- ✓ ▲ 33. Typical cross section of streets
- ✓ ▲ 34. Location and name of existing streets
- ✓ ▲ 35. New street names that are not similar to existing street names
- ✓ ▲ 36. Show street lights
- ✓ ▲ 37. Show Fire Hydrant placement

✓ 38. Show and label all permanent & proposed easements SSWR? FM? Water?
✓ 39. Any proposed open space must be shown
✓ 40. Show the direction and flow of all water courses entering the tract) on drainage plan
✓ 41. Show the direction and flow of all water courses leaving the tract)
✓ 42. The drainage area of all water courses above the points of entry. – drainage plan
✓ 43. The downstream drainage channel and drainage structures substantially impacted by the subdivision/project.
✓ 44. Show source of water supply
✓ 45. Show location of waste water connection to municipal main & sanitary sewer layout
✓ 46. A phasing plan outlining the boundaries for each phase

II. Additional Information Needed, But Not Necessarily On The Plat

✓ 47. Natural features within the proposed subdivision including drainage channels, bodies of water, wooded areas, and other significant features Street & drainage, Drainage basins
n/a 48. Existing streets, buildings, water courses, railroads. Culverts, utilities and easement on and adjacent to the tract.
n/a 49. Where method of disposal of wastewater is other than connection to a public waste water system, detailed information shall accompany the plat.
✓ 50. Calculations and field notes, including drainage calculations along with support drawing
n/a 51. Stormwater detention plan approval from City Engineer (attach copy of approval)
✓ 52. The Certificate of Preliminary Engineering Accuracy on each set of street and drainage plans.
n/a 53. ADA Accessibility Standard Form completed (and attached)
✓ 54. A Bill of Assurance has been prepared for this subdivision (and attached)
✓ 55. All lots comply with minimum square footage area and minimum lot width at the front building line
✓ 56. Street pavement design will be as specified by City or AHTD design procedures, approved by the City Engineer.
n/a 57. Made the "One Call" prior to site clearance or other excavation activity

III. Preliminary Plat Attachments

(Application will not be accepted until all attachment requirements are met)

✓ 58. Letter to Planning Commission stating your request
✓ 59. Completed Checklist
once determ 60. Completed agreement to provide performance assurance
61. Subdivider Performance Bond or Cashier's Check for infrastructure installation
n/a 62. Landscaping plan of any proposed common open space
✓ 63. Draft of Bill of Assurance proposed for the subdivision (if applicable)
✓ 64. 20 copies of Preliminary Plat Plan (folded) that includes vicinity map (minimum size 17" X 34" paper)
✓ 65. Two (2) IBM compatible diskettes or CDR's with pertinent data and Plat in CAD compatible .DXF electronic file format
n/a 66. Copy of Stormwater Detention approval
✓ 67. 2 copies Plan and profile of all streets
✓ 68. Receipt for $300.00 + $3.00 per lot for preliminary Subdivision fee
✓ 69. Receipt for $250.00 or $25.00 per lot (whichever is greater) for Stormwater Detention and Drainage Plan review
See phase 1 70. Copy of ADEQ Stormwater Pollution Prevention Plan for property parcel containing one acre or larger.

III. Final Plat Attachments

(Application will not be accepted until all attachment requirements are met)

- ▲ 71. Letter to Planning Commission stating your request
- ▲ 72. Completed Checklist
- ▲ 73. 20 copies of Final Plat Plan (folded) that includes vicinity map (minimum size 17" X 34" paper)
- ▲ 74. Two (2) IBM compatible diskettes or CDR's with pertinent data and Plat in CAD compatible .DXF electronic file format
- ▲ 75. Bill of Assurance including provisions set out in Title 15 Subdivision Regulations 15.16.01
- ▲ 76. Copy of Water & Sewer Commission approval or....
- ▲ 77. State Health Department approval of any new water supply and/or sewage system.
- ▲ 78. Letter submitted by a Registered Professional Engineer, certifying that all infrastructure improvements and installations have been installed in accordance with the submitted construction plans and drawings and the standards established by the City of Bryant and are functioning properly.
- ▲ 79. Infrastructure Maintenance Bond or Cashier's check.
- ▲ 80. Check for $25.00 + $1.00 per lot for final Subdivision fee
- ▲ 81. Check for Water Sewer impact fees ($100.00 Flushing Fee and $100.00 impact fee per lot)

Benjamin Grove Phase 2
Name of Subdivision

Kelly D. Vanlandingham
Surveyor

I HAVE COMPLIED WITH THE REQUIREMENTS LISTED ABOVE AND HAVE CHECKED ALL OF THE BOXES ON THE CHECKLIST WHICH APPLY TO THIS PROJECT SUBMITTAL.

Owner Signature

Kelly D. Vanlandingham
Engineer Signature

CITY USE

Preliminary Plat Approved _____

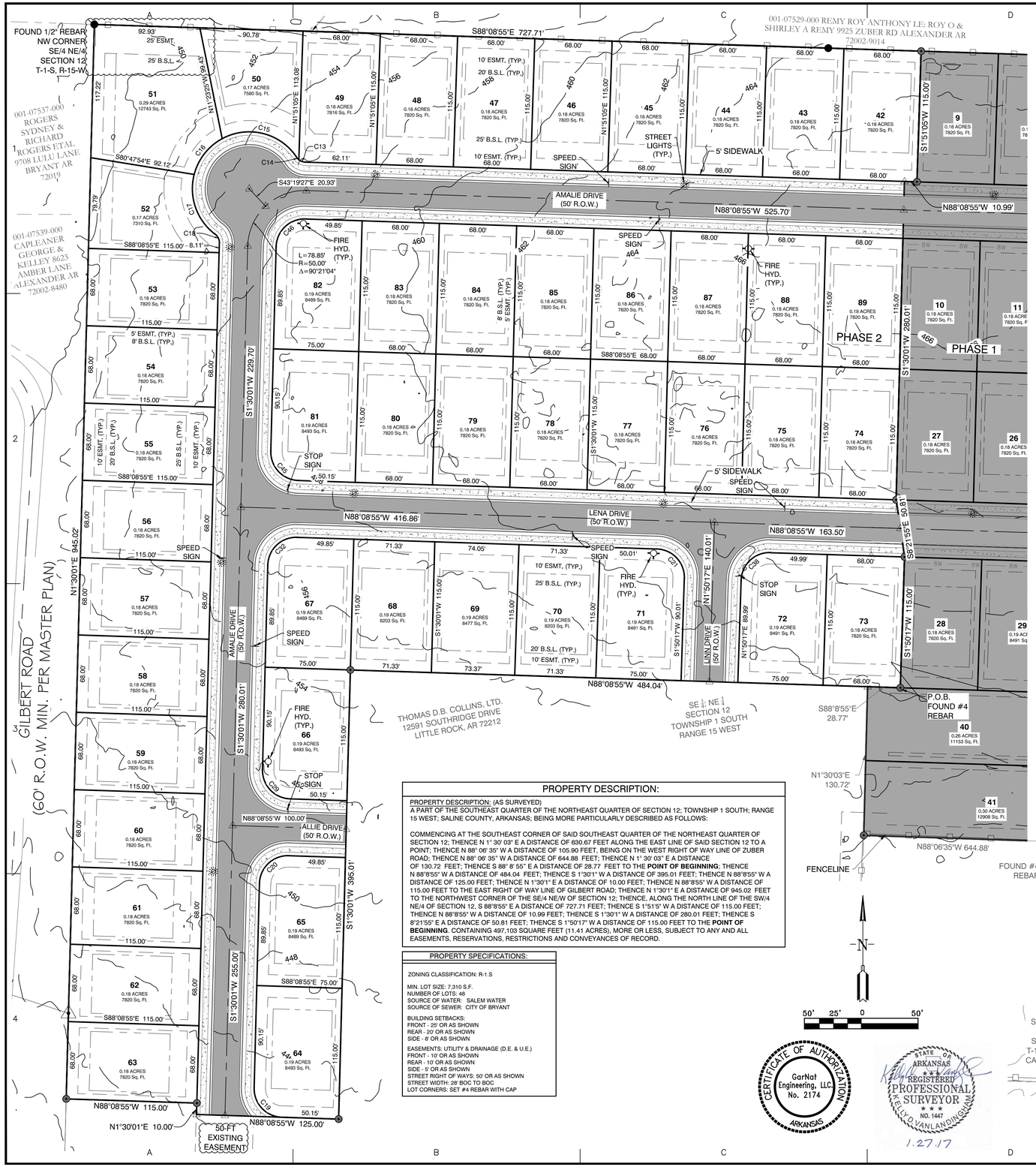
Planning Commission Date _____

Final Plat Approved _____

Planning Commission Date _____

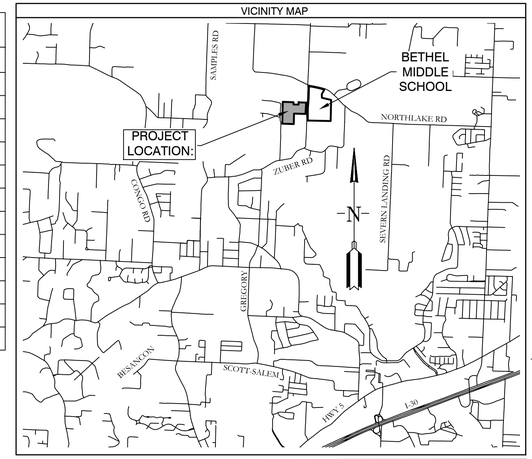
Proof of Recording - County _____

County Clerk _____ Date _____



Curve Table					
Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C1	38.58	25.00	88°24'49"	N47° 38' 40"E	34.86
C2	39.96	25.00	91°35'11"	N42° 21' 20"W	35.84
C3	38.58	25.00	88°24'49"	N47° 38' 40"E	34.86
C4	39.96	25.00	91°35'11"	S42° 21' 20"E	35.84
C5	39.28	25.00	90°00'48"	N46° 50' 41"E	35.36
C6	39.26	25.00	89°59'12"	S43° 09' 19"E	35.35
C7	7.36	50.00	8°25'57"	S0° 32' 25"E	7.35
C8	74.39	50.00	85°14'36"	S47° 22' 42"E	67.72
C9	71.16	50.00	81°32'27"	N49° 13' 46"E	65.30
C10	73.27	50.00	83°57'43"	N33° 31' 18"W	66.89
C11	15.67	14.00	64°08'11"	N43° 26' 04"W	14.87
C12	3.23	14.00	13°12'16"	N4° 45' 51"W	3.22

VICINITY MAP



PLAT CERTIFICATES:

OWNER:

Name: Thomas D.B. Collins, Ltd.

Address: 39 Walnut Valley, Little Rock, AR 72211

DEVELOPER:

Name: Thomas D.B. Collins, Ltd.

Address: 39 Walnut Valley, Little Rock, AR 72211

CERTIFICATE OF OWNER:
We, the undersigned, owners of the real estate shown and described herein do hereby certify that we have laid off, platted and subdivided, and do hereby lay off, plat and subdivide said real estate in accordance with the within plat.

Licensed Abstractor No. _____
Or Attorney Bar No. _____

Source of Title: _____
Saline County Document# 2016-11808 & 2016-12187

CERTIFICATE OF PRELIMINARY ENGINEERING ACCURACY:

I, Kelly D. Vanlandingham, hereby certify that this plat correctly represents a survey and a plan made by me or under my supervision; that all monuments shown hereon actually exist and their locations, size, type, and material are correctly shown; and that all requirements of the City of Bryant Subdivision Rules and Regulations have been fully complied with.

Date: _____ Signed: _____

Kelly D. Vanlandingham
Registered Professional Engineer
No. 7996, Arkansas

CERTIFICATE OF RECORDING:

This document, number_____is filed for record this_____day of____, 20__, at a.m./p.m. in Plat or Deed Book____Page_____.
For Bill of Assurance see Deed Record Book___Page___.

Circuit Clerk

CERTIFICATE OF PRELIMINARY SURVEYING ACCURACY:

I, Kelly D. Vanlandingham, hereby certify that this proposed preliminary plat correctly represents a boundary survey made by me or under my supervision on 1/27/2017, that the boundary lines shown hereon correspond with the description in the deeds cited in the above Source of Title;and that all monuments which were found or placed on the property are correctly described and located.

Date: _____ Signed: _____

Kelly D. Vanlandingham
Registered Land Surveyor
No. 1447, Arkansas

CERTIFICATE OF PRELIMINARY PLAT APPROVAL:

All requirements of the City of Bryant Subdivision Rules and Regulations relative to the preparation and submittal of a Preliminary Plat having been fulfilled, approval of this plat is hereby granted, subject to further provisions of said Rules and Regulations.

This Certificate shall expire Date: _____

Date of Execution

Name, Chairman
Bryant Planning Commission

PROPERTY DESCRIPTION:

PROPERTY DESCRIPTION: (AS SURVEYED)
A PART OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 12; TOWNSHIP 1 SOUTH; RANGE 15 WEST; SALINE COUNTY, ARKANSAS; BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHEAST CORNER OF SAID SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 12; THENCE N 1° 30' 03" E A DISTANCE OF 630.67 FEET ALONG THE EAST LINE OF SAID SECTION 12 TO A POINT; THENCE N 88° 06' 35" W A DISTANCE OF 105.90 FEET, BEING ON THE WEST RIGHT OF WAY LINE OF ZUBER ROAD; THENCE N 88° 06' 35" W A DISTANCE OF 644.88 FEET; THENCE N 1° 30' 03" E A DISTANCE OF 130.72 FEET; THENCE S 88° 8' 55" E A DISTANCE OF 28.77 FEET TO THE **POINT OF BEGINNING**; THENCE N 88°8'55" W A DISTANCE OF 484.04 FEET; THENCE S 1°30'1" W A DISTANCE OF 395.01 FEET; THENCE N 88°8'55" W A DISTANCE OF 125.00 FEET; THENCE N 1°30'1" E A DISTANCE OF 10.00 FEET; THENCE N 88°8'55" W A DISTANCE OF 115.00 FEET TO THE EAST RIGHT OF WAY LINE OF GILBERT ROAD; THENCE N 1°30'1" E A DISTANCE OF 945.02 FEET TO THE NORTHWEST CORNER OF THE SE/4 NE/W OF SECTION 12; THENCE, ALONG THE NORTH LINE OF THE SW/4 NE/4 OF SECTION 12, S 88°8'55" E A DISTANCE OF 727.71 FEET; THENCE S 1°51'5" W A DISTANCE OF 115.00 FEET; THENCE N 88°8'55" W A DISTANCE OF 10.99 FEET; THENCE S 1°30'1" W A DISTANCE OF 280.01 FEET; THENCE S 8°21'55" E A DISTANCE OF 50.81 FEET; THENCE S 1°50'17" W A DISTANCE OF 115.00 FEET TO THE **POINT OF BEGINNING**, CONTAINING 497,103 SQUARE FEET (11.41 ACRES), MORE OR LESS, SUBJECT TO ANY AND ALL EASEMENTS, RESERVATIONS, RESTRICTIONS AND CONVEYANCES OF RECORD.

PROPERTY SPECIFICATIONS:

ZONING CLASSIFICATION: R-1.S

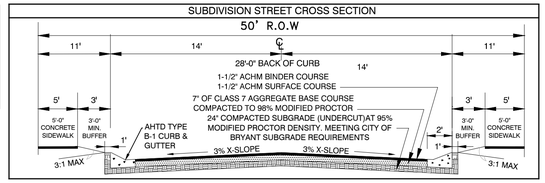
MIN. LOT SIZE: 7,310 S.F.
NUMBER OF LOTS: 48
SOURCE OF WATER: SALEM WATER
SOURCE OF SEWER: CITY OF BRYANT

BUILDING SETBACKS:
FRONT - 25' OR AS SHOWN
REAR - 20' OR AS SHOWN
SIDE - 8' OR AS SHOWN

EASEMENTS: UTILITY & DRAINAGE (D.E. & U.E.)
FRONT - 10' OR AS SHOWN
REAR - 10' OR AS SHOWN
SIDE - 5' OR AS SHOWN
STREET RIGHT OF WAYS: 50' OR AS SHOWN
STREET WIDTH: 28' BOC TO BOC
LOT CORNERS: SET #4 REBAR WITH CAP

SURVEY LEGEND
△ - Computed point
● - Found monument
◉ - Set #4 RB/Plas. Cap
(M)-Measured
(R)-Record
(P)-Platted

SUBDIVISION STREET CROSS SECTION



NOTES:
1. NO FENCES WILL BE CONSTRUCTED IN THE DRAINAGE EASEMENTS WHERE OPEN DITCHES ARE TO BE CONSTRUCTED.

BASIS OF BEARINGS:

BENCHMARK(S) PROVIDED ARE REBAR AND COORDINATES ON BENCHMARKS ARE NORTH AMERICAN DATUM 1983, ARKANSAS SOUTH ZONE, US SURVEY FEET, GRID COORDINATES AND ELEVATIONS ARE NAVD 1988. COORDINATES AND ELEVATIONS WERE ESTABLISHED USING GPS AND WERE PROCESSED USING THE NATIONAL GEODETIC SURVEY'S "ONLINE POSITIONING USER SERVICE" (OPUS).

CERTIFICATIONS:

By affixing my seal and signature, I Kelly D. Vanlandingham, PLS No. 1447, hereby certify that this drawing correctly depicts a survey compiled under my supervision.

According the the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Saline County unincorporated areas, panel # 05125C0225D dated 6/19/2012 , no portion , dated of the property described hereon does lie within the 100 year flood hazard boundary.

DATE	REVISION	BY
2/3/2017	1 – COMMENTS FROM CITY OF BRYANT	KDV

GNE Designing our client's success
GarNat Engineering, LLC
P.O. Box 116 (72018)
2909 Military Road
Benton, Arkansas 72015
Ph (501) 408-4650
Fx (888) 900-3068
gamateengineering@gmail.com

BENJAMIN GROVE SUBDIVISION, PHASE 2
FOR THOMAS D.B.COLLINS, LTD.
PART OF THE SE/4 NE/4 OF
SECTION 12, T-1-S, R-15-W,
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

STATE OF ARKANSAS
REGISTERED
PROFESSIONAL
ENGINEER
NO. 7996
KELLY D VANLANDINGHAM
1.27.17

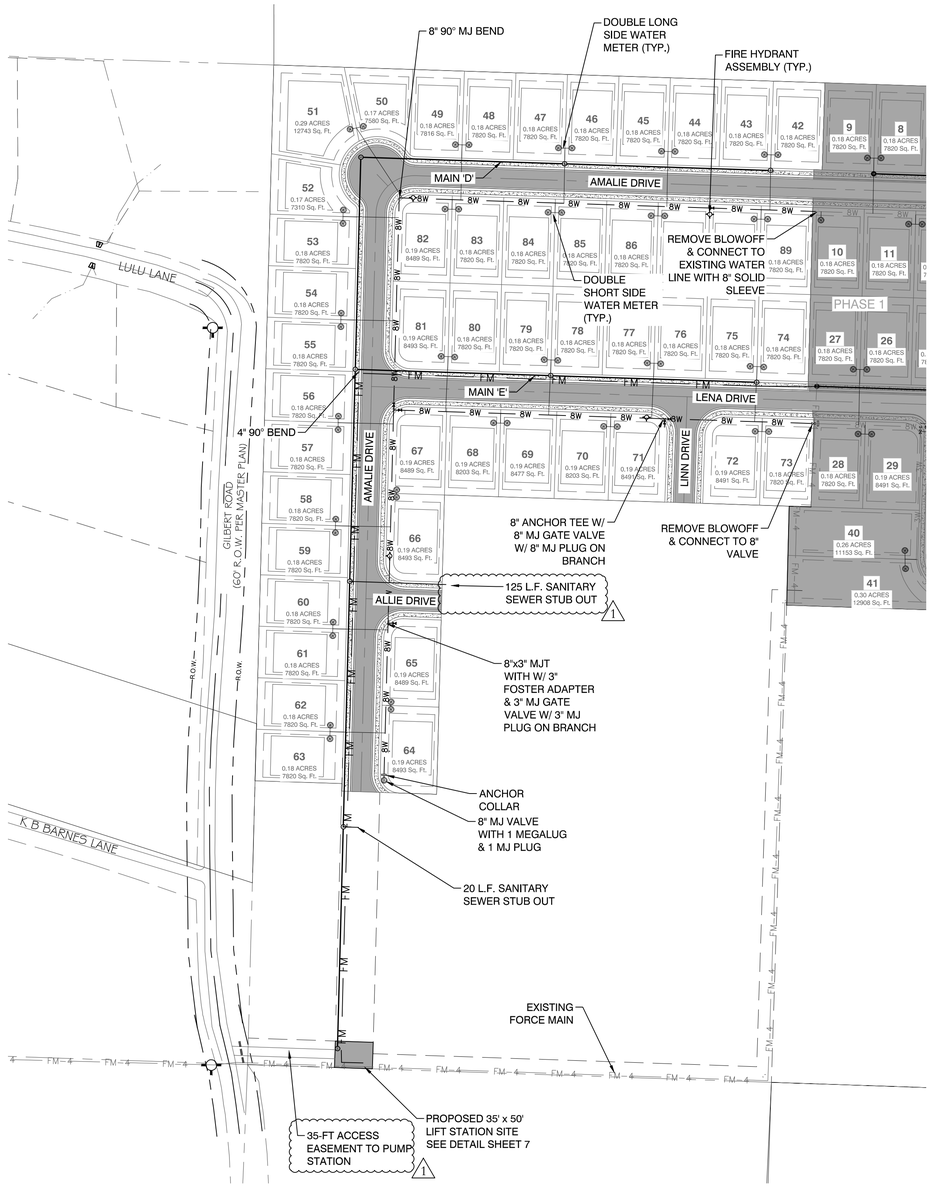
CONTENTS:
PRELIMINARY PLAT

PROJECT NO:
16025

DATE:
JAN 2017

SHEET NO:
1

J:\Projects\2016 Projects\16025 Benjamin Grove Lee Pengelly\DWG\Phase 2\16025 Benjamin Grove Subd – Phase 2 – R24 (with comments addressed).dwg



NOTES:

1. BURIED UTILITIES ARE LOCATED AT THE SITE. CONTACT ARKANSAS ONE CALL & WHERE APPROPRIATE THE UTILITY COMPANIES PRIOR TO DIGGING.

2. ALL UNRESTRAINED WATER LINE FITTINGS SHALL BE INSTALLED WITH A CONCRETE THRUST BLOCK FOR JOINT RESTRAINT.

3. WORK ON EXISTING ROADS SHALL INCLUDE WARNING SIGNS & BARRICADES IN ACCORDANCE WITH THE REQUIREMENTS OF THE STATE, COUNTY, OR CITY HAVING JURISDICTION. OTHER SIGNS & DEVICES, SUCH AS PLATING, SHALL BE PLACED AS REQUIRED TO ADEQUATELY PROTECT THE PUBLIC.

4. ALL SEWER LINE CONSTRUCTION SHALL COMPLY WITH CITY OF BRYANT STANDARD SPECIFICATIONS & DETAILS.

5. ALL WATER LINE CONSTRUCTION SHALL COMPLY WITH SALEM WATER USERS STANDARD SPECIFICATIONS & DETAILS.

6. MAINTAIN 10 FEET OF HORIZONTAL SEPARATION BETWEEN WATER & SEWER LINES.

N

100' 50' 0 100'

DATE	REVISION	BY
2/3/2017	1 – COMMENTS FROM CITY OF BRYANT	KDV

GNE Designing our client's success

GarNat Engineering, LLC
P.O. Box 116 (72018) Ph (501) 408-4650
2909 Military Road Fx (888) 900-3068
Benton, Arkansas 72015 garnatengineering@gmail.com

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SALINE COUNTY, ARKANSAS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
KELLY D. VANLANDINGHAM
NO. 7996
1.27.17

CONTENTS:

OVERALL WATER & SANITARY SEWER PLAN

PROJECT NO: 16025

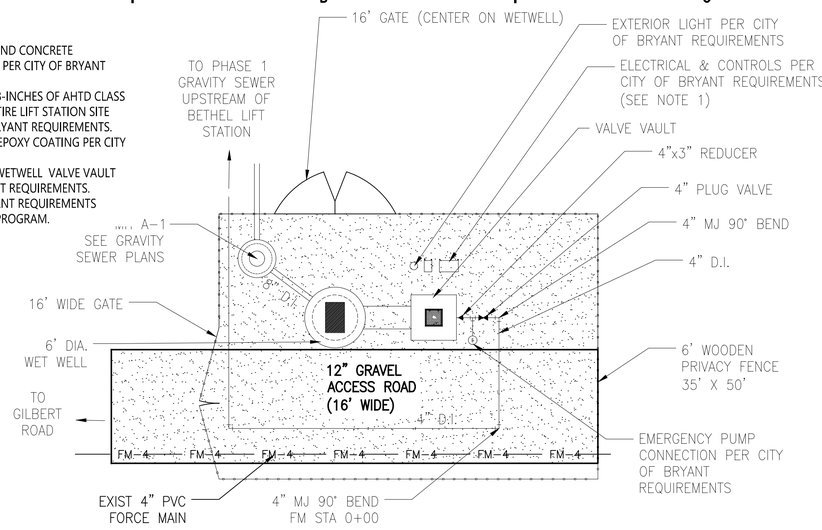
DATE: JAN 2017

SHEET NO: 2

J:\Projects\2016 Projects\16025 Benjamin Grove Lee Pengel\DWG\Phase 2\16025 Benjamin Grove Subd – Phase 2\16025 Benjamin Grove Subd – Phase 2 – R24 (with comments addressed).dwg

LIFT STATION SITE NOTES:

1. PROVIDE CANOPY OVER CABINETS AND CONCRETE HOUSEKEEPING PAD UNDER PANELS PER CITY OF BRYANT REQUIREMENTS.
2. PROVIDE SURFACE CONSISTING OF 8-INCHES OF AHTD CLASS 7 AGGREGATE BASE COURSE ON ENTIRE LIFT STATION SITE (AREA INSIDE FENCE) PER CITY OF BRYANT REQUIREMENTS.
3. MANHOLE D1 SHALL HAVE SPECIAL EPOXY COATING PER CITY OF BRYANT REQUIREMENTS.
4. PROVIDE CONCRETE PAD AROUND WETWELL VALVE VAULT AND CONTROLS PER CITY OF BRYANT REQUIREMENTS.
5. PROVIDE METERING PUMP PER BRYANT REQUIREMENTS (BRYCE RIMMER) FOR DEGREASING PROGRAM.

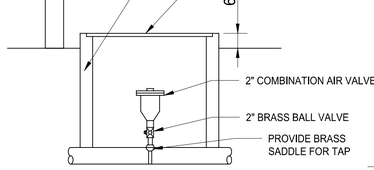


LIFT STATION - PLAN

SCALE: 1"=10'

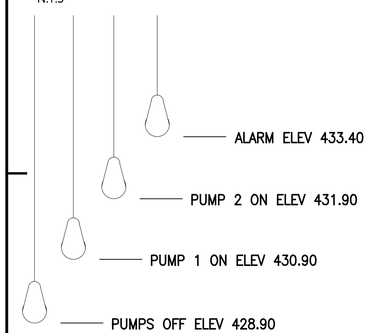
LIFT STATION SECTION NOTES

1. ALL EQUIPMENT SHALL MEET CITY OF BRYANT REQUIREMENTS.
2. PROVIDE LINK SEAL OR EQUAL AT PRESSURE PIPING WALL PENETRATIONS IN WETWELL AND VALVE VAULT.
3. PROVIDE CONCRETE MANHOLE ADAPTER (CMA) OR EQUAL AT GRAVITY SEWER PENETRATIONS.
4. ALL DUCTILE IRON GRAVITY SEWER PIPE SHALL BE THICKNESS CLASS 50 WITH PROTECTO 401 LINING.
5. ALL INTERNAL WETWELL PIPING SHALL BE CONSTRUCTED OF FLANGED SCHEDULE 40 304L STAINLESS STEEL.
6. SPARE PARTS FOR LIFT STATION WILL BE PROVIDED PER CITY OF BRYANT REQUIREMENTS.
7. VALVE VAULT SHALL BE 6' X 6' STANDARD JUNCTION BOX BY HANSON OR EQUAL. REINFORCING PER ASTM A-615 OR ASTM A-185. CONCRETE SHALL HAVE MINIMUM STRENGTH OF 5000 PSI.
8. WETWELL SHALL BE PRECAST CONCRETE MANUFACTURED BY HANSON OR EQUAL. WALLS REINFORCED PER ASTM C-478. TOP AND BOTTOM SLAB REINFORCED WITH #5'S AT 6" O.C.E.W. CONCRETE SHALL HAVE MINIMUM STRENGTH OF 5000 PSI.
9. ALL PIPING ON LIFT STATION SITE SHALL BE RESTRAINED JOINT - EITHER FLANGED OR MECHANICAL JOINT WITH MEGALUG.
10. EXTERIOR OF ALL DUCTILE IRON PIPING IN THE VALVE VAULT MUST BE EPOXY COATED PER CITY OF BRYANT REQUIREMENTS.



2" COMB AIR VALVE - DETAIL

N.T.S

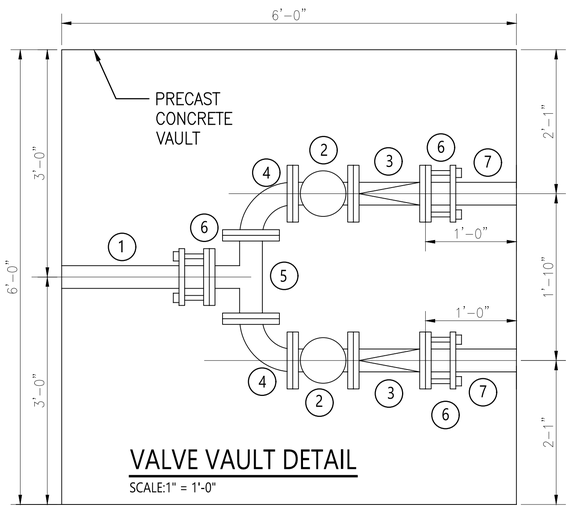


LEVEL CONTROLS

N.T.S.

NOTES:

1. EQUIPMENT USED FOR LEVEL CONTROL SHALL BE PER CITY OF BRYANT REQUIREMENTS.



VALVE VAULT DETAIL

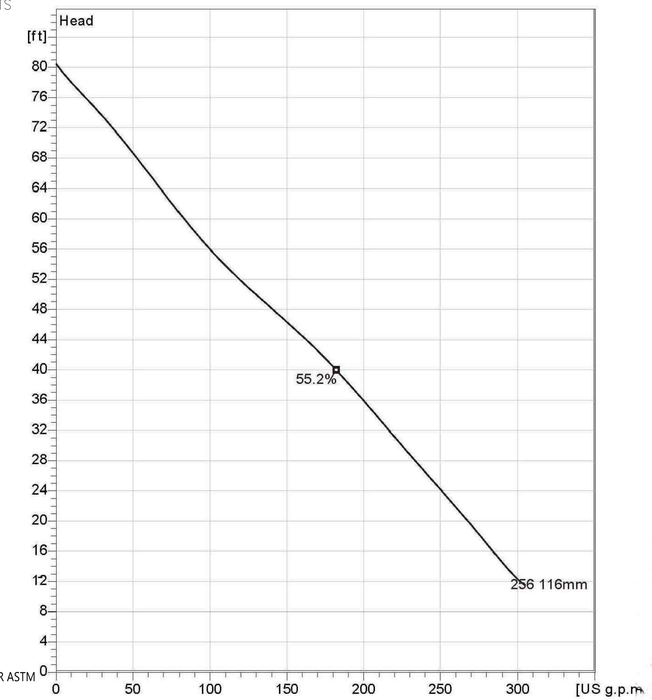
SCALE:1" = 1'-0"

KEYED NOTES:

1. 3" FLANGED DI SPOOL
2. 3" FLANGED PLUG VALVE W/ HAND LEVER PER CITY OF BRYANT REQUIREMENTS
3. 3" FLANGED CHECK VALVE PER CITY OF BRYANT REQUIREMENTS
4. 3" FLANGED DI 90° BEND
5. 3" FLANGED TEE
6. 3" FLANGE COUPLING ADAPTER - EBAA MEGAFLANGE OR EQUAL
7. PE STAINLESS STEEL SPOOL FROM LIFT STATION

NP 3085 SH 3~ 256

Technical specification



PUMP INFORMATION

N.T.S.

Note: Picture might not correspond to the current configuration.

General

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

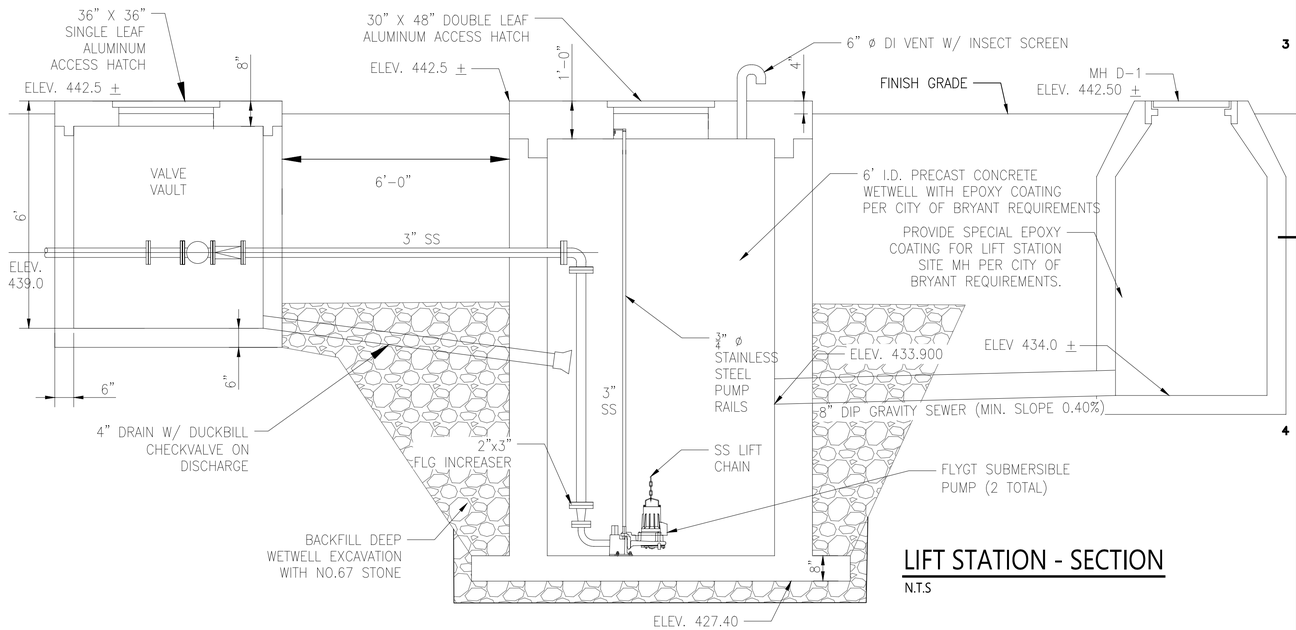
Impeller

Impeller material	Grey cast iron
Discharge Flange Diameter	3 1/8 inch
Suction Flange Diameter	80 mm
Impeller diameter	116 mm
Number of blades	2

Motor

Motor #	N3085.183 15-09-2AL-W 4hp
Stator variant	12
Frequency	60 Hz
Rated voltage	460 V
Number of poles	2
Phases	3~
Rated power	4 hp
Rated current	5.1 A
Starting current	30 A
Rated speed	3415 rpm
Power factor	
1/1 Load	0.91
3/4 Load	0.88
1/2 Load	0.81
Efficiency	
1/1 Load	80.5 %
3/4 Load	82.5 %
1/2 Load	82.5 %

Configuration



LIFT STATION - SECTION

N.T.S

DATE	REVISION	BY
2/3/17	COMMENTS FROM CITY 2/1/17	KDV

GNE Designing our client's success

GarNat Engineering, LLC

P.O. Box 116 (72018) Ph (501) 408-4650
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STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
KELLY D. VANLANDINGHAM
NO. 7996

1.6.17

CONTENTS:

LIFT STATION PLAN & DETAILS

PROJECT NO: 16025

DATE: JAN 2017

SHEET NO: 7

SUMMARY OF HYDROLOGY **2/2/2017**

BENJAMIN GROVE SUBDIVISION - PHASE 2

				25-Year					100-Year				
Element ID	Area (acres)	Drainage Node ID	Weighted Runoff Coefficient	Accumulated Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Rainfall Intensity (inches/hr)	Time of Concentration (days hh:mm:ss)	Accumulated Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Rainfall Intensity (inches/hr)	Time of Concentration (days hh:mm:ss)
1	0.06	CB-F4	0.9500	0.70	0.67	0.48	8.400	0 00:05:00	0.83	0.79	0.57	10.000	0 00:05:00
2	0.18	CB-F4	0.5200	2.29	1.19	0.42	4.390	0 00:31:18	2.90	1.51	0.53	5.560	0 00:31:18
3	0.20	CB-G1	0.9500	0.70	0.67	1.60	8.400	0 00:05:00	0.83	0.79	1.90	10.000	0 00:05:00
4	0.10	CB-F3	0.9500	0.70	0.67	0.81	8.400	0 00:05:00	0.83	0.79	0.96	10.000	0 00:05:00
5	0.13	CB-F3	0.5200	1.95	1.01	0.36	5.088	0 00:23:00	2.45	1.28	0.45	6.397	0 00:23:00
6	0.13	CB-F2	0.9500	0.70	0.67	1.02	8.400	0 00:05:00	0.83	0.79	1.22	10.000	0 00:05:00
8	0.36	CB-F2	0.9500	0.70	0.67	2.87	8.400	0 00:05:00	0.83	0.79	3.42	10.000	0 00:05:00
9	0.80	CB-F2	0.5200	2.31	1.20	1.80	4.339	0 00:31:55	2.93	1.52	2.28	5.496	0 00:31:55
10	0.11	CB-H1	0.9500	0.70	0.67	0.85	8.400	0 00:05:00	0.83	0.79	1.01	10.000	0 00:05:00
11	0.43	CB-H1	0.5200	2.22	1.16	1.02	4.545	0 00:29:21	2.81	1.46	1.29	5.754	0 00:29:21
12	0.10	CB-I1	0.9500	0.70	0.67	0.77	8.400	0 00:05:00	0.83	0.79	0.92	10.000	0 00:05:00
13	0.81	CB-I1	0.5200	2.46	1.28	1.68	3.970	0 00:37:09	3.12	1.62	2.12	5.029	0 00:37:09
14	0.11	CB-J1	0.9500	0.70	0.67	0.91	8.400	0 00:05:00	0.83	0.79	1.08	10.000	0 00:05:00
15	0.67	CB-J1	0.5200	2.60	1.35	1.29	3.672	0 00:42:28	3.29	1.71	1.63	4.651	0 00:42:28
17	0.35	CB-J1	0.5200	2.31	1.20	0.80	4.339	0 00:31:55	2.93	1.52	1.01	5.496	0 00:31:55
19	0.11	CB-H2	0.9500	0.70	0.67	0.89	8.400	0 00:05:00	0.83	0.79	1.05	10.000	0 00:05:00
25	0.05	CB-H2	0.5200	1.44	0.75	0.18	6.467	0 00:13:22	1.78	0.92	0.23	7.995	0 00:13:22
27	0.07	CB-H3	0.9500	0.70	0.67	0.52	8.400	0 00:05:00	0.83	0.79	0.62	10.000	0 00:05:00
28	0.19	CB-H5	0.9500	0.70	0.67	1.52	8.400	0 00:05:00	0.83	0.79	1.81	10.000	0 00:05:00
29	0.11	CB-H5	0.5200	1.50	0.78	0.35	6.332	0 00:14:10	1.85	0.96	0.44	7.846	0 00:14:10
30	0.13	CB-M1	0.9500	0.70	0.67	1.02	8.400	0 00:05:00	0.83	0.79	1.22	10.000	0 00:05:00
31	0.39	CB-M1	0.5200	1.99	1.04	1.00	4.982	0 00:24:04	2.51	1.30	1.26	6.272	0 00:24:04
35	0.97	FES - L1	0.5200	2.39	1.24	2.09	4.138	0 00:34:37	3.03	1.58	2.64	5.241	0 00:34:37
36	0.07	CB-H7	0.9500	0.70	0.67	0.53	8.400	0 00:05:00	0.83	0.79	0.63	10.000	0 00:05:00
37	0.09	CB-H8	0.9500	0.70	0.67	0.73	8.400	0 00:05:00	0.83	0.79	0.86	10.000	0 00:05:00
38	0.17	CB-H8	0.5200	1.83	0.95	0.47	5.397	0 00:20:15	2.29	1.19	0.59	6.760	0 00:20:15
39	0.02	FES-H9	0.9500	0.70	0.67	0.12	8.400	0 00:05:00	0.83	0.79	0.14	10.000	0 00:05:00
40	0.10	CB-K1	0.9500	0.70	0.67	0.80	8.400	0 00:05:00	0.83	0.79	0.95	10.000	0 00:05:00
41	0.20	CB-N1	0.9500	0.70	0.67	1.59	8.400	0 00:05:00	0.83	0.79	1.89	10.000	0 00:05:00
45	0.07	CB-H3	0.9500	0.70	0.67	0.54	8.400	0 00:05:00	0.83	0.79	0.64	10.000	0 00:05:00
48	0.09	CB-H2	0.9500	0.70	0.67	0.73	8.400	0 00:05:00	0.83	0.79	0.86	10.000	0 00:05:00
49	23.80	FES-F1	0.5000	3.86	1.93	22.15	1.861	0 02:04:19	5.06	2.53	29.05	2.441	0 02:04:19
50	14.60	_KBBARNES	0.5000	3.24	1.62	18.94	2.594	0 01:14:48	4.15	2.07	24.28	3.326	0 01:14:48

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Project Description

File Name	Benjamin Grove Phase 2 Drainage 25 year R5.SPF
Description	J:\Projects\2016 Projects\16025 Benjamin Grove Lee Pengelly\Calcs\Phase 2\Benjamin Grove Drainage map phase 2 r6.dwg

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Jan 24, 2017	00:00:00
End Analysis On	Jan 25, 2017	00:00:00
Start Reporting On	Jan 24, 2017	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	33
Nodes	27
Junctions	9
Outfalls	3
Flow Diversions	0
Inlets	15
Storage Nodes	0
Links	35
Channels	15
Pipes	20
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	25 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	{STORM PHASE 2}.1	0.06	0.9500	0.70	0.67	0.04	0.48	0 00:05:00
2	{STORM PHASE 2}.10	0.11	0.9500	0.70	0.67	0.07	0.85	0 00:05:00
3	{STORM PHASE 2}.11	0.43	0.5200	2.22	1.16	0.50	1.02	0 00:29:21
4	{STORM PHASE 2}.12	0.10	0.9500	0.70	0.67	0.06	0.77	0 00:05:00
5	{STORM PHASE 2}.13	0.81	0.5200	2.46	1.28	1.04	1.68	0 00:37:09
6	{STORM PHASE 2}.14	0.11	0.9500	0.70	0.67	0.08	0.91	0 00:05:00
7	{STORM PHASE 2}.15	0.67	0.5200	2.60	1.35	0.91	1.29	0 00:42:28
8	{STORM PHASE 2}.17	0.35	0.5200	2.31	1.20	0.43	0.80	0 00:31:55
9	{STORM PHASE 2}.19	0.11	0.9500	0.70	0.67	0.07	0.89	0 00:05:00
10	{STORM PHASE 2}.2	0.18	0.5200	2.29	1.19	0.22	0.42	0 00:31:18
11	{STORM PHASE 2}.25	0.05	0.5200	1.44	0.75	0.04	0.18	0 00:13:22
12	{STORM PHASE 2}.27	0.07	0.9500	0.70	0.67	0.04	0.52	0 00:05:00
13	{STORM PHASE 2}.28	0.19	0.9500	0.70	0.67	0.13	1.52	0 00:05:00
14	{STORM PHASE 2}.29	0.11	0.5200	1.50	0.78	0.08	0.35	0 00:14:10
15	{STORM PHASE 2}.3	0.20	0.9500	0.70	0.67	0.13	1.60	0 00:05:00
16	{STORM PHASE 2}.30	0.13	0.9500	0.70	0.67	0.09	1.02	0 00:05:00
17	{STORM PHASE 2}.31	0.39	0.5200	1.99	1.04	0.40	1.00	0 00:24:04
18	{STORM PHASE 2}.35	0.97	0.5200	2.39	1.24	1.20	2.09	0 00:34:37
19	{STORM PHASE 2}.36	0.07	0.9500	0.70	0.67	0.04	0.53	0 00:05:00
20	{STORM PHASE 2}.37	0.09	0.9500	0.70	0.67	0.06	0.73	0 00:05:00
21	{STORM PHASE 2}.38	0.17	0.5200	1.83	0.95	0.16	0.47	0 00:20:15
22	{STORM PHASE 2}.39	0.02	0.9500	0.70	0.67	0.01	0.12	0 00:05:00
23	{STORM PHASE 2}.4	0.10	0.9500	0.70	0.67	0.07	0.81	0 00:05:00
24	{STORM PHASE 2}.40	0.10	0.9500	0.70	0.67	0.07	0.80	0 00:05:00
25	{STORM PHASE 2}.41	0.20	0.9500	0.70	0.67	0.13	1.59	0 00:05:00
26	{STORM PHASE 2}.45	0.07	0.9500	0.70	0.67	0.04	0.54	0 00:05:00
27	{STORM PHASE 2}.48	0.09	0.9500	0.70	0.67	0.06	0.73	0 00:05:00
28	{STORM PHASE 2}.5	0.13	0.5200	1.95	1.01	0.14	0.36	0 00:23:00
29	{STORM PHASE 2}.6	0.13	0.9500	0.70	0.67	0.09	1.02	0 00:05:00
30	{STORM PHASE 2}.8	0.36	0.9500	0.70	0.67	0.24	2.87	0 00:05:00
31	{STORM PHASE 2}.9	0.80	0.5200	2.31	1.20	0.96	1.80	0 00:31:55
32	49	23.80	0.5000	3.86	1.93	45.89	22.15	0 02:04:19
33	50	14.60	0.5000	3.24	1.62	23.62	18.94	0 01:14:48

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.FES - L1	Junction	447.00	450.00	447.00	450.00	0.00	2.08	447.42	0.00	2.58	0 00:00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	Junction	443.25	445.00	443.25	445.00	0.00	21.98	444.47	0.00	0.78	0 00:00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	Junction	443.00	445.00	443.00	445.00	0.00	21.98	444.37	0.00	0.65	0 00:00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	Junction	451.28	455.85	451.28	455.85	0.00	5.44	451.96	0.00	3.89	0 00:00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	Junction	445.40	449.19	445.40	449.19	0.00	8.97	446.38	0.00	2.81	0 00:00	0.00	0.00
6	FES-F1	Junction	448.75	457.43	448.75	457.43	0.00	22.15	449.97	0.00	7.45	0 00:00	0.00	0.00
7	FES-P1_KBBARNES	Junction	433.25	435.00	433.25	435.00	0.00	30.41	434.61	0.00	0.64	0 00:00	0.00	0.00
8	FES-P2_KBBARNES	Junction	433.00	435.00	433.00	435.00	0.00	30.40	434.28	0.00	0.72	0 00:00	0.00	0.00
9	StartNullStruct41	Junction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00:00	0.00	0.00
10	{STORM BJ2-1}.FES-H9	Outfall	439.50					11.39	443.32					
11	GUTTER-OUT1	Outfall	440.00					0.07	443.86					
12	KBBARNES-OUT1	Outfall	431.98					30.23	432.84					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)
1	{STORM BJ2-1}.PIPE - H7	Pipe	{STORM BJ2-1}.CB-H7	CB-H8	180.51	444.90	440.35	2.5200	18.000	0.0130	9.37	16.68	0.56	9.76	0.80
2	{STORM BJ2-1}.PIPE - H8	Pipe	CB-H8	{STORM BJ2-1}.FES-H9	31.04	440.25	439.50	2.4200	18.000	0.0130	11.29	16.33	0.69	9.97	0.92
3	{STORM BJ2-1}.PIPE - L1	Pipe	{STORM BJ2-1}.FES - L1	{STORM BJ2-1}.JB-H6	84.01	447.00	445.50	1.7900	18.000	0.0150	2.08	12.16	0.17	5.14	0.42
4	{STORM BJ2-1}.PIPE - M1	Pipe	{STORM BJ2-1}.CB-M1	{STORM BJ2-1}.JB-H6	48.34	446.66	445.50	2.4000	18.000	0.0130	1.33	16.27	0.08	5.56	0.29
5	{STORM BJ2-1}.PIPE - N1	Pipe	{STORM BJ2-1}.CB-N1	CB-H8	32.00	440.80	440.35	1.4100	18.000	0.0130	1.50	12.46	0.12	4.76	0.35
6	{STORM BJ2-1}.PIPE F1	Pipe	{STORM BJ2-1}.CB-F2	FES-F1	99.06	449.34	448.75	0.6000	18.000	0.0130	6.61	8.11	0.82	5.16	1.03
7	{STORM BJ2-1}.PIPE F2	Pipe	CB-F3	{STORM BJ2-1}.CB-F2	250.16	456.00	449.44	2.6200	18.000	0.0130	2.51	17.01	0.15	6.97	0.39
8	{STORM BJ2-1}.PIPE G1	Pipe	{STORM BJ2-1}.CB-G1	CB-F3	32.00	456.60	456.10	1.5600	18.000	0.0130	1.38	13.13	0.11	5.57	0.33
9	{STORM BJ2-1}.PIPE H5	Pipe	{STORM BJ2-1}.CB-H5	{STORM BJ2-1}.JB-H6	183.29	449.00	445.50	1.9100	18.000	0.0130	7.38	14.52	0.51	8.30	0.76
10	{STORM BJ2-1}.PIPE -H6	Pipe	{STORM BJ2-1}.JB-H6	{STORM BJ2-1}.CB-H7	31.79	445.40	445.00	1.2600	18.000	0.0130	8.97	11.78	0.76	7.34	0.98
11	{STORM BJ2-1}.PIPE_F3	Pipe	{STORM BJ2-1}.CB-F4	CB-F3	199.59	460.23	456.10	2.0700	18.000	0.0130	0.47	15.11	0.03	4.23	0.18
12	{STORM BJ2-1}.PIPE-H1	Pipe	{STORM BJ2-1}.CB-H1	{STORM BJ2-1}.CB-H2	32.00	458.25	457.75	1.5600	18.000	0.0130	1.00	13.13	0.08	4.39	0.28
13	{STORM BJ2-1}.PIPE-H2	Pipe	{STORM BJ2-1}.CB-H2	CB-H3	191.94	457.65	455.90	0.9100	18.000	0.0130	2.37	10.03	0.24	4.74	0.49
14	{STORM BJ2-1}.PIPE-H3	Pipe	CB-H3	{STORM BJ2-1}.JB-H4	260.88	455.80	451.38	1.6900	18.000	0.0130	4.34	13.67	0.32	6.96	0.58
15	{STORM BJ2-1}.PIPE-H4	Pipe	{STORM BJ2-1}.JB-H4	{STORM BJ2-1}.CB-H5	96.77	451.28	449.10	2.2500	18.000	0.0130	5.44	15.77	0.35	8.11	0.61
16	{STORM BJ2-1}.PIPE-I1	Pipe	{STORM BJ2-1}.CB-I1	CB-H3	32.00	456.40	455.90	1.5600	18.000	0.0130	1.46	13.13	0.11	4.90	0.34
17	{STORM BJ2-1}.PIPE-J1	Pipe	{STORM BJ2-1}.CB-J1	{STORM BJ2-1}.JB-H4	48.34	451.75	451.38	0.7700	18.000	0.0130	2.01	9.19	0.22	4.17	0.48
18	{STORM BJ2-1}.PIPE-K1	Pipe	{STORM BJ2-1}.CB-K1	{STORM BJ2-1}.CB-H5	32.00	449.60	449.10	1.5600	18.000	0.0130	0.79	13.13	0.06	4.80	0.25
19	{STORM BJ2-1}.PIPE-O1	Pipe	{STORM BJ2-1}.FES-O1 LULU	{STORM BJ2-1}.FES-O2_LULU	29.87	443.15	443.02	0.4400	24.000	0.0150	21.98	34.48	0.64	5.81	1.16
20	{STORM BJ2-1}.PIPE-P1	Pipe	FES-P1_KBBARNES	FES-P2_KBBARNES	22.81	433.25	433.00	1.1000	24.000	0.0150	30.40	41.06	0.74	7.15	1.28
21	BYPASS_K1	Channel	{STORM BJ2-1}.CB-K1	{STORM BJ2-1}.CB-N1	395.48	453.99	444.81	2.3200	6.000	0.0130	0.00	20.05	0.00	3.15	0.02
22	BYPASS_N1	Channel	{STORM BJ2-1}.CB-N1	GUTTER-OUT1	29.94	444.81	443.80	3.3700	6.000	0.0130	0.07	18.75	0.00	4.09	0.06
23	DITCH-01	Channel	FES-F1	{STORM BJ2-1}.FES-O1 LULU	424.00	448.75	443.02	1.3500	24.000	0.0800	21.98	62.45	0.35	1.83	1.22
24	DITCH-02	Channel	{STORM BJ2-1}.FES-O2_LULU	FES-P1_KBBARNES	970.00	443.00	433.25	1.0100	24.000	0.0800	21.71	47.45	0.46	1.77	1.36
25	DITCH-03	Channel	FES-P2_KBBARNES	KBBARNES-OUT1	262.00	433.00	431.98	0.3900	24.000	0.0320	30.23	289.59	0.10	1.65	0.86
26	GUTTER_F2	Channel	CB-F3	{STORM BJ2-1}.CB-F2	250.05	461.10	453.34	3.1000	6.000	0.0130	0.15	18.90	0.01	2.82	0.08
27	GUTTER_F3	Channel	{STORM BJ2-1}.CB-F4	CB-F3	199.54	465.23	461.10	2.0700	6.000	0.0130	0.04	21.08	0.00	2.30	0.05
28	GUTTER_G1	Channel	{STORM BJ2-1}.CB-G1	{STORM BJ2-1}.CB-F2	245.65	460.52	453.34	2.9200	6.000	0.0130	0.15	19.52	0.01	5.89	0.08
29	GUTTER_H2	Channel	{STORM BJ2-1}.CB-H2	CB-H3	191.92	462.65	459.83	1.4700	6.000	0.0130	0.17	12.23	0.01	4.28	0.10
30	GUTTER_H7	Channel	{STORM BJ2-1}.CB-H7	CB-H8	180.42	450.00	445.14	2.6900	6.000	0.0130	0.00	20.34	0.00	0.00	0.00
31	GUTTER_H8	Channel	CB-H8	{STORM BJ2-1}.FES-H9	31.05	445.14	443.30	5.9300	6.000	0.0130	0.01	25.22	0.00	1.26	0.02
32	GUTTER_I1	Channel	{STORM BJ2-1}.CB-H1	{STORM BJ2-1}.CB-I1	191.92	462.65	461.09	0.8100	6.000	0.0130	0.02	14.64	0.00	3.28	0.04
33	GUTTER-H3	Channel	CB-H3	{STORM BJ2-1}.CB-H5	260.86	459.83	454.37	2.0900	6.000	0.0130	0.02	19.15	0.00	3.97	0.03
34	GUTTER-H5	Channel	{STORM BJ2-1}.CB-H5	{STORM BJ2-1}.CB-M1	155.79	454.37	451.66	1.7400	6.000	0.0130	0.17	18.59	0.01	4.74	0.08
35	GUTTER-J1	Channel	{STORM BJ2-1}.CB-I1	{STORM BJ2-1}.CB-J1	224.65	461.09	457.58	1.5600	6.000	0.0130	0.21	16.02	0.01	2.96	0.10

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
0.54	0.00	Calculated
0.61	0.00	Calculated
0.28	0.00	Calculated
0.19	0.00	Calculated
0.23	0.00	Calculated
0.69	0.00	Calculated
0.26	0.00	Calculated
0.22	0.00	Calculated
0.50	0.00	Calculated
0.65	0.00	Calculated
0.12	0.00	Calculated
0.19	0.00	Calculated
0.33	0.00	Calculated
0.39	0.00	Calculated
0.41	0.00	Calculated
0.23	0.00	Calculated
0.32	0.00	Calculated
0.17	0.00	Calculated
0.58	0.00	Calculated
0.64	0.00	Calculated
0.03	0.00	
0.12	0.00	
0.61	0.00	
0.68	0.00	
0.43	0.00	
0.16	0.00	
0.09	0.00	
0.15	0.00	
0.19	0.00	
0.00	0.00	
0.04	0.00	
0.08	0.00	
0.06	0.00	
0.17	0.00	
0.20	0.00	

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	{STORM BJ2-1}.CB-F2	FHWA HEC-22 GENERIC	N/A	On Sag	1	449.34	454.86	449.34	0.00	4.27	N/A	N/A	N/A	12.00	12.06	455.36
2	{STORM BJ2-1}.CB-F4	FHWA HEC-22 GENERIC	N/A	On Grade	1	460.23	464.52	460.23	N/A	0.55	0.49	0.06	89.33	12.00	4.15	464.66
3	{STORM BJ2-1}.CB-G1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.60	459.94	456.60	N/A	1.60	1.39	0.21	86.83	12.00	7.00	460.15
4	{STORM BJ2-1}.CB-H1	FHWA HEC-22 GENERIC	N/A	On Grade	1	458.25	461.79	458.25	N/A	1.02	1.00	0.02	97.73	12.00	5.74	461.97
5	{STORM BJ2-1}.CB-H2	FHWA HEC-22 GENERIC	N/A	On Grade	1	457.65	461.12	457.65	N/A	1.68	1.43	0.25	85.20	12.00	7.15	461.33
6	{STORM BJ2-1}.CB-H5	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.00	452.86	449.00	N/A	1.64	1.42	0.22	86.48	12.00	7.16	453.07
7	{STORM BJ2-1}.CB-H7	FHWA HEC-22 GENERIC	N/A	On Grade	1	444.90	448.42	444.90	N/A	0.53	0.53	0.00	100.00	12.00	4.25	448.59
8	{STORM BJ2-1}.CB-I1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.40	459.56	456.40	N/A	1.69	1.46	0.22	86.75	12.00	7.42	459.77
9	{STORM BJ2-1}.CB-J1	FHWA HEC-22 GENERIC	N/A	On Sag	1	451.75	456.44	451.75	0.00	2.01	N/A	N/A	N/A	12.00	8.40	456.83
10	{STORM BJ2-1}.CB-K1	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.60	452.99	449.60	N/A	0.80	0.79	0.01	99.28	12.00	4.43	453.17
11	{STORM BJ2-1}.CB-M1	FHWA HEC-22 GENERIC	N/A	On Sag	1	446.66	449.94	446.66	0.00	1.33	N/A	N/A	N/A	12.00	6.27	450.30
12	{STORM BJ2-1}.CB-N1	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.80	444.37	440.80	N/A	1.59	1.51	0.08	94.98	12.00	7.72	444.61
13	CB-F3	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.00	459.71	456.00	N/A	0.90	0.71	0.19	78.85	12.00	4.74	459.89
14	CB-H3	FHWA HEC-22 GENERIC	N/A	On Grade	1	455.80	459.56	455.80	N/A	1.10	1.07	0.03	97.54	12.00	5.59	459.76
15	CB-H8	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.25	444.37	440.25	N/A	0.84	0.83	0.01	99.22	12.00	4.59	444.55

Subbasin Hydrology

Subbasin : {STORM PHASE 2}.1

Input Data

Area (ac) 0.06
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.06	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.06		0.95

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	193	0.00	0.00
Slope (%) :	1.2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.23	0.00	0.00
Computed Flow Time (min) :	1.44	0.00	0.00

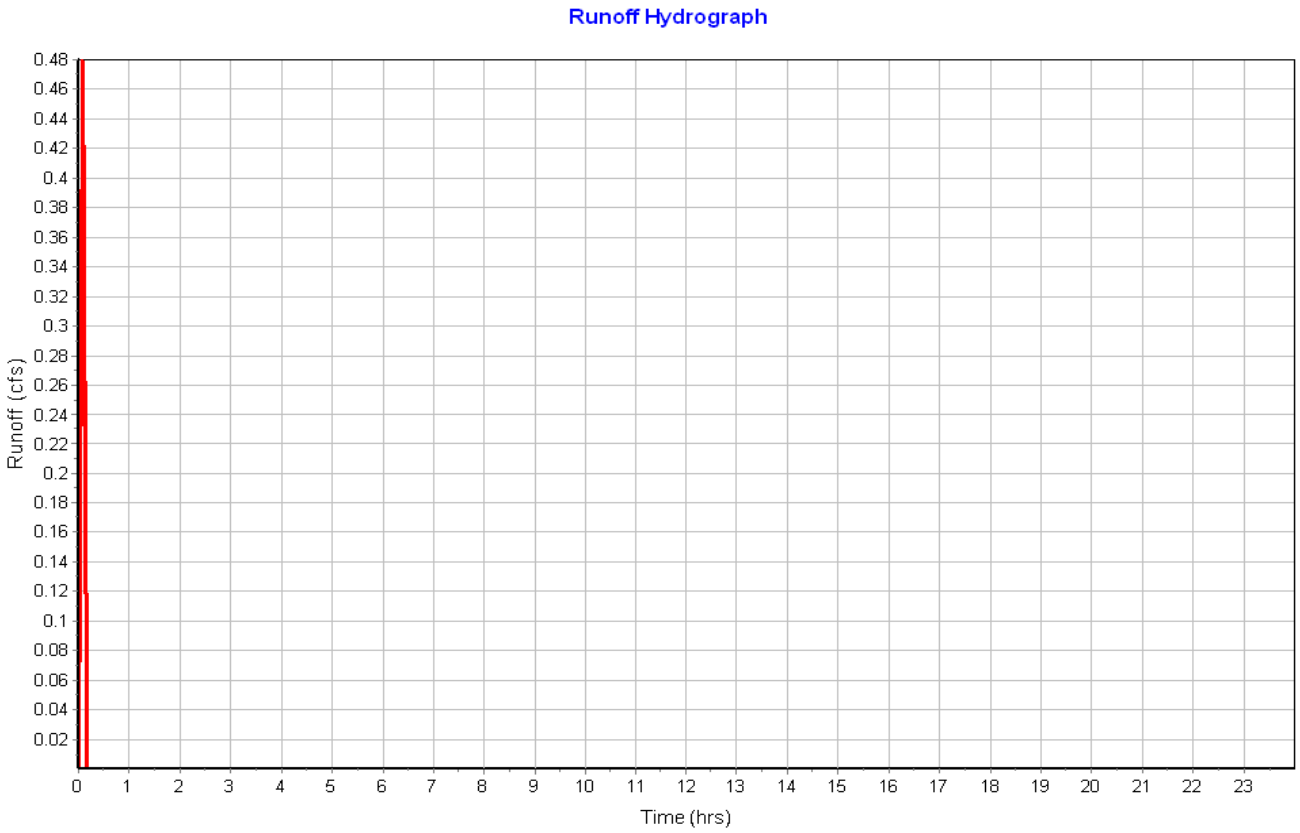
Total TOC (min) 1.70

Subbasin Runoff Results

Total Rainfall (in)	0.70
Total Runoff (in)	0.67
Peak Runoff (cfs)	0.48
Rainfall Intensity	8.400
Weighted Runoff Coefficient	0.9500
Time of Concentration (days hh:mm:ss)	0 00:01:42

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.1



Subbasin : {STORM PHASE 2}.10

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	209	0.00	0.00
Slope (%) :	0.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.91	0.00	0.00
Computed Flow Time (min) :	3.83	0.00	0.00

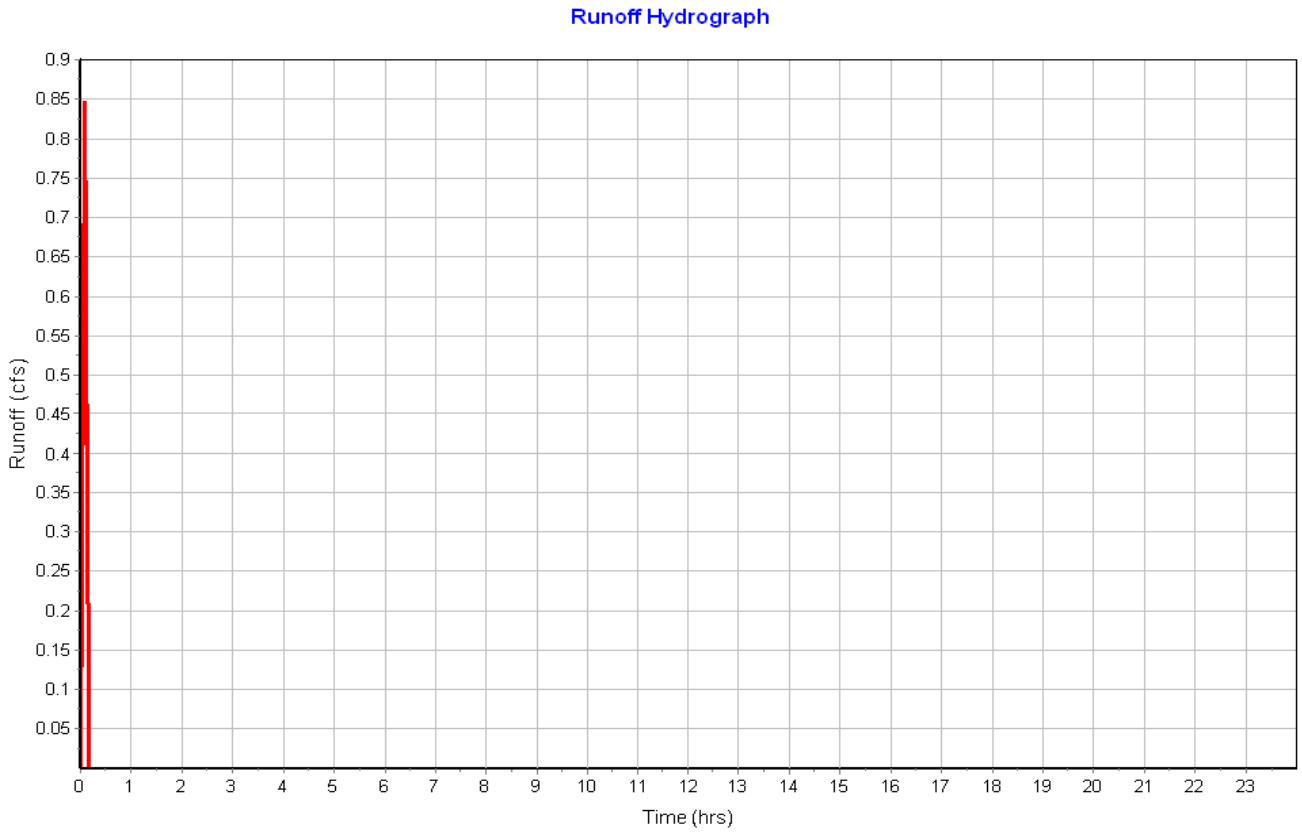
Total TOC (min) 3.83

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.85
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:50

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.10



Subbasin : {STORM PHASE 2}.11

Input Data

Area (ac) 0.43
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.43	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.43		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	233	0.00	0.00
Slope (%) :	1.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	29.36	0.00	0.00

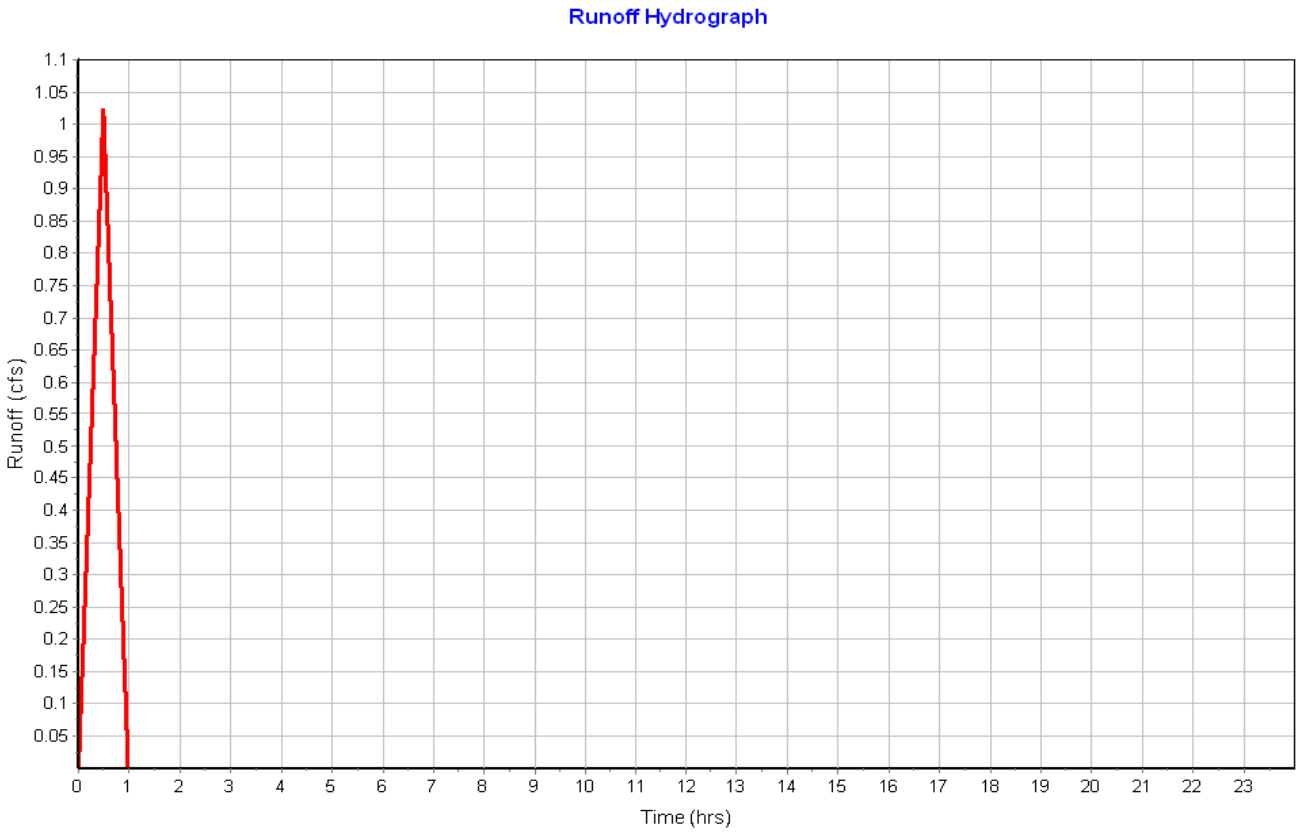
Total TOC (min) 29.36

Subbasin Runoff Results

Total Rainfall (in) 2.22
Total Runoff (in) 1.16
Peak Runoff (cfs) 1.02
Rainfall Intensity 4.545
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:29:22

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.11



Subbasin : {STORM PHASE 2}.12

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	183	0.00	0.00
Slope (%) :	1.2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.26	0.00	0.00
Computed Flow Time (min) :	2.43	0.00	0.00

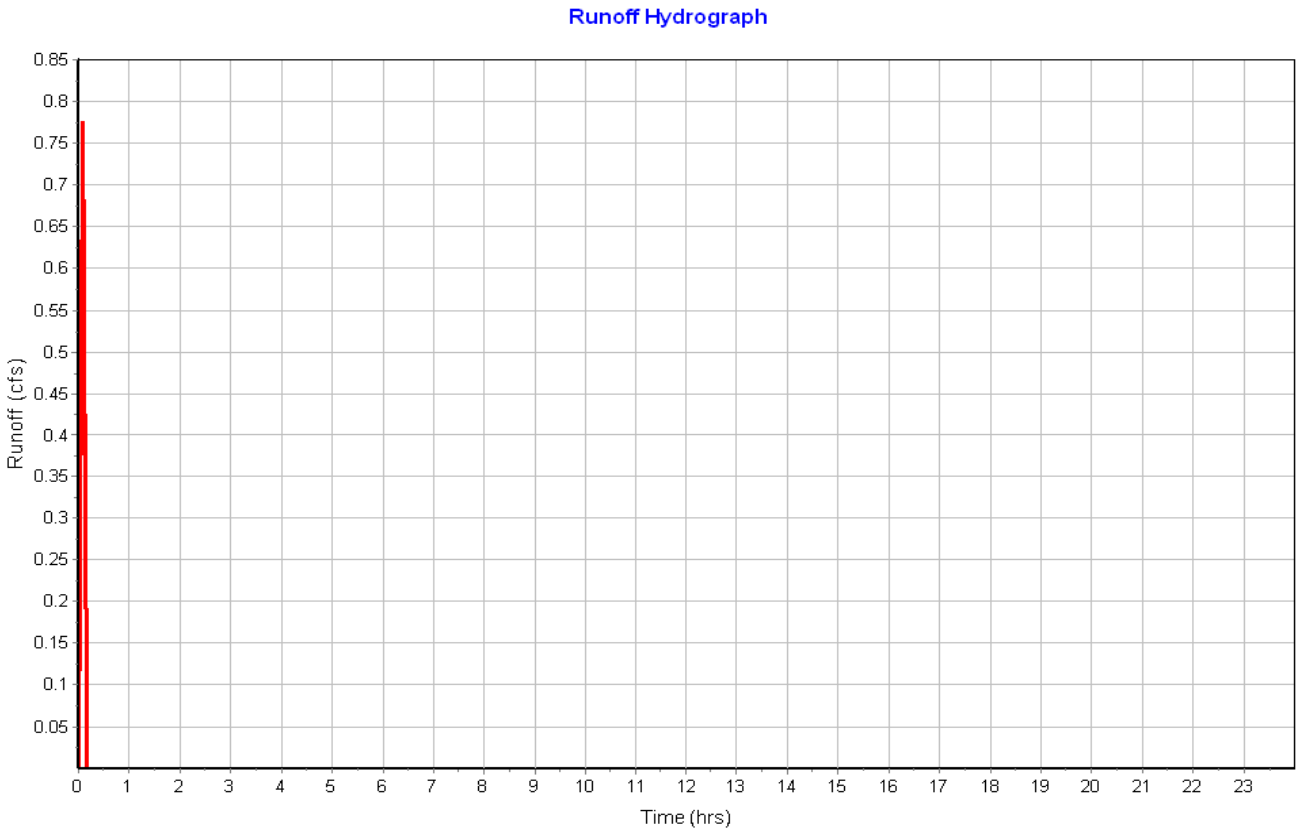
Total TOC (min) 2.43

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.77
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:26

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.12



Subbasin : {STORM PHASE 2}.13

Input Data

Area (ac) 0.81
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.81	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.81		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	336	0.00	0.00
Slope (%) :	1.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	37.16	0.00	0.00

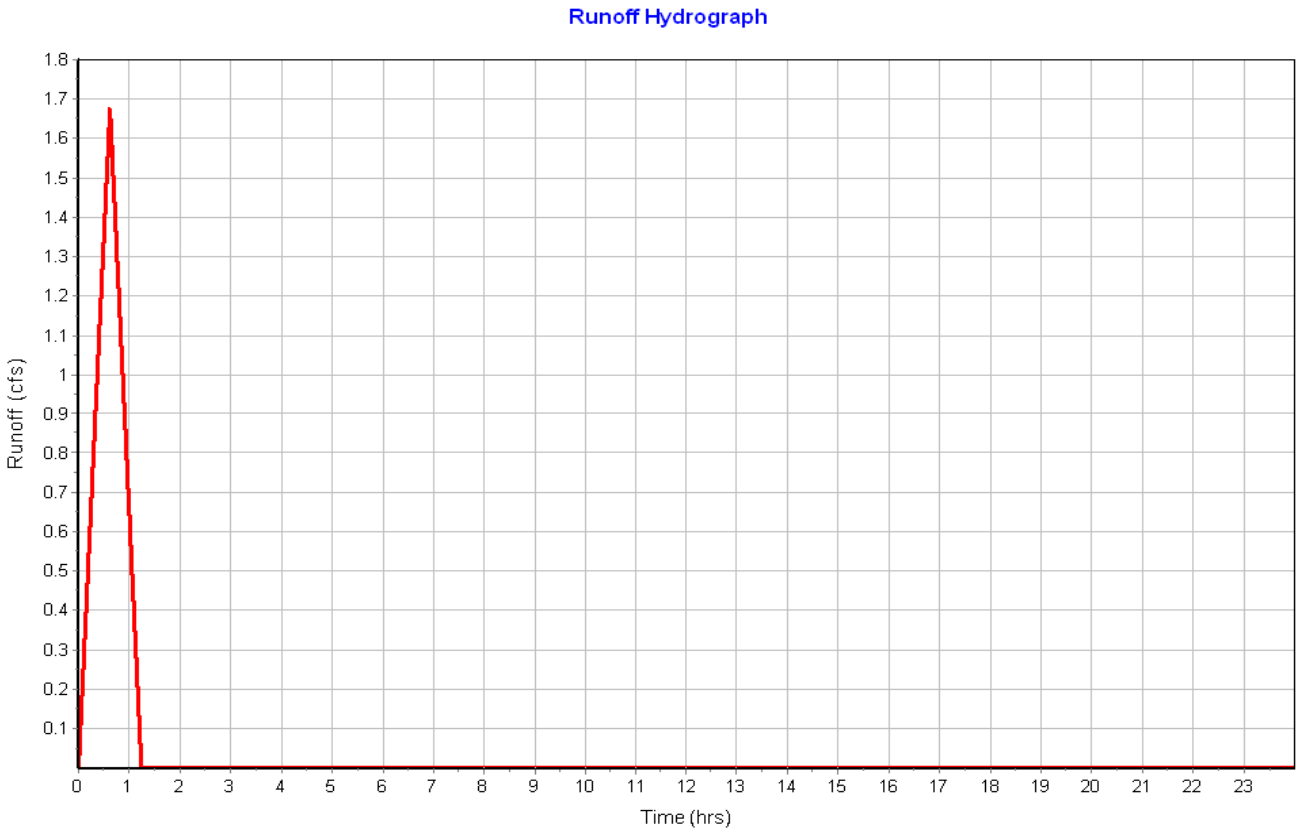
Total TOC (min) 37.16

Subbasin Runoff Results

Total Rainfall (in) 2.46
Total Runoff (in) 1.28
Peak Runoff (cfs) 1.68
Rainfall Intensity 3.970
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:37:10

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.13



Subbasin : {STORM PHASE 2}.14

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	1.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.32	0.00	0.00
Computed Flow Time (min) :	2.52	0.00	0.00

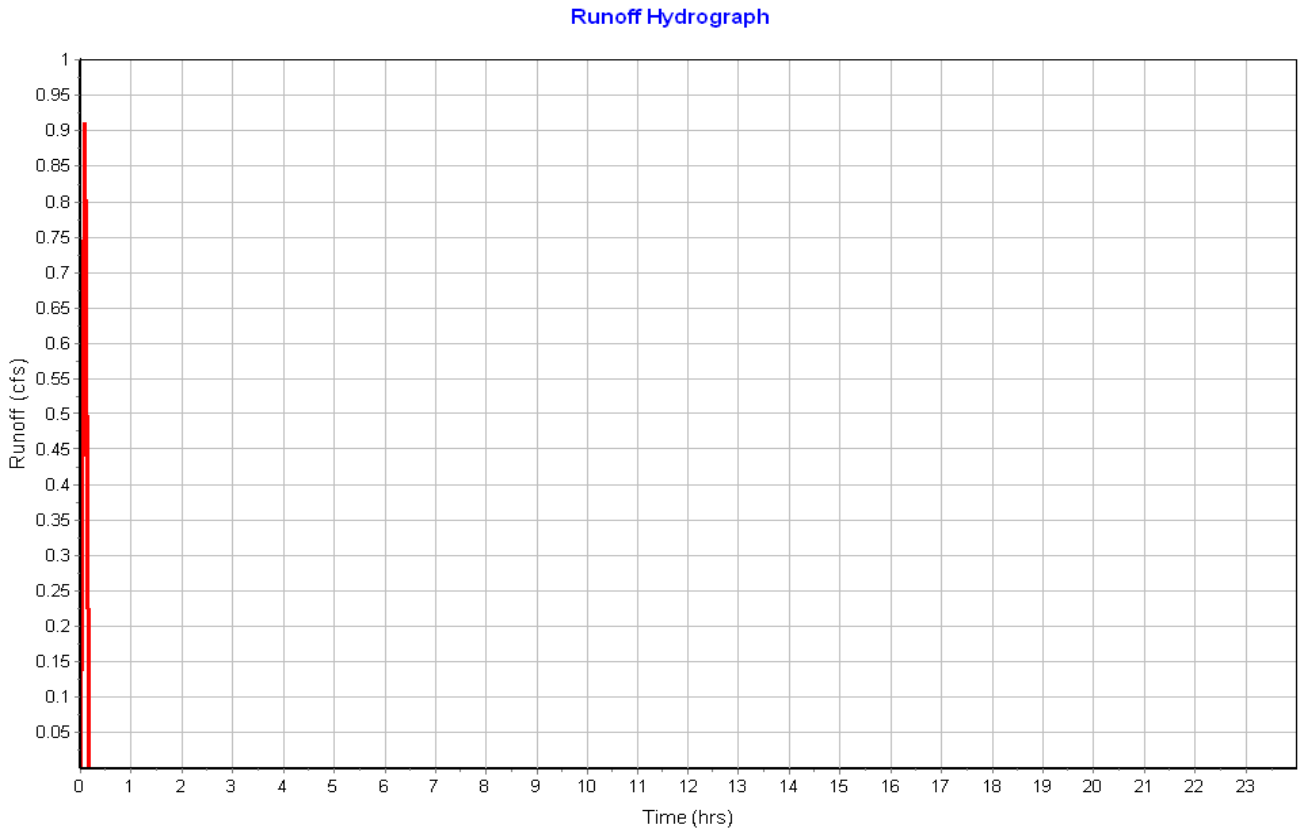
Total TOC (min) 2.52

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.91
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:31

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.14



Subbasin : {STORM PHASE 2}.15

Input Data

Area (ac) 0.67
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.67	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.67		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	447	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	42.48	0.00	0.00

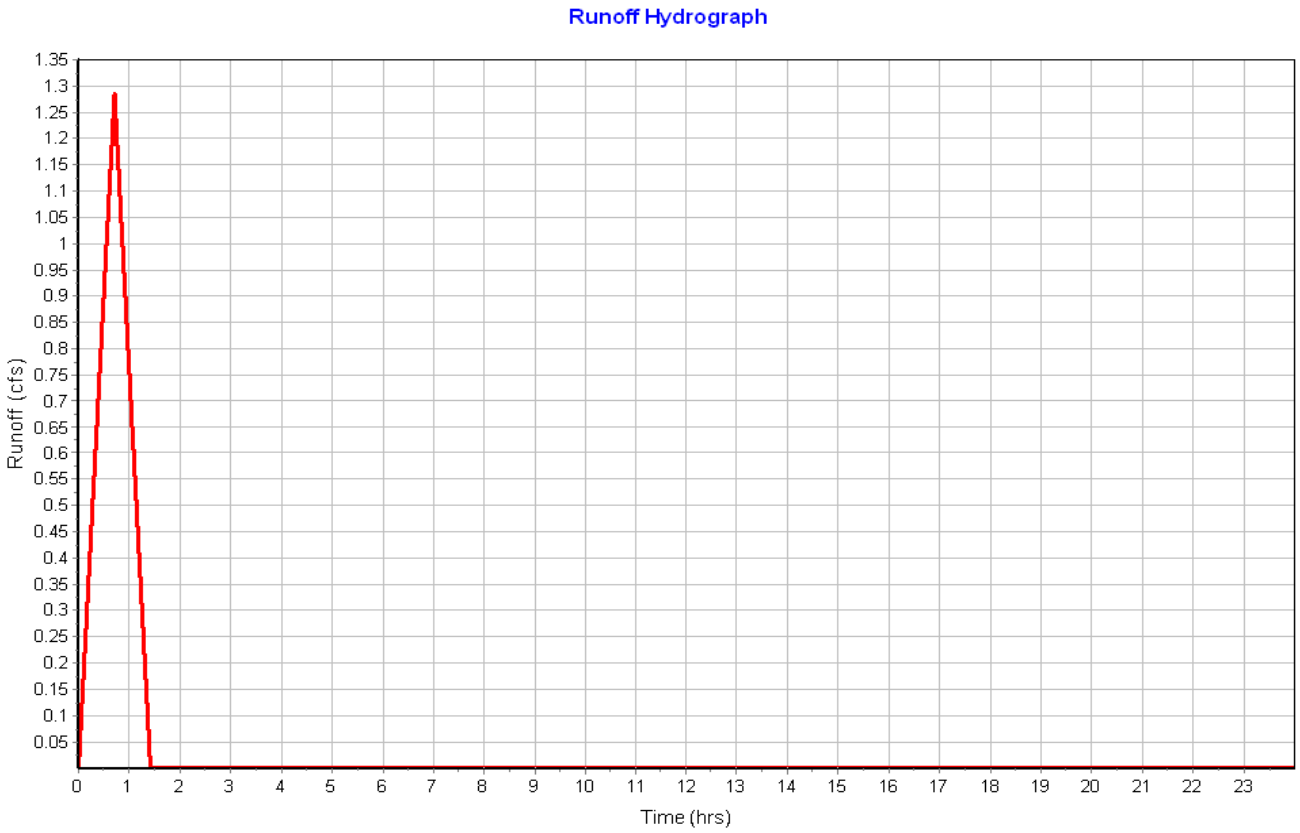
Total TOC (min) 42.48

Subbasin Runoff Results

Total Rainfall (in) 2.60
Total Runoff (in) 1.35
Peak Runoff (cfs) 1.29
Rainfall Intensity 3.672
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:42:29

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.15



Subbasin : {STORM PHASE 2}.17

Input Data

Area (ac) 0.35
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.35	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.35		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	321	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	31.93	0.00	0.00

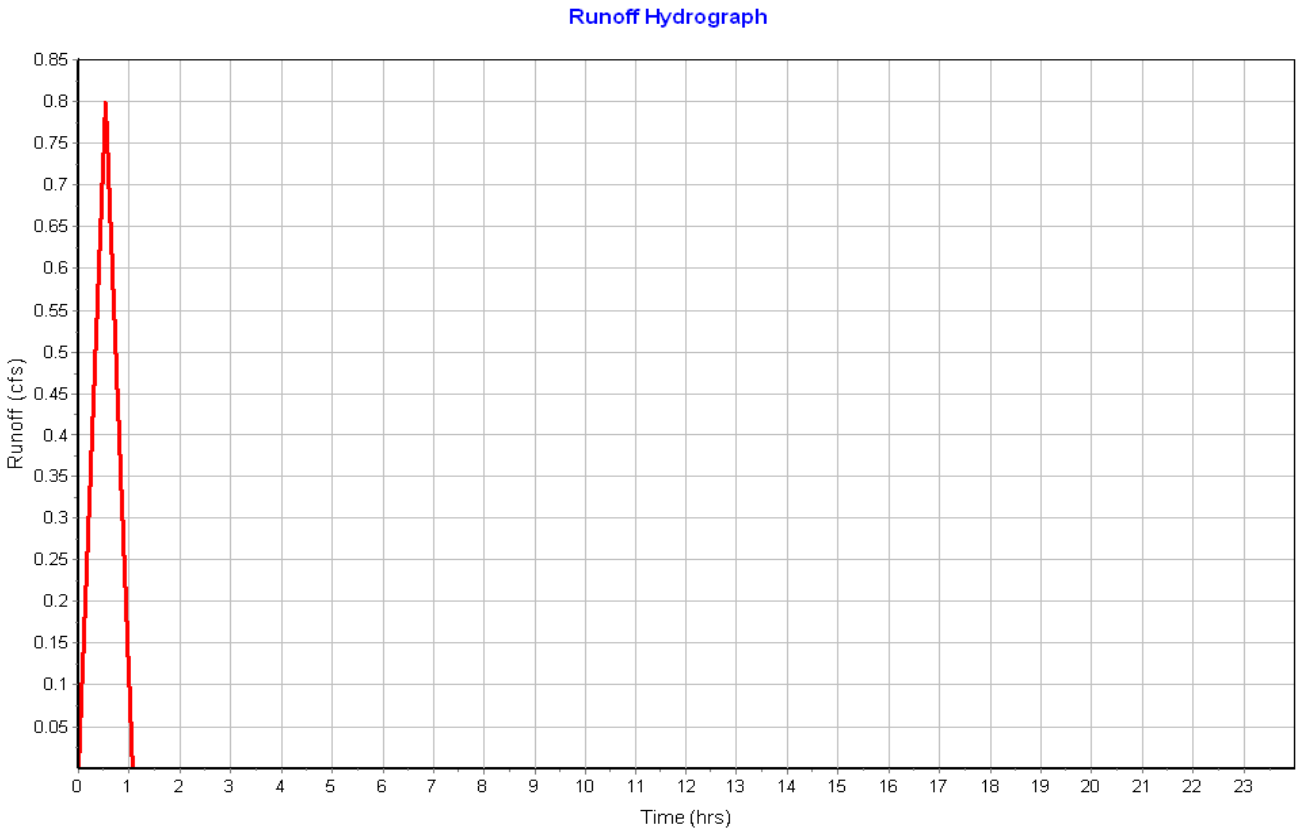
Total TOC (min) 31.93

Subbasin Runoff Results

Total Rainfall (in) 2.31
Total Runoff (in) 1.20
Peak Runoff (cfs) 0.80
Rainfall Intensity 4.339
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:56

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.17



Subbasin : {STORM PHASE 2}.19

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	217	0.00	0.00
Slope (%) :	0.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	3.94	0.00	0.00

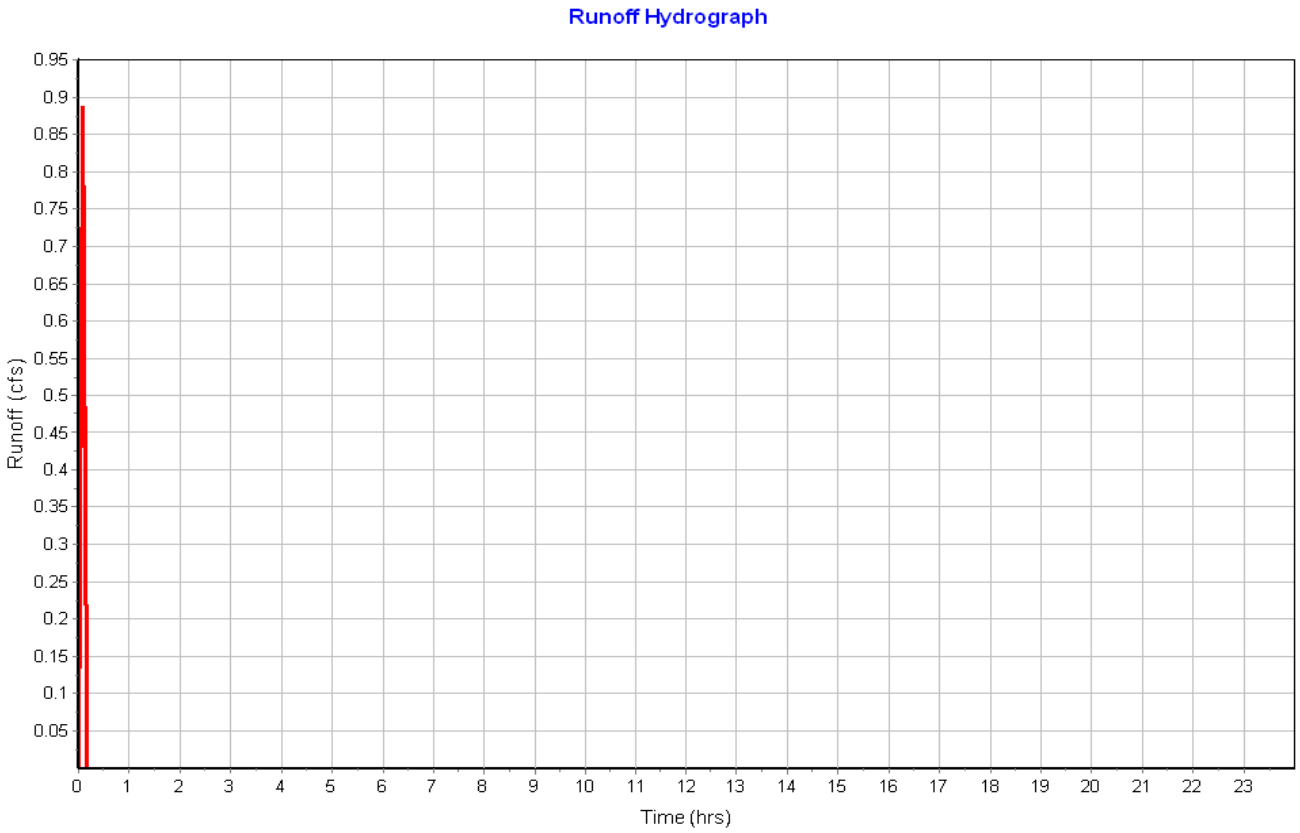
Total TOC (min) 3.94

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.89
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:56

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.19



Subbasin : {STORM PHASE 2}.2

Input Data

Area (ac) 0.18
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.18	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.18		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	198	0.00	0.00
Slope (%) :	0.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.11	0.00	0.00
Computed Flow Time (min) :	31.30	0.00	0.00

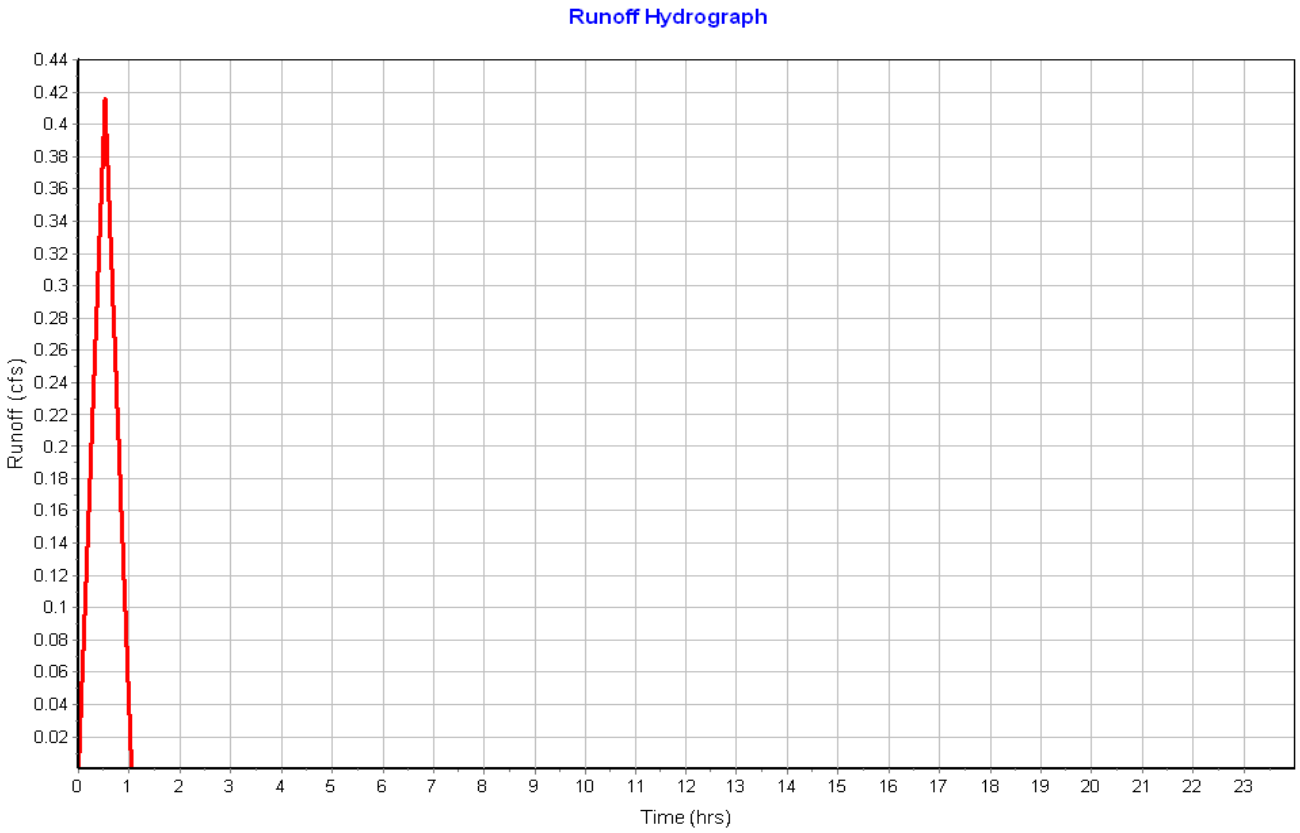
Total TOC (min) 31.30

Subbasin Runoff Results

Total Rainfall (in) 2.29
Total Runoff (in) 1.19
Peak Runoff (cfs) 0.42
Rainfall Intensity 4.390
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:18

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.2



Subbasin : {STORM PHASE 2}.25

Input Data

Area (ac) 0.05
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.05	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.05		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	121	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	13.38	0.00	0.00

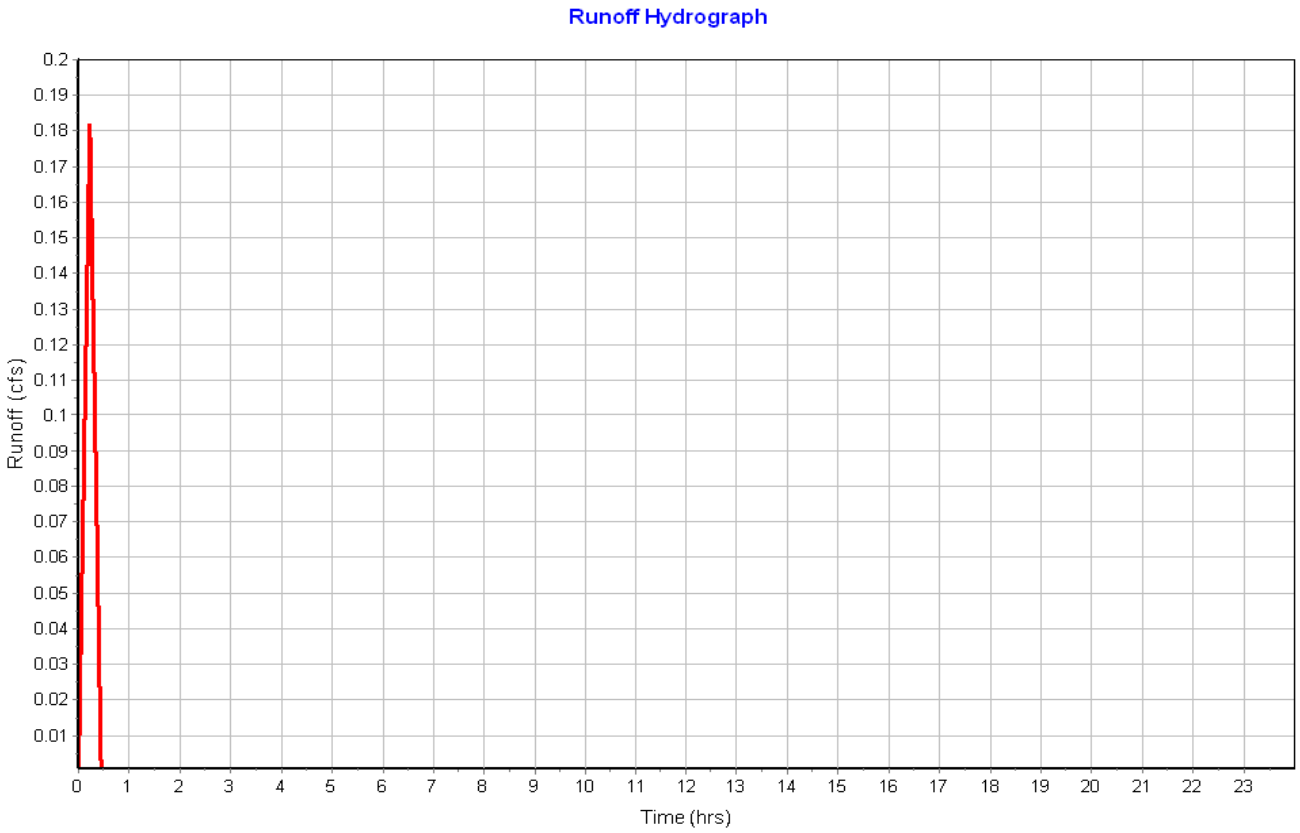
Total TOC (min) 13.38

Subbasin Runoff Results

Total Rainfall (in) 1.44
Total Runoff (in) 0.75
Peak Runoff (cfs) 0.18
Rainfall Intensity 6.467
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:13:23

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.25



Subbasin : {STORM PHASE 2}.27

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	133	0.00	0.00
Slope (%) :	1.7	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.36	0.00	0.00
Computed Flow Time (min) :	1.63	0.00	0.00

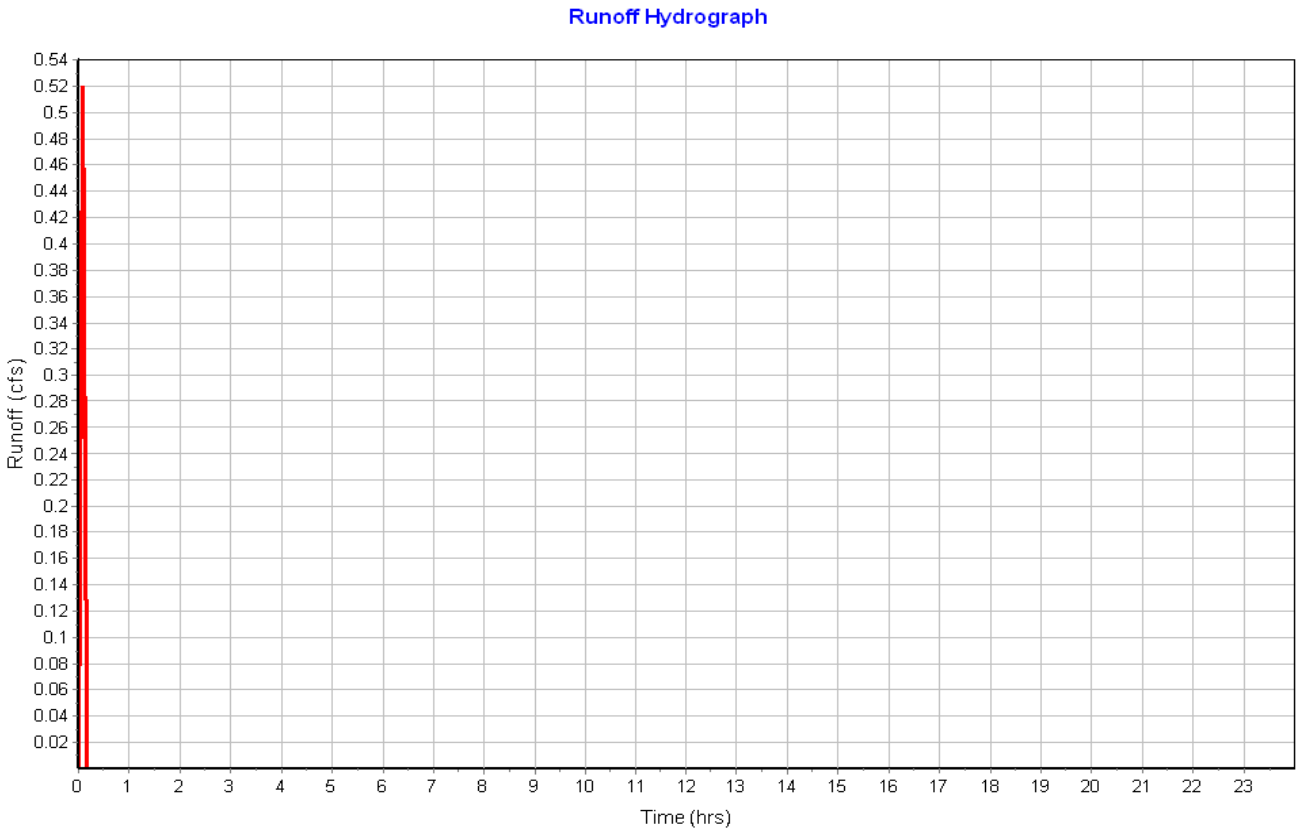
Total TOC (min) 1.63

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.52
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:38

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.27



Subbasin : {STORM PHASE 2}.28

Input Data

Area (ac) 0.19
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.19	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.19		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	351	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.76	0.00	0.00
Computed Flow Time (min) :	3.33	0.00	0.00

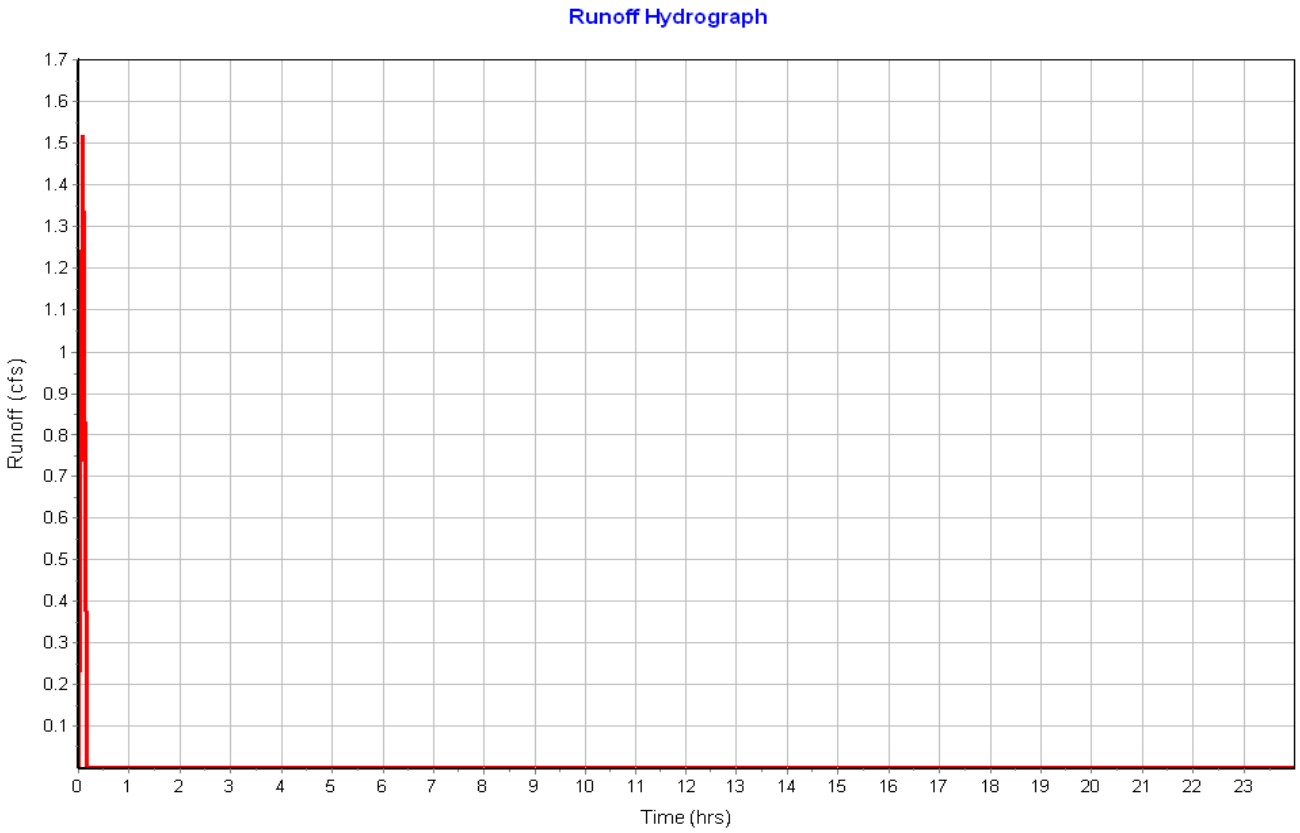
Total TOC (min) 3.33

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.52
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:20

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.28



Subbasin : {STORM PHASE 2}.29

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.11	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.11		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	130	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	14.17	0.00	0.00

Total TOC (min) 14.17

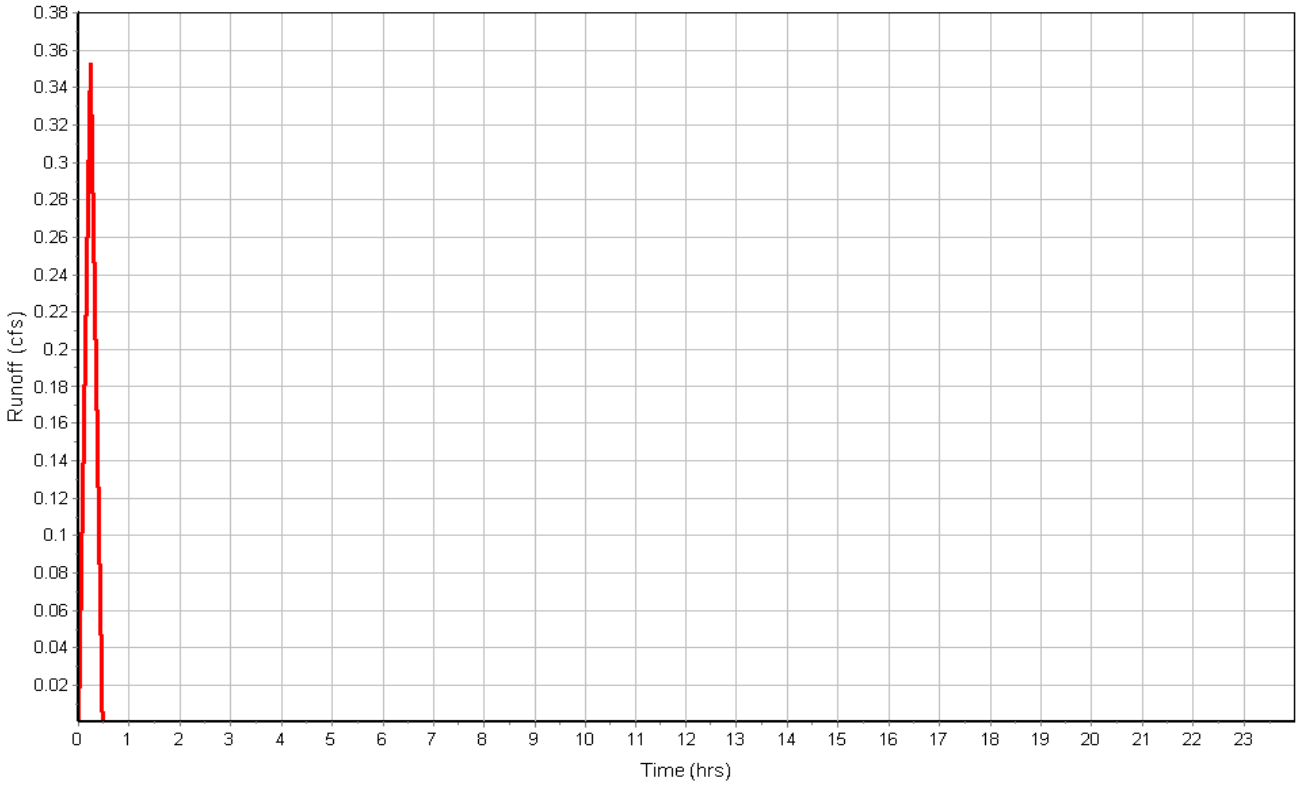
Subbasin Runoff Results

Total Rainfall (in) 1.50
Total Runoff (in) 0.78
Peak Runoff (cfs) 0.35
Rainfall Intensity 6.332
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:14:10

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.29

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.3

Input Data

Area (ac) 0.20
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.20	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.20		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	393	0.00	0.00
Slope (%) :	1.9	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.80	0.00	0.00
Computed Flow Time (min) :	2.34	0.00	0.00

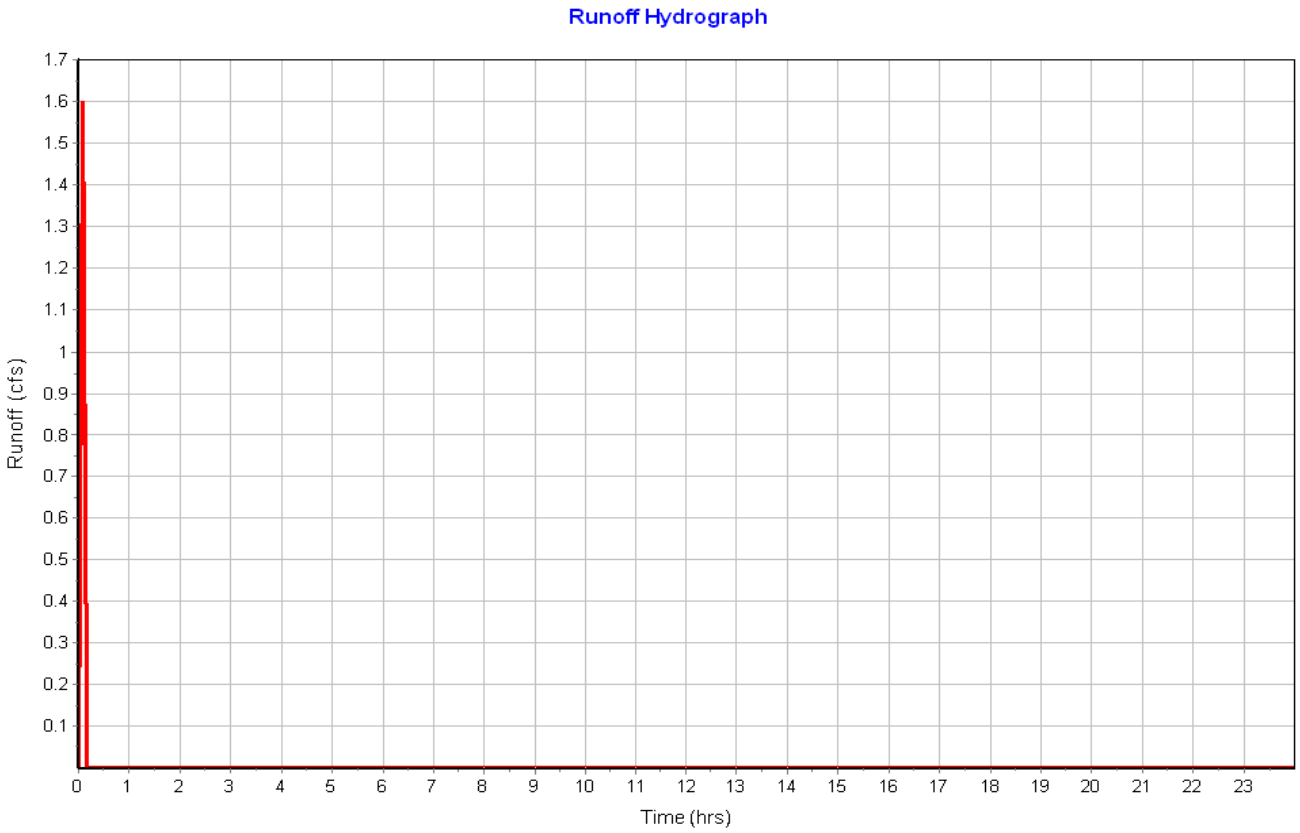
Total TOC (min) 2.59

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.60
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:35

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.3



Subbasin : {STORM PHASE 2}.30

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.13	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.13		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	171	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.49	0.00	0.00
Computed Flow Time (min) :	1.91	0.00	0.00

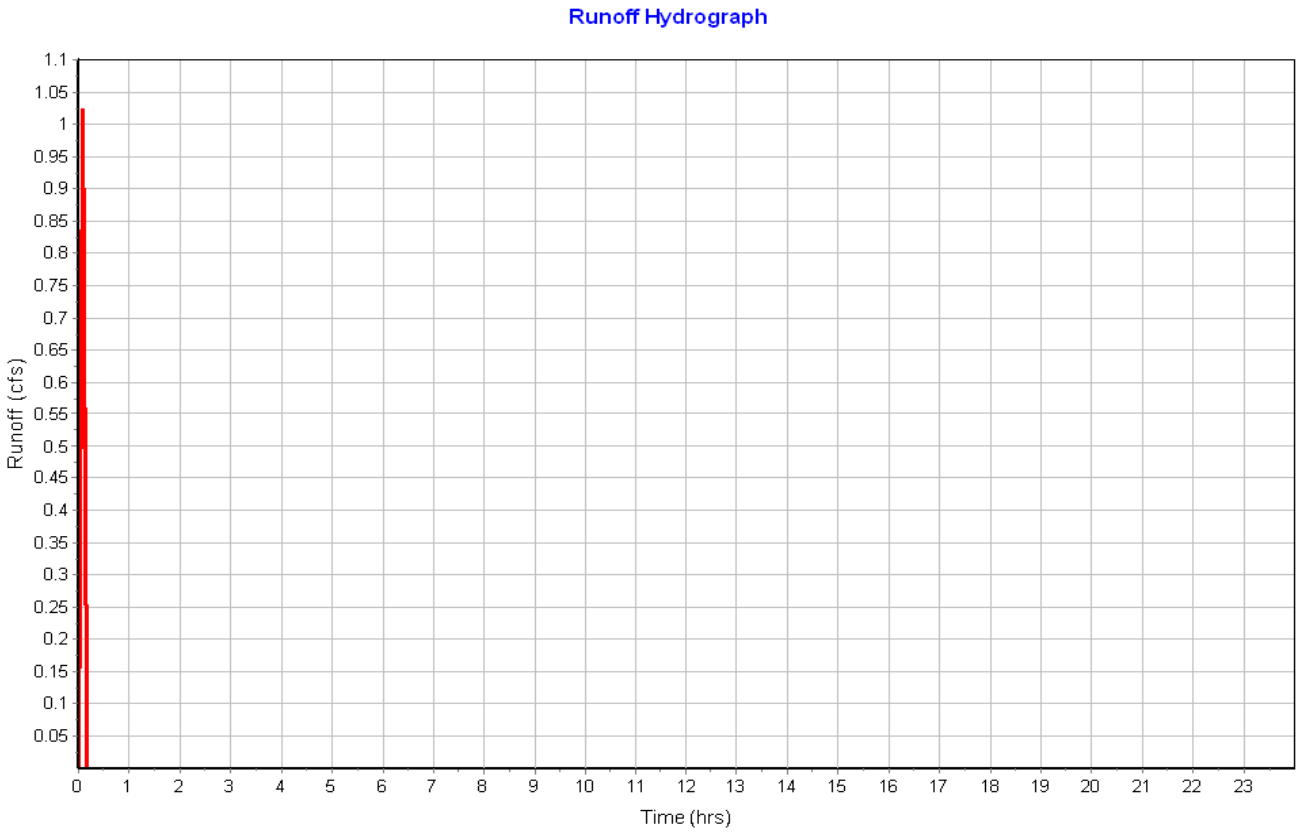
Total TOC (min) 1.91

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.02
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:55

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.30



Subbasin : {STORM PHASE 2}.31

Input Data

Area (ac) 0.39
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.39	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.39		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	252	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	24.07	0.00	0.00

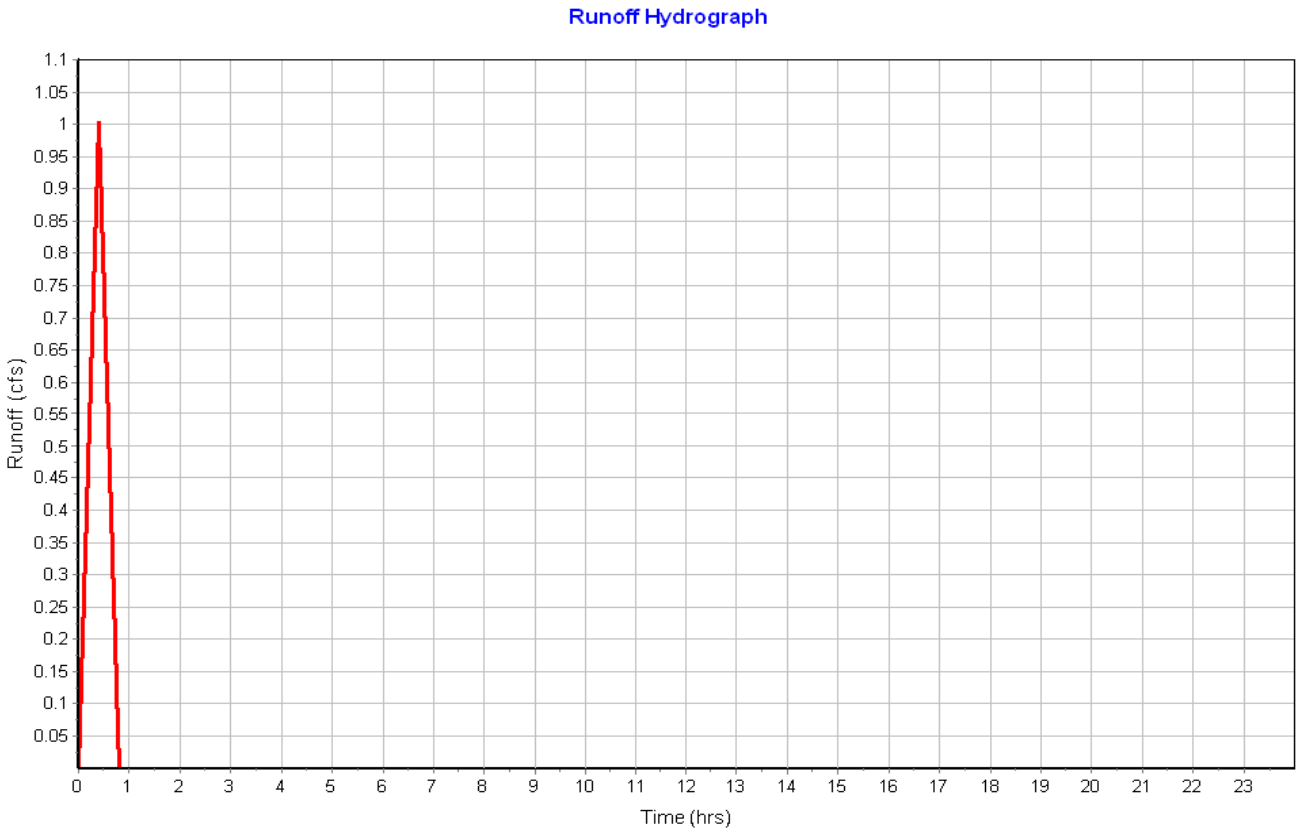
Total TOC (min) 24.07

Subbasin Runoff Results

Total Rainfall (in) 1.99
Total Runoff (in) 1.04
Peak Runoff (cfs) 1.00
Rainfall Intensity 4.982
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:24:04

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.31



Subbasin : {STORM PHASE 2}.35

Input Data

Area (ac) 0.97
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.97	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.97		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	405	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.19	0.00	0.00
Computed Flow Time (min) :	34.63	0.00	0.00

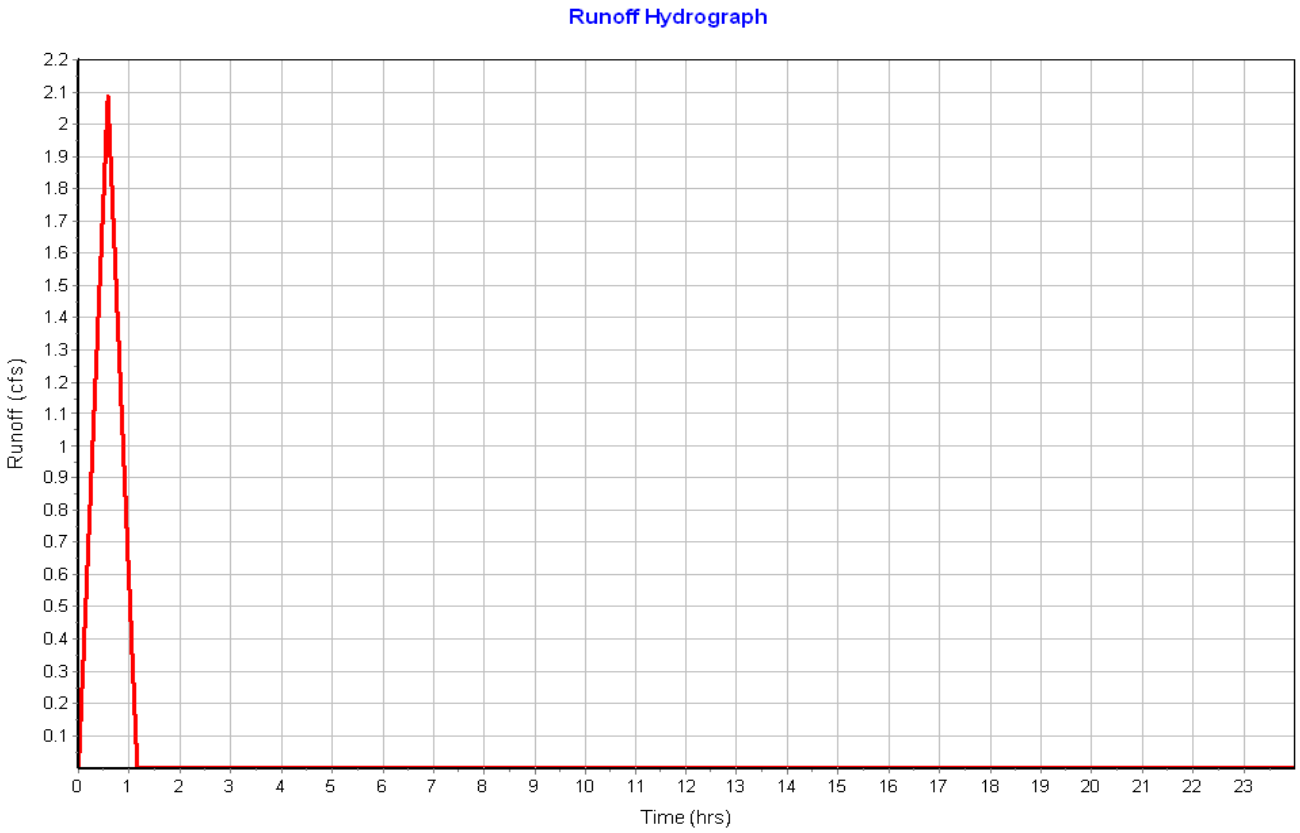
Total TOC (min) 34.63

Subbasin Runoff Results

Total Rainfall (in) 2.39
Total Runoff (in) 1.24
Peak Runoff (cfs) 2.09
Rainfall Intensity 4.138
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:34:38

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.35



Subbasin : {STORM PHASE 2}.36

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.34	0.00	0.00
Computed Flow Time (min) :	1.24	0.00	0.00

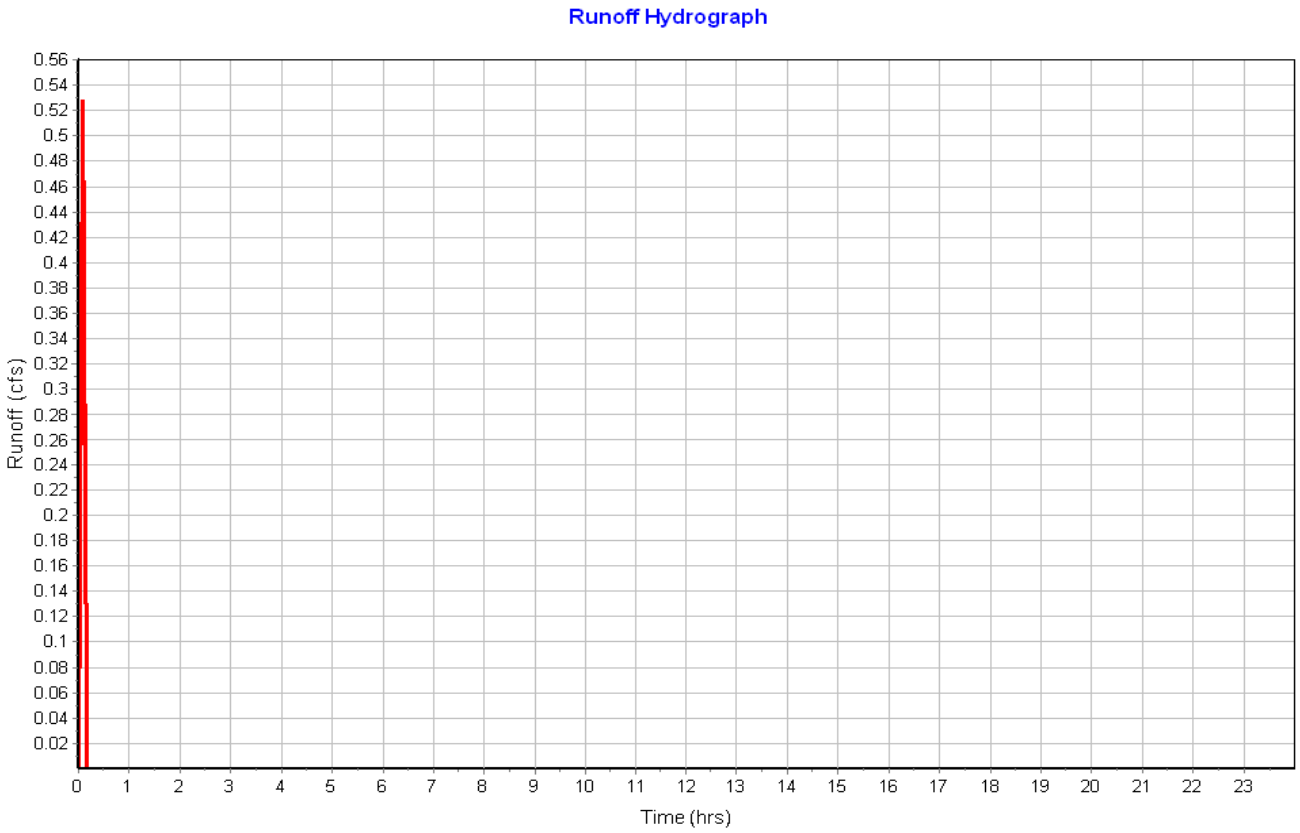
Total TOC (min) 1.24

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.53
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:14

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.36



Subbasin : {STORM PHASE 2}.37

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.09	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.09		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	185	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.69	0.00	0.00
Computed Flow Time (min) :	1.82	0.00	0.00

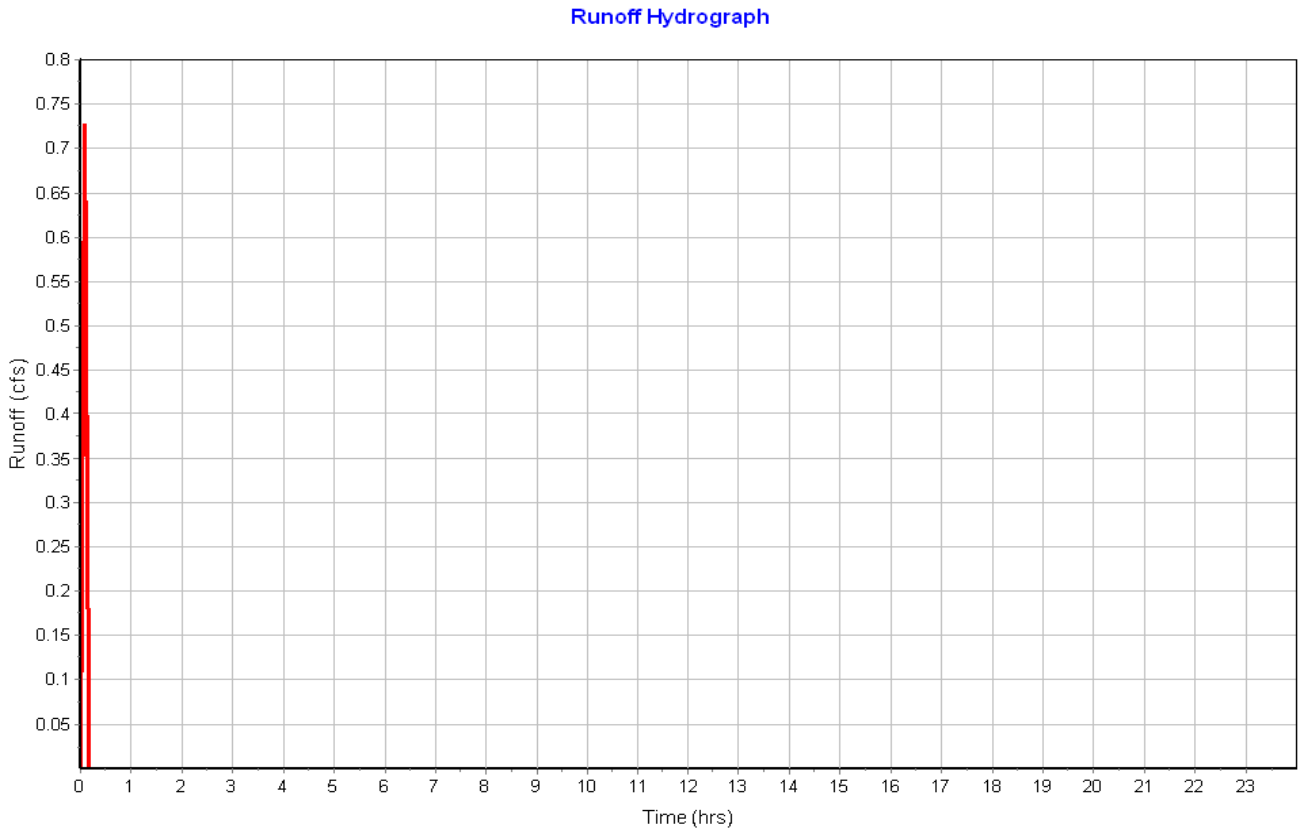
Total TOC (min) 1.82

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.73
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:49

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.37



Subbasin : {STORM PHASE 2}.38

Input Data

Area (ac) 0.17
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.17	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.17		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	211	0.00	0.00
Slope (%) :	2.7	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	20.25	0.00	0.00

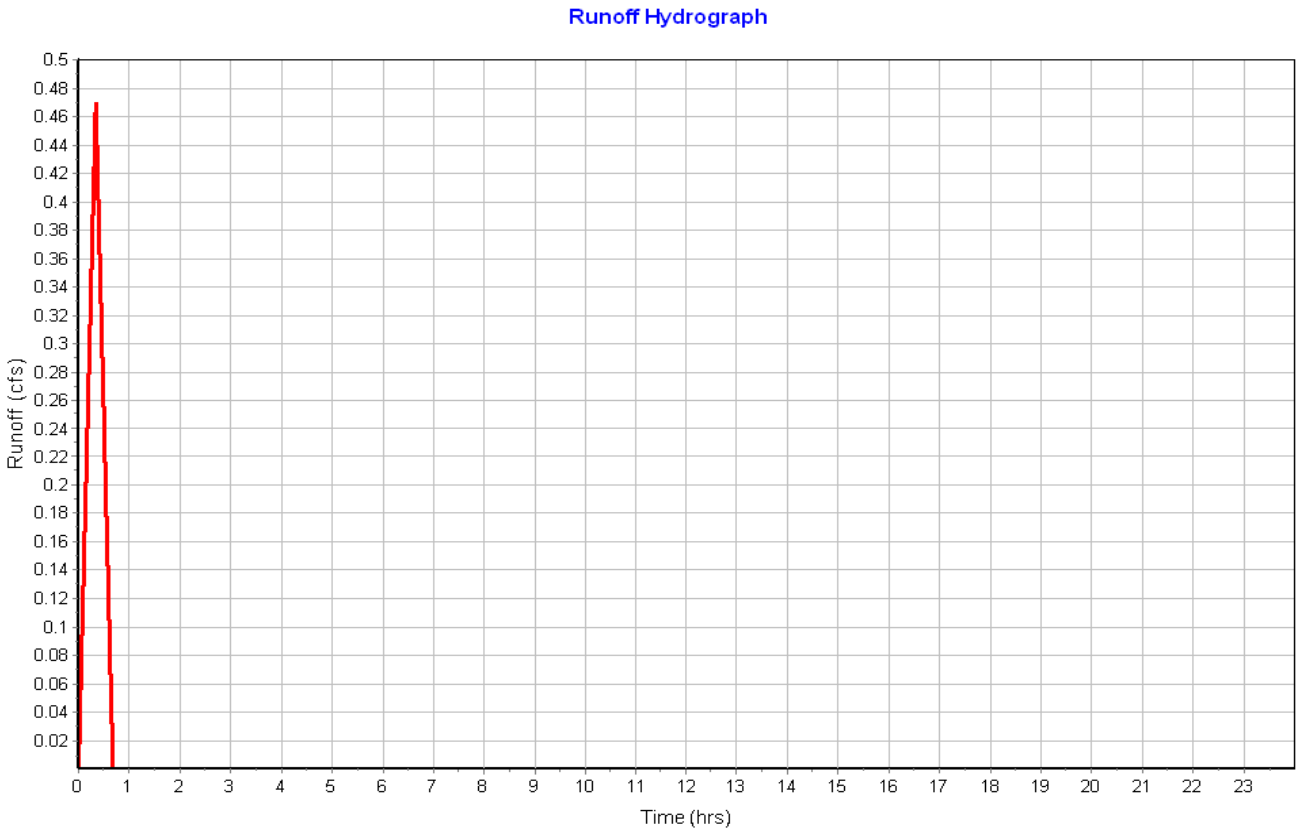
Total TOC (min) 20.25

Subbasin Runoff Results

Total Rainfall (in) 1.83
Total Runoff (in) 0.95
Peak Runoff (cfs) 0.47
Rainfall Intensity 5.397
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:20:15

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.38



Subbasin : {STORM PHASE 2}.39

Input Data

Area (ac) 0.02
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.02	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.02		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.04	0.00	0.00
Computed Flow Time (min) :	0.40	0.00	0.00

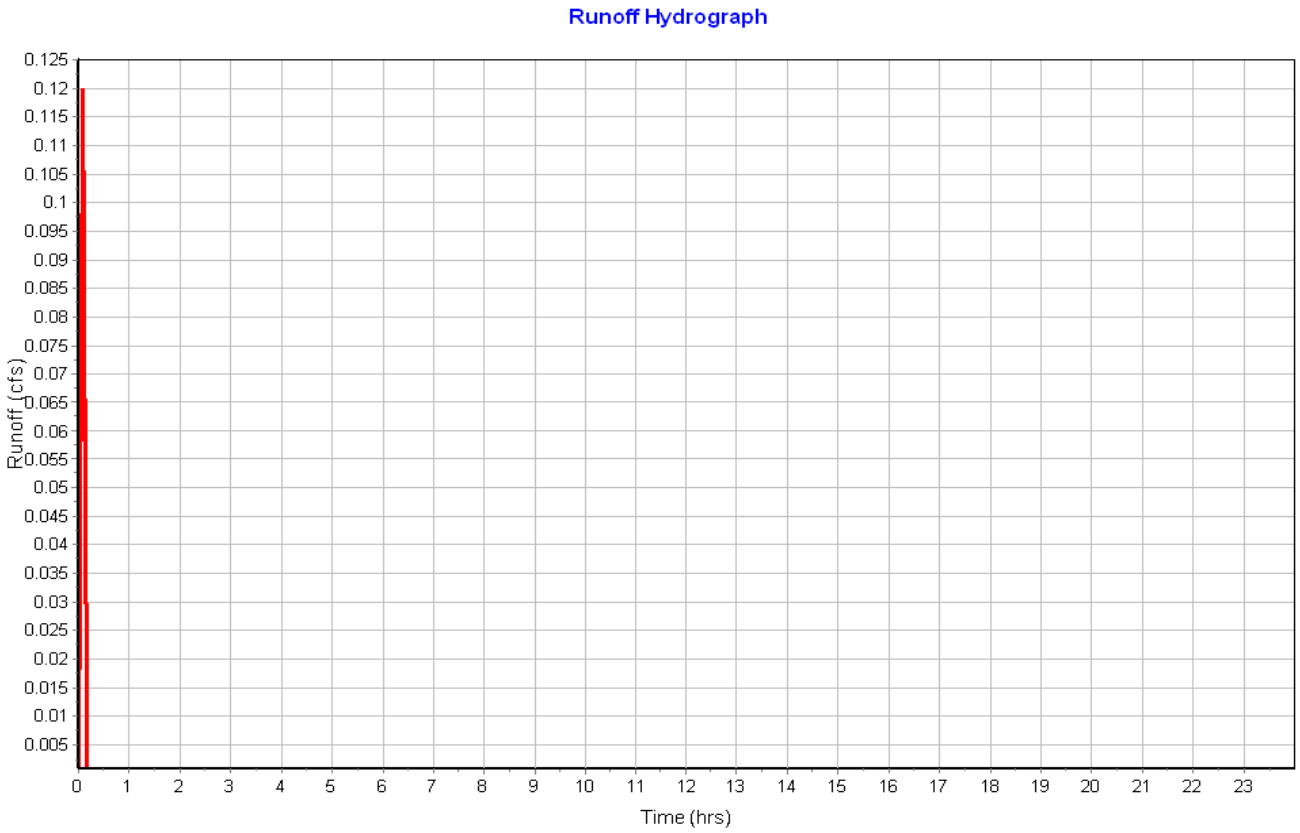
Total TOC (min) 0.40

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.12
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:00:24

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.39



Subbasin : {STORM PHASE 2}.4

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	195	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0.00	0.00
Computed Flow Time (min) :	1.13	0.00	0.00

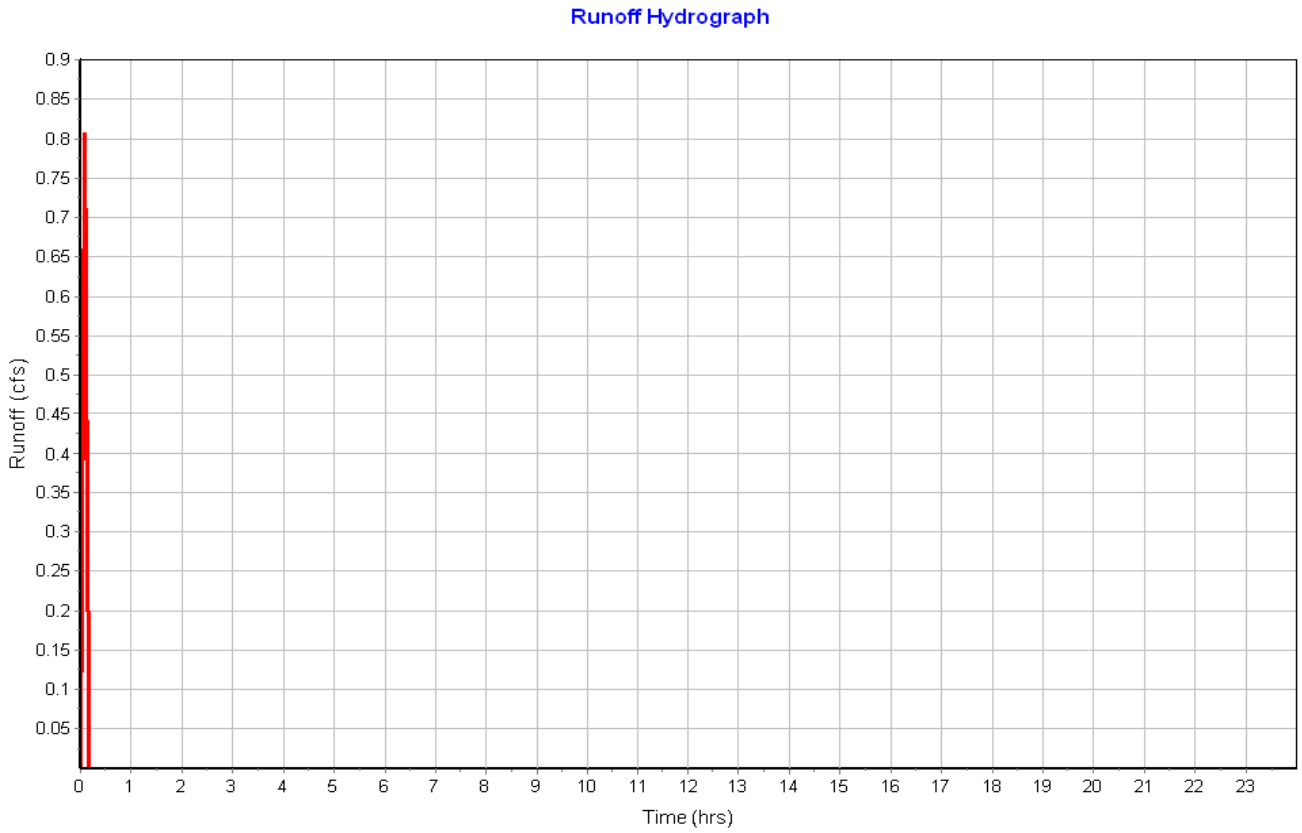
Total TOC (min) 1.39

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.81
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:23

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.4



Subbasin : {STORM PHASE 2}.40

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	1.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.36	0.00	0.00
Computed Flow Time (min) :	2.45	0.00	0.00

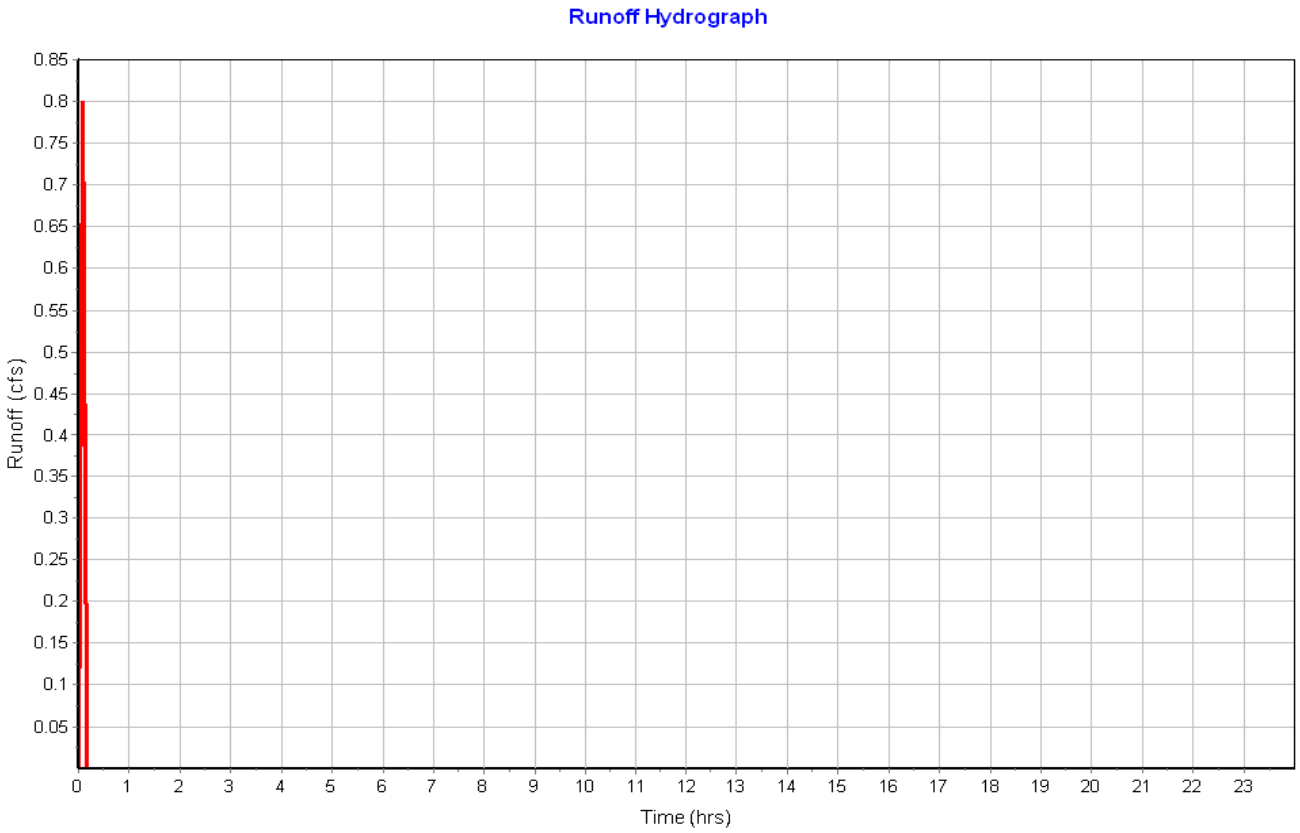
Total TOC (min) 2.45

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.80
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:27

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.40



Subbasin : {STORM PHASE 2}.41

Input Data

Area (ac) 0.20
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.20	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.20		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	394	0.00	0.00
Slope (%) :	2.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.90	0.00	0.00
Computed Flow Time (min) :	3.45	0.00	0.00

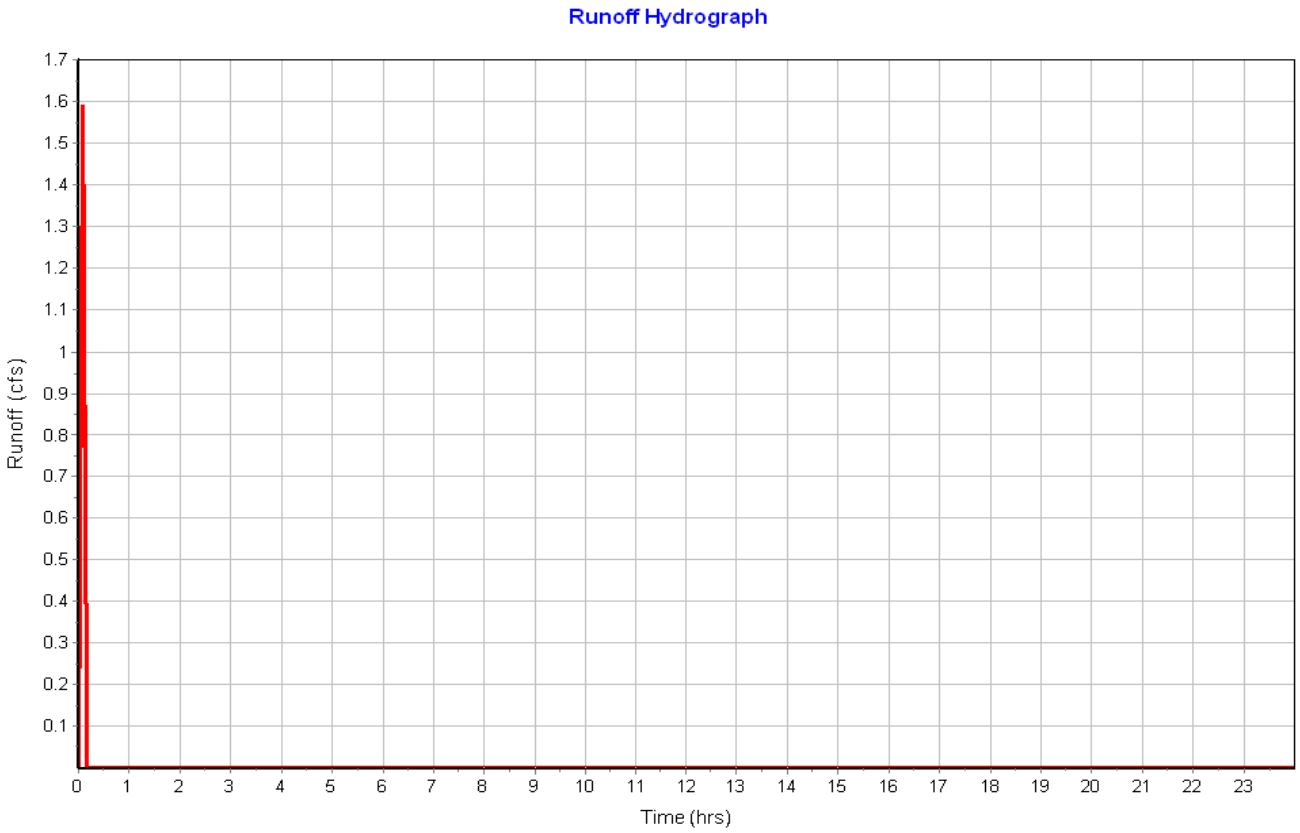
Total TOC (min) 3.45

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.59
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:27

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.41



Subbasin : {STORM PHASE 2}.45

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	222	0.00	0.00
Slope (%) :	2.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.83	0.00	0.00
Computed Flow Time (min) :	2.02	0.00	0.00

Total TOC (min) 2.02

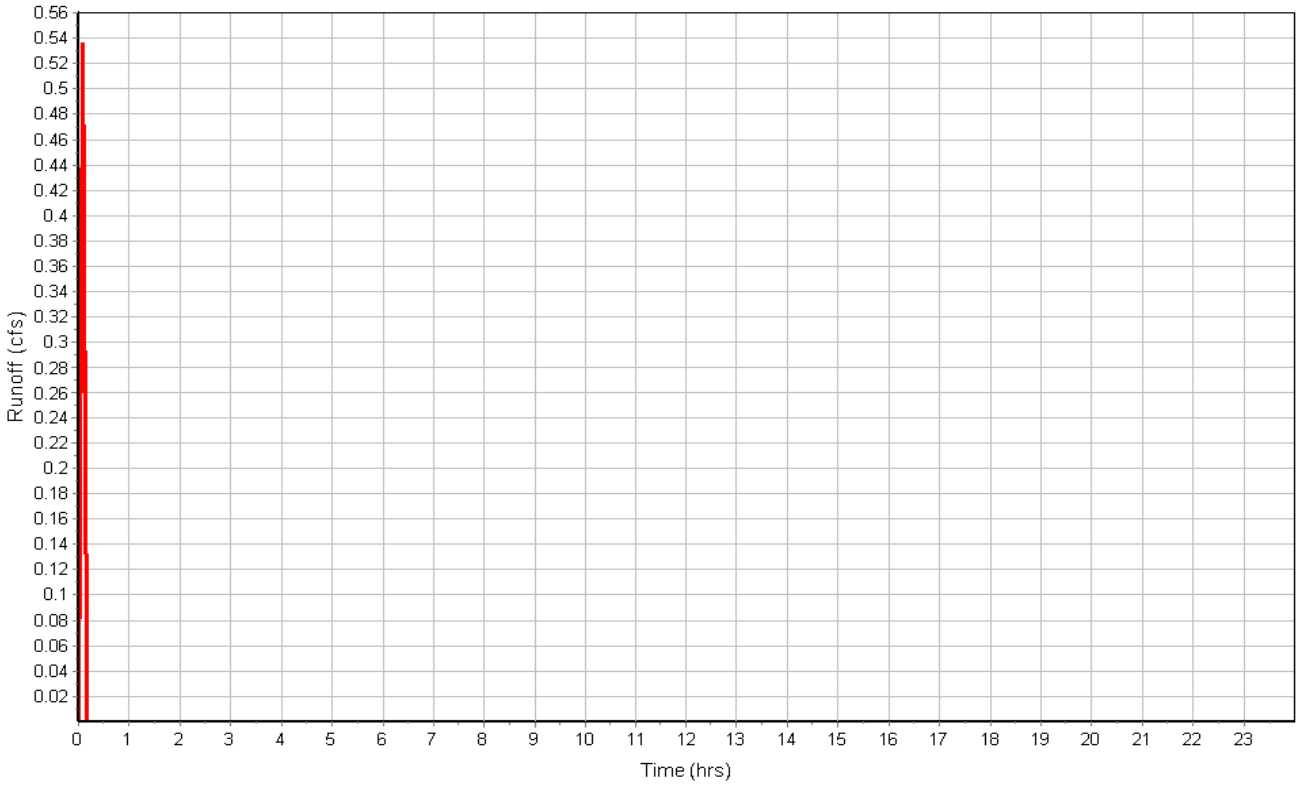
Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.54
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:01

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.45

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.48

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.09	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.09		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	151	0.00	0.00
Slope (%) :	2.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.70	0.00	0.00
Computed Flow Time (min) :	1.48	0.00	0.00

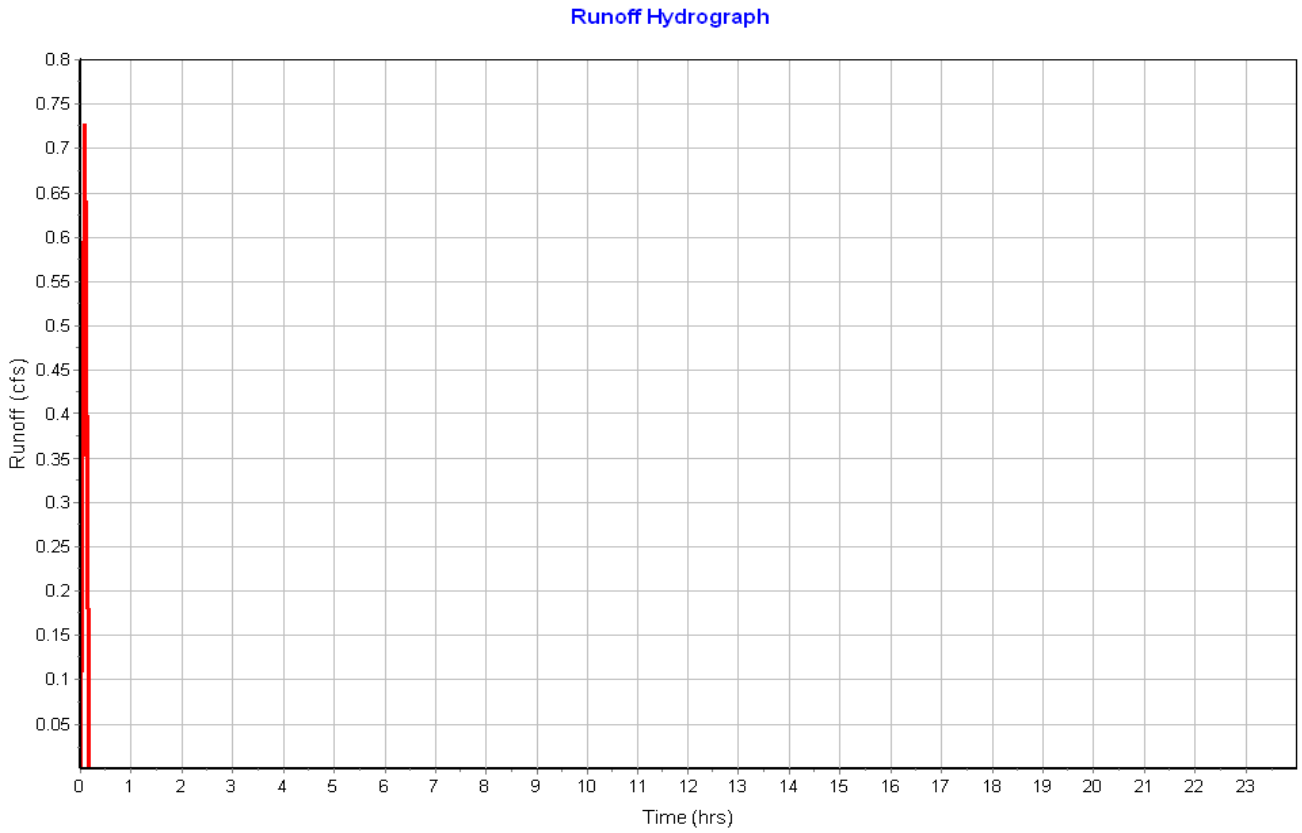
Total TOC (min) 1.48

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.73
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:29

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.48



Subbasin : {STORM PHASE 2}.5

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.13	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.13		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	213	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	23.00	0.00	0.00

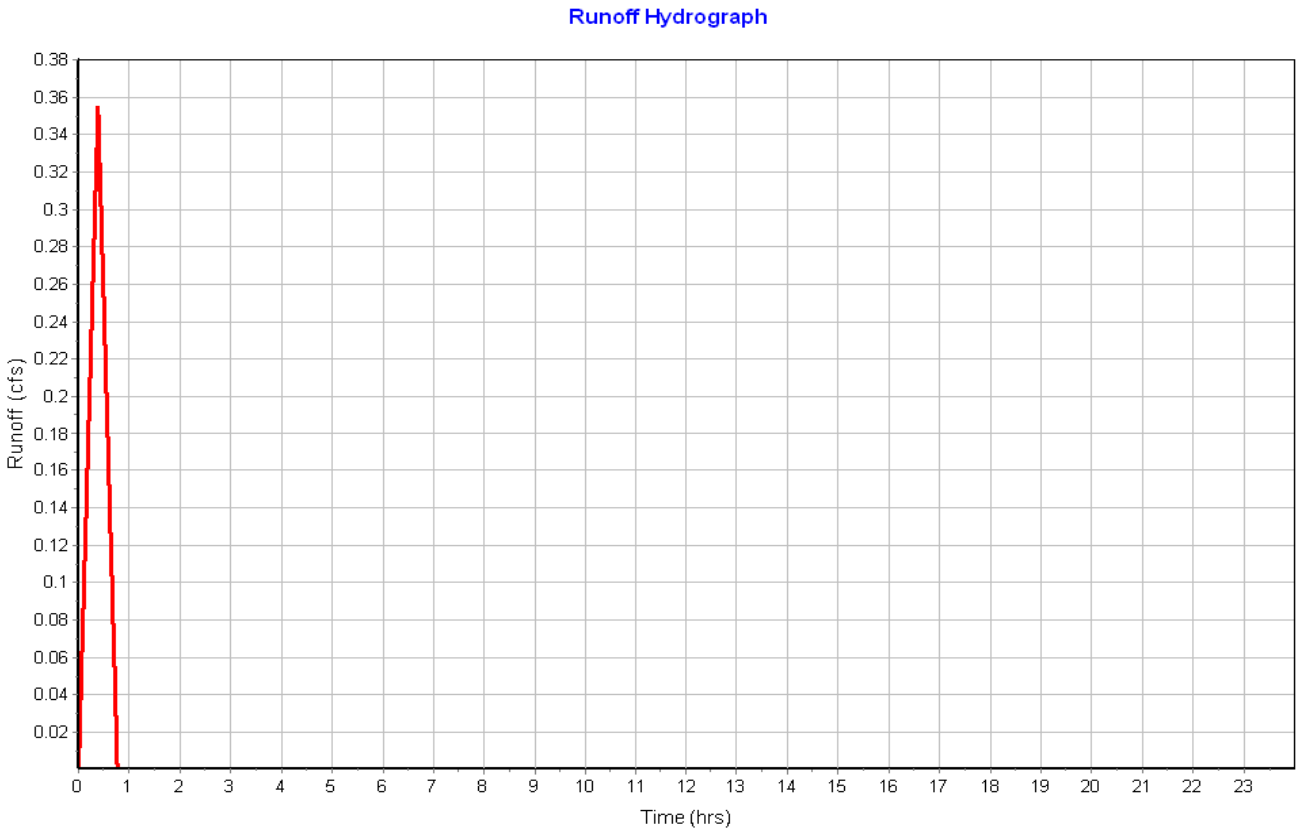
Total TOC (min) 23.00

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 1.01
Peak Runoff (cfs) 0.36
Rainfall Intensity 5.088
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:23:00

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.5



Subbasin : {STORM PHASE 2}.6

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.13	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.13		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	240	0.00	0.00
Slope (%) :	2.9	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	3.46	0.00	0.00
Computed Flow Time (min) :	1.16	0.00	0.00

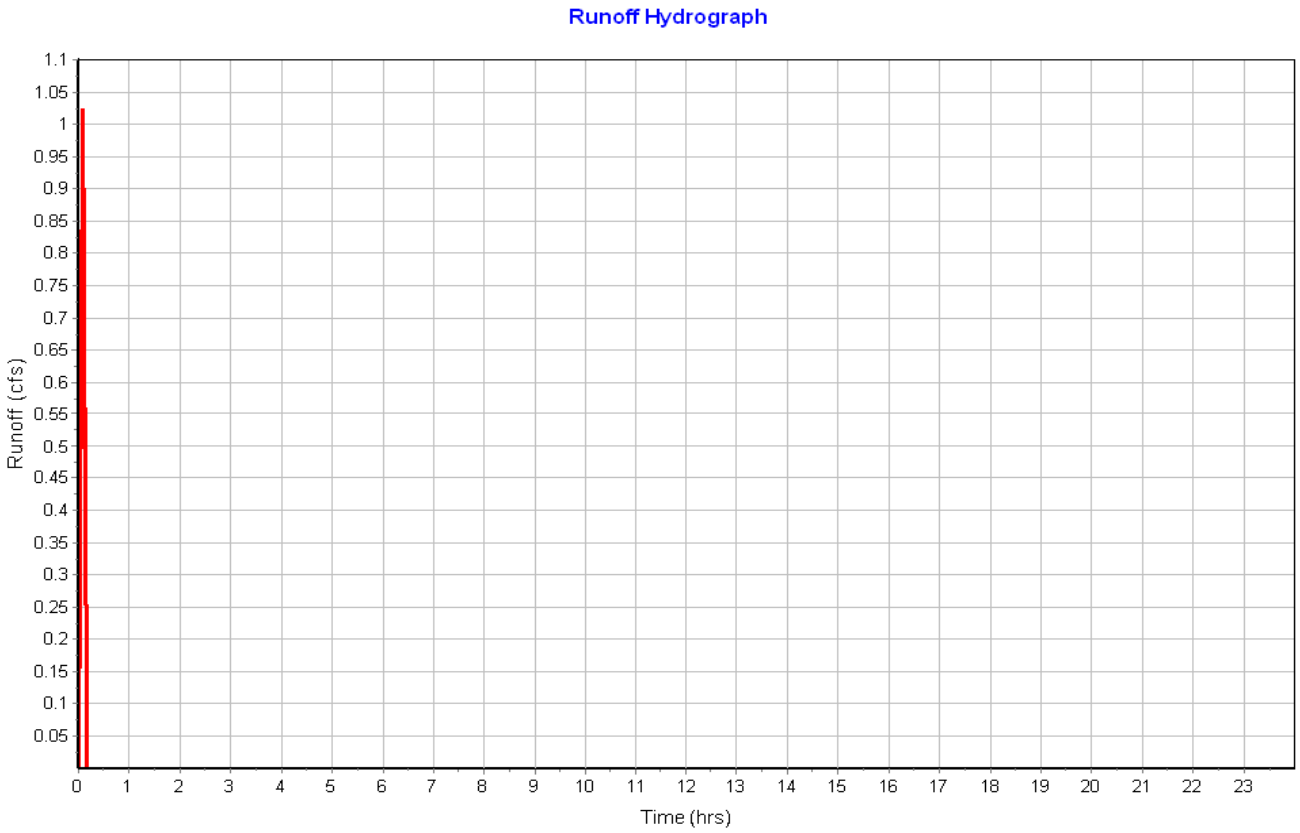
Total TOC (min) 1.41

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.02
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:25

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.6



Subbasin : {STORM PHASE 2}.8

Input Data

Area (ac) 0.36
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.36	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.36		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	233	0.00	0.00
Slope (%) :	1.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.55	0.00	0.00
Computed Flow Time (min) :	2.50	0.00	0.00

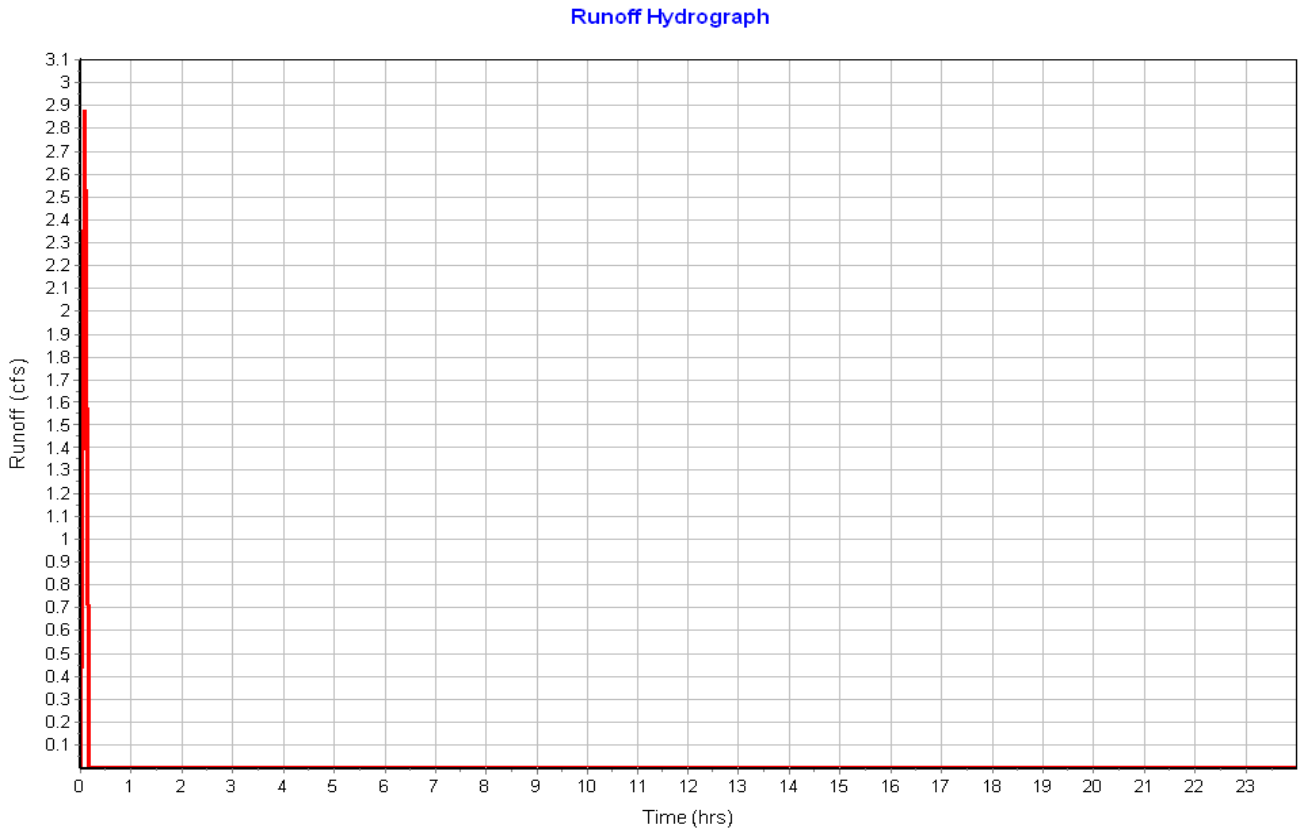
Total TOC (min) 2.50

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 2.87
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:30

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.8



Subbasin : {STORM PHASE 2}.9

Input Data

Area (ac) 0.80
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.80	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.80		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	366	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.19	0.00	0.00
Computed Flow Time (min) :	31.93	0.00	0.00

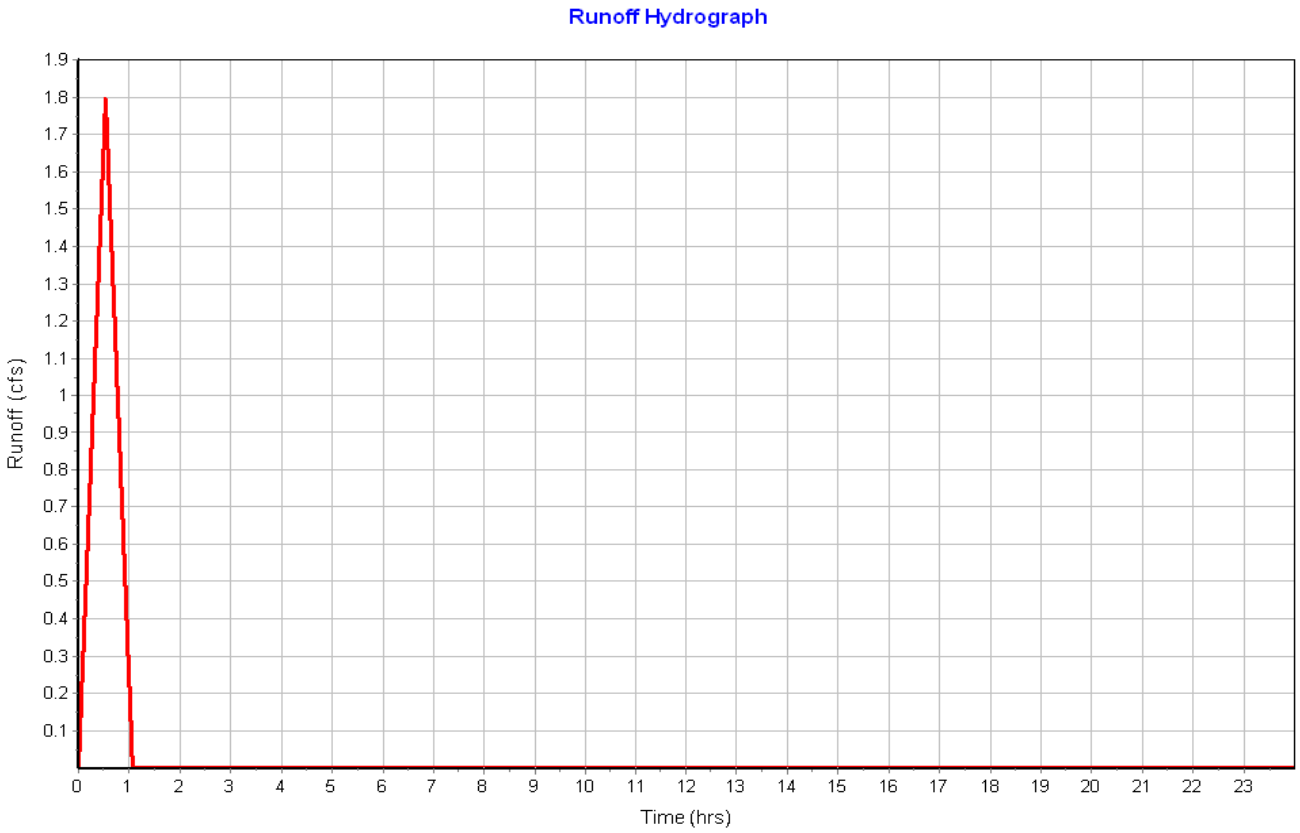
Total TOC (min) 31.93

Subbasin Runoff Results

Total Rainfall (in) 2.31
Total Runoff (in) 1.20
Peak Runoff (cfs) 1.80
Rainfall Intensity 4.339
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:56

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.9



Subbasin : 49

Input Data

Area (ac) 23.80
Weighted Runoff Coefficient 0.5000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Meadow, 25 years or greater	23.80	D (6%+)	0.50
Composite Area & Weighted Runoff Coeff.	23.80		0.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	1132	0.00	0.00
Slope (%) :	3.1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	110.52	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	720	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	13.79	0.00	0.00

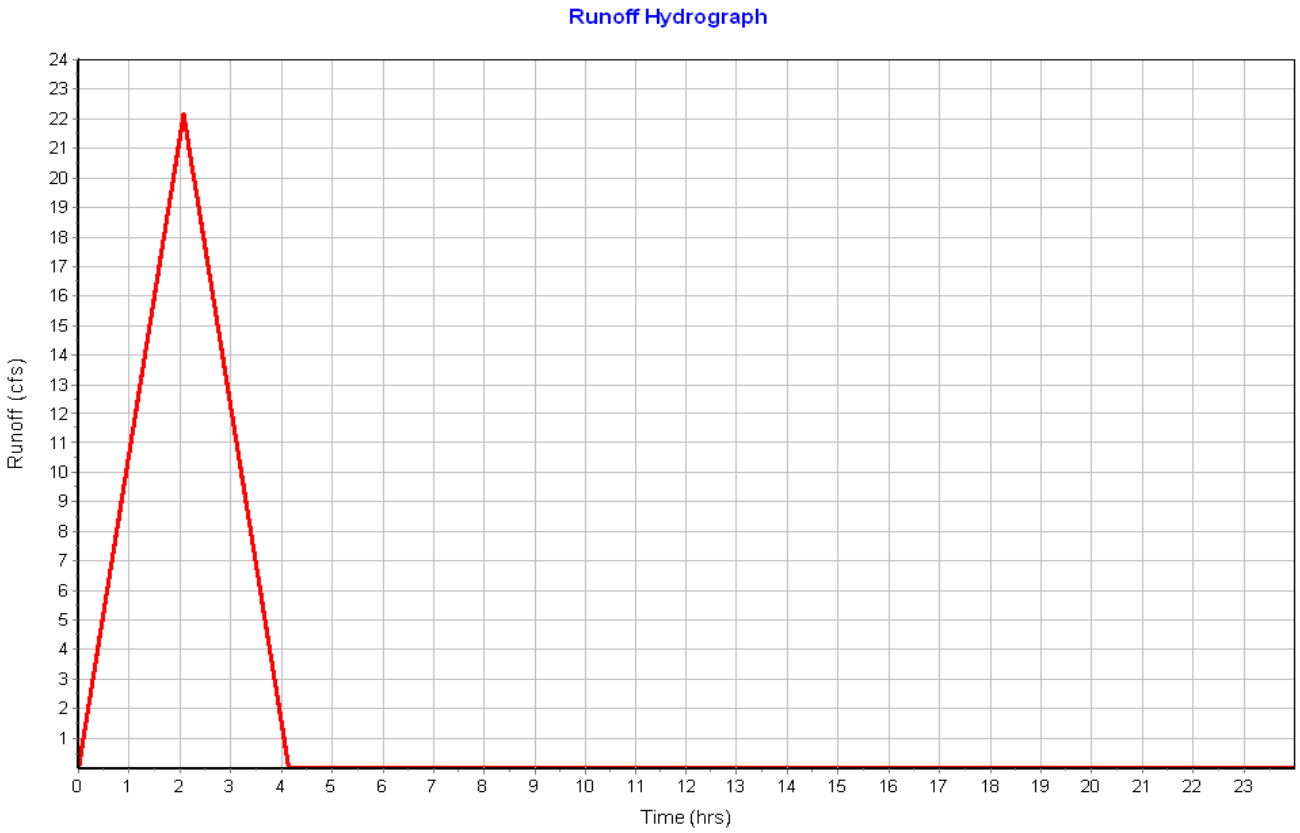
Total TOC (min) 124.32

Subbasin Runoff Results

Total Rainfall (in) 3.86
Total Runoff (in) 1.93
Peak Runoff (cfs) 22.15
Rainfall Intensity 1.861
Weighted Runoff Coefficient 0.5000
Time of Concentration (days hh:mm:ss) 0 02:04:19

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : 49



Subbasin : 50

Input Data

Area (ac) 14.60
Weighted Runoff Coefficient 0.5000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Meadow, 25 years or greater	14.60	D (6%+)	0.50
Composite Area & Weighted Runoff Coeff.	14.60		0.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	525	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	65.14	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	290	0.00	0.00
Slope (%) :	1	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.50	0.00	0.00
Computed Flow Time (min) :	9.67	0.00	0.00

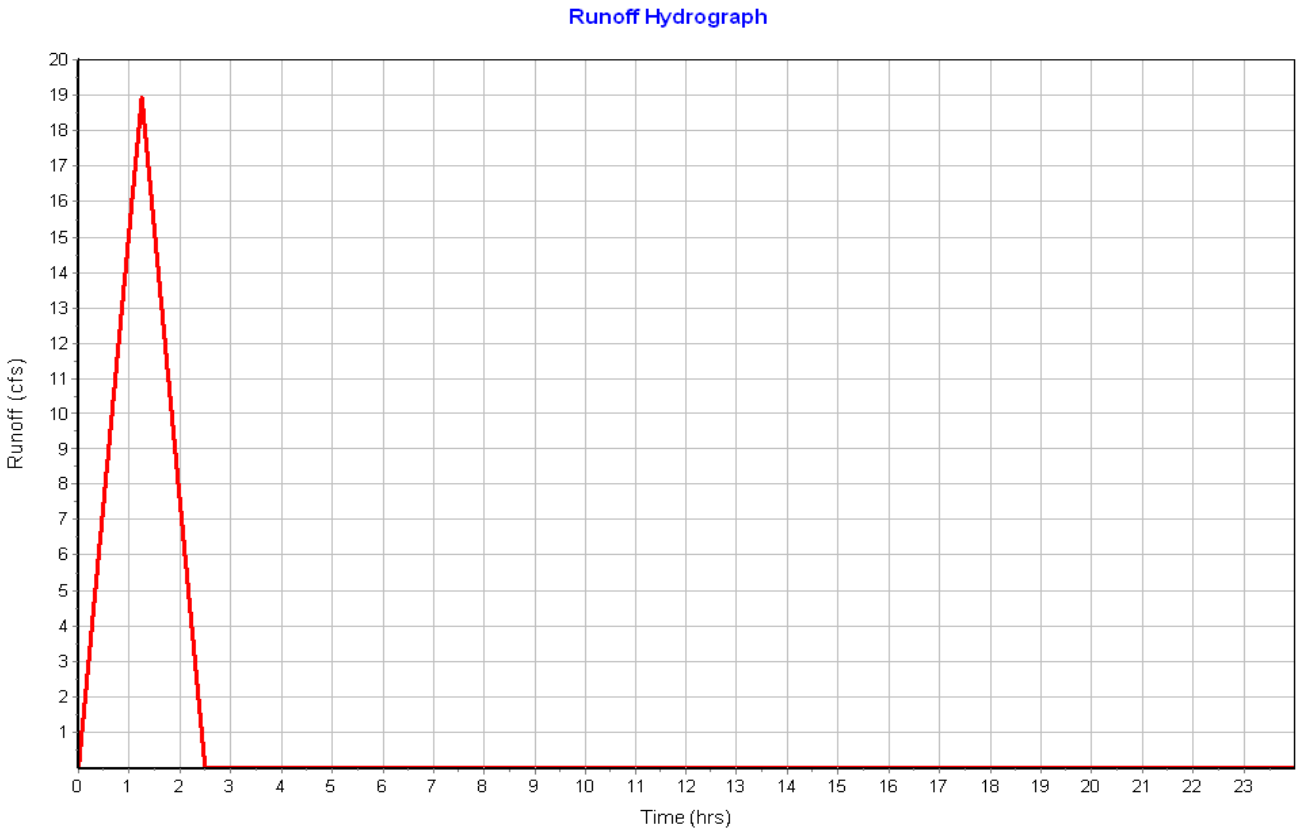
Total TOC (min) 74.81

Subbasin Runoff Results

Total Rainfall (in) 3.24
Total Runoff (in) 1.62
Peak Runoff (cfs) 18.94
Rainfall Intensity 2.594
Weighted Runoff Coefficient 0.5000
Time of Concentration (days hh:mm:ss) 0 01:14:49

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : 50



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	{STORM BJ2-1}.FES - L1	447.00	450.00	3.00	447.00	0.00	450.00	0.00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	443.25	445.00	1.75	443.25	0.00	445.00	0.00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	443.00	445.00	2.00	443.00	0.00	445.00	0.00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	451.28	455.85	4.57	451.28	0.00	455.85	0.00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	445.40	449.19	3.79	445.40	0.00	449.19	0.00	0.00	0.00
6	FES-F1	448.75	457.43	8.68	448.75	0.00	457.43	0.00	0.00	0.00
7	FES-P1_KBBARNES	433.25	435.00	1.75	433.25	0.00	435.00	0.00	0.00	0.00
8	FES-P2_KBBARNES	433.00	435.00	2.00	433.00	0.00	435.00	0.00	0.00	0.00
9	StartNullStruct41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.FES - L1	2.08	2.08	447.42	0.42	0.00	2.58	447.01	0.01	0 00:34	0 00:00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	21.98	0.00	444.47	1.22	0.00	0.78	443.40	0.15	0 02:06	0 00:00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	21.98	0.00	444.37	1.37	0.00	0.65	443.18	0.18	0 02:06	0 00:00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	5.44	0.00	451.96	0.68	0.00	3.89	451.40	0.12	0 00:06	0 00:00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	8.97	0.00	446.38	0.98	0.00	2.81	445.53	0.13	0 00:06	0 00:00	0.00	0.00
6	FES-F1	22.15	22.15	449.97	1.22	0.00	7.45	448.90	0.15	0 02:04	0 00:00	0.00	0.00
7	FES-P1_KBBARNES	30.41	18.94	434.61	1.36	0.00	0.64	433.44	0.19	0 02:12	0 00:00	0.00	0.00
8	FES-P2_KBBARNES	30.40	0.00	434.28	1.28	0.00	0.72	433.17	0.17	0 01:15	0 00:00	0.00	0.00
9	StartNullStruct41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00:00	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	BYPASS_K1	395.48	453.99	4.39	444.81	4.01	9.18	2.3200	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	Yes
2	BYPASS_N1	29.94	444.81	4.01	443.80	3.80	1.01	3.3700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
3	DITCH-01	424.00	448.75	0.00	443.02	-0.23	5.73	1.3500	Trapezoidal	2.000	21.000	0.0800	0.5000	0.5000	0.0000	0.00	No
4	DITCH-02	970.00	443.00	0.00	433.25	0.00	9.75	1.0100	Trapezoidal	2.000	17.000	0.0800	0.5000	0.5000	0.0000	0.00	No
5	DITCH-03	262.00	433.00	0.00	431.98	0.00	1.02	0.3900	Triangular	2.000	100.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	GUTTER_F2	250.05	461.10	5.10	453.34	4.00	7.76	3.1000	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
7	GUTTER_F3	199.54	465.23	5.00	461.10	5.10	4.13	2.0700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
8	GUTTER_G1	245.65	460.52	3.92	453.34	4.00	7.18	2.9200	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
9	GUTTER_H2	191.92	462.65	5.00	459.83	4.03	2.82	1.4700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
10	GUTTER_H7	180.42	450.00	5.10	445.14	4.89	4.86	2.6900	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
11	GUTTER_H8	31.05	445.14	4.89	443.30	3.80	1.84	5.9300	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
12	GUTTER_I1	191.92	462.65	4.40	461.09	4.69	1.56	0.8100	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
13	GUTTER-H3	260.86	459.83	4.03	454.37	5.37	5.46	2.0900	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
14	GUTTER-H5	155.79	454.37	5.37	451.66	5.00	2.71	1.7400	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
15	GUTTER-J1	224.65	461.09	4.69	457.58	5.83	3.51	1.5600	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	BYPASS_K1	0.00	0 00:07	20.05	0.00	3.15	2.09	0.02	0.03	0.00		
2	BYPASS_N1	0.07	0 00:05	18.75	0.00	4.09	0.12	0.06	0.12	0.00		
3	DITCH-01	21.98	0 02:06	62.45	0.35	1.83	3.86	1.22	0.61	0.00		
4	DITCH-02	21.71	0 02:12	47.45	0.46	1.77	9.13	1.36	0.68	0.00		
5	DITCH-03	30.23	0 01:17	289.59	0.10	1.65	2.65	0.86	0.43	0.00		
6	GUTTER_F2	0.15	0 00:06	18.90	0.01	2.82	1.48	0.08	0.16	0.00		
7	GUTTER_F3	0.04	0 00:05	21.08	0.00	2.30	1.45	0.05	0.09	0.00		
8	GUTTER_G1	0.15	0 00:06	19.52	0.01	5.89	0.70	0.08	0.15	0.00		
9	GUTTER_H2	0.17	0 00:06	12.23	0.01	4.28	0.75	0.10	0.19	0.00		
10	GUTTER_H7	0.00	0 00:00	20.34	0.00	0.00		0.00	0.00	0.00		
11	GUTTER_H8	0.01	0 00:05	25.22	0.00	1.26	0.41	0.02	0.04	0.00		
12	GUTTER_I1	0.02	0 00:30	14.64	0.00	3.28	0.98	0.04	0.08	0.00		
13	GUTTER-H3	0.02	0 00:06	19.15	0.00	3.97	1.10	0.03	0.06	0.00		
14	GUTTER-H5	0.17	0 00:05	18.59	0.01	4.74	0.55	0.08	0.17	0.00		
15	GUTTER-J1	0.21	0 00:38	16.02	0.01	2.96	1.26	0.10	0.20	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)
1	{STORM BJ2-1}.PIPE - H7	180.51	444.90	0.00	440.35	0.10	4.55	2.5200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
2	{STORM BJ2-1}.PIPE - H8	31.04	440.25	0.00	439.50	0.00	0.75	2.4200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
3	{STORM BJ2-1}.PIPE - L1	84.01	447.00	0.00	445.50	0.10	1.50	1.7900	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00
4	{STORM BJ2-1}.PIPE - M1	48.34	446.66	0.00	445.50	0.10	1.16	2.4000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
5	{STORM BJ2-1}.PIPE - N1	32.00	440.80	0.00	440.35	0.10	0.45	1.4100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
6	{STORM BJ2-1}.PIPE F1	99.06	449.34	0.00	448.75	0.00	0.59	0.6000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
7	{STORM BJ2-1}.PIPE F2	250.16	456.00	0.00	449.44	0.10	6.56	2.6200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
8	{STORM BJ2-1}.PIPE G1	32.00	456.60	0.00	456.10	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
9	{STORM BJ2-1}.PIPE H5	183.29	449.00	0.00	445.50	0.10	3.50	1.9100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
10	{STORM BJ2-1}.PIPE -H6	31.79	445.40	0.00	445.00	0.10	0.40	1.2600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
11	{STORM BJ2-1}.PIPE_F3	199.59	460.23	0.00	456.10	0.10	4.13	2.0700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
12	{STORM BJ2-1}.PIPE-H1	32.00	458.25	0.00	457.75	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
13	{STORM BJ2-1}.PIPE-H2	191.94	457.65	0.00	455.90	0.10	1.75	0.9100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
14	{STORM BJ2-1}.PIPE-H3	260.88	455.80	0.00	451.38	0.10	4.42	1.6900	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
15	{STORM BJ2-1}.PIPE-H4	96.77	451.28	0.00	449.10	0.10	2.18	2.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
16	{STORM BJ2-1}.PIPE-I1	32.00	456.40	0.00	455.90	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
17	{STORM BJ2-1}.PIPE-J1	48.34	451.75	0.00	451.38	0.10	0.37	0.7700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
18	{STORM BJ2-1}.PIPE-K1	32.00	449.60	0.00	449.10	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
19	{STORM BJ2-1}.PIPE-O1	29.87	443.15	-0.10	443.02	0.02	0.13	0.4400	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00
20	{STORM BJ2-1}.PIPE-P1	22.81	433.25	0.00	433.00	0.00	0.25	1.1000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Flap Gate	No. of Barrels
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	2
No	2

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	{STORM BJ2-1}.PIPE - H7	9.37	0 00:06	16.68	0.56	9.76	0.31	0.80	0.54	0.00		Calculated
2	{STORM BJ2-1}.PIPE - H8	11.29	0 00:06	16.33	0.69	9.97	0.05	0.92	0.61	0.00		Calculated
3	{STORM BJ2-1}.PIPE - L1	2.08	0 00:34	12.16	0.17	5.14	0.27	0.42	0.28	0.00		Calculated
4	{STORM BJ2-1}.PIPE - M1	1.33	0 00:05	16.27	0.08	5.56	0.14	0.29	0.19	0.00		Calculated
5	{STORM BJ2-1}.PIPE - N1	1.50	0 00:05	12.46	0.12	4.76	0.11	0.35	0.23	0.00		Calculated
6	{STORM BJ2-1}.PIPE F1	6.61	0 00:05	8.11	0.82	5.16	0.32	1.03	0.69	0.00		Calculated
7	{STORM BJ2-1}.PIPE F2	2.51	0 00:05	17.01	0.15	6.97	0.60	0.39	0.26	0.00		Calculated
8	{STORM BJ2-1}.PIPE G1	1.38	0 00:05	13.13	0.11	5.57	0.10	0.33	0.22	0.00		Calculated
9	{STORM BJ2-1}.PIPE H5	7.38	0 00:06	14.52	0.51	8.30	0.37	0.76	0.50	0.00		Calculated
10	{STORM BJ2-1}.PIPE -H6	8.97	0 00:06	11.78	0.76	7.34	0.07	0.98	0.65	0.00		Calculated
11	{STORM BJ2-1}.PIPE_F3	0.47	0 00:05	15.11	0.03	4.23	0.79	0.18	0.12	0.00		Calculated
12	{STORM BJ2-1}.PIPE-H1	1.00	0 00:29	13.13	0.08	4.39	0.12	0.28	0.19	0.00		Calculated
13	{STORM BJ2-1}.PIPE-H2	2.37	0 00:05	10.03	0.24	4.74	0.67	0.49	0.33	0.00		Calculated
14	{STORM BJ2-1}.PIPE-H3	4.34	0 00:06	13.67	0.32	6.96	0.62	0.58	0.39	0.00		Calculated
15	{STORM BJ2-1}.PIPE-H4	5.44	0 00:06	15.77	0.35	8.11	0.20	0.61	0.41	0.00		Calculated
16	{STORM BJ2-1}.PIPE-I1	1.46	0 00:37	13.13	0.11	4.90	0.11	0.34	0.23	0.00		Calculated
17	{STORM BJ2-1}.PIPE-J1	2.01	0 00:38	9.19	0.22	4.17	0.19	0.48	0.32	0.00		Calculated
18	{STORM BJ2-1}.PIPE-K1	0.79	0 00:05	13.13	0.06	4.80	0.11	0.25	0.17	0.00		Calculated
19	{STORM BJ2-1}.PIPE-O1	21.98	0 02:06	34.48	0.64	5.81	0.09	1.16	0.58	0.00		Calculated
20	{STORM BJ2-1}.PIPE-P1	30.40	0 01:15	41.06	0.74	7.15	0.05	1.28	0.64	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	{STORM BJ2-1}.CB-F2	FHWA HEC-22 GENERIC	N/A	On Sag	1	449.34	454.86	5.52	449.34	0.00	0.00	0.00
2	{STORM BJ2-1}.CB-F4	FHWA HEC-22 GENERIC	N/A	On Grade	1	460.23	464.52	4.29	460.23	0.00	N/A	0.00
3	{STORM BJ2-1}.CB-G1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.60	459.94	3.34	456.60	0.00	N/A	0.00
4	{STORM BJ2-1}.CB-H1	FHWA HEC-22 GENERIC	N/A	On Grade	1	458.25	461.79	3.54	458.25	0.00	N/A	0.00
5	{STORM BJ2-1}.CB-H2	FHWA HEC-22 GENERIC	N/A	On Grade	1	457.65	461.12	3.47	457.65	0.00	N/A	0.00
6	{STORM BJ2-1}.CB-H5	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.00	452.86	3.86	449.00	0.00	N/A	0.00
7	{STORM BJ2-1}.CB-H7	FHWA HEC-22 GENERIC	N/A	On Grade	1	444.90	448.42	3.52	444.90	0.00	N/A	0.00
8	{STORM BJ2-1}.CB-I1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.40	459.56	3.16	456.40	0.00	N/A	0.00
9	{STORM BJ2-1}.CB-J1	FHWA HEC-22 GENERIC	N/A	On Sag	1	451.75	456.44	4.69	451.75	0.00	0.00	0.00
10	{STORM BJ2-1}.CB-K1	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.60	452.99	3.39	449.60	0.00	N/A	0.00
11	{STORM BJ2-1}.CB-M1	FHWA HEC-22 GENERIC	N/A	On Sag	1	446.66	449.94	3.28	446.66	0.00	0.00	0.00
12	{STORM BJ2-1}.CB-N1	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.80	444.37	3.57	440.80	0.00	N/A	0.00
13	CB-F3	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.00	459.71	3.71	456.00	0.00	N/A	0.00
14	CB-H3	FHWA HEC-22 GENERIC	N/A	On Grade	1	455.80	459.56	3.76	455.80	0.00	N/A	0.00
15	CB-H8	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.25	444.37	4.12	440.25	0.00	N/A	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	{STORM BJ2-1}.CB-F2	N/A	0.0200	0.0160	0.0620	2.00	0.0656	12.00
2	{STORM BJ2-1}.CB-F4	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
3	{STORM BJ2-1}.CB-G1	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
4	{STORM BJ2-1}.CB-H1	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
5	{STORM BJ2-1}.CB-H2	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
6	{STORM BJ2-1}.CB-H5	0.0190	0.0200	0.0160	0.0620	1.50	0.0656	12.00
7	{STORM BJ2-1}.CB-H7	0.0100	0.0200	0.0160	0.0620	2.00	0.0656	12.00
8	{STORM BJ2-1}.CB-I1	0.0170	0.0200	0.0160	0.0620	1.50	0.0656	12.00
9	{STORM BJ2-1}.CB-J1	N/A	0.0200	0.0160	0.0620	1.50	0.0656	12.00
10	{STORM BJ2-1}.CB-K1	0.0190	0.0200	0.0160	0.0620	2.00	0.0656	12.00
11	{STORM BJ2-1}.CB-M1	N/A	0.0200	0.0160	0.0620	1.50	0.0656	12.00
12	{STORM BJ2-1}.CB-N1	0.0100	0.0200	0.0160	0.0620	2.00	0.0656	12.00
13	CB-F3	0.0200	0.0200	0.0160	0.0620	2.00	0.0000	12.00
14	CB-H3	0.0170	0.0200	0.0160	0.0620	2.00	0.0656	12.00
15	CB-H8	0.0190	0.0200	0.0160	0.0620	2.00	0.0656	12.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.CB-F2	4.27	4.17	N/A	N/A	N/A	12.06	455.36	0.49	0 00:05	0.00	0.00
2	{STORM BJ2-1}.CB-F4	0.55	0.55	0.49	0.06	89.33	4.15	464.66	0.15	0 00:05	0.00	0.00
3	{STORM BJ2-1}.CB-G1	1.60	1.60	1.39	0.21	86.83	7.00	460.15	0.20	0 00:05	0.00	0.00
4	{STORM BJ2-1}.CB-H1	1.02	1.02	1.00	0.02	97.73	5.74	461.97	0.18	0 00:29	0.00	0.00
5	{STORM BJ2-1}.CB-H2	1.68	1.68	1.43	0.25	85.20	7.15	461.33	0.21	0 00:05	0.00	0.00
6	{STORM BJ2-1}.CB-H5	1.64	1.64	1.42	0.22	86.48	7.16	453.07	0.21	0 00:06	0.00	0.00
7	{STORM BJ2-1}.CB-H7	0.53	0.53	0.53	0.00	100.00	4.25	448.59	0.17	0 00:06	0.00	0.00
8	{STORM BJ2-1}.CB-I1	1.69	1.68	1.46	0.22	86.75	7.42	459.77	0.21	0 00:37	0.00	0.00
9	{STORM BJ2-1}.CB-J1	2.01	1.82	N/A	N/A	N/A	8.40	456.83	0.40	0 00:38	0.00	0.00
10	{STORM BJ2-1}.CB-K1	0.80	0.80	0.79	0.01	99.28	4.43	453.17	0.17	0 00:05	0.00	0.00
11	{STORM BJ2-1}.CB-M1	1.33	1.23	N/A	N/A	N/A	6.27	450.30	0.36	0 00:05	0.00	0.00
12	{STORM BJ2-1}.CB-N1	1.59	1.59	1.51	0.08	94.98	7.72	444.61	0.24	0 00:05	0.00	0.00
13	CB-F3	0.90	0.88	0.71	0.19	78.85	4.74	459.89	0.18	0 00:05	0.00	0.00
14	CB-H3	1.10	1.05	1.07	0.03	97.54	5.59	459.76	0.20	0 00:05	0.00	0.00
15	CB-H8	0.84	0.84	0.83	0.01	99.22	4.59	444.55	0.18	0 00:06	0.00	0.00

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Project Description

File Name	Benjamin Grove Phase 2 Drainage 100 year R5.SPF
Description	J:\Projects\2016 Projects\16025 Benjamin Grove Lee Pengelly\Calcs\Phase 2\Benjamin Grove Drainage map phase 2 r6.dwg

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Jan 24, 2017	00:00:00
End Analysis On	Jan 25, 2017	00:00:00
Start Reporting On	Jan 24, 2017	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	33
Nodes	27
Junctions	9
Outfalls	3
Flow Diversions	0
Inlets	15
Storage Nodes	0
Links	35
Channels	15
Pipes	20
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	100 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	{STORM PHASE 2}.1	0.06	0.9500	0.83	0.79	0.05	0.57	0 00:05:00
2	{STORM PHASE 2}.10	0.11	0.9500	0.83	0.79	0.08	1.01	0 00:05:00
3	{STORM PHASE 2}.11	0.43	0.5200	2.81	1.46	0.63	1.29	0 00:29:21
4	{STORM PHASE 2}.12	0.10	0.9500	0.83	0.79	0.08	0.92	0 00:05:00
5	{STORM PHASE 2}.13	0.81	0.5200	3.12	1.62	1.32	2.12	0 00:37:09
6	{STORM PHASE 2}.14	0.11	0.9500	0.83	0.79	0.09	1.08	0 00:05:00
7	{STORM PHASE 2}.15	0.67	0.5200	3.29	1.71	1.15	1.63	0 00:42:28
8	{STORM PHASE 2}.17	0.35	0.5200	2.93	1.52	0.54	1.01	0 00:31:55
9	{STORM PHASE 2}.19	0.11	0.9500	0.83	0.79	0.09	1.05	0 00:05:00
10	{STORM PHASE 2}.2	0.18	0.5200	2.90	1.51	0.27	0.53	0 00:31:18
11	{STORM PHASE 2}.25	0.05	0.5200	1.78	0.92	0.05	0.23	0 00:13:22
12	{STORM PHASE 2}.27	0.07	0.9500	0.83	0.79	0.05	0.62	0 00:05:00
13	{STORM PHASE 2}.28	0.19	0.9500	0.83	0.79	0.15	1.81	0 00:05:00
14	{STORM PHASE 2}.29	0.11	0.5200	1.85	0.96	0.10	0.44	0 00:14:10
15	{STORM PHASE 2}.3	0.20	0.9500	0.83	0.79	0.16	1.90	0 00:05:00
16	{STORM PHASE 2}.30	0.13	0.9500	0.83	0.79	0.10	1.22	0 00:05:00
17	{STORM PHASE 2}.31	0.39	0.5200	2.51	1.30	0.50	1.26	0 00:24:04
18	{STORM PHASE 2}.35	0.97	0.5200	3.03	1.58	1.53	2.64	0 00:34:37
19	{STORM PHASE 2}.36	0.07	0.9500	0.83	0.79	0.05	0.63	0 00:05:00
20	{STORM PHASE 2}.37	0.09	0.9500	0.83	0.79	0.07	0.86	0 00:05:00
21	{STORM PHASE 2}.38	0.17	0.5200	2.29	1.19	0.20	0.59	0 00:20:15
22	{STORM PHASE 2}.39	0.02	0.9500	0.83	0.79	0.01	0.14	0 00:05:00
23	{STORM PHASE 2}.4	0.10	0.9500	0.83	0.79	0.08	0.96	0 00:05:00
24	{STORM PHASE 2}.40	0.10	0.9500	0.83	0.79	0.08	0.95	0 00:05:00
25	{STORM PHASE 2}.41	0.20	0.9500	0.83	0.79	0.16	1.89	0 00:05:00
26	{STORM PHASE 2}.45	0.07	0.9500	0.83	0.79	0.05	0.64	0 00:05:00
27	{STORM PHASE 2}.48	0.09	0.9500	0.83	0.79	0.07	0.86	0 00:05:00
28	{STORM PHASE 2}.5	0.13	0.5200	2.45	1.28	0.17	0.45	0 00:23:00
29	{STORM PHASE 2}.6	0.13	0.9500	0.83	0.79	0.10	1.22	0 00:05:00
30	{STORM PHASE 2}.8	0.36	0.9500	0.83	0.79	0.29	3.42	0 00:05:00
31	{STORM PHASE 2}.9	0.80	0.5200	2.93	1.52	1.21	2.28	0 00:31:55
32	49	23.80	0.5000	5.06	2.53	60.19	29.05	0 02:04:19
33	50	14.60	0.5000	4.15	2.07	30.28	24.28	0 01:14:48

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.FES - L1	Junction	447.00	450.00	447.00	450.00	0.00	2.64	447.47	0.00	2.53	0 00:00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	Junction	443.25	445.00	443.25	445.00	0.00	28.85	444.65	0.00	0.60	0 00:00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	Junction	443.00	445.00	443.00	445.00	0.00	28.85	444.57	0.00	0.45	0 00:00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	Junction	451.28	455.85	451.28	455.85	0.00	6.40	452.01	0.00	3.84	0 00:00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	Junction	445.40	449.19	445.40	449.19	0.00	10.69	446.52	0.00	2.67	0 00:00	0.00	0.00
6	FES-F1	Junction	448.75	457.43	448.75	457.43	0.00	29.05	450.15	0.00	7.28	0 00:00	0.00	0.00
7	FES-P1_KBBARNES	Junction	433.25	435.00	433.25	435.00	0.00	39.46	434.82	0.00	0.43	0 00:00	0.00	0.00
8	FES-P2_KBBARNES	Junction	433.00	435.00	433.00	435.00	0.00	39.45	434.57	0.00	0.43	0 00:00	0.00	0.00
9	StartNullStruct41	Junction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00:00	0.00	0.00
10	{STORM BJ2-1}.FES-H9	Outfall	439.50					13.56	443.33					
11	GUTTER-OUT1	Outfall	440.00					0.17	443.89					
12	KBBARNES-OUT1	Outfall	431.98					39.25	432.93					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)
1	{STORM BJ2-1}.PIPE - H7	Pipe	{STORM BJ2-1}.CB-H7	CB-H8	180.51	444.90	440.35	2.5200	18.000	0.0130	11.17	16.68	0.67	10.15	0.90
2	{STORM BJ2-1}.PIPE - H8	Pipe	CB-H8	{STORM BJ2-1}.FES-H9	31.04	440.25	439.50	2.4200	18.000	0.0130	13.44	16.33	0.82	10.32	1.04
3	{STORM BJ2-1}.PIPE - L1	Pipe	{STORM BJ2-1}.FES - L1	{STORM BJ2-1}.JB-H6	84.01	447.00	445.50	1.7900	18.000	0.0150	2.64	12.16	0.22	5.50	0.47
4	{STORM BJ2-1}.PIPE - M1	Pipe	{STORM BJ2-1}.CB-M1	{STORM BJ2-1}.JB-H6	48.34	446.66	445.50	2.4000	18.000	0.0130	1.70	16.27	0.10	5.97	0.33
5	{STORM BJ2-1}.PIPE - N1	Pipe	{STORM BJ2-1}.CB-N1	CB-H8	32.00	440.80	440.35	1.4100	18.000	0.0130	1.71	12.46	0.14	4.95	0.37
6	{STORM BJ2-1}.PIPE F1	Pipe	{STORM BJ2-1}.CB-F2	FES-F1	99.06	449.34	448.75	0.6000	18.000	0.0130	7.86	8.11	0.97	5.29	1.19
7	{STORM BJ2-1}.PIPE F2	Pipe	CB-F3	{STORM BJ2-1}.CB-F2	250.16	456.00	449.44	2.6200	18.000	0.0130	2.83	17.01	0.17	7.20	0.41
8	{STORM BJ2-1}.PIPE G1	Pipe	{STORM BJ2-1}.CB-G1	CB-F3	32.00	456.60	456.10	1.5600	18.000	0.0130	1.55	13.13	0.12	5.79	0.35
9	{STORM BJ2-1}.PIPE H5	Pipe	{STORM BJ2-1}.CB-H5	{STORM BJ2-1}.JB-H6	183.29	449.00	445.50	1.9100	18.000	0.0130	8.65	14.52	0.60	8.61	0.83
10	{STORM BJ2-1}.PIPE -H6	Pipe	{STORM BJ2-1}.JB-H6	{STORM BJ2-1}.CB-H7	31.79	445.40	445.00	1.2600	18.000	0.0130	10.69	11.78	0.91	7.55	1.12
11	{STORM BJ2-1}.PIPE_F3	Pipe	{STORM BJ2-1}.CB-F4	CB-F3	199.59	460.23	456.10	2.0700	18.000	0.0130	0.53	15.11	0.04	4.52	0.19
12	{STORM BJ2-1}.PIPE-H1	Pipe	{STORM BJ2-1}.CB-H1	{STORM BJ2-1}.CB-H2	32.00	458.25	457.75	1.5600	18.000	0.0130	1.19	13.13	0.09	4.62	0.30
13	{STORM BJ2-1}.PIPE-H2	Pipe	{STORM BJ2-1}.CB-H2	CB-H3	191.94	457.65	455.90	0.9100	18.000	0.0130	2.69	10.03	0.27	4.87	0.53
14	{STORM BJ2-1}.PIPE-H3	Pipe	CB-H3	{STORM BJ2-1}.JB-H4	260.88	455.80	451.38	1.6900	18.000	0.0130	5.05	13.67	0.37	7.22	0.63
15	{STORM BJ2-1}.PIPE-H4	Pipe	{STORM BJ2-1}.JB-H4	{STORM BJ2-1}.CB-H5	96.77	451.28	449.10	2.2500	18.000	0.0130	6.39	15.77	0.41	8.47	0.66
16	{STORM BJ2-1}.PIPE-I1	Pipe	{STORM BJ2-1}.CB-I1	CB-H3	32.00	456.40	455.90	1.5600	18.000	0.0130	1.71	13.13	0.13	5.14	0.37
17	{STORM BJ2-1}.PIPE-J1	Pipe	{STORM BJ2-1}.CB-J1	{STORM BJ2-1}.JB-H4	48.34	451.75	451.38	0.7700	18.000	0.0130	2.71	9.19	0.29	4.52	0.56
18	{STORM BJ2-1}.PIPE-K1	Pipe	{STORM BJ2-1}.CB-K1	{STORM BJ2-1}.CB-H5	32.00	449.60	449.10	1.5600	18.000	0.0130	0.94	13.13	0.07	4.97	0.27
19	{STORM BJ2-1}.PIPE-O1	Pipe	{STORM BJ2-1}.FES-O1 LULU	{STORM BJ2-1}.FES-O2_LULU	29.87	443.15	443.02	0.4400	24.000	0.0150	28.85	34.48	0.84	6.14	1.40
20	{STORM BJ2-1}.PIPE-P1	Pipe	FES-P1_KBBARNES	FES-P2_KBBARNES	22.81	433.25	433.00	1.1000	24.000	0.0150	39.45	41.06	0.96	7.44	1.57
21	BYPASS_K1	Channel	{STORM BJ2-1}.CB-K1	{STORM BJ2-1}.CB-N1	395.48	453.99	444.81	2.3200	6.000	0.0130	0.01	20.05	0.00	3.52	0.02
22	BYPASS_N1	Channel	{STORM BJ2-1}.CB-N1	GUTTER-OUT1	29.94	444.81	443.80	3.3700	6.000	0.0130	0.17	18.75	0.01	4.19	0.08
23	DITCH-01	Channel	FES-F1	{STORM BJ2-1}.FES-O1 LULU	424.00	448.75	443.02	1.3500	24.000	0.0800	28.85	62.45	0.46	1.97	1.39
24	DITCH-02	Channel	{STORM BJ2-1}.FES-O2_LULU	FES-P1_KBBARNES	970.00	443.00	433.25	1.0100	24.000	0.0800	28.51	47.45	0.60	1.91	1.56
25	DITCH-03	Channel	FES-P2_KBBARNES	KBBARNES-OUT1	262.00	433.00	431.98	0.3900	24.000	0.0320	39.25	289.59	0.14	1.76	0.95
26	GUTTER_F2	Channel	CB-F3	{STORM BJ2-1}.CB-F2	250.05	461.10	453.34	3.1000	6.000	0.0130	0.23	18.90	0.01	3.14	0.09
27	GUTTER_F3	Channel	{STORM BJ2-1}.CB-F4	CB-F3	199.54	465.23	461.10	2.0700	6.000	0.0130	0.08	21.08	0.00	3.34	0.06
28	GUTTER_G1	Channel	{STORM BJ2-1}.CB-G1	{STORM BJ2-1}.CB-F2	245.65	460.52	453.34	2.9200	6.000	0.0130	0.27	19.52	0.01	6.39	0.10
29	GUTTER_H2	Channel	{STORM BJ2-1}.CB-H2	CB-H3	191.92	462.65	459.83	1.4700	6.000	0.0130	0.30	12.23	0.02	4.63	0.12
30	GUTTER_H7	Channel	{STORM BJ2-1}.CB-H7	CB-H8	180.42	450.00	445.14	2.6900	6.000	0.0130	0.00	20.34	0.00	0.00	0.00
31	GUTTER_H8	Channel	CB-H8	{STORM BJ2-1}.FES-H9	31.05	445.14	443.30	5.9300	6.000	0.0130	0.01	25.22	0.00	1.40	0.03
32	GUTTER_I1	Channel	{STORM BJ2-1}.CB-H1	{STORM BJ2-1}.CB-I1	191.92	462.65	461.09	0.8100	6.000	0.0130	0.10	14.64	0.01	3.68	0.08
33	GUTTER-H3	Channel	CB-H3	{STORM BJ2-1}.CB-H5	260.86	459.83	454.37	2.0900	6.000	0.0130	0.08	19.15	0.00	5.24	0.06
34	GUTTER-H5	Channel	{STORM BJ2-1}.CB-H5	{STORM BJ2-1}.CB-M1	155.79	454.37	451.66	1.7400	6.000	0.0130	0.31	18.59	0.02	5.04	0.11
35	GUTTER-J1	Channel	{STORM BJ2-1}.CB-I1	{STORM BJ2-1}.CB-J1	224.65	461.09	457.58	1.5600	6.000	0.0130	0.43	16.02	0.03	2.82	0.13

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
0.60	0.00	Calculated
0.69	0.00	Calculated
0.32	0.00	Calculated
0.22	0.00	Calculated
0.25	0.00	Calculated
0.79	0.00	Calculated
0.28	0.00	Calculated
0.23	0.00	Calculated
0.56	0.00	Calculated
0.75	0.00	Calculated
0.13	0.00	Calculated
0.20	0.00	Calculated
0.35	0.00	Calculated
0.42	0.00	Calculated
0.44	0.00	Calculated
0.24	0.00	Calculated
0.37	0.00	Calculated
0.18	0.00	Calculated
0.70	0.00	Calculated
0.79	0.00	Calculated
0.04	0.00	
0.17	0.00	
0.70	0.00	
0.78	0.00	
0.47	0.00	
0.19	0.00	
0.12	0.00	
0.19	0.00	
0.24	0.00	
0.00	0.00	
0.05	0.00	
0.15	0.00	
0.11	0.00	
0.21	0.00	
0.26	0.00	

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	{STORM BJ2-1}.CB-F2	FHWA HEC-22 GENERIC	N/A	On Sag	1	449.34	454.86	449.34	0.00	5.20	N/A	N/A	N/A	12.00	13.75	455.39
2	{STORM BJ2-1}.CB-F4	FHWA HEC-22 GENERIC	N/A	On Grade	1	460.23	464.52	460.23	N/A	0.65	0.54	0.11	83.19	12.00	4.52	464.67
3	{STORM BJ2-1}.CB-G1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.60	459.94	456.60	N/A	1.90	1.55	0.35	81.63	12.00	7.55	460.16
4	{STORM BJ2-1}.CB-H1	FHWA HEC-22 GENERIC	N/A	On Grade	1	458.25	461.79	458.25	N/A	1.29	1.19	0.10	91.93	12.00	6.36	461.98
5	{STORM BJ2-1}.CB-H2	FHWA HEC-22 GENERIC	N/A	On Grade	1	457.65	461.12	457.65	N/A	2.00	1.61	0.40	80.21	12.00	7.73	461.34
6	{STORM BJ2-1}.CB-H5	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.00	452.86	449.00	N/A	1.96	1.59	0.36	81.37	12.00	7.74	453.08
7	{STORM BJ2-1}.CB-H7	FHWA HEC-22 GENERIC	N/A	On Grade	1	444.90	448.42	444.90	N/A	0.63	0.63	0.00	100.00	12.00	4.66	448.60
8	{STORM BJ2-1}.CB-I1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.40	459.56	456.40	N/A	2.15	1.71	0.44	79.60	12.00	8.23	459.79
9	{STORM BJ2-1}.CB-J1	FHWA HEC-22 GENERIC	N/A	On Sag	1	451.75	456.44	451.75	0.00	2.71	N/A	N/A	N/A	12.00	10.19	456.87
10	{STORM BJ2-1}.CB-K1	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.60	452.99	449.60	N/A	0.95	0.94	0.01	99.09	12.00	5.00	453.18
11	{STORM BJ2-1}.CB-M1	FHWA HEC-22 GENERIC	N/A	On Sag	1	446.66	449.94	446.66	0.00	1.70	N/A	N/A	N/A	12.00	7.43	450.32
12	{STORM BJ2-1}.CB-N1	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.80	444.37	440.80	N/A	1.89	1.72	0.17	90.75	12.00	8.36	444.62
13	CB-F3	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.00	459.71	456.00	N/A	1.09	0.81	0.28	74.27	12.00	5.34	459.90
14	CB-H3	FHWA HEC-22 GENERIC	N/A	On Grade	1	455.80	459.56	455.80	N/A	1.38	1.29	0.09	93.22	12.00	6.32	459.77
15	CB-H8	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.25	444.37	440.25	N/A	1.01	1.00	0.01	98.82	12.00	5.21	444.56

Subbasin Hydrology

Subbasin : {STORM PHASE 2}.1

Input Data

Area (ac) 0.06
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.06	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.06		0.95

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	193	0.00	0.00
Slope (%) :	1.2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.23	0.00	0.00
Computed Flow Time (min) :	1.44	0.00	0.00

Total TOC (min) 1.70

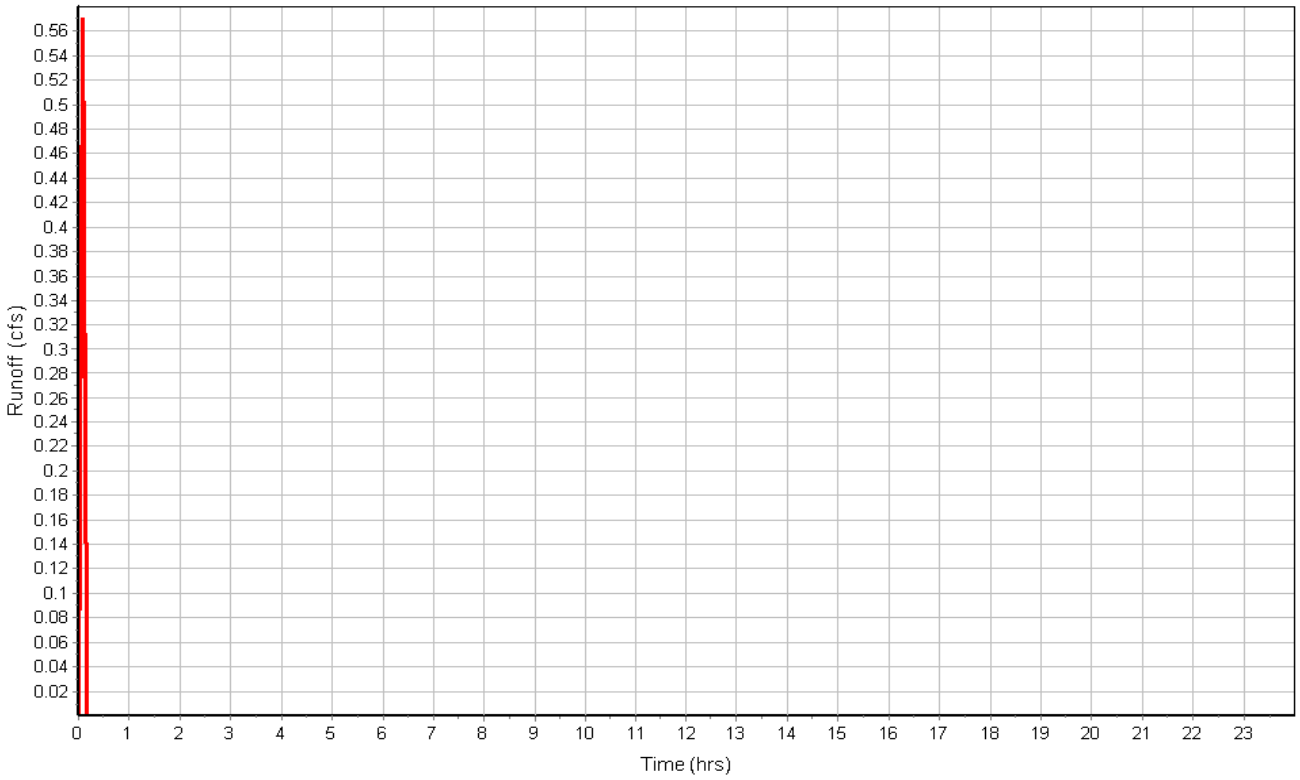
Subbasin Runoff Results

Total Rainfall (in)	0.83
Total Runoff (in)	0.79
Peak Runoff (cfs)	0.57
Rainfall Intensity	10.000
Weighted Runoff Coefficient	0.9500
Time of Concentration (days hh:mm:ss)	0 00:01:42

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.1

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.10

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	209	0.00	0.00
Slope (%) :	0.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.91	0.00	0.00
Computed Flow Time (min) :	3.83	0.00	0.00

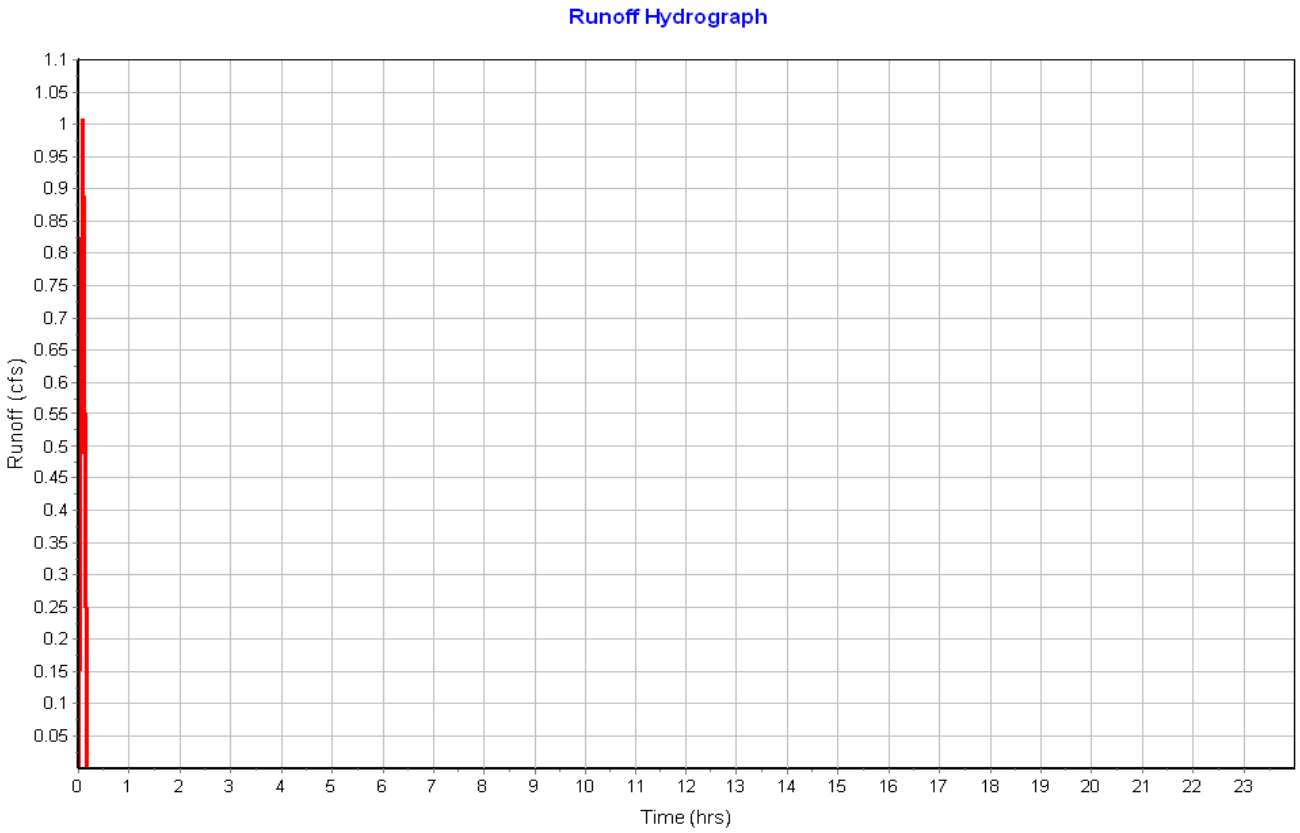
Total TOC (min) 3.83

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.01
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:50

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.10



Subbasin : {STORM PHASE 2}.11

Input Data

Area (ac) 0.43
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.43	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.43		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	233	0.00	0.00
Slope (%) :	1.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	29.36	0.00	0.00

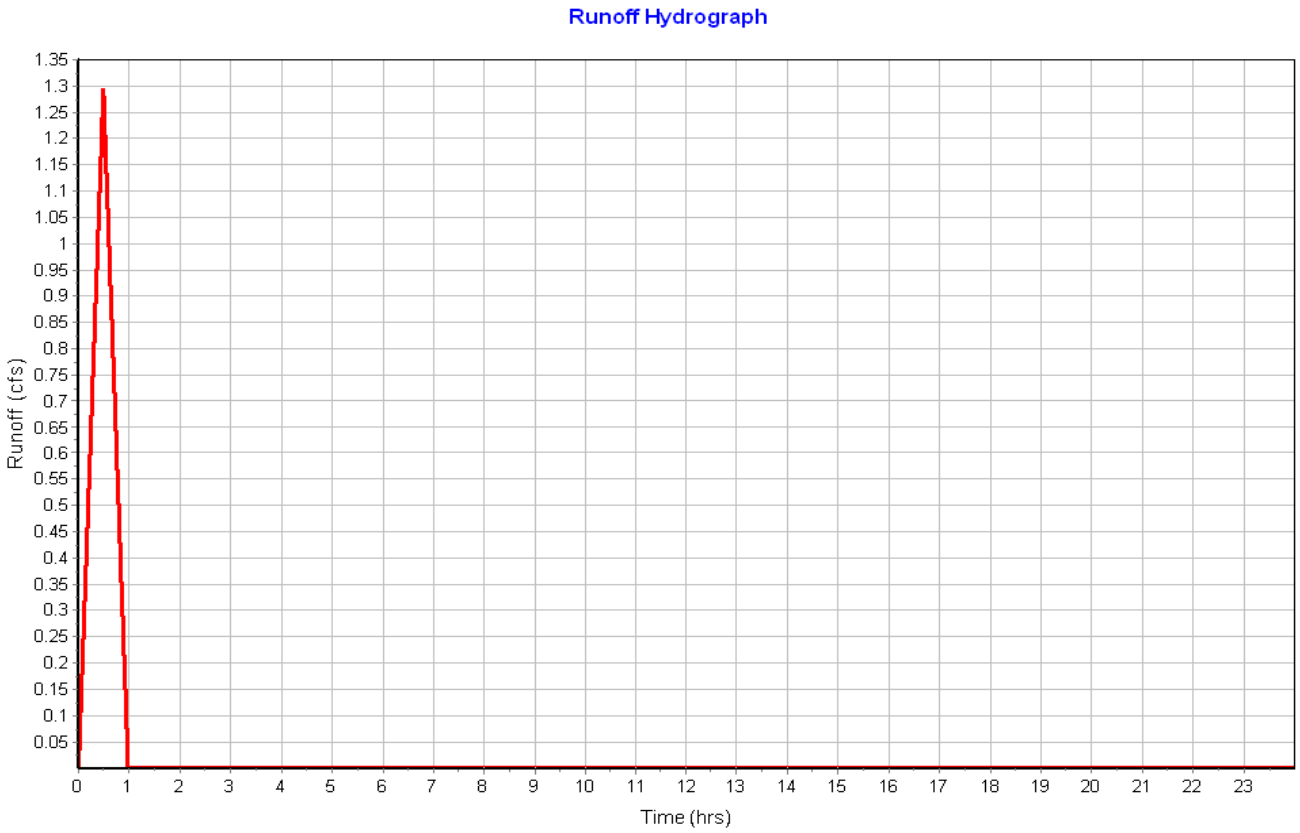
Total TOC (min) 29.36

Subbasin Runoff Results

Total Rainfall (in) 2.81
Total Runoff (in) 1.46
Peak Runoff (cfs) 1.29
Rainfall Intensity 5.754
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:29:22

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.11



Subbasin : {STORM PHASE 2}.12

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	183	0.00	0.00
Slope (%) :	1.2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.26	0.00	0.00
Computed Flow Time (min) :	2.43	0.00	0.00

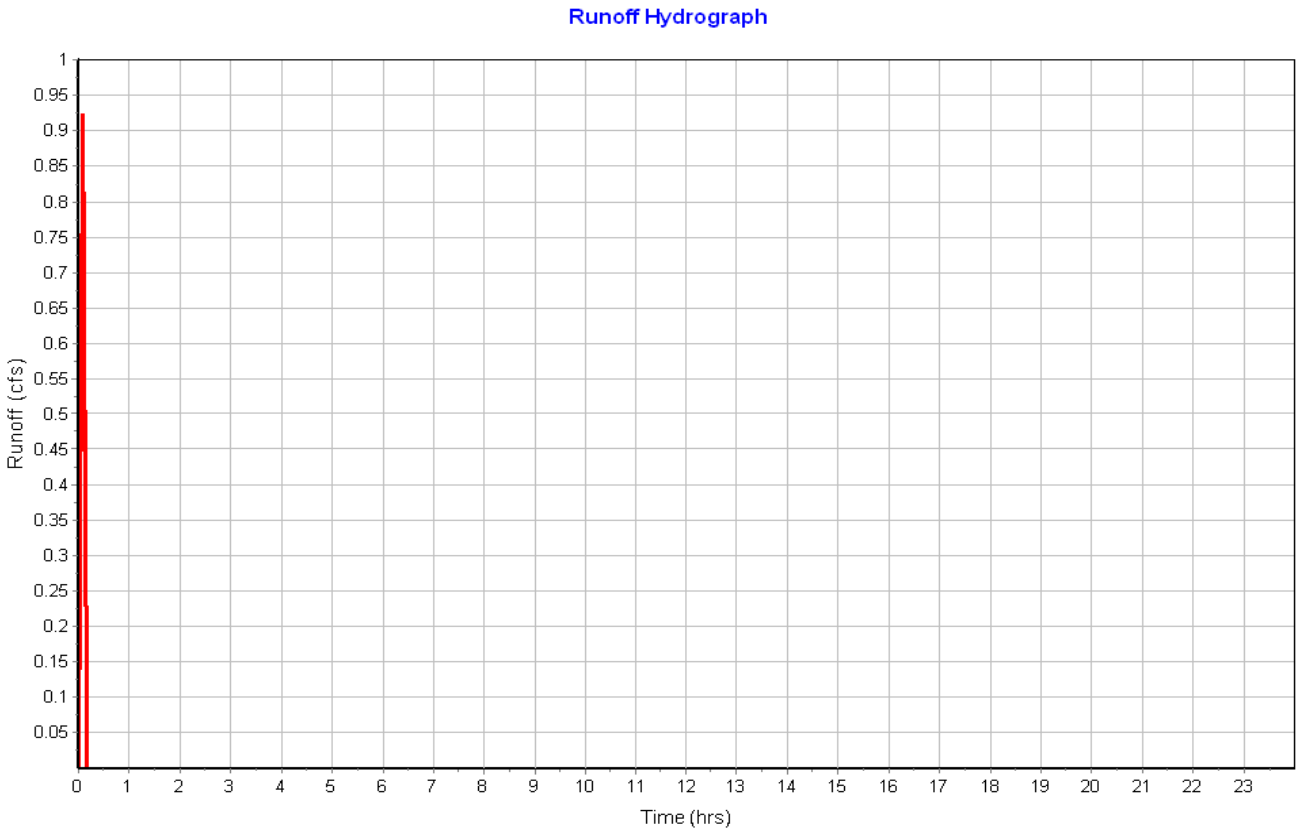
Total TOC (min) 2.43

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.92
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:26

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.12



Subbasin : {STORM PHASE 2}.13

Input Data

Area (ac) 0.81
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.81	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.81		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	336	0.00	0.00
Slope (%) :	1.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	37.16	0.00	0.00

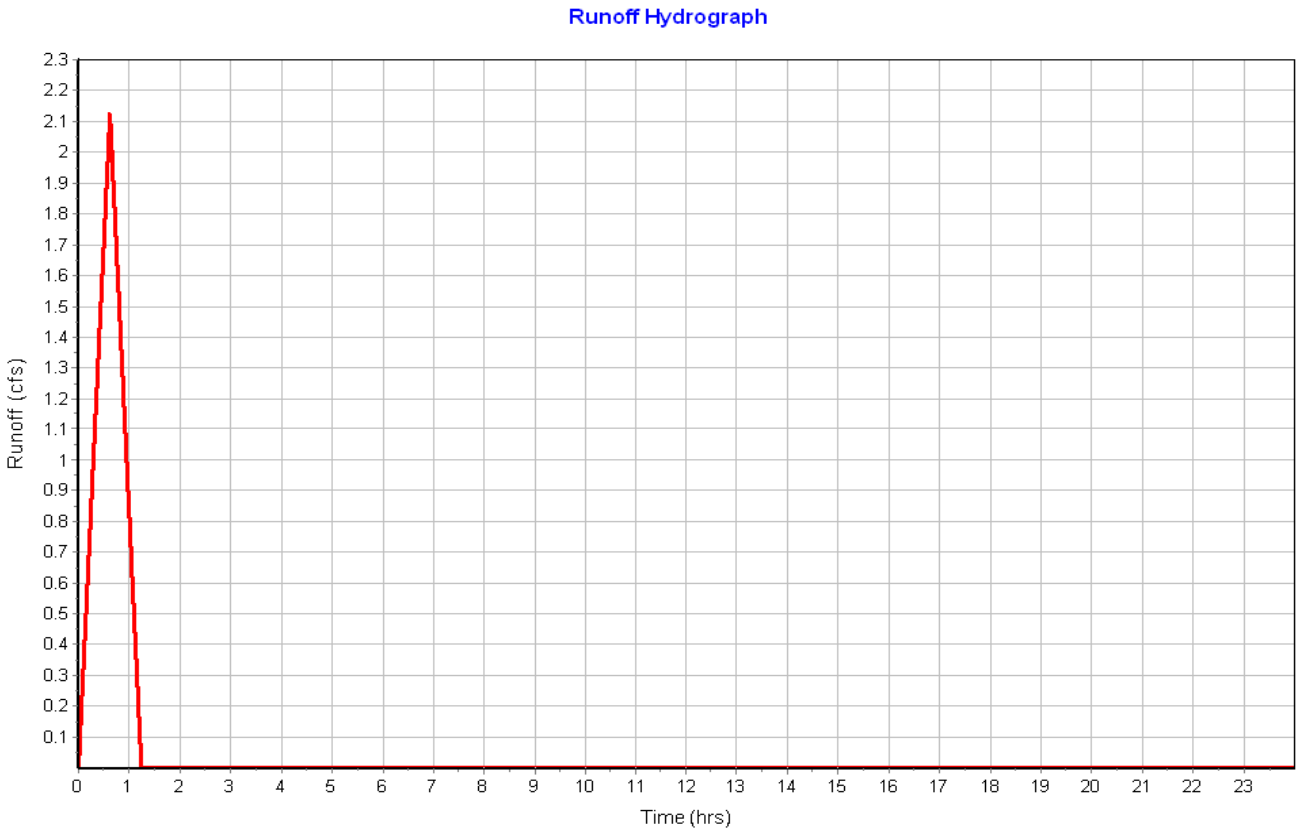
Total TOC (min) 37.16

Subbasin Runoff Results

Total Rainfall (in) 3.12
Total Runoff (in) 1.62
Peak Runoff (cfs) 2.12
Rainfall Intensity 5.029
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:37:10

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.13



Subbasin : {STORM PHASE 2}.14

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	1.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.32	0.00	0.00
Computed Flow Time (min) :	2.52	0.00	0.00

Total TOC (min) 2.52

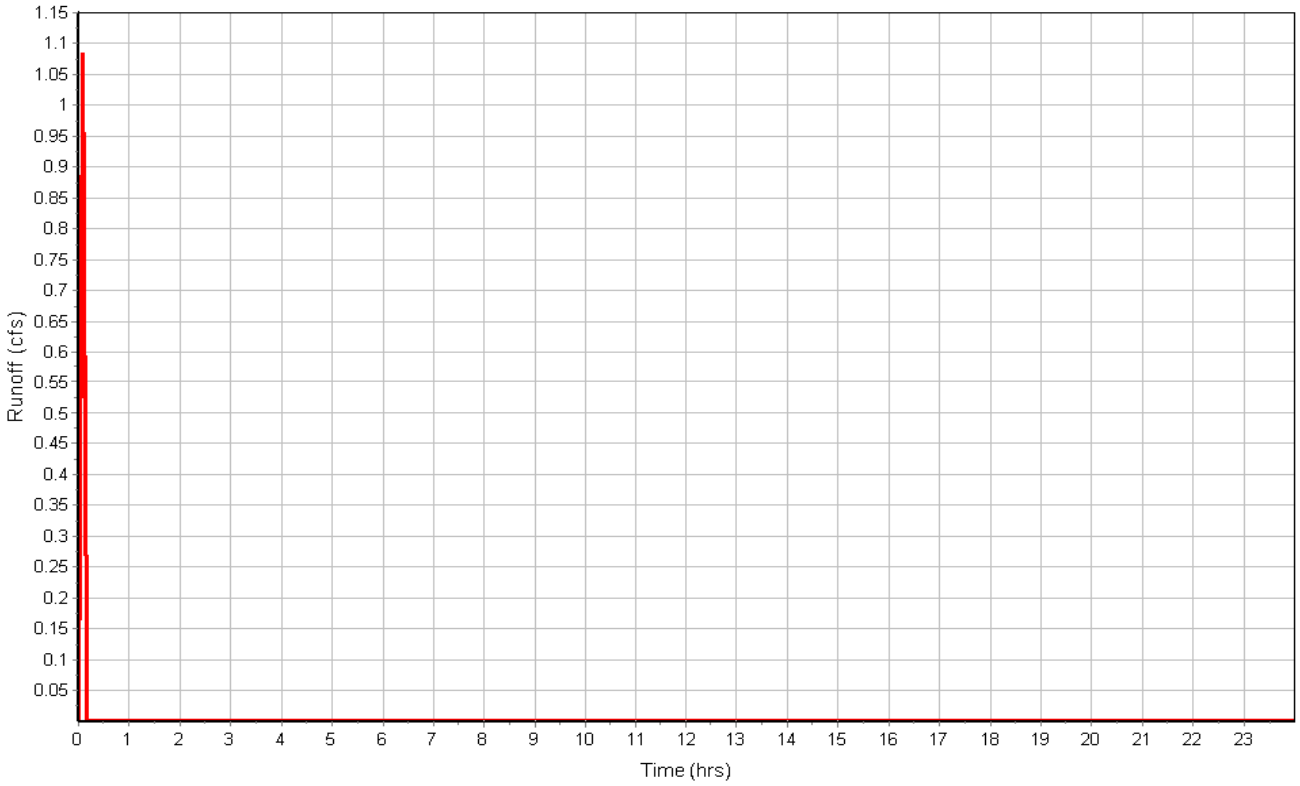
Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.08
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:31

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.14

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.15

Input Data

Area (ac) 0.67
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.67	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.67		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	447	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	42.48	0.00	0.00

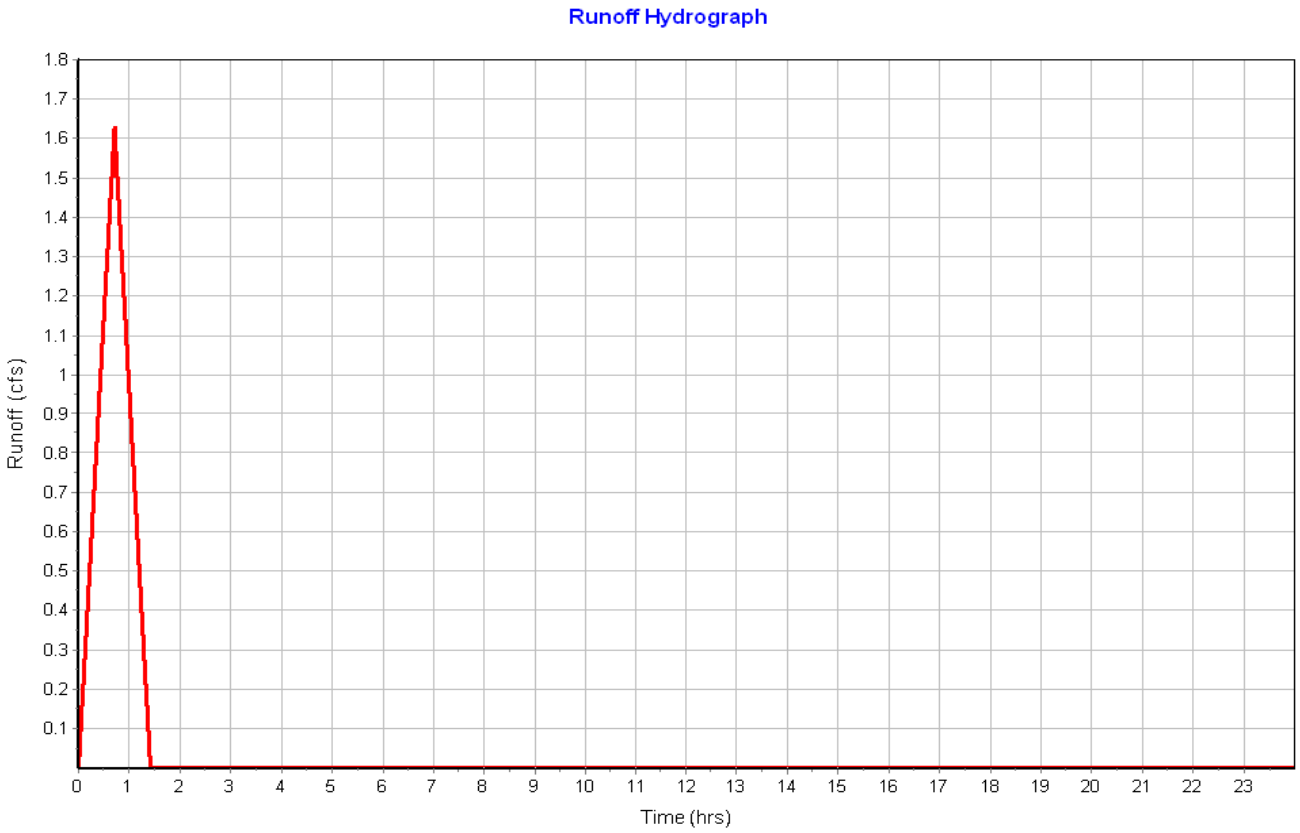
Total TOC (min) 42.48

Subbasin Runoff Results

Total Rainfall (in) 3.29
Total Runoff (in) 1.71
Peak Runoff (cfs) 1.63
Rainfall Intensity 4.651
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:42:29

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.15



Subbasin : {STORM PHASE 2}.17

Input Data

Area (ac) 0.35
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.35	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.35		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	321	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	31.93	0.00	0.00

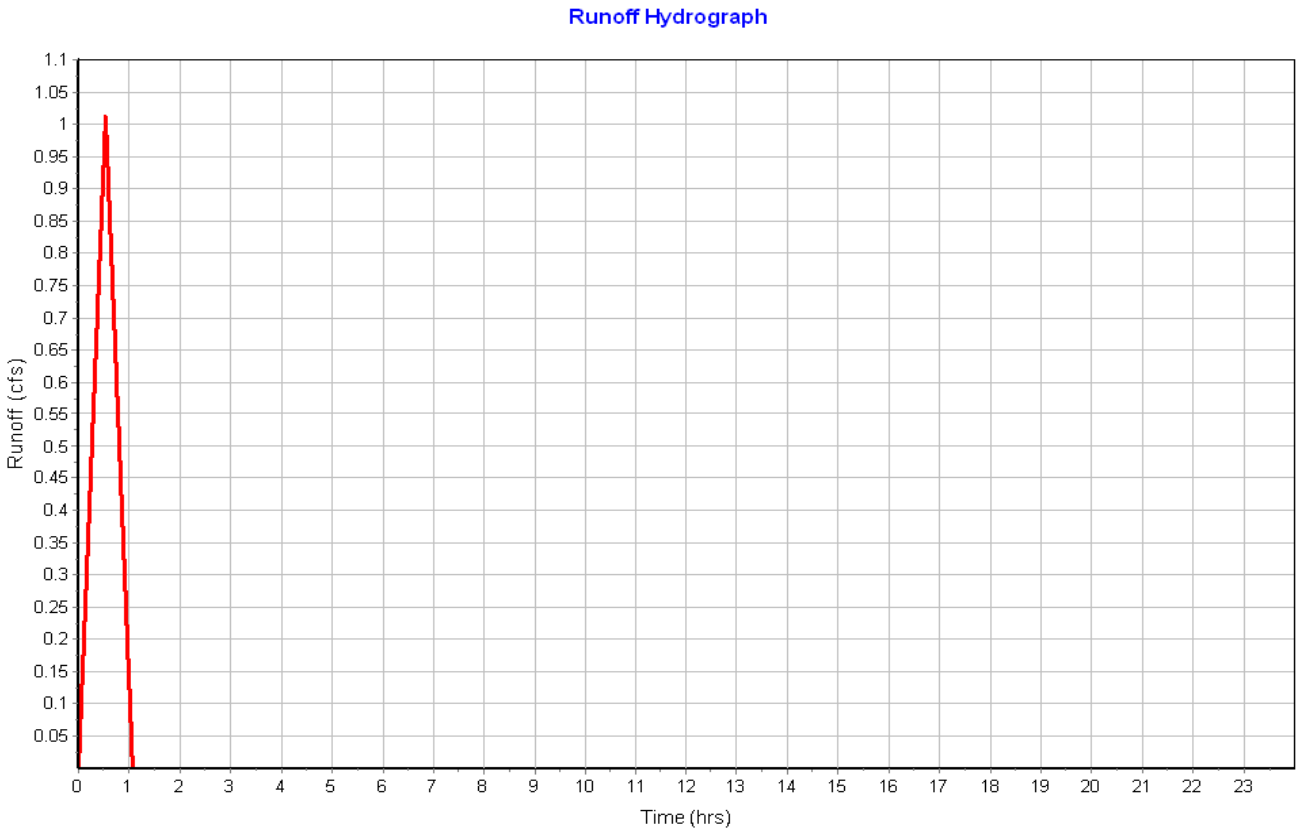
Total TOC (min) 31.93

Subbasin Runoff Results

Total Rainfall (in) 2.93
Total Runoff (in) 1.52
Peak Runoff (cfs) 1.01
Rainfall Intensity 5.496
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:56

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.17



Subbasin : {STORM PHASE 2}.19

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	217	0.00	0.00
Slope (%) :	0.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	3.94	0.00	0.00

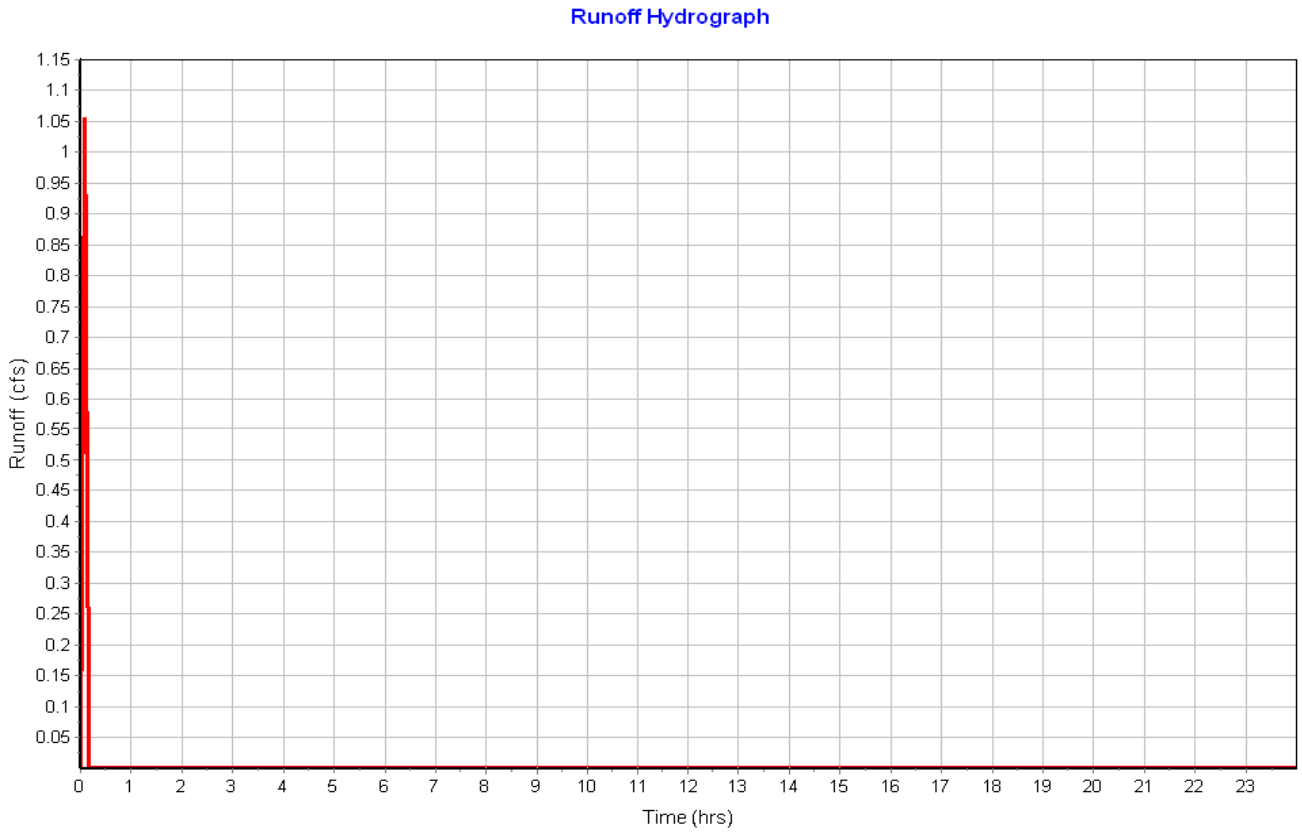
Total TOC (min) 3.94

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.05
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:56

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.19



Subbasin : {STORM PHASE 2}.2

Input Data

Area (ac) 0.18
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.18	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.18		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	198	0.00	0.00
Slope (%) :	0.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.11	0.00	0.00
Computed Flow Time (min) :	31.30	0.00	0.00

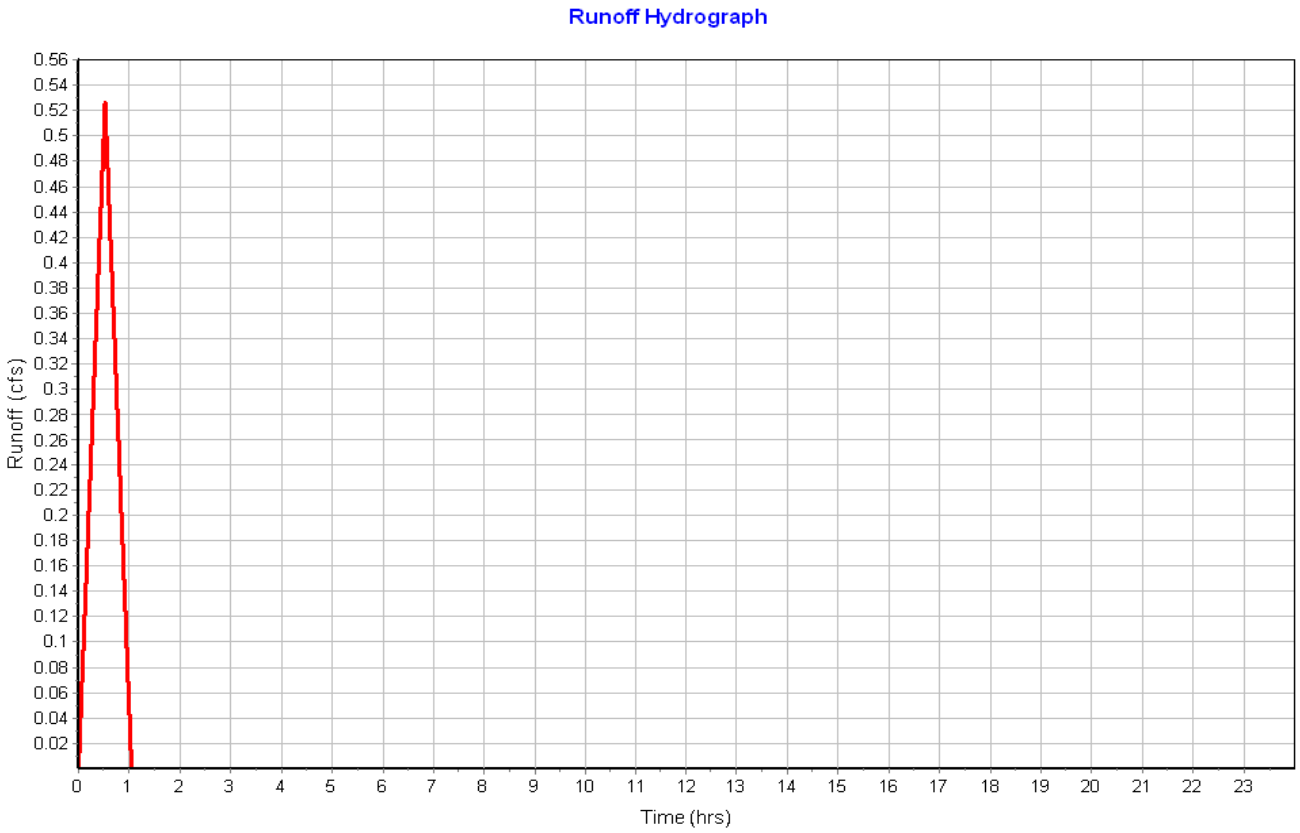
Total TOC (min) 31.30

Subbasin Runoff Results

Total Rainfall (in) 2.90
Total Runoff (in) 1.51
Peak Runoff (cfs) 0.53
Rainfall Intensity 5.560
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:18

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.2



Subbasin : {STORM PHASE 2}.25

Input Data

Area (ac) 0.05
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.05	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.05		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	121	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	13.38	0.00	0.00

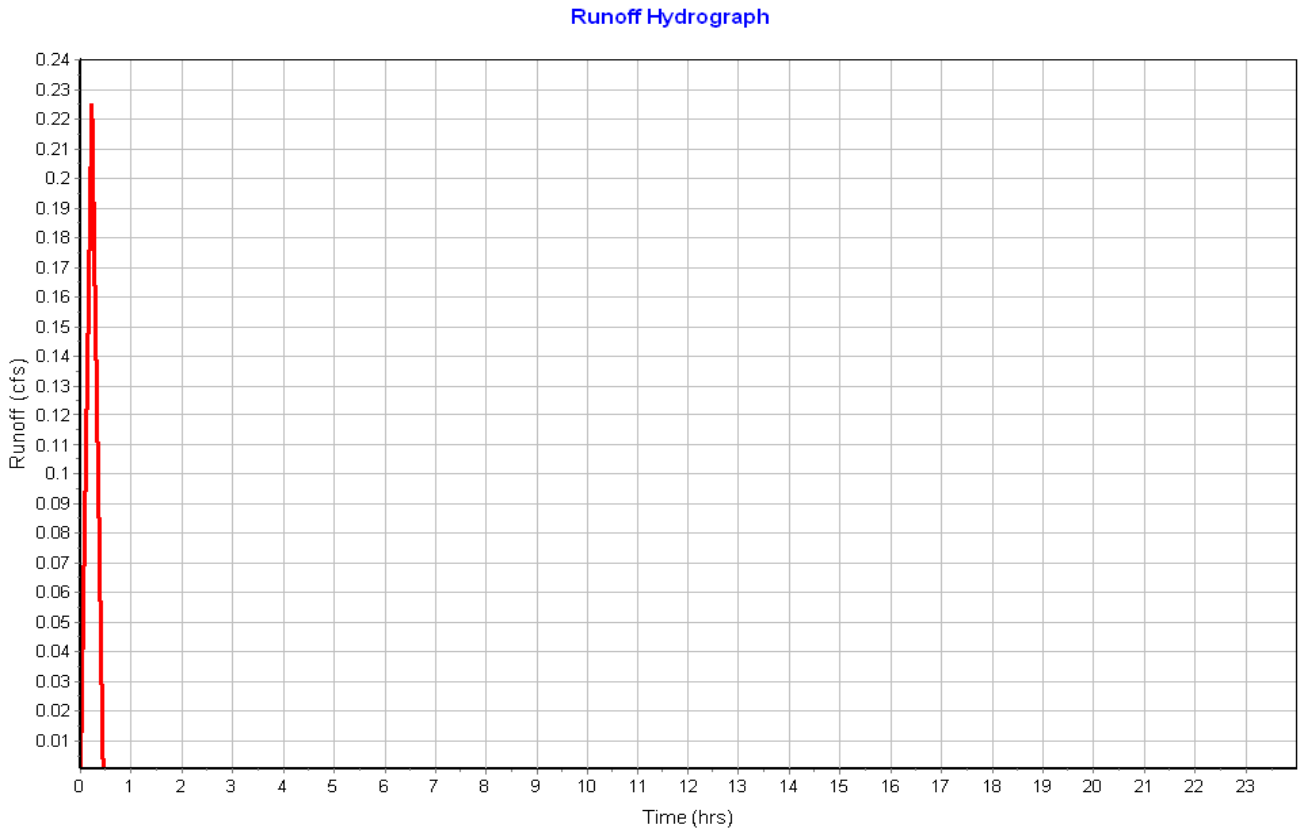
Total TOC (min) 13.38

Subbasin Runoff Results

Total Rainfall (in) 1.78
Total Runoff (in) 0.92
Peak Runoff (cfs) 0.23
Rainfall Intensity 7.995
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:13:23

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.25



Subbasin : {STORM PHASE 2}.27

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	133	0.00	0.00
Slope (%) :	1.7	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.36	0.00	0.00
Computed Flow Time (min) :	1.63	0.00	0.00

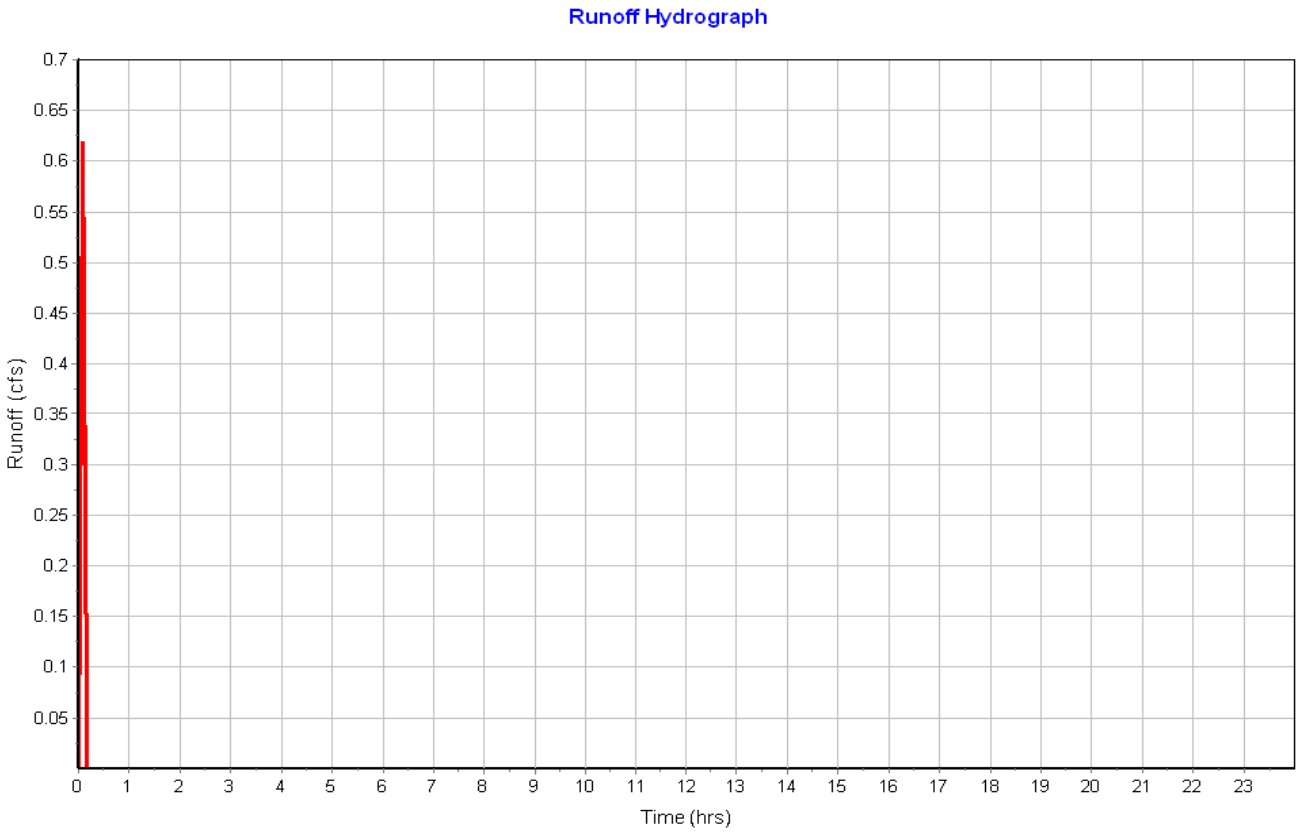
Total TOC (min) 1.63

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.62
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:38

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.27



Subbasin : {STORM PHASE 2}.28

Input Data

Area (ac) 0.19
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.19	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.19		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	351	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.76	0.00	0.00
Computed Flow Time (min) :	3.33	0.00	0.00

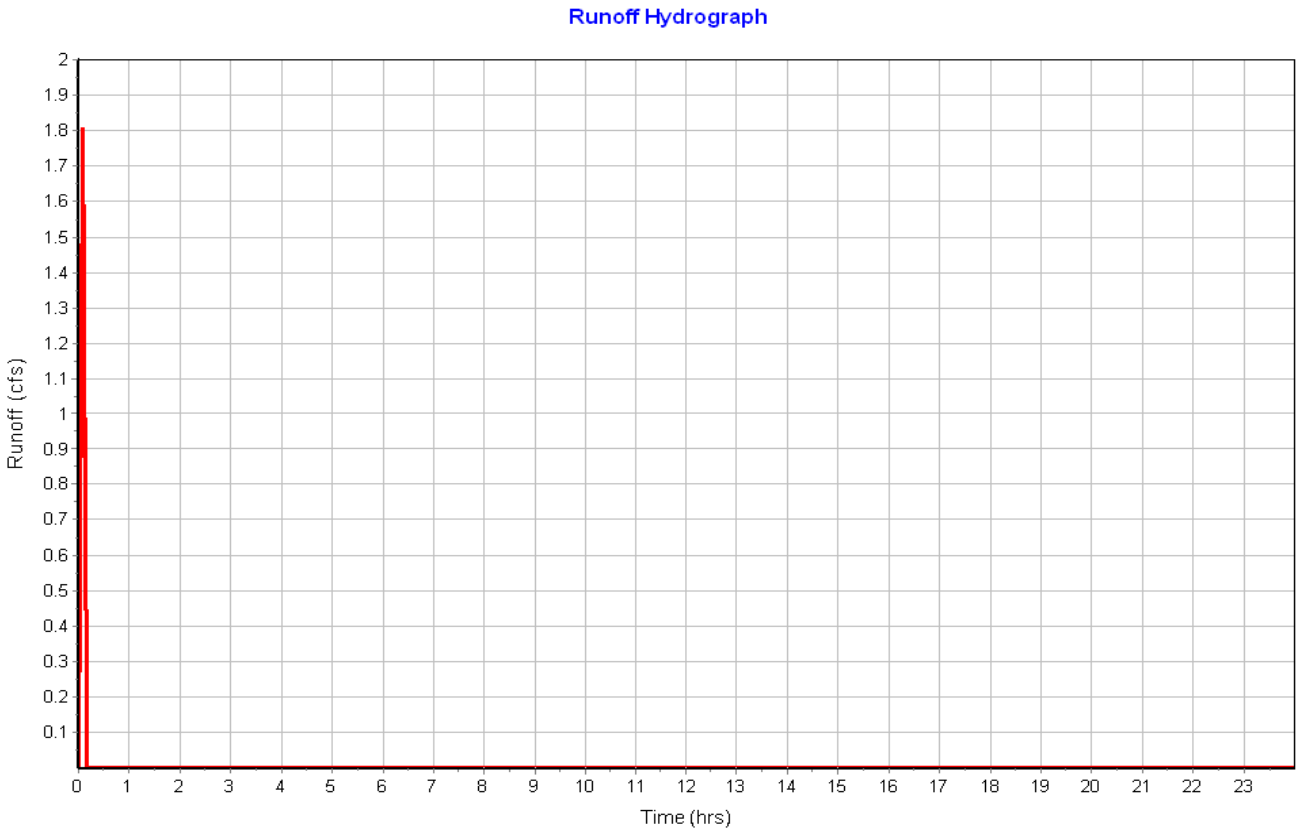
Total TOC (min) 3.33

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.81
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:20

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.28



Subbasin : {STORM PHASE 2}.29

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.11	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.11		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	130	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	14.17	0.00	0.00

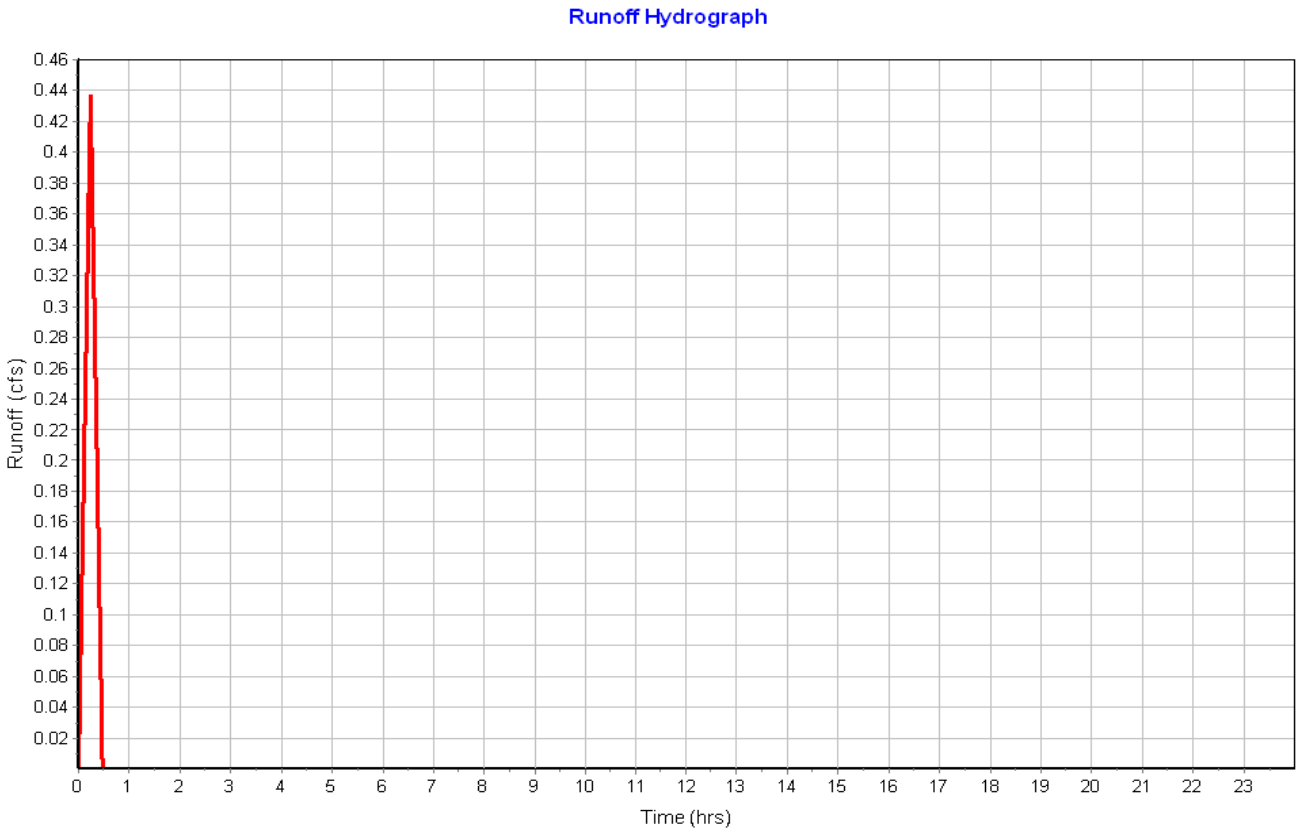
Total TOC (min) 14.17

Subbasin Runoff Results

Total Rainfall (in) 1.85
Total Runoff (in) 0.96
Peak Runoff (cfs) 0.44
Rainfall Intensity 7.846
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:14:10

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.29



Subbasin : {STORM PHASE 2}.3

Input Data

Area (ac) 0.20
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.20	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.20		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	393	0.00	0.00
Slope (%) :	1.9	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.80	0.00	0.00
Computed Flow Time (min) :	2.34	0.00	0.00

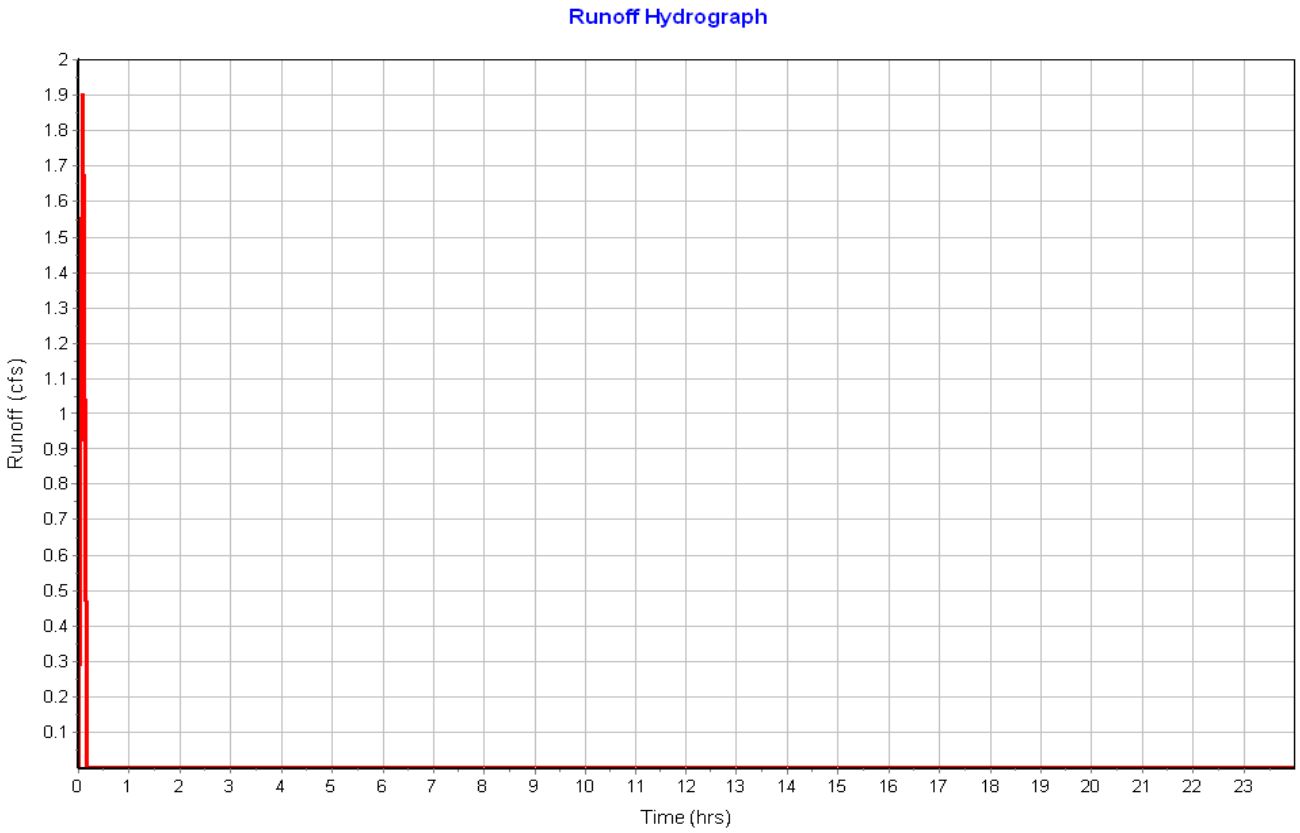
Total TOC (min) 2.59

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.90
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:35

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.3



Subbasin : {STORM PHASE 2}.30

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.13	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.13		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	171	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.49	0.00	0.00
Computed Flow Time (min) :	1.91	0.00	0.00

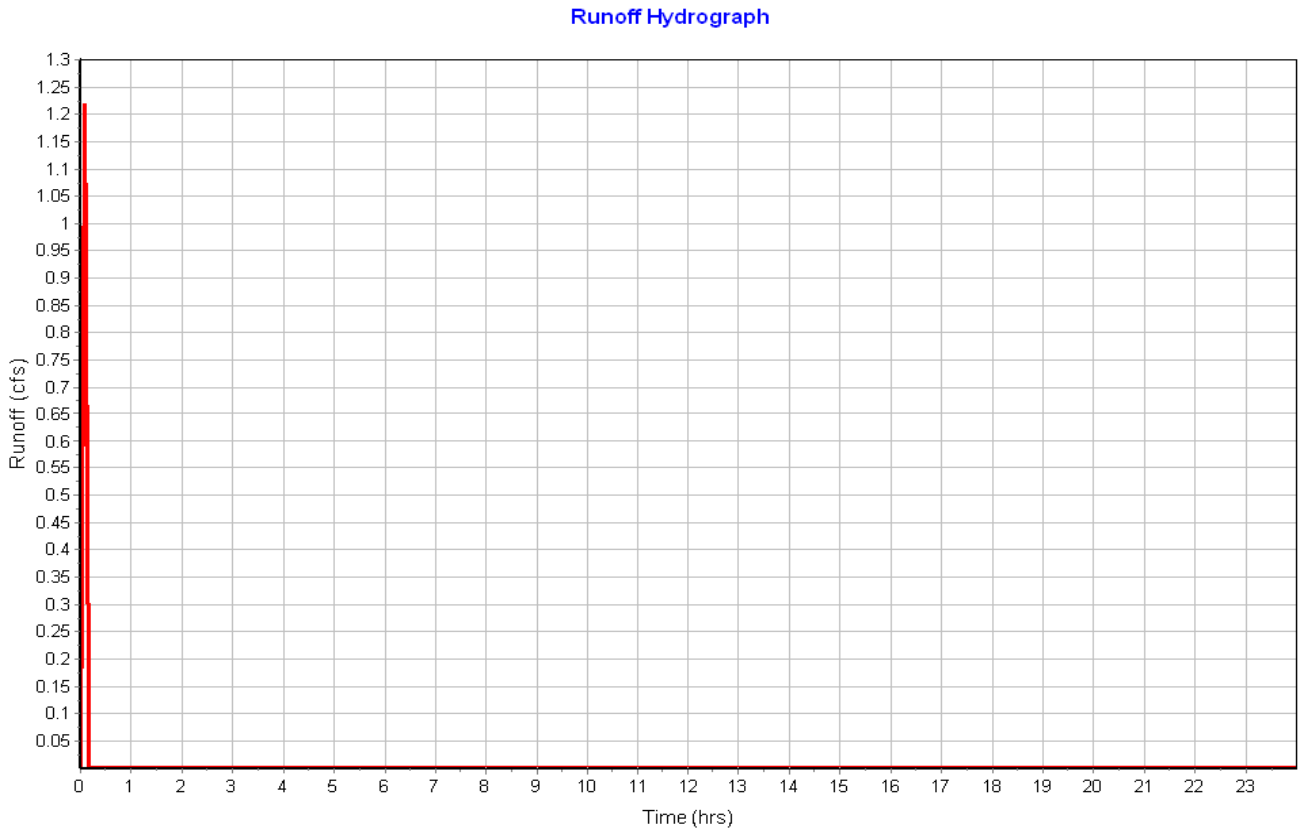
Total TOC (min) 1.91

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.22
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:55

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.30



Subbasin : {STORM PHASE 2}.31

Input Data

Area (ac) 0.39
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.39	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.39		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	252	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	24.07	0.00	0.00

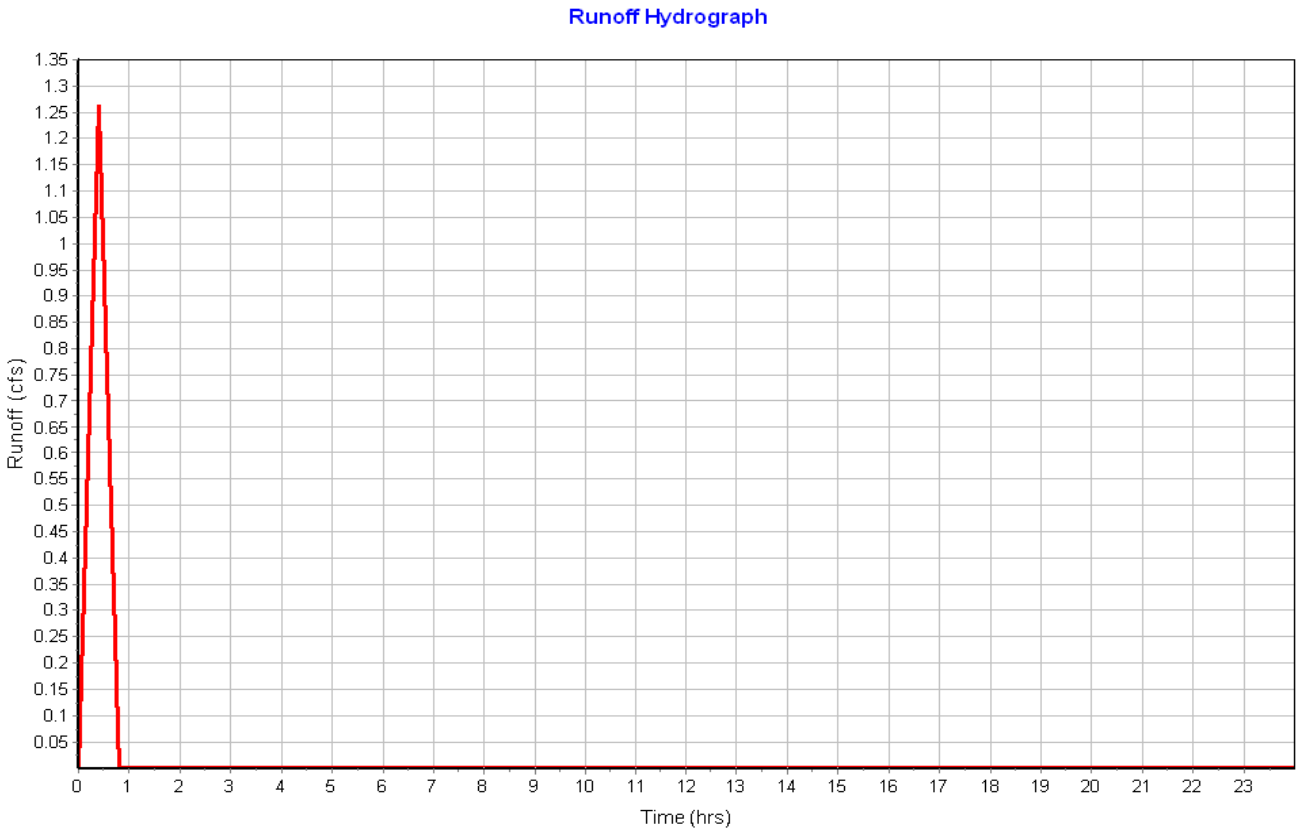
Total TOC (min) 24.07

Subbasin Runoff Results

Total Rainfall (in) 2.51
Total Runoff (in) 1.30
Peak Runoff (cfs) 1.26
Rainfall Intensity 6.272
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:24:04

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.31



Subbasin : {STORM PHASE 2}.35

Input Data

Area (ac) 0.97
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.97	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.97		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	405	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.19	0.00	0.00
Computed Flow Time (min) :	34.63	0.00	0.00

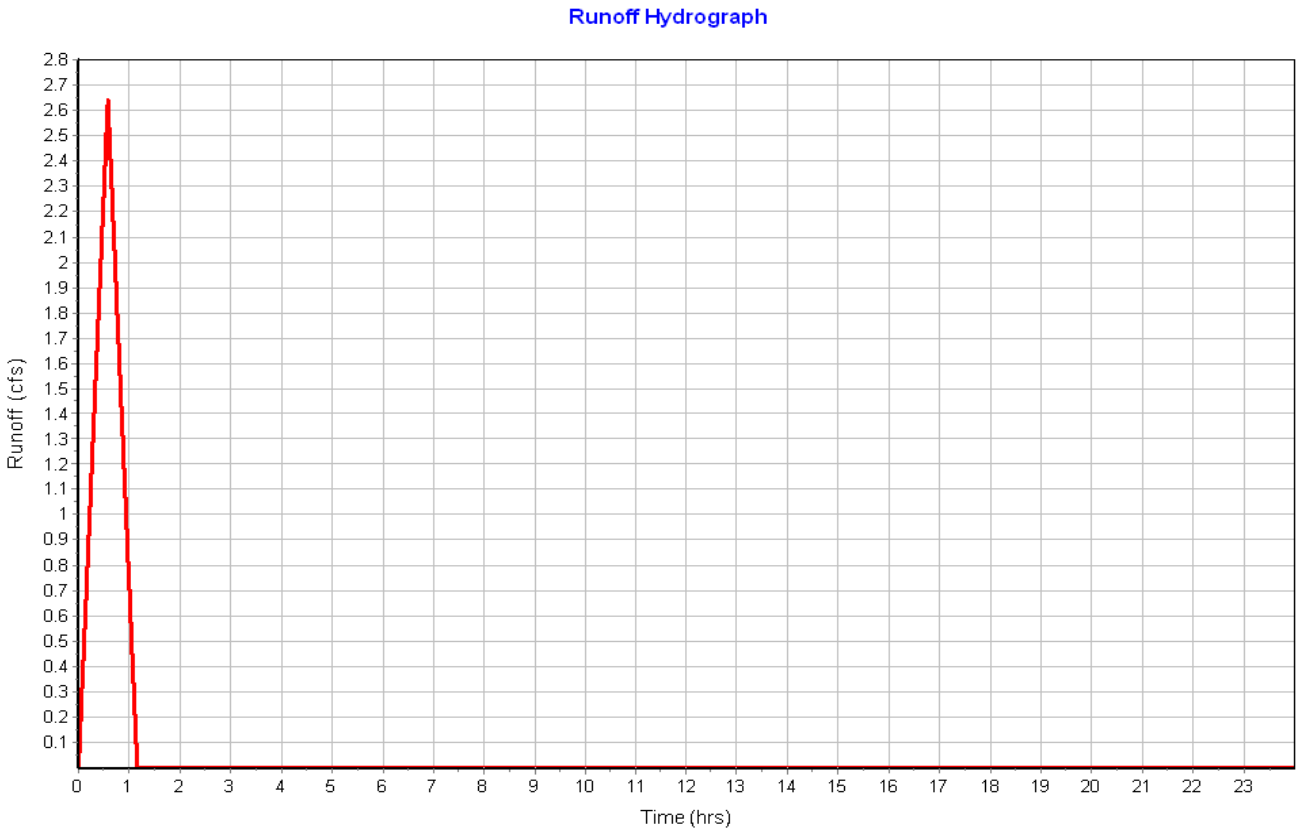
Total TOC (min) 34.63

Subbasin Runoff Results

Total Rainfall (in) 3.03
Total Runoff (in) 1.58
Peak Runoff (cfs) 2.64
Rainfall Intensity 5.241
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:34:38

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.35



Subbasin : {STORM PHASE 2}.36

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.34	0.00	0.00
Computed Flow Time (min) :	1.24	0.00	0.00

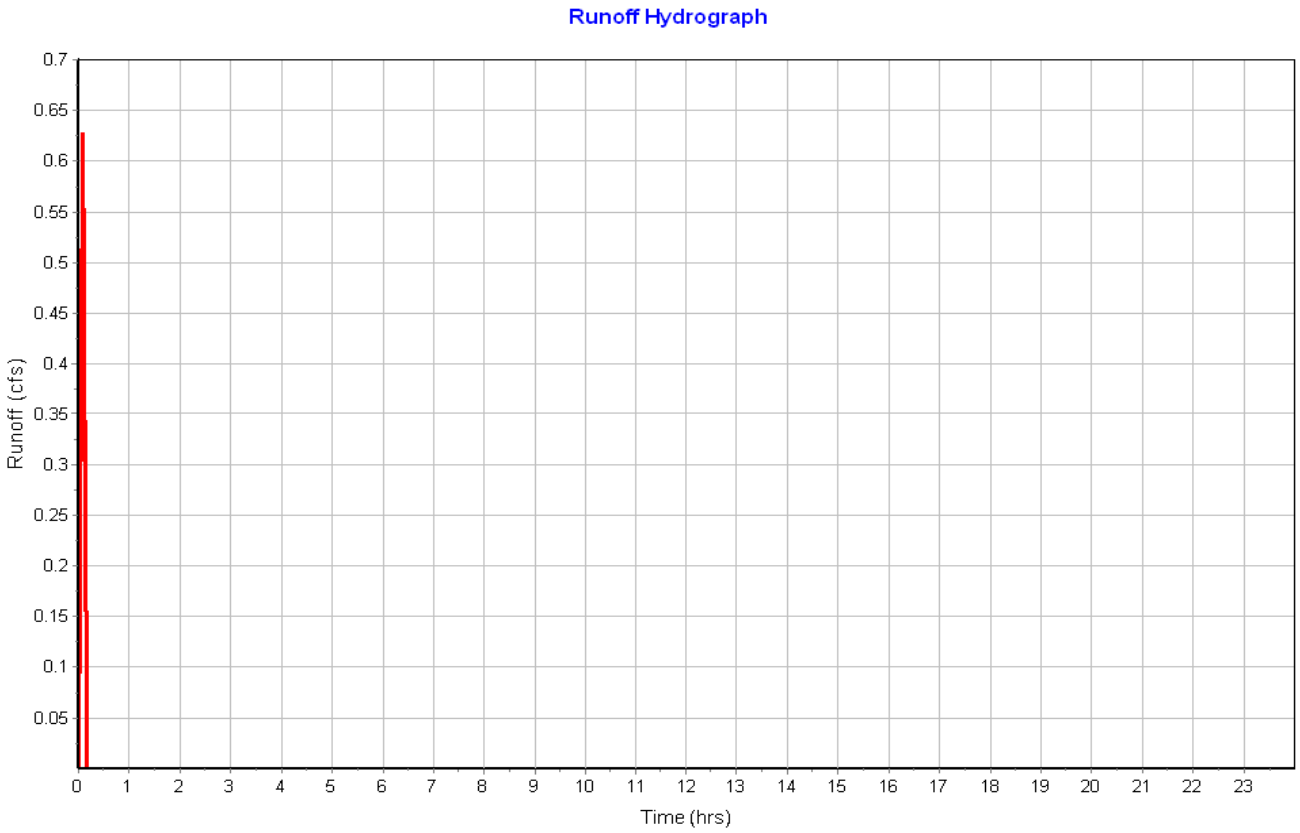
Total TOC (min) 1.24

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.63
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:14

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.36



Subbasin : {STORM PHASE 2}.37

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.09	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.09		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	185	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.69	0.00	0.00
Computed Flow Time (min) :	1.82	0.00	0.00

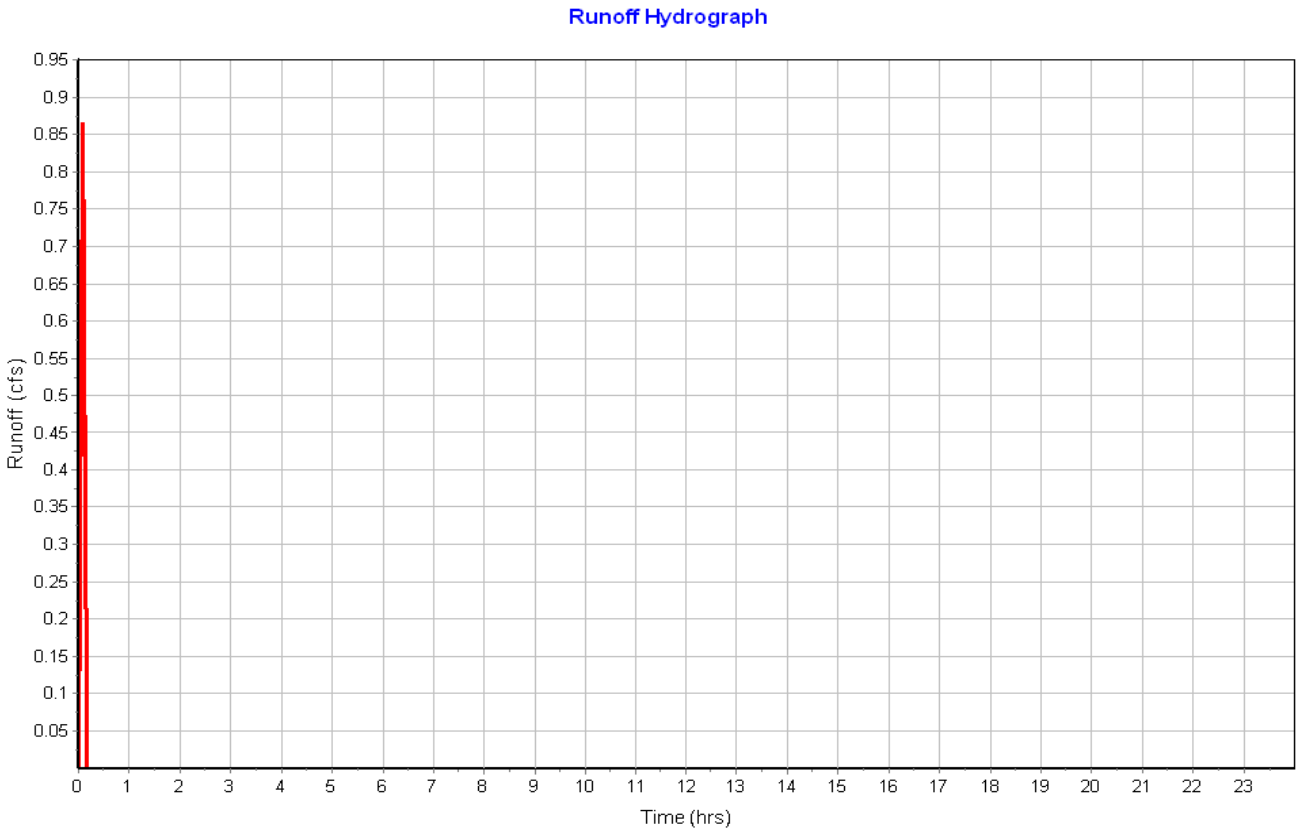
Total TOC (min) 1.82

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.86
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:49

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.37



Subbasin : {STORM PHASE 2}.38

Input Data

Area (ac) 0.17
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.17	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.17		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	211	0.00	0.00
Slope (%) :	2.7	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	20.25	0.00	0.00

Total TOC (min) 20.25

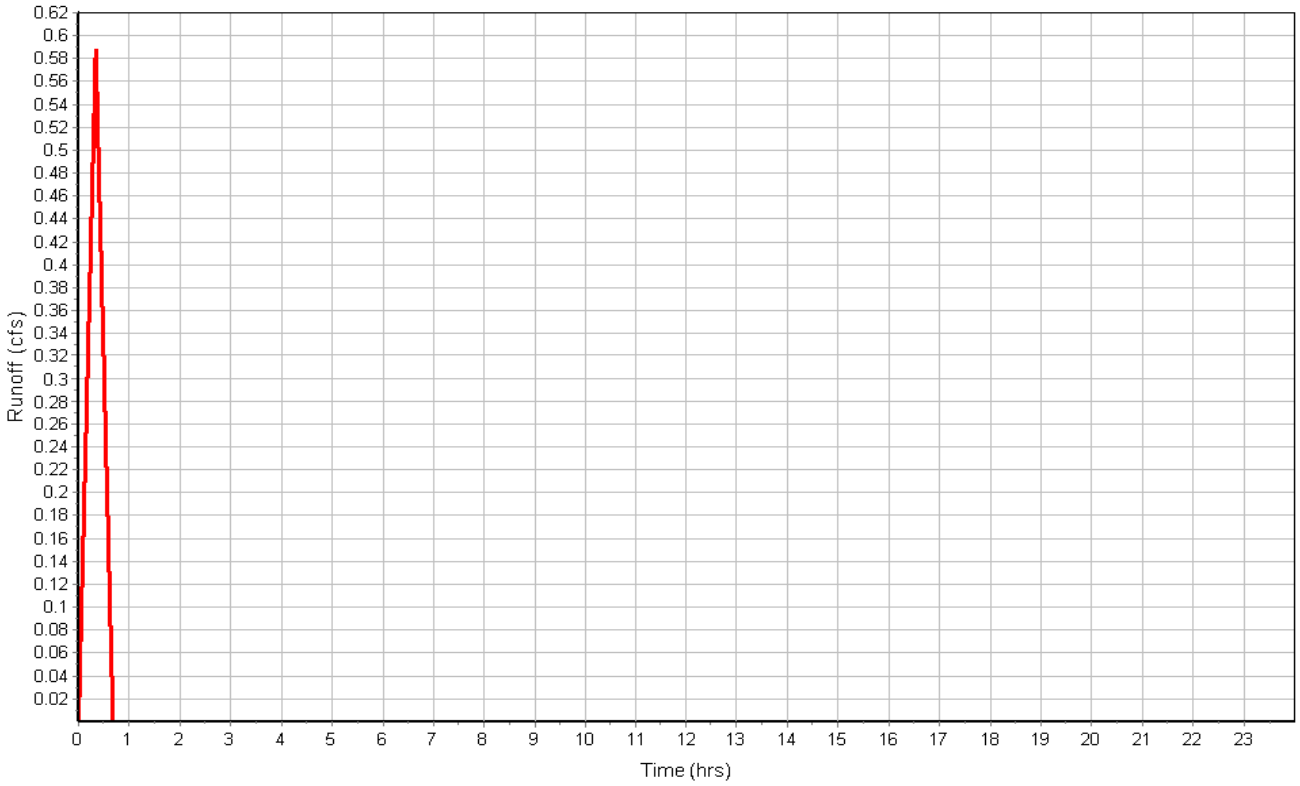
Subbasin Runoff Results

Total Rainfall (in) 2.29
Total Runoff (in) 1.19
Peak Runoff (cfs) 0.59
Rainfall Intensity 6.760
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:20:15

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.38

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.39

Input Data

Area (ac) 0.02
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.02	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.02		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.04	0.00	0.00
Computed Flow Time (min) :	0.40	0.00	0.00

Total TOC (min) 0.40

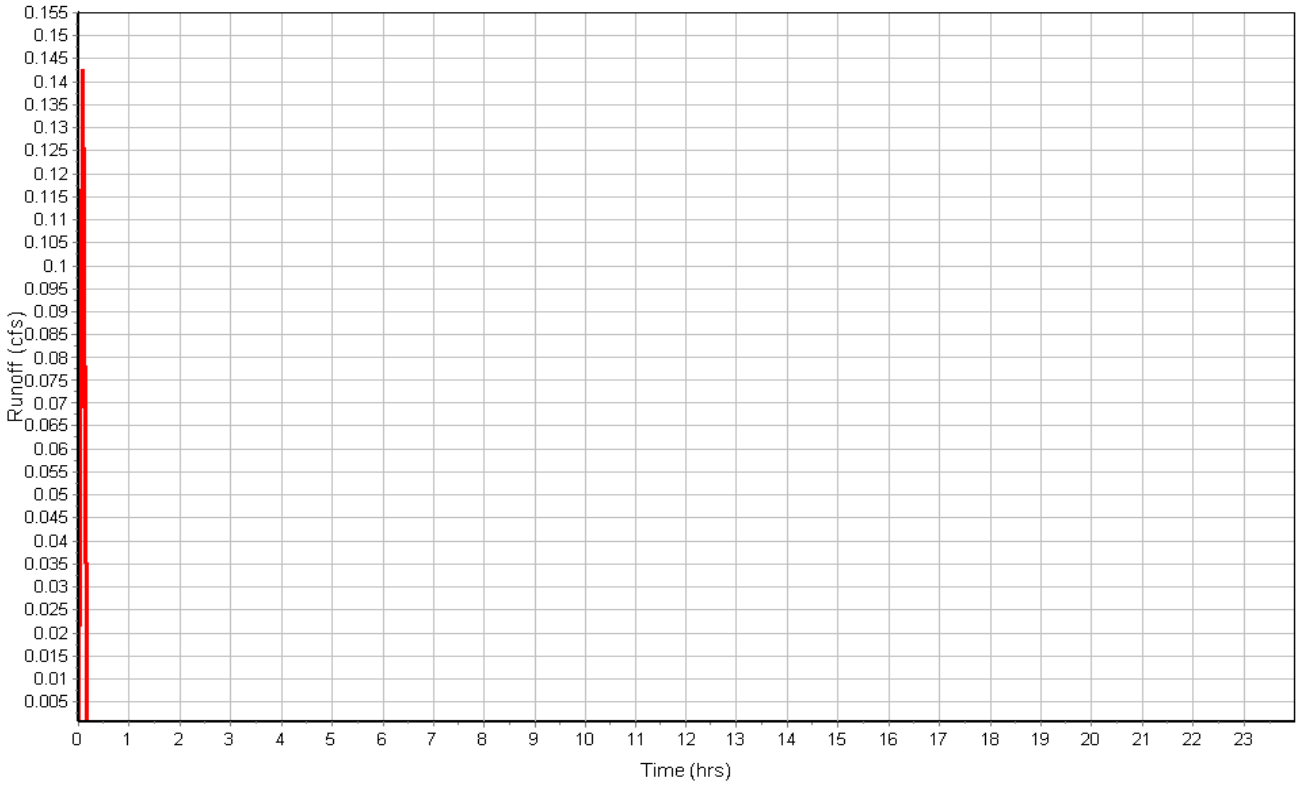
Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.14
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:00:24

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.39

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.4

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	195	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0.00	0.00
Computed Flow Time (min) :	1.13	0.00	0.00

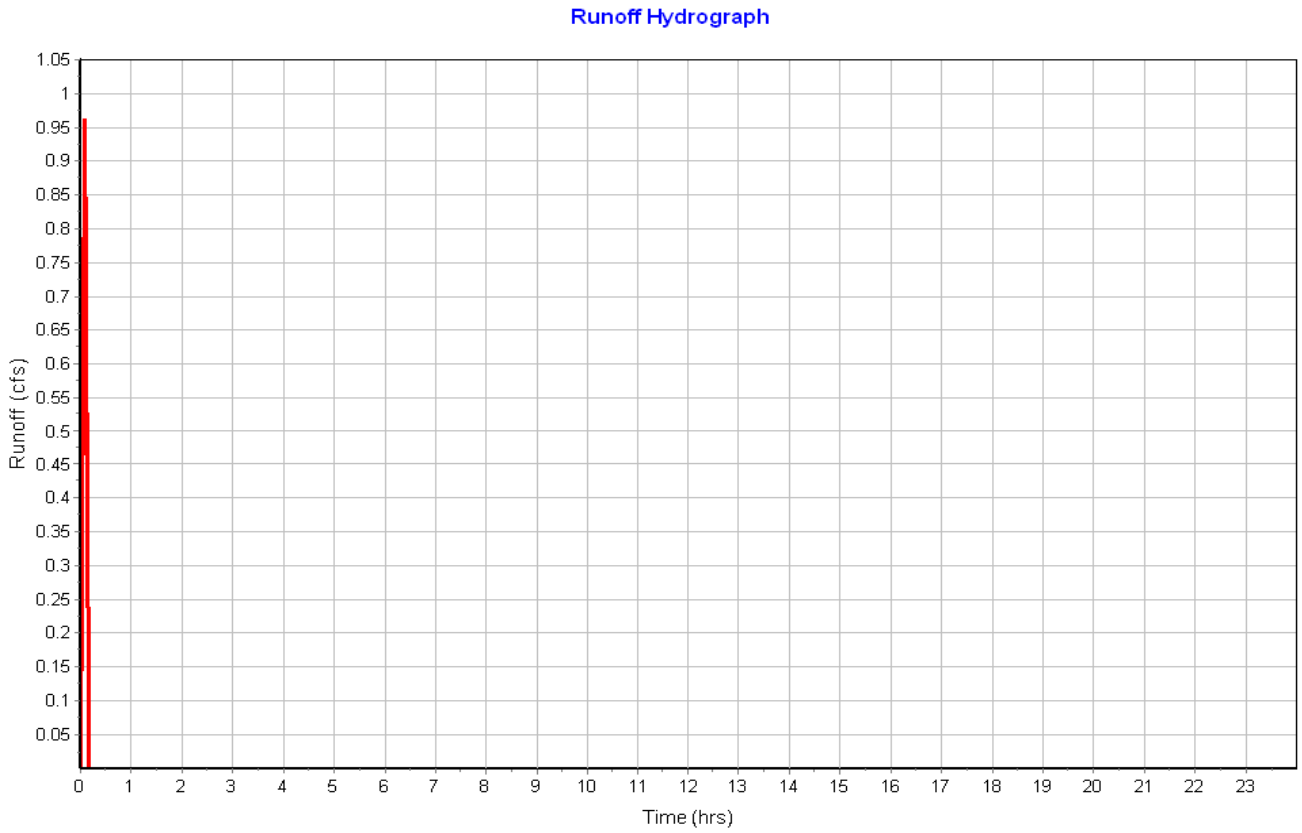
Total TOC (min) 1.39

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.96
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:23

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.4



Subbasin : {STORM PHASE 2}.40

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	1.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.36	0.00	0.00
Computed Flow Time (min) :	2.45	0.00	0.00

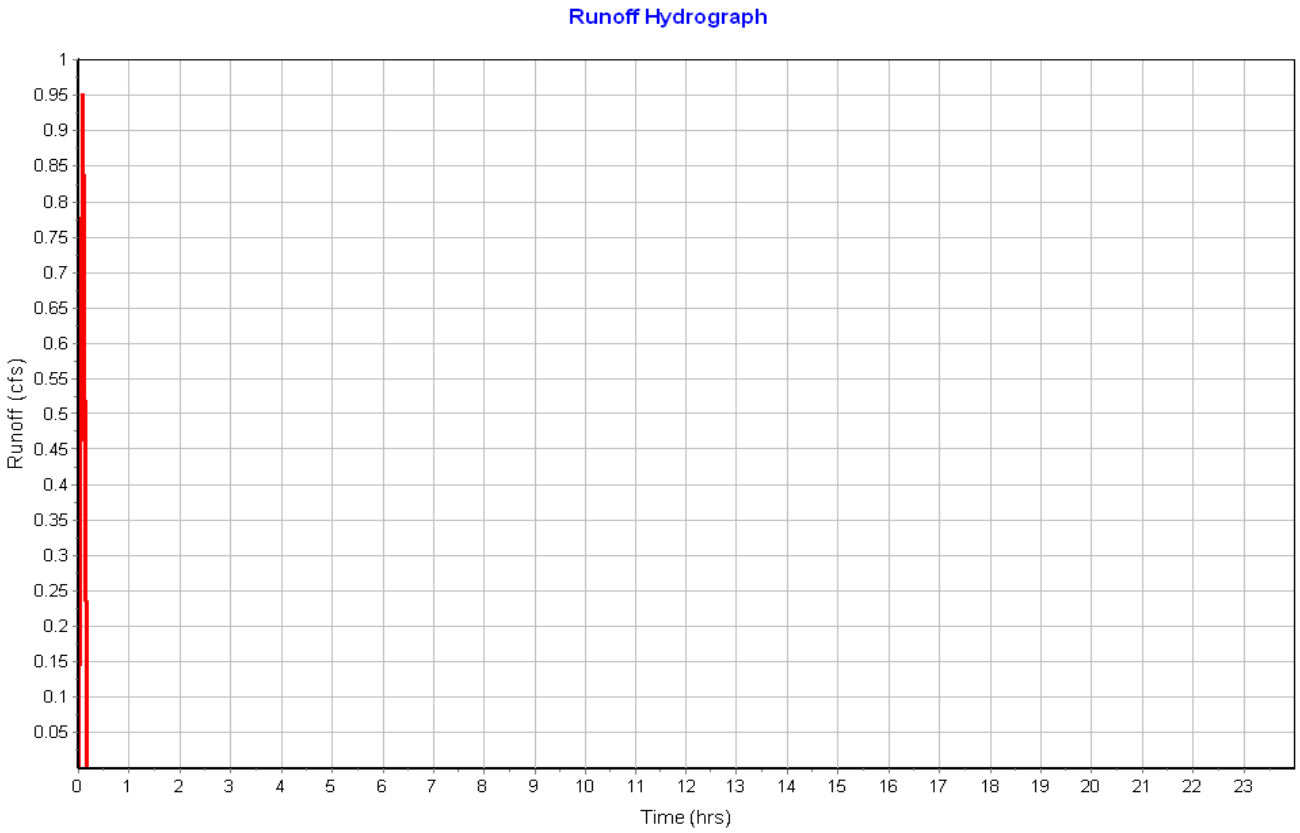
Total TOC (min) 2.45

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.95
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:27

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.40



Subbasin : {STORM PHASE 2}.41

Input Data

Area (ac) 0.20
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.20	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.20		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	394	0.00	0.00
Slope (%) :	2.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.90	0.00	0.00
Computed Flow Time (min) :	3.45	0.00	0.00

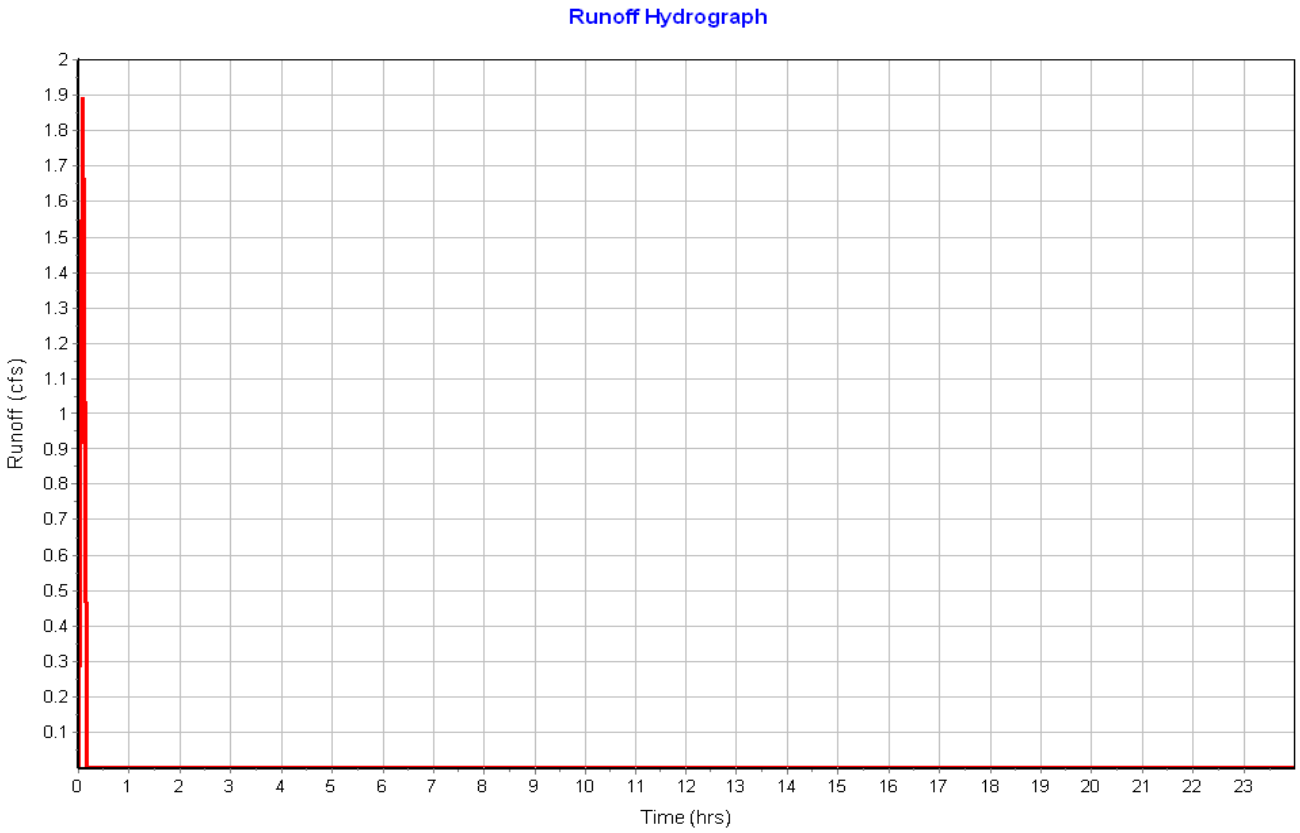
Total TOC (min) 3.45

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.89
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:27

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.41



Subbasin : {STORM PHASE 2}.45

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	222	0.00	0.00
Slope (%) :	2.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.83	0.00	0.00
Computed Flow Time (min) :	2.02	0.00	0.00

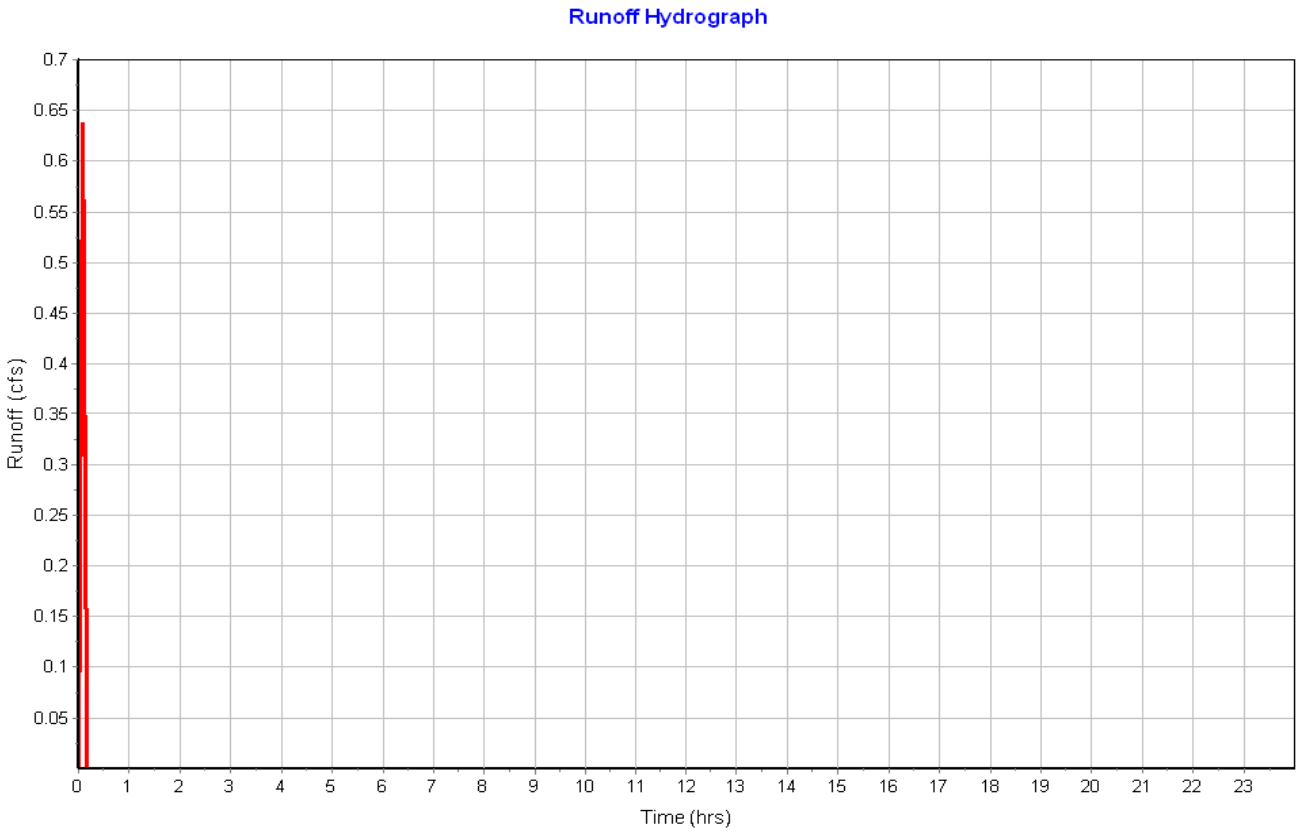
Total TOC (min) 2.02

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.64
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:01

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.45



Subbasin : {STORM PHASE 2}.48

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.09	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.09		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	151	0.00	0.00
Slope (%) :	2.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.70	0.00	0.00
Computed Flow Time (min) :	1.48	0.00	0.00

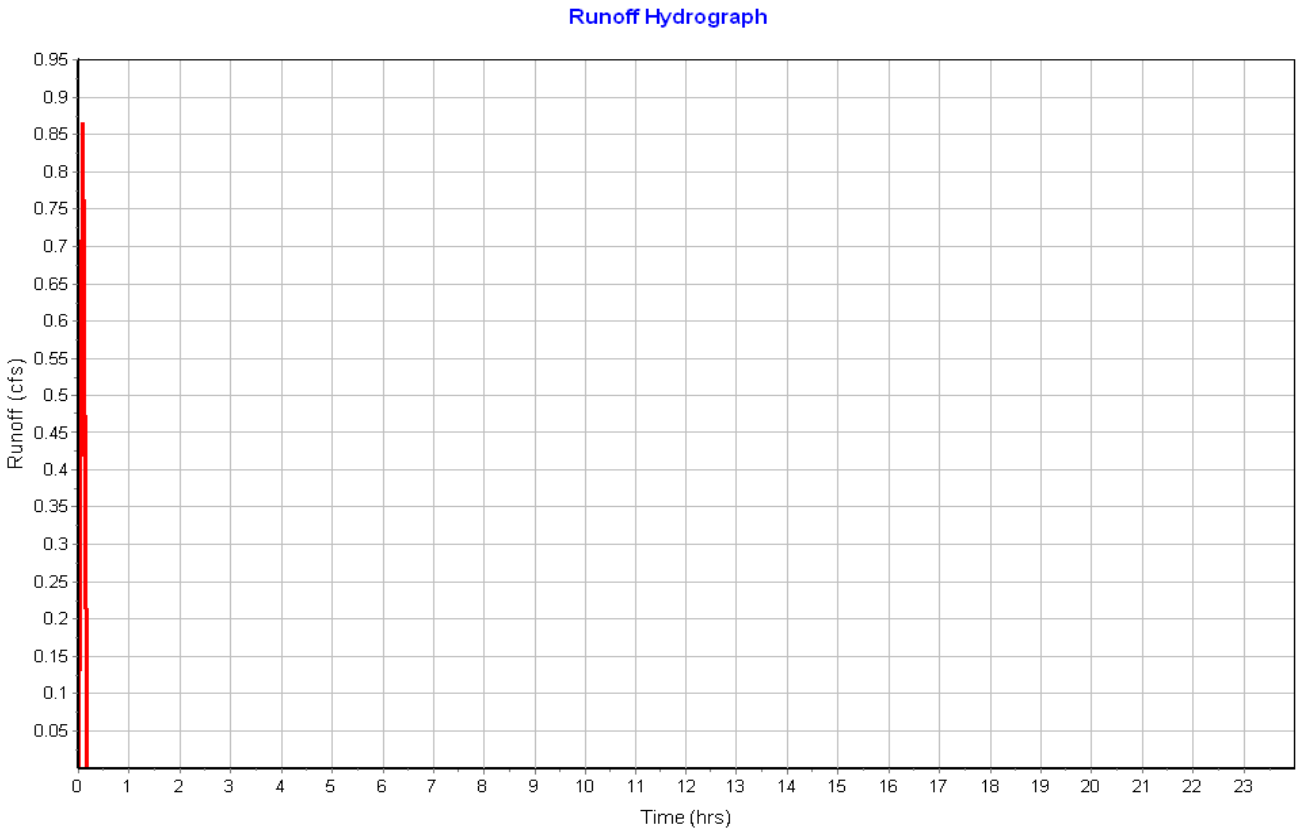
Total TOC (min) 1.48

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.86
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:29

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.48



Subbasin : {STORM PHASE 2}.5

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.13	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.13		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	213	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	23.00	0.00	0.00

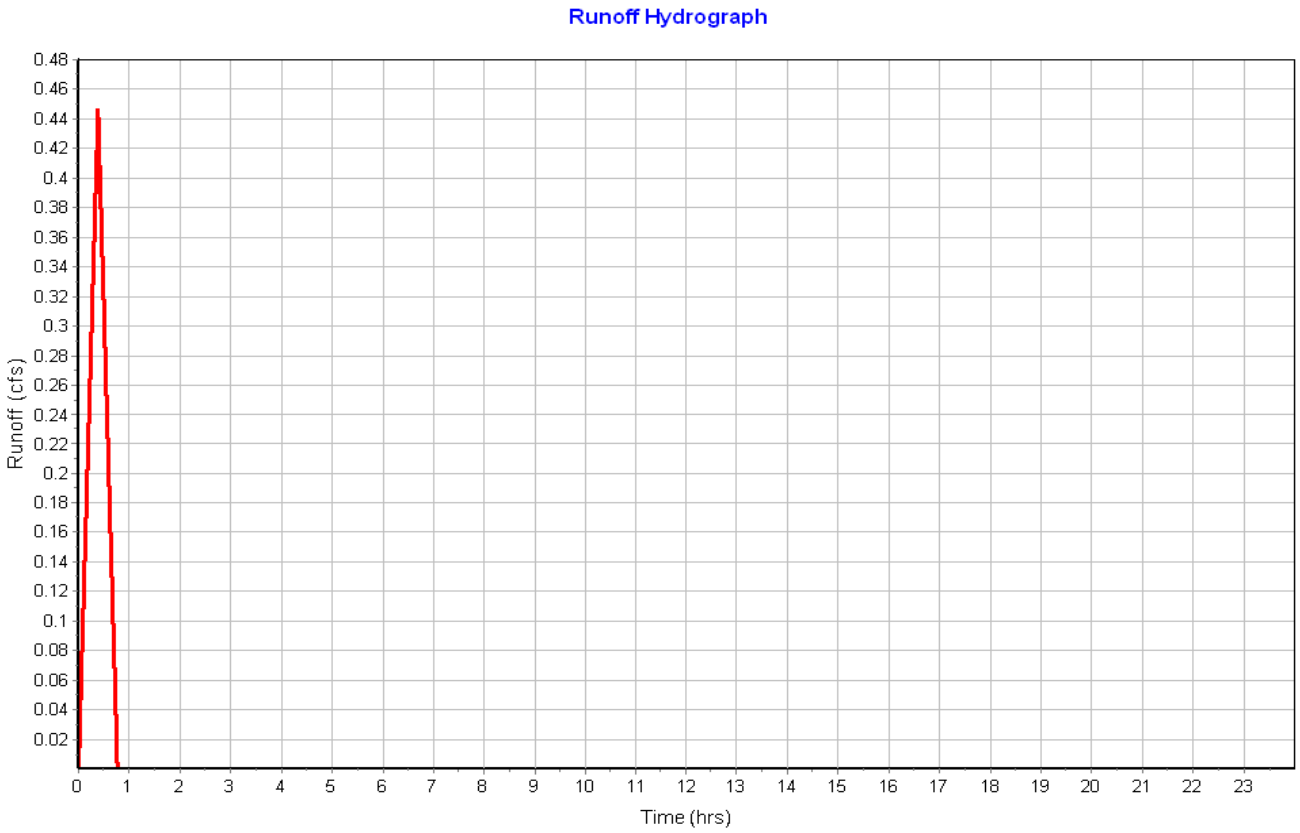
Total TOC (min) 23.00

Subbasin Runoff Results

Total Rainfall (in) 2.45
Total Runoff (in) 1.28
Peak Runoff (cfs) 0.45
Rainfall Intensity 6.397
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:23:00

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.5



Subbasin : {STORM PHASE 2}.6

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.13	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.13		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	240	0.00	0.00
Slope (%) :	2.9	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	3.46	0.00	0.00
Computed Flow Time (min) :	1.16	0.00	0.00

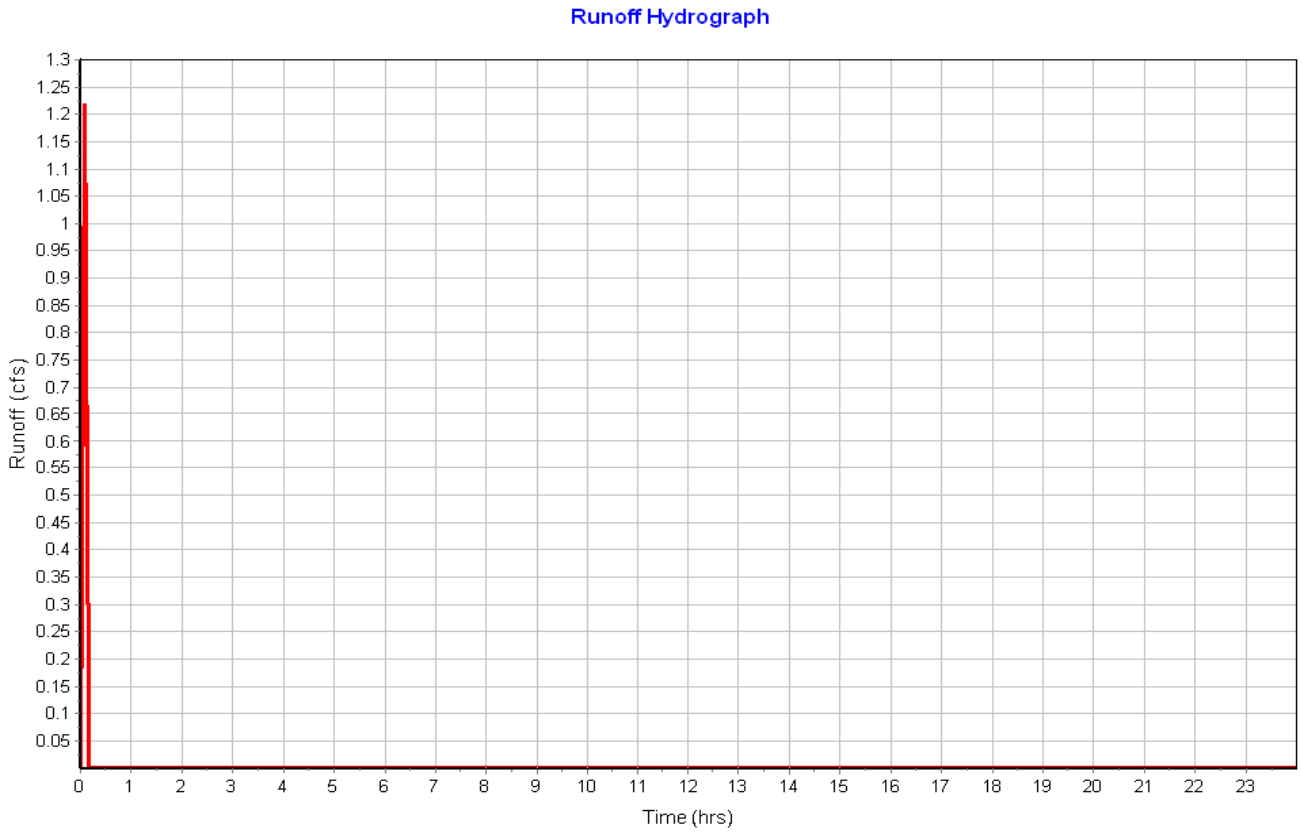
Total TOC (min) 1.41

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.22
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:25

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.6



Subbasin : {STORM PHASE 2}.8

Input Data

Area (ac) 0.36
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.36	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.36		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	233	0.00	0.00
Slope (%) :	1.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.55	0.00	0.00
Computed Flow Time (min) :	2.50	0.00	0.00

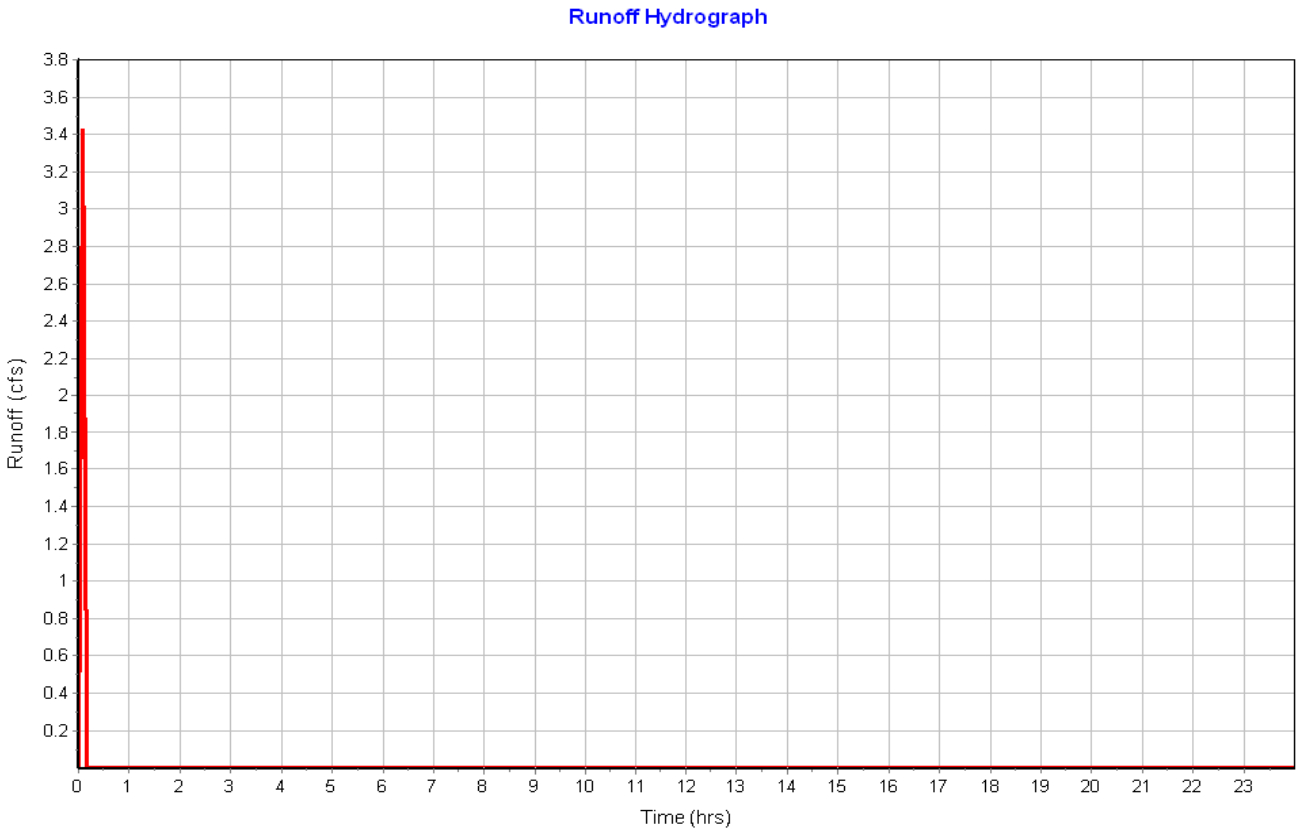
Total TOC (min) 2.50

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 3.42
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:30

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.8



Subbasin : {STORM PHASE 2}.9

Input Data

Area (ac) 0.80
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.80	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.80		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	366	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.19	0.00	0.00
Computed Flow Time (min) :	31.93	0.00	0.00

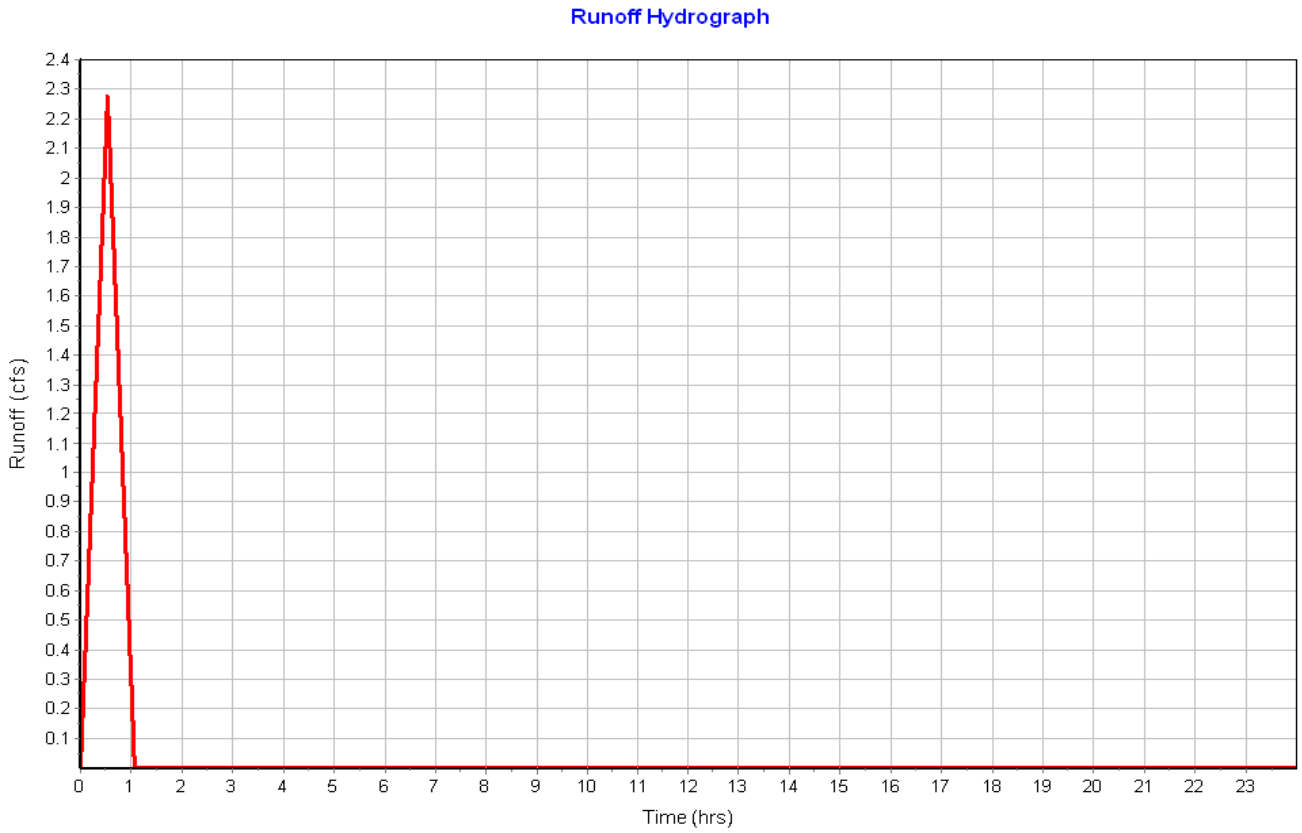
Total TOC (min) 31.93

Subbasin Runoff Results

Total Rainfall (in) 2.93
Total Runoff (in) 1.52
Peak Runoff (cfs) 2.28
Rainfall Intensity 5.496
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:56

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.9



Subbasin : 49

Input Data

Area (ac) 23.80
Weighted Runoff Coefficient 0.5000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Meadow, 25 years or greater	23.80	D (6%+)	0.50
Composite Area & Weighted Runoff Coeff.	23.80		0.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	1132	0.00	0.00
Slope (%) :	3.1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	110.52	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	720	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	13.79	0.00	0.00

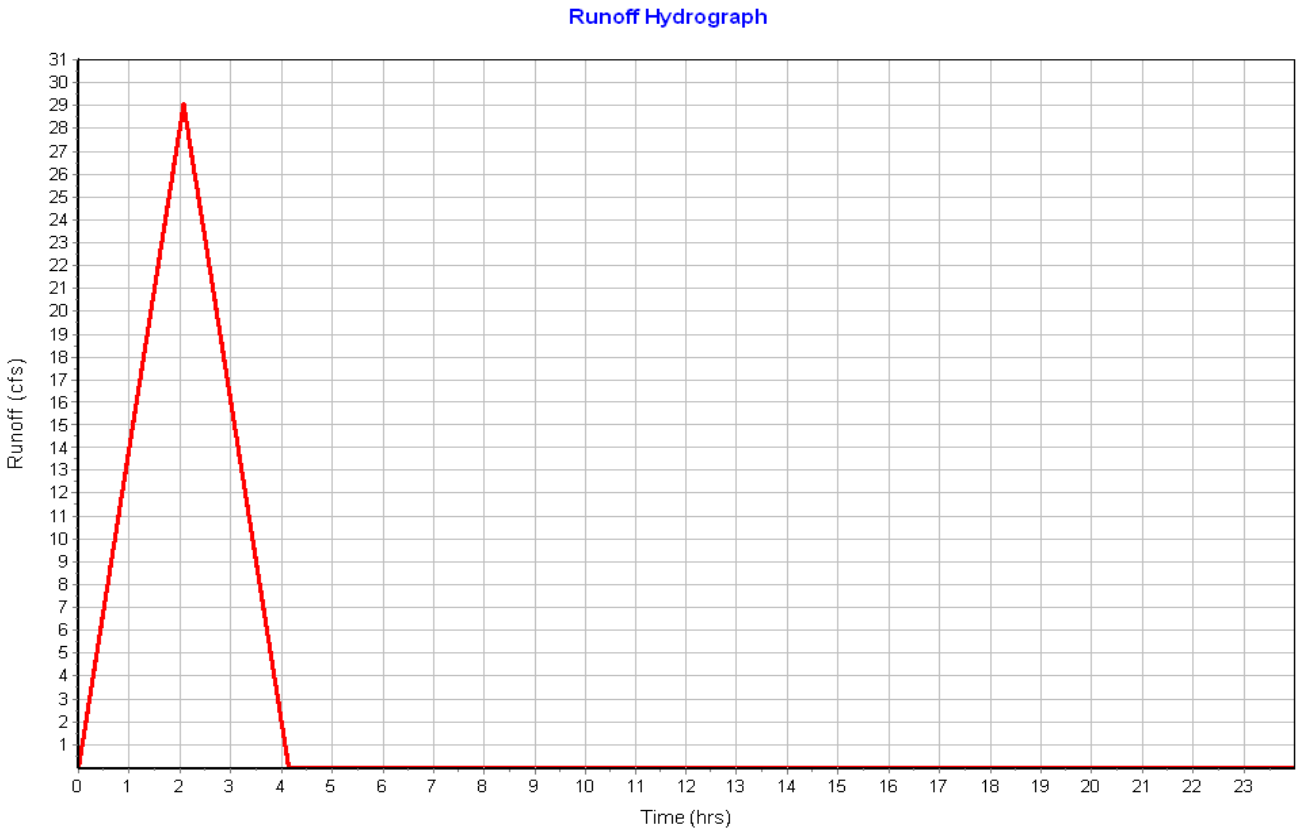
Total TOC (min) 124.32

Subbasin Runoff Results

Total Rainfall (in) 5.06
Total Runoff (in) 2.53
Peak Runoff (cfs) 29.05
Rainfall Intensity 2.441
Weighted Runoff Coefficient 0.5000
Time of Concentration (days hh:mm:ss) 0 02:04:19

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : 49



Subbasin : 50

Input Data

Area (ac) 14.60
Weighted Runoff Coefficient 0.5000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Meadow, 25 years or greater	14.60	D (6%+)	0.50
Composite Area & Weighted Runoff Coeff.	14.60		0.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	525	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	65.14	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	290	0.00	0.00
Slope (%) :	1	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.50	0.00	0.00
Computed Flow Time (min) :	9.67	0.00	0.00

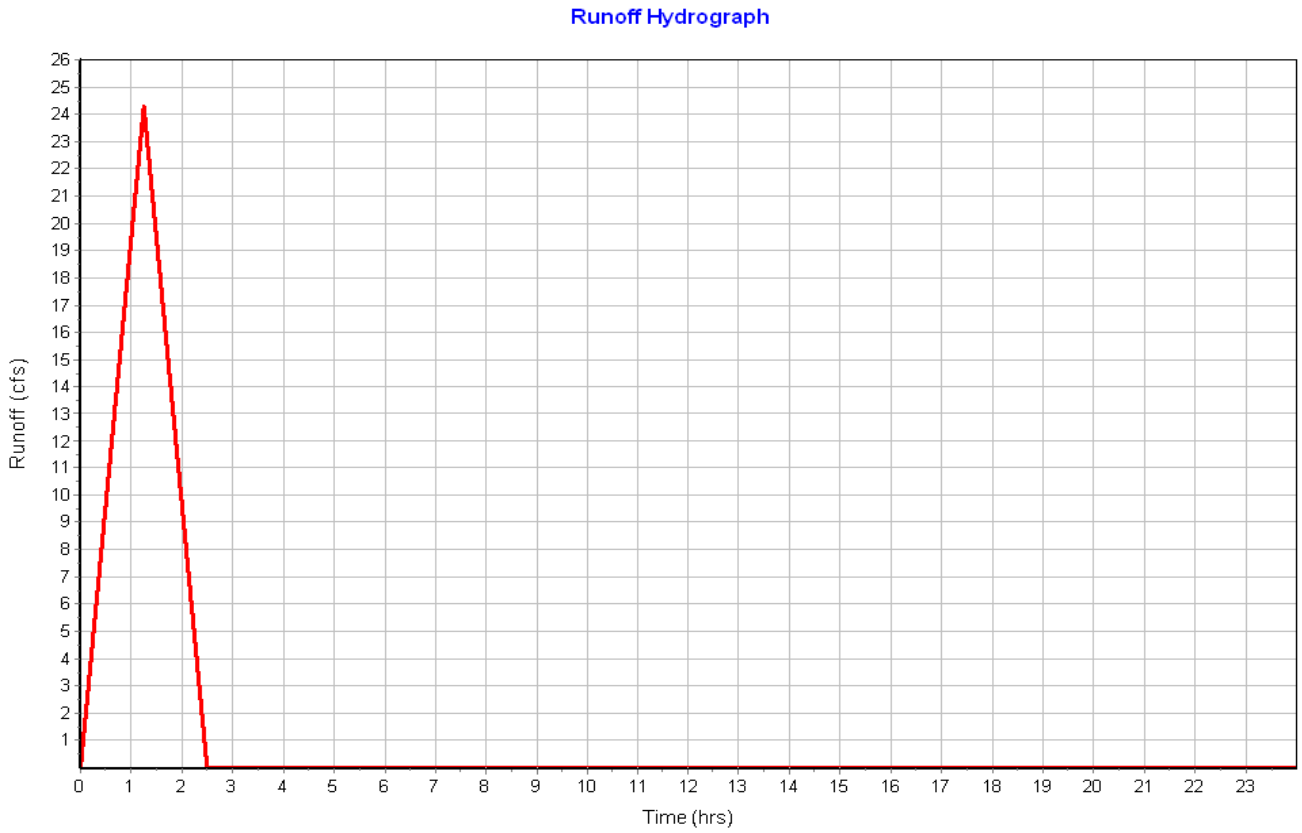
Total TOC (min) 74.81

Subbasin Runoff Results

Total Rainfall (in) 4.15
Total Runoff (in) 2.07
Peak Runoff (cfs) 24.28
Rainfall Intensity 3.326
Weighted Runoff Coefficient 0.5000
Time of Concentration (days hh:mm:ss) 0 01:14:49

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : 50



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	{STORM BJ2-1}.FES - L1	447.00	450.00	3.00	447.00	0.00	450.00	0.00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	443.25	445.00	1.75	443.25	0.00	445.00	0.00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	443.00	445.00	2.00	443.00	0.00	445.00	0.00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	451.28	455.85	4.57	451.28	0.00	455.85	0.00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	445.40	449.19	3.79	445.40	0.00	449.19	0.00	0.00	0.00
6	FES-F1	448.75	457.43	8.68	448.75	0.00	457.43	0.00	0.00	0.00
7	FES-P1_KBBARNES	433.25	435.00	1.75	433.25	0.00	435.00	0.00	0.00	0.00
8	FES-P2_KBBARNES	433.00	435.00	2.00	433.00	0.00	435.00	0.00	0.00	0.00
9	StartNullStruct41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.FES - L1	2.64	2.64	447.47	0.47	0.00	2.53	447.02	0.02	0 00:34	0 00:00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	28.85	0.00	444.65	1.40	0.00	0.60	443.42	0.17	0 02:06	0 00:00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	28.85	0.00	444.57	1.57	0.00	0.45	443.21	0.21	0 02:06	0 00:00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	6.40	0.00	452.01	0.73	0.00	3.84	451.40	0.12	0 00:06	0 00:00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	10.69	0.00	446.52	1.12	0.00	2.67	445.53	0.13	0 00:06	0 00:00	0.00	0.00
6	FES-F1	29.05	29.05	450.15	1.40	0.00	7.28	448.92	0.17	0 02:04	0 00:00	0.00	0.00
7	FES-P1_KBBARNES	39.46	24.28	434.82	1.57	0.00	0.43	433.47	0.22	0 01:15	0 00:00	0.00	0.00
8	FES-P2_KBBARNES	39.45	0.00	434.57	1.57	0.00	0.43	433.20	0.20	0 01:15	0 00:00	0.00	0.00
9	StartNullStruct41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00:00	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	BYPASS_K1	395.48	453.99	4.39	444.81	4.01	9.18	2.3200	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	Yes
2	BYPASS_N1	29.94	444.81	4.01	443.80	3.80	1.01	3.3700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
3	DITCH-01	424.00	448.75	0.00	443.02	-0.23	5.73	1.3500	Trapezoidal	2.000	21.000	0.0800	0.5000	0.5000	0.0000	0.00	No
4	DITCH-02	970.00	443.00	0.00	433.25	0.00	9.75	1.0100	Trapezoidal	2.000	17.000	0.0800	0.5000	0.5000	0.0000	0.00	No
5	DITCH-03	262.00	433.00	0.00	431.98	0.00	1.02	0.3900	Triangular	2.000	100.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	GUTTER_F2	250.05	461.10	5.10	453.34	4.00	7.76	3.1000	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
7	GUTTER_F3	199.54	465.23	5.00	461.10	5.10	4.13	2.0700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
8	GUTTER_G1	245.65	460.52	3.92	453.34	4.00	7.18	2.9200	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
9	GUTTER_H2	191.92	462.65	5.00	459.83	4.03	2.82	1.4700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
10	GUTTER_H7	180.42	450.00	5.10	445.14	4.89	4.86	2.6900	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
11	GUTTER_H8	31.05	445.14	4.89	443.30	3.80	1.84	5.9300	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
12	GUTTER_I1	191.92	462.65	4.40	461.09	4.69	1.56	0.8100	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
13	GUTTER-H3	260.86	459.83	4.03	454.37	5.37	5.46	2.0900	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
14	GUTTER-H5	155.79	454.37	5.37	451.66	5.00	2.71	1.7400	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
15	GUTTER-J1	224.65	461.09	4.69	457.58	5.83	3.51	1.5600	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	BYPASS_K1	0.01	0 00:07	20.05	0.00	3.52	1.87	0.02	0.04	0.00		
2	BYPASS_N1	0.17	0 00:05	18.75	0.01	4.19	0.12	0.08	0.17	0.00		
3	DITCH-01	28.85	0 02:06	62.45	0.46	1.97	3.59	1.39	0.70	0.00		
4	DITCH-02	28.51	0 02:11	47.45	0.60	1.91	8.46	1.56	0.78	0.00		
5	DITCH-03	39.25	0 01:17	289.59	0.14	1.76	2.48	0.95	0.47	0.00		
6	GUTTER_F2	0.23	0 00:06	18.90	0.01	3.14	1.33	0.09	0.19	0.00		
7	GUTTER_F3	0.08	0 00:06	21.08	0.00	3.34	1.00	0.06	0.12	0.00		
8	GUTTER_G1	0.27	0 00:06	19.52	0.01	6.39	0.64	0.10	0.19	0.00		
9	GUTTER_H2	0.30	0 00:06	12.23	0.02	4.63	0.69	0.12	0.24	0.00		
10	GUTTER_H7	0.00	0 00:00	20.34	0.00	0.00		0.00	0.00	0.00		
11	GUTTER_H8	0.01	0 00:05	25.22	0.00	1.40	0.37	0.03	0.05	0.00		
12	GUTTER_I1	0.10	0 00:30	14.64	0.01	3.68	0.87	0.08	0.15	0.00		
13	GUTTER-H3	0.08	0 00:07	19.15	0.00	5.24	0.83	0.06	0.11	0.00		
14	GUTTER-H5	0.31	0 00:05	18.59	0.02	5.04	0.52	0.11	0.21	0.00		
15	GUTTER-J1	0.43	0 00:38	16.02	0.03	2.82	1.33	0.13	0.26	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)
1	{STORM BJ2-1}.PIPE - H7	180.51	444.90	0.00	440.35	0.10	4.55	2.5200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
2	{STORM BJ2-1}.PIPE - H8	31.04	440.25	0.00	439.50	0.00	0.75	2.4200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
3	{STORM BJ2-1}.PIPE - L1	84.01	447.00	0.00	445.50	0.10	1.50	1.7900	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00
4	{STORM BJ2-1}.PIPE - M1	48.34	446.66	0.00	445.50	0.10	1.16	2.4000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
5	{STORM BJ2-1}.PIPE - N1	32.00	440.80	0.00	440.35	0.10	0.45	1.4100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
6	{STORM BJ2-1}.PIPE F1	99.06	449.34	0.00	448.75	0.00	0.59	0.6000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
7	{STORM BJ2-1}.PIPE F2	250.16	456.00	0.00	449.44	0.10	6.56	2.6200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
8	{STORM BJ2-1}.PIPE G1	32.00	456.60	0.00	456.10	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
9	{STORM BJ2-1}.PIPE H5	183.29	449.00	0.00	445.50	0.10	3.50	1.9100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
10	{STORM BJ2-1}.PIPE -H6	31.79	445.40	0.00	445.00	0.10	0.40	1.2600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
11	{STORM BJ2-1}.PIPE_F3	199.59	460.23	0.00	456.10	0.10	4.13	2.0700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
12	{STORM BJ2-1}.PIPE-H1	32.00	458.25	0.00	457.75	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
13	{STORM BJ2-1}.PIPE-H2	191.94	457.65	0.00	455.90	0.10	1.75	0.9100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
14	{STORM BJ2-1}.PIPE-H3	260.88	455.80	0.00	451.38	0.10	4.42	1.6900	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
15	{STORM BJ2-1}.PIPE-H4	96.77	451.28	0.00	449.10	0.10	2.18	2.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
16	{STORM BJ2-1}.PIPE-I1	32.00	456.40	0.00	455.90	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
17	{STORM BJ2-1}.PIPE-J1	48.34	451.75	0.00	451.38	0.10	0.37	0.7700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
18	{STORM BJ2-1}.PIPE-K1	32.00	449.60	0.00	449.10	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
19	{STORM BJ2-1}.PIPE-O1	29.87	443.15	-0.10	443.02	0.02	0.13	0.4400	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00
20	{STORM BJ2-1}.PIPE-P1	22.81	433.25	0.00	433.00	0.00	0.25	1.1000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Flap Gate	No. of Barrels
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	2
No	2

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	{STORM BJ2-1}.PIPE - H7	11.17	0 00:06	16.68	0.67	10.15	0.30	0.90	0.60	0.00		Calculated
2	{STORM BJ2-1}.PIPE - H8	13.44	0 00:06	16.33	0.82	10.32	0.05	1.04	0.69	0.00		Calculated
3	{STORM BJ2-1}.PIPE - L1	2.64	0 00:34	12.16	0.22	5.50	0.25	0.47	0.32	0.00		Calculated
4	{STORM BJ2-1}.PIPE - M1	1.70	0 00:05	16.27	0.10	5.97	0.13	0.33	0.22	0.00		Calculated
5	{STORM BJ2-1}.PIPE - N1	1.71	0 00:05	12.46	0.14	4.95	0.11	0.37	0.25	0.00		Calculated
6	{STORM BJ2-1}.PIPE F1	7.86	0 00:05	8.11	0.97	5.29	0.31	1.19	0.79	0.00		Calculated
7	{STORM BJ2-1}.PIPE F2	2.83	0 00:05	17.01	0.17	7.20	0.58	0.41	0.28	0.00		Calculated
8	{STORM BJ2-1}.PIPE G1	1.55	0 00:05	13.13	0.12	5.79	0.09	0.35	0.23	0.00		Calculated
9	{STORM BJ2-1}.PIPE H5	8.65	0 00:06	14.52	0.60	8.61	0.35	0.83	0.56	0.00		Calculated
10	{STORM BJ2-1}.PIPE -H6	10.69	0 00:06	11.78	0.91	7.55	0.07	1.12	0.75	0.00		Calculated
11	{STORM BJ2-1}.PIPE_F3	0.53	0 00:05	15.11	0.04	4.52	0.74	0.19	0.13	0.00		Calculated
12	{STORM BJ2-1}.PIPE-H1	1.19	0 00:29	13.13	0.09	4.62	0.12	0.30	0.20	0.00		Calculated
13	{STORM BJ2-1}.PIPE-H2	2.69	0 00:05	10.03	0.27	4.87	0.66	0.53	0.35	0.00		Calculated
14	{STORM BJ2-1}.PIPE-H3	5.05	0 00:06	13.67	0.37	7.22	0.60	0.63	0.42	0.00		Calculated
15	{STORM BJ2-1}.PIPE-H4	6.39	0 00:06	15.77	0.41	8.47	0.19	0.66	0.44	0.00		Calculated
16	{STORM BJ2-1}.PIPE-I1	1.71	0 00:37	13.13	0.13	5.14	0.10	0.37	0.24	0.00		Calculated
17	{STORM BJ2-1}.PIPE-J1	2.71	0 00:38	9.19	0.29	4.52	0.18	0.56	0.37	0.00		Calculated
18	{STORM BJ2-1}.PIPE-K1	0.94	0 00:05	13.13	0.07	4.97	0.11	0.27	0.18	0.00		Calculated
19	{STORM BJ2-1}.PIPE-O1	28.85	0 02:06	34.48	0.84	6.14	0.08	1.40	0.70	0.00		Calculated
20	{STORM BJ2-1}.PIPE-P1	39.45	0 01:15	41.06	0.96	7.44	0.05	1.57	0.79	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	{STORM BJ2-1}.CB-F2	FHWA HEC-22 GENERIC	N/A	On Sag	1	449.34	454.86	5.52	449.34	0.00	0.00	0.00
2	{STORM BJ2-1}.CB-F4	FHWA HEC-22 GENERIC	N/A	On Grade	1	460.23	464.52	4.29	460.23	0.00	N/A	0.00
3	{STORM BJ2-1}.CB-G1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.60	459.94	3.34	456.60	0.00	N/A	0.00
4	{STORM BJ2-1}.CB-H1	FHWA HEC-22 GENERIC	N/A	On Grade	1	458.25	461.79	3.54	458.25	0.00	N/A	0.00
5	{STORM BJ2-1}.CB-H2	FHWA HEC-22 GENERIC	N/A	On Grade	1	457.65	461.12	3.47	457.65	0.00	N/A	0.00
6	{STORM BJ2-1}.CB-H5	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.00	452.86	3.86	449.00	0.00	N/A	0.00
7	{STORM BJ2-1}.CB-H7	FHWA HEC-22 GENERIC	N/A	On Grade	1	444.90	448.42	3.52	444.90	0.00	N/A	0.00
8	{STORM BJ2-1}.CB-I1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.40	459.56	3.16	456.40	0.00	N/A	0.00
9	{STORM BJ2-1}.CB-J1	FHWA HEC-22 GENERIC	N/A	On Sag	1	451.75	456.44	4.69	451.75	0.00	0.00	0.00
10	{STORM BJ2-1}.CB-K1	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.60	452.99	3.39	449.60	0.00	N/A	0.00
11	{STORM BJ2-1}.CB-M1	FHWA HEC-22 GENERIC	N/A	On Sag	1	446.66	449.94	3.28	446.66	0.00	0.00	0.00
12	{STORM BJ2-1}.CB-N1	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.80	444.37	3.57	440.80	0.00	N/A	0.00
13	CB-F3	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.00	459.71	3.71	456.00	0.00	N/A	0.00
14	CB-H3	FHWA HEC-22 GENERIC	N/A	On Grade	1	455.80	459.56	3.76	455.80	0.00	N/A	0.00
15	CB-H8	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.25	444.37	4.12	440.25	0.00	N/A	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	{STORM BJ2-1}.CB-F2	N/A	0.0200	0.0160	0.0620	2.00	0.0656	12.00
2	{STORM BJ2-1}.CB-F4	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
3	{STORM BJ2-1}.CB-G1	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
4	{STORM BJ2-1}.CB-H1	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
5	{STORM BJ2-1}.CB-H2	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
6	{STORM BJ2-1}.CB-H5	0.0190	0.0200	0.0160	0.0620	1.50	0.0656	12.00
7	{STORM BJ2-1}.CB-H7	0.0100	0.0200	0.0160	0.0620	2.00	0.0656	12.00
8	{STORM BJ2-1}.CB-I1	0.0170	0.0200	0.0160	0.0620	1.50	0.0656	12.00
9	{STORM BJ2-1}.CB-J1	N/A	0.0200	0.0160	0.0620	1.50	0.0656	12.00
10	{STORM BJ2-1}.CB-K1	0.0190	0.0200	0.0160	0.0620	2.00	0.0656	12.00
11	{STORM BJ2-1}.CB-M1	N/A	0.0200	0.0160	0.0620	1.50	0.0656	12.00
12	{STORM BJ2-1}.CB-N1	0.0100	0.0200	0.0160	0.0620	2.00	0.0656	12.00
13	CB-F3	0.0200	0.0200	0.0160	0.0620	2.00	0.0000	12.00
14	CB-H3	0.0170	0.0200	0.0160	0.0620	2.00	0.0656	12.00
15	CB-H8	0.0190	0.0200	0.0160	0.0620	2.00	0.0656	12.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.CB-F2	5.20	4.99	N/A	N/A	N/A	13.75	455.39	0.53	0 00:05	0.00	0.00
2	{STORM BJ2-1}.CB-F4	0.65	0.65	0.54	0.11	83.19	4.52	464.67	0.15	0 00:05	0.00	0.00
3	{STORM BJ2-1}.CB-G1	1.90	1.90	1.55	0.35	81.63	7.55	460.16	0.21	0 00:05	0.00	0.00
4	{STORM BJ2-1}.CB-H1	1.29	1.29	1.19	0.10	91.93	6.36	461.98	0.19	0 00:29	0.00	0.00
5	{STORM BJ2-1}.CB-H2	2.00	2.00	1.61	0.40	80.21	7.73	461.34	0.22	0 00:05	0.00	0.00
6	{STORM BJ2-1}.CB-H5	1.96	1.96	1.59	0.36	81.37	7.74	453.08	0.22	0 00:07	0.00	0.00
7	{STORM BJ2-1}.CB-H7	0.63	0.63	0.63	0.00	100.00	4.66	448.60	0.18	0 00:06	0.00	0.00
8	{STORM BJ2-1}.CB-I1	2.15	2.12	1.71	0.44	79.60	8.23	459.79	0.23	0 00:37	0.00	0.00
9	{STORM BJ2-1}.CB-J1	2.71	2.31	N/A	N/A	N/A	10.19	456.87	0.43	0 00:38	0.00	0.00
10	{STORM BJ2-1}.CB-K1	0.95	0.95	0.94	0.01	99.09	5.00	453.18	0.18	0 00:05	0.00	0.00
11	{STORM BJ2-1}.CB-M1	1.70	1.48	N/A	N/A	N/A	7.43	450.32	0.38	0 00:05	0.00	0.00
12	{STORM BJ2-1}.CB-N1	1.89	1.89	1.72	0.17	90.75	8.36	444.62	0.25	0 00:05	0.00	0.00
13	CB-F3	1.09	1.06	0.81	0.28	74.27	5.34	459.90	0.19	0 00:05	0.00	0.00
14	CB-H3	1.38	1.25	1.29	0.09	93.22	6.32	459.77	0.21	0 00:05	0.00	0.00
15	CB-H8	1.01	1.01	1.00	0.01	98.82	5.21	444.56	0.19	0 00:06	0.00	0.00

BY	REVISION	DATE

GNE Designing our client's success

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BENJAMIN GROVE SUBDIVISION
FOR THOMAS D.B.COLLINS, LTD.
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

CONTENTS:

DRAINAGE MAP

PROJECT NO:
16025

DATE:
JAN 2017

SHEET NO:
1

J:\Projects\2016 Projects\16025 Benjamin Grove Lee Parcel\Civil\Phase 2\Drainage\Benjamin Grove Drainage map phase 2 (1).dwg

Benjamin Grove
Sewage Lift Station
Lift Station Capacity

# of Homes =	86	
Equivalent Population =	258	People
Estimated Average Flow =	25800	gpd
Estimated Average Flow =	17.92	gpm
Calculated Peaking Factor =	4.11	gpm
Peak Flow =	73.56	gpm
I & I allowance	0	gpm
Design Flowrate =	73.56	
Say	**100**	**gpm**

City of Benton minimum lift station size is 100 gpm

Benjamin Grove
Sewage Lift Station
Lift Station Equivalent Pipe Length

First Pipe Diameter: 3

Item	Equivalent Length (feet)	Quantity	Total Equivalent Length (feet)
straight Pipe	1	30	30
90 degree bend	3.6	2	7.2
check valve	22	1	22
branch tee	7.7	1	7.7
plug valve	2.3	2	4.6
Total Length			71.5

Say **75 feet**

Benjamin Grove
Sewage Lift Station
Lift Station Total Dynamic Head

FM Discharge Elev =	457	feet
Top of Wetwell	442.5	feet
High Wetwell Level =	434.5	feet
Low Wetwell Level =	431	feet
Low Static Lift =	22.5	feet
High Static Lift =	26	feet
Design Flowrate	100	gpm
High C Factor =	150	
Low C Factor =	120	

High Point @ Discharge MH

1 Pump Running

Pipe Sees Flow from 1 Pump

Lift Station Pipe Diameter	3	inch
Pipe Velocity	4.538834	fps
Pipe Length	75	feet
Lift Station Low Headloss =	1.76	feet
Lift Station High Headloss =	2.65	feet

Pipe Sees Flow from 1 Pump

FM Diameter =	4	inch
FM Velocity	2.553094	fps
FM Length =	1300	feet
Minor Losses =	0	feet
Equivalent FM Length =	1300	feet
Force Main Low Headloss =	7.50	feet
Force Main High Headloss =	11.33	feet
Low Totoal Dynamic Head =	31.75	feet
High Totoal Dynamic Head =	39.98	feet
Design TDH =	35	feet

2 Pumps Running

Pipe Sees Flow from 1 Pump

Lift Station Pipe Diameter	3	inch
Pipe Velocity	2.269417	fps
Pipe Length	65	feet
Lift Station Low Headloss =	0.42	feet
Lift Station High Headloss =	0.64	feet

Pipe Sees Flow from 2 Pumps

Lift Station Pipe Diameter	3	inch
Pipe Velocity	4.538834	fps
Pipe Length	10	feet
Lift Station Low Headloss =	0.23	feet
Lift Station High Headloss =	0.35	feet

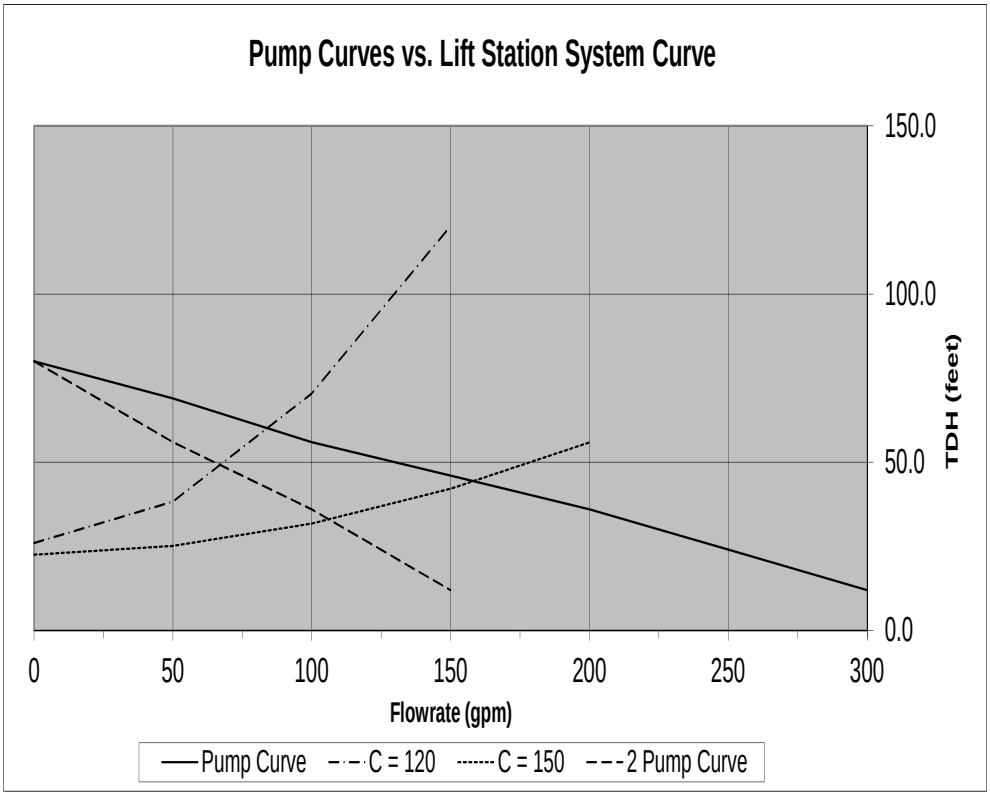
Pipe Sees Flow from 2 Pumps

FM Diameter =	4	inch
FM Velocity	2.553094	fps
FM Length =	1300	feet
Minor Losses =	0	feet
Equivalent FM Length =	1300	feet
Force Main Low Headloss =	7.50	feet
Force Main High Headloss =	11.33	feet
Low Totoal Dynamic Head =	30.65	feet
High Totoal Dynamic Head =	38.32	feet
Design TDH =	35	feet

Benjamin Grove
Sewage Lift Station
Pump Curves vs System Curves
Pumping to MH @ Benjamin Grove Phase 1

Flygt NP 3085 SH

Flow (gpm)	Single Pump Curve TDH (feet)	Double Pump Curve TDH (feet)	System Curve TDH (C=120)	System Curve TDH (C=150)
0	80.0	80.0	26.0	22.5
50	69.0	56.0	38.3	25.1
100	56.0	36.0	70.4	31.8
150	46.0	12.0	120.2	42.1
200	36.0			55.9
250	24.0			
300	12.0			



GILBERT ROAD
(60' R.O.W. MIN. PER MASTER PLAN)

35-FT ACCESS EASEMENT TO PUMP STATION

FORCE MAIN (TYP.)

50' SEWER EASEMENT

20 L.F. SANITARY SEWER STUB OUT

125 L.F. SANITARY SEWER STUB OUT

293' L.F. OF 8" SDR-26 PVC @ 1.26%

324' L.F. OF 8" SDR-26 PVC @ 1.91%

280' L.F. OF 8" SDR-26 PVC @ 1.05%

280' L.F. OF 8" SDR-26 PVC @ 0.40%

269' L.F. OF 8" SDR-26 PVC @ 2.34%

257' L.F. OF 8" SDR-26 PVC @ 2.89%

ALLIE DRIVE (50' R.O.W.)

AMALIE DRIVE (50' R.O.W.)

63	62	61	60	59	58	57	56	55	54	53	52	51	
0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.19 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.17 ACRES 7310 Sq. Ft.	0.29 ACRES 12743 Sq. Ft.	
64	65	66	67	68	69	70	81	82	80	83	79	84	78	85	50	49	48	47	46
0.19 ACRES 8493 Sq. Ft.	0.19 ACRES 8489 Sq. Ft.	0.19 ACRES 8493 Sq. Ft.	0.19 ACRES 8489 Sq. Ft.	0.19 ACRES 8203 Sq. Ft.	0.19 ACRES 8477 Sq. Ft.		0.19 ACRES 8493 Sq. Ft.	0.19 ACRES 8489 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.17 ACRES 7560 Sq. Ft.	0.18 ACRES 7816 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	

N

50' 25' 0 50'

MAIN D
SANITARY SEWER
PLAN

NOTES:

1. ADJUST RIM ELEVATION TO FINISHED GRADE AS REQUIRED.
2. SANITARY SEWER CONSTRUCTION SHALL COMPLY WITH CITY OF BRYANT STANDARD SPECIFICATIONS & DETAILS.
3. MAINTAIN 10 FEET OF HORIZONTAL SEPARATION BETWEEN WATER & SEWER LINES.
4. ALL MANHOLES SHALL BE EPOXY COATED PER CITY OF BRYANT REQUIREMENTS. .
5. ALL DUCTILE IRON GRAVITY SEWER SHALL BE POLY WRAPPED & EPOXY COATED PER CITY OF BRYANT REQUIREMENTS.
6. LIFT STATION & FORCE MAIN DISCHARGE MANHOLES SHALL HAVE SPECIAL EPOXY COATING PER CITY OF BRYANT REQUIREMENTS.

MH - D1
STA 0+00.00
RIM = 442.50
INV = 433.86

MH - D2
STA 2+92.83
RIM = 443.18
INV = 437.68

MH - D3
STA 5+46.83
RIM = 450.11
INV = 444.00

MH - D4
STA 9+06.84
RIM = 455.20
INV = 447.03

MH - D5
STA 11+76.84
RIM = 454.81
INV = 448.23

MH - D6
STA 14+45.84
RIM = 460.51
INV = 454.63

NOTE 6

EXISTING GROUND

AMALIE CENTERLINE FINISHED GRADE

STORM PIPE F-1

8" FL IN = 434.00
8" FL IN = 434.00

8" FL OUT = 437.70
8" FL IN = 437.80
8" FL IN = 437.80

8" FL OUT = 444.00
8" FL IN = 444.10
8" FL IN = 444.10

8" FL OUT = 447.03
8" FL IN = 447.13
8" FL IN = 447.13

8" FL OUT = 448.25
8" FL IN = 448.35

8" FL OUT = 454.65
8" FL IN = 454.75

H: 1"=50'
V: 1"=5'

MAIN D
SANITARY SEWER
PROFILE

DATE	REVISION	BY
2/3/2017	1 – COMMENTS FROM CITY OF BRYANT	KDV

GNE Designing our client's success

GarNat Engineering, LLC
P.O. Box 116 (72018) Ph (501) 408-4650
2909 Military Road Fx (888) 900-3068
Benton, Arkansas 72015 garnatengineering@gmail.com

BENJAMIN GROVE SUBDIVISION, PHASE 2
FOR THOMAS D.B.COLLINS, LTD.
PART OF THE SE/4 NE/4 OF
SECTION 12, T-1-S, R-15-W,
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
NO. 7996
KELVO VAN LANDINGHAM
1.27.17

CONTENTS:

SANITARY SEWER PLAN & PROFILE MAIN D

PROJECT NO: 16025

DATE: JAN 2017

SHEET NO: 3

Bill of Assurance

Benjamin Grove Subdivision

PART A. PREAMBLE

WHEREAS, Thomas D.B. Collins, Ltd. Is the Owner of the following land situated in Saline County, Arkansas to wit:

LEGAL DESCRIPTION- BENJAMIN GROVE SUBDIVISION

See EXHIBIT B

WHEREAS, Owner has caused said land to be surveyed and a plat thereof made, dividing said land into lots as shown on said plat and showing the dimensions of each lot and the width of the streets as known as BENJAMIN GROVE SUBDIVISION, to the City of Bryant, Saline County **Arkansas.**

WHEREAS, the Saline County Real Estate Assessor and Office of Emergency Services have approved said Subdivision and road names.

NOW THEREFORE, Thomas D.B. Collins, LTD, LLC in consideration of the covenants herein stated, does hereby designate said land and make part hereof to be known BENJAMIN GROVE SUBDIVISION, to the City of Bryant Saline County, Arkansas, and that hereafter any conveyance by the Owners of said land by lot number shall forever be held to be good and legal description and the streets shown on said plat in said Subdivision are hereby and will become a public road to be accepted by the City of Bryant for maintenance. The property owners will establish BENJAMIN GROVE Property Owner's Association for the purpose of maintaining and ownership of common areas and appurtenants belonging thereto. The use of the land in said Subdivision being subject to the following Protective and Restrictive Covenants:

PART B. AREA OF APPLICATION

B-1 FULLY PROTECTED RESIDENTIAL AREA. The residential area covenants in Part C in their entirety shall apply to the entire Subdivision.

PART C: RESIDENTIAL AREA COVENANTS:

C-1 LAND USE AND BUILDING TYPE. No lot shall be used except for residential purposes. No business of any nature or kind shall at any time be conducted in any building located on any of the lots. No building shall be erected, altered, placed or allowed to remain on any lot other than one detached, single-family dwelling not to exceed two stories in height, excluding basement area. No lot can be subdivided for any purpose without the prior approval from the City of Bryant Planning Board and the consent of 51% of the voting members of the Property owners associations.

C-2 ARCHITECTURAL CONTROL. No dwelling or structure shall be erected, placed or altered on any lot until the construction plans and specifications and a plan showing the location of the structure, including landscaping, have been approved by the architectural control committee as to quality of workmanship and materials, harmony of external design with existing structures, and as to location with respect to topography and finish grade elevation, and intended objectives of the Architectural Control Committee to achieve a subdivision that accomplishes the desired architectural design in the structure and subdivision ascetics. No fence or wall shall be erected, placed or altered on any lot nearer than the setbacks as shown on the Plat. The term structure is defined to include any and all types of fences, antennas, decks, Permanent basketball goals, swimming pools and television satellite dishes, which in no event shall be placed in front of dwellings. Each property owner requesting approval shall submit to the Architectural Control Committee at least two weeks prior to the time approval is needed, a complete set of house plans and completed material and specifications list. Approval shall be a provided in Part D.

C-3. DWELLING COST, QUALITY AND SIZE. Minimum dwelling size shall be permitted 1400 sq. feet It being the intention and purpose of the covenants to assure that all dwellings

shall be of a quality of workmanship and materials substantially the same or better than that for the minimum permitted dwelling size. Each dwelling shall have a minimum of a two care garage. No open carports are allowed. No manufactured homes are allowed, sit built homes only.

C-4. BUILDING LOCATION. No building shall be located on any lot, nearer to the side street line, than the minimum building set back lines as shown on the recorded plat. For the purposes of this covenant, eaves, steps and open porches shall not be considered as part of the building. No lot shall be subdivided and no more than one dwelling shall be permitted on any one lot.

C-5 BUILDING REQUIREMENTS. All buildings shall have roof pitch of no less than 6/12. A 2 car enclosed garage, and partial brick on the front below the eaves. No chain link fences shall be allowed, all fences shall be of a wood type approved by the Architectural control committee.

C-7: EASEMENTS. Easements for installation and maintenance of utilities and drainage facilities, and construction, repair and maintenance of adequate walls, roofs and eaves are reserved as shown on recorded plat.

C-8. NUISANCES. No noxious or offensive trade or activities shall be carried on, nor shall anything be done thereon which may be or become a nuisance to the neighborhood.

C-9. TEMPORARY STRUCTURES. No structure of a temporary character, basement, tent, shack, garage, barn or other out building shall be used on any tract at any time as a residence either temporarily or permanently; except that the developer may have a temporary construction, storage facility and/or sales office.

C-10 OUT BUILDINGS. One outbuilding for storage shall be permitted, if approved by the Architectural Control Committee and shall conform to the same architectural design and construction of the dwelling. Above ground swimming pools are prohibited.

C-11. SIGNS. No sign of any kind shall be displayed to the public view on any lot, except, one professional sign of not more than one square foot; one sign of not more than five square feet advertising the property for sale or rent or any signs used by a builder to advertise the property during the construction and sales period.

C-12. OWNER RESPONSIBILITY. All property owners shall insure that any contractor performing services for the property owner shall comply with the provisions of this Bill of Assurance.

C-13. CONTRACTOR RESPONSIBILITY. No contractor shall damage in any way the utilities or streets in any manor.

C-14. OIL AND MINING OPERATIONS. No oil drilling, oil development operations, oil refining, quarrying or mining operations of any kind shall be permitted upon or in any lot, nor shall oil wells, tanks, tunnels, mineral excavations or shafts be permitted upon or in any lot. No derrick or structures designated for use in boring for oil or natural gas shall be erected, maintained or permitted upon any lot.

C-15. LIVESTOCK AND POULTRY. No animals, livestock or poultry of any kind may be raised, bred or kept on any tract, except that dogs or cats may be kept, on any lot provided that they are not kept, bred or maintained for any commercial purpose and provided that facilities for maintenance of same are approved by the Architectural Control Committee and that the keeping of same does not constitute a nuisance.

C-16. GARBAGE AND REFUSE DISPOSAL. No lot or easement shall be used or maintained as a dumping ground for rubbish. Trash, garbage and other waste shall not be kept except in sanitary containers. There shall be no burning of trash, rubbish, leaves or yard waste.

C-17 SIGHT DISTANCE AT INTERSECTIONS. No fence, wall, hedge or shrub planting which obstructs sight lines at elevations between 2 and 6 feet above the roadways shall be placed or permitted to remain on any lot corner which the triangular area formed by the street property lines and the line connecting them at points 15 feet from the intersection of street right of way lines, or in the case of a rounded property corner, from the intersection of the street property line extended. The same sight line limitations shall apply on any lot within 10 feet from the intersection of the street property line with the edge of a driveway pavement. No tree shall be permitted to remain within such distances or such intersections unless the foliage line is maintained at sufficient height to prevent obstruction of such sight lines.

C-18. LOT, YARD AND HOME MAINTENANCE. All property owners, after acquisition of any lot, shall keep all grounds and yards mowed, trimmed and clean. All houses shall be painted and stained. No deviation from the original plans shall be permitted without approval of the Architectural Control Committee.

C-19 COMMENCEMENT OF CONSTRUCTION. A property owner must start construction of an approved dwelling within a period of one (1) year from date of purchase. The developer reserves the option to repurchase any lot for the amount of the original purchase price if construction is not commenced within such period of time. This option shall be exercised in writing within a period of thirty (30) days after the one (1) year period.

C-20 COMPLETION OF CONSTRUCTION. Any dwelling must be completed in its entirety within a period of one year from date such construction is commenced.

C-21 MOTOR VEHICLE PARKING. Abandoned or unused motor vehicles shall not be parked or permitted to remain on any lot or within the dedicated street. Boats, recreational

vehicles and trailers cannot be parked at the front or side of any dwelling or in the dedicated street and must be parked in back of the dwelling. Owners or permanent residents are prohibited from parking in the street. There shall be no non-functioning vehicles kept on the lot or in view of the public. There shall be no repair work done outside of the garage.

C-22. **MINIMUM FLOOR LEVEL ELEVATIONS.** The Architectural Control Committee reserves the right to prescribe the minimum floor elevations for lots. All homes shall have a minimum floor elevation of one foot above the back of the curb unless waived in writing by the Architectural Control Committee.

PART D. ARCHITECTURAL CONTROL COMMITTEE:

D-1 **MEMBERSHIP.** The Architectural Control Committee shall be composed of Phillip Pengelly. A majority of the committee may designate a representative to act for it. In the event of death or resignation of any member of the committee, the remaining members shall have full authority to designate a successor. Neither the members of the committee nor its designated representative shall be entitled to any compensation for there services performed pursuant to this covenant.

D-2 **PROCEDURE.** The committee's approval or disapproval as required in these covenants shall be in writing and in the form hereto attached marked Exhibit "A" which, when executed, should be retained by the owner/builder as proof of the Committee's approval. In the event the committee or its designated representative fails to approve or disapprove within 30 days after plans and specification have been submitted to it or in the event no suit to enjoin the construction or compliance with these covenants has been commenced within 180 days after the completion thereof will not be required and the related covenants shall be deemed to have been fully complied with.

PART E. PROPERTY OWNERS ASSOCIATION

E-1 **OWNERS EASEMENTS OF ENJOYMENT.** Every owner shall have a right and easement of enjoyment in and to the common area which shall be appurtenant to and shall pass with the title to every tract. Subject to the following provision:

(a) The right of the Association to charge reasonable fees for maintenance of the common area;

E-2. MEMBERSHIP AND VOTING RIGHTS

SECTION 1: Every owner of a tract which is subject to assessment shall be a member of the Association. Membership shall be appurtenant to and may not be separated from ownership of any tract which is subject to assessment.

SECTION 2: The Association shall have two classes of voting membership:

Class A: Class A members shall be all owners, with the exception of the Declarant, and shall be entitled to one vote for each tract owned, which may be voted at such time as all tracts are sold by the Declarant. When more than one person holds an interest in any tract, all such persons shall be members. The vote for such tract shall be exercised as they determine, but in no event shall more than one vote be cast with respect to any Tract.

Class B: The Class B member(s) shall be the Declarant and shall be entitled to one vote per tract owned. The Class B membership shall cease on the happening of the following events.

(a) when all tracts are sold by declarant.

E-3. COVENANT FOR MAINTENANCE ASSESSMENTS

SECTION 1: Creation of the Lien and Personal Obligation of Assessments: The Declarant, for each tract owned within the properties, hereby covenants, and each owner of any tract by acceptance of a deed therefore, whether or not it shall be so expressed in such deed, is deemed to covenant and agree to pay to the Association annual assessment or charges, such assessments to be established and collected as hereinafter provided. The annual assessments, together with interest, costs and reasonable attorneys' fees, shall be a charge on the land and shall be a continuing lien upon the property against which each such assessment is made. Each such assessment, together with interest, costs, and reasonable attorneys' fees, shall also be the personal obligation of the person who is the owner of such property at the time when the assessment fell due. The personal obligation for delinquent assessments shall not pass to his successors in title unless expressly assumed by them.

SECTION 2: Purpose of Assessment: The assessments levied by the Association shall be used as follows:

(a) For the maintenance and upkeep of all common areas including detention ponds and other drainage structures that serve the entire subdivision even if located in a different phase of the subdivision.
(b) For any other purposes deemed in the best interest of the property owners by the Association

SECTION 3: Annual Assessment: The initial conveyance from Developer to owner shall have a set annual assessment due by the new owner of $10.00, if said property is a vacant lot and a pro-rata value of $60.00 if said lot has a residence. From and after January 1 of the year immediately following the conveyance of the Lot from the Developer to an Owner, annual assessments shall be $60.00 per lot regardless if land is vacant or has a residence and also provided that ownership of a lot on which a residence is located and an adjacent lot shall be considered one lot for fee purposes.

a. From and after January 1 of the year immediately following the conveyance of the Lot to an Owner, the maximum annual assessment may be increased each year not more than 5% above the maximum assessment for the previous years with a vote of over 50% of the membership.

(b) From and after January 1 of the year immediately following the conveyance of the Lot to an Owner, the maximum annual assessment may be increased above 5% by a vote of two-thirds (2/3) of each class of members who are voting the person or by proxy, at a meeting duly called for this purpose.

(c) The Board of Directors may fix the annual assessment at an amount not in excess of the maximum.

SECTION 4: Notice and Quorum for Any Action Authorized Under Section 3: Written Notice of any meeting called for the purpose of taking any action authorized under Section 3 shall be sent to all members not less than 10 days in advance of the meeting. At the first such meeting called, the presence of member or proxies entitled to cast 60% of all votes shall constitute a quorum. If the required quorum is not present, another meeting may be called subject to the same notice requirement, and the required quorum at the preceding meeting shall be one-half (1/2) of the required quorum at the preceding meeting. No such subsequent meeting shall be held more than 60 days following the preceding meeting. Each tract as conveyed by Declarant shall have one vote.

SECTION 5: Uniform Rate of Assessment: Both annual and special assessments must be fixed at a uniform rate and may be collect on a semi-annual or annual basis.

SECTION 6: Date of Commencement of Annual Assessments: Due Dates: The annual assessments provided for herein shall commence as to all Lots on the first day of January

following the date of recordation of this instrument. The Board of Directors shall fix the amount of the annual assessment against each Lot at least thirty (30) day in advance of each annual assessment period. Written notice of the annual assessment shall be sent to every Owner subject thereto. The due date shall be established by the Board of Directors. The Association shall, upon demand, and for a reasonable charge, furnish a certificate signed by an officer of the Association setting forth whether the assessments on a specified Lot have been paid. A properly executed certificate of the Association as to the status of assessments on a Lot is binding upon the Association as of the date of its issuance.

SECTION 7: Effect of Nonpayment of Assessments: Remedies of the Association: Any assessment not paid within thirty (30) days after the due date shall bear interest from the due date at the rate of ten percent per annum. The Association may bring an action at law against the owner personally obligated to pay the same, or foreclose the lien against the property. No owner may waive or otherwise escape liability for the assessments provided for herein by non-use of the common area or abandonment of the property.

SECTION 8: Subordination of the Lien to Mortgages: The lien of the assessments provided for herein shall be subordinate to the lien of any first mortgage. Sale or transfer of any tract shall not affect the assessment lien. However, the sale or transfer of any tract pursuant to mortgage foreclosure or any proceeding in lieu thereof, shall extinguish the lien of such assessments as to payments which became due prior to such sale or transfer. No sale or transfer shall relieve such tract from liability for any assessments thereafter becoming due or from the lien thereon.

SECTION 9: Special Assessments for Capital Improvements: In addition to the annual assessments authorized above, the members may levy, in any assessment year, a special assessment applicable to that year only for the purpose of defraying, in whole or in part, the cost of any construction, reconstruction, repair or replacement of a capital improvement upon the common areas, provided that such assessment shall have the assent of two-thirds (2/3) of the votes of the members who are voting in person or by proxy at a meeting duly called for this purpose.

PART F. GENERAL PROVISIONS:

F-1. TERM. These covenants are to run with the land and shall be binding on all parties and all persons claiming under them for a period of twenty-five years from the date these covenants are recorded after which time, said covenants shall be automatically extended for successive period of ten years, subject to the express provision that these covenants may be amended at any time after the date of execution hereby by an instrument signed by the members of the Architectural Control Committee and the owner or owners of a majority of the lots herein platted.

F-2 ENFORCEMENT. Enforcement shall be by proceedings at law or in equity against any person or persons violating or attempting to violate any covenant either to restrain violations or to recover damages.

F-3 SEVERABILITY Invalidation of any one of these covenants by judgment or court order shall in no way affect any of the other provisions which shall remain in full force and effect.

IN WITNESS WHEREOF, the name of Owner is hereby affixed by its Members this _____ day of _____, 2016.

THOMAS D.B. COLLINS, LTD. LLC

_____
PHILLIP PENGELLY

ACKNOWLEDGEMENT

STATE OF ARKANSAS)
)ss
COUNTY OF SALINE)

On this day appeared before me, a Notary Public, Phillip Pengelly, known to me to be the Member of Thomas D.B. Collins, LTD, LLC and acknowledged that they were authorized to execute the foregoing on its behalf and that they had executed same for the consideration and purpose therein mentions and set forth.

WITNESS my hand and seal this _____ day of _____, 2016.

_____
Notary Public

My commission expires

_____

EXHIBIT "B"

PROPERTY DESCRIPTION: (AS SURVEYED)

A PART OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 12; TOWNSHIP 1 SOUTH; RANGE 15 WEST; SALINE COUNTY, ARKANSAS; BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF SAID SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 12; THENCE N 1° 30' 03" E A DISTANCE OF 630.67 FEET ALONG THE EAST LINE OF SAID SECTION 12 TO A POINT; THENCE N 88° 06' 35" W A DISTANCE OF 105.90 FEET, BEING ON THE WEST RIGHT OF WAY LINE OF ZUBER ROAD; THENCE N 88° 06' 35" W A DISTANCE OF 644.88 FEET; THENCE N 1° 30' 03" E A DISTANCE OF 130.72 FEET; THENCE S 88° 8' 55" E A DISTANCE OF 28.77 FEET TO THE **POINT OF BEGINNING**; THENCE N 88°8'55" W A DISTANCE OF 484.04 FEET; THENCE S 1°30'1" W A DISTANCE OF 395.01 FEET; THENCE N 88°8'55" W A DISTANCE OF 125.00 FEET; THENCE N 1°30'1" E A DISTANCE OF 10.00 FEET; THENCE N 88°8'55" W A DISTANCE OF 115.00 FEET TO THE EAST RIGHT OF WAY LINE OF GILBERT ROAD; THENCE N 1°30'1" E A DISTANCE OF 945.02 FEET TO THE NORTHWEST CORNER OF THE SE/4 NE/W OF SECTION 12; THENCE, ALONG THE NORTH LINE OF THE SW/4 NE/4 OF SECTION 12, S 88°8'55" E A DISTANCE OF 727.71 FEET; THENCE S 1°51'5" W A DISTANCE OF 115.00 FEET; THENCE N 88°8'55" W A DISTANCE OF 10.99 FEET; THENCE S 1°30'1" W A DISTANCE OF 280.01 FEET; THENCE S 8°21'55" E A DISTANCE OF 50.81 FEET; THENCE S 1°50'17" W A DISTANCE OF 115.00 FEET TO THE **POINT OF BEGINNING**. CONTAINING 497,103 SQUARE FEET (11.41 ACRES), MORE OR LESS, SUBJECT TO ANY AND ALL EASEMENTS, RESERVATIONS, RESTRICTIONS AND CONVEYANCES OF RECORD.

CITY OF BRYANT

WALK BIKE DRIVE

BIKE/PEDESTRIAN PLAN

Bike Pedestrian Plan

- Existing Shared-Use Trail
- Proposed Shared-Use Trail
- Existing Bike Lane
- Proposed Bike Lane
- Proposed Bike Route
- Sidewalks
- Proposed Trailheads

Boundaries and Constraints

- Planning Area Boundary
- Other City
- Bryant
- Parks
- School Property
- Floodplain

0 2,000 4,000 Feet

Bethel Middle School
Springhill Elementary
Salem Elementary
Hurricane Lake
Collegeville Elementary
Hurricane Creek Elementary
Bryant Schools Main Campus
Bryant Library
Bishop Park
Mills Park
Potential New School Campus
Hill Farm Elementary
Alcoa Park
Midland Soccer Park

CITY OF BRYANT

WALK BIKE DRIVE

MASTER STREET PLAN

Master Street Plan

- Local Road
- Proposed Local Road
- Collector
- Proposed Collector
- Minor Arterial
- Proposed Minor Arterial
- Interstate

Boundaries and Constraints

- Planning Area Boundary
- Other City
- Bryant
- Floodplain

Revised: February 6, 2017

0 2,000 4,000 Feet

Planned Interchange

Planned Interchange

Hurricane Lake

Hurricane Creek

Owens Creek

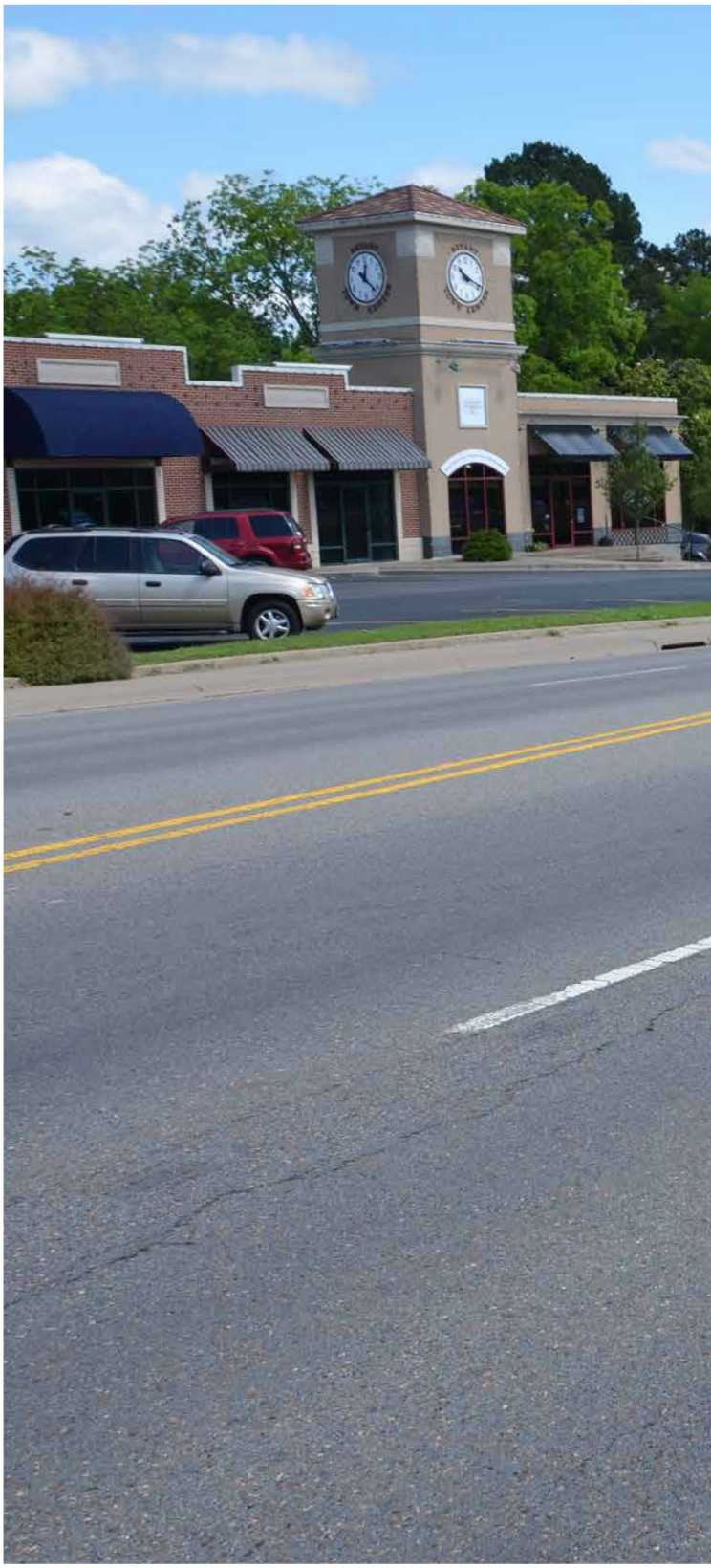
Crooked Creek

WALK BIKE DRIVE

MASTER TRANSPORTATION PLAN

City of Bryant

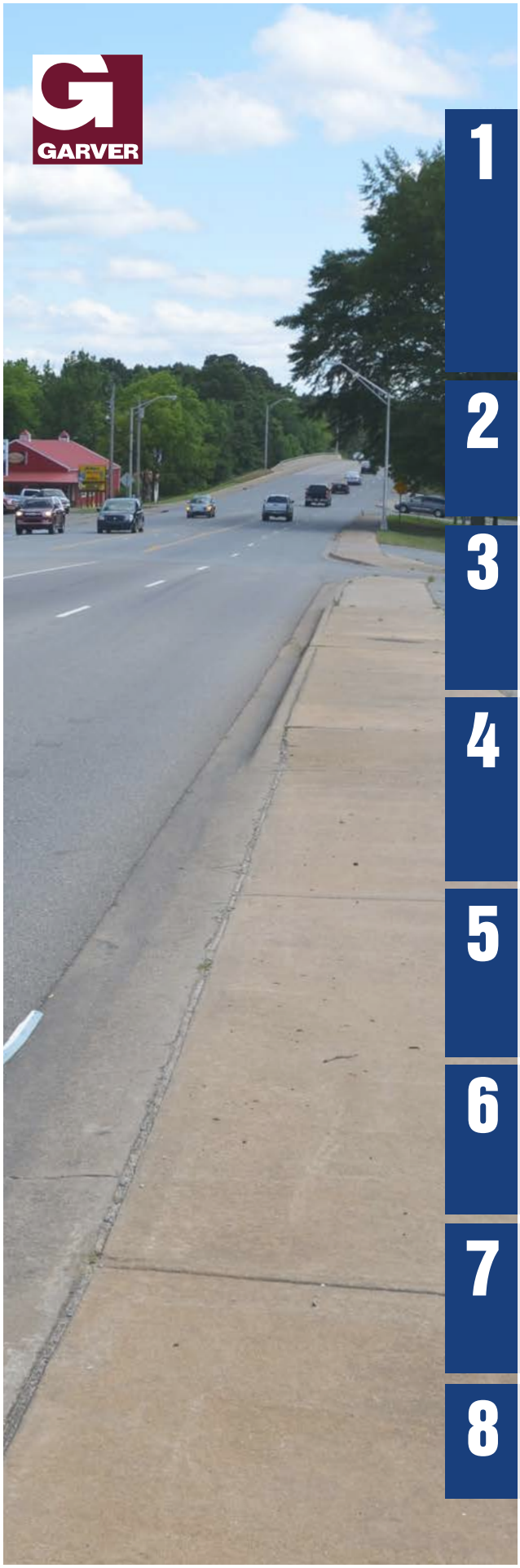
ORDINANCE XXXX-XX
ADOPTED: XXXX 20XX



City of Bryant Arkansas 1892

Bryant Parks & Recreation

GARVER



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Section One: **Introduction**

1.1 Introduction

This plan aims to address a common problem with many Master Street and Master Bike/Pedestrian Plans, a lack of integrated planning as a holistic, active transportation system. As such, this plan bridges the gap incorporating the traditional elements of both street plans and bicycle/pedestrian plans in one plan document. This is intended to move Bryant toward a healthy, active transportation system. The following include some benefits this type of transportation system.

Economic

It's a well-accepted maxim that good roads are important to the economic vibrancy of a community. This happens through facilitating personal mobility, commerce, and access to employment. However, active transportation systems have additional economic benefits. Integrating bike and pedestrian facilities can spur tourism as is being seen within Northwest Arkansas on the Razorback Greenway. Trails often improve the natural beauty of any area and can help increase property values as well. As such, bike and pedestrian improvements can have a tangible economic impact on the community. Additionally, trails are becoming an expected community amenity in communities with a competitive workforce.

Health and Fitness

According to the Robert Woods Johnson Foundation, Arkansas has the highest adult obesity rate in the country at 35.9%. The state is additionally ranked in the top 10 in obesity rates for teens and pre-teens. These conditions lead to numerous adverse health conditions that are forming a serious public-health crisis. Trails and bike lanes provide recreational opportunities that can lead to a healthier lifestyle. Without these facilities, there are few safe, inexpensive options for walking, biking, and running.

Conservation

Trails are often constructed within floodplain areas within greenways. Local examples within this plan include Owen Creek and Crooked Creek. These kinds of trails preserve these greenways, helping provide important linkages for wildlife. These greenways can also help with soil erosion that degrades water quality.

Transportation

Most Bryant residents travel by car and will continue to travel by car. However, not all residents do and some segments of the population, including kids, don't have the option to drive. It is important to provide safe, accessible transportation options for that portion of the Bryant community. Additionally, surveys suggest that the more bicycle and pedestrian facilities that are available, the more people are willing to use them.

1.2 The Plan

Walk Bike Drive Bryant is the officially adopted Master Transportation Plan for Bryant, Arkansas. This plan contains a Master Street Plan and Bicycle and Pedestrian Plan.

The plan sets forth official policy regarding the overall transportation system within the City's Planning Area Boundary. This plans constitutes an element of the City's overall Comprehensive Plan. As such, it is not a piece of municipal

law but rather a statement of policy. It should provide much of the basis for land use and transportation recommendations and decisions made by the Planning Commission and City Council. At a minimum, the plan serves the following purposes:

1. It establishes a functional classification system for existing and proposed streets and bicycle/pedestrian transportation elements within the City and its planning area boundary.

2. It establishes and classifies both existing and proposed bike and pedestrian transportation facilities.

3. It sets forth, in graphic form, the location of existing and proposed transportation elements within the City's planning area boundary.

4. It establishes cross sections for the various types of transportation elements that may be constructed within the planning area boundary.

5. It states policies that govern both the creation and implementation of various elements of the plan.

6. It provides guidance for the development and implementation of a comprehensive, balanced transportation system for the City of Bryant.

7. It relates the Plan to implementing regulations contained in the City's Subdivision Code.

This document contains the provisions of the plan. Supporting documentation includes a number of sources. A partial list of information sources follows:

1. 2011 Bryant Walkability Study

2. 2012 Bryant Comprehensive Plan

3. 2015 Heart of Bryant Sub-Area Plan

4. 2014 Bryant Parks and Recreation Master Plan

5. Imagine Central Arkansas 2040 Plan

6. Arkansas State Highway and Transportation Department traffic volumes figures and other statistical information

7. Records of the Bryant Public Works Department

1.3 Authority

The purpose of this Plan is consistent with the provisions of Arkansas Codes, Annotated (A.C.A.), §14-56-414. This section requires that the Master Street Plan of a municipality be created to "… designate the general location, characteristics, and functions of streets and highways."

1.4 The Planning Area

A city in Arkansas desiring to prepare and implement plans is required to designate the area (planning area boundary) within its territorial jurisdiction in which it will prepare plans, ordinances, and regulations. The City of Bryant maintains a planning area boundary of lands expected to become part of the City within the planning period of 30 years. This Planning Area Boundary Map was prepared in accordance with statutes found in the Arkansas Codes, Annotated § 14-56-413.The City of Bryant will, in accordance with A.C.A. § 14-56-422, file the plans, ordinances, and regulations as they pertain to the territory beyond the corporate limits with the county recorder of Saline County.

1.5 Relationship to the Land Use Regulations

The Arkansas planning statutes provide in A.C.A. § 14-56-417 (a)(1):

> *Following adoption and filing of a master street plan, the Planning Commission may prepare and shall administer, after approval of the legislative body, regulations controlling the development of land.*

These provisions, along with the modern history of planning since the landmark case of Village of Euclid, Ohio v. Ambler Realty Co., 272 U.S. 365 (1926), signify a strong relationship between the plan and its supporting regulations. In simple terms, a municipality first plans and then regulates. The primary supporting regulations consist of the zoning code and

development (subdivision) regulations. As stated in A.C.A. § 14-56-412 (e):

> *In order to promote, regulate, and control development and to protect the various elements of the plans, the commission, after adoption of appropriate plans as provided, may prepare and transmit to the legislative body such ordinances and regulations as are deemed necessary to carry out the intent of the plans, or of parts thereof.*

Planners take these provisions literally and encourage municipalities to base decisions in land use and development upon adopted plans to the greatest extent possible. At the same time, it has been noted in court decisions in Arkansas that plans are not legal documents but rather broad statements of municipal policy. The legal force arises from the adopted regulations developed to support the plan.

1.6 National Standards

The following national standards are encouraged for use in the design of future street and bicycle/pedestrian facilities. These guides provide in depth design guidance for use on state and local facilities.

AASHTO *Guide for the Development of Bicycle Facilities*, 4th Edition – 2012

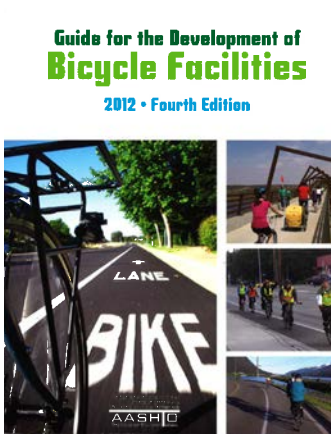
AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, 1st Edition – 2004

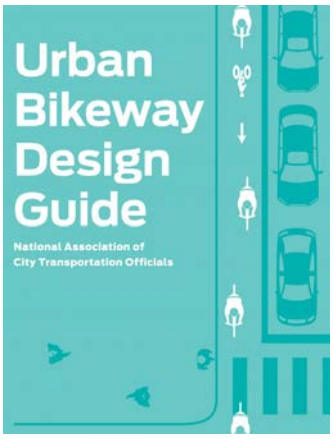
NACTO *Urban Street Design Guide*, 1st Edition – 2013

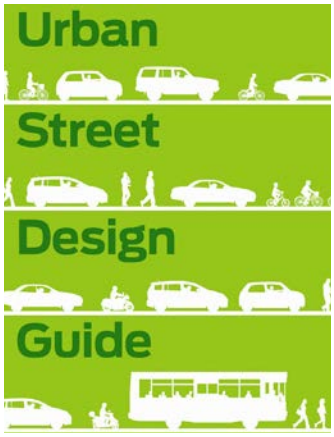
NACTO *Urban Bikeway Design Guide,* 2nd Edition – 2014

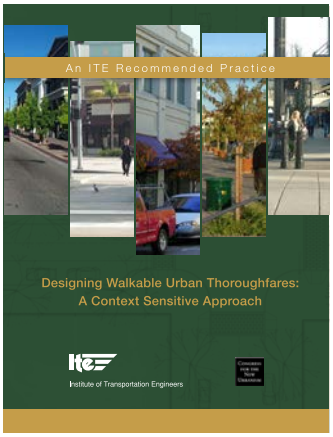
FHWA *Manual on Uniform Traffic Control Devices*, 2009 Edition with Revisions 1 and 2 – 2012

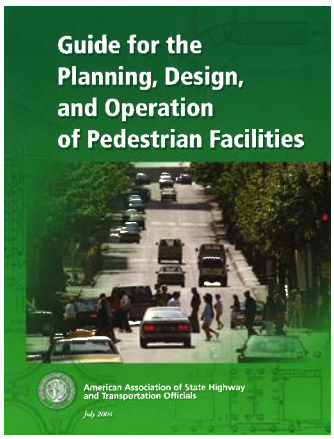
ITE/CNU *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*, 1st Edition – 2010

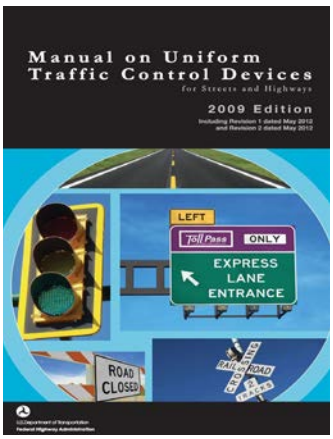












Section Two: **Goals and Policies**

2.1 Goals

This plan seeks to achieve the following goals:

1. To strategically establish and maintain a safe, functional multi-modal transportation network for the planning area built upon Complete Streets Policy and Context Sensitive Design.
2. To ensure transportation facilities safely accommodate all potential users, including vehicles, pedestrians, and bicyclists.
3. To provide and maintain bike and pedestrian facilities that meet the needs of a variety of different users.
4. To promote efficient use of resources committed to the construction of bike, pedestrian, and vehicle facilities in both the private and public sectors.
5. To allow equitable methods of financing transportation facilities.
6. To improve traffic flow, improve safety, and improve bike, pedestrian, and vehicle mobility within the planning area.
7. To ensure an adequate transportation system for future generations.
8. To encourage innovative approaches to development.
9. To reduce traffic conflicts on major traffic arteries.
10. To ensure transportation and land use decisions are fully integrated and that the transportation network is consistent with the principles of efficiency, economy, and equity.

> The direct intent of the goals and policies of this plan is to create and maintain a transportation system based on the principles of Complete Streets and Context Sensitive Design to meet the needs of all users in the Bryant Planning Area.

11. To ensure an inter-connected and grid-based street pattern, which acts to distribute traffic more evenly across the transportation system and minimizes bottlenecks and overloading of facilities.
12. To ensure a safe transportation system that minimizes crashes between all users.
13. To ensure context sensitive roadway designs are achieved that do not adversely affect neighborhoods or the environment.
14. To ensure that planned facilities are consistent with regional and state transportation plans.
15. To develop infrastructure that will encourage active, healthy lifestyles.

2.2 Policies

Policies establish the stated intent of the City of Bryant with regard to the establishment of a functional, multi-modal transportation system for the City's planning area. Policies, like the plan, are not intended to be municipal law but serve as the foundation upon which the City's land use codes and legal documents are built.

The following policies are adopted and made part of this Plan:

1. Bike and pedestrian users will be given consideration in the planning and design of all transportation facilities in the planning area.

2. Bike and pedestrian facilities will be constructed as part of all new development and transportation facilities according to the provisions of this Plan.

3. The City will carefully monitor mobility and access options for citizens with disabilities when reviewing development proposals.

4. The City will develop a bike and pedestrian transportation system that will take into account the mobility and safety needs of a variety of uses, including children, seniors, active adults, and the physically challenged.

5. New developments must provide for the interconnection of existing and proposed streets in order to permit the orderly flow of traffic and the provision of public services, particularly fire and police protection.

6. Proposed subdivisions, large-scale developments, site plans, or concept plans must comply with this Plan. The Planning Commission may consider, on a case by case basis, innovative designs that promote desirable developments without sacrificing the overall goals of this Plan, other City plans, or the Arkansas State Fire Prevention Code.

7. New developments adjacent to or encompassing existing streets shall be responsible for construction of half-street improvements to those streets. Those improvements will be consistent with the functional classification reflected in this Plan, the City's construction standards, and all other applicable standards.

8. Where new developments are adjacent to or encompass arterial streets controlled by the Arkansas State Highway and Transportation Department (AHTD), half-street and bike/pedestrian improvements shall meet the functional classification shown on the Master Transportation Plan or as determined by agreement between the developer, AHTD, and the City.

9. Access points for individual properties front collector and minor arterial, which streets shall be kept to a minimum to facilitate traffic movement, reduce crashes and fatalities, and to increase market areas for local businesses. Keeping access points to a minimum may be achieved through driveway consolidation, joint access agreements, or specific corridor access management plans.

10. The staff and Planning Commission shall include considerations of access management principles in the review of all development plans or requests.

11. No City utilities will be furnished to properties in developments that have not complied with the provisions of the Bryant Subdivision Regulations.

12. Strip commercial developments are discouraged and may be subject to access limitations. The City encourages commercial developments to provide their own internal streets and drives for direct access to individual out parcels.

13. The City shall adopt and enforce land use regulations to carry out the provisions of this Plan.

Section Three: **Existing Conditions**

3.1 Demographic Trends

Table 3.1.1
Population History Bryant and Benton, Arkansas

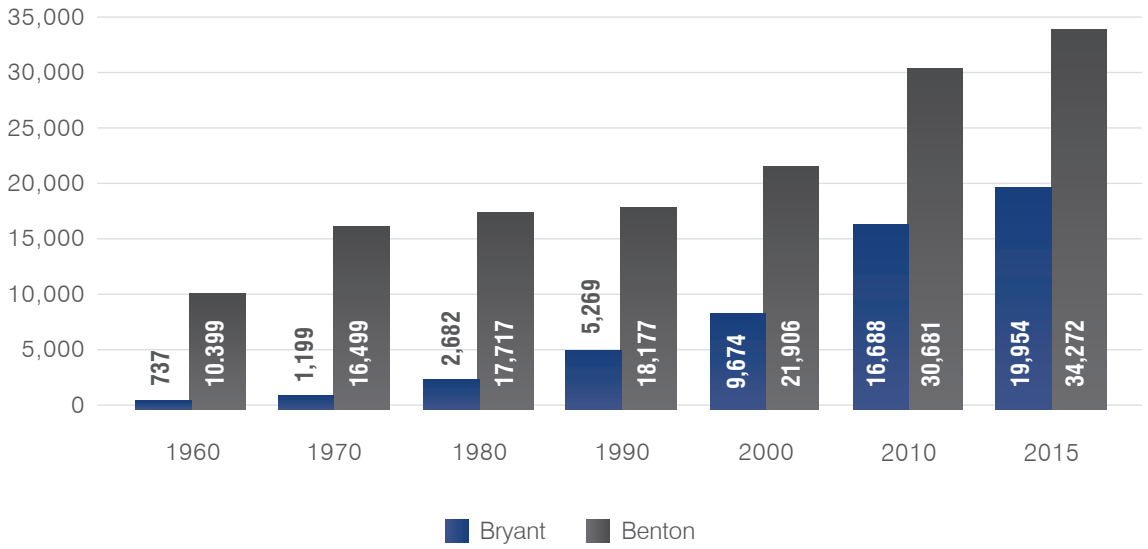


Table 3.1.2
Age Characteristics, 2010 – Bryant, Arkansas

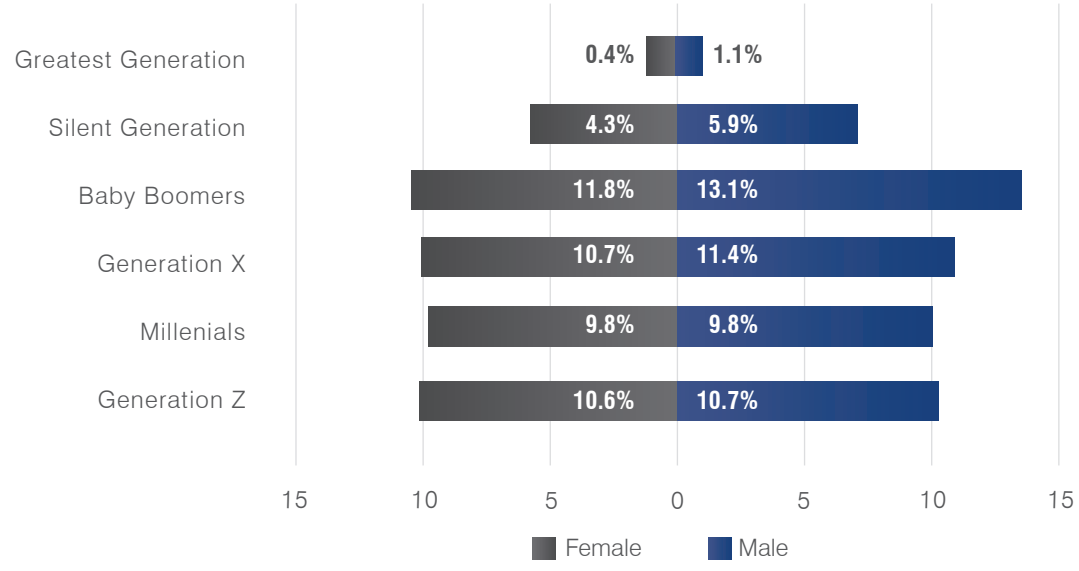


Table 3.1.2

Age Characteristics, 2010 – Arkansas

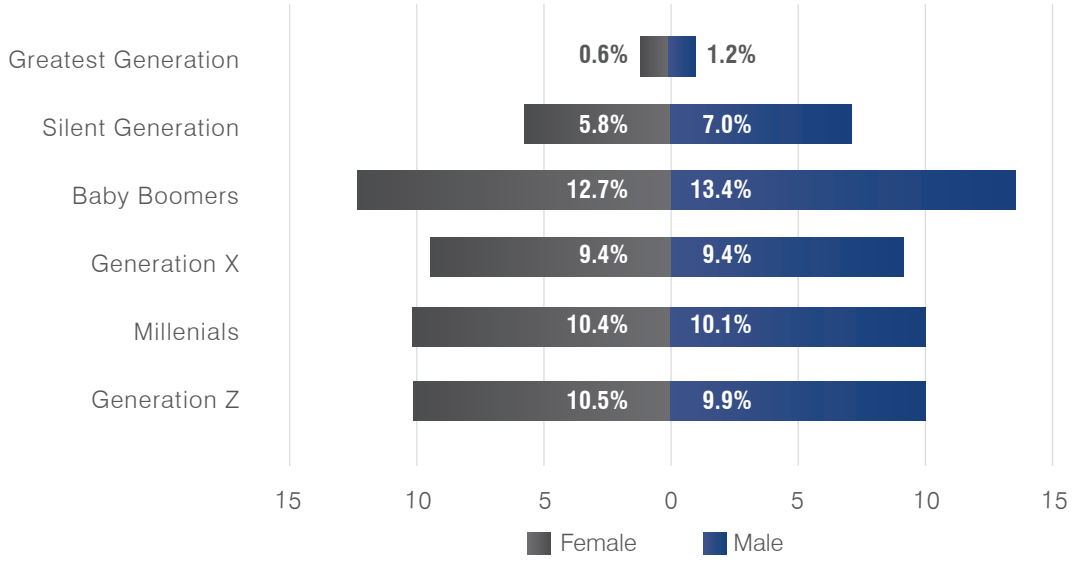


Table 3.1.3

Population Projections

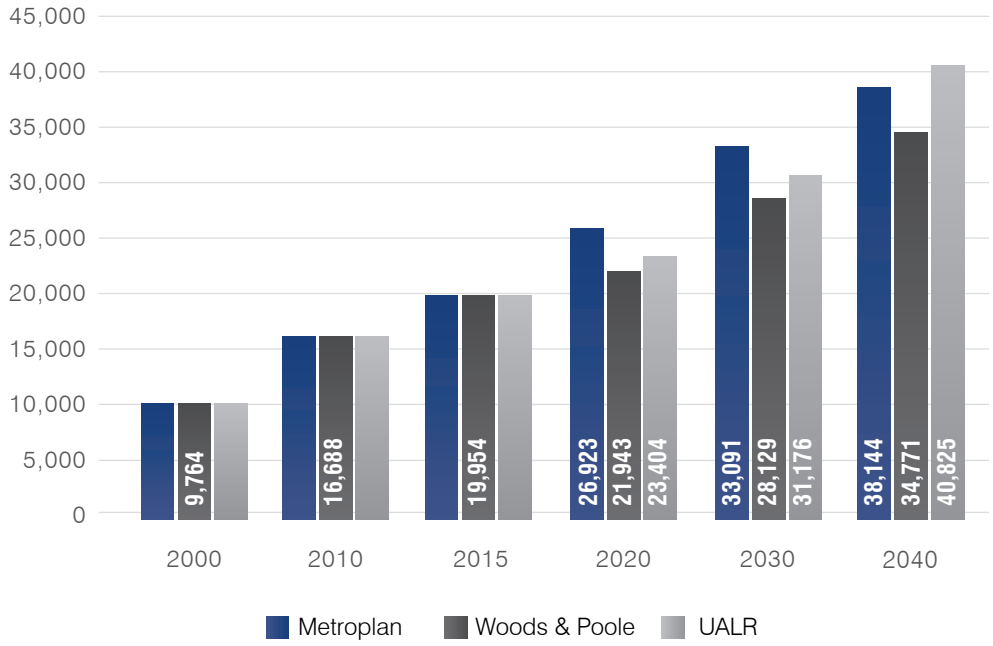
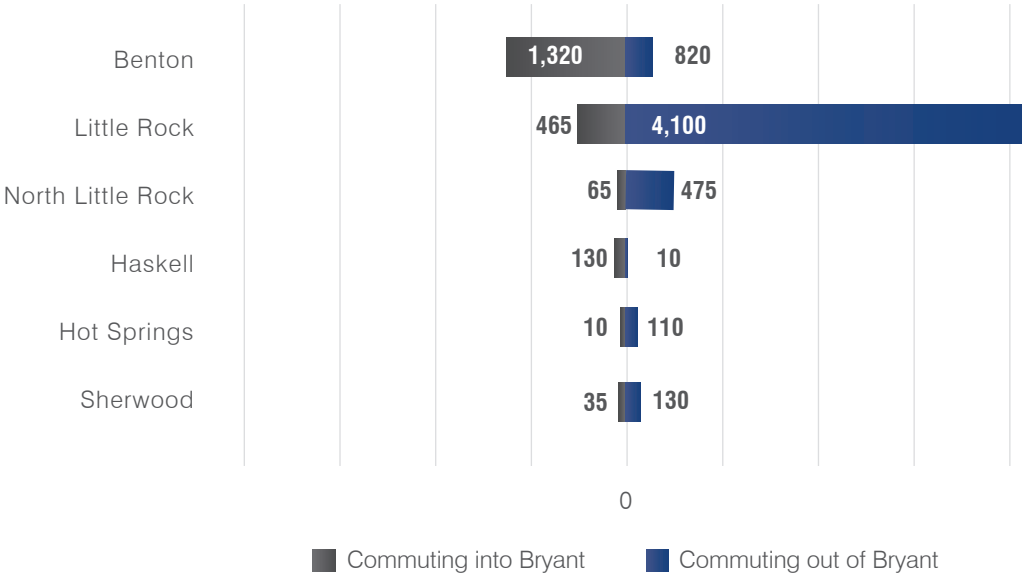


Table 3.1.4
Commuting Patterns

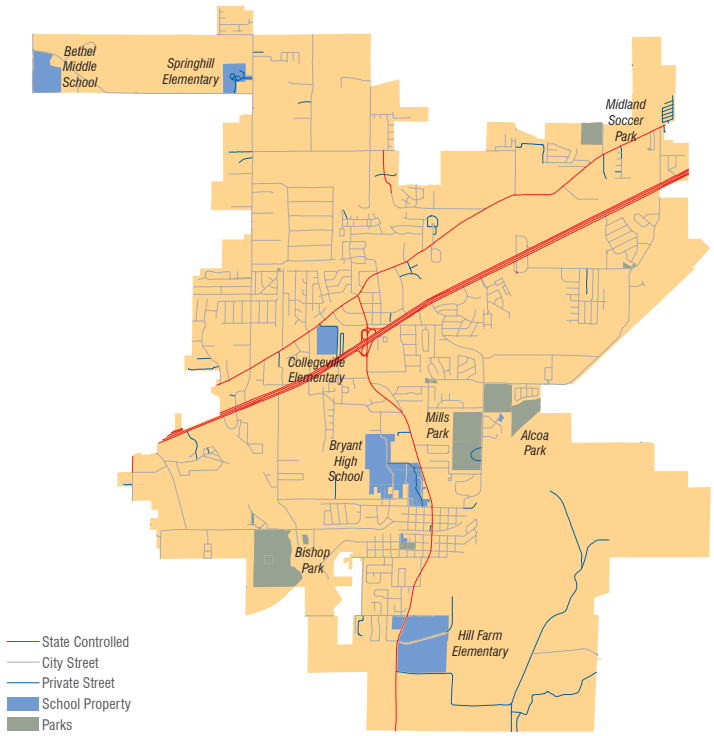


3.2 Existing Street Facilities

At the time this Plan was drafted, the City's existing street network consisted of **158 linear miles of roadway**. The following figures shows the distribution of the City's street facilities.

ROAD TYPE	LENGTH
All Roadway	158 miles
State Highway/I-30	30.2 miles
City Street	113.7 miles
Private Drive	14.1 miles

The City has a regular annual overlay maintenance program funded from the City's street fund. The City also pursues street construction projects for new roadways and widening as funding is available through grants and funding from the street fund.

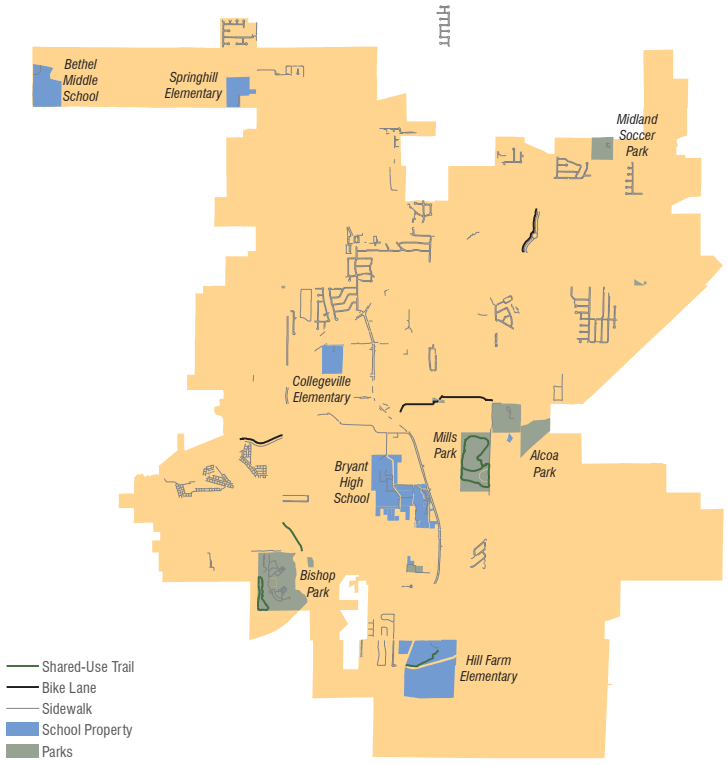


3.3 Existing Bike/Pedestrian Facilities

At the time this Plan was drafted, the pedestrian and bicycle facilities in the City of Bryant were limited.

FACILITY TYPE	LENGTH
Shared-Use Trail	2.7 mi.
Sidewalk	61.3 mi.
Bike Lane	1.8 mi.

The City does not currently have a designated capital improvement program for building bicycle and pedestrian facilities. Facilities are constructed as demanded when funding is available. Primary construction of sidewalk facilities is handled through new development with sidewalk facilities being constructed by developers.



Funding options for new bicycle and pedestrian facilities is varied. Options include:

1. City Property Taxes
2. Sales Tax General Revenue
3. Street Fund Revenue
4. State and Federal Grants (ex. TAP)
5. Regional Grants (Metroplan)
6. Private Grants

Section Four: **Plan Elements**

4.1 Vehicle Facilities

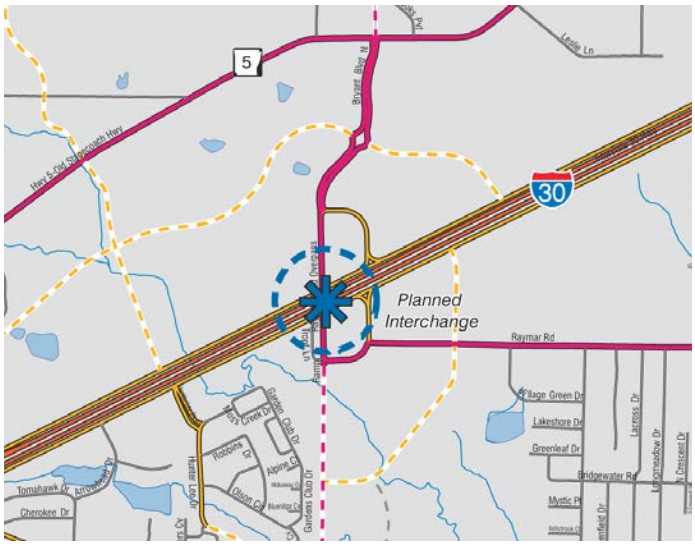
Following are highlights of the major physical elements indicated on the Plan Map.

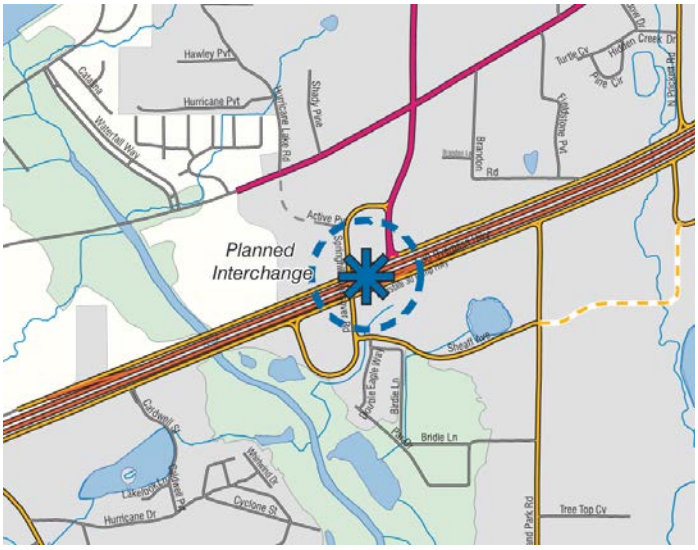
Interstate Interchanges

Currently, the City is served by two interchanges along I-30 at intersections with Arkansas Highway 183/Reynolds Road (Exit 123) and Alcoa Road (Exit 121). Two additional interchanges are depicted on the Master Transportation Plan Map, which is a part of this plan. The included figures depict the planned improvements.

The first additional interchange is planned to be located at the current crossover for Bryant Parkway/Raymar Road. The current crossover rests adjacent to one of the largest pieces of undeveloped property with Interstate frontage within Bryant. An extension north from crossover (Bryant Parkway) has already been constructed that will eventually tie the interchange to Hilldale Road to the north. It will also connect to a planned extension south of the crossover about five miles and connect to West Sardis Road. The interchange and its planned extensions would relieve traffic congestion along Highway 183/Reynolds Road, provide an alternative for commuters, improve access to Bryant's south school campuses, and aide economic development efforts at the Saline County Airport.

The second additional interchange is planned at the Springhill Crossover to serve the long-term needs of the City. The interchange would serve the needs of traffic on the northwest side of Bryant and other areas further north and west. Neither Alcoa Road nor Reynolds Road serve as strong north-south arterials because they both have a northern terminus at Highway 5. This means Springhill Road will continue to face more pressure from traffic as the City grows and more property is developed along and near Springhill Road. The City has been wise in discouraging commercial growth on Springhill Road as this will exacerbate these problems. This interchange will become necessary over the long term but is not an immediate need.





Improving connectivity will be essential to allowing Bryant's transportation system to keep pace with its rapid growth. Reynolds Road has poor connectivity and is becoming problematically congested.

Arterials

The Walk Bike Drive Plan suggests a continuation of arterial roads throughout the planning area as a means to improve circulation across the City, east-west, and north-south. Many of the arterial roads within the planning area are state highways. Proposed additions to the road network with the extension of arterial roads will accommodate improved traffic flow by completion of the network of streets.

This type of connectivity helps spread traffic load. This is particularly important in a fast growing city like Bryant. Infrastructure often trails growth in such fast growing cities. Having a street network with strong connectivity can help forestall or eliminate the need for widening of roadways, providing a city more time to catch its infrastructure up to growth. For example, Reynolds Road with poor connectivity has similar traffic counts to Broadway Avenue with high connectivity within downtown Little Rock, which is roughly 10 times the size of Bryant.

The primary function of arterial streets is to move traffic. Ideally, this function would be protected. However, historic development patterns and economic factors sometimes lead to problems in maintaining traffic flow. Many of the City's arterial roads and adjacent lands were initially constructed and subdivided in a manner that placed a priority on access. As the City and traffic along the arterial roads have grown, the role of the roads has changed, placing greater priority on moving traffic. This access-traffic flow conflict reduces the efficiency and capacity of the road facilities. Such issues cannot be easily or quickly fixed. Addressing the problem requires steady, dedicated implementation of access management standards and policies over the long term.

> Good access management helps decrease congestion and can forestall the need for roadway widening. Access management will be important to ensuring the City is a good steward of tax dollars by maximizing the impact of public money spent on transportation facilities.

Economic factors can also play a role in determining the long-term efficiency and capacity of arterial roads. The high traffic volumes on arterial connectors attract commercial development that desires a great degree of property access. These development demands can easily result in arterial roads littered with curb cut after curb cut and an accompanying diminished capacity and traffic flow. Because cities in Arkansas depend heavily upon sales tax revenue, the Planning Commission faces a constant need to balance traffic concerns with economic development concerns. Finding that balance will be important to ensuring economic growth and protecting taxpayers. Methods of achieving this balance include access management.

Collectors

It is typical to design collectors so they will not function as continuous through streets but will serve to collect traffic and place it onto perimeter arterial-type roads. The City of Maumelle is a good example of this type of transportation system. In a grid street pattern, however, a street several miles long may serve as a collector rather than an arterial if its predominant use is only to reach the next junction with an arterial. This improved connectivity allows the transportation system to be less dependent on large arterial roads to move traffic. Examples of this kind of network can frequently be seen within the older portions of many cities.

The policies and proposals of this plan support a street network that uses collector streets to improve connectivity. The City will strive for a system of collector streets spaced approximately one-quarter to a half-mile in both north-south and east-west directions.

A good network of connected, functional collector streets will be important to ensuring Bryant's traffic problems don't worsen over time.

In most cases, these are existing streets or extensions of existing streets. In undeveloped areas, they are indicated on the Plan Map as general locations. As new developments occur, developers will be responsible for construction of the collector street system. This will include improving all or a portion of existing streets located within, or adjacent to, the developments.

Some streets designated as collectors are fully developed in a manner that will preclude their being brought into compliance with the standards adopted herein. These are maintained as collectors on the plan for two reasons. First, their designation as collectors may result in avoiding any further degradation to their functional classification. Second, in the event that major redevelopment does occur in the future, the Planning Commission may, at that point, require that such redevelopment adhere to the provisions of this plan.

4.2 Bicycle/Pedestrian Facilities

User Types

When designing bicycle and pedestrian facilities it is important to keep in mind the types of users that will be or are intended to be accommodated by the facilities constructed. This plan is designed around more readily accommodating pedestrians and Casual/Less Confident bike riders. As such, more emphasis has been placed on bike and pedestrian facilities that separate users from traffic and make them feel safer. Below is a description of the use types taken from AASHTO's *Guide for the Development of Bicycle Facilities, 2012.*

Experienced/Confident Riders

This group includes bicyclists who are comfortable riding on most types of bike facilities, including roads without any special treatments for bicyclists. This group also includes utilitarian and recreational riders of many ages who are confident enough to ride on busy roads and navigate in traffic to reach their destination. However, some may prefer to travel on low-traffic residential streets or shared-use paths. Such bicyclists may deviate from the most direct route to travel in their preferred riding conditions. Experienced bicyclists may include commuters, long-distance road bicyclists, racers, and those who regularly participate in rides organized by bike clubs.

Experienced/confident riders often prefer road riding.

Casual/Less Confident Riders

This group includes a majority of the population and includes a wide range of people: 1) those who ride frequently for several purposes, 2) those who enjoy biking occasionally but may only ride on trails or low-traffic and/or low-speed streets in favorable conditions, 3) those who ride for recreation, perhaps with children, and 4) those for whom the bike is a necessary mode of transportation. In order for this group to regularly choose biking as a mode of transportation, a physical network of visible, convenient, and well-designed bike facilities is needed. People in this category may move over time to the "experienced and confident" category.

The bicycle/pedestrian system will be designed in order to primarily accommodate inexperienced users. Design for all facilities should center on the "Casual/Less Confident Rider" user type. Doing so will help ensure greater use and satisfaction by the Bryant community.

EXPERIENCED/CONFIDENT RIDERS	CASUAL/LESS CONFIDENT RIDERS
Most are comfortable riding with vehicles on streets and are able to navigate streets like a motor vehicle, including using the full width of a narrow travel lane when appropriate, using left-turn lanes.	Prefer shared-use trail, bike boulevards, or bike lanes that are buffered or along low-volume, low-speed streets.
While comfortable on most streets, some prefer on-street bike lanes, paved shoulders, or shared-use trails when available.	May have difficulty gauging traffic and may be unfamiliar with the rules of the road as they pertain to bikes. May walk bike across intersections.
Prefer a more direct route.	May use less direct route to avoid arterials with heavy traffic volumes.
Avoid riding on sidewalks. Ride with the flow of traffic on streets.	If no on-street facility is available, may ride on sidewalks.
May ride at speeds up to 25 mph on level grades, up to 45 mph on steep descents.	May ride at speeds around 8 to 12 mph.
May cycle long distances.	Cycle shorter distances: 1 to 5 miles is a typical trip distance.

Casual/less confident riders ofter prefer shared-use trails.

Bicycle and Pedestrian Facility Types

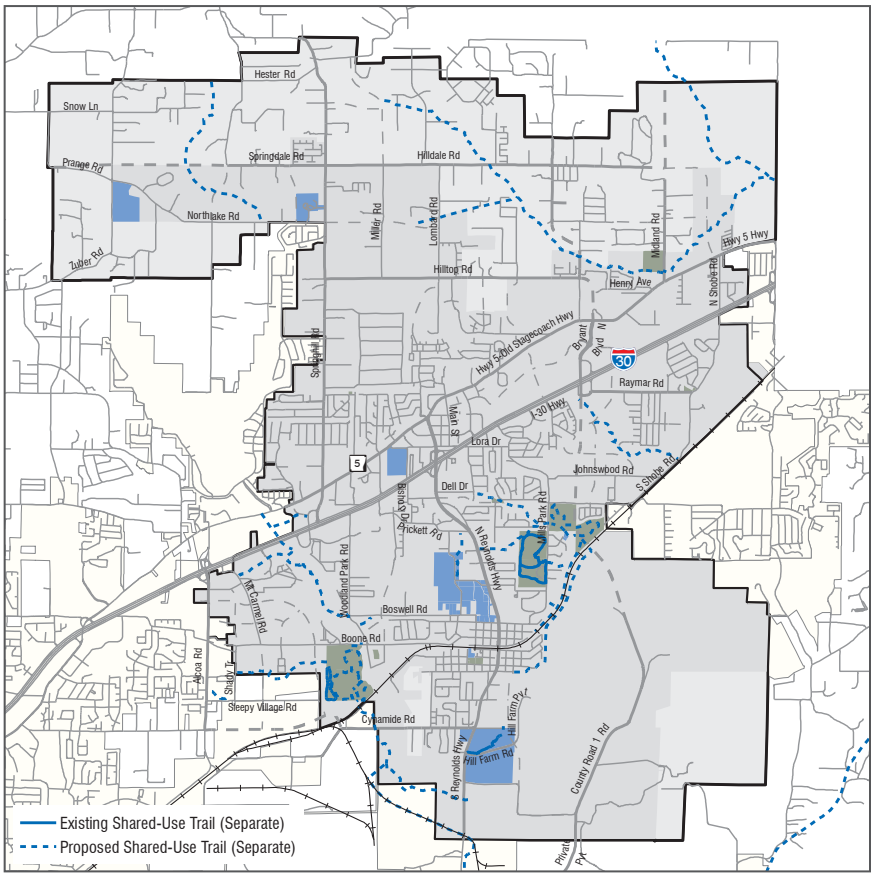
The following constitute the facility types for the bicycle and pedestrian elements of this plan.

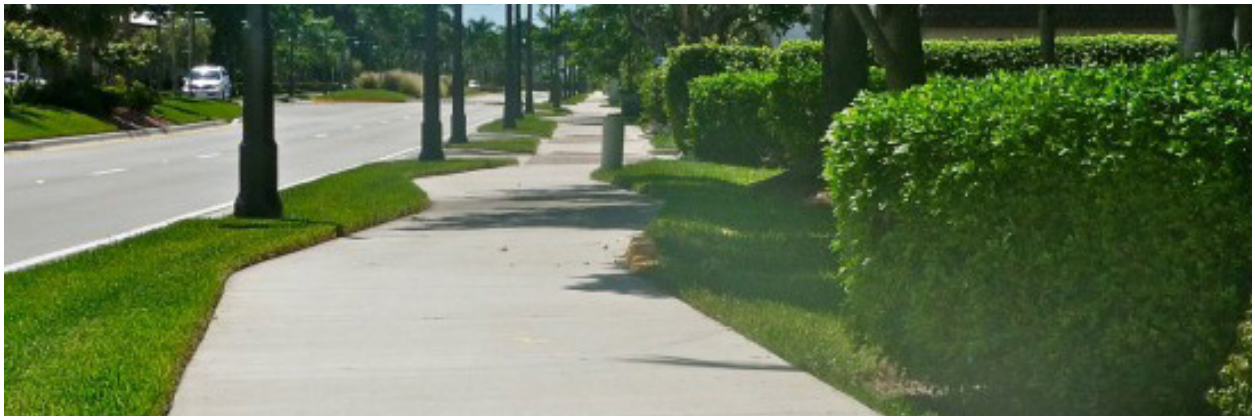
TRAILS	CLASS	USER	
Shared-Use Trail (Separated)	I	Pedestrian/ Bike	A trail, at least 12' wide, designed for use by a variety of users. Located separate from a roadway facility with a park or linear trail system. Ex. Owen Creek Trail
Shared-Use Trail (Road)	I	Pedestrian/ Bike	A trail, at least 12' wide, designed for use by a variety of users. Located adjacent to a roadway facility as a means of providing safe facilities of casual and less confident bike rider and pedestrians. Ex. Bryant Parkway
BIKE FACILITIES			
Bike Lane	II	Bike	A portion of a roadway (lane) that has been designated by striping, signing, and pavement markings for the exclusive use of bicycles.
Bike Route	III	Bike	A traffic lane with pavement markings and signage, typically a sharrow or wide shoulder, that is on a bicycle route and is to be shared between vehicles and bicycles.
PEDESTRIAN CONNECTIONS			
Sidewalks	N/A	Pedestrian	Separated pedestrian paths, at least 5' wide, that are used to make pedestrian connections to the trail system.

Shared-Use Trails (Separated)

- Separated Shared-Use Trails (sometimes called greenways) are at least 12 feet wide and located on a right-of-way or easement independent of a roadway.
- These facilities are designed for a wide variety of users, including cyclists, walkers, joggers, wheelchair users, skaters, etc.
- These trails often run along natural features such as creeks to connect parks, schools, and other community features.

Applicability: Future separated shared-use trails have been proposed along creeks (Hurricane Creek, Owen Creek, and Crooked Creek), in parks (Alcoa Park and Bishop Park), and along utility easements (Entergy and Bryant Sewer). These facilities are intended to be signature features of the City's trail system that will receive high traffic and use (Bishop Park Trail, Alcoa Park Trail, Owen Creek Trail, and portions of the Hurricane Creek Trail). Such trails are generally favored by most users except experienced and avid cyclists. See Section 5 for specific design standards for the construction of shared-use trails.





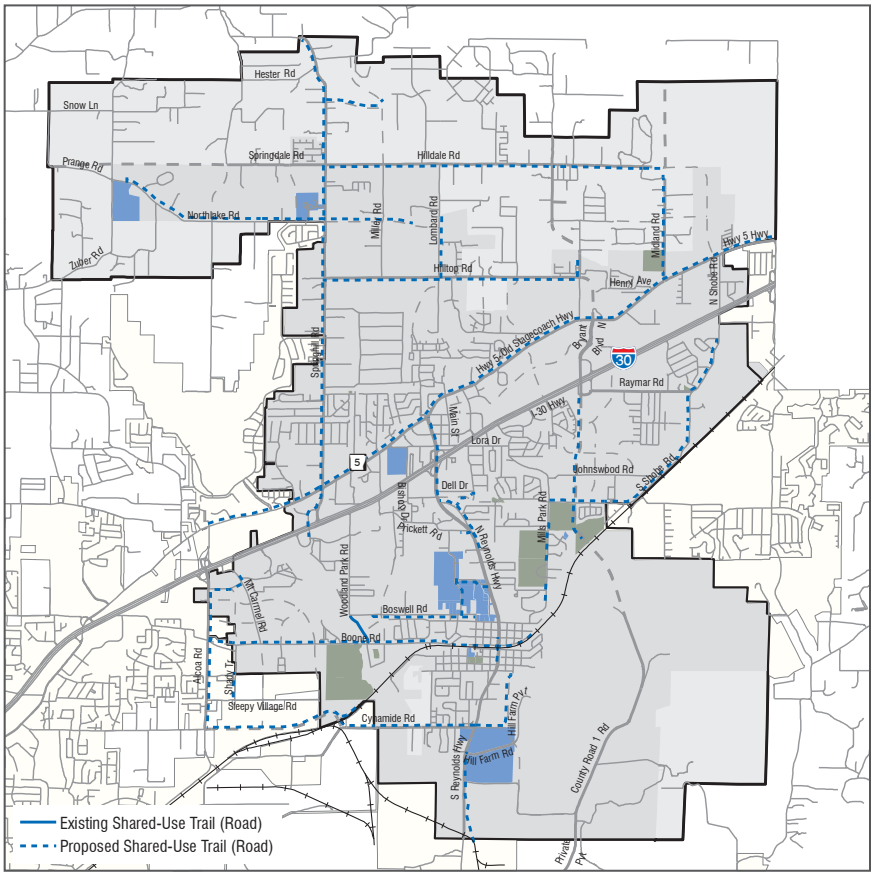
Shared-Use Trails (Road)

- Road shared-use trails (sometimes called sidepaths) are at least 12 feet wide and located on a road right-of-way adjacent to a street or highway.

- These facilities are designed for a wide variety of users, including cyclists, walkers, joggers, wheelchair users, skaters, etc. However, certain locations and context may restrict the types of bicycle riding use.

- These trails help form a backbone to connect various trail destinations such as schools, parks, etc.

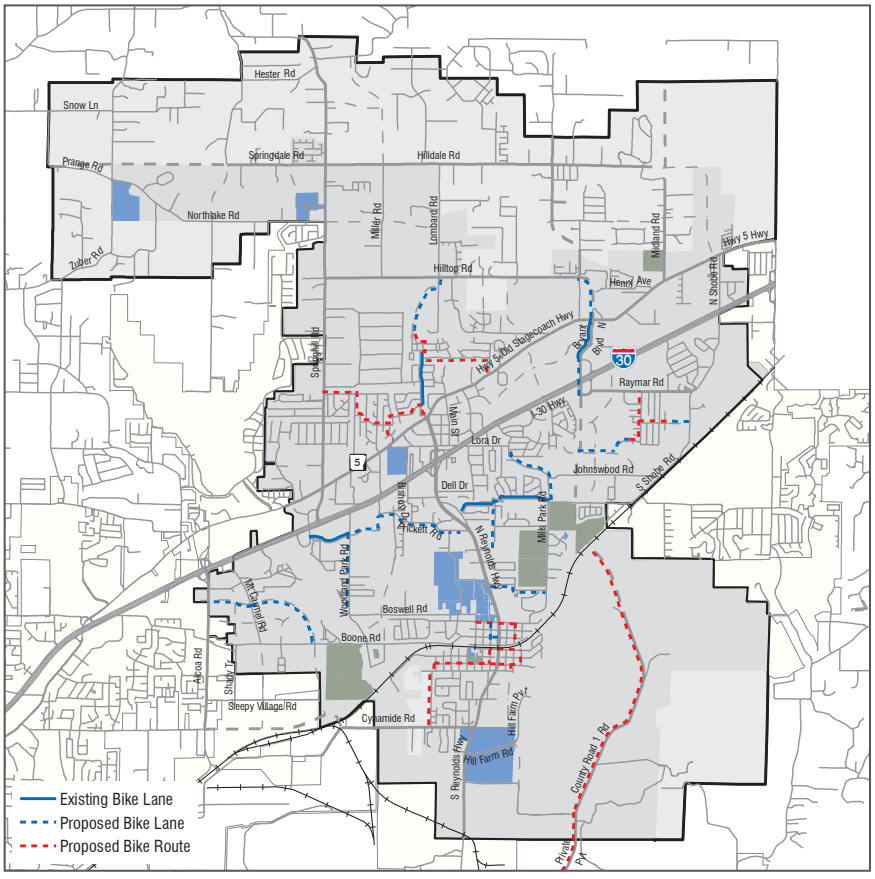
Applicability: Future road shared-use trails have been proposed along streets (Boone-Rail Trail, Hilldale Road, Hilltop Road, etc) and arterial roadways (Highway 5, Reynolds Road, Bryant Parkway, and Springhill Road). These facilities are designed to give priority to inexperienced and casual users. Avid and experienced cyclists tend to prefer other facilities because use of road shared-use trails require the user to operate at slow speeds to maintain safety with cars. Corridors where road shared-use trails are planned should be access managed to limit the number of driveways and increase driveway spacing distance. This provides for greater safety in the use of these facilities for bicycles, pedestrians, and vehicles. See Section 5 for specific design standards for the construction of shared-use trails.



Bike Lanes/Bike Routes

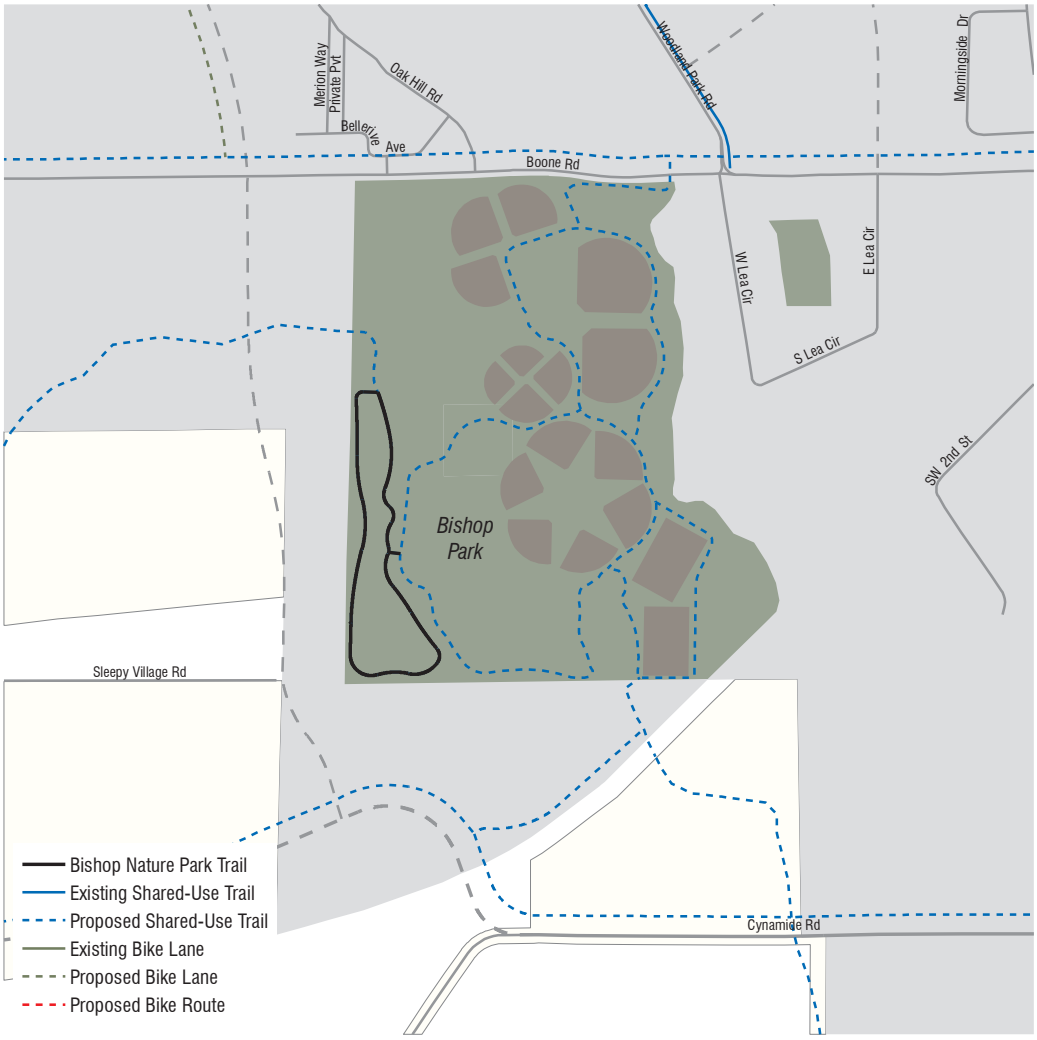
- Bike lanes are a road striping feature that designates a portion of a street (preferential lane) for sole use by bicycles.
- Bike routes are a road striping and signage feature (sharrow) that designates a street for bike use as part of a connected system. No designated lane is provided.
- Bike lanes and bike routes are a critical component to creating a comprehensive system of accessibility and mobility for bicycle users. These facilities are designed solely for bicycle use.

Applicability: Bike lanes future road shared-use trails have been proposed along lower traffic collector streets and local roads (Prickett Road, Debswood Drive, Rogers Drive, Boswell Drive, etc.) These facilities are generally favored by experienced and avid cyclists. This plan recommends the use of buffered bike lanes to protect bike users from traffic through 1.5-3' marked buffer. Bike routes have been proposed along very low traffic local roads (Monticello West, Ashlea Place Drive, SW 3rd Street, Carmichael Road, etc.) These facilities are designed to give priority to more inexperienced and casual users. Sharrow lane marking and bike routes should be features of any designated bike route. See Section 5 for specific design standards for the construction of bike lanes and bike routes.



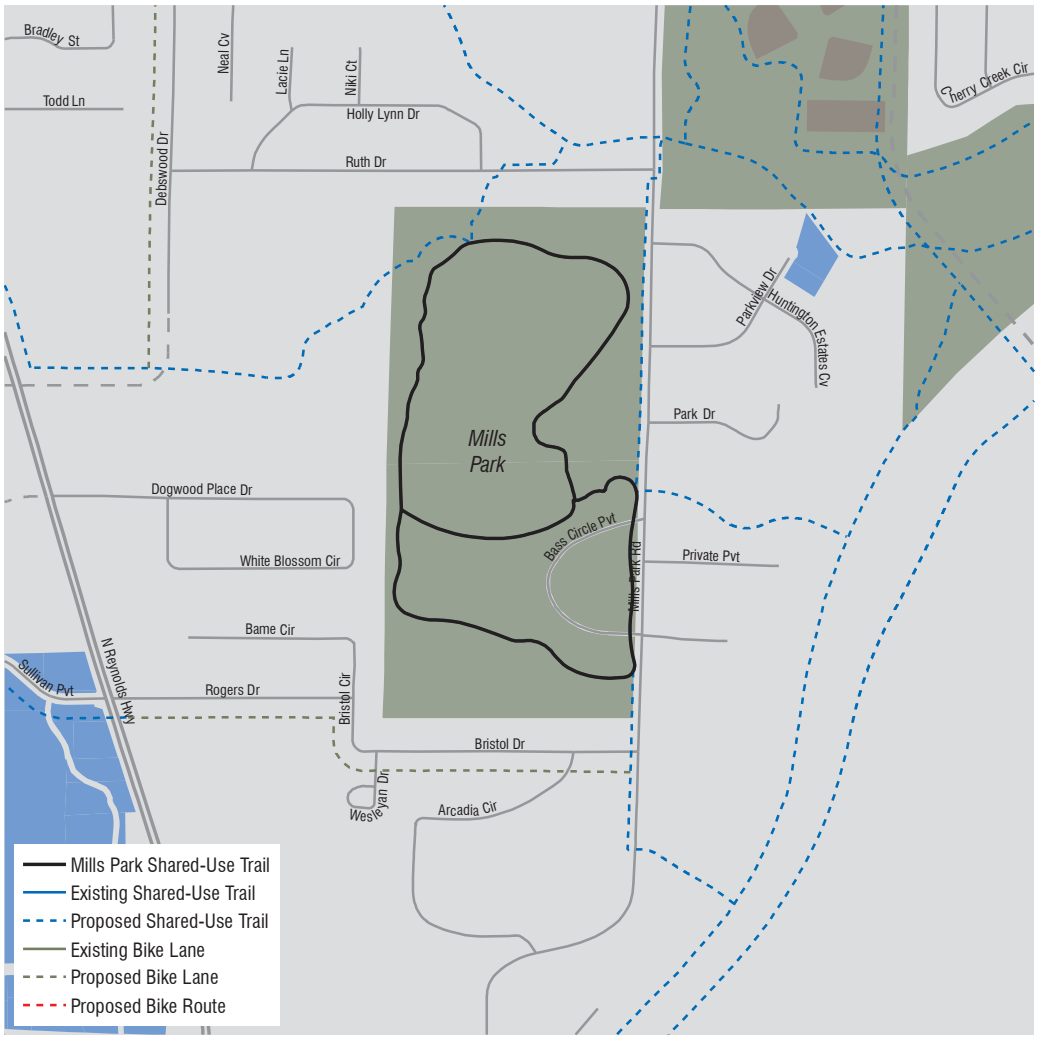
4.3 Existing Trails

Bishop Park Nature Trail



LOCATION	Bishop Park
TYPE	Class I (Separated)
LENGTH	0.7 miles
PAVING	Natural Surface
TRAILHEAD	N/A
FEATURES	Natural Area, Bishop Park
CONNECTIONS	Boone-Rail Trail via connector and Bishop Park Shared-Use Trail

Mills Park Shared-Use Trail



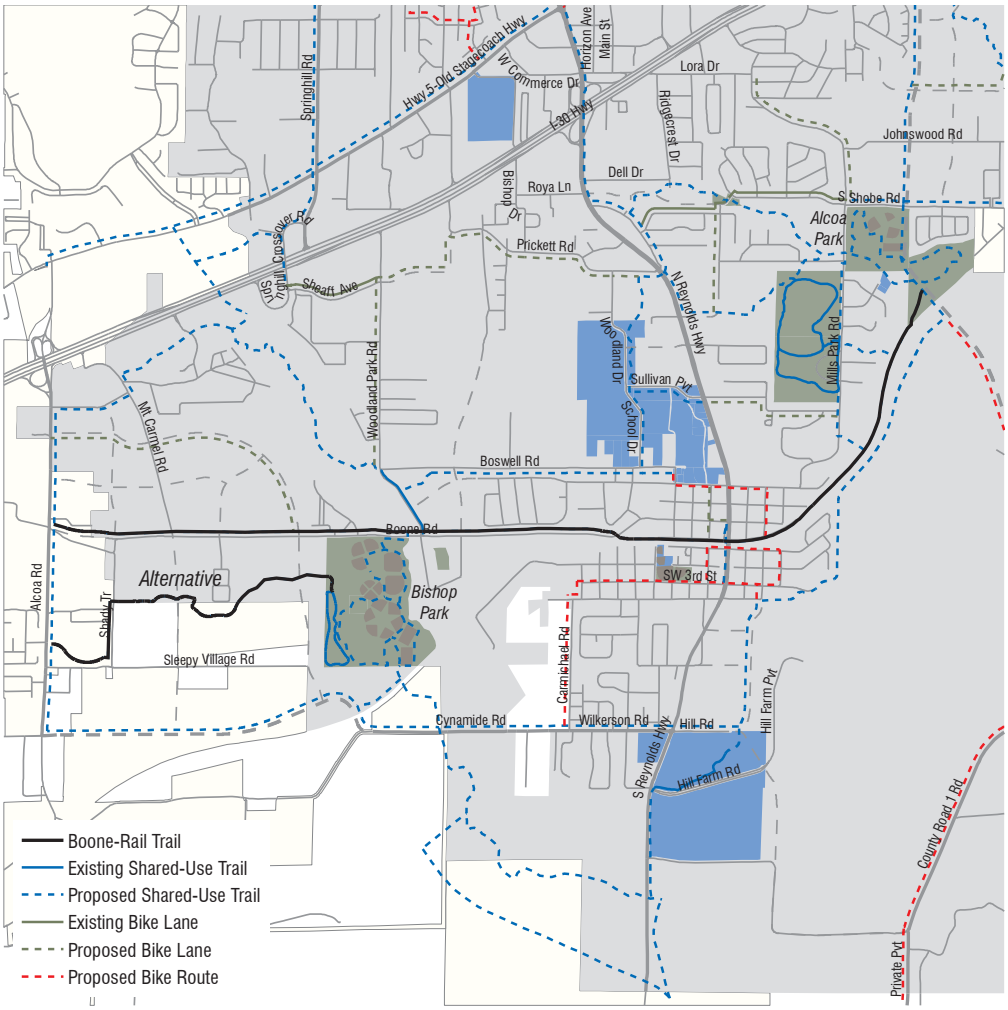
LOCATION	Mills Park
TYPE	Class I (Separated)
LENGTH	1.5 miles
PAVING	Asphalt
TRAILHEAD	Mills Park
FEATURES	Natural Area, Mills Park
CONNECTIONS	Boone-Rail Trail via connector, Crooked Creek Trail, and Prickett-Mills Park Connector

4.4 Major Proposed Trails

Bishop Park Trail

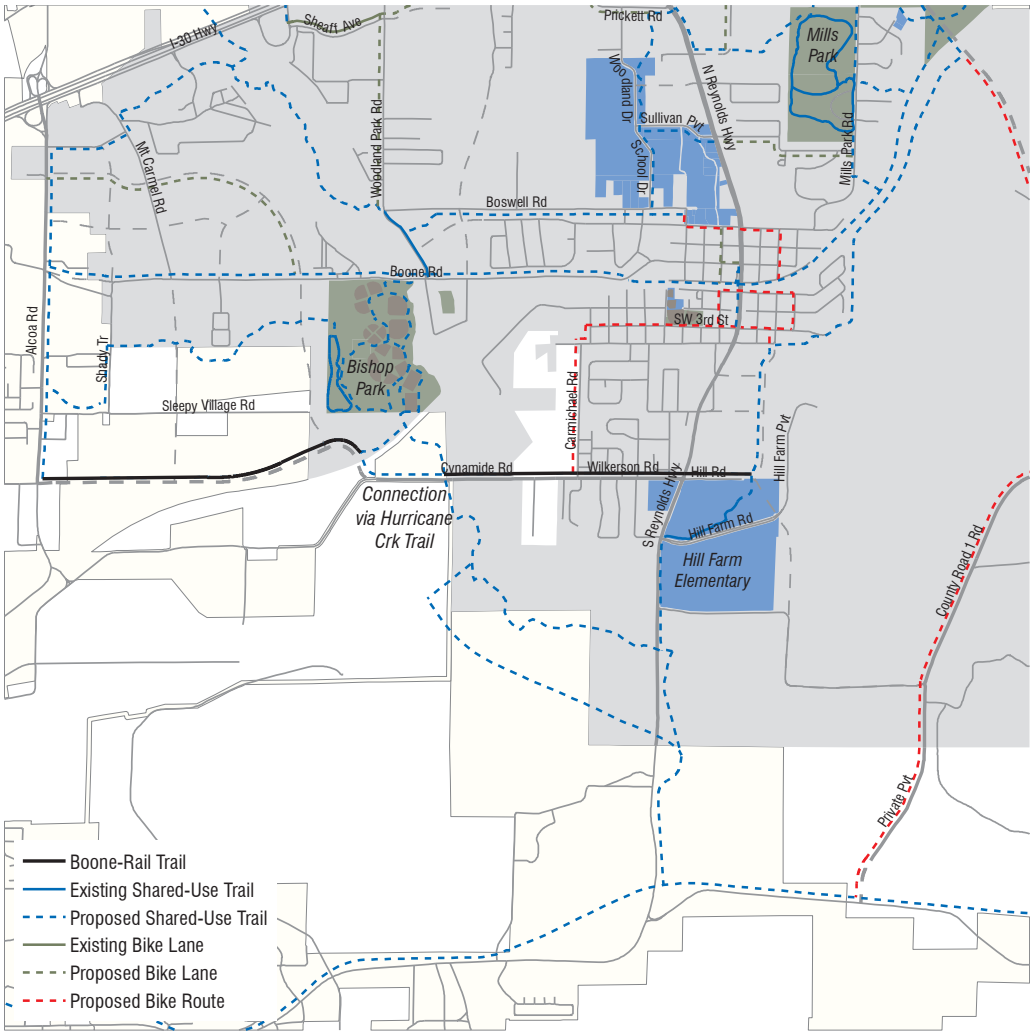
LOCATION	Bishop Park
TYPE	Class I (Separated)
LENGTH	1.7 miles
PAVING	Concrete, Asphalt, and/or Compacted Fine Aggregate
TRAILHEAD	Bishop Park Trailhead
CONSTRUCTION CONSTRAINTS	Improvements within existing park and will include improving existing sidewalks to trail standards
CONNECTIONS	Hurricane Creek Trail, Boone-Rail Trail, and Bishop Park Nature Trail
DESCRIPTION	This park trail will serve as an important connection between portions of the Hurricane Creek Trail.

Boone-Rail Trail



LOCATION	South Bryant, Heart of Bryant
TYPE	Class I (Separated/Road)
LENGTH	4.6 miles
PAVING	Asphalt or Concrete
TRAILHEAD	Bishop Park, Alcoa 40 Park, Mills Park, and Hurricane Creek Elementary (Alternative)
CONSTRUCTION CONSTRAINTS	Use UPRR ROW along Railroad and construct with the improvement of Boone Road
CONNECTIONS	Mills Park via connector, Alcoa 40 Park Trail, Benton Trails, Crooked Creek Trail, Alcoa Trail, and Hurricane Creek Trail
DESCRIPTION	This trail will provide a critical east-west spine for the City with many of the City's important north-south trails connecting off of this trail system.

B-Town Trail

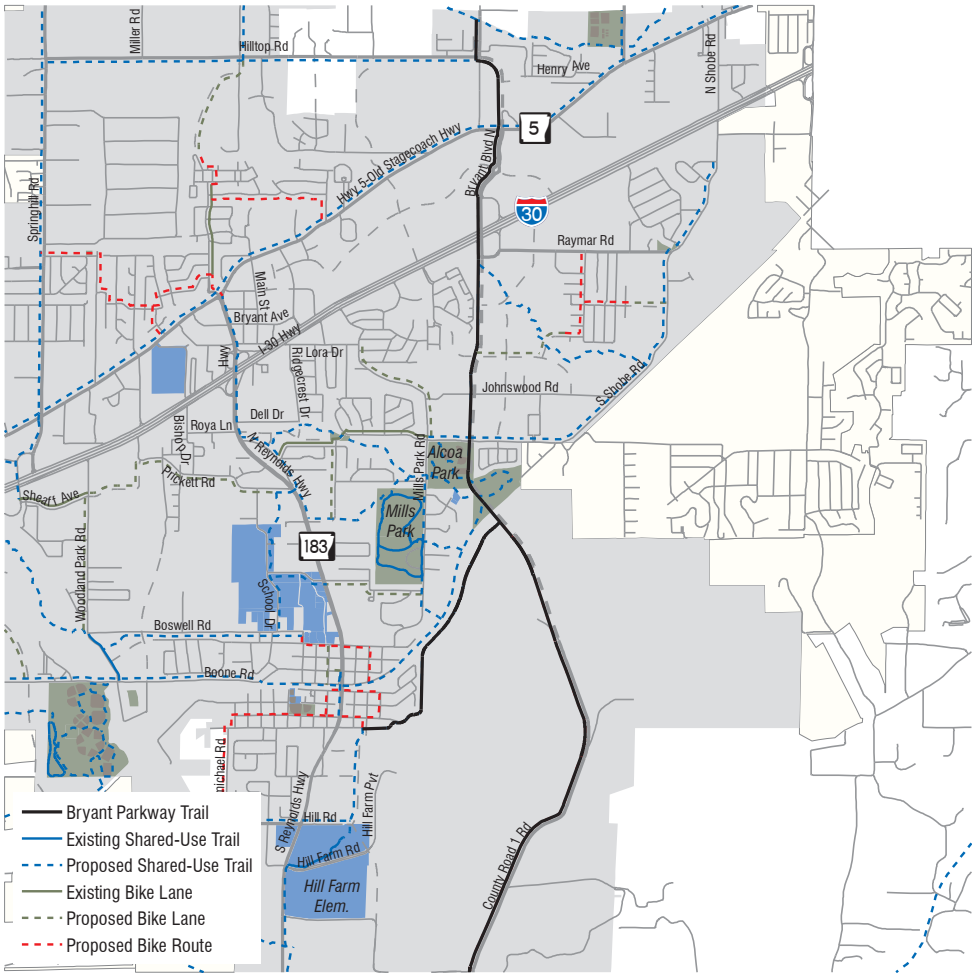


LOCATION	South Bryant
TYPE	Class I (Road)
LENGTH	3.7 miles
PAVING	Concrete or Asphalt
TRAILHEAD	Hill Farm Elementary Trailhead
CONSTRUCTION CONSTRAINTS	Construct with relocation of Cynamide Road, participate with Benton on construction, construct with widening of Wilkerson Road, and construct the improvement and extension of Hill Road
CONNECTIONS	Hurricane Creek Trail, Benton Trails, Bryant Parkway Trail, and Alcoa Road Trail
DESCRIPTION	This trail will provide an important alternative to the Boone-Rail Trail if that trail cannot be constructed. Almost all the improvements will come as part of roadway improvements paid for by the City and developers.

Crooked Creek Trail

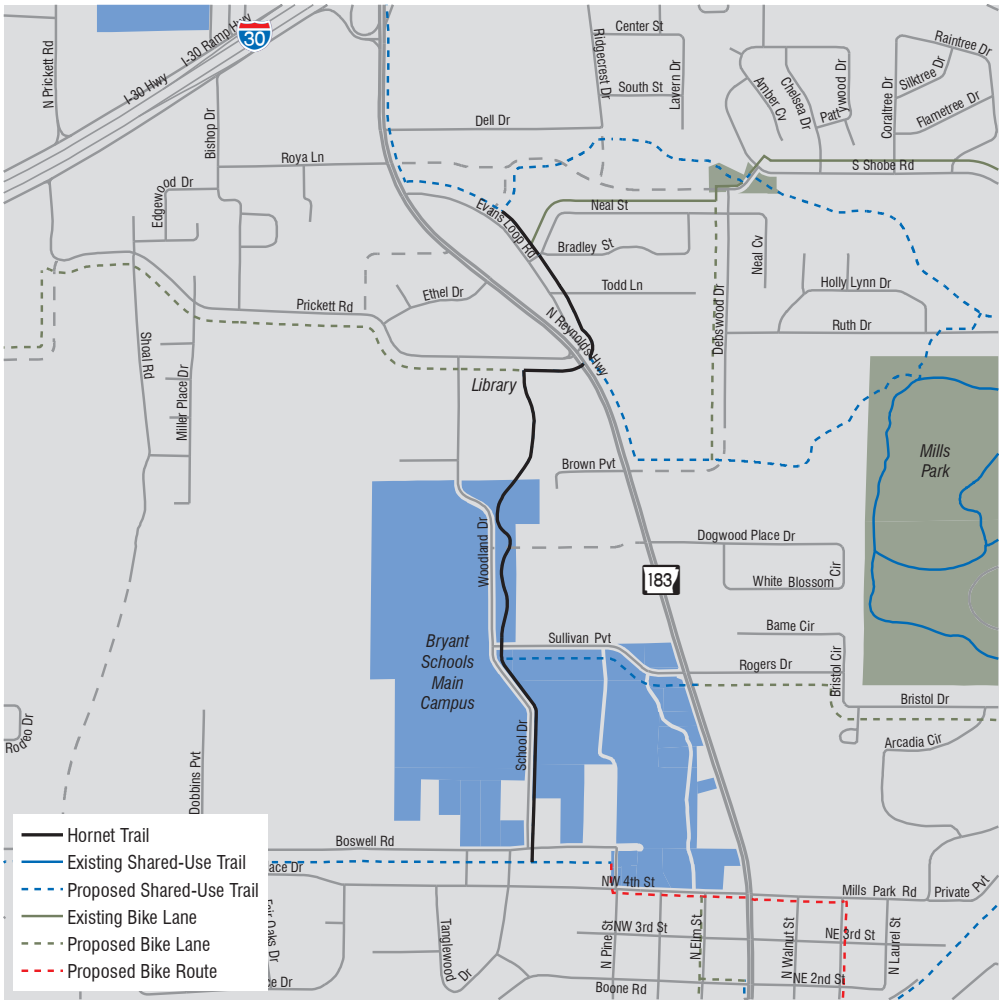
LOCATION	Reynolds Road, Midtown Bryant
TYPE	Class I (Road/Separated)
LENGTH	1.9 miles
PAVING	Asphalt/Concrete and Fine Compacted Aggregate
TRAILHEAD	Debswoord Park Trailhead and Alcoa 40 Park Trailhead
CONSTRUCTION CONSTRAINTS	May require a cantilevered trail over I-30 bridge, Use existing ROW along Reynolds Road and Evans Loop, explore using existing sewer easement for construction along Crooked Creek, and partially crosses City property
CONNECTIONS	Hornet Trail, Shobe Road bike lanes, Alcoa 40 Park Trail, Bishop Park via connector, and North Bryant via bike facilities
DESCRIPTION	This trail will provide a north-south connection across I-30 and will be critical for improving bike/pedestrian connectivity.

Bryant Parkway Trail



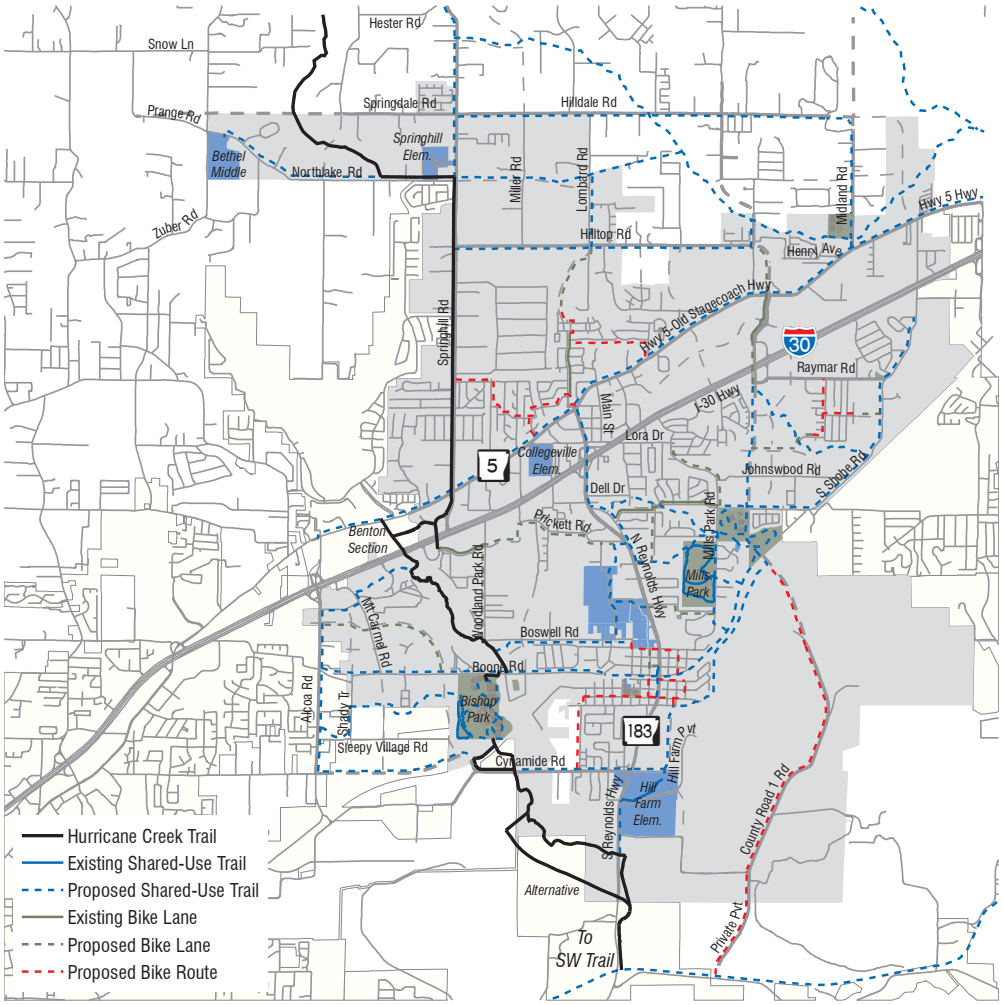
LOCATION	East Bryant, Bryant Parkway Corridor
TYPE	Class I (Road), Class II
LENGTH	6.2 miles
PAVING	Asphalt or Concrete
TRAILHEAD	Alcoa 40 Park Trailhead and Midland Park Trailhead
CONSTRUCTION CONSTRAINTS	Construct with the improvement/construction of the Bryant Parkway Corridor
CONNECTIONS	Owen Creek Trail, Hilltop Trail, Alcoa 40 Park Trail, B-Town Trail. Southwest Trail, Boone-Rail Trail
DESCRIPTION	This trail will serve as the eastern north-south spine for the bike/pedestrian system connecting several east-west trail connections.

Hornet Trail



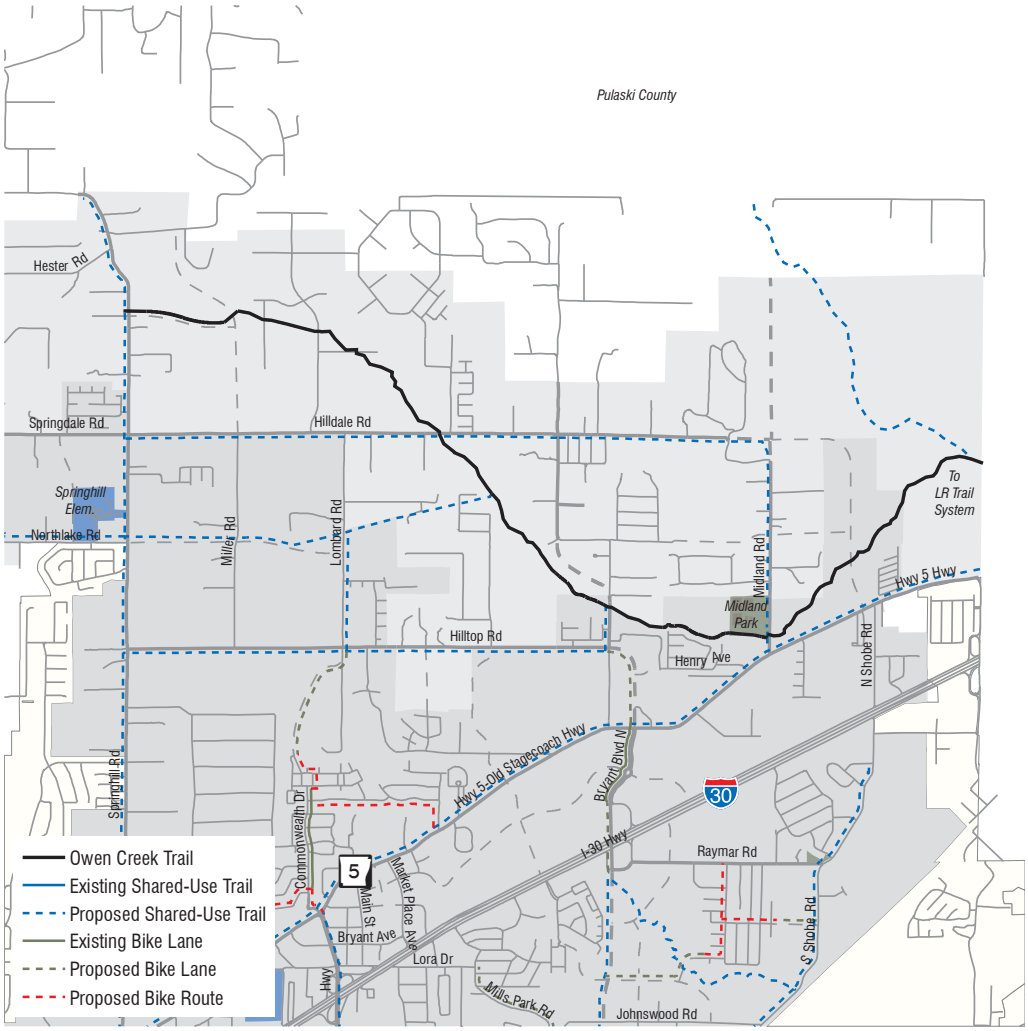
LOCATION	Bryant School Campus, Bryant Library
TYPE	Class I (Road/Separated)
LENGTH	1.2 miles
PAVING	Asphalt or Concrete
TRAILHEAD	Bryant Library Trailhead
CONSTRUCTION CONSTRAINTS	Need easement across portion of private land, construct in conjunction with Bryant Schools, and use the existing ROW from Prickett Road and Evans Loop
CONNECTIONS	Bike facilities on Prickett Road, Crooked Creek Trail, and various other bike facilities
DESCRIPTION	This trail intended to provide safe connections to Bryant Schools' main campus and the surrounding neighborhoods.

Hurricane Creek Trail



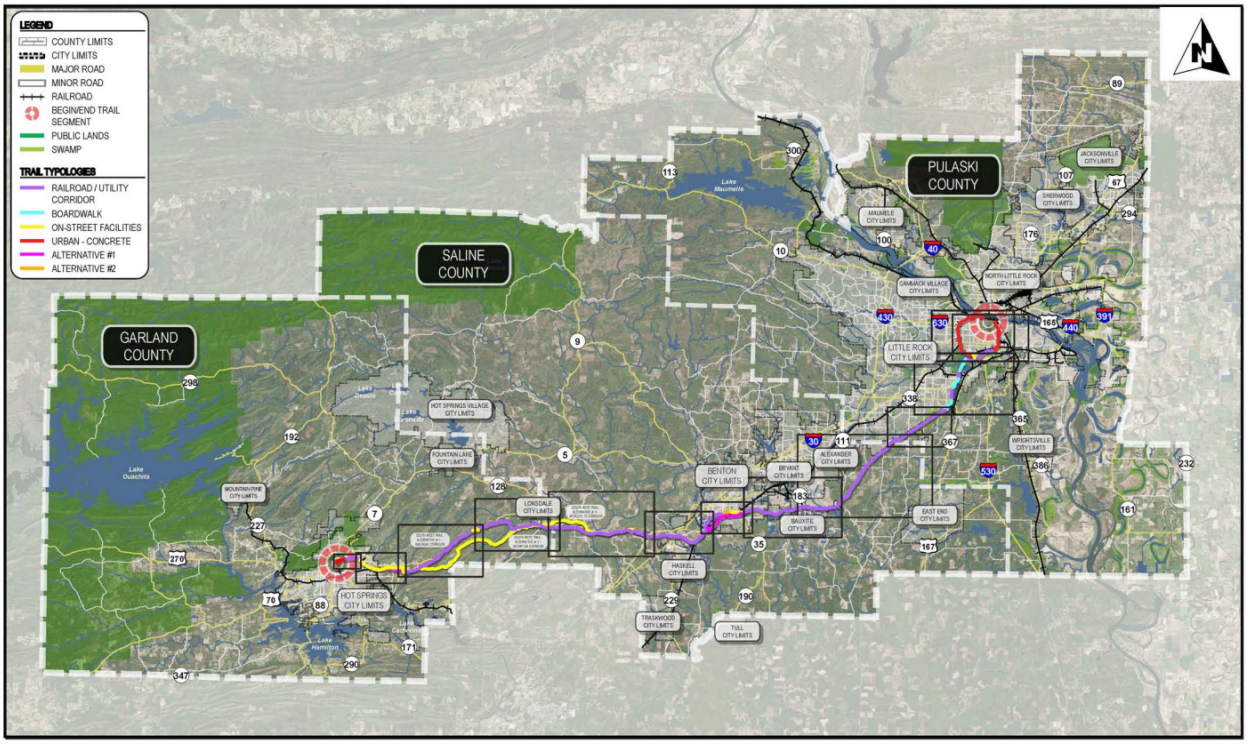
LOCATION	Hurricane Creek, Springhill Road
TYPE	Class I (Road/Separated)
LENGTH	11.8 miles
PAVING	Concrete or Asphalt and Fine Compacted Aggregate
TRAILHEAD	Bishop Park Trailhead, Springhill Manor Park Trailhead via connector, and Springhill Elementary Trailhead
CONSTRUCTION CONSTRAINTS	Construct partially on PTU property, need various easements across property, use Bauxite and Northern Railroad (if abandoned), cross under I-30 at Hurricane Creek bridge, and use Springhill Road ROW
CONNECTIONS	Bishop Park Trails, B-Town Trail, Boone-Rail Trail, Highway 5 bike facilities, Hilltop Trail, Hurricane Owen Trail (to connect with Owen Creek Trail), and Southwest Trail
DESCRIPTION	This is a major north-south trail spine of the West of Bryant. This trail could provide a regional greenway and major connection to the proposed Southwest Trail.

Owen Creek Trail



LOCATION	Owen Creek, North Bryant
TYPE	Class I (Separated)
LENGTH	5.2 miles
PAVING	Fine Compacted Aggregate and/or Concrete/Asphalt
TRAILHEAD	Midland Soccer Trailhead
CONSTRUCTION CONSTRAINTS	Explore possibility of using existing sewer line easement and obtain easement/ROW east of Midland Road
CONNECTIONS	Fourche Creek Trail, Hilldale-Midland Trail, Bryant Parkway Trail, and Hurricane-Owen Trail
DESCRIPTION	This trail will provide a connection to the Little Rock Trail system and provide a scenic greenway along the northern part of Bryant.

Southwest Trail



SOUTH WEST TRAIL – HOT SPRINGS TO LITTLE ROCK
TRAILS THROUGH CITY OF BENTON TO EAST BAUXITE CITY LIMITS

FIGURE 8. MAP OF SEGMENT 8
SEGMENT 8 MEASURES TO 6.71 MILES

LOCATION	Rock Island Railroad ROW
TYPE	Various
LENGTH	~60 miles
PAVING	Various
TRAILHEAD	Multiple
CONNECTIONS	Echo Lake Trail and Hurricane Creek Trail
DESCRIPTION	This regional trail is to be constructed by various regional, state, and local entities in the area. This trail is projected to have major tourism boost. Local connections to the trail are highly important.

Section Five: **Standards**

5.1 Cross Sections

The following cross sections are provided to govern the construction of street and bicycle/pedestrian facilities by the City of Bryant and through private resources by developers. These cross sections work in tandem with the City of Bryant's Street Construction Standards and Specifications that govern all aspects of roadway design and construction excluding street pavement width, curb and gutter requirements, and requirements of bike and pedestrian elements.

CROSS SECTION NAMING CONVENTION	
ROADWAY CLASS	C4.0-4 : Minor Arterials, C5.0-6 : Collectors, C6.0-5 : Local Streets
BIKE/PEDESTRIAN ELEMENTS	I : Shared-Use Trails, II: Bike Lanes, III: Bike Routes

Minor Arterials

Minor Arterials provide network connections within and through the urbanized area. These facilities typically provide a greater amount of access to adjoining land as compared to principal arterials, where the primary function is providing mobility by moving traffic.

1. Required Elements:

    a) Right-of-Way: All required design elements must be included in the cross section and located on publicly owned ROW. Sidewalks or bikeways may be located on permanent dedicated easements. The right-of-way must be sufficient to accommodate four lanes.

    b) Curb and Gutter: Curb and gutter is required except in cases where terrain and/or forecast land use densities are compatible with an open-shoulder design typically used in rural or exurban areas. The gutter width is not to be included in the travel lane.

    c) Sidewalks: Sidewalks are required on both sides of the roadway. Minimum sidewalk width is 5 feet and must be compatible with the Americans with Disabilities Act.

    d) Green Space Buffers: A buffer is required between the back of curb and the sidewalk that is a minimum of 5 feet. However, no buffers are required in Central Business Districts.

    e) Pedestrian Crossings: Safe pedestrian crossing provisions are required to be demonstrated by the proposing jurisdiction or agency where more than 36 feet of pavement (including the gutter) have to be crossed by a pedestrian where pedestrian crossing is anticipated based on land use.

    f) Bike Lanes/Trails: If on a planned bikeway route, the bicycle element must be included and must adhere to the bicycle design standards shown on the appropriate cross section. Where bike lanes are provided, a minimum buffer from the main travel lanes is required.

g) Lane Width: 10 feet minimum for main travel lanes or 11 feet maximum, where the design speed and traffic mix warrant.

2. Optional Elements:

   a) 8 feet minimum paved shoulder on first phase of a planned four-lane minor arterial, with or without curb and gutters.

3. Preferred Elements:

   a) Landscaping of medians and buffers.

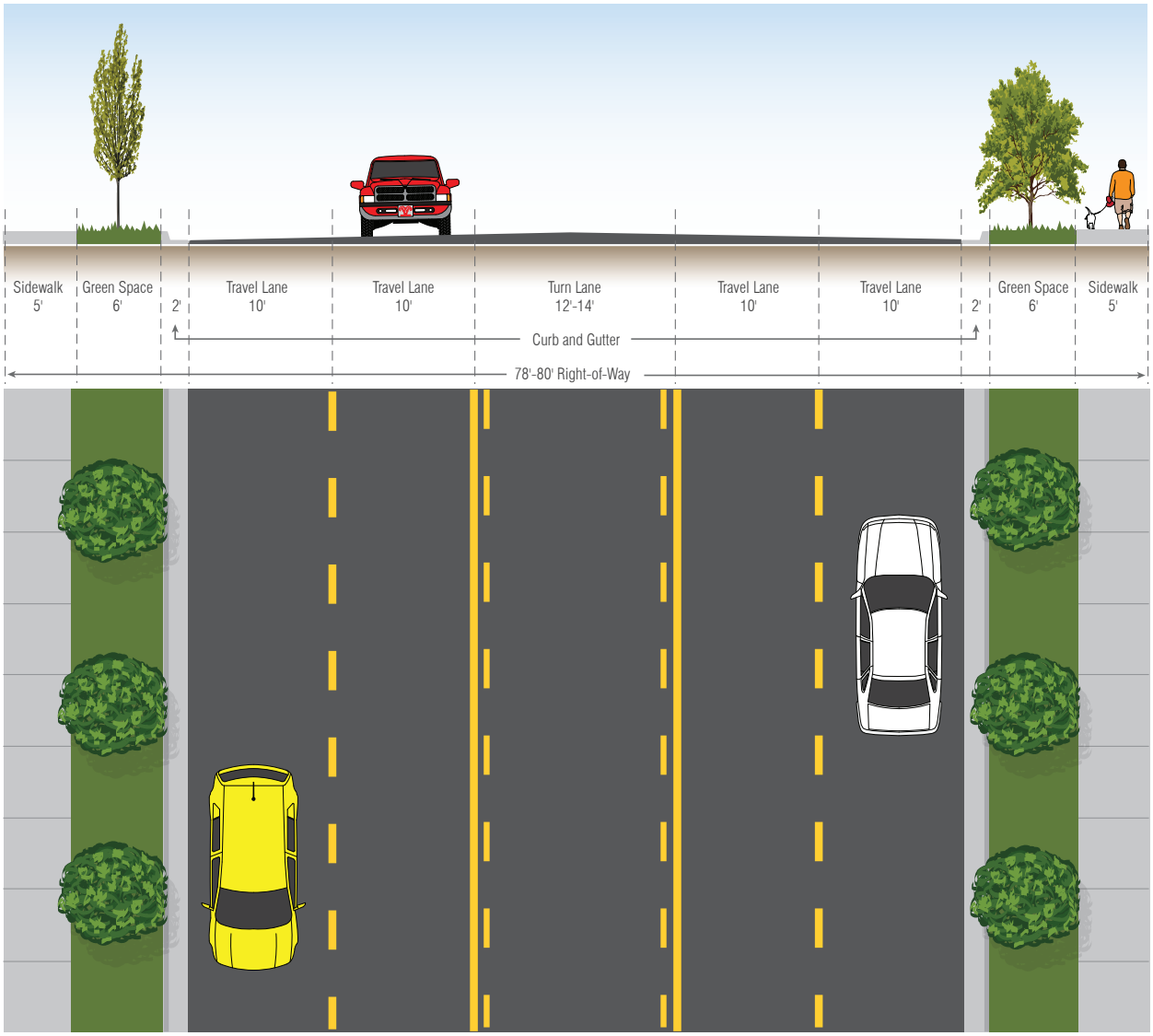
   b) A non-traversable median is preferred for major retrofits and on new locations.

   c) Where applicable, a shared-use trail is preferable over bike lanes.

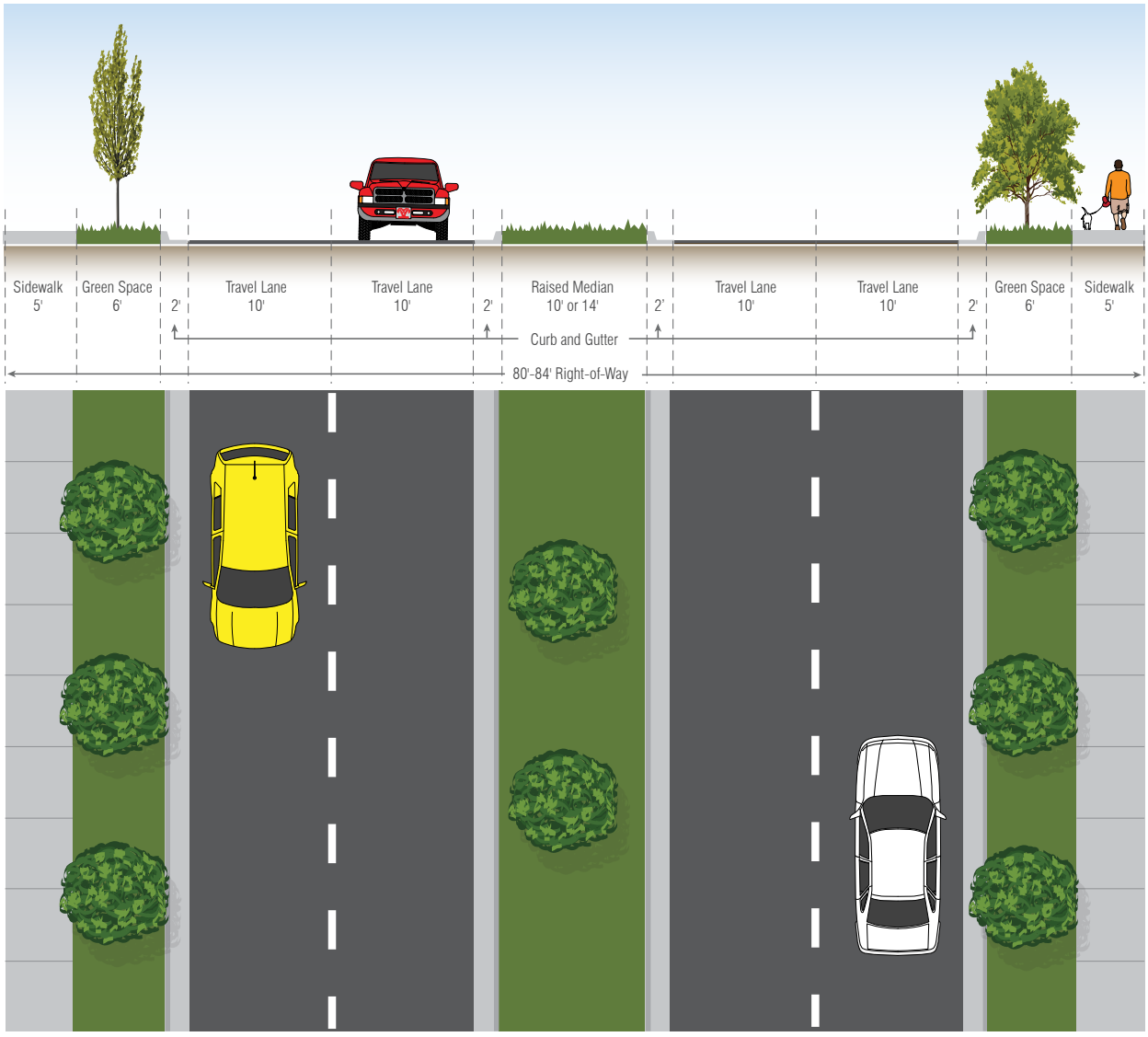
4. Prohibited Elements:

   a) Parking lanes.

C4.0 – Minor Arterial

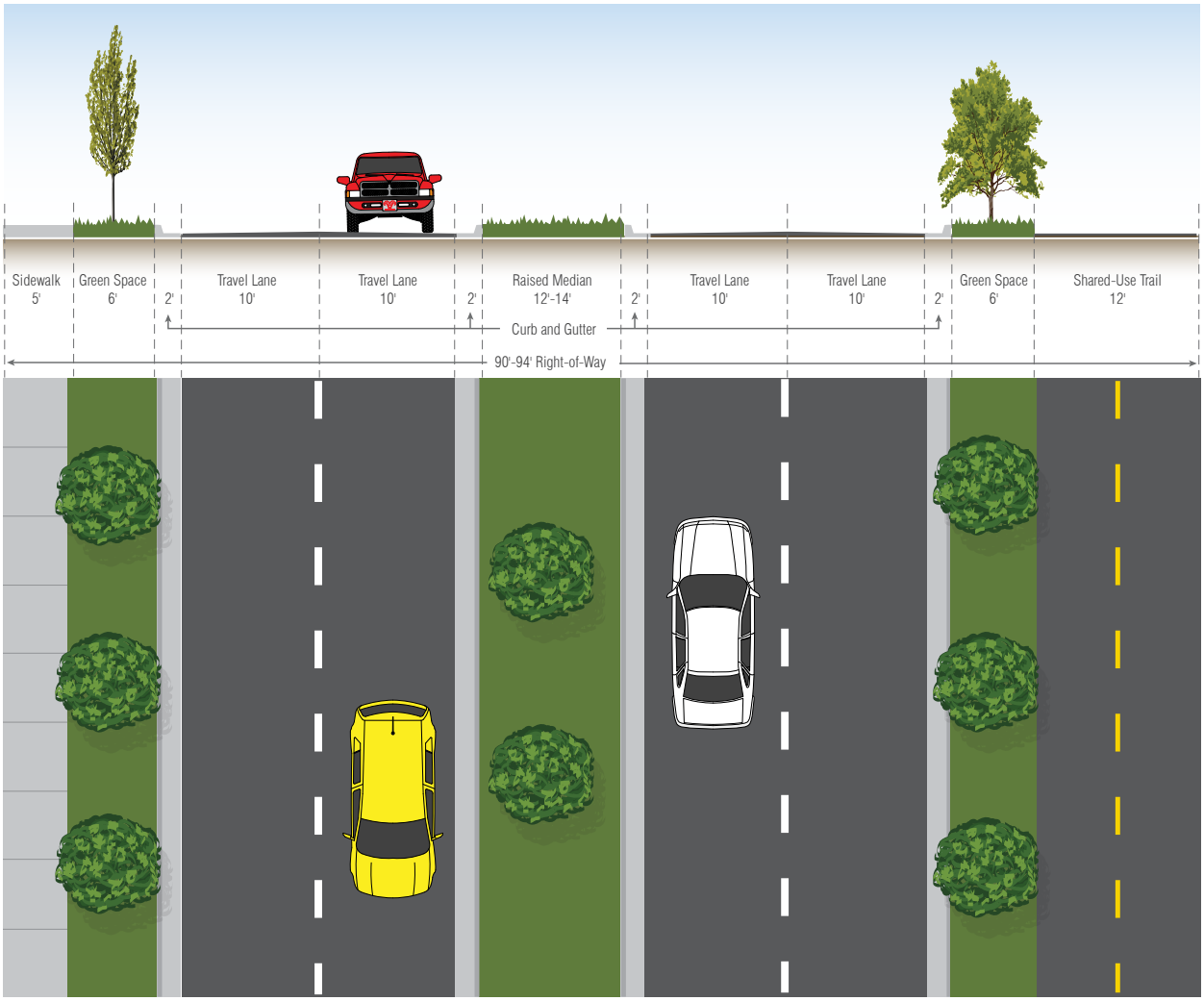


C4.1 – Minor Arterial with Median



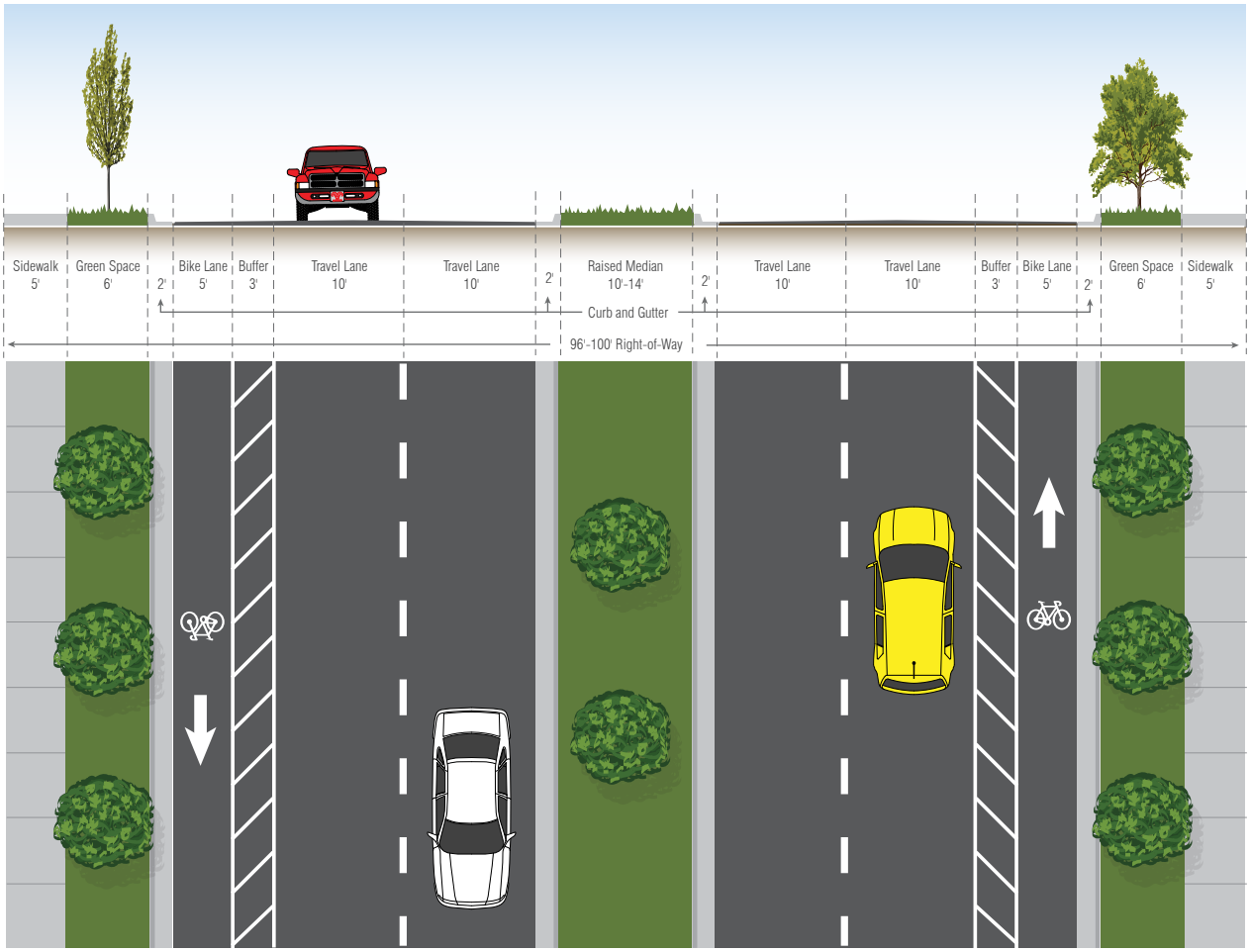
Note: 14-foot median is used when pedestrian refuge island is anticipated.

C4.2l – Minor Arterial with Trail



Note: 14-foot median is used when pedestrian refuge island is anticipated.

C4.3II – Minor Arterial with Bike Lanes



Note: 14-foot median is used when pedestrian refuge island is anticipated.

Collectors

Collector Roadways connect local traffic with the arterial roadway network and provide easy access to adjoining land.

1. Required Elements:

    a) Right-of-Way: All required design elements must be included in the cross section and located on publicly owned ROW. Sidewalks or bikeways may be located on permanent dedicated easements.

    b) Curb and Gutter: Curb and gutter is required except in cases where terrain and/or forecast land use densities are compatible with an open-shoulder design typically used in rural or exurban areas. The gutter width is not to be included in the travel lane.

    c) Sidewalks: Sidewalks are required on both sides of the roadway, except within Industrial Developments (C5.6III). Minimum sidewalk width is 5 feet and must be compatible with the Americans with Disabilities Act.

    d) Green Space Buffers: A buffer is required between the back of curb and the sidewalk that is a minimum of 5 feet. However, no buffers are required in Central Business Districts or where C5.3/C5.4II is used.

    e) Pedestrian Crossings: Safe pedestrian crossing provisions are required to be demonstrated by the proposing jurisdiction or agency where more than 36 feet of pavement (including the gutter) have to be crossed by a pedestrian where pedestrian crossing is anticipated based on land use.

    f) Bike Lanes/Trails: If on a planned bikeway route, the bicycle element must be included and must adhere to the bicycle design standards shown on the appropriate cross section. Where bike lanes are provided, a minimum buffer 1.5 feet from the main travel lanes is required.

    g) Lane Width: 10 feet minimum for main travel lanes or 11 feet maximum, where the design speed and traffic mix warrant. There is a maximum of two travel lanes allowed.

2. Optional Elements:

    a) Parallel parking may be used where warranted (C5.3, C5.4II).

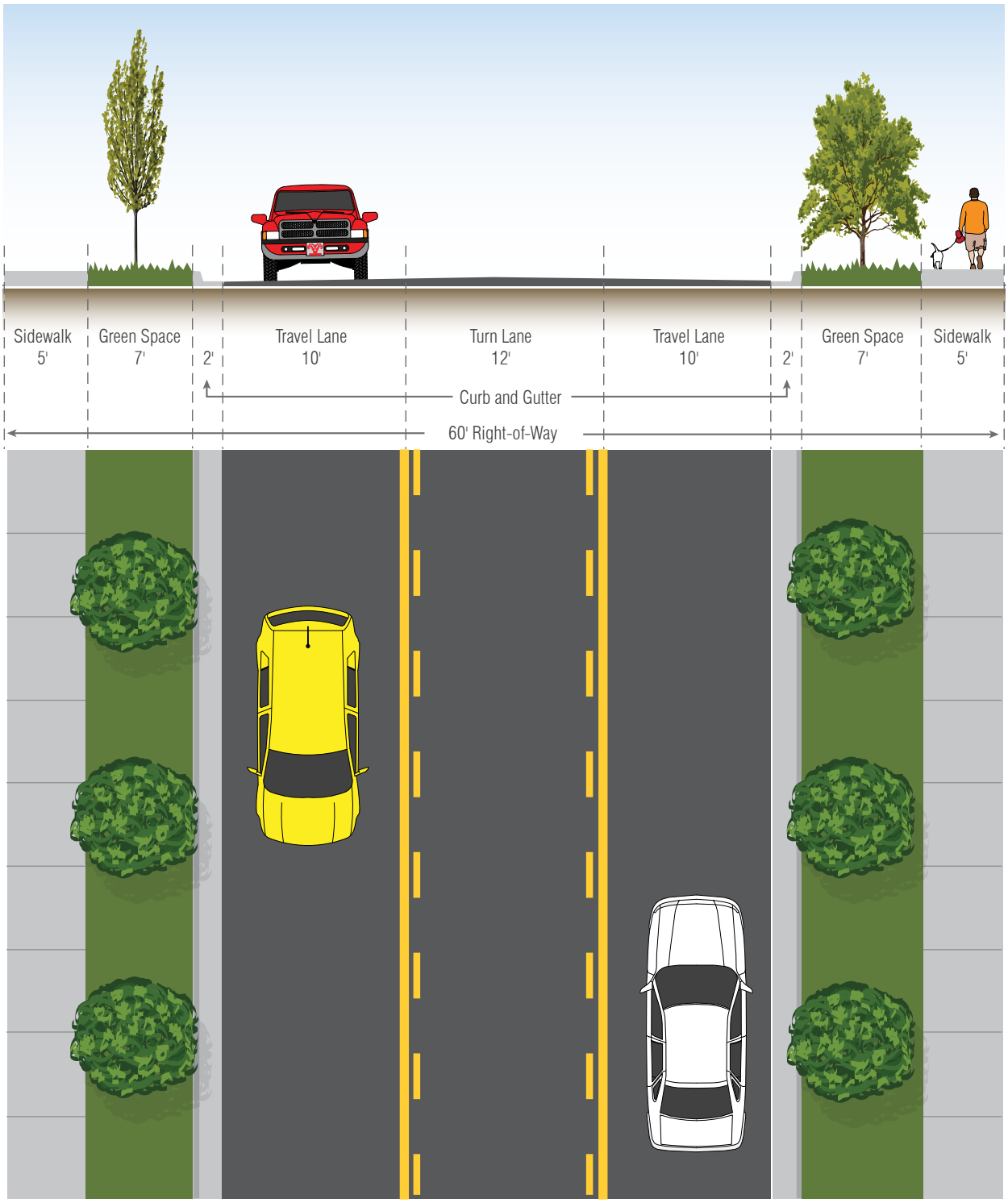
3. Preferred Elements:

    a) Landscaping of medians and buffers.

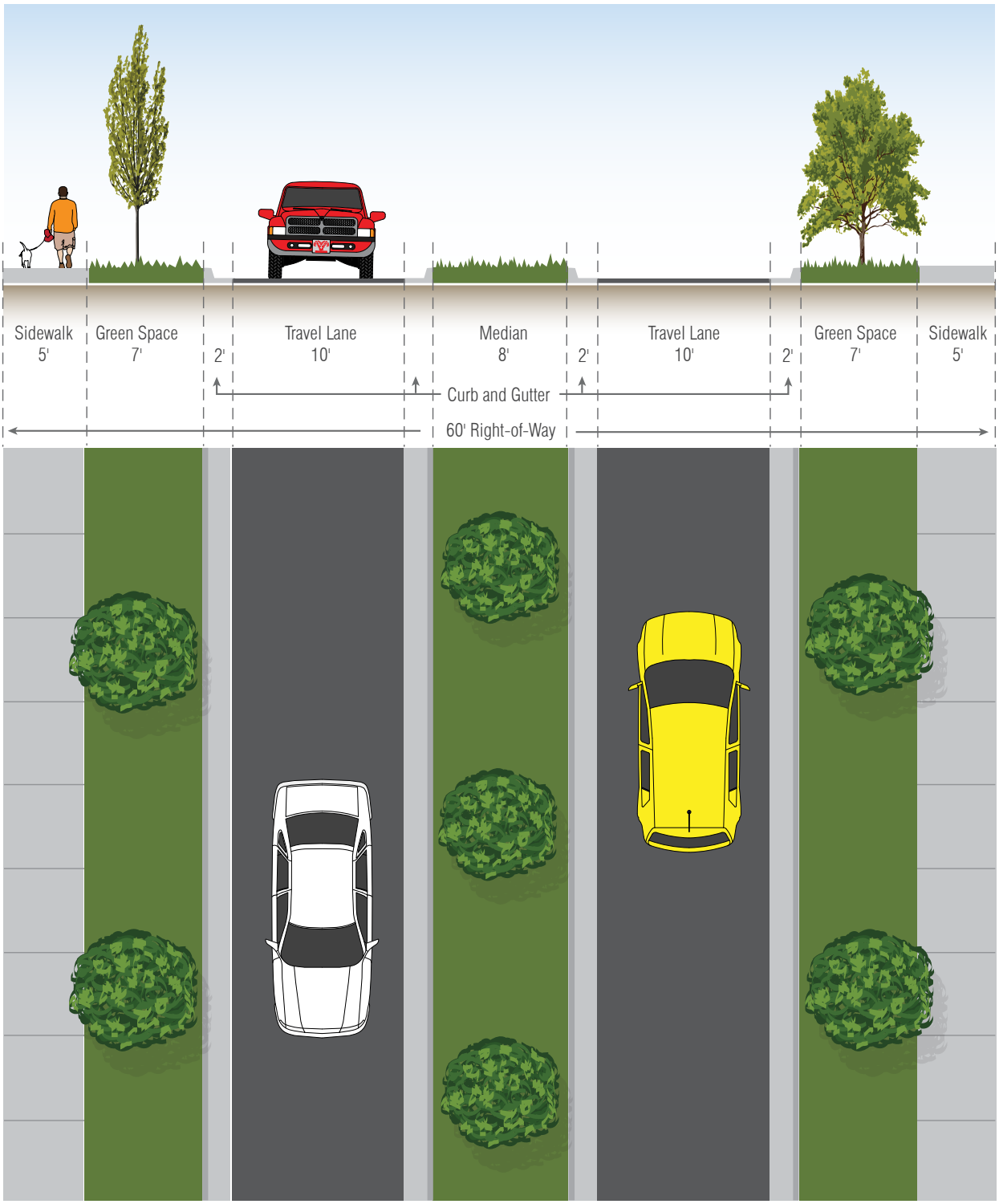
    b) A non-traversable median is preferred for major retrofits and on new locations.

    c) Where applicable, a shared-use trail is preferable over bike lanes.

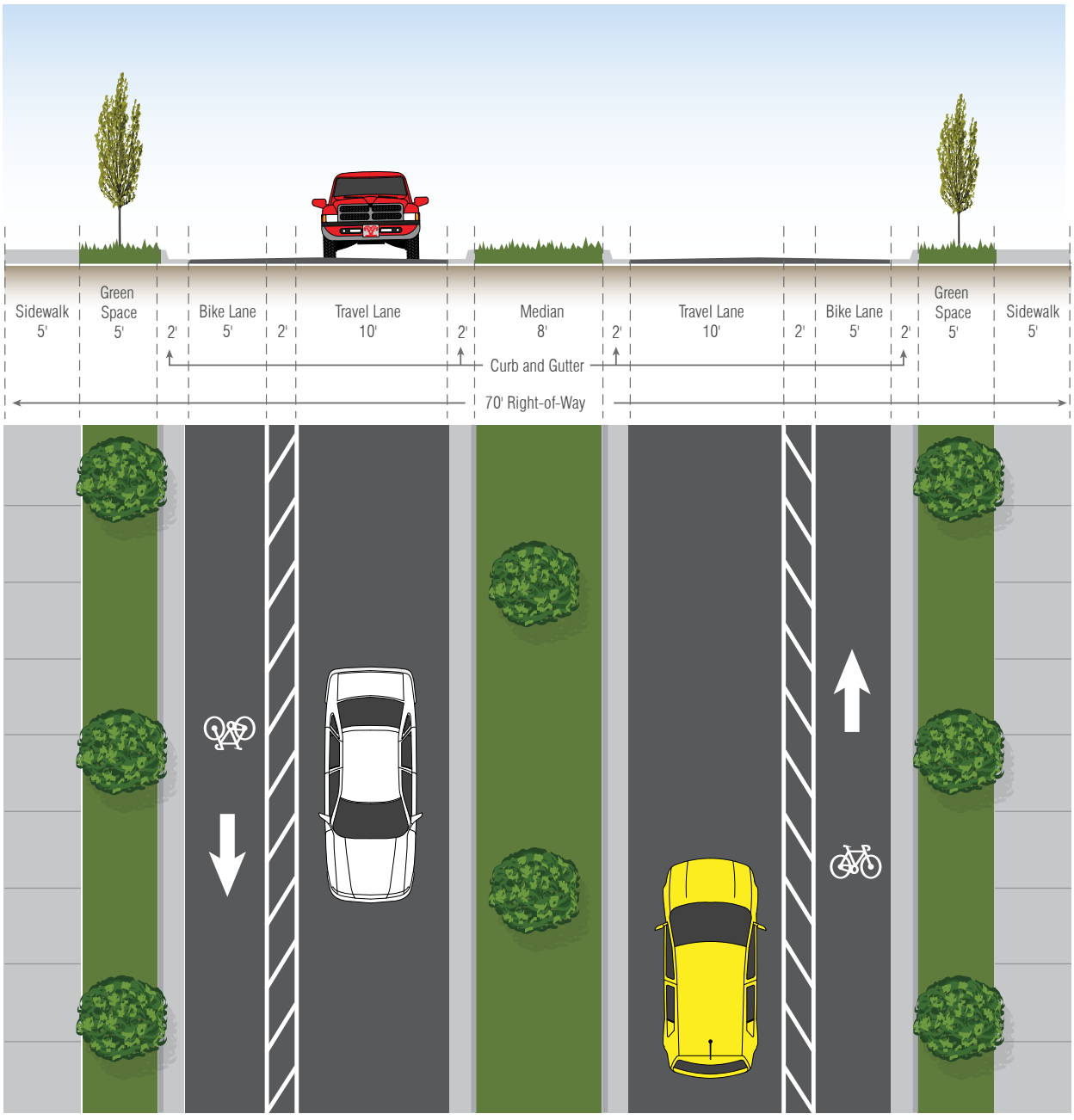
C5.0 – Collector



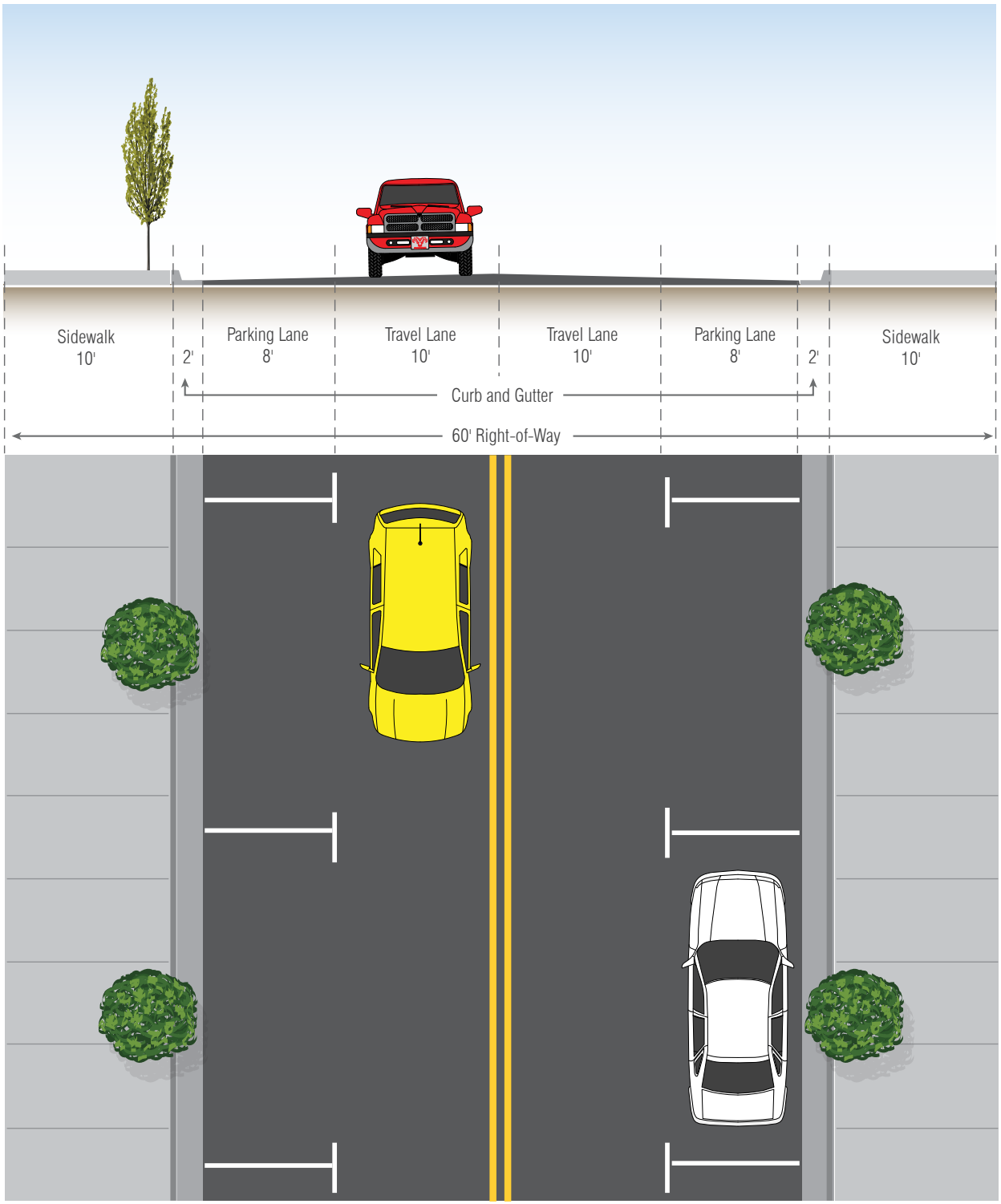
C5.1 – Collector with Median



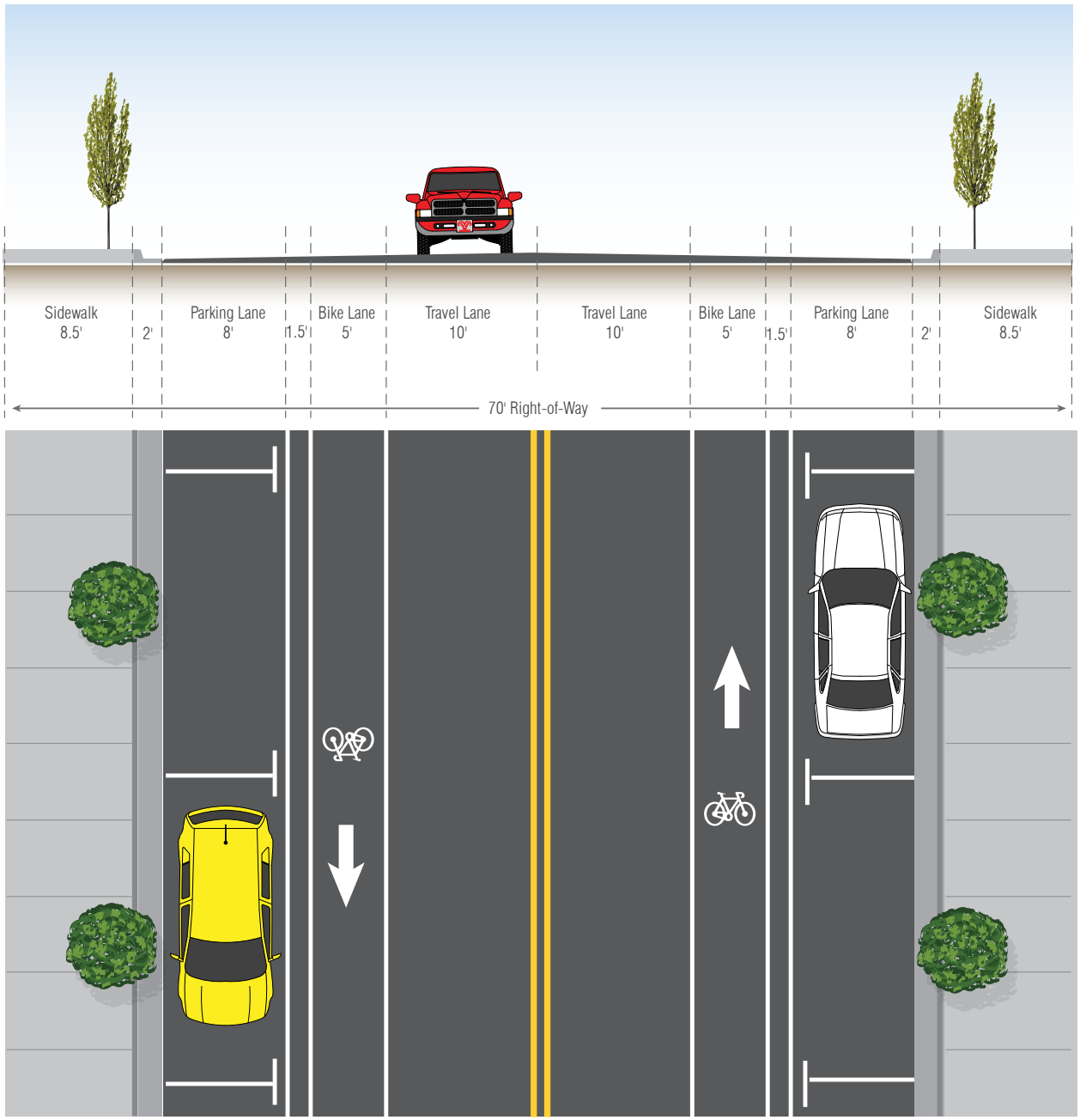
C5.2II – Collector with Bike Lanes



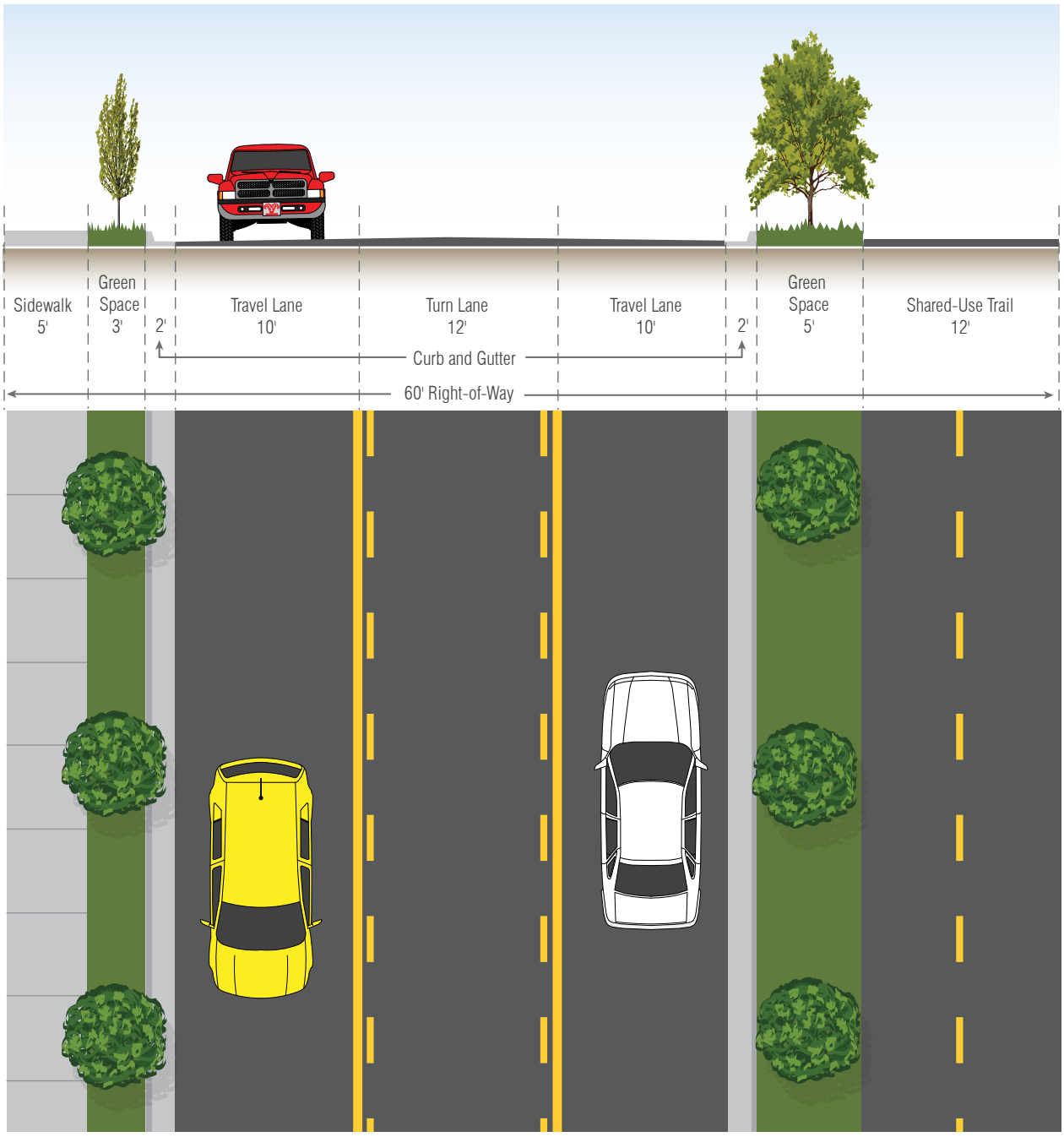
C5.3 – Urban Collector



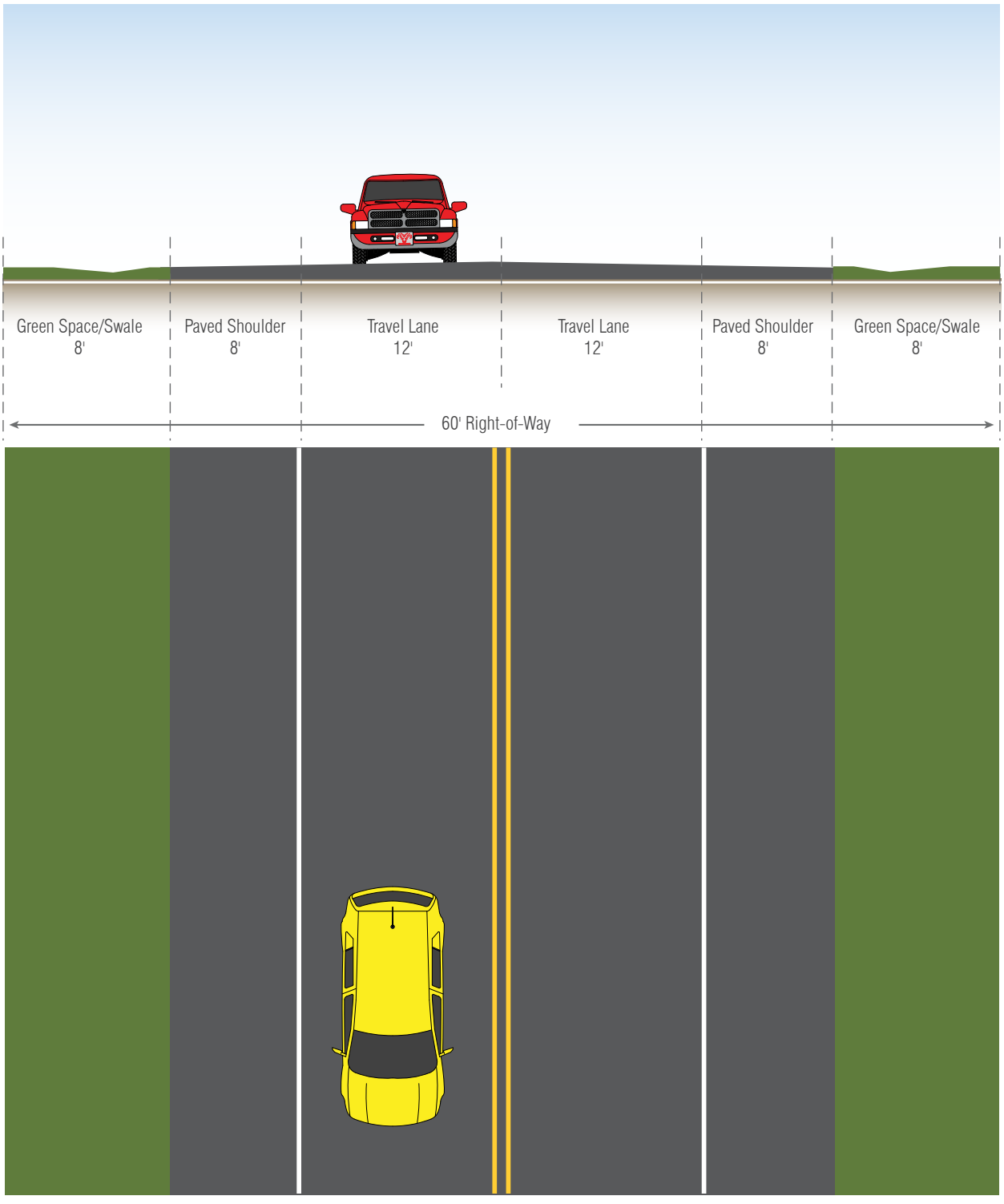
C5.4II – Urban Collector with Bike Lanes



C5.5 – Collector with Trail



C5.6III – Industrial Collector



Local Streets

Local streets are intended to connect traffic with collectors and to the arterial roadway network. They are not intended to carry large traffic loads and are designed for low speeds, providing access to adjoining land.

1. Required Elements:

    a) Right-of-Way: All required design elements must be included in the cross section and located on publicly owned ROW. Sidewalks or bikeways may be located on permanent dedicated easements.

    b) Curb and Gutter: Curb and gutter is required except in cases where terrain and/or forecast land use densities are compatible with an open-shoulder design typically used in rural or exurban areas where the average lot size is greater than one acre. The gutter width is not to be included in the travel lane.

    c) Sidewalks: Sidewalks are required on both sides of the roadway, except within Industrial Developments (C6.5III). Minimum sidewalk width is 5 feet and must be compatible with the Americans with Disabilities Act.

    d) Green Space Buffers: A buffer is required between the back of curb and the sidewalk that is a minimum of 3 feet. However, no buffers are required in Central Business Districts or where C5.3/C5.4II is used. Where not buffer can be provided due to topographical constraints, sidewalks must be at least six feet in width.

    e) Bike Lanes/Trails: If on a planned bikeway route, the bicycle element must be included and must adhere to the bicycle design standards shown on the appropriate cross section.

    f) Lane Width: All lanes shall be used for driving and parking where the combined lanes are greater than 22 feet in width.

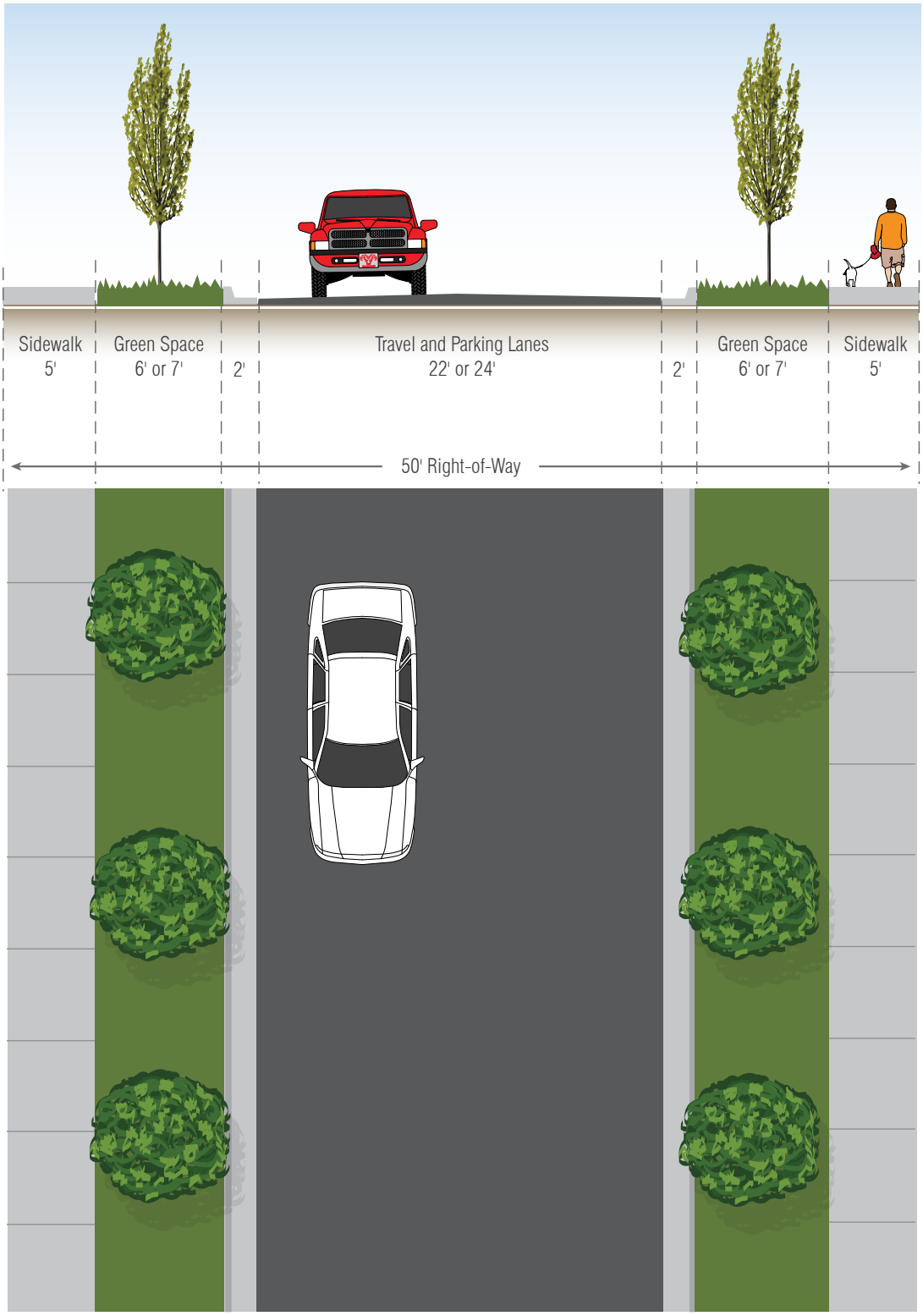
2. Optional Elements:

    a) Parallel parking may be used where warranted (C6.4).

3. Preferred Elements:

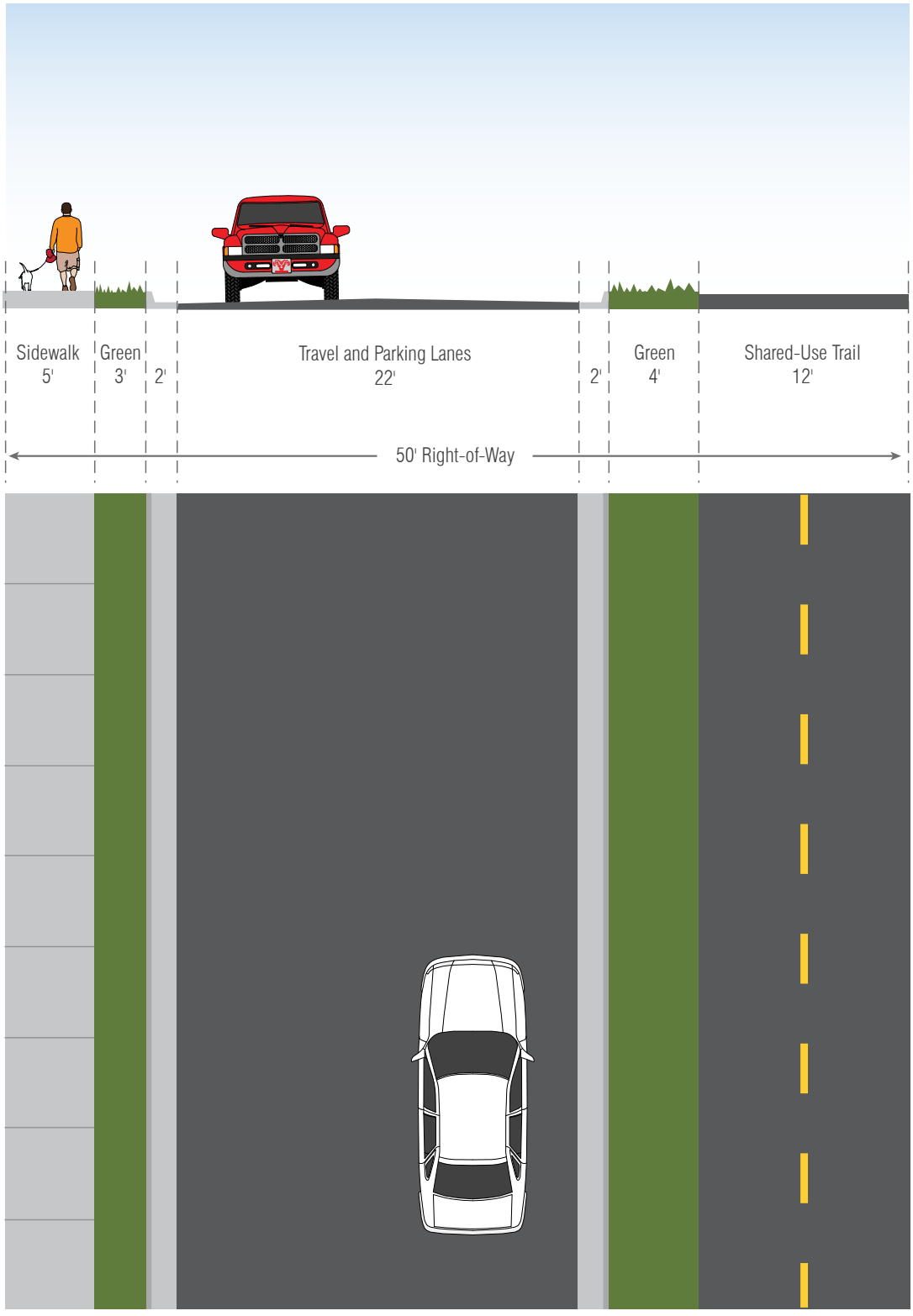
    a) Where applicable, a shared-use trail is preferable over bike lanes.

C6.0 – Local Street



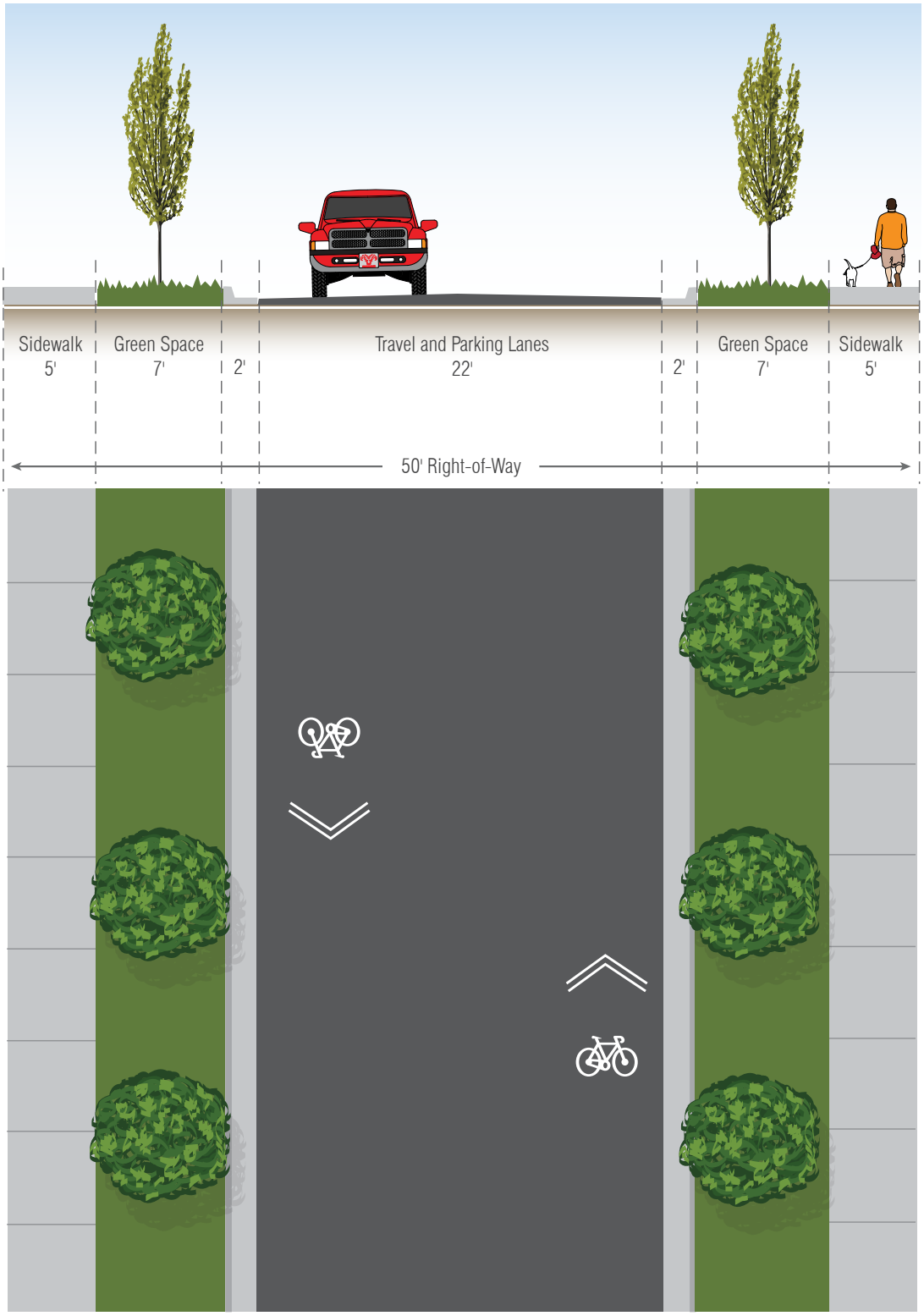
Note: Where parking is provided on-street, paving will be 24 feet wide. In such cases, the green spaces may be reduced to 6 feet.

C6.1l – Local Street with Trail



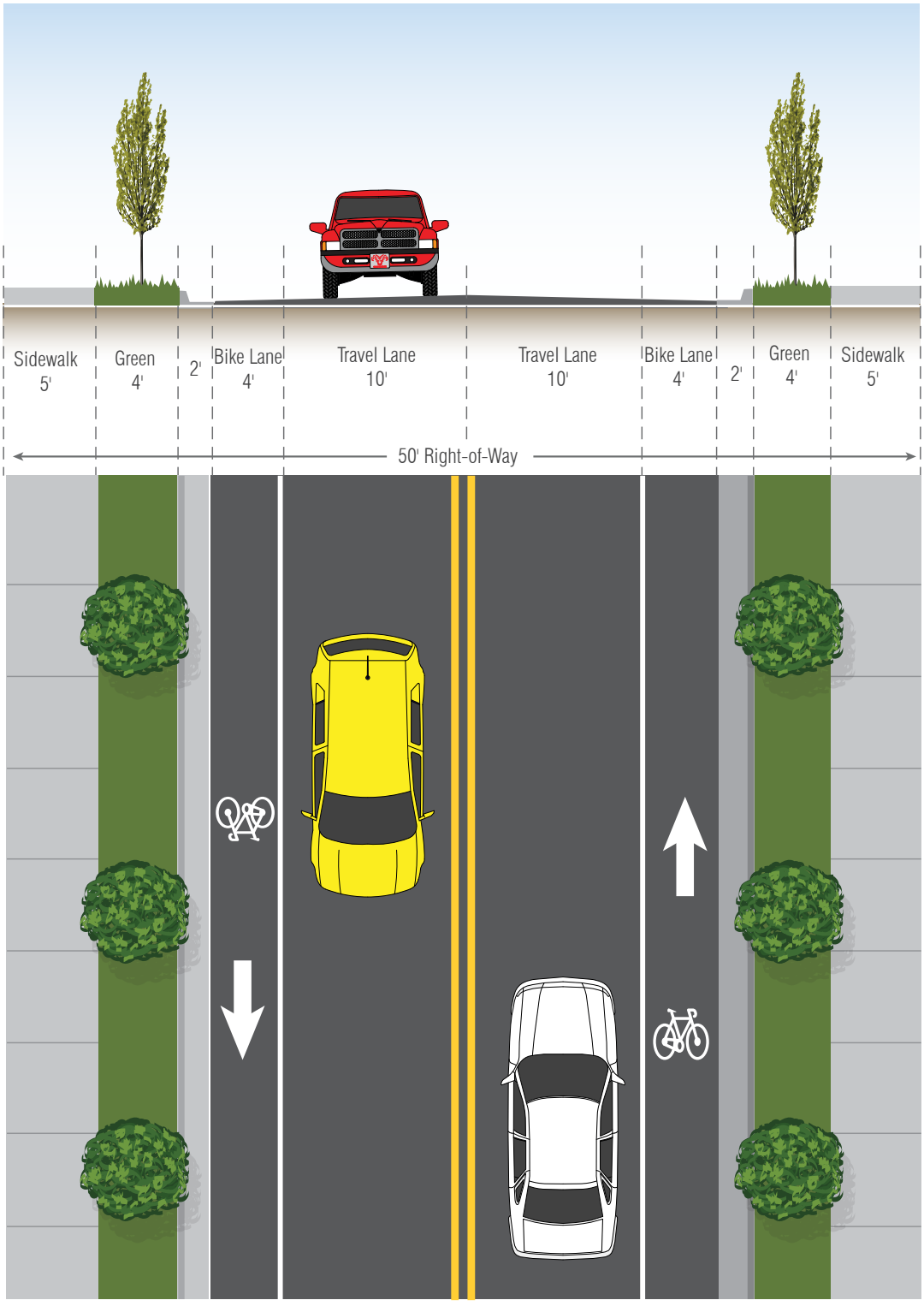
Note: No on-street parking is allowed.

C6.2III – Local Street with Bike Route

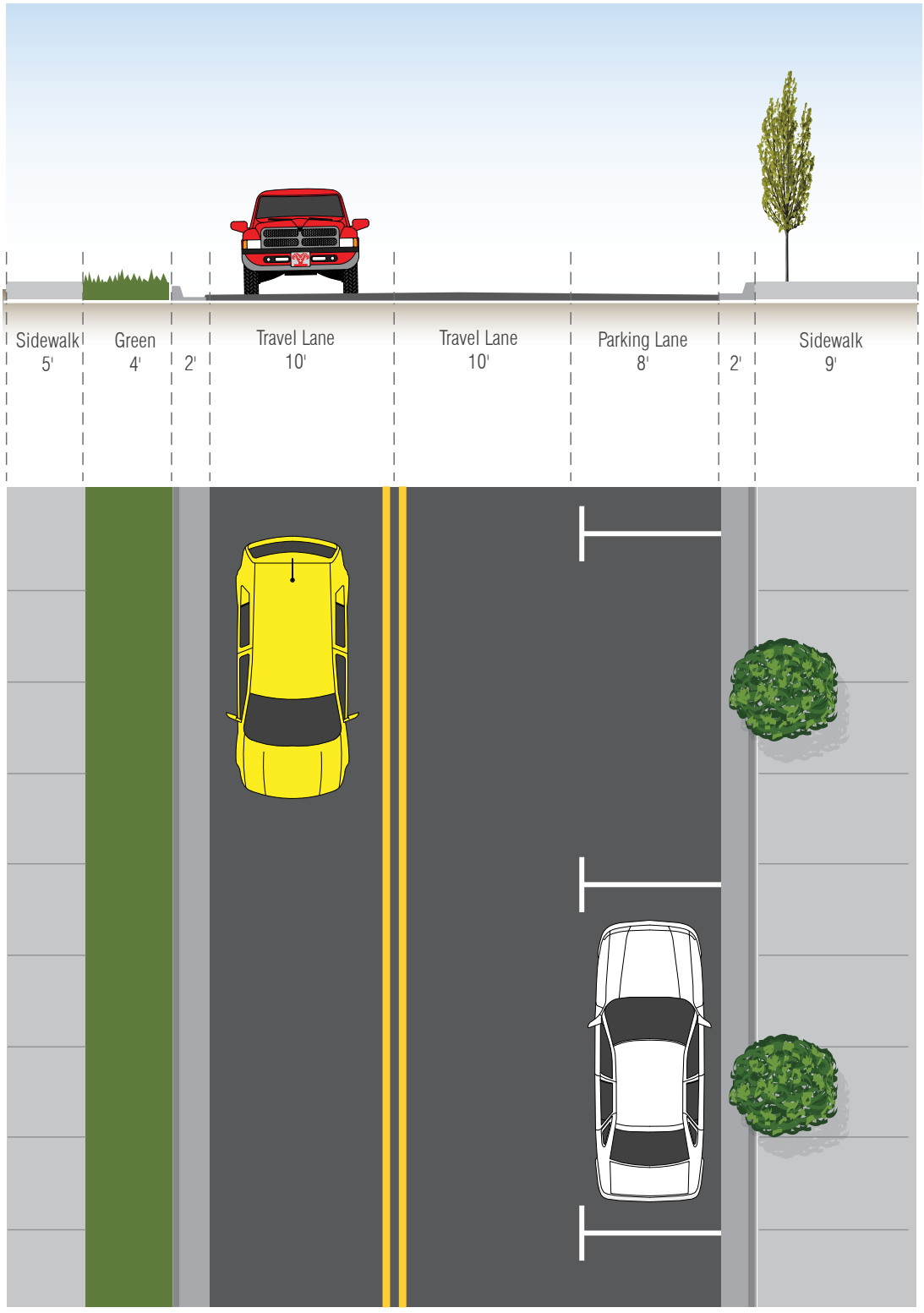


Note: No on-street parking is allowed.

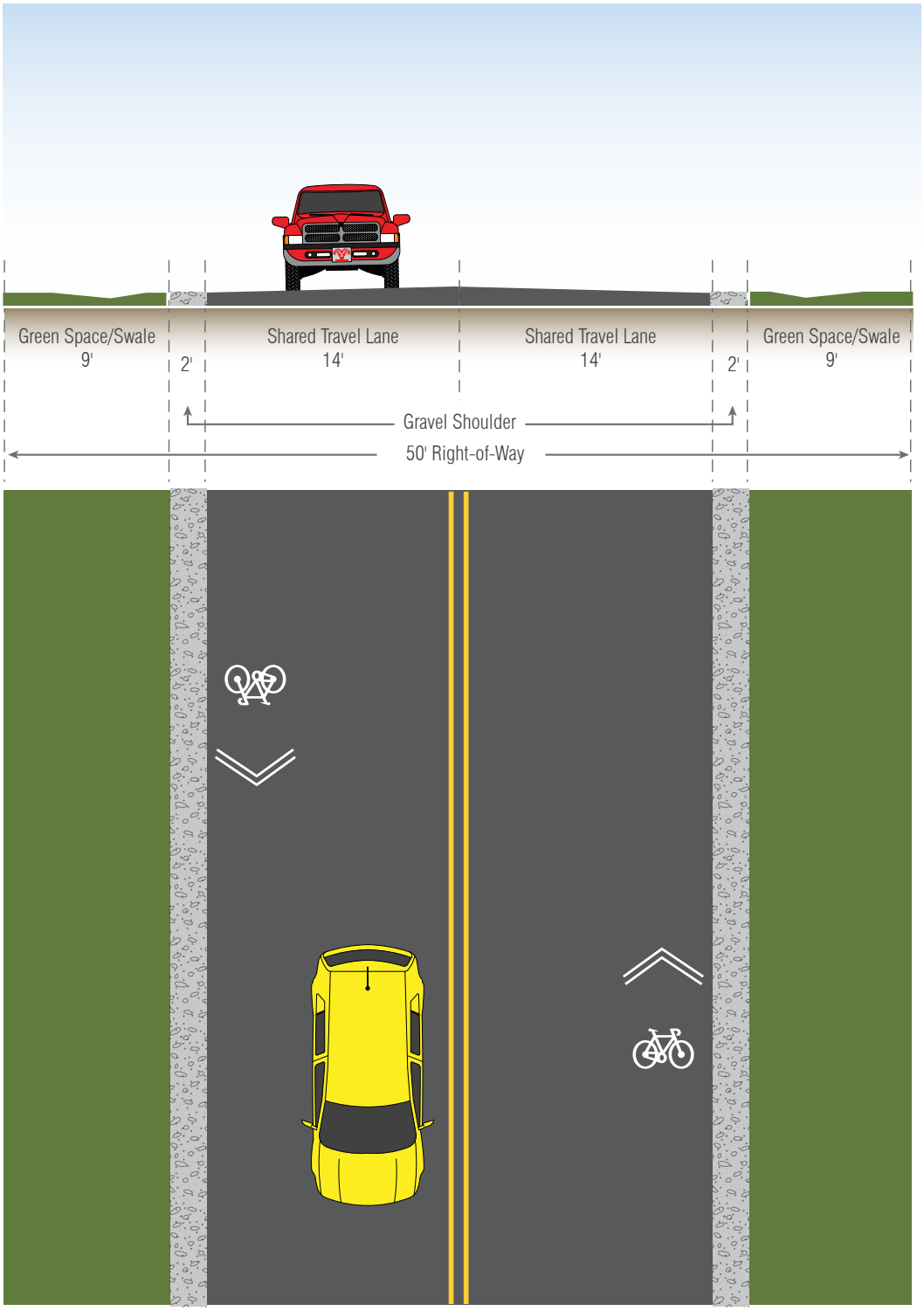
C6.3II – Local Street with Bike Lanes



C6.4 – Local Street with Parking Lane



C6.5III – Rural Local Street



Shared-Use Trails

The following cross section data is to be used only for shared-use trails, which are constructed separate from a roadway. For shared-use trails constructed with a roadway, see the appropriate cross section above.

1. Required Elements:

    a) Right-of-Way/Easement: Share-use trails may be placed on a dedicated right-of-way or within a permanent dedicated easement. Easement/right-of-way should be adequate for trail and needed amenities. Fifteen feet is the minimum requirement, and 20 feet is preferable.

    b) Paving Surface: Concrete, Asphalt, or Fine Compacted Aggregate

    c) Width: Minimum 12' width up to 16' in park areas where heavy use warrants a wider trail.

    d) Curb/Shoulder: A suitable shoulder or curbing is required depending on the paving surface. Concrete – None, Asphalt – gravel or concrete, Fine Compacted Aggregate – Concrete or appropriate edging containment.

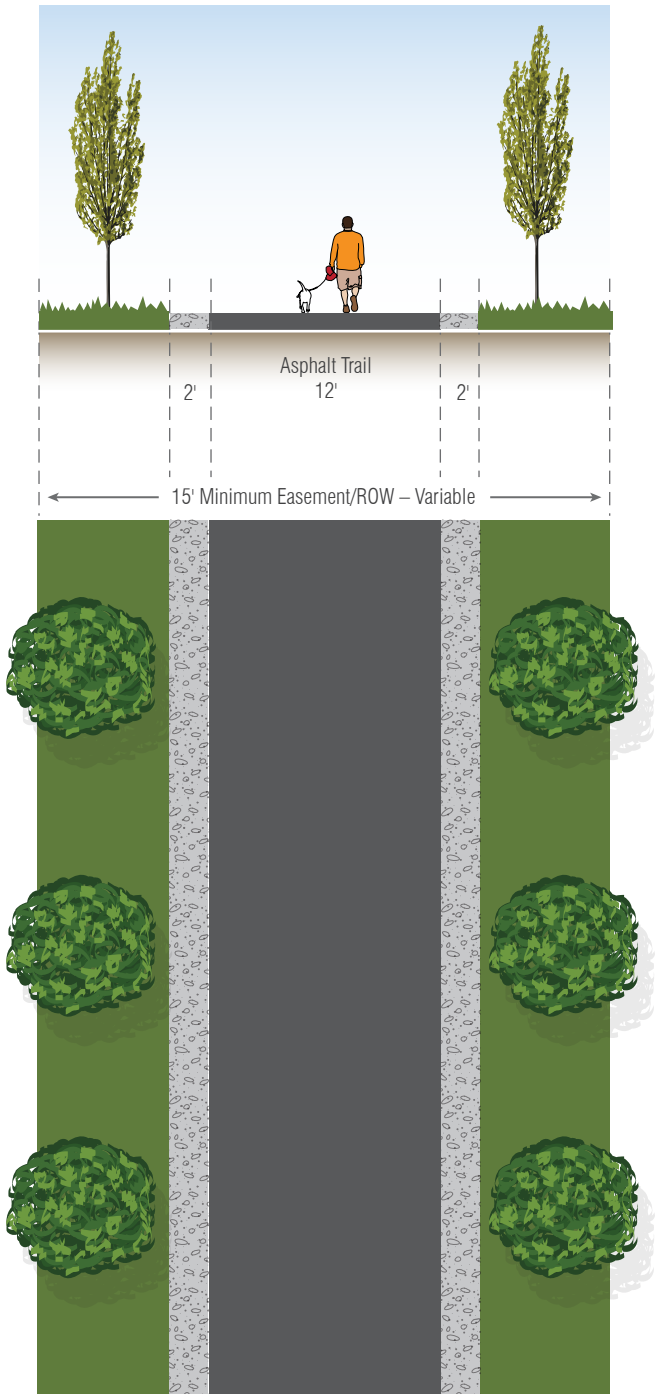
2. Optional/Preferred Amenities:

    a) Park Benches

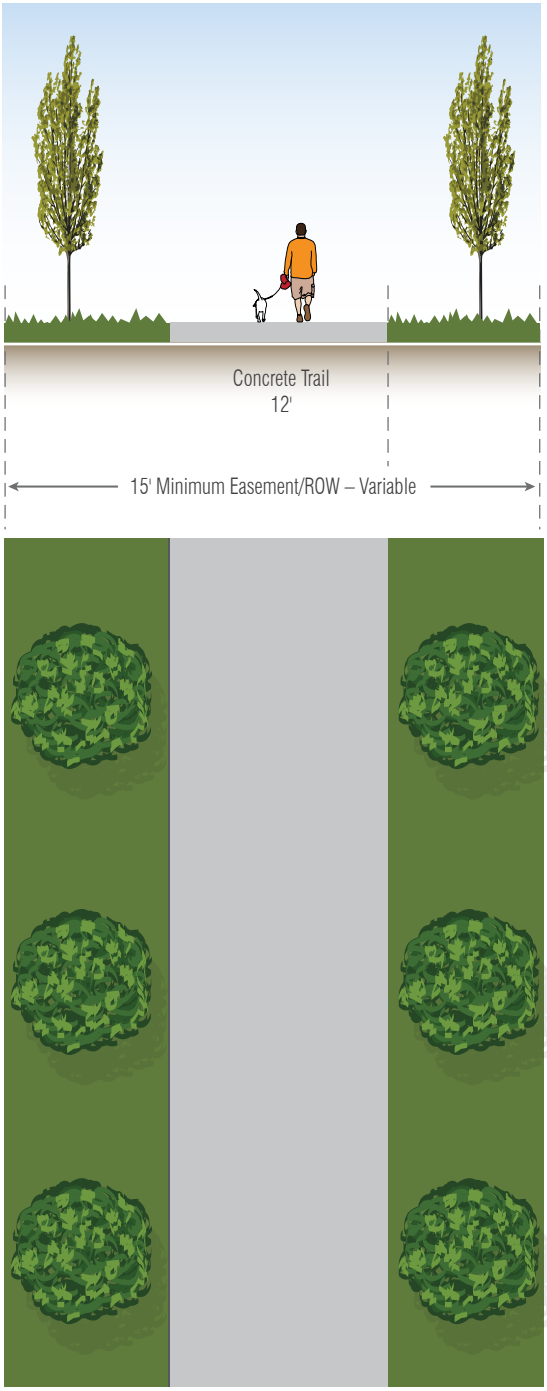
    b) Public Art Installations

    c) Lighting – only where night use is encouraged such as parks.

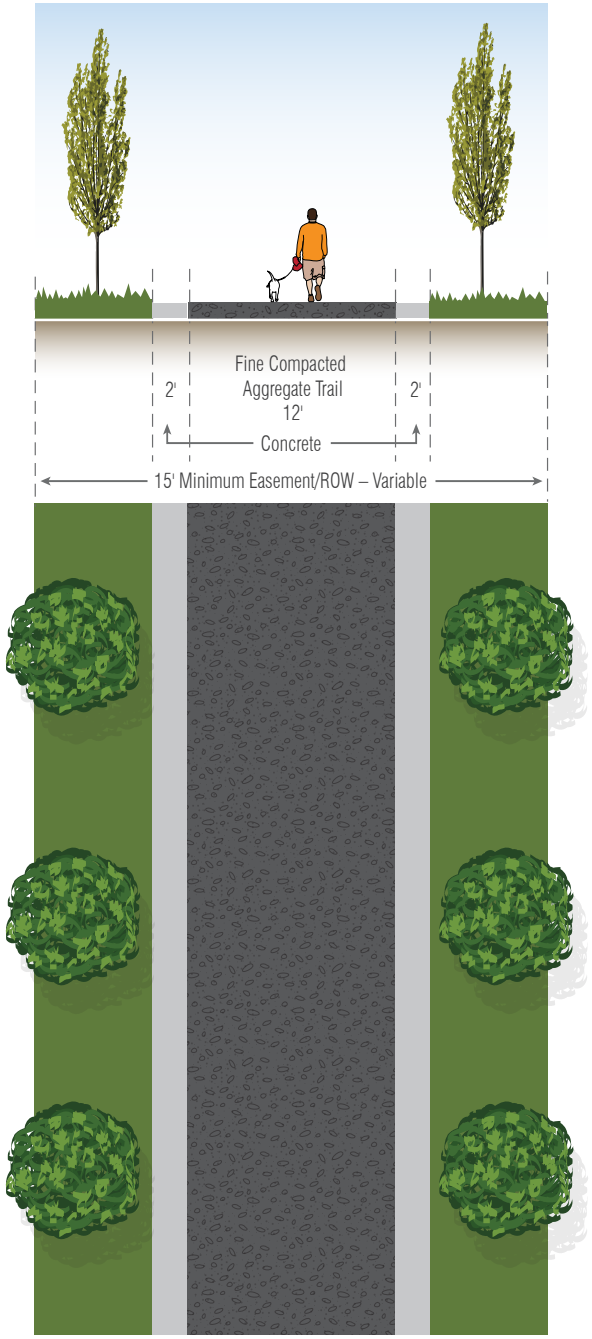
Class I – Shared-Use Trail (Asphalt)



Class I – Shared-Use Trail (Concrete)



Class I – Shared-Use Trail (Aggregate)



5.2 Bicycle and Pedestrian Facility Design Standards and Guidelines

Where these standards are silent or questions and uncertainty regarding design of bicycle and pedestrian facilities exist, refer to one of the following manuals:

1) AASHTO *Guide for the Development of Bicycles Facilities*, 2012

2) AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, 2004

3) NACTO *Urban Bikeway Design Guide*

4) FHWA *Manual on Uniform Traffic Control Devices* (MUTCD)

Trailheads

Trailheads are the primary access points to a trail system. The size of the trailhead and its amenities will be determined by the site conditions with consideration of location and anticipated use. Trailheads should be designed and reviewed prior to construction.

Within the plan, the trail heads are well distributed throughout the community and are primarily located at point sources of pedestrian activity. These include schools, parks, playgrounds, and other public facilities. Most of the trailheads already have several amenities such as parking, benches, bike racks, and bathrooms. Therefore, it isn't anticipated that major investments will be required for most of these facilities.

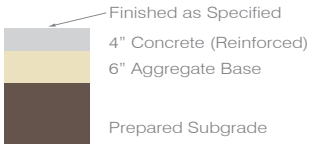
TYPICAL TRAILHEAD AMENITIES
Restrooms
Water Fountains
Parking
Bike Racks
Signage and Trail Maps
Trash Cans
Emergency Phones
Landscaping

Paving

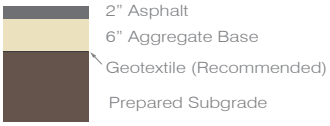
PAVING MATERIALS		
Concrete	Asphalt	Fine Compacted Aggregate

PAVING MATERIAL PERFORMANCE PARAMETERS			
	Concrete	*Asphalt*	*Fine Compacted Aggregate*
Initial Cost	High	Medium	Low
Maintenance	Low	Medium	High
Repair Cost	High	Low	Low
Permeability	None	Semi	Fully

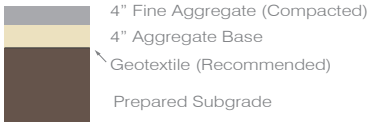
Concrete Paving



Asphalt Paving



Fine Aggregate Paving



Sight Distance

Sight distances should be based upon use for bicyclists and should be based around the hazards, signage, traffic, etc. found on the facility. Design should reference AASHTO *Guide for the Development of Bicycle Facilities*.

> Accessible design is important to ensuring that Bryant's trail facilities can be enjoyed by all users.

Grading and Cross Slopes

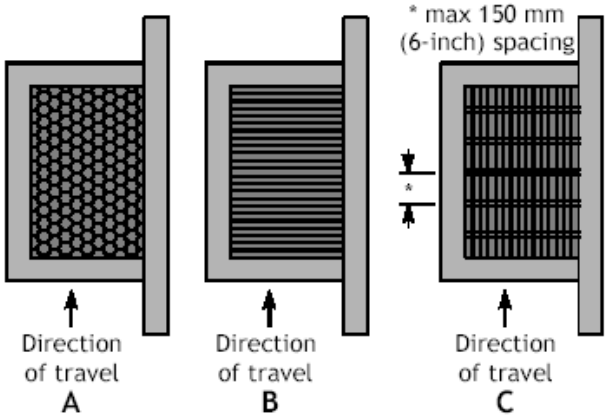
Grading of the trail should be based around intended use for bicyclists and should be compatible with the ADA *Standards for Accessible Design*.

CROSS SLOPES
Do not exceed 2% cross slope.
TRAIL GRADING ALONG ROADWAY
Do not exceed grade of the roadway.

TRAIL GRADING ALONG SEPARATED TRAIL FACILITY	
Distance	Maximum Grade
Overall Trail	5% or less
800 feet	5-6%
400 feet	7%
300 feet	8%
200 feet	9%
100 feet	10%
50 feet	11%

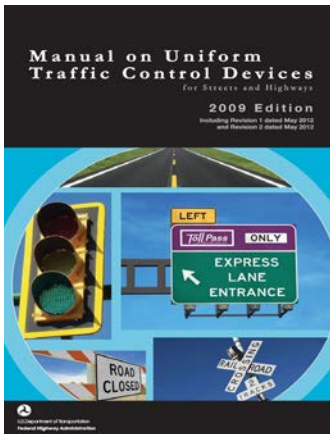
Drainage Grates

Drainage grates, if improperly designed, can create serious safety hazards for bicycle users by causing bike damages and/or crashes. The following are drainage grates recommended by the Federal Highway Administration.



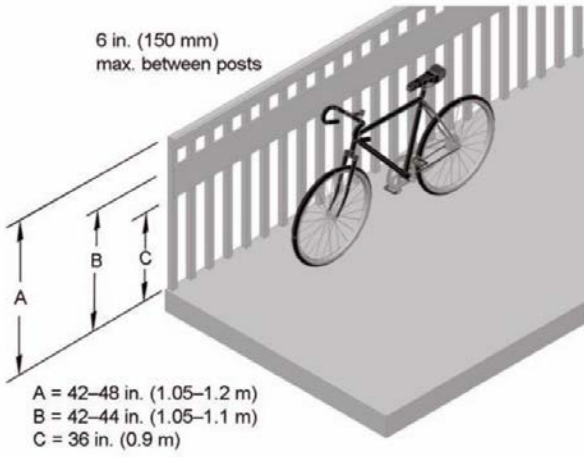
Signage and Pavement Markings

All signage for bicycle and pedestrian facilities should conform to the latest official copy of *Manual on Uniform Traffic Control Devices* (MUTCD).

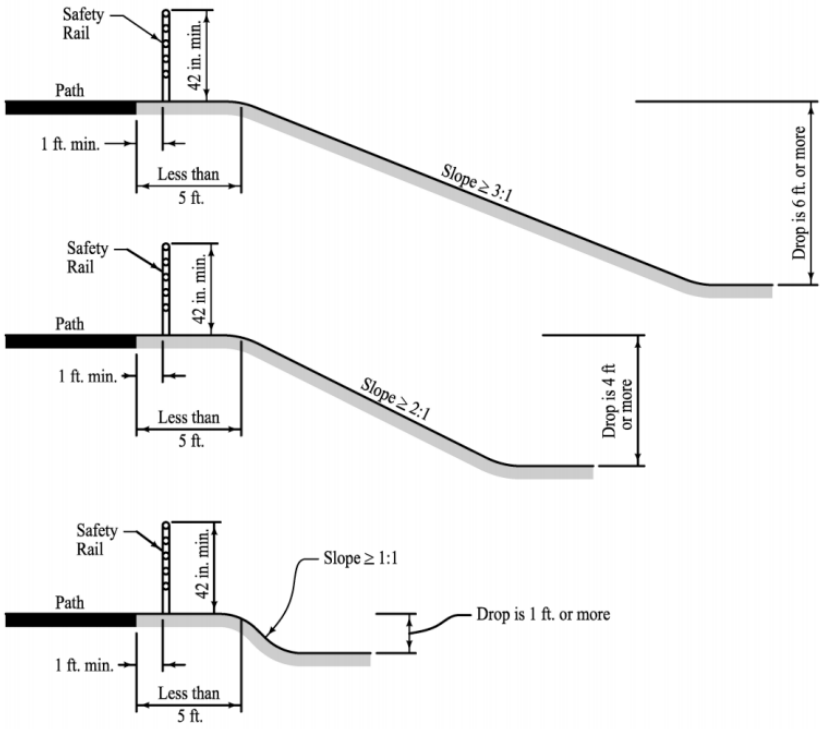


Railings

Where required railings should be at least 42" in height up to 54" in height with 36" bicycle rub-rail.



RAILING USAGE ON TRAILS	
Facility	Used?
Local Street	No
Collector	Yes if <5' setback
Arterial Street	Yes if < 5' Setback
Bridge	Yes
Grade change off Trail	See below



Section Six: **Cost and Phasing**

6.1 Cost Estimates

These cost estimates should be used for planning and budgeting purposes only. They assume the cost associated with the trail or bike/pedestrian improvements as a stand-alone facility or as included in a roadway project. These estimates do not account for any potential needed intersection improvements. Actual trail or improvement construction costs will be determined at the time of design and construction, varying upon the site-specific conditions for each facility. Other unforeseen factors such soil conditions or utility relocation may affect the overall cost of facility development. Raw materials that include a large percentage of the provided cost estimate can fluctuate.

These estimates demonstrate build out of the bicycle/pedestrian system by a private contractor and are based on the assumption that construction costs are borne solely by the City of Bryant. Construction costs burdens can be lessened through grants, city labor, or volunteer labor and materials. It should be noted that City policy will require private development to construct bicycle and pedestrian facilities on private land and along public roadways with commercial and multi-family developments over two acres as well with all platted subdivisions.

Shared-Use Trails

Assumptions: Assumes the cost related to construction. Asphalt construction is indicated for facilities separate from a roadway at $60/LF (linear foot). Concrete construction is indicated for facilities adjacent to a roadway at $100/LF.

Road Adjacent

SECTION	NOTES	SEGMENT COST
North Soccer Park Property Line to Owen Creek	Construct on Park Property with bridge across Owen Creek	$106,065.76
Highway 5 to Northlake Road	Construct with road widening	$1,277,940.19
Bethel Middle School to Little Hurricane Creek	Construct as road is improved	$716,138.53
Reynolds Road to City Limits	Add trail with road widening	$1,894,095.09
Boswell Road to Sullivan Drive	Add to existing roadway	$189,881.26
Springhill to Reynolds	Add trail with widening of road	$599,036.71
Hwy 5 from Alcoa to Springhill	Add Trail with widening	$586,836.09
Mills Park to Alcoa 40 Park	Improve existing sidewalk	$185,831.06
Evans Loop to Highway 5	Widen existing sidewalk	$399,871.42
Proposed Collector to Evans Loop	Build with proposed street construction	$120,926.12
Hurricane Creek to Hill Farm Rd	Construct within Highway 183 ROW	$224,142.37
Pulaksi Tech to Hurricane Creek	Run along existing Highway 183 ROW	$211,351.09
Springhill Road to Hilldale Road	Construct with road widening	$1,073,957.22
Soccer Park to Midland Road Curve	Construct with road widening	$339,236.92
Hurricane Creek to Hurricane Creek (Cynamide Alt)	Cross Union Pacific Railroad with New Overpass	$296,005.71
Cynamide Overpass to Alcoa Road	Construct with New Road	$646,703.50
Hurricane Creek to Carmichael Road	Construct with Road Widening	$262,640.41
Carmichael Road to Highway 183	Construct with Road Widening	$210,944.44
Highway 183 to Hill Farm Road	Construct with New Road and Widening	$130,288.82
Street Rod Ln to Boone Rd Ext	Construct with Alcoa Road Improvements	$410,585.18
Boone Road to Mt Carmel Road	Construct with Alcoa widening	$243,535.53
Hill Road to SE 4th St	Construct with New Road	$264,864.11
SW 3rd to Boswell	Construct with JumpStart Street Improvements	$125,416.69
Boone Rd to Rich Lp	Construct adjacent to UPRR, Provide Fence Barrier	$209,559.49
Rich Lp to NE 3rd St	Construct adjacent to UPRR, Provide postive barrier	$202,878.57
Hurricane Cree Elem to Creek along Shady Trl	Construct with road widening	$122,713.97
Alcoa Road to Shady Trail, Boone Road Ext	Construct with Road Relocation	$130,919.63
Boone Road Ext to Hurricane Creek	Construct with road widening	$580,577.70
Hurricane Creek to Woodland Park Road	Requires new bridge over Hurricane Creek	$33,494.46
Ferguson Property to Pine St on Boswell Road	Construct within ROW, Aggregate Trail	$487,229.16

Road Adjacent Contd.

SECTION	NOTES	SEGMENT COST
Woodland Park Road to Rich St Trail Ext	Construct as road is widened	$399,017.82
Saline County Library to Reynolds Road	Add to existing Road	$49,365.40
Prickett Road to Proposed Debswood Drive Ext	Construct within ROW	$96,913.97
School Drive to Reynolds Road	Widen existing sidewalk	$164,558.02
Lake Yvonne to Mills Park	Construct with new easements	$92,383.51
Springhill Road to Proposed Collector	Construct with New Road	$296,963.74
UPRR to Shobe Road	Construct with new road	$186,736.47
Shobe Road to Raymar Road Overpass	Construct with new road	$499,684.42
Mills Park Road to Cox Canal	Construct with road widening	$679,257.61
Bridgewater Road Ext to Meadow Creek Drive	Construct with road widening	$431,606.04
Cox Canal to Bridgewater Road Ext	Construct with road widening	$185,234.81
Reynolds Road to New Road off Evans Lp	Construct with road widening	$142,060.40
New Road off Evans Loop to Reynolds Road	Construct with Road Widening	$82,907.82
Sheaff Avenue to Highway 5	Add to existing roadway	$246,367.34
Springhill Road to Hilldale Road	Construct with road widening	$1,196,628.89
Springhill Road to Entergy Powerline Easement	Construct with new road	$420,940.91
Hilldale Road to Midland Road Curve	Construct with road widening	$420,740.74
Midland Curve Relocation	Construct with extension of Midland	$131,593.92
Northlake Road to Planning Area Boundary	Construct with road widening	$870,375.86
Soccer Park to Highway 5	Construct with road widening	$32,116.11
Hilltop Road to Owen Creek Trail	Construct with road widening	$112,809.62
Hilltop Road to Entergy Powerline Easement	Construct with road widening	$297,225.77
Reynolds Road to UPRR	Close existing street	$27,440.04
Little Hurricane Creek to Springhill Road	Construct as road is improved	$296,739.64
Alcoa to Mt. Carmel Road	Construct along existing roads	$208,279.31

Separated

SECTION	NOTES	SEGMENT COST
Hilldale Road to Midland Soccer Park	Along creek and sewer easement	$203,150.60
Sullian Drive to Bryant Library/Prickett Road	Obtain easement to construct	$137,818.91
Bishop Park Sewer Easement to Bishop Park	Use sewer easement	$142,538.19
Mills Park Rd to Debswood Dr	Use 12 in sewerline easement and Debswood bridge	$169,395.74
Debswood Bridge to Proposed Collector	Run along creek on City Property	$75,008.40
Bishop Park Multi-Use Trail	Multi-Use trail within Bishop Park	$559,732.22
Bishop Park to Boone Road	Construct around Pond and run under Boone Road Bridge	$55,662.59
Highway 183 to Natural Gas Easement	Run along Hurricane creek	$306,442.06
Pulaski Tech to Natural Gas Easement	Acquire ROW or easement for use on/along B&N Rail	$359,077.73
SW Trail to Bauxite & Northern Railroad	Need easement from Pulaski Tech	$164,209.09
Mills Park to Crooked Creek	Follow tributary to crooked creek, Need bridge	$51,460.22
Reynolds Road to Mills Park Trail	Construct as the property is developed.	$158,391.42
Echo Lake South to Waterford Drive Ext	Construct as property develops	$192,690.69
Waterford Drive Ext to Shobe Road	Construct as property develops	$212,506.44
Midland Road to Fourche Creek/Little Rock	Construct along Owen Creek	$461,384.59
Pulaski County Line to Owen Creek Confluence	Construct along creek in new easement	$581,525.68
Planning Area Limits to Northlake Road	Construct as property develops	$558,747.48
Bauxite & Northern Railroad to Hurricane Creek	Need easement on/along Natural Gas Line	$67,862.03
Natural gas easement to Union Pacific Railroad	Run along Hurricane Creek	$209,971.73
UPRR to Bishop Park	Trail along Hurricane Creek with underpass under UPRR, Alt	$28,973.47
SE 4th to UPRR		$501,889.57
Hill Farm Elementary to Hill Road	On School Property	$41,675.75
NE 3rd to Echo Lake UPRR Overpass	Construct along UPRR ROW	$299,368.98
Shady Trl to Bishop Park Sewer Easement	Run along creek in new easement	$183,882.20
Hurricane Creek Elem to Alcoa	Construct on School Property	$71,832.61
Woodland Park Road through Hurricane Creek Apartments	Obtain easement to use existing cart paths for golf course	$299,351.89
Hurricane Creek Apartments	Construct on existing golf course	$12,876.99
Hurricane Creek Apartments	Obtain easement to use existing cart path on golf course	$28,181.07
Hurricane Creek to Springhill Overpass	Construct on private property as develops	$112,655.20
Woodland Park Road to Boswell Road	Construct as the property is developed	$45,529.79

Separated Contd.

SECTION	NOTES	SEGMENT COST
Woodland Park Road to Boswell Road	Construct as the property is developed	$45,529.79
UPRR to Mills Park Road	Construct as the property is developed	$37,987.49
Proposed Collector to Hilldale Road	Construct along creek in sewer easement	$387,792.24
Hilldale Road to Entergy Powerline Easement	Construct along creek in sewer easement	$122,340.07
Entergy Powerline Easement to Sewer Easement NW	Construct along creek in sewer easement	$158,905.90
Sewer Easement to Hilldale Road	Construct along creek	$87,765.44
Midland Soccer Park to Midland Road	Construct along creek inside park property	$56,939.66
Northlake Road Ext to Owen Creek Trail	Construct within the existing Entergy Powerline easement	$306,587.29
Alcoa 40 Park	Construct through park partially along existing sewer line	$377,283.24
Private Land between Alcoa 40 Park Land	Construct on private property using existing sewer easement	$37,362.18
Hurricane Creek Apartments to I-30	Construct new trail along Hurricane Creek, Go Under I-30 Bridge	$63,620.39
I-30 to Highway 5	Construct on private property as developed	$77,577.34
Mt Carmel Road to Hurricane Creek	Construct on property from Everett BGMC	$151,510.15

Bike Lanes

Assumptions: Assumes the cost related to paving and striping of a bike lane, as appropriate. Thus, paving costs assumed are those that include the additional paving that will be necessary to accommodate the bike lane and not total street cost. This is typically 13'-16' of paving to accommodate bikes lanes plus buffer areas at $80-100/LF. Where cost savings are sought, buffers can be reduced to yield a planning cost estimate of $60/LF. Paving is assumed with 4" ACHM Paving and 12" Aggregate Base.

SECTION	NOTES	SEGMENT COST
N Crescent Drive to Shobe Road	Construct with New Road as property develops	$9,968.80
Rich St to NW 4th St	Construct as a SRTS project, Bike Lane, Add Sidewalks	$10,832.68
Mt Carmel Road to Boone Road	Construct with new road as property develops	$338,474.73
Alcoa Road to Mt Carmel Road	Construct with new road as property develops	$164,197.00
Boswell Road to Sheaff Avenue	Construct with road widening	$320,716.58
Woodland Park Road to Prickett Road	Construct with new road	$165,689.30
Sheaff Avenue Ext to Bishop Drive	Improve with bike lanes with future widening and current pavement	$151,253.17
Bishop Drive to Woodland Drive	Restripe with Bike Lanes	$19,312.33
Woodland Road to Saline County Library	Restripe existing pavement	$5,285.02
Reynolds Road to Mills Park Road	Restripe existing pavement, construct new sidewalk	$28,173.44
Debswood Drive Ext to Neal Street	Restripe existing pavement	$20,858.05
Hunter Lee Drive Ext to edge of Meadowlake Sub	Construct with New Road as property develop	$10,387.84
Echo Lake South to Waterford Drive Ext	Construct with new road	$17,710.21
Lora Drive to Shobe Road	Construct with road widening	$314,580.36
Raymar Road Overpass	Work with AHTD to restripe existing overpass	$17,323.19
Highway 5 to Hilltop Road	Construct with new road	$219,699.58
Midtown undeveloped north to Hilltop Road	Construct as property develops	$260,988.46
Reynolds Road to N Elm St		$30,996.82

Bike Routes

Assumptions: Assumes the cost of bike routes to include sharrows and signage. Signs ($300) to be placed each 250' and sharrows ($700) to be placed each 500'. This yields a cost of $5/LF.

SECTION	NOTES	SEGMENT COST
Edge of Meadowlake Sub to Meadowlake Drive	Stripe for bike route, add bike route signage	$2,041.31
Waterford Drive to Raymar Road	Stripe for bike route, add bike route signage	$11,306.59
Meadowlake Drive to N Crescent Drive	Stripe for Bike Route, Add bike route signage	$6,857.03
Springhill Road to Commonwealth Drive	Stripe as bike route, add bike route signage	$33,219.53
Reynolds Road to Providence Drive	Stripe as bike route, add bike route signage	$3,776.81
Midtown Bryant South entrance to undeveloped north	Restripe as bike route, add bike route signage	$6,611.11
Highway 5 to Ashlea Place Drive	Stripe as a bike route, add bike route signage	$4,295.59
Commonwealth Dr to Hwy 5	Stripe for bike route and add bike route signage	$18,076.19
Spruce to Oak	Stripe with Sharrow, Bike Route Signage, Add Sidewalks	$7,789.95
Oak to existing sidewalk	Stripe with Sharrow, Bike Lane Signage, Add Sidewalk	$2,037.97
Ashley Park to Elm St	Stripe for Sharrow, Bike Lane Signage	$3,228.87
SW 3rd to SW 1st	Stripe for Sharrow, Bike Route Signage, Add Sidewalk	$3,565.78
SW Elm to SE Laurel	Stripe for Sharrow, Bike Route Signage, Add Sidewalk	$7,311.09
Reynolds to SE Laurel	Stripe for Sharrow, Bike Lane Route, Add Sidewalk	$5,003.34
Elm to Reynolds	Stripe for Sharrow, Bike Route Signage, Add Sidewalk	$1,696.25
NE 1st to Mills Park Rd	Stripe for Sharrow, Bike Route Signage, Add Sidewalk	$5,165.81
Pine Street to NE Hazel Street	Stripe with Sharrow, Bike Route Signage, Improve Sidewalks	$10,579.80
Wilkerson to SW 4th	Stripe with Sharrow, Bike Route Signage, Add Sidewalks	$13,205.70
Carmichael Road to SW 3rd St	Stripe with Sharrow, Bike Route Signage, Add Sidewalks	$2,223.94
SE 4th to SE Laurel	Stripe for Sharrow, Bike Route Signage, Add Sidewalk	$1,478.97
SE 3rd to SE 1st	Stripe for Sharrow, Bike Route Signage, Add Sidewalk	$3,595.51
UPRR to Bryant Parkway Terminus	Stripe shoulder with Sharrows and Sign as Bike Route	$92,421.54

6.2 Phasing Plan

Phasing of the implementation of the bike and pedestrian network is broken down into the three phases based upon location, need, cost, and construction constraints. **The following is an explanation of each phase within the plan:**

Phase 1: Years 1-5

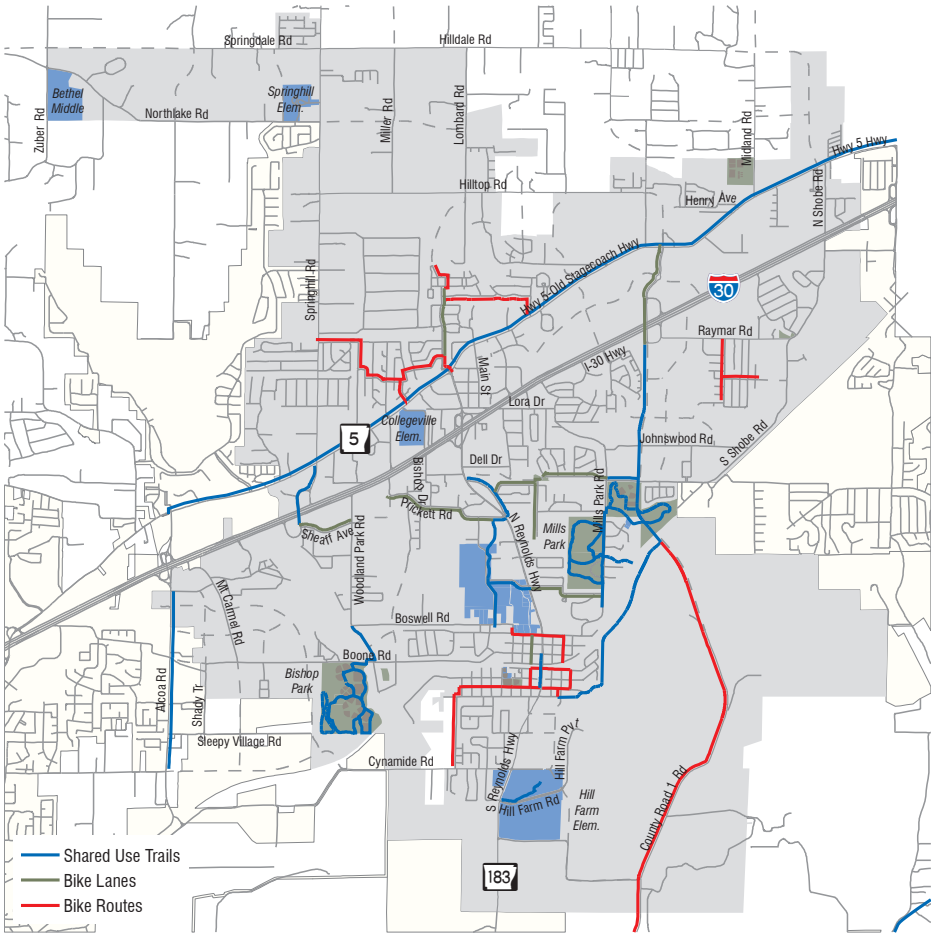
This phase consists primarily of many "low-hanging fruit" or quick victory projects that can be accomplished in the very near term. Such projects are important as they create momentum for the plan and help create a constituency that advocates for continued implementation of the plan.

Phase 1 also contains projects that are currently under construction or will be constructed in the near term as well as segments that are considered critical or important linkages.

These include:

- Bike routes on streets that only require sharrow striping and signage.
- Bike lanes on streets thatonly require restriping of an existing street.
- Shared-use trails planned for construction by the City or AHTD within five years.
- Shared-use trail planned within existing parks.
- Shared-use trails that serve as high priority linkages between existing facilities

Examples: Alcoa Road Trail, Prickett Road Bike Lanes, Heart of Bryant Bike Routes



Phase 2: Years 5-15

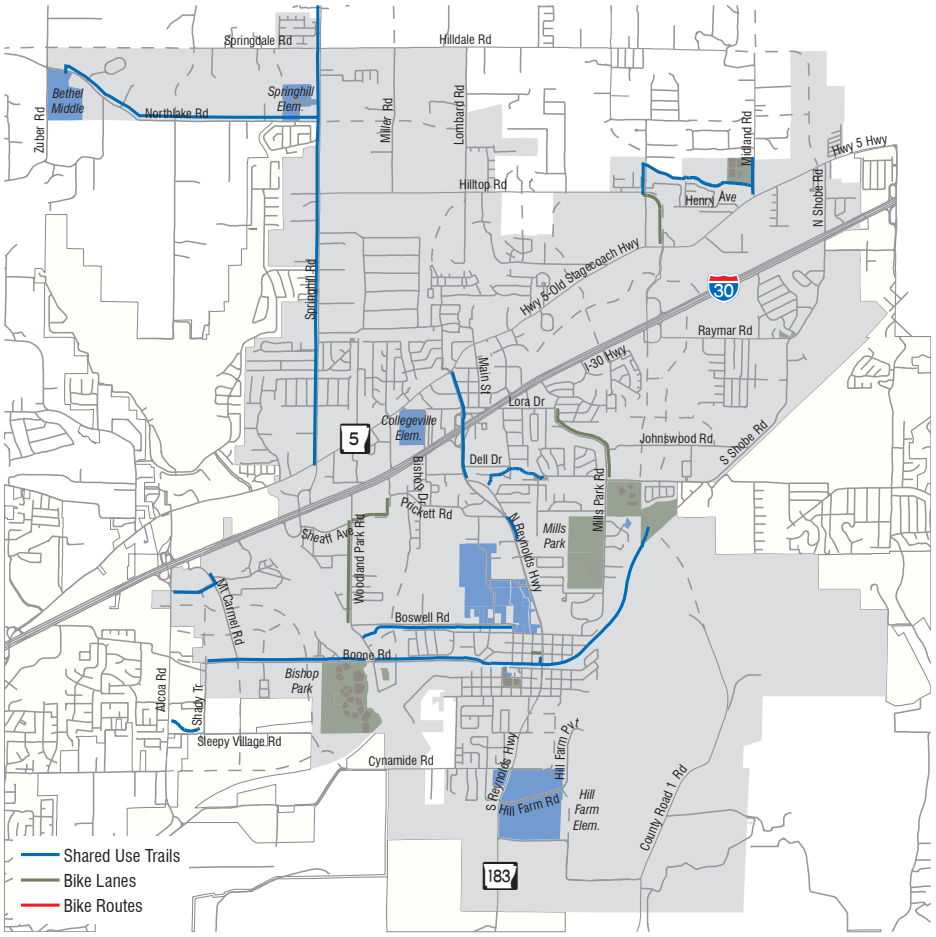
This phase consists of projects that will largely require significant dedicated funding with many segments included with new street construction (Snooks Ln Extension) or street improvements (Boone Road). Other segments will require coordination with private land owners, utilities, or Union Pacific Railroad.

Phase 2 will build on the backbone developed in Phase 1, extend the bike/pedestrian network to include linkages into more neighborhoods, and link more parks, schools, and shopping areas.

These include:

- Bike lanes and shared-use trails that will require street widening.
- Bike lanes and shared-use trails running with roads that are projected to be constructed by the City.
- Shared-use trails that will require acquisition or use of easements.
- Shared-use trails planned for construction by the City or AHTD within five years.
- Shared-use trail planned within existing parks.

Examples: Boone-Rail Trail, Owen Creek Trail near Midland Park, Woodland Park Road Bike Lanes



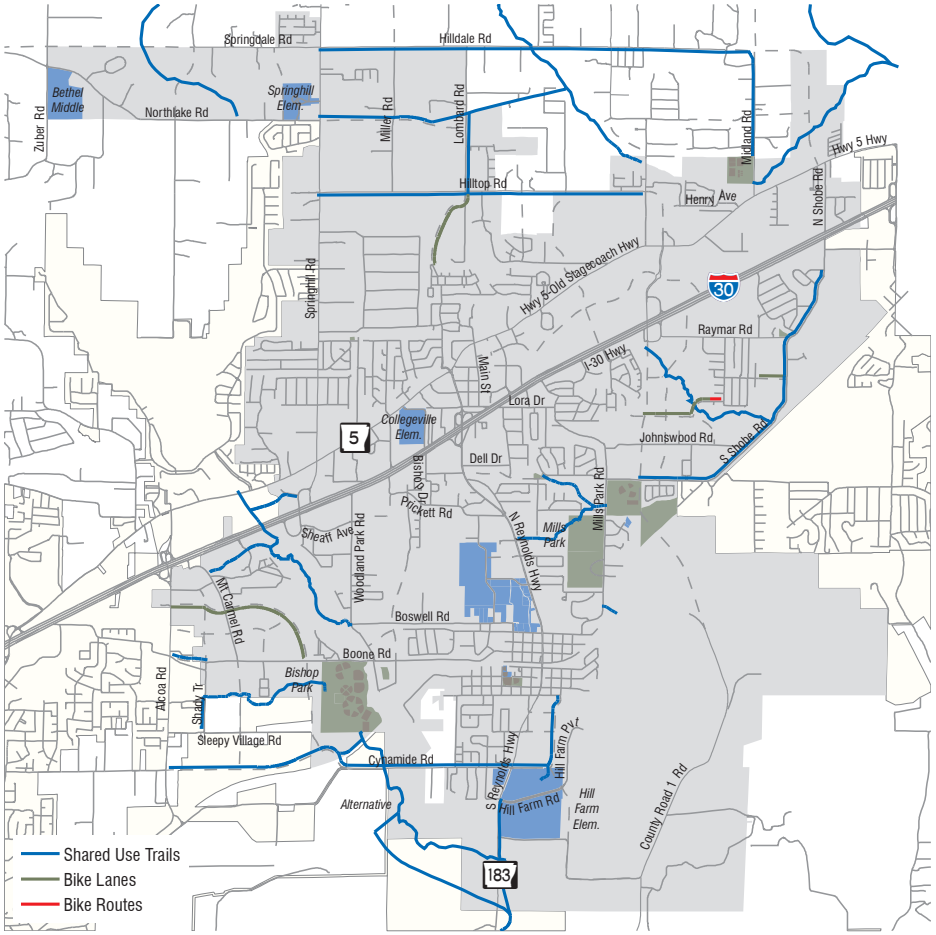
Phase 3: Long Range Projects

This phase predominantly contains projects that are not intended to be constructed by the City of Bryant. This means either bike/pedestrian infrastructure constructed as part of development, trails outside the City limits, or projects that will require regional cooperation. As such, these projects are considered long range, but some can be constructed in the very near term as a result of private development. Other segments are considered long range "dream" projects such as the Hurricane Creek Greenway Trail.

These include:

- Shared-use trail and bike lanes contingent upon future private development.
- Shared-use trails and bike lanes along long-range street improvement projects.
- Shared-use trails and bike lanes that can only be made useful after Phase 1-2 is constructed.

Examples: Hurricane Creek Trail to SW Trail, Crooked Creek Trail, Trail along Northlake Road extension



Section Seven: **Work Plan**

7.1 Implementation Matrix

The following is a matrix that details the actions needed to carry out this plan along with the parties responsible for implementation.

Implementation Actions	Responsible Party			
	City	Developer	AHTD	Metroplan
PLAN ADOPTION AND TRANSPORTATION PLANNING				
1) Adopt Walk Bike Drive – Master Transportation Plan.	✓			
2) Encourage transportation design elements that encourage safety for all users.	✓	✓	✓	✓
3) Provide consultation, advice, and assistance on planning transportation improvements in the City.				✓
DEVELOPMENT PLAN REVIEW				
1) Utilize the Bryant Subdivision Code to carry out the plan.	✓			
2) Regulate driveway access on City streets.	✓			
3) Regulate driveway access on state highways.	✓		✓	
4) Ensure bicycle and pedestrian facilities are considered and incorporated in development plans.	✓	✓		
5) Ensure adequate rights-of-way are dedicated with new developments.	✓			
6) Review proposed half-street improvements for new developments along state highways and arterial roads, which are part of the CARTS Regional Arterial Network.	✓		✓	✓
7) Ensure the enforcement of access management policies and standards contained in this plan and all other City plans and regulations.	✓			
8) Ensure all development proposals are consistent with the provisions of this plan.	✓	✓		

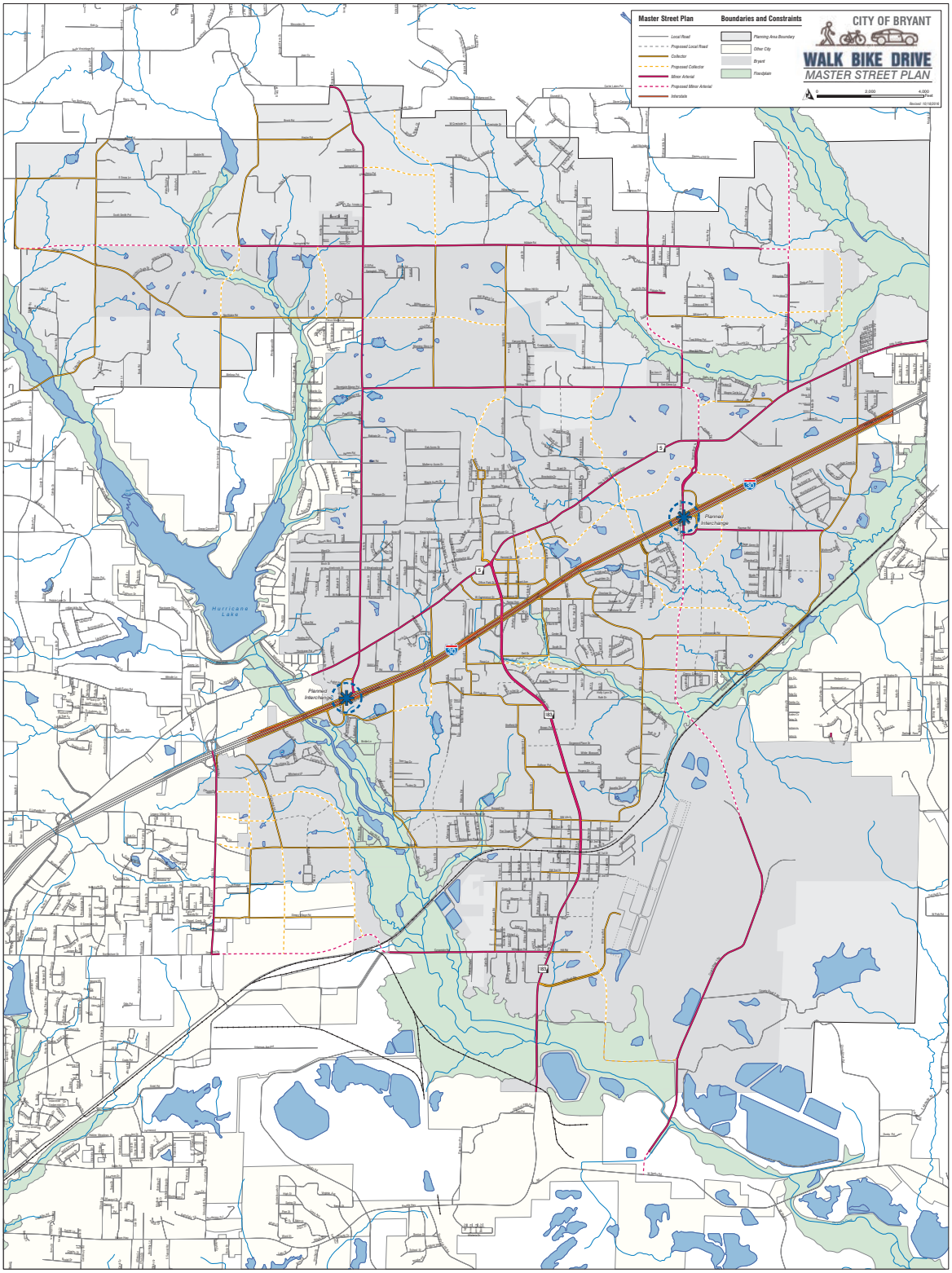
Implementation Actions	Responsible Party			
	City	Developer	AHTD	Metroplan
9) Ensure development review carefully considers both transportation and land use issues simultaneously.	✓			
TRANSPORTATION FACILITIES CONSTRUCTION				
1) Construct half-street improvements for new developments on City streets and state highways according to the cross section standards of this plan.		✓		
2) Finance and construct any proposed trails/sidewalks and local or collector level streets as a part of a new development.		✓		
3) Finance and construct any proposed minor or major arterial street as part of a new development.	✓	✓		
4) Finance and construct trails/sidewalks/bike lanes as well as the widening or location of a new or existing City street that is not tied to a proposed development.	✓			
5) Finance and construct the widening or location of a new or existing state highway that is not tied to a proposed development.			✓	
6) Finance and construct trails/sidewalks/bike lanes as well as the widening or location of a new or existing road, which is part of the CARTS Transportation Improvement Program.	✓		✓	✓
6) Maintain City streets.	✓			
7) Maintain state highways.			✓	

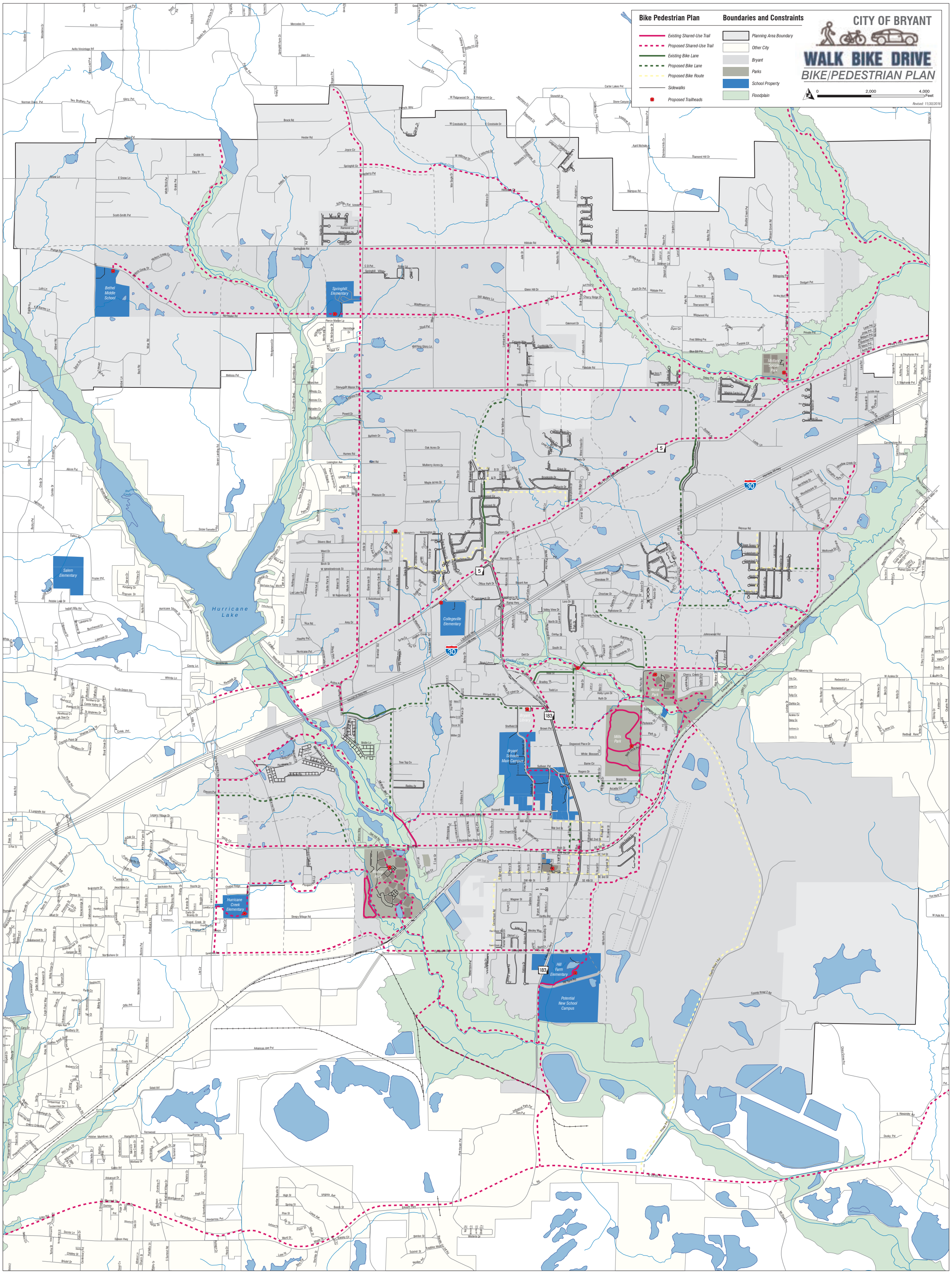
7.2 Performance Measures

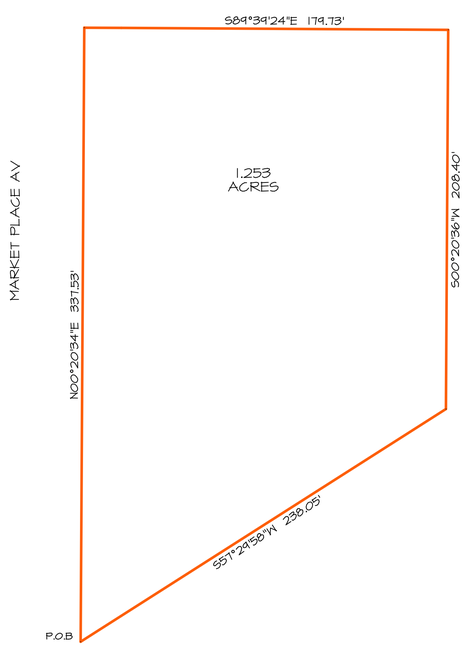
The following is a list of performances measures that can track the overall success in implementation of this plan in addressing issues of traffic, vehicle and bike/pedestrian safety, street and bike/pedestrian connectivity, capital improvements, and community satisfaction.

PERFORMANCE MEASURE	GOAL	PROGRESS INDICATOR	LONG-RANGE TARGET
% of Bryant school campuses connected by sidewalks/trails	Improve Connectivity	Annual % increase	100%
% of residences within a ½ mile to bike/pedestrian facilities, including bike lanes and trails	Improve Connectivity	Annual % increase	100%
Number of crashes involving bikes and pedestrians	Improve Safety	Annual decrease in number of crashes	50% reduction from 2016 levels
Number of fatal crashes involving bike and pedestrians	Improve Safety	Annual decrease in number of fatalities	0 deaths
Number of linear miles of street per square mile	Improve Connectivity	Annual increase in street network density	20 miles/sq. mi.
Miles of trails	Capital Improvements	Annual increase in number of miles	10.5 miles by 2030
Miles of sidewalks	Capital Improvements	Annual increase in number of miles	100 miles by 2030
Miles of bike lanes/bike routes	Capital Improvements	Annual increase in number of miles	18 miles by 2030
% of students walking/biking to school	Improve Health	Annual % increase	25%
Number of marked crosswalks	Improve Safety	Annual increase in number of crosswalks	
Linear feet of street overlain each year	Capital Improvements	Amount as budget allows. Currently need approximately 4 miles per year to for adequate maintenance of system.	~4 miles/year
Acres of land developed in a walkable manner	Improve Walkability	Annual increase	300 acres by 2030
% of overall bike/pedestrian system completed	Capital Improvements	Annual % increase	75% by 2030
% of overall roadway system completed	Capital Improvements	Annual % increase	75% by 2030
% level of community satisfaction with bike/pedestrian system	Resident Satisfaction	Annual % increase	90%
% level of community satisfaction with traffic	Resident Satisfaction	Annual % increase	75%

Section Eight: **Plan Map**




Bike Pedestrian Plan
Existing Shared-Use Trail
Proposed Shared-Use Trail
Existing Bike Lane
Proposed Bike Lane
Proposed Bike Route
Sidewalks
Proposed Trailheads
Boundaries and Constraints
Planning Area Boundary
Other City
Bryant
Parks
School Property
Floodplain
CITY OF BRYANT
WALK BIKE DRIVE
BIKE/PEDESTRIAN PLAN
0
2,000
4,000
Feet
Revised: 11/30/2016
Hurricane Lake
Bethel Middle School
Springhill Elementary
Salem Elementary
Collegeville Elementary
Bryant Schools Main Campus
Hurricane Creek Elementary
Hill Farm Elementary
Potential New School Campus



LEGAL DESCRIPTION. (TRACT H)
THAT PORTION OF THE EAST HALF OF THE NW1/4, SECTION 22, T-1-S, R-14-W, SALINE COUNTY, ARKANSAS, DESCRIBED AS COMMENCING AT THE SOUTHWEST CORNER OF SAID E1/2 OF NW1/4, THENCE NORTH 00°19'42" EAST, A DISTANCE OF 311.79 FEET; THENCE NORTH 51°06'32" EAST, A DISTANCE OF 526.01 FEET; THENCE NORTH 71°53'28" WEST, A DISTANCE OF 45.18 FEET; THENCE NORTH 32°53'21" WEST, A DISTANCE OF 104.44 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE EAST HAVING A RADIUS OF 340.00 FEET AND A CENTRAL ANGLE OF 33°14'06" AND BEING SUBTENDED BY A CHORD WHICH BEARS NORTH 16°16'21" WEST 194.47 FEET; THENCE NORTHWESTERLY AND NORTHERLY ALONG SAID CURVE, A DISTANCE OF 197.22 FEET; THENCE NORTH 00°20'36" EAST TANGENT TO SAID CURVE, A DISTANCE OF 304.81 FEET TO THE POINT OF BEGINNING; THENCE NORTH 00°20'34" EAST, A DISTANCE OF 337.53 FEET; THENCE SOUTH 89°39'03" EAST, A DISTANCE OF 200.00 FEET; THENCE SOUTH 00°20'36" WEST, A DISTANCE OF 208.40 FEET; THENCE SOUTH 57°29'58" WEST, A DISTANCE OF 238.05 FEET TO THE POINT OF BEGINNING, CONTAINING 1.253 ACRES, MORE OR LESS.

CERTIFICATE OF AUTHORIZATION
REAL ESTATE SERVICES OF SALINE COUNTY INC.
No. 2023
ARKANSAS SURVEYOR

DATE: 6-2-16

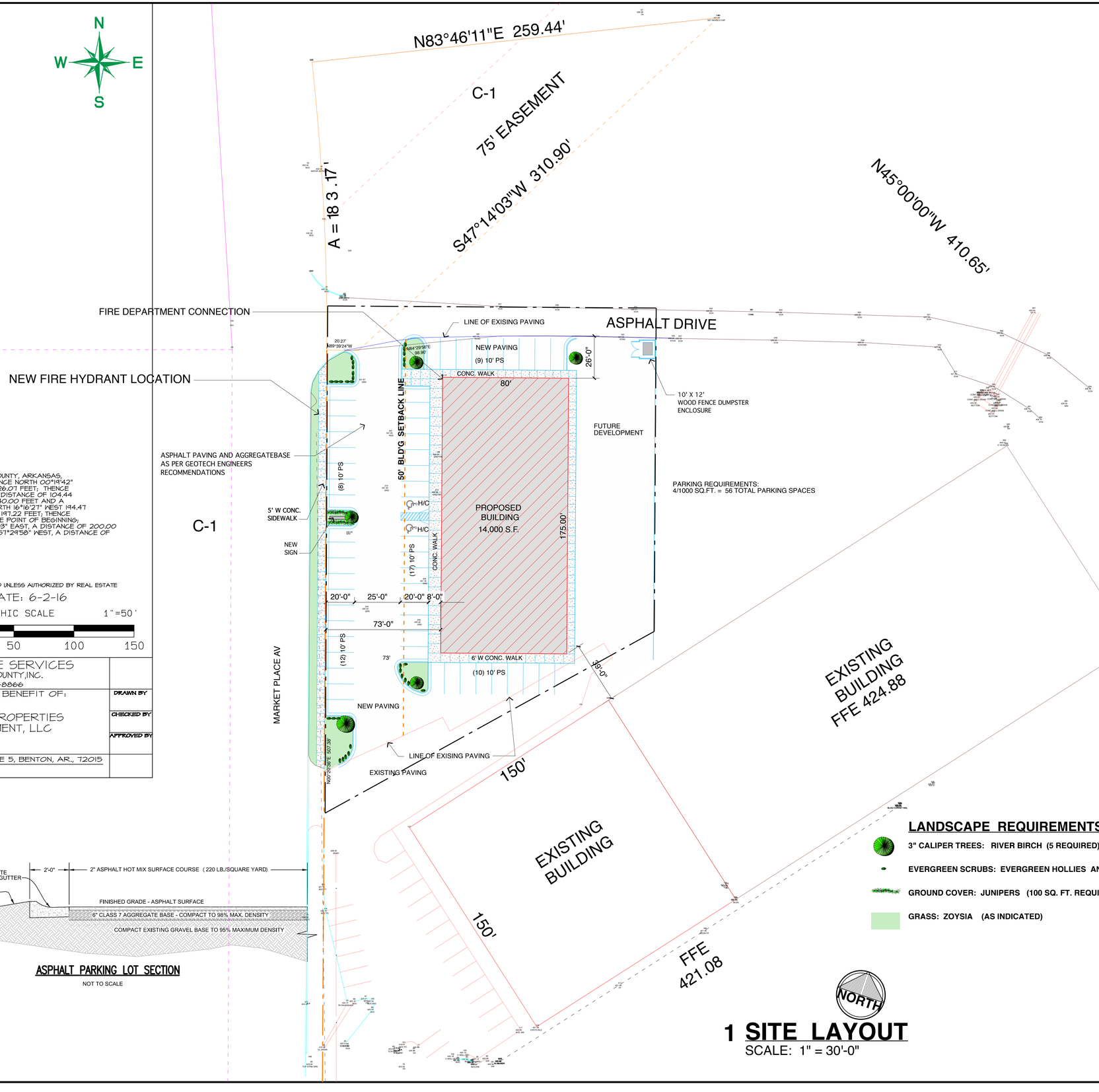
GRAPHIC SCALE 1"=50'

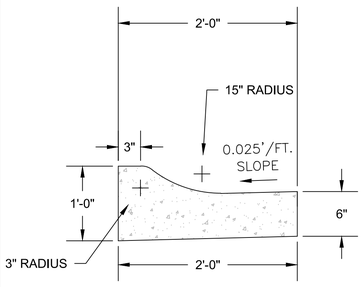
0 50 100 150

LEGEND
- ○ SET #5 BAR/CAP
- ● EXISTING MON.
- △ CALC. POINT
- X FENCE

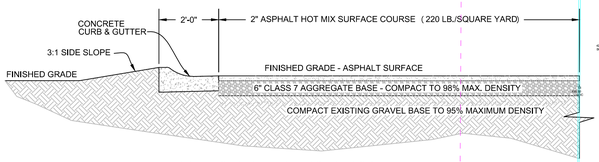
LICENSED PROFESSIONAL SURVEYOR
STATE OF ARKANSAS
No. 1141
JERRY D. LANE

DRAWING NO.	REAL ESTATE SERVICES OF SALINE COUNTY,INC. 501-315-8866	
REVISIONS BY	FOR USE AND BENEFIT OF:	DRAWN BY
DATE		CHECKED BY
	FERGUSON PROPERTIES MANAGEMENT, LLC	APPROVED BY
	1200 FERGUSON DR., SUITE 5, BENTON, AR., 72015	





CONCRETE CURB DETAIL
NOT TO SCALE



ASPHALT PARKING LOT SECTION
NOT TO SCALE

LANDSCAPE REQUIREMENTS:
- 3" CALIPER TREES: RIVER BIRCH (5 REQUIRED)
- EVERGREEN SCRUBS: EVERGREEN HOLLIES AND NANDINA (27 REQUIRED)
- GROUND COVER: JUNIPERS (100 SQ. FT. REQUIRED)
- GRASS: ZOYSIA (AS INDICATED)

1 SITE LAYOUT
SCALE: 1" = 30'-0"

BLACK CORLEY OWENS + HUGHES
ARCHITECTS
219 W SOUTH ST
BENTON, AR 72015
[501] 315-7686 PH
[501] 315-0487 FX

NEW RETAIL BUILDING
MARKET PLACE
BRYANT, AR

Sheet Revisions:

No.	Date/Reference
1	
2	
3	
4	
5	
6	

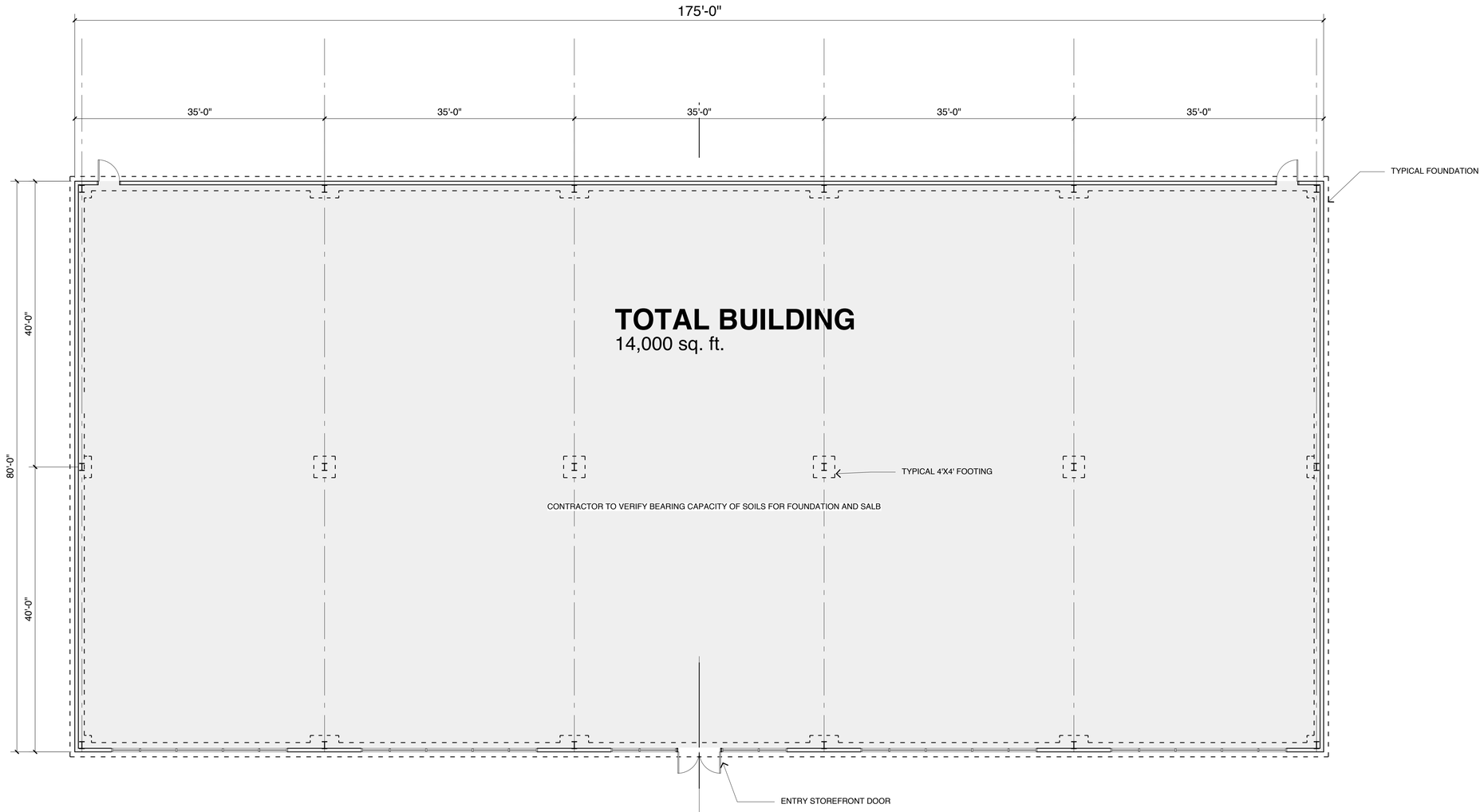
Professional Stamps:

Sheet Title:

Date: 06oct16

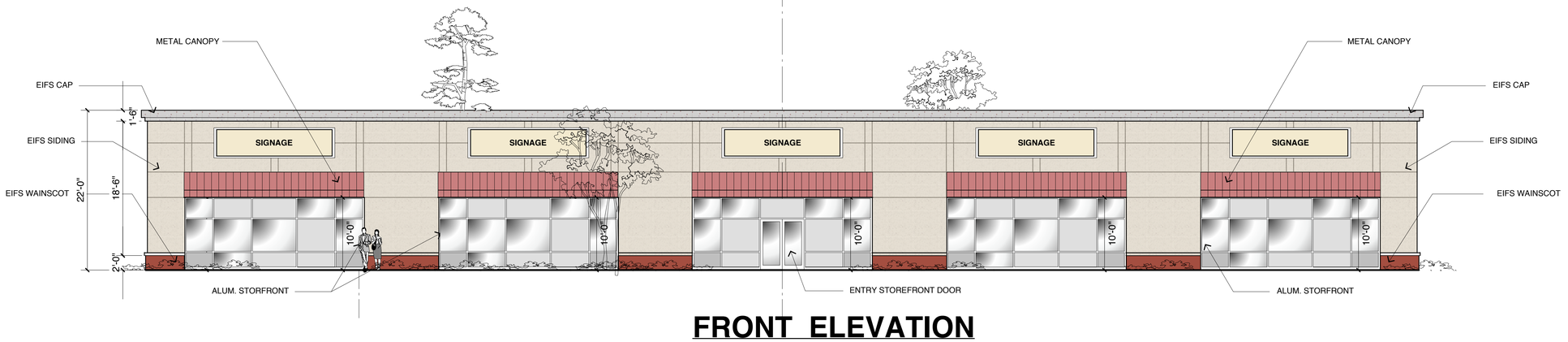
Sheet Number:

A0



PLAN

SC: 1/8" = 1'-0"



FRONT ELEVATION

SC: 1/8" = 1'-0"

BLACK CORLEY OWENS + HUGHES
ARCHITECTS
219 W SOUTH ST
BENTON, AR 72015
[501] 315-7686 PH
[501] 315-0487 FX

NEW RETAIL BUILDING
MARKET PLACE
BRYANT, AR

Sheet Revisions:	
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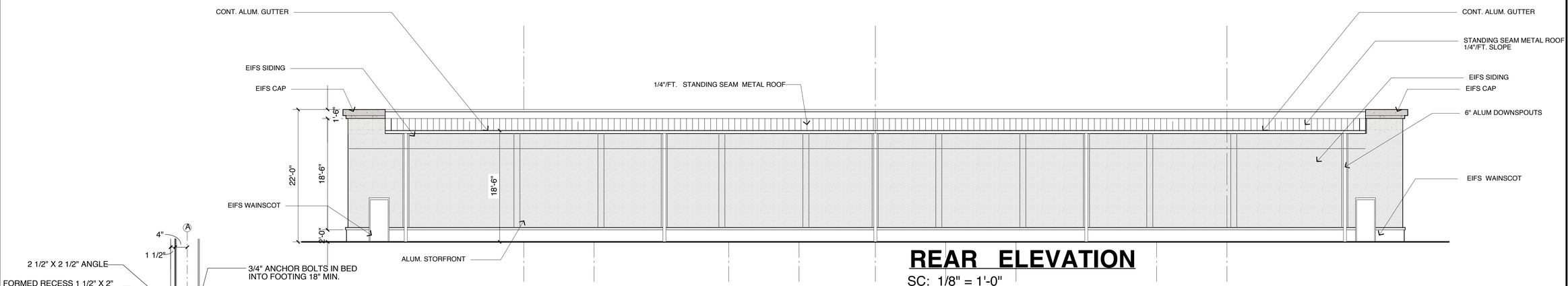
Professional Stamps:

Sheet Title:

Date: 6oct16

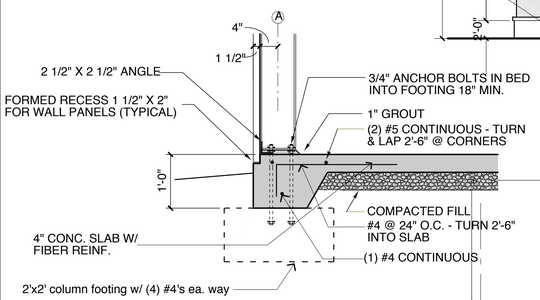
Sheet Number:

A1



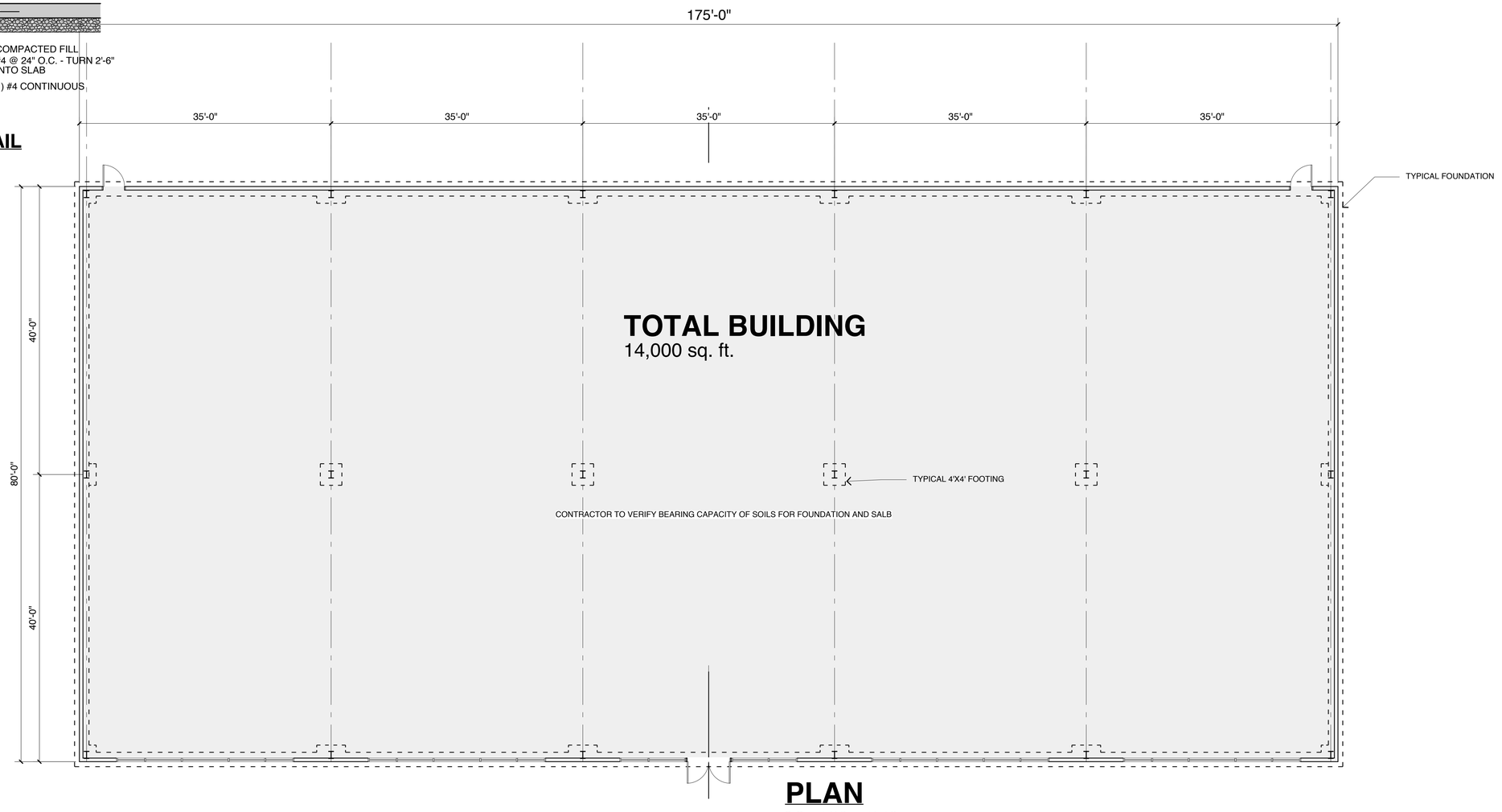
REAR ELEVATION

SC: 1/8" = 1'-0"



FOUNDATION DETAIL

3/4" = 1'-0"



PLAN

SC: 1/8" = 1'-0"

BLACK CORLEY OWENS + HUGHES
ARCHITECTS
219 W SOUTH ST
BENTON, AR 72015
[501] 315-7686 PH
[501] 315-0487 FX

NEW RETAIL BUILDING
MARKET PLACE
BRYANT, AR

Sheet Revisions:	
No.	Date/Reference
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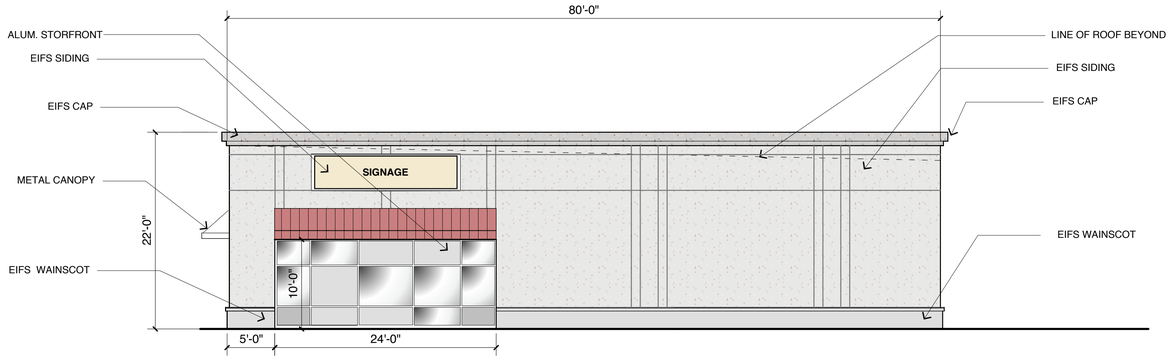
Professional Stamps:

Sheet Title:

Date: 6oct16

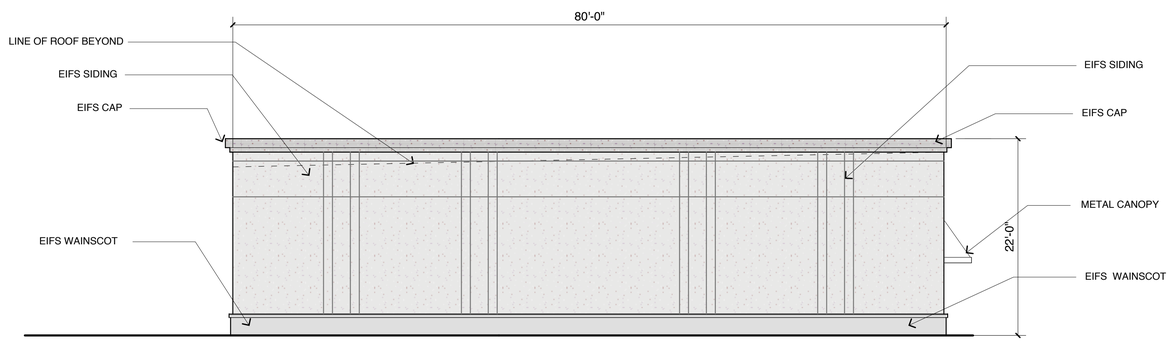
Sheet Number:

A2



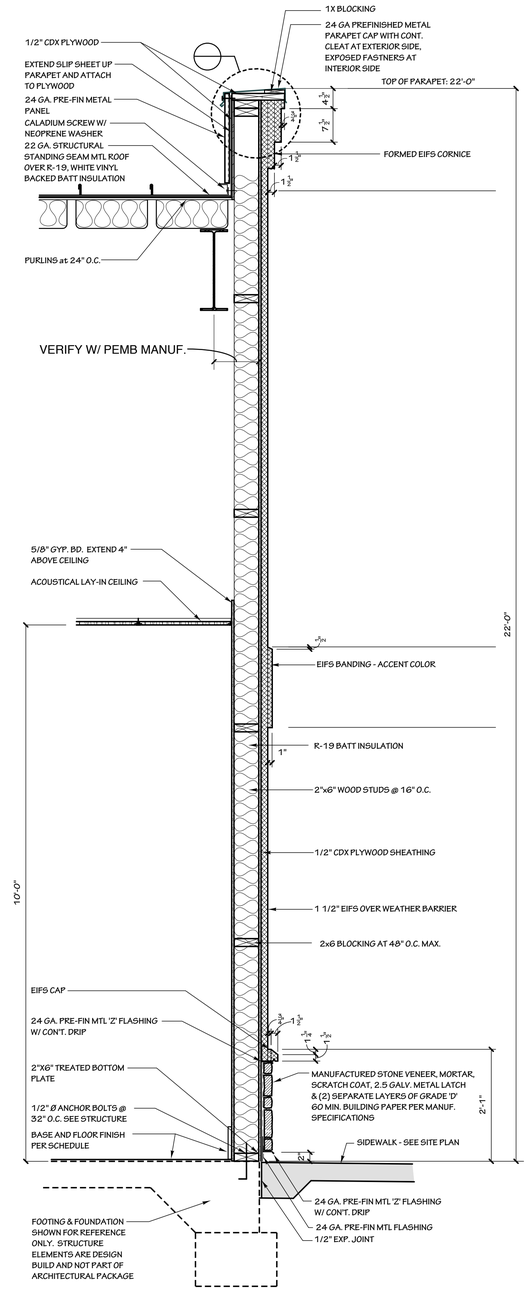
RIGHT SIDE ELEVATION

SC: 1/8" = 1'-0"



LEFT SIDE ELEVATION

SC: 1/8" = 1'-0"



1 WALL SECTION 1

3/4" = 1'-0"

BLACK CORLEY OWENS+ HUGHES
ARCHITECTS
219 W SOUTH ST
BENTON, AR 72015
[501] 315-7686 PH
[501] 315-0487 FX

NEW RETAIL BUILDING
MARKET PLACE
BRYANT, AR

Sheet Revisions:	
No.	Date/Reference
1	
2	
3	
4	
5	
6	

Professional Stamps:

Sheet Title:

Date: 06oct16

Sheet Number:

A3

GNE
Designing our client's success

GarNat Engineering, LLC
P.O. Box 116 (72018)
2909 Military Road
Benton, Arkansas 72015
PH: (501) 408-4650
FX: (888) 900-3068
garnatengineering@gmail.com

February 3, 2017

Mr. Truett Smith
Bryant Planning Coordinator/Planning Commission Secretary
210 SW 3rd Street
Bryant, AR 72022

Re: Preliminary Plat – Benjamin Grove Subdivision – Phase 2 (GNE #16025)
Responses to Comments dated 2-1-2017

Dear Mr. Smith:

The following are our responses to comments made in a letter from Les Price (Crist Engineers) to you dated 2-1-2017. The numbers of the comments match the comment numbers in the

1. This item will be addressed prior to final platting and after receipt of equipment pricing.
2. A summary of hydrology table was created and is included with this response
3. The pipe between lots 50 and 51 was checked for the 100-year storm and found to be adequate. A revised drainage report was prepared to show the 100-year storm flows.
4. The ditch on the north side of lot 51 was revised to have a 4 horz : 1 vert sideslopes. The drainage analysis was revised to also show this slope. Also, the 100-year storm analysis mention in note 3 above is included this change.
5. The preliminary plat (sheet 1) was revised to show a 25-ft drainage easement on the north side of lot 51 and a note regarding the existing 50-ft easement was added to the south of Amalie Drive. A note was also added stating that no fences will be constructed across open ditches.
6. This stub-out was extended from 60-ft to 125-ft and is shown on sheets 2 and 3.
7. A label for this easement was added on sheets 2 and 3.
8. This item will be addressed through a separate correspondence.
9. Sheet 7 was revised to show a 16-ft gate.
10. The 8-inch pipe between manhole A-1 and the wetwell was revised to show ductile iron.
11. The piping in the wetwell was revised on sheet 7 to stainless steel.
12. Note 10 was added to the section notes on sheet 7 to reflect that the piping inside of the valve vault is to be coated per City of Bryant specifications.
13. The details on sheet 7 were revised to show the correct elevations and spacings in the wetwell.

14. The controls were moved next to the valve vault on sheet 7. Lift station site note 4 was revised to provide concrete under the controls.
15. The valve vault dimensions were revised on sheet 7.
16. Refer to the new calculations which are included with this response.
17. No

We also addressed a separate comment regarding the addition of a metering pump. We also removed the half-street section for Zuber Road as it does not apply to Phase 2.

Revised or new documents included with this response include:

- Sheet 1 – Preliminary Plat (revised)
- Sheet 2 – Overall Water & Sewer Plan (revised)
- Sheet 3 – Sewer Plan and Profile (revised)
- Sheet 7 – Lift Station Plan and Details (revised)
- Summary of Hydrology table (new)
- 25-year drainage report (revised)
- 100-year drainage report (new)
- Lift station design calculations (revised)

If you have questions or need any additional information, please do not hesitate to contact me.

Sincerely,
GarNat Engineering, LLC

Vernon J. Williams, P.E., President

Attachments

Cc: Les Price, Crist Engineers, Inc.

City of Bryant Subdivision Checklist

Subdivision/Project Name Benjamin Grove Phase 2

Contact Person Kelly Vanlandingham **Phone** 501-408-4650

Mailing Address 2909 Military Rd, Benton, Ar 72015

I. Basic Information Needed On The Plat

- ✓ ▲ 1. Name of Subdivision/Project
- ✓ ▲ 2. Current zoning R1.5
- ✓ ▲ 3. Name and Address of owner of Record
- ✓ ▲ 4. Illustrate Source of Title giving deed record book and page number
- ✓ ▲ 5. Name & address of the sub-divider
- ✓ ▲ 6. Date of Survey
- ✓ ▲ 7. Vicinity map locating streets, highways, section lines, railroad, schools, & parks within ½ mile
- ✓ ▲ 8. Legal description of the property with exact boundary lines
- ✓ ▲ 9. Acreage of property
- ✓ ▲ 10. Number of Lots
- ✓ ▲ 11. Lot area in square feet
- ✓ ▲ 12. Lot lines with appropriate dimensions
- ✓ ▲ 13. Building setback lines
- ✓ ▲ 14. Preliminary Engineering certificate seal and signature on each page
- ✓ ▲ 15. Certificate of Engineering Accuracy
- ✓ ▲ 16. Certificate of Owner
- ✓ ▲ 17. Certificate of Final Plat Approval
- ✓ ▲ 18. Certificate of Recording
- ✓ ▲ 19. Show scale (not less than 1" = 100')
- ✓ ▲ 20. North Arrow
- ✓ ▲ 21. Show Title block
- ✓ ▲ 22. Show adjoining property owners
- ✓ ▲ 23. Layout of all proposed streets including traffic control devices (stop signs, speed limit, etc.)
- ✓ 24. Layout of all subdivision entrance street upgrades
- N/A ▲ 25. Layout of all proposed alleys
- ✓ ▲ 26. Layout of all proposed sidewalk systems
- N/A ▲ 27. Layout identifies any FEMA flood plain and flood way property within the 100-year flood elevation. (Provide Corp of Engineers 404 Permit if required) Not
- ✓ ▲ 28. Drainage easements for stormwater run-off and detention giving dimensions, locations, and purpose
- ✓ ▲ 29. Layout accommodates Master Street Plan segments within the boundaries
- ✓ ▲ 30. Street layout ties to existing adjoining subdivision stub-out streets and provides stub-out streets for future adjoining subdivisions.
- ✓ ▲ 31. Street width and right-of-way properly shown for each functional classification
- ✓ ▲ 32. Street centerlines showing angles of deflection, intersection, radii, length oftangents and arcs, and degree of curvature with basis of curve data
- ✓ ▲ 33. Typical cross section of streets
- ✓ ▲ 34. Location and name of existing streets
- ✓ ▲ 35. New street names that are not similar to existing street names
- ✓ ▲ 36. Show street lights
- ✓ ▲ 37. Show Fire Hydrant placement

✓ 38. Show and label all permanent & proposed easements SSWR? FM? Water?
✓ 39. Any proposed open space must be shown
✓ 40. Show the direction and flow of all water courses entering the tract) on drainage plan
✓ 41. Show the direction and flow of all water courses leaving the tract)
✓ 42. The drainage area of all water courses above the points of entry. – drainage plan
✓ 43. The downstream drainage channel and drainage structures substantially impacted by the subdivision/project.
✓ 44. Show source of water supply
✓ 45. Show location of waste water connection to municipal main & sanitary sewer layout
✓ 46. A phasing plan outlining the boundaries for each phase

II. Additional Information Needed, But Not Necessarily On The Plat

✓ 47. Natural features within the proposed subdivision including drainage channels, bodies of water, wooded areas, and other significant features Street & drainage, Drainage basins
n/a 48. Existing streets, buildings, water courses, railroads. Culverts, utilities and easement on and adjacent to the tract.
n/a 49. Where method of disposal of wastewater is other than connection to a public waste water system, detailed information shall accompany the plat.
✓ 50. Calculations and field notes, including drainage calculations along with support drawing
n/a 51. Stormwater detention plan approval from City Engineer (attach copy of approval)
✓ 52. The Certificate of Preliminary Engineering Accuracy on each set of street and drainage plans.
n/a 53. ADA Accessibility Standard Form completed (and attached)
✓ 54. A Bill of Assurance has been prepared for this subdivision (and attached)
✓ 55. All lots comply with minimum square footage area and minimum lot width at the front building line
✓ 56. Street pavement design will be as specified by City or AHTD design procedures, approved by the City Engineer.
n/a 57. Made the "One Call" prior to site clearance or other excavation activity

III. Preliminary Plat Attachments

(Application will not be accepted until all attachment requirements are met)

✓ 58. Letter to Planning Commission stating your request
✓ 59. Completed Checklist
once determ 60. Completed agreement to provide performance assurance
61. Subdivider Performance Bond or Cashier's Check for infrastructure installation
n/a 62. Landscaping plan of any proposed common open space
✓ 63. Draft of Bill of Assurance proposed for the subdivision (if applicable)
✓ 64. 20 copies of Preliminary Plat Plan (folded) that includes vicinity map (minimum size 17" X 34" paper)
✓ 65. Two (2) IBM compatible diskettes or CDR's with pertinent data and Plat in CAD compatible .DXF electronic file format
n/a 66. Copy of Stormwater Detention approval
✓ 67. 2 copies Plan and profile of all streets
✓ 68. Receipt for $300.00 + $3.00 per lot for preliminary Subdivision fee
✓ 69. Receipt for $250.00 or $25.00 per lot (whichever is greater) for Stormwater Detention and Drainage Plan review
See phase 1 70. Copy of ADEQ Stormwater Pollution Prevention Plan for property parcel containing one acre or larger.

III. Final Plat Attachments

(Application will not be accepted until all attachment requirements are met)

- ▲ 71. Letter to Planning Commission stating your request
- ▲ 72. Completed Checklist
- ▲ 73. 20 copies of Final Plat Plan (folded) that includes vicinity map (minimum size 17" X 34" paper)
- ▲ 74. Two (2) IBM compatible diskettes or CDR's with pertinent data and Plat in CAD compatible .DXF electronic file format
- ▲ 75. Bill of Assurance including provisions set out in Title 15 Subdivision Regulations 15.16.01
- ▲ 76. Copy of Water & Sewer Commission approval or....
- ▲ 77. State Health Department approval of any new water supply and/or sewage system.
- ▲ 78. Letter submitted by a Registered Professional Engineer, certifying that all infrastructure improvements and installations have been installed in accordance with the submitted construction plans and drawings and the standards established by the City of Bryant and are functioning properly.
- ▲ 79. Infrastructure Maintenance Bond or Cashier's check.
- ▲ 80. Check for $25.00 + $1.00 per lot for final Subdivision fee
- ▲ 81. Check for Water Sewer impact fees ($100.00 Flushing Fee and $100.00 impact fee per lot)

Benjamin Grove Phase 2
Name of Subdivision

Kelly D. Vanlandingham
Surveyor

I HAVE COMPLIED WITH THE REQUIREMENTS LISTED ABOVE AND HAVE CHECKED ALL OF THE BOXES ON THE CHECKLIST WHICH APPLY TO THIS PROJECT SUBMITTAL.

Owner Signature

Kelly D. Vanlandingham
Engineer Signature

CITY USE

Preliminary Plat Approved _____

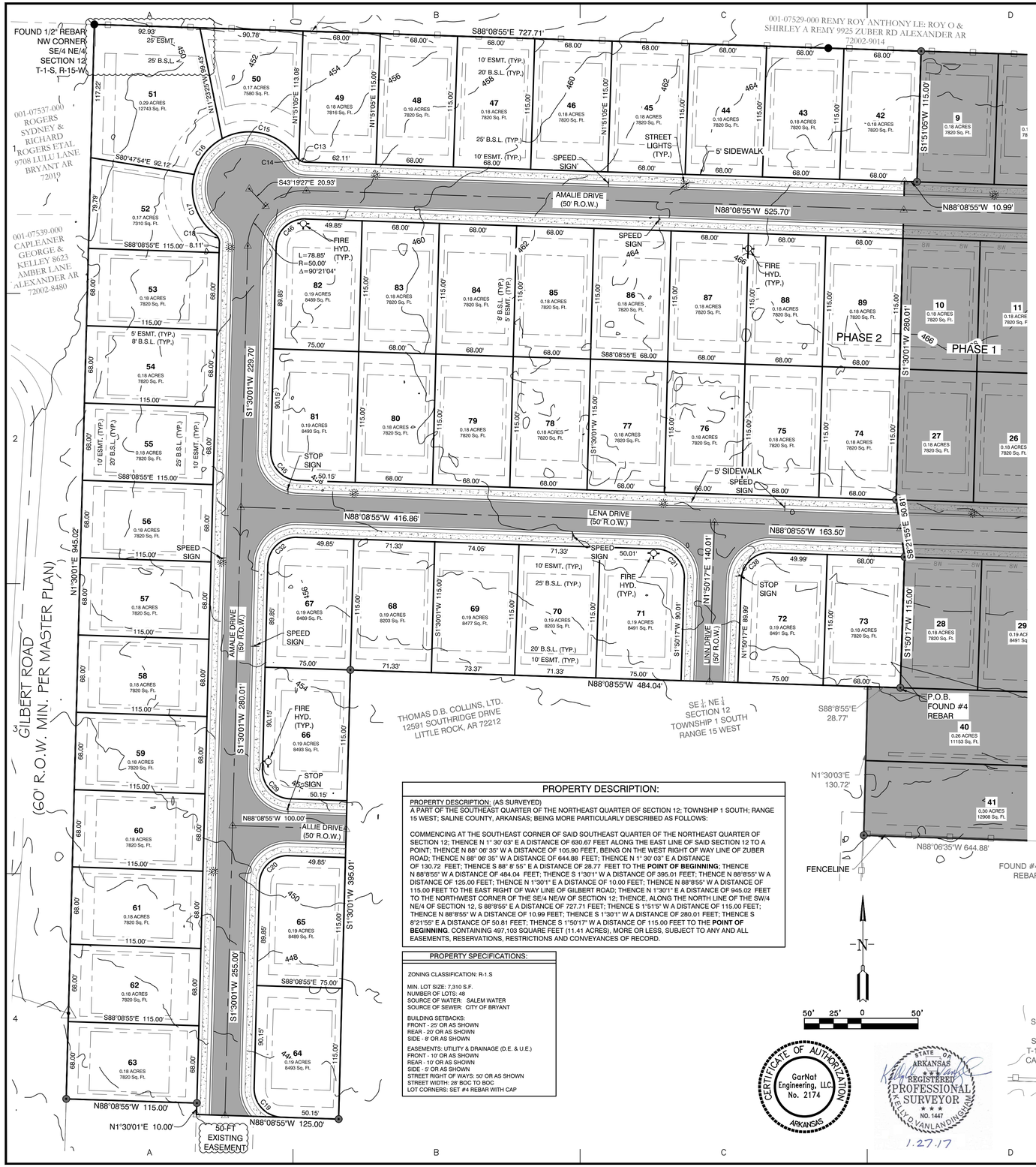
Planning Commission Date _____

Final Plat Approved _____

Planning Commission Date _____

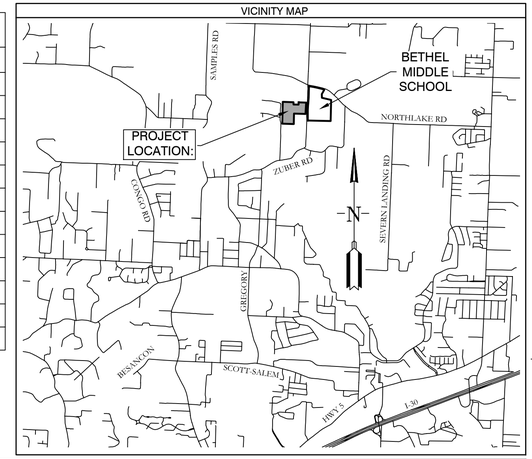
Proof of Recording - County _____

County Clerk _____ Date _____



Curve Table					
Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C1	38.58	25.00	88°24'49"	N47° 38' 40"E	34.86
C2	39.96	25.00	91°35'11"	N42° 21' 20"W	35.84
C3	38.58	25.00	88°24'49"	N47° 38' 40"E	34.86
C4	39.96	25.00	91°35'11"	S42° 21' 20"E	35.84
C5	39.28	25.00	90°00'48"	N46° 50' 41"E	35.36
C6	39.26	25.00	89°59'12"	S43° 09' 19"E	35.35
C7	7.36	50.00	8°25'57"	S0° 32' 25"E	7.35
C8	74.39	50.00	85°14'36"	S47° 22' 42"E	67.72
C9	71.16	50.00	81°32'27"	N49° 13' 46"E	65.30
C10	73.27	50.00	83°57'43"	N33° 31' 18"W	66.89
C11	15.67	14.00	64°08'11"	N43° 26' 04"W	14.87
C12	3.23	14.00	13°12'16"	N4° 45' 51"W	3.22

VICINITY MAP



PLAT CERTIFICATES:

OWNER:

Name: Thomas D.B. Collins, Ltd.

Address: 39 Walnut Valley, Little Rock, AR 72211

DEVELOPER:

Name: Thomas D.B. Collins, Ltd.

Address: 39 Walnut Valley, Little Rock, AR 72211

CERTIFICATE OF OWNER:
We, the undersigned, owners of the real estate shown and described herein do hereby certify that we have laid off, platted and subdivided, and do hereby lay off, plat and subdivide said real estate in accordance with the within plat.

Licensed Abstractor No. _____
Or Attorney Bar No. _____

Source of Title: _____
Saline County Document# 2016-11808 & 2016-12187

CERTIFICATE OF PRELIMINARY ENGINEERING ACCURACY:

I, Kelly D. Vanlandingham, hereby certify that this plat correctly represents a survey and a plan made by me or under my supervision; that all monuments shown hereon actually exist and their locations, size, type, and material are correctly shown; and that all requirements of the City of Bryant Subdivision Rules and Regulations have been fully complied with.

Date: _____ Signed: _____

Kelly D. Vanlandingham
Registered Professional Engineer
No. 7996, Arkansas

CERTIFICATE OF RECORDING:

This document, number_____is filed for record this_____day of____, 20__, at a.m./p.m. in Plat or Deed Book____Page_____.
For Bill of Assurance see Deed Record Book___Page___.

Circuit Clerk

CERTIFICATE OF PRELIMINARY SURVEYING ACCURACY:

I, Kelly D. Vanlandingham, hereby certify that this proposed preliminary plat correctly represents a boundary survey made by me or under my supervision on 1/27/2017, that the boundary lines shown hereon correspond with the description in the deeds cited in the above Source of Title;and that all monuments which were found or placed on the property are correctly described and located.

Date: _____ Signed: _____

Kelly D. Vanlandingham
Registered Land Surveyor
No. 1447, Arkansas

CERTIFICATE OF PRELIMINARY PLAT APPROVAL:

All requirements of the City of Bryant Subdivision Rules and Regulations relative to the preparation and submittal of a Preliminary Plat having been fulfilled, approval of this plat is hereby granted, subject to further provisions of said Rules and Regulations.

This Certificate shall expire Date: _____

Date of Execution

Name, Chairman
Bryant Planning Commission

PROPERTY DESCRIPTION:

PROPERTY DESCRIPTION: (AS SURVEYED)
A PART OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 12; TOWNSHIP 1 SOUTH; RANGE 15 WEST; SALINE COUNTY, ARKANSAS; BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHEAST CORNER OF SAID SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 12; THENCE N 1° 30' 03" E A DISTANCE OF 630.67 FEET ALONG THE EAST LINE OF SAID SECTION 12 TO A POINT; THENCE N 88° 06' 35" W A DISTANCE OF 105.90 FEET, BEING ON THE WEST RIGHT OF WAY LINE OF ZUBER ROAD; THENCE N 88° 06' 35" W A DISTANCE OF 644.88 FEET; THENCE N 1° 30' 03" E A DISTANCE OF 130.72 FEET; THENCE S 88° 8' 55" E A DISTANCE OF 28.77 FEET TO THE **POINT OF BEGINNING**; THENCE N 88°8'55" W A DISTANCE OF 484.04 FEET; THENCE S 1°30'1" W A DISTANCE OF 395.01 FEET; THENCE N 88°8'55" W A DISTANCE OF 125.00 FEET; THENCE N 1°30'1" E A DISTANCE OF 10.00 FEET; THENCE N 88°8'55" W A DISTANCE OF 115.00 FEET TO THE EAST RIGHT OF WAY LINE OF GILBERT ROAD; THENCE N 1°30'1" E A DISTANCE OF 945.02 FEET TO THE NORTHWEST CORNER OF THE SE/4 NE/W OF SECTION 12; THENCE, ALONG THE NORTH LINE OF THE SW/4 NE/4 OF SECTION 12, S 88°8'55" E A DISTANCE OF 727.71 FEET; THENCE S 1°51'5" W A DISTANCE OF 115.00 FEET; THENCE N 88°8'55" W A DISTANCE OF 10.99 FEET; THENCE S 1°30'1" W A DISTANCE OF 280.01 FEET; THENCE S 8°21'55" E A DISTANCE OF 50.81 FEET; THENCE S 1°50'17" W A DISTANCE OF 115.00 FEET TO THE **POINT OF BEGINNING**, CONTAINING 497,103 SQUARE FEET (11.41 ACRES), MORE OR LESS, SUBJECT TO ANY AND ALL EASEMENTS, RESERVATIONS, RESTRICTIONS AND CONVEYANCES OF RECORD.

PROPERTY SPECIFICATIONS:

ZONING CLASSIFICATION: R-1.S

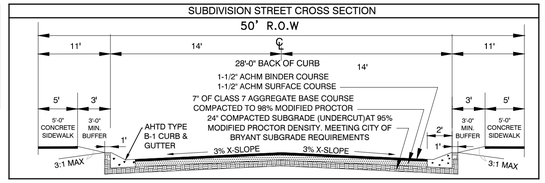
MIN. LOT SIZE: 7,310 S.F.
NUMBER OF LOTS: 48
SOURCE OF WATER: SALEM WATER
SOURCE OF SEWER: CITY OF BRYANT

BUILDING SETBACKS:
FRONT - 25' OR AS SHOWN
REAR - 20' OR AS SHOWN
SIDE - 8' OR AS SHOWN

EASEMENTS: UTILITY & DRAINAGE (D.E. & U.E.)
FRONT - 10' OR AS SHOWN
REAR - 10' OR AS SHOWN
SIDE - 5' OR AS SHOWN
STREET RIGHT OF WAYS: 50' OR AS SHOWN
STREET WIDTH: 28' BOC TO BOC
LOT CORNERS: SET #4 REBAR WITH CAP

SURVEY LEGEND
△ - Computed point
● - Found monument
◉ - Set #4 RB/Plas. Cap
(M)-Measured
(R)-Record
(P)-Platted

SUBDIVISION STREET CROSS SECTION



NOTES:
1. NO FENCES WILL BE CONSTRUCTED IN THE DRAINAGE EASEMENTS WHERE OPEN DITCHES ARE TO BE CONSTRUCTED.

BASIS OF BEARINGS:

BENCHMARK(S) PROVIDED ARE REBAR AND COORDINATES ON BENCHMARKS ARE NORTH AMERICAN DATUM 1983, ARKANSAS SOUTH ZONE, US SURVEY FEET, GRID COORDINATES AND ELEVATIONS ARE NAVD 1988. COORDINATES AND ELEVATIONS WERE ESTABLISHED USING GPS AND WERE PROCESSED USING THE NATIONAL GEODETIC SURVEY'S "ONLINE POSITIONING USER SERVICE" (OPUS).

CERTIFICATIONS:

By affixing my seal and signature, I Kelly D. Vanlandingham, PLS No. 1447, hereby certify that this drawing correctly depicts a survey compiled under my supervision.

According the the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Saline County unincorporated areas, panel # 05125C0225D dated 6/19/2012 , no portion , dated of the property described hereon does lie within the 100 year flood hazard boundary.

DATE	REVISION	BY
2/3/2017	1 – COMMENTS FROM CITY OF BRYANT	KDV

GNE Designing our client's success
GarNat Engineering, LLC
P.O. Box 116 (72018)
2909 Military Road
Benton, Arkansas 72015
Ph (501) 408-4650
Fx (888) 900-3068
gamateengineering@gmail.com

BENJAMIN GROVE SUBDIVISION, PHASE 2
FOR THOMAS D.B.COLLINS, LTD.
PART OF THE SE/4 NE/4 OF
SECTION 12, T-1-S, R-15-W,
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

STATE OF ARKANSAS
REGISTERED
PROFESSIONAL
ENGINEER
NO. 7996
KELLY D VANLANDINGHAM
1.27.17

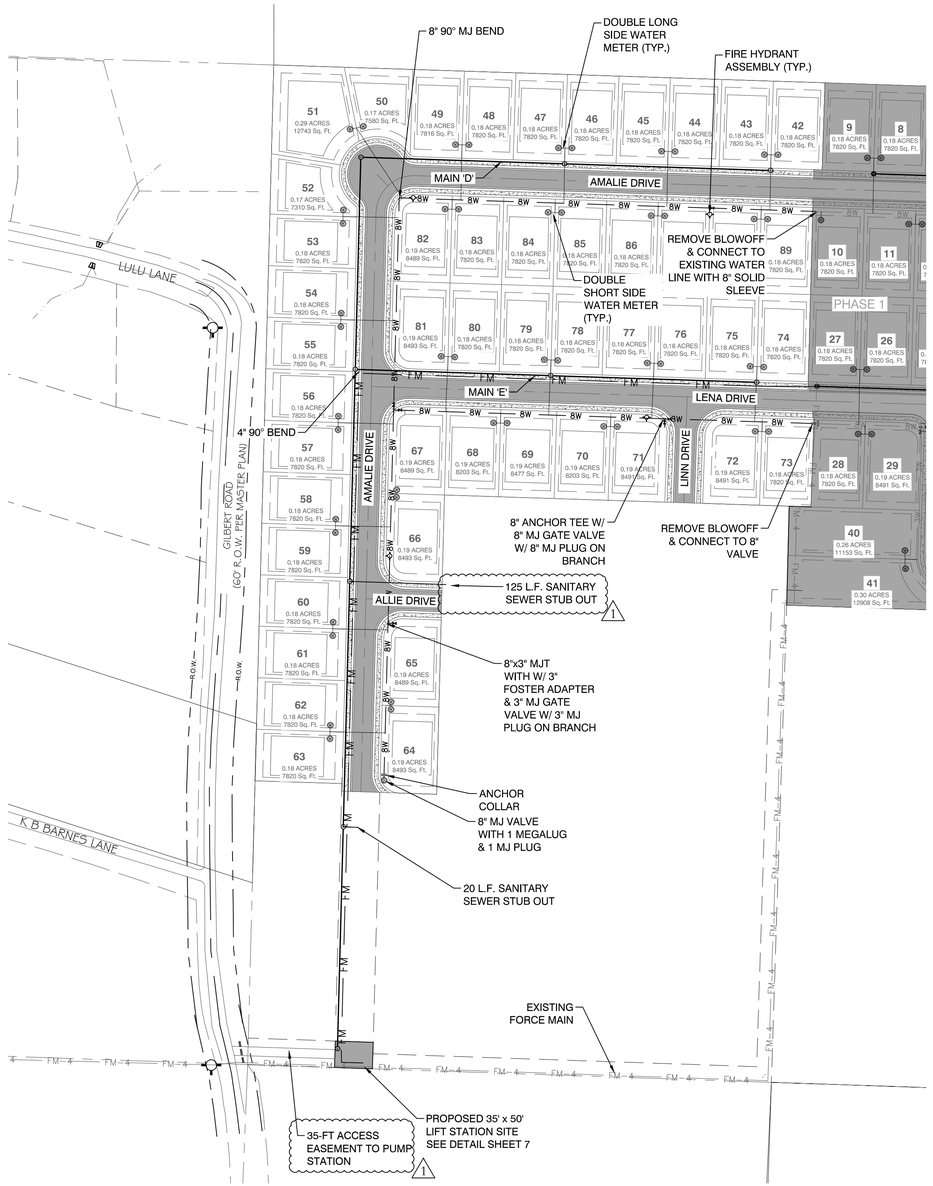
CONTENTS:
PRELIMINARY PLAT

PROJECT NO:
16025

DATE:
JAN 2017

SHEET NO:
1

J:\Projects\2016 Projects\16025 Benjamin Grove Lee Pengelly\DWG\Phase 2\16025 Benjamin Grove Subd – Phase 2 – R24 (with comments addressed).dwg



NOTES:

1. BURIED UTILITIES ARE LOCATED AT THE SITE. CONTACT ARKANSAS ONE CALL & WHERE APPROPRIATE THE UTILITY COMPANIES PRIOR TO DIGGING.

2. ALL UNRESTRAINED WATER LINE FITTINGS SHALL BE INSTALLED WITH A CONCRETE THRUST BLOCK FOR JOINT RESTRAINT.

3. WORK ON EXISTING ROADS SHALL INCLUDE WARNING SIGNS & BARRICADES IN ACCORDANCE WITH THE REQUIREMENTS OF THE STATE, COUNTY, OR CITY HAVING JURISDICTION. OTHER SIGNS & DEVICES, SUCH AS PLATING, SHALL BE PLACED AS REQUIRED TO ADEQUATELY PROTECT THE PUBLIC.

4. ALL SEWER LINE CONSTRUCTION SHALL COMPLY WITH CITY OF BRYANT STANDARD SPECIFICATIONS & DETAILS.

5. ALL WATER LINE CONSTRUCTION SHALL COMPLY WITH SALEM WATER USERS STANDARD SPECIFICATIONS & DETAILS.

6. MAINTAIN 10 FEET OF HORIZONTAL SEPARATION BETWEEN WATER & SEWER LINES.

N

100' 50' 0 100'

DATE	REVISION	BY
2/3/2017	1 – COMMENTS FROM CITY OF BRYANT	KDV

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STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
KELLY D. VANLANDINGHAM
NO. 7996
1.27.17

CONTENTS:

OVERALL WATER & SANITARY SEWER PLAN

PROJECT NO: 16025

DATE: JAN 2017

SHEET NO: 2

J:\Projects\2016 Projects\16025 Benjamin Grove Lee Pengel\DWG\Phase 2\16025 Benjamin Grove Subd – Phase 2\16025 Benjamin Grove Subd – Phase 2 – R24 (with comments addressed).dwg

GILBERT ROAD
(60' R.O.W. MIN. PER MASTER PLAN)

35-FT ACCESS EASEMENT TO PUMP STATION

FORCE MAIN (TYP.)

50' SEWER EASEMENT

20 L.F. SANITARY SEWER STUB OUT

125 L.F. SANITARY SEWER STUB OUT

293' L.F. OF 8" SDR-26 PVC @ 1.26%

324' L.F. OF 8" SDR-26 PVC @ 1.91%

280' L.F. OF 8" SDR-26 PVC @ 1.05%

280' L.F. OF 8" SDR-26 PVC @ 0.40%

269' L.F. OF 8" SDR-26 PVC @ 2.34%

257' L.F. OF 8" SDR-26 PVC @ 2.89%

ALLIE DRIVE (50' R.O.W.)

AMALIE DRIVE (50' R.O.W.)

63	62	61	60	59	58	57	56	55	54	53	52	51	
0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.19 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.17 ACRES 7310 Sq. Ft.	0.29 ACRES 12743 Sq. Ft.	
64	65	66	67	68	69	70	81	82	80	83	79	84	78	85	50	49	48	47	46
0.19 ACRES 8493 Sq. Ft.	0.19 ACRES 8489 Sq. Ft.	0.19 ACRES 8493 Sq. Ft.	0.19 ACRES 8489 Sq. Ft.	0.19 ACRES 8203 Sq. Ft.	0.19 ACRES 8477 Sq. Ft.		0.19 ACRES 8493 Sq. Ft.	0.19 ACRES 8489 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.17 ACRES 7560 Sq. Ft.	0.18 ACRES 7816 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	0.18 ACRES 7820 Sq. Ft.	

N

50' 25' 0 50'

MAIN D
SANITARY SEWER
PLAN

NOTES:

1. ADJUST RIM ELEVATION TO FINISHED GRADE AS REQUIRED.
2. SANITARY SEWER CONSTRUCTION SHALL COMPLY WITH CITY OF BRYANT STANDARD SPECIFICATIONS & DETAILS.
3. MAINTAIN 10 FEET OF HORIZONTAL SEPARATION BETWEEN WATER & SEWER LINES.
4. ALL MANHOLES SHALL BE EPOXY COATED PER CITY OF BRYANT REQUIREMENTS. .
5. ALL DUCTILE IRON GRAVITY SEWER SHALL BE POLY WRAPPED & EPOXY COATED PER CITY OF BRYANT REQUIREMENTS.
6. LIFT STATION & FORCE MAIN DISCHARGE MANHOLES SHALL HAVE SPECIAL EPOXY COATING PER CITY OF BRYANT REQUIREMENTS.

MH - D1
STA 0+00.00
RIM = 442.50
INV = 433.86

MH - D2
STA 2+92.83
RIM = 443.18
INV = 437.68

MH - D3
STA 5+46.83
RIM = 450.11
INV = 444.00

MH - D4
STA 9+06.84
RIM = 455.20
INV = 447.03

MH - D5
STA 11+76.84
RIM = 454.81
INV = 448.23

MH - D6
STA 14+45.84
RIM = 460.51
INV = 454.63

NOTE 6

EXISTING GROUND

AMALIE CENTERLINE FINISHED GRADE

STORM PIPE F-1

8" FL IN = 434.00
8" FL IN = 434.00

8" FL OUT = 437.70
8" FL IN = 437.80
8" FL IN = 437.80

8" FL OUT = 444.00
8" FL IN = 444.10
8" FL IN = 444.10

8" FL OUT = 447.03
8" FL IN = 447.13
8" FL IN = 447.13

8" FL OUT = 448.25
8" FL IN = 448.35

8" FL OUT = 454.65
8" FL IN = 454.75

H: 1"=50'
V: 1"=5'

MAIN D
SANITARY SEWER
PROFILE

DATE	REVISION	BY
2/3/2017	1 – COMMENTS FROM CITY OF BRYANT	KDV

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STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
NO. 7996
KELVO VAN LANDINGHAM
1.27.17

CONTENTS:

SANITARY SEWER PLAN & PROFILE MAIN D

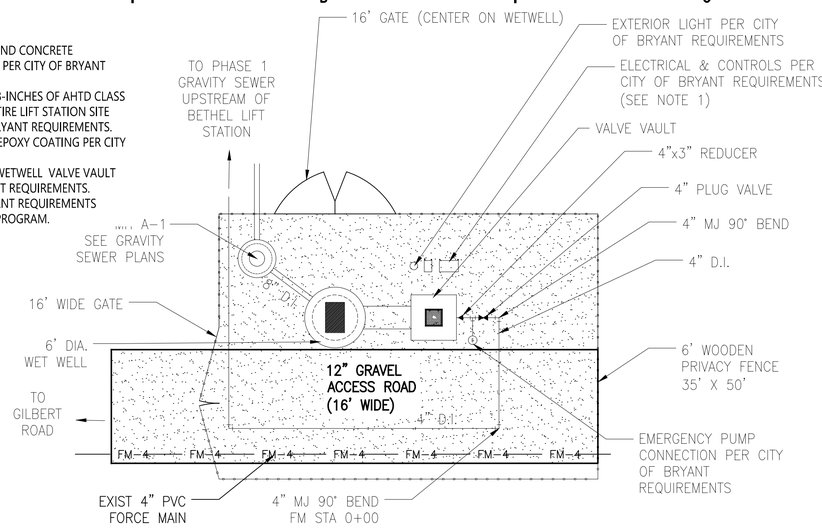
PROJECT NO: 16025

DATE: JAN 2017

SHEET NO: 3

LIFT STATION SITE NOTES:

1. PROVIDE CANOPY OVER CABINETS AND CONCRETE HOUSEKEEPING PAD UNDER PANELS PER CITY OF BRYANT REQUIREMENTS.
2. PROVIDE SURFACE CONSISTING OF 8-INCHES OF AHTD CLASS 7 AGGREGATE BASE COURSE ON ENTIRE LIFT STATION SITE (AREA INSIDE FENCE) PER CITY OF BRYANT REQUIREMENTS.
3. MANHOLE D1 SHALL HAVE SPECIAL EPOXY COATING PER CITY OF BRYANT REQUIREMENTS.
4. PROVIDE CONCRETE PAD AROUND WETWELL VALVE VAULT AND CONTROLS PER CITY OF BRYANT REQUIREMENTS.
5. PROVIDE METERING PUMP PER BRYANT REQUIREMENTS (BRYCE RIMMER) FOR DEGREASING PROGRAM.

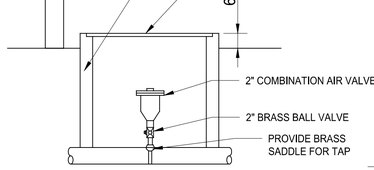


LIFT STATION - PLAN

SCALE: 1"=10'

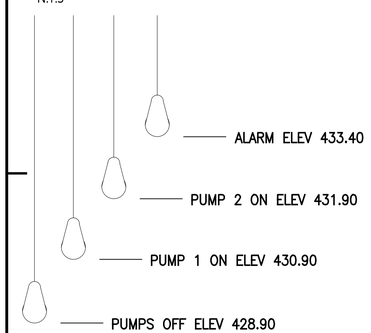
LIFT STATION SECTION NOTES

1. ALL EQUIPMENT SHALL MEET CITY OF BRYANT REQUIREMENTS.
2. PROVIDE LINK SEAL OR EQUAL AT PRESSURE PIPING WALL PENETRATIONS IN WETWELL AND VALVE VAULT.
3. PROVIDE CONCRETE MANHOLE ADAPTER (CMA) OR EQUAL AT GRAVITY SEWER PENETRATIONS.
4. ALL DUCTILE IRON GRAVITY SEWER PIPE SHALL BE THICKNESS CLASS 50 WITH PROTECTO 401 LINING.
5. ALL INTERNAL WETWELL PIPING SHALL BE CONSTRUCTED OF FLANGED SCHEDULE 40 304L STAINLESS STEEL.
6. SPARE PARTS FOR LIFT STATION WILL BE PROVIDED PER CITY OF BRYANT REQUIREMENTS.
7. VALVE VAULT SHALL BE 6' X 6' STANDARD JUNCTION BOX BY HANSON OR EQUAL. REINFORCING PER ASTM A-615 OR ASTM A-185. CONCRETE SHALL HAVE MINIMUM STRENGTH OF 5000 PSI.
8. WETWELL SHALL BE PRECAST CONCRETE MANUFACTURED BY HANSON OR EQUAL. WALLS REINFORCED PER ASTM C-478. TOP AND BOTTOM SLAB REINFORCED WITH #5'S AT 6" O.C.E.W. CONCRETE SHALL HAVE MINIMUM STRENGTH OF 5000 PSI.
9. ALL PIPING ON LIFT STATION SITE SHALL BE RESTRAINED JOINT - EITHER FLANGED OR MECHANICAL JOINT WITH MEGALUG.
10. EXTERIOR OF ALL DUCTILE IRON PIPING IN THE VALVE VAULT MUST BE EPOXY COATED PER CITY OF BRYANT REQUIREMENTS.



2" COMB AIR VALVE - DETAIL

N.T.S

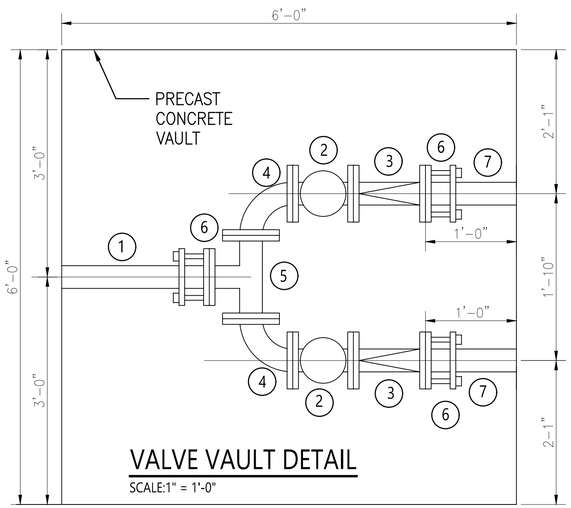


LEVEL CONTROLS

N.T.S.

NOTES:

1. EQUIPMENT USED FOR LEVEL CONTROL SHALL BE PER CITY OF BRYANT REQUIREMENTS.



VALVE VAULT DETAIL

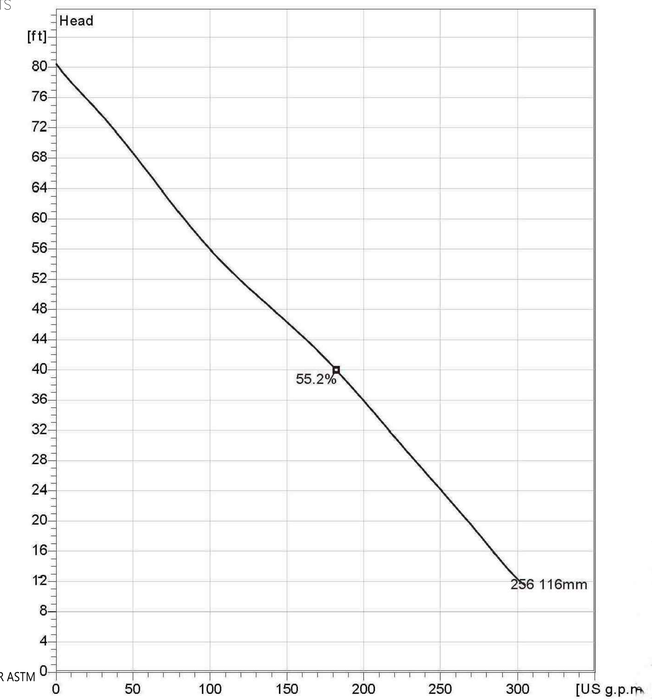
SCALE:1" = 1'-0"

KEYED NOTES:

1. 3" FLANGED DI SPOOL
2. 3" FLANGED PLUG VALVE W/ HAND LEVER PER CITY OF BRYANT REQUIREMENTS
3. 3" FLANGED CHECK VALVE PER CITY OF BRYANT REQUIREMENTS
4. 3" FLANGED DI 90° BEND
5. 3" FLANGED TEE
6. 3" FLANGE COUPLING ADAPTER - EBAA MEGAFLANGE OR EQUAL
7. PE STAINLESS STEEL SPOOL FROM LIFT STATION

NP 3085 SH 3~ 256

Technical specification



PUMP INFORMATION

N.T.S.

Note: Picture might not correspond to the current configuration.

General

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

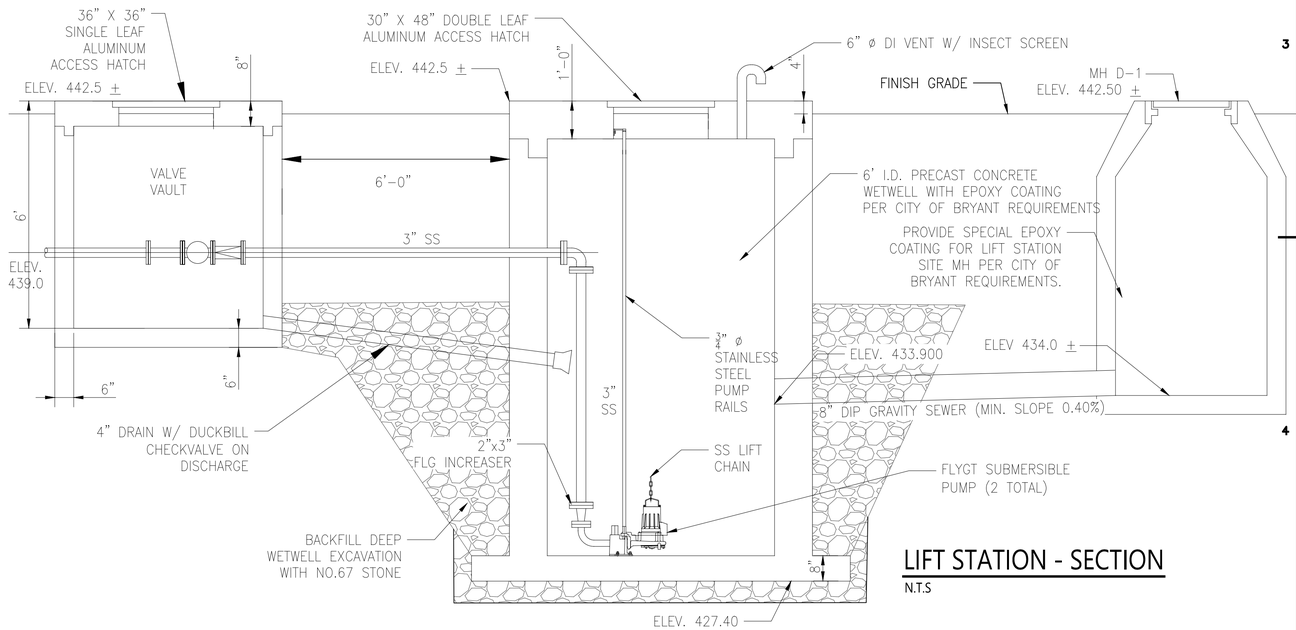
Impeller

Impeller material	Grey cast iron
Discharge Flange Diameter	3 1/8 inch
Suction Flange Diameter	80 mm
Impeller diameter	116 mm
Number of blades	2

Motor

Motor #	N3085.183 15-09-2AL-W 4hp
Stator variant	12
Frequency	60 Hz
Rated voltage	460 V
Number of poles	2
Phases	3~
Rated power	4 hp
Rated current	5.1 A
Starting current	30 A
Rated speed	3415 rpm
Power factor	
1/1 Load	0.91
3/4 Load	0.88
1/2 Load	0.81
Efficiency	
1/1 Load	80.5 %
3/4 Load	82.5 %
1/2 Load	82.5 %

Configuration



LIFT STATION - SECTION

N.T.S

DATE	REVISION	BY
2/3/17	COMMENTS FROM CITY 2/1/17	KDV

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KELLY D. VANLANDINGHAM
NO. 7996

1.6.17

CONTENTS:

LIFT STATION PLAN & DETAILS

PROJECT NO: 16025

DATE: JAN 2017

SHEET NO: 7

SUMMARY OF HYDROLOGY **2/2/2017**

BENJAMIN GROVE SUBDIVISION - PHASE 2

				25-Year					100-Year				
Element ID	Area (acres)	Drainage Node ID	Weighted Runoff Coefficient	Accumulated Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Rainfall Intensity (inches/hr)	Time of Concentration (days hh:mm:ss)	Accumulated Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Rainfall Intensity (inches/hr)	Time of Concentration (days hh:mm:ss)
1	0.06	CB-F4	0.9500	0.70	0.67	0.48	8.400	0 00:05:00	0.83	0.79	0.57	10.000	0 00:05:00
2	0.18	CB-F4	0.5200	2.29	1.19	0.42	4.390	0 00:31:18	2.90	1.51	0.53	5.560	0 00:31:18
3	0.20	CB-G1	0.9500	0.70	0.67	1.60	8.400	0 00:05:00	0.83	0.79	1.90	10.000	0 00:05:00
4	0.10	CB-F3	0.9500	0.70	0.67	0.81	8.400	0 00:05:00	0.83	0.79	0.96	10.000	0 00:05:00
5	0.13	CB-F3	0.5200	1.95	1.01	0.36	5.088	0 00:23:00	2.45	1.28	0.45	6.397	0 00:23:00
6	0.13	CB-F2	0.9500	0.70	0.67	1.02	8.400	0 00:05:00	0.83	0.79	1.22	10.000	0 00:05:00
8	0.36	CB-F2	0.9500	0.70	0.67	2.87	8.400	0 00:05:00	0.83	0.79	3.42	10.000	0 00:05:00
9	0.80	CB-F2	0.5200	2.31	1.20	1.80	4.339	0 00:31:55	2.93	1.52	2.28	5.496	0 00:31:55
10	0.11	CB-H1	0.9500	0.70	0.67	0.85	8.400	0 00:05:00	0.83	0.79	1.01	10.000	0 00:05:00
11	0.43	CB-H1	0.5200	2.22	1.16	1.02	4.545	0 00:29:21	2.81	1.46	1.29	5.754	0 00:29:21
12	0.10	CB-I1	0.9500	0.70	0.67	0.77	8.400	0 00:05:00	0.83	0.79	0.92	10.000	0 00:05:00
13	0.81	CB-I1	0.5200	2.46	1.28	1.68	3.970	0 00:37:09	3.12	1.62	2.12	5.029	0 00:37:09
14	0.11	CB-J1	0.9500	0.70	0.67	0.91	8.400	0 00:05:00	0.83	0.79	1.08	10.000	0 00:05:00
15	0.67	CB-J1	0.5200	2.60	1.35	1.29	3.672	0 00:42:28	3.29	1.71	1.63	4.651	0 00:42:28
17	0.35	CB-J1	0.5200	2.31	1.20	0.80	4.339	0 00:31:55	2.93	1.52	1.01	5.496	0 00:31:55
19	0.11	CB-H2	0.9500	0.70	0.67	0.89	8.400	0 00:05:00	0.83	0.79	1.05	10.000	0 00:05:00
25	0.05	CB-H2	0.5200	1.44	0.75	0.18	6.467	0 00:13:22	1.78	0.92	0.23	7.995	0 00:13:22
27	0.07	CB-H3	0.9500	0.70	0.67	0.52	8.400	0 00:05:00	0.83	0.79	0.62	10.000	0 00:05:00
28	0.19	CB-H5	0.9500	0.70	0.67	1.52	8.400	0 00:05:00	0.83	0.79	1.81	10.000	0 00:05:00
29	0.11	CB-H5	0.5200	1.50	0.78	0.35	6.332	0 00:14:10	1.85	0.96	0.44	7.846	0 00:14:10
30	0.13	CB-M1	0.9500	0.70	0.67	1.02	8.400	0 00:05:00	0.83	0.79	1.22	10.000	0 00:05:00
31	0.39	CB-M1	0.5200	1.99	1.04	1.00	4.982	0 00:24:04	2.51	1.30	1.26	6.272	0 00:24:04
35	0.97	FES - L1	0.5200	2.39	1.24	2.09	4.138	0 00:34:37	3.03	1.58	2.64	5.241	0 00:34:37
36	0.07	CB-H7	0.9500	0.70	0.67	0.53	8.400	0 00:05:00	0.83	0.79	0.63	10.000	0 00:05:00
37	0.09	CB-H8	0.9500	0.70	0.67	0.73	8.400	0 00:05:00	0.83	0.79	0.86	10.000	0 00:05:00
38	0.17	CB-H8	0.5200	1.83	0.95	0.47	5.397	0 00:20:15	2.29	1.19	0.59	6.760	0 00:20:15
39	0.02	FES-H9	0.9500	0.70	0.67	0.12	8.400	0 00:05:00	0.83	0.79	0.14	10.000	0 00:05:00
40	0.10	CB-K1	0.9500	0.70	0.67	0.80	8.400	0 00:05:00	0.83	0.79	0.95	10.000	0 00:05:00
41	0.20	CB-N1	0.9500	0.70	0.67	1.59	8.400	0 00:05:00	0.83	0.79	1.89	10.000	0 00:05:00
45	0.07	CB-H3	0.9500	0.70	0.67	0.54	8.400	0 00:05:00	0.83	0.79	0.64	10.000	0 00:05:00
48	0.09	CB-H2	0.9500	0.70	0.67	0.73	8.400	0 00:05:00	0.83	0.79	0.86	10.000	0 00:05:00
49	23.80	FES-F1	0.5000	3.86	1.93	22.15	1.861	0 02:04:19	5.06	2.53	29.05	2.441	0 02:04:19
50	14.60	_KBBARNES	0.5000	3.24	1.62	18.94	2.594	0 01:14:48	4.15	2.07	24.28	3.326	0 01:14:48

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Project Description

File Name	Benjamin Grove Phase 2 Drainage 25 year R5.SPF
Description	J:\Projects\2016 Projects\16025 Benjamin Grove Lee Pengelly\Calcs\Phase 2\Benjamin Grove Drainage map phase 2 r6.dwg

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Jan 24, 2017	00:00:00
End Analysis On	Jan 25, 2017	00:00:00
Start Reporting On	Jan 24, 2017	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	33
Nodes	27
Junctions	9
Outfalls	3
Flow Diversions	0
Inlets	15
Storage Nodes	0
Links	35
Channels	15
Pipes	20
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	25 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	{STORM PHASE 2}.1	0.06	0.9500	0.70	0.67	0.04	0.48	0 00:05:00
2	{STORM PHASE 2}.10	0.11	0.9500	0.70	0.67	0.07	0.85	0 00:05:00
3	{STORM PHASE 2}.11	0.43	0.5200	2.22	1.16	0.50	1.02	0 00:29:21
4	{STORM PHASE 2}.12	0.10	0.9500	0.70	0.67	0.06	0.77	0 00:05:00
5	{STORM PHASE 2}.13	0.81	0.5200	2.46	1.28	1.04	1.68	0 00:37:09
6	{STORM PHASE 2}.14	0.11	0.9500	0.70	0.67	0.08	0.91	0 00:05:00
7	{STORM PHASE 2}.15	0.67	0.5200	2.60	1.35	0.91	1.29	0 00:42:28
8	{STORM PHASE 2}.17	0.35	0.5200	2.31	1.20	0.43	0.80	0 00:31:55
9	{STORM PHASE 2}.19	0.11	0.9500	0.70	0.67	0.07	0.89	0 00:05:00
10	{STORM PHASE 2}.2	0.18	0.5200	2.29	1.19	0.22	0.42	0 00:31:18
11	{STORM PHASE 2}.25	0.05	0.5200	1.44	0.75	0.04	0.18	0 00:13:22
12	{STORM PHASE 2}.27	0.07	0.9500	0.70	0.67	0.04	0.52	0 00:05:00
13	{STORM PHASE 2}.28	0.19	0.9500	0.70	0.67	0.13	1.52	0 00:05:00
14	{STORM PHASE 2}.29	0.11	0.5200	1.50	0.78	0.08	0.35	0 00:14:10
15	{STORM PHASE 2}.3	0.20	0.9500	0.70	0.67	0.13	1.60	0 00:05:00
16	{STORM PHASE 2}.30	0.13	0.9500	0.70	0.67	0.09	1.02	0 00:05:00
17	{STORM PHASE 2}.31	0.39	0.5200	1.99	1.04	0.40	1.00	0 00:24:04
18	{STORM PHASE 2}.35	0.97	0.5200	2.39	1.24	1.20	2.09	0 00:34:37
19	{STORM PHASE 2}.36	0.07	0.9500	0.70	0.67	0.04	0.53	0 00:05:00
20	{STORM PHASE 2}.37	0.09	0.9500	0.70	0.67	0.06	0.73	0 00:05:00
21	{STORM PHASE 2}.38	0.17	0.5200	1.83	0.95	0.16	0.47	0 00:20:15
22	{STORM PHASE 2}.39	0.02	0.9500	0.70	0.67	0.01	0.12	0 00:05:00
23	{STORM PHASE 2}.4	0.10	0.9500	0.70	0.67	0.07	0.81	0 00:05:00
24	{STORM PHASE 2}.40	0.10	0.9500	0.70	0.67	0.07	0.80	0 00:05:00
25	{STORM PHASE 2}.41	0.20	0.9500	0.70	0.67	0.13	1.59	0 00:05:00
26	{STORM PHASE 2}.45	0.07	0.9500	0.70	0.67	0.04	0.54	0 00:05:00
27	{STORM PHASE 2}.48	0.09	0.9500	0.70	0.67	0.06	0.73	0 00:05:00
28	{STORM PHASE 2}.5	0.13	0.5200	1.95	1.01	0.14	0.36	0 00:23:00
29	{STORM PHASE 2}.6	0.13	0.9500	0.70	0.67	0.09	1.02	0 00:05:00
30	{STORM PHASE 2}.8	0.36	0.9500	0.70	0.67	0.24	2.87	0 00:05:00
31	{STORM PHASE 2}.9	0.80	0.5200	2.31	1.20	0.96	1.80	0 00:31:55
32	49	23.80	0.5000	3.86	1.93	45.89	22.15	0 02:04:19
33	50	14.60	0.5000	3.24	1.62	23.62	18.94	0 01:14:48

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.FES - L1	Junction	447.00	450.00	447.00	450.00	0.00	2.08	447.42	0.00	2.58	0 00:00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	Junction	443.25	445.00	443.25	445.00	0.00	21.98	444.47	0.00	0.78	0 00:00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	Junction	443.00	445.00	443.00	445.00	0.00	21.98	444.37	0.00	0.65	0 00:00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	Junction	451.28	455.85	451.28	455.85	0.00	5.44	451.96	0.00	3.89	0 00:00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	Junction	445.40	449.19	445.40	449.19	0.00	8.97	446.38	0.00	2.81	0 00:00	0.00	0.00
6	FES-F1	Junction	448.75	457.43	448.75	457.43	0.00	22.15	449.97	0.00	7.45	0 00:00	0.00	0.00
7	FES-P1_KBBARNES	Junction	433.25	435.00	433.25	435.00	0.00	30.41	434.61	0.00	0.64	0 00:00	0.00	0.00
8	FES-P2_KBBARNES	Junction	433.00	435.00	433.00	435.00	0.00	30.40	434.28	0.00	0.72	0 00:00	0.00	0.00
9	StartNullStruct41	Junction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00:00	0.00	0.00
10	{STORM BJ2-1}.FES-H9	Outfall	439.50					11.39	443.32					
11	GUTTER-OUT1	Outfall	440.00					0.07	443.86					
12	KBBARNES-OUT1	Outfall	431.98					30.23	432.84					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)
1	{STORM BJ2-1}.PIPE - H7	Pipe	{STORM BJ2-1}.CB-H7	CB-H8	180.51	444.90	440.35	2.5200	18.000	0.0130	9.37	16.68	0.56	9.76	0.80
2	{STORM BJ2-1}.PIPE - H8	Pipe	CB-H8	{STORM BJ2-1}.FES-H9	31.04	440.25	439.50	2.4200	18.000	0.0130	11.29	16.33	0.69	9.97	0.92
3	{STORM BJ2-1}.PIPE - L1	Pipe	{STORM BJ2-1}.FES - L1	{STORM BJ2-1}.JB-H6	84.01	447.00	445.50	1.7900	18.000	0.0150	2.08	12.16	0.17	5.14	0.42
4	{STORM BJ2-1}.PIPE - M1	Pipe	{STORM BJ2-1}.CB-M1	{STORM BJ2-1}.JB-H6	48.34	446.66	445.50	2.4000	18.000	0.0130	1.33	16.27	0.08	5.56	0.29
5	{STORM BJ2-1}.PIPE - N1	Pipe	{STORM BJ2-1}.CB-N1	CB-H8	32.00	440.80	440.35	1.4100	18.000	0.0130	1.50	12.46	0.12	4.76	0.35
6	{STORM BJ2-1}.PIPE F1	Pipe	{STORM BJ2-1}.CB-F2	FES-F1	99.06	449.34	448.75	0.6000	18.000	0.0130	6.61	8.11	0.82	5.16	1.03
7	{STORM BJ2-1}.PIPE F2	Pipe	CB-F3	{STORM BJ2-1}.CB-F2	250.16	456.00	449.44	2.6200	18.000	0.0130	2.51	17.01	0.15	6.97	0.39
8	{STORM BJ2-1}.PIPE G1	Pipe	{STORM BJ2-1}.CB-G1	CB-F3	32.00	456.60	456.10	1.5600	18.000	0.0130	1.38	13.13	0.11	5.57	0.33
9	{STORM BJ2-1}.PIPE H5	Pipe	{STORM BJ2-1}.CB-H5	{STORM BJ2-1}.JB-H6	183.29	449.00	445.50	1.9100	18.000	0.0130	7.38	14.52	0.51	8.30	0.76
10	{STORM BJ2-1}.PIPE -H6	Pipe	{STORM BJ2-1}.JB-H6	{STORM BJ2-1}.CB-H7	31.79	445.40	445.00	1.2600	18.000	0.0130	8.97	11.78	0.76	7.34	0.98
11	{STORM BJ2-1}.PIPE_F3	Pipe	{STORM BJ2-1}.CB-F4	CB-F3	199.59	460.23	456.10	2.0700	18.000	0.0130	0.47	15.11	0.03	4.23	0.18
12	{STORM BJ2-1}.PIPE-H1	Pipe	{STORM BJ2-1}.CB-H1	{STORM BJ2-1}.CB-H2	32.00	458.25	457.75	1.5600	18.000	0.0130	1.00	13.13	0.08	4.39	0.28
13	{STORM BJ2-1}.PIPE-H2	Pipe	{STORM BJ2-1}.CB-H2	CB-H3	191.94	457.65	455.90	0.9100	18.000	0.0130	2.37	10.03	0.24	4.74	0.49
14	{STORM BJ2-1}.PIPE-H3	Pipe	CB-H3	{STORM BJ2-1}.JB-H4	260.88	455.80	451.38	1.6900	18.000	0.0130	4.34	13.67	0.32	6.96	0.58
15	{STORM BJ2-1}.PIPE-H4	Pipe	{STORM BJ2-1}.JB-H4	{STORM BJ2-1}.CB-H5	96.77	451.28	449.10	2.2500	18.000	0.0130	5.44	15.77	0.35	8.11	0.61
16	{STORM BJ2-1}.PIPE-I1	Pipe	{STORM BJ2-1}.CB-I1	CB-H3	32.00	456.40	455.90	1.5600	18.000	0.0130	1.46	13.13	0.11	4.90	0.34
17	{STORM BJ2-1}.PIPE-J1	Pipe	{STORM BJ2-1}.CB-J1	{STORM BJ2-1}.JB-H4	48.34	451.75	451.38	0.7700	18.000	0.0130	2.01	9.19	0.22	4.17	0.48
18	{STORM BJ2-1}.PIPE-K1	Pipe	{STORM BJ2-1}.CB-K1	{STORM BJ2-1}.CB-H5	32.00	449.60	449.10	1.5600	18.000	0.0130	0.79	13.13	0.06	4.80	0.25
19	{STORM BJ2-1}.PIPE-O1	Pipe	{STORM BJ2-1}.FES-O1 LULU	{STORM BJ2-1}.FES-O2_LULU	29.87	443.15	443.02	0.4400	24.000	0.0150	21.98	34.48	0.64	5.81	1.16
20	{STORM BJ2-1}.PIPE-P1	Pipe	FES-P1_KBBARNES	FES-P2_KBBARNES	22.81	433.25	433.00	1.1000	24.000	0.0150	30.40	41.06	0.74	7.15	1.28
21	BYPASS_K1	Channel	{STORM BJ2-1}.CB-K1	{STORM BJ2-1}.CB-N1	395.48	453.99	444.81	2.3200	6.000	0.0130	0.00	20.05	0.00	3.15	0.02
22	BYPASS_N1	Channel	{STORM BJ2-1}.CB-N1	GUTTER-OUT1	29.94	444.81	443.80	3.3700	6.000	0.0130	0.07	18.75	0.00	4.09	0.06
23	DITCH-01	Channel	FES-F1	{STORM BJ2-1}.FES-O1 LULU	424.00	448.75	443.02	1.3500	24.000	0.0800	21.98	62.45	0.35	1.83	1.22
24	DITCH-02	Channel	{STORM BJ2-1}.FES-O2_LULU	FES-P1_KBBARNES	970.00	443.00	433.25	1.0100	24.000	0.0800	21.71	47.45	0.46	1.77	1.36
25	DITCH-03	Channel	FES-P2_KBBARNES	KBBARNES-OUT1	262.00	433.00	431.98	0.3900	24.000	0.0320	30.23	289.59	0.10	1.65	0.86
26	GUTTER_F2	Channel	CB-F3	{STORM BJ2-1}.CB-F2	250.05	461.10	453.34	3.1000	6.000	0.0130	0.15	18.90	0.01	2.82	0.08
27	GUTTER_F3	Channel	{STORM BJ2-1}.CB-F4	CB-F3	199.54	465.23	461.10	2.0700	6.000	0.0130	0.04	21.08	0.00	2.30	0.05
28	GUTTER_G1	Channel	{STORM BJ2-1}.CB-G1	{STORM BJ2-1}.CB-F2	245.65	460.52	453.34	2.9200	6.000	0.0130	0.15	19.52	0.01	5.89	0.08
29	GUTTER_H2	Channel	{STORM BJ2-1}.CB-H2	CB-H3	191.92	462.65	459.83	1.4700	6.000	0.0130	0.17	12.23	0.01	4.28	0.10
30	GUTTER_H7	Channel	{STORM BJ2-1}.CB-H7	CB-H8	180.42	450.00	445.14	2.6900	6.000	0.0130	0.00	20.34	0.00	0.00	0.00
31	GUTTER_H8	Channel	CB-H8	{STORM BJ2-1}.FES-H9	31.05	445.14	443.30	5.9300	6.000	0.0130	0.01	25.22	0.00	1.26	0.02
32	GUTTER_I1	Channel	{STORM BJ2-1}.CB-H1	{STORM BJ2-1}.CB-I1	191.92	462.65	461.09	0.8100	6.000	0.0130	0.02	14.64	0.00	3.28	0.04
33	GUTTER-H3	Channel	CB-H3	{STORM BJ2-1}.CB-H5	260.86	459.83	454.37	2.0900	6.000	0.0130	0.02	19.15	0.00	3.97	0.03
34	GUTTER-H5	Channel	{STORM BJ2-1}.CB-H5	{STORM BJ2-1}.CB-M1	155.79	454.37	451.66	1.7400	6.000	0.0130	0.17	18.59	0.01	4.74	0.08
35	GUTTER-J1	Channel	{STORM BJ2-1}.CB-I1	{STORM BJ2-1}.CB-J1	224.65	461.09	457.58	1.5600	6.000	0.0130	0.21	16.02	0.01	2.96	0.10

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
0.54	0.00	Calculated
0.61	0.00	Calculated
0.28	0.00	Calculated
0.19	0.00	Calculated
0.23	0.00	Calculated
0.69	0.00	Calculated
0.26	0.00	Calculated
0.22	0.00	Calculated
0.50	0.00	Calculated
0.65	0.00	Calculated
0.12	0.00	Calculated
0.19	0.00	Calculated
0.33	0.00	Calculated
0.39	0.00	Calculated
0.41	0.00	Calculated
0.23	0.00	Calculated
0.32	0.00	Calculated
0.17	0.00	Calculated
0.58	0.00	Calculated
0.64	0.00	Calculated
0.03	0.00	
0.12	0.00	
0.61	0.00	
0.68	0.00	
0.43	0.00	
0.16	0.00	
0.09	0.00	
0.15	0.00	
0.19	0.00	
0.00	0.00	
0.04	0.00	
0.08	0.00	
0.06	0.00	
0.17	0.00	
0.20	0.00	

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	{STORM BJ2-1}.CB-F2	FHWA HEC-22 GENERIC	N/A	On Sag	1	449.34	454.86	449.34	0.00	4.27	N/A	N/A	N/A	12.00	12.06	455.36
2	{STORM BJ2-1}.CB-F4	FHWA HEC-22 GENERIC	N/A	On Grade	1	460.23	464.52	460.23	N/A	0.55	0.49	0.06	89.33	12.00	4.15	464.66
3	{STORM BJ2-1}.CB-G1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.60	459.94	456.60	N/A	1.60	1.39	0.21	86.83	12.00	7.00	460.15
4	{STORM BJ2-1}.CB-H1	FHWA HEC-22 GENERIC	N/A	On Grade	1	458.25	461.79	458.25	N/A	1.02	1.00	0.02	97.73	12.00	5.74	461.97
5	{STORM BJ2-1}.CB-H2	FHWA HEC-22 GENERIC	N/A	On Grade	1	457.65	461.12	457.65	N/A	1.68	1.43	0.25	85.20	12.00	7.15	461.33
6	{STORM BJ2-1}.CB-H5	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.00	452.86	449.00	N/A	1.64	1.42	0.22	86.48	12.00	7.16	453.07
7	{STORM BJ2-1}.CB-H7	FHWA HEC-22 GENERIC	N/A	On Grade	1	444.90	448.42	444.90	N/A	0.53	0.53	0.00	100.00	12.00	4.25	448.59
8	{STORM BJ2-1}.CB-I1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.40	459.56	456.40	N/A	1.69	1.46	0.22	86.75	12.00	7.42	459.77
9	{STORM BJ2-1}.CB-J1	FHWA HEC-22 GENERIC	N/A	On Sag	1	451.75	456.44	451.75	0.00	2.01	N/A	N/A	N/A	12.00	8.40	456.83
10	{STORM BJ2-1}.CB-K1	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.60	452.99	449.60	N/A	0.80	0.79	0.01	99.28	12.00	4.43	453.17
11	{STORM BJ2-1}.CB-M1	FHWA HEC-22 GENERIC	N/A	On Sag	1	446.66	449.94	446.66	0.00	1.33	N/A	N/A	N/A	12.00	6.27	450.30
12	{STORM BJ2-1}.CB-N1	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.80	444.37	440.80	N/A	1.59	1.51	0.08	94.98	12.00	7.72	444.61
13	CB-F3	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.00	459.71	456.00	N/A	0.90	0.71	0.19	78.85	12.00	4.74	459.89
14	CB-H3	FHWA HEC-22 GENERIC	N/A	On Grade	1	455.80	459.56	455.80	N/A	1.10	1.07	0.03	97.54	12.00	5.59	459.76
15	CB-H8	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.25	444.37	440.25	N/A	0.84	0.83	0.01	99.22	12.00	4.59	444.55

Subbasin Hydrology

Subbasin : {STORM PHASE 2}.1

Input Data

Area (ac) 0.06
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.06	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.06		0.95

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	193	0.00	0.00
Slope (%) :	1.2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.23	0.00	0.00
Computed Flow Time (min) :	1.44	0.00	0.00

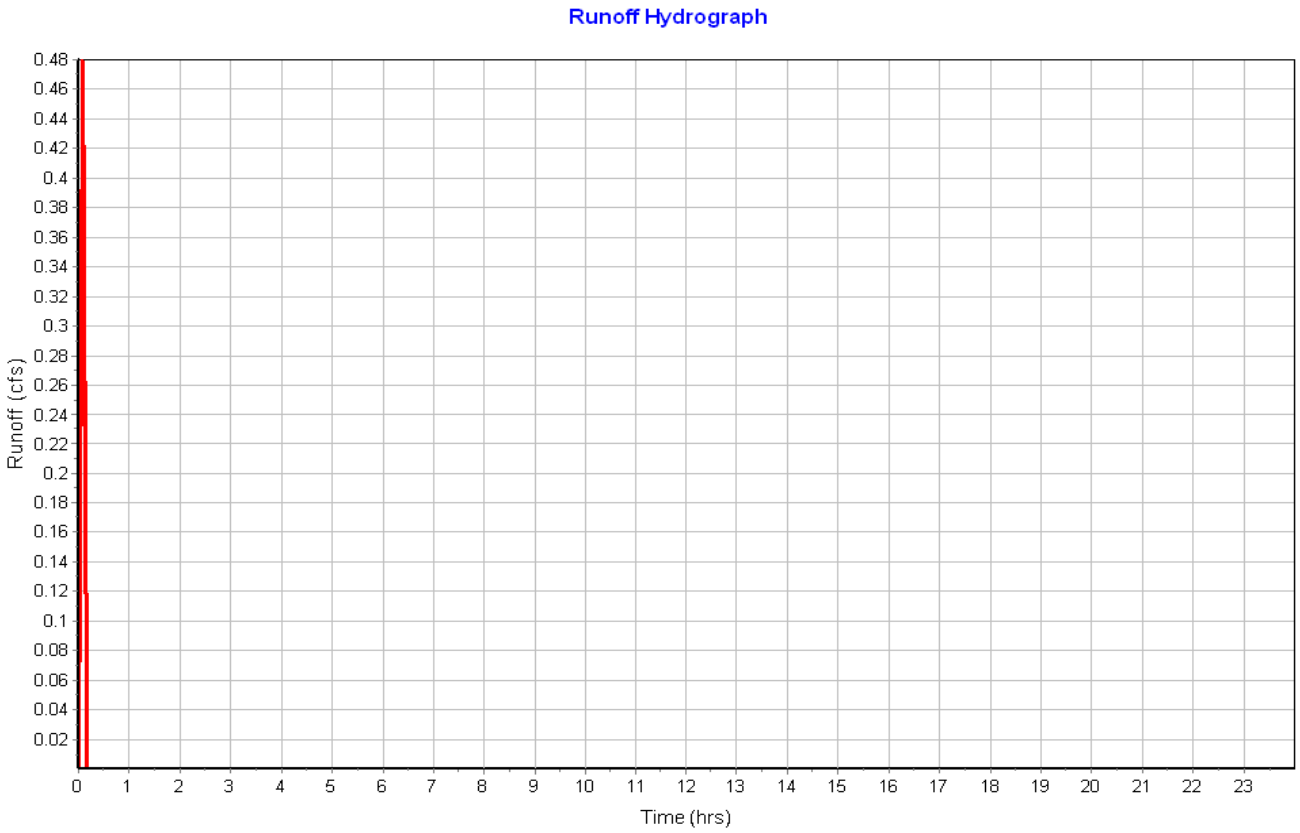
Total TOC (min) 1.70

Subbasin Runoff Results

Total Rainfall (in)	0.70
Total Runoff (in)	0.67
Peak Runoff (cfs)	0.48
Rainfall Intensity	8.400
Weighted Runoff Coefficient	0.9500
Time of Concentration (days hh:mm:ss)	0 00:01:42

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.1



Subbasin : {STORM PHASE 2}.10

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	209	0.00	0.00
Slope (%) :	0.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.91	0.00	0.00
Computed Flow Time (min) :	3.83	0.00	0.00

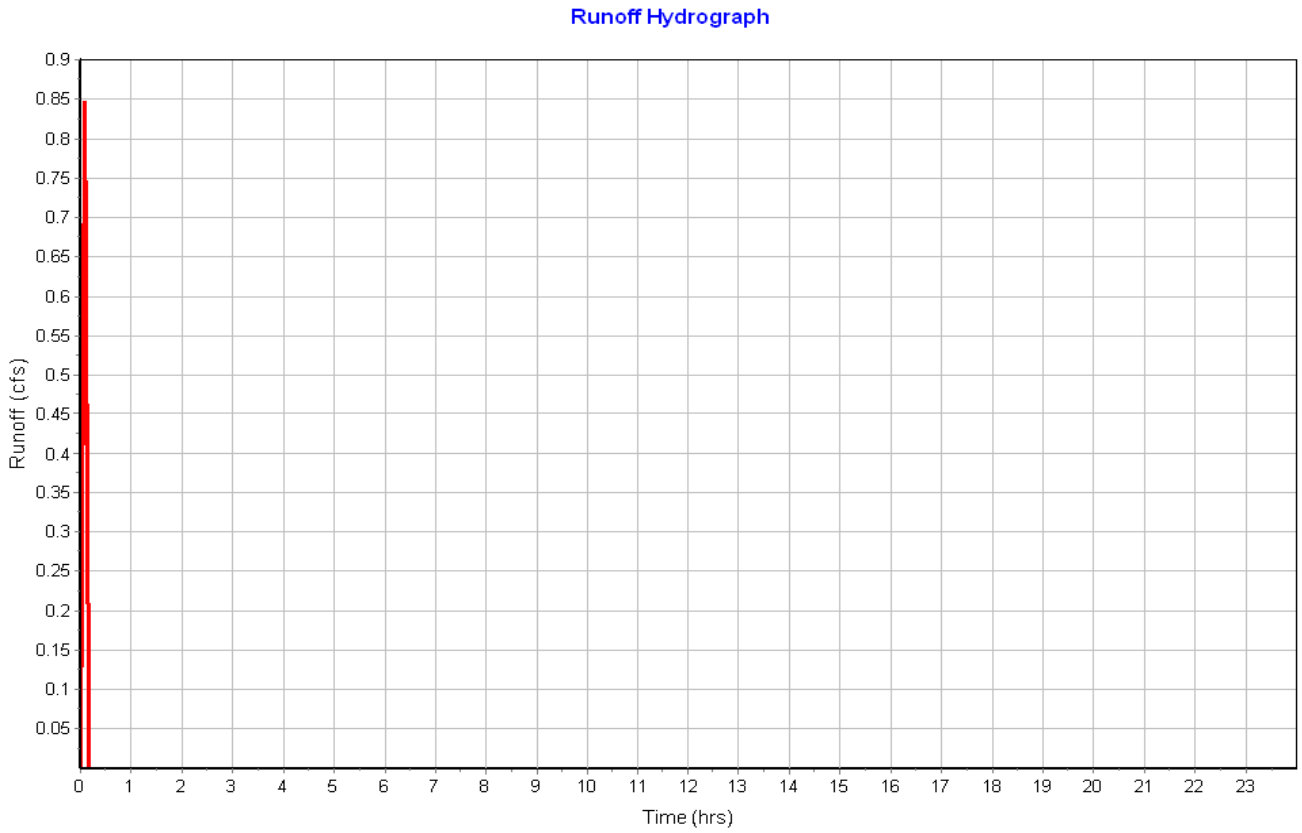
Total TOC (min) 3.83

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.85
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:50

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.10



Subbasin : {STORM PHASE 2}.11

Input Data

Area (ac) 0.43
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.43	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.43		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	233	0.00	0.00
Slope (%) :	1.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	29.36	0.00	0.00

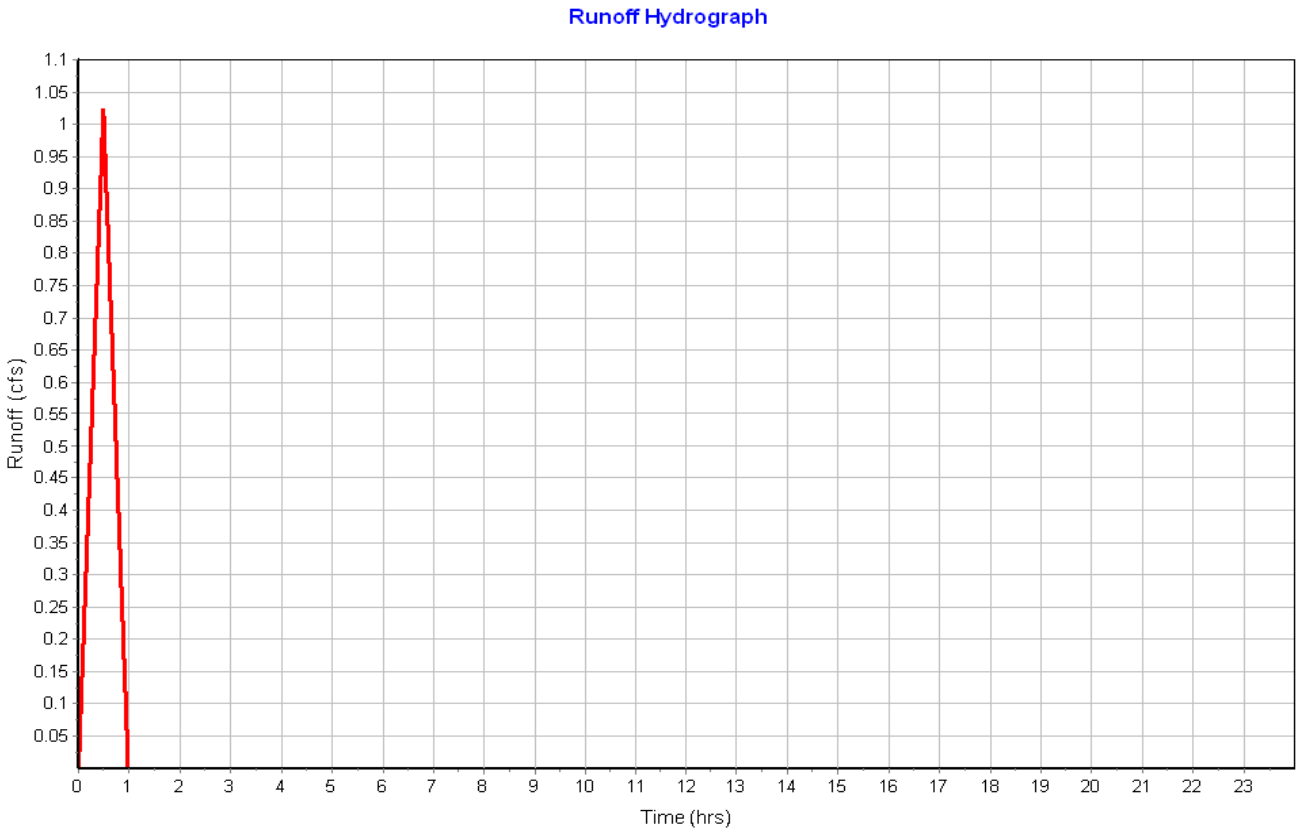
Total TOC (min) 29.36

Subbasin Runoff Results

Total Rainfall (in) 2.22
Total Runoff (in) 1.16
Peak Runoff (cfs) 1.02
Rainfall Intensity 4.545
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:29:22

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.11



Subbasin : {STORM PHASE 2}.12

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	183	0.00	0.00
Slope (%) :	1.2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.26	0.00	0.00
Computed Flow Time (min) :	2.43	0.00	0.00

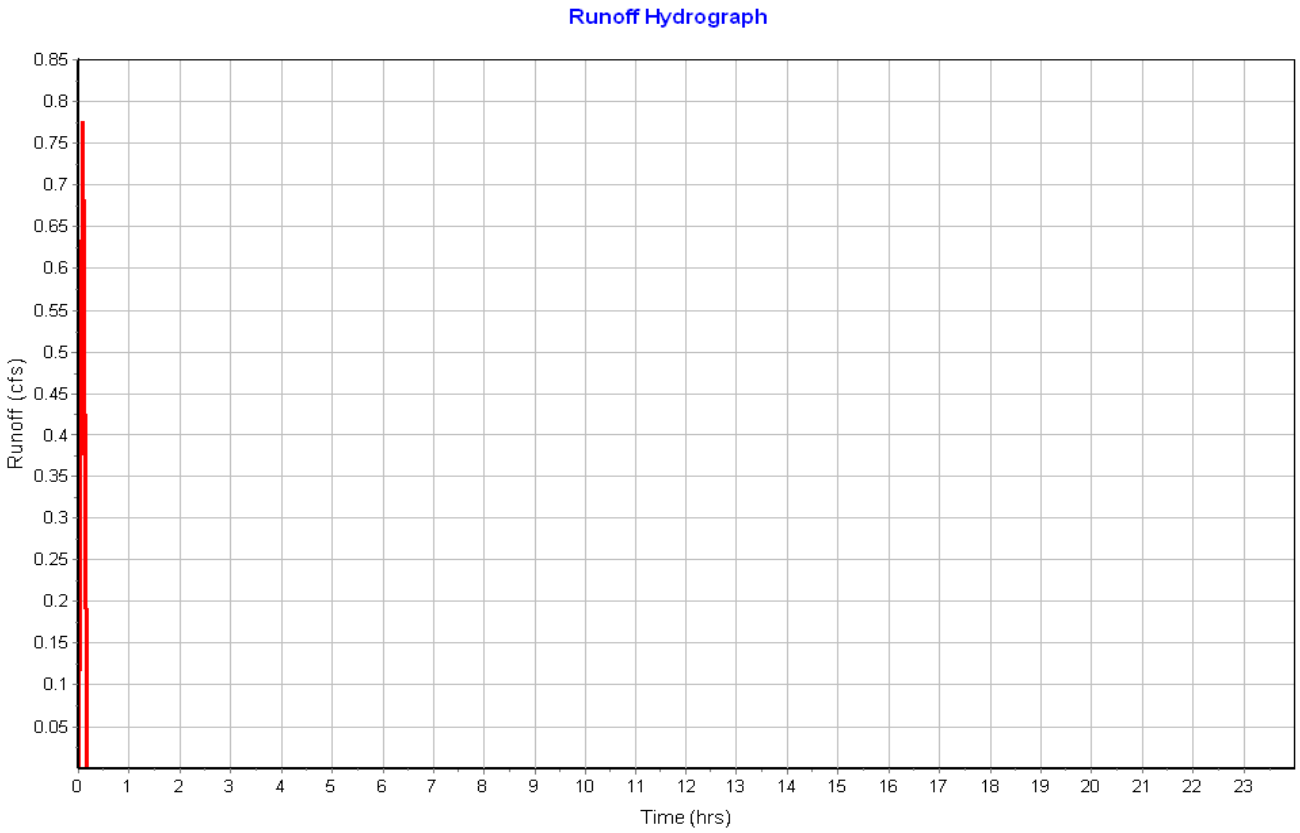
Total TOC (min) 2.43

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.77
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:26

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.12



Subbasin : {STORM PHASE 2}.13

Input Data

Area (ac) 0.81
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.81	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.81		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	336	0.00	0.00
Slope (%) :	1.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	37.16	0.00	0.00

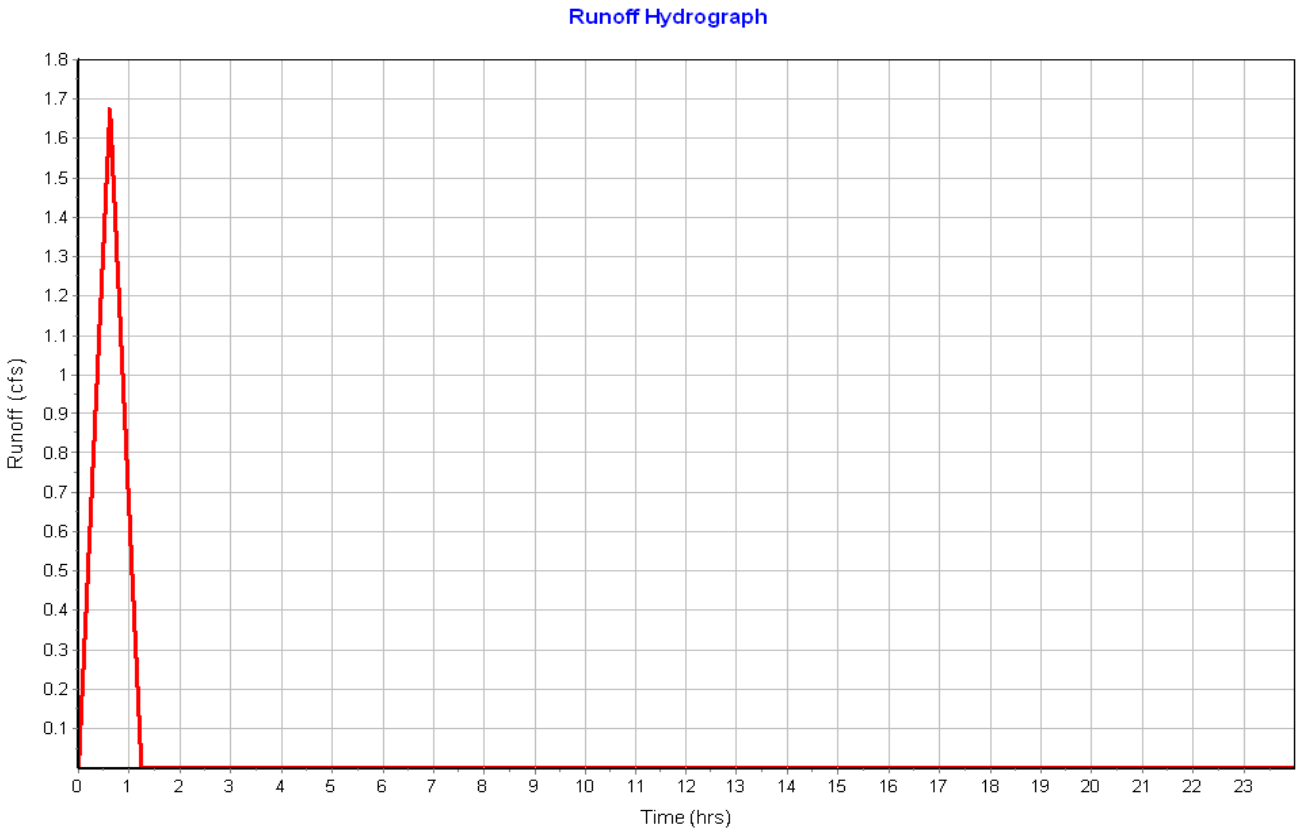
Total TOC (min) 37.16

Subbasin Runoff Results

Total Rainfall (in) 2.46
Total Runoff (in) 1.28
Peak Runoff (cfs) 1.68
Rainfall Intensity 3.970
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:37:10

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.13



Subbasin : {STORM PHASE 2}.14

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	1.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.32	0.00	0.00
Computed Flow Time (min) :	2.52	0.00	0.00

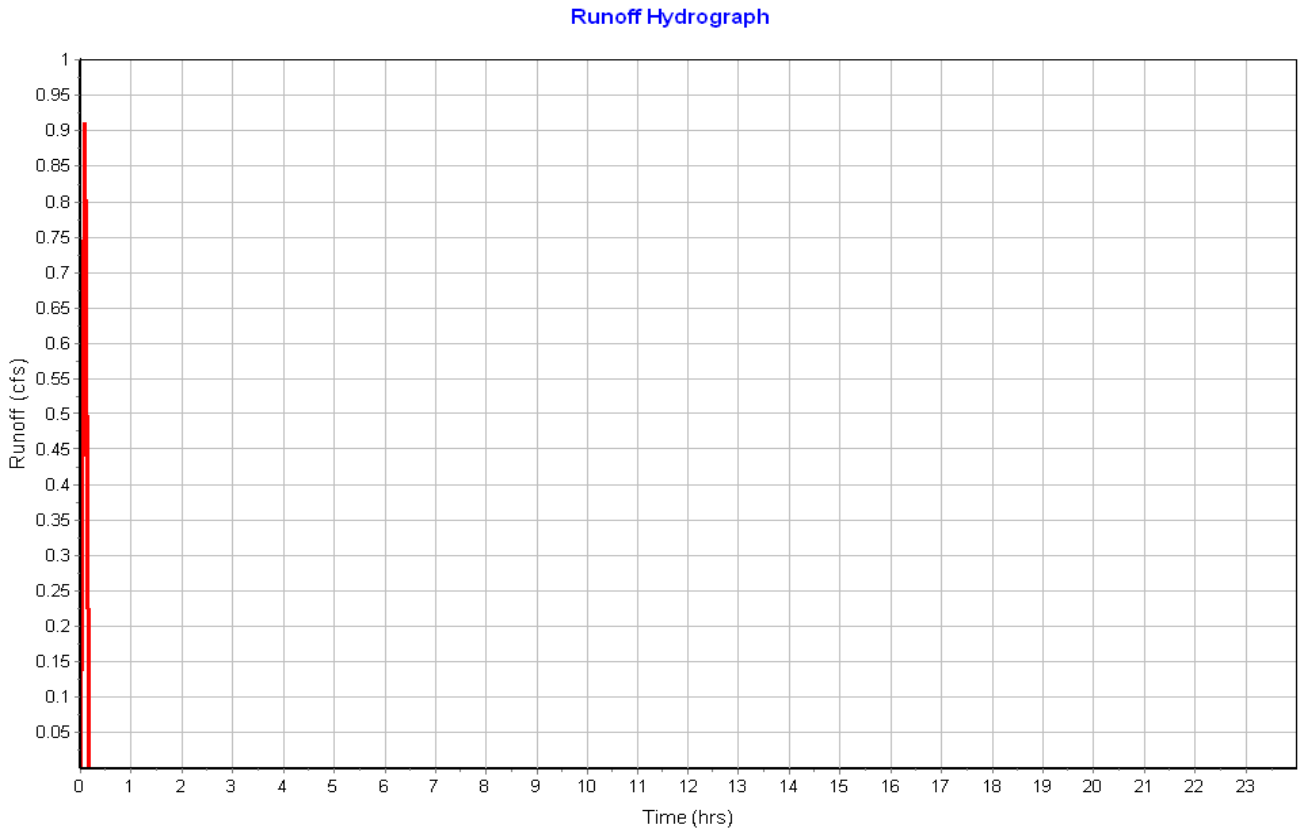
Total TOC (min) 2.52

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.91
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:31

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.14



Subbasin : {STORM PHASE 2}.15

Input Data

Area (ac) 0.67
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.67	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.67		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	447	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	42.48	0.00	0.00

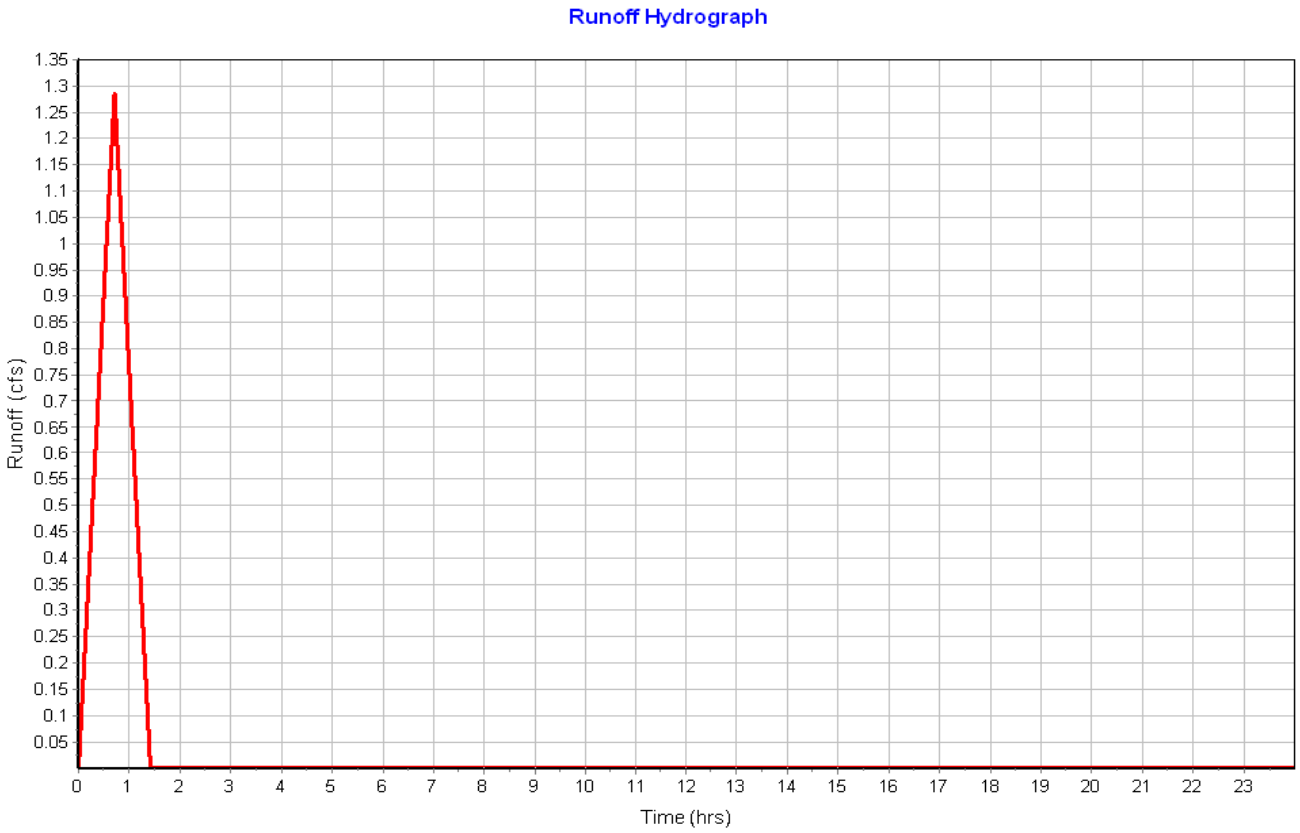
Total TOC (min) 42.48

Subbasin Runoff Results

Total Rainfall (in) 2.60
Total Runoff (in) 1.35
Peak Runoff (cfs) 1.29
Rainfall Intensity 3.672
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:42:29

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.15



Subbasin : {STORM PHASE 2}.17

Input Data

Area (ac) 0.35
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.35	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.35		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	321	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	31.93	0.00	0.00

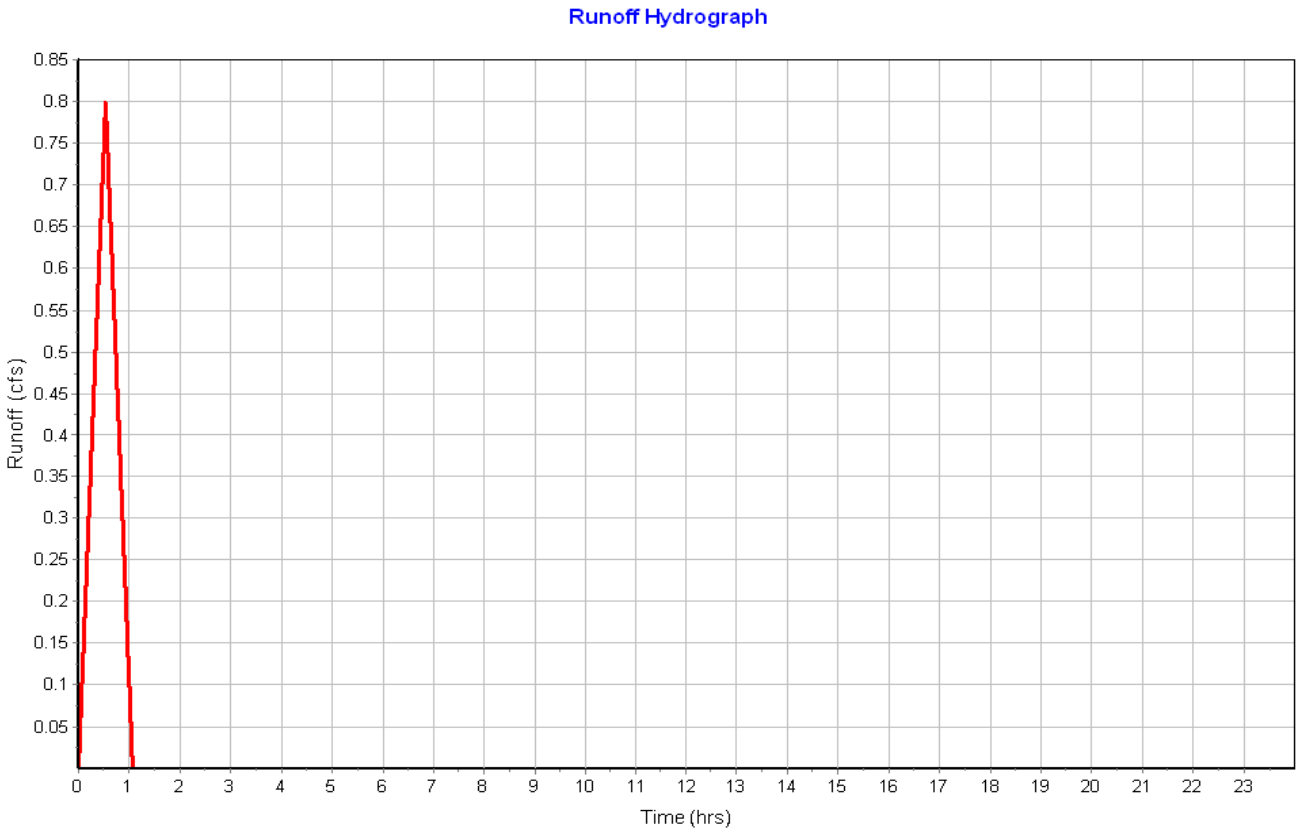
Total TOC (min) 31.93

Subbasin Runoff Results

Total Rainfall (in) 2.31
Total Runoff (in) 1.20
Peak Runoff (cfs) 0.80
Rainfall Intensity 4.339
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:56

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.17



Subbasin : {STORM PHASE 2}.19

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	217	0.00	0.00
Slope (%) :	0.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	3.94	0.00	0.00

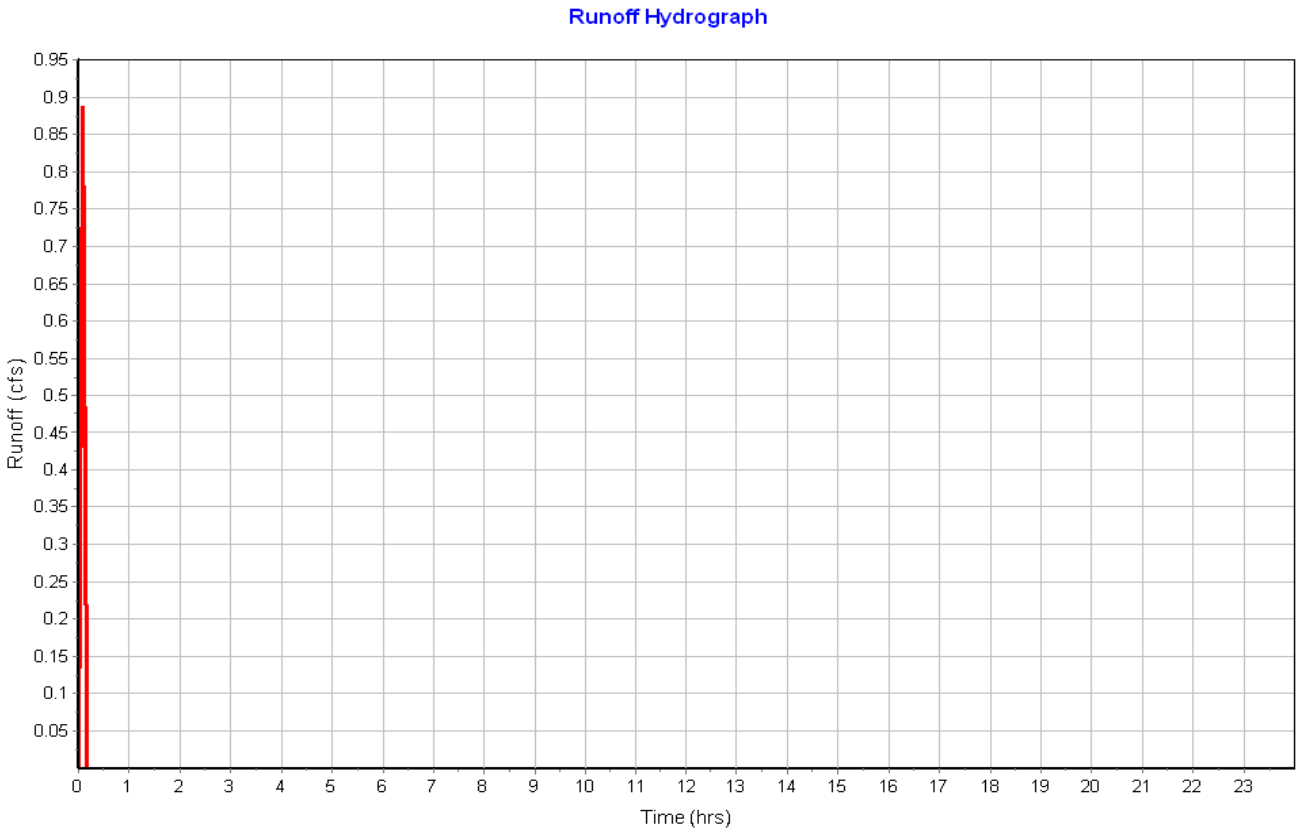
Total TOC (min) 3.94

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.89
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:56

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.19



Subbasin : {STORM PHASE 2}.2

Input Data

Area (ac) 0.18
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.18	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.18		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	198	0.00	0.00
Slope (%) :	0.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.11	0.00	0.00
Computed Flow Time (min) :	31.30	0.00	0.00

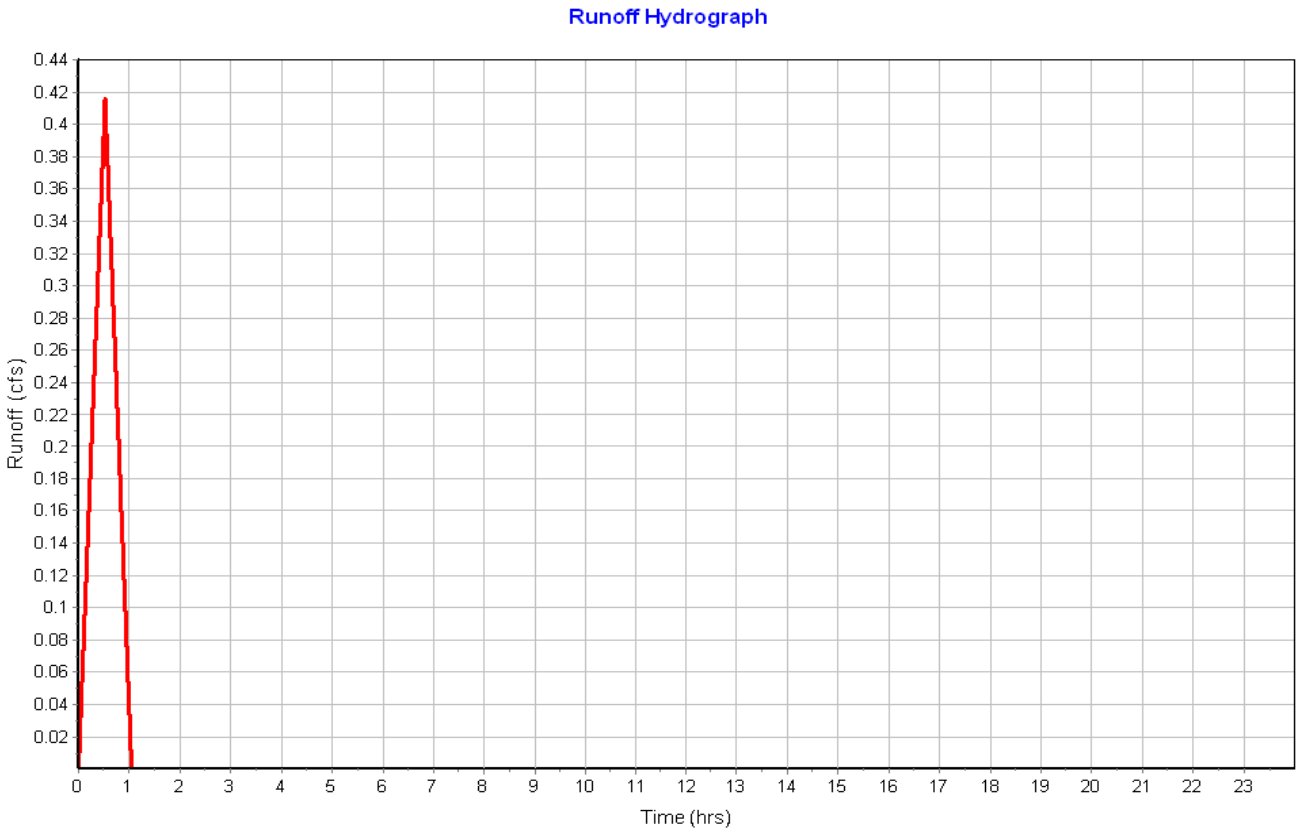
Total TOC (min) 31.30

Subbasin Runoff Results

Total Rainfall (in) 2.29
Total Runoff (in) 1.19
Peak Runoff (cfs) 0.42
Rainfall Intensity 4.390
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:18

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.2



Subbasin : {STORM PHASE 2}.25

Input Data

Area (ac) 0.05
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.05	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.05		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	121	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	13.38	0.00	0.00

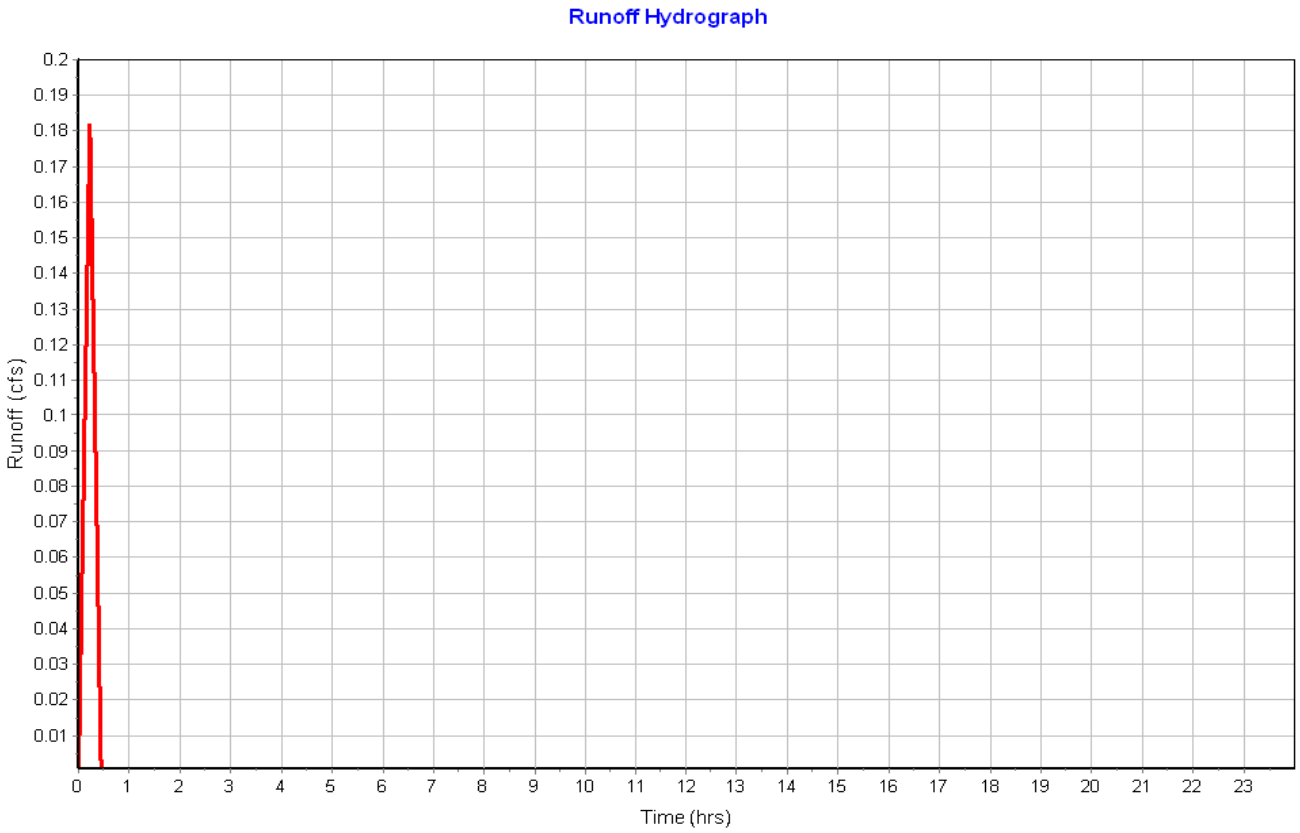
Total TOC (min) 13.38

Subbasin Runoff Results

Total Rainfall (in) 1.44
Total Runoff (in) 0.75
Peak Runoff (cfs) 0.18
Rainfall Intensity 6.467
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:13:23

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.25



Subbasin : {STORM PHASE 2}.27

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	133	0.00	0.00
Slope (%) :	1.7	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.36	0.00	0.00
Computed Flow Time (min) :	1.63	0.00	0.00

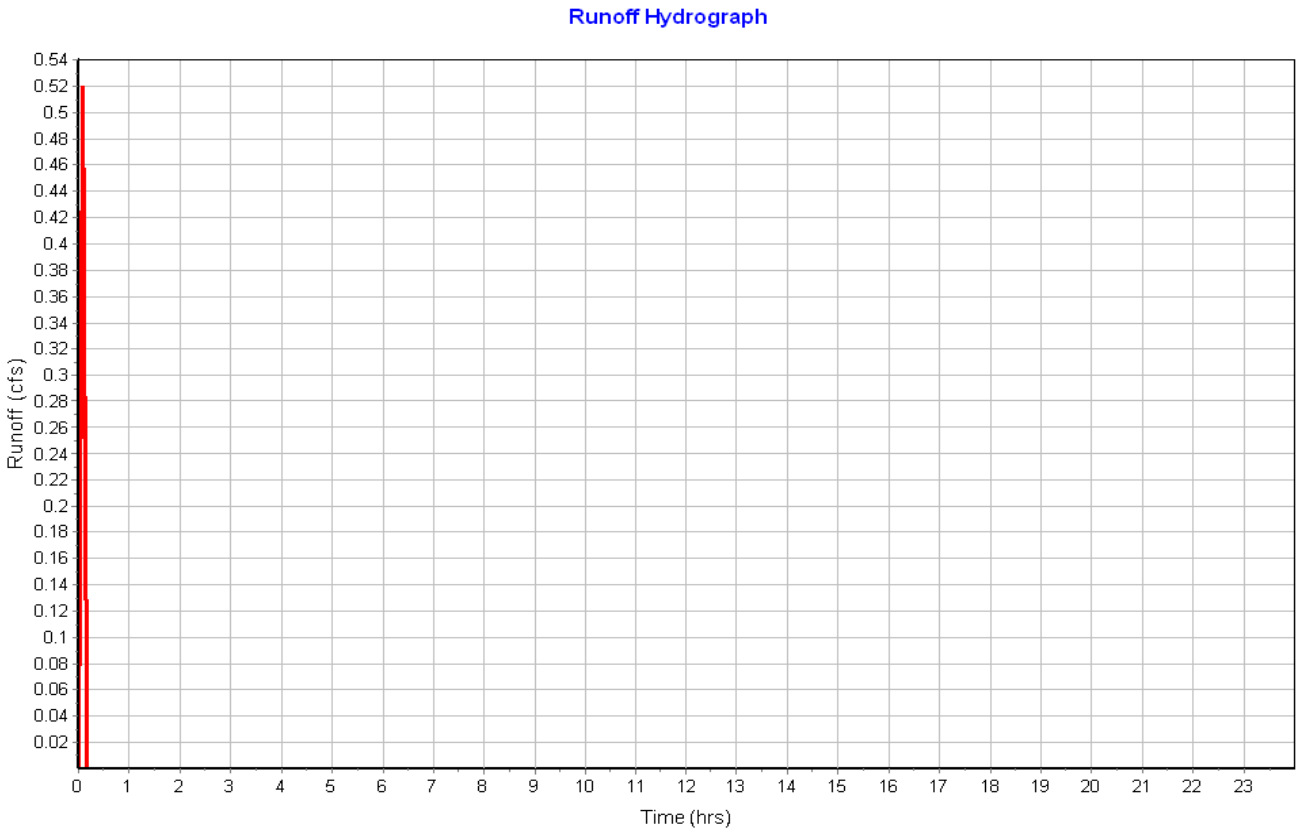
Total TOC (min) 1.63

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.52
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:38

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.27



Subbasin : {STORM PHASE 2}.28

Input Data

Area (ac) 0.19
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.19	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.19		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	351	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.76	0.00	0.00
Computed Flow Time (min) :	3.33	0.00	0.00

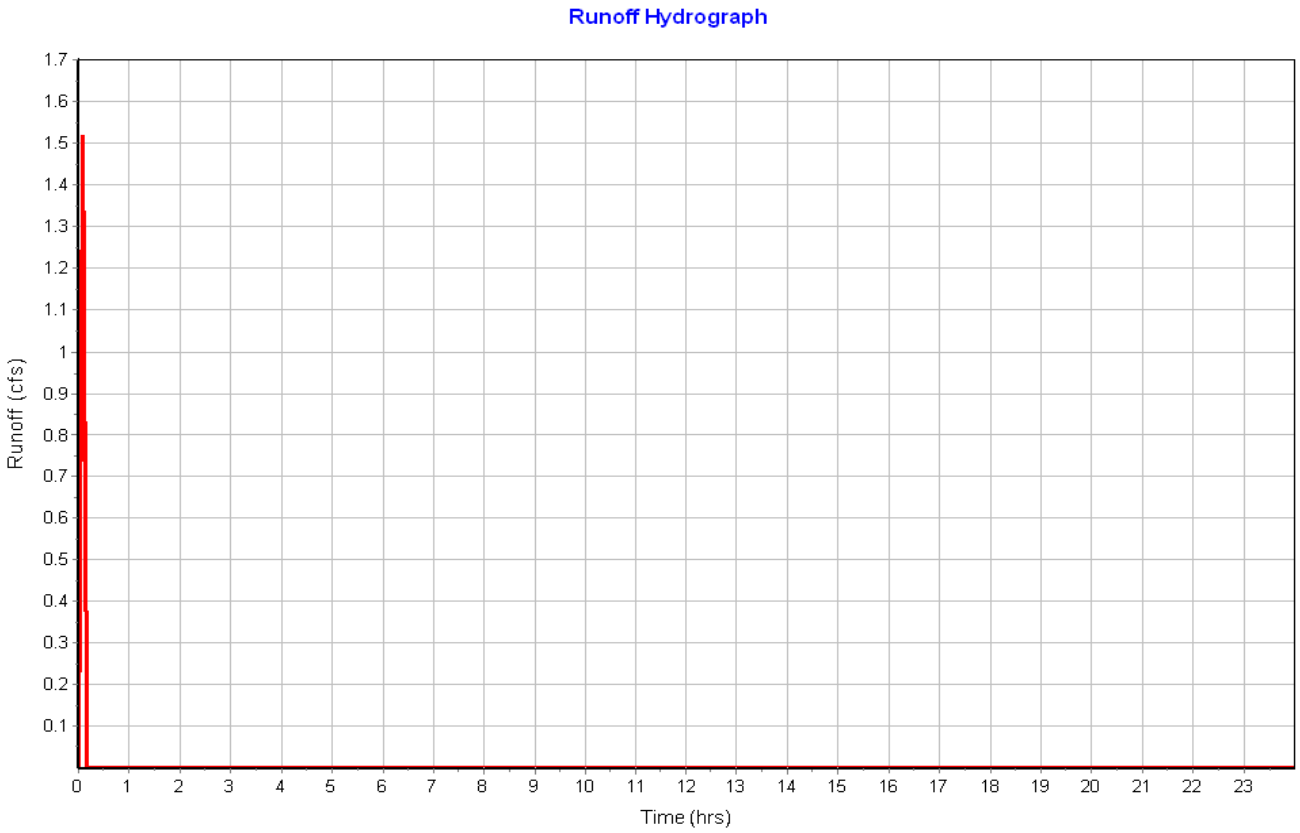
Total TOC (min) 3.33

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.52
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:20

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.28



Subbasin : {STORM PHASE 2}.29

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.11	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.11		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	130	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	14.17	0.00	0.00

Total TOC (min) 14.17

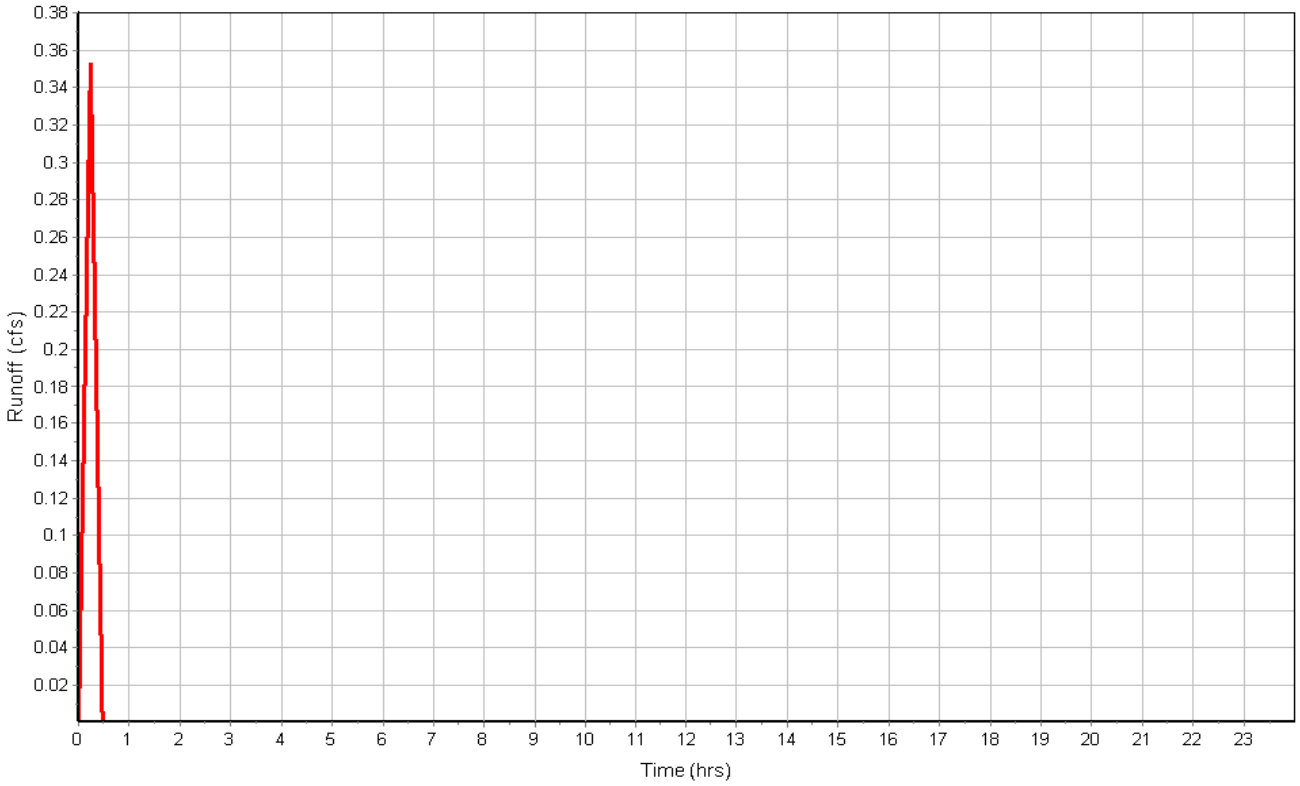
Subbasin Runoff Results

Total Rainfall (in) 1.50
Total Runoff (in) 0.78
Peak Runoff (cfs) 0.35
Rainfall Intensity 6.332
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:14:10

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.29

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.3

Input Data

Area (ac) 0.20
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.20	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.20		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	393	0.00	0.00
Slope (%) :	1.9	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.80	0.00	0.00
Computed Flow Time (min) :	2.34	0.00	0.00

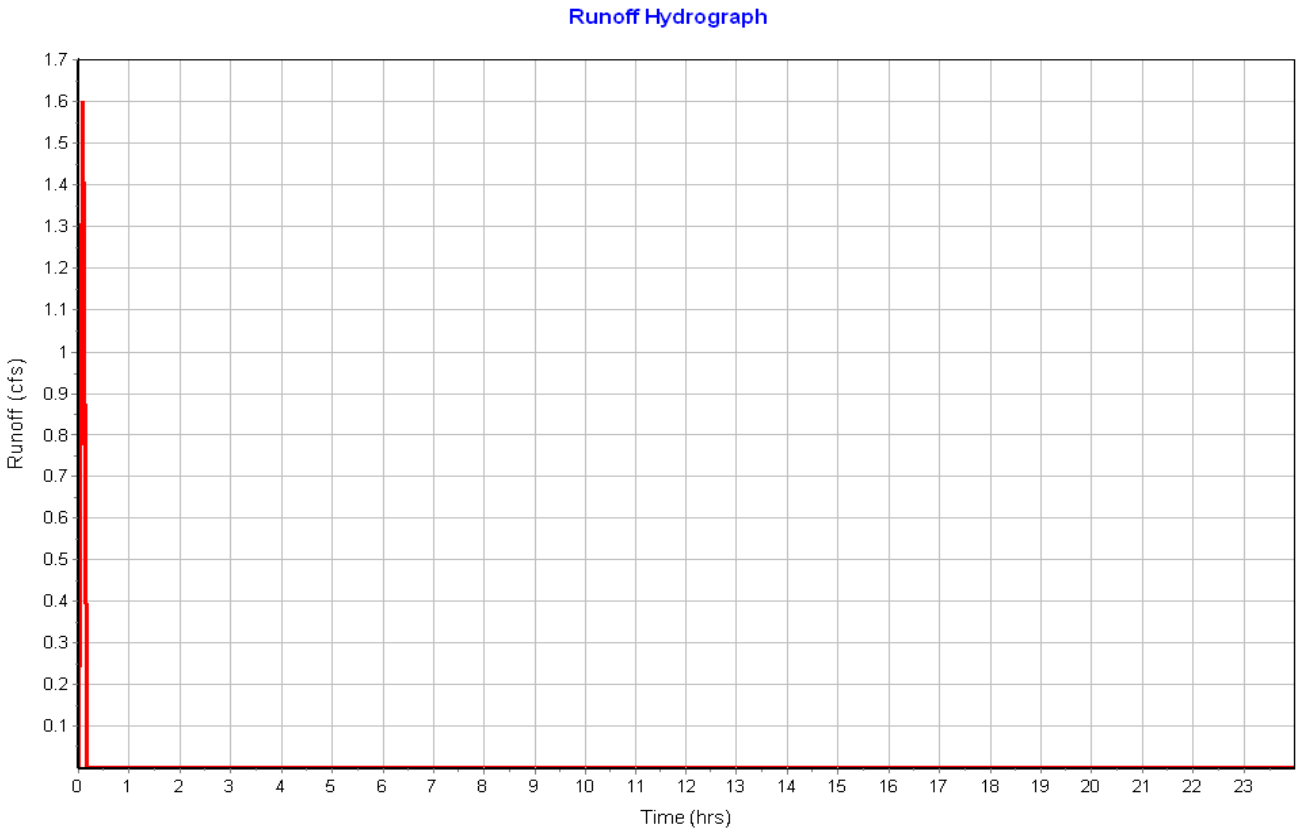
Total TOC (min) 2.59

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.60
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:35

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.3



Subbasin : {STORM PHASE 2}.30

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.13	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.13		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	171	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.49	0.00	0.00
Computed Flow Time (min) :	1.91	0.00	0.00

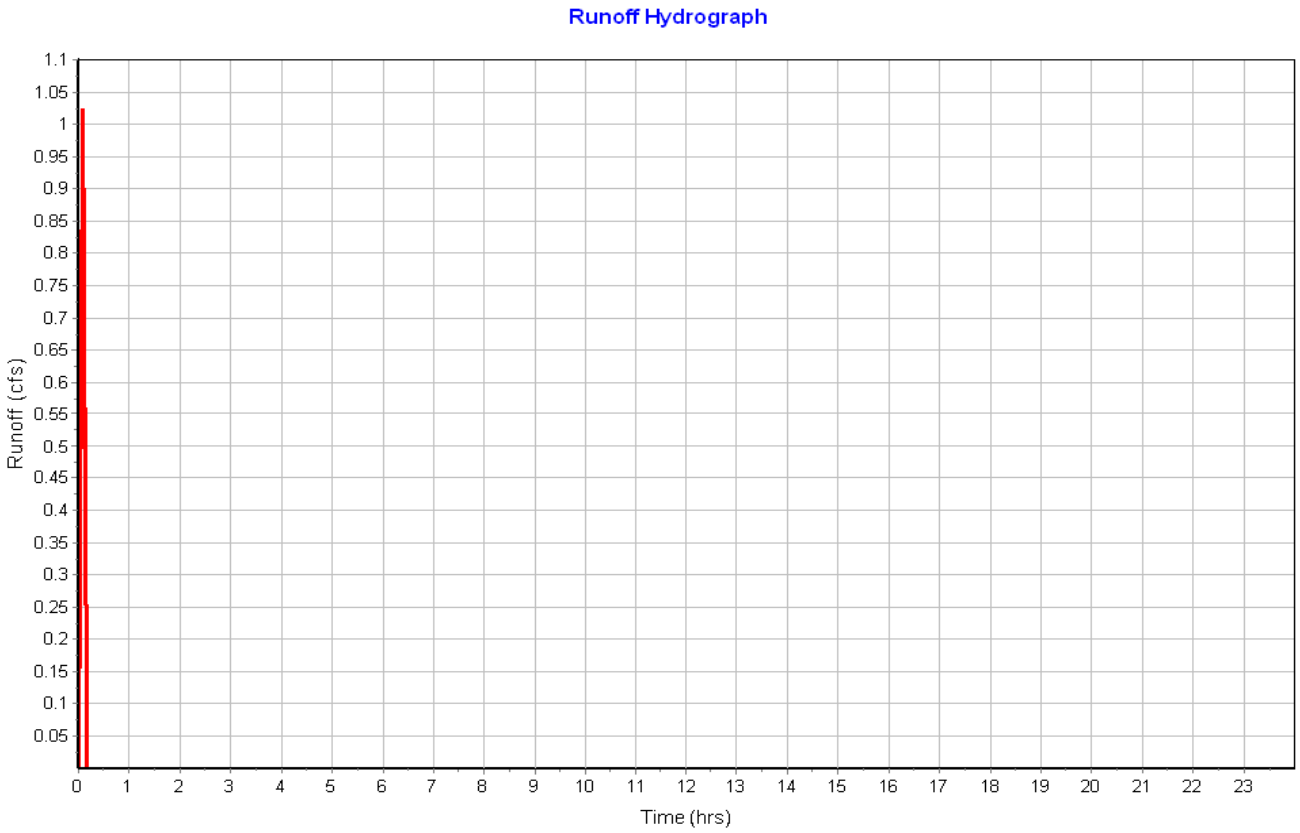
Total TOC (min) 1.91

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.02
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:55

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.30



Subbasin : {STORM PHASE 2}.31

Input Data

Area (ac) 0.39
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.39	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.39		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	252	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	24.07	0.00	0.00

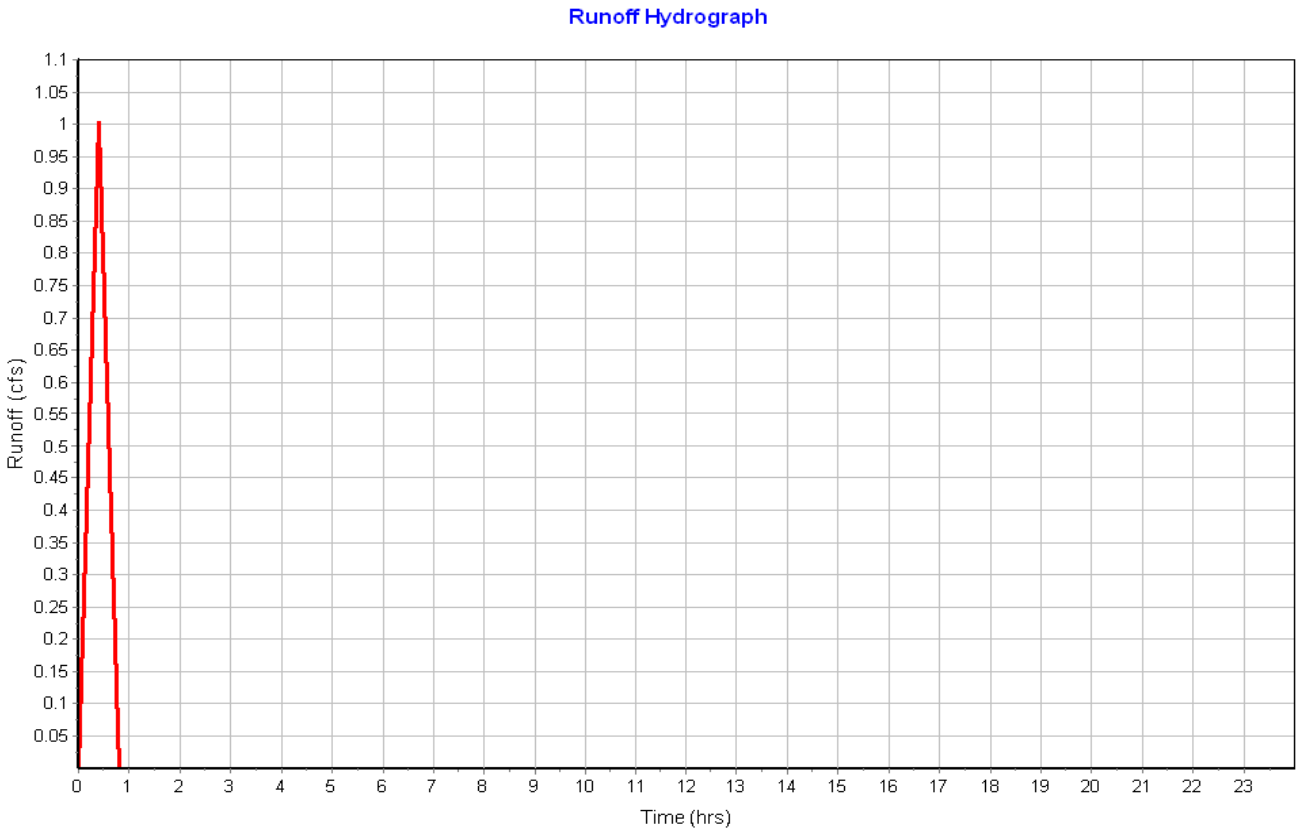
Total TOC (min) 24.07

Subbasin Runoff Results

Total Rainfall (in) 1.99
Total Runoff (in) 1.04
Peak Runoff (cfs) 1.00
Rainfall Intensity 4.982
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:24:04

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.31



Subbasin : {STORM PHASE 2}.35

Input Data

Area (ac) 0.97
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.97	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.97		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	405	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.19	0.00	0.00
Computed Flow Time (min) :	34.63	0.00	0.00

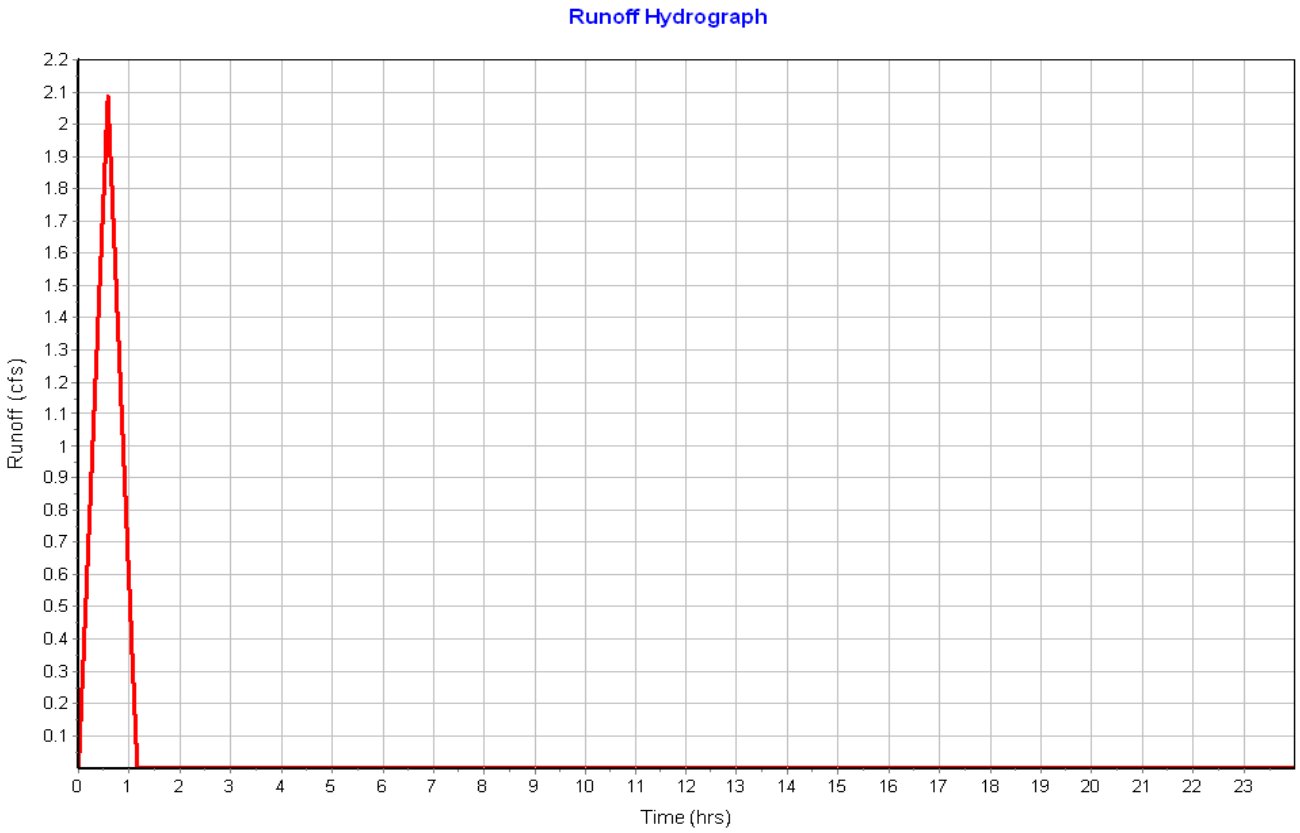
Total TOC (min) 34.63

Subbasin Runoff Results

Total Rainfall (in) 2.39
Total Runoff (in) 1.24
Peak Runoff (cfs) 2.09
Rainfall Intensity 4.138
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:34:38

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.35



Subbasin : {STORM PHASE 2}.36

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.34	0.00	0.00
Computed Flow Time (min) :	1.24	0.00	0.00

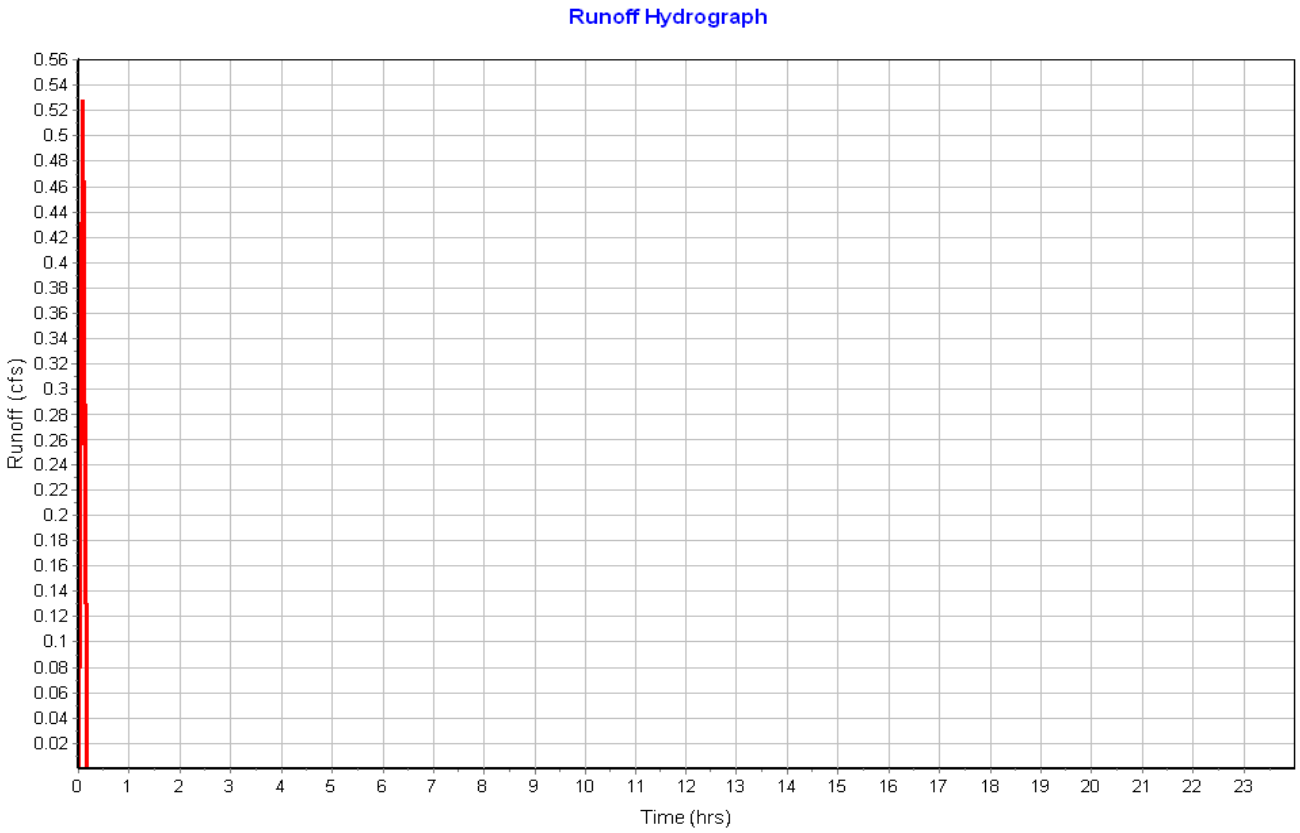
Total TOC (min) 1.24

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.53
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:14

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.36



Subbasin : {STORM PHASE 2}.37

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.09	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.09		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	185	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.69	0.00	0.00
Computed Flow Time (min) :	1.82	0.00	0.00

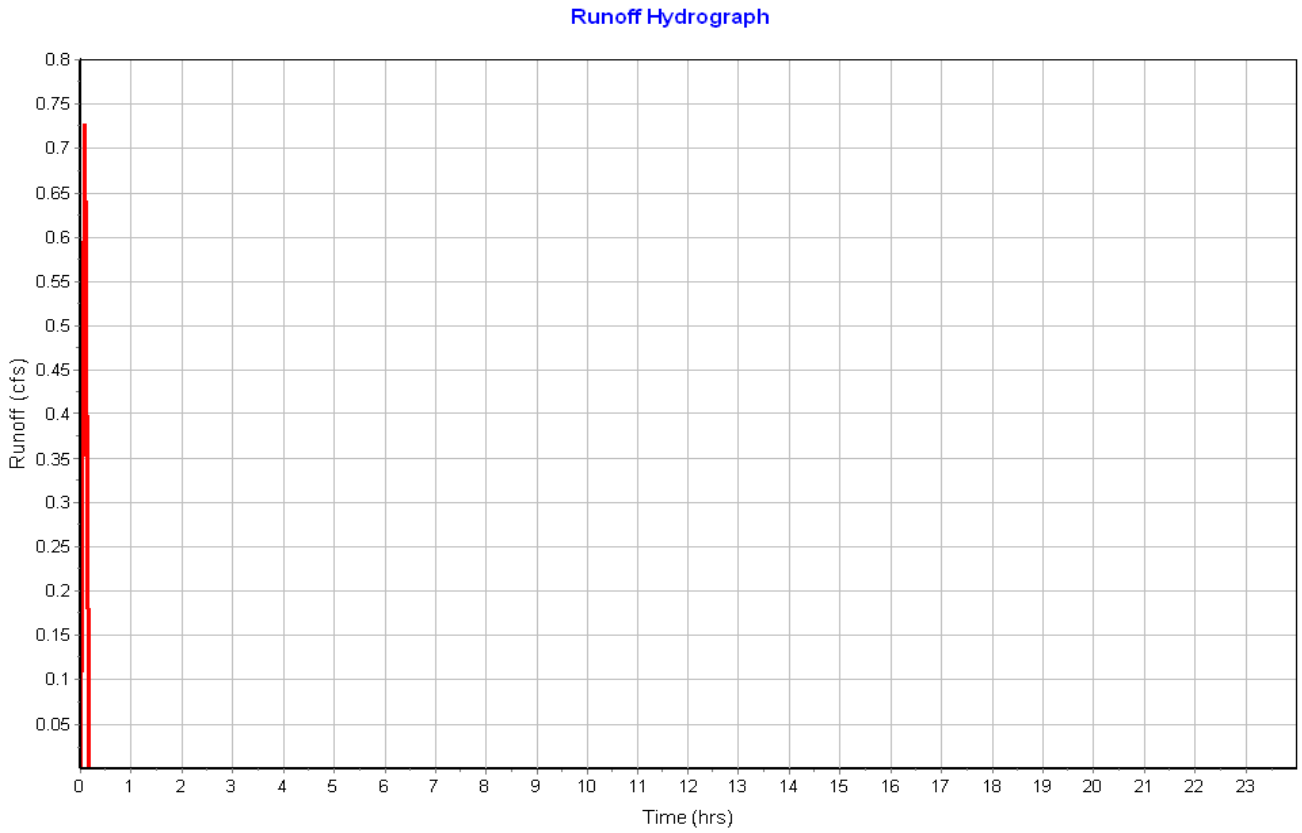
Total TOC (min) 1.82

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.73
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:49

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.37



Subbasin : {STORM PHASE 2}.38

Input Data

Area (ac) 0.17
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.17	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.17		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	211	0.00	0.00
Slope (%) :	2.7	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	20.25	0.00	0.00

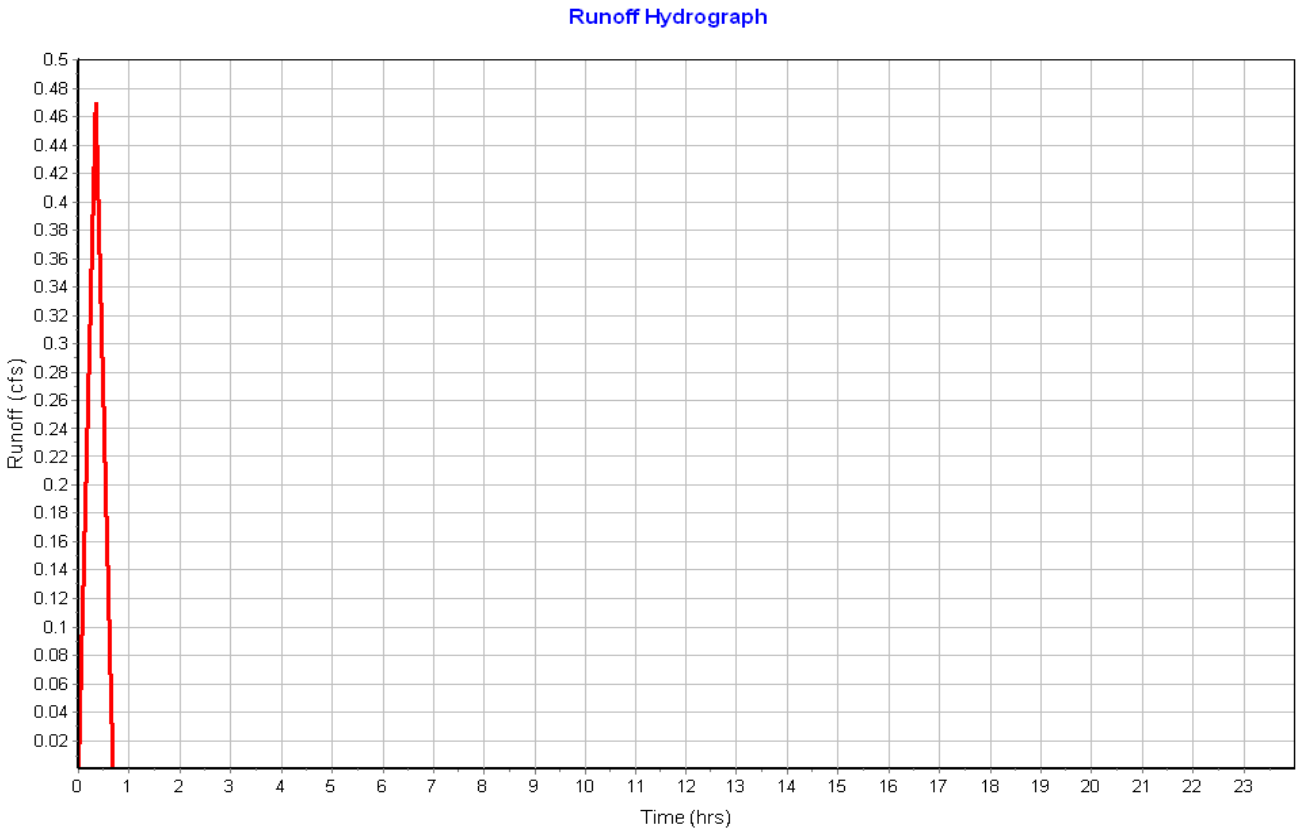
Total TOC (min) 20.25

Subbasin Runoff Results

Total Rainfall (in) 1.83
Total Runoff (in) 0.95
Peak Runoff (cfs) 0.47
Rainfall Intensity 5.397
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:20:15

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.38



Subbasin : {STORM PHASE 2}.39

Input Data

Area (ac) 0.02
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.02	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.02		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.04	0.00	0.00
Computed Flow Time (min) :	0.40	0.00	0.00

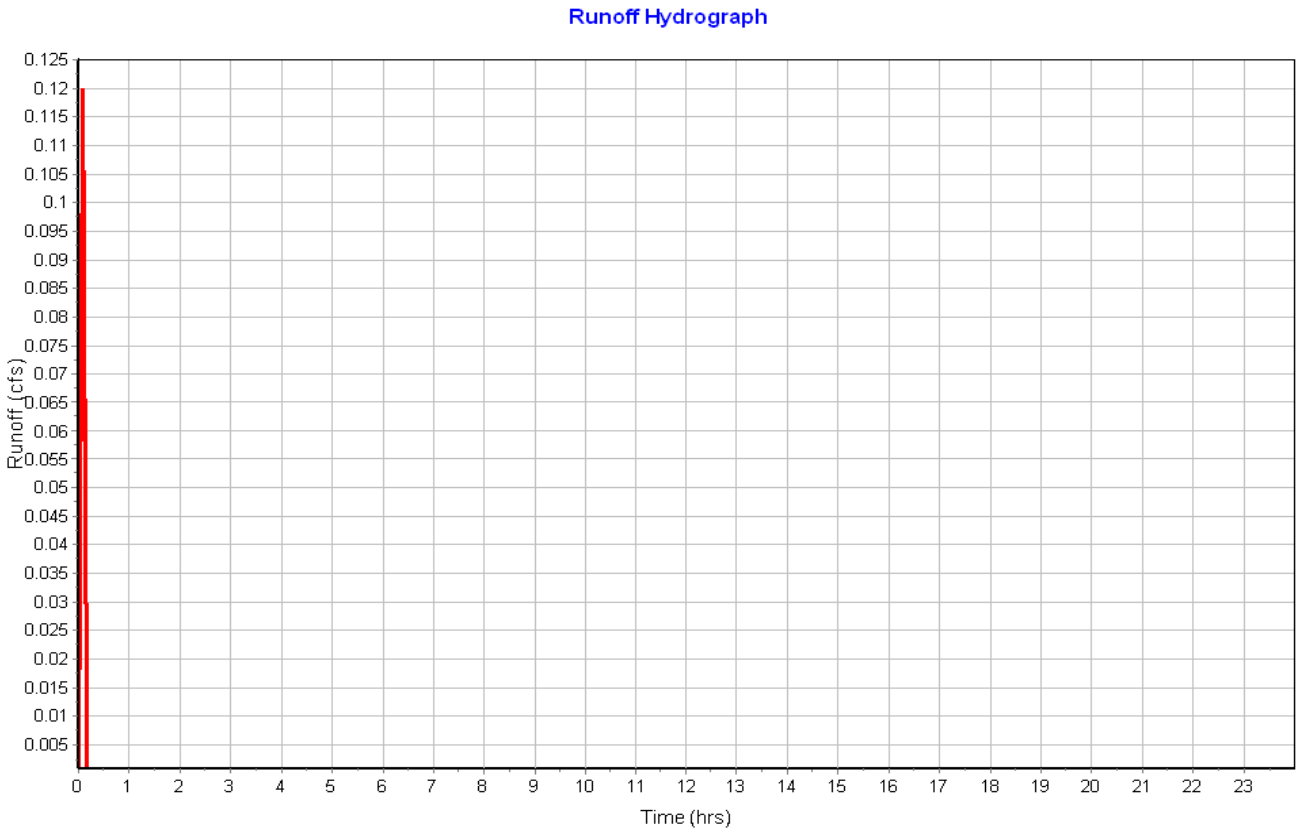
Total TOC (min) 0.40

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.12
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:00:24

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.39



Subbasin : {STORM PHASE 2}.4

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	195	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0.00	0.00
Computed Flow Time (min) :	1.13	0.00	0.00

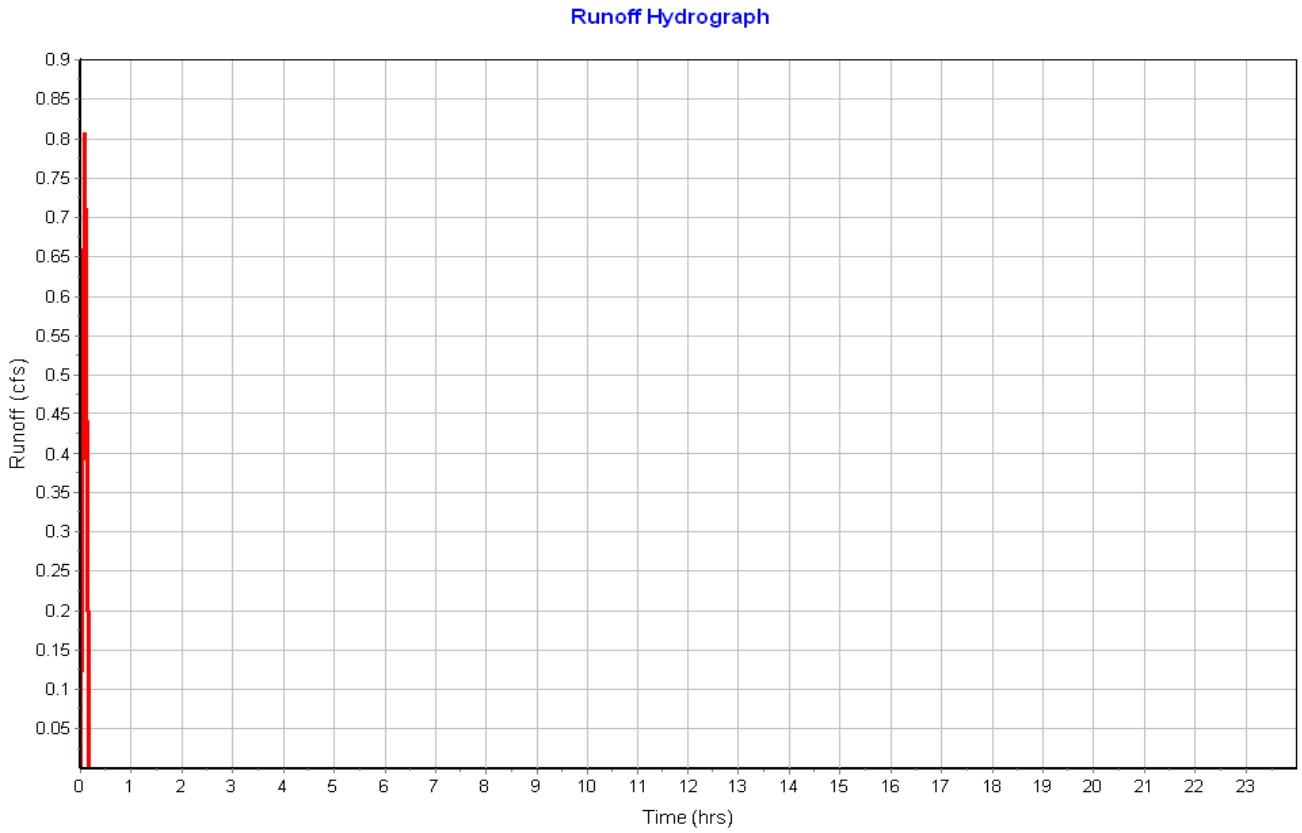
Total TOC (min) 1.39

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.81
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:23

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.4



Subbasin : {STORM PHASE 2}.40

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	1.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.36	0.00	0.00
Computed Flow Time (min) :	2.45	0.00	0.00

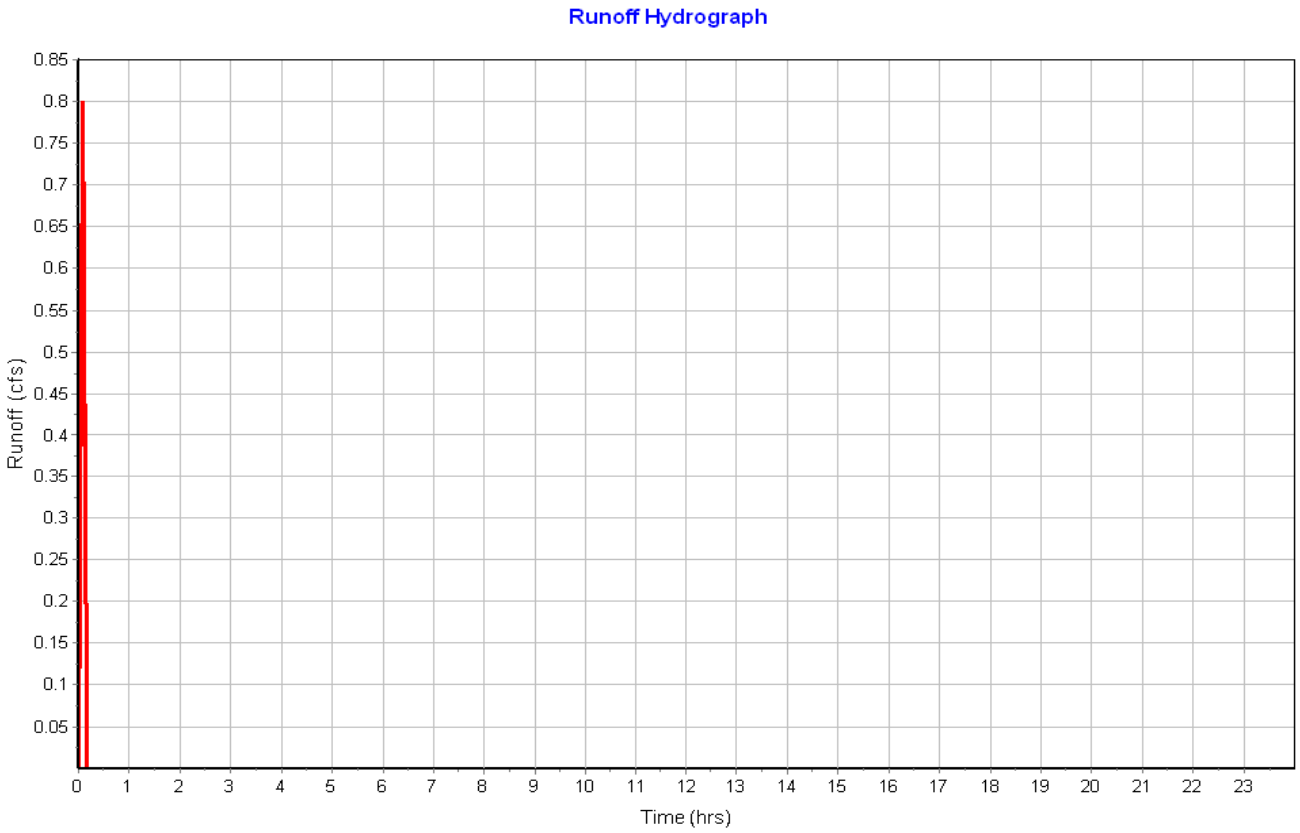
Total TOC (min) 2.45

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.80
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:27

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.40



Subbasin : {STORM PHASE 2}.41

Input Data

Area (ac) 0.20
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.20	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.20		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	394	0.00	0.00
Slope (%) :	2.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.90	0.00	0.00
Computed Flow Time (min) :	3.45	0.00	0.00

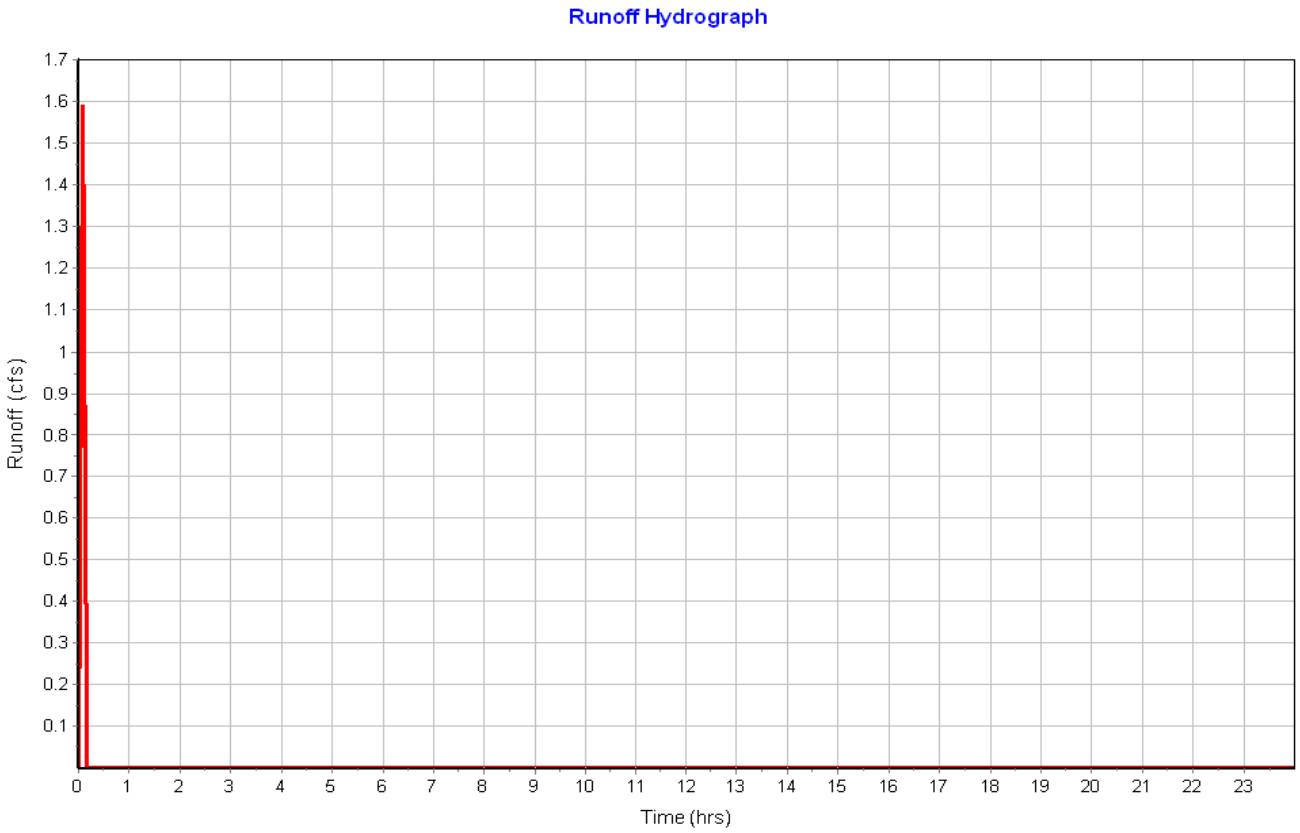
Total TOC (min) 3.45

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.59
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:27

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.41



Subbasin : {STORM PHASE 2}.45

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	222	0.00	0.00
Slope (%) :	2.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.83	0.00	0.00
Computed Flow Time (min) :	2.02	0.00	0.00

Total TOC (min) 2.02

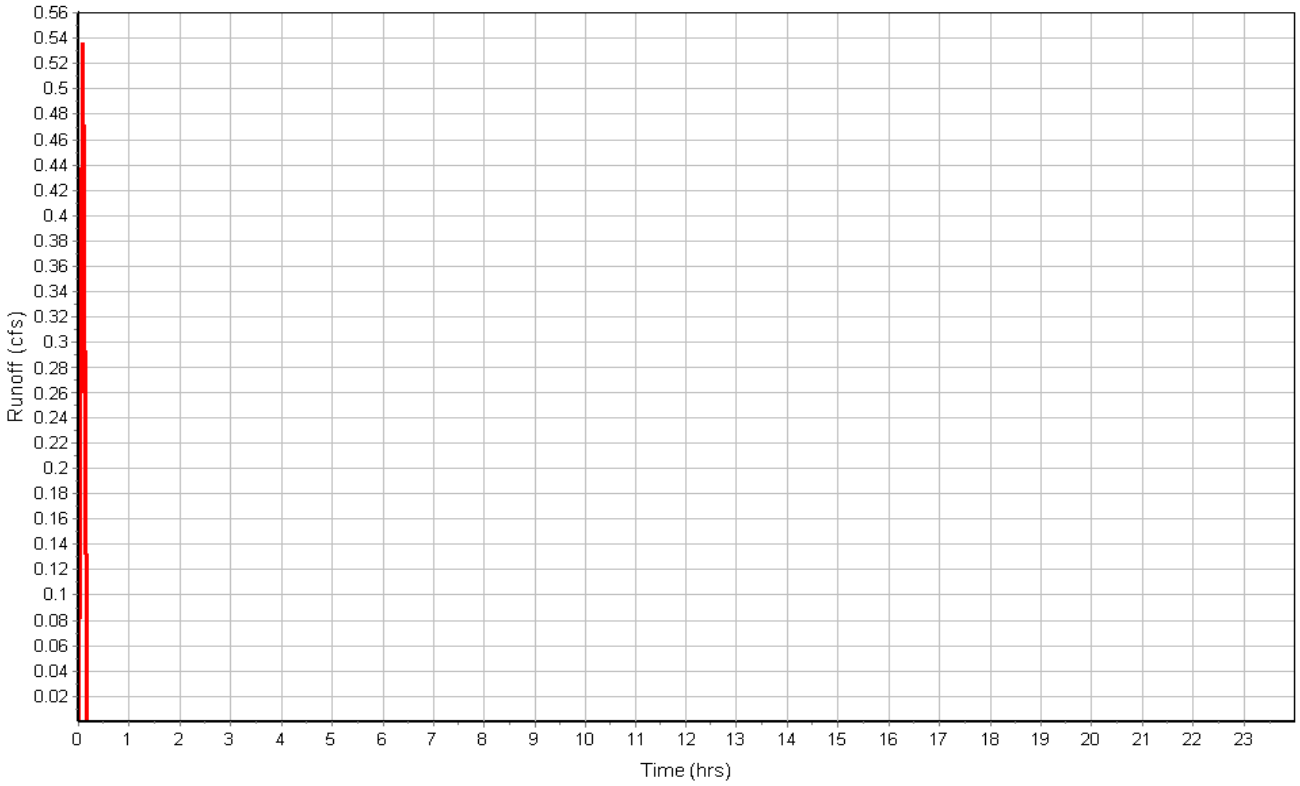
Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.54
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:01

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.45

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.48

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.09	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.09		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	151	0.00	0.00
Slope (%) :	2.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.70	0.00	0.00
Computed Flow Time (min) :	1.48	0.00	0.00

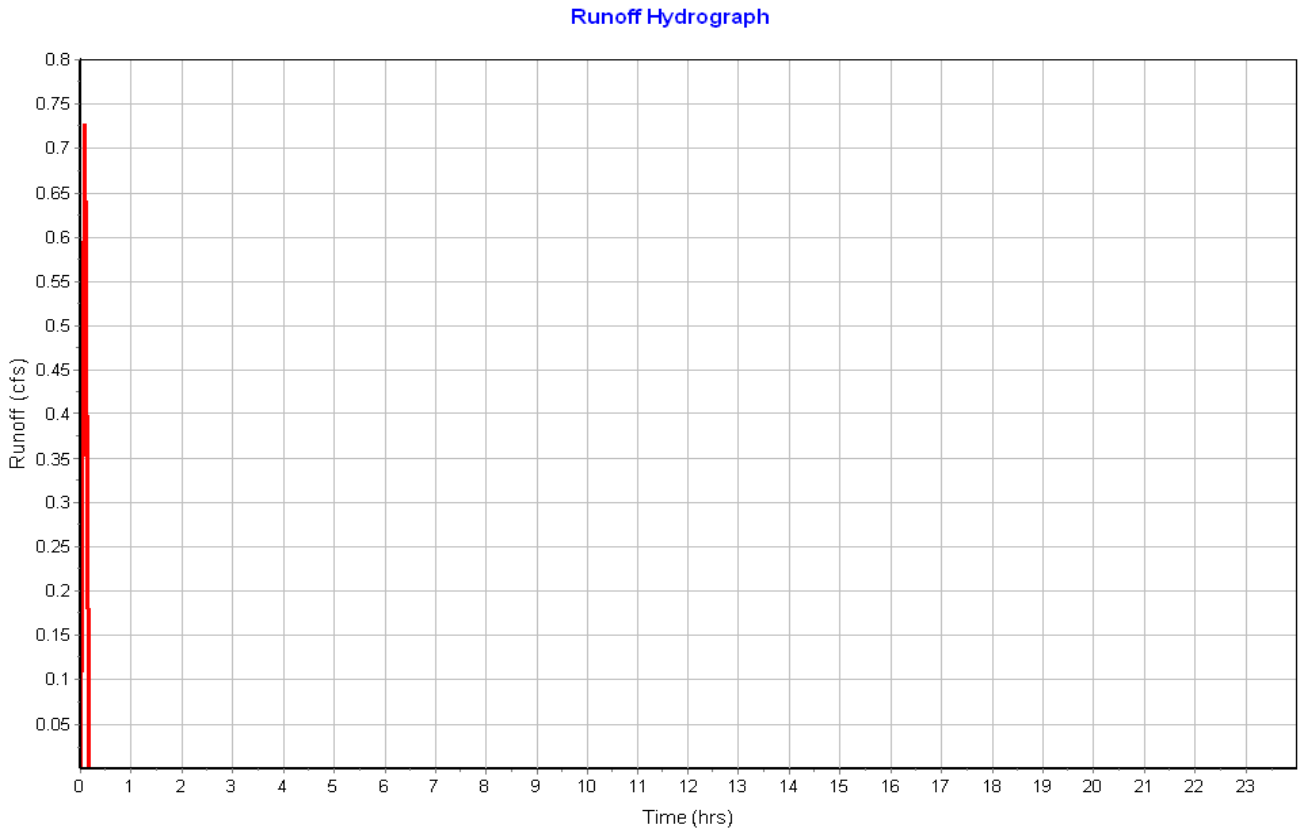
Total TOC (min) 1.48

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 0.73
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:29

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.48



Subbasin : {STORM PHASE 2}.5

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.13	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.13		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	213	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	23.00	0.00	0.00

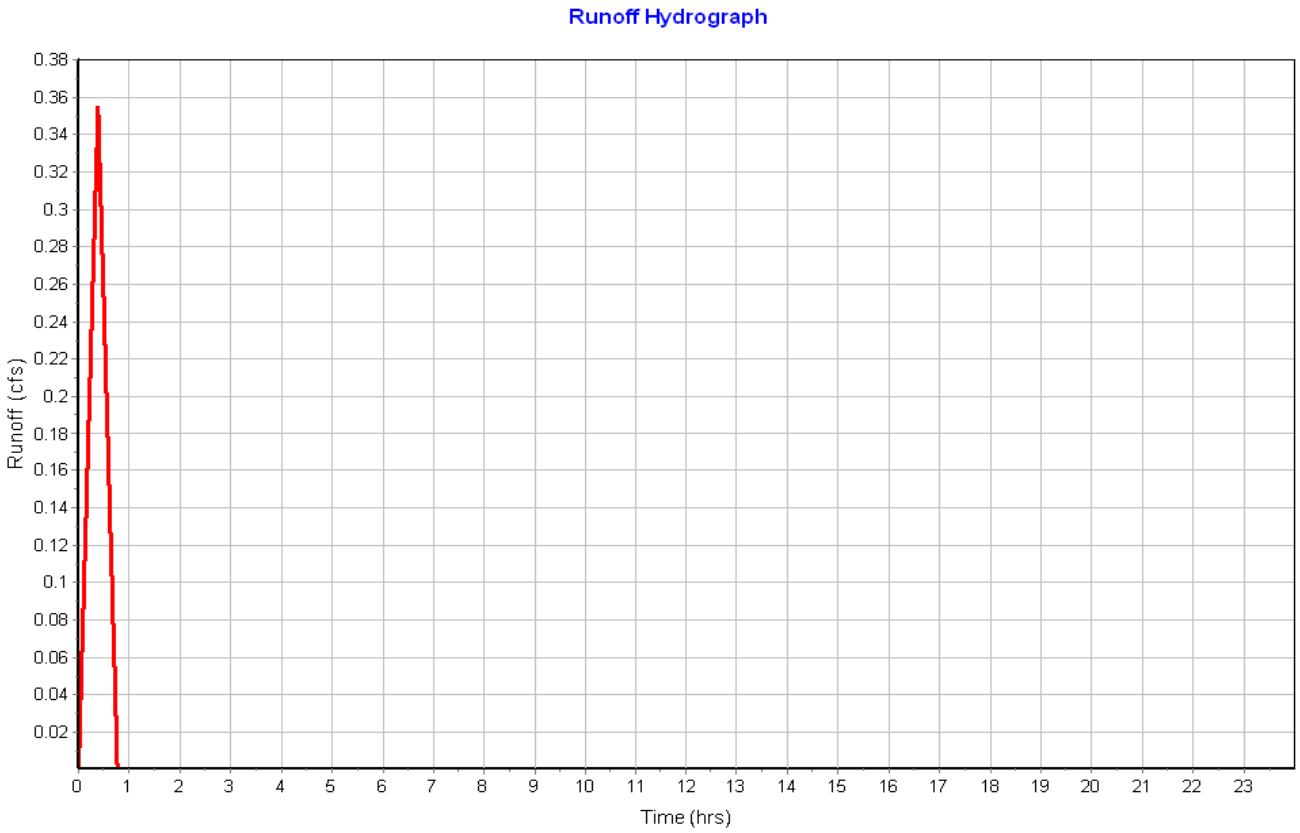
Total TOC (min) 23.00

Subbasin Runoff Results

Total Rainfall (in) 1.95
Total Runoff (in) 1.01
Peak Runoff (cfs) 0.36
Rainfall Intensity 5.088
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:23:00

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.5



Subbasin : {STORM PHASE 2}.6

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.13	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.13		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	240	0.00	0.00
Slope (%) :	2.9	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	3.46	0.00	0.00
Computed Flow Time (min) :	1.16	0.00	0.00

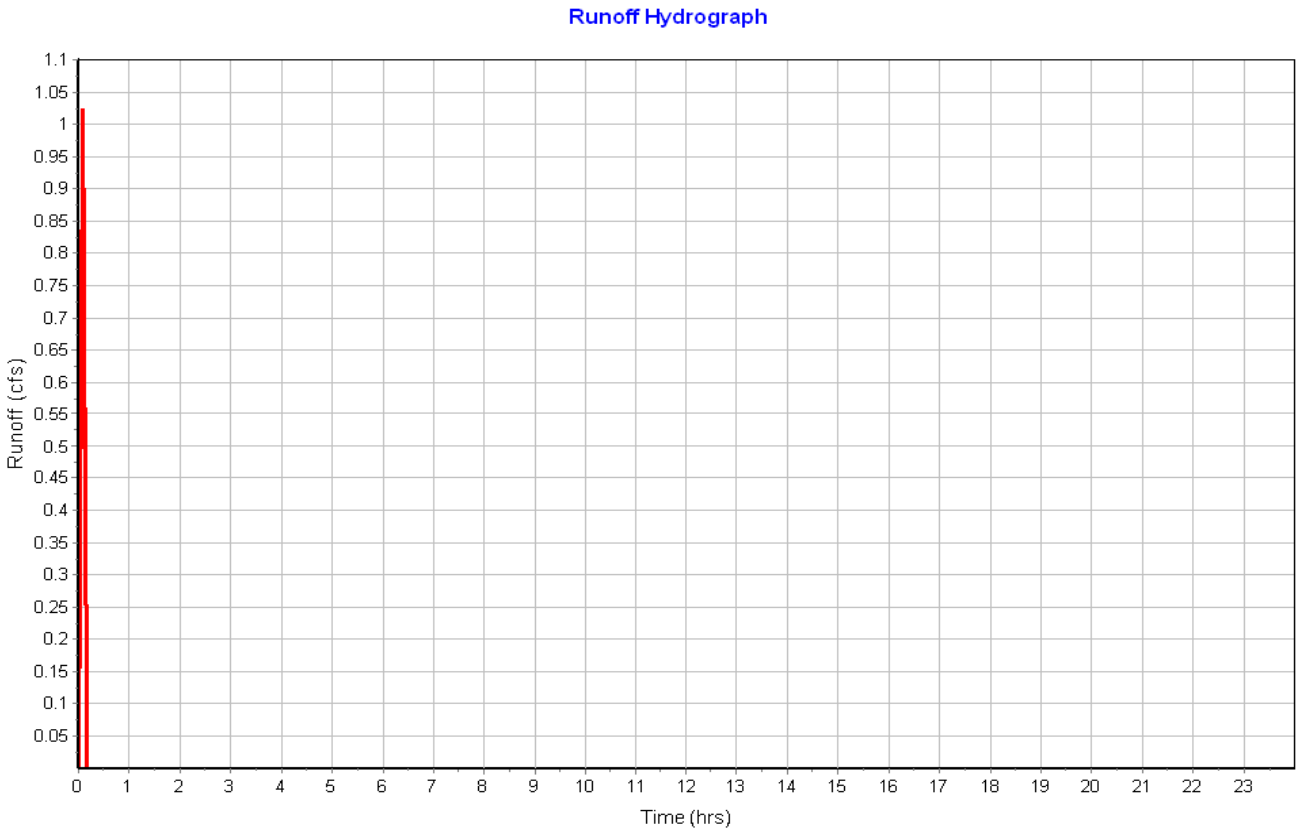
Total TOC (min) 1.41

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 1.02
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:25

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.6



Subbasin : {STORM PHASE 2}.8

Input Data

Area (ac) 0.36
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.36	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.36		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	233	0.00	0.00
Slope (%) :	1.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.55	0.00	0.00
Computed Flow Time (min) :	2.50	0.00	0.00

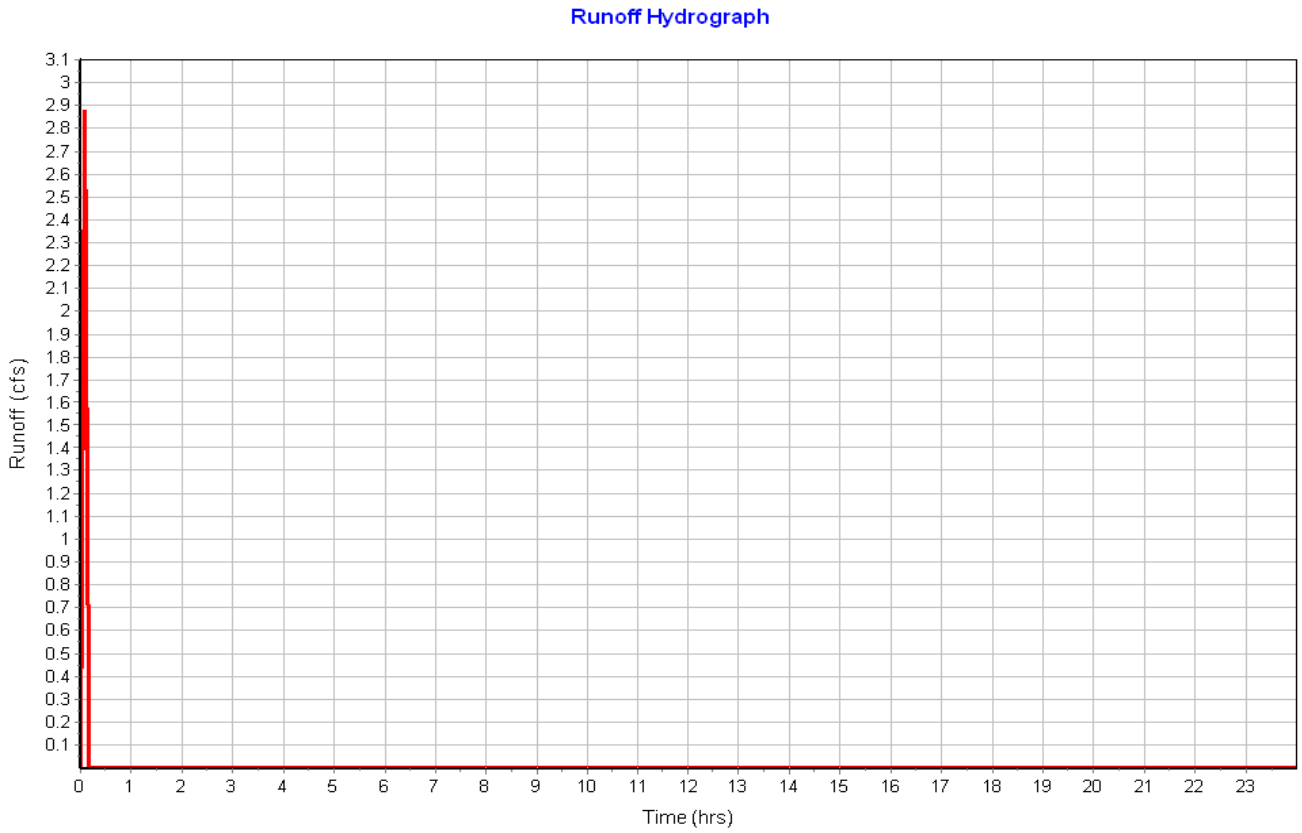
Total TOC (min) 2.50

Subbasin Runoff Results

Total Rainfall (in) 0.70
Total Runoff (in) 0.67
Peak Runoff (cfs) 2.87
Rainfall Intensity 8.400
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:30

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.8



Subbasin : {STORM PHASE 2}.9

Input Data

Area (ac) 0.80
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.80	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.80		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	366	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.19	0.00	0.00
Computed Flow Time (min) :	31.93	0.00	0.00

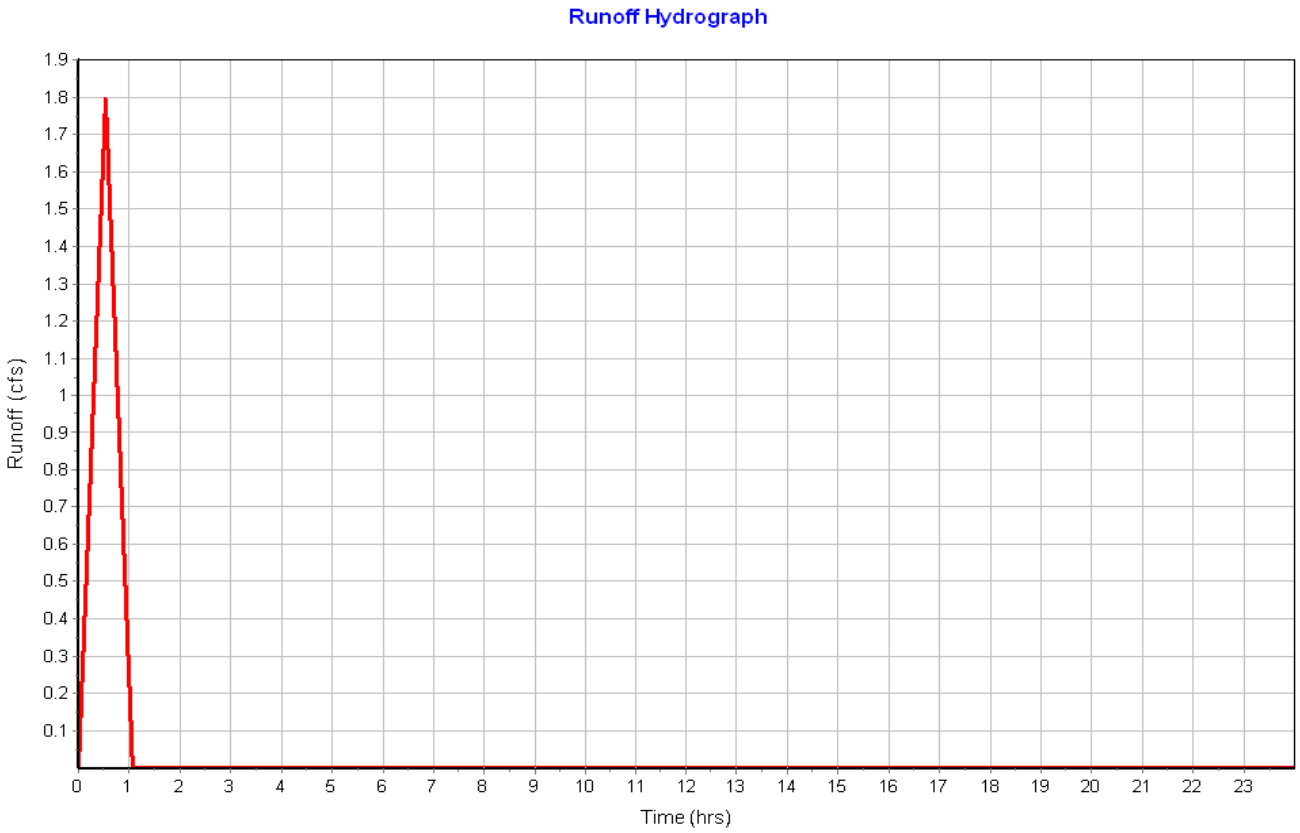
Total TOC (min) 31.93

Subbasin Runoff Results

Total Rainfall (in) 2.31
Total Runoff (in) 1.20
Peak Runoff (cfs) 1.80
Rainfall Intensity 4.339
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:56

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.9



Subbasin : 49

Input Data

Area (ac) 23.80
Weighted Runoff Coefficient 0.5000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Meadow, 25 years or greater	23.80	D (6%+)	0.50
Composite Area & Weighted Runoff Coeff.	23.80		0.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	1132	0.00	0.00
Slope (%) :	3.1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	110.52	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	720	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	13.79	0.00	0.00

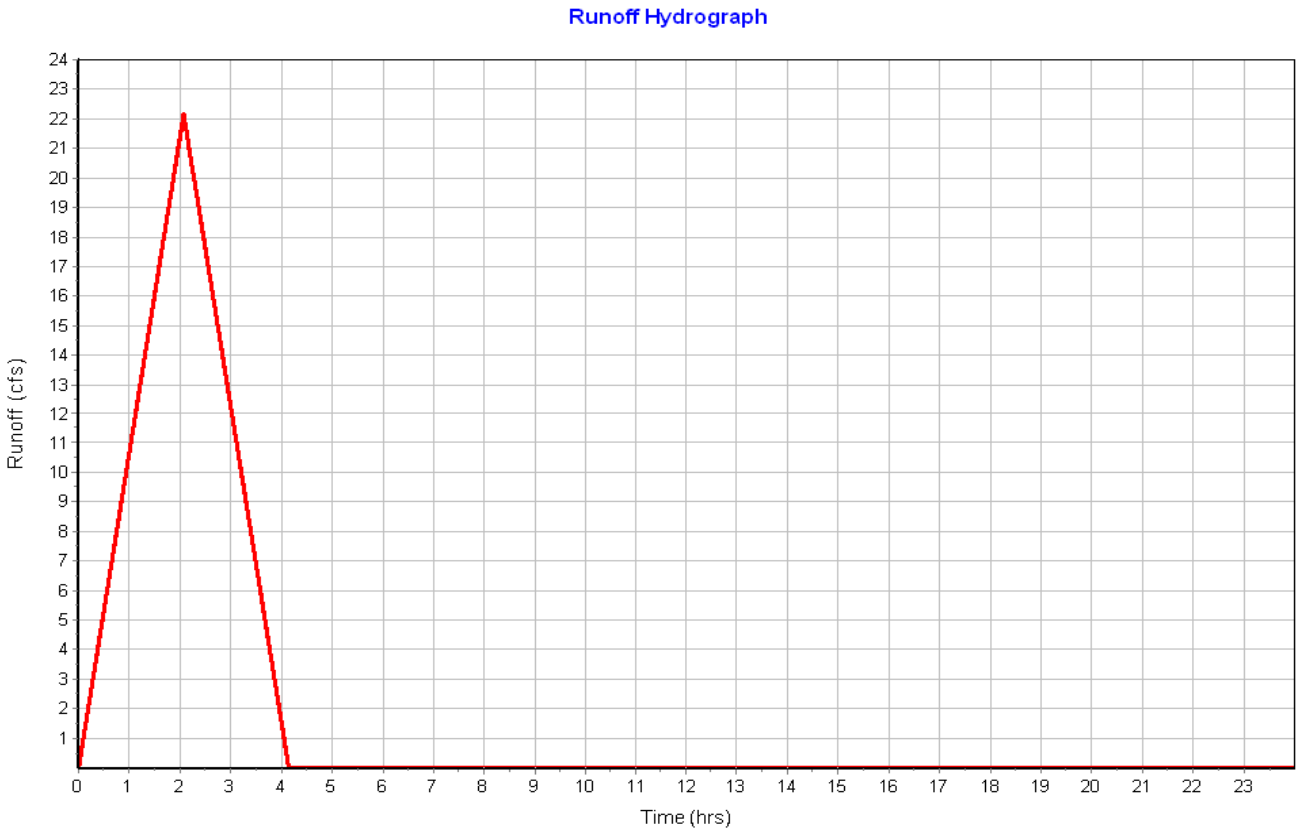
Total TOC (min) 124.32

Subbasin Runoff Results

Total Rainfall (in) 3.86
Total Runoff (in) 1.93
Peak Runoff (cfs) 22.15
Rainfall Intensity 1.861
Weighted Runoff Coefficient 0.5000
Time of Concentration (days hh:mm:ss) 0 02:04:19

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : 49



Subbasin : 50

Input Data

Area (ac) 14.60
Weighted Runoff Coefficient 0.5000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Meadow, 25 years or greater	14.60	D (6%+)	0.50
Composite Area & Weighted Runoff Coeff.	14.60		0.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	525	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	65.14	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	290	0.00	0.00
Slope (%) :	1	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.50	0.00	0.00
Computed Flow Time (min) :	9.67	0.00	0.00

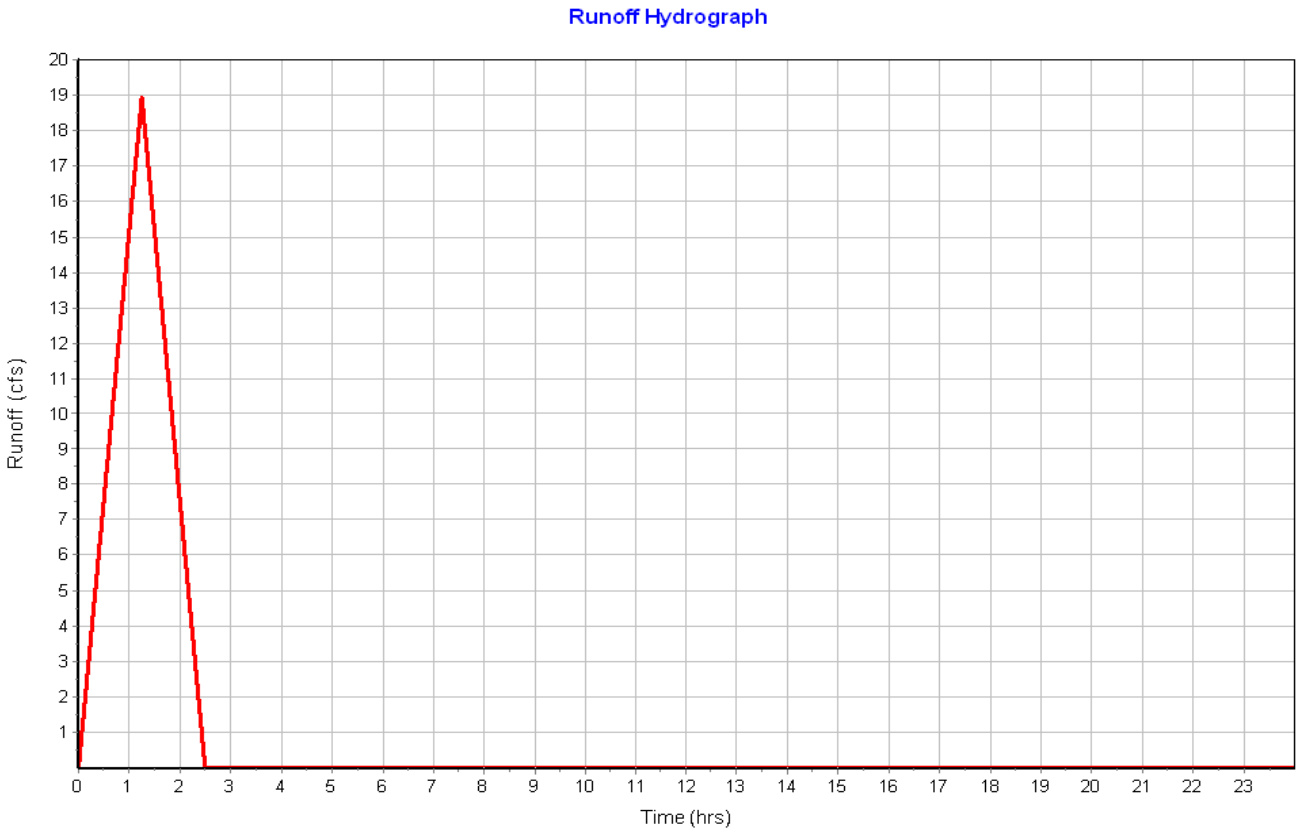
Total TOC (min) 74.81

Subbasin Runoff Results

Total Rainfall (in) 3.24
Total Runoff (in) 1.62
Peak Runoff (cfs) 18.94
Rainfall Intensity 2.594
Weighted Runoff Coefficient 0.5000
Time of Concentration (days hh:mm:ss) 0 01:14:49

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Subbasin : 50



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	{STORM BJ2-1}.FES - L1	447.00	450.00	3.00	447.00	0.00	450.00	0.00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	443.25	445.00	1.75	443.25	0.00	445.00	0.00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	443.00	445.00	2.00	443.00	0.00	445.00	0.00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	451.28	455.85	4.57	451.28	0.00	455.85	0.00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	445.40	449.19	3.79	445.40	0.00	449.19	0.00	0.00	0.00
6	FES-F1	448.75	457.43	8.68	448.75	0.00	457.43	0.00	0.00	0.00
7	FES-P1_KBBARNES	433.25	435.00	1.75	433.25	0.00	435.00	0.00	0.00	0.00
8	FES-P2_KBBARNES	433.00	435.00	2.00	433.00	0.00	435.00	0.00	0.00	0.00
9	StartNullStruct41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.FES - L1	2.08	2.08	447.42	0.42	0.00	2.58	447.01	0.01	0 00:34	0 00:00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	21.98	0.00	444.47	1.22	0.00	0.78	443.40	0.15	0 02:06	0 00:00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	21.98	0.00	444.37	1.37	0.00	0.65	443.18	0.18	0 02:06	0 00:00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	5.44	0.00	451.96	0.68	0.00	3.89	451.40	0.12	0 00:06	0 00:00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	8.97	0.00	446.38	0.98	0.00	2.81	445.53	0.13	0 00:06	0 00:00	0.00	0.00
6	FES-F1	22.15	22.15	449.97	1.22	0.00	7.45	448.90	0.15	0 02:04	0 00:00	0.00	0.00
7	FES-P1_KBBARNES	30.41	18.94	434.61	1.36	0.00	0.64	433.44	0.19	0 02:12	0 00:00	0.00	0.00
8	FES-P2_KBBARNES	30.40	0.00	434.28	1.28	0.00	0.72	433.17	0.17	0 01:15	0 00:00	0.00	0.00
9	StartNullStruct41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00:00	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	BYPASS_K1	395.48	453.99	4.39	444.81	4.01	9.18	2.3200	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	Yes
2	BYPASS_N1	29.94	444.81	4.01	443.80	3.80	1.01	3.3700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
3	DITCH-01	424.00	448.75	0.00	443.02	-0.23	5.73	1.3500	Trapezoidal	2.000	21.000	0.0800	0.5000	0.5000	0.0000	0.00	No
4	DITCH-02	970.00	443.00	0.00	433.25	0.00	9.75	1.0100	Trapezoidal	2.000	17.000	0.0800	0.5000	0.5000	0.0000	0.00	No
5	DITCH-03	262.00	433.00	0.00	431.98	0.00	1.02	0.3900	Triangular	2.000	100.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	GUTTER_F2	250.05	461.10	5.10	453.34	4.00	7.76	3.1000	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
7	GUTTER_F3	199.54	465.23	5.00	461.10	5.10	4.13	2.0700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
8	GUTTER_G1	245.65	460.52	3.92	453.34	4.00	7.18	2.9200	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
9	GUTTER_H2	191.92	462.65	5.00	459.83	4.03	2.82	1.4700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
10	GUTTER_H7	180.42	450.00	5.10	445.14	4.89	4.86	2.6900	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
11	GUTTER_H8	31.05	445.14	4.89	443.30	3.80	1.84	5.9300	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
12	GUTTER_I1	191.92	462.65	4.40	461.09	4.69	1.56	0.8100	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
13	GUTTER-H3	260.86	459.83	4.03	454.37	5.37	5.46	2.0900	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
14	GUTTER-H5	155.79	454.37	5.37	451.66	5.00	2.71	1.7400	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
15	GUTTER-J1	224.65	461.09	4.69	457.58	5.83	3.51	1.5600	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	BYPASS_K1	0.00	0 00:07	20.05	0.00	3.15	2.09	0.02	0.03	0.00		
2	BYPASS_N1	0.07	0 00:05	18.75	0.00	4.09	0.12	0.06	0.12	0.00		
3	DITCH-01	21.98	0 02:06	62.45	0.35	1.83	3.86	1.22	0.61	0.00		
4	DITCH-02	21.71	0 02:12	47.45	0.46	1.77	9.13	1.36	0.68	0.00		
5	DITCH-03	30.23	0 01:17	289.59	0.10	1.65	2.65	0.86	0.43	0.00		
6	GUTTER_F2	0.15	0 00:06	18.90	0.01	2.82	1.48	0.08	0.16	0.00		
7	GUTTER_F3	0.04	0 00:05	21.08	0.00	2.30	1.45	0.05	0.09	0.00		
8	GUTTER_G1	0.15	0 00:06	19.52	0.01	5.89	0.70	0.08	0.15	0.00		
9	GUTTER_H2	0.17	0 00:06	12.23	0.01	4.28	0.75	0.10	0.19	0.00		
10	GUTTER_H7	0.00	0 00:00	20.34	0.00	0.00		0.00	0.00	0.00		
11	GUTTER_H8	0.01	0 00:05	25.22	0.00	1.26	0.41	0.02	0.04	0.00		
12	GUTTER_I1	0.02	0 00:30	14.64	0.00	3.28	0.98	0.04	0.08	0.00		
13	GUTTER-H3	0.02	0 00:06	19.15	0.00	3.97	1.10	0.03	0.06	0.00		
14	GUTTER-H5	0.17	0 00:05	18.59	0.01	4.74	0.55	0.08	0.17	0.00		
15	GUTTER-J1	0.21	0 00:38	16.02	0.01	2.96	1.26	0.10	0.20	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)
1	{STORM BJ2-1}.PIPE - H7	180.51	444.90	0.00	440.35	0.10	4.55	2.5200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
2	{STORM BJ2-1}.PIPE - H8	31.04	440.25	0.00	439.50	0.00	0.75	2.4200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
3	{STORM BJ2-1}.PIPE - L1	84.01	447.00	0.00	445.50	0.10	1.50	1.7900	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00
4	{STORM BJ2-1}.PIPE - M1	48.34	446.66	0.00	445.50	0.10	1.16	2.4000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
5	{STORM BJ2-1}.PIPE - N1	32.00	440.80	0.00	440.35	0.10	0.45	1.4100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
6	{STORM BJ2-1}.PIPE F1	99.06	449.34	0.00	448.75	0.00	0.59	0.6000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
7	{STORM BJ2-1}.PIPE F2	250.16	456.00	0.00	449.44	0.10	6.56	2.6200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
8	{STORM BJ2-1}.PIPE G1	32.00	456.60	0.00	456.10	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
9	{STORM BJ2-1}.PIPE H5	183.29	449.00	0.00	445.50	0.10	3.50	1.9100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
10	{STORM BJ2-1}.PIPE -H6	31.79	445.40	0.00	445.00	0.10	0.40	1.2600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
11	{STORM BJ2-1}.PIPE_F3	199.59	460.23	0.00	456.10	0.10	4.13	2.0700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
12	{STORM BJ2-1}.PIPE-H1	32.00	458.25	0.00	457.75	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
13	{STORM BJ2-1}.PIPE-H2	191.94	457.65	0.00	455.90	0.10	1.75	0.9100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
14	{STORM BJ2-1}.PIPE-H3	260.88	455.80	0.00	451.38	0.10	4.42	1.6900	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
15	{STORM BJ2-1}.PIPE-H4	96.77	451.28	0.00	449.10	0.10	2.18	2.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
16	{STORM BJ2-1}.PIPE-I1	32.00	456.40	0.00	455.90	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
17	{STORM BJ2-1}.PIPE-J1	48.34	451.75	0.00	451.38	0.10	0.37	0.7700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
18	{STORM BJ2-1}.PIPE-K1	32.00	449.60	0.00	449.10	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
19	{STORM BJ2-1}.PIPE-O1	29.87	443.15	-0.10	443.02	0.02	0.13	0.4400	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00
20	{STORM BJ2-1}.PIPE-P1	22.81	433.25	0.00	433.00	0.00	0.25	1.1000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00

BENJAMIN GROVE PHASE 2
25-YEAR DRAINAGE

Flap Gate	No. of Barrels
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	2
No	2

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	{STORM BJ2-1}.PIPE - H7	9.37	0 00:06	16.68	0.56	9.76	0.31	0.80	0.54	0.00		Calculated
2	{STORM BJ2-1}.PIPE - H8	11.29	0 00:06	16.33	0.69	9.97	0.05	0.92	0.61	0.00		Calculated
3	{STORM BJ2-1}.PIPE - L1	2.08	0 00:34	12.16	0.17	5.14	0.27	0.42	0.28	0.00		Calculated
4	{STORM BJ2-1}.PIPE - M1	1.33	0 00:05	16.27	0.08	5.56	0.14	0.29	0.19	0.00		Calculated
5	{STORM BJ2-1}.PIPE - N1	1.50	0 00:05	12.46	0.12	4.76	0.11	0.35	0.23	0.00		Calculated
6	{STORM BJ2-1}.PIPE F1	6.61	0 00:05	8.11	0.82	5.16	0.32	1.03	0.69	0.00		Calculated
7	{STORM BJ2-1}.PIPE F2	2.51	0 00:05	17.01	0.15	6.97	0.60	0.39	0.26	0.00		Calculated
8	{STORM BJ2-1}.PIPE G1	1.38	0 00:05	13.13	0.11	5.57	0.10	0.33	0.22	0.00		Calculated
9	{STORM BJ2-1}.PIPE H5	7.38	0 00:06	14.52	0.51	8.30	0.37	0.76	0.50	0.00		Calculated
10	{STORM BJ2-1}.PIPE -H6	8.97	0 00:06	11.78	0.76	7.34	0.07	0.98	0.65	0.00		Calculated
11	{STORM BJ2-1}.PIPE_F3	0.47	0 00:05	15.11	0.03	4.23	0.79	0.18	0.12	0.00		Calculated
12	{STORM BJ2-1}.PIPE-H1	1.00	0 00:29	13.13	0.08	4.39	0.12	0.28	0.19	0.00		Calculated
13	{STORM BJ2-1}.PIPE-H2	2.37	0 00:05	10.03	0.24	4.74	0.67	0.49	0.33	0.00		Calculated
14	{STORM BJ2-1}.PIPE-H3	4.34	0 00:06	13.67	0.32	6.96	0.62	0.58	0.39	0.00		Calculated
15	{STORM BJ2-1}.PIPE-H4	5.44	0 00:06	15.77	0.35	8.11	0.20	0.61	0.41	0.00		Calculated
16	{STORM BJ2-1}.PIPE-I1	1.46	0 00:37	13.13	0.11	4.90	0.11	0.34	0.23	0.00		Calculated
17	{STORM BJ2-1}.PIPE-J1	2.01	0 00:38	9.19	0.22	4.17	0.19	0.48	0.32	0.00		Calculated
18	{STORM BJ2-1}.PIPE-K1	0.79	0 00:05	13.13	0.06	4.80	0.11	0.25	0.17	0.00		Calculated
19	{STORM BJ2-1}.PIPE-O1	21.98	0 02:06	34.48	0.64	5.81	0.09	1.16	0.58	0.00		Calculated
20	{STORM BJ2-1}.PIPE-P1	30.40	0 01:15	41.06	0.74	7.15	0.05	1.28	0.64	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	{STORM BJ2-1}.CB-F2	FHWA HEC-22 GENERIC	N/A	On Sag	1	449.34	454.86	5.52	449.34	0.00	0.00	0.00
2	{STORM BJ2-1}.CB-F4	FHWA HEC-22 GENERIC	N/A	On Grade	1	460.23	464.52	4.29	460.23	0.00	N/A	0.00
3	{STORM BJ2-1}.CB-G1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.60	459.94	3.34	456.60	0.00	N/A	0.00
4	{STORM BJ2-1}.CB-H1	FHWA HEC-22 GENERIC	N/A	On Grade	1	458.25	461.79	3.54	458.25	0.00	N/A	0.00
5	{STORM BJ2-1}.CB-H2	FHWA HEC-22 GENERIC	N/A	On Grade	1	457.65	461.12	3.47	457.65	0.00	N/A	0.00
6	{STORM BJ2-1}.CB-H5	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.00	452.86	3.86	449.00	0.00	N/A	0.00
7	{STORM BJ2-1}.CB-H7	FHWA HEC-22 GENERIC	N/A	On Grade	1	444.90	448.42	3.52	444.90	0.00	N/A	0.00
8	{STORM BJ2-1}.CB-I1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.40	459.56	3.16	456.40	0.00	N/A	0.00
9	{STORM BJ2-1}.CB-J1	FHWA HEC-22 GENERIC	N/A	On Sag	1	451.75	456.44	4.69	451.75	0.00	0.00	0.00
10	{STORM BJ2-1}.CB-K1	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.60	452.99	3.39	449.60	0.00	N/A	0.00
11	{STORM BJ2-1}.CB-M1	FHWA HEC-22 GENERIC	N/A	On Sag	1	446.66	449.94	3.28	446.66	0.00	0.00	0.00
12	{STORM BJ2-1}.CB-N1	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.80	444.37	3.57	440.80	0.00	N/A	0.00
13	CB-F3	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.00	459.71	3.71	456.00	0.00	N/A	0.00
14	CB-H3	FHWA HEC-22 GENERIC	N/A	On Grade	1	455.80	459.56	3.76	455.80	0.00	N/A	0.00
15	CB-H8	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.25	444.37	4.12	440.25	0.00	N/A	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	{STORM BJ2-1}.CB-F2	N/A	0.0200	0.0160	0.0620	2.00	0.0656	12.00
2	{STORM BJ2-1}.CB-F4	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
3	{STORM BJ2-1}.CB-G1	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
4	{STORM BJ2-1}.CB-H1	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
5	{STORM BJ2-1}.CB-H2	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
6	{STORM BJ2-1}.CB-H5	0.0190	0.0200	0.0160	0.0620	1.50	0.0656	12.00
7	{STORM BJ2-1}.CB-H7	0.0100	0.0200	0.0160	0.0620	2.00	0.0656	12.00
8	{STORM BJ2-1}.CB-I1	0.0170	0.0200	0.0160	0.0620	1.50	0.0656	12.00
9	{STORM BJ2-1}.CB-J1	N/A	0.0200	0.0160	0.0620	1.50	0.0656	12.00
10	{STORM BJ2-1}.CB-K1	0.0190	0.0200	0.0160	0.0620	2.00	0.0656	12.00
11	{STORM BJ2-1}.CB-M1	N/A	0.0200	0.0160	0.0620	1.50	0.0656	12.00
12	{STORM BJ2-1}.CB-N1	0.0100	0.0200	0.0160	0.0620	2.00	0.0656	12.00
13	CB-F3	0.0200	0.0200	0.0160	0.0620	2.00	0.0000	12.00
14	CB-H3	0.0170	0.0200	0.0160	0.0620	2.00	0.0656	12.00
15	CB-H8	0.0190	0.0200	0.0160	0.0620	2.00	0.0656	12.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.CB-F2	4.27	4.17	N/A	N/A	N/A	12.06	455.36	0.49	0 00:05	0.00	0.00
2	{STORM BJ2-1}.CB-F4	0.55	0.55	0.49	0.06	89.33	4.15	464.66	0.15	0 00:05	0.00	0.00
3	{STORM BJ2-1}.CB-G1	1.60	1.60	1.39	0.21	86.83	7.00	460.15	0.20	0 00:05	0.00	0.00
4	{STORM BJ2-1}.CB-H1	1.02	1.02	1.00	0.02	97.73	5.74	461.97	0.18	0 00:29	0.00	0.00
5	{STORM BJ2-1}.CB-H2	1.68	1.68	1.43	0.25	85.20	7.15	461.33	0.21	0 00:05	0.00	0.00
6	{STORM BJ2-1}.CB-H5	1.64	1.64	1.42	0.22	86.48	7.16	453.07	0.21	0 00:06	0.00	0.00
7	{STORM BJ2-1}.CB-H7	0.53	0.53	0.53	0.00	100.00	4.25	448.59	0.17	0 00:06	0.00	0.00
8	{STORM BJ2-1}.CB-I1	1.69	1.68	1.46	0.22	86.75	7.42	459.77	0.21	0 00:37	0.00	0.00
9	{STORM BJ2-1}.CB-J1	2.01	1.82	N/A	N/A	N/A	8.40	456.83	0.40	0 00:38	0.00	0.00
10	{STORM BJ2-1}.CB-K1	0.80	0.80	0.79	0.01	99.28	4.43	453.17	0.17	0 00:05	0.00	0.00
11	{STORM BJ2-1}.CB-M1	1.33	1.23	N/A	N/A	N/A	6.27	450.30	0.36	0 00:05	0.00	0.00
12	{STORM BJ2-1}.CB-N1	1.59	1.59	1.51	0.08	94.98	7.72	444.61	0.24	0 00:05	0.00	0.00
13	CB-F3	0.90	0.88	0.71	0.19	78.85	4.74	459.89	0.18	0 00:05	0.00	0.00
14	CB-H3	1.10	1.05	1.07	0.03	97.54	5.59	459.76	0.20	0 00:05	0.00	0.00
15	CB-H8	0.84	0.84	0.83	0.01	99.22	4.59	444.55	0.18	0 00:06	0.00	0.00

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Project Description

File Name	Benjamin Grove Phase 2 Drainage 100 year R5.SPF
Description	J:\Projects\2016 Projects\16025 Benjamin Grove Lee Pengelly\Calcs\Phase 2\Benjamin Grove Drainage map phase 2 r6.dwg

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Jan 24, 2017	00:00:00
End Analysis On	Jan 25, 2017	00:00:00
Start Reporting On	Jan 24, 2017	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	33
Nodes	27
Junctions	9
Outfalls	3
Flow Diversions	0
Inlets	15
Storage Nodes	0
Links	35
Channels	15
Pipes	20
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	100 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	{STORM PHASE 2}.1	0.06	0.9500	0.83	0.79	0.05	0.57	0 00:05:00
2	{STORM PHASE 2}.10	0.11	0.9500	0.83	0.79	0.08	1.01	0 00:05:00
3	{STORM PHASE 2}.11	0.43	0.5200	2.81	1.46	0.63	1.29	0 00:29:21
4	{STORM PHASE 2}.12	0.10	0.9500	0.83	0.79	0.08	0.92	0 00:05:00
5	{STORM PHASE 2}.13	0.81	0.5200	3.12	1.62	1.32	2.12	0 00:37:09
6	{STORM PHASE 2}.14	0.11	0.9500	0.83	0.79	0.09	1.08	0 00:05:00
7	{STORM PHASE 2}.15	0.67	0.5200	3.29	1.71	1.15	1.63	0 00:42:28
8	{STORM PHASE 2}.17	0.35	0.5200	2.93	1.52	0.54	1.01	0 00:31:55
9	{STORM PHASE 2}.19	0.11	0.9500	0.83	0.79	0.09	1.05	0 00:05:00
10	{STORM PHASE 2}.2	0.18	0.5200	2.90	1.51	0.27	0.53	0 00:31:18
11	{STORM PHASE 2}.25	0.05	0.5200	1.78	0.92	0.05	0.23	0 00:13:22
12	{STORM PHASE 2}.27	0.07	0.9500	0.83	0.79	0.05	0.62	0 00:05:00
13	{STORM PHASE 2}.28	0.19	0.9500	0.83	0.79	0.15	1.81	0 00:05:00
14	{STORM PHASE 2}.29	0.11	0.5200	1.85	0.96	0.10	0.44	0 00:14:10
15	{STORM PHASE 2}.3	0.20	0.9500	0.83	0.79	0.16	1.90	0 00:05:00
16	{STORM PHASE 2}.30	0.13	0.9500	0.83	0.79	0.10	1.22	0 00:05:00
17	{STORM PHASE 2}.31	0.39	0.5200	2.51	1.30	0.50	1.26	0 00:24:04
18	{STORM PHASE 2}.35	0.97	0.5200	3.03	1.58	1.53	2.64	0 00:34:37
19	{STORM PHASE 2}.36	0.07	0.9500	0.83	0.79	0.05	0.63	0 00:05:00
20	{STORM PHASE 2}.37	0.09	0.9500	0.83	0.79	0.07	0.86	0 00:05:00
21	{STORM PHASE 2}.38	0.17	0.5200	2.29	1.19	0.20	0.59	0 00:20:15
22	{STORM PHASE 2}.39	0.02	0.9500	0.83	0.79	0.01	0.14	0 00:05:00
23	{STORM PHASE 2}.4	0.10	0.9500	0.83	0.79	0.08	0.96	0 00:05:00
24	{STORM PHASE 2}.40	0.10	0.9500	0.83	0.79	0.08	0.95	0 00:05:00
25	{STORM PHASE 2}.41	0.20	0.9500	0.83	0.79	0.16	1.89	0 00:05:00
26	{STORM PHASE 2}.45	0.07	0.9500	0.83	0.79	0.05	0.64	0 00:05:00
27	{STORM PHASE 2}.48	0.09	0.9500	0.83	0.79	0.07	0.86	0 00:05:00
28	{STORM PHASE 2}.5	0.13	0.5200	2.45	1.28	0.17	0.45	0 00:23:00
29	{STORM PHASE 2}.6	0.13	0.9500	0.83	0.79	0.10	1.22	0 00:05:00
30	{STORM PHASE 2}.8	0.36	0.9500	0.83	0.79	0.29	3.42	0 00:05:00
31	{STORM PHASE 2}.9	0.80	0.5200	2.93	1.52	1.21	2.28	0 00:31:55
32	49	23.80	0.5000	5.06	2.53	60.19	29.05	0 02:04:19
33	50	14.60	0.5000	4.15	2.07	30.28	24.28	0 01:14:48

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.FES - L1	Junction	447.00	450.00	447.00	450.00	0.00	2.64	447.47	0.00	2.53	0 00:00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	Junction	443.25	445.00	443.25	445.00	0.00	28.85	444.65	0.00	0.60	0 00:00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	Junction	443.00	445.00	443.00	445.00	0.00	28.85	444.57	0.00	0.45	0 00:00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	Junction	451.28	455.85	451.28	455.85	0.00	6.40	452.01	0.00	3.84	0 00:00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	Junction	445.40	449.19	445.40	449.19	0.00	10.69	446.52	0.00	2.67	0 00:00	0.00	0.00
6	FES-F1	Junction	448.75	457.43	448.75	457.43	0.00	29.05	450.15	0.00	7.28	0 00:00	0.00	0.00
7	FES-P1_KBBARNES	Junction	433.25	435.00	433.25	435.00	0.00	39.46	434.82	0.00	0.43	0 00:00	0.00	0.00
8	FES-P2_KBBARNES	Junction	433.00	435.00	433.00	435.00	0.00	39.45	434.57	0.00	0.43	0 00:00	0.00	0.00
9	StartNullStruct41	Junction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00:00	0.00	0.00
10	{STORM BJ2-1}.FES-H9	Outfall	439.50					13.56	443.33					
11	GUTTER-OUT1	Outfall	440.00					0.17	443.89					
12	KBBARNES-OUT1	Outfall	431.98					39.25	432.93					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)
1	{STORM BJ2-1}.PIPE - H7	Pipe	{STORM BJ2-1}.CB-H7	CB-H8	180.51	444.90	440.35	2.5200	18.000	0.0130	11.17	16.68	0.67	10.15	0.90
2	{STORM BJ2-1}.PIPE - H8	Pipe	CB-H8	{STORM BJ2-1}.FES-H9	31.04	440.25	439.50	2.4200	18.000	0.0130	13.44	16.33	0.82	10.32	1.04
3	{STORM BJ2-1}.PIPE - L1	Pipe	{STORM BJ2-1}.FES - L1	{STORM BJ2-1}.JB-H6	84.01	447.00	445.50	1.7900	18.000	0.0150	2.64	12.16	0.22	5.50	0.47
4	{STORM BJ2-1}.PIPE - M1	Pipe	{STORM BJ2-1}.CB-M1	{STORM BJ2-1}.JB-H6	48.34	446.66	445.50	2.4000	18.000	0.0130	1.70	16.27	0.10	5.97	0.33
5	{STORM BJ2-1}.PIPE - N1	Pipe	{STORM BJ2-1}.CB-N1	CB-H8	32.00	440.80	440.35	1.4100	18.000	0.0130	1.71	12.46	0.14	4.95	0.37
6	{STORM BJ2-1}.PIPE F1	Pipe	{STORM BJ2-1}.CB-F2	FES-F1	99.06	449.34	448.75	0.6000	18.000	0.0130	7.86	8.11	0.97	5.29	1.19
7	{STORM BJ2-1}.PIPE F2	Pipe	CB-F3	{STORM BJ2-1}.CB-F2	250.16	456.00	449.44	2.6200	18.000	0.0130	2.83	17.01	0.17	7.20	0.41
8	{STORM BJ2-1}.PIPE G1	Pipe	{STORM BJ2-1}.CB-G1	CB-F3	32.00	456.60	456.10	1.5600	18.000	0.0130	1.55	13.13	0.12	5.79	0.35
9	{STORM BJ2-1}.PIPE H5	Pipe	{STORM BJ2-1}.CB-H5	{STORM BJ2-1}.JB-H6	183.29	449.00	445.50	1.9100	18.000	0.0130	8.65	14.52	0.60	8.61	0.83
10	{STORM BJ2-1}.PIPE -H6	Pipe	{STORM BJ2-1}.JB-H6	{STORM BJ2-1}.CB-H7	31.79	445.40	445.00	1.2600	18.000	0.0130	10.69	11.78	0.91	7.55	1.12
11	{STORM BJ2-1}.PIPE_F3	Pipe	{STORM BJ2-1}.CB-F4	CB-F3	199.59	460.23	456.10	2.0700	18.000	0.0130	0.53	15.11	0.04	4.52	0.19
12	{STORM BJ2-1}.PIPE-H1	Pipe	{STORM BJ2-1}.CB-H1	{STORM BJ2-1}.CB-H2	32.00	458.25	457.75	1.5600	18.000	0.0130	1.19	13.13	0.09	4.62	0.30
13	{STORM BJ2-1}.PIPE-H2	Pipe	{STORM BJ2-1}.CB-H2	CB-H3	191.94	457.65	455.90	0.9100	18.000	0.0130	2.69	10.03	0.27	4.87	0.53
14	{STORM BJ2-1}.PIPE-H3	Pipe	CB-H3	{STORM BJ2-1}.JB-H4	260.88	455.80	451.38	1.6900	18.000	0.0130	5.05	13.67	0.37	7.22	0.63
15	{STORM BJ2-1}.PIPE-H4	Pipe	{STORM BJ2-1}.JB-H4	{STORM BJ2-1}.CB-H5	96.77	451.28	449.10	2.2500	18.000	0.0130	6.39	15.77	0.41	8.47	0.66
16	{STORM BJ2-1}.PIPE-I1	Pipe	{STORM BJ2-1}.CB-I1	CB-H3	32.00	456.40	455.90	1.5600	18.000	0.0130	1.71	13.13	0.13	5.14	0.37
17	{STORM BJ2-1}.PIPE-J1	Pipe	{STORM BJ2-1}.CB-J1	{STORM BJ2-1}.JB-H4	48.34	451.75	451.38	0.7700	18.000	0.0130	2.71	9.19	0.29	4.52	0.56
18	{STORM BJ2-1}.PIPE-K1	Pipe	{STORM BJ2-1}.CB-K1	{STORM BJ2-1}.CB-H5	32.00	449.60	449.10	1.5600	18.000	0.0130	0.94	13.13	0.07	4.97	0.27
19	{STORM BJ2-1}.PIPE-O1	Pipe	{STORM BJ2-1}.FES-O1 LULU	{STORM BJ2-1}.FES-O2_LULU	29.87	443.15	443.02	0.4400	24.000	0.0150	28.85	34.48	0.84	6.14	1.40
20	{STORM BJ2-1}.PIPE-P1	Pipe	FES-P1_KBBARNES	FES-P2_KBBARNES	22.81	433.25	433.00	1.1000	24.000	0.0150	39.45	41.06	0.96	7.44	1.57
21	BYPASS_K1	Channel	{STORM BJ2-1}.CB-K1	{STORM BJ2-1}.CB-N1	395.48	453.99	444.81	2.3200	6.000	0.0130	0.01	20.05	0.00	3.52	0.02
22	BYPASS_N1	Channel	{STORM BJ2-1}.CB-N1	GUTTER-OUT1	29.94	444.81	443.80	3.3700	6.000	0.0130	0.17	18.75	0.01	4.19	0.08
23	DITCH-01	Channel	FES-F1	{STORM BJ2-1}.FES-O1 LULU	424.00	448.75	443.02	1.3500	24.000	0.0800	28.85	62.45	0.46	1.97	1.39
24	DITCH-02	Channel	{STORM BJ2-1}.FES-O2_LULU	FES-P1_KBBARNES	970.00	443.00	433.25	1.0100	24.000	0.0800	28.51	47.45	0.60	1.91	1.56
25	DITCH-03	Channel	FES-P2_KBBARNES	KBBARNES-OUT1	262.00	433.00	431.98	0.3900	24.000	0.0320	39.25	289.59	0.14	1.76	0.95
26	GUTTER_F2	Channel	CB-F3	{STORM BJ2-1}.CB-F2	250.05	461.10	453.34	3.1000	6.000	0.0130	0.23	18.90	0.01	3.14	0.09
27	GUTTER_F3	Channel	{STORM BJ2-1}.CB-F4	CB-F3	199.54	465.23	461.10	2.0700	6.000	0.0130	0.08	21.08	0.00	3.34	0.06
28	GUTTER_G1	Channel	{STORM BJ2-1}.CB-G1	{STORM BJ2-1}.CB-F2	245.65	460.52	453.34	2.9200	6.000	0.0130	0.27	19.52	0.01	6.39	0.10
29	GUTTER_H2	Channel	{STORM BJ2-1}.CB-H2	CB-H3	191.92	462.65	459.83	1.4700	6.000	0.0130	0.30	12.23	0.02	4.63	0.12
30	GUTTER_H7	Channel	{STORM BJ2-1}.CB-H7	CB-H8	180.42	450.00	445.14	2.6900	6.000	0.0130	0.00	20.34	0.00	0.00	0.00
31	GUTTER_H8	Channel	CB-H8	{STORM BJ2-1}.FES-H9	31.05	445.14	443.30	5.9300	6.000	0.0130	0.01	25.22	0.00	1.40	0.03
32	GUTTER_I1	Channel	{STORM BJ2-1}.CB-H1	{STORM BJ2-1}.CB-I1	191.92	462.65	461.09	0.8100	6.000	0.0130	0.10	14.64	0.01	3.68	0.08
33	GUTTER-H3	Channel	CB-H3	{STORM BJ2-1}.CB-H5	260.86	459.83	454.37	2.0900	6.000	0.0130	0.08	19.15	0.00	5.24	0.06
34	GUTTER-H5	Channel	{STORM BJ2-1}.CB-H5	{STORM BJ2-1}.CB-M1	155.79	454.37	451.66	1.7400	6.000	0.0130	0.31	18.59	0.02	5.04	0.11
35	GUTTER-J1	Channel	{STORM BJ2-1}.CB-I1	{STORM BJ2-1}.CB-J1	224.65	461.09	457.58	1.5600	6.000	0.0130	0.43	16.02	0.03	2.82	0.13

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
0.60	0.00	Calculated
0.69	0.00	Calculated
0.32	0.00	Calculated
0.22	0.00	Calculated
0.25	0.00	Calculated
0.79	0.00	Calculated
0.28	0.00	Calculated
0.23	0.00	Calculated
0.56	0.00	Calculated
0.75	0.00	Calculated
0.13	0.00	Calculated
0.20	0.00	Calculated
0.35	0.00	Calculated
0.42	0.00	Calculated
0.44	0.00	Calculated
0.24	0.00	Calculated
0.37	0.00	Calculated
0.18	0.00	Calculated
0.70	0.00	Calculated
0.79	0.00	Calculated
0.04	0.00	
0.17	0.00	
0.70	0.00	
0.78	0.00	
0.47	0.00	
0.19	0.00	
0.12	0.00	
0.19	0.00	
0.24	0.00	
0.00	0.00	
0.05	0.00	
0.15	0.00	
0.11	0.00	
0.21	0.00	
0.26	0.00	

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	{STORM BJ2-1}.CB-F2	FHWA HEC-22 GENERIC	N/A	On Sag	1	449.34	454.86	449.34	0.00	5.20	N/A	N/A	N/A	12.00	13.75	455.39
2	{STORM BJ2-1}.CB-F4	FHWA HEC-22 GENERIC	N/A	On Grade	1	460.23	464.52	460.23	N/A	0.65	0.54	0.11	83.19	12.00	4.52	464.67
3	{STORM BJ2-1}.CB-G1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.60	459.94	456.60	N/A	1.90	1.55	0.35	81.63	12.00	7.55	460.16
4	{STORM BJ2-1}.CB-H1	FHWA HEC-22 GENERIC	N/A	On Grade	1	458.25	461.79	458.25	N/A	1.29	1.19	0.10	91.93	12.00	6.36	461.98
5	{STORM BJ2-1}.CB-H2	FHWA HEC-22 GENERIC	N/A	On Grade	1	457.65	461.12	457.65	N/A	2.00	1.61	0.40	80.21	12.00	7.73	461.34
6	{STORM BJ2-1}.CB-H5	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.00	452.86	449.00	N/A	1.96	1.59	0.36	81.37	12.00	7.74	453.08
7	{STORM BJ2-1}.CB-H7	FHWA HEC-22 GENERIC	N/A	On Grade	1	444.90	448.42	444.90	N/A	0.63	0.63	0.00	100.00	12.00	4.66	448.60
8	{STORM BJ2-1}.CB-I1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.40	459.56	456.40	N/A	2.15	1.71	0.44	79.60	12.00	8.23	459.79
9	{STORM BJ2-1}.CB-J1	FHWA HEC-22 GENERIC	N/A	On Sag	1	451.75	456.44	451.75	0.00	2.71	N/A	N/A	N/A	12.00	10.19	456.87
10	{STORM BJ2-1}.CB-K1	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.60	452.99	449.60	N/A	0.95	0.94	0.01	99.09	12.00	5.00	453.18
11	{STORM BJ2-1}.CB-M1	FHWA HEC-22 GENERIC	N/A	On Sag	1	446.66	449.94	446.66	0.00	1.70	N/A	N/A	N/A	12.00	7.43	450.32
12	{STORM BJ2-1}.CB-N1	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.80	444.37	440.80	N/A	1.89	1.72	0.17	90.75	12.00	8.36	444.62
13	CB-F3	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.00	459.71	456.00	N/A	1.09	0.81	0.28	74.27	12.00	5.34	459.90
14	CB-H3	FHWA HEC-22 GENERIC	N/A	On Grade	1	455.80	459.56	455.80	N/A	1.38	1.29	0.09	93.22	12.00	6.32	459.77
15	CB-H8	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.25	444.37	440.25	N/A	1.01	1.00	0.01	98.82	12.00	5.21	444.56

Subbasin Hydrology

Subbasin : {STORM PHASE 2}.1

Input Data

Area (ac) 0.06
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.06	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.06		0.95

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	193	0.00	0.00
Slope (%) :	1.2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.23	0.00	0.00
Computed Flow Time (min) :	1.44	0.00	0.00

Total TOC (min) 1.70

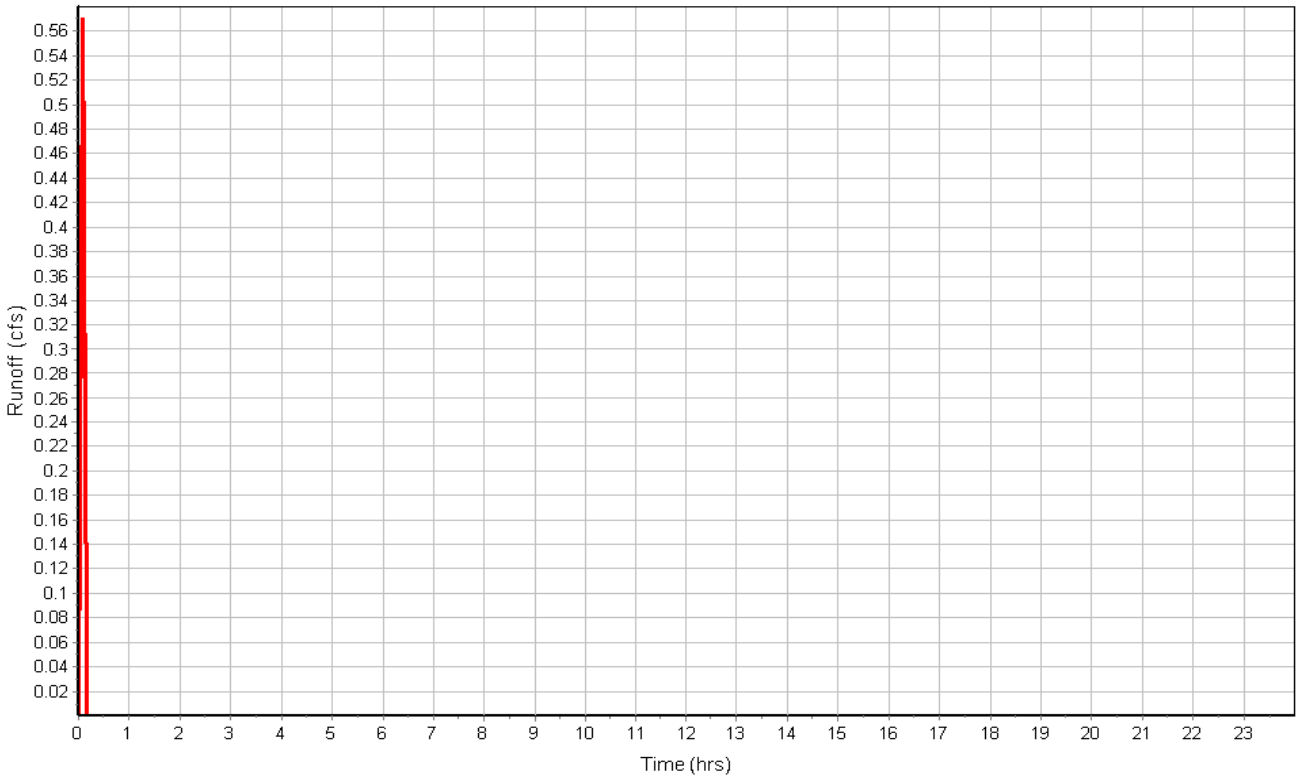
Subbasin Runoff Results

Total Rainfall (in)	0.83
Total Runoff (in)	0.79
Peak Runoff (cfs)	0.57
Rainfall Intensity	10.000
Weighted Runoff Coefficient	0.9500
Time of Concentration (days hh:mm:ss)	0 00:01:42

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.1

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.10

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	209	0.00	0.00
Slope (%) :	0.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.91	0.00	0.00
Computed Flow Time (min) :	3.83	0.00	0.00

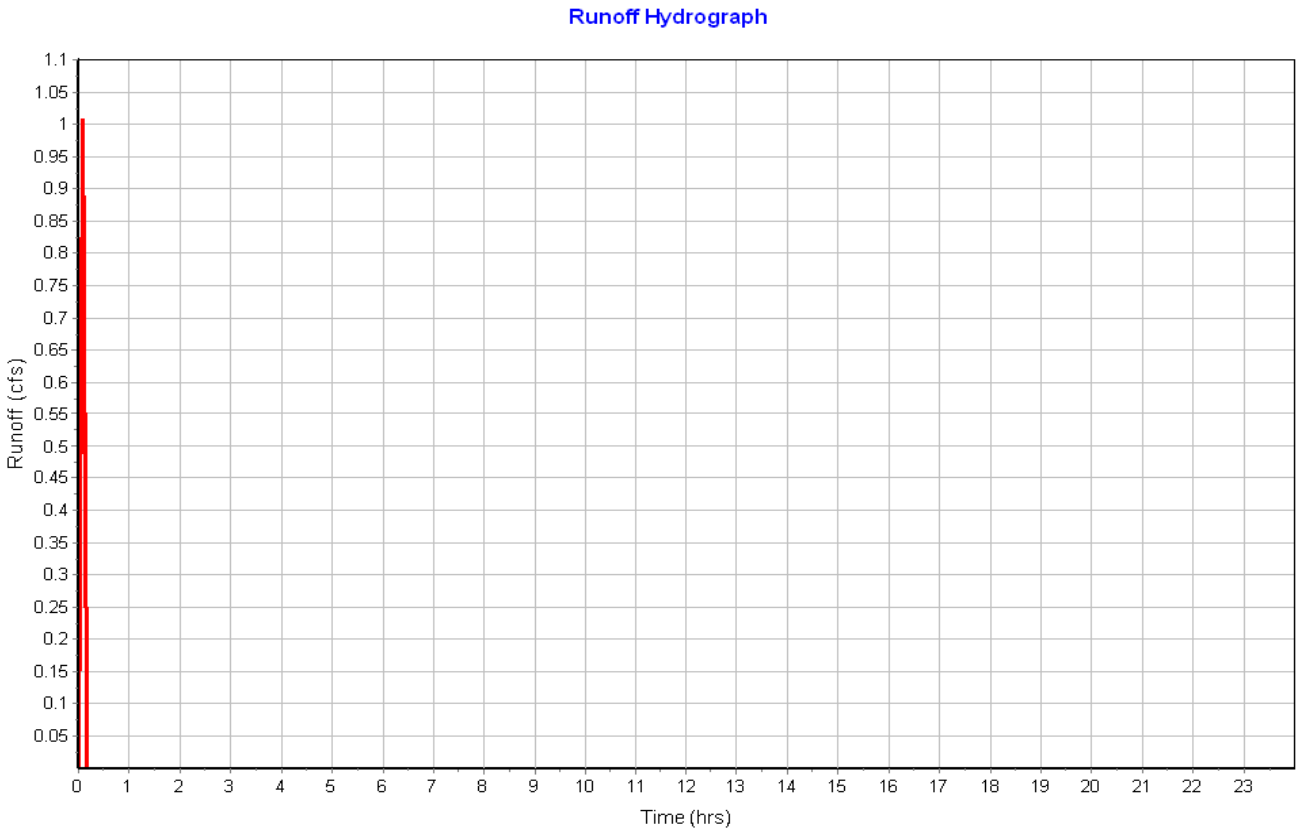
Total TOC (min) 3.83

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.01
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:50

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.10



Subbasin : {STORM PHASE 2}.11

Input Data

Area (ac) 0.43
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.43	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.43		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	233	0.00	0.00
Slope (%) :	1.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	29.36	0.00	0.00

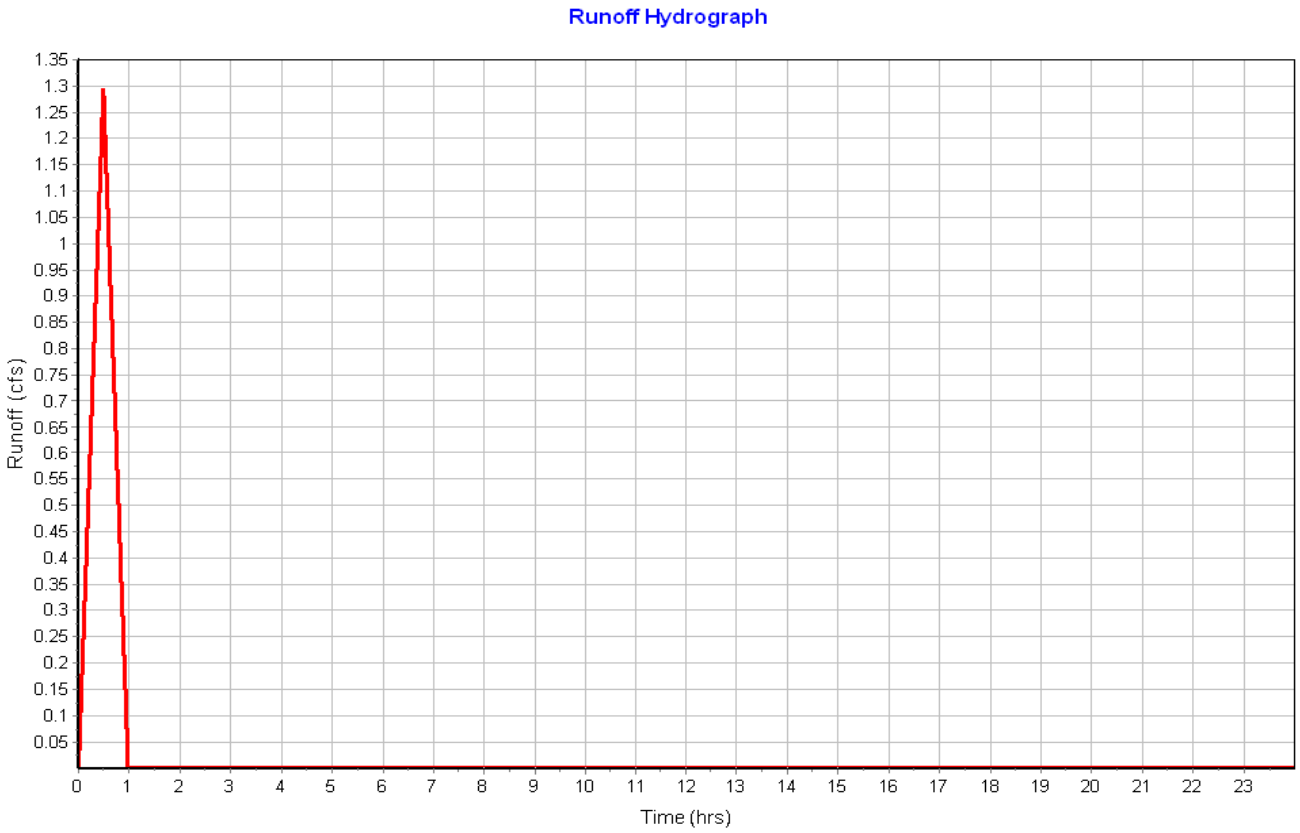
Total TOC (min) 29.36

Subbasin Runoff Results

Total Rainfall (in) 2.81
Total Runoff (in) 1.46
Peak Runoff (cfs) 1.29
Rainfall Intensity 5.754
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:29:22

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.11



Subbasin : {STORM PHASE 2}.12

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	183	0.00	0.00
Slope (%) :	1.2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.26	0.00	0.00
Computed Flow Time (min) :	2.43	0.00	0.00

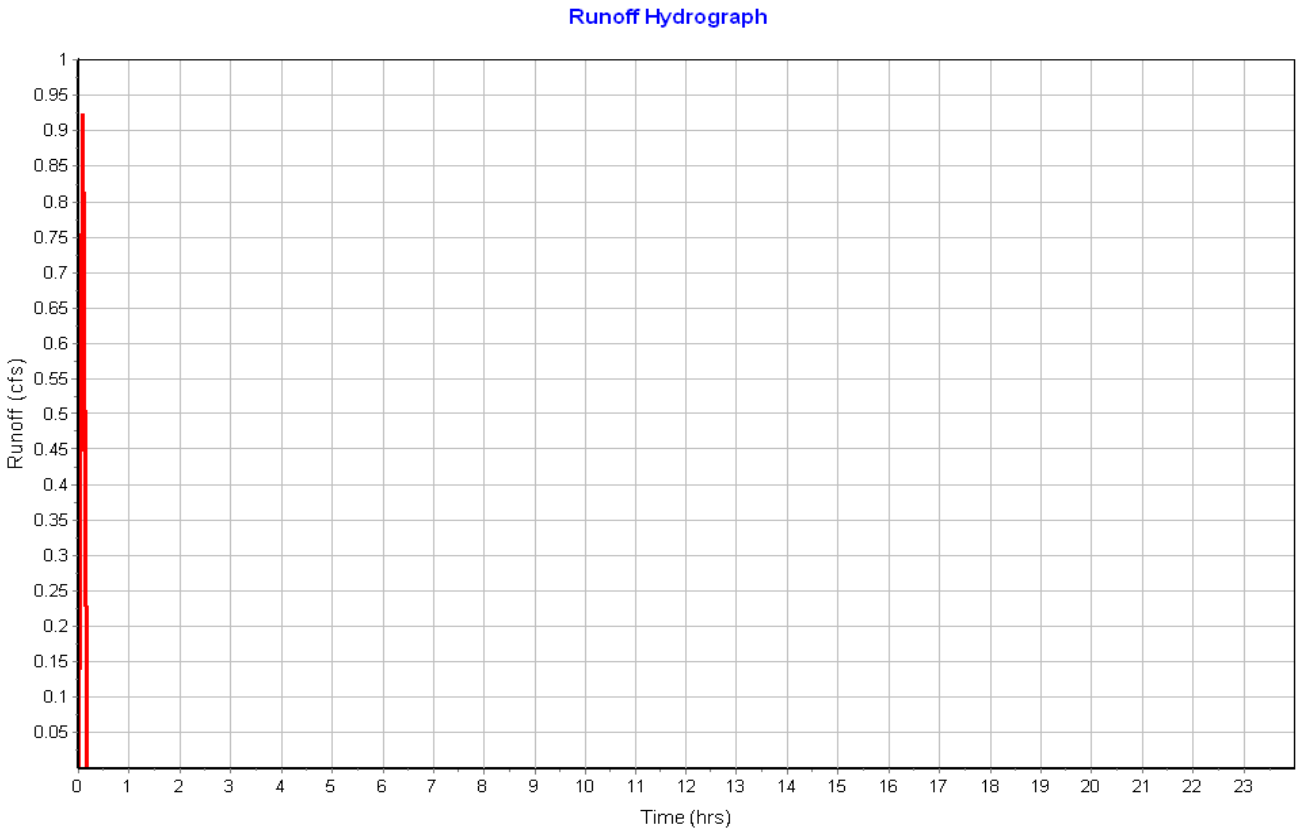
Total TOC (min) 2.43

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.92
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:26

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.12



Subbasin : {STORM PHASE 2}.13

Input Data

Area (ac) 0.81
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.81	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.81		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	336	0.00	0.00
Slope (%) :	1.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	37.16	0.00	0.00

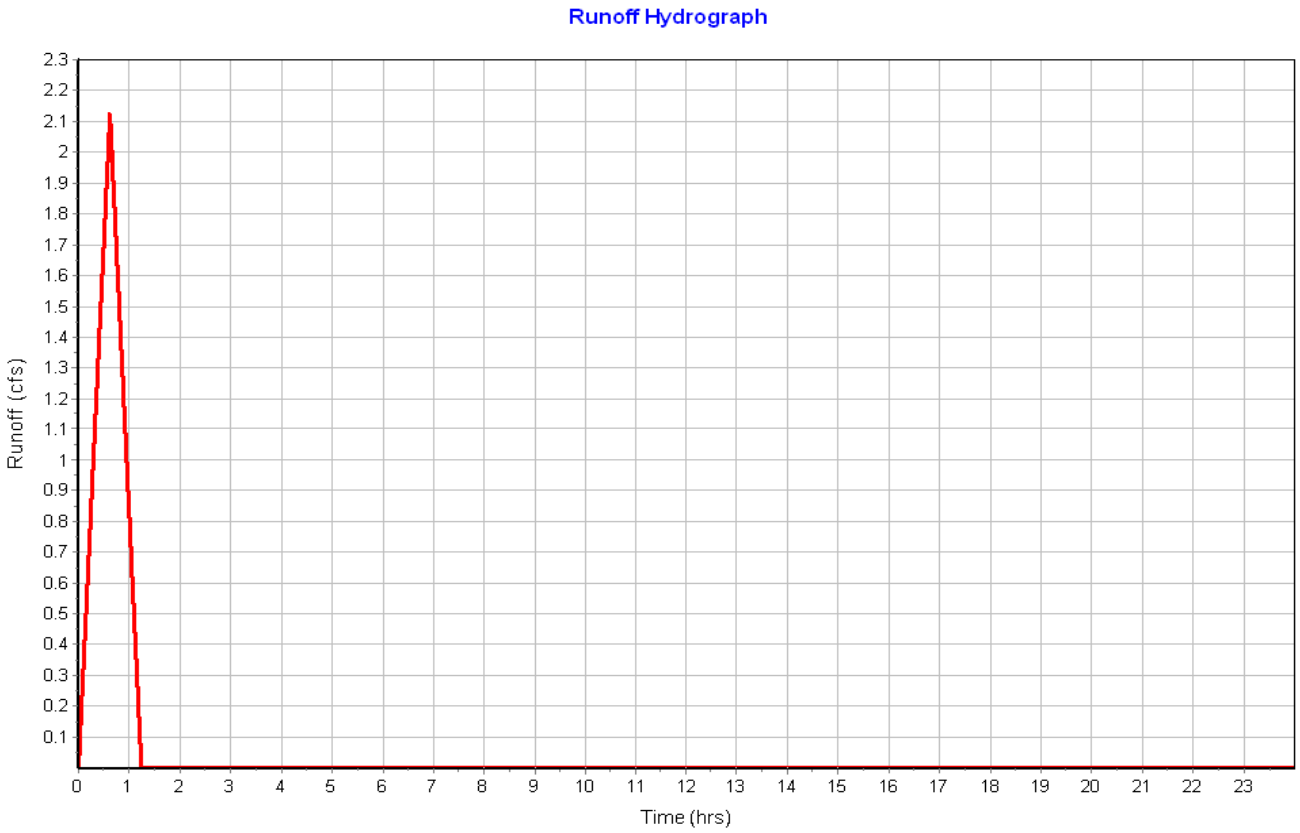
Total TOC (min) 37.16

Subbasin Runoff Results

Total Rainfall (in) 3.12
Total Runoff (in) 1.62
Peak Runoff (cfs) 2.12
Rainfall Intensity 5.029
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:37:10

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.13



Subbasin : {STORM PHASE 2}.14

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	1.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.32	0.00	0.00
Computed Flow Time (min) :	2.52	0.00	0.00

Total TOC (min) 2.52

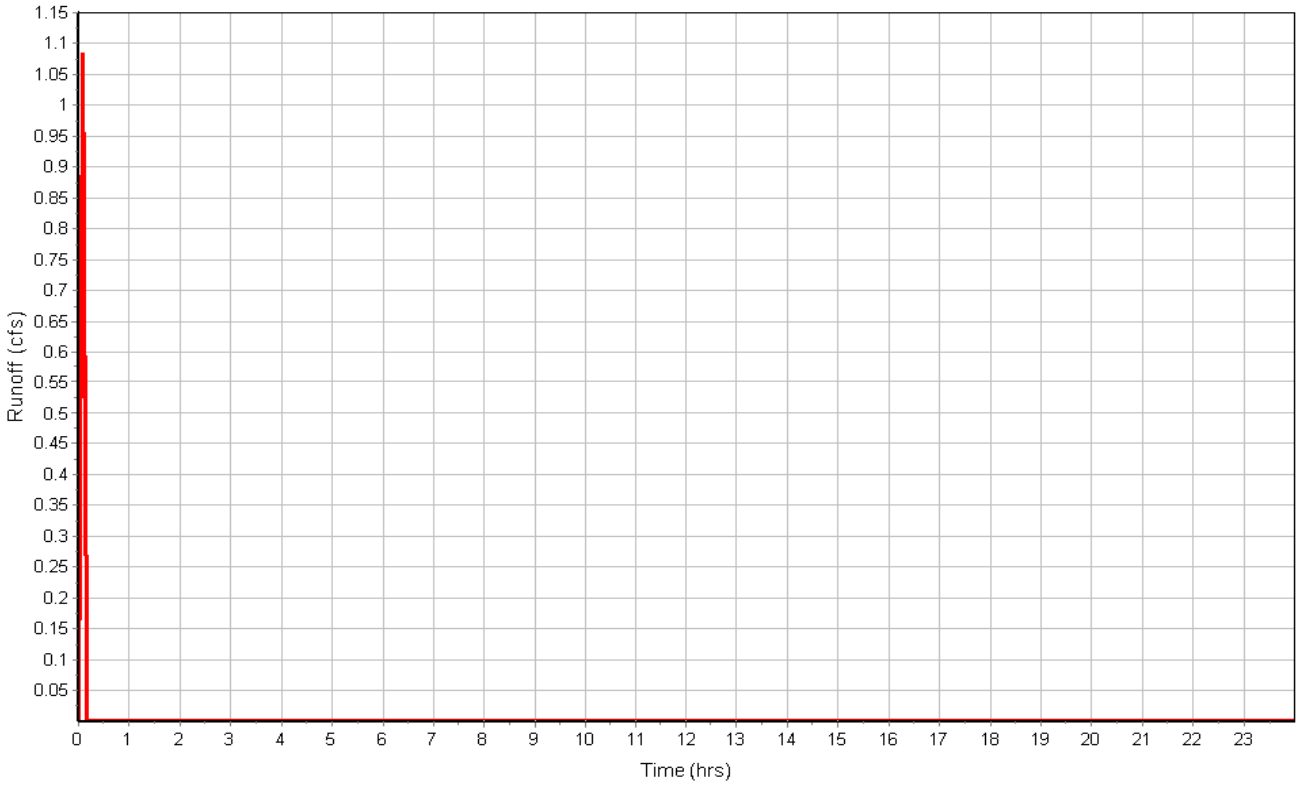
Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.08
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:31

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.14

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.15

Input Data

Area (ac) 0.67
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.67	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.67		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	447	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.18	0.00	0.00
Computed Flow Time (min) :	42.48	0.00	0.00

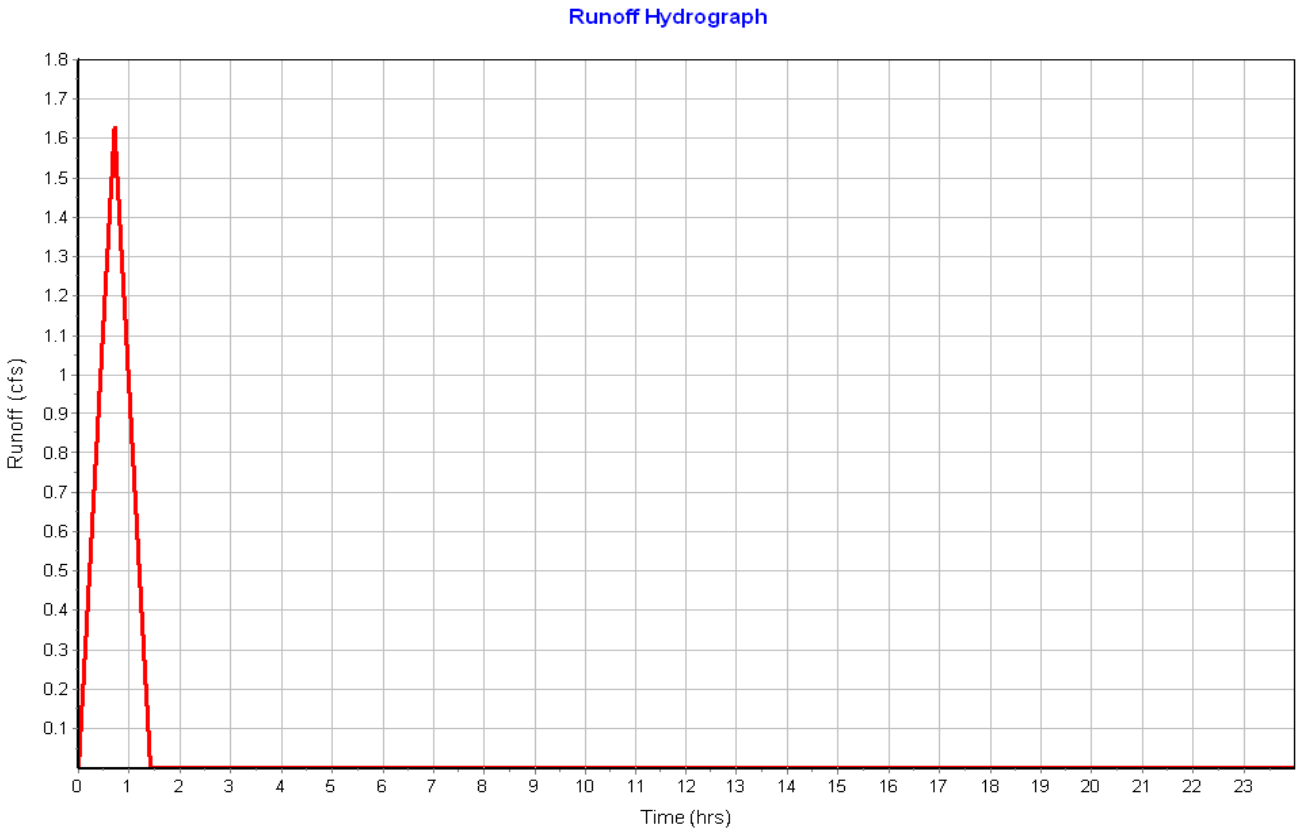
Total TOC (min) 42.48

Subbasin Runoff Results

Total Rainfall (in) 3.29
Total Runoff (in) 1.71
Peak Runoff (cfs) 1.63
Rainfall Intensity 4.651
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:42:29

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.15



Subbasin : {STORM PHASE 2}.17

Input Data

Area (ac) 0.35
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.35	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.35		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	321	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	31.93	0.00	0.00

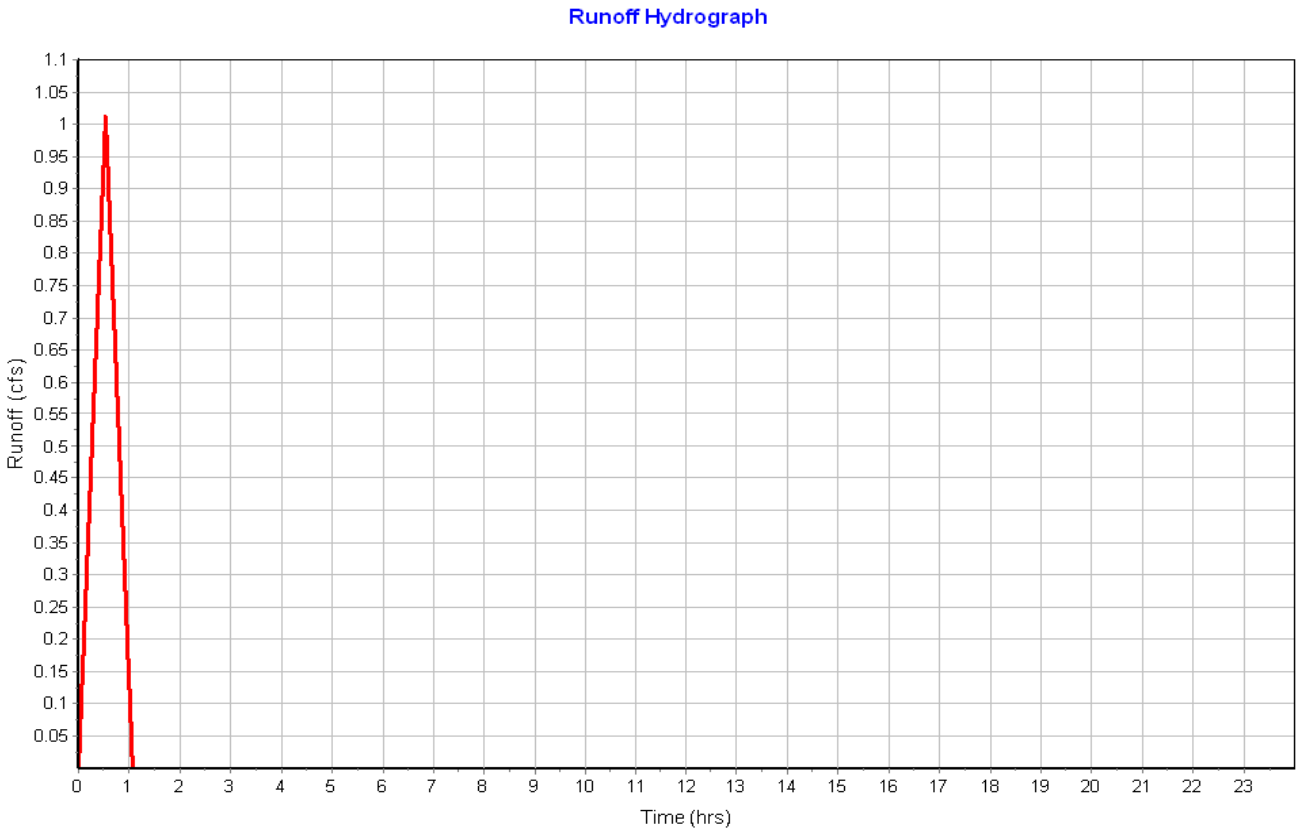
Total TOC (min) 31.93

Subbasin Runoff Results

Total Rainfall (in) 2.93
Total Runoff (in) 1.52
Peak Runoff (cfs) 1.01
Rainfall Intensity 5.496
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:56

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.17



Subbasin : {STORM PHASE 2}.19

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.11	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.11		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	217	0.00	0.00
Slope (%) :	0.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	3.94	0.00	0.00

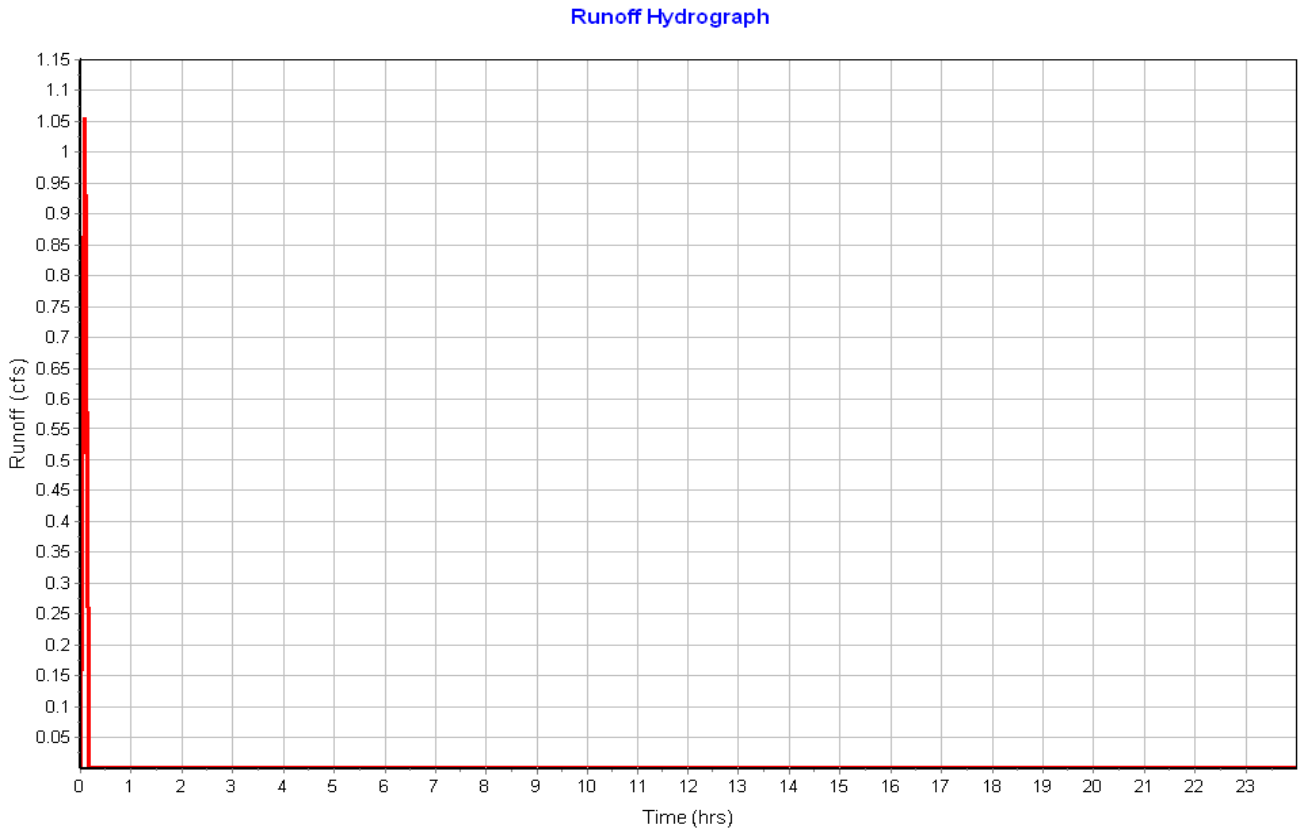
Total TOC (min) 3.94

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.05
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:56

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.19



Subbasin : {STORM PHASE 2}.2

Input Data

Area (ac) 0.18
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.18	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.18		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	198	0.00	0.00
Slope (%) :	0.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.11	0.00	0.00
Computed Flow Time (min) :	31.30	0.00	0.00

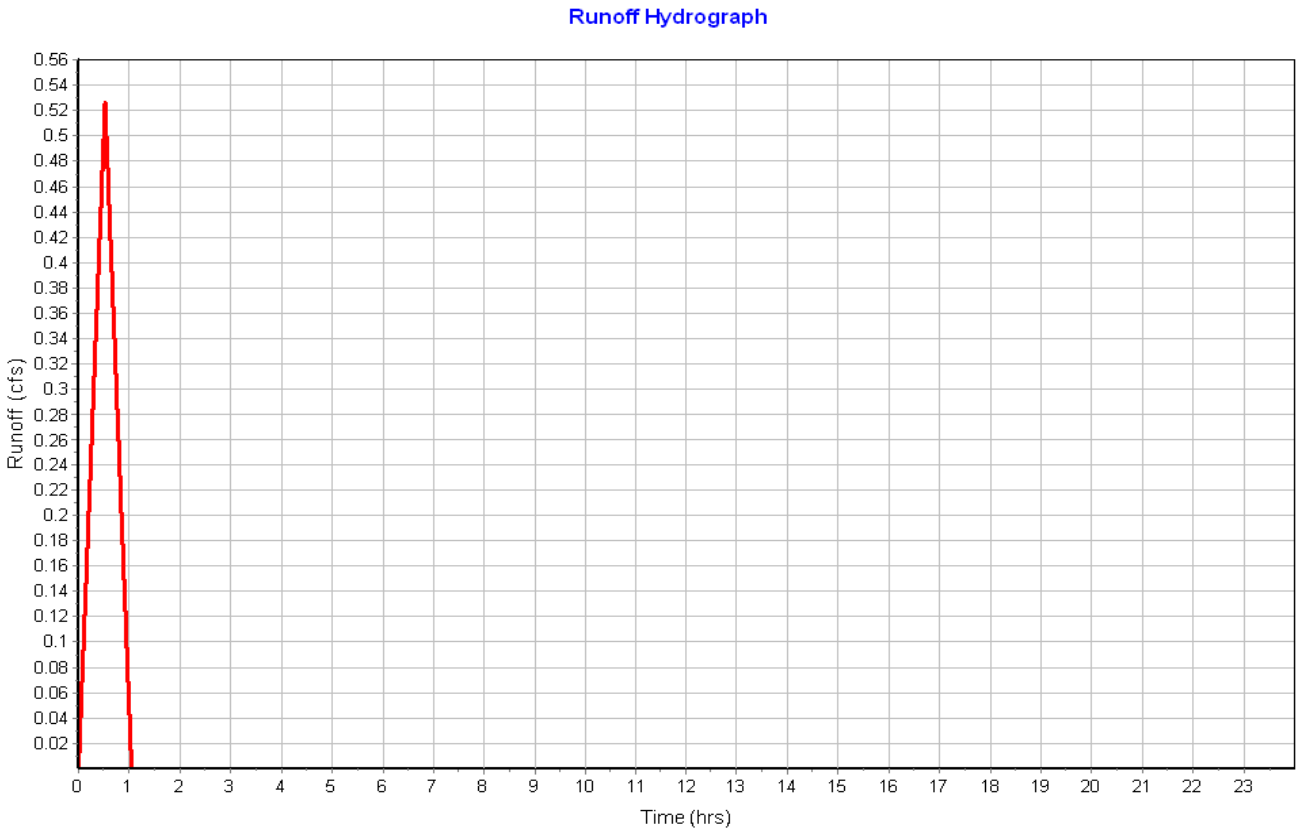
Total TOC (min) 31.30

Subbasin Runoff Results

Total Rainfall (in) 2.90
Total Runoff (in) 1.51
Peak Runoff (cfs) 0.53
Rainfall Intensity 5.560
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:18

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.2



Subbasin : {STORM PHASE 2}.25

Input Data

Area (ac) 0.05
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.05	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.05		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	121	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	13.38	0.00	0.00

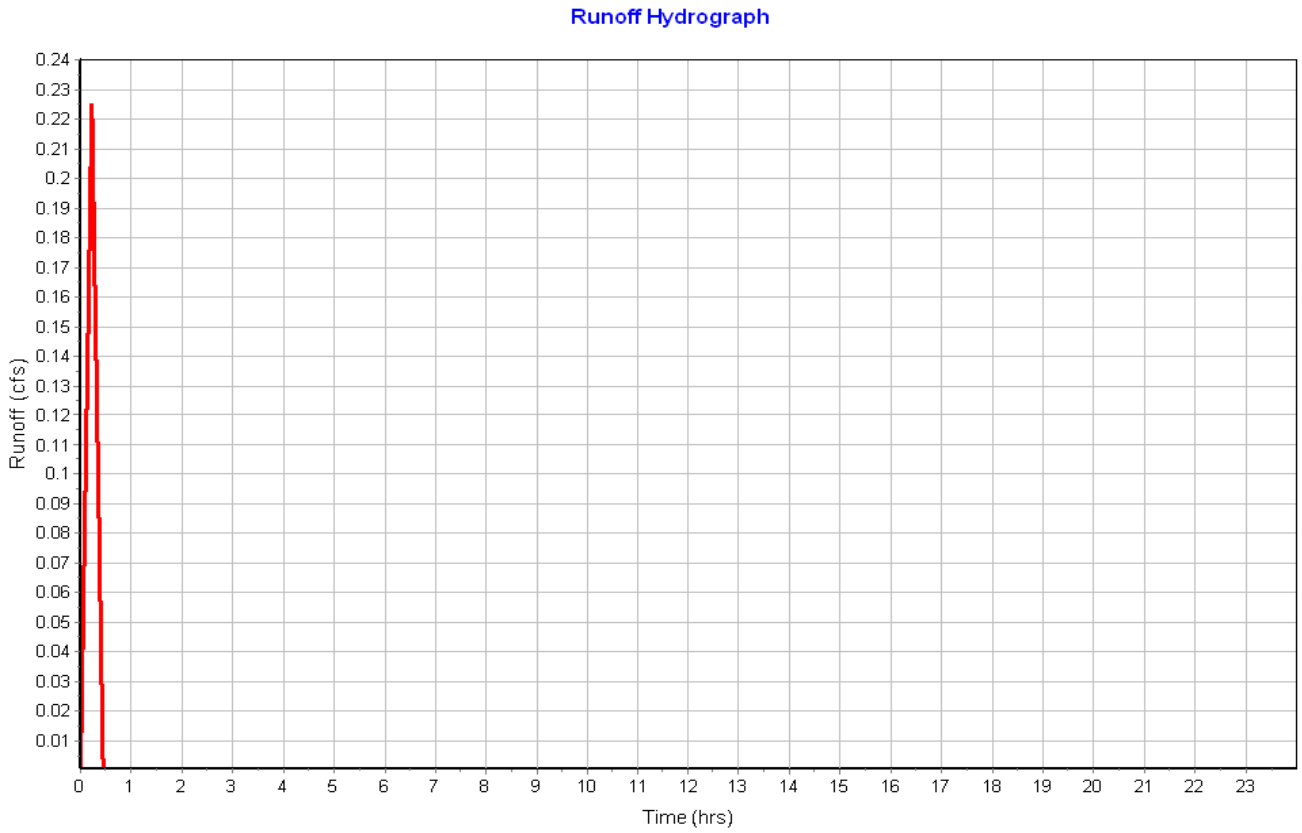
Total TOC (min) 13.38

Subbasin Runoff Results

Total Rainfall (in) 1.78
Total Runoff (in) 0.92
Peak Runoff (cfs) 0.23
Rainfall Intensity 7.995
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:13:23

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.25



Subbasin : {STORM PHASE 2}.27

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	133	0.00	0.00
Slope (%) :	1.7	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.36	0.00	0.00
Computed Flow Time (min) :	1.63	0.00	0.00

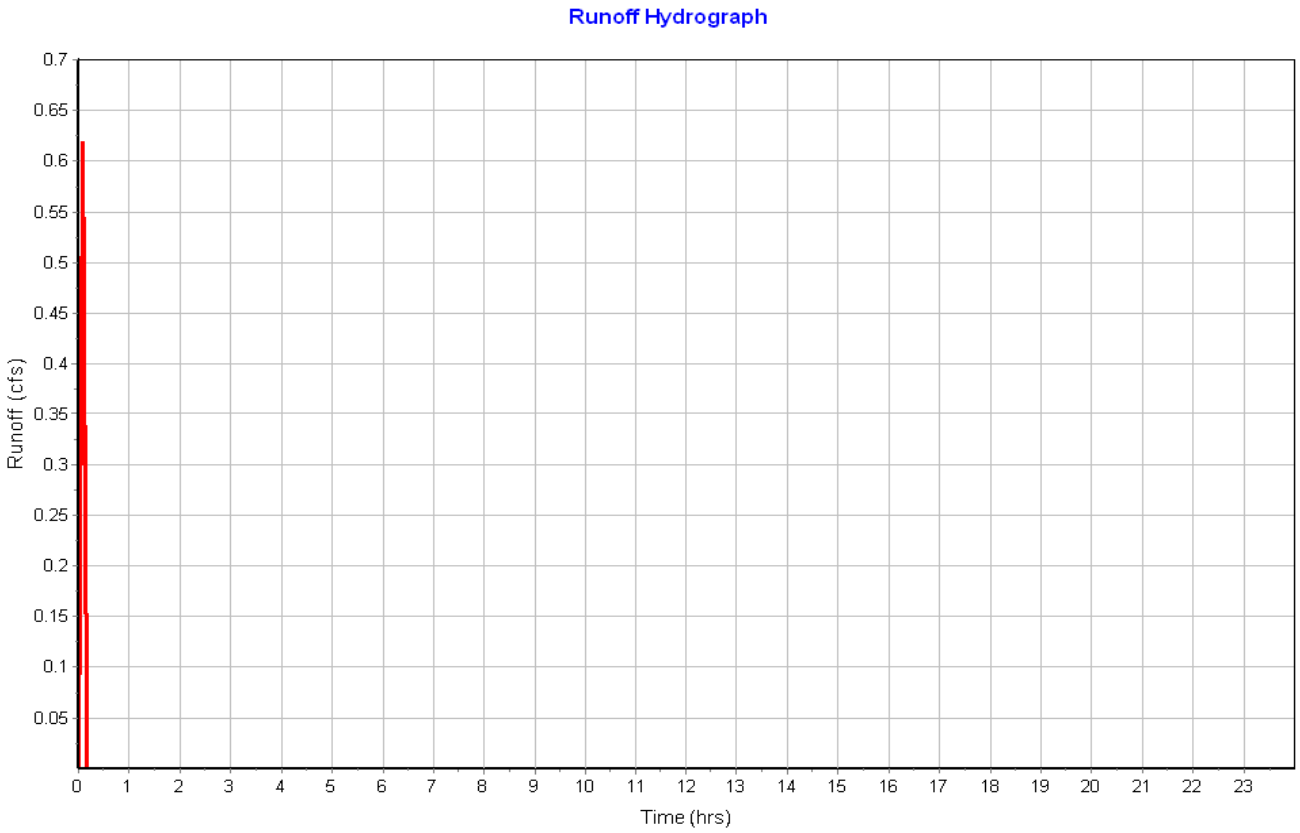
Total TOC (min) 1.63

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.62
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:38

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.27



Subbasin : {STORM PHASE 2}.28

Input Data

Area (ac) 0.19
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.19	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.19		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	351	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.76	0.00	0.00
Computed Flow Time (min) :	3.33	0.00	0.00

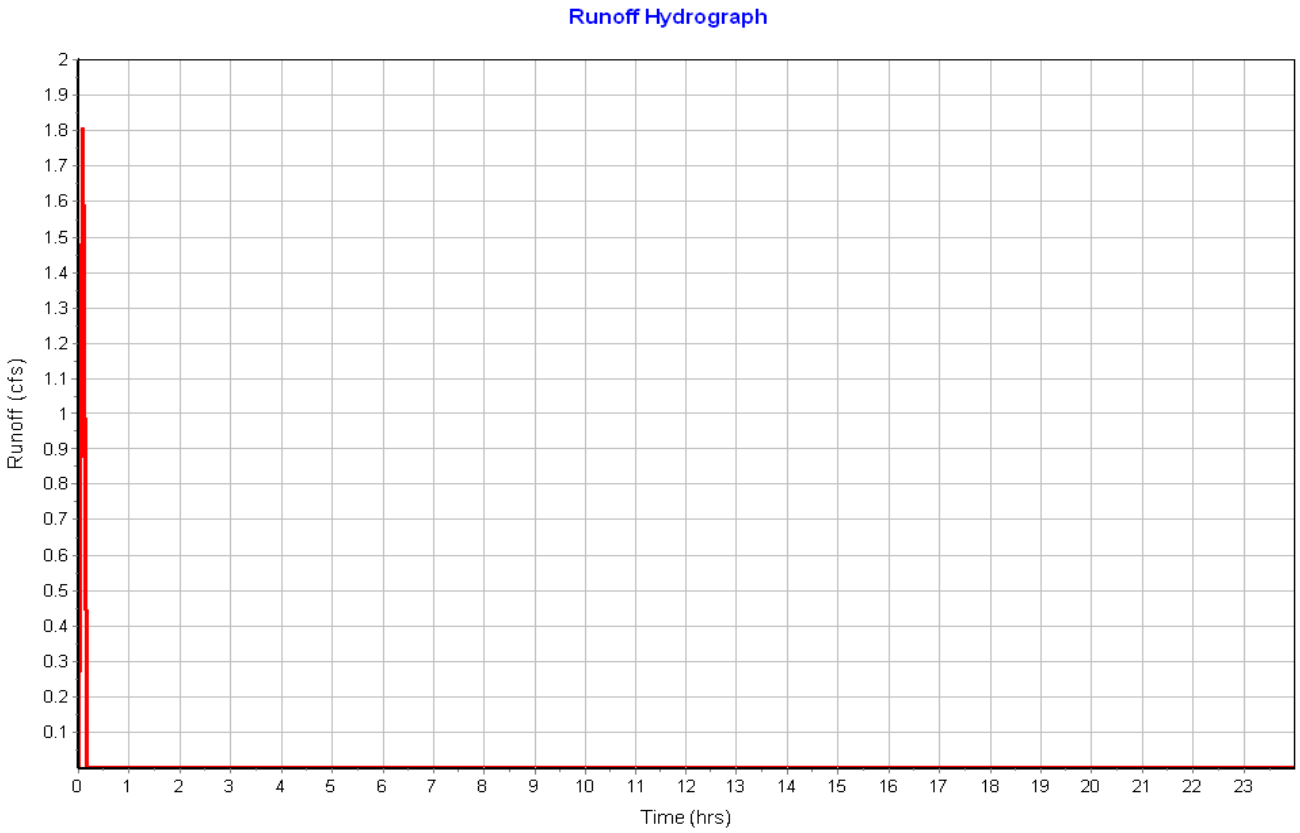
Total TOC (min) 3.33

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.81
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:20

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.28



Subbasin : {STORM PHASE 2}.29

Input Data

Area (ac) 0.11
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.11	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.11		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	130	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	14.17	0.00	0.00

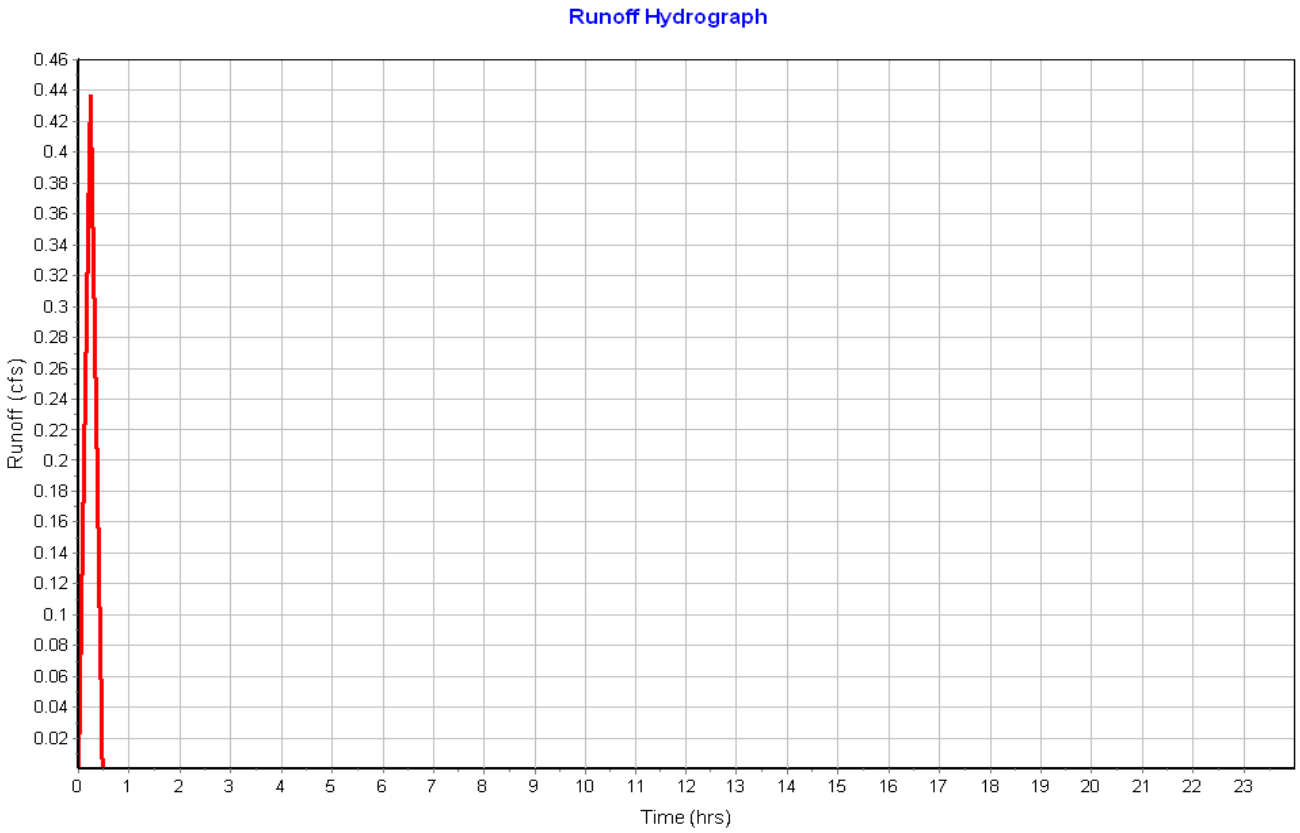
Total TOC (min) 14.17

Subbasin Runoff Results

Total Rainfall (in) 1.85
Total Runoff (in) 0.96
Peak Runoff (cfs) 0.44
Rainfall Intensity 7.846
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:14:10

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.29



Subbasin : {STORM PHASE 2}.3

Input Data

Area (ac) 0.20
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.20	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.20		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	393	0.00	0.00
Slope (%) :	1.9	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.80	0.00	0.00
Computed Flow Time (min) :	2.34	0.00	0.00

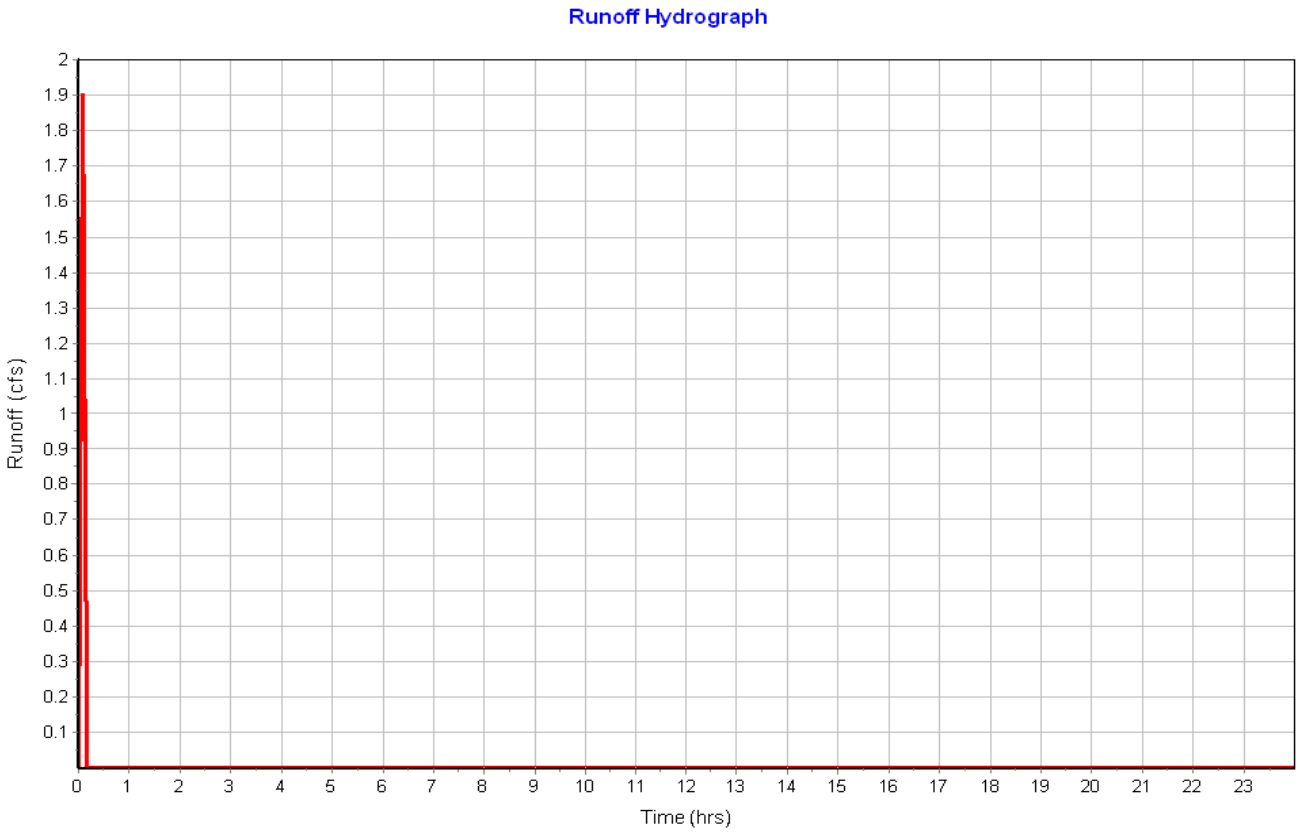
Total TOC (min) 2.59

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.90
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:35

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.3



Subbasin : {STORM PHASE 2}.30

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.13	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.13		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	171	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.49	0.00	0.00
Computed Flow Time (min) :	1.91	0.00	0.00

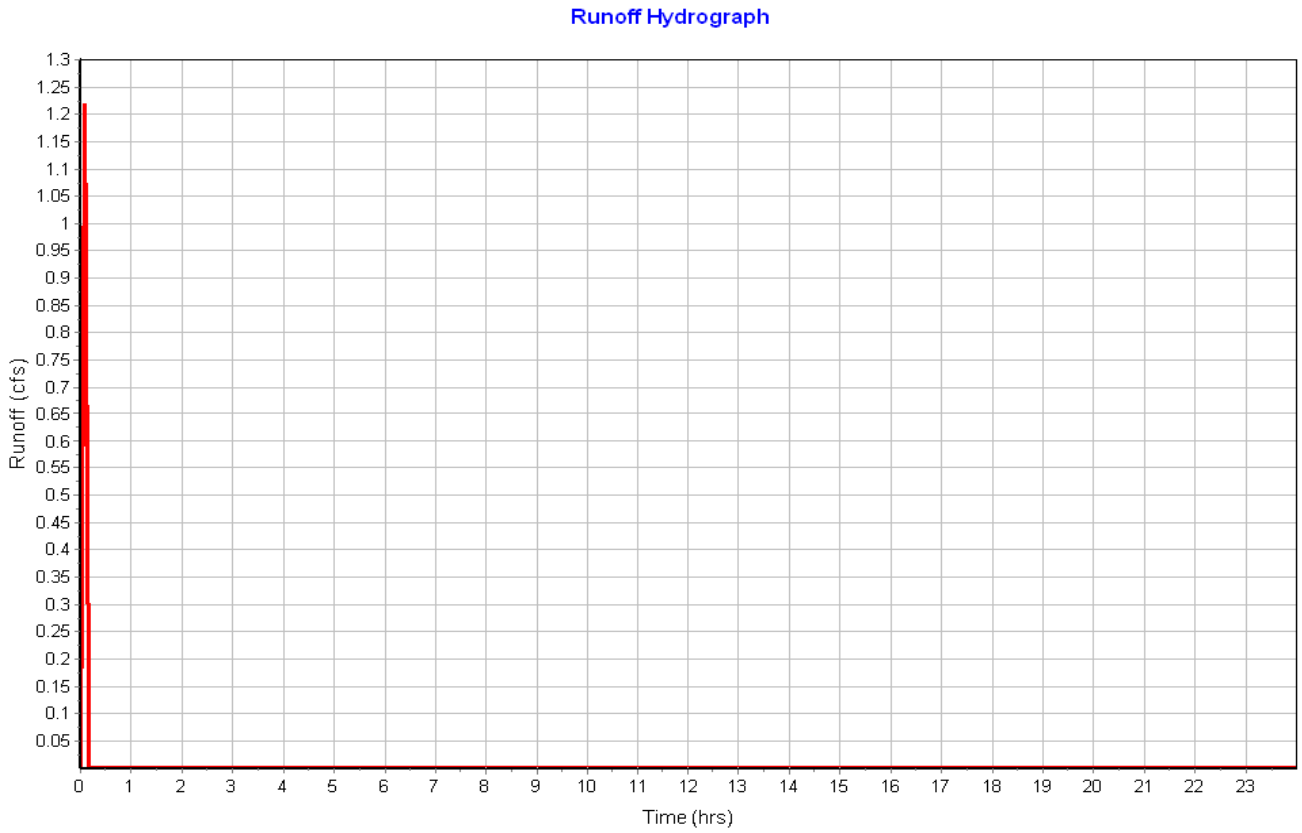
Total TOC (min) 1.91

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.22
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:55

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.30



Subbasin : {STORM PHASE 2}.31

Input Data

Area (ac) 0.39
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.39	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.39		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	252	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	24.07	0.00	0.00

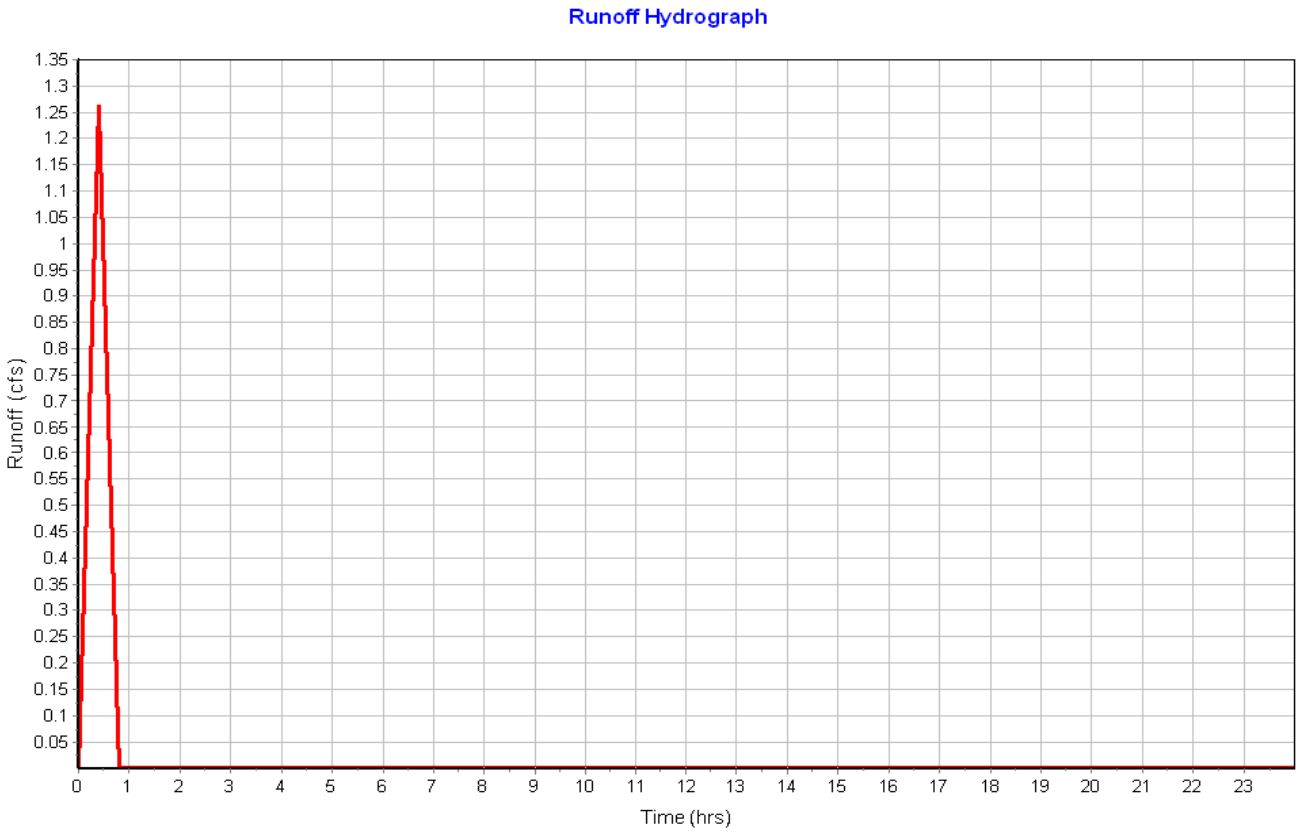
Total TOC (min) 24.07

Subbasin Runoff Results

Total Rainfall (in) 2.51
Total Runoff (in) 1.30
Peak Runoff (cfs) 1.26
Rainfall Intensity 6.272
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:24:04

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.31



Subbasin : {STORM PHASE 2}.35

Input Data

Area (ac) 0.97
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.97	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.97		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	405	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.19	0.00	0.00
Computed Flow Time (min) :	34.63	0.00	0.00

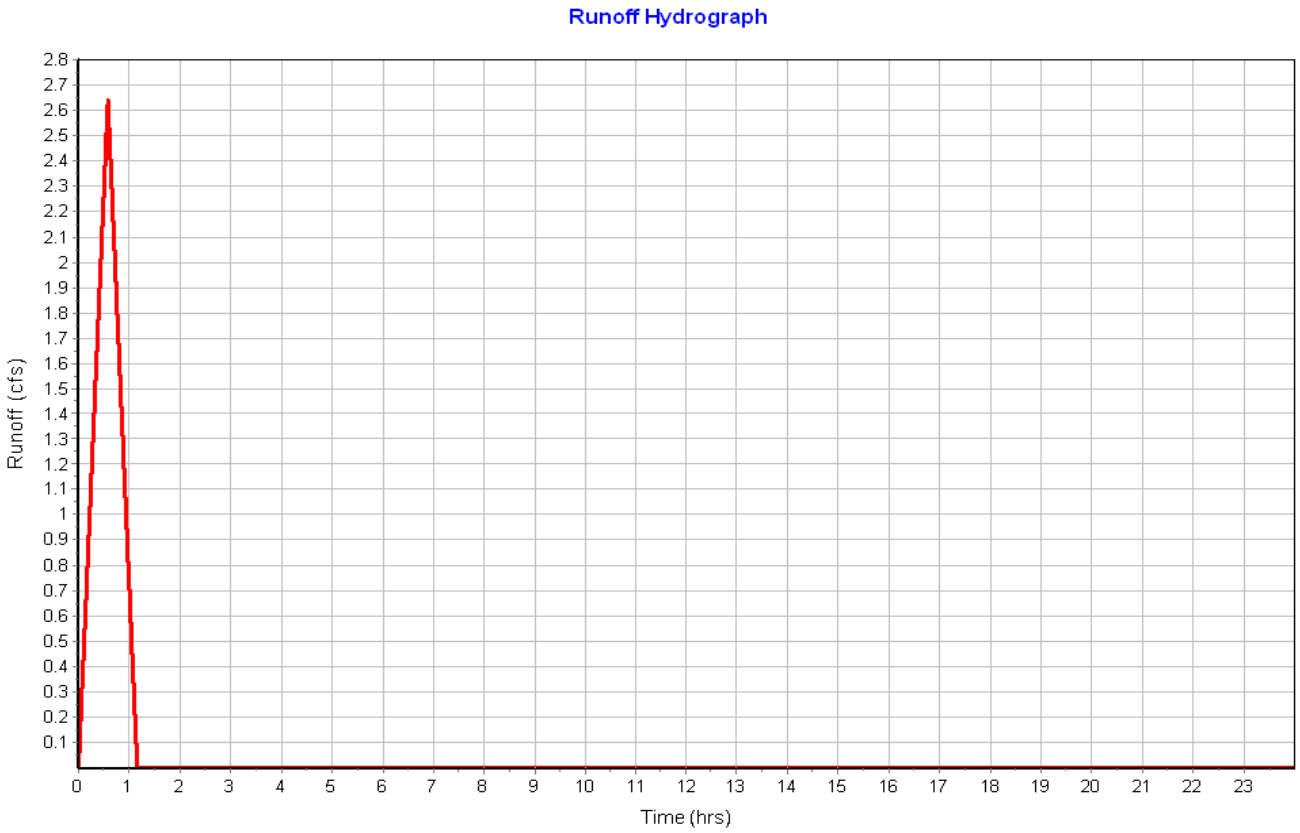
Total TOC (min) 34.63

Subbasin Runoff Results

Total Rainfall (in) 3.03
Total Runoff (in) 1.58
Peak Runoff (cfs) 2.64
Rainfall Intensity 5.241
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:34:38

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.35



Subbasin : {STORM PHASE 2}.36

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1.9	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.34	0.00	0.00
Computed Flow Time (min) :	1.24	0.00	0.00

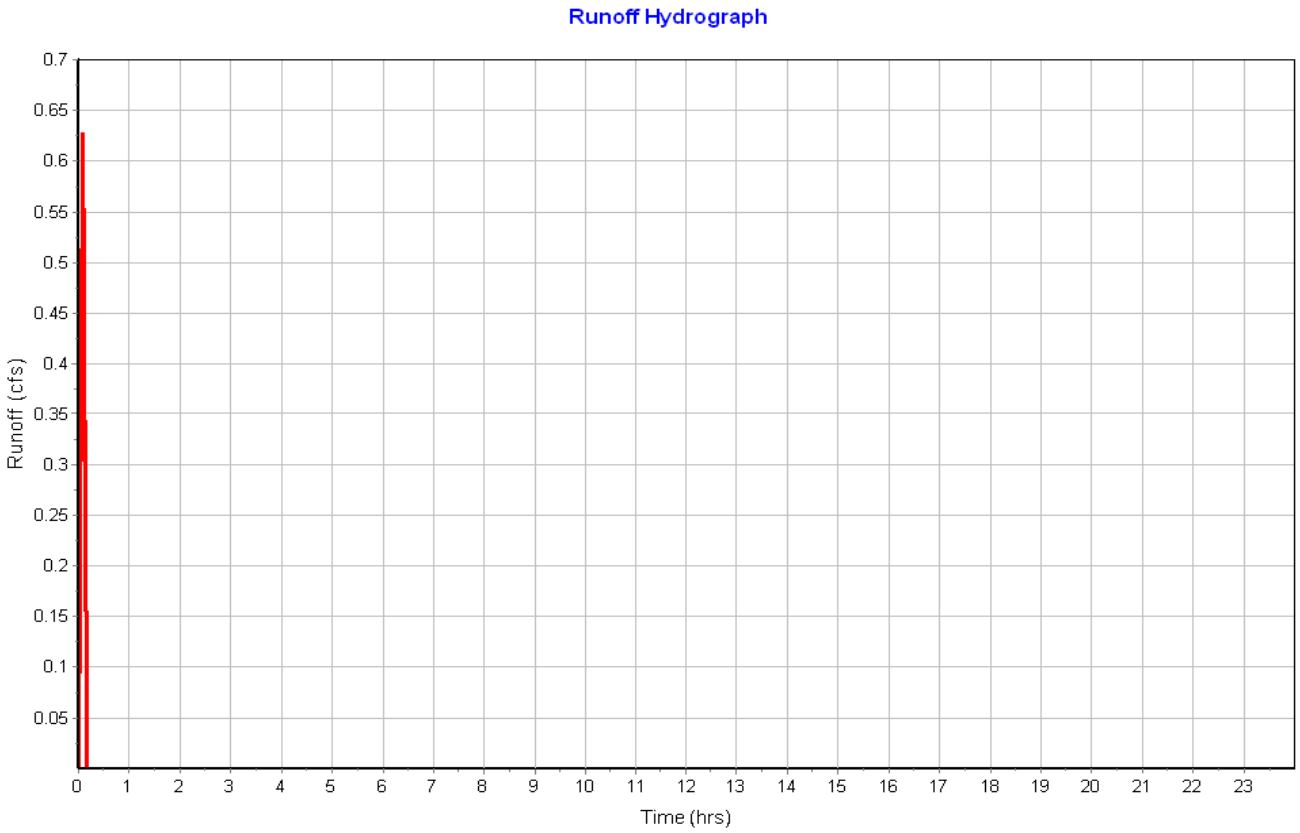
Total TOC (min) 1.24

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.63
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:14

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.36



Subbasin : {STORM PHASE 2}.37

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.09	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.09		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	185	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.69	0.00	0.00
Computed Flow Time (min) :	1.82	0.00	0.00

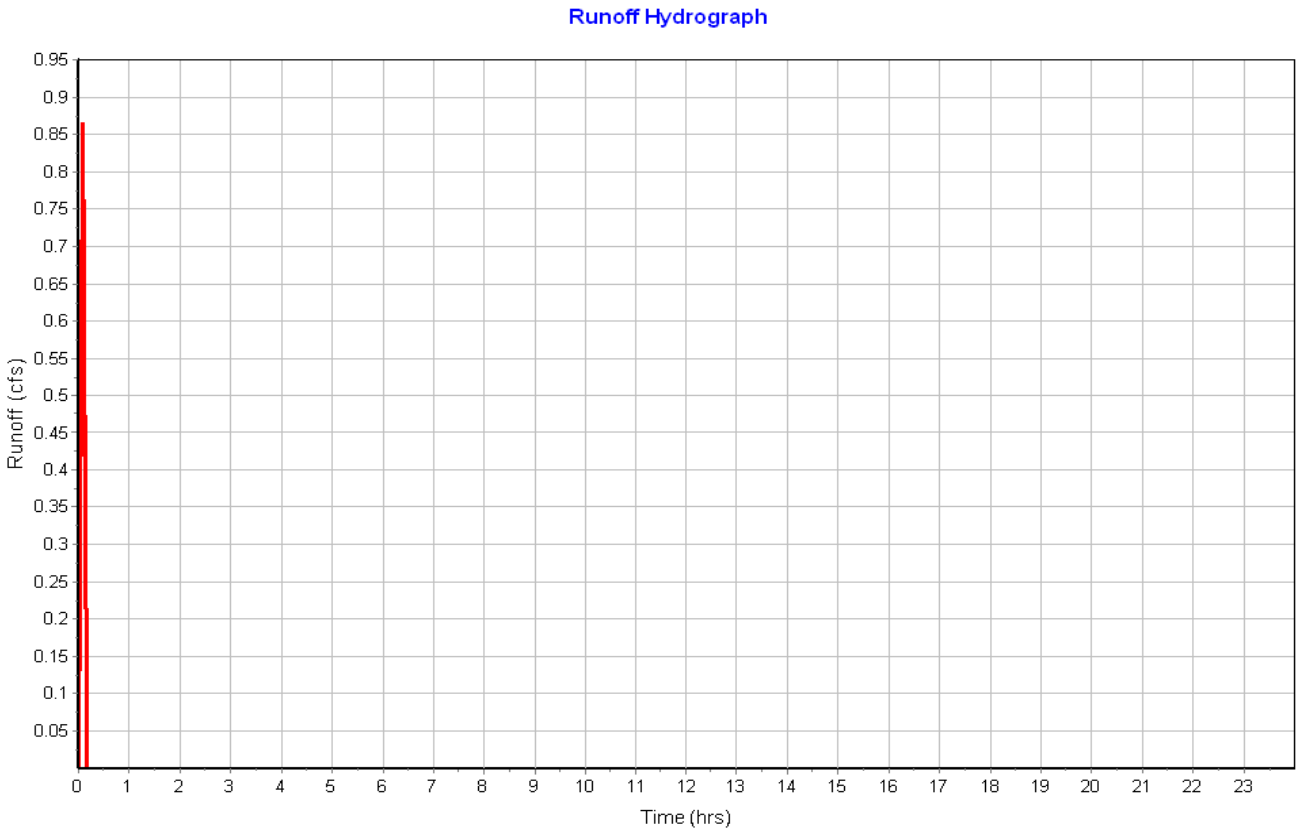
Total TOC (min) 1.82

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.86
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:49

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.37



Subbasin : {STORM PHASE 2}.38

Input Data

Area (ac) 0.17
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.17	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.17		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	211	0.00	0.00
Slope (%) :	2.7	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	20.25	0.00	0.00

Total TOC (min) 20.25

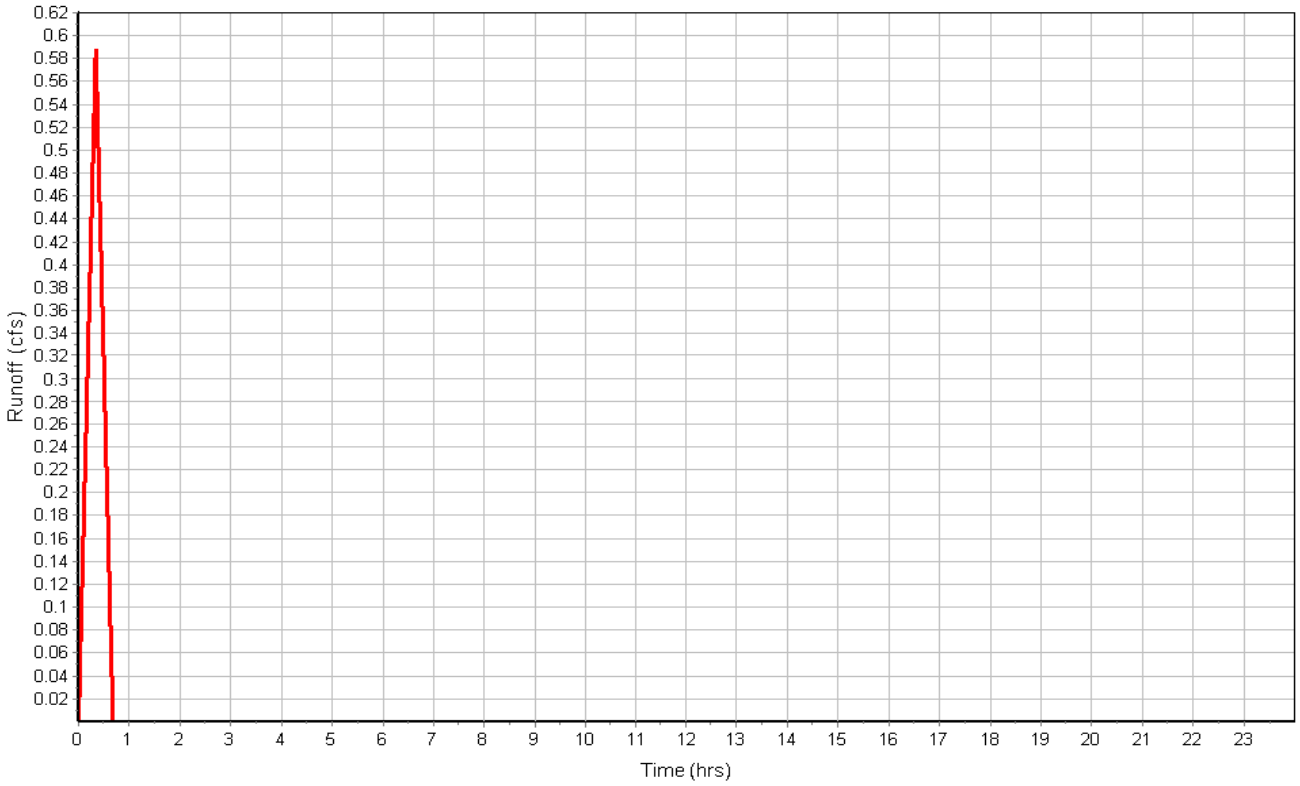
Subbasin Runoff Results

Total Rainfall (in) 2.29
Total Runoff (in) 1.19
Peak Runoff (cfs) 0.59
Rainfall Intensity 6.760
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:20:15

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.38

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.39

Input Data

Area (ac) 0.02
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.02	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.02		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.04	0.00	0.00
Computed Flow Time (min) :	0.40	0.00	0.00

Total TOC (min) 0.40

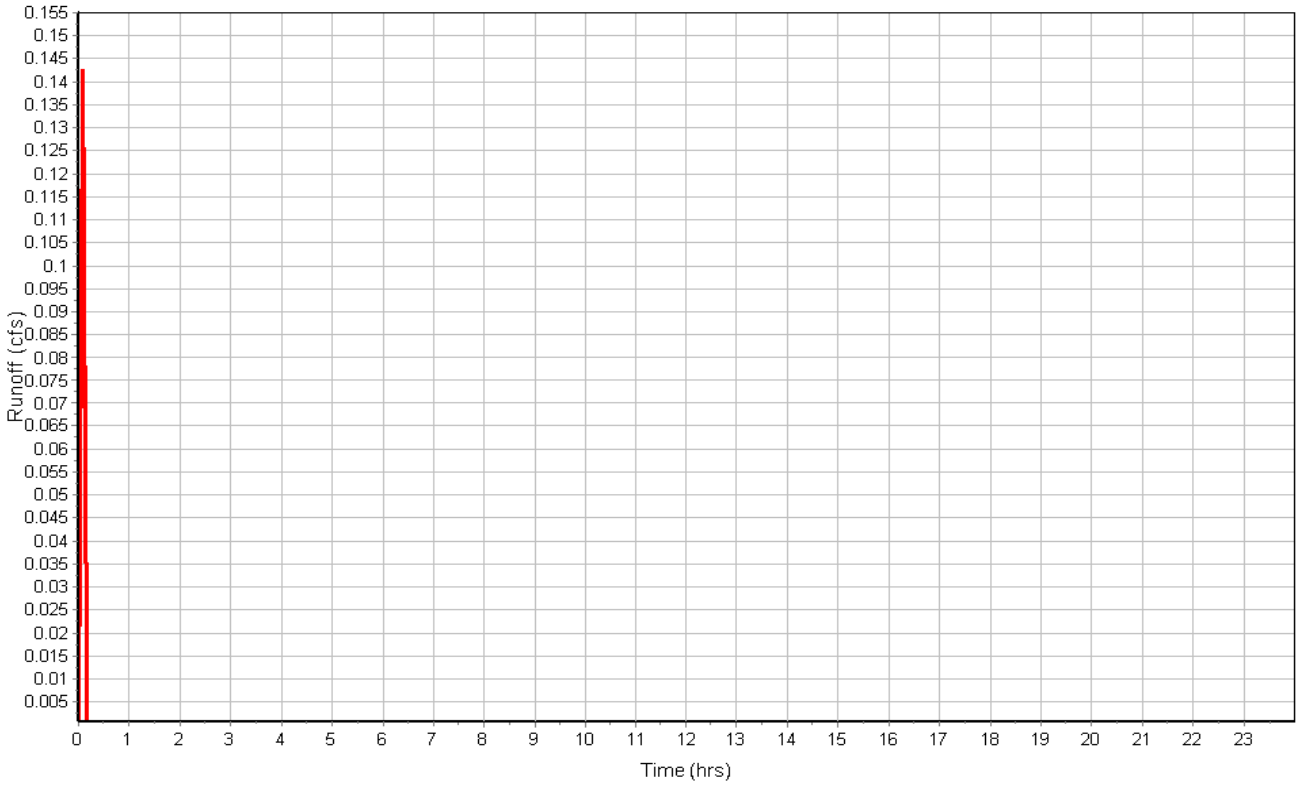
Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.14
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:00:24

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.39

Runoff Hydrograph



Subbasin : {STORM PHASE 2}.4

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	195	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0.00	0.00
Computed Flow Time (min) :	1.13	0.00	0.00

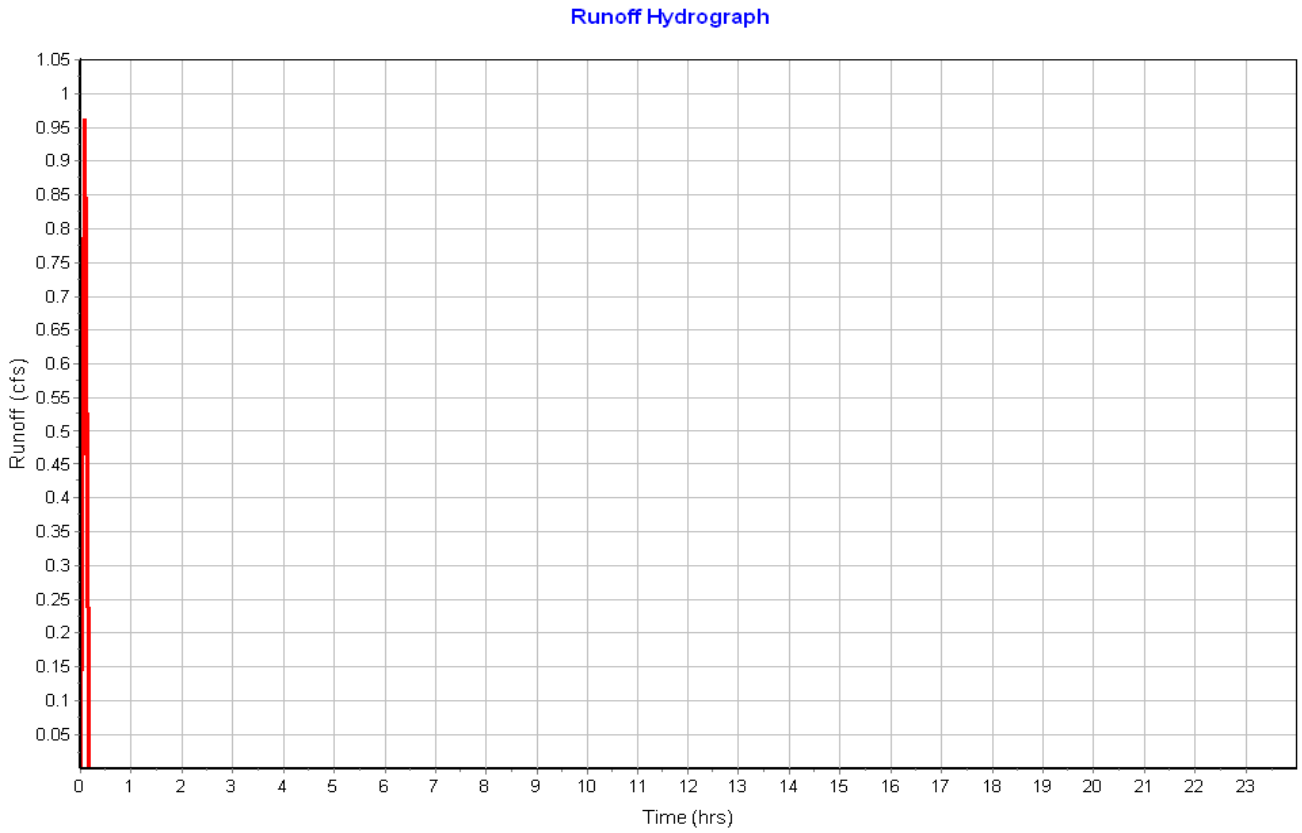
Total TOC (min) 1.39

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.96
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:23

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.4



Subbasin : {STORM PHASE 2}.40

Input Data

Area (ac) 0.10
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.10	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.10		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	200	0.00	0.00
Slope (%) :	1.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.36	0.00	0.00
Computed Flow Time (min) :	2.45	0.00	0.00

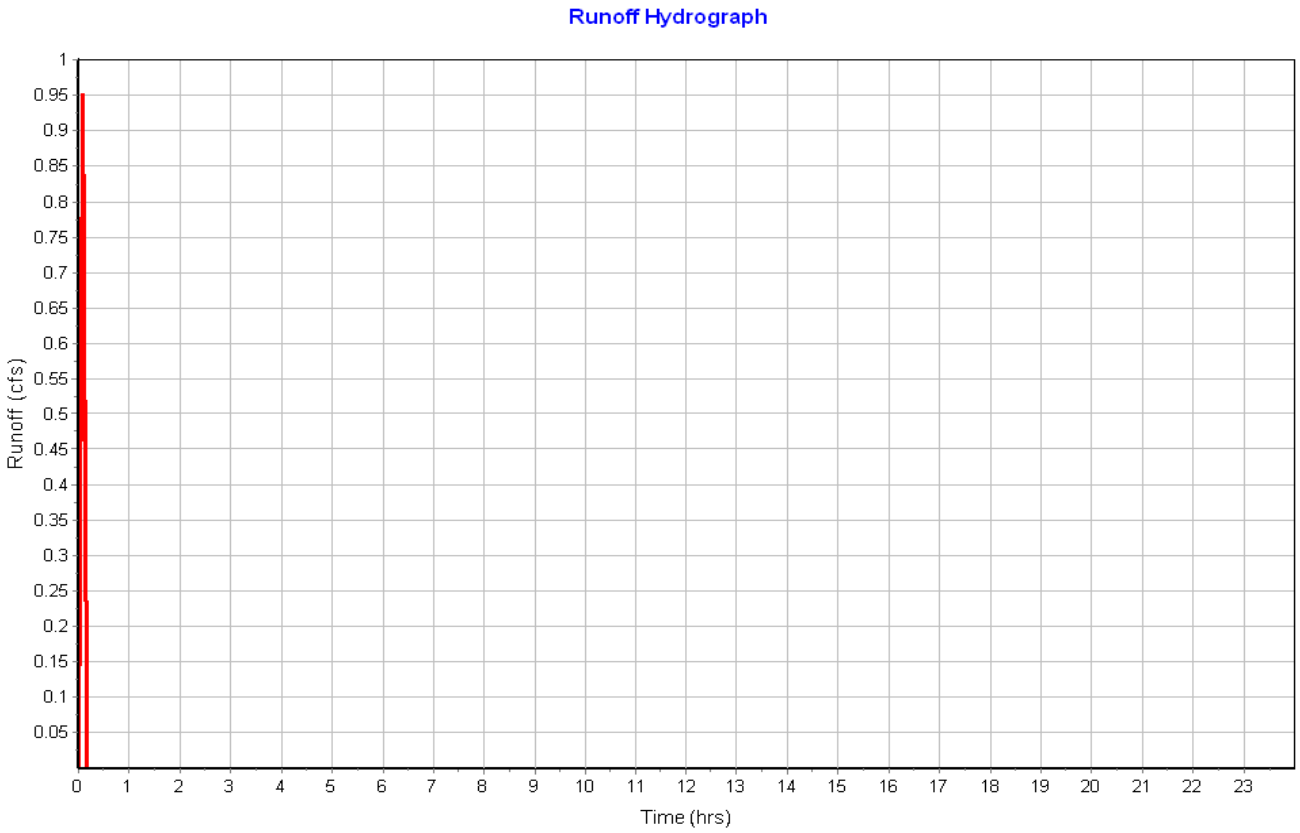
Total TOC (min) 2.45

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.95
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:27

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.40



Subbasin : {STORM PHASE 2}.41

Input Data

Area (ac) 0.20
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.20	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.20		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	394	0.00	0.00
Slope (%) :	2.3	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.90	0.00	0.00
Computed Flow Time (min) :	3.45	0.00	0.00

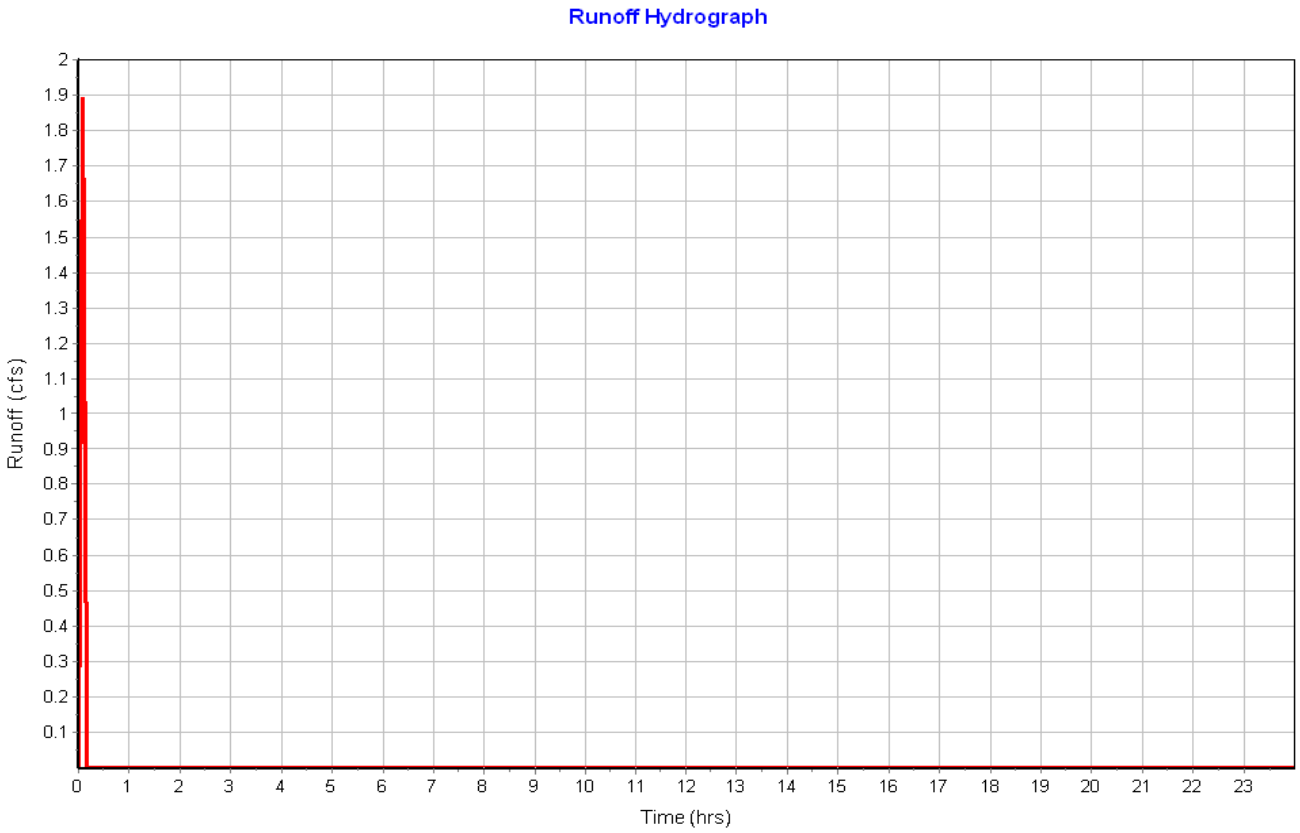
Total TOC (min) 3.45

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.89
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:03:27

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.41



Subbasin : {STORM PHASE 2}.45

Input Data

Area (ac) 0.07
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.07	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.07		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	222	0.00	0.00
Slope (%) :	2.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.83	0.00	0.00
Computed Flow Time (min) :	2.02	0.00	0.00

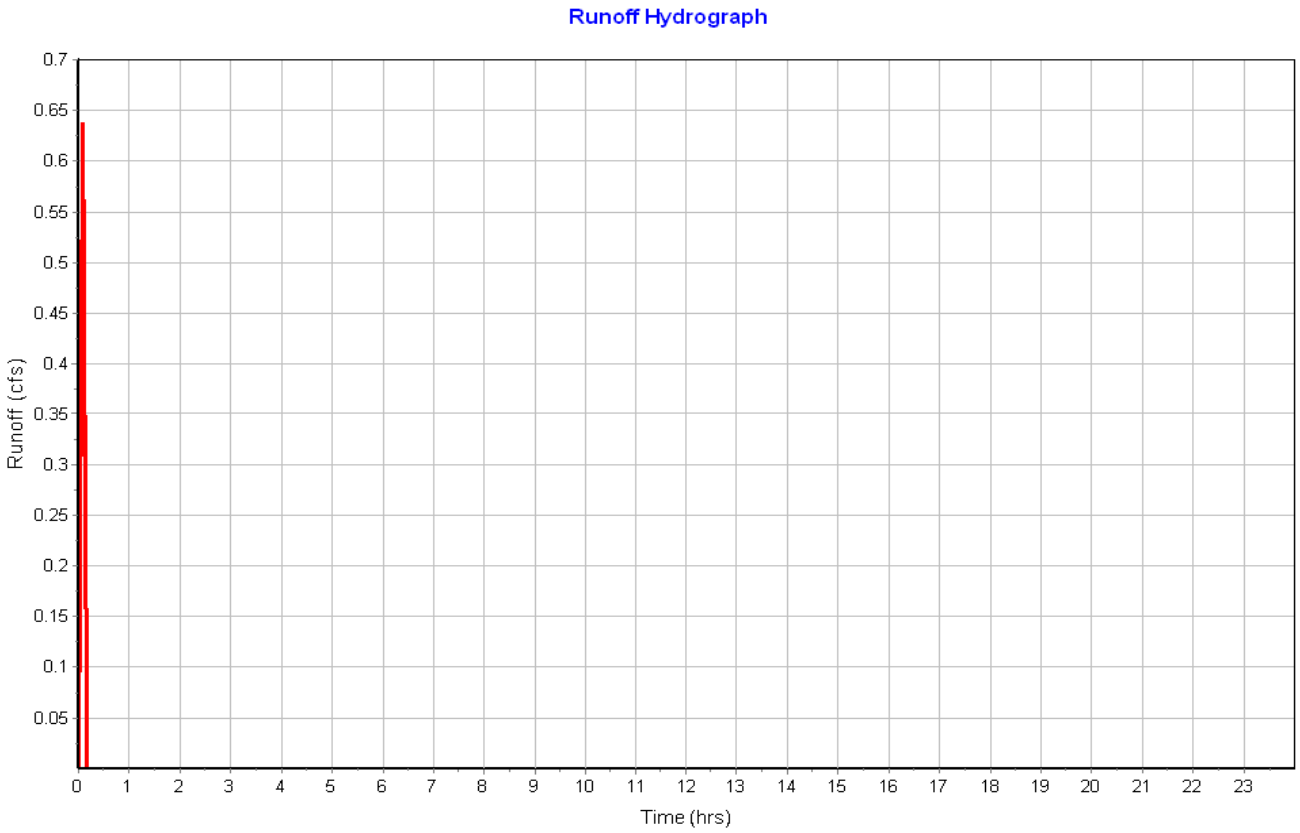
Total TOC (min) 2.02

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.64
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:01

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.45



Subbasin : {STORM PHASE 2}.48

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.09	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.09		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	151	0.00	0.00
Slope (%) :	2.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.70	0.00	0.00
Computed Flow Time (min) :	1.48	0.00	0.00

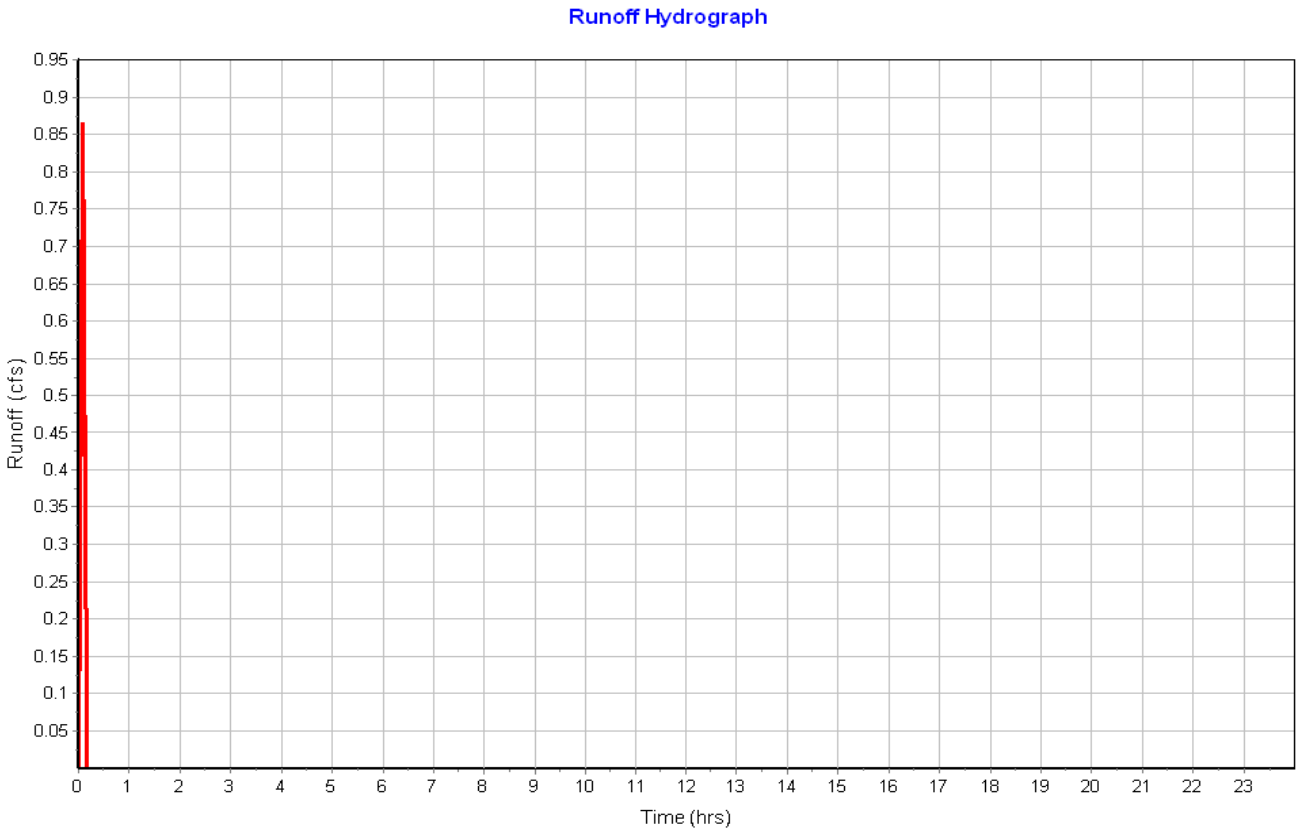
Total TOC (min) 1.48

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 0.86
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:29

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.48



Subbasin : {STORM PHASE 2}.5

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.13	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.13		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	213	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.15	0.00	0.00
Computed Flow Time (min) :	23.00	0.00	0.00

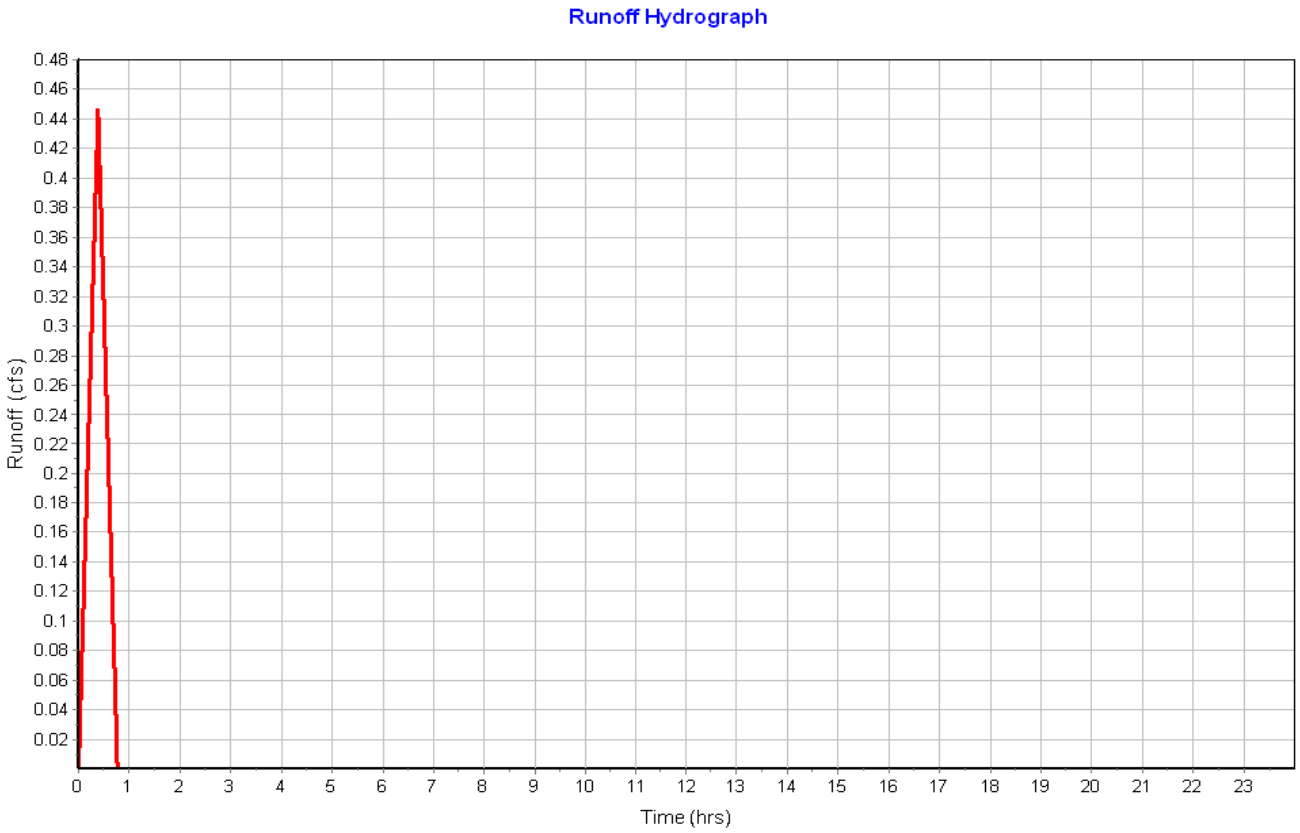
Total TOC (min) 23.00

Subbasin Runoff Results

Total Rainfall (in) 2.45
Total Runoff (in) 1.28
Peak Runoff (cfs) 0.45
Rainfall Intensity 6.397
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:23:00

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.5



Subbasin : {STORM PHASE 2}.6

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.13	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.13		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	14	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.92	0.00	0.00
Computed Flow Time (min) :	0.25	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	240	0.00	0.00
Slope (%) :	2.9	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	3.46	0.00	0.00
Computed Flow Time (min) :	1.16	0.00	0.00

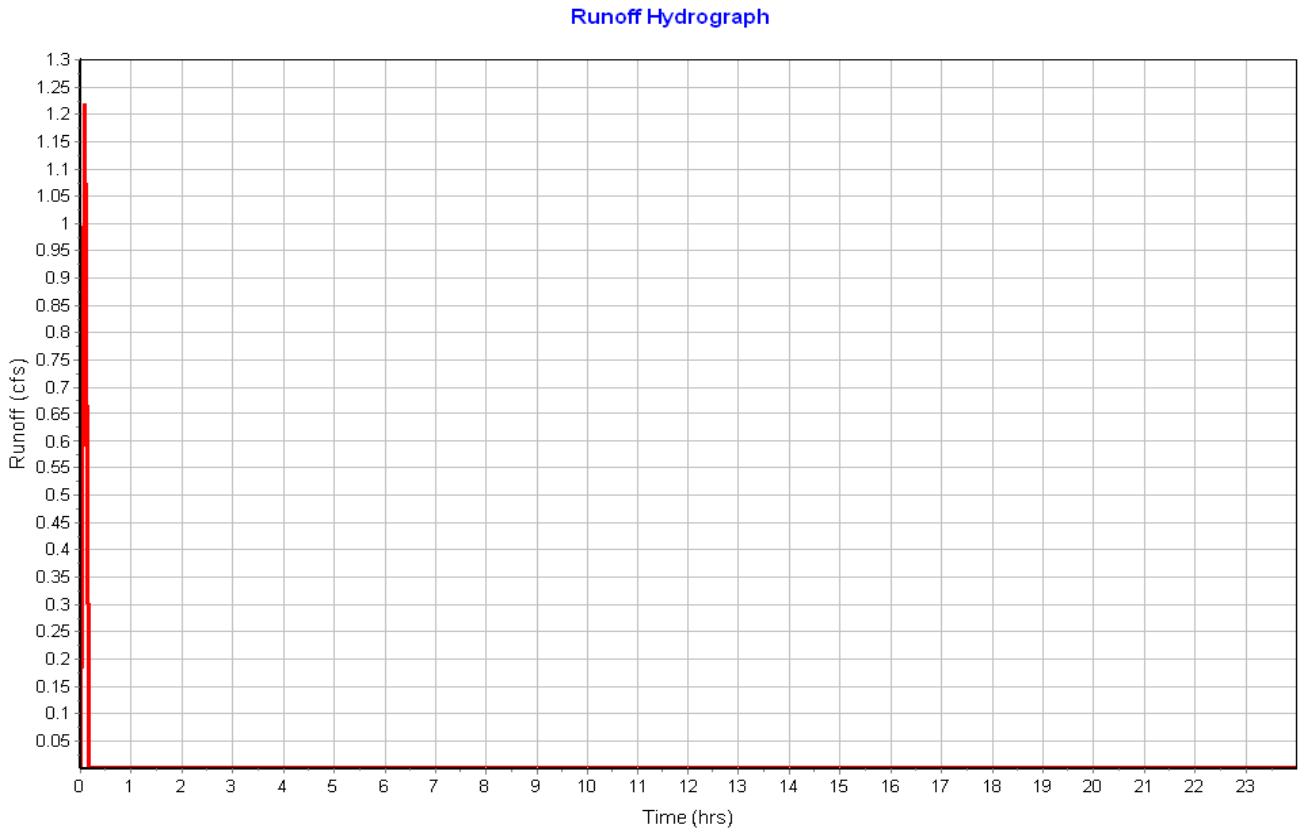
Total TOC (min) 1.41

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 1.22
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:01:25

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.6



Subbasin : {STORM PHASE 2}.8

Input Data

Area (ac) 0.36
Weighted Runoff Coefficient 0.9500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Streets, 25 years or greater	0.36	D (6%+)	0.95
Composite Area & Weighted Runoff Coeff.	0.36		0.95

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	233	0.00	0.00
Slope (%) :	1.8	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	1.55	0.00	0.00
Computed Flow Time (min) :	2.50	0.00	0.00

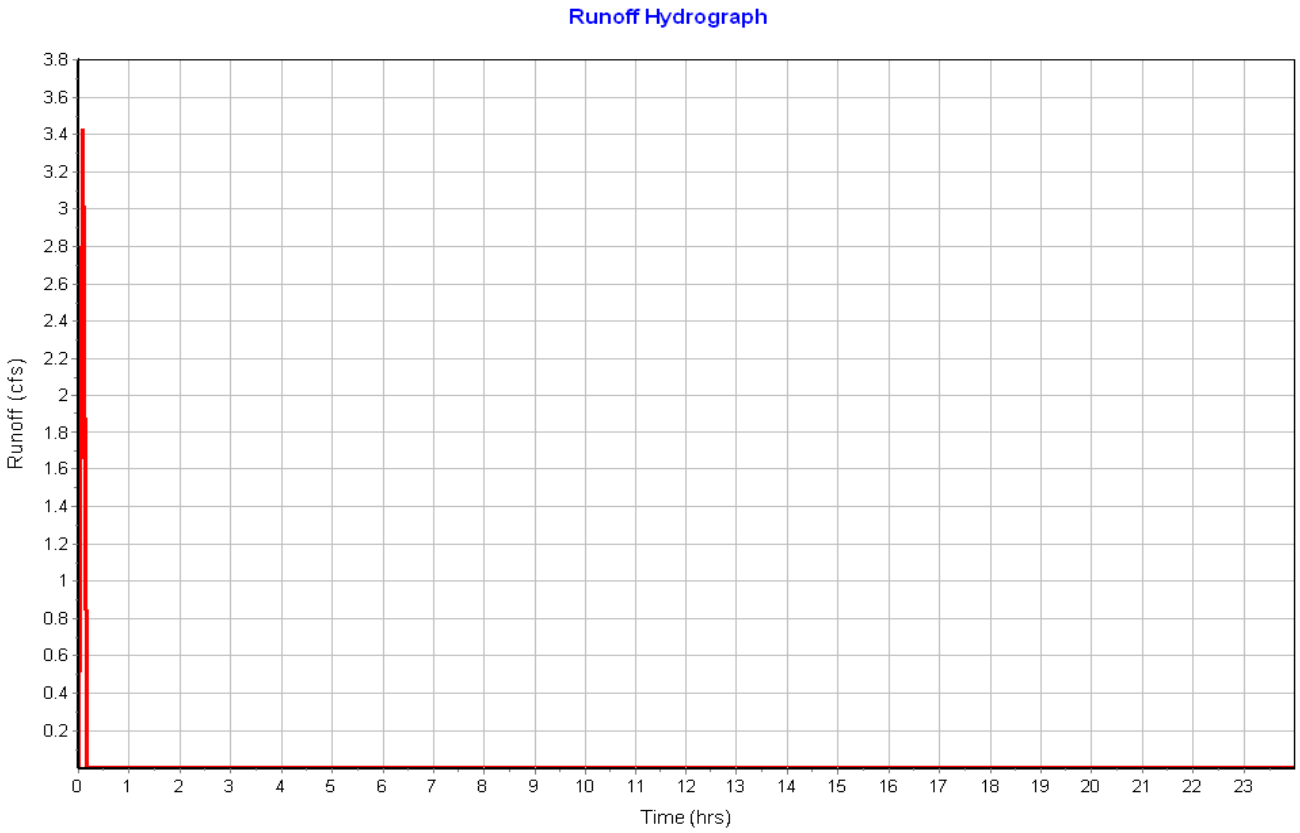
Total TOC (min) 2.50

Subbasin Runoff Results

Total Rainfall (in) 0.83
Total Runoff (in) 0.79
Peak Runoff (cfs) 3.42
Rainfall Intensity 10.000
Weighted Runoff Coefficient 0.9500
Time of Concentration (days hh:mm:ss) 0 00:02:30

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.8



Subbasin : {STORM PHASE 2}.9

Input Data

Area (ac) 0.80
Weighted Runoff Coefficient 0.5200

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Residential Lot Size 1/4 Acre, 25 years or greater	0.80	D (6%+)	0.52
Composite Area & Weighted Runoff Coeff.	0.80		0.52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0.00	0.00
Flow Length (ft) :	366	0.00	0.00
Slope (%) :	2.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.19	0.00	0.00
Computed Flow Time (min) :	31.93	0.00	0.00

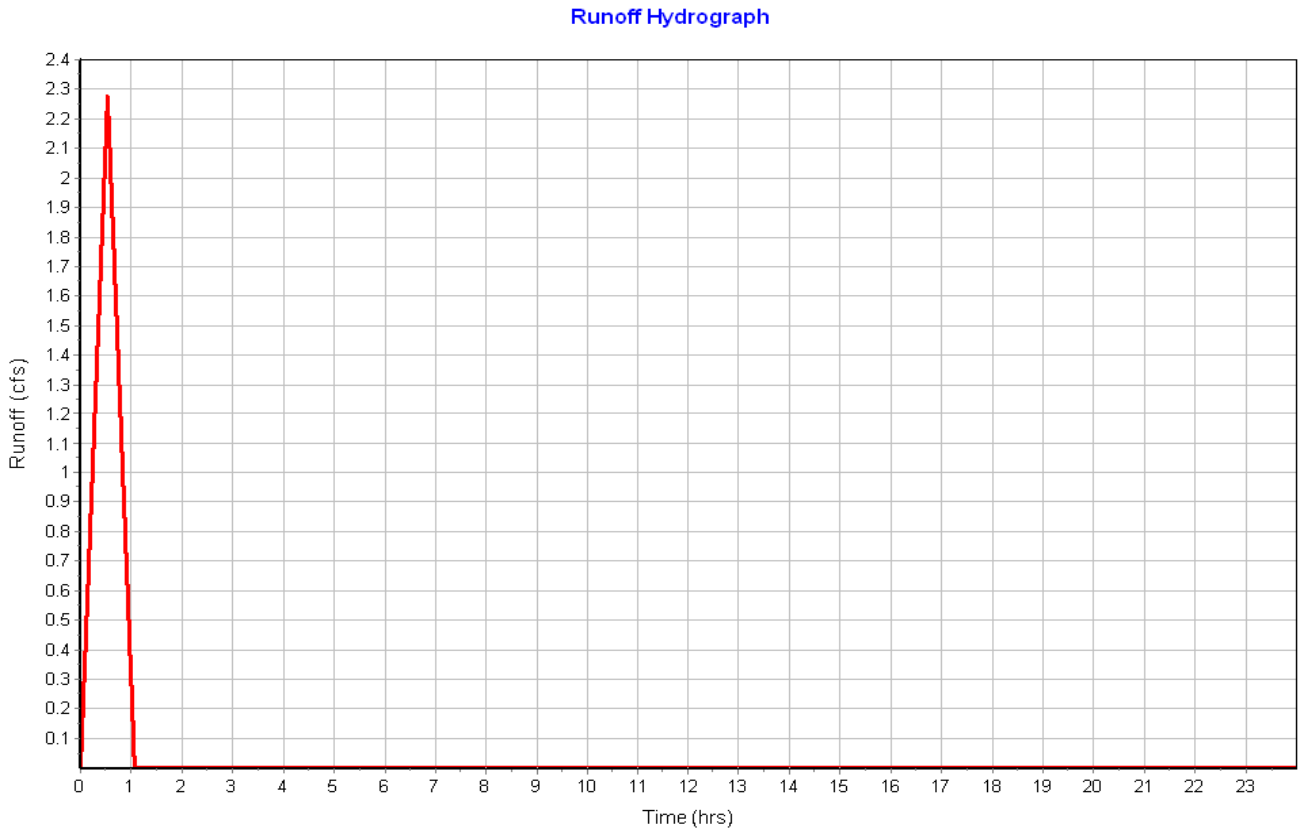
Total TOC (min) 31.93

Subbasin Runoff Results

Total Rainfall (in) 2.93
Total Runoff (in) 1.52
Peak Runoff (cfs) 2.28
Rainfall Intensity 5.496
Weighted Runoff Coefficient 0.5200
Time of Concentration (days hh:mm:ss) 0 00:31:56

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : {STORM PHASE 2}.9



Subbasin : 49

Input Data

Area (ac) 23.80
Weighted Runoff Coefficient 0.5000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Meadow, 25 years or greater	23.80	D (6%+)	0.50
Composite Area & Weighted Runoff Coeff.	23.80		0.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	1132	0.00	0.00
Slope (%) :	3.1	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	110.52	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	720	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	13.79	0.00	0.00

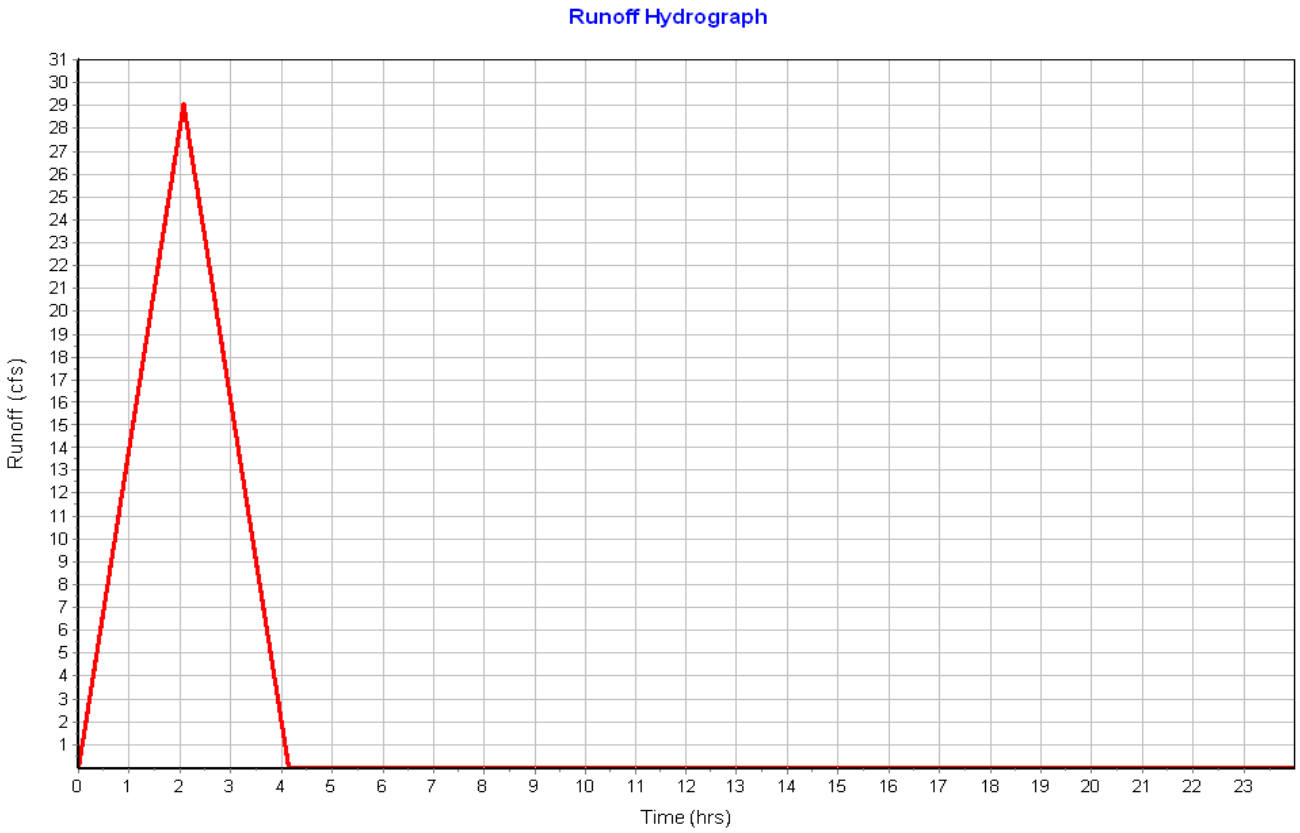
Total TOC (min) 124.32

Subbasin Runoff Results

Total Rainfall (in) 5.06
Total Runoff (in) 2.53
Peak Runoff (cfs) 29.05
Rainfall Intensity 2.441
Weighted Runoff Coefficient 0.5000
Time of Concentration (days hh:mm:ss) 0 02:04:19

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : 49



Subbasin : 50

Input Data

Area (ac) 14.60
Weighted Runoff Coefficient 0.5000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
Meadow, 25 years or greater	14.60	D (6%+)	0.50
Composite Area & Weighted Runoff Coeff.	14.60		0.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	525	0.00	0.00
Slope (%) :	2.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.13	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	65.14	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	290	0.00	0.00
Slope (%) :	1	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.50	0.00	0.00
Computed Flow Time (min) :	9.67	0.00	0.00

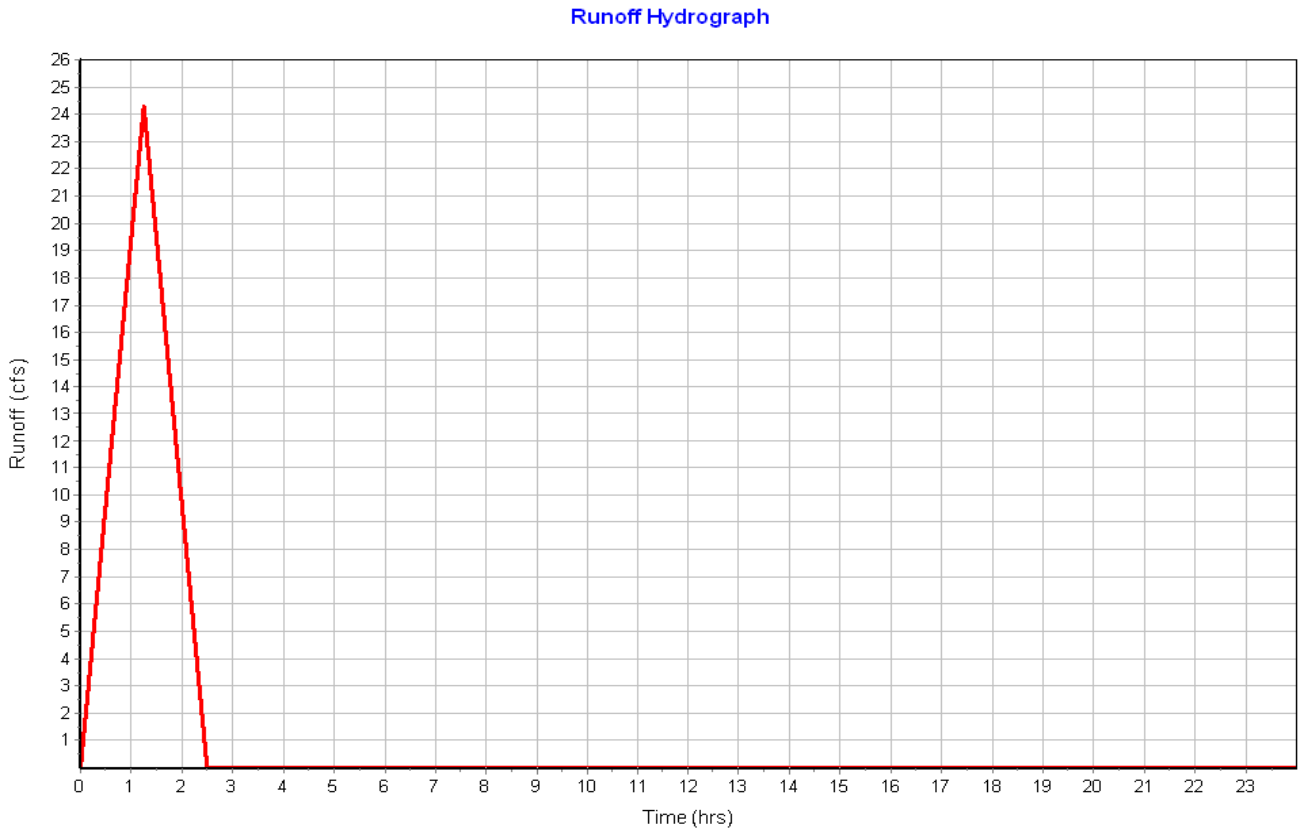
Total TOC (min) 74.81

Subbasin Runoff Results

Total Rainfall (in) 4.15
Total Runoff (in) 2.07
Peak Runoff (cfs) 24.28
Rainfall Intensity 3.326
Weighted Runoff Coefficient 0.5000
Time of Concentration (days hh:mm:ss) 0 01:14:49

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Subbasin : 50



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	{STORM BJ2-1}.FES - L1	447.00	450.00	3.00	447.00	0.00	450.00	0.00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	443.25	445.00	1.75	443.25	0.00	445.00	0.00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	443.00	445.00	2.00	443.00	0.00	445.00	0.00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	451.28	455.85	4.57	451.28	0.00	455.85	0.00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	445.40	449.19	3.79	445.40	0.00	449.19	0.00	0.00	0.00
6	FES-F1	448.75	457.43	8.68	448.75	0.00	457.43	0.00	0.00	0.00
7	FES-P1_KBBARNES	433.25	435.00	1.75	433.25	0.00	435.00	0.00	0.00	0.00
8	FES-P2_KBBARNES	433.00	435.00	2.00	433.00	0.00	435.00	0.00	0.00	0.00
9	StartNullStruct41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.FES - L1	2.64	2.64	447.47	0.47	0.00	2.53	447.02	0.02	0 00:34	0 00:00	0.00	0.00
2	{STORM BJ2-1}.FES-O1 LULU	28.85	0.00	444.65	1.40	0.00	0.60	443.42	0.17	0 02:06	0 00:00	0.00	0.00
3	{STORM BJ2-1}.FES-O2_LULU	28.85	0.00	444.57	1.57	0.00	0.45	443.21	0.21	0 02:06	0 00:00	0.00	0.00
4	{STORM BJ2-1}.JB-H4	6.40	0.00	452.01	0.73	0.00	3.84	451.40	0.12	0 00:06	0 00:00	0.00	0.00
5	{STORM BJ2-1}.JB-H6	10.69	0.00	446.52	1.12	0.00	2.67	445.53	0.13	0 00:06	0 00:00	0.00	0.00
6	FES-F1	29.05	29.05	450.15	1.40	0.00	7.28	448.92	0.17	0 02:04	0 00:00	0.00	0.00
7	FES-P1_KBBARNES	39.46	24.28	434.82	1.57	0.00	0.43	433.47	0.22	0 01:15	0 00:00	0.00	0.00
8	FES-P2_KBBARNES	39.45	0.00	434.57	1.57	0.00	0.43	433.20	0.20	0 01:15	0 00:00	0.00	0.00
9	StartNullStruct41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00:00	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	BYPASS_K1	395.48	453.99	4.39	444.81	4.01	9.18	2.3200	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	Yes
2	BYPASS_N1	29.94	444.81	4.01	443.80	3.80	1.01	3.3700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
3	DITCH-01	424.00	448.75	0.00	443.02	-0.23	5.73	1.3500	Trapezoidal	2.000	21.000	0.0800	0.5000	0.5000	0.0000	0.00	No
4	DITCH-02	970.00	443.00	0.00	433.25	0.00	9.75	1.0100	Trapezoidal	2.000	17.000	0.0800	0.5000	0.5000	0.0000	0.00	No
5	DITCH-03	262.00	433.00	0.00	431.98	0.00	1.02	0.3900	Triangular	2.000	100.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	GUTTER_F2	250.05	461.10	5.10	453.34	4.00	7.76	3.1000	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
7	GUTTER_F3	199.54	465.23	5.00	461.10	5.10	4.13	2.0700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
8	GUTTER_G1	245.65	460.52	3.92	453.34	4.00	7.18	2.9200	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
9	GUTTER_H2	191.92	462.65	5.00	459.83	4.03	2.82	1.4700	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
10	GUTTER_H7	180.42	450.00	5.10	445.14	4.89	4.86	2.6900	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
11	GUTTER_H8	31.05	445.14	4.89	443.30	3.80	1.84	5.9300	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
12	GUTTER_I1	191.92	462.65	4.40	461.09	4.69	1.56	0.8100	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
13	GUTTER-H3	260.86	459.83	4.03	454.37	5.37	5.46	2.0900	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
14	GUTTER-H5	155.79	454.37	5.37	451.66	5.00	2.71	1.7400	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
15	GUTTER-J1	224.65	461.09	4.69	457.58	5.83	3.51	1.5600	Triangular	0.500	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	BYPASS_K1	0.01	0 00:07	20.05	0.00	3.52	1.87	0.02	0.04	0.00		
2	BYPASS_N1	0.17	0 00:05	18.75	0.01	4.19	0.12	0.08	0.17	0.00		
3	DITCH-01	28.85	0 02:06	62.45	0.46	1.97	3.59	1.39	0.70	0.00		
4	DITCH-02	28.51	0 02:11	47.45	0.60	1.91	8.46	1.56	0.78	0.00		
5	DITCH-03	39.25	0 01:17	289.59	0.14	1.76	2.48	0.95	0.47	0.00		
6	GUTTER_F2	0.23	0 00:06	18.90	0.01	3.14	1.33	0.09	0.19	0.00		
7	GUTTER_F3	0.08	0 00:06	21.08	0.00	3.34	1.00	0.06	0.12	0.00		
8	GUTTER_G1	0.27	0 00:06	19.52	0.01	6.39	0.64	0.10	0.19	0.00		
9	GUTTER_H2	0.30	0 00:06	12.23	0.02	4.63	0.69	0.12	0.24	0.00		
10	GUTTER_H7	0.00	0 00:00	20.34	0.00	0.00		0.00	0.00	0.00		
11	GUTTER_H8	0.01	0 00:05	25.22	0.00	1.40	0.37	0.03	0.05	0.00		
12	GUTTER_I1	0.10	0 00:30	14.64	0.01	3.68	0.87	0.08	0.15	0.00		
13	GUTTER-H3	0.08	0 00:07	19.15	0.00	5.24	0.83	0.06	0.11	0.00		
14	GUTTER-H5	0.31	0 00:05	18.59	0.02	5.04	0.52	0.11	0.21	0.00		
15	GUTTER-J1	0.43	0 00:38	16.02	0.03	2.82	1.33	0.13	0.26	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)
1	{STORM BJ2-1}.PIPE - H7	180.51	444.90	0.00	440.35	0.10	4.55	2.5200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
2	{STORM BJ2-1}.PIPE - H8	31.04	440.25	0.00	439.50	0.00	0.75	2.4200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
3	{STORM BJ2-1}.PIPE - L1	84.01	447.00	0.00	445.50	0.10	1.50	1.7900	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00
4	{STORM BJ2-1}.PIPE - M1	48.34	446.66	0.00	445.50	0.10	1.16	2.4000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
5	{STORM BJ2-1}.PIPE - N1	32.00	440.80	0.00	440.35	0.10	0.45	1.4100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
6	{STORM BJ2-1}.PIPE F1	99.06	449.34	0.00	448.75	0.00	0.59	0.6000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
7	{STORM BJ2-1}.PIPE F2	250.16	456.00	0.00	449.44	0.10	6.56	2.6200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
8	{STORM BJ2-1}.PIPE G1	32.00	456.60	0.00	456.10	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
9	{STORM BJ2-1}.PIPE H5	183.29	449.00	0.00	445.50	0.10	3.50	1.9100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
10	{STORM BJ2-1}.PIPE -H6	31.79	445.40	0.00	445.00	0.10	0.40	1.2600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
11	{STORM BJ2-1}.PIPE_F3	199.59	460.23	0.00	456.10	0.10	4.13	2.0700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
12	{STORM BJ2-1}.PIPE-H1	32.00	458.25	0.00	457.75	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
13	{STORM BJ2-1}.PIPE-H2	191.94	457.65	0.00	455.90	0.10	1.75	0.9100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
14	{STORM BJ2-1}.PIPE-H3	260.88	455.80	0.00	451.38	0.10	4.42	1.6900	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
15	{STORM BJ2-1}.PIPE-H4	96.77	451.28	0.00	449.10	0.10	2.18	2.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
16	{STORM BJ2-1}.PIPE-I1	32.00	456.40	0.00	455.90	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
17	{STORM BJ2-1}.PIPE-J1	48.34	451.75	0.00	451.38	0.10	0.37	0.7700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
18	{STORM BJ2-1}.PIPE-K1	32.00	449.60	0.00	449.10	0.10	0.50	1.5600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00
19	{STORM BJ2-1}.PIPE-O1	29.87	443.15	-0.10	443.02	0.02	0.13	0.4400	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00
20	{STORM BJ2-1}.PIPE-P1	22.81	433.25	0.00	433.00	0.00	0.25	1.1000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00

BENJAMIN GROVE PHASE 2
100-YEAR DRAINAGE

Flap Gate	No. of Barrels
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	1
No	2
No	2

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	{STORM BJ2-1}.PIPE - H7	11.17	0 00:06	16.68	0.67	10.15	0.30	0.90	0.60	0.00		Calculated
2	{STORM BJ2-1}.PIPE - H8	13.44	0 00:06	16.33	0.82	10.32	0.05	1.04	0.69	0.00		Calculated
3	{STORM BJ2-1}.PIPE - L1	2.64	0 00:34	12.16	0.22	5.50	0.25	0.47	0.32	0.00		Calculated
4	{STORM BJ2-1}.PIPE - M1	1.70	0 00:05	16.27	0.10	5.97	0.13	0.33	0.22	0.00		Calculated
5	{STORM BJ2-1}.PIPE - N1	1.71	0 00:05	12.46	0.14	4.95	0.11	0.37	0.25	0.00		Calculated
6	{STORM BJ2-1}.PIPE F1	7.86	0 00:05	8.11	0.97	5.29	0.31	1.19	0.79	0.00		Calculated
7	{STORM BJ2-1}.PIPE F2	2.83	0 00:05	17.01	0.17	7.20	0.58	0.41	0.28	0.00		Calculated
8	{STORM BJ2-1}.PIPE G1	1.55	0 00:05	13.13	0.12	5.79	0.09	0.35	0.23	0.00		Calculated
9	{STORM BJ2-1}.PIPE H5	8.65	0 00:06	14.52	0.60	8.61	0.35	0.83	0.56	0.00		Calculated
10	{STORM BJ2-1}.PIPE -H6	10.69	0 00:06	11.78	0.91	7.55	0.07	1.12	0.75	0.00		Calculated
11	{STORM BJ2-1}.PIPE_F3	0.53	0 00:05	15.11	0.04	4.52	0.74	0.19	0.13	0.00		Calculated
12	{STORM BJ2-1}.PIPE-H1	1.19	0 00:29	13.13	0.09	4.62	0.12	0.30	0.20	0.00		Calculated
13	{STORM BJ2-1}.PIPE-H2	2.69	0 00:05	10.03	0.27	4.87	0.66	0.53	0.35	0.00		Calculated
14	{STORM BJ2-1}.PIPE-H3	5.05	0 00:06	13.67	0.37	7.22	0.60	0.63	0.42	0.00		Calculated
15	{STORM BJ2-1}.PIPE-H4	6.39	0 00:06	15.77	0.41	8.47	0.19	0.66	0.44	0.00		Calculated
16	{STORM BJ2-1}.PIPE-I1	1.71	0 00:37	13.13	0.13	5.14	0.10	0.37	0.24	0.00		Calculated
17	{STORM BJ2-1}.PIPE-J1	2.71	0 00:38	9.19	0.29	4.52	0.18	0.56	0.37	0.00		Calculated
18	{STORM BJ2-1}.PIPE-K1	0.94	0 00:05	13.13	0.07	4.97	0.11	0.27	0.18	0.00		Calculated
19	{STORM BJ2-1}.PIPE-O1	28.85	0 02:06	34.48	0.84	6.14	0.08	1.40	0.70	0.00		Calculated
20	{STORM BJ2-1}.PIPE-P1	39.45	0 01:15	41.06	0.96	7.44	0.05	1.57	0.79	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	{STORM BJ2-1}.CB-F2	FHWA HEC-22 GENERIC	N/A	On Sag	1	449.34	454.86	5.52	449.34	0.00	0.00	0.00
2	{STORM BJ2-1}.CB-F4	FHWA HEC-22 GENERIC	N/A	On Grade	1	460.23	464.52	4.29	460.23	0.00	N/A	0.00
3	{STORM BJ2-1}.CB-G1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.60	459.94	3.34	456.60	0.00	N/A	0.00
4	{STORM BJ2-1}.CB-H1	FHWA HEC-22 GENERIC	N/A	On Grade	1	458.25	461.79	3.54	458.25	0.00	N/A	0.00
5	{STORM BJ2-1}.CB-H2	FHWA HEC-22 GENERIC	N/A	On Grade	1	457.65	461.12	3.47	457.65	0.00	N/A	0.00
6	{STORM BJ2-1}.CB-H5	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.00	452.86	3.86	449.00	0.00	N/A	0.00
7	{STORM BJ2-1}.CB-H7	FHWA HEC-22 GENERIC	N/A	On Grade	1	444.90	448.42	3.52	444.90	0.00	N/A	0.00
8	{STORM BJ2-1}.CB-I1	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.40	459.56	3.16	456.40	0.00	N/A	0.00
9	{STORM BJ2-1}.CB-J1	FHWA HEC-22 GENERIC	N/A	On Sag	1	451.75	456.44	4.69	451.75	0.00	0.00	0.00
10	{STORM BJ2-1}.CB-K1	FHWA HEC-22 GENERIC	N/A	On Grade	1	449.60	452.99	3.39	449.60	0.00	N/A	0.00
11	{STORM BJ2-1}.CB-M1	FHWA HEC-22 GENERIC	N/A	On Sag	1	446.66	449.94	3.28	446.66	0.00	0.00	0.00
12	{STORM BJ2-1}.CB-N1	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.80	444.37	3.57	440.80	0.00	N/A	0.00
13	CB-F3	FHWA HEC-22 GENERIC	N/A	On Grade	1	456.00	459.71	3.71	456.00	0.00	N/A	0.00
14	CB-H3	FHWA HEC-22 GENERIC	N/A	On Grade	1	455.80	459.56	3.76	455.80	0.00	N/A	0.00
15	CB-H8	FHWA HEC-22 GENERIC	N/A	On Grade	1	440.25	444.37	4.12	440.25	0.00	N/A	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	{STORM BJ2-1}.CB-F2	N/A	0.0200	0.0160	0.0620	2.00	0.0656	12.00
2	{STORM BJ2-1}.CB-F4	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
3	{STORM BJ2-1}.CB-G1	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
4	{STORM BJ2-1}.CB-H1	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
5	{STORM BJ2-1}.CB-H2	0.0200	0.0200	0.0160	0.0620	1.50	0.0656	12.00
6	{STORM BJ2-1}.CB-H5	0.0190	0.0200	0.0160	0.0620	1.50	0.0656	12.00
7	{STORM BJ2-1}.CB-H7	0.0100	0.0200	0.0160	0.0620	2.00	0.0656	12.00
8	{STORM BJ2-1}.CB-I1	0.0170	0.0200	0.0160	0.0620	1.50	0.0656	12.00
9	{STORM BJ2-1}.CB-J1	N/A	0.0200	0.0160	0.0620	1.50	0.0656	12.00
10	{STORM BJ2-1}.CB-K1	0.0190	0.0200	0.0160	0.0620	2.00	0.0656	12.00
11	{STORM BJ2-1}.CB-M1	N/A	0.0200	0.0160	0.0620	1.50	0.0656	12.00
12	{STORM BJ2-1}.CB-N1	0.0100	0.0200	0.0160	0.0620	2.00	0.0656	12.00
13	CB-F3	0.0200	0.0200	0.0160	0.0620	2.00	0.0000	12.00
14	CB-H3	0.0170	0.0200	0.0160	0.0620	2.00	0.0656	12.00
15	CB-H8	0.0190	0.0200	0.0160	0.0620	2.00	0.0656	12.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	{STORM BJ2-1}.CB-F2	5.20	4.99	N/A	N/A	N/A	13.75	455.39	0.53	0 00:05	0.00	0.00
2	{STORM BJ2-1}.CB-F4	0.65	0.65	0.54	0.11	83.19	4.52	464.67	0.15	0 00:05	0.00	0.00
3	{STORM BJ2-1}.CB-G1	1.90	1.90	1.55	0.35	81.63	7.55	460.16	0.21	0 00:05	0.00	0.00
4	{STORM BJ2-1}.CB-H1	1.29	1.29	1.19	0.10	91.93	6.36	461.98	0.19	0 00:29	0.00	0.00
5	{STORM BJ2-1}.CB-H2	2.00	2.00	1.61	0.40	80.21	7.73	461.34	0.22	0 00:05	0.00	0.00
6	{STORM BJ2-1}.CB-H5	1.96	1.96	1.59	0.36	81.37	7.74	453.08	0.22	0 00:07	0.00	0.00
7	{STORM BJ2-1}.CB-H7	0.63	0.63	0.63	0.00	100.00	4.66	448.60	0.18	0 00:06	0.00	0.00
8	{STORM BJ2-1}.CB-I1	2.15	2.12	1.71	0.44	79.60	8.23	459.79	0.23	0 00:37	0.00	0.00
9	{STORM BJ2-1}.CB-J1	2.71	2.31	N/A	N/A	N/A	10.19	456.87	0.43	0 00:38	0.00	0.00
10	{STORM BJ2-1}.CB-K1	0.95	0.95	0.94	0.01	99.09	5.00	453.18	0.18	0 00:05	0.00	0.00
11	{STORM BJ2-1}.CB-M1	1.70	1.48	N/A	N/A	N/A	7.43	450.32	0.38	0 00:05	0.00	0.00
12	{STORM BJ2-1}.CB-N1	1.89	1.89	1.72	0.17	90.75	8.36	444.62	0.25	0 00:05	0.00	0.00
13	CB-F3	1.09	1.06	0.81	0.28	74.27	5.34	459.90	0.19	0 00:05	0.00	0.00
14	CB-H3	1.38	1.25	1.29	0.09	93.22	6.32	459.77	0.21	0 00:05	0.00	0.00
15	CB-H8	1.01	1.01	1.00	0.01	98.82	5.21	444.56	0.19	0 00:06	0.00	0.00

BY	REVISION	DATE

GNE Designing our client's success

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BENJAMIN GROVE SUBDIVISION
FOR THOMAS D.B.COLLINS, LTD.
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

CONTENTS:

DRAINAGE MAP

PROJECT NO:
16025

DATE:
JAN 2017

SHEET NO:
1

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Benjamin Grove
Sewage Lift Station
Lift Station Capacity

# of Homes =	86	
Equivalent Population =	258	People
Estimated Average Flow =	25800	gpd
Estimated Average Flow =	17.92	gpm
Calculated Peaking Factor =	4.11	gpm
Peak Flow =	73.56	gpm
I & I allowance	0	gpm
Design Flowrate =	73.56	
Say	**100**	**gpm**

City of Benton minimum lift station size is 100 gpm

Benjamin Grove
Sewage Lift Station
Lift Station Equivalent Pipe Length

First Pipe Diameter: 3

Item	Equivalent Length (feet)	Quantity	Total Equivalent Length (feet)
straight Pipe	1	30	30
90 degree bend	3.6	2	7.2
check valve	22	1	22
branch tee	7.7	1	7.7
plug valve	2.3	2	4.6
Total Length			71.5

Say **75 feet**

Benjamin Grove
Sewage Lift Station
Lift Station Total Dynamic Head

FM Discharge Elev =	457	feet
Top of Wetwell	442.5	feet
High Wetwell Level =	434.5	feet
Low Wetwell Level =	431	feet
Low Static Lift =	22.5	feet
High Static Lift =	26	feet
Design Flowrate	100	gpm
High C Factor =	150	
Low C Factor =	120	

High Point @ Discharge MH

1 Pump Running

Pipe Sees Flow from 1 Pump

Lift Station Pipe Diameter	3	inch
Pipe Velocity	4.538834	fps
Pipe Length	75	feet
Lift Station Low Headloss =	1.76	feet
Lift Station High Headloss =	2.65	feet

Pipe Sees Flow from 1 Pump

FM Diameter =	4	inch
FM Velocity	2.553094	fps
FM Length =	1300	feet
Minor Losses =	0	feet
Equivalent FM Length =	1300	feet
Force Main Low Headloss =	7.50	feet
Force Main High Headloss =	11.33	feet
Low Totoal Dynamic Head =	31.75	feet
High Totoal Dynamic Head =	39.98	feet
Design TDH =	35	feet

2 Pumps Running

Pipe Sees Flow from 1 Pump

Lift Station Pipe Diameter	3	inch
Pipe Velocity	2.269417	fps
Pipe Length	65	feet
Lift Station Low Headloss =	0.42	feet
Lift Station High Headloss =	0.64	feet

Pipe Sees Flow from 2 Pumps

Lift Station Pipe Diameter	3	inch
Pipe Velocity	4.538834	fps
Pipe Length	10	feet
Lift Station Low Headloss =	0.23	feet
Lift Station High Headloss =	0.35	feet

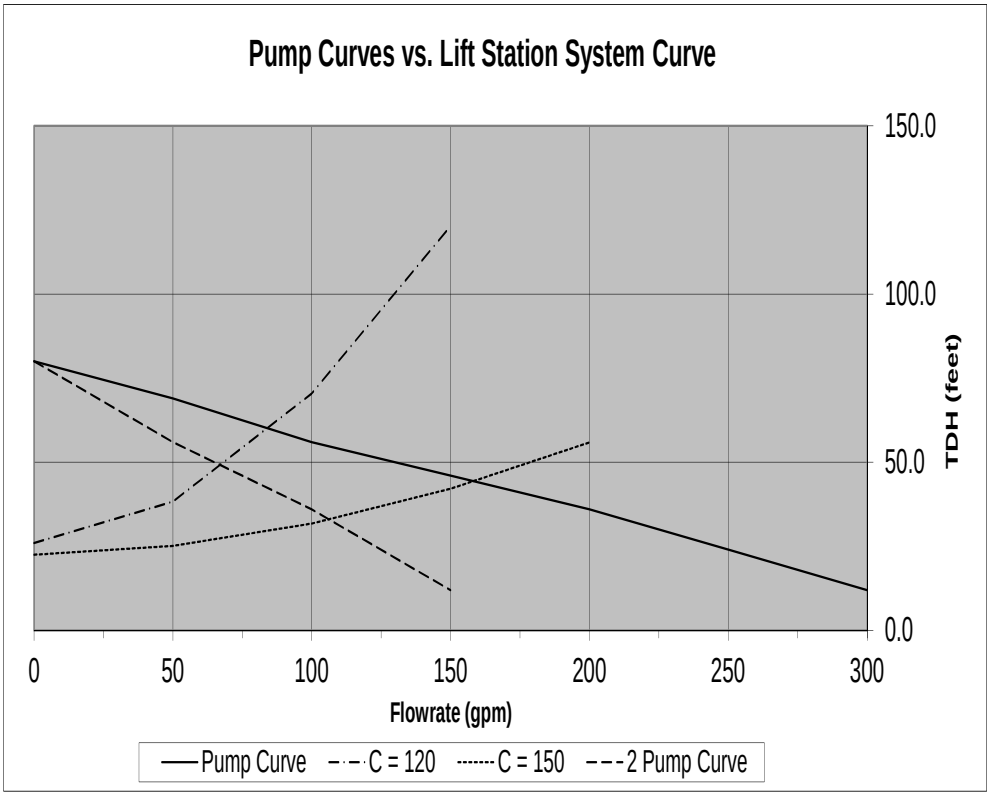
Pipe Sees Flow from 2 Pumps

FM Diameter =	4	inch
FM Velocity	2.553094	fps
FM Length =	1300	feet
Minor Losses =	0	feet
Equivalent FM Length =	1300	feet
Force Main Low Headloss =	7.50	feet
Force Main High Headloss =	11.33	feet
Low Totoal Dynamic Head =	30.65	feet
High Totoal Dynamic Head =	38.32	feet
Design TDH =	35	feet

Benjamin Grove
Sewage Lift Station
Pump Curves vs System Curves
Pumping to MH @ Benjamin Grove Phase 1

Flygt NP 3085 SH

Flow (gpm)	Single Pump Curve TDH (feet)	Double Pump Curve TDH (feet)	System Curve TDH (C=120)	System Curve TDH (C=150)
0	80.0	80.0	26.0	22.5
50	69.0	56.0	38.3	25.1
100	56.0	36.0	70.4	31.8
150	46.0	12.0	120.2	42.1
200	36.0			55.9
250	24.0			
300	12.0			



Bill of Assurance

Benjamin Grove Subdivision

PART A. PREAMBLE

WHEREAS, Thomas D.B. Collins, Ltd. Is the Owner of the following land situated in Saline County, Arkansas to wit:

LEGAL DESCRIPTION- BENJAMIN GROVE SUBDIVISION

See EXHIBIT B

WHEREAS, Owner has caused said land to be surveyed and a plat thereof made, dividing said land into lots as shown on said plat and showing the dimensions of each lot and the width of the streets as known as BENJAMIN GROVE SUBDIVISION, to the City of Bryant, Saline County **Arkansas.**

WHEREAS, the Saline County Real Estate Assessor and Office of Emergency Services have approved said Subdivision and road names.

NOW THEREFORE, Thomas D.B. Collins, LTD, LLC in consideration of the covenants herein stated, does hereby designate said land and make part hereof to be known BENJAMIN GROVE SUBDIVISION, to the City of Bryant Saline County, Arkansas, and that hereafter any conveyance by the Owners of said land by lot number shall forever be held to be good and legal description and the streets shown on said plat in said Subdivision are hereby and will become a public road to be accepted by the City of Bryant for maintenance. The property owners will establish BENJAMIN GROVE Property Owner's Association for the purpose of maintaining and ownership of common areas and appurtenants belonging thereto. The use of the land in said Subdivision being subject to the following Protective and Restrictive Covenants:

PART B. AREA OF APPLICATION

B-1 FULLY PROTECTED RESIDENTIAL AREA. The residential area covenants in Part C in their entirety shall apply to the entire Subdivision.

PART C: RESIDENTIAL AREA COVENANTS:

C-1 LAND USE AND BUILDING TYPE. No lot shall be used except for residential purposes. No business of any nature or kind shall at any time be conducted in any building located on any of the lots. No building shall be erected, altered, placed or allowed to remain on any lot other than one detached, single-family dwelling not to exceed two stories in height, excluding basement area. No lot can be subdivided for any purpose without the prior approval from the City of Bryant Planning Board and the consent of 51% of the voting members of the Property owners associations.

C-2 ARCHITECTURAL CONTROL. No dwelling or structure shall be erected, placed or altered on any lot until the construction plans and specifications and a plan showing the location of the structure, including landscaping, have been approved by the architectural control committee as to quality of workmanship and materials, harmony of external design with existing structures, and as to location with respect to topography and finish grade elevation, and intended objectives of the Architectural Control Committee to achieve a subdivision that accomplishes the desired architectural design in the structure and subdivision ascetics. No fence or wall shall be erected, placed or altered on any lot nearer than the setbacks as shown on the Plat. The term structure is defined to include any and all types of fences, antennas, decks, Permanent basketball goals, swimming pools and television satellite dishes, which in no event shall be placed in front of dwellings. Each property owner requesting approval shall submit to the Architectural Control Committee at least two weeks prior to the time approval is needed, a complete set of house plans and completed material and specifications list. Approval shall be a provided in Part D.

C-3. DWELLING COST, QUALITY AND SIZE. Minimum dwelling size shall be permitted 1400 sq. feet It being the intention and purpose of the covenants to assure that all dwellings

shall be of a quality of workmanship and materials substantially the same or better than that for the minimum permitted dwelling size. Each dwelling shall have a minimum of a two care garage. No open carports are allowed. No manufactured homes are allowed, sit built homes only.

C-4. BUILDING LOCATION. No building shall be located on any lot, nearer to the side street line, than the minimum building set back lines as shown on the recorded plat. For the purposes of this covenant, eaves, steps and open porches shall not be considered as part of the building. No lot shall be subdivided and no more than one dwelling shall be permitted on any one lot.

C-5 BUILDING REQUIREMENTS. All buildings shall have roof pitch of no less than 6/12. A 2 car enclosed garage, and partial brick on the front below the eaves. No chain link fences shall be allowed, all fences shall be of a wood type approved by the Architectural control committee.

C-7: EASEMENTS. Easements for installation and maintenance of utilities and drainage facilities, and construction, repair and maintenance of adequate walls, roofs and eaves are reserved as shown on recorded plat.

C-8. NUISANCES. No noxious or offensive trade or activities shall be carried on, nor shall anything be done thereon which may be or become a nuisance to the neighborhood.

C-9. TEMPORARY STRUCTURES. No structure of a temporary character, basement, tent, shack, garage, barn or other out building shall be used on any tract at any time as a residence either temporarily or permanently; except that the developer may have a temporary construction, storage facility and/or sales office.

C-10 OUT BUILDINGS. One outbuilding for storage shall be permitted, if approved by the Architectural Control Committee and shall conform to the same architectural design and construction of the dwelling. Above ground swimming pools are prohibited.

C-11. SIGNS. No sign of any kind shall be displayed to the public view on any lot, except, one professional sign of not more than one square foot; one sign of not more than five square feet advertising the property for sale or rent or any signs used by a builder to advertise the property during the construction and sales period.

C-12. OWNER RESPONSIBILITY. All property owners shall insure that any contractor performing services for the property owner shall comply with the provisions of this Bill of Assurance.

C-13. CONTRACTOR RESPONSIBILITY. No contractor shall damage in any way the utilities or streets in any manor.

C-14. OIL AND MINING OPERATIONS. No oil drilling, oil development operations, oil refining, quarrying or mining operations of any kind shall be permitted upon or in any lot, nor shall oil wells, tanks, tunnels, mineral excavations or shafts be permitted upon or in any lot. No derrick or structures designated for use in boring for oil or natural gas shall be erected, maintained or permitted upon any lot.

C-15. LIVESTOCK AND POULTRY. No animals, livestock or poultry of any kind may be raised, bred or kept on any tract, except that dogs or cats may be kept, on any lot provided that they are not kept, bred or maintained for any commercial purpose and provided that facilities for maintenance of same are approved by the Architectural Control Committee and that the keeping of same does not constitute a nuisance.

C-16. GARBAGE AND REFUSE DISPOSAL. No lot or easement shall be used or maintained as a dumping ground for rubbish. Trash, garbage and other waste shall not be kept except in sanitary containers. There shall be no burning of trash, rubbish, leaves or yard waste.

C-17 SIGHT DISTANCE AT INTERSECTIONS. No fence, wall, hedge or shrub planting which obstructs sight lines at elevations between 2 and 6 feet above the roadways shall be placed or permitted to remain on any lot corner which the triangular area formed by the street property lines and the line connecting them at points 15 feet from the intersection of street right of way lines, or in the case of a rounded property corner, from the intersection of the street property line extended. The same sight line limitations shall apply on any lot within 10 feet from the intersection of the street property line with the edge of a driveway pavement. No tree shall be permitted to remain within such distances or such intersections unless the foliage line is maintained at sufficient height to prevent obstruction of such sight lines.

C-18. LOT, YARD AND HOME MAINTENANCE. All property owners, after acquisition of any lot, shall keep all grounds and yards mowed, trimmed and clean. All houses shall be painted and stained. No deviation from the original plans shall be permitted without approval of the Architectural Control Committee.

C-19 COMMENCEMENT OF CONSTRUCTION. A property owner must start construction of an approved dwelling within a period of one (1) year from date of purchase. The developer reserves the option to repurchase any lot for the amount of the original purchase price if construction is not commenced within such period of time. This option shall be exercised in writing within a period of thirty (30) days after the one (1) year period.

C-20 COMPLETION OF CONSTRUCTION. Any dwelling must be completed in its entirety within a period of one year from date such construction is commenced.

C-21 MOTOR VEHICLE PARKING. Abandoned or unused motor vehicles shall not be parked or permitted to remain on any lot or within the dedicated street. Boats, recreational

vehicles and trailers cannot be parked at the front or side of any dwelling or in the dedicated street and must be parked in back of the dwelling. Owners or permanent residents are prohibited from parking in the street. There shall be no non-functioning vehicles kept on the lot or in view of the public. There shall be no repair work done outside of the garage.

C-22. **MINIMUM FLOOR LEVEL ELEVATIONS.** The Architectural Control Committee reserves the right to prescribe the minimum floor elevations for lots. All homes shall have a minimum floor elevation of one foot above the back of the curb unless waived in writing by the Architectural Control Committee.

PART D. ARCHITECTURAL CONTROL COMMITTEE:

D-1 **MEMBERSHIP.** The Architectural Control Committee shall be composed of Phillip Pengelly. A majority of the committee may designate a representative to act for it. In the event of death or resignation of any member of the committee, the remaining members shall have full authority to designate a successor. Neither the members of the committee nor its designated representative shall be entitled to any compensation for there services performed pursuant to this covenant.

D-2 **PROCEDURE.** The committee's approval or disapproval as required in these covenants shall be in writing and in the form hereto attached marked Exhibit "A" which, when executed, should be retained by the owner/builder as proof of the Committee's approval. In the event the committee or its designated representative fails to approve or disapprove within 30 days after plans and specification have been submitted to it or in the event no suit to enjoin the construction or compliance with these covenants has been commenced within 180 days after the completion thereof will not be required and the related covenants shall be deemed to have been fully complied with.

PART E. PROPERTY OWNERS ASSOCIATION

E-1 **OWNERS EASEMENTS OF ENJOYMENT.** Every owner shall have a right and easement of enjoyment in and to the common area which shall be appurtenant to and shall pass with the title to every tract. Subject to the following provision:

(a) The right of the Association to charge reasonable fees for maintenance of the common area;

E-2. MEMBERSHIP AND VOTING RIGHTS

SECTION 1: Every owner of a tract which is subject to assessment shall be a member of the Association. Membership shall be appurtenant to and may not be separated from ownership of any tract which is subject to assessment.

SECTION 2: The Association shall have two classes of voting membership:

Class A: Class A members shall be all owners, with the exception of the Declarant, and shall be entitled to one vote for each tract owned, which may be voted at such time as all tracts are sold by the Declarant. When more than one person holds an interest in any tract, all such persons shall be members. The vote for such tract shall be exercised as they determine, but in no event shall more than one vote be cast with respect to any Tract.

Class B: The Class B member(s) shall be the Declarant and shall be entitled to one vote per tract owned. The Class B membership shall cease on the happening of the following events.

(a) when all tracts are sold by declarant.

E-3. COVENANT FOR MAINTENANCE ASSESSMENTS

SECTION 1: Creation of the Lien and Personal Obligation of Assessments: The Declarant, for each tract owned within the properties, hereby covenants, and each owner of any tract by acceptance of a deed therefore, whether or not it shall be so expressed in such deed, is deemed to covenant and agree to pay to the Association annual assessment or charges, such assessments to be established and collected as hereinafter provided. The annual assessments, together with interest, costs and reasonable attorneys' fees, shall be a charge on the land and shall be a continuing lien upon the property against which each such assessment is made. Each such assessment, together with interest, costs, and reasonable attorneys' fees, shall also be the personal obligation of the person who is the owner of such property at the time when the assessment fell due. The personal obligation for delinquent assessments shall not pass to his successors in title unless expressly assumed by them.

SECTION 2: Purpose of Assessment: The assessments levied by the Association shall be used as follows:

(a) For the maintenance and upkeep of all common areas including detention ponds and other drainage structures that serve the entire subdivision even if located in a different phase of the subdivision.
(b) For any other purposes deemed in the best interest of the property owners by the Association

SECTION 3: Annual Assessment: The initial conveyance from Developer to owner shall have a set annual assessment due by the new owner of $10.00, if said property is a vacant lot and a pro-rata value of $60.00 if said lot has a residence. From and after January 1 of the year immediately following the conveyance of the Lot from the Developer to an Owner, annual assessments shall be $60.00 per lot regardless if land is vacant or has a residence and also provided that ownership of a lot on which a residence is located and an adjacent lot shall be considered one lot for fee purposes.

a. From and after January 1 of the year immediately following the conveyance of the Lot to an Owner, the maximum annual assessment may be increased each year not more than 5% above the maximum assessment for the previous years with a vote of over 50% of the membership.

(b) From and after January 1 of the year immediately following the conveyance of the Lot to an Owner, the maximum annual assessment may be increased above 5% by a vote of two-thirds (2/3) of each class of members who are voting the person or by proxy, at a meeting duly called for this purpose.

(c) The Board of Directors may fix the annual assessment at an amount not in excess of the maximum.

SECTION 4: Notice and Quorum for Any Action Authorized Under Section 3: Written Notice of any meeting called for the purpose of taking any action authorized under Section 3 shall be sent to all members not less than 10 days in advance of the meeting. At the first such meeting called, the presence of member or proxies entitled to cast 60% of all votes shall constitute a quorum. If the required quorum is not present, another meeting may be called subject to the same notice requirement, and the required quorum at the preceding meeting shall be one-half (1/2) of the required quorum at the preceding meeting. No such subsequent meeting shall be held more than 60 days following the preceding meeting. Each tract as conveyed by Declarant shall have one vote.

SECTION 5: Uniform Rate of Assessment: Both annual and special assessments must be fixed at a uniform rate and may be collect on a semi-annual or annual basis.

SECTION 6: Date of Commencement of Annual Assessments: Due Dates: The annual assessments provided for herein shall commence as to all Lots on the first day of January

following the date of recordation of this instrument. The Board of Directors shall fix the amount of the annual assessment against each Lot at least thirty (30) day in advance of each annual assessment period. Written notice of the annual assessment shall be sent to every Owner subject thereto. The due date shall be established by the Board of Directors. The Association shall, upon demand, and for a reasonable charge, furnish a certificate signed by an officer of the Association setting forth whether the assessments on a specified Lot have been paid. A properly executed certificate of the Association as to the status of assessments on a Lot is binding upon the Association as of the date of its issuance.

SECTION 7: Effect of Nonpayment of Assessments: Remedies of the Association: Any assessment not paid within thirty (30) days after the due date shall bear interest from the due date at the rate of ten percent per annum. The Association may bring an action at law against the owner personally obligated to pay the same, or foreclose the lien against the property. No owner may waive or otherwise escape liability for the assessments provided for herein by non-use of the common area or abandonment of the property.

SECTION 8: Subordination of the Lien to Mortgages: The lien of the assessments provided for herein shall be subordinate to the lien of any first mortgage. Sale or transfer of any tract shall not affect the assessment lien. However, the sale or transfer of any tract pursuant to mortgage foreclosure or any proceeding in lieu thereof, shall extinguish the lien of such assessments as to payments which became due prior to such sale or transfer. No sale or transfer shall relieve such tract from liability for any assessments thereafter becoming due or from the lien thereon.

SECTION 9: Special Assessments for Capital Improvements: In addition to the annual assessments authorized above, the members may levy, in any assessment year, a special assessment applicable to that year only for the purpose of defraying, in whole or in part, the cost of any construction, reconstruction, repair or replacement of a capital improvement upon the common areas, provided that such assessment shall have the assent of two-thirds (2/3) of the votes of the members who are voting in person or by proxy at a meeting duly called for this purpose.

PART F. GENERAL PROVISIONS:

F-1. TERM. These covenants are to run with the land and shall be binding on all parties and all persons claiming under them for a period of twenty-five years from the date these covenants are recorded after which time, said covenants shall be automatically extended for successive period of ten years, subject to the express provision that these covenants may be amended at any time after the date of execution hereby by an instrument signed by the members of the Architectural Control Committee and the owner or owners of a majority of the lots herein platted.

F-2 ENFORCEMENT. Enforcement shall be by proceedings at law or in equity against any person or persons violating or attempting to violate any covenant either to restrain violations or to recover damages.

F-3 SEVERABILITY Invalidation of any one of these covenants by judgment or court order shall in no way affect any of the other provisions which shall remain in full force and effect.

IN WITNESS WHEREOF, the name of Owner is hereby affixed by its Members this _____ day of _____, 2016.

THOMAS D.B. COLLINS, LTD. LLC

_____
PHILLIP PENGELLY

ACKNOWLEDGEMENT

STATE OF ARKANSAS)
)ss
COUNTY OF SALINE)

On this day appeared before me, a Notary Public, Phillip Pengelly, known to me to be the Member of Thomas D.B. Collins, LTD, LLC and acknowledged that they were authorized to execute the foregoing on its behalf and that they had executed same for the consideration and purpose therein mentions and set forth.

WITNESS my hand and seal this _____ day of _____, 2016.

_____
Notary Public

My commission expires

_____

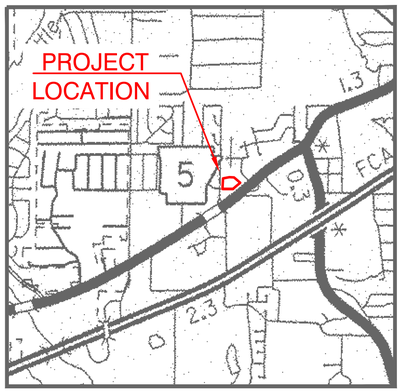
EXHIBIT "B"

PROPERTY DESCRIPTION: (AS SURVEYED)

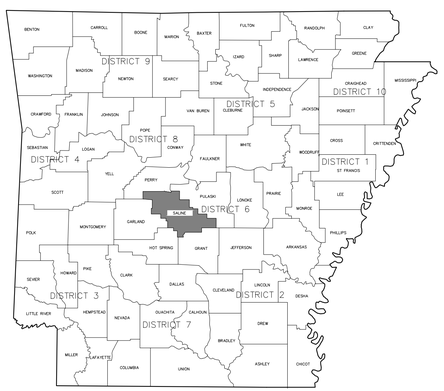
A PART OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 12; TOWNSHIP 1 SOUTH; RANGE 15 WEST; SALINE COUNTY, ARKANSAS; BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF SAID SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 12; THENCE N 1° 30' 03" E A DISTANCE OF 630.67 FEET ALONG THE EAST LINE OF SAID SECTION 12 TO A POINT; THENCE N 88° 06' 35" W A DISTANCE OF 105.90 FEET, BEING ON THE WEST RIGHT OF WAY LINE OF ZUBER ROAD; THENCE N 88° 06' 35" W A DISTANCE OF 644.88 FEET; THENCE N 1° 30' 03" E A DISTANCE OF 130.72 FEET; THENCE S 88° 8' 55" E A DISTANCE OF 28.77 FEET TO THE **POINT OF BEGINNING**; THENCE N 88°8'55" W A DISTANCE OF 484.04 FEET; THENCE S 1°30'1" W A DISTANCE OF 395.01 FEET; THENCE N 88°8'55" W A DISTANCE OF 125.00 FEET; THENCE N 1°30'1" E A DISTANCE OF 10.00 FEET; THENCE N 88°8'55" W A DISTANCE OF 115.00 FEET TO THE EAST RIGHT OF WAY LINE OF GILBERT ROAD; THENCE N 1°30'1" E A DISTANCE OF 945.02 FEET TO THE NORTHWEST CORNER OF THE SE/4 NE/W OF SECTION 12; THENCE, ALONG THE NORTH LINE OF THE SW/4 NE/4 OF SECTION 12, S 88°8'55" E A DISTANCE OF 727.71 FEET; THENCE S 1°51'5" W A DISTANCE OF 115.00 FEET; THENCE N 88°8'55" W A DISTANCE OF 10.99 FEET; THENCE S 1°30'1" W A DISTANCE OF 280.01 FEET; THENCE S 8°21'55" E A DISTANCE OF 50.81 FEET; THENCE S 1°50'17" W A DISTANCE OF 115.00 FEET TO THE **POINT OF BEGINNING**. CONTAINING 497,103 SQUARE FEET (11.41 ACRES), MORE OR LESS, SUBJECT TO ANY AND ALL EASEMENTS, RESERVATIONS, RESTRICTIONS AND CONVEYANCES OF RECORD.

CONSTRUCTION PLANS
CRYE-LEIKE COMMERCIAL RETAIL

BRYANT, ARKANSAS



VICINITY MAP
SCALE: 1" = 2000'



PREPARED BY:

HOPE CONSULTING
ENGINEERS - SURVEYORS

117 S. Market Street,
Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

DRAWING INDEX

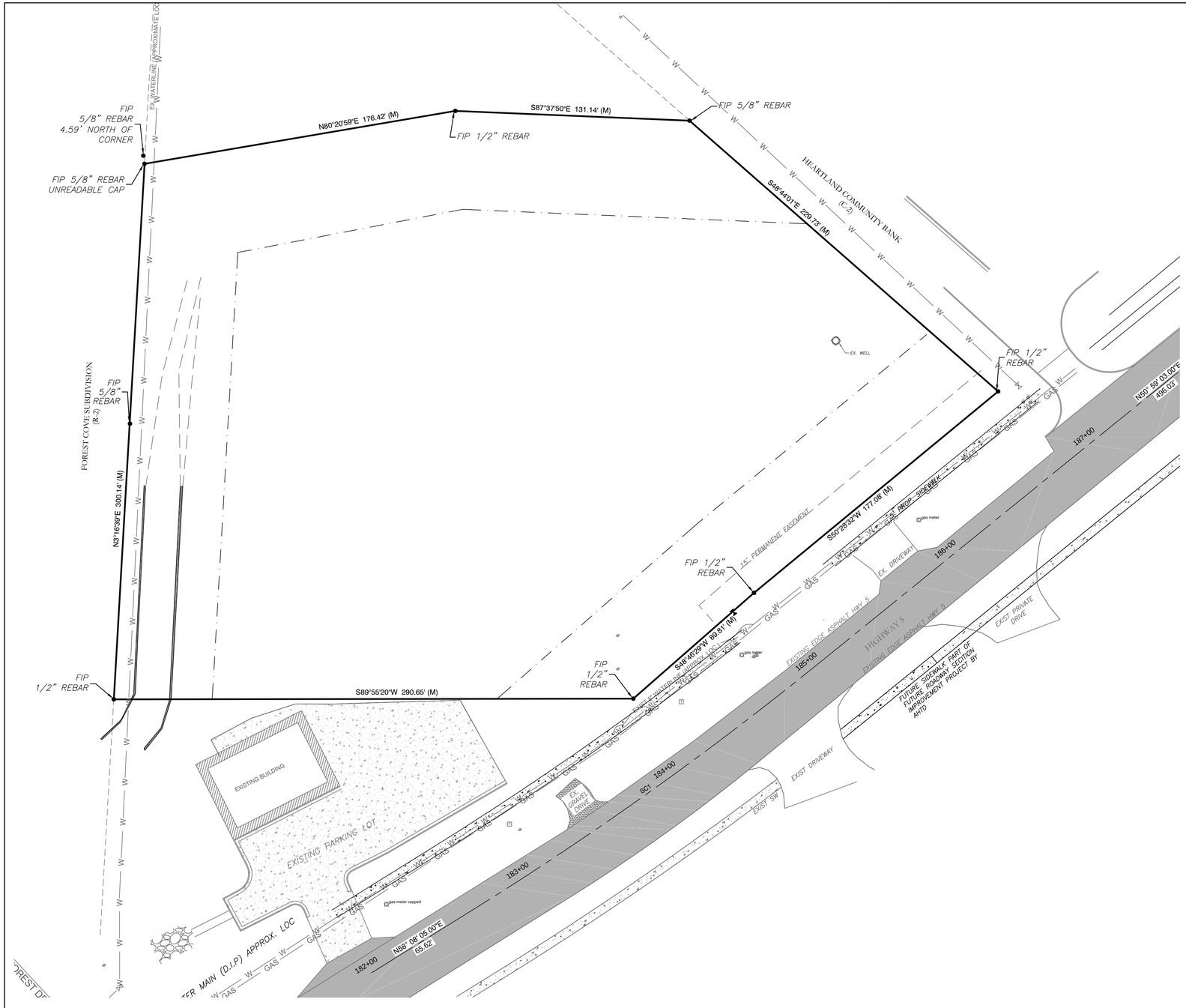
SHEET NO.	TITLE
	BOUNDARY & TOPO SURVEY
C-1.0	SITE PLAN
C-2.0	GRADING PLAN
C-3.0	UTILITY PLAN
C-4.0	CIVIL SPECIFICATIONS
C-5.0	TRENCH DETAILS
C-6.0	DRAINAGE PLAN AND DETENTION DETAILS
A-1.0	FLOOR PLAN
L-1.0	LANDSCAPE PLAN
P-1.0	NOT YET RECEIVED
P-1.1	NOT YET RECIEVED
P-1.2	NOT YET RECEIVED
S-1.0	NOT YET RECEIVED
S-1.1	NOT YET RECEIVED
S-2.0	NOT YET RECEIVED
S-3.0	NOT YET RECEIVED
S-3.1	NOT YET RECEIVED
S-4.0	NOT YET RECEIVED

CIVIL ENGINEER
HOPE CONSULTING INC
117 S. MARKET STREET
BENTON, AR 72015

OWNER
HAROLD E. CRYE
11600 KANIS RD SUITE 40
LITTLE ROCK, AR 72211

ARCHITECT
DON JOHNSON
JOHNSON ARCHITECTS, PLC
275 CANTRELL RD, SUITE 107
LITTLE ROCK, AR 72202

GEOTECHNICAL ENGINEER
MTA ENGINEERS
LITTLE ROCK, AR
P.O. BOX 23715
LITTLE ROCK, AR 72221



WATER NOTES

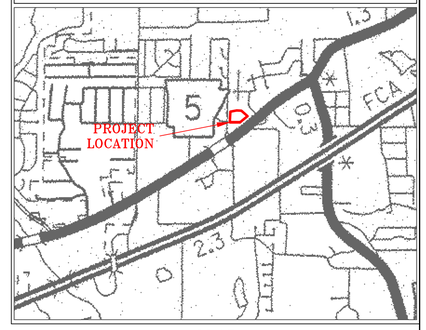
APPROX. LOCATION OF UTILITY EASEMENT AND PROPOSED 8" WATER LINE AND GATE VALVE ARE SHOWN ON PLANS AS PER CRIST ENGINEERS.

PROPOSED 8" MAIN AND GATE VALVE PART OF A SEPARATE WATER RELOCATION PROJECT AND ONLY SHOWN FOR PURPOSES OF TYING PROPOSED 1.5" SERVICE FOR THIS INTO WATER SYSTEM

GAS NOTES

MEP TO VERIFY PROP GAS LOCATION AND METER

VICINITY MAP:



SCALE:
1"=2000'

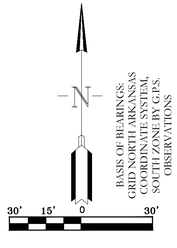
PROPERTY DETAILS

CURRENT ZONING: C-2 (HIGHWAY COMMERCIAL)
PARKING SPACE REQUIREMENTS
REQUIRED SPACES: 1 SPACE PER 300 SQUARE FEET OF OCCUPIED SPACE (70 SPACES)
PROPOSED SPACES: 96 (INCLUDES 4 HC SPACES)

Legal Description was taken from survey completed on June 16, 2016 by Scott Foster PLS # 1467

Property Description:

Part of the Southwest Quarter of the Northeast Quarter of Section 21, Township 1 South, Range 14 West, Saline County, Arkansas. Being more Particularly Described as Follows: Beginning at the Southwest Corner of the Said Southwest Quarter of the Northeast Quarter; Thence North 03 Degrees 16 Minutes 36 Seconds East Along the East Line of Forest Cove Subdivision 296.35 Feet to a Found Five Eights Inch Rebar; Thence Departing Said East Line North 79 Degrees 08 Minutes 23 Seconds East 177.43 Feet to a Point; Thence South 87 Degrees 35 Minutes 58 Seconds East 131.11 Feet to a Found Five Eights Inch Rebar; Thence South 48 Degrees 42 Minutes 58 Seconds East 229.78 Feet to a Set One Half Inch Rebar on the Northern Right of Way Line of Arkansas State Highway Number 5; Thence Along Said Right of Way Line the Following Two Courses and Distances; Thence South 50 Degrees 29 Minutes 58 Seconds West 177.09 Feet to a Set One Half Inch Rebar; Thence South 48 Degrees 48 Minutes 29 Seconds West 89.77 Feet to a Set One Half Inch Rebar; Thence Departing Said Right of Way Line South 89 Degrees 54 Minutes 56 Seconds West 290.66 Feet to the Point of Beginning Containing 124.648 Square Feet or 2.86 acres More or Less.



BASIS OF BEARINGS: GRID NORTH ARKANSAS COORDINATE SYSTEM, SOUTH ZONE BY G.P.S. OBSERVATIONS

UTILITY NOTES

1. EXISTING UTILITY LOCATIONS SHOWN ON PLANS ARE APPROXIMATE ONLY. CONTRACTOR SHOULD ALWAYS CALL ONE CALL BEFORE DIGGING.

811 Know what's below. Call before you dig.

CERTIFICATE OF AUTHORIZATION — HOPE CONSULTING, INC. — No. 1931 — ARKANSAS

WATER LEGEND:	EXISTING UTILITY LEGEND:
PROP. GATE VALVE	EXIST POWER POLE
2" BLOW OFF	EXIST WATER MAIN — GATE VALVE
REDUCER	REDUCER
FIRE HYDRANT	GMET GAS METER
DOUBLE WATER SERVICE	TELEPHONE PED.
SINGLE WATER SERVICE	EXISTING WATER METER
	FIRE HYDRANT

NOTE: ALL FIRE HYDRANT LEADERS HAVE A GATE VALVE BETWEEN MAIN AND FIRE HYDRANT.

SURVEY LEGEND

- △ - Computed point
- ● - Found monument
- ⊙ - Set Iron Pipe
- (M) - Measured
- (P) - PLAT/DEED
- ∅ - Power Pole

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FOR USE AND BENEFIT OF:
HAROLD CRYE

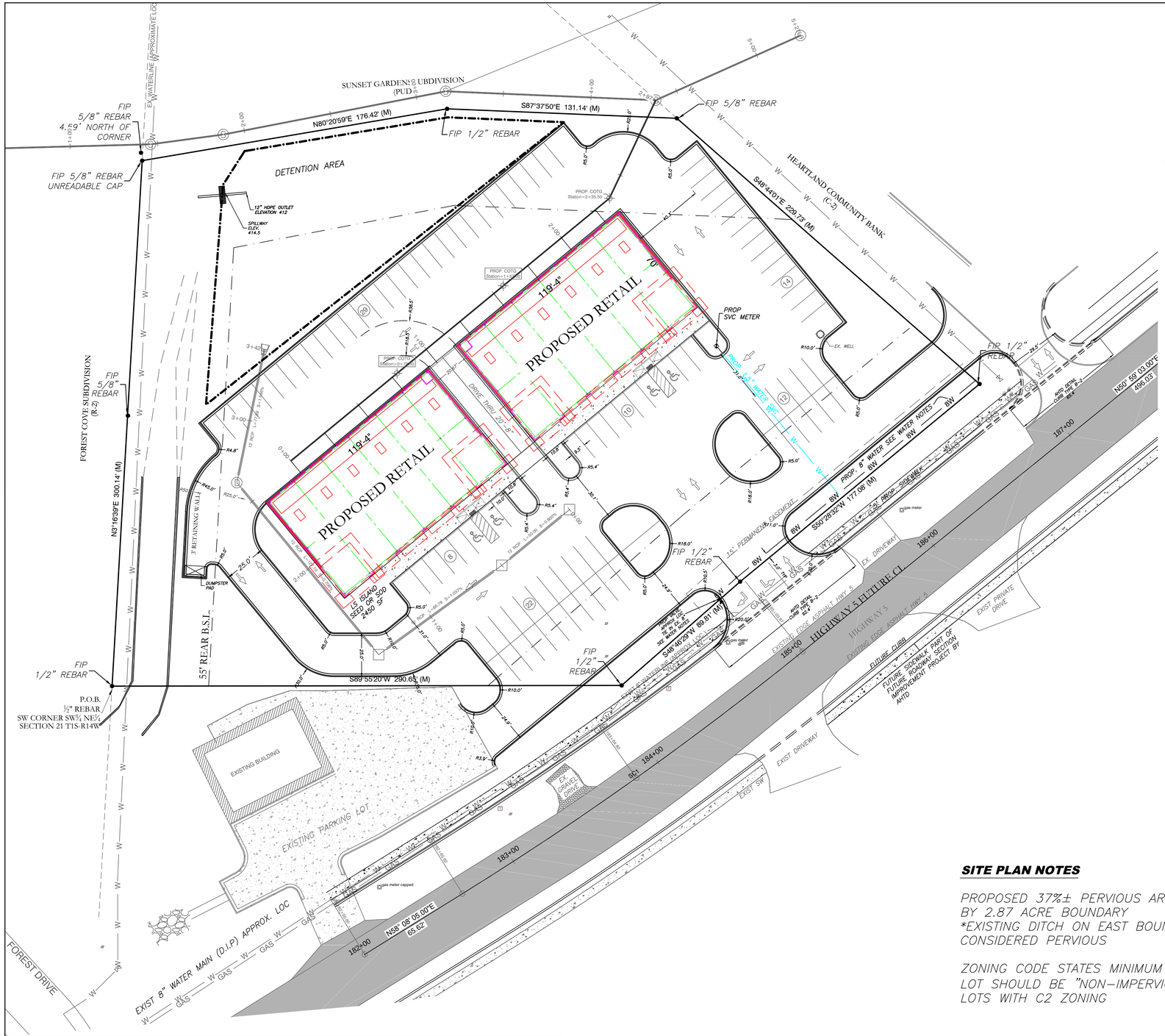
CRYE-LEIKE COMMERCIAL RETAIL BOUNDARY SURVEY

BRYANT, SALINE COUNTY, ARKANSAS

DATE:	1/19/2017	C.A.D. BY:	JNS	DRAWING NUMBER:	16-0380
REVISED:	n/a	CHECKED BY:			
SHEET:	BOUNDARY	SCALE: AS SHOWN			

500	01S	14W	0	19	440	62	1762

K:\LAND PROJECTS\2016\COMMERCIAL\2016\16-0380 JFIP HILL HWY 5\16-0380 BASE DRAWING (REV 1-26-17).DWG



WATER NOTES

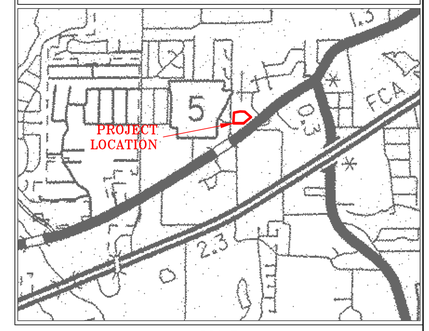
APPROX. LOCATION OF UTILITY EASEMENT AND PROPOSED 8" WATER LINE AND GATE VALVE ARE SHOWN ON PLANS AS PER CRIST ENGINEERS.

PROPOSED 8" MAIN AND GATE VALVE PART OF A SEPARATE WATER RELOCATION PROJECT AND ONLY SHOWN FOR PURPOSES OF TYING PROPOSED 1.5" SERVICE FOR THIS INTO WATER SYSTEM

GAS NOTES

MEP TO VERIFY PROP. GAS LOCATION AND METER

VICINITY MAP:



SCALE: 1"=2000'

SITE PLAN NOTES

PROPOSED 37%± PERVIOUS AREAS ENCLOSED BY 2.87 ACRE BOUNDARY
*EXISTING DITCH ON EAST BOUNDARY CONSIDERED PERVIOUS

ZONING CODE STATES MINIMUM OF 10% OF LOT SHOULD BE "NON-IMPERVIOUS" FOR LOTS WITH C2 ZONING

PROPERTY DETAILS

CURRENT ZONING: C-2 (HIGHWAY COMMERCIAL)
PARKING SPACE REQUIREMENTS
REQUIRED SPACES: 1 SPACE PER 300 SQUARE FEET OF OCCUPIED SPACE (70 SPACES)
PROPOSED SPACES: 96 (INCLUDES 4 HC SPACES)

Legal Description was taken from survey completed on June 16, 2016 by Scott Foster PLS # 1467

Property Description:

Part of the Southwest Quarter of the Northeast Quarter of Section 21, Township 1 South, Range 14 West, Saline County, Arkansas. Being more Particularly Described as Follows: Beginning at the Southwest Corner of the Said Southwest Quarter of the Northeast Quarter; Thence North 03 Degrees 16 Minutes 36 Seconds East Along the East Line of Forest Cove Subdivision 296.35 Feet to a Found Five Eights Inch Rebar; Thence Departing Said East Line North 79 Degrees 08 Minutes 23 Seconds East 177.43 Feet to a Point; Thence South 87 Degrees 35 Minutes 58 Seconds East 131.11 Feet to a Found Five Eights Inch Rebar; Thence South 48 Degrees 42 Minutes 58 Seconds East 229.78 Feet to a Set One Half Inch Rebar on the Northern Right of Way Line of Arkansas State Highway Number 5; Thence Along Said Right of Way Line the Following Two Courses and Distances; Thence South 50 Degrees 29 Minutes 58 Seconds West 177.09 Feet to a Set One Half Inch Rebar; Thence South 48 Degrees 48 Minutes 29 Seconds West 89.77 Feet to a Set One Half Inch Rebar; Thence Departing Said Right of Way Line South 89 Degrees 54 Minutes 56 Seconds West 290.66 Feet to the Point of Beginning Containing 124.648 Square Feet or 2.86 acres More or Less.

SITE LEGEND

EXIST HIGHWAY 5 ASPHALT PAVEMENT

UTILITY NOTES

1. EXISTING UTILITY LOCATIONS SHOWN ON PLANS ARE APPROXIMATE ONLY. CONTRACTOR SHOULD ALWAYS CALL ONE CALL BEFORE DIGGING.

811 Know what's below. Call before you dig.

EXISTING UTILITY LEGEND:

- EXIST POWER POLE
- EXIST WATER MAIN — GATE VALVE
- REDUCER
- GMET — GAS METER
- TELEPHONE PED.
- EXISTING WATER METER
- FIRE HYDRANT

SEWER LEGEND:

- SEWER MANHOLE

NOTE:
USE SDR-26 PVC SEWER PIPE EXCEPT WHERE DUCTILE IRON PIPE REQUIRED FOR COVER. USE DUCTILE IRON PIPE WHERE 30" MINIMUM COVER CANNOT BE MAINTAINED.

CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL BURIED UTILITIES PRIOR TO CONSTRUCTION.

WATER LEGEND:

- PROP. GATE VALVE
- 2" BLOW OFF
- REDUCER
- FIRE HYDRANT
- DOUBLE WATER SERVICE
- SINGLE WATER SERVICE

NOTE:
ALL FIRE HYDRANT LEADERS HAVE A GATE VALVE BETWEEN MAIN AND FIRE HYDRANT.

CERTIFICATE OF AUTHORIZATION — HOPE CONSULTING, INC. — No. 1931 — ARKANSAS

STATE OF ARKANSAS — REGISTERED PROFESSIONAL ENGINEER — NO. 14048 — WILLIAM W. McFADDEN

N

30' 15' 0 30'

BASIS OF BEARINGS: GRID NORTH ARKANSAS COORDINATE SYSTEM, SOUTH ZONE BY G.P.S. OBSERVATIONS

LEGEND
- Computed point
- Found monument
- Set Iron Pipe
(M) - Measured
(R) - Record
(D) - Deed
- Power Pole
- Overhead Power

HOPE CONSULTING ENGINEERS - SURVEYORS
117 S. Market Street,
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PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

FOR USE AND BENEFIT OF:
HAROLD CRYE

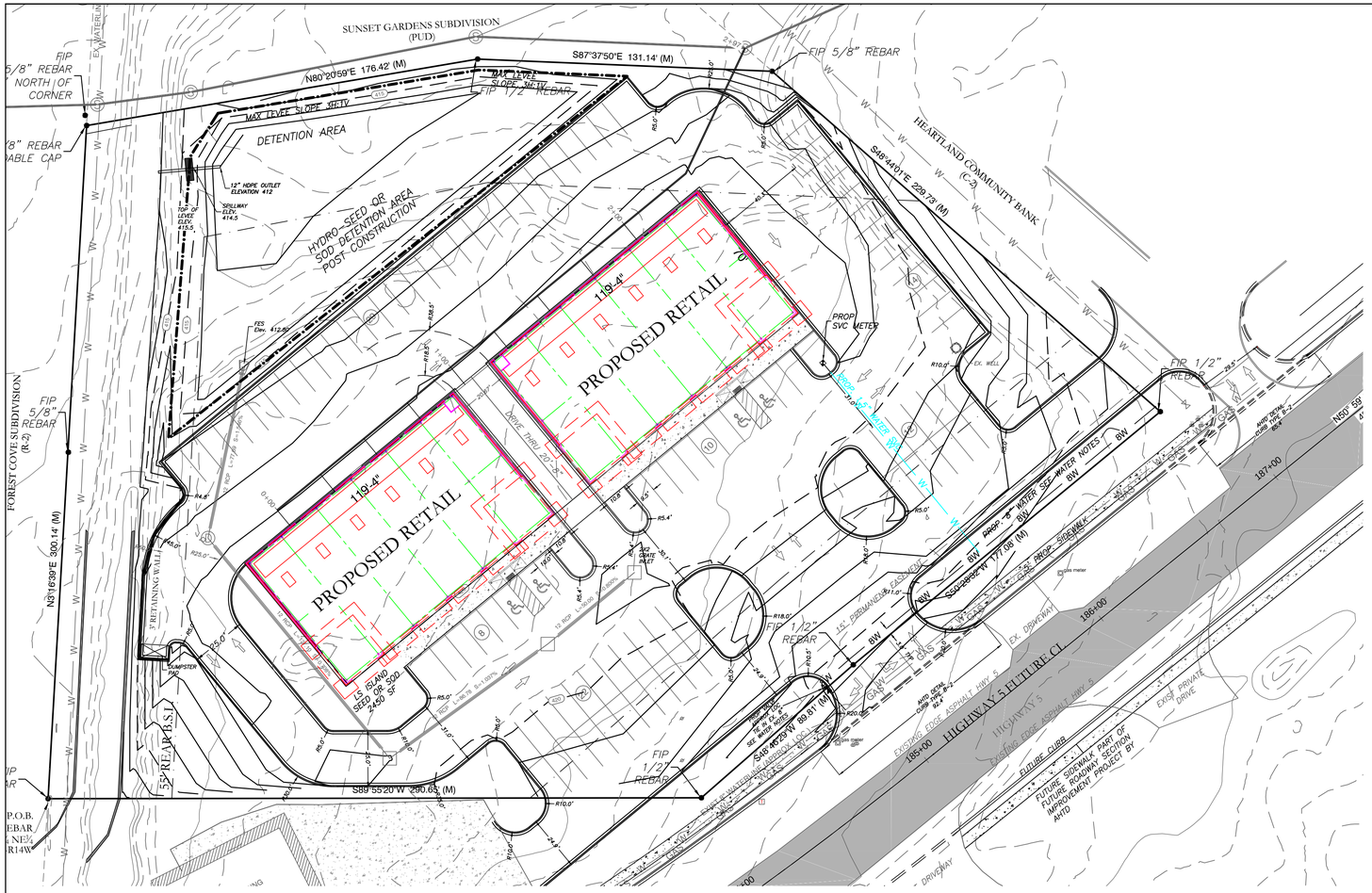
CRYE-LEIKE COMMERCIAL RETAIL SITE PLAN

BRYANT, SALINE COUNTY, ARKANSAS

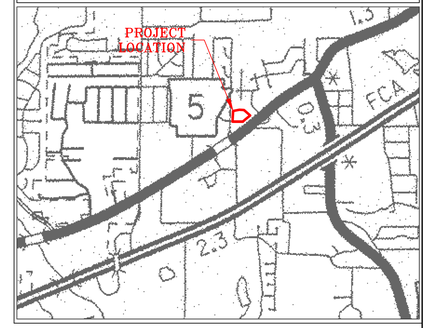
DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER:
REVISED:	1/26/2017	CHECKED BY:	16-0380
SHEET:	C-1.0	SCALE: AS SHOWN	

500	01S	14W	0	19	440	62	1762

K:\LAND PROJECTS 2016\COMMERCIAL\2016\16-0380\JEFF HILL HWY 5\16-0380 BASE DRAWING (REV 1-26-17).DWG



VICINITY MAP:



SCALE:
1"=2000'

UTILITY NOTES

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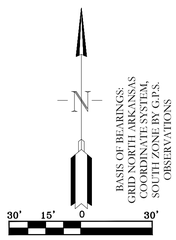
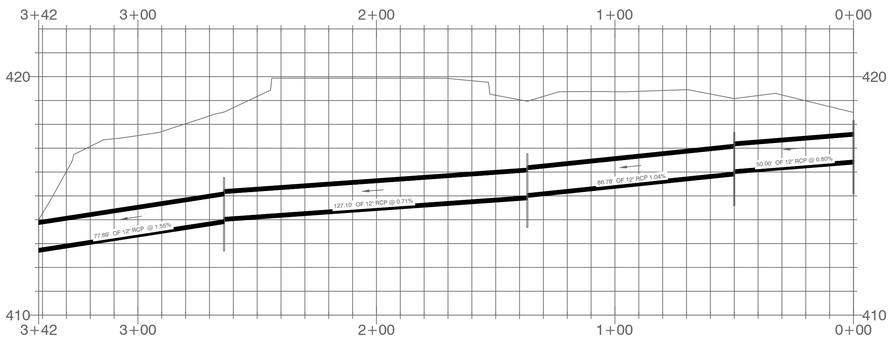


Storm pipe PROFILE



Drainage Structure	Unpaved Area (Acres)	Paved Area (Acres)	C_u	C_p	i	Discharge (Q = CiA)	Offsite Discharge	Cumulative Discharge	Pipe #	(RCP) Pipe Size(in.)	Slope	Velocity (V_{min}=3.0) (V_{max}=8.0)	PIPE CAPACITY (EACH)	PIPE CAPACITY (TOTAL)	% CAPACITY	Entrance Loss K_e	Assumed Length	Required Head	Elev Head from S_{pipe}	Required Additional Head
1_{100yr}		0.25		0.97	10.0	2.4		2.4	1	12	0.80%		3.5	3.5	70.2%	0.5	50	0.4	0.4	0.0
2_{100yr}		0.25		0.97	10.0	2.4		2.4	1	12	1.04%		3.9	3.9	61.6%	0.5	86	0.6	0.9	0.0
3_{100yr}		0.25		0.97	10.0	2.4		2.4	1	12	0.71%		3.3	3.3	74.6%	0.5	127	0.7	0.9	0.0
4_{100yr}		0.25		0.97	10.0	2.4		2.4	1	12	1.55%		4.8	4.8	50.5%	0.5	77	0.5	1.2	0.0

CERTIFICATE OF AUTHORIZATION
HOPE CONSULTING, INC.
No. 1931
ARKANSAS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
NO. 14048
WILLIAM W. McFADDEN

HOPE CONSULTING
ENGINEERS - SURVEYORS
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Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

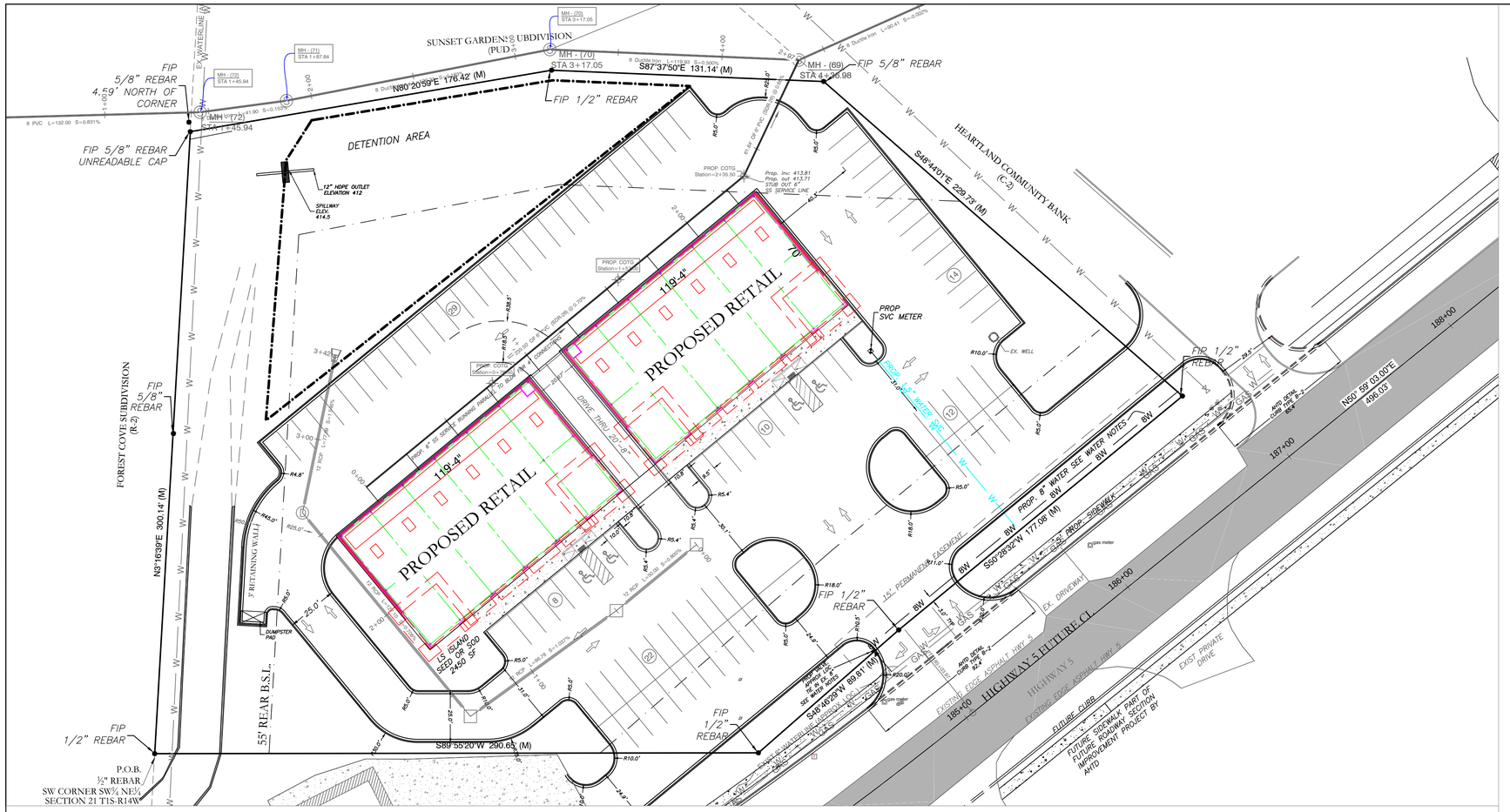
FOR USE AND BENEFIT OF:
HAROLD CRYE

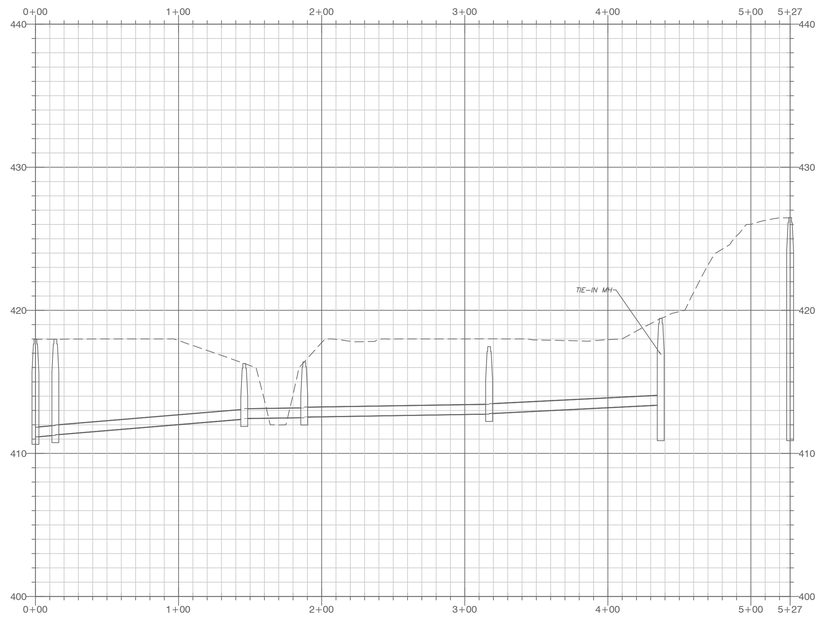
CRYE-LEIKE COMMERCIAL RETAIL
GRADING PLAN
BRYANT, SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER:
REVISED:	n/a	CHECKED BY:	16-0380
SHEET:	C-2.0	SCALE: AS SHOWN	

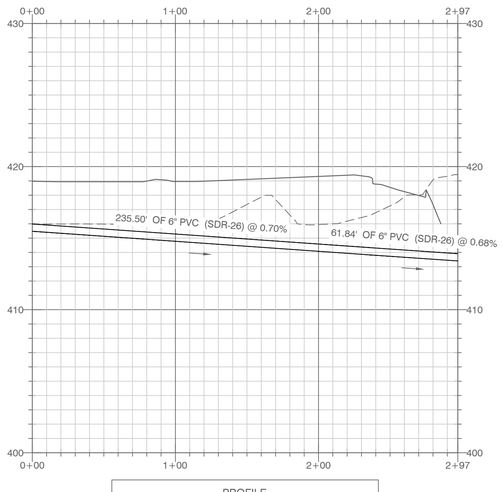
500	01S	14W	0	19	440	62	1762

K:\LAND PROJECTS\2016\COMMERCIAL\2016\16-0380 JEFF BELL HWY 5\16-0380 BASE DRAWING (REV 1-26-17).DWG



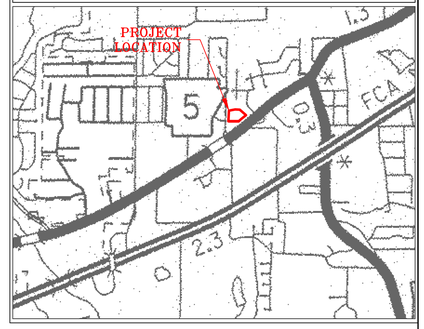


PROFILE
EXIST SANITARY SEWER
HORIZONTAL SCALE 1" = 50'



PROFILE
PROPOSED SEWER (MANHOLE North corner pin)
HORIZONTAL SCALE 1" = 50'
VERTICAL SCALE 1" = 5'

VICINITY MAP:



SCALE:
1"=2000'

SEWER NOTES

6" SEWER SERVICE SHOWN RUNNING PARALLEL TO PROPOSED BUILDING ON REAR SIDE OF BUILDING.

EACH INDIVIDUAL UNIT OF PROPOSED BUILDING WILL TIE INTO THIS 6" SEWER SERVICE

PROPOSED CLEANOUTS ALONG 6" SERVICE AS SHOWN

UTILITY NOTES

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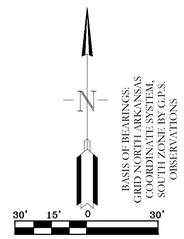

BASIS OF BEARINGS:
GRID NORTH ARKANSAS COORDINATE SYSTEM, SOUTH ZONE BY G.P.S. OBSERVATIONS

SEWER LEGEND:	WATER LEGEND:
EXISTING	2" BLOW OFF
PROPOSED	GATE VALVE
	REDUCER
	FIRE HYDRANT
	DOUBLE WATER SERVICE
	SINGLE WATER SERVICE

NOTE:
USE SDR-26 PVC SEWER PIPE EXCEPT WHERE DUCTILE IRON PIPE REQUIRED FOR COVER. USE DUCTILE IRON PIPE WHERE 30" MINIMUM COVER CANNOT BE MAINTAINED.

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NOTE:
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FOR USE AND BENEFIT OF:
HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL
UTILITY PLAN/SEWER PROFILE
BRYANT, SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER:
REVISED:	N/A	CHECKED BY:	16-0380
SHEET:	C-3.0	SCALE: AS SHOWN	

500	01S	14W	0	19	440	62	1762

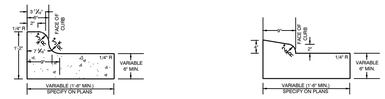
K:\LAND PROJECTS 2004\COMMERCIAL\2016\16-0380 JEFF BELL HWY 5\16-0380 BASE DRAWING REV 1-26-17.DWG

CURB NOTES:

1. PARKING LOT SHALL HAVE 18" STANDARD CURB AND GUTTER (TYPE A-1), EXCEPT WHERE PAVING ABUTS A SIDEWALK WITH INTEGRAL CURB & EXCEPT WHERE OTHERWISE SPECIFIED AS TYPE B-1.
2. CONCRETE FOR CURB AND GUTTER TO BE CLASS A, 4000 PSI, 6.0 BAG MIX WITH 4-7% AIR ENTRAINMENT
3. ALL CURB AND GUTTER SHALL HAVE A BROOMED FINISH UNLESS OTHERWISE SPECIFIED.
4. CONCRETE CURB TO BE SAWCUT AT 15' INTERVALS PERPENDICULAR TO THE GUTTER LINE AND SEALED WITH ONE PART COLD APPLIED SILICONE JOINT SEALER OR OTHER APPROVED SEALANT.
5. PROVIDE 1/2" PREFORMED EXPANSION JOINT MATERIAL BETWEEN CONCRETE CURB AND STATIONARY STRUCTURES, SUCH AS DROP INLETS, MANHOLES, ENDS OF CURB, DRIVEWAYS, ETC. (SEE DETAIL)
6. EXPANSION JOINTS SHALL BE PROVIDED AT APPROXIMATELY 50 FOOT SPACINGS IN CONCRETE PAVING AND WHERE CURB AND CONCRETE PAVING MEET.

PAVEMENT NOTES:

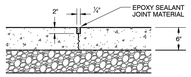
1. CONCRETE FOR HEAVY DUTY PAVING SHALL BE CLASS A, 4000 PSI, 6.0 BAG MIX WITH 4-7% AIR ENTRAINMENT.
2. ALL CONCRETE PAVEMENT SHALL HAVE A BROOMED FINISH UNLESS OTHERWISE SPECIFIED.
3. PROVIDE 1/2" PREFORMED EXPANSION JOINT MATERIAL BETWEEN CONCRETE PAVEMENT AND STATIONARY STRUCTURES, SUCH AS DROP INLETS, MANHOLES, ENDS OF CURB, DRIVEWAYS, ETC. (SEE DETAIL)
4. CONCRETE PAVEMENT SHALL HAVE 1- ½" DEEP SAW-CUT CONTROL JOINTS AT 10' SPACINGS, WHERE POSSIBLE, NOT TO EXCEED 15' IN ANY DIRECTION, AND SEALED WITH ONE PART COLD APPLIED SILICONE JOINT SEALER OR OTHER APPROVED SEALANT.
5. WHERE KEYWAY IS USED, CONTROL JOINTS SHALL STILL BE SAW CUT, AS NECESSARY, TO ACHIEVE THE REQUIRED SPACING.
6. EXPANSION JOINTS SHALL BE PROVIDED AT APPROXIMATELY 50 FOOT SPACINGS IN CONCRETE PAVING AND WHERE CURB AND CONCRETE PAVING MEET.

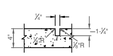


TYPE A

TYPE B-1

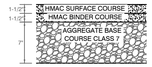
NOT TO SCALE





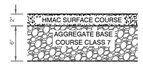
SAWED JOINT DETAIL

NOT TO SCALE



HEAVY-DUTY PARKING LOT PAVEMENT SECTION

NOT TO SCALE

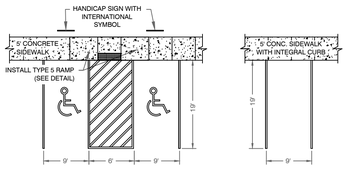


LIGHT-DUTY PARKING LOT PAVEMENT SECTION

NOT TO SCALE

CURB AND PAVEMENT DETAILS & NOTES

NOT TO SCALE



TYPICAL HANDICAP PARKING SPACE & RAMP

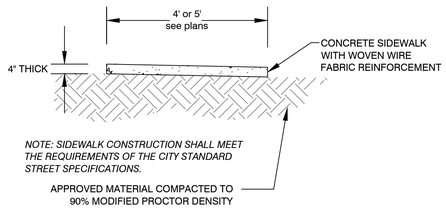
TYPICAL 9' x 19' PARKING SPACE

PARKING SPACE DETAILS - TYPICAL & HANDICAP-ACCESSIBLE

NOT TO SCALE

HEAVY-DUTY CONCRETE PAVEMENT SECTION

NOT TO SCALE



Typical Sidewalk Detail

SUBGRADE MATERIAL

A. Subgrade soils shall be all materials used for subgrade including in-situ materials and fill materials.
B. Subrades for pavement shall be stabilized by mechanical compaction. Stabilization methods such as fabrics and chemical stabilization may be submitted for approval when supported by engineering data and calculations to substantiate the adequacy of the stabilized procedure.
C. Subgrade shall be compacted to 95 percent modified proctor density minimum. Moisture content shall be +/- 3% of optimum moisture unless otherwise supported by the site specific geotechnical data and approved by City.
D. Subgrade shall be prepared in such a manner that the base course shall be placed on a firm foundation that is stable and free from soft spots, pumping, dust pockets, wheel ruts, or other defects.
E. The top 24 inches of the subgrade shall be a material not susceptible to frost action unless modified with cement, lime or another method approved specifically by the City to resist frost action. Soils classified as A-4 and A-5 including sandy silts, fine silty sand or lean clays are highly susceptible to frost action.
F. In-situ soils meeting the requirements outlined in these specifications may be utilized as subgrade material. In-situ soils used as subgrade shall be scarified to a minimum depth of 8-inches below finish subgrade, recompacted and tested as described below. Fill material for subgrade shall be placed in lifts not to exceed 8-inches compacted depth.
G. Methods and procedures for establishing the total depth of soil replacement and/or modification shall be as specified by the design engineer and geotechnical investigations. The adequacy of in-situ soils and fill materials as pavement subgrade shall be evaluated based upon the soils classification, liquid limit, and plasticity index.
H. Soils with a liquid limit greater than 40, or a plasticity index greater than 15 shall be undercut and removed from the street section or improved by a design method of stabilization approved by the City.
I. Quality control testing shall be as specified below.
J. Undercut 24" of soil below finished street base course. Proof roll to verify stability.
K. Backfill the undercut subgrade with Class 7 aggregate or soil meeting the requirements of this section and compact in lifts not exceeding 8".

BASE COURSE

A. Base course material shall be crushed stone meeting the requirements of AHTD Class 7 aggregate base course as specified in the latest edition of AHTD Standard Specifications.
B. Base course shall be compacted to 98 percent modified proctor density minimum. Moisture content shall be +/- 3% of optimum moisture.

SURFACE COURSE

A. Surface course for flexible pavement designs shall utilize plant mix bituminous base and binder courses conforming to AHTD Standard Specifications.

CURB AND GUTTER

A. Curb and gutter shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000 psi. Concrete shall be air-entrained with a maximum of 4-inch slump.
B. Compaction requirements under curb and gutter shall conform to the requirements for street subgrade materials. Compaction requirements shall extend to a minimum of 1 foot behond the back of curb and gutter removing all soft spots and replacing with suitable material.
C. Curb and gutter shall conform to the typical detail within these specifications or AHTD Standard Roadway Drawing Details for curbing.
D. Expansion joints shall be made with 1/2-inch preformed expansion joint filler of a non-extruding type. Expansion joints shall be placed at intervals not exceeding 195 feet, intersection radii, driveways, stationary structures, and sidewalks.
E. Contraction joints shall be sawed or fromed at intervals not greater than 20 feet. Depth of saw-cut hall be 1 1/2-inch and have a width of 1/4-inch. Contraction joints shall be sealed in accordance with AHTD Standard Specifications.
F. Forms shall be made of metal or wood and shall be properly braced. The minimum length of each section of form used shall be 10 feet. Each section of form shall be uniform and free from undesirable bends or warps. Forms shall be of such cross section and strength and so secured as to resist the pressure of the impact and vibration on any equipment which they support without springing or settlement.
G. Curb and gutter placed with slip form or extruding equipment will be acceptable providing it complies with all of the above requirements.
H. After curing, the curb shall be immediately backfilled to within 4 inches of the top curb to eliminatethe possibility of washing beneath the curb. The remaining 4 inches shall be topsoil.
I. Cold weather protection shall meet the requirements of the latest edition of AHTD Standard Specifications.

SIDEWALKS

General

A. Sidewalks shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000 psi.
B. Sidewalks shall be on both sides of streets in line with sidewalks on opposite corners of roads.
C. All sidewalks including ramps shall meet all current Federal Americans with Disabilities (ADA) design guidelines or requirements.
D. Traverse slopes shall not exceed 2 percent.
E. Subgrade under sidewalks shall be compacted to 90 percent modified proctor density minimum.
F. Sidewalks shall not be placed upon grassy or organic materials.
G. Sidewalks which extend or link existing sidewalks shall adjoin the existing sidewalks to form a continuous, even pathway.
H. Utility poles, utility boxes, mailboxes, fire hydrants, and other similar obstructions shall not be located in sidewalks Sidewalk location may vary at the discretion of the City to avoid such obstacles.

Minimum thickness and reinforcement

A. Sidewalks shall have a minimum thickness of 4 inches.
B. Sidewalks shall be reinforced, at a minimum, with woven wire fabric reinforcement.

Contraction and expansion joints

A. Contraction joints shall be provided perpendicular to the sidewalk at intervals equal to the sidewalk width.
B. Expansion joints shall be constructed perpendicular to the sidewalk at intervals equal to five times the sidewalk width. Expansion joints shall be made with 1/2-inch preformed expansion joint filler of a non-extruding type. Expansion joints shall be placed at driveways, drop inlets, and curbs.

Quality control testing and inspection by the City

A. Subgrade and formwork for sidewalks shall be inspected by the City prior to pouring of the sidewalk.
B. All testing of materials and construction shall be provided and paid for by the Developer/Owner.
C. All field tests required for a project shall be witnessed by the City, contractor, or their authorized representatives.
D. All testing shall be accomplished by a testing firm approved by the City and shall be performed under the supervision of a licensed Professional Engineer.
E. Sampling and testing locations shall be subject to approval by the City.
F. Density tests on subgrades shall be taken every 300 feet or portion thereof.
G. The City shall be notified at least one day in advance of the need to inspect subgrade and formwork of sidewalks.

Subgrade

A. Subgrade soils shall be all materials used for subgrade including in-situ materials and fill materials.
B. Subgrade shall be compacted to 90 percent modified proctor desnity minimum. Moisture content shall be +/- 3% of optimum moisture unless otherwise supported by the site specific geotechnical data and approved by City.
C. Subgrade shall be prepared in such a manner that the base course shall be placed on a firm foundation that is stable and free from soft spots, pumping, dust pockets, wheel ruts, or other defects.
D. The top 24 inches of the subgrade shall be a material not susceptible to frost action unless modified with cement, lime or another method approved specifically by the City to resist frost action. Soils classified as A-4 and A-5 including sandy silts, fine silty sand or lean clays are highly susceptible to frost action.

QUALITY CONTROL TESTING AND INSPECTIONS

General

A. Materials and construction employed in street improvements shall be subject to inspection and quality control testing. All testing of materials and construction shall be provided and paid for by the Developer/Owner.
B. The Developer/Owner shall provide for inspections of street improvements during construction. The inspections shall be accomplished under the supervision of the Engineer of Record. The Engineer of Record shall provide certification that all materials and construction conform to the approved plans and specifications and with these minimum street standards.
C. The Engineer of Record shall furnish inspection whenever a critical construction activity is taking place. This means that a representative of the Engineer of Record must be on-site whenever a critical construction activity is taking place.
D. All field tests required for a project shall be witnessed by the City, Engineer of Record, contractor, or other authorized representatives.
E. The City shall be notified at least one day in advance of any test(s). It is the responsibility of the contractor to coordinated the scheduling of all tests with the City.

UTILITY NOTES

1. *EXISTING UTILITY LOCATIONS SHOWN ON PLANS ARE APPROXIMATE ONLY. CONTRACTOR SHOULD ALWAYS CALL ONE CALL BEFORE DIGGING.*

811 Know what's below. Call before you dig.

CERTIFICATE OF AUTHORIZATION — HOPE CONSULTING, INC. — No. 1931 — ARKANSAS

STATE OF ARKANSAS — REGISTERED PROFESSIONAL ENGINEER — NO. 14048 — WILLIAM W. McFADDEN

HOPE CONSULTING ENGINEERS - SURVEYORS
117 S. Market Street,
Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

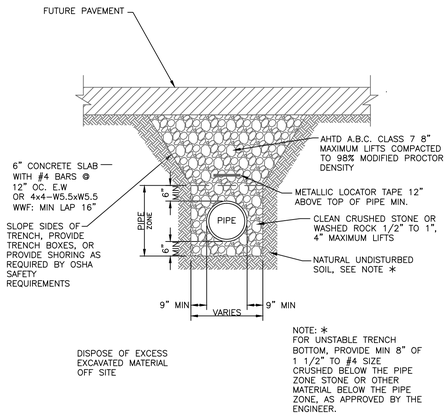
FOR USE AND BENEFIT OF:
HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL
GENERAL SPECIFICATIONS
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER: 16-0380
REVISED:		CHECKED BY:	
SHEET:	C-4.0	SCALE: AS SHOWN	

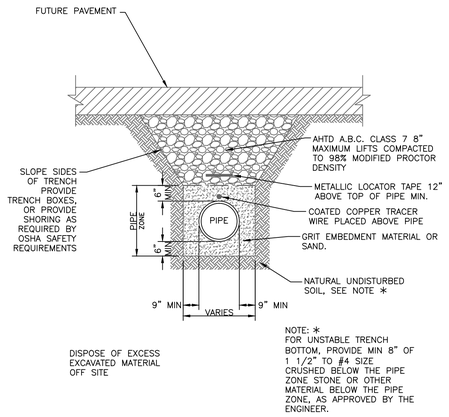
500	01S	14W	0	19	440	62	1762

K:\LAND PROJECTS 2016\COMMERCIAL\2016-16-0380 JEFF BELL HWY 5\16-0380 BASE DRAWING (REV 1-25-17).DWG



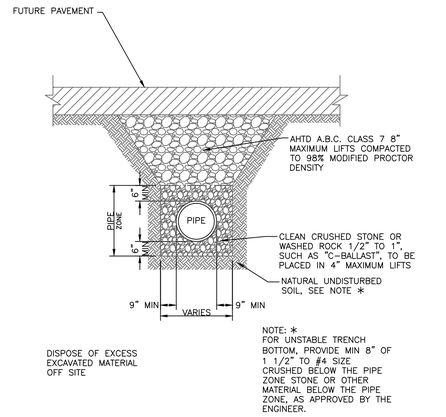
PVC SEWER TRENCH UNDER FUTURE ASPHALT STREET

N.T.S.



PVC WATER LINE TRENCH UNDER FUTURE ASPHALT STREET

N.T.S.

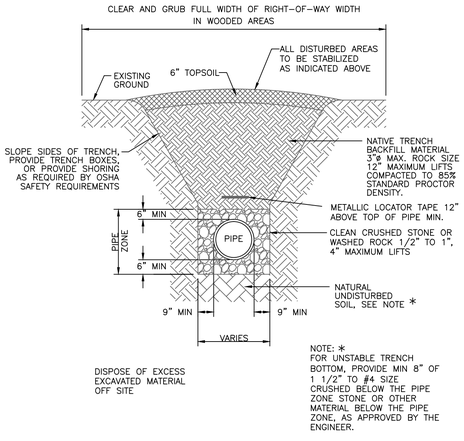


DRAINAGE PIPE TRENCH UNDER FUTURE ASPHALT STREET

N.T.S.

SOIL STABILIZATION REQUIREMENTS:

1. IN LAWN AREAS, DISTURBED SOIL SHALL BE STABILIZED BY PLACEMENT OF SOD TO MATCH EXISTING.
2. IN FIELDS OR WOODED AREAS, DISTURBED SOIL SHALL BE STABILIZED BY SEEDING.



PVC SEWER TRENCH IN UNPAVED AREAS

N.T.S.

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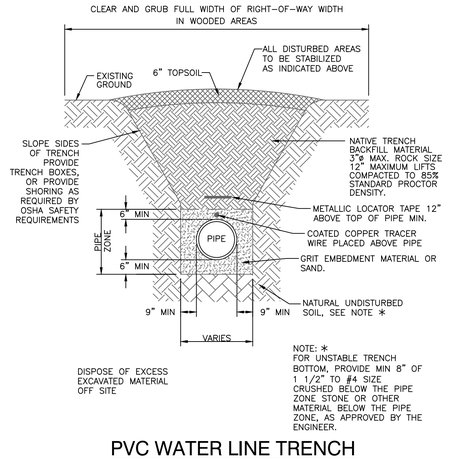

PVC WATER LINE TRENCH IN UNPAVED AREAS

N.T.S.

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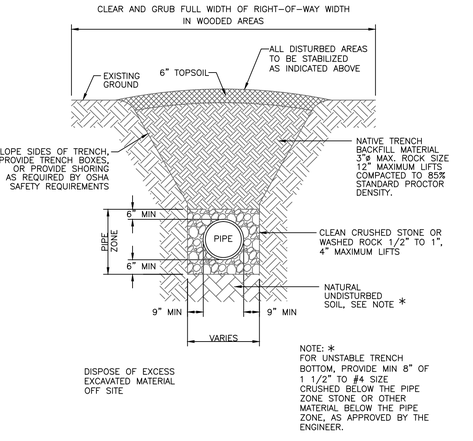

DRAINAGE PIPES IN UNPAVED AREAS

N.T.S.

Trench Details of Highway 5 Commercial Retail

HOPE CONSULTING, INC. No. 1931 — CERTIFICATE OF AUTHORIZATION — ARKANSAS

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FOR USE AND BENEFIT OF:
HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL
TYPICAL TRENCH DETAILS
CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER:
REVISED:		CHECKED BY:	16-0380
SHEET:	C-5.0	SCALE: AS SHOWN	

500	01S	14W	0	19	440	62	1762

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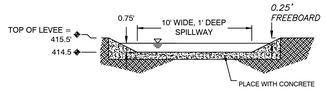


SPILLWAY END VIEW
NTS

$$Q=\frac{3.247*L*H^{1.48}-0.566*L^{1.9}}{1+2^{1.87}}$$

OVERFLOW SPILLWAY SIZED FOR HUNDRED YEAR FLOOD WITH 0.25' AVAILABLE FREEBOARD

H=0.75'
L=10'
Q=21 CFS

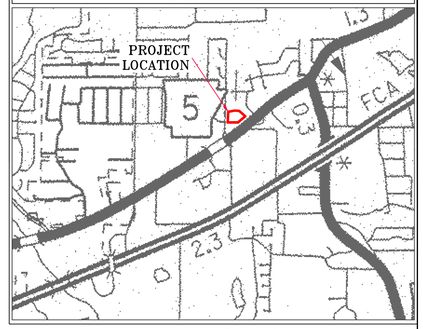
LEGEND

- DETENTION DRAINAGE AREA DELINEATION
- OVERALL STUDY AREA
- DETENTION AREA

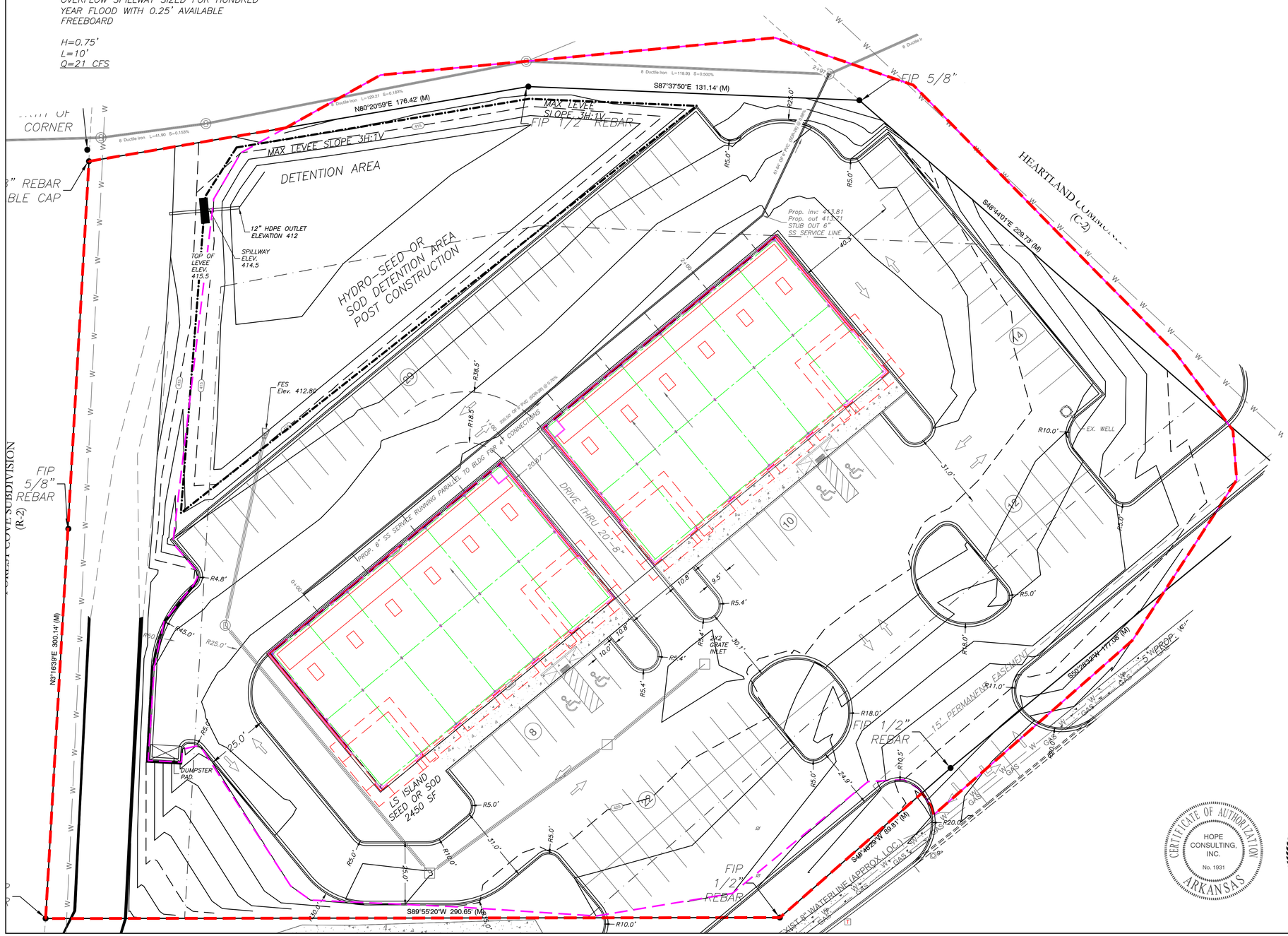
DRAINAGE/DETENTION NOTES

HYDRO-SEED OR SOD DETENTION AREA POST-CONSTRUCTION
MAXIMUM SLOPE OF 3H:1V ON DETENTION POND LEVEES
STUDY AREA LIMITED TO PROPERTY BOUNDARY 3.00 AC±
DRAINAGE DELINEATION AREA APPROX. 2.58 AC±

VICINITY MAP:



SCALE: 1"=2000'



DETENTION POND MAINTENANCE PLAN

Background
The detention pond is located at the northwest corner of the subject property. It is designed to temporarily detain stormwater to meet water quantity criteria before discharging off the property.

Routine Maintenance
The property owners association will maintain the detention pond. Routine maintenance will include but not be limited to:
-Mowing of the bottom, bank slopes and area around the pond on a monthly basis during the growing season and as needed during the cooler months.

-The outlet pipe from the pond and other areas will be inspected monthly for debris which could inhibit the proper flow of discharge. Any debris will be removed immediately and disposed of or placed in a location to prevent future maintenance and to not cause impact up or downstream of the structure.

-Trash will be removed from around the pond to prevent entering the pond. Generally, the site should be kept free of loose trash which could be carried off site by wind or rain.

-Inspect the pond and outlet pipe for non-routine maintenance need.

Periodic or Non-Routine Maintenance
The routine inspection of the pond area and discharge pipe will identify needed repairs and non-routine maintenance. These items may include but not be limited to:

-Re-growth of trees on or around the pond bank. These should be cut and removed from the pond area.

-Sediment from the site may accumulate in the pond bottom and reduce the pond to below design volume requirements. The pond should be excavated if the pond bottom elevation reached a level that allows excessive aquatic growth or reduces the pond efficiency such, that the sediments are passing the discharge structure and release off site.

-Stabilization or re-grading of side slopes may be required periodically or after excessive rain events. Any disturbance of slopes should be reseeded or may require installation of erosion control materials until seeding can reestablish adequate grasses to prevent future erosion.

-Any other maintenance or repairs which would minimize other maintenance to the pond or outfall structures.

For questions or concerns about the detention pond, contact at 501-.

UTILITY NOTES

1. EXISTING UTILITY LOCATIONS SHOWN ON PLANS ARE APPROXIMATE ONLY. CONTRACTOR SHOULD ALWAYS CALL ONE CALL BEFORE DIGGING.

811 Know what's below. Call before you dig.

N

20' 10' 0 20'

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CERTIFICATE OF AUTHORIZATION
HOPE CONSULTING, INC.
No. 1931
ARKANSAS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
NO. 14048
WILLIAM W. McFADDEN

FOR USE AND BENEFIT OF:
HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL DRAINAGE PLAN

CITY OF BRYANT,
SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY: WM	DRAWING NUMBER: 16-0380
REVISED:		CHECKED BY:	
SHEET:	C-6.0	SCALE: AS SHOWN	

500	01S	14W	0	19	440	62	1762

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WATER NOTES

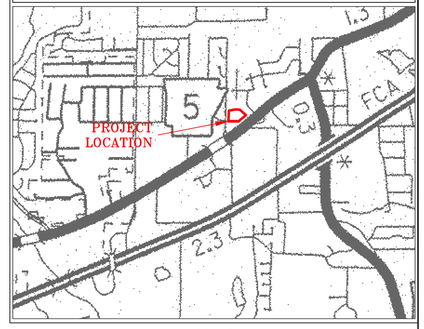
APPROX. LOCATION OF UTILITY EASEMENT AND PROPOSED 8" WATER LINE AND GATE VALVE ARE SHOWN ON PLANS AS PER CRIST ENGINEERS.

PROPOSED 8" MAIN AND GATE VALVE PART OF A SEPARATE WATER RELOCATION PROJECT AND ONLY SHOWN FOR PURPOSES OF TYING PROPOSED 1.5" SERVICE FOR THIS INTO WATER SYSTEM

GAS NOTES

MEP TO VERIFY PROP. GAS LOCATION AND METER

VICINITY MAP:



SCALE: 1"=2000'

UTILITY NOTES

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811 Know what's below. Call before you dig.

LS LEGEND

- 2" RED MAPLE – 4
- 2" WILLOW OAK – 4
- 2" FOSTER HOLLY – 2
- BERMUDA SOD
- MULCHED PLANTING BED (3 GAL AND GAL PLANTS)

LITTLEROCK LANDSCAPE, INC. Residential Commercial SINCE 1978

EXISTING UTILITY LEGEND:	
	EXIST POWER POLE
EXIST WATER MAIN	GATE VALVE
	REDUCER
GMET	GAS METER
	TELEPHONE PED.
	EXISTING WATER METER
	FIRE HYDRANT

SEWER LEGEND:	WATER LEGEND:
S SEWER MANHOLE	PROP. GATE VALVE
	2" BLOW OFF
	REDUCER
	FIRE HYDRANT
	DOUBLE WATER SERVICE
	SINGLE WATER SERVICE

NOTE: USE SDR-26 PVC SEWER PIPE EXCEPT WHERE DUCTILE IRON PIPE REQUIRED FOR COVER. USE DUCTILE IRON PIPE WHERE 30" MINIMUM COVER CANNOT BE MAINTAINED.

CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL BURIED UTILITIES PRIOR TO CONSTRUCTION.

NOTE: ALL FIRE HYDRANT LEADERS HAVE A GATE VALVE BETWEEN MAIN AND FIRE HYDRANT.

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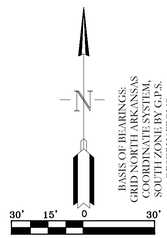

BASIS OF BEARINGS: GRID NORTH ARKANSAS COORDINATE SYSTEM, SOUTH ZONE BY G.P.S. OBSERVATIONS

LEGEND
- Computed point
- Found monument
- Set Iron Pipe
(M) - Measured
(R) - Record
(D) - Deed
- Power Pole
— E — - Overhead Power

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FOR USE AND BENEFIT OF: HAROLD CRYE

CRYE-LEIKE COMMERCIAL RETAIL LANDSCAPE PLAN

BRYANT, SALINE COUNTY, ARKANSAS

DATE:	1/16/2017	C.A.D. BY:	WM	DRAWING NUMBER:
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SHEET:	L-1.0	SCALE: AS SHOWN		

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