Crafton Tull
architecture | engineering | surveying

300 North College, Suite 317
Fayetteville, AR 72701
479.455.2207
craftontull.com

January 21, 2024

City of Bryant
Attn: Engineering Department
210 SW 3rd. Street,
Bryant, AR 72022

Re: Panera Bread - Drainage Letter
CT Job #: 24304000

Mr. Wilson,

The following information concerns a new Panera Bread being proposed to be constructed just north of the David's Burgers at 23140 I-30 W Bryant, AR. This project is part of a larger commercial development (Reynolds Centre) that was designed by Holloway Engineering previously. A portion of the Panera Bread site will remain unimproved to allow for future development.

As part of the previous development of David's Burgers/Reynolds Centre, regional underground detention chambers were designed and constructed to provide detention for the overall development. This underground detention design accounted for the commercial development of the property upon which this project sits.

The original design for this site was a large retail center with associated parking. The development of the Panera Bread will have a smaller runoff coefficient than that of the original designed retail center. A portion of the site will remain unimproved to allow for future development. Because of the original retail design and conservative runoff coefficient, the Panera Bread and the future development (once constructed) will have no negative impact upon Bryant's stormwater system. A summary of the runoff coefficients is shown below:

Runoff Coefficient			
	10 YR Storm	25 YR Storm	100 YR Storm
Original Design Retail Center (By Others)	0.9	0.93	0.95
Panera Bread with unimproved remaining future development area	0.59	0.64	0.72

Should you have any questions, please feel free to contact us at your earliest convenience.

Sincerely,

Caroline Gardner, PE
Project Engineer
Crafton Tull

REYNOLDS CENTER
APPLICABLE PLAN SHEETS
(BY OTHERS)

Crafton Tull

GRAPHIC SCALE 1"=30'

0 30 60

BASIS OF BEARING
STATE PLANE COORDINATES
ARKANSAS NORTH ZONE NAD-83

LEGEND:

TC = TOP OF CURB
G = GUTTER
SW = SIDEWALK
HP = HIGH POINT
LP = LOW POINT

NOTES:

1. CONTRACTOR TO NOTIFY "ARKANSAS ONE-CALL" AND ALL APPROPRIATE UTILITIES, CABLE COMPANIES, ETC., PRIOR TO STARTING ANY EXCAVATION. DIAL 811.
2. EXISTING UTILITY LOCATIONS SHOWN MAY NOT BE ACCURATE. ALSO UTILITIES OTHER THAN THOSE SHOWN MAY EXIST.
3. SOME UTILITIES MAY NEED TO BE RELOCATED IN ORDER TO COMPLY WITH THIS GRADING PLAN.
4. VEGETATION MUST BE ESTABLISHED ON DISTURBED AREAS WITHIN 14 DAYS OF COMPLETION OF GRADING ACTIVITIES.
5. ADEQ PERMIT MUST BE OBTAINED AND EROSION CONTROL MEASURES MUST BE INSTALLED TO REDUCE DISCHARGE OF POLLUTED STORMWATER BEFORE CONSTRUCTION CAN COMMENCE.
6. ALL SIDEWALK AREAS TO MAINTAIN A MAXIMUM 2% CROSS-SLOPE AND A 5% RUNNING SLOPE & CONFORM TO ALL ADA REGULATIONS. ALL ADA PARKING TO BE MAX. 2% SLOPE ALL DIRECTIONS.

HOLLOWAY ENGINEERING
Surveying, & Civil Design, PLLC
200 Casey Drive
Maumelle, Arkansas 72113
(501) 851-3366
admin@holloway-eng.com

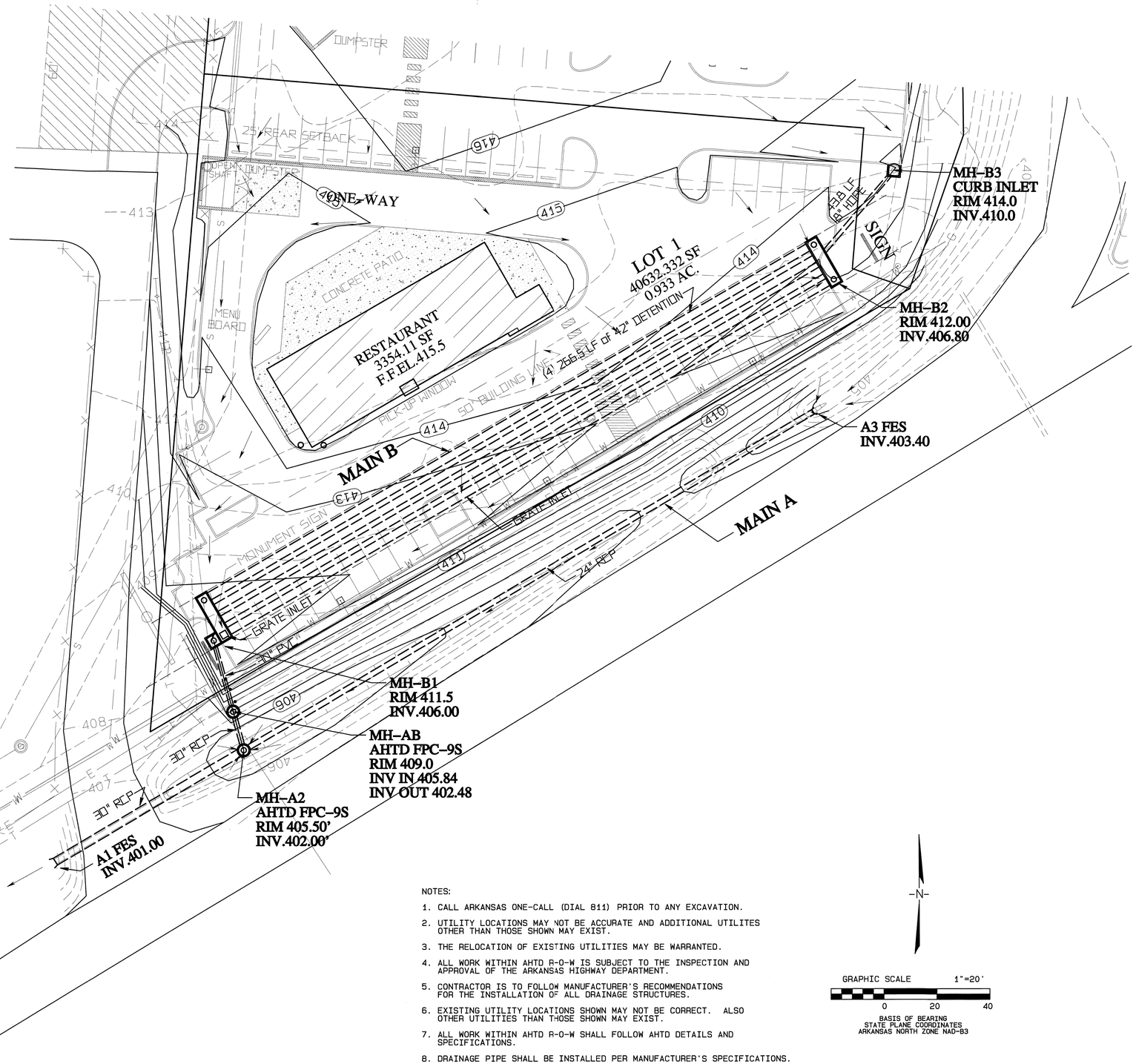
Grading Plan of the Reynolds Centre City of Bryant, Saline County, Arkansas for: David's Real Estate, LLC

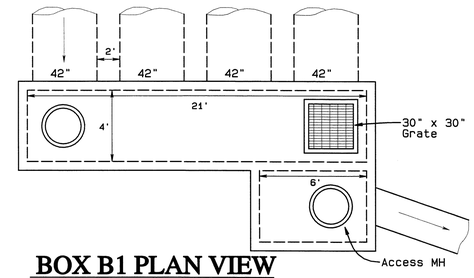
date	revisions	int.
2/28/17	Reserve Decel Lane	DLW

dwg by: MDR
checked: DLW
date: 5/8/2017
scale: noted

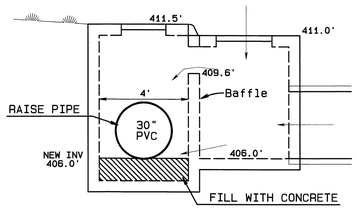
C2.00

L:\2016\2016-083 Davids Burgers Bryant - Alan Bubbus\GradingPlan\2016-083.pro
5/8/2017
11:32:31AM

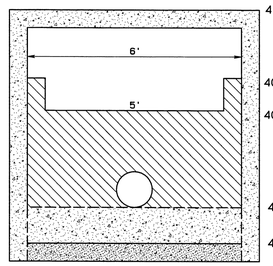




BOX B1 PLAN VIEW
NTS



BOX B1 SOUTH VIEW
NTS



BOX B1 BAFFLE
NTS

NOTES:

1. CALL ARKANSAS ONE-CALL (DIAL 811) PRIOR TO ANY EXCAVATION.
2. UTILITY LOCATIONS MAY NOT BE ACCURATE AND ADDITIONAL UTILITES OTHER THAN THOSE SHOWN MAY EXIST.
3. THE RELOCATION OF EXISTING UTILITIES MAY BE WARRANTED.
4. ALL WORK WITHIN AHTD R-O-W IS SUBJECT TO THE INSPECTION AND APPROVAL OF THE ARKANSAS HIGHWAY DEPARTMENT.
5. CONTRACTOR IS TO FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR THE INSTALLATION OF ALL DRAINAGE STRUCTURES.
6. EXISTING UTILITY LOCATIONS SHOWN MAY NOT BE CORRECT. ALSO OTHER UTILITIES THAN THOSE SHOWN MAY EXIST.
7. ALL WORK WITHIN AHTD R-O-W SHALL FOLLOW AHTD DETAILS AND SPECIFICATIONS.
8. DRAINAGE PIPE SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.

-N-

GRAPHIC SCALE 1"=20'
0 20 40

BASIS OF BEARING
STATE PLANE COORDINATES
ARKANSAS NORTH ZONE NAD-B3

CERTIFICATE OF AUTHORIZATION
Holloway Engineering, Surveying & Civil Design, PLLC
No. 1879
ARKANSAS

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 10852
DAVID L. WHITE
4-1-17

HOLLOWAY ENGINEERING
Surveying, & Civil Design, PLLC
200 Casey Drive
Maumelle, Arkansas 72113
(501) 851-3366
admin@holloway-eng.com

Drainage Plan of the Reynolds Centre
City of Bryant, Saline County, Arkansas
for: David's Real Estate, LLC

date	revisions	int.
1/30/17	B1 to A2 change	DLW
2/28/17	Remove Decal Lane	DLW
3/6/17	Drainage for Retail Lot	DLW

dwg by: MDR
checked: DLW
date: 4/7/2017
scale: noted

C2.01

L:\2016\2016-083 Davids Burgers Bryant - Alan Bubbus\DrainagePlan2016-083.pro
4/7/2017
4:24:12PM

LEGEND:

TC = TOP OF CURB
G = GUTTER
SW = SIDEWALK
HP = HIGH POINT
LP = LOW POINT

NOTES:

1. CONTRACTOR TO NOTIFY "ARKANSAS ONE-CALL" AND ALL APPROPRIATE UTILITIES, CABLE COMPANIES, ETC., PRIOR TO STARTING ANY EXCAVATION. DIAL 811.
2. EXISTING UTILITY LOCATIONS SHOWN MAY NOT BE ACCURATE. ALSO UTILITIES OTHER THAN THOSE SHOWN MAY EXIST.
3. SOME UTILITIES MAY NEED TO BE RELOCATED IN ORDER TO COMPLY WITH THIS GRADING PLAN.
4. VEGETATION MUST BE ESTABLISHED ON DISTURBED AREAS WITHIN 14 DAYS OF COMPLETION OF GRADING ACTIVITIES.
5. ADEQ PERMIT MUST BE OBTAINED AND EROSION CONTROL MEASURES MUST BE INSTALLED TO REDUCE DISCHARGE OF POLLUTED STORMWATER BEFORE CONSTRUCTION CAN COMMENCE.
6. ALL SIDEWALK AREAS TO MAINTAIN A MAXIMUM 2% CROSS-SLOPE AND A 5% RUNNING SLOPE & CONFORM TO ALL ADA REGULATIONS, ALL ADA PARKING TO BE MAX. 2% SLOPE ALL DIRECTIONS.

HOLLOWAY ENGINEERING
Surveying, & Civil Design, PLLC
200 Casey Drive
Maumelle, Arkansas 72113
(501) 851-3366
admin@holloway-eng.com

Grading Plan of the Reynolds Centre

City of Bryant, Saline County, Arkansas
for: David's Real Estate, LLC

date	revisions	int.
2/28/17	Remove Decel Lane	DLW

dwg by: MDR
checked: DLW
date: 5/8/2017
scale: noted

C2.00

L:\2016\2016-083 Davids Burgers Bryant - Alan Bubbus\GradingPlan2016-083.pro
5/8/2017
11:32:31AM

PIPES

Design based on 100-year Storm

Inlet	Drainage Area ac	Area Q req'd cfs	Pipe	Q req'd cfs	Pipe Dia in	Area ft^2	W.P. ft	Rh	Slope ft/ft	n	Max Velocity fps	Full Flow Capacity cfs	Vel Head $v^2/2g$ ft	Fig 3-1 Flow Depth ft	H.E.G ft	Rim Elev ft
B3	1.14	10.07	B3 to B2	10.07	18	1.77	4.71	0.375	0.045	0.013	12.66	22.36	2.5			
B2	0.37	3.22	B2 to B1	13.30	42	9.62	10.99	0.875	0.003	0.013	5.74	55.20	0.5			
B1	1.41	12.48	B1 to AB	25.78	30	4.91	7.85	0.625	0.005	0.010	7.69	37.73	0.9			
AB	0.00	0.00	AB to A2	25.78	30	4.91	7.85	0.625	0.015	0.013	10.25	50.27	1.6			
A3	2.60	15.00	A3 to A2	15.00	24	3.14	6.28	0.5	0.005	0.013	5.09	15.99	0.4	1.6		
A2	0.49	3.49	A2 to A1	44.27	30	4.91	7.85	0.625	0.012	0.013	9.16	44.96	1.3	2.0	405.3	405.5
C2	1.00	8.84	C2 to C1	8.84	18	1.77	4.71	0.375	0.019	0.013	8.24	14.55	1.1	0.8		

H.E.G. = Inv + Vel Head + Flow Depth

Q req'd = (Drainage Area) x (9.5 in/hr) x (0.93)

Flow Depth from LR Drainage Manual Fig 3-1

Velocity = ((1.49/n) (Rh)^0.66 (Slope)^0.5)

Capacity = Q = Area x Velocity

A2 - Q req'd = (0.49)(9.5)(0.75) = 3.49 cfs

Offsite Drainage into A3: **1) Waffle House Lot** A = 0.90 ac **2) Ditch & Pavement of Ramp Road** A = 0.90 ac

L1 = 300 ft L2 = 525 ft Lo = 825 ft Δh = 20 ft Slope = 2.5% Tc = 30 min

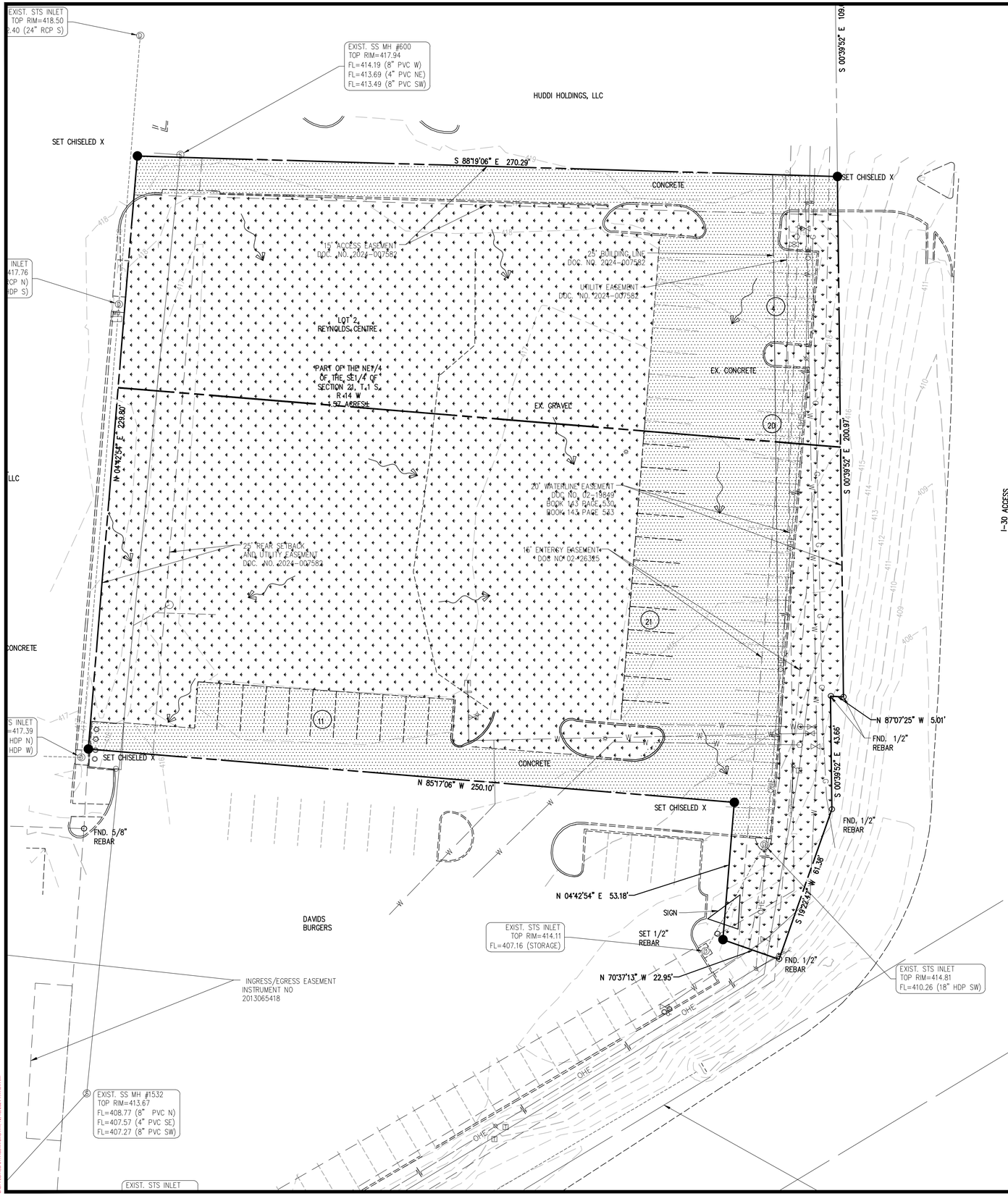
I = 5.5 in/hr Q = CIA = (0.75)(5.5)(1.80) = 7.4 cfs

3) Interstate Area A = 0.85 ac Q = CIA = (0.90)(10.0)(0.85) = 7.6 cfs

A3 - 15.0 cfs

PREDEVELOPMENT DRAINAGE EXHIBIT

Crafton Tull



INTENSITY CALCULATIONS						
STORM YEAR	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
INTESITY (IN/HR)	5.88	6.79	7.58	8.53	9.45	10.00
TC (MIN)	5	5	5	5	5	5

COMPOSITE C- VALUE (PRE-DEV)							
SURFACE	AREA (AC)	C VALUE					
		2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
ASPHALTIC	0.00	0.73	0.77	0.81	0.86	0.90	0.95
CONCRETE/ROOF	0.50	0.75	0.80	0.83	0.88	0.92	0.97
GRASS AREA	1.07	0.25	0.28	0.30	0.34	0.37	0.41
TOTAL/COMPOSITE	1.57	0.41	0.45	0.47	0.51	0.55	0.59

FLOW OFF OF SITE (PRE-DEV)						
YEAR	2	5	10	25	50	100
A (ACRES)	1.57	1.57	1.57	1.57	1.57	1.57
C VALUE	0.41	0.45	0.47	0.51	0.55	0.59
INTENSITY (IN/HR)	5.88	6.79	7.58	8.53	9.45	10.00
Q (CFS)	3.78	4.75	5.58	6.86	8.09	9.24

GRASS/LAWN

CONCRETE PAVED/BUILDING

PAVED/ASPHALT

Arkansas One Call 811
Know what's **below**.
Call before you dig.

10825 Financial Centre Parkway, Suite 300
Little Rock, Arkansas 72211
Crafton Tull
engineering | surveying
501.664.3245 t 501.664.6704 f
www.craftontull.com

CERTIFICATE OF AUTHORIZATION:

CERTIFICATE OF AUTHORIZATION
CRAFTON, TULL & ASSOCIATES, INC.
No. 109
ARKANSAS ENGINEER

GRAPHIC SCALE IN FEET
20' 0 20'

PANERA BREAD
BRYANT, AR

Key Plan

No.	Description	Date

This document, and the ideas and designs incorporated herein, as an instrument of professional service, is the property of Crafton, Tull & Associates, Inc., and is not to be used, in whole or in part, for any other project, without the written authorization of Crafton, Tull & Associates, Inc.

PROJECT NO: 24304000
ISSUE DATE: 11/20/24
CONTACT: T.TOLLEY
QC by:
QC Date:

PRELIMINARY PLANS

THIS DOCUMENT IS PRELIMINARY IN NATURE AND IS NOT A FINAL, SIGNED AND SEALED DOCUMENT

NOT FOR CONSTRUCTION ... REVIEW SET ... NOT FOR CONSTRUCTION ... REVIEW SET ...

© 2024 Crafton, Tull & Associates, Inc.

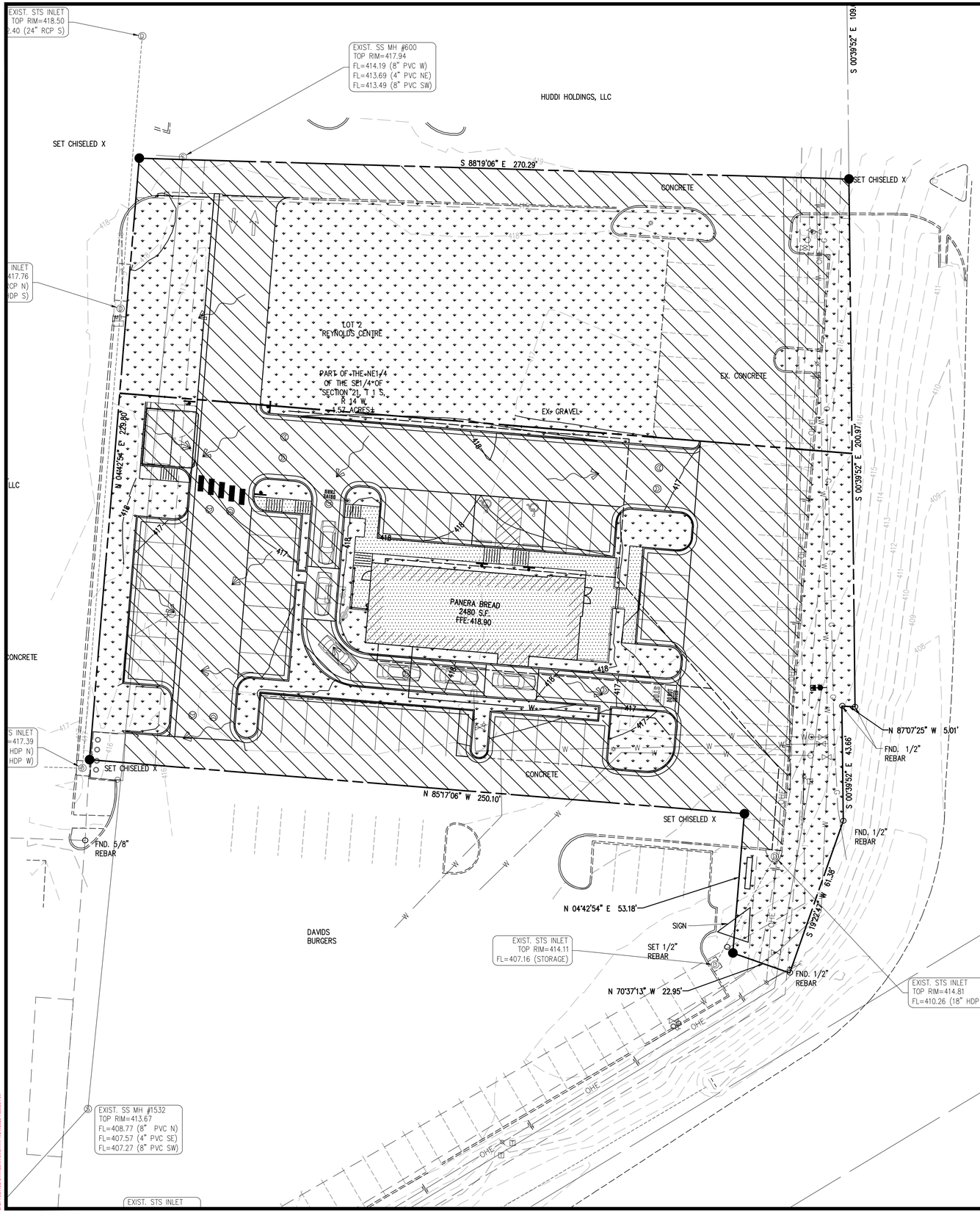
PRE-DEV DRAINAGE EXHIBIT

C-107

DRAWING F:\24304000_PANERA-BRYANT\CIVIL\PANERA-BRYANT_CIVIL.RVP\DATA\DRAINAGE\DRAINAGE.DWG\DRAINAGE EXHIBIT.DWG
LAST SAVED BY: JUSTIN BROWN, 12/12/2024 9:19:04 AM
LAST PLOTTED BY: JUSTIN BROWN, 12/12/2024 9:19:54 AM

POST DEVELOPMENT DRAINAGE EXHIBIT

Crafton Tull



INTENSITY CALCULATIONS						
STORM YEAR	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
INTESITY (IN/HR)	5.88	6.79	7.58	8.53	9.45	10.00
TC (MIN)	5	5	5	5	5	5

COMPOSITE C- VALUE (POST-DEV)							
SURFACE	AREA (AC)	C VALUE					
		2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
ASPHALTIC	0.85	0.73	0.77	0.81	0.86	0.90	0.95
CONCRETE/ROOF	0.10	0.75	0.80	0.83	0.88	0.92	0.97
GRASS AREA	0.62	0.21	0.23	0.25	0.29	0.32	0.36
TOTAL/COMPOSITE	1.57	0.53	0.56	0.59	0.64	0.67	0.72

FLOW OFF OF SITE (POST-DEV)						
YEAR	2	5	10	25	50	100
A (ACRES)	1.57	1.57	1.57	1.57	1.57	1.57
C VALUE	0.53	0.56	0.59	0.64	0.67	0.72
INTENSITY (IN/HR)	5.88	6.79	7.58	8.53	9.45	10.00
Q (CFS)	4.86	5.96	7.02	8.52	9.97	11.28

GRASS/LAWN

CONCRETE PAVED/BUILDING

PAVED/ASPHALT

CHANGE IN C (RUNOFF COEFFICIENT)						
YEAR	2	5	10	25	50	100
DESIGN (BY OTHERS)	-	-	0.90	0.93	-	0.95
POST-DEV	0.53	0.56	0.59	0.64	0.67	0.72

Arkansas One Call 811
Know what's **below**.
Call before you dig.

10825 Financial Centre Parkway, Suite 300
Little Rock, Arkansas 72211
Crafton Tull
engineering | surveying
501.664.3245 t 501.664.6704 f
www.craftontull.com

CERTIFICATE OF AUTHORIZATION:

CERTIFICATE OF AUTHORIZATION
CRAFTON, TULL & ASSOCIATES, INC.
No. 109
ARKANSAS ENGINEER

GRAPHIC SCALE IN FEET
20' 0 20'

PANERA BREAD
BRYANT, AR

Key Plan

No.	Description	Date

This document, and the ideas and designs incorporated herein, as an instrument of professional service, is the property of Crafton, Tull & Associates, Inc., and is not to be used, in whole or in part, for any other project, without the written authorization of Crafton, Tull & Associates, Inc..

PROJECT NO: 24304000
ISSUE DATE: 01/6/25
CONTACT: T.TOLLEY
QC by:
QC Date:

PRELIMINARY PLANS

THIS DOCUMENT IS PRELIMINARY IN NATURE AND IS NOT A FINAL, SIGNED AND SEALED DOCUMENT

NOT FOR CONSTRUCTION ... REVIEW SET ... NOT FOR CONSTRUCTION ... REVIEW SET ...

© 2025 Crafton, Tull & Associates, Inc.

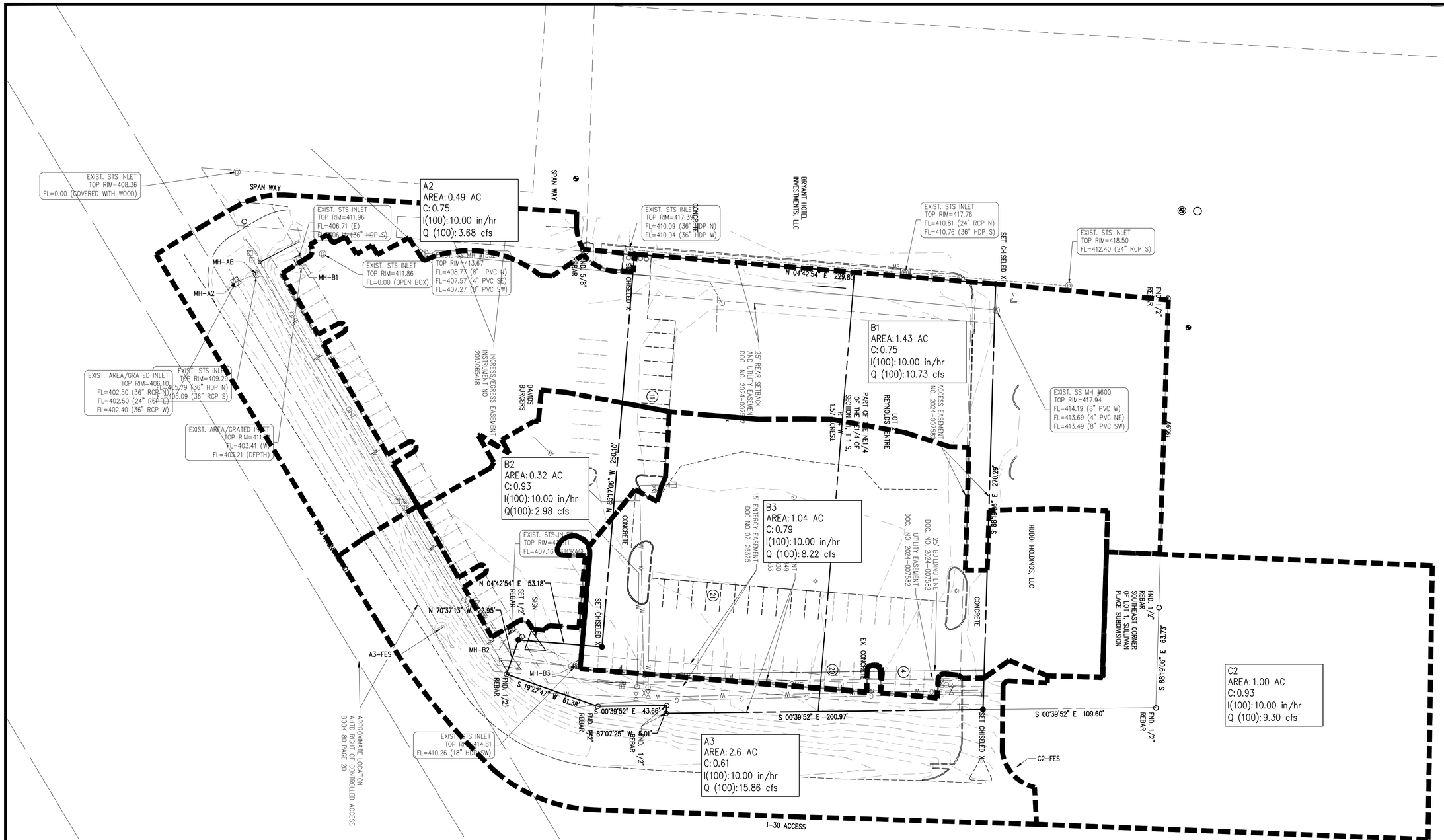
POST-DEV DRAINAGE EXHIBIT

C-108

DRAWING: Z:\JOBS\2024\000_PANERA\PLANS\CAD FILES\CIVIL USER\DRG\DRAINAGE\DWG\DRAINAGE EXHIBIT.DWG
LAST PLOTTED BY: KRISTIN BROWN, 12/12/2025 9:58:54 AM

PREDEVELOPMENT
INLET AREA MAP

Crafton Tull



Arkansas One Call 811
Know what's **below**.
Call before you dig.

10825 Financial Centre Parkway, Suite 300
Little Rock, Arkansas 72211
Crafton Tull
engineering | surveying
501.664.3245 t 501.664.6704 f
www.craftontull.com

CERTIFICATE OF AUTHORIZATION:
CERTIFICATE OF AUTHORIZATION
CRAFTON, TULL & ASSOCIATES, INC.
No. 109
ARKANSAS ENGINEER

GRAPHIC SCALE IN FEET
30' 0 30'

PANERA BREAD
BRYANT, AR

Key Plan

No.	Description	Date

This document, and the ideas and designs incorporated herein, as an instrument of professional service, is the property of Crafton, Tull & Associates, Inc., and is not to be used, in whole or in part, for any other project, without the written authorization of Crafton, Tull & Associates, Inc.

PROJECT NO: 24304000
ISSUE DATE: 01/6/25
CONTACT: T.TOLLEY
QC by:
QC Date:

PRELIMINARY PLANS

THIS DOCUMENT IS PRELIMINARY IN NATURE AND IS NOT A FINAL, SIGNED AND SEALED DOCUMENT

NOT FOR CONSTRUCTION · REVIEW SET

© 2025 Crafton, Tull & Associates, Inc.

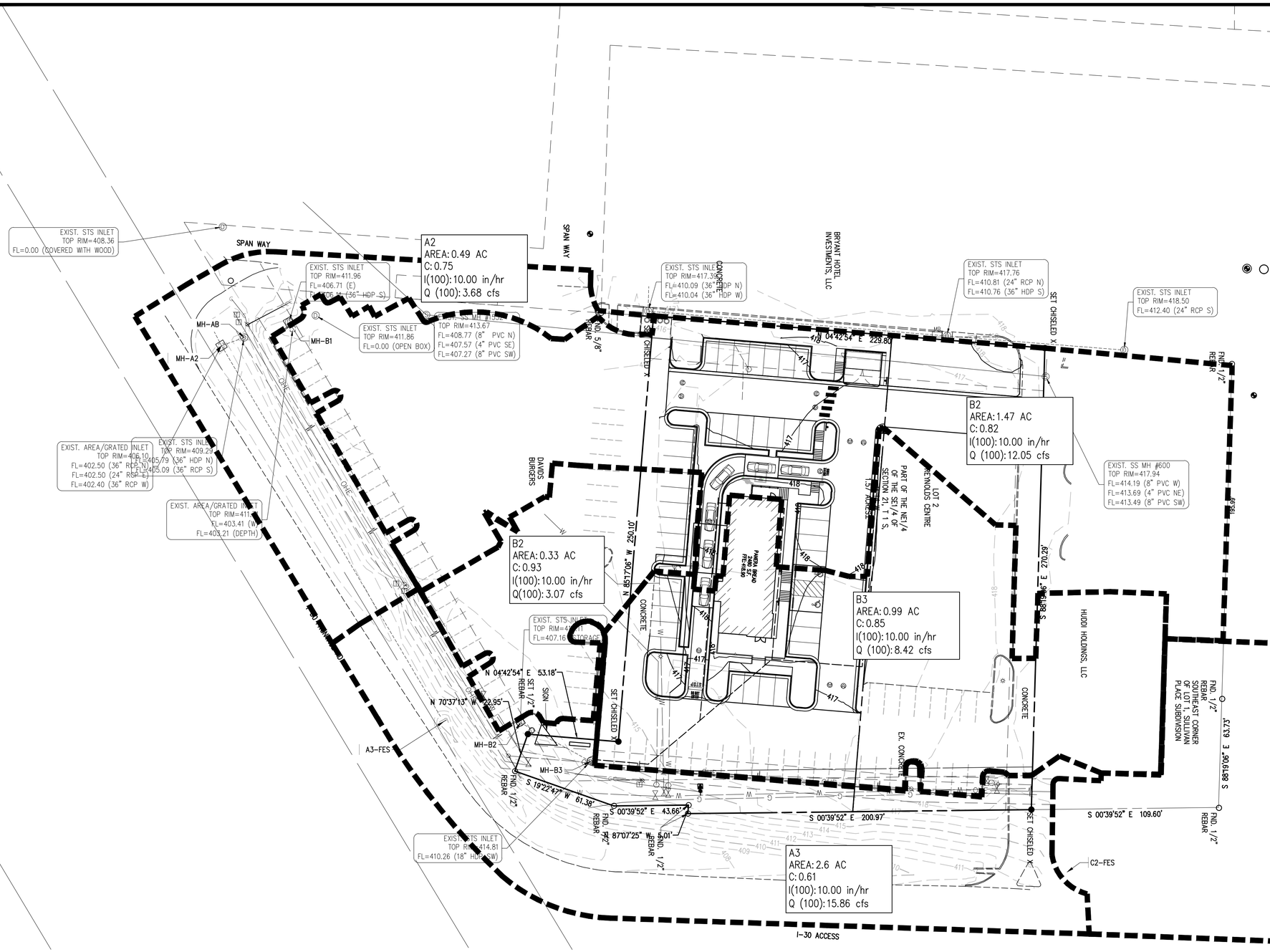
PRE-DEV INLET MAP

C-109

DRAWING C:\24304000_PANERA\ARCH\CRAFTON\PRE-DEV\SHEETS\24304000_PRE-DEV_SHEETS.DWG ARKANSAS\DRAWINGS\DWG\INLET MAP.DWG
LAST MODIFIED BY: ANDREW BROWN, 1/21/2025 - 11:53:27 AM

POST DEVELOPMENT
INLET AREA MAP

Crafton Tull



10825 Financial Centre Parkway, Suite 300
Little Rock, Arkansas 72211
Crafton Tull
engineering | surveying
501.664.3245 t 501.664.6704 f
www.craftontull.com

CERTIFICATE OF AUTHORIZATION:

CERTIFICATE OF AUTHORIZATION
CRAFTON, TULL & ASSOCIATES, INC.
No. 109
ARKANSAS ENGINEER

GRAPHIC SCALE IN FEET
30' 0 30'

PANERA BREAD

BRYANT, AR

Key Plan

No.	Description	Date

This document, and the ideas and designs incorporated herein, as an instrument of professional service, is the property of Crafton, Tull & Associates, Inc., and is not to be used, in whole or in part, for any other project, without the written authorization of Crafton, Tull & Associates, Inc..

PROJECT NO: 24304000
ISSUE DATE: 01/6/25
CONTACT: T.TOLLEY
QC by:
QC Date:

PRELIMINARY PLANS

THIS DOCUMENT IS PRELIMINARY IN NATURE AND IS NOT A FINAL, SIGNED AND SEALED DOCUMENT

NOT FOR CONSTRUCTION ... REVIEW SET ... NOT FOR CONSTRUCTION

© 2025 Crafton, Tull & Associates, Inc.

POST-DEV INLET MAP

C-110

Arkansas One Call 811
Know what's **below**.
Call before you dig.

DRAWING: Z:\JOBS\2024\00_PANERA\PATCH_HWY67&I30\CIVIL\CIVIL3D\SHEETS\01_DRAINAGE\DWGS\INLET MAP.DWG
LAST SAVED BY: TTOLLEY, LAST PLOTTED: 1/7/2025 11:05:13 AM
LAST PLOTTED BY: TTOLLEY

INLET CALCULATIONS

Crafton Tull

Job Description: Panera Bryant
CTA Job Number: 24304000

Date: January 16, 2024
By: Austin Brown, EI

CATCH BASINS IN A SUMP: DESIGN (10 - YEAR STORM EVENT)

	INLET NUMBER	INLET LOCATION	AREA Tc (min)	TYPE OF INLET	AREA (ac)	C	TOTAL Tc (min)	* I (in/hr)	RUNOFF AT INLET (CA)	CARRY-OVER FROM UPSTREAM INLET (CA)	TOTAL FLOW Qt (cfs)	INLET LENTGTH (ft)	AREA OPENING (sf^2)	** CAPAC. Qp (cfs) CURB	** CAPAC Qp (cfs) GRATE	DEPTH AT CURB d (ft)	DEPTH AT GRATE d (ft)	RDWY CROSS SLOPE (ft/ft)	SPREAD AT INLET (ft)	SPREAD AT GRATE (ft)	TOTAL RUNOFF (CA)
1	B1	Post-develop	5	Curb	0.99	0.85	5	7.58	0.84		6.38	6		6.4	0.0	0.50	0.00	0.0200	25.04	0.00	0.84
2	B2	Post-develop	5	Curb	0.33	0.93	5	7.58	0.31		2.33	4		4.2	0.0	0.33	0.00	0.0200	16.75	0.00	0.31
3	B3	Post-develop	5	Grate	1.47	0.82	5	7.58	1.21		9.14		2.5	0.0	9.5	0.00	0.46	0.0200	0.00	23.16	1.21

* **5 MINUTES IS THE MINIMUM TIME OF CONCENTRATION FOR CATCHMENT BASINS (10 - YEAR I = 7.34 IN/HR).**

** **CAPACITY FOR A MAXIMUM OF 6" HEADWATER**

SOILS REPORT

Crafton Tull

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Saline County, Arkansas



November 26, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Saline County, Arkansas.....13
29—Tiak silt loam, 3 to 8 percent slopes.....13
References.....14

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:671 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Saline County, Arkansas
Survey Area Data: Version 21, Sep 10, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 1, 2022—May 29, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
29	Tiak silt loam, 3 to 8 percent slopes	1.6	100.0%
Totals for Area of Interest		**1.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Saline County, Arkansas

29—Tiak silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: m06q
Elevation: 70 to 570 feet
Mean annual precipitation: 44 to 61 inches
Mean annual air temperature: 49 to 74 degrees F
Frost-free period: 185 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Tiak and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tiak

Setting

Landform: Interfluves
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy and clayey marine deposits

Typical profile

A - 0 to 7 inches: silt loam
E - 7 to 9 inches: loam
Bt1 - 9 to 32 inches: clay
Bt2 - 32 to 72 inches: clay

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F133BY002TX - Seasonally Wet Upland
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf