TABLE OF CONTENTS

GENERAL

Certification Letter – McCallum Sweeney 1
Aerial Photograph 2
USGS Quadrangle Map 3
Map of Adjoining & Nearby Business 4

PROPERTY AVAILABILITY

Deeds of Current Ownership 5
Survey 6

PROPERTY DEVELOPABILITY

Topographic Survey 7
proposed pad on property 8
FEMA flood map 9
phase 1 environmental site assessment 10
national wetlands inventory map 11
Jurisdictional determination letter 12
U.S. wildlife species report 13
concurrence letter from the U.S. fish & wildlife service 14
cultural resources survey 15
concurrence letter SHPO 16
geotechnical study 17

ZONING

zoning map 18

UTILITIES

infrastructure map 19

ELECTRIC

electric questionnaire 20

NATURAL GAS

natural gas questionnaire 21

WATER

water questionnaire 22

WASTEWATER

wastewater questionnaire 23

TELECOMMUNICATIONS

telecommunications questionnaire 24

OTHER REQUIREMENTS

site concept plan 25

McCALLUM SWEENEY
THE GEOGRAPHY OF BUSINESS®

May 3, 2017

Sue McGowan
Director of Economic Development / CEO
Economic Development Corporation of Paragould
300 W. Court Street
Paragould, AR 72450

Dear Ms. McGowan:

Thank you for submitting the Paragould South Industrial Park for the McCallum Sweeney Industrial Site Certification Program. We appreciate your time and dedication to this project. McCallum Sweeney Consulting has conducted an exhaustive analysis of the property. Based on the information you and your team provided and our evaluation of your site, we have certified the **Paragould South Industrial Park** as a **General Industrial Site**.

McCallum Sweeney Consulting has developed a program to certify industrial sites as ready for industrial development. We have certified the Paragould South Industrial Park as meeting the following criteria:

- **The property must be available for sale or lease (with a documented price and terms) to prospective industrial investors.** A letter dated March 17, 2017 from Mark Miller (Chairman) with the Economic Development Corporation of Paragould states that the property is available for industrial development. The letter also establishes a purchase price. A title search was completed in January 2017.

- **The property must be 50-249 total acres with at least 80% contiguous, developable[1] acres. The configuration of the contiguous, developable acreage must be acceptable for a single industrial user.** The property is 78.77 total acres, all of which are developable.

- **The property's developable acreage must be located outside of the 100-year flood zone or be able to be filled within 90 days.** The entire acreage is located in FEMA flood zone X - outside the 100- and 500-year flood zones.

- **The property must be free of recognized environmental conditions or have recognized environmental conditions remediated and/or resolved prior to certification.** A Phase I Environmental Site Assessment (ESA) conducted in accordance with ASTM E1527-13 was completed on the site in August 2016. The Phase I ESA revealed no evidence of recognized environmental conditions (RECs) on site.

[1] "Developable" acres are those that have no impediments to development, or mitigation for any known impediments can be accomplished in less than 90 days.

phone: (864) 553-7038
fax: (864) 672-1610
15 South Main Street, Suite 950
Greenville, SC 29601
www.mccallumsweeney.com
lcannon@mccallumsweeney.com

- **The property's developable acreage must be free of wetlands or be able to be mitigated within 90 days.** An approved Jurisdictional Determination dated July 8, 2016 states, "The property does not contain any wetlands or other waters of the United States."

- **The property's developable acreage must be free of state and federal threatened and endangered species or be able to be mitigated within 90 days.** An Information for Planning and Consultation (IPaC) Trust Resource Report dated February 25, 2016 states that the Fat Pocketbook, the Scaleshell Mussel, the Pondberry, and the Indiana Bat are all endangered species that may occur or could potentially be affected by activities in this location. The project area was determined to have no critical habitat. A letter to the U.S. Fish and Wildlife Service dated October 3, 2016 requesting determination was stamped with a "Will have no effect on those trust resources" determination by an Acting Field Supervisor on October 10, 2016.

- **The property's developable acreage must be free of areas of archaeological or historical significance or be able to be mitigated within 90 days.** A Phase I Cultural Resources Survey was finalized on the property in January 2017. The survey resulted in the identification of one newly recorded archaeological site (3GE513), which is not eligible for the National Register of Historic Places. The survey concludes, "The proposed undertaking will not have an adverse impact on cultural resources. No additional cultural resources investigation is recommended." A letter from the State Historic Preservation Office (Frances McSwain, Deputy State Historic Preservation Officer) dated December 20, 2016 concurs with the findings. The letter stated that the Delaware Nation, the Quapaw Tribe of Oklahoma, and the Shawnee Tribe of Oklahoma expressed interest in the area and it was recommended that they were consulted. The tribes have been notified of the study.

- **The property's developable acreage must have soils compatible with industrial development.** A Geotechnical Investigation was completed November 16, 2016 on the site, and five borings were drilled to a depth of 26.5 feet. The site soils were found to be consistent with the area geology and consisted primarily of silty clay over a majority of the depths investigated. The study recommended a Seismic Site Class of D.

- **The property must be zoned appropriately or be able to be rezoned for industrial use within 90 days (if applicable).** The property is zoned Manufacturing 1 (M-1) by the City of Paragould, Arkansas. A zoning change is not necessary for industrial development.

- **The property must be within 10 miles of an interstate or four-lane highway. The property should be directly served or be able to be served within 12 months by a road that is compatible with standards for tractor-trailer access (80,000 pounds / 20,000 pounds per axle).** The property is directly served by Arkansas Highway 358, a road that is compatible with standards for tractor/trailer access (80,000 pounds/20,000 pounds per axle), and a secondary access point could be constructed from U.S. Highway 412 Bypass which is adjacent to the south side of the site. The site is 1.6 miles from U.S. Highway 49 (four-lane highway).

- **To market the property as rail-served, the property must be served or be able to be served within 12 months by rail.** The property will not be marketed as rail served.

- **The property must be served or be able to be served by industrial quality power that can meet a minimum of 2.5 MW demand within six months.** Paragould Light, Water & Cable is the electric provider to the site. According to the Electric Questionnaire dated December 1, 2016 submitted by Darrell Phillips (General Manager) with Paragould Light, Water & Cable, a 13.2 kV distribution line is currently on site running along the site's northern boundary. There is currently 8 MW of electric capacity available to the property. Service can be provided immediately.

- **The property must be served or be able to be served within six months by natural gas. Natural gas service should provide at least 10,000 mcf per month.** CenterPoint Energy is the natural gas provider to the site. According to the Natural Gas Questionnaire dated December 6, 2016 submitted by Chauncey Taylor (Key Accounts Manager) with CenterPoint Energy, there is a four-inch plastic line with a pressure of 60 psi adjacent to the site along Arkansas Highway 358. There is no expected cost, and service of 10,000 mcf per month can be provided to the site in six months.

- **The property must be served or be able to be served within six months by water infrastructure and a water system with a minimum excess capacity of 150,000 gallons per day.** Paragould Light, Water & Cable is the water provider to the site. According to the Water Questionnaire dated December 1, 2016 submitted by Darrell Phillips (General Manager) with Paragould Light, Water & Cable, there is a 16-inch line with 3 million gallons per day of total capacity and 1.3 million gallons per day of excess capacity adjacent to the site along Arkansas Highway 358. Service of 150,000 gallons per day is readily available at the site. The 5th Avenue Water Treatment Plant has 6 million gallons per day of total capacity and a peak utilization of 4.1 million gallons per day, leaving an excess capacity of 2.9 million gallons per day.

- **The property must be served or be able to be served within six months by wastewater infrastructure and a wastewater treatment plant with a minimum excess capacity of 100,000 gallons per day.** Paragould Light, Water & Cable is the wastewater provider to the site. According to the Wastewater Questionnaire dated December 1, 2016 submitted by Darrell Phillips (General Manager) with Paragould Light, Water & Cable, there is a 15-inch gravity main adjacent to the south side of the site along U.S. Highway 412 Bypass with 1.9 million gallons per day of total and excess capacity. The capacity of the line is limited to 470,000 gallons per day due to the capacity of a pump station. To provide 100,000 gallons per day of wastewater service, a new sewer lift station would need to be constructed. The estimated cost to provide the new lift station is $260,000, and the estimated timeline to provide service is six months. The Paragould Light, Water & Cable Wastewater Treatment Plant has a total permitted capacity of 6.0 million gallons per day, and an excess capacity of 2.8 million gallons per day, factoring in average utilization.

- **The property should be served or be able to be served within six months by fiber telecommunications infrastructure.** Paragould Light, Water & Cable is the telecommunications provider to the site. According to the Telecommunications Questionnaire dated December 1, 2016 from Darrell Phillips (General Manager) with Paragould Light, Water & Cable, there is dark fiber and aerial fiber adjacent to the site. The estimated schedule to provide service is two weeks.

- **The property must have a Site Concept Plan that shows the total and developable acreage, potential building pad, planned ingress/egress, location of utilities (existing and proposed), and easements. The Site Concept Plan should take into consideration and note the location of development limitations such as wetlands, floodplains, and permanent easements.** A Site Concept Plan has been created that shows the total and developable acreage, potential building pad, planned ingress/egress, location of utilities (existing and proposed), and easements. A 1,000,000 square foot building pad is shown on the Site Concept Plan.

The information outlined in this letter has been incorporated into the Site Concept Plan dated April 4, 2017, which is enclosed.

This certification will expire on **May 3, 2022.** Upon certification expiration, the property will need to submit for recertification. We congratulate you and your team for your hard work and congratulations on achieving certification. If there are any questions regarding our analysis, please contact us.

Sincerely,

Lindsey M. Cannon
Principal
Director, Site Readiness Programs

Kyle Neu
Consultant

#35 Site Concept Plan

LEGEND:

SS	15" SANITARY SEWER GRAVITY MAIN
SS	12" SANITARY SEWER FORCE MAIN
W	18" WATER MAIN
W	16" WATER MAIN
W	12" WATER MAIN
NG	4" NATURAL GAS – 60 PSI
OE	13.2 KV OVERHEAD ELECTRIC PRIMARY
	CITY COAX
FO	DARK FIBER
PL	PROPERTY BOUNDARY

PROPOSED SITE PLAN AND UTILITIES

SCALE: 1"=50'-0"

50' 0 50' 100' 150'

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN / BUILD PROPOSAL DRAWING

THIS DRAWING IS FOR PROPOSAL INFORMATION ONLY & NOT INTENDED TO BE USED FOR CONSTRUCTION.

NO.	DATE	DESCRIPTION

PRELIMINARY NOT FOR CONSTRUCTION

PROJECT NO. -

DRAWN BY CDK

DESIGN LEADER -

CHECKED BY -

REVIEWED BY -
(PROJECT MANAGER)

PROPOSED INDUSTRIAL SITE
ECONOMIC DEVELOPMENT COROPORATION
PARAGOULD, ARKANSAS

FORCUM LANNOM
CONTRACTORS, LLC
350 US Hwy, 51 Bypass S. Dyersburg, Tennessee 38024 PH: (731) 287-4700

Date 04-04-17

Sheet C3.0

#2 Aerial Photograph

Greene Rd 920

S 2nd Ave

Jones Rd

69
358

78.77Acre Tract for Site Certification

Additional acreage owned Zoned Commercial

BUS
412

Greene Rd 907

Greene Rd 955

Google earth

1994

Imagery Date: 4/4/2013 36°01'11.39" N 90°29'14.15" W elev 261 ft eye alt 8242 ft

#3 USGS Quadrangle Map Site Drawing March, 2016

Paragould Industrial Site Area Topology

Paragould South Industrial Site

Gabrielle St
S 22nd St
Dana Marie St
Butter Cup Ln
Grant Ln
Greene 903 Rd
Shalimar Ln
Cloverdale St
Dogwood Trl
S 18th St
S 17th St
Wild Rose Ln
Cypress St
Birch St
Mockingbird Ln
Julie Ann Dr
Pvt
PLWC Service Ctr
PLWC Generation Plant
Old Bethel Rd
Union Pacific Railroad
American Railcar Industries
ARI - 301 Paint Trk 3
ARI - 102 PaintLining Trk 1&2
ARI - 300 Steel ShopTrk 3
ARI - 400 Roll Mill
ARI - 101 SteelShop Track 1&2
ARI
Ameri Steel
AmeriSteel
Truss Plant
Railcar Rd
ARI - Axis Forging
ARI - Wheel and Axel
S 2nd Ave AR 69 Hwy
Jones Rd
Anchor Distribution Center
Smith Drug
270ft
Pvt
US 412 SPUR Hwy
Greene 920 Rd
Greene 907 Rd
Greene 942 Rd

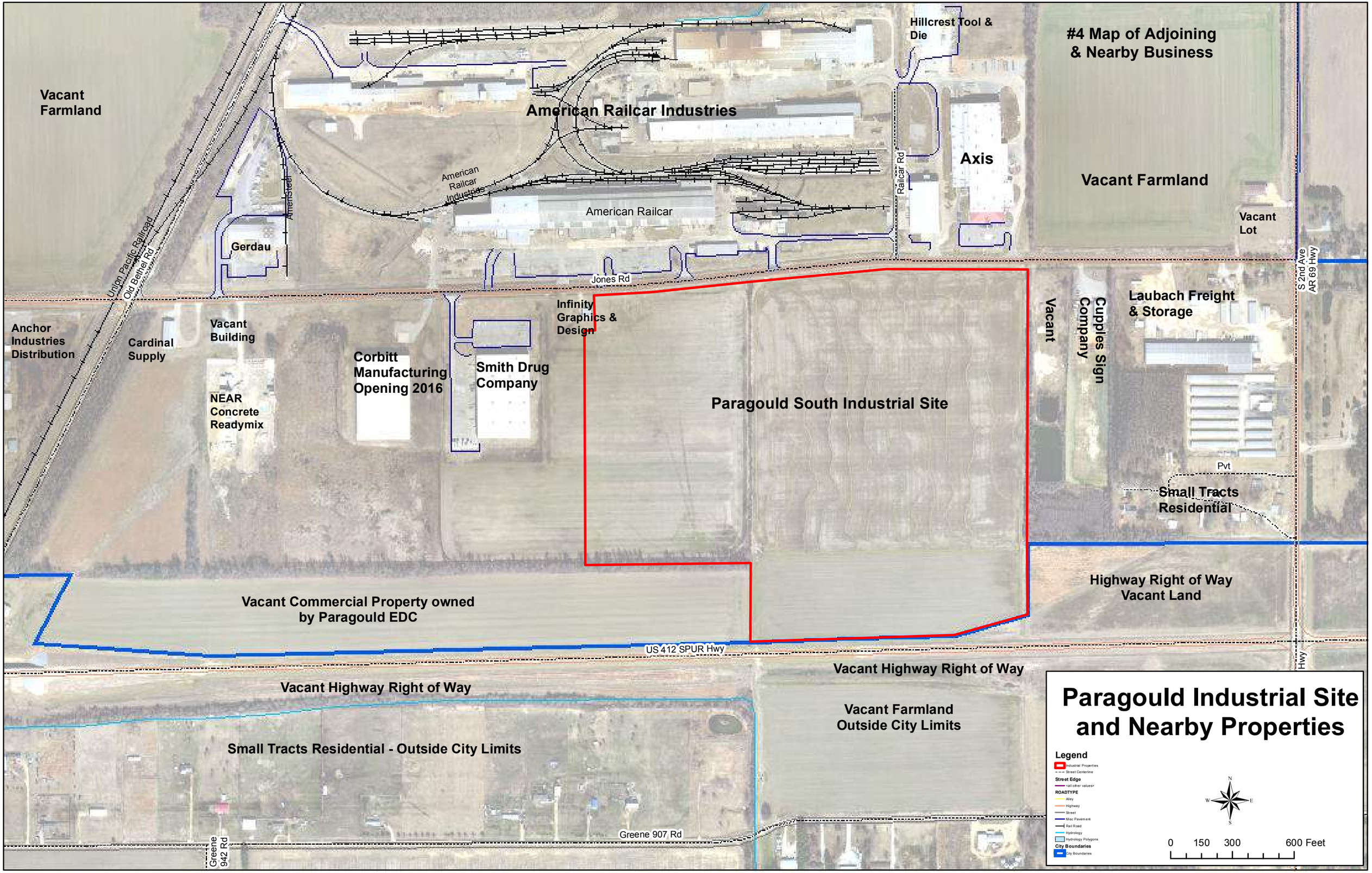
Legend

- Industrial Properties
- Street Centerline
- Rail Road
- Hydrology
- Hydrology Polygons
- City Boundaries

N W E S

0 250 500 1,000 Feet

USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; U.S. Census Bureau - TIGER/Line; HERE Road Data


Vacant Farmland
American Railcar Industries
Hillcrest Tool & Die
#4 Map of Adjoining & Nearby Business
Axis
Railcar Rd
Vacant Farmland
Vacant Lot
American Railcar Industries
American Railcar
AmeriSteel
Union Pacific Railroad
Old Bethel Rd
Gerdau
Jones Rd
S 2nd Ave
AR 69 Hwy
Infinity Graphics & Design
Laubach Freight & Storage
Vacant
Cupples Sign Company
Anchor Industries Distribution
Cardinal Supply
Vacant Building
Corbitt Manufacturing Opening 2016
Smith Drug Company
NEAR Concrete Readymix
Paragould South Industrial Site
Pvt
Small Tracts Residential
Highway Right of Way Vacant Land
Vacant Commercial Property owned by Paragould EDC
US 412 SPUR Hwy
Vacant Highway Right of Way
Vacant Highway Right of Way
Vacant Farmland Outside City Limits
Small Tracts Residential - Outside City Limits
Greene 907 Rd
Greene 942 Rd
Hwy
Paragould Industrial Site and Nearby Properties
Legend
Industrial Properties
Street Centerline
Street Edge
<all other values>
ROADTYPE
Alley
Highway
Street
Misc Pavement
Rail Road
Hydrology
Hydrology Polygons
City Boundaries
City Boundaries
N
W
E
S
0
150
300
600 Feet

3

#5 Present Deeds - 4

Deeds Property was purchased by the Economic Development Corporation of Paragould in 4 transactions.

City – EDC Corporation Deed
ALW/kgu
02/29/16
F# 130-268

Doc# 20160161B
Filed 03/04/2016 02:39:41 PM
I, Jan Griffith, hereby certify that this instrument was FILED FOR RECORD and is RECORDED in the Official Records on the Date & Time as stamped hereon.
JAN GRIFFITH, Circuit Clerk
Recorder of GREENE COUNTY
Signed by: D Phillips
Deputy Clerk

PREPARED BY:

BRANCH, THOMPSON, WARMATH & DALE
A Professional Association
414 West Court Street
Paragould, Arkansas 72450

CORPORATION DEED

KNOW ALL MEN BY THESE PRESENTS:

That ***The City of Paragould, Arkansas***, an Arkansas municipality organized under and by virtue of the laws of the State of Arkansas, by its Mayor and City Clerk, duly authorized hereto by proper resolution of its City Council, for the consideration of the sum of Ten and no/100 ($10.00) dollars, and other good and valuable consideration, in hand paid by ***The Economic Development Corporation of Paragould, Arkansas***, Grantee, does hereby grant, bargain, sell and convey unto the said Grantee and unto the successors and assigns of the Grantee forever, the following described property located in Greene County, Arkansas:

> The Northwest Quarter of the Northwest Quarter of Section 18, Township 16 North, Range 6 East, containing 41.95 acres, more or less, and subject to the use of Arkansas State Highway 358 along the North side thereof. Subject to any easements that may affect said lands.

TO HAVE AND TO HOLD THE SAME unto the said Grantee and unto the successors and assigns of the Grantee forever, with all appurtenances thereunto belonging.

And the Grantor does hereby bind itself, its successors and assigns to warrant and defend the title thereto unto the said Grantee and unto the successors and assigns of the Grantee against all claims whatsoever.

Doc# 20160161B
FILED 03/04/2016 02:39:41 PM

IN WITNESS WHEREOF, the Grantor has caused this instrument to be signed by its Mayor and City Clerk and its seal affixed on this the 4 day of March, 2016.

CITY OF PARAGOULD, ARKANSAS

BY: _____
Mayor – Mike Gaskill

ATTEST:

Andrea Williams
City Clerk – Andrea Williams

CERTIFICATE

I, certify under penalty of false swearing that documentary stamps or a documentary symbol in the legally correct amount has been placed on this instrument.

_____
Grantee
Address _____
_____

ACKNOWLEDGMENT

STATE OF ARKANSAS

COUNTY OF GREENE

BE IT REMEMBERED, That on this day personally appeared before me, the undersigned Notary Public within and for the State and County aforesaid, duly commissioned and acting, ***Mike Gaskill and Andrea Williams*** and acknowledged that they had, in their representative capacity, executed the foregoing instrument for the consideration and purposes therein mentioned and set forth.

WITNESS my hand and seal as such Notary Public on this the 4 day of March, 2016.

My Commission Expires:

7/18/24

Karen D Ussery
Notary Public

KAREN D USSERY
Comm. No. 12399670
NOTARY PUBLIC
My Comm. Exp. July 18, 2024
GREENE CO., ARKANSAS

3

Chesser – EDC Warranty Deed
ALW/kgu
06/27/14
F# 3377-73

Doc# 2014004475
Filed 06/30/2014 03:12:59 PM
I, Jan Griffith, hereby certify that this instrument was FILED FOR RECORD and is RECORDED in the Official Records on the Date & Time as stamped hereon.
JAN GRIFFITH, Circuit Clerk
Recorder of GREENE COUNTY
Signed by: D Phillips
Deputy Clerk

PREPARED BY:

BRANCH, THOMPSON, WARMATH & DALE
A Professional Association
414 West Court Street
Paragould, Arkansas 72450

WARRANTY DEED

KNOW ALL MEN BY THESE PRESENTS:

That the undersigned, ***Weldon E. Chesser and Patsy A. Chesser, husband and wife,*** **Grantor**, whether one or more, for and in consideration of the sum of One Dollar, and other valuable consideration paid by ***The Economic Development Corporation of Paragould,*** **Grantee**, whether one or more, the receipt of which is hereby acknowledged, does hereby grant, bargain, sell, and convey unto the said Grantee, and unto the heirs, successors, and assigns of the Grantee forever the following lands lying in the State of Arkansas, to-wit:

COUNTY: Greene

That part of the Southwest Quarter of the Northwest Quarter of Section 18, Township 16 North, Range 6 East, described as follows: Beginning at the Northeast corner of said tract; run thence South 00 degrees 25 minutes East, 364.6 feet to the North Right-of-Way Line of U. S. Highway 412 BYPASS; run thence South 74 degrees 22 minutes West along said right-of-way line, 368.8 feet; run thence South 88 degrees 16 minutes West along said right-of-way line, 495.2 feet; run thence South 88 degrees 14 minutes West along said right-of-way line, 495.2 feet; run thence North 00 degrees 07 minutes East, 379.6 feet; run thence North 00 degrees 12 minutes West, 144.4 feet; run thence South 88 degrees 44 minutes East, 1342.3 feet to the true point of beginning, containing 14.70 acres, more or less. Subject to any easements that may affect said lands.

TO HAVE AND TO HOLD the same unto the Grantee, heirs, successors, and assigns forever, with all appurtenances thereunto belonging.

And the Grantor covenants with the Grantee that the Grantor will forever warrant and defend the title to the lands against all claims whatever.

And the undersigned, spouse of the undersigned Grantor, for and in consideration of the sum hereinabove stated, does hereby release and relinquish unto the Grantee all rights of dower, curtesy, and homestead in and to said lands.

Doc# 201404475
FILED 06/30/2014 03:12:59 PM

DATED: This the 30 day of June, 2014.

Weldon E. Chesser

Weldon E. Chesser

Patsy A. Chesser

Patsy A. Chesser, his wife

ACKNOWLEDGMENT

STATE OF ARKANSAS

COUNTY OF GREENE

BE IT REMEMBERED, that on this day personally appeared before me the undersigned, a Notary Public within and for the County And State aforesaid, duly commissioned and acting, ***Weldon E. Chesser and Patsy A. Chesser, husband and wife,*** to me well known to be the persons whose names are subscribed to the within instrument and acknowledged said execution of the above and foregoing instrument for the consideration and purposes therein mentioned and set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and seal as such Notary Public on this 30 day of June, 2014.

My Commission Expires:

7/18/14

Karen D Ussery

Notary Public

KAREN G. USSERY MY COMM. EXP. NOTARY PUBLIC JULY 18, 2014 GREENE CO. ARKANSAS

CERTIFICATE

I, certify under penalty of false swearing that documentary stamps or a documentary symbol in the legally correct amount has been placed on this Instrument..

Grantee Economic Development Corporation of Paragould

Address P.O. Box 124

Paragould, AR 72451

10030138

3

D: #200304501
Da: 5/13/2003 11:53:50 AM
Filed & Recorded in
Official Records of
GREENE COUNTY
ELLEN JOHNSON CLERK
Signed by: Stanley dc

This Instrument Prepared by:
HAMILTON & COLBERT, LLP
P.O. Box 638
Paragould, Arkansas 72451-0638
Telephone: (870)236-1500

By: Roger Colbert
Roger U. Colbert

ARKANSAS DOCUMENTARY $220 220987

ARKANSAS DOCUMENTARY $220 220988

ARKANSAS DOCUMENTARY $44.00 269827

ARKANSAS DOCUMENTARY $4.40 579237

WARRANTY DEED

This indenture made this 9th day of May, 2003, by and between William D. Hartwick and Frances Diane Hartwick, his wife, and Helen Thayer, a single person, acting by and through her attorney-in-fact, William David Hartwick, the same person as William D. Hartwick, GRANTOR (whether one or more and of whatever gender), and The Economic Development of Paragould, an Arkansas Industrial Development Corporation, GRANTEE, WITNESSETH:

That for and in consideration of the sum of ONE DOLLAR, cash in hand paid and other valuable considerations, the receipt of which is hereby acknowledged, grantor does, by these presents, grant, bargain, sell, transfer and convey unto the said grantee and unto its successors and assigns forever, the following described lands in Greene County, Arkansas, to wit:

The East Half of the following described lands:

Tract I:
The East Half of the East Half of the Northwest Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, containing 9.99 acres, more or less; and

Tract II:
The Northeast Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, LESS AND EXCEPT the following described lands: Beginning at the Northeast Corner of said

HAMILTON & COLBERT, LLP
ATTORNEYS AT LAW
401 W. COURT STREET
P.O. BOX 638
PARAGOULD,
ARKANSAS 72451
TELEPHONE:
(870) 236-1500
TELECOPIER:
(870) 236-1592

tract; run thence South 88 degrees 42 minutes West 758.7 feet to the true point of beginning; run thence South 02 degrees 23 minutes East 179.8 feet; run thence South 87 degrees 30 minutes West 209.9 feet; run thence North 02 degrees 18 minutes West 184.2 feet; run thence North 88 degrees 42 minutes East 209.6 feet to the true point of beginning, containing 0.88 acres in said exception.

Frances Diane Hartwick joins in the execution of this deed for the purpose of relinquishing all homestead, dower and other statutory interests she may have in the above-described lands by virtue of being the spouse of William D. Hartwick.

Helen Thayer, acting through her attorney-in-fact, joins in the execution of this deed for the purpose of relinquishing her life estate interest in the above-described lands.

William D. Hartwick, the same person as William David Hartwick, has executed this deed as the attorney-in-fact for his mother, Helen Thayer, pursuant to a certain durable power of attorney dated January 25, 1985, recorded January 7, 2003, and appearing of record as Document #200300161 in the records for Greene County, Arkansas.

TO HAVE AND TO HOLD said lands unto the said grantee and unto its successors and assigns forever, together with all and singular the appurtenances thereunto belonging.

And the grantor hereby covenants to and with the grantee and unto its successors and assigns that they will forever WARRANT AND DEFEND the title to said lands as against all lawful claims whatsoever.

As to any person executing this instrument who may be the spouse of any other person executing it, execution and acknowledgment of this instrument by such spouse shall convey any interest which the spouse may have in his or her own right

HAMILTON & COLBERT, LLP
ATTORNEYS AT LAW
301 W. COURT STREET
P.O. BOX 638
PARAGOULD,
ARKANSAS 72451
TELEPHONE:
(870) 236-4500
TELECOPIER:
(870) 236-1592

and shall also release any rights of homestead, dower, curtesy or other statutory interest in the lands hereby conveyed.

IN WITNESS WHEREOF, the grantor have set their hand the day and date first above written.

William D. Hartwick

William D. Hartwick

Frances Diane Hartwick

Frances Diane Hartwick

Helen Thayer by William D. Hartwick

Helen Thayer by William D. Hartwick, her attorney-in-fact

ACKNOWLEDGMENT

STATE OF ARKANSAS
COUNTY OF GREENE

On this 9 day of May, 2003, before me, a Notary Public, the undersigned officer, personally appeared William D. Hartwick and Frances Diane Hartwick, his wife, known to me (or satisfactorily proven) to be the persons whose names are subscribed to the within instrument and acknowledged that they executed the same for the purposes therein contained.

IN WITNESS WHEREOF I hereunto set my hand and official seal.

Theresa Roberts

Notary Public

My Commission Expires:

(SEAL)

OFFICIAL SEAL
THERESA ROBERTS
GREENE COUNTY
NOTARY PUBLIC - ARKANSAS
MY COMMISSION EXPIRES OCT. 18, 2011

HAMILTON & COLBERT, LLP
ATTORNEYS AT LAW
401 W. COURT STREET
P.O. BOX 638
PARAGOULD,
ARKANSAS 72451
TELEPHONE:
(870) 236-1500
TELECOPIER:
(870) 236-1592

ACKNOWLEDGMENT

STATE OF ARKANSAS
COUNTY OF GREENE

On this 9 day of May, 2003, before me, a Notary Public, the undersigned officer, personally appeared William D. Hartwick as attorney-in-fact for Helen Thayer under a durable power of attorney dated January 25, 1985, recorded January 7, 2003, and appearing of record as Document #200300161 in the records for Greene County, Arkansas, known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument and acknowledged that executed the same for the purposes therein contained.

IN WITNESS WHEREOF I hereunto set my hand and official seal.

Theresa Roberts
Notary Public

My Commission Expires:

(SEAL)

OFFICIAL SEAL
THERESA ROBERTS
GREENE COUNTY
NOTARY PUBLIC - ARKANSAS
MY COMMISSION EXPIRES OCT. 18, 2011

I certify under penalty of false swearing that at least the legally correct amount of documentary stamps have been placed on this instrument.

Theresa Roberts agent
Grantee/Agent

PO Box 124
Paragould AR 72451
Address

HAMILTON & COLBERT, LLP
ATTORNEYS AT LAW
401 W. COURT STREET
P.O. BOX 638
PARAGOULD,
ARKANSAS 72451
TELEPHONE:
(870) 236-1500
TELECOPIER:
(870) 236-1592

10037323
3

Doc 200306938
Date 8/2003 02:18:02 PM
Filed & Recorded in Official Records
of GREENE COUNTY
ELLEN JOHNSON CLERK
Signed by: R Callaham

This Instrument Prepared by:
HAMILTON & COLBERT, LLP
P.O. Box 638
Paragould, Arkansas 72451-0638
Telephone: (870)236-1500

By: Roger U. Colbert
Roger U. Colbert

ARKANSAS DOCUMENTARY $2.20 221042
ARKANSAS DOCUMENTARY $2.20 221043
ARKANSAS DOCUMENTARY $22.00 448307
ARKANSAS DOCUMENTARY $22.00 448308
ARKANSAS DOCUMENTARY $11.00 605382
ARKANSAS DOCUMENTARY $11.00 605383
ARKANSAS DOCUMENTARY $2.20 080778

WARRANTY DEED

This indenture made this 11 day of July, 2003, by and between Lloyd E. McGavin, successor trustee of the Barbara H. McGavin Revocable Trust created by a written trust agreement dated May 25, 2000, GRANTOR, and The Economic Development of Paragould, an Arkansas Industrial Development Corporation, GRANTEE, WITNESSETH:

That for and in consideration of the sum of ONE DOLLAR, cash in hand paid and other valuable considerations, the receipt of which is hereby acknowledged, grantor does, by these presents, grant, bargain, sell, transfer and convey unto the said grantee and unto its successors and assigns forever, the following described lands in Greene County, Arkansas, to wit:

The West Half of the following described lands:

Tract I:
The East Half of the East Half of the Northwest Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, containing 9.99 acres, more or less; and

Tract II:
The Northeast Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, LESS AND EXCEPT the following described lands: Beginning at the Northeast Corner of said tract; run thence South 88 degrees 42 minutes West 758.7 feet to the true point of beginning; run thence South 02 degrees 23 minutes East 179.8 feet; run thence South 87 degrees 30 minutes West 209.9 feet; run thence North 02 degrees 18 minutes West

HAMILTON & COLBERT, LLP
ATTORNEYS AT LAW
401 W. COURT STREET
P.O. BOX 638
PARAGOULD,
ARKANSAS 72451
TELEPHONE:
(870) 236-1500
TELECOPIER:
(870) 236-1592

184.2 feet; run thence North 88 degrees 42 minutes East 209.6 feet to the true point of beginning, containing 0.88 acres in said exception.

TO HAVE AND TO HOLD said lands unto the said grantee and unto its successors and assigns forever, together with all and singular the appurtenances thereunto belonging.

And the grantor hereby covenants to and with the grantee and unto its successors and assigns that they will forever WARRANT AND DEFEND the title to said lands as against all lawful claims whatsoever.

IN WITNESS WHEREOF, the grantor has set his hand the day and date first above written.

Lloyd E. McGavin,
successor trustee of the
Barbara H. McGavin
Revocable Trust

ACKNOWLEDGMENT

STATE OF FLORIDA
COUNTY OF Brevard

On this 11 day of July, 2003, before me, a Notary Public, the undersigned officer, personally appeared Lloyd E. McGavin, known to me (or satisfactorily proven) to be the person whose name is subscribed as the successor trustee of the Barbara H. McGavin Revocable Trust, and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF I hereunto set my hand and official seal.

Angie Vorndran
Notary Public

My Commission Expires:
2/8/05
(SEAL)

OFFICIAL NOTARY SEAL
ANGIE VORNDRAN
NOTARY PUBLIC STATE OF FLORIDA
COMMISSION NO. 1000307
MY COMMISSION EXP. FEB. 8 2005

HAMILTON & COLBERT, LLP
ATTORNEYS AT LAW
401 W. COURT STREET
P.O. BOX 638
PARAGOULD,
ARKANSAS 72451
TELEPHONE:
(870) 236-1500
TELECOPIER:
(870) 236-1592

I certify under penalty of false swearing that at least the legally correct amount of documentary stamps have been placed on this instrument.

Grantee/Agent

EDC PO Box 124

P.G/D

Address

HAMILTON & COLBERT, LLP
ATTORNEYS AT LAW
401 W. COURT STREET
P.O. BOX 638
PARAGOULD,
ARKANSAS 72451
TELEPHONE:
(870) 236-1500
TELECOPIER:
(870) 236-1592

LOT SPLIT FOR: Economic Development Corporation of Paragould

#6 Survey
Tract

DESCRIPTION OF SURVEY:

The following described lands in Greene County, Arkansas, to-wit:

Entire Tract:
A part of the Northwest Quarter of the Northwest Quarter AND a part of the Southwest Quarter of the Northwest Quarter ALL IN Section 18, Township 16 North, Range 6 East; A part of the Southeast Quarter of the Northeast Quarter, a part of the Northeast Quarter of the Northeast Quarter, a part of the Southwest Quarter of the Northeast Quarter, and a part of the Southeast Quarter of the Northwest Quarter ALL IN Section 13, Township 16 North, Range 5 East, being more particularly described as follows: Beginning at the Northeast corner of said Section 13, run thence N0°11'W 46.2 feet to the true point of beginning, run thence N84°01'E 520.0 feet, run thence Easterly along a curve to the right having a radius of 1326.5 feet a distance of 144.9 feet, run thence S89°37'E 689.0 feet, run thence S0°13'W 1308.2 feet, run thence S0°26'E 364.7 feet, run thence S74°24'W 368.7 feet, run thence S88°15'W 495.2 feet, run thence S88°14'W 495.2 feet, run thence S88°26'W 1317.0 feet, run thence S88°25'W 439.0 feet, run thence S88°26'W 878.0 feet, run thence N86°09'W 859.4 feet, run thence N26°31'E 389.5 feet, run thence N89°13'E 2512.9 feet, run thence N0°11'W 1138.6 feet, run thence N84°05'E 51.5 feet, run thence N1°50'W 170.1 feet, run thence N88°40'E 69.0 feet, run thence Easterly along a curve to the left having a radius of 2669.3 feet a distance of 213.1 feet, run thence N84°01'E 479.0 feet to the true point of beginning, containing 109.61 acres, more or less.

INTO:

Tract 1:
That part of the Southeast Quarter of the Northwest Quarter and that part of the Southwest Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, described as follows: Beginning at the Northwest corner of said SW1/4 NE1/4, run thence N89°13'E 220.0 feet, run thence South 412.5 feet, run thence S88°26'W 224.5 feet, run thence N86°09'W 859.4 feet, run thence N26°31'E 389.5 feet, run thence N89°13'E 688.1 feet to the true point of beginning, containing 8.94 acres, more or less, SUBJECT TO a 20-foot utility and drainage easement off the South side thereof and a 100-foot power line right of way across the West side thereof.

Tract 2:
That part of the Southwest Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, described as follows: Beginning at the Northwest corner of said SW1/4 NE1/4, run thence N89°13'E 220.0 feet to the true point of beginning, run thence N89°13'E 599.8 feet, run thence South 404.3 feet, run thence S88°26'W 600.0 feet, run thence North 412.5 feet to the true point of beginning, containing 5.62 acres, more or less, SUBJECT TO a 20-foot utility and drainage easement off the South side thereof.

Tract 3:
That part of the Southwest Quarter of the Northeast Quarter and that part of the Southeast Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, described as follows: Beginning at the Northwest corner of said SW1/4 NE1/4, run thence N89°13'E 819.8 feet to the true point of beginning, run thence N89°13'E 498.4 feet, run thence South 397.4 feet, run thence S88°26'W 6.1 feet, run thence S88°25'W 439.0 feet, run thence S88°26'W 53.5 feet, run thence North 404.3 feet to the true point of beginning, containing 4.59 acres, more or less, SUBJECT TO a 20-foot utility and drainage easement off the South side thereof.

Tract 4:
That part of the Southeast Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, described as follows: Begininng at the Northwest corner of the SW1/4 NE1/4 of said Section 13, run thence N89°13'E 1318.2 feet to the true point of beginning, run thence N89°13'E 506.7 feet, run thence S0°11'E 390.5 feet, run thence S88°26'W 508.1 feet, run thence North 397.4 feet to the true point of begininng, containing 4.59 acres, more or less, SUBJECT TO a 20-foot utility and drainage easement off the South side thereof.

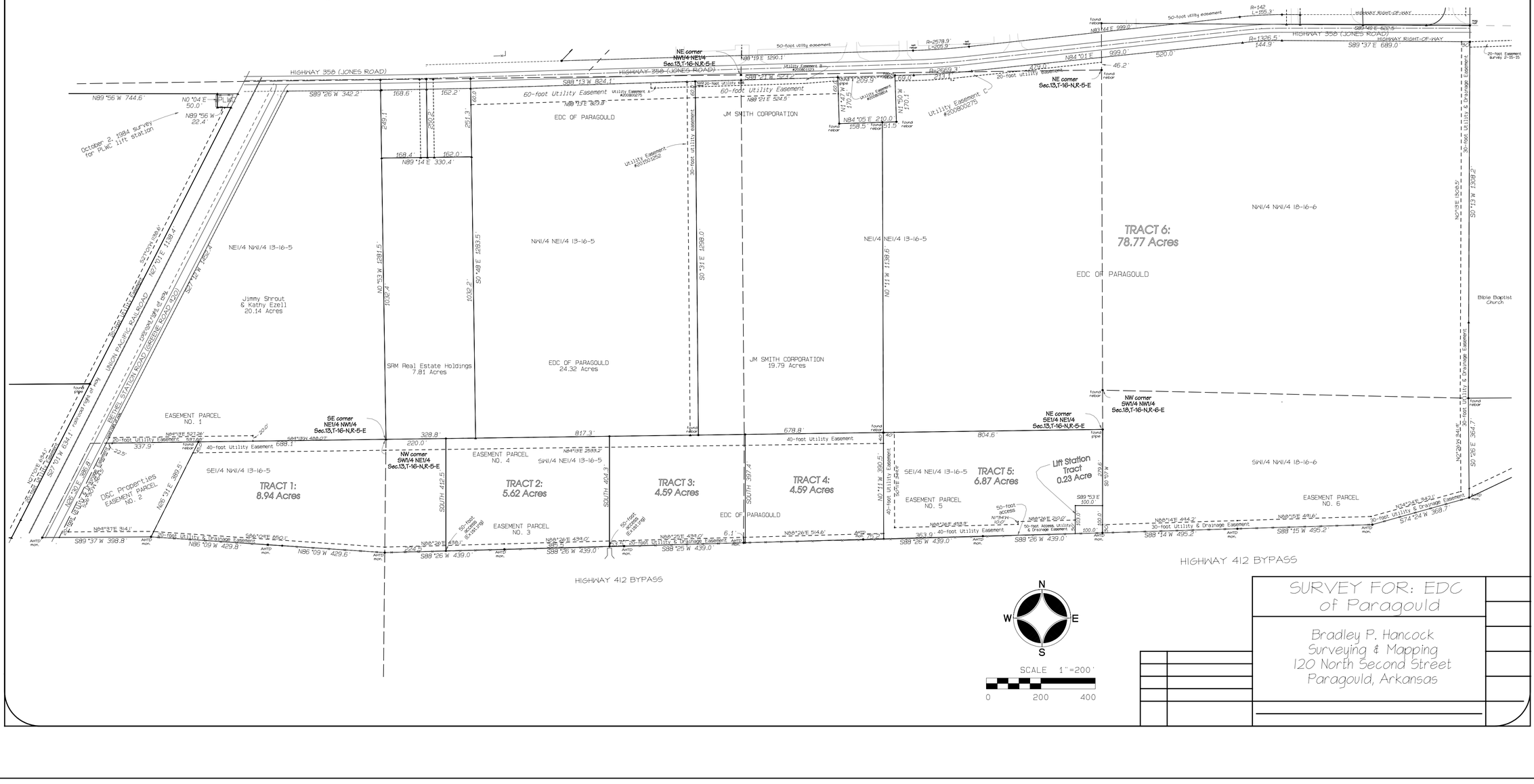
Tract 5:
That part of the Southeast Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, described as follows: Begininng at the Northeast corner of the SE1/4 NE1/4 of said Section 13, run thence S0°07'W 279.6 feet, run thence N89°53'W 100.0 feet, run thence S0°07'W 103.0 feet to the North right of way of Highway 412, run thence S88°26'W along right of way 702.9 feet, run thence N0°11'W 390.5 feet, run thence N89°13'E 804.6 feet to the true point of begininng, containing 6.87 acres, more or less, SUBJECT TO utility easements across the South and West sides thereof.

Tract 6:
A part of the Northwest Quarter of the Northwest Quarter AND a part of the Southwest Quarter of the Northwest Quarter ALL IN Section 18, Township 16 North, Range 6 East; A part of the Northeast Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, being more particularly described as follows: Beginning at the Northeast corner of said Section 13, run thence N0°11'W 46.2 feet to the true point of beginning, run thence N84°01'E 520.0 feet, run thence Easterly along a curve to the right having a radius of 1326.5 feet a distance of 144.9 feet, run thence S89°37'E 689.0 feet, run thence S0°13'W 1308.2 feet, run thence S0°26'E 364.7 feet, run thence S74°24'W 368.7 feet, run thence S88°15'W 495.2 feet, run thence N0°07'E 379.6 feet, run thence S89°13'W 804.6 feet, run thence N0°11'W 1138.6 feet, run thence N84°05'E 51.5 feet, run thence N1°50'W 170.1 feet, run thence N88°40'E 69.0 feet, run thence Easterly along a curve to the left having a radius of 2669.3 feet a distance of 213.1 feet, run thence N84°01'E 479.0 feet to the true point of beginning, containing 78.77 acres, more or less, SUBJECT TO a utility and drainage easement along the East and South sides thereof.

Lift Station Tract (to PLWC):
Lift Station Tract: to obtain from Economic Development Corporation of Paragould:
That part of the Southeast Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, described as follows: Beginning at the Northeast corner of said SE1/4 NE1/4, run thence S0°07'W 279.6 feet to the true point of beginning, run thence S0°07'W 100.0 feet, run thence S88°26'W 100.0 feet, run thence N0°07'E 103.0 feet, run thence S89°53'E 100.0 feet to the true point of beginning, containing 0.23 acre, more or less.

Notes:
1.) Bearings from GPS, Arkansas State Plane Coordinates.

Dated: March 11, 2015

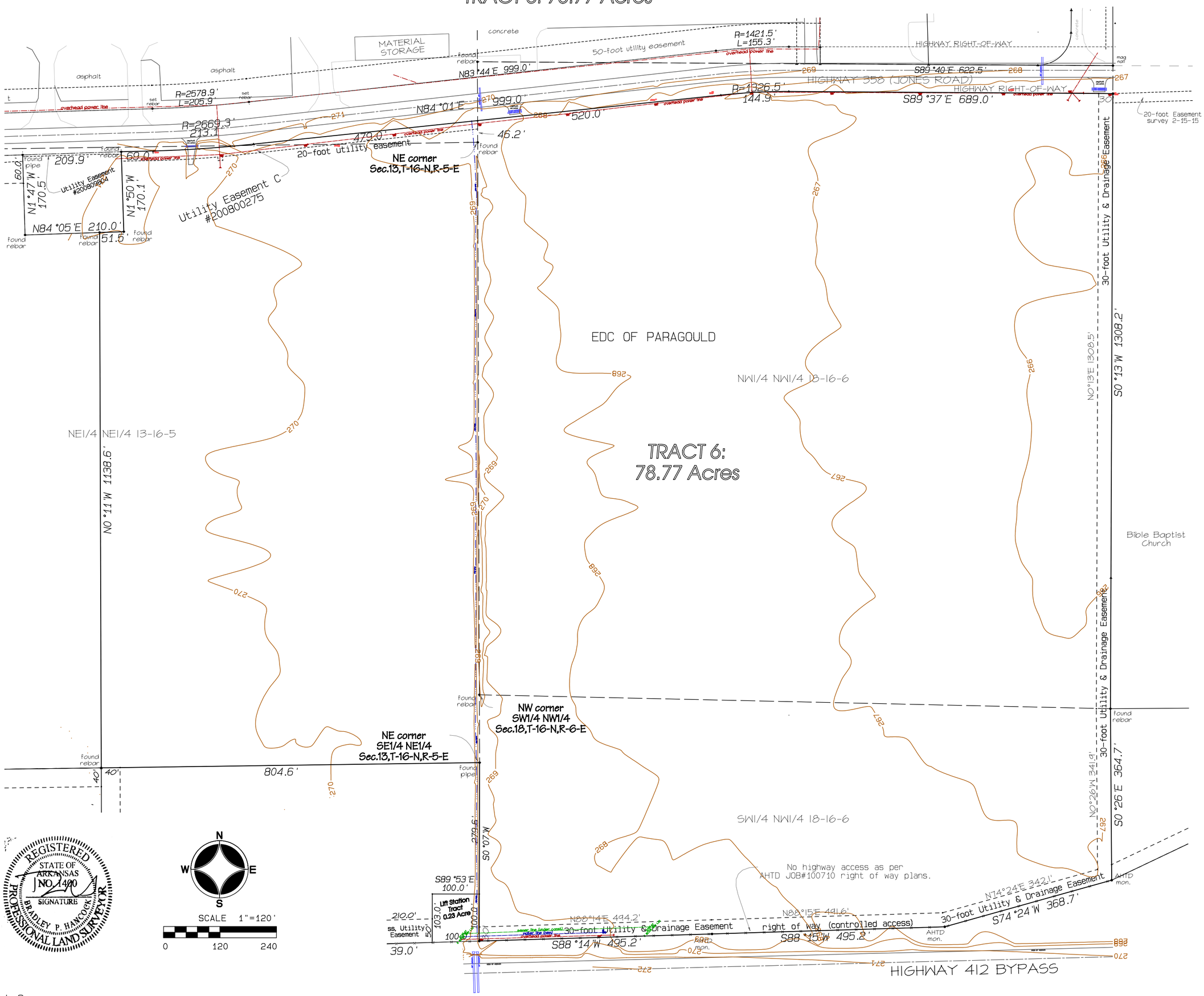


SURVEY FOR: EDC of Paragould

Bradley P. Hancock
Surveying & Mapping
120 North Second Street
Paragould, Arkansas

TOPOGRAPHIC SURVEY FOR: Paragould EDC

TRACT 6: 78.77 Acres



Tract 6:
A part of the Northwest Quarter of the Northwest Quarter AND a part of the Southwest Quarter of the Northwest Quarter ALL IN Section 18, Township 16 North, Range 6 East; A part of the Northeast Quarter of the Northeast Quarter of Section 13, Township 16 North, Range 5 East, being more particularly described as follows: Beginning at the Northeast corner of said Section 13, run thence N0°11'W 46.2 feet to the true point of beginning, run thence N84°01'E 520.0 feet, run thence Easterly along a curve to the right having a radius of 1326.5 feet a distance of 144.9 feet, run thence S89°37'E 689.0 feet, run thence S0°13'W 1308.2 feet, run thence S0°26'E 364.7 feet, run thence S74°24'W 368.7 feet, run thence S88°15'W 495.2 feet, run thence N0°07'E 379.6 feet, run thence S89°13'W 804.6 feet, run thence N0°11'W 1138.6 feet, run thence N84°05'E 51.5 feet, run thence N1°50'W 170.1 feet, run thence N88°40'E 69.0 feet, run thence Easterly along a curve to the left having a radius of 2669.3 feet a distance of 213.1 feet, run thence N84°01'E 479.0 feet to the true point of beginning, containing 78.77 acres, more or less, SUBJECT TO a utility and drainage easement along the East and South sides thereof.

Notes:
1.) Bearings from GPS, Arkansas State Plane Coordinates.
2.) Elevations are NGVD 1929.

Dated: September 14, 2016

TOPOGRAPHIC SURVEY FOR: Paragould EDC

Bradley P. Hancock
Surveying & Mapping
120 North Second Street
Paragould, Arkansas

#8 Proposed Pad on Property

LEGEND:

- SS — 15" SANITARY SEWER GRAVITY MAIN
- SS — 12" SANITARY SEWER FORCE MAIN
- W — 18" WATER MAIN
- W — 16" WATER MAIN
- W — 12" WATER MAIN
- NG — 4" NATURAL GAS – 60 PSI
- OE — 13.2 KV OVERHEAD ELECTRIC PRIMARY
- CITY COAX
- FO — DARK FIBER
- PROPERTY BOUNDARY

PROPOSED SITE PLAN AND UTILITIES

SCALE: 1"=100'-0"

100' 0 100' 200' 300'

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN / BUILD PROPOSAL DRAWING

THIS DRAWING IS FOR PROPOSAL INFORMATION ONLY & NOT INTENDED TO BE USED FOR CONSTRUCTION.

NO.	DATE	DESCRIPTION

PRELIMINARY NOT FOR CONSTRUCTION

PROJECT NO. -

DRAWN BY CDK

DESIGN LEADER -

CHECKED BY -

REVIEWED BY -
(PROJECT MANAGER)

PROPOSED INDUSTRIAL SITE
ECONOMIC DEVELOPMENT CORPORATION
PARAGOULD, ARKANSAS

FORCUM LANNOM
CONTRACTORS, LLC
350 US Hwy. 51 Bypass S. Dyersburg, Tennessee 38024 PH: (731) 287-4700

Date 12-28-16

Sheet C3.1

#9 FEMA Flood Map Map 2
March, 2016

JOINS PANEL 03

12

BETH

GRANT LANE

7

903

8

93

MAP SCALE 1" = 1000'

500 0 1000 2000

FEET

METER

ZONE A

620000 FT

RAILROAD

358

JONES

Paragould South Industrial

Eight Mile Ditch

907

18

17

13

Greene County Unincorporated Areas 050435

615000 FT

ZONE A

903

ZONE A

69

907

Ditch

19

20

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0365F

FIRM

FLOOD INSURANCE RATE MAP

GREENE COUNTY, ARKANSAS
AND INCORPORATED AREAS

PANEL 365 OF 525

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GREENE COUNTY	050435	0365	F
PARAGOULD, CITY OF	050085	0365	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
05055C0365F

MAP REVISED
MAY 16, 2013

Federal Emergency Management Agency

PHASE I ENVIRONMENTAL SITE ASSESSEMENT REPORT

A 110 Acre Tract owned by EDC of Paragould
Located South of Hwy 358
And East of UP Railroad
City of Paragould, Green County,
Arkansas 72450

August 2016

PREPARED FOR:
Economic Development Corporation of Paragould, Inc.
300West Court Street
Paragould, AR 72450

PREPARED BY:

Mizan Rahman, **P.E.**
ETC **ENGINEERS** & ARCHITECTS, INC.

1510 South Broadway
Little Rock, AR 72202

TABLE OF CONTENTS

SECTION **PAGE**

Summary

Introduction & Purpose User Provided Information Record Review

Site Reconnaissance Interviews Evaluation

Assumptions and Contingent Conditions

DECLARATION

We declare that to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in § 312.10 of 40 CFR § 312.

We also have the specific qualification based on education, and experience to assess a property of the nature, history, and setting of the subject property. We have performed all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Mizan Rahman, BSCE, MSE, P.E.
Sr. Engineer

ETC Engineers & Architects, Inc.

SUMMARY

This is the summary of a Phase I Environmental Site Assessment Report for a tract of land currently owned by the Economic Development Corporation of Paragould. The property is approximately 110 acres in size. A part of it is located within NE Y4 of the NW Y4 and a part of the SW Y4 of the NW Y4 and SE Y4 of the NE Y4, Section 18, Township 16 North and Range 6 East; a part of it is located in the SE Y4 of the NE Y4; a part of the NW Y4 of the NE Y4; a part of the SE Y4 of the NE Y4; and a part of the SE Y4 of the NW Y4. All in Section 13, Township 16 North, Range 5 East. A description of the property is included in the survey following page 7 of this report.

The Economic Development Corporation of Paragould (EDCP) acquired this property through three different acquisitions. At each acquisition, the writer of this report prepared a Phase I Environmental report for the property that was being acquired. This report is a consolidated report based on the findings of all three previous reports.

It is understood that the Economic Development Corporation of Paragould, Inc. is relying on this information for the purpose of performing environmental due diligence. The observations provided herein are based on the following sources:

- Site visits to the target property by Mr. Mizan Rahman, P.E., of ETC Engineers & Architects, Inc.(ETCEA) at various times

- Environmental Risk Management Data obtained from Environmental Data Resources, Inc. (EDR), Shelton, Connecticut.

- Arkansas Department of Environmental Quality (ADEQ) hazardous waste, UST and LUST site listings provided by Environmental Data Resources (EDR), Inc.

- Review of ownership documents, provided by the Economic Development Corporation of Paragould, Inc., Paragould, Arkansas.

- Review of RCRA, CERCLA and NPL site listings maintained by the USEPA Region VI and provided by Environmental Data Resources, Inc. (EDR), Inc.

- Review of other site listings maintained by the EPA, U.S. Coast Guard, U.S. DOT, DEA, DOD, U.S. Geological Survey, U.S. Army Corps of Engineers, U.S. Navy, Department of Justice, Department of Energy, Department of Labor, NRC and Arkansas Department of Environmental Quality and provided by EDR, Inc.

The property does not appear to be listed in any of the environmental databases maintained by EPA or ADEQ. The site is currently used as farmland and has historically been used for farming purposes.

Based on our visual inspection of the property, a database search and historical use of the property, it is our opinion that no potential environmental hazards exist within the boundaries of this property.

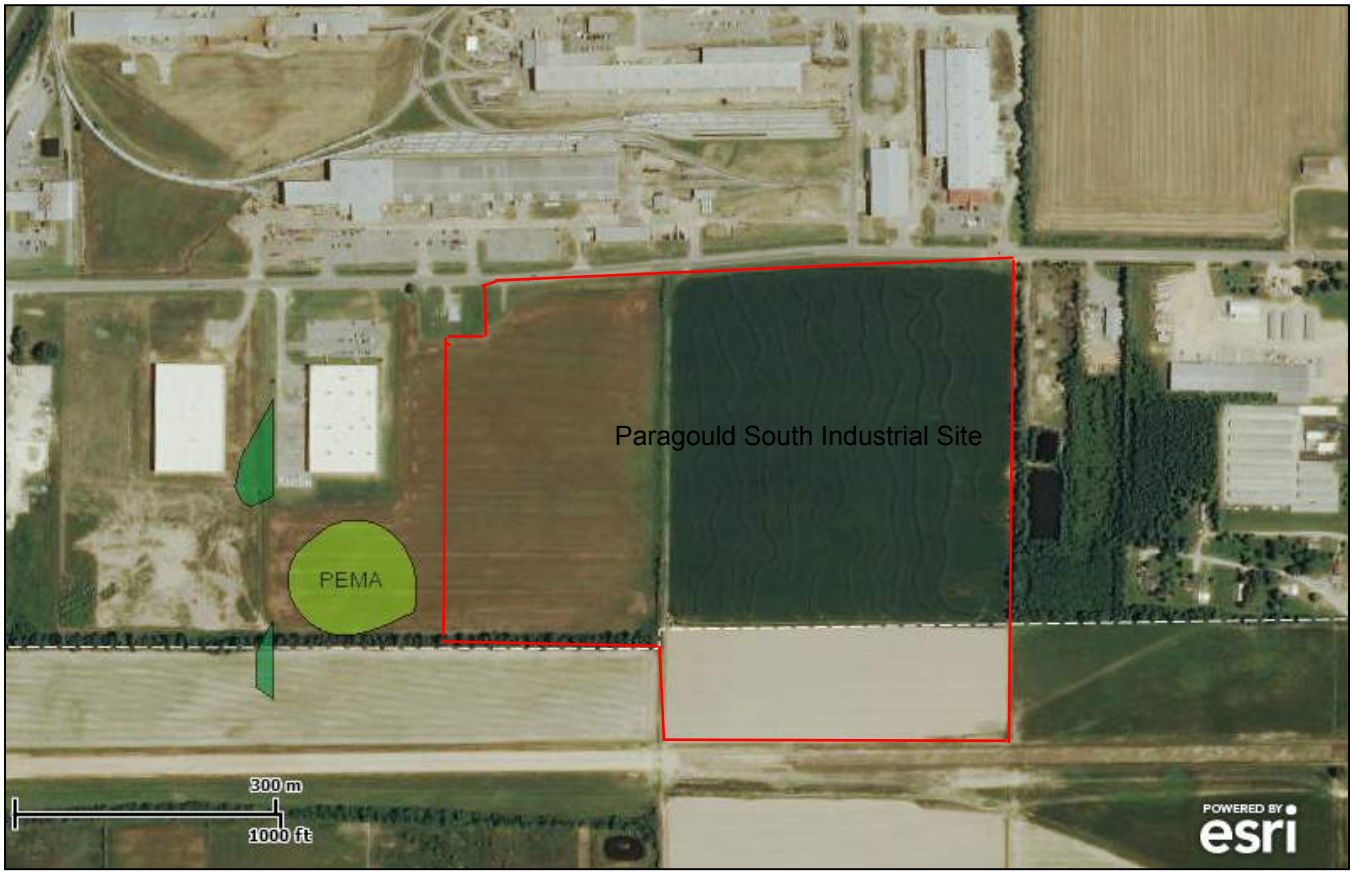
Above is a summary of the Phase 1 report. Complete copy available upon request.

U.S. Fish and Wildlife Service

National Wetlands Inventory

#11
Wetlands
NWI Map

Mar 13, 2016



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

User Remarks:

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS
167 NORTH MAIN STREET B-202
MEMPHIS, TENNESSEE 38103-1894

July 8, 2016

Sue McGowan
Paragould Regional Chamber of Commerce
P.O. Box 124
300 W Court Street
Paragould, Arkansas 72451

Dear Ms. McGowan:

This is in reference to your request for an approved jurisdictional determination on a piece of property located in Section 13, Township 16N, Range 5E, and Section 18, Township 16N, Range 6E, in Greene County, Arkansas, as shown on the attached maps. Based on the information you provided, a site visit and other information available to us, it is our approved jurisdictional determination (AJD) that the property does not contain any wetlands or other waters of the United States.

The basis for our AJD is available on our website at the following address: http://www.mvm.usace.army.mil/About/Offices/Regulatory/JurisdictionalDeterminations.aspx. This AJD is valid for five years from the date of this letter, unless new information warrants a revision of the determination before the expiration date of the District Engineer has identified, after public notice and comment, that specific geographic areas with rapidly changing environmental conditions merit re-verification on a more frequent basis.

If you object to this AJD, you may request an administrative appeal under Corps of Engineers regulations at 33 CFR Part 331 as described in Section D of the attached request for appeal (RFA) form. The completed RFA form must be submitted to the Mississippi Valley Division, Administrative Appeals Review Officer, P.O. Box 80, Vicksburg, Mississippi 39181-0080 within 60 days from the date of this letter. In order for an RFA to be accepted by the Corps of Engineers, the Corps of Engineers must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5 and that is has been received by the division office at the above address by September 6, 2016. Please review and carefully consider this information. It is not necessary to submit an RFA form to the division office if you do not object to the decision in this letter.

This determination has been conducted to identify the limits of the Corps of Engineers Clean Water Act jurisdiction for the particular site identified in this request. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are United States Department of Agriculture (USDA) program participants, or anticipate participation in the USDA program, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

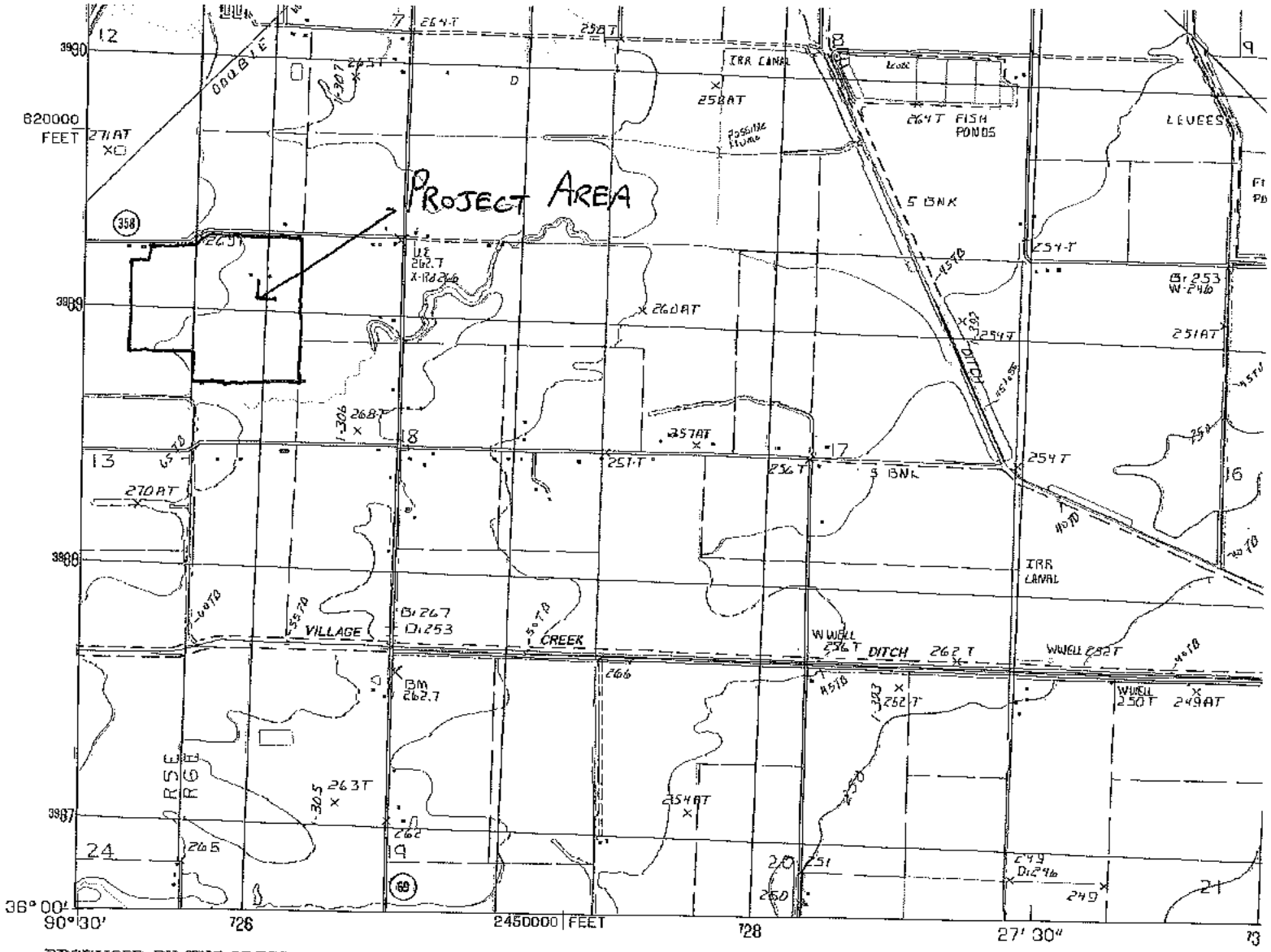
The Memphis District, Regulatory Branch is committed to providing quality and timely service to our customers. In an effort to improve customer service, we invite you to complete a Customer Service Survey found at http://corpsmapu.usace.army.mil/cm_apex /f?p=regulatory_survey. Your comments, positive or negative, will not affect any current or future dealings with the Corps of Engineers.

If you have questions, please contact Josh Bright at (901) 544-0926 and refer to File No. MVM-2016-199.

Sincerely,

Roger S. Allan
Chief, Western Section
Regulatory Branch

Enclosures



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY. . . . . USGS AND NOS/NOAA
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN. . . . . 1978 AND 1980
FIELD CHECKED . . . . . 1982. MAP EDITED 1983
PROJECTION . . . . . LAMBERT CONFORMAL CONIC
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR . . . . . ZONE 15
10,000-FOOT STATE GRID TICKS . . . . . ARKANSAS, NORTH ZONE
UTM GRID DECLINATION . . . . . 1°E EAST
1983 MAGNETIC NORTH DECLINATION . . . . . 3°00' EAST
VERTICAL DATUM . . . . . NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM . . . . . 1927 NORTH AMERICAN DATUM

To place on the predicted North American Datum of 1983, move the projection lines as shown by dashed corner ticks (5 meters south and 9 meters east)

There may be private inholdings within the boundaries of any Federal and State Reservations shown on this map

No distinction made between houses, barns, and other buildings. Gray tint indicates area in which selected buildings are shown

1 1000 0 1000

1 .5 1000

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of photography. 1

U.S. Fish and Wildlife Service

National Wetlands Inventory

#18a Wetlands -NWI Map

Mar 13, 2016

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Sue McGowan	File Number: MVM-2016-199	Date: 7/8/16
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:
Mr. Gregg W. Williams, Chief
Regulatory Branch
U.S. Army Corps of Engineers, Memphis District
167 North Main Street, Room B-202
Memphis, TN 38103

If you only have questions regarding the appeal process you may also contact:
Administrative Appeals Review Officer
Mississippi Valley Division
U.S. Army Corps of Engineers
1400 Walnut Street
Vicksburg, MS 39181-0080
601-634-5820

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

	Date:	Telephone number:
_____ Signature of appellant or agent.		

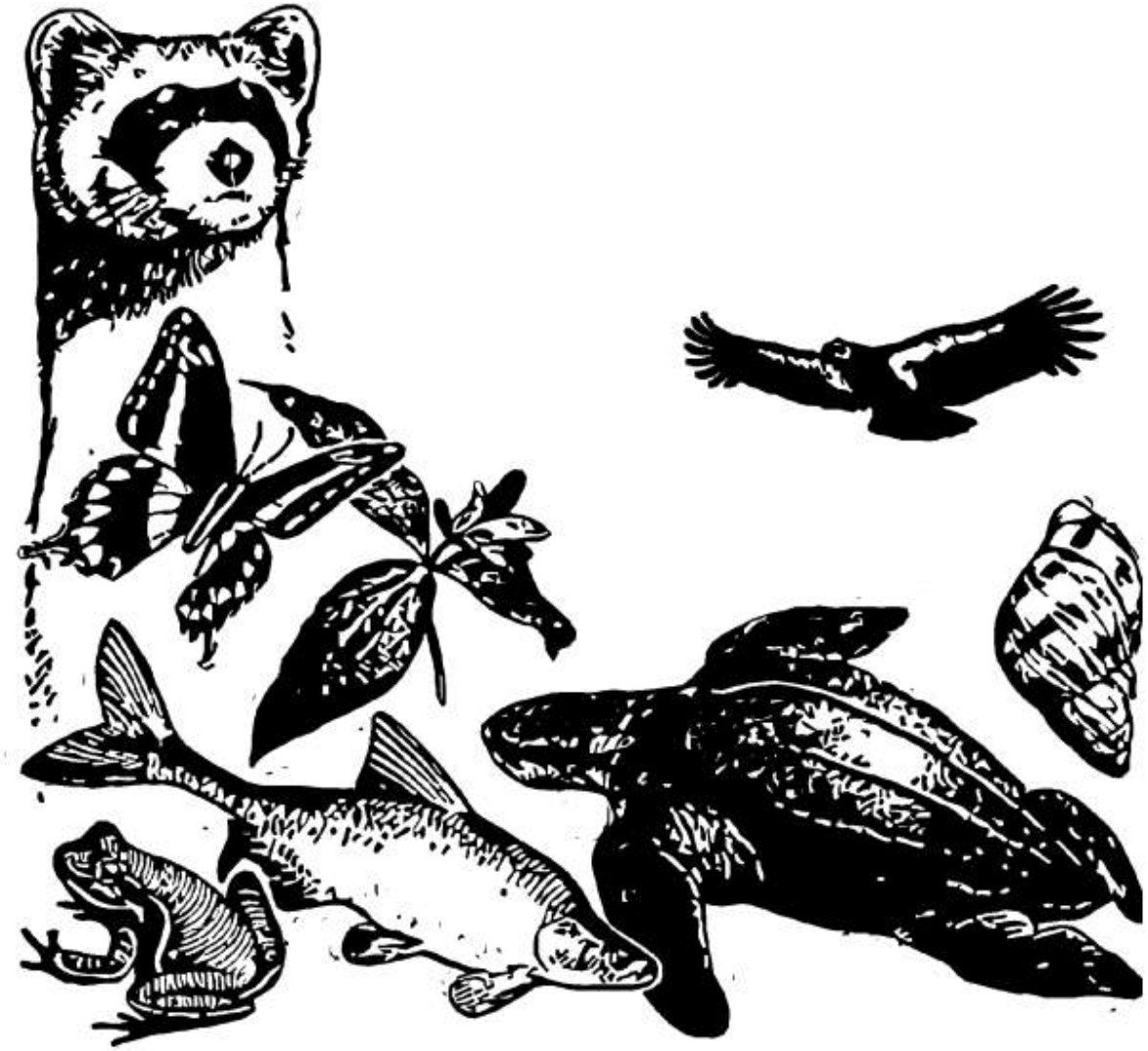
U.S. Fish & Wildlife Service

Paragould South Industrial Park

IPaC Trust Resource Report

Generated February 25, 2016 12:51 PM MST, IPaC v2.3.2

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (http://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

US Fish & Wildlife Service

IPaC Trust Resource Report

NAME

Paragould South Industrial Park

LOCATION

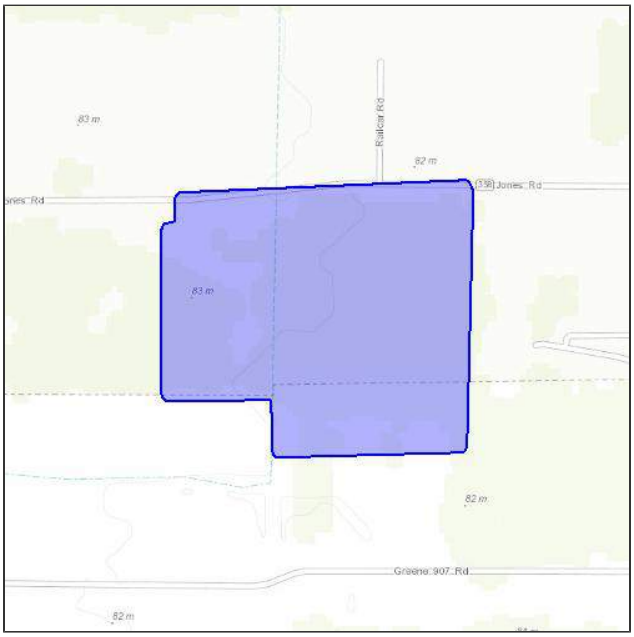
Greene County, Arkansas

DESCRIPTION

Certification by McCallum Sweeney

IPAC LINK

http://ecos.fws.gov/ipac/project/NKVFJ-GMISR-FPTP4-ZW45H-U2QYOU



U.S. Fish & Wildlife Contact Information

Trust resources in this location are managed by:

Arkansas Ecological Services Field Office
110 South Amity Suite 300
Conway, AR 72032-8975
(501) 513-4470

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require FWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from the Regulatory Documents section in IPaC.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Clams

Fat Pocketbook Potamilus capax — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=F00T

Scaleshell Mussel Leptodea leptodon — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=F00W

Flowering Plants

Pondberry Lindera melissifolia — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q2CO

Mammals

Indiana Bat Myotis sodalis — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A000

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

The following species of migratory birds could potentially be affected by activities in this location:

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Bell's Vireo Vireo bellii — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JX

Chuck-will's-widow Caprimulgus carolinensis — Bird of conservation concern
Season: Breeding

Dickcissel Spiza americana — Bird of conservation concern
Season: Breeding

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Wintering

Kentucky Warbler Oporornis formosus — Bird of conservation concern
Season: Breeding

Le Conte's Sparrow Ammodramus leconteii — Bird of conservation concern
Season: Wintering

Least Bittern Ixobrychus exilis — Bird of conservation concern
Season: Breeding

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY

Mississippi Kite Ictinia mississippiensis — Bird of conservation concern
Season: Breeding

Orchard Oriole Icterus spurius — Bird of conservation concern
Season: Breeding

Painted Bunting Passerina ciris — Bird of conservation concern
Season: Breeding

Prairie Warbler Dendroica discolor — Bird of conservation concern
Season: Breeding

Prothonotary Warbler Protonotaria citrea — Bird of conservation concern
Season: Breeding

Red-headed Woodpecker Melanerpes erythrocephalus — Bird of conservation concern
Year-round

Rusty Blackbird Euphagus carolinus — Bird of conservation concern
Season: Wintering

Sedge Wren Cistothorus platensis — Bird of conservation concern
Season: Migrating

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Swainson's Warbler Limnothlypis swainsonii — Bird of conservation concern
Season: Breeding

Wood Thrush Hylocichla mustelina — Bird of conservation concern
Season: Breeding

Worm Eating Warbler Helmitheros vermivorum — Bird of conservation concern
Season: Breeding

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuges in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Wetland data is unavailable at this time.

Paragould
ECONOMIC DEVELOPMENT CORPORATION

October 3, 2016

Melissa Lombordi
U.S. Fish & Wildlife
Arkansas Field Office
110 S Amity Road, Suite 300
Conway, AR 72032

Melissa:

The Economic Development Corporation of Paragould is pursuing certification of the Paragould South Industrial Park through the McCallum Sweeney Consulting Site Certification Program. As required by the program, we are requesting a determination by the U.S. Fish and Wildlife Service on the provided IPaC Trust Resources Report.

Thank you for your assistance.

Sincerely,

Sue M. Dawson

Sue McGowan
Director of Economic Development/CEO

This project has been reviewed for effects to Federal trust resources currently protected by the Endangered Species Act of 1973 16 U.S.C. 1531 et seq.; Act) and under our jurisdiction. The project as proposed:

[X] Will have no effect on those trust resources; or

[ ] There are no trust resources protected by the Act present.

This finding fulfills the requirements under section7(a)(2) of the Act

10/7/16

Acting Field Supervisor — Date
Arkansas Ecological Services Field Office
U.S. Fish and Wildlife Service

PANAMERICAN REPORT NO. 36139

PANAMERICAN CONSULTANTS, INC.

PHASE I CULTURAL RESOURCES SURVEY FOR A 78.77-ACRE CERTIFIED INDUSTRIAL SITE, PARAGOULD, GREENE COUNTY, ARKANSAS

PREPARED FOR:

PARAGOULD REGIONAL
CHAMBER OF COMMERCE
300 WEST COURT STREET
PARAGOULD, ARKANSAS 72450

PREPARED BY:

PANAMERICAN CONSULTANTS, INC.
91 TILLMAN STREET
MEMPHIS, TENNESSEE 38111

FINAL REPORT
JANUARY 2017

Cover Image: View northwest across the proposed Certified Industrial Site tract from the southeastern corner (PB212238).

FINAL REPORT

PHASE I CULTURAL RESOURCES SURVEY FOR A 78.77-ACRE CERTIFIED INDUSTRIAL SITE, PARAGOULD, GREENE COUNTY, ARKANSAS

Prepared for:

Paragould Regional Chamber of Commerce
300 West Court Street
Paragould, Arkansas 72450

Prepared by:

C. Andrew Buchner
with contributions from Karla Oesch

Panamerican Consultants, Inc.
91 Tillman Street
Memphis, Tennessee 38111
Panamerican Project No. 36139

C. Andrew Buchner

C. Andrew Buchner, RPA
Principal Investigator

JANUARY 2017

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ABSTRACT

Under contract with the Paragould Regional Chamber of Commerce, Panamerican Consultants, Inc. performed a Phase I cultural resources survey for the proposed 78.77-ac. Certified Industrial Site tract in Paragould, Greene County, Arkansas. A literature search revealed that there is no previously recorded archaeological site or historic property within the Certified Industrial Site. A cartographic review revealed that a farmstead consisting of from one to four structures existed within the tract ca. 1936–1983, and that the tract was land leveled for rice production ca. 1984–1993.

Two two-person teams, consisting of a Register of Professional Archaeologists Archaeologist and an Archaeological Technician, surveyed the Certified Industrial Site tract on 26 September and 21 November 2016. The survey of the tract resulted in the identification of one newly recorded archaeological site (3GE513). It is a Historic twentieth-century farmstead that has been destroyed via land leveling. The investigations at Site 3GE513 produced only two artifacts (two pieces of machine made glass) from the site surface and plowzone. Such a low artifact frequency at a twentieth-century farmstead once composed of four structures attests to the destructive power that land leveling has on archaeological sites.

The recommended National Register of Historic Places status for Site 3GE513 is not eligible. Because there is no National Register of Historic Places listed, eligible, or potentially significant archaeological site or historic property within the tract, the proposed undertaking will not have an adverse impact on cultural resources. No additional cultural resources investigation is recommended.

ACKNOWLEDGEMENTS

Panamerican Consultants, Inc. appreciates the opportunity to have provided the Paragould Regional Chamber of Commerce with our services. Sue McGowan was our point of contact.

Panamerican Consultants, Inc. personnel that contributed to the project included the following individuals. Andrew Saatkamp, RPA, Robert Taylor, RPA, Hannah Fite, and Philip Geary conducted the fieldwork. Karla Oesch, Laboratory Director, conducted the artifact analysis and contributed to *Chapter V: Field Investigations*. Kate Gilow provided administrative support throughout all stages of this project. Anna Hinnenkamp-Faulk edited the report.

TABLE OF CONTENTS

ABSTRACT i

ACKNOWLEDGEMENTS ii

LIST OF FIGURES v

LIST OF TABLES v

I. INTRODUCTION 1

PROJECT LOCATION 1
BACKGROUND 1
REPORT OUTLINE 1

II. ENVIRONMENTAL SETTING 5

GEOLOGY 5
St. Francis Sunk Lands *7*
GEOMORPHOLOGY 7
SOILS 8
PRESENT CLIMATE 10
PALEOENVIRONMENT 10
LITHIC RESOURCES 10
FLORA 11

III. CULTURAL BACKGROUND 13

HISTORY OF INVESTIGATIONS 13
Antiquarian Investigations *13*
Early Twentieth Century *13*
Lower Mississippi Survey *14*
1947-1967 ..... *14*
Arkansas Archeological Survey *15*
Cultural Resources Management Era *15*
CULTURAL HISTORY 15
Paleoindian *15*
Dalton *17*
Archaic *17*
Poverty Point *18*
Woodland *19*
Mississippi *21*
Protohistoric *22*
Historic Aboriginal *23*
Colonial *24*
Early Nineteenth Century *24*
Public Land Sales 25
Civil War and Reconstruction 26
Land Reclamation Efforts 27
The Great Flood of 1927 27
Tenant Period *28*
Railroad Period *29*

IV. LITERATURE AND RECORDS SEARCH 33
ARKANSAS ARCHEOLOGICAL SURVEY SITE FILES 33
PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS 33
Waterworks Investigations *33*
Eightmile Ditch Survey *33*
Regional Water District Survey *34*
U.S. Highway 412 Bypass Survey *34*
ARKANSAS HISTORIC PRESERVATION PROGRAM STRUCTURE FILES 34
NATIONAL REGISTER OF HISTORIC PLACES LISTINGS 34
CARTOGRAPHIC REVIEW 34
General Land Office Plats *34*
1936 Greene County Road Map *37*
1940 Quadrangle Map *38*
1958 Quadrangle Map *39*
1968 Air Photograph *40*
1983 Quadrangle Map *40*
1994–2015 Google Earth Images *40*
GENERAL LAND OFFICE LAND PATENTS 40

V. FIELD INVESTIGATIONS 41
METHODS 41
Shovel Test Definition *41*
Site Definition *41*
Survey Documentation *41*
FINDINGS 43
Site 3GE513 ..... *43*
Location and Setting 43
Archaeology 44
Artifacts 46
Additional Remarks 46
Recommendation 47

VI. SUMMARY AND RECOMMENDATIONS 49
SUMMARY 49
RECOMMENDATIONS 49

VII. REFERENCES CITED 51

APPENDIX A: HISTORIC PRESERVATION OFFICES CORRESPONDENCE

APPENDIX B: BIOGRAPHIES OF KEY PERSONNEL

C. ANDREW BUCHNER, PRINCIPAL INVESTIGATOR
ANDREW SAATKAMP, FIELD DIRECTOR
KARLA OESCH, LABORATORY DIRECTOR

APPENDIX C: REMOVABLE SITE LOCATOR MAP

LIST OF FIGURES

Figure 1-01. Quad map locator for the proposed Paragould Certified Industrial Site tract 2
Figure 1-02. Google Earth image of the Paragould Certified Industrial Site tract 3
Figure 1-03. Surveyors' plan of the Paragould Certified Industrial Site tract 4
Figure 2-01. Project area shown on an Ecoregions of Arkansas map 6
Figure 2-02. Geological cross-section of Crowley's Ridge 7
Figure 2-03. Project area shown on a geomorphic map 8
Figure 2-04. Project area shown on a soil map 9
Figure 3-01. Chart for percentage of farm tenants in Arkansas and the South 28
Figure 4-01. The 1840 T16N R5E General Land Office plat map with the study tract highlighted in red 35
Figure 4-02. The 1826 T16N R6E General Land Office plat map with the study tract highlighted in red 36
Figure 4-03. A portion of the 1936 Greene County Road Map with the study tract highlighted in red 37
Figure 4-04. A portion of the 1940 Marmaduke, AR 15-min. quad with the study tract highlighted in red 38
Figure 4-05. A portion of the 1958 Marmaduke, AR 15-min. quad with the study tract highlighted in red 39
Figure 5-01. View northwest across the tract from the southeastern corner 42
Figure 5-02. View west from the southern-central portion of the tract 42
Figure 5-03. View south across Site 3GE513 43
Figure 5-04. Site 3GE513 sketch map 44
Figure C-01. Quad map locator for Site 3GE513 within the proposed Paragould Certified Industrial Site tract C-1

LIST OF TABLES

Table 2-01. Stratigraphic Units of Crowley's Ridge 7
Table 3-01. Summary of northeastern Arkansas cultural history 16
Table 4-01. Previously recorded archaeological sites within 2 km of the study area 33
Table 5-01. Shovel test inventory 45

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I. INTRODUCTION

At the request of the Paragould Regional Chamber of Commerce (PRCC), Panamerican Consultants, Inc. (Panamerican) performed a Phase I cultural resources survey for the proposed 78.77-ac. Certified Industrial Site tract in Paragould, Greene County, Arkansas. The purpose of the survey was to identify any cultural resource that is listed on, eligible for, or potentially significant for the National Register of Historic Places (NRHP). The project was conducted to assist PRCC management in complying with Federal statutes, including Section 106 of the National Historic Preservation Act of 1966, as amended; Executive Order 11593; and the Advisory Council's "Protection of Historic Sites (36 CFR Part 800)," effective 17 June 1999. All field and office work was conducted in accordance with the Standards and Guidelines established in 36 CFR Part 66, Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards and Reporting Requirements (Federal Register, Volume 42, Number 19-Friday, 18 January 1977), and conforms to the Arkansas State Historic Preservation Officer's (SHPO's) guidelines for survey level investigations found in Appendix B of the *Arkansas State Plan*, "Guidelines for Cultural Resources Fieldwork and Report Writing in Arkansas" (Davis 1994, Revised Version in effect as of 1 January 2010).

PROJECT LOCATION

The 78.77-ac. Certified Industrial Site tract is located on the southeastern edge of Paragould, north of the U.S. Highway 412 (US-412) Bypass. The tract is irregularly shaped and composed of two adjacent fields. The northern boundary of the tract is Highway 358 (HY-358), and north of this there is a sprawling industrial complex. The eastern boundary is a quarter section line, and east of this there is another industrial facility. The US-412 Bypass forms part of the southern boundary, and the tree line on a property line forms the rest of the southern boundary (on the west). The western boundary is an arbitrary property line, and a large industrial warehouse is located near the northwestern boundary of the tract on HY-358.

The tract can be identified on the Paragould East 7.5-min. quad. In legal terms, the proposed Certified Industrial Site tract is located in the NE¼ of Section 13 Township 16 North Range 5 East (T16N R5E) and the NW¼ of Section 18 Township 16 North Range 6 East (T16N R6E).

BACKGROUND

The 15 June 2016 SHPO Section 106 Review letter for this undertaking (AHPP Tracking No. 96046; *Appendix A: Historic Preservation Offices Correspondence*) recommended that a cultural resources survey be conducted.

REPORT OUTLINE

The technical report contained herein is organized in the following manner (see also *Table of Contents*). The most salient aspects of the local environmental setting are outlined in Chapter II and a discussion of the local cultural sequence is provided in Chapter III. The results of the literature and records search are presented in Chapter IV. The field methods and results, and artifact analysis are presented in Chapter V. Chapter VI provides a summary and recommendations. The References Cited chapter and various appendices conclude this report.

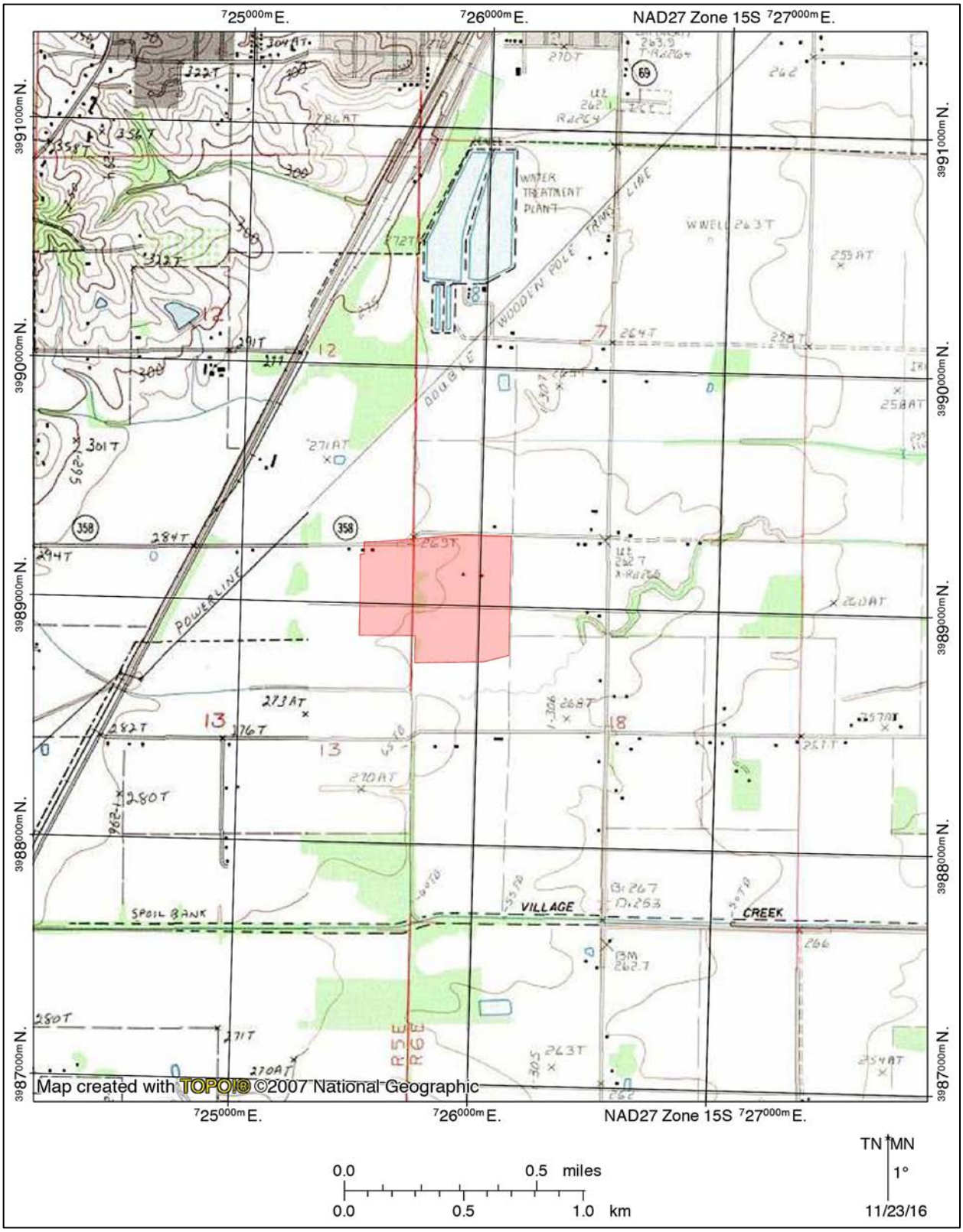

Figure 1-01. Quad map locator for the proposed Paragould Certified Industrial Site tract (base map: 1983 Paragould East, AR 7.5-min. quad).

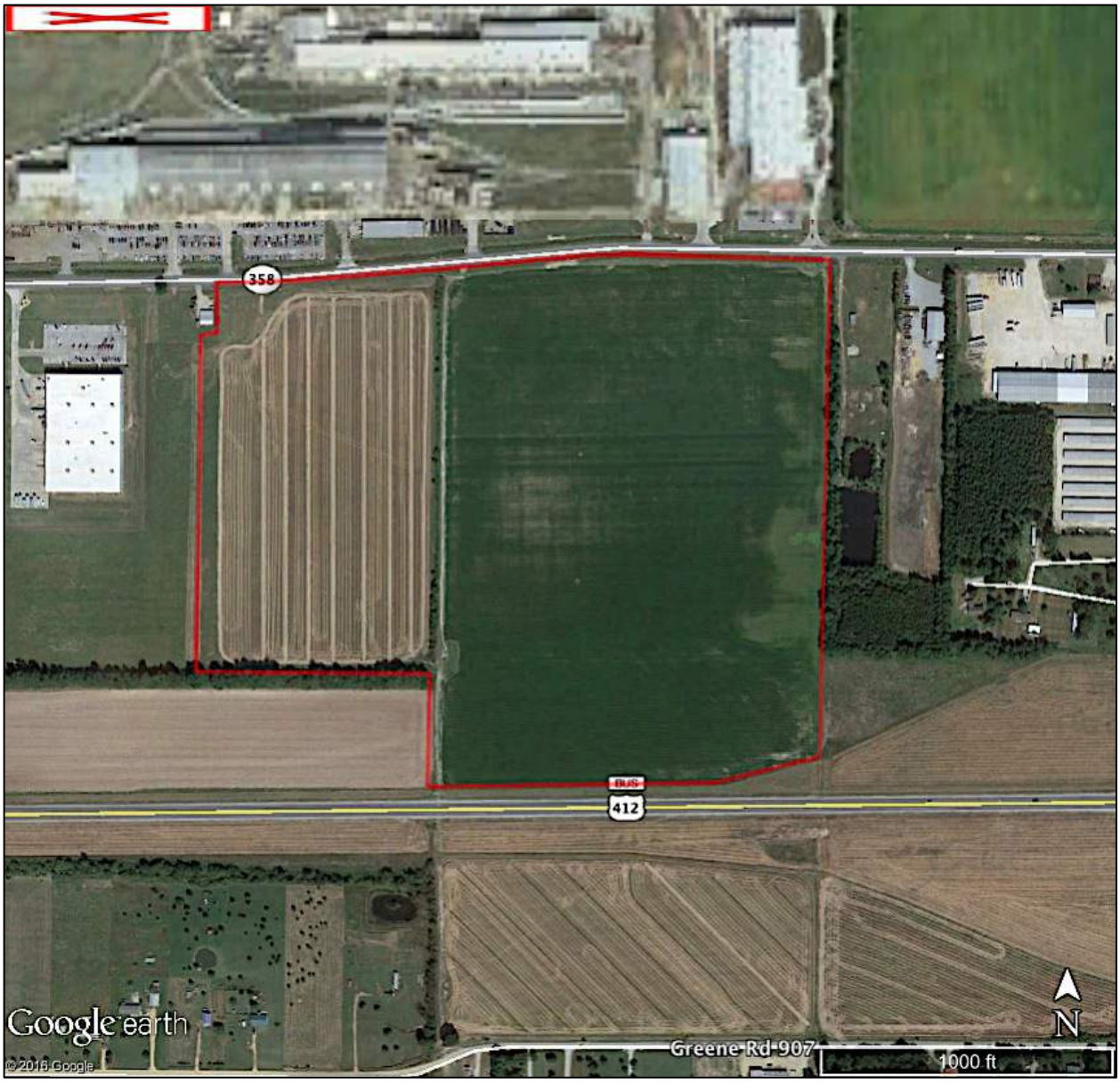

Figure 1-02. Google Earth image of the Paragould Certified Industrial Site tract.

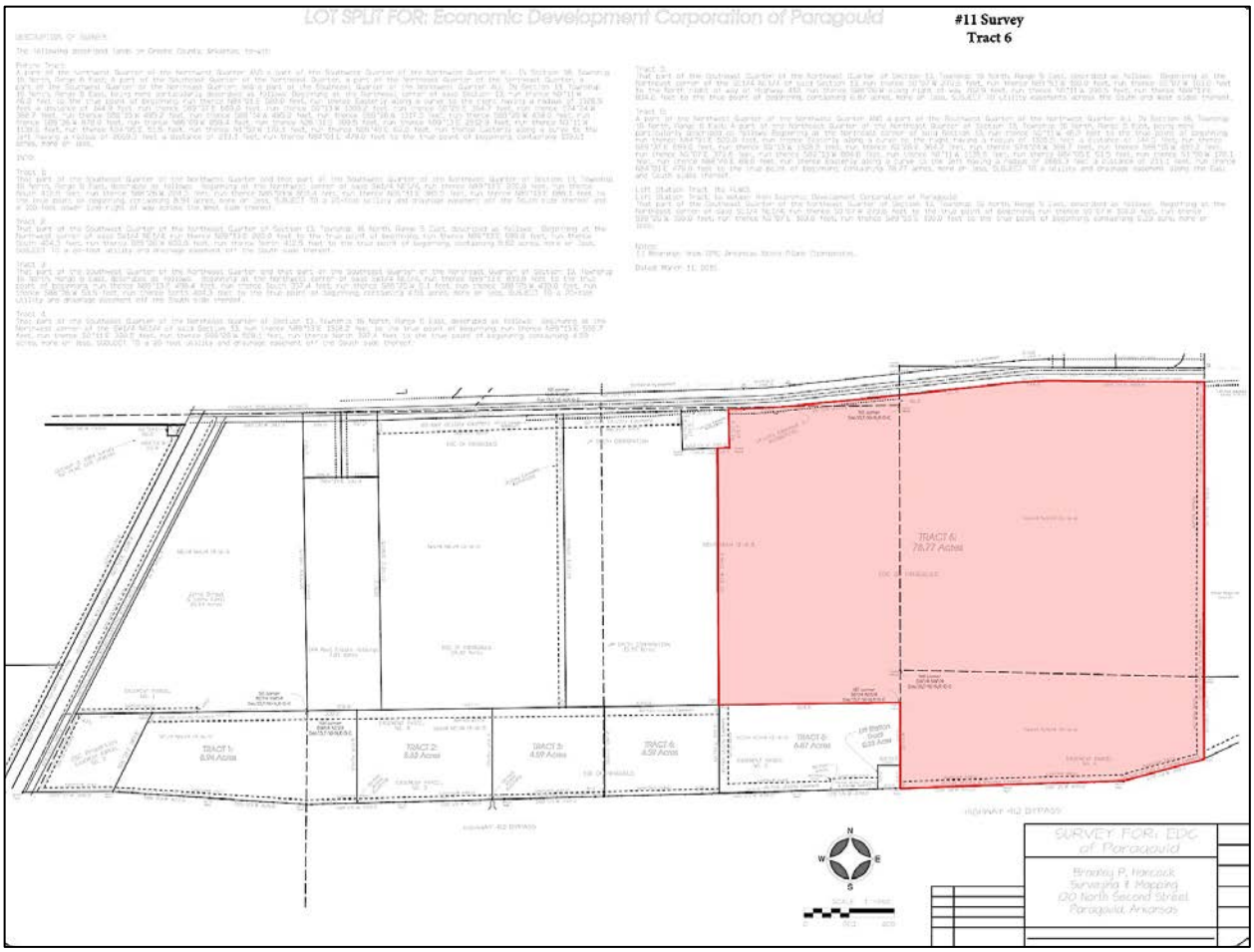

Figure 1-03. Surveyors' plan of the Paragould Certified Industrial Site tract.

II. ENVIRONMENTAL SETTING

GEOLOGY

The project area is situated on two major landforms of the Lower Mississippi Valley in northeastern Arkansas: Crowley's Ridge and the St. Francis River Basin (Figure 2-01). Archaeologists consider this basin part of the Central Mississippi Valley, which is essentially the region between the mouths of the Ohio and Arkansas rivers (McNutt 1996; Morse and Morse 1983:1). The St. Francis River Basin is referred to as the eastern lowlands, while the White-L'Anguille River Basin, located west of Crowley's Ridge, is considered the western lowlands. The topography within the St. Francis River Basin is typical of bottomlands along a major perennial stream, ranging from broad flats to areas of alternating swales and low ridges. Except along a few stream banks, local differences in elevation are minor.

Crowley's Ridge is an important upland area within the otherwise low and level Mississippi Alluvial Valley. The ridge is ancient, and Saucier (1994:I:219) suggests that it "probably became a prominent topographic feature for the first time" during an interglacial stage known as the Intermediate Complex (dated 1,300,000–800,000 years before present [YBP]). It is an upland remnant occasionally referred to as a plateau, which separates what was once the main valley of the Mississippi River, the Western Lowlands, from the main valley of the Ohio River, the Eastern Lowlands (Saucier 1994:I:27). The ridge is unbroken for 200 km between the Marianna River and St. Francis River gaps, and if several isolated but geologically related areas are included, then its total length is 344 km. The northern portion of Crowley's Ridge averages 16 km wide.

Crowley's Ridge rises 30–76 m above the adjacent Wisconsin-aged valley train surfaces (Saucier 1994:I:27; Figure 2-02). This is in part due to being capped by thick loess deposits; Crowley's Ridge is one of the thickest loess deposits in the Mississippi Valley (Saucier 1994:I:132). Five loess sheets have been identified in the Mississippi Valley, and Crowley's Ridge is the only location where all five sheets are present. From youngest to oldest, the loess sheets include: Peoria; Roxana; Sicily Island; Crowley's Ridge; and Marianna. The two oldest loess sheets date to the Illinoian stage (160,000–125,000 YBP; Saucier 1994:I:49) or earlier. The final mantle of loess on Crowley's Ridge, the Peoria loess, was laid down during the period 22,000–12,500 YBP (i.e., the late Wisconsin glaciation; Saucier 1994:I:133).

Geologically, Crowley's Ridge is considered "an erosional remnant of unconsolidated Eocene clay, silt, sand, and lignite, capped by Pliocene sand and gravel, and middle to late Pleistocene loess" (Guccione et al. 1990:23). The basement geology consists of three Tertiary units, all Eocene-aged (Table 2-01).

The Pliocene-aged sand and gravel deposit that forms the surface geology of Crowley's Ridge is correlated with the "Lafayette Gravel" (Guccione et al. 1990:33). The gravel in this deposit was the most significant source of lithic raw material for the prehistoric populations of northeastern Arkansas. Chert dominates the lithology in the pebble fraction, but sandstone, quartz, and Tertiary clay pebbles are also present (Guccione et al. 1990:29). The Lafayette gravel varies from 0–38 m in thickness (it averages 10 m thick) and includes thick gravel beds.

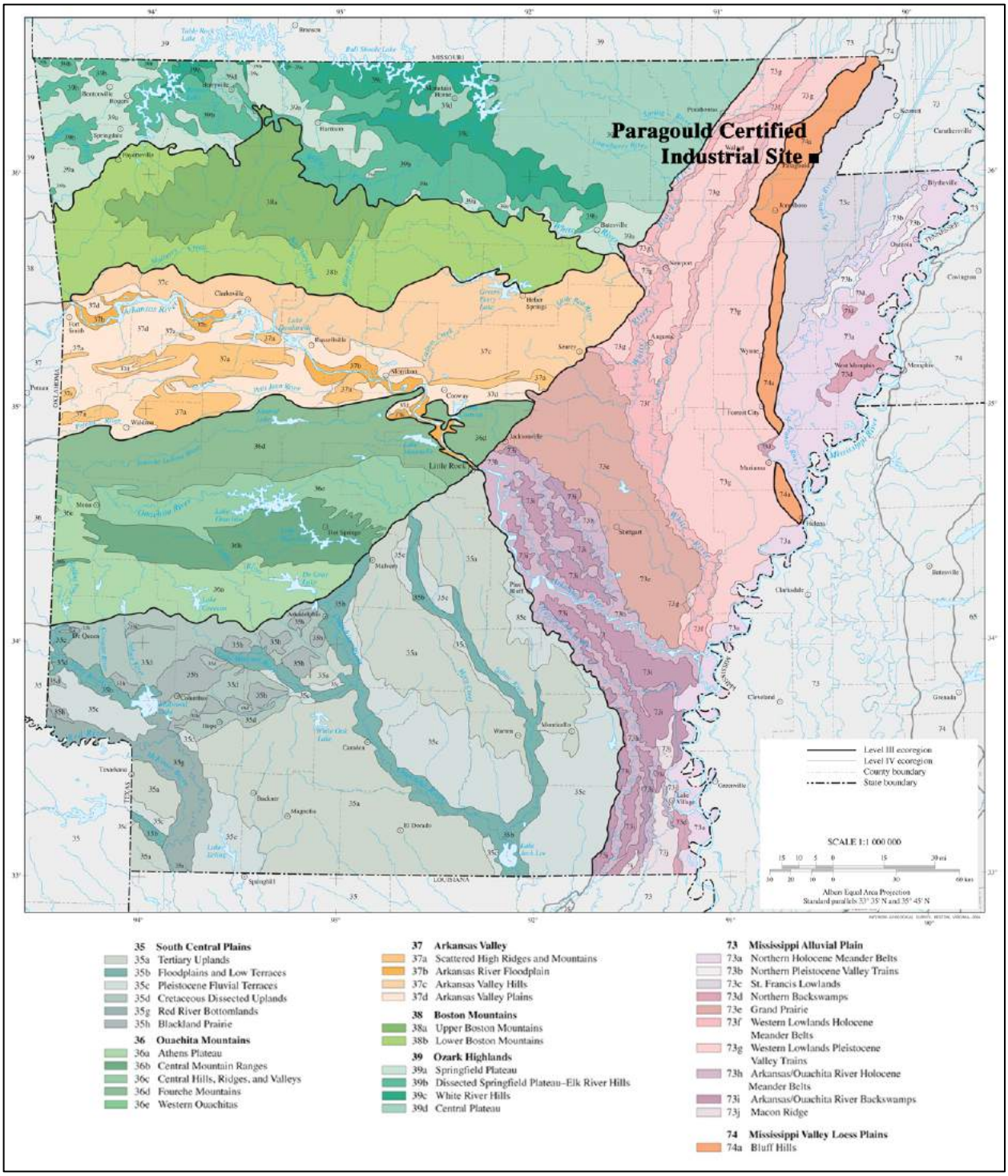

Figure 2-01. Project area shown on an Ecoregions of Arkansas map (after Woods et al. 2004).

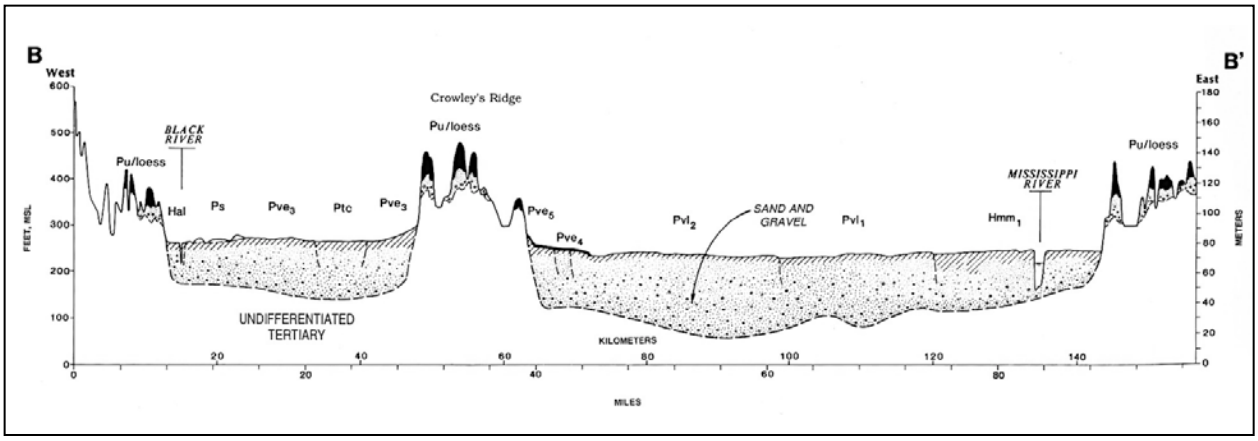

Figure 2-02. Geological cross-section of Crowley's Ridge (map source: Saucier 1994:II).

Table 2-01. Stratigraphic Units of Crowley's Ridge.

System	Series	Stage	Stratigraphic unit
Quaternary	Holocene		unnamed terrace sand and gravel
	Pleistocene	Wisconsinan	Peoria Loess
			Roxana Loess
		Sangamonian	
		Illinoian	Sicily Island Loess
		pre-Illinoian	Crowley's Ridge Loess
			Marianna Loess
Tertiary	Pliocene		Lafayette Gravel
	Eocene		Jackson Group
			Claiborne Group
			Wilcox Group

St. Francis Sunk Lands

In the nineteenth century, the St. Francis Sunk Lands were a long series of shallow lakes and deep swamps (interspersed with small islands) bordering the St. Francis River above the mouth of the Little River. Similar conditions existed along the lower reaches of the Right Hand Chute of the Little River and at Big Lake. The St. Francis Sunk Lands were once thought to have been formed by the New Madrid Earthquake (Fuller 1912), but currently natural levee formation ("alluvial drowning") along the Left Hand chute of the Little River is considered the "primary mechanism" in the formation of the sunk lands (Saucier 1970:2851).

Geomorphology

Examination of Saucier's (1994:II:Plate 5) geomorphic map reveals that the project area is located on the Early Wisconsin Stage Valley Train Level 3 deposits (Pve 3; Figure 2-03). Fisk (1944) refers to this terrace as the Malden Plain, after a town to the north in Missouri. Valley

trains are the result of the deposition of coarse-grained glacial outwash by streams carrying "copious" quantities of meltwater from receding continental glaciers (Saucier 1994:I:97). Saucier (1994:94) considers the most apparent and diagnostic recognition pattern for valley trains to be "relict patterns of wide, frequently branching channels separating irregular braid bars and interfluve areas."

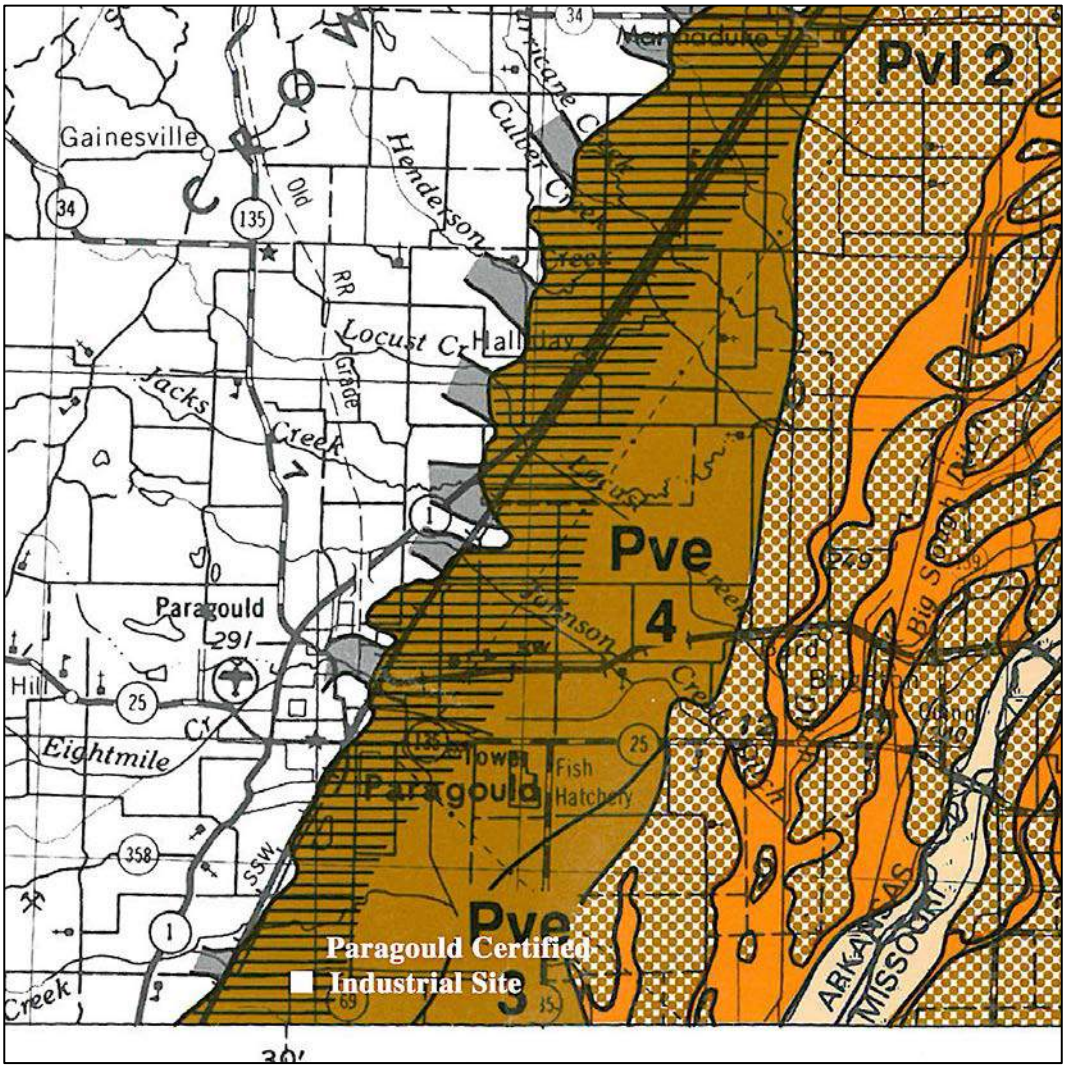

Figure 2-03. Project area shown on a geomorphic map (after Saucier's 1994:II:Plate 5).

SOILS

Robertson (1969:Sheet 52) mapped three soil types within the project area (Figure 2-04). Fayala silt loam, 0–1 percent slopes (Fa) is the most extensive within the site, and covers the majority of the larger eastern field. This soil type is found on bottomlands along streams that drain Crowley's Ridge, and runoff is slow (Robertson 1969:15). It is a Capability Unit IIw-3 soil.

Calloway silt loam, 0–1 percent slopes (CIA) is found in the southwestern corner of the project area (see Figure 2-04). This soil is found on broad flats and low ridges on the loessal plain adjacent to Crowley's Ridge (Robertson 1969:13). It is a Capability Unit IIw-1.

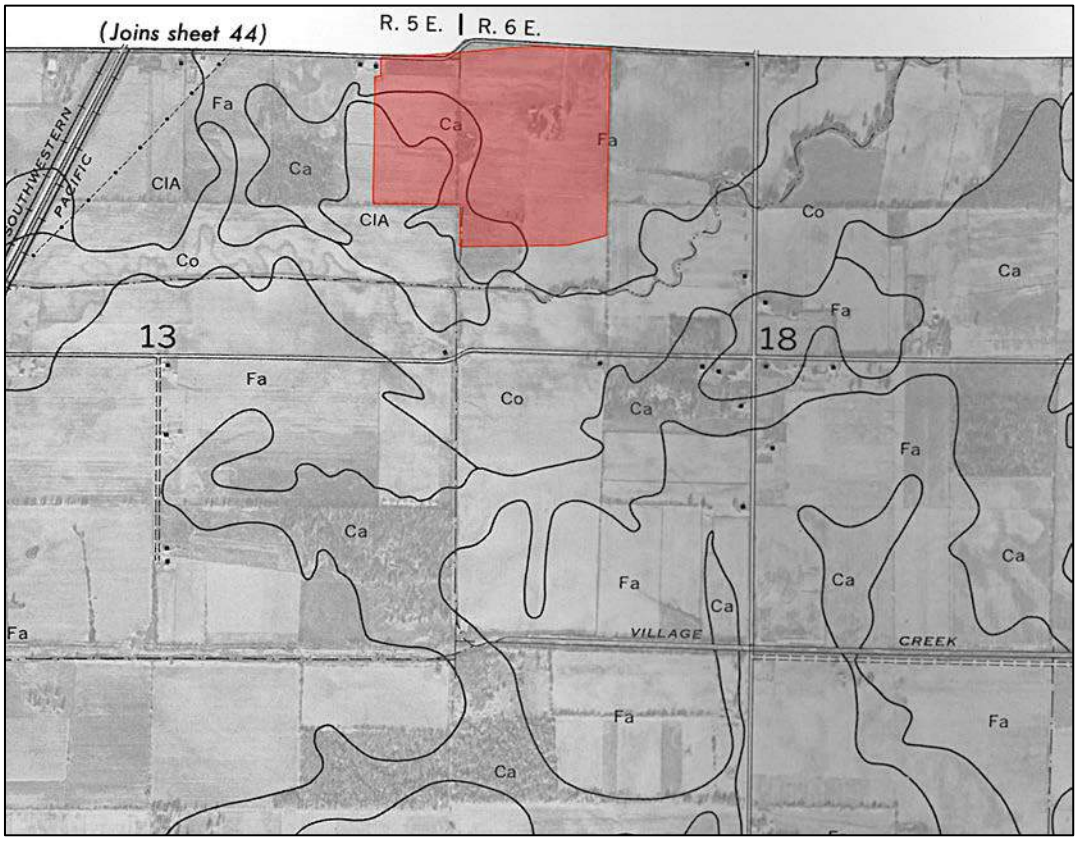

Figure 2-04. Project area shown on a soil map (after Robertson 1969:Sheet 52).

A narrow band of Calhoun silt loam, 0–1 percent slopes (Ca) lies between the Fayala silt loam and the Calloway silt loam. It is found on nearly flat to depressional areas on Crowley's Ridge and the adjoining loessal plain (Robertson 1969:12). It is a Capability Unit IIIw-5.

Because soils are indicators of past environments, soil types and/or phases can be used to predict a given tract's potential for containing archaeological deposits. The Natural Resources Conservation Service's "Capability Unit" classification is a measure of the limitations of each soil type that can restrict its use. These capability units can be used by archeologists as indicators of the potential that a given soil type has for containing an archaeological deposit, because soils with few limitations are more likely to yield evidence of human occupation than soils with moderate or severe limitations.

From an archaeological standpoint, Capability Units (or Classes) are evaluated as followed:

- Class I soils have few limitations that restrict their use, and are considered to have a high probability of containing archaeological resources.
- Class II soils have moderate limitations, and are considered to have a moderate probability of containing archaeological resources.
- Class III and IV soils have severe limitations, and are considered to have a low probability of containing archaeological resources.
- Class V and VI soils have very severe limitations, and are considered to have little probability of containing archaeological resources.

Given the Capability Unit of the three soils within the project area, the majority of the proposed Paragould Certified Industrial Site tract is considered to have a moderate probability of containing archaeological resources, and the remainder has a low probability.

PRESENT CLIMATE

The present climate of northeastern Arkansas is characterized by warm summers with relatively mild winters. During the late spring, summer, and early fall, sunlight is quite intense, which keeps the humidity and soil moisture evaporation levels high. Winters in the area are characterized by cool and cloudy weather coupled with frequent rainfall, interspersed with periods of clear and cold conditions. Warm, rainy periods occur intermittently during the winter months as well.

In Greene County, July is, on average, the warmest month with a daily maximum temperature of 92°F; January is the coldest month with an average daily maximum temperature of 48°F (Robertson 1969:Table 13). Precipitation in Greene County averages 46.93 in. per annum, and "60 percent of the annual precipitation falls during the winter and spring" (Robertson 1969:62).

PALEOENVIRONMENT

Paleoenvironmental conditions were substantially different in the late Pleistocene through the middle Holocene. Important regional sites with Quaternary plant fossil records include the Pemiscot Bayou and Big Lake corings in Mississippi County (Scott and Aasen 1987); the Hood Lake coring in Poinsett County (Delcourt and Delcourt 1989); the Old Field site in Stoddard County, Missouri (King and Allen 1977); and the Nonconnah Creek Mastodon site in Shelby County, Tennessee (Delcourt et al. 1980). Delcourt et al. (1997) have synthesized data and mapped vegetation reconstructions for the Central Mississippi Valley for various temporal intervals.

Post-glacial warming began about 10,500 B.C., and a cool-temperate spruce-fir-larch forest gave way to a warm-temperate mixed oak deciduous forest (Morse and Morse 1983:8). By 7000 B.C. the mixed oak deciduous forest was firmly established in the Central Mississippi Valley, and the Mississippi River had diverted through Thebes Gap and changed from braided to meandering. The period from ca. 7000–3000 B.C. (or possibly 8000–4000 B.C., see Morse and Morse 1983) was warm and dry and is referred to as the Hypsithermal. Modern floristic regions developed after 3000 B.C. with the return of wetter conditions.

LITHIC RESOURCES

The Citronelle gravel beds associated with Crowley's Ridge offered the closest and most readily available source of lithic resources for the inhabitants of prehistoric northeastern Arkansas. Known prior to 1955 as Lafayette chert (Stallings 1989), these gravels likely originated in the mid-continent Paleozoic craton and Appalachian Mountains region prior to being redeposited via erosion during the late Pliocene or early Pleistocene (Guccione et al. 1990:29). Aboriginal use of this lithic material for tool production is well documented in eastern Arkansas archaeological literature (House 1975:81-84; Morse and Million 1980:15-26). A cluster of prehistoric extractive (quarry) sites was documented in the Whaley Slough valley on the western escarpment of Crowley's Ridge near Bono during the Cache River archeological project (House 1975). This led House (1975:82) to suggest that similar quarry/extractive sites, which are clustered in areas where the Citronelle gravels outcrop, are "probably present along the whole length of Crowley's Ridge." Today, Citronelle gravel is used for road surfaces.

FLORA

Crowley's Ridge is a unique floristic "island" within Braun's (1950) Southeastern Evergreen Forest Region of the Mississippi Alluvial Plain. The forests of the ridge are in contrast to the bottomland forests of the Eastern and Western Lowlands that surround it. Braun (1950:161) remarks, "here is an outlier of the mixed mesophytic forest, so situated that it cannot be included in the Western Mesophytic Forest region, although it is similar to the forest of the western border of that region." In short, the forest vegetation on Crowley's Ridge is most akin to the forests of the Loess Hills that flank the eastern side of the Mississippi Embayment, than to any forest region in Arkansas.

The Crowley's Ridge forest is "interpreted as a Tertiary relic preserved in ravines of the bluff and ridge where fertile soil favors its persistence" (Braun 1950:484). As a result a number of species, including the Tulip Tree or Yellow Poplar (*Liriodendron tulipifera*), only occur in Arkansas on Crowley's Ridge (Hunter 1989:70). The reason for this floristic preservation is the great antiquity of the ridge and its loess soils (see *Geology* above). Turner (as cited in Braun 1950:161) remarks, "On the north slopes, and in deep gullies, there occurs a [forest] type which is more closely related to the forests of the western Appalachian Mountain region than to any type found in Arkansas…" Species that occur with this forest include white oak (*Quercus alba*), black oak (*Q. velutina),* northern red oak (*Q. rubra*), chestnut oak (*Q. prinus*), burr oak (*Q. macrocarp)*, shagbark hickory (*Carya ovata*), white hickory (*C. tomentosa)*, bitternut hickory (*C. cordiformis)*, white ash (*Fraxinus americana*), green ash (*F. pennsylvanica*), hard maple (*Acer nigrum*), red maple (*A. rubrum*), wild cherry (*Prunus serotina)*, walnut (*Juglans nigra*), butternut (*J. cinerea)*, elms (*Ulmus* sp.), basswood (*Tilia* sp.), chinquapin (*Castanea pumila*), red gum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica* var. *slyvatica*), and yellow poplar (Braun 1950:161).

East and west of Crowley's Ridge, a bottomland forest once covered the lowlands. These alluvial forests are subdivided into three ecozones: swamp forests or sloughs; hardwood bottoms; and ridge bottoms or cane ridges (Braun 1950:291). In Lewis' (1974) ecological approach, floodplain environments are classified into ten biotic communities. Applying this model to the study corridor allows for a more detailed portrait of the local environmental conditions to emerge.

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III. CULTURAL BACKGROUND

The following chapter provides a cultural background for the project area. A briefing on historic development of archaeological research in northeastern Arkansas is presented first, which incorporates recent cultural resource management (CRM) projects. Next, a cultural history of northeastern Arkansas is presented in the standard stage-by-stage format.

HISTORY OF INVESTIGATIONS

ANTIQUARIAN INVESTIGATIONS

Self-trained individuals, who focused on monumental earthworks, initially conducted early archaeological investigations in the Central Mississippi Valley. The earliest published scholars, such as Caleb Atwater (1820) and Squier and Davis (1848) attributed the earthworks to a non-aboriginal group, the mythic "Mound Builders." H.R. Schoolcraft (1854) was one of the few scholars who advocated the mounds were actually Native American constructions.

After the Civil War, antiquarian researchers radiated across the Southeast in a quest for museum specimens and during the late nineteenth century, some of the most intensive investigations took place in northeastern Arkansas. Professor Putnam (1875a, 1875b) of the Peabody Museum was active in the collection of museum specimens and recording of mounds in the Lower St. Francis Basin of Arkansas and New Madrid County, Missouri.

In 1879 Congress created the Bureau of Ethnology within the Smithsonian Institution, and a branch known as the Division of Mound Exploration was established in 1881 specifically to determine "the origins of the mounds" (Thomas 1985[1894]:21). In Cyrus Thomas's (1985[1894]) classic *Mound Explorations*, in which the Mound Builder myth is destroyed, mound groups and pottery specimens from northeastern Arkansas are described. Thomas (1985[1894]: 183-192) described sites in 21 Arkansas counties. Illustrated ceramics from northeastern Arkansas include a head pot and a painted bottle from Mississippi County (Thomas 1985[1894]: Figure 130, 131). The best descriptive analysis of the numerous ceramics recovered by Thomas's field crews is provided by W.H. Holmes (1884, 1886, 1903). The Arkansas data in the 1894 Thomas volume are based on the 1881–1886 fieldwork of a number of individuals (Smith 1985:Table 2), principally Edward Palmer. Details of the 1881–1884 work of Palmer, including formerly unpublished diaries, notes, reports, and illustrations (by a former slave, Henry Lewis), have been compiled and published (Jeter 1990). With the origin of the mounds now demonstrated and generally recognized to be Native American, the main archaeological research issue of the late nineteenth to early twentieth century shifted to determining the antiquity of the human occupation of America (O'Brien 1996).

EARLY TWENTIETH CENTURY

In the early twentieth century, the pace of archaeological work in the Central Mississippi Valley accelerated. Clarence B. Moore (1908, 1910, 1911, 1916) spent several field seasons in Arkansas, excavating large sites in the region along the Mississippi, St. Francis, White, and Black rivers. Moore visited 11 sites on the Black River to the west of Crowley's Ridge (Moore 1910:351-362). These sites include, in ascending order: Elgin (3LA4), Lindley, Perkins, Turkey Hill (3IN53), Harter (3IN54), Tucker Bay (3LW28), Clover Bend, Lauratown (3LW509), Cornpen (3LW588?), Hovey (3RA67?), and Mitchell's (Morse and Morse 1998:18-19).

Moore (1910:339) was disappointed with his findings along the Black River, remarking, "While some vessels were found, not one was of a character to warrant its transportation home". Morse and Morse (1998:12) indicate the general absence of decorated pottery in the Lower Black River relates

to a lack of permanent occupation after 1400. Moore's expedition is significant for discovering evidence of a flourishing Late Archaic occupation in the region. The midden mound at Perkins produced points and a stone pipe (Moore 1910:354). At Little Turkey Hill, a multiple burial yielded shell and stone beads, and an elaborately decorated marine shell cup; the only artifact Moore (1910:Figures 73 and 74) illustrated from the Black River. At Harter Knoll, three burials contained grave goods, including stone and shell beads and a bannerstone (Moore 1910:358).

Between 1910 and 1930, modern excavation techniques, such as use of a grid and establishment of stratigraphic control, became popularized. The University of Arkansas Museum, conducted extensive excavations in northeastern Arkansas with a grant from the Carnegie Foundation. Samuel C. Dellinger, the museum curator, selected large St. Francis sites, such as Nodena, Hazel, Vernon Paul, and Togo, for excavation. Much of this work was never published, although a summary was presented in *American Antiquity* (Dellinger and Dickson 1940). Also in the 1930s, the University of Alabama conducted important excavations at the Nodena Site (Morse 1989).

On a national level, the marriage of archaeology and anthropology was achieved in the early twentieth century. By 1935, seven universities offered Ph.D. programs in anthropology. Professional archaeological organizations began to form at this time and state societies, which had begun as early as the 1880s in some areas, multiplied. Intensive excavations funded by the Works Progress Administration (WPA) did not occur in northeastern Arkansas, but Civilian Conservation Corps (CCC) crews were active; they built Crowley's Ridge State Park in Greene County during 1935–1938.

LOWER MISSISSIPPI SURVEY

Beginning in 1939, Lower Mississippi Valley Survey (LMS) compiled survey data and conducted test excavations at many of the large sites in the Yazoo Basin. The LMS was a combined effort of the Peabody Museum (Harvard University), Louisiana State University, University of Michigan, and American Museum of Natural History (Phillips et al. 1951). The LMS investigations are a watershed event in the archaeology of the region. The ceramic typology and initial phase definitions for most of the ceramic period archaeological cultures of this region were made by the LMS (Phillips 1970). The extensive LMS site files are now available on-line at a password protected site.

1947–1967

During this time, various organizations and individuals conducted research in northeastern Arkansas and the University of Arkansas began to grow as a research facility. In the late 1950s, the Gilcrease Institute of American History and Art funded excavations at the Banks site and Cherry Valley Mound (Perino 1966, 1967) to provide perspective on some collections. Based on late 1950s work, avocational archaeologist John Moselage (1962) produced the Lawhorn site report, which Morse and Morse (1983:28) note is the first "complete descriptive" site report for the region. In 1961 and 1962, Ford and Redfield performed a site survey of the Lower Mississippi Alluvial Valley that focused on pre-ceramic sites (Redfield 1971). The study documented many Dalton sites in the Cache River Basin, including one (3GE11) near Walcott. The survey was co-sponsored by the National Science Foundation and the American Museum of Natural History.

James Ford excavated the Hopewell burial mounds at Helena Crossing for the American Museum of Natural History and obtained some of the first (and still oldest) ^{14}C dates in eastern Arkansas (Ford 1963). In 1960, the Arkansas Archeological Society was formed. The Society began publishing a *Bulletin*, which continues today and began a summer dig program, which has excavated some sites in northeastern Arkansas (Morse and Morse 1983:29).

On a national level, several significant advances were made during this time. Willey and Phillips (1958) published *Method and Theory in American Archaeology*, which proposed a basic archaeological unit taxonomy that replaced the Midwestern Taxonomic System. However, historic archaeology is largely neglected. After 1950, radiocarbon dating became established and available to researchers, and the true antiquity of the Archaic and Paleoindian stages became analytically established. The latter portion of this period falls in Willey and Sabloff's (1974) "Explanatory Period," which is characterized by processual analysis, systems theory, and use of statistics, and is derived from the neo-evolutionary theory of Leslie White. No Smithsonian River Basin Survey (RBS) project took place in the lowlands of northeastern Arkansas.

ARKANSAS ARCHEOLOGICAL SURVEY

The Arkansas Archeological Survey (AAS) was created and funded by the state legislature in 1967 (Davis 1982). Arkansas State University at Jonesboro was selected as the survey station for northeastern Arkansas. Dr. Dan Morse served as station archaeologist from 1967 to 1997. Defining the local northeastern Arkansas sequence was one of the first tasks accomplished (Morse 1969a). Problem oriented research and salvage projects by the AAS Northeastern Arkansas Station have produced much of the data regarding the area's archaeology. The station also serves as a regional repository for artifacts.

CULTURAL RESOURCES MANAGEMENT ERA

The scope and intensity of archaeological investigations in northeastern Arkansas and across the Southeast increased dramatically with the passage of the Moss-Bennett bill, or the Archaeological Conservation Act, by U.S. Congress in 1974. Most federally mandated CRM studies are a direct result of this legislation. A number of major CRM studies have taken place in northeastern Arkansas, as have numerous smaller studies. Major contracting agencies and companies in northeastern Arkansas include the U.S. Army Corps of Engineers (USACE), the National Park Service (NPS), the Soil Conservation Service, the Arkansas State Highway and Transportation Department (AHTD), and the Arkansas Power & Light Company.

CULTURAL HISTORY

The following is a summary of the prehistoric and historic cultural sequence of northeastern Arkansas. Each cultural stage is defined by characteristic artifact assemblages and patterns of subsistence and settlement. The prehistoric sequence in the southeastern United States is traditionally divided into four major stages: Paleoindian; Archaic; Woodland; and Mississippian. Synthesis for northeastern Arkansas and the related cultural manifestations of southeastern Missouri include the following, which were drawn upon in the preparation of this summary: Chapman (1975, 1980); Lafferty and Price (1996); McNutt (1996); Morse and Morse (1983, 1996); O'Brien (1994, 1996); and Phillips (1970). Table 3-01 summarizes the cultural history.

PALEOINDIAN

Paleoindian occupations represent the first well-accepted occurrence of humans in the Western Hemisphere. Paleoindians are usually thought of as highly adaptive, mobile hunter-gatherers whose recent ancestors were the Upper Paleolithic Siberians that migrated across the present Bering Strait in the Late Pleistocene, when sea levels were ca. 60 m lower. During the Late Glacial era, when initial human colonization of the Southeast is postulated (ca. 12,000–10,000 YBP), climatic changes followed the receding of the continental ice sheets and there was a widespread extinction of megafauna. The environment at the time is usually interpreted as characterized by a spruce and/or pine-dominated boreal forest (Saucier 1978:42). By 1,000 years before the fluted point occupations, the environment had changed to deciduous forest (Delcourt et al. 1980). In northeastern Arkansas, Early and Middle Paleoindian sites center on Pleistocene terrace and sand dune deposits along major river systems within 30 km of locally available chert (Gillam 1996).

Table 3-01. Summary of northeastern Arkansas cultural history†.

Date	Stage	Phase or culture
	Modern	
A.D. 1950		
	Historic	Tenant
A.D. 1874		
	Historic	Reconstruction
A.D. 1865		
	Historic	Civil War
A.D. 1861		
	Historic	Ante-bellum Statehood
A.D. 1836		
	Historic	Territorial
A.D. 1803		
	Historic Aboriginal; Colonial	Quapaw, Michigamea; French, Spanish
A.D. 1650		
	Protohistoric	Armorel
A.D. 1541		
	Late Mississippian	Nodena, Parkin, Kent, Walls
A.D. 1400		
	late Middle Mississippian	Lawhorn
A.D. 1200		
	early Middle Mississippian	Cherry Valley
A.D. 1050		
	Early Mississippian	Big Lake, Hayti
A.D. 700		
	Baytown	Dunklin, Baytown, Hoecake
A.D. 400		
	Late Marksville	Cow Mound, Keller
A.D. 200		
	Early Marksville	Helena, Turnage (?)
A.D./B.C.		
	Tchula	Pascola, Turkey Ridge (?)
500 B.C.		
	Poverty Point	
1500 B.C.		
	Late Archaic	Frierson
3000 B.C.		
	Middle Archaic	
7000 B.C.		
	Early Archaic	Cache River
8000 B.C.		
	Dalton	L'Anguille
8500 B.C.		
	Paleoindian	Sedgwick, Crowley's Ridge
9300 B.C.		

† This table is largely after Morse and Morse (1996:Figure 5-5), except for the following: Phillips (1970) Turnage phase is added to Early Marksville (see Morse and Morse 1983:172); we chose not to list the Early Mississippian Owls Bend and Plum Bayou phases; the Late Mississippi phases follow (Phillips 1970) and Morse and Morse's 1983) eastern lowlands designations; S. Williams' (1980) Armorel phase is used for Protohistoric (rather than Belle Meade phase), but the local Late Mississippian phase do continue; and the Historic period subdivisions follow our discussion below, with the Colonial period ending in 1803 (as opposed to 1776).

Recent research on Paleoindian diagnostics (Anderson et al. 1990) indicates that the period may be subdivided into Early (ca. 9500–9000 B.C.), Middle (ca. 9000–8500 B.C.), and Late (ca. 8500–8000 B.C.) stages based on changes in hafted biface morphology. No radiocarbon date is available to confirm independently the accuracy of the subdivision. The early occurrence of classic Clovis points is followed by points that Morse and Morse (1983) identify as Coldwater and Sedgwick in Eastern Arkansas. Like most other regions of the southeast, the Paleoindian diagnostics of the area tend to occur as isolated surface finds.

Aboriginal groups of the period were likely small, mobile bands dependent upon a hunting and gathering economy. Although they may have hunted some of the megafauna that became extinct at the end of the Pleistocene, such as mastodon (*Mammut americanum*), bison (*Bison bison antiquus*), and ground sloth (*Megalonyx sp.*), it is likely that the subsistence base was varied and included a number of plant and animal foods. The nearest firm association of a fluted point with a mastodon remain is at the Kimmswick site near St. Louis (Graham et al. 1981), although a possible association at Island 35 should be noted as well (S. Williams 1957).

DALTON

The Dalton period is considered transitional between the Paleoindian and Archaic traditions. The key distinguishing feature of material culture is the unfluted, serrated Dalton point, but the Dalton tool kit includes a number of other diagnostic special-function tools and a woodworking adz (Morse 1996; Morse and Morse 1983). Goodyear (1982) suggests that Dalton represents a distinct temporal horizon, dating to 8500–7900 B.C. While technologically similar to Paleoindian, Dalton assemblages suggest an adaptive pattern that is more akin to later Archaic cultures. One of the most important game species from this time forward to the contact era seems to have been the white-tailed deer (Morse and Morse 1983:71). During the Dalton period, the Mississippi River meander system was established in the Lower Valley and was working northward, but a braided stream regime still existed here in the St. Francis Basin.

Dalton components are much better represented in northeastern Arkansas than the preceding Early and Middle Paleoindian diagnostics. In the 1960s, the Ford-Redfield survey project identified a heavy concentration of Dalton components in northeastern Arkansas (Redfield 1971; Redfield and Moselage 1970). Important sites include Brand (Goodyear 1974), Sloan (Morse 1997), and Lace (Morse and Morse 1983), with Brand producing evidence for the oldest cemetery in the New World. Other features at Brand were interpreted as living floors and shelter remains. The distribution of sites and site types along the major drainages has also led to the formulation of competing settlement pattern models for band level societies (Morse 1975, 1977; Price and Krakker 1975; Schiffer 1975), which have been commented on by McNutt (1996:191-192).

In the Missouri Bootheel to the north, Dalton is characterized by Plano-like lanceolate projectile points/knives (PP/Ks; Chapman 1975:125), indicating a continued affiliation with technologies of the Plains region. The Dalton Serrated point may have developed into broad lanceolate Early Archaic forms, such as Graham Cave Fluted, which date to 8000–7000 B.C. (Chapman 1975:126).

ARCHAIC

The Archaic is usually thought of in three subperiods: Early (ca. 8000–7000 B.C.); Middle (7000–3000 B.C.); and Late (3000–1500 B.C.). Temporal divisions of the Archaic are mainly based on the distinctive PP/Ks. Throughout Archaic times a hunter-gatherer lifeway seems to have continued, focused on essentially the same flora and fauna as the current natural environment. The Archaic is seen as a time of regional "settling in," when an efficient use of the environment was keyed to highly cyclical, repetitive seasonal activities continued by indigenous groups over thousands of years (Caldwell 1958). Some seasonal movement to exploit econiches was likely required, but Archaic populations, compared to Paleoindian, are generally portrayed as attached to localities, river valleys, or regions. In the Central Mississippi Valley, few Archaic

sites have been excavated; these components seem to have been overlooked by archaeologists more concerned with ceramic adaptations (McNutt 1996:194; S. Williams 1991).

The Early Archaic is best understood from rockshelter excavation, such as Modoc (Fowler 1959) and Graham Cave (Chapman 1975), rather than from open habitation sites. McNutt (1996:194) commented, "we can see several projectile points coming into the Valley from the west and north, probably in conjunction with the prairie expansion and dry econiches during the Hypsithermal." Point forms considered diagnostic for the Early Archaic include Hardin, Hidden Valley Stemmed, Rice Lanceolate, Hardaway-Dalton, San Patrice, St. Charles-Plevna, and a variety of named side notch types (Big Sandy, Graham Cave, Cache River, etc.). For northeastern Arkansas, the Morses (1983) proposed a series of horizon markers that grade from classic Early Archaic Corner-Notched forms (ca. 7500–7000 B.C.) to Middle Archaic Basal Notched forms.

The Middle Archaic period was marked by a shift in subsistence modes. This was possibly due to environmental changes caused by a climatic episode called the Altithermal optimum, or Hypsithermal, which is dated 7000–3000 B.C. (McNutt 1996) or 8000–4000 B.C. (Morse and Morse 1983). This change resulted in restricted deciduous forest occurrence, limiting the availability of certain floral and faunal resources. The cultural impact of this warming trend appears to have been most strongly felt from 5500 to 3500 B.C. Several settlement models regarding human adaptation during the climatic optimum have been posited. Morse and Morse (1983) propose that the western lowlands of northeastern Arkansas were largely abandoned for the uplands (Ozark Plateau and its escarpment). However, in the lower Tennessee/Cumberland region, populations appear to have congregated at a limited number of floodplain locations and produced deep middens (Nance 1987). Higgins (1990) proposed that the drying of the uplands forced people into the floodplain (American Bottom).

The Late Archaic begins with at the end of the Altithermal climatic episode (ca. 3000 B.C.) and the establishment of the modern climatic regime. The Mississippi River was now a well-entrenched meander belt type stream, and adapting to this type of environment was critical for human occupation of the eastern lowlands. There is evidence for more sedentary lifeways, and possibly limited horticulture was being employed, as sunflower, squash, and other cultivated native starchy seed annuals appear in the archaeobotanical record at this time in the other areas of the Southeast. Late Archaic settlement models typically have a seasonal round aspect, and there is evidence that the substantial "winter" villages, typically located on major streams, were actually occupied year round. Both earthen and shell mounds appear in the archaeological record in the Southeast at this time.

The Late Archaic is characterized by a substantial increase in the number of sites, cultural elaboration, and wide spread trade. The period opens with Benton culture, but Benton material and sites are generally restricted to east of the Mississippi, rarely Benton points are found west of the Mississippi. Morse and Morse (1983:118) suggest Big Creek points (3000–2000 B.C.), which predate Burkett (2000–1000 B.C.) and Weems (1000–500 B.C.) points, are characteristic of pre-Poverty Point Late Archaic assemblages. Two regional Late Archaic phases have been defined: the Frierson phase based on information from the Frierson site in the western lowlands (Morse 1982) and the O'Bryan Ridge phase in southeast Missouri (S. Williams 1954). Farther north, the Titterington/Sedalia phase is characteristic of the Late Archaic in the prairie regions of Missouri and Illinois (McNutt 1996:201).

POVERTY POINT

Poverty Point, or Terminal Late Archaic, components, are distinguished by the appearance of large mounds, earthworks, clay balls or "Poverty Point Objects," microlithics, lapidary work, raw material trade, and specialized manufacturing sites. The Poverty Point period (1500–

500 B.C.) period is considered one of three cultural "zeniths" in prehistoric Southeastern studies. In other portions of the southeast, these components are referred to as Gulf Formational (Walthall 1990[1980]), and include fiber-tempered ceramics as a diagnostic, but in northeastern Arkansas, fiber-tempered ceramics have yet to be reported (Morse and Morse 1983:124).

Morse and Morse (1983:130) have noted a "pattern of sites located within the lowlands adjacent to the meander belt" and use the Cairo Lowlands as an example. Midden mounds and gathering camps appear in archaeological record at this time and reflect semi-sedentary populations (McNutt 1996; Morse and Morse 1983).

The clay balls are though to be a substitute for boiling stones, and have considerable time depth, apparently extending into the early Middle Woodland and cannot be used as exclusively as Poverty Point component markers. A variety of stemmed projectile points are characteristic of the period, including Burkett-Etley-Gary forms, similar to Ledbetter-Pickwick-Mulberry Creek points, and the Weems-Wade-Dyroff-McIntire forms, which lead into the Early Woodland.

WOODLAND

During the Woodland period, intensification in horticultural methods, construction of earthworks, elaboration of artistic expression, and burial rituals are all thought to be interrelated to the reorganization of social structure (Griffin 1967). For at least part of the year, a sedentary group was needed to plant, tend, and harvest crops. Sedentism and communal labor efforts promoted territorial circumscription. This period was also characterized by increased variety and use of ceramics. Ceramic types and varieties thus are a primary consideration in interpreting settlement patterns and chronological progression during the Woodland period. Considerable archaeological attention has been focused on these ceramic cultures and a number of phases and phase sequences have been proposed for eastern Arkansas and southeastern Missouri.

Early Woodland components in the Central Mississippi Valley are referred to as Tchula, and these are assumed roughly contemporary with Tchefuncte in the Lower Valley (Phillips et al. 1951). The grog/clay tempered ceramics of Tchula components contrast with the sand-tempered wares of the Pascola phase components to the north. The best-documented Tchula assemblage in northeastern Arkansas is from the McCarty site (3PO467), the type-site for the Early Woodland McCarty phase (Morse and Morse 1983; Morse 1986). Ceramics include Cormorant Cord Impressed, Mulberry Creek Cord Marked, Withers Fabric Impressed, Baytown Plain and Tchefuncte Stamped, which were associated with a reel shaped gorget, biconical baked clay objects, and heavy ground stone tools. The Burkett site in southeast Missouri produced related ceramics (S. Williams 1954:28), but the extensive Middle Woodland occupation makes separation of the Early Woodland material difficult at Burkett. In general, the Early Woodland is poorly defined in the Eastern Lowlands.

The Middle Woodland features elaborate burial ceremonialism and artistic expression, and represents the second major cultural "zenith" in the prehistoric Southeast. In the Ohio Valley the Middle Woodland period is referred to in terms of Hopewell, while in the Lower Mississippi Valley this period is characterized as Marksville. The Helena phase (Phillips 1970:887-889; Toth 1988) is thought to represent to represent the local emergence of Hopewellian-type culture in northeastern Arkansas. Excavations at the Helen Crossing Mounds (3PH11) revealed log tombs with burials and associated artifacts such as cut sheet mica, copper earspools, copper coated panpipes, blade flakes, and Marksville ceramics (Ford 1963). Calibrated radiocarbon date intercepts from four Helena Crossing ^{14}C samples range from ca. 90 B.C.–A.D. 429. Mainfort (1988) has interpreted the mortuary pattern at Helena Crossing as evidence for only a moderately stratified society. The Helena Crossing site is, however, an anomaly, as there is a general scarcity of Hopewell/Marksville traits in eastern Arkansas. The Mound City Group near West Memphis may be an exception (Morse and Morse 1996:125). Habitation site assemblages

consist predominately of Baytown Plain and Mulberry Creek Cord Marked, with lesser frequencies of Withers Fabric Marked and Cormorant Cord Impressed. Zone punctated and dentate stamped ceramics, definitive Hopewell markers, occur only in trace frequencies, if at all, especially in small assemblages. Morse and Morse (1996:126) suggest that identified Middle Woodland components are rare as a result of the population being dispersed in hamlets and small villages, and "masking" by subsequent more intensive occupations at major sites. The Keller site (3PO159) is the best-reported example of the "minimal residential habitation[s] that" are typical of the Late Marksville in northeastern Arkansas (Morse 1988:74).

The initial Middle Woodland occupations are followed by Dunklin (Barnes) and Baytown phases in the Central Mississippi Valley (Morse and Morse 1983). Terminal Middle Woodland/early Late Woodland occupations in northeastern Arkansas are identified by sand-tempered (Barnes or Kennett) ceramics of the Dunklin phase or clay/grog-tempered ceramics of the Baytown phase. These ceramics have discrete (but slightly overlapping) spatial distributions, and are believed to be contemporary (Morse and Morse 1983:Figure 9.1). Morse and Morse (1983) interprets the distribution as reflective of different social groups, while others, including Phillips (1970) suggest environmental differences (i.e., sandy soils) may account for the paste variability.

The Late Woodland period is poorly understood throughout the southeast. The elaborate ceremonialism, trade networks, and earthwork construction activities associated with Middle Woodland times become attenuated. There is a general paucity of lithic artifacts during the Late Woodland that may be related to the introduction of the bow and arrow ca. 700 A.D. (see Blitz 1988), which may have reduced "the production of stone points to near zero" (Dunnell and Feathers 1991:26). The bow technology may have led to a dispersal of the regional populations.

In northeastern Arkansas, the dichotomy between sand- and clay/grog-tempered component distributions noted in the waning Middle Woodland becomes fully expressed during the Late Woodland, or Baytown, period (note: Baytown is a term with a number of archaeological meanings, primarily: (1) a Late Woodland phase, ca. A.D. 400–700; and (2) a ceramic tradition; but also can be (3) a general reference to the Woodland stage). The proximity of these two dichotomous ceramic traditions is interpreted as representing "opposite extremes of the segmentary tribe" (Morse and Morse 1983:192). Baytown components (Phillips 1970) dominate the south St. Francis Basin, while Dunklin phase components dominate to the north (Morse and Morse 1983:Figure 9.1). Baytown (and Hoecake; S. Williams 1954) groups appear to have been organized into larger more socially complex settlements, than Dunklin groups. Excavations at the Brougham Lake site (Klinger et al. 1983) revealed that Late Woodland Baytown populations used circular to oval single poled structures, with a mean floor areas of 20 m^2.

A "Dunklin phase component underlay" the Big Lake occupation at Zebree (Morse and Morse 1980). Late Woodland Dunklin phase components are very often associated with Early Mississippian Big Lake components. Morse and Morse (1980) calibrate the three ^{14}C dates associated with the Dunklin occupation at Zebree to A.D. 691, 829, and 863 (using a 1974 radiocarbon curve), while results of A.D. 740, 893, and 971 were obtained on the same samples using Stuiver and Pearsons' (1986) more recent radiocarbon curve (i.e., Stuiver and Reimer's [1993] CALIB software program). This represents a shift of nearly a century. Dunklin ceramic assemblages are characterized by: sand-tempered Barnes Cordmarked and Plain ceramics, with principal vessel forms being large conconial jar and small food bowls. Minority decorated types including fabric impressed and check stamped (Morse and Morse 1980). Projectiles are crude expended stemmed, side notched, corner notched and rounded stemmed forms, typically knapped from local Crowley's Ridge chert or quartzite. Limited Dunklin phase structural evidence (a partial circular structure or windbreak) was reported at Zebree, but numerous pits were associated with this component. Morse and Morse (1983:186) suggested that the Dunklin occupation at Zebree was a winter village composed of a "maximum kin aggregate," which was

relatively isolated—due to lack of evidence for bow technology, horticulture, and/or exotic chert sources.

MISSISSIPPI

Hallmarks of the Mississippian period include population increase, intensive floodplain settlement, greater emphasis on agricultural activity, earthwork construction on celestial alignments, inter-regional exchange of exotic items, shell-tempered ceramics, and possibly bow warfare. These factors and the development of a distinctive elite iconography are associated with the rise of conscripted, complex sociopolitical system, which are known as chiefdoms. A complex mosaic of competing chiefdoms dominated the late prehistoric southeast political landscape. These chiefdoms were documented by the Spanish explorers at the close of the Mississippian period, which is the final "zenith" of the native cultural development.

Two Early Mississippian phases are recognized in northeastern Arkansas: Big Lake (Morse and Morse 1980, 1990) and Hayti, which is largely based on collections from the Kersey site in Pemiscot County (Little River lowlands), Missouri (Marshall 1965). Big Lake components are best understood from excavations at the Zebree Site, the type-site for the Big Lake phase, and more recent excavations at the Priestly site (3PO490) near Trumann. Big Lake phase components are characterized by the presence of Varney Red, Mississippi Plain, and Wickliffe Thick ceramics (Morse and Morse 1980). Jars are the most common vessel form for Varney Red ceramics, followed by saltpans and simple rounded base bowls. Hooded bottles and Kersey clay objects are also part of these assemblages. Most of the Mississippian Plain vessels were large jars with capacities of over 50 liters. Wickliffe Thick pottery is associated with a specialized funnel. Other artifacts associated with Big Lake phase assemblages include: sherd abraders; pottery discodials; Sequoyah, Scallorn, and Madison arrow points, Mill Creek hoes; items related to microlith production; Anculosa shell beads; fish scale tools; and bone fishhooks and harpoons. Subsistence studies suggest a diverse economy, with corn being only a small portion of the diet. Big Lake structures are rectangular and are small, ranging 6.6–11.4 m^2 in size (Morse and Morse 1990:61). While Zebree was fortified, Priestly, a smaller village, was not (Benn 1990:451). Big Lake structures are typically located in distinct midden clusters containing burials and cylindrical pits. At Priestly a charnel house was identified, and this suggests that public, communal, rituals were a part of daily life in the numerous small Early Mississippian villages (or hamlets) scatters across the eastern lowlands (Benn 1990:452-453).

Morse and Morse (1990:157) note that during the Middle Mississippian, "Mississippian culture crystallized into what is often called *mature* Mississippian". This period is marked by settlement diversity, with fortified ceremonial centers, smaller villages, and isolated farmsteads, as well as intensive corn agriculture, and rise of independent chiefdoms. Numerous Middle Mississippian components have been excavated (see Morse and Morse 1983:Figure 11.1).

The transition from Early to Middle Mississippian took place ca. A.D. 1000–1050, when Varney Red Filmed ceramics use declines rapidly. The Mangrum (3CG636; Klinger et al. 1981), Hyneman (3PO53; Morse and Morse 1983), Rose Mound (Morse and Morse 1983), Banks Mound 3 (Perino 1967), and Golightly (Morse and Morse 1983) sites are important sites relating to this transitional period.

The early Middle Mississippian Cherry Valley phase (A.D. 1050–1200) is associated with the western lowlands (Phillips 1970:929-930; Morse and Morse 1983). Sites include small ceremonial centers with mounds covering earth-like lodge structures, small villages, and isolated hamlets. The Cherry Valley phase is associated with the "Beaker Horizon" of Morse and Morse (1990:157). Sites with ^{14}C dates for this horizon include Cherry Valley (3CS40), Hazel, Banks 3, and Obion (40HY14) in Tennessee (Morse and Morse 1990). Other important Beaker sites include the Floodway site (3PO46), the Webb Group (or Bay Mounds, 3CG29), Parkin (3CS29),

Turnbow (3CS61), Vernon Paul (3CS25), Ballard (3PO115) and McClellan (3PO32; Morse and Morse 1990:Table 16). Beyond the distinctive, but rare beakers, diagnostics include: O'Byam Incised, Mound Place Incised, loop handled jars, appearance of bottles and plates, and a variety of arrow points, including Madison, Scallorn, and Schugtown types.

Later Middle Mississippian occupations (A.D. 1200–1400) are associated the "Matthews Horizon" (Morse and Morse 1990:158). During this period the plate vessel form disappears, large strap handled jars are common, and painted ceramics become more frequent. Trade intensified, not only in exotic items but also in Mill Creek hoes and basalt adzes (Morse and Morse 1983:267). Exchange of Southeastern Ceremonial Complex artifacts, including copper repoussé plates, stone images, and shell gorgets with a distinctive iconography, peaks at this time (Brown et al. 1990). Considerable social change took place, with the settlement pattern shifting from a relatively dispersed pattern of farmsteads and villages with a few ceremonial centers to a pattern characterized by large villages with constituent hamlets clustered around major civic-ceremonial centers (Morse and Morse 1983). This realignment and establishment of a settlement hierarchy is associated with the rise of chiefdom level societies. By A.D. 1400, the braided stream surfaces were abandoned and populations nucleated onto meander belt surface.

Excavations at the Moon site (3PO488) near Trumann revealed evidence of a planned fortified village dating to this period (Benn 1992). The site has a similar layout to the Powers phase Snodgrass site in southeast Missouri (Price and Griffin 1979). In the southern St. Francis Basin, late Middle Mississippi components are considered Lawhorn phase. Important excavated sites include Hazel, Schugtown (Morse and Morse 1983), and Lawhorn (Moselage 1962). While the Middle Mississippi occupation of the Lower St. Francis was significant, the Cairo Lowlands were also intensively occupied at this time, as evidenced by large fortified sites such as Lilbourn, Towosahgy, and Corsno (Chapman 1980; Price and Griffin 1979; S. Williams 1954).

The Late Mississippian occupations have been intensively studied and are characterized by a number of contemporary phases (Morse and Morse 1983:Figure 12.1; Phillips 1970). Highly nucleated and fortified towns are present in some areas ("St. Francis" type sites; Phillips et al. 1951), while other sections of the St. Francis Basin are apparently uninhabited. These depopulated areas are interpreted as "buffer zones" between competing chiefdoms. Much of the western lowlands and parts of Missouri were abandoned, resulting in S. Williams (1990) "Vacant Quarter Hypothesis." Along and near the St. Francis, the Nodena (Morse 1989), Parkin (P. Morse 1981), Walls, Kent (House 1993), and formerly Old Town (House 1993) phases are recognized mainly based on decorated ceramic frequencies. There is some gradation between the phases, and certain sites, such as Gant (3MS11; Andrews 1967) in the Little River lowlands exhibit traits of more than one phase. The latter portion of the Late Mississippian (post-1540) has become a research interest of late and is commonly referred to as the Protohistoric.

PROTOHISTORIC

This period is generally considered to have begun with the first appearance of European peoples in the Southeast. De Soto visited the several chiefdoms within the St. Francis basin in 1541, including Aquixo (Belle Meade, 3CT30), Casqui (Parkin phase), and Pacaha (Bradley, 3CT7). Two of De Soto's men (Moreno and Silvera) traveled northeast from Pacaha and apparently visited a Nodena phase-Pemiscot Bayou site, Campbell (23PM5; Dye 1993:49). Sites, such as Campbell and Nodena, which were occupied after initial European contact, are considered Armorel phase components (S. Williams 1980). These sites produce low frequencies of European trade goods, such as iron and copper items and glass beads, in association with Late Mississippian artifact types.

HISTORIC ABORIGINAL

Terming seventeenth-century aboriginal occupations "historic" versus "protohistoric" is a rather arbitrary division, as by this point Native American culture had irretrievably changed from pre-European contact lifeways. Most scholars consider northeastern Arkansas to have been depopulated after the de Soto expedition trek west of the Mississippi (1541–1543) and before Marquette and Joliet's 1673 canoe trip brought them to the Quapaw villages at the mouth of the Arkansas.

The Quapaw phase was proposed by Phillips (1970:943) and updated by Hoffman (1977b). These sites are located on the lower Arkansas River. The ceramic assemblages are shell-tempered, and appear to have derived from Late Mississippian/Protohistoric culture. Some distinctive ceramic vessel forms such as elaborated painted bottles, teapots, and helmet bowls are considered diagnostic, as are seventeenth-century European trade goods. While Ford (1961) considered his excavations at the Menard Mounds (the Quapaw village of Osotouy) as "conclusive" evidence of the link between the ethnohistorical Quapaw and the archaeological phase, Hoffman (1990:219) has noted there is conflict between Quapaw oral tradition, linguistics, and the ethnological and archaeological data. House and McKelway (1982:SE41) term this problem the "Quapaw Paradox."

In northeastern Arkansas, Marquette's 1673 map reveals a Michigamea village in close proximity to what would become the Missouri/Arkansas line. Morse (1992:61) considers this village to be the Grigsby site (3RA262) located near Pocahontas. This site is located halfway between Kaskaskia and the 1673–1690 location for the Kappa site, and is on the Natchitoches Trace, a major trading path that follows the Ozark escarpment. The Michigamea are thought to have operated as trading intermediaries between the Illinois French and the lower Arkansas Quapaw, until in 1686, the establishment of the Arkansas Post near the Quapaw village of Osotouy provided direct access to trade goods for the Quapaw.

In the late seventeenth century, the Quapaw actively sought an alliance with the French, primarily to obtain firearms, so that they could combat the Chickasaw (who had been armed by British traders operating overland from Charlestown). The importance of firearms to the Quapaw is illustrated by their inclusion on early eighteenth-century painted buffalo robes given by the tribe to the French king (Horse Capture et al. 1993). During the 1730s and 1740s, the Chickasaw were a constant threat to French flatboat traffic on the Mississippi. Bienville organized two unsuccessful campaigns against the Chickasaw and paid the Quapaw for Chickasaw scalps, during this period. In 1749, the a Chickasaw raid (led by James Adair, an Englishman) on John Law's old settlement alarmed all of Louisiana, and as a result Arkansas Post was moved up the Arkansas River to Ecores Rouges (the Red Bluffs).

In the later eighteenth and early nineteenth centuries, several dislocated Native American groups would briefly inhabit the St. Francis Basin, including the Delaware, Shawnee, Chickasaw, Kickapoo, Piankashaw, Miami, and Wea (Morse and Morse 1983:325). The Cherokee, fleeing from their role in the Muscle Shoals massacre, began infiltrating the St. Francis Basin in significant numbers in 1794 (Hanson and Moneyhon 1989:17). By 1800, the Cherokee were in competition with the Osage for control of the Ozark Highlands. The Spanish Colonial government, who desired these Indian contingents along the Mississippi to serve as a buffer to American settlers, welcomed these late eighteenth-century disruptions by eastern Native American groups.

After the Jefferson (or Louisiana) Purchase in 1803, the westward movement of American settlers put pressure on these recently established Native American groups in eastern Arkansas to give up their lands. Northeastern Arkansas was ceded to the United States through two agreements negotiated by Pierre Chouteau at Fort Clark in North Dakota (Hanson and Moneyhon

1989:19). The second agreement, signed November 10, 1808, is commonly known as the Osage Treaty, and resulted in 14 million acres (including northeastern Arkansas) changing hands. By the 1840s, most Native American had been pushed out of the Central Valley, although Goodspeed Publishing Co. (1889:452) does note that as late as 1861 various Indians of "different tribes" were still living around Chickasawba.

COLONIAL

Northeastern Arkansas was part of Louisiana (New France) during most of the Colonial period. In 1756, the French and Indian War (Seven Years War) broke out partly because of French efforts to fortify the Ohio Valley. France was defeated and signed the Treaty of Paris on 10 February 1763, ending the war. Immediately before the formal ending of the war, the French ceded Louisiana to the Spanish. The Spanish really saw Louisiana as a buffer between the British colonists and Mexico, their prized colony. Louisiana was returned to France in 1800, but many Spanish officials still held local offices in 1803.

The region was undoubtedly involved in the European trade network, as by the late seventeenth century, at least 800 *coureurs de bois* (forest rangers) were hunting in west New France (Arnold 1991:7). Colonial documents suggest the vast majority of the population was involved in the fur trade. Ft. St. Francis was established near the mouth of the St. Francis River in 1766 and Ft. Esperanza was established in 1797 across from the fourth Chickasaw bluff (now Memphis, Tennessee). The El Camino Real (Kings Road, a.k.a. Natchitoches Trace), which ran along the edge of the Ozark Uplift and through Old Davidsonville, was an important road at the time.

Excavations have been conducted at two Arkansas Post locations: the mid-eighteenth-century Desha County location (McClurkan 1971), and the ca. 1779–1804 upstream Ecores Rouges location (Holder 1957). Holder (1957) identified the remains of the De La Houssaye 1752 fort and the Spanish Fort San Carlos III, built in 1780. Walthall (1991) has recently analyzed the ceramics from Holder's excavations, and observed a temporal lag of 26.5 years between the mean ceramic dates and mean historic dates for the site, an indication of the post's isolation.

There were apparently a few French settlements on the upper Black River at end of the eighteenth century. Thomas (1930:32) reports that "the Graviers" had settled on the Black River (a major tributary of the White River with its mouth at Newport) by 1793 and that "John Baptiste Janis and a few other Frenchmen" had settled at Clover Bend on the Black River before 1800. Any late colonial period traders, or *couris du bois*, operating along the Black River would likely have been sanctioned by or included Francis D'Armond, a "rich merchant and fur trader" who founded a trading post in 1766 (Thomas 1930:30). The location of D'Armond's settlement, known as Montgomery Point, was at the mouth of the White River.

EARLY NINETEENTH CENTURY

Arkansas was part of the Louisiana District from 1804 to 1805, and until 1812 was part of the Louisiana Territory. From 1812 to 1819, Arkansas was part of the Missouri Territory. Northeastern Arkansas was rocked by the New Madrid earthquakes, a series of massive earthquakes in 1811–1812 (Fuller 1912). The town of New Madrid was destroyed and the aftershocks continued for months. After the War of 1812 ended (in 1815) and the British-Creek Confederacy was defeated, immigration increased rapidly.

On 2 March 1819, President James Monroe signed a bill creating "Arkansaw Territory," which included present day Arkansas and Oklahoma (Hanson and Moneyhon 1989:28). During the Territorial period (1819–1836), county formations by the General Assembly further subdivided the landscape. Lawrence (1815), Crittenden (1825), St. Francis (1827), Greene (1833), and Mississippi (1833) counties covered most of the northeastern corner of the state.

The first Euro-American settler on Crowley's Ridge was Benjamin Crowley (Hansbrough 1954; Mueller 1984:21; Paragould Soliphone 1906; Rowland 1978). Mr. Crowley was a War of 1812 veteran from Kentucky who decided to move to the Arkansas frontier with his wife and eight children before 1820 (when he was over 60 years of age). Reportedly, the Crowley party with their slaves crossed the Mississippi River at Cape Girardeau, and then followed the Natchitoches Trace (later known as the Old National Road and/or the Southwest Trail) southwest to Old Davidsonville. From there they followed an old Indian trail eastward to Crowley's Ridge, and upon finding the large springs where Crowley's Ridge State Park is today, Mr. Crowley reportedly stated "This is good enough" (Hansbrough 1954:53). On Christmas Day 1821, they established permanent residency.

In 1833, other local pioneers gathered at Benjamin Crowley's cabin and prepared a bill to petition the territorial government to allow of the formation of a new county. Greene County was formed from the southern end of Lawrence County. Benjamin Crowley's house served as the temporary county seat until a suitable location was chosen. Craighead County was not formed unit 19 February 1859, and it was created from portions of Greene, Mississippi, and Poinsett counties (Herndon 1922:747).

The town of Davidsonville is probably the best-known antebellum archaeological site in northeastern Arkansas (Stewart-Abernathy 1980). This town existed from 1815 to 1830 on the edge of the Ozark Highlands, near the Natchitoches Trace. Excavations located the brick footings of the courthouse and a brick chimney associated with the post office. Typical early nineteenth-century artifacts were associated with the structural remains, including: blue and green shell edged pearlware, polychrome underglaze pearlware, thin window glass, and wrought and cut nails (Morse and Morse 1983:329).

Price (1979) has reported on late nineteenth-century assemblages in the Ozark Highlands and in the Western Lowlands (Little Black River) of southeastern Missouri along the Natchitoches Trace. At the ca. 1815–1870 Widow Harris Site (23RI-Hl9), foundations of two cabins and an old roadbed were excavated. Blue transfer print pearlware was the most common decorated ceramic type. Other artifacts recovered at Widow Harris include: British and French gunflints, firearm arts, and kaolin and clay pipe fragments (Morse and Morse 1983:329). Price's (1979) monograph has become a standard reference for nineteenth-century ceramics in the region.

Steamboats provided the most reliable and cheapest transportation in the early to mid-nineteenth century, although few settlers came to Greene and Craighead counties by water (Mueller 1984:31). Steamboats need wood for fuel, and one of the main occupations of late nineteenth-century settlers along the Mississippi River was selling wood to the boats (Goodspeed Publishing Co. 1889). The clearings these choppers generated became the first town and plantation sites.

Public Land Sales

The General Land Office (GLO) began surveying eastern Arkansas into townships in 1815 and this work continued up to the Civil War. The initial objective was to lie out 2,000,000 ac. for distribution to veterans of the War of 1812 (Hanson and Moneyhon 1989:26). The east-west base line was set at a point near the mouth of the St. Francis and running due west to the Arkansas River. The Fifth Principal Meridian was used as a north-south line. Land sales based on this Township-Range system began in 1821. Today, the nineteenth-century GLO plat maps and field notes are used by archaeologists to both locate historic features and to reconstruct environmental conditions.

The policy of surveying public land into 6-mi. square townships that were subdivided into 36 numbered sections of 640 ac. had been established by the Ordinance of 1785 (Fehrenbacher 1969:40). Initially public land was sold in 640-ac. tracts (whole sections), but such tracts proved

too large and too expensive for most frontiersmen, even at the Land Act of 1796 price of $2.00 per acre. The Land Act of 1800, also known as the Harrison Land Act, authorized minimum purchases of 320 ac. and a four-year credit system (Johnson 1966:663); however, the credit system failed because of the large number of overdue payments. This, coupled with the financial Panic of 1819, prompted Congress to abolish the credit system. The Land Act of 1820 re-established the policy of selling land only for cash, and lowered the price to $1.25 per acre.

Civil War and Reconstruction

Arkansas's position in the Civil War was complex as a result of being a slave border state. Unionist sentiment was highest in the northwest, while the southern and eastern counties, where cotton was produced with slave labor, not surprisingly favored secession. In the initial vote for secession during March 1861, delegates from northeastern Arkansas split, with Mississippi and St. Francis Counties favoring secession and delegates from Crittenden, Poinsett, Craighead, and Greene counties not favoring secession (Hanson and Moneyhon 1989:41). After the war began in April, the convention reconvened and Arkansas voted for secession on 20 May 1861.

No strategically significant military engagement took place in northeastern Arkansas during the Civil War. By June 1862, Federal forces had control of the Mississippi south to Memphis. After the Battle of Helena and the surrender of Vicksburg in July 1863, virtually all Confederate resistance west of the Mississippi River had collapsed.

The best known local engagement is the "Battle of Chalk Bluff," on 1 and 2 May 1863, as a Confederate force of approximately 5,000 men under General Marmaduke fought a delaying action while a makeshift bridge was built over the swollen St. Francis River (DeBlack 1994:70-74). Marmaduke's force was withdrawing after raiding Cape Girardeau. Causality reports for the battle are unavailable (DeBlack 1994), but local reports that "hundreds" were killed are likely exaggerated (*Clay County Courier* 1992). The battle at Chalk Bluff was considered a success by the Confederates, because General Marmaduke's army was saved and the unsuccessful raid did not turn into a disaster. The Chalk Bluff Battlefield was placed on the NRHP on 29 October 1971.

During December 1981, the AAS conducted a survey of portions of the Chalk Bluff Civil War Battlefield area (P. Morse 1982) located 10 km north of Piggott. The area was being developed by Clay County as a State Natural Heritage site. Visual reconnaissance, metal detectors and shovel tests failed to locate any significant cultural resources within the impact area; however, the project did result in the battlefield being assigned an archaeological site number (3CY222). Site 3CY222 is considered to be an 1840–1880 town and ferry site ("Chalk Bluff"), as well as a Civil War skirmish area. Three areas of Civil War trenches are noted on the site form. In 1992, Arkansas Historic Preservation Program (AHPP) personnel mapped the battlefield (*Clay County Courier* 1992).

Sporadic guerrilla activity and general lawlessness characterized the latter war years in the area. One skirmish between a federal regiment and two Confederate companies took place near Jonesboro in August 1863; 11 Union soldiers were killed and 33 were wounded (Stuck 1960:81).

In Arkansas, reconstruction lasted from 1865 to 1874. Due to lawlessness, some areas remained under martial law for several years after the end of the war. This era was bitterly remembered by the local disenfranchised white society as the time of "carpet bag rule." Organized underground movements, with the aims of both "recover[ing] for the whites the control government and society and to destroy the influence of carpetbaggers and Northern Opportunists among the Negros," began after 1867 (Folmsbee et al. 1969:360). The best known of these groups is the Ku Klux Klan, which formed in Pulaski County, Tennessee, and was active in northeastern Arkansas by 1868 (Stuck 1960). Black secret societies also formed during reconstruction. A race riot took

place in Osceola in 1872 that is known as the Blackhawk War (Goodspeed Publishing Co. 1889:458). In 1874, Arkansas adopted a new constitution and was readmitted to the Union.

Land Reclamation Efforts

The development of eastern Arkansas was closely linked with efforts at reclamation that improved lands that frequently overflowed. One of the first significant actions in reclamation was Congress's passage of the Swamp Act of 1850. Much of the St. Francis Basin was sold under this act at prices ranging from 50 cents to $1.25 per acre (Harrison and Kollmorgen 1947). Unfortunately, early efforts to use swampland revenues by inexperienced local levee and drainage district boards were uncoordinated and largely futile.

The first Arkansas Swamp Land Secretary was appointed in 1858. Prior to this, levee and drainage ditch construction had been unorganized and conducted on an individual basis. After the Civil War improvements higher up on the Mississippi lead to increased flood heights in the 1870s and 1880s (Burke et al. 1945). Partly as a result, the Mississippi River Commission was created in 1879. In 1881, the first $1,000,000 appropriation was made for levee construction along the Mississippi (Clay 1986:17). After 1865 and into the 1890s thousands of Irish immigrants participated in manual levee construction. The St. Francis Levee District was formed in 1893, and subdivision of the basin into local drainage districts began.

Local flood control was favored by some, including R.E.L. Wilson, a millionaire lumberman, the largest landowner and major developer of late nineteenth- to late twentieth-century Mississippi County (Snowden 1986); however, many other landowners were against the mortgages and bond sales that were necessary to fund the district constructions. R.E.L. Wilson eventually "sold the people on the idea of organizing drainage districts" under the Drainage District Act (Snowden 1986:134). Ditching by the districts began in earnest during the second decade of the twentieth century. The drainage of the swamplands caused a land boom in 1919 (Dew 1968:31).

The Great Flood of 1927

The Flood of 1927 had its origins in August 1926, when heavy rainfall in the central U.S. caused most of the upper Mississippi tributaries to overflow. In late 1926 the U.S. Weather Service noted that "the average reading through the last three months of 1926 on every single river gauge reading on each of the three greatest rivers of North America, the Ohio, the Missouri, and the Mississippi itself…was the highest ever known" (Barry 1998:175).

On New Year's Day 1927, the Mississippi River reached flood stage at Cairo, Illinois, the earliest for any year on record. Violent winter and spring storms contributed to worse conditions, and by late March, four separate flood crests had passed Cairo (Barry 1998:185). By April, there were already 35,000 refugees and Memphis's *Commercial Appeal* (1927) reported that the "outlook was gloomy now." On Saturday, 16 April, a 1,200-ft. section of the levee at Dorena, Missouri (30 mi. below Cairo) crumbled and its collapse "sent a chill all the way down the Mississippi to New Orleans" since this was the first federal levee to fail (Barry 1998:194). By the end of April, the "Cairo to Memphis sector was lost" and floodwaters continued their devastation at all points downstream (Barry 1998:282).

In June, as flooded areas of Missouri and Arkansas began emerging from the water and farmers began planting, another flood crest moved through Cairo (Barry 1998:285). As of late July, 1,500,000 ac. remained underwater. It was not until August 1927, four months after the first break of the mainline levee on the Mississippi at Dorena, that all the water receded. The Red Cross established 154 refugee camps in seven states, and over 325,000 people, mostly African-Americans, lived in squalid conditions there for four months. An additional 311,000 people, mostly white, outside these camps were fed and clothed by the Red Cross during the same time.

The U.S. Weather Bureau reported 313 deaths from the flood and put direct losses at $355,147,000 and indirect losses at $1,000,000,000.

The legacy of the Great Flood of 1927 was felt not only in mud-caked settlements along the Mississippi River and it tributaries, but also in Washington, D.C. and in the nation's black community. In *Rising Tide: The Great Mississippi River Flood of 1927 and How It Changed America*, Barry (1998) addresses not only the physical impacts of the flood, but also the less tangible socio-political developments in its aftermath. Legacies of the flood include shifting "perceptions of the role and responsibility of the federal government, calling for greater expansion, and shatter[ing] the myth of a quasi-feudal bond between Delta blacks and the southern aristocracy…It accelerated the great migration of blacks north. And it altered both southern and northern politics" (Barry 1998:422). Herbert Hoover, who served as relief coordinator and was widely held as a hero for his efforts, was elected President in the aftermath of the flood, and Huey Long was elected Governor of Louisiana.

TENANT PERIOD

The period of 1870–1950 is known as the Tenant period (Stewart-Abernathy and Watkins 1982), and is named for the sharecropping or tenant farm labor system that was a significant characteristic of southern U.S. agriculture after the Civil War. This decentralization of the old plantation system developed during Reconstruction as a means of stabilizing labor relations between former slaves and landowners. Prunty (1955) has interpreted tenancy as a Postbellum modification of the plantation system. Arkansas's farm tenancy percentage peaked in 1930 at 63.0 percent and was higher than the Southern average (Holley 2000:27;Figure 3-01).

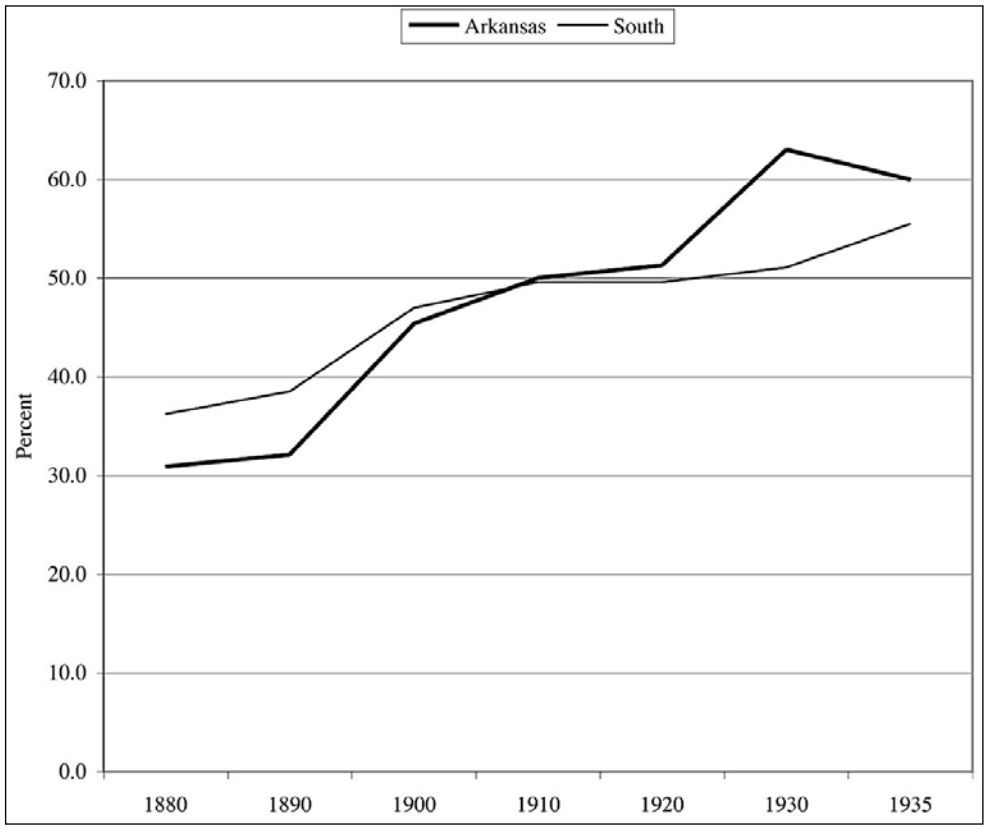

Figure 3-01. Chart for percentage of farm tenants in Arkansas and the South (data from Holley 2000:27).

The archaeological importance of the Tenant period is the representation of the maximum occupation of the project area. The dispersed settlement pattern of the Tenant period contrasts sharply with the clustered settlement pattern prior to 1865 (Orser and Nekola 1985:68). The tenant settlement pattern can be seen on 1930s and 1940s aerial photos, with alignments along roads and bayous at regular spacing. Sites dating to this period are plenty, and the issue of these sites' NRHP status has generated some commentary (Wilson 1990). Stewart-Abernathy and Watkins defined the tenant farm activity period as:

> …the phase within the history of commercial agriculture in which the rural landscapes dominated by mono-culture are composed of small farms of minimal size operated by white and black renter or sharecropper families. These small farms are tied to the plantation complex and represent a decentralized stage in this development…the use of capital for the production of a base crop is routed through an extra step consisting of the several families who are responsible for raising the crop. While the direction of capital use and power obviously flows from top to bottom in this stage, the extent to which the tenant family, in fact, exercises control over various of their affairs is problematical, with archaeological implications ranging from source of supply for table ceramics and architectural environment to responsibility for social and physical community patterning and maintenance of ethnic identity [Stewart-Abernathy and Watkins 1982:HA16-HA17].

Stewart-Abernathy (1999:240) also notes "intriguing" investigations at a number of African-American and multi-component tenant and owner-occupied farmsteads have been conducted in eastern Arkansas by contract archaeologists (Buchner 1992; Buchner and Childress 1991; Buchner and Weaver 1990; Childress 1990; Weaver et al. 1996). Nearly all of this work was CRM investigations funded by the USACE, Memphis District. Examination of eastern Arkansas delta Tenant period archaeological site data led Buchner (1992) to propose a distinct "Tenant Period Artifact Pattern" (when assemblages are analyzed using South's [1977] functional groups). While some deviations can be seen in frequency patterns identified based on surface collected assemblages versus excavated assemblages, the pattern is generally one where Kitchen Group artifacts dominate. Excavated assemblages tend to produce more nails, thus the proportional representation of the Architecture Group increases at the expense of the Kitchen Group.

The ceramics are typically cheap types that can be identified following Price (1979), often from mismatched sets. Mean ceramic dates are often not calculated due to the long span of whiteware production and problems relating to temporal lag. Garrow et al. (1989:60) note, "South's (1977) mean ceramic date (MCD) formula tends to break down after ca. 1860…the primary reason is that neither manufacturing or popularity date ranges have been firmly established for the post-1860 period." Only trace frequencies of other artifact groups are found (Arms, Clothing, Personal Items, Furniture, and Tobacco). In small assemblages, minority groups are often not represented.

Tenant site cultural deposits are usually near the surface, which are often plowzone only contexts, due to the buildings being frame structures elevated on brick, concrete, or cypress stump piers. If a house did not have a substantial chimney, it was more likely to be swept away in a flood (Buchner 1992). Occasionally, tenant sites are multi-component (i.e., co-occur with prehistoric material); this largely depends on the natural setting. Many tenant sites are found on silty clay backswamp soils that were not suitable for human habitation until after drainage improvements were made.

RAILROAD PERIOD

Communication and transportation were dominated by railroads during this period (1855–1950), which is "foremost characterized by a drastic reorganization of non-farming settlement pattern keyed to extremely narrow corridors…" (Stewart-Abernathy and Watkins 1982:HA18-19). From an archaeological viewpoint, Stewart-Abernathy and Watkins summarized the Railroad period as:

> …aside from the increased presence of consumer goods and increased general information level, the Railroad period is reflected by scores of nucleated settlements whose end or beginning date correspond to the coming of the railroad, and by some of the greatest landscape modifications made by people. These modifications take the form of embankments, cuttings, bridges, and support complexes, and exist on an intensive and extensive scale matched only by the construction after 1950 of highways and levees [Stewart-Abernathy and Watkins 1982:HA18-19].

The first railroad in Arkansas was the Memphis & Little Rock (M&LR) charted in 1853. By 1858, the track was complete from Hopefield (opposite Memphis) to the St. Francis River (Woolfolk 1967). By 1862, the western end of the M&LR line was in place from Little Rock to DeValls Bluff on the White River (Hanson and Moneyhon 1989:49). It was not until after the Civil War that the two sections were joined, under the supervision of former C.S.A. Gen. Nathan B. Forrest. The first permanent bridge constructed over the Lower White River was at DeValls Bluff. With the completion of this bridge in 1871, the Memphis and Little Rock Railroad was open as a continuous line from Hopefield to Little Rock (Moneyhon 1993:212).

Another important early railroad in northeastern Arkansas was the Cairo & Fulton (C&F). By 1874, the C&F, an extension of the St. Louis, Iron Mountain & Southern (SLIMS) Railroad, had completed a line from northeastern Arkansas (Clay County) to Little Rock and southwest to Fulton on the Red River; trains were running from St. Louis to Texarkana (Hanson and Moneyhon 1989:49). The northeast section of this line (Corning, Walnut Ridge, Hoxie, Jacksonport) is roughly parallel to the escarpment of the Ozark Plateau and is still used by Amtrak's Texas Eagle. Hanson and Moneyhon (1989:49) note there were 822 mi. of track in Arkansas by the close of the 1870s.

The 1880s railroad construction in northeastern Arkansas was a watershed event. The two most significant lines built in the region were the St. Louis & Southwestern and the St. Louis & San Francisco (Hanson and Moneyhon 1989:49). In 1882, Jonesboro and Clarendon were linked by the Texas & St. Louis Railroad (H.L. Williams 1930:332). In 1885, this line was reorganized as the St. Louis, Arkansas & Texas, and in 1891, it became the St. Louis & Southwestern, or "Cotton Belt." The St. Louis & San Francisco ran northwest from Memphis, through Crittenden, Poinsett, Craighead and Lawrence counties. It was not until 1897 that the first railroad bridge over the Mississippi River at Memphis, the Frisco Bridge, was opened. By the turn of the century, 3,167 mi. of railroad had been laid in Arkansas (Hanson and Moneyhon 1989:49).

One aspect of early railroad development (ca. 1876–1914) was the presence of numerous short line railroads (Hanson and Moneyhon 1989:50). These lines developed out of local interests and played an important role in developing the state. In northeastern Arkansas, the most historically significant short line railroad was the Jonesboro, Lake City and Eastern Railroad (JLC&E).

During the 1880s railroad boom in northeastern Arkansas, the sunken lands had essentially been bypassed (Dew 1968). The major lines skirted the southern and western boundaries of the sunken lands, with stations at Paragould, Jonesboro and Marked Tree. The JLC&E was chartered 7 April 1897 (Poor's Manual 1912:1080) by a group of Jonesboro businessmen intent on developing the sunken lands. Initially, the JLC&E ended at Lake City 12 mi. east of Jonesboro, but by 1899 the St. Francis River had been bridged there, thus opening Buffalo Island for development (Dew 1968). In 1902, the next big obstacle, Big Lake, had been bridged and Blytheville was reached. Communities that grew along the JLC&E include Lake City, Black Oak, Monette, Leachville, Manila and Dell. In 1905, the JLC&E consolidated with another local short line railroad, the Chickasawba Railroad. The JLC&E purchased the Wilson Northern Railroad, another short line, in 1912 (Poor's Manual 1912:3026).

The JLC&E began experiencing financial difficulties during the Panic of 1907 (Dew 1968). By 1913, most of the easily accessible timber along the JLC&E had been felled and the railroad

reported a loss; however, drainage district improvements led to a land boom in 1919, and the JLC&E profited from selling cut-over lands to farmers. In 1920, cotton prices crashed and the railroad again fell on hard times. By the 1930s, cutbacks in service had begun in part due to competition from automobiles. The use of railroads in northeastern Arkansas (and nationally) declined significantly after World War II (WWII).

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IV. LITERATURE AND RECORDS SEARCH

ARKANSAS ARCHEOLOGICAL SURVEY SITE FILES

The Automated Management of Archeological Site Data in Arkansas (AMASDA) database was reviewed online for this project. A standard site files check was performed, and prior archaeological work in the study tract and within a 2-km radius was researched. Importantly, the site files research reveals that there is no previously recorded archaeological site within the study tract.

Within a 2-km radius of the study tract there are three previously recorded archaeological sites (Table 4-01). All are prehistoric sites that were recorded between 1968 and 1976; two were tested.

Table 4-01. Previously recorded archaeological sites within 2 km of the study area.

Site	Description	NRHP
3GE96	Woodland scatter reported in 1968; one point collected	Unknown
3GE238	An extensive Prehistoric scatter at the Paragould Waterworks; tested by Morse and Ellis (1976)	Not eligible
3GE239	A small Prehistoric scatter at the Paragould Waterworks; tested by Morse and Ellis (1976)	Not eligible

PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

Review of the AMASDA records revealed that the study tract has not been previously surveyed for cultural resources. Within a 2-km radius of the study tract four previous investigations are documented.

WATERWORKS INVESTIGATIONS

During 1975, the AAS conducted survey and testing for the Paragould Waterworks (Morse and Ellis 1976). Three sites were examined: 3CG238; 3CG239; and an old barn/house site. Work conducted included the excavation of two backhoe trenches and two 1-x-1-m units using a backhoe. All recovery was reported from the plowzone (10–30 cm below surface [cmbs]) and no evidence of midden was found. Morse and Ellis (1976:5) interpreted Sites 3CG238 and 3CG239 as representing a "remnant portion of a much larger site or possibly the remains of a series of chipping stations," and indicated that the bulk of sites had been destroyed by sewage lagoon construction ca. 1963. The old barn/house site was determined to be twentieth century. All three sites were considered not significant.

EIGHTMILE DITCH SURVEY

During 1988-1989, Historic Preservation Associates (HPA) surveyed a 17.9-km section of Eightmile Ditch that extended from Paragould southeast to the Marked Tree Floodway. Garrow & Associates, Inc. reported the results (Buchner and Childress 1995). The survey resulted in the identification of nine newly recorded sites (3CG365–3CG373), two previously recorded sites (3CG186 and 3CG347), and one isolated find. Identified component frequencies were as follows: Early Archaic (n=2); Middle/Late Archaic Benton (n=1); Late Archaic (n=2); Early Woodland (n=1); Late Woodland Dunklin Phase (n=4); Mississippian (n=3); and Late nineteenth- to early twentieth-century Historic (n=3). Additionally, a ca. 1929 Historic bridge was recorded.

REGIONAL WATER DISTRICT SURVEY

During 1992, HPA surveyed 74.7 km of corridor associated with water system improvements in western Greene County that were designed to supply homes (Klinger and Smith 1992). The improvement corridors were immediately adjacent to existing road and utility corridors in highly disturbed settings. Negative findings were reported.

U.S. HIGHWAY 412 BYPASS SURVEY

During 2011, AHTD archaeologists conducted a survey of an 8.6-km corridor slated for development as the HY-412 Bypass on the southeastern side of Paragould (McAlexander 2011). This corridor forms part of the southern boundary of the study tract. Shovel testing at 20-m intervals was employed. No archaeological resource was identified. Several standing structures were documented, but none would be impacted by the project.

ARKANSAS HISTORIC PRESERVATION PROGRAM STRUCTURE FILES

The AHPP ArcGIS database was reviewed online. Importantly, this revealed that there is no previously recorded property within the study tract, and that there is none within the 2-km radius.

NATIONAL REGISTER OF HISTORIC PLACES LISTINGS

As of this writing, there are 17 NRHP listed properties in Greene County, Arkansas (National Register of Historic Places 2016). Importantly, there is no NRHP listed property within the study tract. The nearest NRHP listed property to the study tract is the Greene County Courthouse in Paragould, 3.3 km to the north.

CARTOGRAPHIC REVIEW

GENERAL LAND OFFICE PLATS

The earliest detailed maps of the study tract are the GLO plats for T16N R5E and T16N R6E (Figures 4-01 and 4-02). No cultural feature is shown within the study tract.

The most significant feature shown on either plat map is the "Deserted Delaware Village" in Sections 17 and 18 of T16N R6E (see Figure 4-01). This village is located along Village Creek, and is the reason that the creek became so-named. A large archaeological site (3GE160) has been recorded along this reach of Village Creek, which includes the Deserted Delaware Village shown on the 1840 plat. The Site 3GE160 site form indicates this was a 120-ac. fortified village that was occupied ca. 1789–1824. A number of other trails radiate out from the village in a hub-like fashion. One of these traces leads to a 20-ac. Shawnee village (3GE161) located nearby (but not indicated on the 1840 plat map).

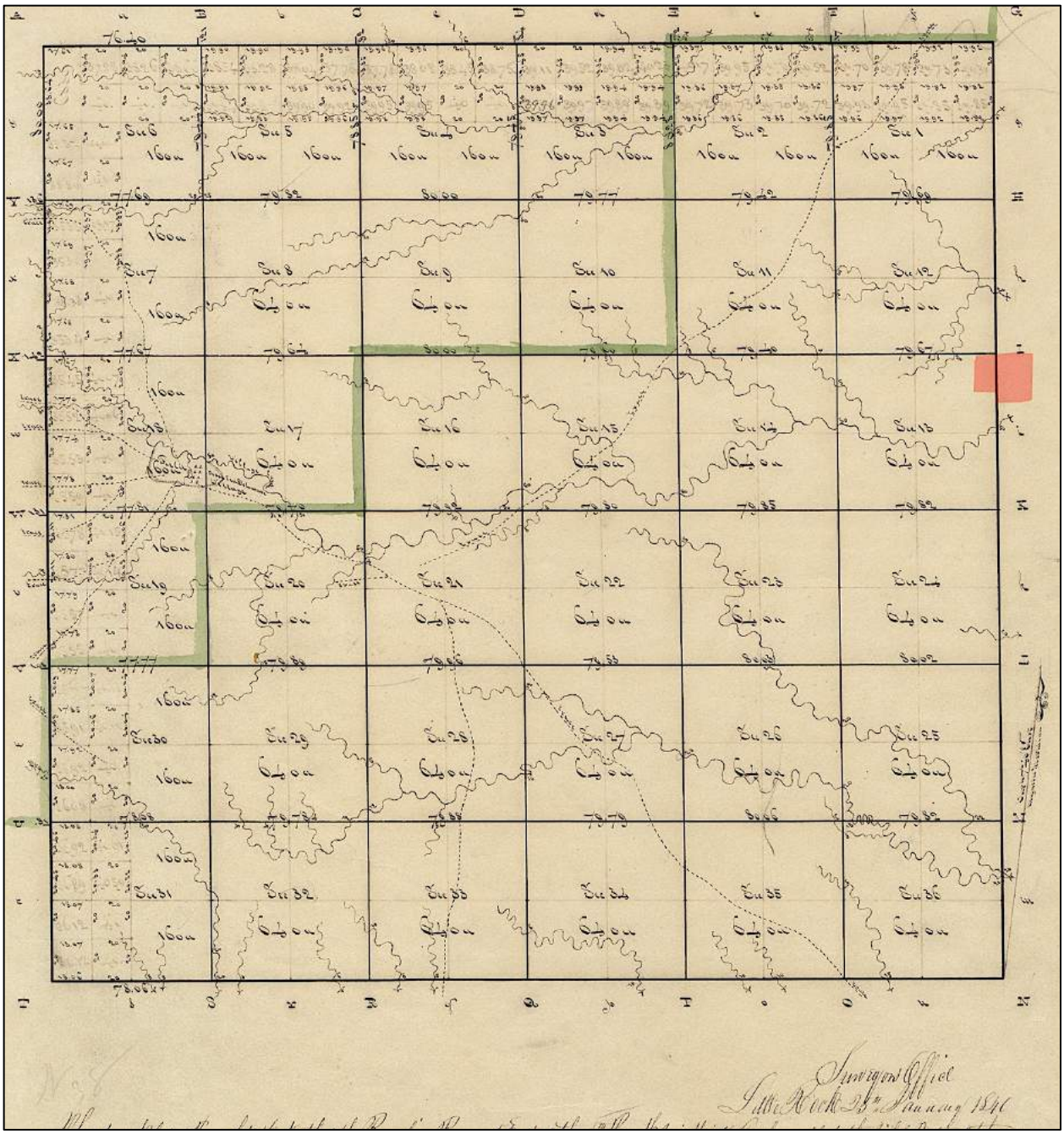

Figure 4-01. The 1840 T16N R5E General Land Office plat map with the study tract highlighted in red.

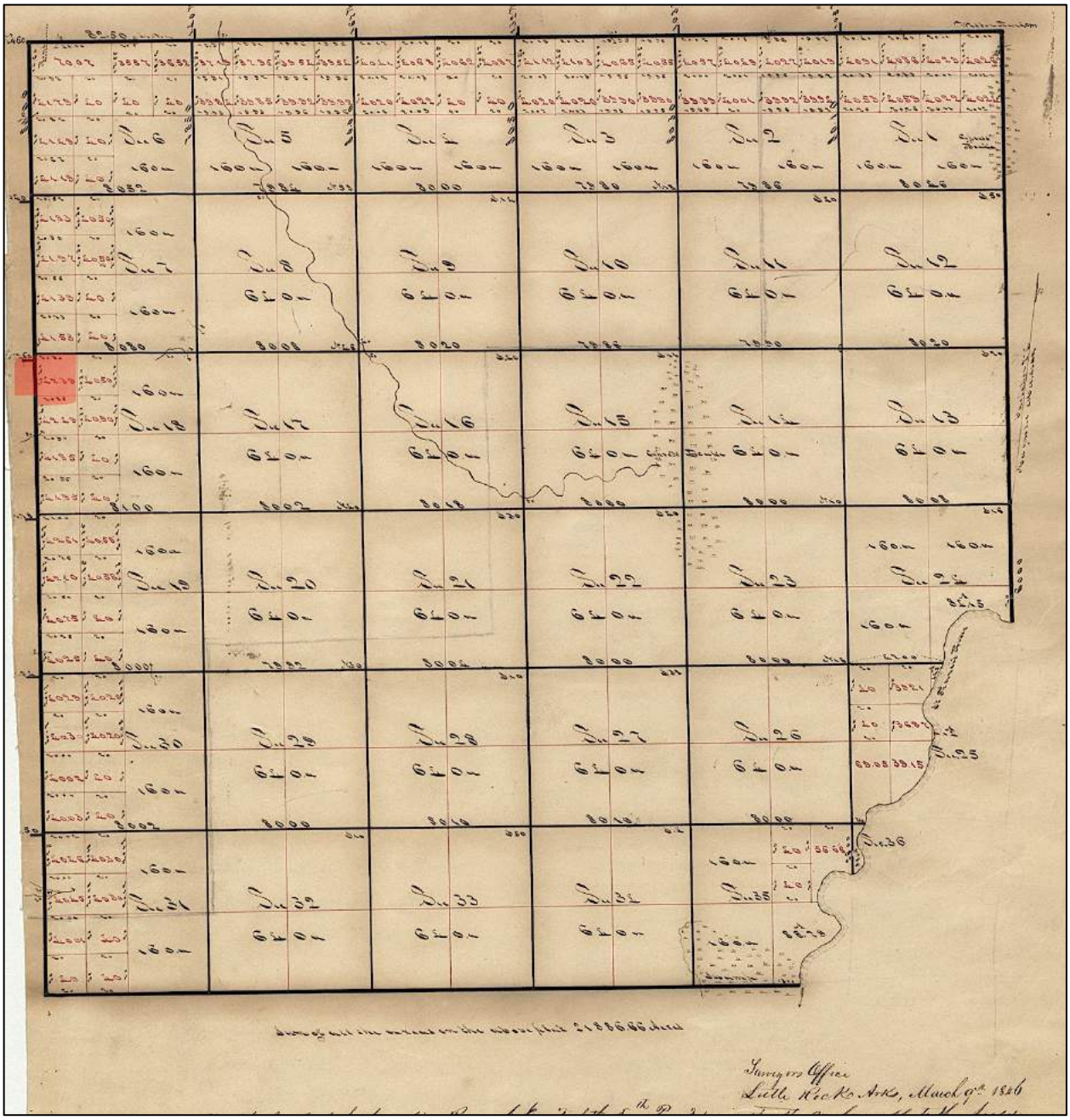

Figure 4-02. The 1826 T16N R6E General Land Office plat map with the study tract highlighted in red.

1936 GREENE COUNTY ROAD MAP

A copy of the 1936 Greene County Road Map was reviewed (Figure 4-03). This map indicates one structure within the study tract. The map clearly reveals that the local settlement pattern is focused on the roads.

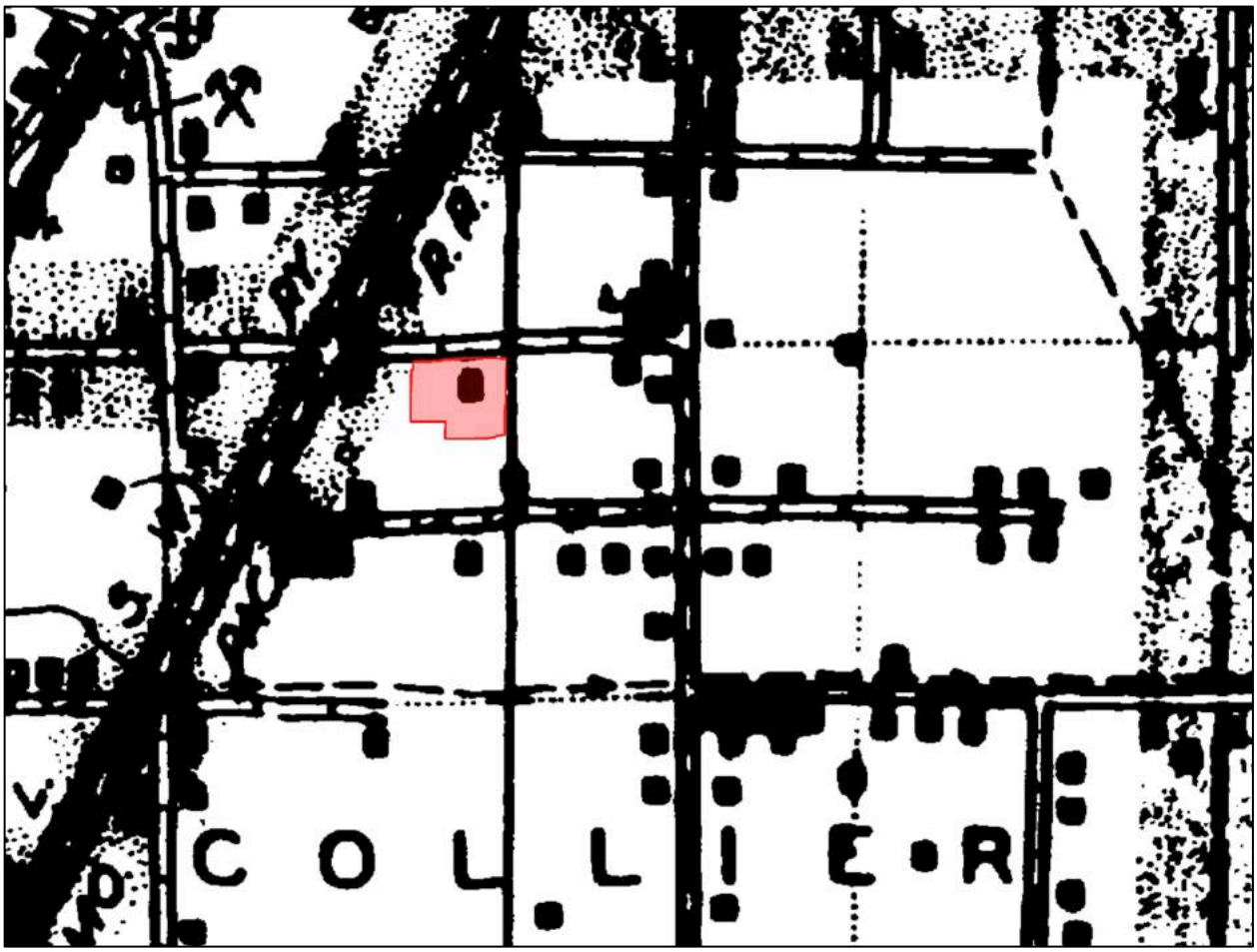

Figure 4-03. A portion of the 1936 Greene County Road Map with the study tract highlighted in red.

1940 QUADRANGLE MAP

The 1940 Marmaduke, AR 15-min. quad was reviewed (Figure 4-04). This map reveals two structures on opposites sides of a north-south unimproved road within the study tract. One of these structures is interpreted as the structure shown on the 1936 Greene County Road Map (see Figure 4-03). The area around the structure and the southwestern corner of the tract is shaded green, implying that these areas are wooded. The bulk of the tract is open and presumed to be under cultivation.

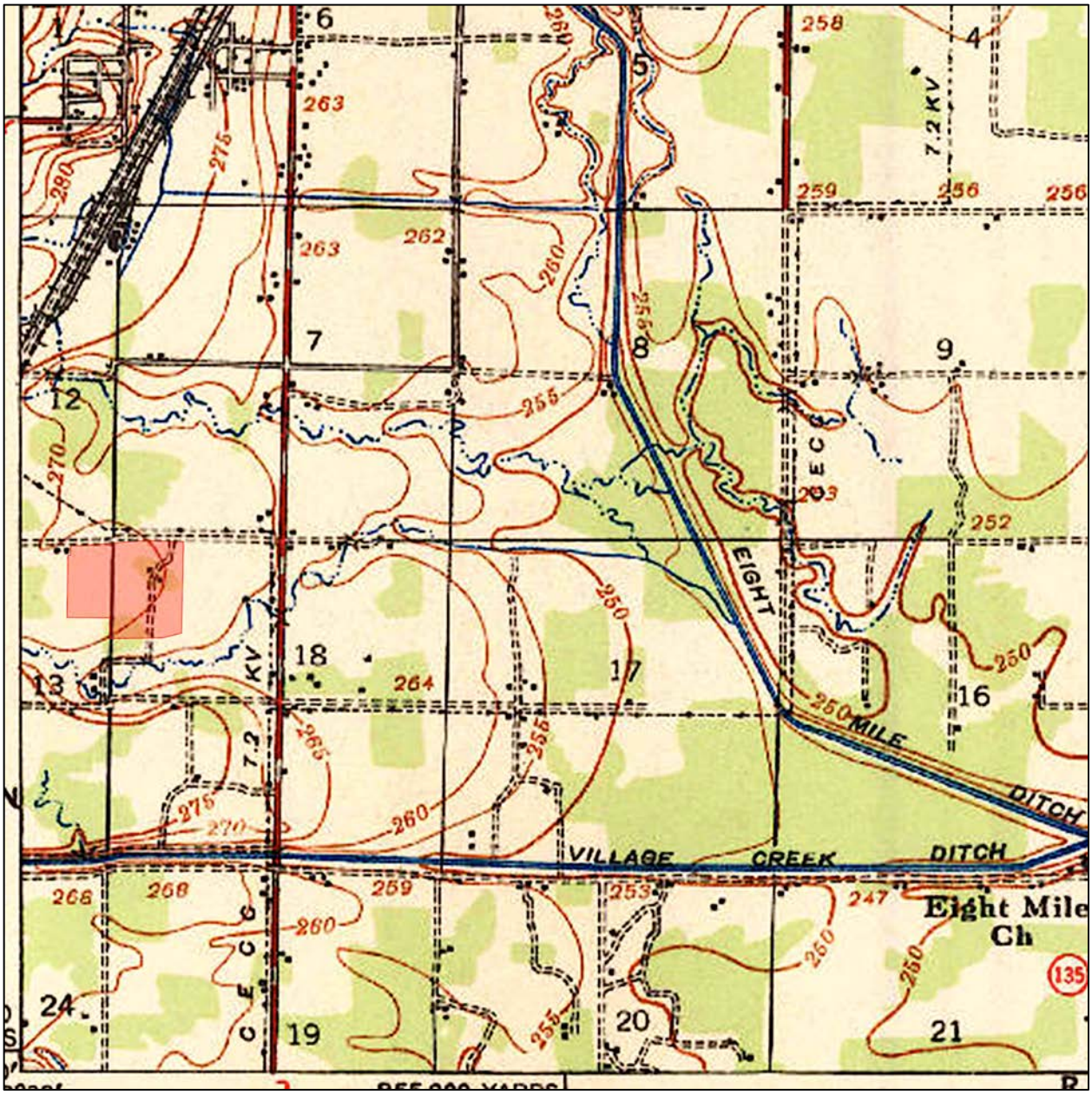

Figure 4-04. A portion of the 1940 Marmaduke, AR 15-min. quad with the study tract highlighted in red.

1958 QUADRANGLE MAP

The 1958 Marmaduke, AR 15-min. quad was reviewed (Figure 4-05). This map reveals four structures at the end of a north-south unimproved road within the northern-central portion of the study tract. Two of these structures are interpreted as the structures shown on the 1940 Marmaduke, AR 15-min. quad (see Figure 4-04).

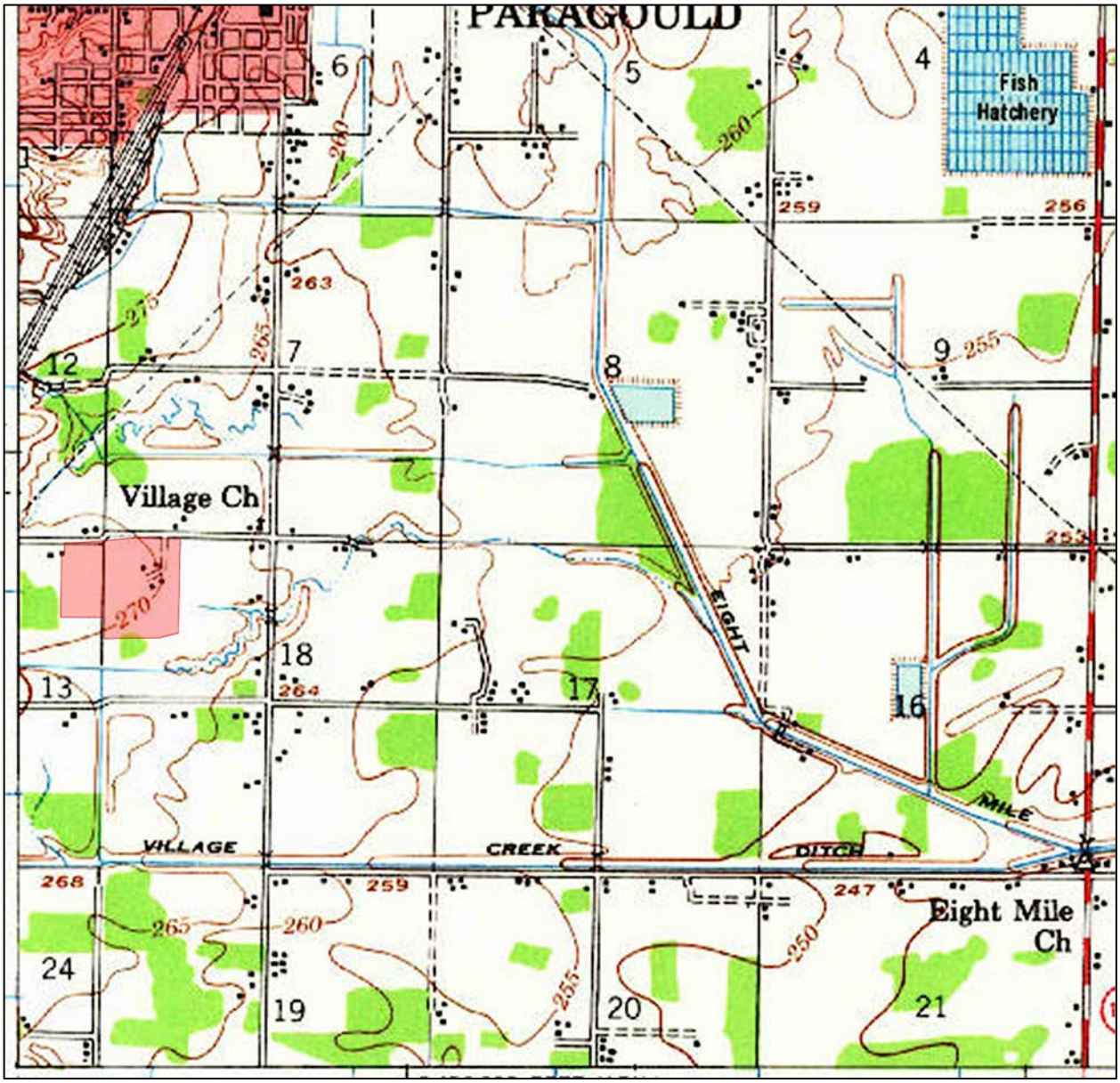

Figure 4-05. A portion of the 1958 Marmaduke, AR 15-min. quad with the study tract highlighted in red.

1968 AIR PHOTOGRAPH

A 1968 air photo from the *Soil Survey of Greene County* (Robertson 1969:Sheet 52) shows a clump of trees and probable structures in the same location as the four structures shown on the 1958 quad (see Figure 2-04).

1983 QUADRANGLE MAP

The 1983 Paragould East, AR 7.5-min. quad was reviewed (see Figure 1-01). This map reveals two structures within the northern-central portion of the study tract. Evidently, two of the four structures shown on the 1958 Marmaduke, AR 15-min. quad (see Figure 4-05) had been razed by this date.

1994–2015 GOOGLE EARTH IMAGES

Google Earth images are available on-line for the study tract that date from 1994 to 2015. A 1994 Google Earth image reveals that both structures shown on 1983 quad (see Figure 1-01) are gone, and furrow and levee patterns suggest the study tract consisted of two adjoining rice fields, as it does today. Thus, it is suggested that the structures were razed and destroyed when the field was land-leveled ca. 1984–1993.

GENERAL LAND OFFICE LAND PATENTS

To investigate the early history of private land ownership in the study tract, land patent data were researched using the Bureau of Land Management (BLM) webpage. This was accomplished by searching for patents issued for Section 13 of T16N R5E and Section 18 of T16N R6E. This search failed to identify any U.S. patent associated with the study tract. Given, this is assumed that these lands were most likely conveyed from the U.S. to Arkansas under the Swamp Land Act of 1850, and that the first patents associated with the study tract were state issued.

V. FIELD INVESTIGATIONS

METHODS

Two two-person teams, consisting of a Register of Professional Archaeologists Archaeologist and an Archaeological Technician, surveyed the Certified Industrial Site tract on 26 September and 21 November 2016. During the initial site visit in September, the cover consisted of a harvested rice field and the surface visibility was poor. Work conducted during this visit included shovel testing at 10-m intervals at two locations where structures are shown on the 1983 Paragould East, AR 7.5-min. quad (see Figure 1-01). After the field was plowed under and rained on, surface visibility was excellent (Figures 5-01 and 5-02). The second crew returned to the tract in November and conducted a visual inspection of the entire area, and excavated a few additional shovel tests. The methods conform to that of an "intensive survey" under the 2010 *State Plan* guidelines (Appendix B of the Arkansas *State Plan*, revised version in effect as of 1 January 2010).

SHOVEL TEST DEFINITION

A shovel test consisted of the excavation of a four-sided hole at least 30 cm to a side (0.09 m^2). Each shovel test was excavated to culturally sterile deposits. To ensure consistent artifact recovery, all sediment was hand-screened through 0.25-in. mesh hardware cloth. All natural and cultural strata revealed in the individual shovel test profiles were recorded using metric depth measurements, and described in terms of textural class and color (using the Munsell Soil Color Chart). Additional strata descriptions were provided as needed, such as moisture, natural rock content, and number and size of roots. Panamerican employs a specialized shovel test form to insure consistent shovel test profile recording. Following recording a shovel test, artifact sample bags (if any) were labeled. All holes were subsequently backfilled as closely as possible to the original condition.

SITE DEFINITION

In Arkansas, an archeological site is "defined by the presence of three or more artifacts (chips, flakes, historic objects, etc.) within 5 m of each other, or by the presence of man-made features such as mounds, Civil War entrenchments, [or] wells," even when there is no artifact present (2010 *State Plan* Appendix B guidelines). Additionally, to be recorded in the AAS site files database, a site must be 50 years or older.

An isolated find is recorded as a site if it is a diagnostic or significant artifact. By way of example, the 2010 *State Plan* Appendix B guidelines note that a *diagnostic* artifact is "one that provides temporal or cultural information" and an example of a *significant* artifact is a novaculite flake in the Delta.

SURVEY DOCUMENTATION

To ensure appropriate field data management, Panamerican employs a system the company developed for intensive surveys. This system has been successfully implemented for several years and, for example, it has been used successfully during various past projects within Arkansas. Throughout the course of the fieldwork, the crew used specialized forms to individually record the shovel test locations. The status of each shovel test was assessed as positive (■), negative (❑), or not excavated (Ø). In the case of the latter, which are referred to as "no-test" locations, the reason for not excavating a shovel test is provided on the forms. This allows for a complete inventory of shovel tests to be generated. Shovel test profiles, sediment characteristics, and depths of artifact recovery, if any, were recorded on the forms during the fieldwork. At the end of each field day, this information is collected by the field director and reviewed for content.

Figure 5-01. View northwest across the tract from the southeastern corner (PB212238).

Figure 5-02. View west from the southern-central portion of the tract; U.S. Highway 412 Bypass is on the left (PB212239).

In addition to the individual shovel test results recorded by the Archaeological Technicians, the field documentation included, but was not limited to, the following: (1) the Field Director maintained a set of field notes that outlines daily activities and provides a general commentary on the project findings; (2) the location of each identified cultural resource was recorded on a 7.5-min. quad map; and (3) the survey area and all recorded sites were documented using digital photography.

FINDINGS

The survey of the industrial tract resulted in the identification of one newly recorded archaeological site (3GE513). It is a Historic twentieth-century farmstead that has been destroyed via land leveling. During the course of the survey 25 shovels tests were excavated, and the only positive shovel test was at Site 3GE513.

SITE 3GE513

Cultural Affiliation .....Historic Twentieth Century
Site Type .....Land Leveled Farmstead
Site Size .....200 m^2
Artifact Recovery Total 2
Recommended NRHP Status .....Not Eligible

Location and Setting

Site 3GE513 is located in the central portion of the western field about 150 m south of HY-358. The setting is a land-leveled rice field on the Pleistocene Terrace (Pve 3; Figure 5-03). The elevation is about 269 ft. The soil at site is mapped as Foley silt loam (Robertson 1969:Sheet 52). The nearest water is Village Creek Ditch, which is located 1.2 km to the south.

Figure 5-03. View south across Site 3GE513 (PB212445).

Archaeology

Site 3GE513 is a very low-density, Historic, plowzone deposit located within a land-leveled rice field. During the initial 26 September 2106 site visit, the surface visibility was poor, as the rice field had just been harvested and was covered in stubble and rice straw. After the tract was plowed, the site was revisited on 21 November 2016, and surface visibility was excellent (see Figures 5-01–5-03).

Two site grids were established (Grid 1 and Grid 2); the grid origins represent the approximate locations of two structures shown on the 1983 Paragould East, AR 7.5-min. quad. Twenty-five shovel tests were excavated at 10-m intervals at the site, and one was positive (Shovel Test West 10 [ST W10]; Figure 5-04; Table 5-01). The soil profile in ST W10 was typical of the tract. It was recorded as: Plowzone (Ap) from surface to 20 cmbs, composed of 10YR 4/3 silty clay mottled with 10YR 5/6; and subsoil 20–40 cmbs sterile, 10YR 4/1 silty clay mottled with 10YR 5/6. One artifact was recovered from the Ap in W10. Despite the excellent surface visibility, only one surface artifact was found observed and collected, a piece of glass. The site size of 20-x-10 m is based on the distribution of the positive shovel test and the surface find (see Figure 5-04).

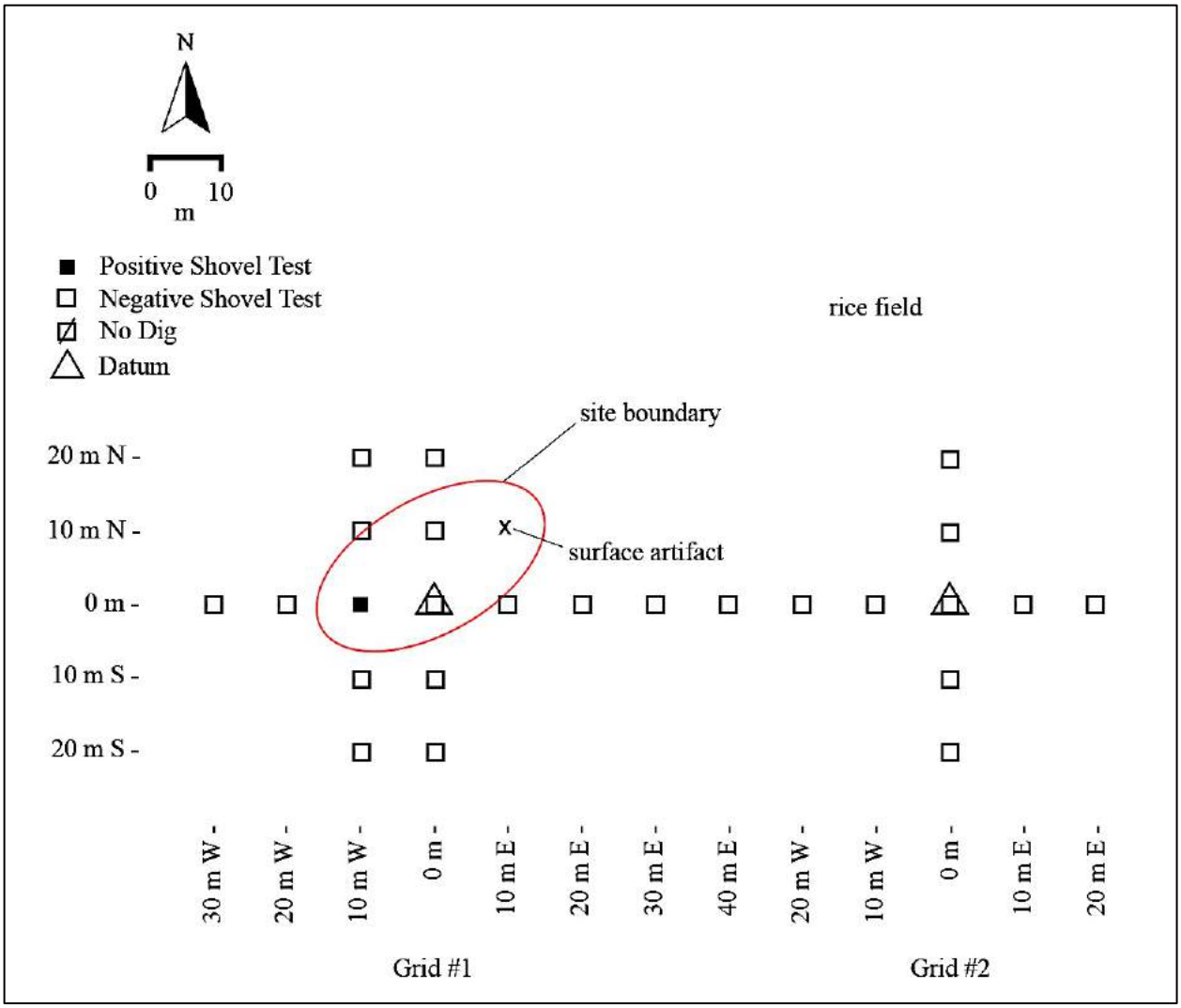

Figure 5-04. Site 3GE513 sketch map.

Table 5-01. Shovel test inventory.

Grid	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	E30	❑	30	0–30 cm mottled 10YR 4/3 and 10YR 5/2 silty clay	heavily oxidized
1	E40	❑	30	0–30 cm mottled 10YR 4/3 and 10YR 5/2 silty clay	heavily oxidized
1	E10	❑	40	0–30 cm mottled 10YR 4/3 and 10YR 5/6 silty clay; 30–40 cm mottled 10YR 4/1 and 10YR 5/6 silty clay	
1	E20	❑	40	0–10 cm mottled 10YR 4/3 and 10YR 5/6 silty clay; 10–40 cm mottled 10YR 4/1 and 10YR 5/6 silty clay	
1	W10	■	40	0–20 cm mottled 10YR 4/3 and 10YR 5/6 silty clay; 20–40 cm mottled 10YR 4/1 and 10YR 5/6 silty clay	clear glass
1	W20	❑	40	0–30 cm mottled 10YR 4/3 and 10YR 5/6 silty clay; 30–40 cm mottled 10YR 4/1 and 10YR 5/6 silty clay	
1	W30	❑	55	0–45 cm mottled 10YR 4/3 and 10YR 5/6 silty clay; 45–55 cm mottled 10YR 4/1 and 10YR 5/6 silty clay	
1	0, 0	❑	30	0–15 cm mottled 10YR 5/3 and 7.5YR 4/6 silty clay; 15–30 cm mottled 10YR 6/2 and 10YR 5/8 silty clay	
1	S10	❑	30	0–15 cm mottled 10YR 4/3 and 7.5YR 4/6 silty clay; 15–30 cm mottled 10YR 5/2 and 10YR 5/8 silty clay	
1	S20	❑	30	0–10 cm mottled 10YR 4/3 and 7.5YR 4/6 silty clay; 10–30 cm mottled 10YR 5/2 and 10YR 5/8 silty clay	
1	N10	❑	30	0–10 cm mottled 10YR 4/3 and 7.5YR 4/6 silty clay; 10–30 cm mottled 10YR 5/2 and 10YR 5/8 silty clay	
1	N20	❑	30	0–10 cm mottled 10YR 4/3 and 7.5YR 4/6 silty clay; 10–30 cm mottled 10YR 5/2 and 10YR 5/8 silty clay	
1	N20 W10	❑	30	0–20 cm mottled 10YR 5/3 and 7.5YR 4/6 silty clay; 20–30 cm mottled 10YR 6/3 and 10YR 5/8 compacted silty clay	compacted soil at 30 cmbs
1	S10 W10	❑	30	0–20 cm 10YR 6/2 silty clay loam; 20–30 cm mottled 10YR 7/1 and 10YR 5/6 silty loam	manganese concretions
1	S20 W10	❑	30	0–20 cm 10YR 5/4 silty clay loam; 20–30 cm mottled 10YR 7/1 and 10YR 5/6 silty loam	manganese concretions and streaking throughout
2	DATUM	❑	30	0–15 cm 10YR 5/6 silty clay loam; 15–30 cm mottled 10YR 7/3 and 10YR 6/8 silty loam	manganese concretions and streaking throughout
2	S10	❑	30	0–15 cm 10YR 5/1 silty clay loam; 15–30 cm mottled 10YR 7/1 and 10YR 6/8 silty loam	manganese concretions and streaking throughout

Grid	ST	R	Max Depth (cmbs)	Soil Description	Notes
2	S20	❑	30	0–10 cm 10YR 5/1 silty clay loam; 10–30 cm mottled 10YR 7/3 and 10YR 6/8 silty clay	manganese concretions and streaking throughout
2	N10	❑	40	0–30 cm mottled 10YR 4/3 and 10YR 5/6 silty clay; 30–40 cm mottled 10YR 4/1 and 10YR 5/6 silty clay	
2	N20	❑	50	0–40 cm mottled 10YR 4/1 and 10YR 5/6 silty clay; 40–50 cm mottled 10YR 4/3 and 10YR 5/6 silty clay	
2	W10	❑	45	0–25 cm mottled 10YR 4/1 and 10YR 5/6 silty clay; 25–35 cm mottled 10YR 4/3 and 10YR 5/6 silty clay; 35–45 cm mottled 10YR 4/1 and 10YR 5/6 silty clay	
2	W20	❑	50	0–40 cm mottled 10YR 4/3 and 10YR 5/6 silty clay; 40–50 cm mottled 10YR 4/1 and 10YR 5/6 silty clay	
2	E10	❑	30	0–20 cm mottled 10YR 4/3 and 7.5YR 4/6 silty clay; 20–30 cm mottled 10YR 6/3 and 10YR 5/8 compacted silty clay	compacted soil
2	E20	❑	30	0–20 cm mottled 10YR 4/3 and 7.5YR 4/6 silty clay; 20–30 cm mottled 10YR 5/2 and 10YR 5/8 compact silty clay	compacted soil

Key: Shovel Test Number= ST; Result=R; cm below surface=cmbs; Positive=■; Negative=❑; and No Test=Ø

Artifacts

Site 3CG1285 produced two artifacts: a piece of clear bottle glass (1.0 g) was recovered from the Ap in ST W10; and a fragment of a milk-colored (white) glass jar (9.1 g) was recovered from the site surface; it appears to be a fragment of a cosmetics jar.

The bottle glass in this assemblage is all machine-made, no free blow or mold blown glass was recovered. During the 1860s and 1870s there was an increased demand for clear glass containers that "became readily apparent by 1880" (Fike 1987:17). Consumer pressure forced the growing food-preservation industry into using clear glass containers, in order that a bottle's contents could be viewed, without distortion, at the point of purchase. Heavy recovery of clear bottle glass is a common trait of archaeological assemblages that post-date the 1880s.

Initially, adding soda lime to the glass formula made glass clear, which was an expensive process. After 1880, manganese oxide was used to produce clear glass, which continued until WWI interrupted the supply of manganese oxide from Germany (Jones and Sullivan 1989). Manganese reacts to ultraviolet rays in sunlight (i.e., solarizes), leaving the formerly clear glass a violet or purple shade known as "amethyst glass." Lack of control over the amount of manganese introduced into the glass formula occurred when machine production began; thus, the bottles produced in 1893–1917 generally tend to show a deeper color change. Amethyst glass was not recovered at Site 3GE513; thus, it is suggested that the site postdates 1917.

Additional Remarks

Historic maps dating from 1936, 1940, 1958 show from one to four structures at and near this location (see Figures 4-03–4-05). A 1968 air photo from the *Soil Survey of Greene County* (Robertson 1969:Sheet 52) shows a clump of trees and probable structures at this location. The

1983 Paragould East, AR 7.5-min. quad shows one structure at Site 3GE513 and another structure approximately 70 m to the east (i.e., at Grid 2). A 1994 Google Earth image reveals that both structures are gone, and furrow and levee patterns suggest the tract was a rice field. Thus we suggest that the structures at Site 3GE513 were razed and destroyed when the field was land-leveled ca. 1984–1993.

Recommendation

The recommended NRHP status for Site 3GE513 is not eligible. Shovel testing revealed that the archaeological deposits at the site is low-density, near surface, and associated with an early to late twentieth-century farmstead complex that was destroyed via land leveling ca. 1984–1993. Land-leveled domestic sites are ubiquitous throughout eastern Arkansas, and this example does not meet enough of the criteria for NRHP eligibility established by Wilson (1990) to be considered eligible. As such, the recommended management action is no further work.

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VI. SUMMARY AND RECOMMENDATIONS

SUMMARY

At the request of the PRCC, Panamerican performed a Phase I cultural resources survey of the proposed 78.77-ac. Certified Industrial Site tract in Paragould, Greene County, Arkansas. The purpose of this study was to identify all known and unrecorded cultural resources present, and to provide appropriate management recommendations for any such properties identified.

The 78.77-ac. Certified Industrial Site tract is located on the southeastern edge of Paragould, north of the US-412 Bypass and south of HY-358 in an area characterized by both industrial facilities and agricultural fields. The tract is irregularly shaped, composed of two adjacent rice fields, and can be identified on the Paragould East 7.5-min. quad (see Figures 1-01–1-03).

The 15 June 2016 SHPO Section 106 review letter for this undertaking (AHPP Tracking No. 96046; Appendix A) recommended that a cultural resources survey be conducted.

A literature search was conducted using AMASDA, AHPP, and NRHP databases, and it revealed that there is no previously recorded archaeological site or historic property within the study tract. A cartographic review revealed that a farmstead consisting of from one to four structures existed within the tract ca. 1936–1983 (see Figures 4-02–4-04). Aerial imagery suggests that the farmstead was razed ca. 1984–1993 when the field was land leveled for rice production. Site 3GE513 was identified at the farmstead location.

Two two-person teams, consisting of a Register of Professional Archaeologists Archaeologist and an Archaeological Technician, surveyed the Certified Industrial Site tract on 26 September and 21 November 2016. During the initial September site visit the cover consisted of a harvested rice field, but surface visibility was poor. Work conducted during this visit include shovel testing at 10-m intervals two locations where structures are shown on the 1983 Paragould East, AR 7.5-min. quad. After the field was plowed under and rained on, surface visibility was excellent, and a second crew returned to the tract in November and conducted a visual inspection of the entire area and excavated a few additional shovel tests.

The survey of the Certified Industrial Site tract resulted in the identification of one newly recorded archaeological site (3GE513). It is a Historic twentieth-century farmstead that has been destroyed via land leveling. During the course of the survey 25 shovels tests were excavated at Site 3GE513, but only one was positive. The investigations at Site 3GE513 produced only two artifacts (two pieces of machine made glass) from the site surface and plowzone. Such a low artifact frequency at a twentieth-century farmstead once composed of four structures attests to the destructive power that land leveling has on archaeological sites.

RECOMMENDATIONS

The recommended NRHP status for Site 3GE513 is not eligible. Shovel testing revealed that the archaeological deposit at the site is low-density, near surface, and associated with an early to late twentieth-century farmstead complex that was destroyed via land leveling ca. 1984–1993. Land-leveled domestic sites are ubiquitous throughout eastern Arkansas, and this example does not meet enough of the criteria for NRHP eligibility established by Wilson (1990) to be considered eligible.

Because there is no NRHP listed, eligible, or potentially significant archaeological site or historic property within the Certified Industrial Site tract, the proposed undertaking will not have an

adverse impact on cultural resources. No additional cultural resources investigation is recommended.

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APPENDIX A: HISTORIC PRESERVATION OFFICES CORRESPONDENCE

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THE DEPARTMENT OF ARKANSAS
HERITAGE

Asa Hutchinson
Governor

Stacy Hurst
Director

Arkansas Arts Council
•
Arkansas Natural Heritage Commission
•
Delta Cultural Center
•
Historic Arkansas Museum
•
Mosaic Templars Cultural Center
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Old State House Museum

ARKANSAS HISTORIC PRESERVATION PROGRAM

National Historic Preservation Act 1966-2016

323 Center Street, Suite 1500
Little Rock, AR 72201

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tdd: 711

e-mail:
info@arkansaspreservation.org
website:
www.arkansaspreservation.com

An Equal Opportunity Employer

June 15, 2016

Ms. Sue McGowan
Paragould Economic Development Corporation
P.O. Box 124, 300 W Court Street
Paragould, AR 72451

RE: Greene County – General
Section 106 Review – EDA
Paragould Certified Industrial Site
AHPP Tracking Number 96046

Dear Ms. McGowan:

This letter is in response to your inquiry regarding properties of archeological, historical, or architectural significance in the area of the proposed referenced project. The staff of the Arkansas Historic Preservation Program has reviewed records pertaining to the area in question.

There are no recorded cultural resources located within this undertaking. However, due to the paucity of cultural resources surveys conducted in the vicinity of the undertaking, we recommend that a cultural resources survey be conducted in the areas of direct impacts.

Tribes that have expressed an interest in the area include: The Delaware Nation (Mr. Jason Ross), the Quapaw Tribe of Oklahoma (Mr. Everett Bandy) and the Shawnee Tribe of Oklahoma (Ms. Kim Jumper). We recommend that they be consulted in accordance with 36 CFR § 800.2 (c) (2).

Thank you for the opportunity to review this undertaking. Please refer to the AHPP Tracking Number listed above in all correspondence. If you have any questions, please call Tim Dodson of my staff at 501-324-9784

Sincerely,

Frances McSwain

Frances McSwain
Deputy State Historic Preservation Officer

cc: Mr. Jonathan Markley, EDA
Dr. Andrea Hunter, Osage Nation
Dr. Ann Early, Arkansas Archeological Survey

THE DEPARTMENT OF ARKANSAS HERITAGE

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website:
www.arkansaspreservation.com

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December 20, 2016

Ms. Sue McGowan
Paragould Economic Development Corporation
P.O. Box 124, 300 W Court Street
Paragould, AR 72451

RE: Greene County – General
Section 106 Review – EDA
Report: *Phase I Cultural Resources Survey for a 78.77-Acre Certified Industrial Site, Paragould, Greene County, Arkansas*
AHPP Tracking Number: 96046.01

Dear Ms. McGowan:

The staff of the Arkansas Historic Preservation Program (AHPP) has reviewed the above-referenced Phase I cultural resources report.

Based on the information presented in this report, we concur that site 3GE0513 is not eligible for the National Register of Historic Places (NRHP) and requires no further work.

Based on the information presented in this report, we also concur that the proposed undertaking will have *No Effect* on historic properties.

Tribes that have expressed an interest in the area include: The Delaware Nation (Mr. Jason Ross), the Quapaw Tribe of Oklahoma (Mr. Everett Bandy) and the Shawnee Tribe of Oklahoma (Ms. Kim Jumper). We recommend that they be consulted in accordance with 36 CFR § 800.2 (c) (2).

Thank you for the opportunity to review this undertaking. Please refer to the AHPP Tracking Number listed above in all correspondence. If you have any questions, please call Tim Dodson of my staff at 501-324-9784.

Sincerely,

Frances McSwain

Frances McSwain
Deputy State Historic Preservation Officer

cc: Mr. Jonathan Markley, EDA
Dr. Andrea Hunter, Osage Nation
Dr. Ann Early, Arkansas Archeological Survey

QUAPAW TRIBE OF OKLAHOMA

P.O. Box 765
Quapaw, OK 74363-0765

(918) 542-1853
FAX (918) 542-4694

January 6, 2017

Sue McGowan
Paragould Regional Chamber of Commerce
300 West Court Street
Paragould, Arkansas 72450

Re: Phase I Cultural Resources Survey for a 78.77 – acre Certified Industrial Site, Paragould, Greene County, Arkansas

Dear Sue,

The Quapaw Tribe Historic Preservation Office has received and reviewed the information provided for the above mentioned project in Paragould and Greene County, Arkansas. This office concurs with the agency finding that the proposed undertaking will not have an adverse impact on cultural resources.

In accordance with the National Historic Preservation Act, (NHPA) [16 U.S C. 470 §§ 470-470w-6] 1966, undertakings subject to the review process are referred to in S101 (d) (6) (A), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969).

The Quapaw Tribe has vital interests in protecting its historic and ancestral cultural resources. We do not anticipate that this project will adversely impact any cultural resources or human remains protected under the NHPA, NEPA, or the Native American Graves Protection and Repatriation Act. If, however, artifacts or human remains are discovered during project construction, we ask that work cease immediately and the Quapaw Tribe Historic Preservation Office be contacted.

Should you have any questions or need any additional information, please feel free to contact me at the number listed below. Thank you for consulting with the Quapaw Tribe on this matter.

Sincerely,

Everett Bandy

Everett Bandy
Tribal Historic Preservation Officer
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, OK 74363
(w) 918-239-3100

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APPENDIX B: BIOGRAPHIES OF KEY PERSONNEL

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C. ANDREW BUCHNER, PRINCIPAL INVESTIGATOR

C. Andrew Buchner has 27 years experience as a cultural resource management (CRM) archeologist, is an owner/partner in Panamerican Consultants, Inc., and currently manages the company's Memphis office. His degrees include an M.A. (1989) in Anthropology from the University of Memphis, and a B.A. (1984) in Anthropology/Sociology from Westminster College, Fulton, Missouri. A native Arkansan (Little Rock Catholic High Class of 1980), he is certified by the Register of Professional Archeologists (RPA ID# 12420), and is a member of various professional organizations including the Society for American Archeology, the Southeastern Archeological Conference, the Caddo Conference, the Society for Historical Archeology, and the Society for Industrial Archeology. Additionally, he is a Life Member of the Arkansas Archeological Society. "Drew" has participated in dozens of projects in rural and urban contexts within Arkansas for clients including AHTD, the Corps of Engineers, the National Park Service, the Ouachita National Forest, Arkansas Parks, and Arkansas Game & Fish Commission, as well as various engineering firms. Mr. Buchner has written over 600 technical reports (including at least 216 reports in the AMASDA database), and is published in various peer-reviewed journals including two monographs in the Arkansas Archeological Survey's Research Series: *Mississippian Transitions at John's Lake* (Research Series No. 60) and *Excavations at the Howe Pottery a Late Nineteenth-Century Kiln in Benton, Arkansas* (Research Series No. 66).

ANDREW SAATKAMP, FIELD DIRECTOR

Andrew Saatkamp has 20 years of experience as a CRM archaeologist. His degrees include an M.A. (1994) in Anthropology from the University of Memphis and a B.A. (1989) in Anthropology from the University of Tennessee, Knoxville. Mr. Saatkamp is certified by the Register of Professional Archaeologists (RPA ID# 15459), and he is a member the Society for American Archaeology. Since joining Panamerican in 1994, Mr. Saatkamp has served as a Field Director for numerous survey projects in the southeastern United States, including numerous Phase I cultural resources projects in Arkansas. During his career, Mr. Saatkamp has authored or co-authored more than 200 contract reports. Mr. Saatkamp possesses various ancillary and computer skills, including GIS manipulation and analysis.

KARLA OESCH, LABORATORY DIRECTOR

Ms. Karla Oesch has nine years experience in the cultural resource management (CRM) field, and currently manages the Panamerican's Memphis laboratory and artifact collections. Her degrees include an M.S. (2016) in Earth Sciences/Archaeology from the University of Memphis, and a B.A. (2008) from the University of Alabama in 2008. She initially joined Panamerican in 2007, and since 2010 has served as the Laboratory Director of the Memphis office. While working for Panamerican, she has conducted artifact analysis of prehistoric and historic materials from both large and small-scale projects throughout Arkansas, and the elsewhere in the Southeast. She is a contributing author for over 100 CRM reports documenting Phase I, II, and III investigations. Karla is certified by the Register of Professional Archaeologists, and is currently a member of the Southeastern Archaeological Conference and the Society for American Archaeology. Additionally, Ms. Oesch is also very adept at creating graphic designs such as logos and marketing materials, and has prepared archaeology themed posters for conference presentations.

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APPENDIX C: REMOVABLE SITE LOCATOR MAP

THIS APPENDIX CONTAINS SITE-SENSITIVE INFORMATION AND IS NOT INTENDED FOR PUBLIC DISTRIBUTION

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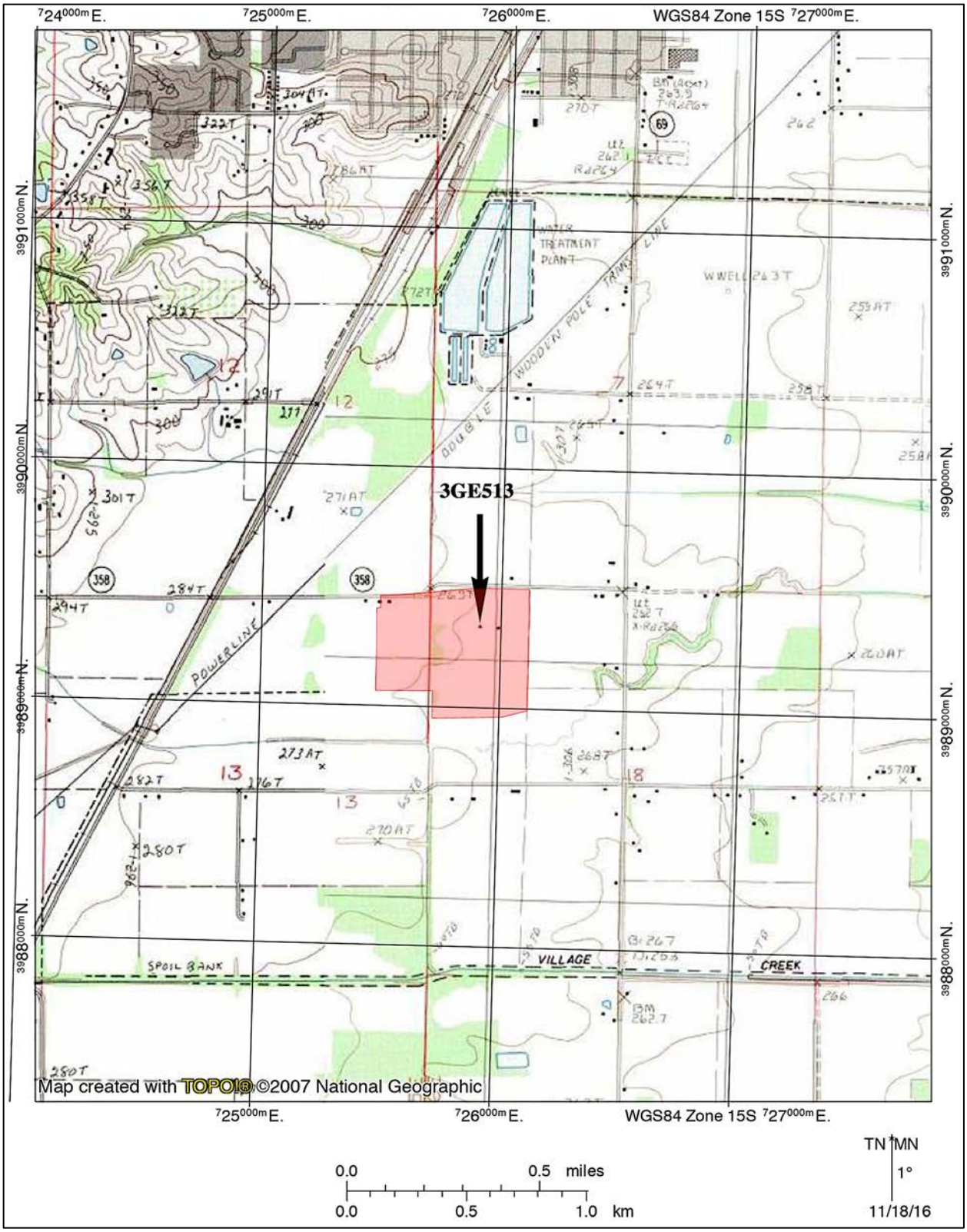

Figure C-01. Quad map locator for Site 3GE513 within the proposed Paragould Certified Industrial Site tract (base map: 1983 Paragould East, AR 7.5-min. quad).

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THE DEPARTMENT OF ARKANSAS
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Governor

Stacy Hurst
Director

Arkansas Arts Council

Arkansas Natural Heritage Commission

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December 20, 2016

Ms. Sue McGowan
Paragould Economic Development Corporation
P.O. Box 124, 300 W Court Street
Paragould, AR 72451

RE: Greene County – General
Section 106 Review – EDA
Report: *Phase I Cultural Resources Survey for a 78.77-Acre Certified Industrial Site, Paragould, Greene County, Arkansas*
AHPP Tracking Number: 96046.01

Dear Ms. McGowan:

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Thank you for the opportunity to review this undertaking. Please refer to the AHPP Tracking Number listed above in all correspondence. If you have any questions, please call Tim Dodson of my staff at 501-324-9784.

Sincerely,

Frances McSwain
Deputy State Historic Preservation Officer

cc: Mr. Jonathan Markley, EDA
Dr. Andrea Hunter, Osage Nation
Dr. Ann Early, Arkansas Archeological Survey

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 Rockwood Road, Little Rock, Arkansas 72204
Phone 501-455-4545 • Fax 501-455-4552

GEOTECHNICAL INVESTIGATION

FOR

PROPOSED PARAGOULD INDUSTRIAL SITE

PARAGOULD, ARKANSAS

* * * * *

ECONOMIC DEVELOPMENT CORPORATION OF PARAGOULD

OWNERS

300 WEST COURT STREET

PARAGOULD, ARKANSAS 72451

* * * * *

NOVEMBER 16, 2016

JOB NO. 15161

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD – LITTLE ROCK, ARKANSAS 72204
PHONE (501) 455-4545 FAX (501) 455-4552

November 16, 2016

Job No. 15161

Ms. Sue McGowan
Economic Development Corporation of Paragould
300 West Court Street
Paragould, Arkansas 72451

Re: Geotechnical Investigation
Proposed Paragould Industrial Site
Paragould, Arkansas

Dear Ms. McGowan:

It is our pleasure to submit this report on the soil and foundation investigation for the proposed Paragould Industrial Site at Paragould, Arkansas. The investigation consisted of field test borings, soils laboratory analyses, pavement analyses, and foundation design analyses.

It is recommended a more detailed investigation be performed once the project becomes more defined. As a minimum, we recommend that the site preparation and foundation excavations be verified by our qualified geotechnical representative during the foundation construction, so that adequate remedial measures can be implemented. This is the most feasible means of assuring the owners, designers, and builders that the geotechnical design intent is being achieved. In the event adverse geotechnical conditions are encountered during excavation, they must be identified and evaluated so that safe and economical structures may be constructed.

We wish to express our appreciation for the opportunity of serving you and other members of the design team. We are available for further consultation during the design and construction at any time, should you have a need for further assistance.

Very truly yours,

ANDERSON ENGINEERING CONSULTANTS, INC.

CERTIFICATE OF AUTHORIZATION ANDERSON ENGINEERING CONSULTANTS, INC. No. 73 ARKANSAS - ENGINEER

Stuart M. Scheiderer, R.E.P., P.E.
Senior Geotechnical Engineer

Scott W. Anderson, R.E.P., P.E.
Principal Engineer

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No.11424 STUART M. SCHEIDERER 11/16/16

SMS/SWA/plf
15161.GEO

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

GEOTECHNICAL INVESTIGATION

FOR

PROPOSED PARAGOULD INDUSTRIAL SITE

PARAGOULD, ARKANSAS

* * * * *

ECONOMIC DEVELOPMENT CORPORATION OF PARAGOULD

OWNERS

300 WEST COURT STREET

PARAGOULD, ARKANSAS 72451

* * * * *

BY

ANDERSON ENGINEERING CONSULTANTS, INC.

GEOTECHNICAL CONSULTANTS

10205 ROCKWOOD ROAD

LITTLE ROCK, ARKANSAS 72204

NOVEMBER 16, 2016 JOB NO. 15161

TABLE OF CONTENTS

TEXT	PAGE
Important Information About Your Geotechnical Engineering Report	i
Purpose	1
Scope	1
Authority	2
Project Description	2
General Geology	2
Geotechnical Investigation	2
Groundwater Conditions/Drainage	3
Seismicity	4
Laboratory Testing	5
Earthwork	5
Foundations	8
Floor Slabs	9
Drives and Parking Areas	9
Construction Quality Control	10
Conclusions and Recommendations	11
Limitations	12

APPENDIX A	PLATE
Vicinity Map	1
Plan of Borings	2
Logs of Borings	3 - 7
Field Classification System for Soil Exploration	8
Key to Soil Classifications and Symbols	9
Unified Soil Classification System (ASTM D 2487)	10
Design Calculations for Conventional Footings	11
Depth Versus Bearing Capacity Curve	12
Explanation of Bearing Capacity Calculations	13

APPENDIX B	PLATE
Moisture Content Determination (ASTM D 2216)	B1
Atterberg Limit Determinations (ASTM D 4318)	B2
Mechanical Grain Size Analyses (ASTM D 422 and D 1140)	B3 - B4
Shrinkage/Swell Index Tests (FHA Publication No. 701)	B5 - B6

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one —not even you —*should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

IIGER060045.0M

PURPOSE

The primary purposes of this geotechnical investigation were:

a. To determine the physical and engineering properties of the soils within the area of the proposed construction with respect to their suitability for the support of normal construction.

b. To make general recommendations for the earthwork, pavements and the type of foundation suited for the prevailing soil conditions within the proposed construction area.

c. To evaluate and recommend the design procedures for the various soil, pavement and foundation items in accordance with current engineering practices.

SCOPE

The scope of this geotechnical investigation includes the following:

a. The geologic features in the vicinity of the project consist of alluvial clayey and silty soils. A total of five auger borings were performed and terminated at depths of 26.5 feet as authorized by the client.

b. Field testing consisted of Standard Penetration test samples (ASTM D 1586) taken in all of the borings. Soils were visually classified in the field by a soils engineering technician.

c. The soils analyses were based on N-values obtained from the Standard Penetration tests, moisture contents, Atterberg limits, mechanical grain size analyses, shrinkage/swell tests, visual observations, and other routine inspection and classification methods. The soils were classified basically in accordance with the Unified Soil Classification System (ASTM D 2487); however, visual classifications may be given on the logs.

d. The foundation bearing capacity and settlement analyses were based on our current foundation design procedures, using the Standard Penetration N-values obtained during drilling, results of the laboratory testing program, and engineering analyses.

e. The flexible pavement design shown in this report is based on the CBR design method estimated from field and laboratory tests on the near surface soils encountered across the site.

AUTHORITY

This geotechnical investigation was authorized by acceptance of AECI Proposal No. 87016 on September 2, 2016, by Ms. Sue McGowan of the Economic Development Corporation of Paragould, the owner's representative for the proposed project. Access to the property was delayed to facilitate harvest of crops.

PROJECT DESCRIPTION

The site is comprised of approximately 78.8 acres and is located between Business Highway 412 and Jones Road, just west of their intersection with South 2nd Avenue in Paragould, Arkansas, as illustrated on the Vicinity Map, Plate 1. The borings were placed across the site as shown on the Plan of Borings, Plate 2, to obtain the general soil conditions across the site. It is understood that a specific project has not been selected for development. Grading and loading information are unknown at the time of the investigation.

GENERAL GEOLOGY

The Paragould, Arkansas, area lies on Crowley's Ridge within the Mississippi Embayment Physiographic region of north eastern Arkansas. This area consists of a complex layering of alluvial and terrace deposits of silts, clays, and sands with lenses of clay and gravel from the Quaternary Period. The soils range, in general, from clays to sands. The site soils were found to be consistent with the area geology and consisted primarily of silty clay (CL) over a majority of the depths investigated.

GEOTECHNICAL INVESTIGATION

On October 19, 2016, a geotechnical drilling crew performed the drilling and sampling of five borings at the proposed project site. As a result of the drilling program, boring logs showing stratigraphic and testing information are provided on Plates 3 through 7. The Field Classification System for Soil Exploration and Key to the Soil Classifications and Symbols are given on

Plates 8 and 9, respectively. These systems are provided to aid the reader in interpreting the various symbols used on the logs of borings. The Unified Soil Classification System is given on Plate 10. This system is used to determine the soil classification and to develop the terminology used on the logs of borings.

The N-values shown on the logs and were determined from the number of blows (N) of the 140.0-pound hammer required to drive the 1-3/8-inch I.D. split spoon the last 12.0 inches of the total 18.0-inch drive or portions thereof as may be indicated on the boring logs. These values are used to correlate strength and settlement characteristics of the soils and to determine allowable bearing values of these materials. The N-values obtained in the structural borings are summarized in the following table:

TABLE I
SUMMARY OF STRUCTURAL BORINGS

SAMPLE INTERVAL (FEET)	B1	B2	B3	B4	B4
0.0 - 1.5	20	6	11	12	8
2.5 - 4.0	25	8	11	12	7
5.0 - 6.5	10	5	15	8	10
7.5 - 9.0	11	10	14	13	11
10.0 - 11.5	11	11	16	11	11
15.0 - 16.5	9	16	11	10	12
20.0 - 21.5	15	25	10	13	21
25.0 - 26.5	18	25	11	11	18

GROUNDWATER CONDITIONS/DRAINAGE

Groundwater was encountered during this investigation at an approximate depth of 13.0 feet. Perched water, however, should be expected during wet periods near the surface. This latent water condition is typically due to storage of recent rainfall or by a barrier to capillary evaporation. Perched water if encountered will most likely be brief in duration and typically in low quantities. Areas likely to contain perched water include paved areas, beneath existing structures, old drainage swales, fills, and existing utility trenches.

Where perched water is encountered the contractor should expect to excavate gravity drainage ditches to divert it away from the construction area. Additionally, soft, wet and pumpable soils can be expected. In structural areas these soils should be removed and be replaced with a select fill soil compacted to project specifications. Since the quantity of undercut is unknown it would be prudent to establish a unit rate for this item of work to minimize construction delays.

The proposed construction area is relatively flat and offers minimal relief for surficial runoff. Efforts should be made to install permanent drainage features as early as possible to promote drainage. Increased amounts of moisture could compromise the integrity of the subgrade and result in additional undercut. The construction areas should be maintained in a well-drained condition in an effort to limit the amount of undercut required.

SEISMICITY

The seismic analysis requires the selection of appropriate site coefficients and other seismic values that can be established from the subsurface conditions, guidelines set forth by local, state, and federal codes, and historical seismic information. The structure should be designed using guidelines as set forth in the 2012/2015 International Building Code as required by **Arkansas Act 1100-1991** (and subsequent amendments) as determined appropriate. The site soils consist primarily of silty clay over the depths investigated. The following seismic values were obtained from the U.S. Geological Seismic Design Maps application and are considered applicable to this project site based upon the site conditions and the 2012/2015 International Building Code (IBC) seismic values for Arkansas:

IBC (2012/2015)

Site Class	D*
Value of Site Coefficient (F_a)	1.000
Value of Site Coefficient (F_v)	1.500
Spectral Response Acceleration at Short Periods (S_s)	1.443 g
Spectral Response Acceleration at a Period of 1.0 Second (S_1)	0.502 g

*Considering the size and function of the proposed structure the 100-foot deep boring was not performed at the site as allowed by the IBC. A liquefaction analyses was also not performed under the scope of this investigation.

LABORATORY TESTING

Laboratory tests were performed on selected samples to aid in classification of the soils encountered and recommendations. The moisture content of the samples tested exceeded 20.0% in most cases, which is considered excessive. Atterberg limits were also performed and indicate a majority of the soils are slightly plastic with a liquid limit ranging from 29 to 36 and plasticity index (PI) values between 10 and 18. Mechanical grain size analyses were also performed and indicate the soils contain a minimum of 94.9% fines (passing the No. 200 sieve). Based on these results, a majority of the soils would classify as silty clay (CL). Some non-cohesive soils near the surface would classify as silt (ML). Two representative samples were remolded in the laboratory and inundated to determine the swell pressure that could develop if the soils were allowed to saturate in the field. Negligible swell pressures resulted. A maximum linear shrinkage value of 4.4% was also determined. Provided the criteria in the **EARTHWORK** section is met or exceeded, swell values should be maintained at tolerable limits (<0.25-inch). Individual test results are shown in Appendix B.

EARTHWORK

The following sections are intended to provide the designer and contractor with guidelines for construction of the project. They are not intended to be used as a specification for construction procedures or methods. It is strongly recommended that a more detailed investigation be performed once the project becomes more defined. The condition of the subgrade materials should be considered a significant factor in the early stages of project planning and construction. The conditions reflected herein are based on the data obtained from the borings and the soil condition at the time of drilling. Data obtained from the borings can be effected by seasonal fluctuations in rainfall and temperatures. Construction planning and sequencing will likely be a crucial factor on the amount of undercut required for soft soil conditions. Time constraints (proposed schedule) may restrict the contractor's ability to process wet soils. Prepared subgrade

or compacted fill should not be subjected to prolonged periods of weather or construction traffic. Areas intended to be used as staging by the contractor will likely require additional processing and compaction due to distress caused by construction traffic.

The proposed construction areas should be stripped of vegetation and topsoil. Variable amounts of undercut or stabilization could be required prior to fill placement to prepare the subgrade adequately for fill placement. For an estimation on the amount of soft soils, the reader should consult the N-values summarized in Table I on page 3. Previous experience has shown the soils with an N-value of 10 or greater typically perform adequately for proof rolling, with minor amounts of re-working or processing. Proof rolling should be performed prior to fill placement. A proof roll should be defined as a loaded, tandem axle dump truck performing several passes across the exposed subgrade. Soft or unstable soils will require undercut or stabilization. Depending on the construction schedule and depth of soft soils, undercut may prove to be the most feasible alternative.

The soils identified are extremely moisture sensitive, especially the non-cohesive silts at the surface in some areas. These materials will readily pump and rut with increases in moisture content. The owner and contractor should expect difficulty with these materials in wet or winter months, especially in maintaining their stability. Areas of fill should be graded to facilitate run-off and prevent accumulation of water.

Ideal fill materials for the project should consist of granular, non-expansive type soils with a plasticity index (PI) between 5 and 20 per ACI 360R. Other locally available soils may also be suitable, but must be approved by the soils engineer prior to their use. Obtaining compaction of on-site soils will be difficult given their soft condition and elevated moisture content. On-site soils are more prone to pumping and rutting than off-site granular soils, therefore, if on site soils

are utilized it will be difficult and likely result in additional earthwork expense for aeration, drying, etc. Fill soils should be placed in maximum 8.0-inch loose lifts, moisture conditioned to within three percentage points of optimum moisture content, and compacted to a minimum of 98% Standard compaction. It should be noted that especially during wet or winter months, aeration of fill may be required.

The soils encountered should be excavated with normal tracked excavators. No conditions were encountered over the depths investigated that would indicate difficulty with excavations. Trench excavations for utilities should be completed with normal excavation equipment. The site soils are cohesive and should not be prone to significant sloughing or cave-ins. However, if these materials are allowed to saturate, some cave-ins are possible. Based on OSHA regulations (29 CFR 1926, Subpart P) regarding soil classification for trench excavations, the shallow soils encountered would best classify as Type C. In any case, OSHA regulations regarding shoring or benching of excavations should be considered during construction. Backfilling trench excavations should satisfy the criteria given previously, though flowable fill may be used as an alternative for confined spaces provided it is allowed to properly cure.

Site grading and earthwork operations will be more difficult in wet or winter months. Should earthwork operations for the project begin in the time period of November through April, the owner should anticipate and budget for additional expenses for earthwork. Construction of an all weather haul road may be necessary for access and mobility. Not only will more frequent and saturating rains be prevalent during these months, ambient air conditions are not conducive to drying of site soils. Efficient aeration and drying of soils is dependent upon high temperatures, low humidity, and the contractor's ability to disc or scarify the soils. Aeration and drying of on-site soils will require additional effort by the contractor and should be considered during budgeting or planning. Wet conditions may also require drying of otherwise suitable soils.

FOUNDATIONS

Provided specific recommendations for foundations is difficult since the parameters of the project are not yet defined. Conventional shallow foundations (strip/spread) would likely be the most feasible foundation alternative for support of light to moderate loads. The average N-values with depth across the site were used to develop the calculations and curve presented on Plates 11 and 12. As indicated on Plate 12, an allowable bearing capacity of 2000 psf could be used in design. An explanation of bearing capacity terminology is provided on Plate 13. Footings should bear 2.0 feet below finished grades or as directed by local building codes. For these conditions, the magnitude of settlement is estimated to be on the order of 1.00 inch total with a differential settlement of 0.50 inch. It should be noted that these values could require modification based on grading and loading information.

The bearing capacity and settlement discussions provided previously assume that the structural loadings are static and positioned such that a relatively uniform bearing pressure is exerted to the bearing strata. Eccentric, inclined or other loadings that result in a non-uniform bearing pressure will require further evaluation by this firm once specific loading conditions are established. In any case, it would be prudent to increase the rigidity of the foundation in an effort to minimize potential differential movements. An increase in rigidity can be achieved by techniques that would increase the section modulus of the foundation members. Column and wall footings should be designed in accordance with the requirements of the various applicable codes.

Heavy and/or dynamic loads will require support by deep or intermediate foundations to limit settlements. Depending on the loading conditions, drilled piers or augered cast-in-place piles could be used for support of these items. Stone-columns or other soil improvement techniques might also prove to be feasible alternatives. Without specific loading conditions, it is difficult to provide specific depth and capacity details. These areas will require more information as a specific project is selected.

FLOOR SLABS

The stiffness effect of a well compacted subgrade and/or engineered fill should greatly diminish the differential floor slab movements to tolerable limits. The anticipated grades would result in the floor slabs bearing on varying amounts of compacted fill or adequate natural ground. For this condition the designer should consider a modulus of subgrade reaction (k) of 100.0 pci over the top 8.0 inches of compacted subgrade. In the American Concrete Institute (ACI) Publication 302.1R-15, Subsection 6.1.4, a "base material" is recommended in place of the conventional cleaner "sand cushion" material. The manual maintains that clean sand (commonly "cushion" sand) is difficult to compact and maintain until concrete placement is complete. ACI recommends a clean, fine graded material (with at least 10% to 30% of particles passing a #100 sieve) which is not contaminated with clay, silt or organic material.

DRIVES AND PARKING AREAS

The following pavement designs and pavement recommendations are based on numerous reasonable assumptions concerning the pavement use, site conditions, and maintenance. The existing natural ground after stripping of all surface features, topsoil, organic root zone, and any near surface debris will perform satisfactorily as subgrade for the pavement structures. An estimated CBR of 3 was determined for the subgrade soils based on SPT values obtained from borings in the parking area of the site and earthwork criteria provided previously. As indicated in the **EARTHWORK** section and boring logs in parking areas of the site, variable amounts of undercut or stabilization will likely be required. These sections should be considered for budget estimates only and must be reviewed once specific loading conditions are established.

Flexible pavement typically consists of asphalt cement hot mix (ACHM). ACHM is most commonly used for light to moderate traffic areas including straight drives and parking areas for light vehicles. It should not be used in traffic lanes where trucks turn, backup, or pickup trash

dumpsters. Based on the subgrade CBR of 3 and a minimum of 8.0 inches of properly compacted subgrade, light duty pavement should consist of 2.0 inches of asphalt and 6.0 inches of base. A heavy duty section should contain 3.0 inches of asphalt and 8.0 inches of base.

Rigid (PCC) pavements are commonly used for both light and heavy duty traffic applications. Minimally, approach slabs, truck turning areas, docks, and dumpster pads should be PCC. Based on the site subgrade CBR of 3 and a modulus of subgrade reaction of 100.0 pci over the minimum 8.0 inches of compacted subgrade, light duty areas should consist of 5.0 inches of concrete and 4.0 inches of base. Heavy duty sections should consist of a minimum of 7.0 inches of concrete and 6.0 inches of base.

The long term pavement performance will be directly related to several factors such as adequate edge drainage and surface drainage which does not allow water to accumulate on the pavement surface or behind the curbs and pavement edges. All pavement joints must be sealed and should be placed parallel to the overall site drainage direction. All irrigation, water, and other utility lines should be carefully monitored to insure they do not contribute to premature pavement failure by allowing water to migrate onto or under the pavements. Adequate quality control testing including proof rolling, compaction testing, thickness testing of base and ACHM as well as compaction of the ACHM is critical to successful long term pavement performance. In addition, pavements will require regular maintenance such as periodic surface sealing and crack sealing to prolong the desired performance and life.

CONSTRUCTION QUALITY CONTROL

Quality control testing should be utilized in all phases of the construction. To verify that the proper performance of the proposed structures, all fill required should be compacted to a minimum of 98% Standard compaction, in accordance with ASTM D 698. The turndown excavations should be evaluated to verify that the recommended bearing capacity has not been reduced by disturbance to excavation or massive imperfections in the bearing strata. A

geotechnical engineering representative should be present to evaluate the bottom of the foundation excavations by means of a static cone penetration device. The compaction of the pavement sections should be verified by tests after the earthwork is completed, so as not to invalidate the design criteria. Our recommendations are based upon adequate quality control testing being utilized and further evaluations and reviews during the construction phase of the project.

CONCLUSIONS AND RECOMMENDATIONS

As a result of this geotechnical investigation, the following recommendations are offered for consideration:

1. A more detailed investigation should be performed once a specific project is selected for development.
2. As previously discussed, conventional footings would serve satisfactorily for light to moderately loaded structures. Deep or intermediate foundations should be considered for heavy and/or dynamic loads. Foundations should be designed in accordance with the necessary structural and/or architectural requirements.
3. Low PI, non-expansive fill soils shall be placed in 8.0-inch thick lifts and be compacted within three percentage points of optimum moisture content to 98% Standard Proctor density as per ASTM D 698. The select fill shall have a PI between 5 and 20 per ACI 360R. On-site soils with a PI of less than 20 may be used provided they are moisture conditioned to at least optimum.
4. Perimeter surface drainage should be assured around the exterior of the building to intercept and drain surface runoff or seepage water from the near surface and foundation support soils. It would also be a prudent measure to slope backfill soils away from foundation walls and otherwise protect the structure from moisture infiltration.
5. Quality control testing should be utilized in the construction of the foundation, undercutting, fill placement, and floor slab construction with adequate testing to verify that the design requirements have been achieved.

6. The use of flexible or rigid pavements should be a function of the anticipated traffic use as determined by the designer using the recommended sections. As a minimum PCC pavements should be used for truck lanes and dumpster pads.
7. Geotechnical engineering services by a qualified firm are recommended during the foundation construction phase so that adequate compensation can be made for conditions that may occur which differ significantly from those assumed as a result of this investigation.
8. Other recommendations are given throughout the text of this report.

LIMITATIONS

The project is undefined at this point. A more detailed investigation should be performed. The boring logs shown in this report contain information related to the types of soil encountered at specific locations and times and show lines delineating the interface between these materials, as well as results of tests performed in the laboratory on representative samples. The logs also contain our field geologist's interpretation of conditions that are believed to exist in those depth intervals between the actual samples taken. Therefore, these boring logs contain both factual and interpretative information. It is not warranted that these logs are representative of subsurface conditions at other locations and times.

The analyses, conclusions, and recommendations contained in this report are based on site conditions as they existed at the time of our field investigation and further on the assumption that the exploratory borings are representative of the subsurface conditions throughout the site. If, during construction, different subsurface conditions from those encountered in our borings are observed, or appear to be present beneath excavations, we must be advised promptly so that we can review these conditions and provide new recommendations as becomes necessary. Recognize that both natural and manmade events may have changed site conditions since issuance of this report and further review may result. If after submission of this report structural loads or finished grades are changed from those that were assumed, we urge that we be promptly informed, and

retained to review our report to determine the applicability of the conclusions and recommendations, considering the changed conditions and/or time lapse. Further, we request that our firm be retained to review those portions of the plans and specifications for this particular project that pertain to earthwork and foundations as a means to determine whether the plans and specifications are consistent with the recommendations contained in the report.

It should be understood that there is the possibility that even with the proper application of current engineering principles, conditions may exist on the site that could not be identified within the scope of this investigation or which were not reasonably identifiable from the available information. The conclusions and recommendations in this report contain all the limitations inherent to the principles and practice of geotechnical engineering. AECI has not performed any observations, investigation, study, or testing that is not specifically listed in the scope of services. Thus, AECI shall not be liable for failing to discover any condition whose discovery required the performance of services outside of the scope of services provided in our proposal.

* * * * *

APPENDIX A

PLATES

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

NORTH

VICINITY MAP

PARAGOULD, ARKANSAS

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NOT DRAWN TO SCALE.

NORTH

PLAN OF BORINGS

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED PARAGOULD INDUSTRIAL SITE
PARAGOULD, ARKANSAS
BORING NO: B1

FOR: PARAGOULD REGIONAL CHAMBER OF COMMERCE **LOCATION:** SEE PLAN OF BORINGS

DATE: 10/19/16 **JOB NO:** 15161 **BORING TYPE:** WASH W/SPT

DRILLER: JOHNSON
HILYARD ATV
GEOTECHNICIAN: JOHNSON **GROUND ELEVATION:** NOT FURNISHED

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	20		6.0 INCHES OF TOPSOIL VERY STIFF MOIST BROWN SILT (ML) PP = 2.00 TSF
	P2	25		PP = 2.50 TSF
5	P3	10		STIFF TO VERY STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.00 TSF
	P4	11		PP = 1.25 TSF
10	P5	11		CONTINUES (CL) PP = 1.25 TSF
15	P6	9		PP = 1.00 TSF
20	P7	15		CONTINUES (CL) PP = 1.50 TSF
25	P8	18		PP = 2.00 TSF
				BOTTOM OF HOLE AT 26.5 FEET. BORING REMAINED OPEN. WATER TABLE CANNOT BE VERIFIED DUE TO WASH DRILL METHOD.

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED PARAGOULD INDUSTRIAL SITE
PARAGOULD, ARKANSAS
BORING NO: B2

FOR: PARAGOULD REGIONAL CHAMBER OF COMMERCE **LOCATION:** SEE PLAN OF BORINGS

DATE: 10/19/16 **JOB NO:** 15161 **BORING TYPE:** AUGER/WASH W/SPT

DRILLER: JOHNSON
HILYARD ATV
GEOTECHNICIAN: JOHNSON **GROUND ELEVATION:** NOT FURNISHED

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	6		6.0 INCHES OF TOPSOIL MEDIUM STIFF TO VERY STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.75 TSF
	P2	8		PP = 1.00 TSF
5	P3	5		CONTINUES (CL) PP = 0.50 TSF
	P4	10		PP = 1.00 TSF
10	P5	11		CONTINUES (CL) PP = 1.25 TSF
				BEGIN WASH DRILL
15	P6	16		CONTINUES (CL) - BECOMES SANDY PP = 1.75 TSF
20	P7	25		CONTINUES (CL) PP = 2.50 TSF
25	P8	25		PP = 2.50 TSF
				BOTTOM OF HOLE AT 26.5 FEET. BORING REMAINED OPEN. WATER TABLE ENCOUNTERED AT 13.0 FEET IN AUGER PORTION OF BORING.

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED PARAGOULD INDUSTRIAL SITE
PARAGOULD, ARKANSAS
BORING NO: B3

FOR: PARAGOULD REGIONAL CHAMBER OF COMMERCE **LOCATION:** SEE PLAN OF BORINGS

DATE: 10/19/16 **JOB NO:** 15161 **BORING TYPE:** WASH W/SPT

DRILLER: JOHNSON
HILYARD ATV
GEOTECHNICIAN: JOHNSON **GROUND ELEVATION:** NOT FURNISHED

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	11		6.0 INCHES OF TOPSOIL STIFF TO VERY STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.25 TSF
	P2	11		PP = 1.25 TSF
5	P3	15		CONTINUES (CL) PP = 1.50 TSF
	P4	14		PP = 1.50 TSF
10	P5	16		CONTINUES (CL) PP = 1.75 TSF
15	P6	11		PP = 1.25 TSF
20	P7	10		CONTINUES (CL) PP = 1.00 TSF
25	P8	11		PP = 1.25 TSF
				BOTTOM OF HOLE AT 26.5 FEET. BORING REMAINED OPEN. WATER TABLE CANNOT BE VERIFIED DUE TO WASH DRILL METHOD.

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED PARAGOULD INDUSTRIAL SITE
PARAGOULD, ARKANSAS
BORING NO: B4

FOR: PARAGOULD REGIONAL CHAMBER OF COMMERCE **LOCATION:** SEE PLAN OF BORINGS

DATE: 10/19/16 **JOB NO:** 15161 **BORING TYPE:** WASH W/SPT

DRILLER: JOHNSON
HILYARD ATV
GEOTECHNICIAN: JOHNSON **GROUND ELEVATION:** NOT FURNISHED

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	12		8.0 INCHES OF TOPSOIL VERY STIFF MOIST BROWN SILT (ML) PP = 1.25 TSF
	P2	12		MEDIUM STIFF TO STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.25 TSF
5	P3	8		PP = 1.00 TSF
	P4	13		PP = 1.50 TSF
10	P5	11		CONTINUES (CL) PP = 1.25 TSF
15	P6	10		PP = 1.00 TSF
20	P7	13		CONTINUES (CL) PP = 1.50 TSF
25	P8	11		PP = 1.25 TSF
				BOTTOM OF HOLE AT 26.5 FEET. BORING REMAINED OPEN. WATER TABLE CANNOT BE VERIFIED DUE TO WASH DRILL METHOD.

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED PARAGOULD INDUSTRIAL SITE
PARAGOULD, ARKANSAS
BORING NO: B5

FOR: PARAGOULD REGIONAL CHAMBER OF COMMERCE **LOCATION:** SEE PLAN OF BORINGS

DATE: 10/19/16 **JOB NO:** 15161 **BORING TYPE:** WASH W/SPT

DRILLER: JOHNSON
HILYARD ATV
GEOTECHNICIAN: JOHNSON **GROUND ELEVATION:** NOT FURNISHED

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	8		8.0 INCHES OF TOPSOIL VERY STIFF MOIST BROWN SILT (ML) PP = 1.25 TSF
	P2	7		MEDIUM STIFF TO STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.75 TSF
5	P3	10		PP = 1.00 TSF
	P4	11		PP = 1.25 TSF
10	P5	11		CONTINUES (CL) PP = 1.25 TSF
15	P6	12		PP = 1.25 TSF
20	P7	21		CONTINUES (CL) PP = 2.25 TSF
25	P8	18		PP = 2.00 TSF
				BOTTOM OF HOLE AT 26.5 FEET. BORING REMAINED OPEN. WATER TABLE CANNOT BE VERIFIED DUE TO WASH DRILL METHOD.

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

FIELD CLASSIFICATION SYSTEM
FOR SOIL EXPLORATION

NON COHESIVE SOILS

(Silt, Sand, Gravel and Combinations)

Density

Very Loose	- 0 - 4 blows/ft.
Loose	- 4 to 10 blows/ft.
Medium Dense	- 10 to 30 blows/ft.
Dense	- 30 to 50 blows/ft.
Very Dense	- over 50

Relative Proportions

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

Particle Size Identification

Boulders	-	8-inch diameter or more
Cobbles	-	3 to 8-inch diameter
Gravel	- Coarse	- 1 to 3-inch
	Medium	- ½ to 1-inch
	Fine	- ¼ to ½-inch
Sand	- Coarse	- 0.6 mm to ¼-inch (dia. of pencil lead)
	Medium	- 0.2 mm to 0.6 mm (dia. of broom straw)
	Fine	- 0.05 mm to 0.2 mm (dia. of human hair)
Silt		- 0.06 mm to 0.002 mm (Cannot see particles)

COHESIVE SOILS

(Clay, Silt and Combinations)

Consistency

Very Soft	- < 2 blows/f.t
Soft	- 2 to 4 blows/ft.
Medium Stiff	- 4 to 8 blows/ft.
Stiff	- 8 to 15 blows/ft.
Very Stiff	- 15 to 30 blows/ft.
Hard	- over 30

Plasticity

Degree of Plasticity	Plasticity Index
None to slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	over 22

NOTES

Classification on logs are made by visual inspection.

Standard Penetration Test - Driving a 2.0-inch O.D., 1⅜-inch I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30.0 inches. It is customary for AECI to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6.0 inches of penetration on the drill log (Example: 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e., 8 + 9 = 17 blows/ft.).

Strata Changes - In the column "Soil Descriptions" on the drill log the horizontal lines represent strata changes. A solid line (------) represents an actually observed change, a dashed line (- - - -) represents an estimated change.

Groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

KEY TO SOIL CLASSIFICATIONS AND SYMBOLS

UNIFIED SOIL CLASSIFICATION SYSTEM(1)

Major Divisions		Letter	Symbol: Hatching	Symbol: Color	Name
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW		RED	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP			Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM		YELLOW	Silty gravels, gravel-sand-silt mixtures
		GC			Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS	SW		RED	Well-graded sands or gravelly sands, little or no fines
		SP			Poorly-graded sands or gravelly sands, little or no fines
		SM		YELLOW	Silty sands, sand-silt mixtures
		SC			Clayey sands, sand-clay mixtures
FINE GRAINED SOILS	SILTS AND CLAYS LL<50	ML		GREEN	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL			Organic silts and organic silt-clays of low plasticity
	SILTS AND CLAYS LL>50	MH		BLUE	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH			Inorganic clays of high plasticity, fat clays
		OH			Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		Pt		ORANGE	Peat and other highly organic soils

TERMS CHARACTERIZING SOIL STRUCTURE(2)

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance.

FISSURED - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

LAMINATED (VARVED) - composed of thin layers of varying color and texture, usually grading from sand or silt at the bottom to clay at the top.

CRUMBLY - cohesive soils which break into small blocks or crumbs on drying.

CALCAREOUS - containing appreciable quantities of calcium carbonate, generally nodular.

WELL GRADED - having wide range in grain sizes and substantial amounts of all intermediate particle sizes.

POORLY GRADED - predominantly of one grain size (uniformly graded) or having a range of sizes with some intermediate size missing (gap or skip graded).

SYMBOLS FOR TEST DATA

M/C = 15 - Natural moisture content in percent.
γ = 95 - Dry unit weight in pounds/cubic foot.
Qu = 1.23 - Unconfined compression strength in tons/square foot.
Qc = 1.68 (21 psi) - Confined compression strength at indicated lateral pressure.
51-21-30 - Liquid limit, Plastic limit, and Plasticity index.
30% FINER - Percent finer than No. 200 mesh sieve.
30 B/F - Blows per foot, Standard Penetration test.
▼ - Hydrostatic water table.
▽ - Static water table.

TERMS DESCRIBING CONSISTENCY OF SOILS(2)

COARSE GRAINED SOILS		FINE GRAINED SOILS		
DESCRIPTIVE TERM	NO. BLOWS/FOOT STANDARD PEN. TEST	DESCRIPTIVE TERM	NO. BLOWS/FOOT STANDARD PEN. TEST	UNCONFINED COMPRESSION TONS PER SQ. FT.
Very Loose	0 - 4	Very Soft	<2	<0.25
Loose	4 - 10	Soft	2 - 4	0.25 - 0.50
Firm (medium dense)	10 - 30	Plastic (medium stiff)	4 - 8	0.50 - 1.00
Dense	30 - 50	Stiff	8 - 15	1.00 - 2.00
Very Dense	over 50	Very Stiff	15 - 30	2.00 - 4.00
		Hard	over 30	over 4.00

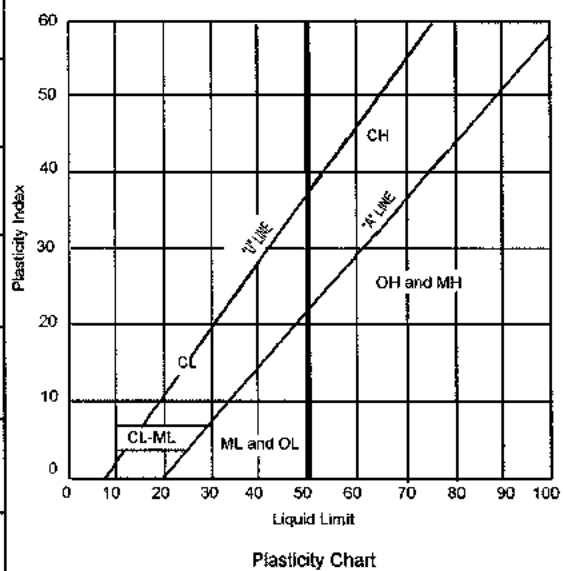
Field classification for "Consistency" is determined with a 0.25-inch diameter penetrometer.

(1) - From Waterways Experiment Station Technical Memorandum No. 3-357

(2) - From "Soil Mechanics in Engineering Practice" by Terzaghi and Peck

UNIFIED SOIL CLASSIFICATION SYSTEM

(ASTM D 2487)

Major divisions			Group Symbols	Typical Names	Laboratory Classifications Criteria
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (more than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent ..... GW, GP, SW, SP; More than 12 percent ..... GM, GC, SM, SC; 5 to 12 percent ..... Borderline cases requiring dual symbols**
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravels with fines (Appreciable amount of fines)	GM* d / u	Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits below "A" line or P.I. less than 4
					Atterberg limits above "A" line with P.I. greater than 7
					Above "A" line with P.I. Between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM* d / u	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
					Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly Organic soils		Pt	Peat and other highly organic soils	

Plasticity Chart

*Division of GM and SM groups into subdivisions of d and u are for roads and airfield only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I is 6 or less; u used when L.L. is greater than 24.

**Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example GW-GC, well-graded gravel-sand mixture with clay binder.

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

Design Calculations for Conventional Footings

PROJECT: Proposed Paragould Industrial Site
PROJECT NO.: 15161 DATE: 11/15/16
BORING NO.: AVG TESTED BY: AECI SAFETY FACTOR: 2.00

Df ft	Depth from	- ft. to	STRATA H - ft	N B/F	Qu KSF	Qu/2 KSF	1.25Qu KSF	.125Df KSF	Qa KSF
1.5	0.0	1.5	1.5	11	2.9	1.5	3.6	0.188	1.9
4.0	1.5	4.0	2.5	13	3.4	1.7	4.3	0.500	2.4
6.5	4.0	6.5	2.5	10	2.7	1.3	3.3	0.813	2.1
9.0	6.5	9.0	2.5	12	3.2	1.6	4.0	1.125	2.5
11.5	9.0	11.5	2.5	12	3.2	1.6	4.0	1.438	2.7
16.5	11.5	16.5	5.0	12	3.2	1.6	4.0	2.063	2.9
21.5	16.5	21.5	5.0	17	4.5	2.2	5.6	2.688	3.9
26.5	21.5	26.5	5.0	17	4.5	2.2	5.6	3.313	4.0

WATER TABLE LEVEL: 13.0 ft.

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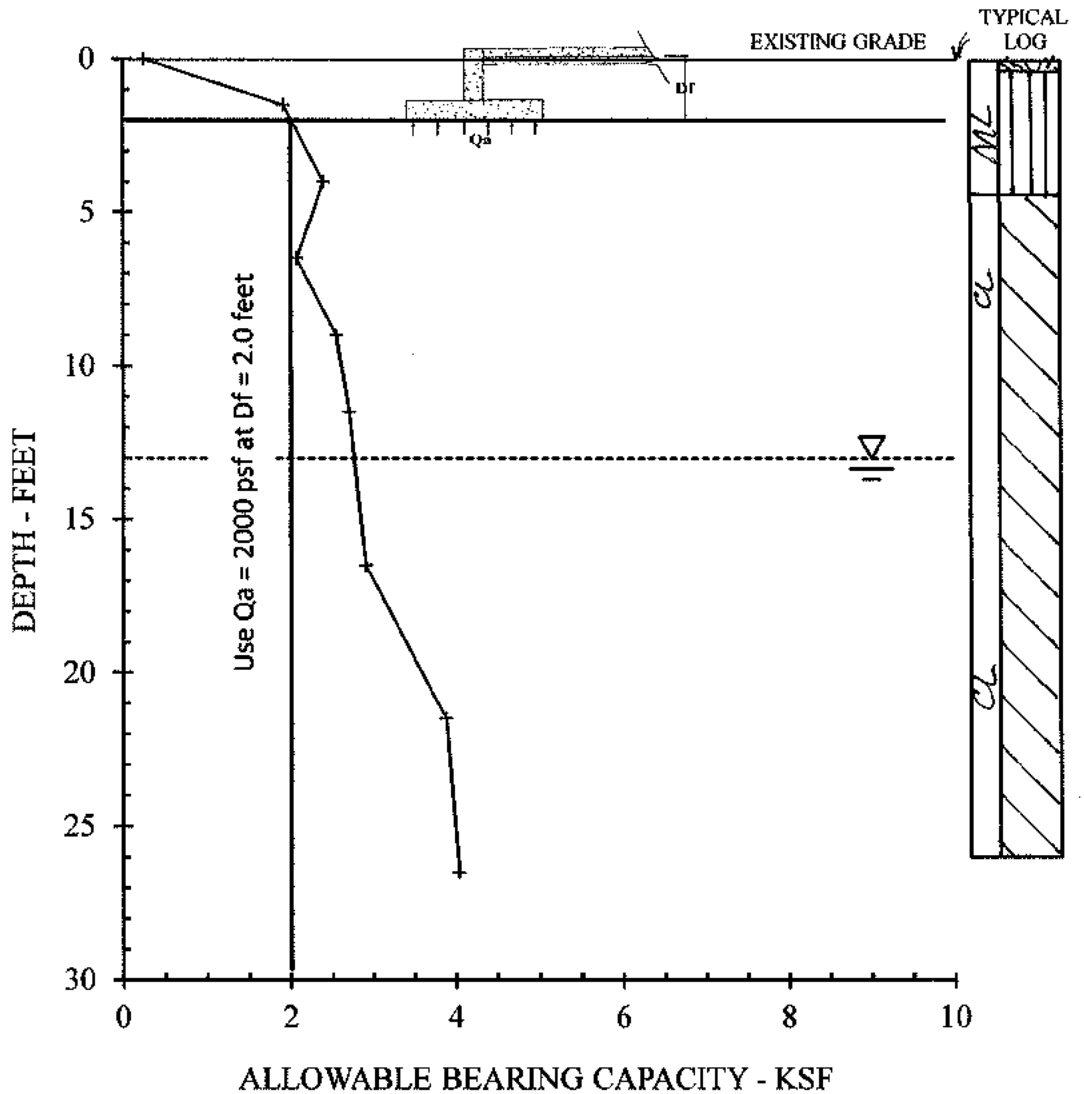
CONVENTIONAL FOOTINGS

PROJECT: **Proposed Paragould Industrial Site**
Paragould, Arkansas

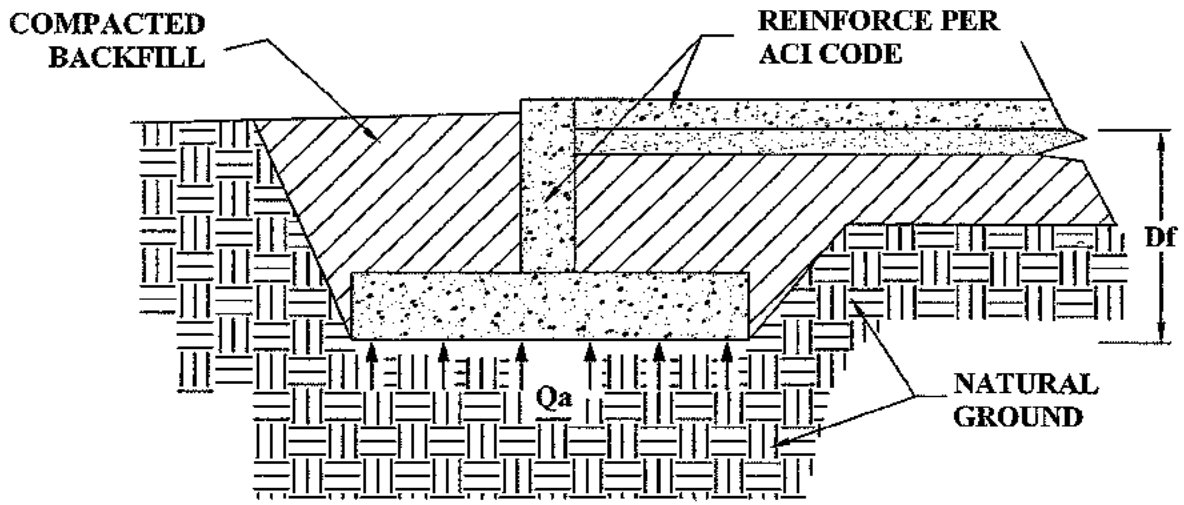
BORING NO.: **AVG**

PROJECT NO.: **15161** WATER TABLE: **13.0 ft.** SAFETY FACTOR: **2.00**



DEPTH - BEARING CAPACITY CURVE

CONVENTIONAL FOOTINGS



Explanation of Calculations Shown in Tables

D_f = Depth from ground surface to bottom of footing (feet)

Depth = Depth from top to bottom of soil strata (feet)

Strata H = Thickness of soil strata (feet)

N = Standard penetration N-value (blows per foot)

Q_u = Ultimate soil strength (ksf)

1.25 Q_u = Soil Strength parameter (ksf)

0.125 D_f = Depth factor (ksf)

Q_a = Allowable bearing capacity = (1.25 Q_u + 0.125 D_f) ÷ Safety Factor (ksf)

EXPLANATION OF BEARING CAPACITY CALCULATIONS

APPENDIX B

SUPPORTING LABORATORY DATA

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

MOISTURE CONTENT DETERMINATION
ASTM D 2216

Project: PARAGOULD SOUTH INDUSTRIAL SITE **Project No.:** 15161
Location: PARAGOULD, ARKANSAS **Date:** 11/02/16

MOISTURE CONTENT							
Sample Number	B1;P1	B1;P2	B1;P4	B1;P5	B3;P1	B3;P2	B3;P3
Tare Number	B7	J29	776	BC163	B6	FM	ACH
Tare + Wet Soil (g)	810.16	182.18	152.09	171.51	176.99	195.62	162.09
Tare + Dry Soil (g)	706.28	152.18	121.32	136.84	144.54	159.54	130.00
Tare (g)	184.09	10.26	10.22	9.77	10.2	11.84	10.24
Water (g)	103.88	30.00	30.77	34.67	32.45	36.08	32.09
Dry Soil (g)	522.19	141.92	111.10	127.07	134.34	147.70	119.76
Water Content (%)	**19.89**	**21.14**	**27.70**	**27.28**	**24.16**	**24.43**	**26.80**

MOISTURE CONTENT					
Sample Number	B3;P4	B3;P5	B5;P1	B5;P3	B5;P5
Tare Number	F80	AW	XX	6170	G20
Tare + Wet Soil (g)	166.15	171.24	180.63	189.87	171.1
Tare + Dry Soil (g)	137.57	140.31	150.00	157.72	138.99
Tare (g)	11.57	10.95	11.18	11.29	11.32
Water (g)	28.58	30.93	30.63	32.15	32.11
Dry Soil (g)	126.00	129.36	138.82	146.43	127.67
Water Content (%)	**22.68**	**23.91**	**22.06**	**21.96**	**25.15**

ANDERSON ENGINEERING CONSULTANTS, INC.
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ATTERBERG LIMIT DETERMINATION
ASTM D 4318

Project: PARAGOULD SOUTH INDUSTRIAL SITE **Project No.:** 15161
Location: PARAGOULD, ARKANSAS **Date:** 11/07/16

LIQUID LIMIT					
Sample Number	B1;P2	B1;P5	B3;P1	B5;P1	B5;P3
Tare Number	NON - PLASTIC	16A	23	68	71B
Number of Blows		28	21	21	25
Tare + Wet Soil (g)		28.1	18.77	34.03	27.33
Tare + Dry Soil (g)		22.95	15.73	28.86	22.98
Tare (g)		8.25	7.63	8.10	7.75
Water (g)		5.15	3.04	5.17	4.35
Dry Soil (g)		14.70	8.10	20.76	15.23
Water Content (%)		35.03	37.53	24.90	28.56
Liquid Limit	NP	36	37	24	29

PLASTIC LIMIT					
Sample Number	B1;P2	B1;P5	B3;P1	B5;P1	B5;P3
Tare Number	NON - PLASTIC	29	35	MC	BC
Tare + Wet Soil (g)		17.11	19.96	17.06	15.26
Tare + Dry Soil (g)		15.70	17.79	15.39	14.11
Tare (g)		7.88	7.93	7.87	7.95
Water (g)		1.41	2.17	1.67	1.15
Dry Soil (g)		7.82	9.86	7.52	6.16
Water Content (%)		18.03	22.01	22.21	18.67
Plastic Limit		18	22	22	19
Plasticity Index		**18**	**15**	**2**	**10**
Classification (#40)	NP	CL	CL	ML	CL

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MECHANICAL GRAIN SIZE ANALYSES
ASTM D 1140

Project: PARAGOULD SOUTH INDUSTRIAL SITE **Project No.:** 15161
Location: PARAGOULD, ARKANSAS **Date:** 11/04/16
Sample No.: B1;P1 **Sample Depth:** 0'-1.5'
Soil Description: GRAY & BROWN SILT

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
#200	24.3	24.3	4.7	95.3
PAN	497.9	522.2	100.0	0.0

Percent Sample Gravel/Sand: 4.7 **Sample Weight:** 522.2
Percent Sample Silt/Clay: 95.3 **Washing Loss:** 497.9g

Project: PARAGOULD SOUTH INDUSTRIAL SITE **Project No.:** 15161
Location: PARAGOULD, ARKANSAS **Date:** 11/04/16
Sample No.: B1;P7 **Sample Depth:** 20'-21.5'
Soil Description: LIGHT GRAY & LIGHT REDDISH BROWN LEAN CLAY

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
#200	20.2	20.2	4.3	95.7
PAN	449.5	469.7	100.0	0.0

Percent Sample Gravel/Sand: 4.3 **Sample Weight:** 469.7
Percent Sample Silt/Clay: 95.7 **Washing Loss:** 449.5g

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

MECHANICAL GRAIN SIZE ANALYSES
ASTM D 1140

Project:	PARAGOULD SOUTH INDUSTRIAL SITE	**Project No.:**	15161
Location:	PARAGOULD, ARKANSAS	**Date:**	11/04/16
Sample No.:	B5;P4	**Sample Depth:**	7.5'-9'
Soil Description:	GRAY & BROWN LEAN CLAY		

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
#200	18.7	18.7	5.1	94.9
PAN	351.5	370.2	100.0	0.0

Percent Sample Gravel/Sand:	5.1	**Sample Weight:**	370.2
Percent Sample Silt/Clay:	94.9	**Washing Loss:**	351.5g

ANDERSON ENGINEERING CONSULTANTS, INC.
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SHRINKAGE / SWELL INDEX TESTS

Project:	PARAGOULD SOUTH INDUSTRIAL SITE	**Project No.:**	15161
Location:	PARAGOULD, ARKANSAS	**Date:**	11/02/16
Sample No.:	B1;P3	**Sample Depth:**	5'-6.5'
Soil Description:	GRAY & BROWN LEAN CLAY	**K PRC:**	2.0

Liquid Limit:	NA	**Est. Specific Gravity:**	2.67
Plastic Limit:	NA	**No. of Layers:**	3
Plasticity Index:	NA	**No. Blows/Layer:**	7

WATER CONTENT

	Before Test		After Test
Tare Number	OX	Tare Number	BT-5
Tare + Wet Soil	170.2 g	Tare + Wet Soil	168.6 g
Tare + Dry Soil	140.8 g	Tare + Dry Soil	146.6 g
Tare	10.4 g	Tare	49.9 g
Water Content	22.5 %	Water Content	22.7 %
Saturation	100.0 %	Saturation	100.0 %
Dry Density	105.0 pcf	Dry Density	105.0 pcf

VOID RATIO DETERMINATION

Vo	57.786 ccm	Vf	57.786 ccm
Wt of Soil + Ring	357.3 g	Wt of Soil + Ring	357.5 g
Wt of Ring	238.2 g	Wt of Ring	238.2 g
Moist Wt of Soil	119.2 g	Moist Wt fo Soil	119.3 g
Vs	36.441 ccm	Vs	36.441 ccm
Eo	0.5857	Ef	0.5857

SWELL DATA

Time	Dial (* 0.0001)	Pressure	Void Ratio
9.13	0.00	0.0	0.6685
9.28	0.00	0.0	0.6685
10.00	0.00	0.0	0.6685
10.25	0.00	0.0	0.6685
12.25	0.00	0.0	0.6685
14.35	0.00	0.0	0.6685

Final Dial Reading: 0.00 Swell Pressure: **0 PSF**

Heave = 0.000 % = 0.0000 inches/foot

SHRINKAGE DATA

Linear Shrinkage (Bar Method):

Linear Shrinkage: **4.4 %**

Volumetric Shrinkage: **12.6 %**

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

SHRINKAGE / SWELL INDEX TESTS

Project:	PARAGOULD SOUTH INDUSTRIAL SITE	**Project No.:**	15161
Location:	PARAGOULD, ARKANSAS	**Date:**	11/02/16
Sample No.:	B5;P2	**Sample Depth:**	2.5'-4'
Soil Description:	GRAY & BROWN LEAN CLAY	**K PRC:**	2.0

Liquid Limit:	NA	**Est. Specific Gravity:**	2.67
Plastic Limit:	NA	**No. of Layers:**	3
Plasticity Index:	NA	**No. Blows/Layer:**	7

WATER CONTENT

	Before Test		After Test
Tare Number	BC-162	Tare Number	BT-1
Tare + Wet Soil	178.4 g	Tare + Wet Soil	166.8 g
Tare + Dry Soil	147.0 g	Tare + Dry Soil	144.7 g
Tare	9.8 g	Tare	49.9 g
Water Content	22.9 %	Water Content	23.4 %
Saturation	100.0 %	Saturation	100.0 %
Dry Density	104.1 pcf	Dry Density	104.1 pcf

VOID RATIO DETERMINATION

Vo	57.786 ccm	Vf	57.786 ccm
Wt of Soil + Ring	352.4 g	Wt of Soil + Ring	352.8 g
Wt of Ring	233.8 g	Wt of Ring	233.8 g
Moist Wt of Soil	118.6 g	Moist Wt fo Soil	119.0 g
Vs	36.123 ccm	Vs	36.123 ccm
Eo	0.5997	Ef	0.5997

SWELL DATA

Time	Dial (* 0.0001)	Pressure	Void Ratio
8.58	0.00	0.0	0.6832
9.13	0.00	0.0	0.6832
9.28	0.00	0.0	0.6832
10.00	0.00	0.0	0.6832
10.25	0.00	0.0	0.6832
12.25	0.00	0.0	0.6832
14.25	0.00	0.0	0.6832

Final Dial Reading: 0.00 Swell Pressure: **0 PSF**

Heave = 0.000 % = 0.0000 inches/foot

SHRINKAGE DATA

Linear Shrinkage (Bar Method):

Linear Shrinkage: **3.2 %**

Volumetric Shrinkage: **9.3 %**

#18 Current Zoning Map
March, 2016

AG
R-2
AG
M-1
C-3
American Railcar Industries
AmeriSteel
Railcar Rd
Union Pacific Railroad
Old Bethel Rd
Jones Rd
S 2nd Ave
AR 69 Hwy
C-3
Paragould South Industrial Site
M-1
C-3
M-1
Pvt
M-2
M-1
AG
Pvt
Pvt
C-3
US 412 SPUR Hwy
Greene 907 Rd

Paragould Industrial Site Area Zoning

Legend

- Industrial Properties
- **Zoning**
  - M-1: Manufacturing 1
  - M-2: Manufacturing 2
  - M-3: Manufacturing 3
  - C-3: Commercial 3
  - AG: Agriculture
  - R-2: Residential 2
  - Street Centerline
- **Street Edge**
  - <all other values>
- **ROADTYPE**
  - Alley
  - Highway
  - Street
  - Misc Pavement
  - Rail Road
  - Hydrology
  - Hydrology Polygons
- **City Boundaries**
  - City Boundaries

N
W
E
S

0 150 300 600 Feet

#19 Infrastructure Map

Arkansas Hwy. 358

16" water main.

12" water main.

18" water main.

13.2 KV 3 phase overhead electric primary.

City cable coax on the north side of the Hwy.

16" water main.

Paragould South Industrial Site

Proposed 750 gpm sewer lift station.

15" sanitary sewer main.

13.2 KV 3 phase overhead electric

Dark fiber.

16" water main.

US 412 Spur Hwy.

LEGEND:

- 15 GS — 15" SANITARY SEWER GRAVITY MAIN
- 12 FM — 12" SANITARY SEWER FORCE MAIN
- 18 V — 18" WATER MAIN
- 16 V — 16" WATER MAIN
- 12 V — 12" WATER MAIN
- OHE — 13.2 KV OVERHEAD ELECTRIC PRIMARY
- DARK FIBER
- PROPERTY BOUNDRY

100 0 100 200 300
GRAPHIC SCALE – FEET
Horizontal 1"=100'

PLWC
PARAGOULD LIGHT WATER & CABLE
Engineering Services
P.O. Box 9 - 1901 Jones Road
Paragould, Arkansas 72451

PARAGOULD SOUTH INDUSTRIAL SITE
EXISTING UTILITIES

NO.	DATE	DESCRIPTION
1	12/1/2016	CORRECTED SLOPE BETWEEN PWS AND PWS.

ENGINEER'S STAMP

DESIGNED BY
DRAWN BY TG
CHECKED BY
DATE 12/1/2016
PLWC PROJECT NO.

Electric Questionnaire

Evaluation Criteria Guideline:

The property is being evaluated on the following criteria:

The property must be served or be able to be served by industrial quality power that can meet a minimum of 2.5 MW demand within six months.

Electric Details for Property:

Provide information below regarding electric service based on the evaluation criteria listed above.

	Answer
Electric transmission company	**Southwest Power Administration**
Electric distribution company	**Paragould Light Water & Cable**
Is customer choice available? (yes/no)	**No**
Voltage of nearest distribution line(s)	**13.2 KV**
Distance to nearest distribution line(s)	**On sit.**
Voltage of nearest transmission line(s)	**161 KV**
Distance to nearest transmission line(s)	**4 Miles**
Available electric capacity at the property (MW)	**8 MW**
Name of substation serving property	**Southwest Substation**
Distance to substation serving property	**4,300 feet**
Describe any necessary improvements to provide the recommended level of electric service	**Existing**
Estimated cost to provide recommended level of electric service to the property	**None**
Estimated schedule to provide recommended level of electric service to the property	**Existing**
Describe any necessary rights-of-way that would need to be acquired in order to provide the recommended level of service	**None needed.**
Feasibility of redundant electric service at the property	**Possible**

Any additional information?

By providing this information, I am confirming that PROVIDER NAME would be willing and able to serve the PROPERTY NAME with electric service based on the information provided above.

Signature:	
Name:	Darrell Phillips
Title:	General Manager
Date:	12/1/2016

Natural Gas Questionnaire

Evaluation Criteria Guideline:

The property is being evaluated on the following criteria:

The property must be served or be able to be served within six months by natural gas. Natural gas service should provide at least 10,000 mcf per month.

Natural Gas Details for Property:

Provide information below regarding natural gas service based on the evaluation criteria listed above.

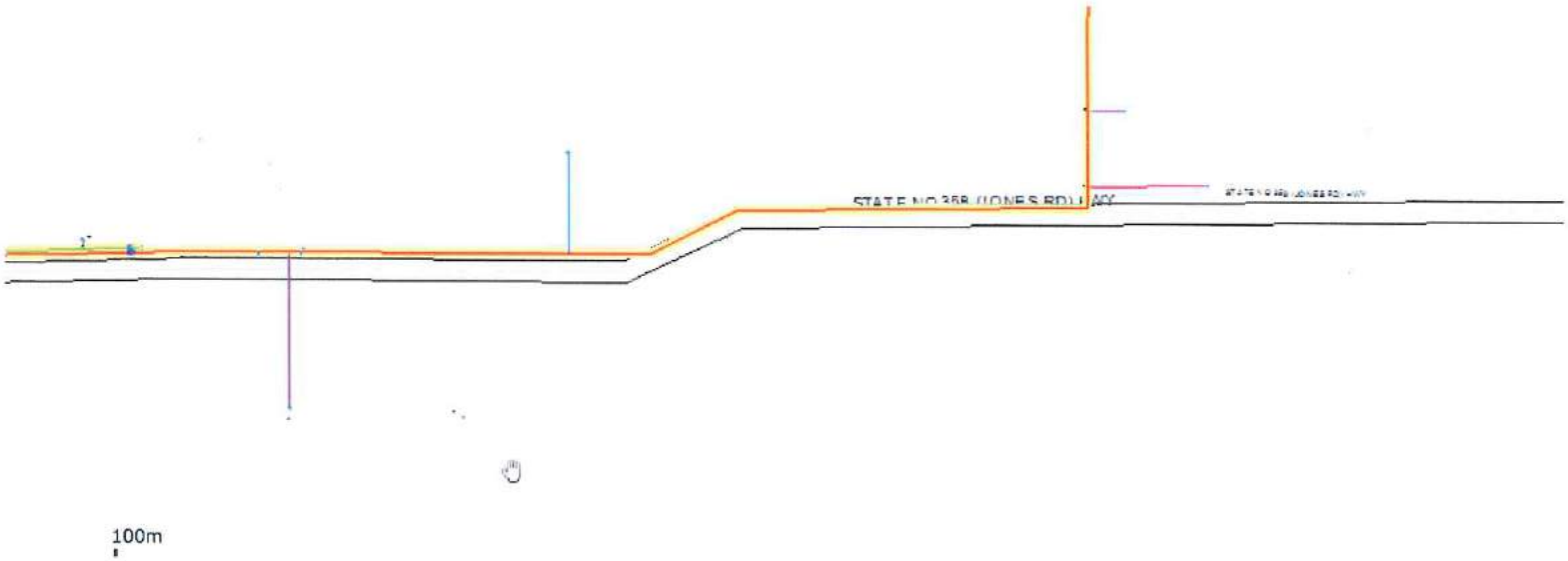
	Answer
Natural gas transmission company(ies)	Enable Gas Transmission
Natural gas distribution company(ies)	CenterPoint Energy
Size of nearest line(s)	4 inch plastic
Pressure of nearest line(s)	60 Psi MAOP
Distance to the property (feet)	Along Jones Road
Describe any necessary improvements to provide the recommended level of natural gas service	Extend 6 inch line to site
Estimated cost to provide recommended level of natural gas service to the property	None
Estimated schedule to provide recommended level of natural gas service to the property	6 months
Describe any necessary rights-of-way that would need to be acquired in order to provide the recommended level of service	None, ROW along Jones road will be used
Describe the current usage of the line and any bottlenecks within the system that will need to be upgraded to serve the required capacity	Heavy volumes used by industry in area. No known bottle necks for proposed volumes at this time.

Any additional information?

Answer:

By providing this information, I am confirming that PROVIDER NAME would be willing and able to serve the PROPERTY NAME with natural gas service based on the information provided above.

Signature:	
Name:	Chauncey Taylor
Title:	Key Accounts Manager
Date:	12/6/16


100m

Water Questionnaire

Evaluation Criteria Guideline:

The property is being evaluated on the following criteria:

The property must be served or be able to be served within six months by water infrastructure and a water system with a minimum excess capacity of 150,000 gallons per day.

Water Details for Property:

Provide information below regarding water service based on the evaluation criteria listed above.

	Answer
Name of water provider	**Paragould Light Water & Cable**
Size of nearest line(s)	**16" water main**
Distance to the property (feet)	**On site south side. Across state Hwy. north side.**
Total capacity of the line(s) serving the property (mgd)	**3 MGD**
Excess capacity of the line(s) serving the property (mgd)	**1.3 MGD**
Describe any necessary improvements to provide the recommended level of water service	**None**
Estimated cost to provide required level of water service to the property	**None**
Estimated schedule to provide required level of water service to the property	**Available now.**
Describe any necessary rights-of-way that would need to be acquired in order to provide the recommended level of service	**None**

Does the water provider purchase capacity from another provider?

Answer: **NO**

If yes, who is capacity purchased from?

Answer:

When does current water agreement expire?

Answer:

Provide information below regarding the water treatment plant serving the property:

	Answer
Name of water treatment plant serving the property	**5th Ave. Water Treatment Plant**
Owner/Operator of water treatment plant	**Paragould Light Water & Cable**
Distance to the property	**4 Miles**
Total permitted capacity (mgd)	**6 MGD**
Allocated capacity (mgd)	**N/A**
Average utilization (mgd)	**3.1 MGD**
Peak utilization (mgd)	**4.1 MGD**
Excess capacity (mgd)	**2.9 MGD**
Are there any other encumbrances including any known requests for additional capacity to the water system capacity?	**No**
Identify any planned upgrades to the water system, including the schedule for the project.	**None**

Any additional information?

Answer:

By providing this information, I am confirming that PROVIDER NAME would be willing and able to serve the PROPERTY NAME with water service based on the information provided above.

Signature:	
Name:	Darrell Phillips
Title:	General Manager
Date:	12/1/2016

Wastewater Questionnaire

Evaluation Criteria Guideline:

The property is being evaluated on the following criteria:

The property must be served or be able to be served within six months by wastewater infrastructure and a wastewater treatment plant with a minimum excess capacity of 100,000 gallons per day.

Wastewater Details for Property:

Provide information below regarding wastewater service based on the evaluation criteria listed above.

	Answer
Name of wastewater provider	**Paragould Light Water & Cable**
Size of nearest line(s)	**15 inch gravity main**
Distance to the property (feet)	**On site.**
Type of line serving the property (gravity or force main)	**Gravity Main.**
If force main, excess capacity of nearest pump station serving the property (mgd)	**0.47 MGD**
Total capacity of the line(s) serving the property (mgd)	**1.9 MGD**
Excess capacity of the line(s) serving the property (mgd)	**1.9 MGD**
Describe any necessary improvements to provide the recommended level of wastewater service	**Sewer lift station only. Wet well, gravity and force main are installed.**
Estimated cost to provide required level of wastewater service to the property	**$260,000**
Estimated schedule to provide required level of wastewater service to the property	**6 Months**
Describe any necessary rights-of-way that would need to be acquired in order to provide the recommended level of service	**None**

Does the wastewater provider purchase capacity from another provider?

Answer: **No**

If yes, who is capacity purchased from?

Answer:

When does current wastewater agreement expire?

Answer:

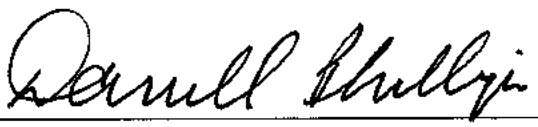
Provide information below regarding the wastewater treatment plant serving the property:

	Answer
Name of wastewater treatment plant serving the property	**Paragould Light Water & Cable WWTP**
Owner/Operator of wastewater treatment plant	**Paragould Light Water & Cable**
Permit expiration date of the treatment plant	**07/30/2020**
Distance to the property	**3,500 feet**
Total permitted capacity (mgd)	**6.0**
Allocated capacity (mgd)	**NA**
Average utilization (mgd)	**3.2**
Peak utilization (mgd)	**5.4**
Excess capacity (mgd)	**2.8**
Are there any other encumbrances including any known requests for additional capacity to the wastewater system capacity?	**No**
Identify any planned upgrades to the wastewater system, including the schedule for the project.	**Increasing headworks capacity and changing bio-solids processing. Construction complete 2018.**

Any additional information?

Answer:

By providing this information, I am confirming that PROVIDER NAME would be willing and able to serve the PROPERTY NAME with wastewater service based on the information provided above.

Signature:	
Name:	Darrell Phillips
Title:	General Manager
Date:	12/1/2016

Telecommunications Questionnaire

Evaluation Criteria Guideline:

The property is being evaluated on the following criteria:

The property should be served or be able to be served within six months by fiber telecommunications infrastructure.

Telecommunications Details for Property:

Provide information below regarding telecommunications service at the proposed property:

	Answer
Name of telecommunication provider(s)	**Paragould Light Water & Cable**
Distance to the nearest telecommunications infrastructure	**PLWC headend 2.5 miles**
Services available	**Dark Fiber & Internet**
Is fiber available at the property? If yes, aerial or underground?	**Yes, Aerial**
Is dark fiber available at the property?	**Yes**
Typical schedule for delivering service to property	**2 Week delivery on new services.**

Any additional information?

Answer:

By providing this information, I am confirming that PROVIDER NAME would be willing and able to serve the PROPERTY NAME with telecommunications service.

Signature:	Darrell Phillips
Name:	Darrell Phillips
Title:	General Manager
Date:	12/1/2016

McCALLUM SWEENEY