McCLELLAND CONSULTING ENGINEERS, INC.
DESIGNED TO SERVE

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Little Rock, AR 72204
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mce.us.com

January 13, 2026

David Isaacs,
Engineer, Division of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118
501.682.0744

RE: Second Notice of Deficiency for Permit Application
Tucker Compost Facility (not Max)
Permit Tracking Number: 0318-SC; AFIN: 35-00112
Cross Reference Identifier(s): 80202, 80881, 82843

Dear David Issacs,

We are providing responses to your September 2025 letter that identified deficiencies in the Tucker Unit Compost Facility's Revised Permit Application you received on October 12, 2022 along with an updated application:

1. Please provide the legal description and proof of ownership/deed of the site as required by 8 CAR § 60-303(c)(2)(C)

a. The owner of the ADC Tucker Unit is the listed as "State Farm Attn Ark Dept of Corr A/P. It is a SIC 9223 – Correctional Institution. Please see Appendix B – REAL PROPERTY REPORT TUCKER UNIT. Gloria Tillman, Jefferson County's Assessor stated that they don't have a deed for this property in their files.

2. The maps provided indicate the facility is either in the floodplain, or very near to it. Please provide an explanation of how the facility will mitigate the risk of washout of solid waste. Any release of solid waste may pose a hazard to human health, wildlife, or land or water resources (8 CAR 60-803(a)(2)).

a. The facility is NOT located in the 100-year nor the 500-year floodplain per the FEMA 05069C0075D and the FEMA Flood Risk Information Report for this facility GPS's location. It is located in a Zone X*, the "Area with Reduced Flood Risk due to Levee"* and outside of a Zone A. The Compost Facility is 634 L.F. away from this Zone A* and this Zone A has a 500-year flood elevation of only 211.7'.*,. The finished floor of the Compost Facility is 216'. The facility mitigates the risk of washout of solid waste, so as to NOT pose a hazard to human health, wildlife, or land or water resources by way of the 216' finished floor plus the additional 2' 5" of the compost vessel discharge opening. See Appendix C *FEMA 05069C0075D Flood Map, Appendix D – **FEMA Flood Risk Information Report and Figure 1 Below:**

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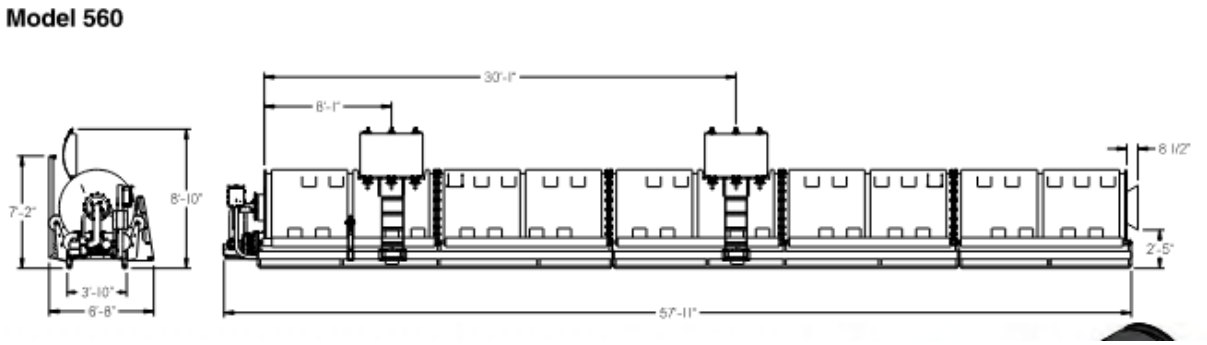
FIGURE 1



3. Information demonstrating that the facility is not located within wetlands must be provided to DEQ (8 CAR 60-803(a)(3)). A statement by the Department of the Army, U.S. Army Corps of Engineers, must be provided showing that the facility is not located within any wetlands or jurisdictional waters. The wetland delineation map provided (Sheet Number 8 of Document Identifier **82843** is not explained and no sources are given.)

a. Facility is not in known Wetlands or Jurisdictional Waters. Please see attached Appendix E. – U.S. Fish and Wildlife Service National Wetlands Inventory Wetland Map.

4. All type "O" facilities must submit a geotechnical report that describes site conditions to a depth of at least ten feet below existing ground surface as determined from existing data or supplemented by on-site investigations. DEQ could not locate these geotechnical reports. Please submit a report which includes the following categories: (i) Soil type, (ii) Bedrock characteristics, and (iii) Seasonal high-water table.

a. Please see the Appendix F attached USDA Soil Survey of Jefferson County (1980), which provides; soil type, bedrock characteristics and seasonal high-water table. The USDA data shows that the Tucker Unit Compost Facility is on "33 Rilla Silt Loam, 0 to 1 percent slopes. This well drained level soil is o natural levees and terraces of former channels of the Arkansas River. Individual areas are 20 – 300 acres. Typically, the surface layover is brown silt loam about 9 inches thick. The upper part of the subsoil is yellowish red silt loam that extends to a depth of about 15 inches. The middle part is yellowish red silty clay loam that extends to a depth of about 28 inches and yellowish red silt loam that extends to a depth of about 42 inches. The lower part is reddish brown loam that extends to a depth of about 55 inches. The underlaying material , extending to a depth of 72 inches or more, is yellowish red loam… "Permeability is moderate, and runoff is slow." and Appendix G – MCE's Geotechnical Investigation – ADC Tucker Unit Water Treatment Plant Improvements, which provides soil and water table conditions to at least 10 feet depth. See Appendix A (of Appendix G) – Bore Locations for locations and Appendix B (of Appendix G) – Boring Logs which shows that Bore's B-01 through B-04, near Tucker Unit, have Clean Clay (CL) extends to at least a depth of 15'.

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5. The revised Operating Narrative must address methods to maintain biological conditions, and to minimize, manage, and monitor odors including how leachate will be collected or mitigated at the compost facility (8 CAR 60-804(b)(8)(B)(viii)).

a. To maintain biological conditions, and to minimize, manage, and monitor odors, including how leachate will be mitigated at the compost facility the required - licensed operator will comply with PMI's Operation Plan by; 1. only operate the facility when they are on site, and 2. will inspect the vessel daily to confirm that all openings/inspection lids are closed and secure, that there is no leachate leaking from the vessel, and confirm at least 131ºF prior operating the vessel. The vent/discharge is part of the design, but any odors will be reduced by adjusting the wood chip as needed. 3. Each access hatch has a robust seal and three (3) clamps which does not allow any leachate leakage. The facility is sufficiently covered and protected from rainfall so that rain will not create any runoff from the concrete pad and sufficient height of the finished floor above the floodplain so leachate would not be washed into waterways. Please see Page 63 – "Operating Narrative" in Ecodrum's Composter Operator's Manual which is required by Appendix H – PMI's 05/17/22 Compost Application Submittal & Appendix J – Amendments to Operation Plans.

6. Please submit a flow diagram of the proposed processing steps including an estimated mass balance of material received, residuals generated, recyclable items recovered and finished compost produced (8 CAR 60-806(b)(1)).
Please see Flow Diagram and Mass Balance Calculations below, which provides the mass balance of material received, residuals generated, recyclable items recovered and the finished compost produced.
For a more detailed description, please see PMI's Operating Plan: forth page, Section 2.0 Operating Plan , sixth (6th) paragraph

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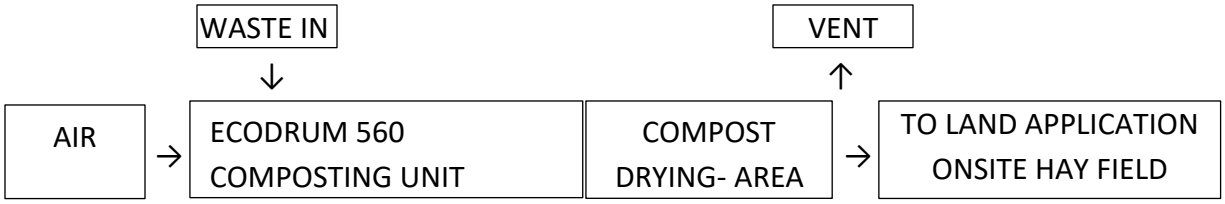
FLOW DIAGRAM
COVERED FACILITY



MASS BALANCE

Materials Received:
1,500 lbs food waste/day (37.50 ft^3)
+ 845 lbs to 1,779 lbs wood chips/day (2 X 37.50 ft^3)
= 2,354 lbs to 3,279 lbs/day (3 X 37.50 ft^3)

Residuals Generated/Recyclable Items Recovered/Finished Compost Produced:
= 1,413 lbs to 1,968 lbs/day*
***See Ecodrum Operation Manual attached which predicts the finished product to be 60 % of the original mass.**

7. Please indicate in the revised Operating Plan the source of the waste to be composted (8 CAR § 60-804), and the end use of the compost material (8 CAR § 60-804(b)(8)(B)(xi). Composted materials must meet the requirements of 8 CAR § 60-801.

a. The source of the waste to be only composted is organic waste from the Correctional Unit's process food waste. Cellulose – wood chip is added to mitigate odor and provide carbon and air for complete breakdown. The material stays in vessel for 6 – 10 days and is then placed in a storage bay for 1 – 2 months. The end use of the compost will be on-site land application for hay fields for local livestock. These do meet the requirements of 60-801(b)(3)(B)(ii/iii)

8. The floor of the facility must have a subbase of compacted clay, treated soil, or other impermeable material with a permeability of 1 x 10^{-7} cm/sec or less (8 CAR 60-806(b)(3)). Please provide documentation that confirms the facility floor was built in accordance to the stated rule.

a. The subbase below the concrete pad is Absolute Barrier Y30 BAC which actual has a gaseous permeability of 5.57 X 10^{-15} to 1.45 X 10^{-09} m/s for the gases they test per the "Permeation of Volatile Organic Compounds through EVOH Thin Film Membranes and Coextruded LLDPE/EVOH/LLDPE Geomembranes, McWatters and Rowe, Journal of Geotechnical and Geoenvironmental Engineering© ASCE/ September 2015. (Permeation is the Permeation Coefficient adjusted to actual film thickness - calculated at 1 kg/m³.) The study used to determine PCE and TCE is titled: Evaluation of diffusion of PCE & TCE through high performance geomembranes by Di

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Battista and Rowe, Queens University 8 Feb 2018. These gaseous permeability results support that the material exceeds the hydro requirements set forth by 806(b)(3). Please see the attached Appendix I "Absolute Barrier Y30 BAC Performance Brochure".

9. As required by 8 CAR 60-807(a), the facility may not commence construction or operation without required stormwater or discharge permits or documentation that these permit(s) are not required. Please provide documentation that either the required stormwater or discharge permits are held by the facility or that they are not required.

a. Storm water permit is not required because the facility is covered, finished floor is at least 4 feet above the 500 year floodplain, and leachate is mitigated by the design of the Ecodrum 560 . Please see Appendix H – PMI's 05/17/22 Compost Application Submittal.

10. Section 2 of the operating plan of the original Notice of Intent (NOI) (Doc ID **80202**) indicates that a temperature of 131°F will be maintained for 3 continuous days. This was later omitted in the revised NOI (Doc ID **82843**). Section 3 of operating plan in the revised NOI indicates that compost will only be sampled and tested annually. Please explain how compost quality control will be maintained with only annual testing or revise the sampling plan to include at **minimum weekly** temperature sampling.

a. This comment seems inaccurate as "131ºF will be maintained for 3 continuous days" is included in both 80202 and 82843 Document IDs. The PMI's Operating Plan states "Daily temperature readings and retention times during PFRP" in 5.0 REPORTING AND RECORD KEEPING, Item 7.0, which exceeds the requirement of a "minimum of weekly temperature sampling".

The "annual testing" referenced above is for Compliance Samples and not temperature testing. Please see Section 3 which states; "compost material will be sampled and tested annually" which is per DEQ Reg 22.807(c).

The second chamber of each composter is equipped with a temperature gauge. The drum turns until the temperature probe is in the material at the bottom of the drum. The Operating Plan requires operations per the Manufacturer which also requires that the "composting process can only take place when the mixture temperature is kept above 131ºF continuously for at least 3 days to meet recommendation from U.S. Composting Council". Please see Appendix H – PMI's 05/17/22 Compost Application Submittal, which has;

PMI's Operating Plan:

- **i. Forth page, Section 2.0 Operating Plan , fifth paragraph, which states "131ºF for at least 3 continuous days…",**
- **ii. Sixth page, Section 2.0, Operating Plan, fifteenth (15th) paragraph which states "…750 lb/day…at 131 ºF"**

Ecodrums Composter Operator's Manual:

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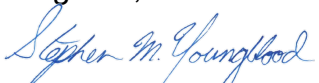
iii. **2.12(2) & 2.13(7) on Page 8,**
iv. **4.2 on page 15,,**
v. **4.11(3) on Page 26,**
vi. **4.13(6)(m) on Page 40,**
vii. **4.13(11) on Page 43,**
viii. **4.13(12) on Page 44,**
ix. **4.13(15) on Page 45,**
x. **6. Troubleshooting Page 64,**
xi. **7. On Page 65.**

b. **which all require 131ºF and most reference "for at least 3 days". Please see Appendix J – Amendments to Operation Plans.**

11. The operating plans for the Tucker Unit and Tucker Max Unit Compost facilities were identical prior to the first revision. Please explain why the curing process portion of the operating plan was omitted in only one of the revised NOI's. It is absent from Doc ID **82843**, but retained in Doc ID **82844** (final paragraph of page 44).

a. **The reason for the omission is unknown, however, the Operation Plans in 82843 require staff follows the operation guidelines set by the manufacture which is the same curing process as in 82844. The Operation Plans in 82844 do have a more thorough description of monitoring so the staff will be encouraged to use that one for both, without any conflict in the two. Please see Appendix H – PMI's 05/17/22 Compost Application Submittal for the Tucker Unit which includes the curing process portion in Ecodrum Composting Operator's Manual which PMI's Operating Plans do, in fact, require adherence to the manufacturer. Please see Appendix J – Amendments to Operation Plans.**

Regards,



Stephen M. Youngblood, P.E.
Design Engineer
W: 501.371.0272
syoungblood@mce.us.com

Attached:
Appendix A: New Tucker Unit Compost Solid Waste Processing Facility Application Form 04.APPL. WPD Revised 4/2021 with, 7.5 Minute Sectional of the Tucker Unit Facility and Compost Facility Labeled, Jefferson County Map, and with Tucker Unit and Compost Facility labeled, U.S. Fish and Wildlife – Tucker Unit Wetlands Map, and other Appendices.

cc: James Flannery, DOC
Beecher Brodnax, DOC
Eddie Powell, DOC

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APPENDICES

APPENDIX A - NEW SOLID WASTE PROCESSING FACILITY APPLICATION FORM 04.APPL. WPD Revised 4/2021 WITH 7.5 MINUTE SECTIONAL AND JEFFERSON COUNTY MAP

APPENDIX B - REAL PROPERTY REPORT TUCKER UNIT

APPENDIX C - FEMA 05069C0075D FLOOD MAP

APPENDIX D - FEMA FLOOD RISK INFORMATION REPORT

APPENDIX E - U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY WETLAND MAP

APPENDIX F - USDA SOIL SURVEY OF JEFFERSON COUNTY (1980)

APPENDIX G - MCE's GEOTECHNICAL INVESTIGATION – ADC TUCKER UNIT WTP IMPROVEMENTS

APPENDIX H - PMI's 05/17/22 COMPOST APPLICATION SUBMITTAL

APPENDIX I - ABSOLUTE BARRIER Y30 BAC PERFORMANCE BROCHURE

APPENDIX J – AMENDMENTS TO OPERATION PLANS

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APPENDIX A
NEW SOLID WASTE PROCESSING FACILITY APPLICATION
FORM 04.APPL. WPD – Revised 4/2021
WITH
7.5 MINUTE SECTIONAL
&
JEFFERSON COUNTY MAP

SOLID WASTE PROCESSING FACILITY APPLICATION FORM

DIVISION OF ENVIRONMENTAL
OFFICE OF LAND RESOURCES
5301 NORTHSHORE DRIVE
NORTH LITTLE ROCK, AR 72118-5317

Act 237 of the 1971 Arkansas General Assembly, as amended, makes it unlawful to construct, install, alter, modify, use or operate any solid waste processing facility without a permit. Section 22.303 of Arkansas Pollution Control and Ecology Commission Regulation No. 22, Solid Waste Management, requires that applicants for new solid waste processing facilities prepare and submit an application on forms prepared by the Division and the form is to include certain information.

I. FACILITY TYPE

(Check the one that applies)

_____ Yard Waste Composting Facility (Y)

__X__ Organic Waste Composting Facility (O)

_____ Mixed Solid Waste Composting Facility (S)

_____ Solid Waste Transfer Station (TS)

_____ Solid Waste Recovery Facility (WRF)

_____ Construction and Demolition Recovery Facility (CDRF)

Facility is: __X__ New _____ Existing

II. FACILITY IDENTIFICATION

Facility Name: Tucker Unit Site Manager: Jim Flannery

Facility Location: Tucker, AR

Street Address: 2400 State Farm Road

City: Tucker State: AR Zip: 72168

County: Jefferson Telephone Number: 870.267.6620 Fax Number: _____

Longitude: 91°54'23.7"W (-91.90634374544258) Latitude: 34°26'15.9"N (34.43790417797165)

Section/Township/Range: S19 T3S R8W

III. APPLICANT IDENTIFICATION

Name of Applicant: Arkansas Department of Corrections

Address of Applicant: 7800 Correction Circle

City: Pine Bluff State: AR Zip: 71603

Applicant Telephone Number: 870.267.6625 Fax Number: 870.267.6619

Applicant Email Address: eddie.powell@doc.Arkansas .gov

Is the applicant the Facility Owner? Yes: X No: _____ If no, please fill out Section IV.

IV. OWNER IDENTIFICATION

Name of Facility Owner: Arkansas Department of Corrections

Address of Facility Owner: 7800 Correction Circle

City: Pine Bluff State: AR Zip: 71603

Facility Owner Telephone Number: 870.267.6625 Fax Number: 870.267.6619

Facility Owner Email Address: eddie.powell@doc.Arkansas .gov

V. SITE INFORMATION

Legal description: Section 19, Township 03S, Range 08W, Jefferson County,

Parcel Parcel Number 001-00469-00

(Continue on additional sheets if required)

Directions to the site: South on AR-15 S from England for approx. 11.4 miles. Turn left/east on State Farm Road for approx. 9.8 miles, stay right/SE for another 0.8 miles, turn left/NE onto Tucker Facility for approx. 0.4 miles, turn right/ESE for another 0.11 miles, turn slight right/S for 370 feet, turn the tighter left/ESE turn for another 0.11 miles, compost facility is on the right/south. 34.4379, -91.90634.

Location of property referenced to known landmarks describing access roads to site: The facility is south of State Farm Road, east of the main Tucker Unit, and west of the Tucker Unit WWTP.

Describe site and area drainage: The site is in Zone X and drains to the south and east, There is a drainage ditch located northeast of the compost facility and another located southwest of the compost facility. Storm water north of the facility flows northeast into the northeastern drainage ditch.. Stormwater south of the facility flows southwest into the southwester drainage ditch. both then flow into the Wabbaseka Bayou. There is no organic load added to the flood waters as the facility is covered and the Estimated Base Flood Elevation is 211.7 and the finished floor is 216. Compost opening another 2' 5" higher than finished floor.

For Transfer Stations and Solid Waste Recovery Facilities:

Houses/Dwellings/Places of Business within ½ mile of site & method used to determine: NA

Water supplies within ½ mile of site & method used to determine: NA

For Composting Facilities:

Houses/Dwellings/Places of Business within ½ mile of site & method used to determine: Inmate housing and facility staff housing is located within 1/2 mile of the facility.

Google Earth on-line imagery - 2025

Water supplies within ½ mile of site & method used to determine: None; On-line Imagery - 2025 and Arkansas Department of Health GIS Data

Describe the nature and type of waste the facility will process: The facility will process food waste from the correctional unit mixed with wood chip. The facility will not be open to the public

VI. FACILITY INFORMATION

Describe facility service area: The facility will only process food waste from the Tucker Unit

Identify the average weight or volume of the material that this facility will receive or process:

0.75 tons / day	Cubic yards or tons received per day
274 tons / year	Cubic yards or tons received annually
N/A	Cubic yards or tons per day residual (if applicable)

Provide a brief description of the disposition of transferred/processed material, and, if applicable, how any residual material will be disposed: The source of the waste to be composted is organic waste from the Correctional Unit's process food waste. Cellulose – Wood Fiber is added to mitigate odor and provide carbon and air for complete breakdown. The material stays in vessel for 6 – 10 days and is then placed in a storage bay for 1 – 2 months, thence the composted material is land applied onsite hay fields

Identify the average and maximum time that waste is anticipated to be stored on site: Average of 1 mo.

VII. APPLICATION CONTENTS

Permit Drawings *(Identify below each design drawing or document included with this application)*

Drawing Number	Title	Date	Revision Number
	USFWS- Wetlands Map	11/04/2025	
	MCE GeoTech Report	10/15/2021	
	7.5 Minute Quadrangle Map	1963	01/30/1973
	Jefferson County Report	11/12/2021	
	Jefferson County Map		

IX. CERTIFICATION

To the best of my knowledge and belief, I certify the information provided in this application is true and accurate:

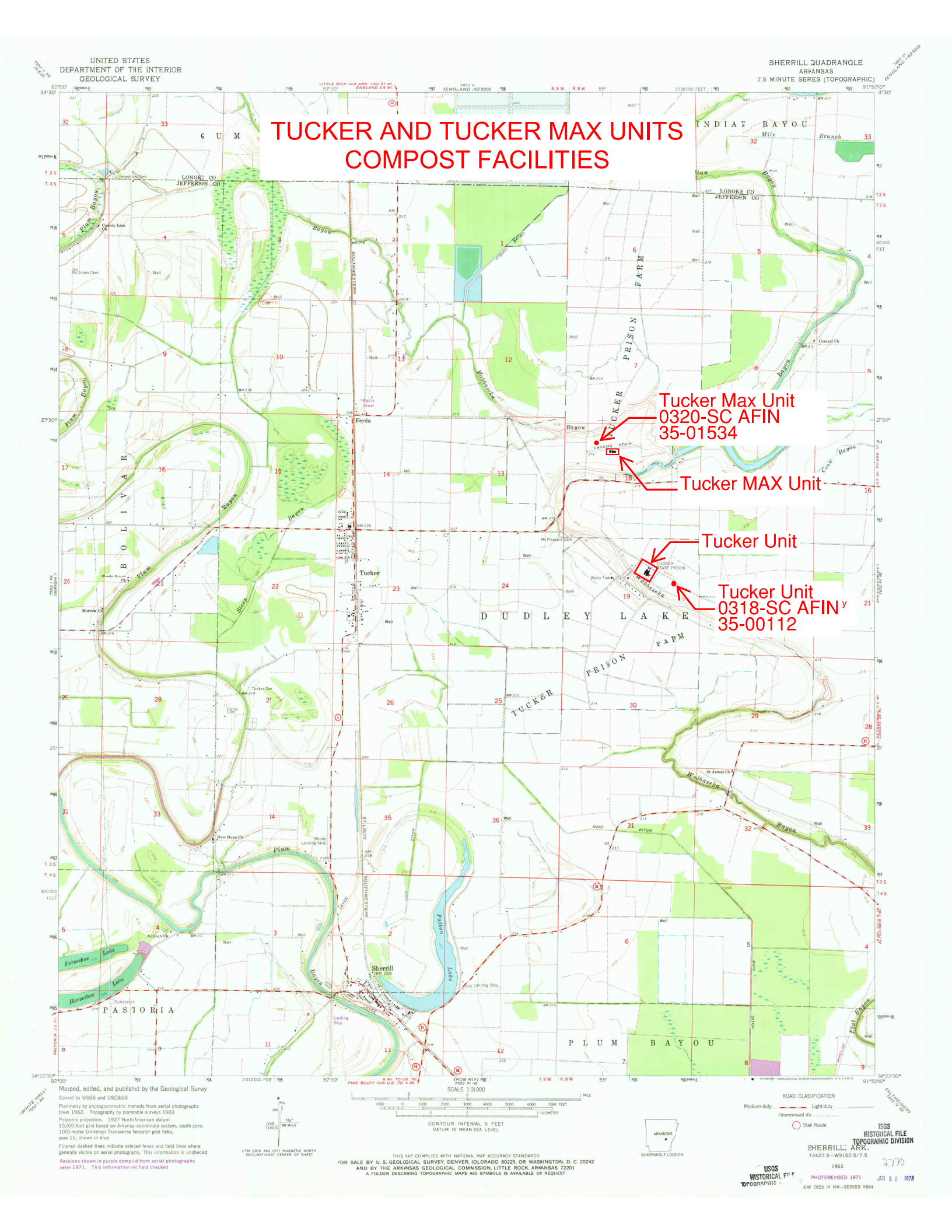
APPLICANT

Signature & Title	Printed Name	Date
Asst Director	Eddie Powell	12/20/26

ENGINEER/CONSULTANT

Signature & Title	Printed Name	Date
Stephen M. Youngblood	Stephen M. Youngblood, P.E.	12/09/2025

CONFIDENTIALITY: *This application shall be available for public inspection, provided, however, that the Division shall not disclose, except to authorized persons, any information which the Director determines is entitled by law to protection as trade secrets without the consent of the applicant. Trade secrets shall not include the name and address of the applicant, nor any information necessary, as determined by the Director, for the public to evaluate the hazards associated with the proposed operation, nor any other information required by law to be available to the public.*


TUCKER AND TUCKER MAX UNITS
COMPOST FACILITIES
Tucker Max Unit
0320-SC AFIN
35-01534
Tucker MAX Unit
Tucker Unit
Tucker Unit
0318-SC AFIN
35-00112
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SHERRILL QUADRANGLE
ARKANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL
ROAD CLASSIFICATION
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
AND BY THE ARKANSAS GEOLOGICAL COMMISSION, LITTLE ROCK, ARKANSAS 72201
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
USGS
HISTORICAL FILE
TOPOGRAPHIC DIVISION
SHERRILL, ARK.
1963
PHOTOREVISED 1971
AMS 7652 IV NW—SERIES V884

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

SHERRILL QUADRANGLE
ARKANSAS
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 15S

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, August 2019 - August 2019
Roads.....U.S. Census Bureau, 2015 - 2017
Names.....GNIS, 1980 - 2023
Hydrography.....National Hydrography Dataset, 2002 - 2022
Contours.....National Elevation Dataset, 2018
Boundaries.....Multiple sources; see metadata file 2021 - 2022
Public Land Survey System.....BLM, 2018
Wetlands.....FWS National Wetlands Inventory 1983 - 1989

MN
GN
0°22′ 7 MILS
0°36′ 11 MILS
UTM GRID AND 2023 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
100
WU XU
Grid Zone Designation 15S

SCALE 1:24 000
1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.



QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

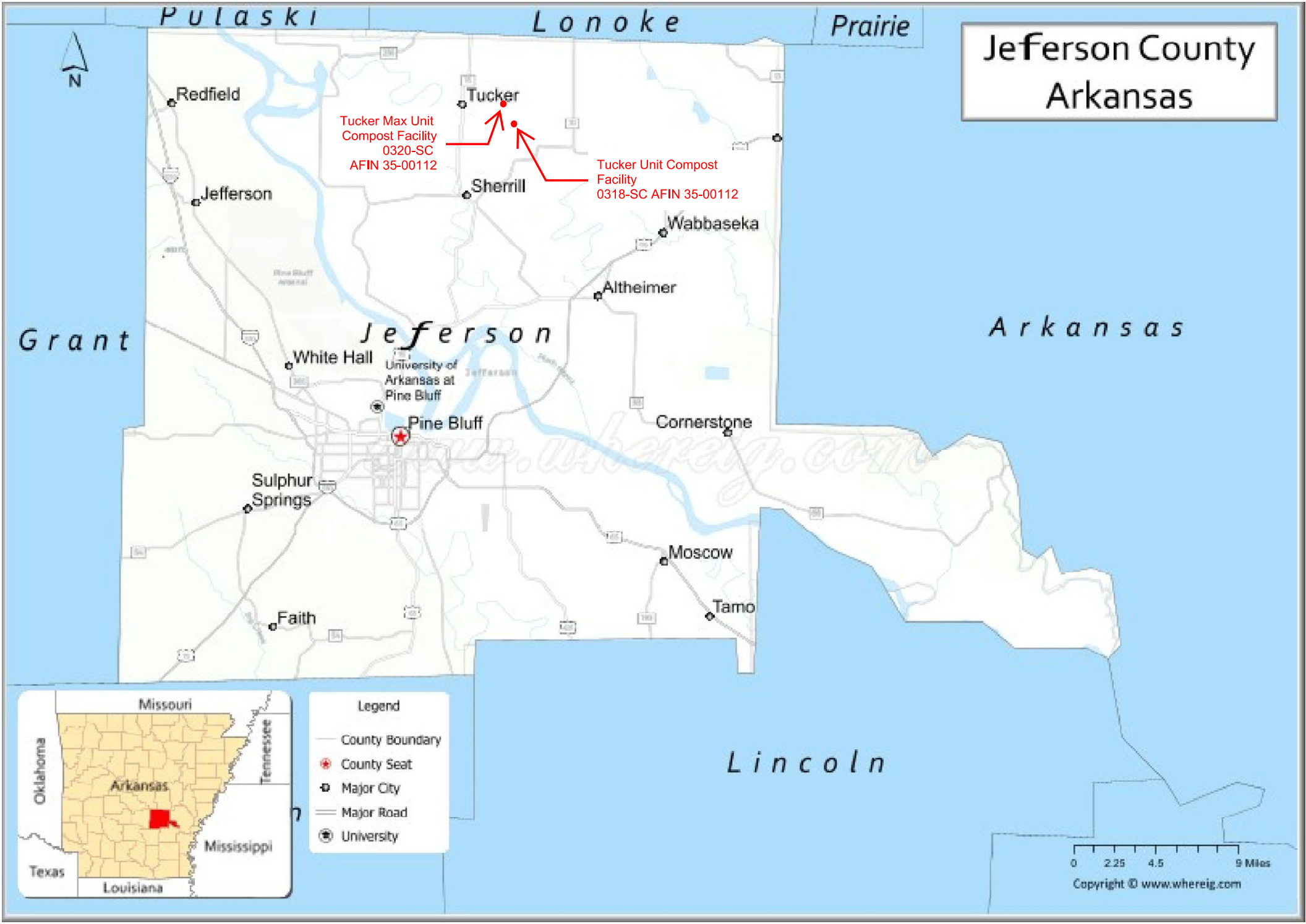
1 Keo
2 England
3 Humnoke
4 Wright
5 Gethsemane
6 White Hall
7 Rob Roy
8 Altheimer

ADJOINING QUADRANGLES

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

SHERRILL, AR
2024

NSN 7643016353451
NGA REF NO.USGSX24K41047


Jefferson County
Arkansas
Pulaski
Lonoke
Prairie
Grant
Arkansas
Lincoln
Jefferson
Redfield
Tucker
Tucker Max Unit
Compost Facility
0320-SC
AFIN 35-00112
Tucker Unit Compost
Facility
0318-SC AFIN 35-00112
Sherrill
Jefferson
Wabbaseka
Altheimer
White Hall
University of
Arkansas at
Pine Bluff
Pine Bluff
Cornerstone
Sulphur
Springs
Moscow
Tamo
Faith
Missouri
Oklahoma
Tennessee
Arkansas
Mississippi
Texas
Louisiana
Legend
County Boundary
County Seat
Major City
Major Road
University
0
2.25
4.5
9 Miles
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APPENDIX B
REAL PROPERTY REPORT TUCKER UNIT

Parcel: 001-00469-000 ID: 511
As of: 11/12/2025 10:21:56 PM

Jefferson County Report

Property Owner

Name:	STATE FARM ATTN ARK DEPT OF CORR A/P
Mailing Address:	PO BOX 6408 PINE BLUFF, AR 71611-6408
Type:	(EG) Ex. Government
Tax District:	(020) 2 DOLLARWAY-RURAL
Millage Rate:	57.35

Property Information

Physical Address:	2400 STATE FARM (TUCKER UNIT MH PK) RD
Subdivision:	SEC 19 TWP 3 S RNG 08 W
Block/Lot:	N/A / N/A
S-T-R:	19-03-08
Size (Acres):	756.38
Legal:	ALL 756.38 ACRES

Market and Assessed Values

	Estimated Market Value	Full Assessed (20% Market Value)	Taxable Value
Land	N/A	N/A	N/A
Building	N/A	N/A	0
Totals	**N/A**	**N/A**	**N/A**

Taxes

Estimated Taxes:	0
Homestead Credit:	0 Note: Tax amounts are estimates only. Contact the county/parish tax collector for exact amounts.

Status: (EX) - Exempt

Special Assessments

Assessment	Tax Amount
FLAT BAYOU DR. DISTR	$55.77
	Total $55.77

Note: Due to rounding errors, please contact the Tax Collector for the exact taxes owed. 870-541-5313

Land

Land Use	Size	Units
Commercial(19)	129.805	Acres
Exempt(01)	201.012	Acres
Exempt(02)	124.087	Acres
Exempt(04)	285.819	Acres
Exempt(12)	1.274	Acres
Timber(01)	3.636	Acres
Timber(12)	10.747	Acres
Total	**756.38**	

Deed Transfers

Deed Date	Book	Page	Deed Type	Stamps	Est. Sale	Grantee	Code	Type
1/1/1910	000	0000	N/A	N/A	N/A	STATE FARM	N/A	N/A

Residential Card 1 Details

Occupancy	Story	Construction	Total Liv	Grade	Age	Year Built	Condition	Beds
Mobile Home	ONE	Frame Siding Std.	840	5	10	N/A	Average	N/A

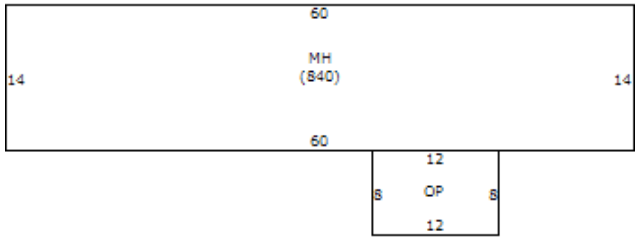
Exterior Wall:	N/A	**Plumbing:**	**Full:** N/A **Half:** N/A
Foundation:	N/A	**Fireplace:**	**Type:** N/A **Qty:** 0
Heat/Cool:	N/A	**Floor Struct:**	N/A
Floor Cover:	N/A	**Basement:**	N/A
Insulation:	N/A	**Basement Area:**	N/A
Roof Cover:	N/A	**Year Remodeled:**	N/A
Roof type:	N/A	**Style:**	N/A

Residential Card 1 Photo



Residential Card 1 Sketch

DataScout, LLC



Base Structure

Item	Label	Description	Area
A	MH	Mobile Home	840
B	OP	Porch, open	96

Outbuildings and Yard Improvements

Item	Type	Size / Dim	Unit Multi.	Quality	Age
Wood deck	N/A	N/A	N/A	N/A	N/A

Reappraisal Value History

Tax Year	Total Value	Total Assessed
2024	N/A	N/A
2023	N/A	N/A
2022	N/A	N/A
2021	N/A	N/A
2020	N/A	N/A
2019	N/A	N/A
2018	N/A	N/A
2017	N/A	N/A
2016	N/A	N/A
2015	N/A	N/A

Map



Not a Legal Document

Subject to terms and conditions
www.actDataScout.com

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APPENDIX C
FEMA 05069C0075D FLOOD MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Arkansas State Plane south zone (FIPSZONE 0302). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC- 3, #9202
1315 East- West Highway
Silver Spring, MD 20910- 3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by Arkansas Geographic Information Office.

This map reflects more detailed and up- to- date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

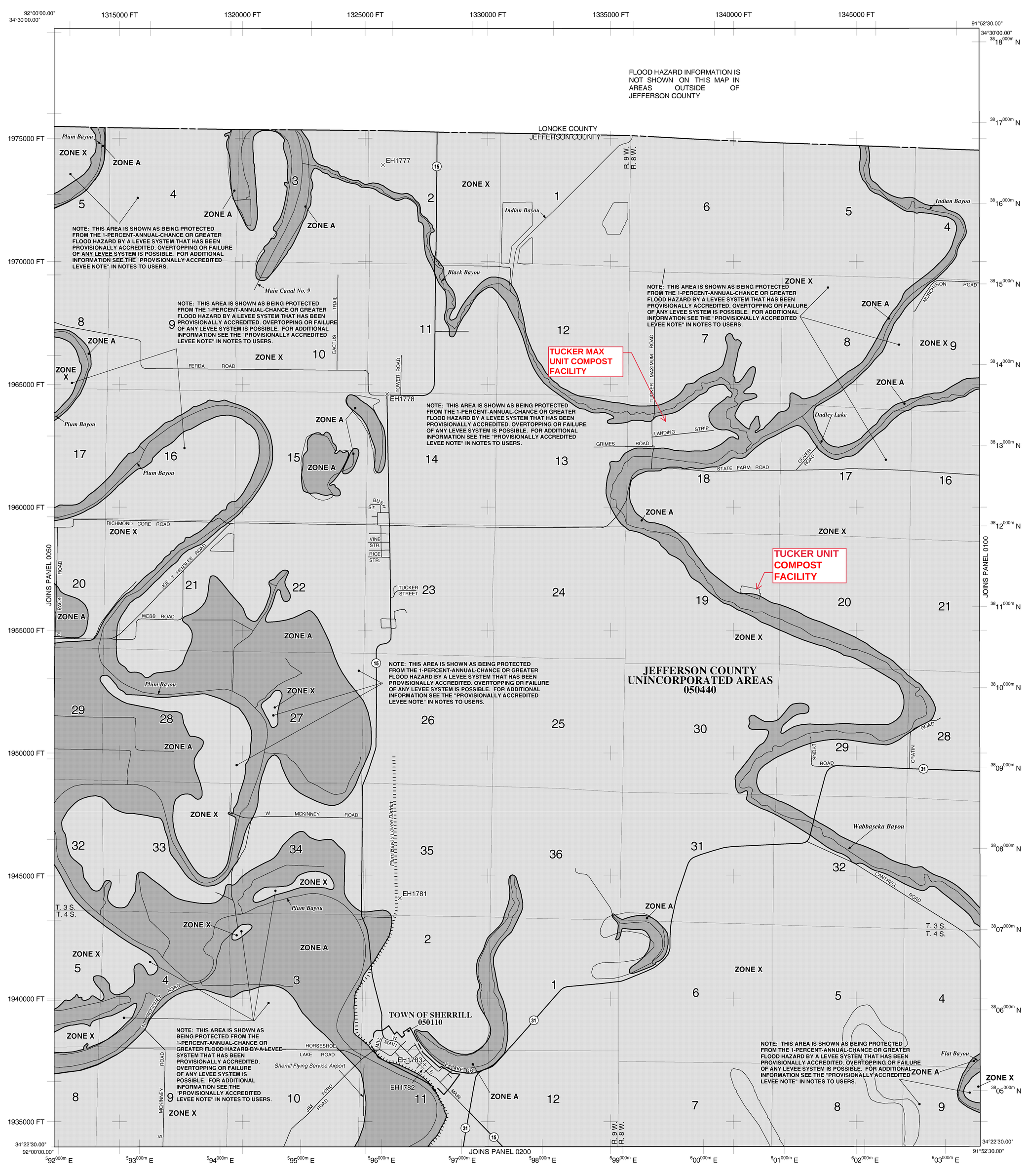
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de- annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1- 800- 358- 9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report,* and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1- 800- 358- 9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1- 877- 336- 2627) or visit the FEMA website at http://www.fema.gov/.

Provisionally Accredited Levee Notes to Users: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations by (April 5, 2009). If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referred to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275 000m N — 1000-meter Universal Transverse Mercator grid ticks, zone 15
- 6000000 FT — 5000-foot grid ticks: Arkansas State Plane coordinate system, south zone (FIPSZONE 0302), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
March 16, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1- 800- 638- 6620.

MAP SCALE 1" = 2000'
1000 0 2000 4000 FEET
600 0 600 1200 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0075D

FIRM
FLOOD INSURANCE RATE MAP

JEFFERSON COUNTY, ARKANSAS
AND INCORPORATED AREAS

PANEL 75 OF 600
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
JEFFERSON COUNTY	050440	0075	D
SHERRILL, TOWN OF	050110	0075	D

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
05069C0075D

EFFECTIVE DATE
MARCH 16, 2009

Federal Emergency Management Agency

National Flood Hazard Layer FIRMette

FEMA

91°54'55"W 34°26'37"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

91°54'17"W 34°26'7"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/12/2025 at 11:17 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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APPENDIX D
FEMA FLOOD RISK INFORMATION REPORT

Estimated Base Flood Elevation (estBFE)

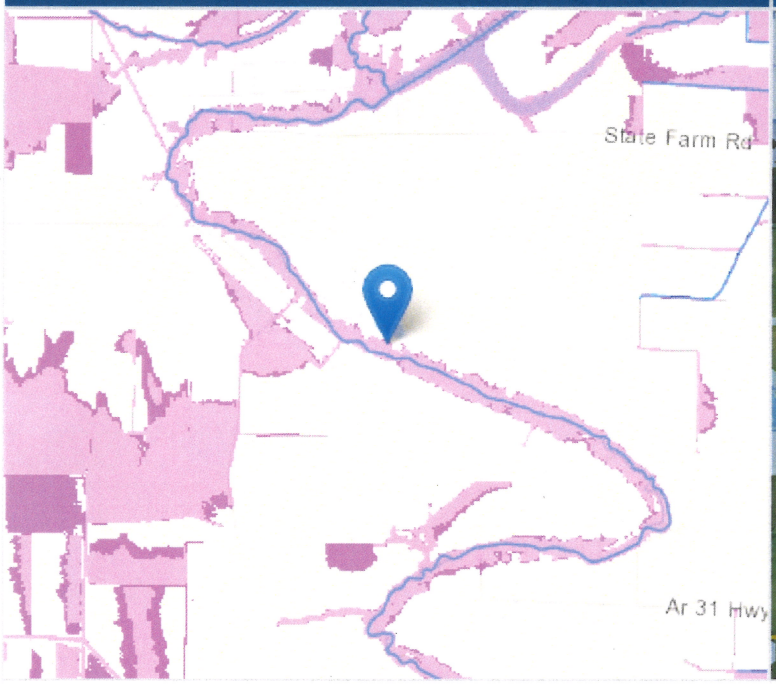
FEMA

Flood Risk Information Report

Latitude 34.4357, Longitude -91.9059 (Jefferson County, AR)

FEMA is providing a look at flood data availability and relative Base Level Engineering analysis through the Estimated Base Flood Elevation Viewer (Estimated BFE Viewer). Base Level Engineering uses high resolution ground elevation data, flood flow calculations, and fundamental engineering modeling techniques to define flood extents for streams. The viewer is an effective tool for property owners, community officials, and land developers to identify flood risk, estimated flood elevations, and flood depths for watersheds where Base Level Engineering has been prepared.

Estimated Flood Extent



High risk (1% flood zone) | Low to moderate risk (0.2% flood zone) | Areas of coastal influence | Levees | Streams

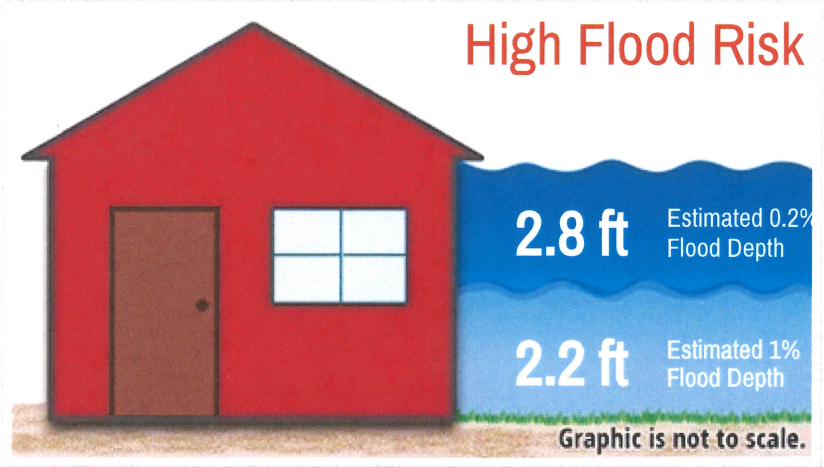
Estimated 1% Flood Depth



≤ 1 foot | > 1 – 2 feet | > 2 – 3 feet | > 3 – 4 feet | > 4 – 5 feet | > 5 feet | Areas of coastal influence | Levees | Streams

Flood Event	Estimated Flood Depth*	Estimated Base Flood Elevation*
1 Percent (100 Year)	2.2 feet above land surface	211.1 feet NAVD 1988
0.2 Percent (500 Year)	2.8 feet above land surface	211.7 feet NAVD 1988

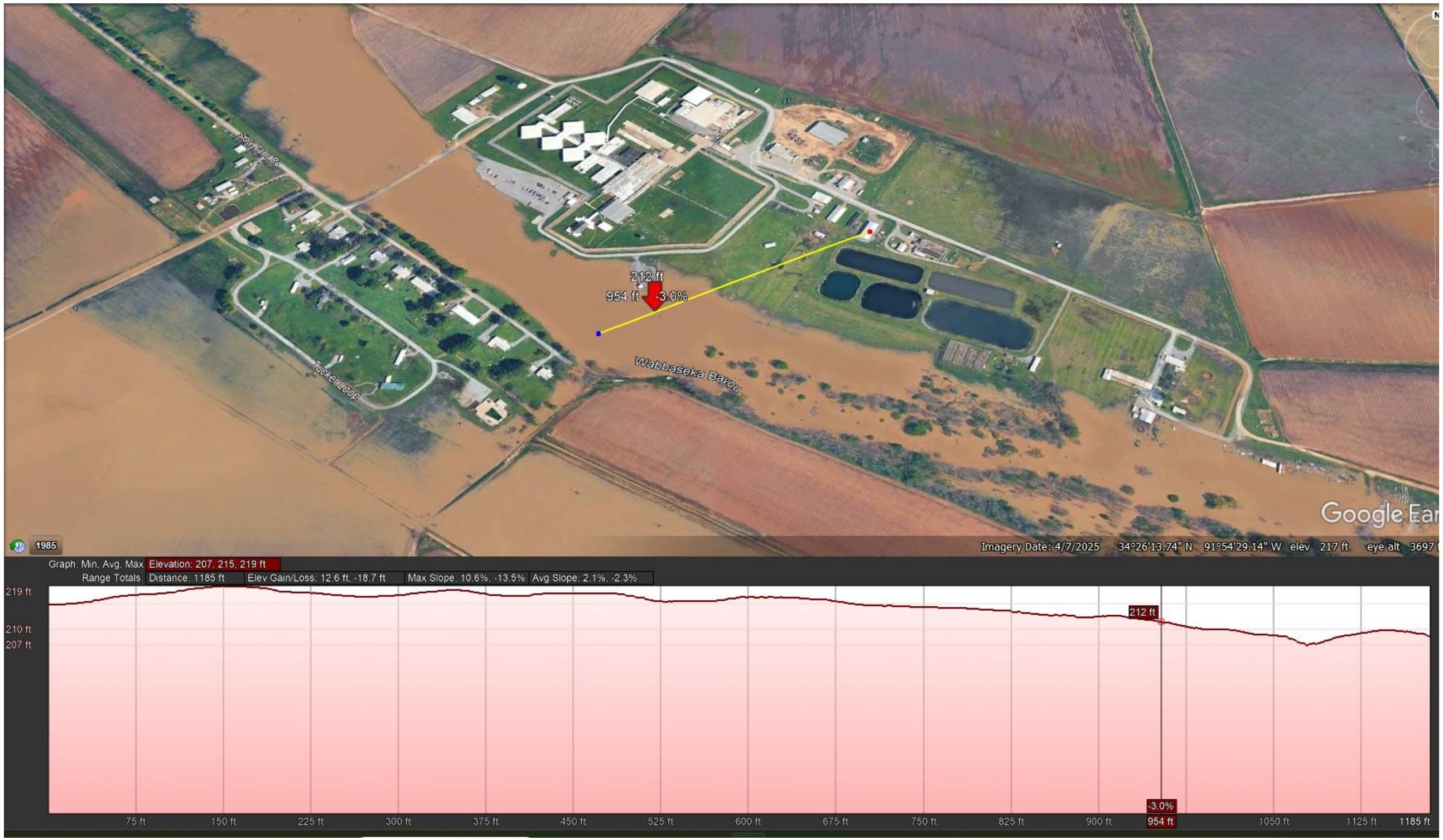
* The information included in this report is based on the location marker shown in the map. Results are not considered an official determination.



PROFILE FROM COMPOST FACILITY TO CENTER OF WABBASEKA BAYOU FOR THE SOUTHWEST DRAINAGE.

500 YEAR ESTIMATED BASE FLOOD ELEVATION SHOWN (211.7 FEET MSL)

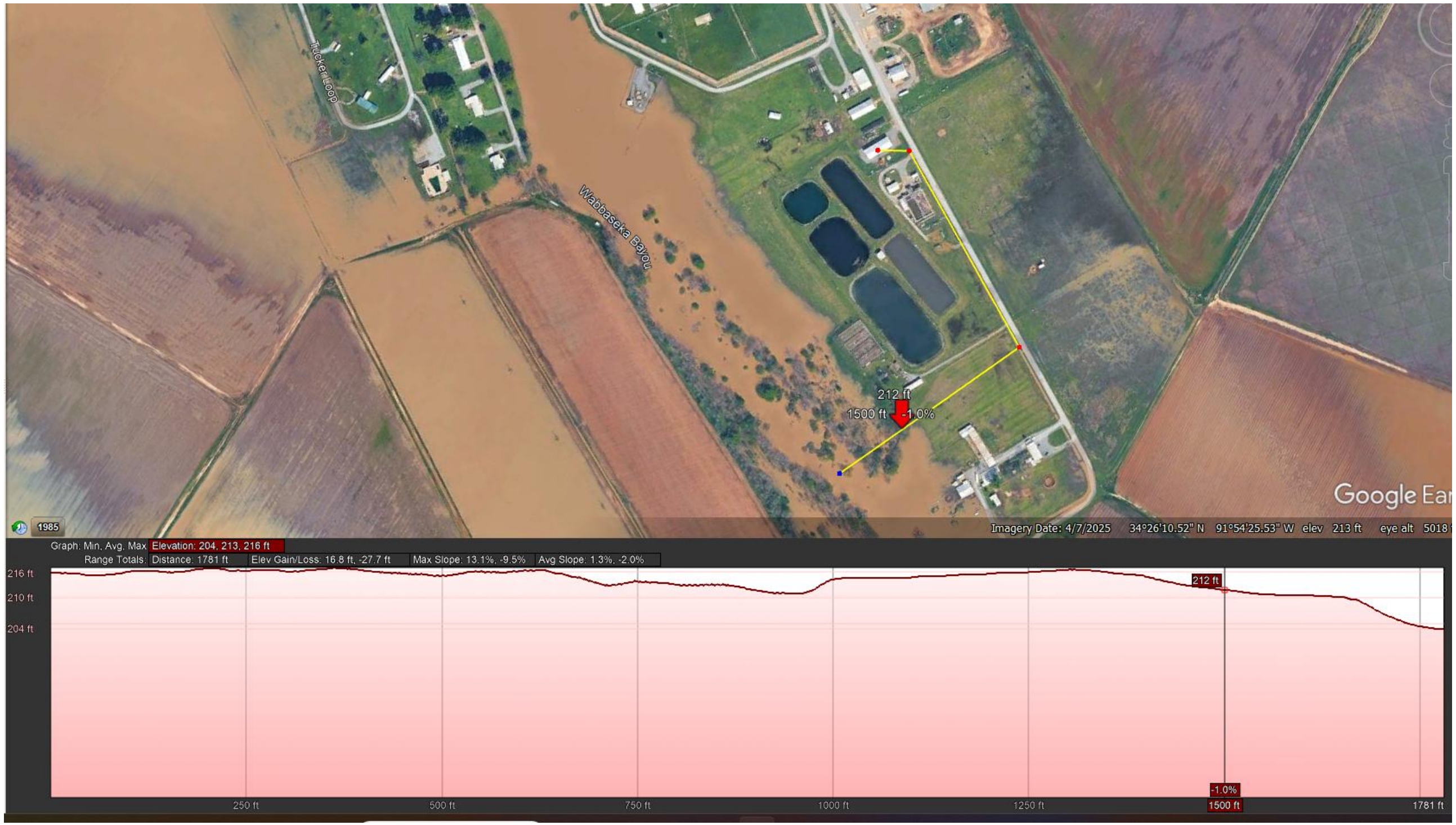
FINISHED FLOOR: 216 FEET MSL



PROFILE FROM COMPOST FACILITY TO CENTER OF WABBASEKA BAYOU FOR THE NORTHEAST DRAINAGE.

500 YEAR ESTIMATED BASE FLOOD ELEVATION SHOWN (211.7 FEET MSL)

FINISHED FLOOR: 216 FEET MSL



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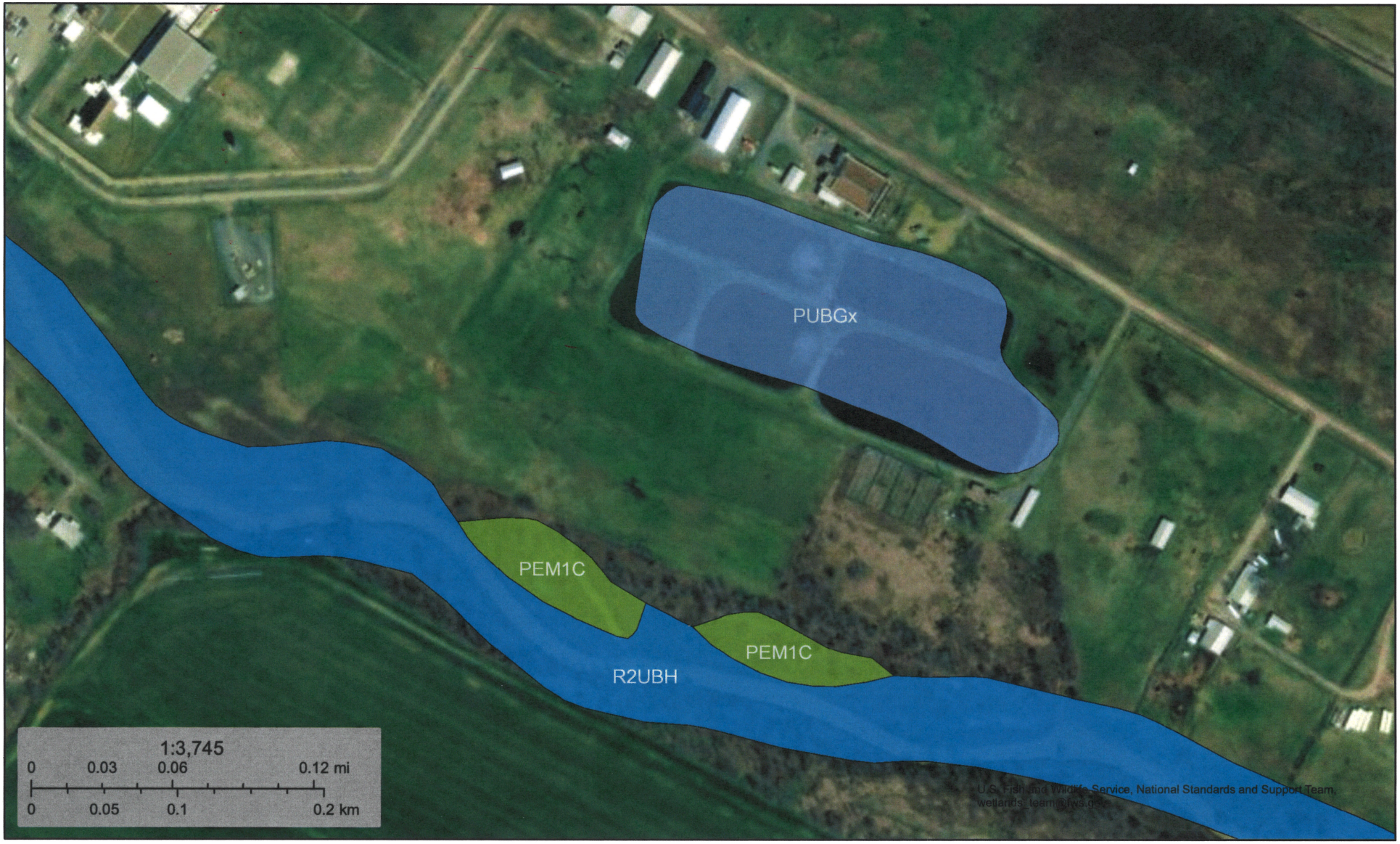
APPENDIX E
U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY WETLAND MAP

U.S. Fish and Wildlife Service

National Wetlands Inventory

TUCKER UNIT



November 24, 2025

Wetlands

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

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.

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APPENDIX F
USDA SOIL SURVEY OF JEFFERSON COUNTY (1980)

SOIL SURVEY OF

Jefferson and Lincoln Counties, Arkansas

United States Department of Agriculture
Soil Conservation Service

In cooperation with
Arkansas Agricultural Experiment Station

SOIL LEGEND

The legend is numeric. Soil names followed by the superscript 1/ are broadly defined units. The composition of these units is more variable than that of the other units in the survey area, but has been controlled well enough to be interpreted for the expected use of the soils.

SYMBOL	NAME
1	Amy silt loam
2	Amy soils, frequently flooded 1/
3	Amy-Urban land complex
4	Calloway silt loam, 0 to 1 percent slopes
5	Calloway silt loam, 1 to 3 percent slopes
6	Calloway-Urban land complex
7	Caspiana silt loam, 0 to 1 percent slopes
8	Coushatta silt loam
9	Coushatta soils, occasionally flooded 1/
10	Coushatta-Urban land complex
11	Crevasse loamy fine sand
12	Crevasse soils, frequently flooded
13	Desha clay
14	Desha clay, occasionally flooded
15	Grenada silt loam, 1 to 3 percent slopes
16	Grenada silt loam, 3 to 8 percent slopes
17	Grenada-Urban land complex, 1 to 3 percent slopes
18	Grenada-Urban land complex, 3 to 8 percent slopes
19	Hebert silt loam
20	Henry silt loam
21	Henry-Urban land complex
22	McGehee silt loam
23	McGehee silt loam, occasionally flooded
24	Oklared fine sandy loam, occasionally flooded
25	Ouachita soils, frequently flooded 1/
26	Perry clay
27	Perry clay, occasionally flooded
28	Pheba silt loam, 0 to 2 percent slopes
29	Pheba-Urban land complex, 0 to 2 percent slopes
30	Portland clay
31	Portland clay, occasionally flooded
32	Portland-Urban land complex
33	Rilla silt loam, 0 to 1 percent slopes
34	Rilla silt loam, undulating
35	Roxana silt loam
36	Roxana silt loam, occasionally flooded
37	Roxana-Urban land complex
38	Ruston fine sandy loam, 1 to 3 percent slopes
39	Sacul fine sandy loam, 1 to 3 percent slopes
40	Sacul fine sandy loam, 3 to 8 percent slopes
41	Savannah fine sandy loam, 1 to 3 percent slopes
42	Savannah fine sandy loam, 3 to 8 percent slopes
43	Savannah-Urban land complex, 1 to 3 percent slopes
44	Savannah-Urban land complex, 3 to 8 percent slopes
45	Sawyer silt loam, 1 to 3 percent slopes
46	Sawyer silt loam, 3 to 8 percent slopes
47	Smithdale fine sandy loam, 3 to 8 percent slopes
48	Smithdale fine sandy loam, 8 to 12 percent slopes
49	Wabbaseka-Latanier complex, undulating
50	Wabbaseka-Latanier complex, occasionally flooded
51	Yorktown silty clay

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

has not been altered but is covered by 6 to 24 inches of clayey material.

Included with this complex in mapping are a few intermingled areas of Perry, McGehee, and Hebert soils. These soils have been altered in some places.

Portland soils are high in natural fertility. Reaction is strongly acid or very strongly acid in the upper 16 to 26 inches except in limed areas. The lower part of the subsoil ranges from slightly acid to moderately alkaline. Permeability is very slow, and available water capacity is high. When dry, these soils shrink and crack, and when wet, they expand and seal the cracks. The water table is seasonally high; it is within 12 inches of the surface during winter and early spring.

This complex has low potential for most urban uses. Wetness, shrink-swell potential, and low strength are severe limitations for dwellings, commercial buildings, streets, and roads. Slow permeability and wetness are severe limitations for septic tank absorption fields. These limitations are difficult and expensive to overcome. Landscaping plants that tolerate a high content of water in the soil can be selected for planting. Unprotected areas are muddy and sticky when wet. Not assigned to a capability unit or a woodland suitability group.

33—Rilla silt loam, 0 to 1 percent slopes. This well drained, level soil is on natural levees and terraces of former channels of the Arkansas River. Individual areas are 20 to 300 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The upper part of the subsoil is yellowish red silt loam that extends to a depth of about 15 inches. The middle part is yellowish red silty clay loam that extends to a depth of about 28 inches and yellowish red silt loam that extends to a depth of about 42 inches. The lower part is reddish brown loam that extends to a depth of about 55 inches. The underlying material, extending to a depth of 72 inches or more, is yellowish red loam.

Included with this soil in mapping are some soils that have a surface layer of fine sandy loam and small areas of Hebert, McGehee, and Portland soils. These included soils make up less than 10 percent of the unit. Also included are small areas of soils that have clayey horizons below a depth of 36 inches.

This soil has high natural fertility. Reaction ranges from slightly acid to strongly acid in the surface layer and from medium acid to very strongly acid in the subsoil. Permeability is moderate, and runoff is slow. Available water capacity is high.

This soil has high potential for row crops and small grains. The main crops are cotton (fig. 8) and soybeans. Other suitable crops are grain sorghum, winter small grains, and corn. This soil warms early in spring and permits early plantings. Tilth is easy to maintain. The soil can be cultivated over a wide range of moisture conditions. Adapted pasture plants are bahiagrass, bermudagrass, and tall fescue.

This soil has high potential for eastern cottonwood, American sycamore, cherrybark oak, and sweetgum, and it has no significant limitations for woodland use or management.

This soil has medium potential for most urban uses. Shrink-swell potential and low strength are moderate limitations for dwellings, small commercial buildings, and local roads and streets. Moderate permeability and wetness are moderate limitations for septic tank absorption fields. Capability unit I-1; woodland suitability group 2o4.

34—Rilla silt loam, undulating. This well drained undulating soil is in the form of ridges and swales along former channels of the Arkansas River. Slope is 0 to 3 percent. Individual areas are 20 to 100 acres.

Typically the surface layer is brown silt loam about 9 inches thick. The upper part of the subsoil is yellowish red silt loam that extends to a depth of about 15 inches. The middle part is yellowish red silty clay loam that extends to a depth of about 28 inches and yellowish red silt loam that extends to a depth of about 42 inches. The lower part is reddish brown loam that extends to a depth of about 55 inches. The underlying material, extending to a depth of 72 inches or more, is yellowish red loam.

Included with this soil in mapping are small areas of soils that have slopes of more than 3 percent and small areas of Hebert, McGehee, and Portland soils. These included soils make up less than 10 percent of the unit. Also included are small areas of soils that have clayey horizons below a depth of 36 inches.

This soil has high natural fertility. Permeability is moderate, and runoff is slow. Available water capacity is high. Reaction ranges from slightly acid to strongly acid in the surface layer and from medium acid to very strongly acid in the subsoil.

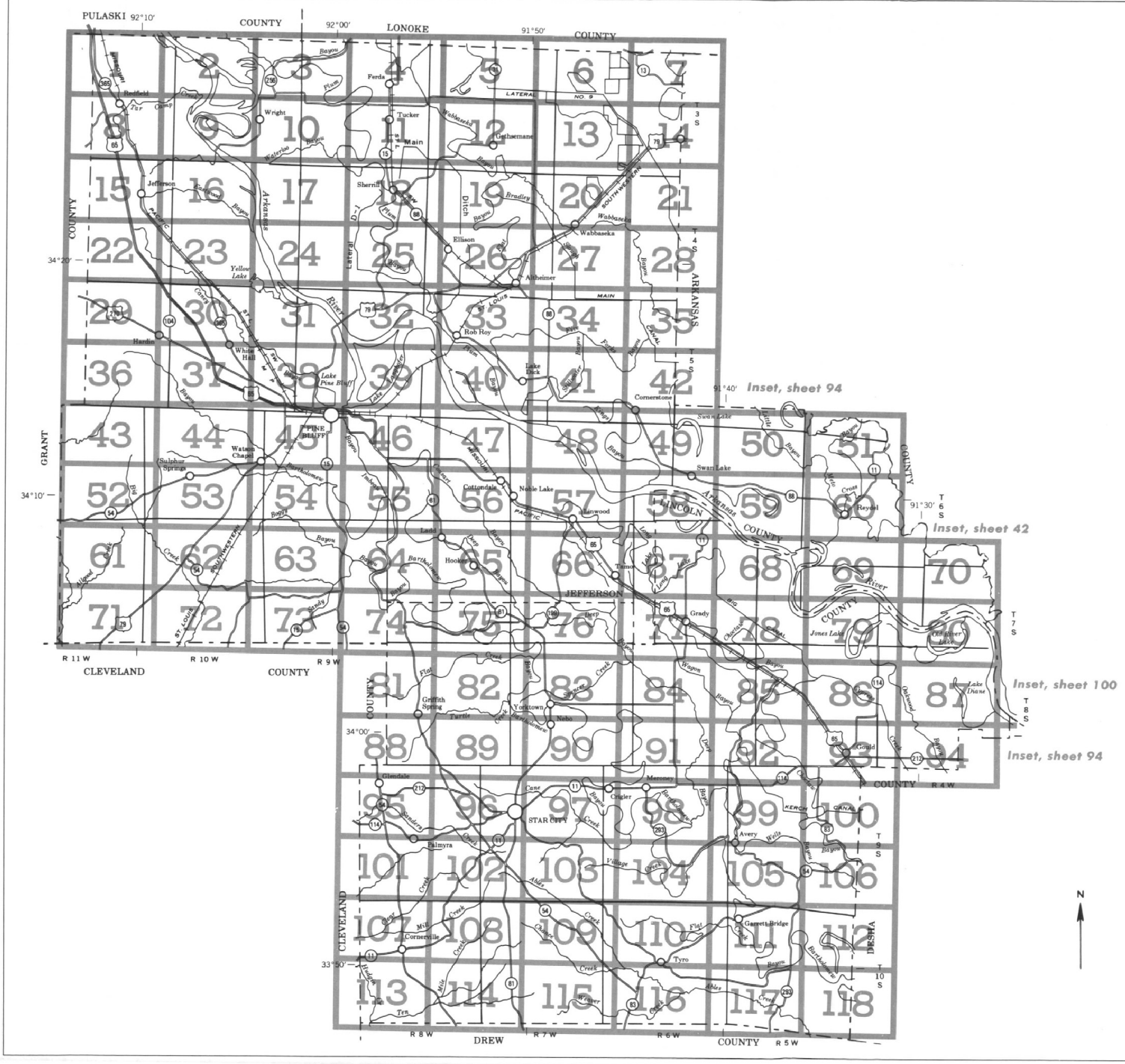
This soil has high potential for row crops and small grain. The main crops are cotton and soybeans. Other suitable crops are grain sorghum, winter small grains, and corn. This soil warms early in spring and permits early planting. Tilth is easy to maintain. The soil can be cultivated over a wide range of moisture conditions. The short side slopes of ridges are susceptible to slight erosion. Adapted pasture plants are bahiagrass, bermudagrass, and tall fescue.

This soil has high potential for eastern cottonwood, American sycamore, cherrybark oak, and sweetgum, and it has no significant limitations for woodland use or management.

This soil has medium potential for most urban uses. Shrink-swell potential and low strength are moderate limitations for dwellings, small commercial buildings, and local roads and streets. Moderate permeability and wetness are moderate limitations for septic tank absorption fields. Capability unit IIe-2; woodland suitability group 2o4.

35—Roxana silt loam. This well drained, level soil is on natural levees of bottom lands of the Arkansas River. Slope is 0 to 1 percent. Individual areas range from about 20 to 100 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The underlying material, extending



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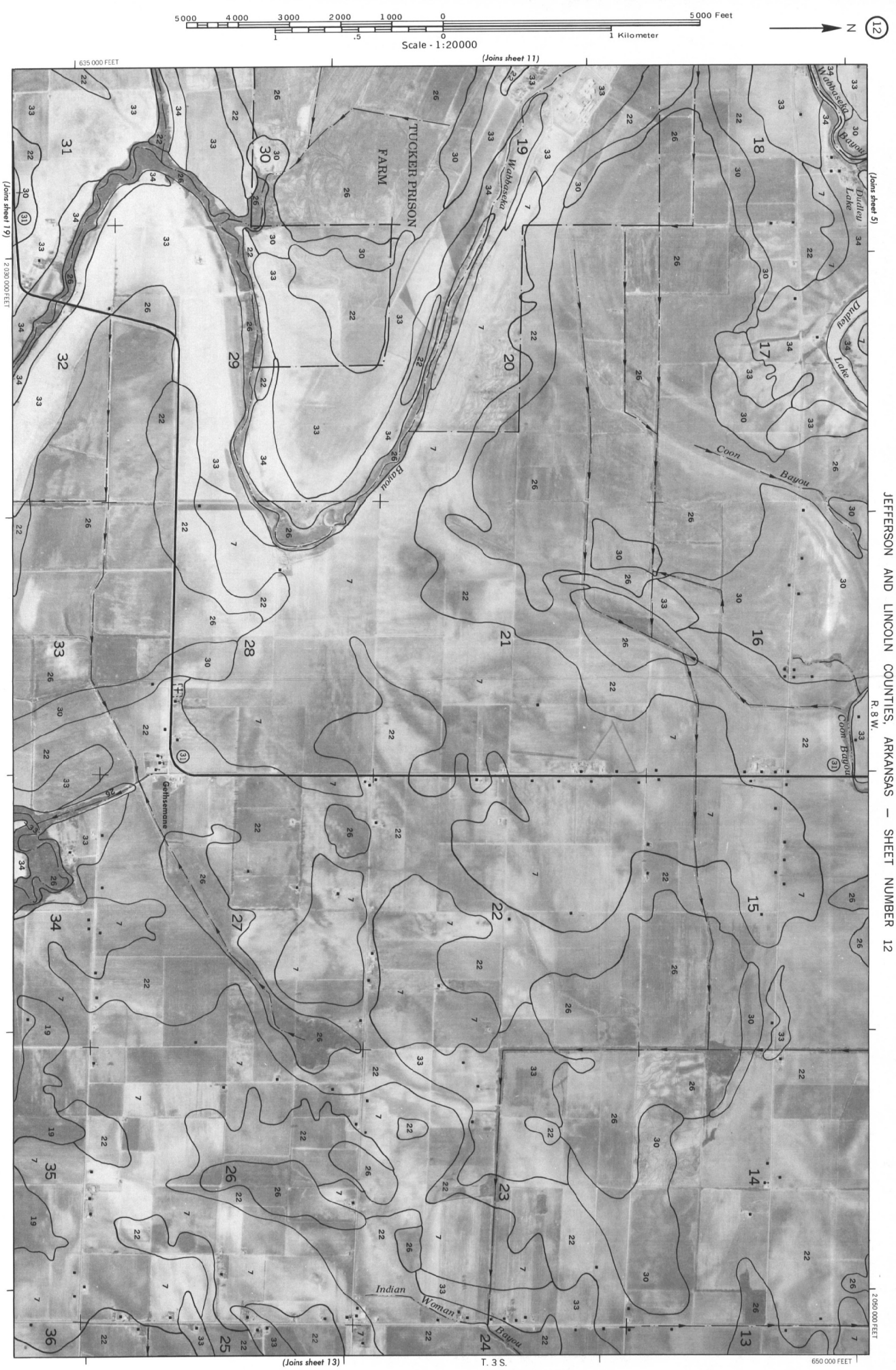
JEFFERSON AND LINCOLN COUNTIES, ARKANSAS

Scale 1:316,800

1 0 1 2 3 4 5 Miles

1 0 5 10 Km



This map is compiled on 1978 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JEFFERSON AND LINCOLN COUNTIES, ARKANSAS NO. 12

McCLELLAND CONSULTING ENGINEERS, INC.
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APPENDIX G
MCE's GEOTECHNICAL INVESTIGATION – ADC TUCKER UNIT WTP IMPROVEMENTS

McCLELLAND CONSULTING ENGINEERS, INC.
DESIGNED TO SERVE

1580 East Stearns Street
Fayetteville, AR 72703
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October 15, 2021

CERTIFICATE OF AUTHORIZATION
McCLELLAND CONSULTING ENGINEERS, INC.
No. 24
ARKANSAS-ENGINEER

Arkansas Department of Corrections
Construction/Central Maintenance
7800 Correction Circle
Pine Bluff, Arkansas 71603

ATTN: Mr. Richard Cooper
Assistant Director

RE: Geotechnical Investigation
ADC Tucker Unit Water Treatment Plant Improvements
Tucker, Arkansas
MCE Project Number: 21-5775

Dear Mr. Cooper:

We are submitting herewith the report for the Geotechnical Investigation on the above-referenced project. We appreciate the opportunity to provide this service to you. If there are any questions regarding the Geotechnical Investigation, please contact us.

Sincerely yours,

McCLELLAND CONSULTING ENGINEERS, INC.
DESIGNED TO SERVE

Steven J. Head, PE
Principal | Geotechnical Department Head

Enclosure: Geotechnical Report

STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No. 16434
STEVEN J. HEAD
10/15/2021

GEOTECHNICAL INVESTIGATION

Tucker Water Treatment Plant Improvements

Tucker, Arkansas

MCE Project Number: 21-5775



Arkansas Department of Corrections
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7800 Correction Circle
Pine Bluff, Arkansas 71603

October, 2021

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GEOTECHNICAL REPORT

Tucker Unit Water Treatment Plant Improvements

MCE Project Number: 21-5775

Tucker, Arkansas

FOR

Arkansas Department of Corrections
Tucker Unit & Maximum Security Unit
State Farm Road
Tucker, AR 72168

Executive Summary

This is a report of the findings of the final investigation for the proposed improvements to the Arkansas Department of Corrections (ADC) Tucker Unit Water Treatment Plant located in Tucker, Arkansas. This report includes information on the existing surface materials, subsurface conditions, structure foundations recommendations, construction considerations, and considerations for site preparation and grading.

The following is a summary of significant findings:

- A total of six (6) project borings were conducted across the project site. These borings were strategically placed in an effort to obtain as much subsurface information as feasibly possible and to ensure that we captured specific subsurface data as it pertains to the proposed improvement features.
    - A total of four (4) borings were conducted within the proposed extents of Tucker Unit (Site A), initially, these borings had planned target depths of 15 and 30 feet below the existing surface elevations. The proposed 30-foot borings (B-01 and B-02) were each extended to a depth of 45 feet based on the acquired data and size of the structures during drilling operations. These borings were extended to encounter a more competent basal stratum (Stratum III). Both of these borings achieved their planned target depths of 45 feet below the existing surface elevations.
    - Project boring B-03 was conducted within the proposed footprint of the new Chemical Building, and project boring B-04 was conducted within the proposed footprint of the below-grade Clearwell. Both of these borings achieved their planned target depths of 15 feet below the existing surface elevations.
    - The remaining two (2) project borings (B-05 and B-06) were conducted with the proposed extent of Site B. Both of these project borings were conducted near the proposed footprint of the new Elevated Water Storage Tank. Both of these borings achieved their planned target depths of 45 feet below the existing surface elevations.
- Surface materials encountered at both project sites consisted of silty topsoil materials. All of the project borings encountered a silty/sandy topsoil material at the surface, this material was observed having a thickness that ranged from six (6) to eight (8) inches. We recommend the topsoil, and any other deleterious materials are removed full-depth from beneath the proposed development footprints. MCE recommends that the Contractor anticipate an average of twelve (12) inches of initial stripping depths across both project sites.

- Groundwater was encountered by one (1) of the project borings (B-03) at the time of this investigation. The groundwater was observed at an approximate depth of 10 feet below the existing surface elevations at the time of drilling, and is indicative of perched groundwater at this location. Long-term groundwater monitoring was not included as part of our scope of work. The installation and periodic measurement of monitoring wells would be required to establish seasonal piezometric surfaces below the project site.

- Based on the data from this investigation, stable subgrade materials were generally encountered in the upper one (1) to two (2) feet at both of the project sites. However these materials may have exhibited high consistency values at these depths, the consistency values were noted to fluctuate as they advanced to their respective target depths. This factor, coupled with anticipated time of construction, should be considered by the bidding Contractors.

- The foundation system recommended for the proposed Chemical Building is a shallow foundation system composed of continuous and individual (spread) foundations. The structure shallow foundations should bear on a minimum of one (1) foot of properly placed and compacted select fill material. This condition will likely be achieved by initial grading operations and additional undercutting/replacement.

- Due to the anticipated structural loading conditions and the encountered onsite subgrade materials, we recommend that the proposed pump station be supported by a mat foundation system. Mat foundations, sometimes referred to as ‘slab’ foundations, distribute structural loads across a large surface area. By evenly distributing heavy loads, mat foundations are able to provide less contact pressure than traditional footings.

- The foundations relevant to the proposed Elevated Tank are recommended to consist of a deep foundation system. Based on the anticipated size and capacity of this tank, we recommend a Driven Pile System. Driven Piles are deep foundation systems that utilize impact or vibration hammers to install foundation elements to a designed depth or resistance. At the time of preparing this report, structural loading data and other details of the Tank were not available, and it is expected that the tank manufacturer will be responsible for designing the foundation system relevant to the new elevated tank.

- Select fill material required for the project is recommended to be of locally available, homogenous material meeting Unified Soils Classification as a CL, SC, or SM. It should be free of any organic matter, with particle sizes no larger than two (2) millimeters in diameter. The locally available materials suggested for use on this project have negligible plasticity characteristics, and a maximum of 70% passing the No. 200 sieve. Any material to be used as select fill on the project should be reviewed and approved by the Geotechnical Engineer. The table below provides the recommended compaction parameters for select fill and Class 7 base course on the project.

Type of Material	Test Specifications	Minimum Dry Density (%)	Optimum Moisture Range (%)
Select Fill	ASTM D698	95	-2% to +2%
Base Course	ASTM D1557	95	Near Optimum

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Introduction

A geotechnical investigation of subsurface soil conditions was conducted by McClelland Consulting Engineers, Inc. (MCE), for the proposed improvements to the ADC Tucker Unit Water Treatment Plant located in Tucker, Arkansas. The investigation was requested by Mr. Byron Hicks, P.E. with MCE, and authorized by Mr. Dexter Payne with the ADC to investigate subsurface soil conditions at the project site and to prepare final recommendations and considerations for site preparation, grading operations, and recommended construction monitoring.

Site Descriptions

The proposed project is split into two (2) separate locations, one (1) located on the existing property of the **Tucker Unit** (**Site A**) and the other located on the existing property of the **Tucker Maximum Security Unit** (**Site B**).

More specifically, Site A is located within the extents of the existing Water Treatment Plant located to the west of the Tucker Unit. Site A is positioned on the northwest side of State Farm Road and encompasses approximately 2.7-acres. The existing vegetation was encountered as low-to-medium cut grass and weeds largely maintained through landscaping efforts. Being that this project is proposed within the existing confines of the Water Treatment Plant, several structures currently exist on the property. Site A could be described as relatively flat-lying with maximum grade differentials on the order of approximately four (4) feet across the project site.

Site B is located approximately one (1) mile to the north of Site A. Site B is located on the northern side of Wabbaseka Bayou and on the south side of Grimes Road. The proposed project site is currently positioned on the west side of the existing parking lot for the Tucker Maximum Security Unit and encompasses approximately 0.4-acres. The existing vegetation was encountered as low-to-medium cut grass and weeds largely maintained through landscaping efforts. This site is currently vacant of any structures. Site B could be described as flat-lying with maximum grade differentials on the order of approximately one (1) to two (2) feet across the project site.

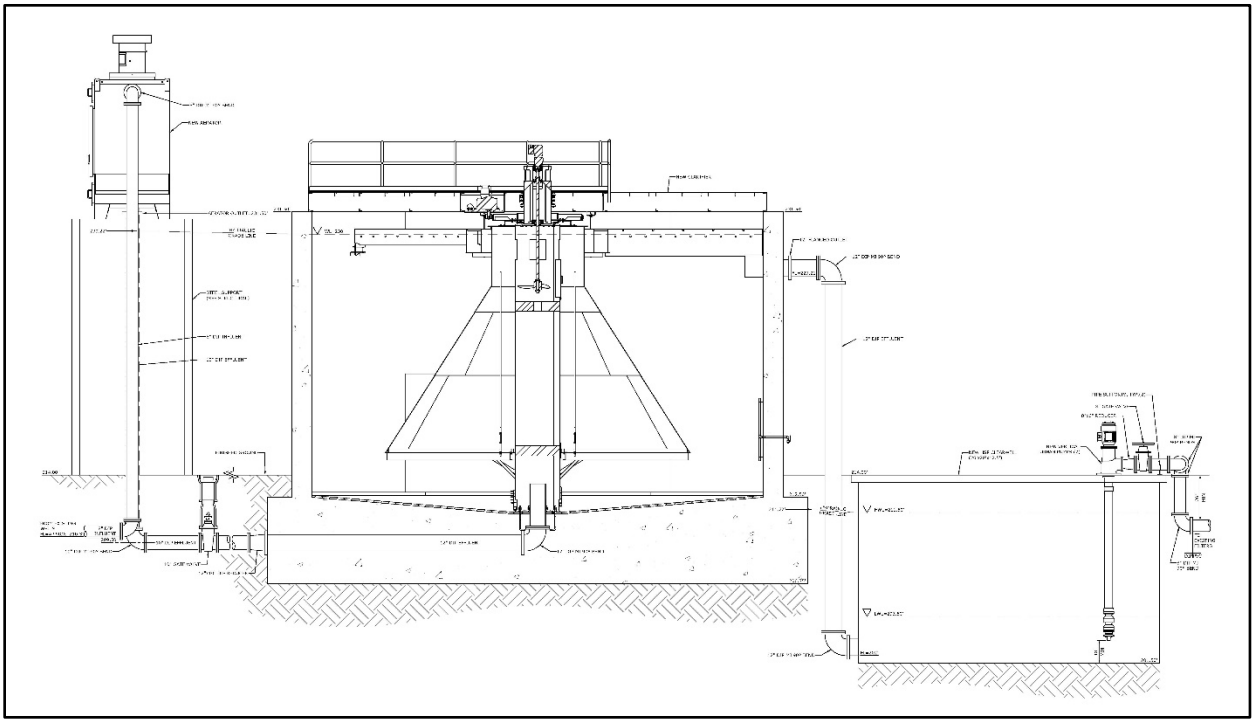
Based on our experience in the area and information published by the Arkansas Geological Survey, we anticipate that the project site is underlain by Quaternary Age Alluvial deposits. Alluvial deposits are described as loose clay, silt, sand, or gravel that has been deposited by running water in a stream bed, on a floodplain, in an alluvial fan or beach, or in similar settings.

Project Description

Our understanding of the current project scope includes multiple improvements to the existing Water Treatment Plant that services the Tucker Unit and the Maximum Security Unit. As previously mentioned, these improvements are proposed at two (2) separate locations. The majority of the improvements are proposed for the existing Water Treatment Plant, which we will refer to as Site A within this report. Additional improvements are proposed near the Maximum Security Unit to the north of the Water Treatment Plant, which we will refer to as Site B within this report.

The improvements currently planned within Site A consist of the construction of a new Clarifier, a new Chemical Building, installation of a new Clearwell Pump and service pumps, the installation of a new eight (8) inch Flow Meter, and the installation of a new Aerator.

At the time of preparing this report, we understand that the new Clarifier will have an approximate diameter of 30 feet and the height to the top of the sidewalls is approximately 19 feet. The installation of a below-grade Clearwell with associated pumps is planned just to the northwest of the new Clarifier. The Clearwell is planned to extend to an approximate depth of 13 feet below the finished grade and be constructed using rigid concrete materials. The new Chemical Building is currently planned to have an approximate footprint of 600 square feet. We understand that the new Chemical Building will likely be constructed using Concrete Masonry Unit (CMU) blocks with a slab-on-grade foundation. Three (3) storage tanks are proposed to be installed in the new Chemical Building including, two (2) 1,500 gallon Caustic Tanks, and one (1) 200 gallon Day Tank. The new Chemical Building is planned to be located to the northeast of the new Clarifier. The new Aerator is planned to be installed approximately 10 feet from the new Clarifier on the northeast side. The new Aerator is planned to be fixed to steel supports approximately 17 feet above finished grade. A profile of the majority of the Site A improvement is presented in Figure 1 on the following page.



This image shows the proposed positioning and dimensions for the new Clarifier, Clearwell, and Aerator.

The Site B improvements consist of the construction of a new Elevated Water Storage Tank. As previously mentioned, the proposed Site B project site is located near the parking for the Maximum Security Unit to the north. The proposed tank is understood to be approximately 140 feet tall with an outside tank diameter of approximately 36 feet, this tank is understood to have a 200,000-gallon capacity. The type of tank proposed for this project is commonly referred to as a Double Ellipsoidal; constructed of a cylindrical side wall welded to an ellipsoid top and bottom and supported by steel beams and columns, double ellipsoidal storage tanks are often considered to be the industry standard.

Field Investigation

This investigation consisted of a total of six (6) project borings. These borings were strategically placed in an effort to obtain as much subsurface information as feasibly possible and to ensure that we captured specific subsurface data as it pertains to the proposed improvement features.

A total of four (4) borings were conducted within the proposed extents of Site A, initially, these borings had planned target depths of 15 and 30 feet below the existing surface elevations. The proposed 30-foot borings (B-01 and B-02) were each extended to a depth of 45 feet based on the acquired data and size of the structures during drilling operations. These borings were extended to encounter a more competent basal stratum (Stratum III). Project boring B-01 was conducted within the proposed footprint of the new Clarifier, and project boring B-02 was conducted within the proposed footprint of the new Aerator. Both of these borings achieved their updated planned target depths of 45 feet below the existing surface elevations. Project boring B-03 was conducted within the proposed footprint of the new Chemical Building, and project boring B-04 was conducted within the proposed footprint of the below-grade Clearwell. Both of these borings achieved their planned target depths of 15 feet below the existing surface elevations.

The remaining two (2) project borings (B-05 and B-06) were conducted with the proposed extent of Site B. Both of these project borings were conducted near the proposed footprint of the new Elevated Water Storage Tank. These borings also achieved their planned target depths of 45 feet below the existing surface elevations.

All project borings were conducted using a CME 45B truck-mounted drill rig utilizing both four (4) inch diameter solid stem augers and six (6) inch hollow stem augers. Soil samples were obtained at the depths indicated on the boring logs by the use of a two (2) inch diameter split-spoon sampler. The split-spoon sampler was driven by blows from a 140-pound automatic hammer dropped from a fixed height of 30 inches. The number of blows required to drive the split-spoon sampler the final 12 inches of an 18-inch drive, or portion thereof, is referred to as the Standard Penetration value, N, and is recorded on the boring logs in units of blows-per-foot.

Four (4) of the project borings (B-01, B-02, B-05, and B-06) were conducted to approximately 25 feet using traditional auger drilling techniques, then rotary/wash boring techniques were utilized to advance these boring to their target depths of 45 feet below the existing surface elevations. In rotary/wash boring, the soil is cut by the constant rotation of various types of bits. Drilling fluid, which is either water or bentonite slurry, is circulated through drilling rods. The returning fluid lifts the loosened material up and out till a predetermined depth is achieved. Split-spoon sampling will be conducted once the loosened materials are cleared. The utilization of drilling fluid will likely provide elevated moisture contents in obtained samples, which can be referenced within the data presented on the boring logs.

Final drilled depths are shown as the depths achieved by the split-spoon sampler. In addition to Standard Penetration Testing (SPT), the field tests performed included visual soil classifications and groundwater observations. The boring logs can be referenced in Appendix B on Plates 2 through 7.

Table 1: Project Boring Depths and Elevations

Boring ID	Topsoil Thickness	Ground Elevation	Total Depth Drilled	End of Boring Elevation
	(inches)	(feet)	(feet)	(feet)
B-01	8	214.0	45.0	169.0
B-02	8	214.0	45.0	169.0
B-03	8	214.5	15.0	199.5
B-04	8	214.0	15.0	199.0
B-05	6	216.0	45.0	171.0
B-06	8	216.5	45.0	171.5

NOTES: Elevations shown in Table 1 are rounded to the nearest 0.5 feet; based on the current topographic survey produced by MCE (dated 8/18/21).
Reported thicknesses are rounded to the nearest 1.0 inches.

Laboratory Testing

Laboratory tests were performed on soil samples recovered from the borings. The laboratory tests were conducted to determine the engineering properties of the project soil strata. The laboratory tests were conducted in accordance with the American Society for Testing and Materials (ASTM) designations. The tests performed on samples from the borings included moisture content, Atterberg Limits, and sieve analyses. The natural soil moisture content was determined on all soil samples to provide a moisture profile for each boring. Atterberg Limits tests (liquid and plastic limits) were performed on selected samples to aid in the soil classification and to help evaluate the volume-change characteristics of each soil stratum. Sieve analyses were performed on representative soil samples to aid in the soil classification of the selected soil strata. Results of laboratory testing for the project borings are provided on the boring logs and on the Laboratory Test Results Summary in Appendix C on Plates 9 and 10. A key to the terms and symbols used on the boring logs is also presented in Appendix B on Plate 8. Table 2 below shows the relevant test method specifications utilized on the project.

Table 2: Laboratory Test Method Specifications

Test Designation	Test Method
ASTM D2488	Standard Practice for Description and Identification of Soils (Visual)
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (USCS)
ASTM D2216	Standard Test Method for Lab Determination of Water Content of Soil
ASTM D6913	Standard Test Method for Particle-Size Distribution of Soils Using Sieve Analysis
ASTM D4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

On-Site Soil Conditions

The following project sections provide information regarding onsite conditions at the project location. This information includes descriptions of the existing soil types, imagery showing the approximate location of the existing soil types, and details pertaining to the local geology.

USDA Soil Types & Map

The following soil types exist in the project area according to current United States Department of Agriculture (USDA) soil maps, with descriptions from the Natural Resources Conservation Service (NRCS). The project site is in the northern portion of Jefferson County in central Arkansas. The soil types known to exist within the project areas, according to current USDA soil maps are detailed on the following page. In addition, Figure 2 and 3 below provides imagery of the approximate site locations and how they relate to the existing soil types.

- **McGehee Silt Loam (22) – known to exist within the extent of Site A.**

  McGehee soils are on slopes of 0 to 2 percent in the Arkansas and Red River bottomlands. The soil formed in thick silty and clayey alluvium and was somewhat poorly drained; slow runoff; slow permeability.

- **Rilla Silt Loam (33 and 34) – known to exist within the extent of both project sites.**

  The Rilla series consists of very deep, well-drained, moderately permeable soils that formed in reddish silty and loamy alluvium. These soils are on nearly level to gently sloping natural levees along the Red River and the present and abandoned channels of the Arkansas River. Slopes range from 0 to 5 percent.



Figure 2 - Site A

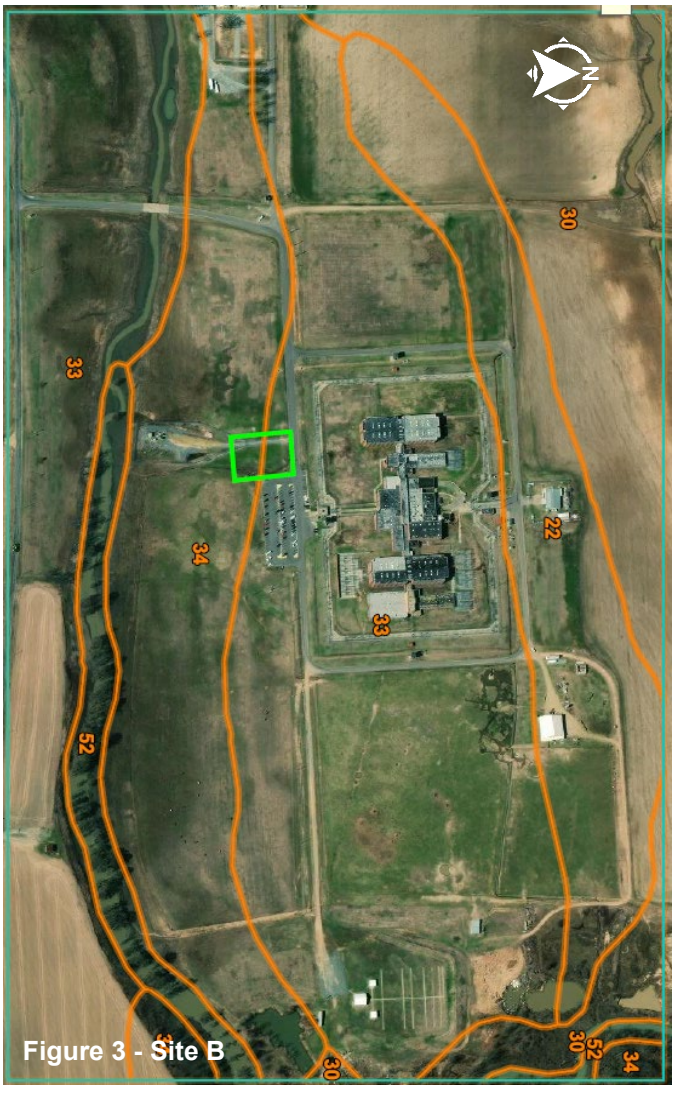


Figure 3 - Site B

Figure 2: Site A - USDA Soil Survey Report Image.
The image was produced by the United States Department of Agriculture.
The green line is the approximate project extent.

Figure 3: Site B - USDA Soil Survey Report Image.
The image was produced by the United States Department of Agriculture.
The green line is the approximate project extent.

Site Geology

According to maps and literature published by the United States Geological Survey and the Arkansas Geological Survey, the overall project sites are located in Alluvium Deposits. Alluvium represents the deposits of major stream channels and/or meanders of major streams. In terms of geologic time, the sediments are young and generally date to the Holocene time of the Quaternary Period. Typical sediments include gravels, sands, silts, clays, and mixtures of any and all these according to Information Circular 36 produced by the Arkansas Geological Survey. The thickness of these alluvial deposits is known to be quite variable. Imagery and the formation key are presented in Figure 4 below.

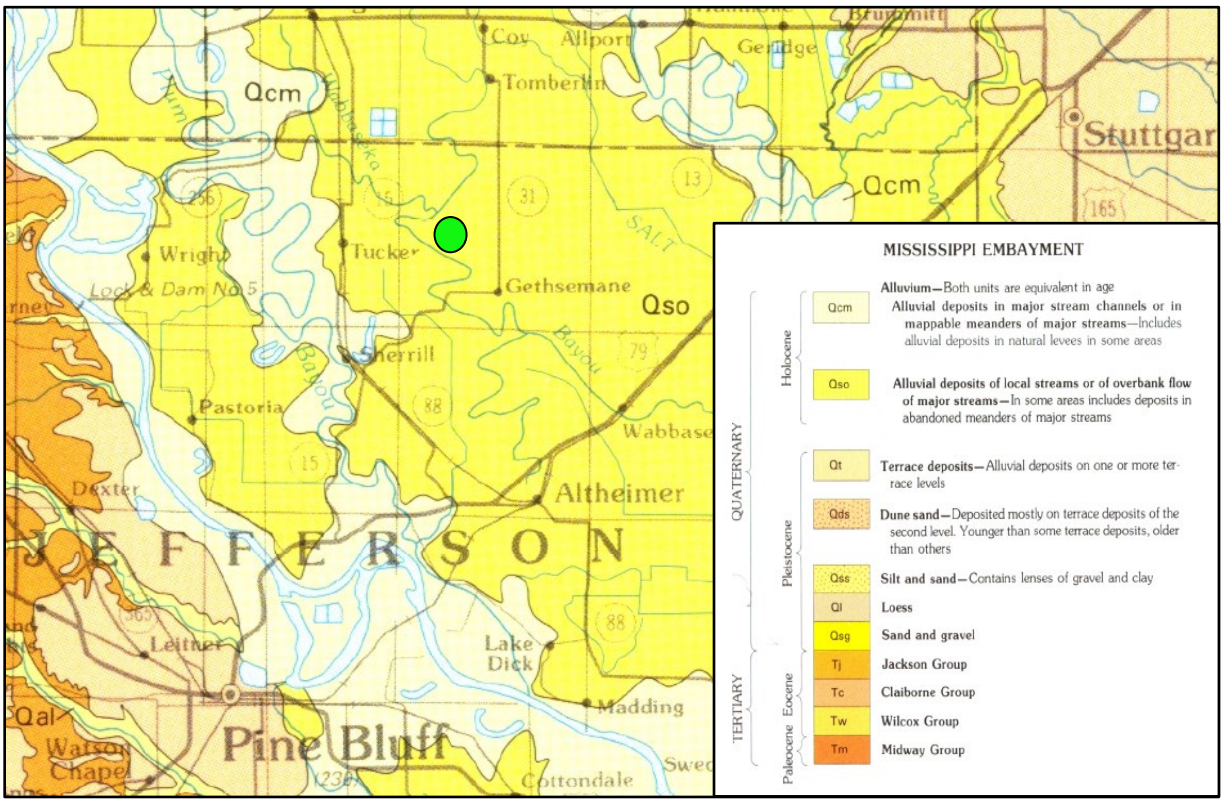


Figure 4: Image from the Geologic Map of Arkansas
The green dot represents the approximate location of the project site.

On-Site Soil Stratum Summary

The subsurface soil conditions at the site are described as below:

Stratum I – Surface Materials

The Stratum I surface materials consisted of silty topsoil materials. All of the project borings encountered a silty/sandy topsoil material at the surface, this material was observed having a thickness that ranged from six (6) to eight (8) inches.

Stratum II – Fine-Grained Soils

The fine-grained soils that make up Stratum II exhibited low-to-moderate plasticity characteristics. The Stratum II materials include Silt (ML), Silt with Sand (ML), Lean Clay (CL), and Sandy Fat Clay (CH). The Stratum II materials contained varying amounts and gradations of sand and gravel.

The ML materials that were encountered as dark tannish-brown to tannish-brown, light tannish-brown, light tannish-brown and gray, and light reddish-orange in color. Consistency values were observed as being medium-stiff to very stiff, with corresponding N-values ranging from 4 to 21. The natural soil moisture contents for these materials ranged from 12 to 25 percent based on ASTM D2216. The fine fraction of these materials was determined to have a negligible plasticity characteristic. The fine fraction of these soils accounts for 65 to 100 percent of the overall soil mass as indicated by the results of gradation analysis from the borings.

The CL materials were encountered as light reddish-orange and brown, and light tannish-brown and light reddish-brown in color. Consistency values were observed as being soft to very stiff with corresponding N-values ranging from 3 to 21. The natural soil moisture content for these materials was determined to range between 11 to 28 percent. The fine fraction of these materials has a low-to-moderate plasticity characteristic and moderate potential for volumetric changes due to alterations in the soil's moisture content. The Liquid Limit (LL) of these materials ranged from 26 to 42, with a Plasticity Index (PI) value ranging from 9 to 28. The fine fraction of these makes up between 92 and 98 percent of the overall soil mass as indicated by the results of gradation analysis from the borings.

The CH materials that were encountered as light grayish-brown in color. Consistency values were observed as being medium-stiff to stiff, with a corresponding N-value of 6. The natural soil moisture content for these materials was determined to be 27 percent. The fine fraction of these materials has a moderate-to-high plasticity characteristic and a high potential for volumetric changes due to alterations in the soil's moisture content. The LL of this material was found to be 53, with a PI value of 36. The fine fraction of these soils account for approximately 64 percent of the overall soil mass as indicated by the results of gradation analysis from the borings.

Stratum III – Coarse-Grained Subgrade Materials

The coarse-grained soils that make up Stratum III exhibited a negligible plasticity characteristic. The Stratum III materials include Silty Sand (SM). The Stratum III materials contained varying amounts and gradations of sand and gravel.

The SM materials were encountered as light grayish-brown, light tannish-brown, and tannish-brown in color. Consistency values ranged from loose to dense, with corresponding N-values ranging from 4 to 32. The natural soil moisture content for these materials ranged from 17 to 40 percent. The fine fraction of these materials was determined to have a negligible plasticity characteristic. The fine fraction of these soils makes up between 22 and 40 percent of the overall soil mass as indicated by the results of gradation analysis from the borings.

Engineer’s Analysis and Recommendations

As mentioned previously, our understanding of the current project scope includes a number of different improvements to the existing Water Treatment Plant that services the Tucker Unit and the Maximum Security Unit at two (2) separate locations. The majority of the improvements are proposed for the existing Water Treatment Plant (Site A). Additional improvements are proposed near the Maximum Security Unit (Site B) to the north of the Water Treatment Plant. The improvements currently planned within Site A consist of the construction of a new Clarifier, a new Chemical Building, installation of a new Clearwell Pump and service pumps, the installation of a new eight (8) inch Flow Meter, and the installation of a new Aerator. Site B consist of the installation of a new Elevated Water Storage Tank and associated mechanical equipment.

Site Preparation and Grading

As previously described in the Stratum I summary, the project borings encountered a silty/sandy topsoil at the surface across the project sites. The topsoil was measured to have a thickness that ranged from six (6) to eight (8) inches. We recommend the topsoil, and any other deleterious materials are removed full-depth from beneath the proposed development footprints. MCE recommends that the Contractor anticipate an average of twelve (12) inches of initial stripping depths across both project sites.

Based on the data from this investigation, stable subgrade materials were generally encountered in the upper one (1) to two (2) feet at both of the project sites. However these materials may have exhibited high consistency values at these depths, the consistency values were noted to fluctuate as they advanced to their respective target depths. This factor, coupled with anticipated time of construction, should be considered by the bidding Contractors. The onsite subgrade soils, primarily the Stratum II materials, will be more susceptible to reduced shear strengths if construction occurs during historically wet portions of the calendar year; meaning soils that would be stable under relatively dry conditions would likely be otherwise during saturated conditions. This condition should be considered by bidding earthwork contractors.

Excavated slopes during construction should be benched or sloped to provide a minimum two-to-one horizontal-to-vertical (2H:1V) ratio. Construction slopes steeper than recommended may be unstable, particularly when introduced to moisture increases during precipitation events. Temporary shoring measures should be anticipated to stabilize construction slopes that are steeper than 2H:1V, particularly in the utility installation operations.

Groundwater – Site-Dewatering

Groundwater was encountered by one (1) of the project borings (B-03) at the time of this investigation. The groundwater was observed at an approximate depth of 10 feet below the existing surface elevations at the time of drilling, and is indicative of perched groundwater at this location. Long-term groundwater monitoring was not included as part of our scope of work. The installation and periodic measurement of monitoring wells would be required to establish seasonal piezometric surfaces below the project site.

As previously mentioned, rotary/wash boring can cause the moisture contents to increase. So the elevated moisture contents deeper than 20 feet presented on the boring logs for borings B-01, B-02, B-05, and B-06 are indicative of this technique and not the actual in-situ conditions.

Subgrade Verification

Following stripping and initial grading, the structure footprint and pavement area subgrade should be proof-rolled with a tandem-axle fully-loaded dump truck weighing approximately 60,000 pounds, or equivalent construction equipment. The proof-rolling should be observed by the Geotechnical Engineer or his/her representative to verify stable subgrade conditions.

Any soft and/or yielding subgrade areas encountered should be repaired by undercutting and backfilling with select fill material. As mentioned above, stable subgrade materials should generally be expected in the upper two (2) feet across the project site based on the subgrade conditions encountered at the time of this investigation. Isolated areas may require additional undercut to uncover stable materials. It is our anticipation that the majority of subgrade soils within the project site will be stable during proof rolling operations following initial stripping and grading as recommended. This is based on the high relative density/consistency values of in-situ materials encountered at shallow depths within the project borings. A correlation of N-values as they relate to relative density/consistency can be seen in Appendix B on Plate 8.

General Foundation Recommendations

The foundations relevant to the new project structures should be sized to meet three (3) conditions. First, the maximum stresses imposed on the foundation strata should not exceed the allowable bearing pressures as determined from the shear strength properties of the bearing strata. Secondly, foundations should be designed to limit the maximum anticipated total and differential settlement to magnitudes that will neither damage nor impair the use of the structures. Finally, the foundation systems must also be designed to resist the anticipated lateral or overturning forces during the most critical loading conditions, including earthquake loadings. These factors, as well as construction considerations related to the existing soil and ground conditions, were influential in the preparation of the recommendations presented hereinafter.

Foundation Recommendations – New Chemical Building and New Aerator

The foundation system recommended for the proposed Chemical Building is a shallow foundation system composed of continuous and individual (spread) foundations. The structure shallow foundations should bear on a minimum of one (1) foot of properly placed and compacted select fill material. This condition will likely be achieved by initial grading operations and additional undercutting/replacement. If not, footing excavations should be over-excavated to allow for the placement of a minimum of one (1) foot of properly compacted and moisture-conditioned select fill to be placed beneath the structure foundations.

A shallow foundation system placed on a minimum of two (2) feet of properly compacted and moisture-conditioned select fill material can utilize safe allowable bearing pressures of 2,000 pounds per square foot (psf) for continuous foundations and 2,300 psf for spread or individual foundations. The allowable bearing pressures provide a minimum factor of safety of three (3) and were calculated using a minimum footing width of two (2) feet, a minimum footing thickness of one (1) foot, and a minimum footing depth of two (2) feet below exterior ground elevations, which is adequate to protect against frost heave in the project area.

Prior to the placement of select fill material, the Aerator foundation dimensions and New Chemical Building footprint subgrade materials should be proof rolled for stability verification as described above. It is imperative to note that structure foundations should not bear on a combination of select fill materials and native materials as this may induce differential settlement beyond the values anticipated in this report. This requirement is expected to be satisfied by the recommended placement of a minimum of two (2) feet of select fill beneath the referenced shallow foundations.

Additionally, foundation excavations should be conducted so that they allow for select fill material to be placed a minimum of one (1) foot wider on all sides of the relevant structure foundations. The placement of additional select fill material may be required beneath footings in isolated areas, depending on the depth required to achieve stable subgrade conditions.

The total long-term foundation settlement for footings bearing in select fill material with the assumed dimensions and loading is anticipated to be approximately ¾-inch. The maximum differential settlement between footings is anticipated to be on the order of ½-inch between individual footings or along a 40-foot span for continuous footings. As previously mentioned, it is imperative to note that structure foundations should not bear on a combination of select fill materials and residual/native materials as this may induce differential settlement beyond the values anticipated in this report.

Foundation Recommendations – Clearwell Pump Station

Due to the anticipated structural loading conditions and the encountered onsite subgrade materials, we recommend that the proposed pump station be supported by a mat foundation system. Mat foundations, sometimes referred to as 'slab' foundations, distribute structural loads across a large surface area. By evenly distributing heavy loads, mat foundations are able to provide less contact pressure than traditional footings. Project design may utilize a safe allowable bearing pressure of 2,800 psf for the materials encountered at a depth where the planned foundations will be placed. This recommendation accounts for a minimum of one (1) foot of select fill material being placed and compacted beneath the structure elements. Adequate consideration, budgeting, and planning should occur regarding temporary shoring for the clearwell pump station excavation.

A minimum mat slab thickness of 12 inches is anticipated by this recommendation, but a slab thickness on the order of 18 inches may be required based on the structural design. The design of the mat foundation system should anticipate a total long-term foundation settlement no greater than 0.5 inches and differential settlement in the order of 0.25 inches after loading. Deep excavations are expected for the construction of the proposed Clearwell Pump Station. As such, consideration should be given to temporary shoring methods if vertical or near-vertical excavations are required.

Foundation Recommendations – Elevated Tank

The foundations relevant to the proposed Elevated Tank are recommended to consist of a deep foundation system. Based on the anticipated size and capacity of this tank, we recommend a Driven Pile System. Driven Piles are deep foundation systems that utilize impact or vibration hammers to install foundation elements to a designed depth or resistance. At the time of preparing this report, structural loading data and other details of the Tank were not available, and it is expected that the tank manufacturer will be responsible for designing the foundation system relevant to the new elevated tank.

Based on the data from the two (2) project borings (B-05 and B-06) conducted within the proposed footprint of the Elevated Tank, we believe that acceptable bearing capacities are obtainable at depths that are appropriate for a Driven Pile system. Both project borings were each conducted to an approximate depth of 45 feet and encountered both fine-grained silt (ML - Stratum II) and silt with sand (ML – Stratum II) before encountering coarse-grained silty sand (SM – Stratum III). The medium-dense to dense silty sand (SM – Stratum III) was encountered at an approximate depth of 43.5 feet below the existing surface elevations at both boring locations. Table 3 below provides some minimal design data to aid in the overall design of the Elevated Tank foundations.

Table 3: Elevated Tank Foundation Design Data

Encountered Strata	Soil Type	USCS Classification	Encountered Depths (ft)	Moist Unit Weight (lbs/ft³)	Allowable Uplift Skin Friction (psf)
Onsite Soils (Stratum II)	Silt	ML	.42 - 23.5	122	500
Onsite Soils (Stratum II)	Silt with Sand	ML	23.5 - 43.5	122	1000
Onsite Soils (Stratum III)	Silty Sand	SM	43.5 - 45.0	118	2500

MCE understands that the tank manufacturer will be responsible for designing the foundation, however, MCE will be willing to participate in discussion and coordination regarding design elements of the tank foundation system.

Building Slab-on-Grade

Slab-on-grade construction may be utilized for the planned structures, provided a minimum four (4) inch cushion of sand, crushed stone or gravel is placed below the slab areas with a vapor barrier directly below the concrete.

It is recommended that stable subgrade materials be exposed beneath the building slab and a minimum of one (1) foot of select fill material be properly placed beneath the slab dimensions to provide adequate subgrade support and stable under-slab conditions. Again, this condition will likely be achieved by initial grading operations. The entirety of the slab subgrade area is recommended to be verified during construction by proof-rolling as previously described in the *Subgrade Verification* section of this report.

Site Retaining Structures – Lateral Earth Pressures

The installation of retaining features that require design consideration should be designed to resist the minimum equivalent fluid weights provided in Table 4 below. The recommended minimum factor of safety against sliding and overturning is 1.5 and 2.0 respectively. The provided lateral earth pressures assume a drained condition for the backfill material.

To achieve a drained condition, the retaining structures should be backfilled using a free-draining granular material and be provided with thru-wall drains or a gravity trench drain system graded to daylight for the release of any hydrostatic pressure which may develop. The values provided by Table 4 for No. 57 or No. 67 crushed stone gravel assume a 1H:1V maximum backfill slope from the heel of the retaining wall foundation. If a vertical “chimney drain” is provided by the No. 57 or No. 67 stone, then the values for onsite soils should be used based on proximity and relevancy towards the material behind the gravel.

Table 4: Lateral Earth Pressures

Soil/Backfill Type	Moist Unit Weight (lbs/ft³)	Friction Angle, ϕ (°)	Equivalent Fluid Pressure (lbs/ft³)		
			Active	Passive	At-Rest
Onsite Soils (Stratum II)	122	28	44	338	65
Onsite Soils (Stratum III)	118	26	46	302	66
Select Fill Material (GC or GM)	120	28	43	332	64
No. 57 or No. 67 Stone	95	35	25	350	41

A coefficient of friction of 0.40 may be used provided the retaining structure is supported on a minimum of four (4) inches of placed and compacted Class 7 Base Course material. A friction value of 0.35 may be used provided the retaining structures are supported directly on select fill material or onsite soils.

Select Fill Material

Select fill material required for the project is recommended to be of locally available, homogenous material meeting Unified Soils Classification as a CL, SC, or SM. It should be free of any organic matter, with particle sizes no larger than two (2) millimeters in diameter. The locally available materials suggested for use on this project have negligible plasticity characteristics, and a maximum of 70% passing the No. 200 sieve. Any material to be used as select fill on the project should be reviewed and approved by the Geotechnical Engineer.

Onsite material is **not** recommended to be utilized as select fill for this project. Any material planned to be used as select fill material should be submitted to the Geotechnical Engineer for approval and appropriate testing. Slight variations to the above criteria may be considered for approval. Select fill material should be placed in maximum 8-inch compacted lifts at a minimum density of 98 percent of the maximum dry density as determined by the Standard Proctor Test, ASTM D698. All fill and backfill should be placed in horizontal lifts. When placing fill next to existing slopes, the slope face should be stripped of all vegetation and the face “benched” to allow the placement of horizontal lifts and bonding to the slope face. Table 5 on the following page provides the recommended compaction parameters for select fill and Class 7 base course on the project.

Table 5: Compaction Requirements

Type of Material	Test Specifications	Minimum Dry Density (%)	Optimum Moisture Range (%)
Select Fill	ASTM D698	95	-2% to +2%
Base Course	ASTM D1557	95	Near Optimum

Construction Materials Testing and Special Inspections

Construction materials testing and special inspection services are recommended to be provided by MCE to provide consistency with the recommendations in this report and the documentation of those recommendations being implemented during construction. Testing of the earthwork, concrete, paving, structure, and other phases is recommended to be conducted and documented during construction to assure the Owner and Engineer that the construction complies with the specifications. In particular, field verification of earthwork operations will be required to confirm the recommendations contained herein. Additionally, all trenching and excavations should be conducted in accordance with the current Arkansas State Law and Occupational Safety and Health Administration (OSHA) guidelines and requirements.

Limitations and Reserved Rights

The recommendations and conclusions made in this report are based on the assumption that the subsoil conditions do not deviate appreciably from those disclosed in the subsurface exploration. Should significant subsoil variations or undesirable conditions be encountered during construction that is not described herein, the Geotechnical Engineer reserves the right to inspect these conditions for the purpose of reevaluating this report. A review of the final construction plans and specifications by this office is encouraged to ensure compliance with the intent of these recommendations.

Appendix A: Boring Layout



McCLELLAND CONSULTING ENGINEERS, INC.
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Little Rock
Fayetteville
Fort Smith
Tulsa



Arkansas Department of Corrections

7800 Correction Circle
Pine Bluff, Arkansas 71603

PROJECT NUMBER

21-5775

McCLELLAND CONSULTING ENGINEERS, INC.
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ADC Tucker Unit Water Treatment Plant Improvements

Tucker, Arkansas

PLATE 1



Arkansas Department of Corrections

7800 Correction Circle
Pine Bluff, Arkansas 71603

PROJECT NUMBER

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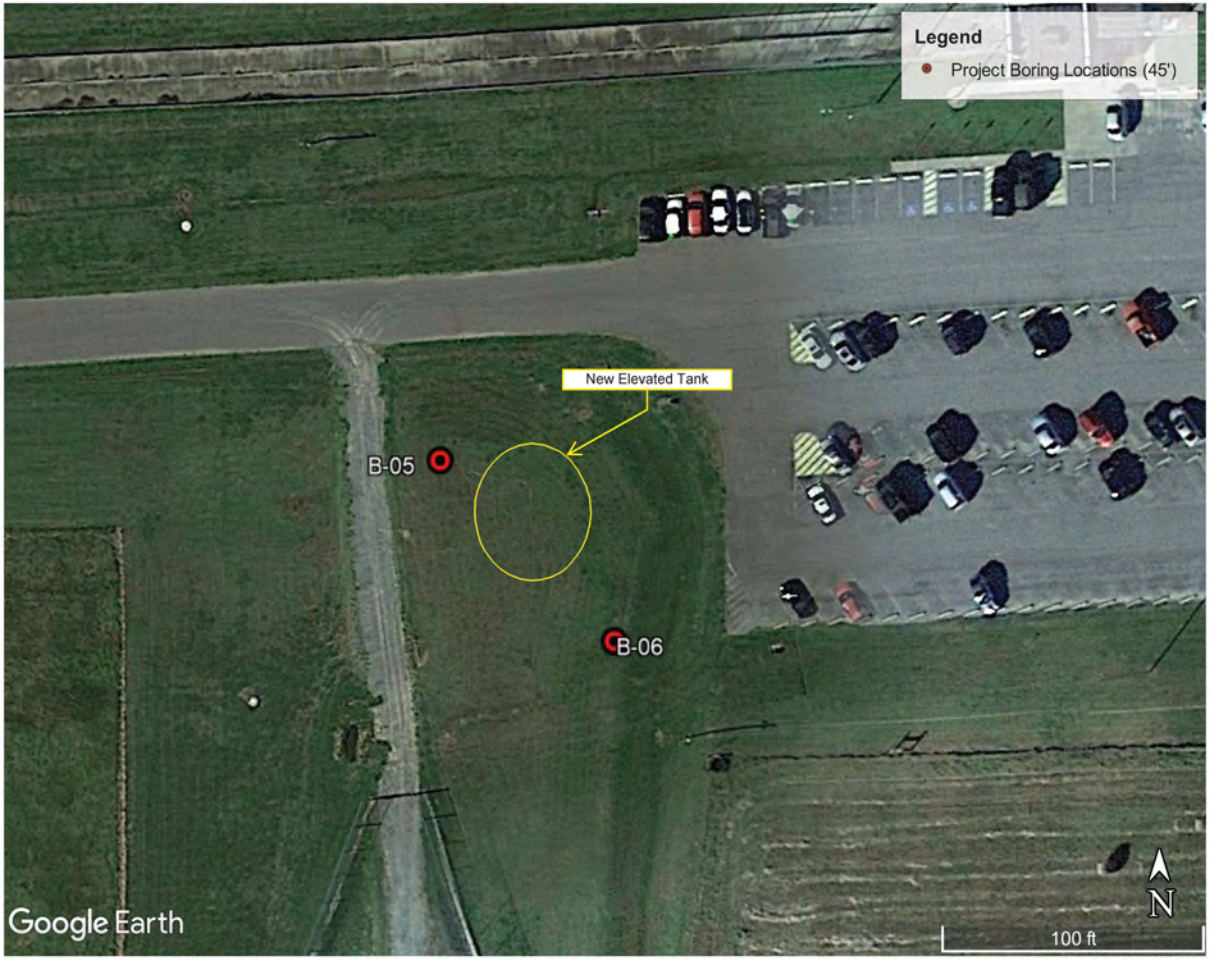
ADC Tucker Unit Water Treatment Plant Improvements

Tucker, Arkansas

PLATE 1A



Arkansas Department of Corrections

7800 Correction Circle
Pine Bluff, Arkansas 71603

PROJECT NUMBER

21-5775

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ADC Tucker Unit Water Treatment Plant Improvements

Tucker, Arkansas

PLATE 1B

Appendix B: Boring Logs



MCE McCLELLAND CONSULTING ENGINEERS, INC.
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Tulsa

McClelland Consulting Engineers, Inc.
1580 East Stearns Street
Fayetteville, AR 72703
Telephone: 479.587.1303

BORING NUMBER B-01

CLIENT Arkansas Department of Corrections
PROJECT NAME ADC Tucker Unit WTP Improvements
PROJECT NUMBER 21-5775
PROJECT LOCATION Tucker, Arkansas
DATE STARTED 9/15/21 **COMPLETED** 9/15/21
GROUND ELEVATION 214 ft **HOLE SIZE** 6.25 inches
DRILLING CONTRACTOR McClelland Consulting Engineers, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger / Rotary/Wash Drilling
AT TIME OF DRILLING ---
LOGGED BY A. Miller **CHECKED BY** D. Lawrence
AT END OF DRILLING ---
NOTES Conducted Using a CME-45B Truck Mounted Drill Rig
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		TOPSOIL (8")	SPT 1	89	5-3-4 (7)			16		NP	NP	65
		(ML) SILT: Dark Tannish-Brown to Tannish-Brown; Stiff; Neglible Plasticity; Trace Medium and FIne Sand; Moist	SPT 2	100	4-6-5 (11)			23				
			SPT 3	89	3-4-5 (9)			22				
		(CL) LEAN CLAY: Light Reddish-Orange and Brown; Very Stiff; Low to Moderate Plasticity; Few Fine Sand; Moist	SPT 4	83	4-6-8 (14)			19				
10		- Medium-Stiff	SPT 5	89	2-3-2 (5)			23	26	17	9	94
			SPT 6	100	1-2-3 (5)			23				
20			SPT 7	100	0-2-2 (4)			28				
		ROTARY WASH DRILLING From 20 to 45 Feet										
		- Medium-Stiff to Stiff - Trace Medium and Fine Sand	SPT 8	100	2-3-3 (6)			26	42	14	28	92
30			SPT 9	100	4-2-4 (6)			28				
		(SM) SILTY SAND: Light Grayish-Brown; Loose; Negligible Plasticity; Mostly Fine Sand; Moist to Wet	SPT 10	100	2-2-2 (4)			40				
40		- Light Tannish-Brown - Moist	SPT 11	100	3-1-6 (7)			21		NP	NP	42
		- Dense	SPT 12	100	8-10-17 (27)			31				

Bottom of borehole at 45.0 feet.

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 9/27/21 14:53 - L:\CURRENT JOBS\GEOTS\21-GEOT\21-5775 - TUKER, AR - TUCKER WATER TREATMENT IMPROVEMENT PROJECT (GEOT)\GEOTECH REPORT\21-5775 - TUKER, AR - TUCKER WATER TREATME

McClelland Consulting Engineers, Inc.
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Fayetteville, AR 72703
Telephone: 479.587.1303

BORING NUMBER B-02

CLIENT Arkansas Department of Corrections
PROJECT NAME ADC Tucker Unit WTP Improvements
PROJECT NUMBER 21-5775
PROJECT LOCATION Tucker, Arkansas
DATE STARTED 9/15/21 **COMPLETED** 9/15/21
GROUND ELEVATION 214 ft **HOLE SIZE** 6.25 inches
DRILLING CONTRACTOR McClelland Consulting Engineers, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger / Rotary/Wash Drilling
AT TIME OF DRILLING ---
LOGGED BY A. Miller **CHECKED BY** D. Lawrence
AT END OF DRILLING ---
NOTES Conducted Using a CME-45B Truck Mounted Drill Rig
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		TOPSOIL (8")	SPT 1	100	8-8-5 (13)			13				
		(ML) SILT: Dark Tannish-Brown to Tannish-Brown; Very Stiff; Neglible Plasticity; Moist	SPT 2	100	5-7-7 (14)			13	32	19	13	98
		(CL) LEAN CLAY: Light Reddish-Orange and Brown; Stiff; Low to Moderate Plasticity; Trace Fine Sand; Moist	SPT 3	100	4-5-6 (11)			14				
			SPT 4	100	4-5-5 (10)			23				
10		- Medium-Stiff	SPT 5	100	2-2-2 (4)			25				
			SPT 6	100	0-2-2 (4)			26	30	16	14	96
20			SPT 7	100	1-2-2 (4)			28				
		ROTARY WASH DRILLING From 20 to 45 Feet										
		- Medium-Stiff to Stiff	SPT 8	100	2-3-3 (6)			28				
30			SPT 9	100	3-2-4 (6)			28				
		(CH) SANDY FAT CLAY: Light Grayish-Brown; Medium-Stiff to Stiff; Moderate to High Plasticity; Few Medium Sand; Some Fine Sand; Moist	SPT 10	100	2-3-3 (6)			27	53	17	36	64
40		(SM) SILTY SAND: Light Tannish-Brown; Dense; Negligible Plasticity; Trace Medium Sand; Mostly Fine Sand; Moist	SPT 11	100	6-7-20 (27)			26		NP	NP	22
			SPT 12	100	10-16-16 (32)			26				

Bottom of borehole at 45.0 feet.

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Fayetteville, AR 72703
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BORING NUMBER B-03

CLIENT Arkansas Department of Corrections
PROJECT NAME ADC Tucker Unit WTP Improvements
PROJECT NUMBER 21-5775
PROJECT LOCATION Tucker, Arkansas
DATE STARTED 9/15/21 **COMPLETED** 9/15/21
GROUND ELEVATION 214.5 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR McClelland Consulting Engineers, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Miller **CHECKED BY** D. Lawrence
AT END OF DRILLING 10.00 ft / Elev 204.50 ft
NOTES Conducted Using a CME-45B Truck Mounted Drill Rig
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		TOPSOIL (8")										
		SILT: Light Tannish-Brown; Very Stiff; Negligible Plasticity; Moist	SPT 1	83	12-10-7 (17)			12				
2.5		(CL) LEAN CLAY: Light Reddish-Orange and Brown; Very Stiff; Low to Moderate Plasticity; Trace Medium and Fine Sand; Moist	SPT 2	83	12-10-11 (21)			11				
		- Stiff	SPT 3	83	8-5-5 (10)			14	32	17	15	94
5.0		- Stiff to Very Stiff	SPT 4	100	4-5-7 (12)			21				
7.5		- Medium-Stiff	SPT 5	100	1-2-2 (4)			25				
10.0		▼										
12.5		- Soft to Medium-Stiff	SPT 6	100	0-0-3 (3)			28	31	16	15	95
15.0		Bottom of borehole at 15.0 feet.										

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BORING NUMBER B-04

CLIENT Arkansas Department of Corrections
PROJECT NAME ADC Tucker Unit WTP Improvements
PROJECT NUMBER 21-5775
PROJECT LOCATION Tucker, Arkansas
DATE STARTED 9/15/21 **COMPLETED** 9/15/21
GROUND ELEVATION 214 ft **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR McClelland Consulting Engineers, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Miller **CHECKED BY** D. Lawrence
AT END OF DRILLING ---
NOTES Conducted Using a CME-45B Truck Mounted Drill Rig
AFTER DRILLING ---

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0	TOPSOIL (8")										
	SILT: Light Tannish-Brown; Medium-Stiff; Negligible Plasticity; Moist	SPT 1	100	4-2-2 (4)			17				
2.5	(CL) LEAN CLAY: Light Tannish-Brown and Light Reddish-Orange; Stiff; Low to Moderate Plasticity; Trace Medium and Fine Sand; Moist	SPT 2	100	3-4-5 (9)			21	32	18	14	95
		SPT 3	100	3-3-5 (8)			19				
5.0	- Stiff to Very Stiff	SPT 4	100	4-4-8 (12)			22				
7.5											
	- Medium-Stiff	SPT 5	100	2-2-3 (5)			24	26	17	9	94
10.0											
12.5											
		SPT 6	83	0-2-3 (5)							
15.0	Bottom of borehole at 15.0 feet.										

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BORING NUMBER B-05

CLIENT Arkansas Department of Corrections
PROJECT NAME ADC Tucker Unit WTP Improvements
PROJECT NUMBER 21-5775
PROJECT LOCATION Tucker, Arkansas
DATE STARTED 9/14/21 **COMPLETED** 9/14/21
GROUND ELEVATION 216 ft **HOLE SIZE** 6.25 inches
DRILLING CONTRACTOR McClelland Consulting Engineers, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger / Rotary/Wash Drilling
AT TIME OF DRILLING ---
LOGGED BY A. Miller **CHECKED BY** D. Lawrence
AT END OF DRILLING ---
NOTES Conducted Using a CME-45B Truck Mounted Drill Rig
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		TOPSOIL (6")	SPT 1	67	8-8-9 (17)			9				
		(ML) SILT: Light Tannish-Brown; Very Stiff; Negligible Plasticity; Trace Fine Sand; Moist	SPT 2	100	8-6-7 (13)			6		NP	NP	100
			SPT 3	83	5-6-5 (11)			6				
		- Medium-Stiff to Stiff	SPT 4	100	4-3-3 (6)			8				
10		- Stiff	SPT 5	100	4-4-4 (8)			11		NP	NP	99
			SPT 6	100	3-3-4 (7)			15				
20		- Medium-Stiff	SPT 7	100	2-2-2 (4)			13				
		ROTARY WASH DRILLING From 20 to 45 Feet										
		(ML) SILT WITH SAND: Light Tannish-Brown and Gray; Stiff; Negligible Plasticity; Some Fine Sand; Moist	SPT 8	100	4-4-6 (10)			17				
30			SPT 9	100	4-5-10 (15)			20		NP	NP	83
		- Very Stiff	SPT 10	100	6-9-12 (21)			20				
40		- Stiff	SPT 11	100	5-7-3 (10)			21		NP	NP	74
		SILTY SAND: Tannish-Brown; Medium-Dense; Negligible Plasticity; Moist	SPT 12	100	8-8-10 (18)			22				

Bottom of borehole at 45.0 feet.

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1580 East Stearns Street
Fayetteville, AR 72703
Telephone: 479.587.1303

BORING NUMBER B-06

CLIENT Arkansas Department of Corrections
PROJECT NAME ADC Tucker Unit WTP Improvements
PROJECT NUMBER 21-5775
PROJECT LOCATION Tucker, Arkansas
DATE STARTED 9/14/21 **COMPLETED** 9/14/21
GROUND ELEVATION 216.5 ft **HOLE SIZE** 6.25 inches
DRILLING CONTRACTOR McClelland Consulting Engineers, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger / Rotary/Wash Drilling
AT TIME OF DRILLING ---
LOGGED BY A. Miller **CHECKED BY** D. Lawrence
AT END OF DRILLING ---
NOTES Conducted Using a CME-45B Truck Mounted Drill Rig
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		TOPSOIL (8")	SPT 1	89	6-6-7 (13)			8				
		(ML) SILT: Light Reddish-Orange; Stiff; Negligible Plasticity; Trace Fine Sand; Moist	SPT 2	83	7-6-7 (13)			8				
		- Medium-Stiff	SPT 3	100	5-6-5 (11)			10		NP	NP	97
			SPT 4	100	3-4-4 (8)			14				
10		- Medium- Stiff to Stiff	SPT 5	100	3-3-3 (6)			15				
			SPT 6	100	2-3-3 (6)			15		NP	NP	95
20		- Medium-Stiff	SPT 7	100	2-3-2 (5)			21				
		ROTARY WASH DRILLING From 20 to 45 Feet										
		(ML) SILT WITH SAND: Light Tannish-Brown; Medium-Stiff; Negligible Plasticity; Some Fine Sand; Moist	SPT 8	100	3-3-4 (7)			20		NP	NP	71
30		- Stiff	SPT 9	100	4-6-7 (13)			25				
			SPT 10	100	6-8-9 (17)			19				
40			SPT 11	100	6-6-8 (14)			15				
		(SM) SILTY SAND: Light Grayish-Brown; Dense; Negligible Plasticity; Trace Medium Sand; Mostly Fine Sand; Moist	SPT 12	100	9-11-17 (28)			17		NP	NP	30
		Bottom of borehole at 45.0 feet.										

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1580 East Stearns Street
Fayetteville, AR 72703
Telephone: 479.587.1303

KEY TO SYMBOLS

CLIENT Arkansas Department of Corrections
PROJECT NAME ADC Tucker Unit WTP Improvements
PROJECT NUMBER 21-5775
PROJECT LOCATION Tucker, Arkansas

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


CH: USCS High Plasticity Clay


CL: USCS Low Plasticity Clay


ML: USCS Silt


SM: USCS Silty Sand


TOPSOIL: Topsoil

SAMPLER SYMBOLS


Standard Penetration Test

FINE GRAINED ANALYSIS DESCRIPTORS

Descriptor	Meaning
Trace	Less than 5%
Few	5% to 10%
Little	15% to 25%
Some	30% to 45%
Mostly	50% to 100%

IN-SITU SHEAR STRENGTHS

COARSE-GRAINED SOILS			FINE-GRAINED SOILS		
Penetration (blows/foot)		In-Situ Strengths	Penetration (blows/foot)		In-Situ Strengths
Auto	Manual		Auto	Manual	
0 - 3	0 - 4	Very Loose	< 2	< 2	Very Soft
3 - 8	4 - 10	Loose	2 - 3	2 - 4	Soft
8 - 23	10 - 30	Medium-Dense	3 - 6	4 - 8	Medium-Stiff
23 - 38	30 - 50	Dense	6 - 12	8 - 15	Stiff
> 38	> 50	Very Dense	12 - 23	15 - 30	Very Stiff
			> 23	> 30	Hard

ABBREVIATIONS

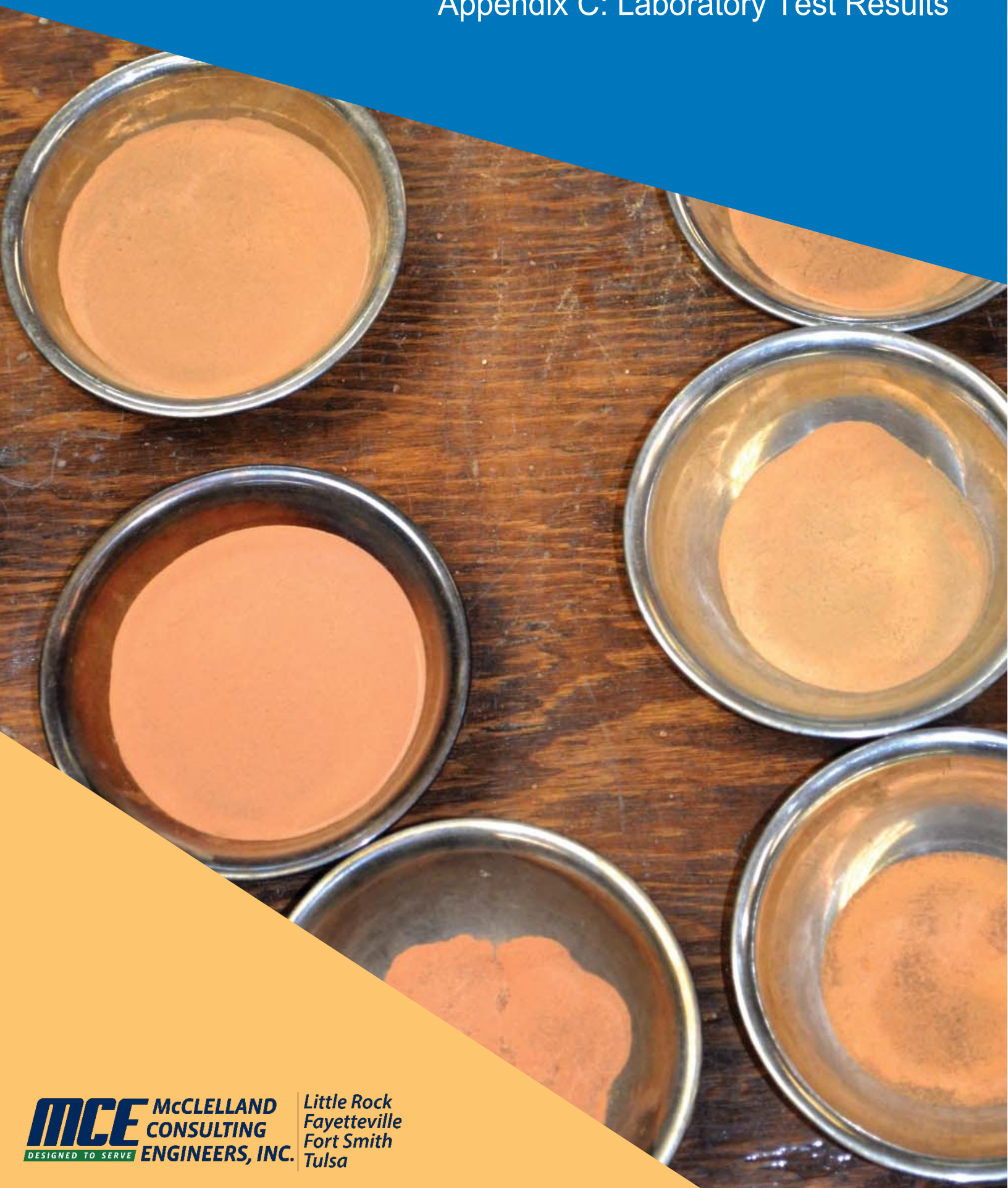
LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION


Water Level at Time Drilling, or as Shown


Water Level at End of Drilling, or as Shown


Water Level After 24 Hours, or as Shown

Appendix C: Laboratory Test Results



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SUMMARY OF LABORATORY RESULTS

CLIENT Arkansas Department of Corrections **PROJECT NAME** ADC Tucker Unit WTP Improvements

PROJECT NUMBER 21-5775 **PROJECT LOCATION** Tucker, Arkansas

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-01	0.7		NP	NP	9.5	65	ML	15.5			
B-01	2.0							22.6			
B-01	3.5							22.1			
B-01	5.0							19.3			
B-01	8.5	26	17	9	4.75	94	CL	23.2			
B-01	13.5							23.0			
B-01	18.5							28.0			
B-01	23.5	42	14	28	4.75	92	CL	26.1			
B-01	28.5							27.8			
B-01	33.5							40.4			
B-01	38.5		NP	NP	2	42	SM	21.5			
B-01	43.5							30.5			
B-02	0.7							12.7			
B-02	2.0	32	19	13	2	98	CL	13.3			
B-02	3.5							14.3			
B-02	5.0							22.7			
B-02	8.5							24.5			
B-02	13.5	30	16	14	4.75	96	CL	25.7			
B-02	18.5							27.9			
B-02	23.5							27.7			
B-02	28.5							28.2			
B-02	33.5	53	17	36	4.75	64	CH	27.4			
B-02	38.5		NP	NP	9.5	22	SM	26.4			
B-02	43.5							25.9			
B-03	0.7							11.7			
B-03	2.0							11.5			
B-03	3.5	32	17	15	9.5	94	CL	13.7			
B-03	5.0							20.6			
B-03	8.5							25.3			
B-03	13.5	31	16	15	2	95	CL	27.5			
B-04	0.7							16.6			
B-04	2.0	32	18	14	4.75	95	CL	20.7			
B-04	3.5							19.1			
B-04	5.0							21.8			
B-04	8.5	26	17	9	4.75	94	CL	24.4			
B-05	0.5							8.5			
B-05	2.0		NP	NP	0.425	100	ML	6.2			
B-05	3.5							6.1			
B-05	5.0							7.6			
B-05	8.5		NP	NP	0.425	99	ML	11.4			
B-05	13.5							14.7			
B-05	18.5							12.6			
B-05	23.5							16.6			

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SUMMARY OF LABORATORY RESULTS

CLIENT Arkansas Department of Corrections **PROJECT NAME** ADC Tucker Unit WTP Improvements

PROJECT NUMBER 21-5775 **PROJECT LOCATION** Tucker, Arkansas

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-05	28.5		NP	NP	2	83	ML	20.4			
B-05	33.5							19.6			
B-05	38.5		NP	NP	2	74	ML	20.9			
B-05	43.5							21.9			
B-06	0.7							8.2			
B-06	2.0							8.4			
B-06	3.5		NP	NP	2	97	ML	9.8			
B-06	5.0							14.3			
B-06	8.5							15.1			
B-06	13.5		NP	NP	0.425	95	ML	15.1			
B-06	18.5							20.6			
B-06	23.5		NP	NP	2	71	ML	20.2			
B-06	28.5							25.3			
B-06	33.5							19.4			
B-06	38.5							15.0			
B-06	43.5		NP	NP	4.75	30	SM	17.2			

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mce.us.com

APPENDIX H
PMI's 05/17/22 COMPOST APPLICATION SUBMITTAL

Karen Blue (adpce.ad)

To: Greg Banic (adpce.ad)
Subject: RE: Tucker Solid Waste Processing Revised Application

From: Zach White [mailto:zwhite@pmico.com]
Sent: Wednesday, October 12, 2022 11:52 AM
To: Greg Banic (adpce.ad)
Cc: Cole Glover
Subject: Tucker Solid Waste Processing Revised Application

AFIN: 35-00112
PMT#: 0318-SC
Received
By Karen Blue at 1:36 pm, Oct 14, 2022
DOC ID#: 82843
TO: AC>FILE <KMB

Greg,

Attached is the revised application for the Tucker composting facility.

If you have any questions, please don't hesitate to reach out to either me or Cole.

Respectfully,

Zach

Zachary White
Project Biologist
3512 S Shackleford Rd Little Rock, AR 72205
Office: (501) 221-7122
Cell: (501)804-8240
www.pmico.com

May 17, 2022

Mr. Dillon Daniels
Engineer, Office of Land Resources
Division of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118 - 5317

RE: Revised Permit Application of a Type O Composting Facility Arkansas Department of Corrections – Tucker Unit AFIN: 35-00112

Dear Mr. Daniels,

On behalf of the Arkansas Department of Corrections – Tucker Unit, transmitted with this letter is a revised Solid Waste Processing Facility Permit Application Package addressing DEQ comments received October 11, 2021. The package includes the following documents:

- Solid Waste Processing Facility Application Form
- Application Drawing Set
  - Map of delineated wetlands included in Drawing 8
- Operating Plan
  - Food waste totals received per day has been updated.
  - Contingency plans have been updated in Section 4.0
- Composter Operating Manual
- Facility Closure Plan
- Vicinity Map
- Land Use Aerial
- Engineer's Opinion of Closure Costs
- Proof of Land Ownership
- Southeast Arkansas Solid Waste Management Board Approval Letter

If you have any questions or comments, please do not hesitate to contact Brad Wingfield at 501-221-7122 or bwingfield@pmico.com. We appreciate your time with this project, and look forward to receiving feedback.

Sincerely,
PMI

Brad Wingfield, P.E
Principal – Engineering Division

SOLID WASTE PROCESSING FACILITY APPLICATION FORM

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
SOLID WASTE MANAGEMENT DIVISION
5301 NORTHSHORE DRIVE
NORTH LITTLE ROCK, AR 72118

Act 237 of the 1971 Arkansas General Assembly, as amended, makes it unlawful to construct, install, alter, modify, use or operate any solid waste processing facility without a permit. Section 22.303 of Regulation 22, Solid Waste Management, requires that applicants for new solid waste processing facilities prepare and submit an application on forms prepared by the Department and the form is to include certain information.

I. FACILITY TYPE

(Check the one that applies)

_____Yard Waste Composting Facility (Y)

___X___Organic Waste Composting Facility (O)

_____Mixed Solid Waste Composting Facility (S)

_____Solid Waste Transfer Station (TS)

_____Solid Waste Recovery Facility (WRF)

_____Construction and Demolition Recycling Facility (CDRF)

Facility is: ___X___New _____Existing

II. FACILITY IDENTIFICATION

Facility Name: Tucker Unit Site Manager: Allen Gibson

Facility Location: Tucker, AR

Street Address: 2400 State Farm Rd.

City: Tucker State: AR Zip: 72168

County: Jefferson Telephone Number: 501-842-2519 Fax Number: 501-842-3958

Longitude: 91°54'23.69"W Latitude: 34°26'15.94"N

Section/Township/Range: S19/T3S/R8W

III. APPLICANT IDENTIFICATION

Name of Applicant: Arkansas Department of Corrections

Address of Applicant: 7800 Correction Circle

City: Pine Bluff State: AR Zip: 71603

Applicant Telephone Number: 870-267-6625 Fax Number: 870-267-6619

Is the applicant the Facility Owner? [x] Yes ☐ No If no, please fill out Section IV.

IV. OWNER IDENTIFICATION

Name of Facility Owner: Arkansas Department of Corrections

Address of Facility Owner: 7800 Correction Circle

City: Pine Bluff State: AR Zip: 71603

Facility Owner Telephone Number: 870-267-6625 Fax Number: 870-267-6619

V. SITE INFORMATION

Legal description:

(Continue on additional sheets if required)

Directions to the site: Travel south on US-165 toward England. Turn left onto E Fordyce Street, and travel east approximately 0.7 miles. Turn right onto Pine Bluff Hwy, and travel south approximately 7.4 miles. Turn left onto State Farm Road, and travel east approximately 2.5 miles. The facility will be south of the road.

Location of property referenced to known landmarks describing access roads to site: The facility is south of State Farm Road.

Describe site and area drainage: Site topography is relatively flat. Drainage is to stormwater collection system and into Wabbaseka Bayou.

For Transfer Stations and Solid Waste Recovery Facilities:

Houses/Dwellings/Places of Business within 1/4 mile of site & method used to determine: N/A

Water supplies within 1/4 mile of site & method used to determine: N/A

For Composting Facilities:

Houses/Dwellings/Places of Business within ½ mile of site & method used to determine: Inmate housing and facility staff housing is located within ½ mile of the facility. Online Imagery.

Water supplies within ½ mile of site & method used to determine: None; Online satellite imagery and measuring tools provided by the Department of Interior, U.S. Geological Survey, Arkansas Water Science Center. See S9 "Water Supplies Map"

Describe the nature and type of waste the facility will process: The facility will process food waste from the correctional unit. The facility will not be open to the public.

VI. FACILITY INFORMATION

Describe facility service area: The facility will only process food waste from the Tucker Unit.

Identify the average weight and volume of the material that this facility will receive or process:

0.75 tons / day	Cubic yards or tons received per day
274 tons / year	Cubic yards or tons received per year
N/A	Cubic yards or tons per day residual (if applicable)

Provide a brief description of the disposition of transferred/processed material, and, if applicable, how any residual material will be disposed: De-watered food waste from the correctional unit kitchen is loaded into the in-vessel composter once a day. Wood chips/shavings/pellets are added to the composter at the same time. The material stays in the vessel for 6-10 days before being discharged, dry, into a storage bay.

Identify the average and maximum time that waste is anticipated to be stored on site: 6-10 days

VII. APPLICATION CONTENTS

Permit Drawings *(Identify below each design drawing or document included with this application)*

Drawing Number	Title	Date	Revision Number
A1.01	Tucker Unit – Composting Facility	Dec. 30, 2020	1

IX. CERTIFICATION

To the best of my knowledge and belief, I certify the information provided in this application is true and accurate:

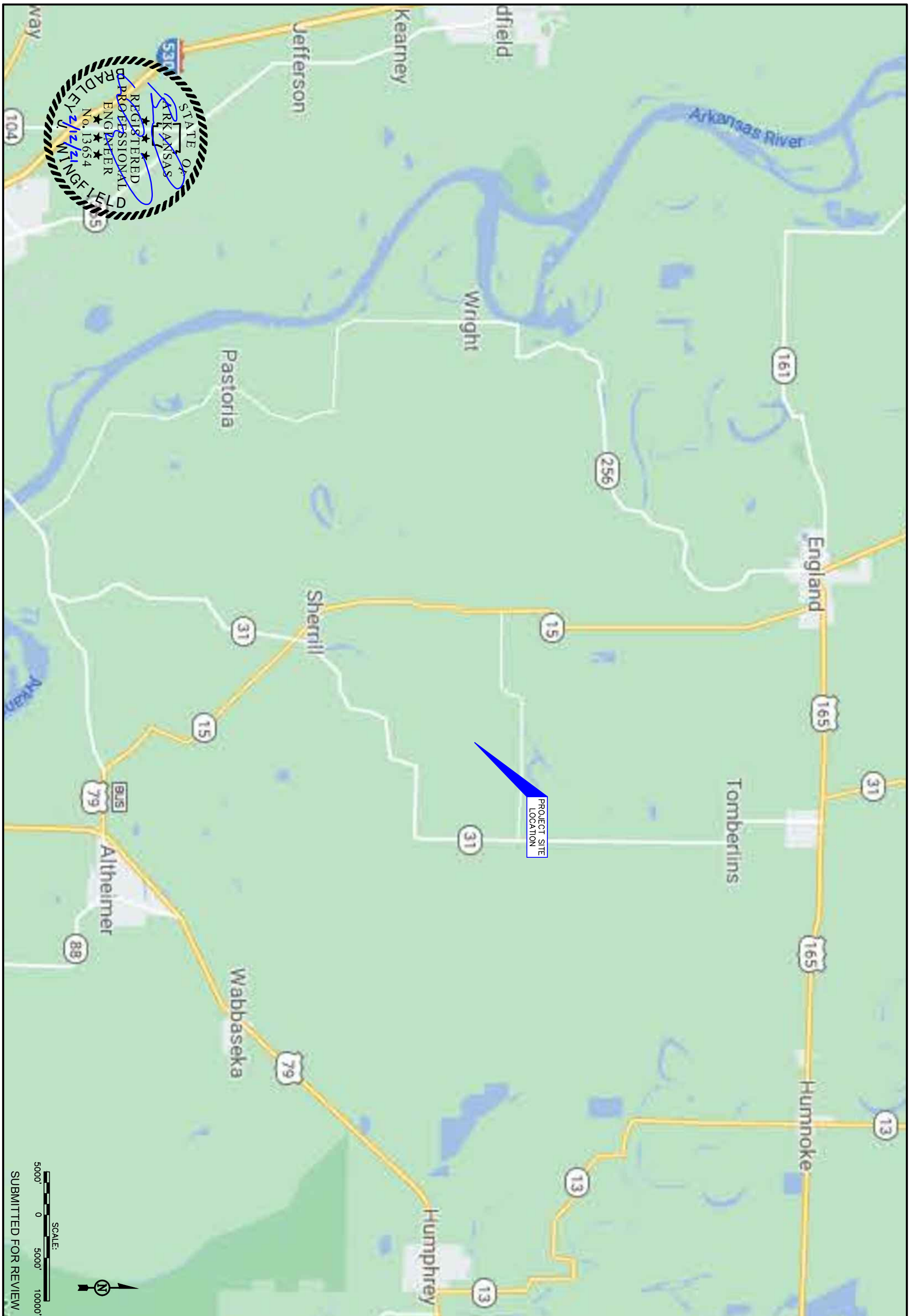
APPLICANT

Signature & Title	Printed Name	Date
DOC Assistant Director	**Richard Cooper**	5/3/2021

ENGINEER/CONSULTANT

Signature & Title	Printed Name	Date
	Brad Wingfield, P.E.	5/18/2021

CONFIDENTIALITY: *This application shall be available for public inspection, provided, however, that the Department shall not disclose, except to authorized persons, any information which the Director determines is entitled by law to protection as trade secrets without the consent of the applicant. Trade secrets shall not include the name and address of the applicant, nor any information necessary, as determined by the Director, for the public to evaluate the hazards associated with the proposed operation, nor any other information required by law to be available to the public.*



SUBMITTED FOR REVIEW

SHEET NUMBER:	1
JOB NUMBER:	ENTY-12162

CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
3512 SOUTH SHACKLEFORD RD
LITTLE ROCK, ARKANSAS 72205
PH: (501) 221-7122 FX: (501) 221-7775

DESIGNED BY:	BW	DATE:	FEB. 10, 2021
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CHECKED BY:	BW		

FILE: E:\ENTY-12162 - ADC COMPOSTING SITES\TUCKER ADEQ PERMIT APP\DRAWINGS\TUCKER PERMIT DRAWINGS.DWG

REVISIONS:

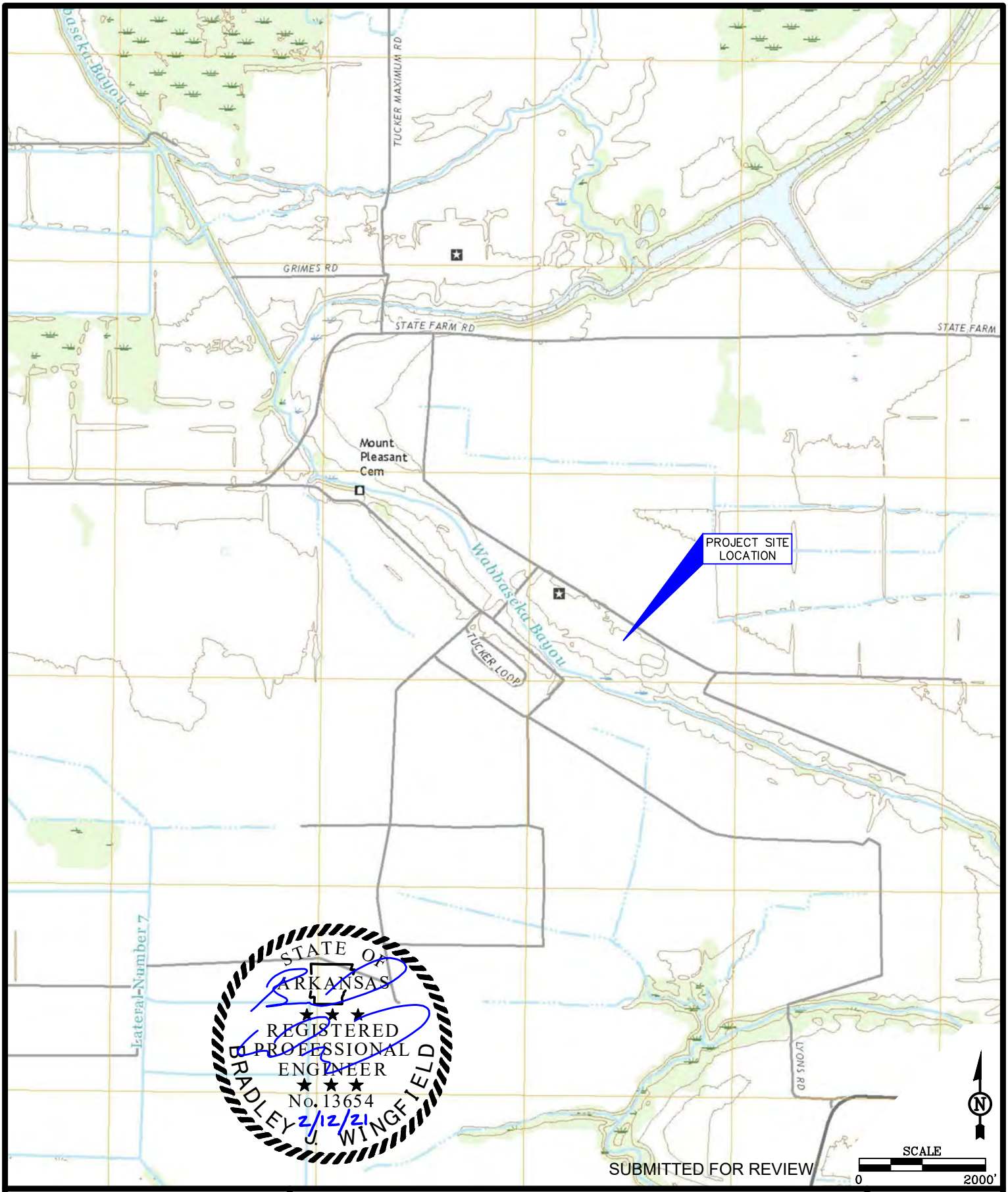
NO:	DATE:	DESCRIPTION:	BY:

SHEET TITLE:

SITE LOCATION MAP

PROJECT TITLE:

COMPOST FACILITY
TUCKER UNIT
ARKANSAS DEPARTMENT OF CORRECTIONS



STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 13654
BRADLEY J. WINGFIELD
2/12/21

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VICINITY MAP

COMPOST FACILITY
TUCKER UNIT
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NOTES:
1. NO WELLHEADS EXIST WITHIN ½ MILE OF THE COMPOST FACILITY.
2. ADJACENT LANDS ARE AGRICULTURAL.
3. SITE MEETS LOCAL & FAA AIRSPACE REQUIREMENTS.
4. ENTIRE SITE IS WITHIN ZONE A FLOODPLAIN. FLOODPLAIN DEVELOPMENT PERMIT HAS BEEN APPLIED FOR AND RECIEVED.

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SHEET TITLE: LAND USE AERIAL

PROJECT TITLE: COMPOST FACILITY
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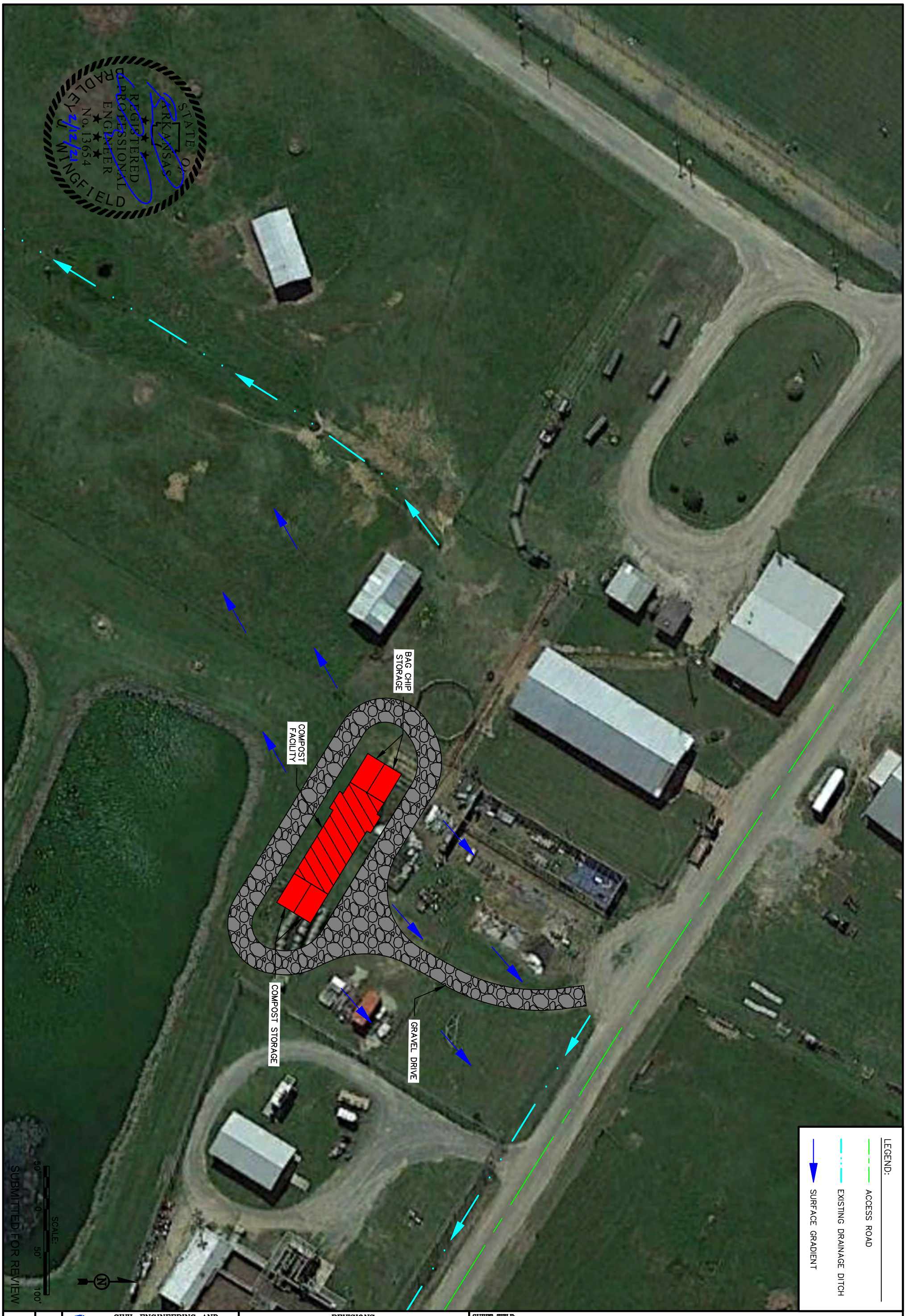
JOB NUMBER: ENTY-12162

SHEET NUMBER: 3



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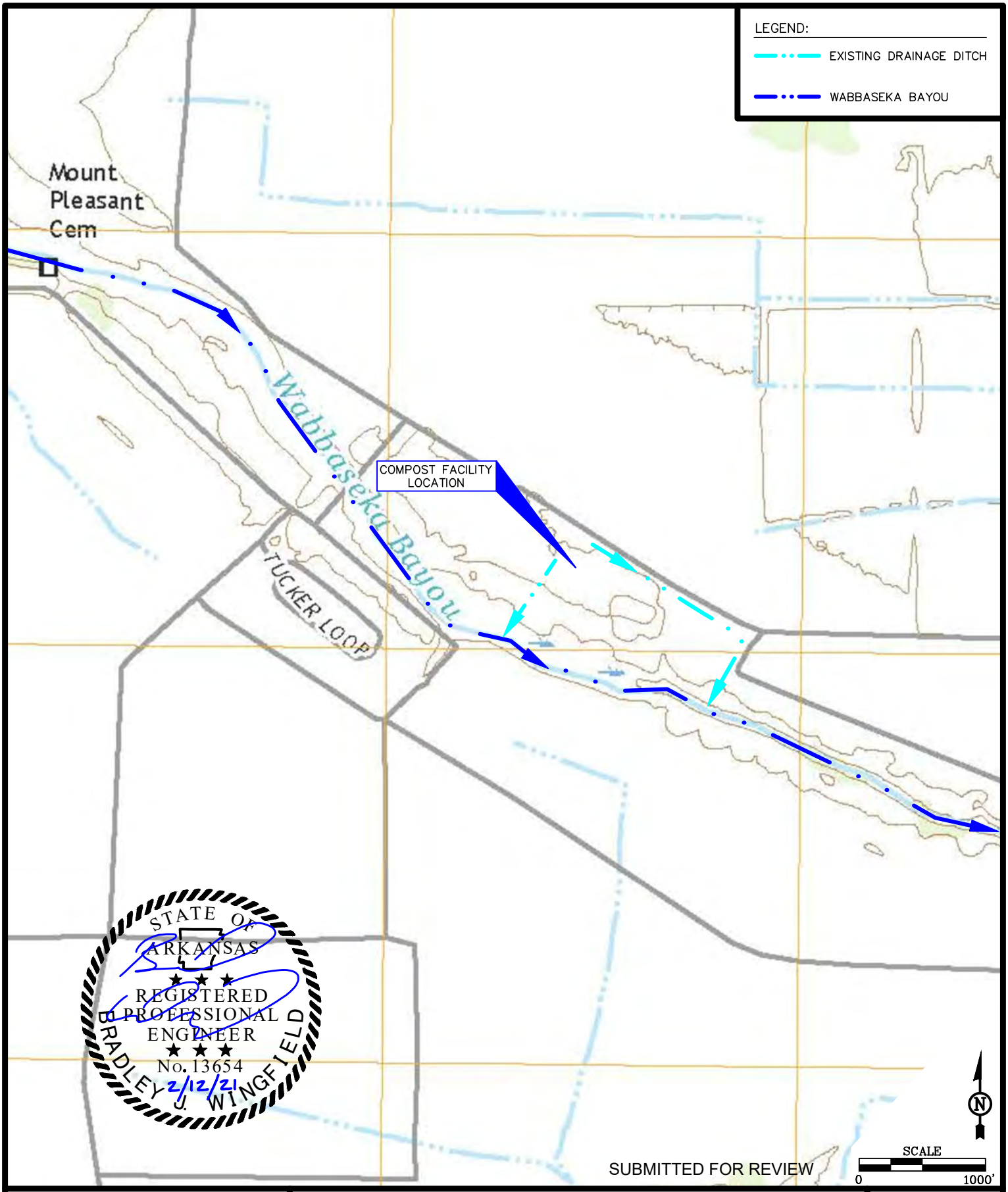
SHEET TITLE:
COMPOST FACILITY SITE LAYOUT

PROJECT TITLE:
COMPOST FACILITY
TUCKER UNIT
ARKANSAS DEPARTMENT OF CORRECTIONS

JOB NUMBER: ENTY-12162

SHEET NUMBER: 4



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STORMWATER DRAINAGE MAP

COMPOST FACILITY
TUCKER UNIT
ARKANSAS DEPARTMENT OF CORRECTIONS

JOB NUMBER: ENTY-12162

SHEET NO.: 5

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Area protected by levee.
See the "Accredited Levee Note"
in Notes to Users.

Zone A

Zone A

COMPOST FACILITY
LOCATION

ON COUNTY

AREA WITH REDUCED FLOOD RISK DUE TO LEVEE
Zone X

otected by levee.
"Provisionally Accredited
lote" in Notes to Users.

Area protected by levee.
See the "Accredited Levee Note"
in Notes to Users.

Area protected by levee.
See the "Provisionally Accredited
Levee Note" in Notes to Users.

SCALE:
2000' 0 2000' 4000'

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FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP
FOR DRAFT FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard. Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile. Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 13654
BRADLEY J. WINGFIELD
2/12/21

FEMA FLOOD MAP

SHEET TITLE:

COMPOST FACILITY
TUCKER UNIT
ARKANSAS DEPARTMENT OF CORRECTIONS

PROJECT TITLE:

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NO:	DATE:	DESCRIPTION:	BY:

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PH: (501) 221-7122 FX: (501) 221-7775

DESIGNED BY:	BW	DATE:	FEB. 11, 2021
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CHECKED BY:	BW		

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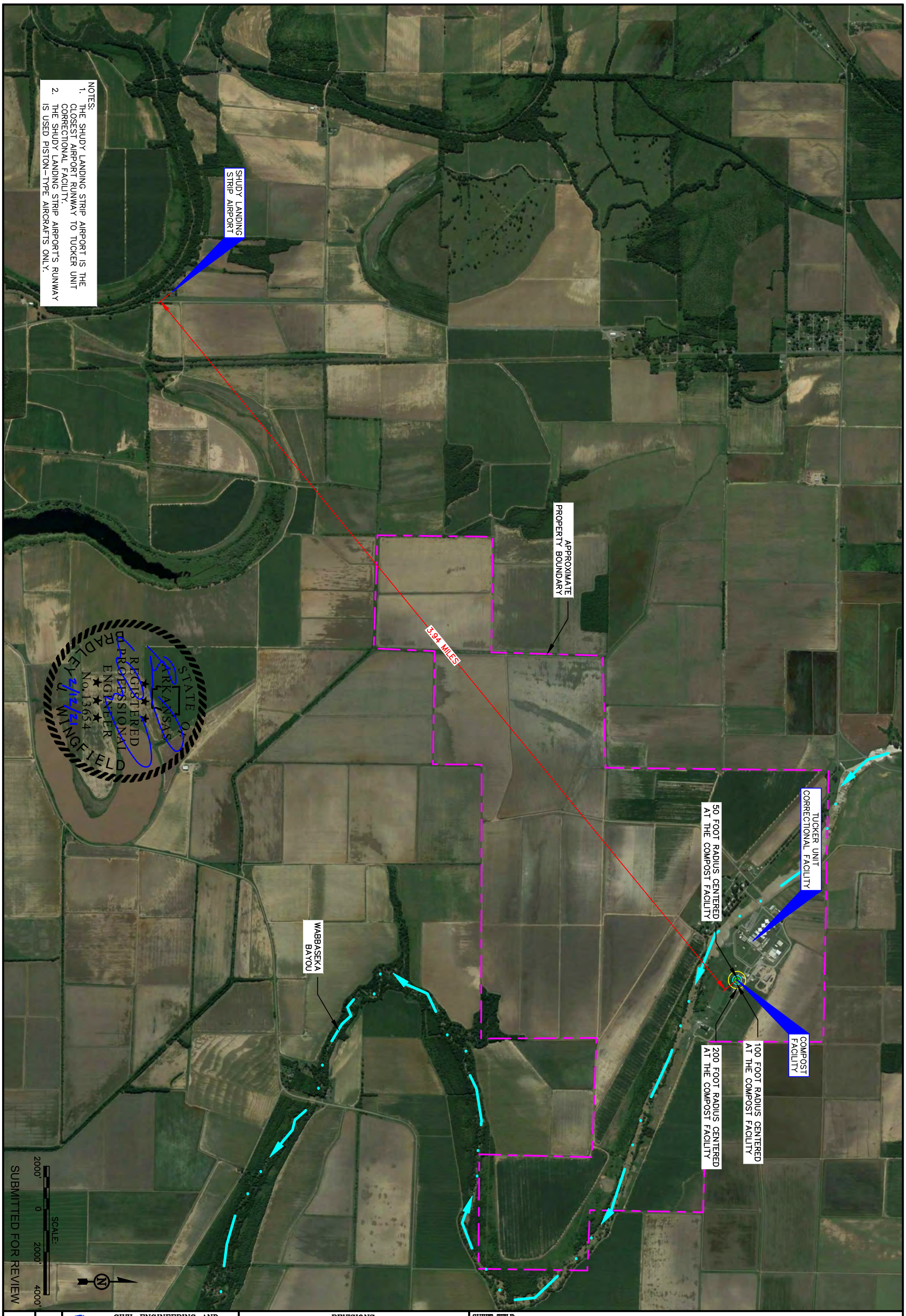
JOB NUMBER:
ENTY-12162

SHEET NUMBER:
6



JOB NUMBER:	ENTY-12162
SHEET NUMBER:	7

CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
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SHEET TITLE:
AERIAL VICINITY MAP

PROJECT TITLE:
COMPOST FACILITY
TUCKER UNIT
ARKANSAS DEPARTMENT OF CORRECTIONS



REVISIONS:		
NO:	DATE:	DESCRIPTION:

BY:

SHEET TITLE:

WETLAND DELINEATION MAP

PROJECT TITLE:

COMPOST FACILITY
TUCKER UNIT
ARKANSAS DEPARTMENT OF CORRECTIONS

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DRAWN BY: CG
CHECKED BY: BW
DATE: MAR. 25, 2022
SCALE: 1" = 250'

JOB NUMBER
ENTY-12162

SHEET NUMBER
8

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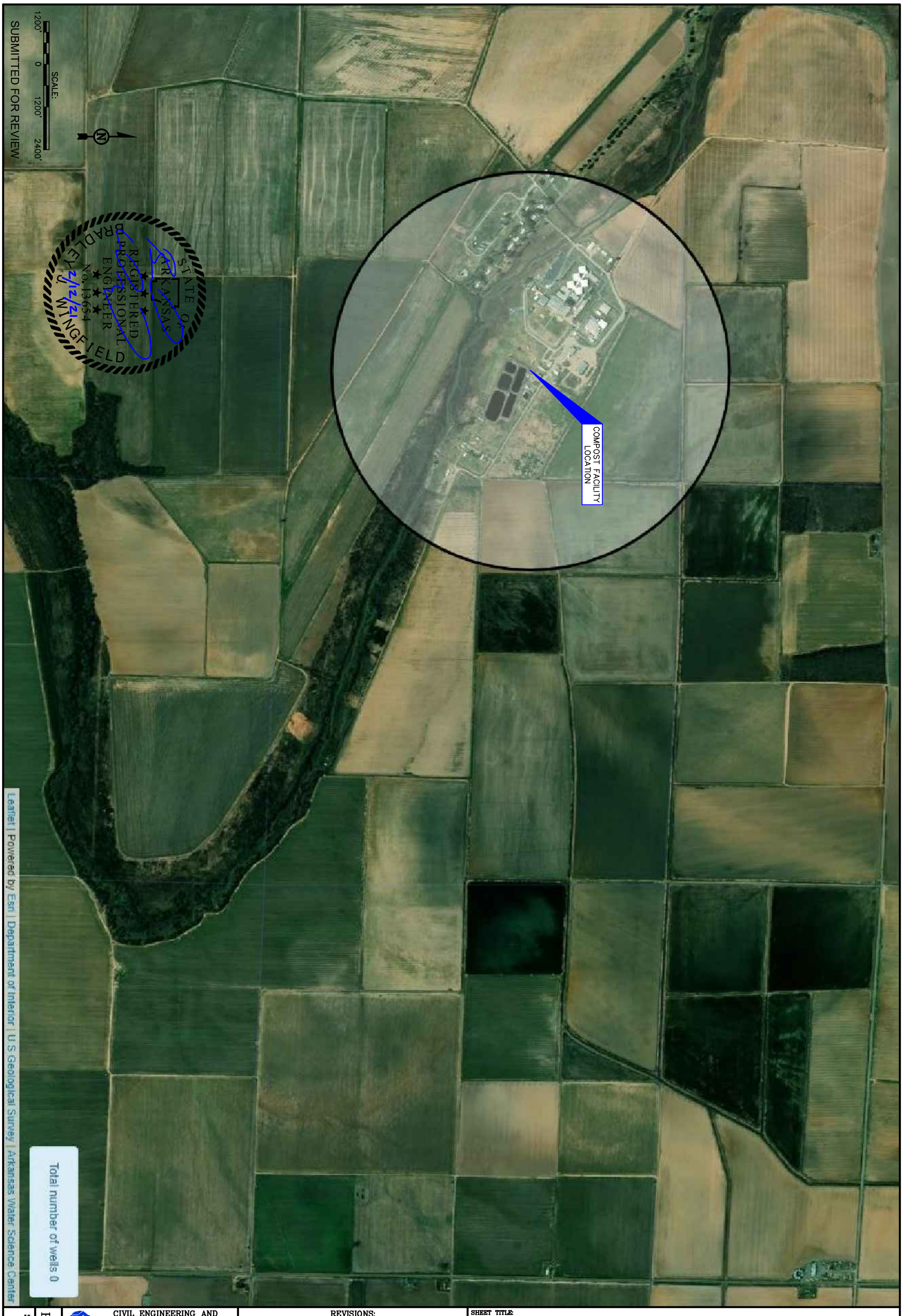

SHEET NUMBER: 9

JOB NUMBER: ENTY-12162

PMI
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PH: (501) 221-7122 FX: (501) 221-7775

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CHECKED BY:	BW		

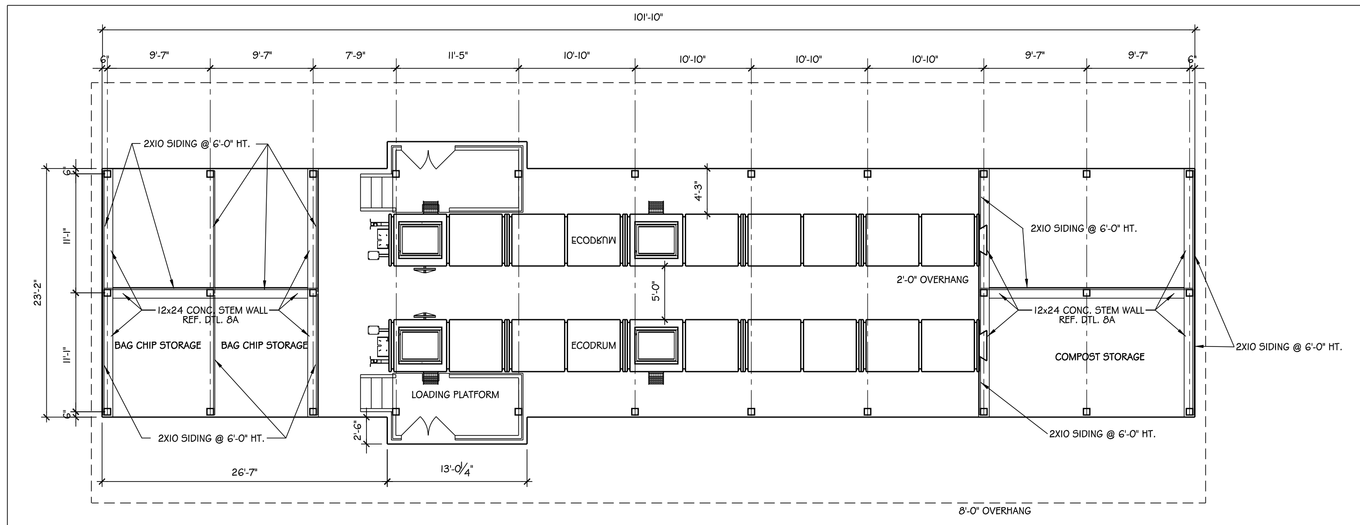
FILE: E:\ENTY-12162 - ADC COMPOSTING SITES\TUCKER ADEQ PERMIT APP\DRAWINGS\TUCKER PERMIT DRAWINGS.DWG

REVISIONS:

NO:	DATE:	DESCRIPTION:	BY:

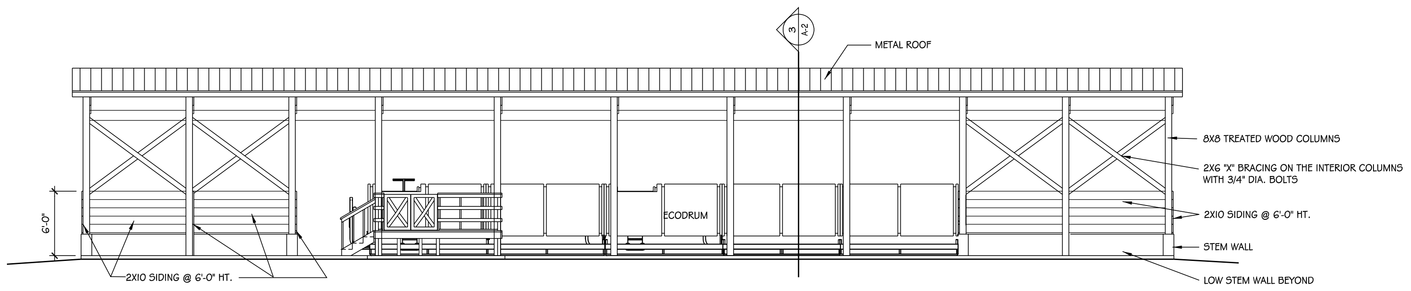
SHEET TITLE: WATER SUPPLIES MAP

PROJECT TITLE:
COMPOST FACILITY
TUCKER UNIT
ARKANSAS DEPARTMENT OF CORRECTIONS



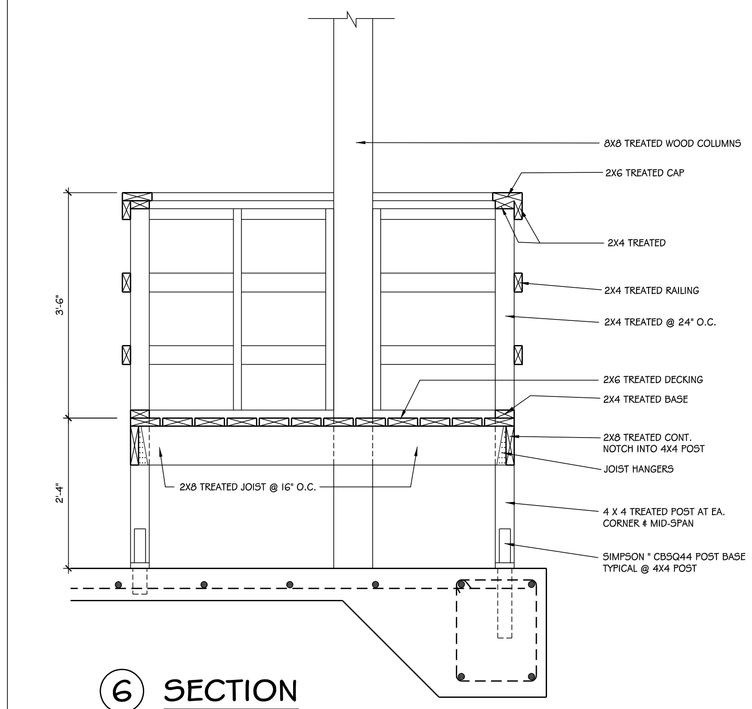
1 ECODRUM COMPOSTING PLAN

SCALE 1/8" = 1'-0"



4 FRONT ELEVATION

SCALE 1/8" = 1'-0"

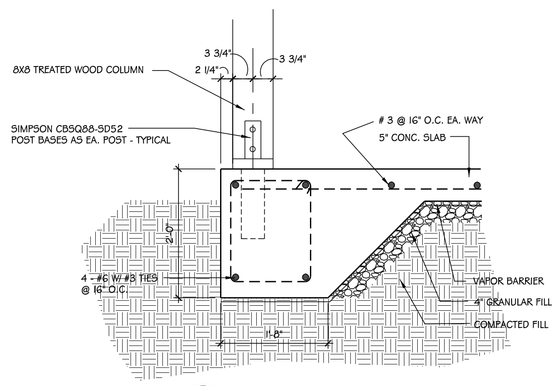


6 SECTION

SCALE 3/4" = 1'-0"

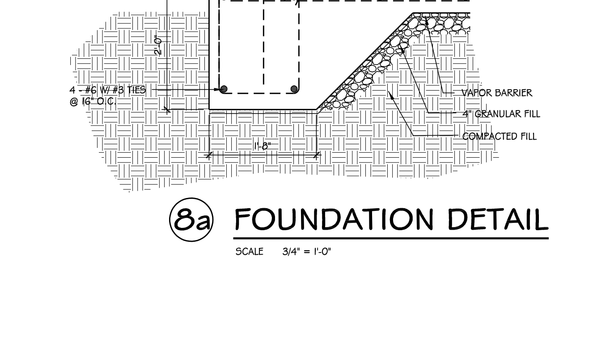
GENERAL NOTES:

1. ALL WOOD TO BE TREATED.
2. USE HOT DIPPED GLAVANIZED FINISH FOR ALL CONNECTIONS WHERE METAL IS USED. (BASE CONNECTIONS, TRUSS CONNECTIONS ETC.)



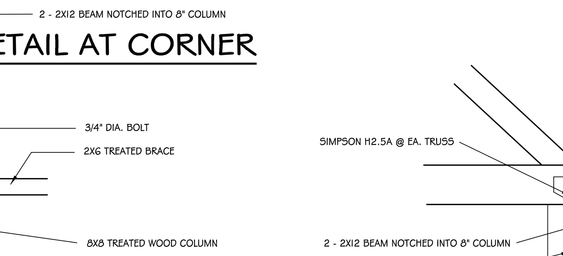
8 FOUNDATION DETAIL

SCALE 3/4" = 1'-0"



2 ENLARGED PLATFORM

SCALE 1/4" = 1'-0"

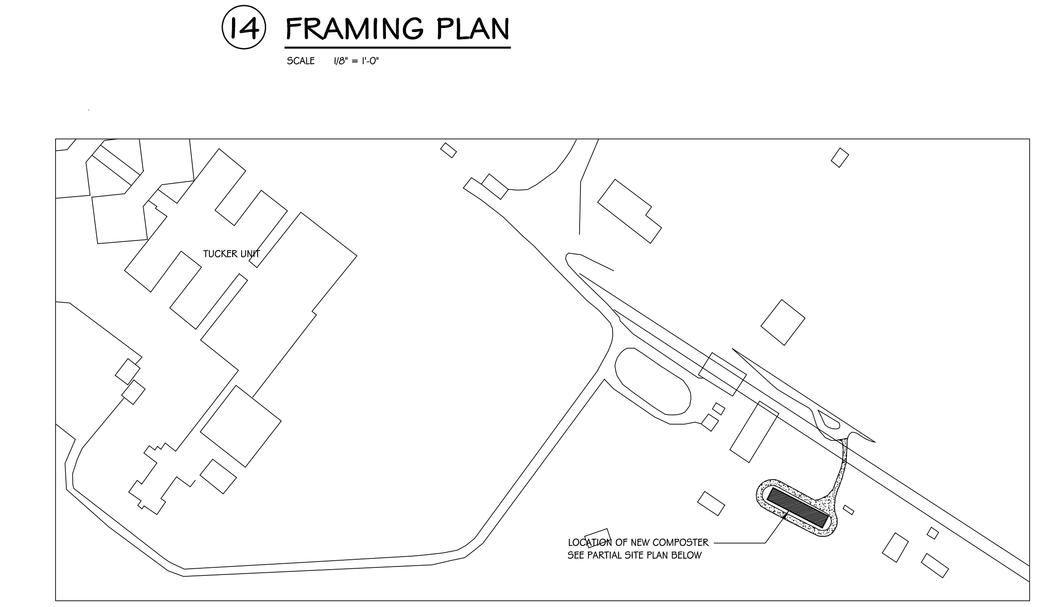


5 SIDE ELEVATION

SCALE 1/8" = 1'-0"

8a FOUNDATION DETAIL

SCALE 3/4" = 1'-0"



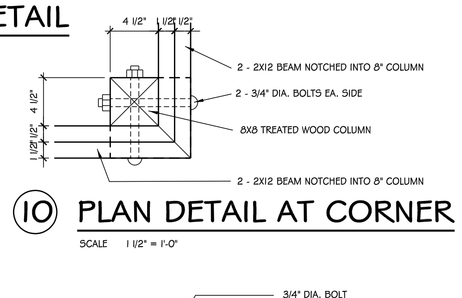
3 SECTION

SCALE 1/4" = 1'-0"

14 FRAMING PLAN

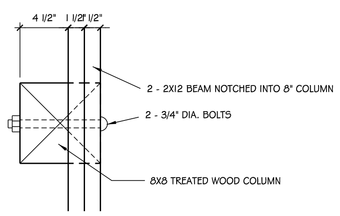
SCALE 1/8" = 1'-0"

KEY PLAN



10 PLAN DETAIL AT CORNER

SCALE 1 1/2" = 1'-0"



9 PLAN DETAIL AT COLUMN

SCALE 1 1/2" = 1'-0"

11 PLAN DETAIL AT BRACE

SCALE 1 1/2" = 1'-0"

15 SECTION

SCALE 1" = 1'-0"

PARTIAL SITE PLAN

7 SECTION

SCALE 3/4" = 1'-0"

12 PLAN DETAIL AT BRACE

SCALE 1 1/2" = 1'-0"

13 SECTION @ BEAM & COLUMN

SCALE 1 1/2" = 1'-0"

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ENERGY PROJECT
ARKANSAS DEPARTMENT OF CORRECTIONS
TUCKER UNIT
2501 STATE FARM ROAD, TUCKER, AR

JOB NO.	19-040
DESIGN	J.D.B.
DATE	Dec. 30, 2020
SHEET NO.	A1.01

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Cast-in-place concrete work, complete, unless otherwise specified, including formwork, reinforcing steel, mix design, placement procedures, and finishes. Furnish reinforcing steel bars for masonry work and tie bars after they are in place.

1.2 SUBMITTALS:

A. Product Data: Submit manufacturer's product data for reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, and other as requested by Engineer.

B. Shop Drawings: Submit, prior to installation, shop drawings of reinforcing steel, including bar cutting lists, typical bar bend diagrams, construction of forms including jointing, reveals, location and pattern of form tie placement, and construction joint schedule with details.

C. Design Mix: Prior to placement of concrete, submit concrete mix designs proposed by the concrete supplier, for class of concrete, including recent test results substantiating the quality of concrete produced by each mix.

D. Reports: Weekly reports of all compression, slump, and air content tests from the testing laboratory.

E. Samples: Submit samples of concrete stain and sealer in color selected by Engineer for approval.

1.3 QUALITY ASSURANCE:

A. Codes And Standards: Comply with the provisions of the following codes, specifications and standards, except where more stringent requirements are indicated or specified, and except as accepted or directed by Engineer during unusual climatic conditions.

1. ACI 301 "Specifications for Structural Concrete for Buildings."
2. ACI 318 "Building Code Requirements for Reinforced Concrete."
3. CRSI "Manual of Standard Practice."

B. Local Codes and Ordinances: Wherever provisions of the International Building Code 2018 (IBC) or the local current ordinances are more stringent than the above specifications and standards, the local codes and ordinances shall govern.

C. Concrete Testing Service: Engage a testing laboratory acceptable to Owner and Engineer to perform material evaluation tests and to design concrete mixes.

1. Tests, including retesting of rejected materials for installed work, shall be paid for by the Contractor. Testing requirements are specified in FIELD SAMPLING AND TESTING paragraph.

PART 2 - PRODUCTS

2.1 FORM MATERIALS:

A. Forms For Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces.

B. Forms For Unexposed Finish Concrete: Use plywood, lumber, metal, or other acceptable material. If lumber is used, it must be dressed on at least 2 edges and 2 sides for a tight fit.

C. Form Coatings: Commercial formulation form coating compound with maximum VOC of 350 mg/l that will not bond with, stain, nor adversely affect concrete surfaces, will not impair subsequent treatments of concrete surfaces.

D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2" to exposed surface.

1. Provide ties that, when removed, will leave holes not larger than 1" diameter in concrete surface.

2.2 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615(S1), Grade 60, deformed billet steel bars of grades indicated on drawings, free from loose rust, scale and other coatings that may reduce bond.

B. Mesh or Fabric Reinforcement: ASTM A 185, welded wire fabric, of sizes and types as indicated on drawings. Use flat sheets.

C. Supports For Reinforcement: Bolsters, chairs, spacers, and other devices necessary for properly spacing, supporting, and fastening reinforcement in place.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).
3. For footings, support reinforcing steel with wire, metal chairs, bolsters or other approved device; do not use bricks, rocks or stones.

2.3 CONCRETE MATERIALS:

A. Portland Cement: ASTM C 150, Type I.

B. Concrete Aggregates: ASTM C 33, and as specified. Provide aggregates from a single source for exposed concrete.

1. Fine Aggregate: Clean, sharp, natural or manufactured sand, free from loam, clay, lumps, or other deleterious substances.
2. Coarse Aggregate: Clean, uncoated, processed, locally available aggregate, containing no clay, mud, loam or foreign matter; maximum size of 1-1/2" at foundations and 1" at slabs.

C. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcing.

D. Admixtures:

1. Air Entrained Admixture: ASTM C 260; compatible with other required admixtures.
2. Other Admixtures: Do not use other admixtures unless accepted by Engineer; added chlorides will not be accepted.

E. Miscellaneous Materials:

1. Connectors: Provide metal connectors required for placement in cast-in-place concrete, for the attachment of structural and non-structural members.
2. Vapor Barrier: Refer to Specification Section 07 26 16, UNDERSLAB VAPOR RETARDER for information pertaining to the Vapor Barrier.
3. Expansion Joint Filler: ASTM D 1751, non-extruding premoulded material, 1/2" thick, unless otherwise noted, composed of fiberboard impregnated with asphalt, except use ASTM D 1752, Type II, resin-bound cork for walks and other exposed areas.

4. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
5. Moisture-Retaining Cover: One of the following, complying with ASTM C 171; waterproof paper, polyethylene film, polyethylene-coated burlap.
6. Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal. Conspec "Cure & Seal", L & M "L & M "Dress & Seal", Sonneborn "Kure-N-Seal", Euclid "Eurocure", Master Builders "Masterkure", W.R. Meadows "Sealtight CS-309", or approved equal.
7. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.

    a. Non-Metallic Shrinkage-Resistant Grout: Conspec "100 Non-Shrink Grout (Non-Metallic)", Euclid "Euco N.S.", L & M "Crystex", Master Builders "Masterflow 713", W. R. Meadows "Sealtight CG-86 Grout", or approved equal.

8. Bonding Agent: Polyvinyl acetate or acrylic base.

    a. Polyvinyl Acetate (Interior Only): Euclid "Euco Weld", L & M "Everweld", or approved equal.
    b. Acrylic or Styrene Butadiene: Euclid "SBR Latex", L & M "Everbond", Conspec "Strongbond", Master Builders "Acryl-Set", Sonneborn "Sonocrete", or approved equal.

9. Epoxy Adhesive: ASTM C 881, two component materials suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit project requirements.

    a. Conspec "Spec-Bond 100", Euclid "Euco Epoxy System #452 or #620", L & M "Epabond", Master Builders "Concresive Standard Liquid", or approved equal.

10. Concrete Sealer: Sonneborn "Son-No-Mar", Euclid "Eucopoxy I", L & M "Super Seal #35", W.R. Meadows "Sealtight Acrylic Concrete Sealer", or approved equal.
11. Concrete Stain: L.M. Scofield is specified. Equivalent products from Southern Color & Chemical are acceptable, or approved equal.

    a. Concrete Stain: Lithochrome Chemstain, in color as selected by Engineer.
    b. Color Sealer: Colorcure Concrete Sealer, color matched to concrete stain color.

12. Waterstop: Cetco (Volclay) Waterstop RX.

2.4 PROPORTIONING OF MIXES:

A. Concrete minimum ultimate strength at 28 days; refer to structural drawings.

B. Mix Designs:

1. Prepare design mixes for each type of concrete, in accordance with ACI 301 and ACI 318.
2. Proportion design mixes by weight for class of concrete required, complying with ACI 211.

C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as approved by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and approved by Engineer before using in work.

D. Provide test results from the concrete supplier for proposed design mix, to establish the following:

1. Gross weight and yield per cu. yd of trial mixtures.
2. Measured slump.
3. Measured air content.
4. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7- and 28-day test, and for each design mix.

E. Submit written reports to Engineer for design mixes at least 15 calendar days prior to the start of work.

2.5 ADMIXTURES

A. Use air-entrained admixtures in strict compliance with manufacturer's directions at all concrete exposed to weather.

2.6 SLUMP LIMITS: 4" to +1".

2.7 BATCHING AND MIXING

A. Concrete may be ready-mixed or job-mixed at the Contractor's option, in accordance with the governing building code and with the referenced ACI 318. No hand mixing allowed.

B. Job-Site Mixing:

1. Mix materials for concrete in appropriate drum-type batch machine mixer. For mixers of one cu. yd. or smaller capacity, continue mixing at least 1-

1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd. or fraction thereof.

2. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

C. Ready-Mix Concrete:

1. Comply with requirements of ASTM C 94, and as specified.
2. When air temperature is between 85°F and 90°F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORM WORK:

A. Coordinate installation of joint materials, vapor barrier/retarder, and other related materials with placement of forms and reinforcing steel.

B. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads, and static and dynamic loads that might be applied until such loads can be supported by the concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment elevations, and position.

C. Construct forms in accordance with ACI 347, to sizes, shapes, lines and dimensions indicated, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, molding, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous location.

F. Chamfer exposed corners and edges 3/4" unless otherwise indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Preparation of Form Surfaces: Coat the contact surfaces of forms with a form-coating compound where applicable before reinforcement is placed.

H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such ties. Accurately place and securely support items built in to form.

I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms after concrete placement, if required, to eliminate mortar leaks.

3.2 VAPOR BARRIER INSTALLATION:

A. Following leveling and tamping of granular base for slabs-on-grade, place vapor barrier in position with longest dimension parallel with direction of pour.

B. Lap joints 6" and seal with manufacturers recommended mastic or pressure sensitive tape.

3.3 PLACING REINFORCEMENT:

A. Comply with the Concrete Reinforcing Steel Institute (CRSI) recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports, and as herein specified.

1. Avoid cutting or puncturing vapor barriers during reinforcement placement and concreting operations.

B. Clean reinforcement of loose rust, mill scale, dirt, and other materials or coatings which reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as required.

D. Place reinforcement to obtain minimum coverages indicated, or if not indicated, in compliance with CRSI. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Do not place bars more than 2" beyond the last leg of continuous support. Do not use supports to hold runways for conveying equipment.

F. Install mesh welded wire fabric reinforcement in as long lengths as practicable, lapping pieces at least one mesh plus 2" but in no case less than 8". Lace splices with wire. Offset end laps to prevent continuous laps in either direction. Lift mesh to middle third of slab by use of hooks.

3.4 JOINTS AND INSERTS:

A. Joints: Provide construction and expansion joints. Locate and install joints, which are not shown on the drawings, so as not to impair the strength and appearance of structure. Submit joint schedule and details to Engineer.

1. Waterstops: Provide waterstops in construction joints as indicated. Install to form continuous diaphragm in each joint. Support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.

B. Inserts: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, concrete. Properly locate embedded items in cooperation with other trades, and secure in position before concrete is poured. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

3.5 PREPARATION OF FORM SURFACES

A. Coat contact surfaces of forms with an approved nonresidual, low-VOC, form-coating compound before reinforcement is placed. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.6 CONCRETE PLACEMENT:

A. Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.

B. Pre-Placement Inspection: Before placing concrete, clean and inspect formwork, reinforcing steel, and items to be embedded or cast-in. Notify other crafts in ample time to permit the installation of their work, and cooperate with them in setting such work, as required. Make sure soil treatment for termite control has been applied to cushion fill before vapor barrier and concrete are installed. Coordinate the installation of joint materials and vapor barriers with placement of forms and reinforcing steel.

C. Notify Engineer 48 hours before placing any concrete.

D. Conveying: Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials. Provide equipment for chuting, pumping, and pneumatically conveying concrete of proper size and design as to insure a practically continuous flow of concrete at the point of delivery and without segregation of the materials. Keep open troughs and chutes clean and free from coatings of hardened concrete. Do not allow concrete to drop freely more than 10 feet. All equipment and methods used for conveying are subject to the approval of Engineer.

E. Depositing: Deposit concrete continuously or in layers of such thickness that no concrete will be placed on hardened concrete so as to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete near or in its final location to avoid segregation due to rehandling or flowing, and displacement of the reinforcement.

F. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

G. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps and hollows. Do not disturb slab surfaces prior to beginning finishing operations.
3. Maintain reinforcing in proper position during concrete placement.

H. Cold Weather Placing: Comply with the requirements of ACI 306 and as follows:

1. Protect concrete work from physical damage and reduced strength that could be caused by frost, freezing actions, and low temperatures.
2. When air temperature has fallen to or is expected to fall below 40`F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50`F and not more than 80`F at point of placement.

    a. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
    b. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted for mix designs.

I. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with the requirements of ACI 305 and as follows:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90`F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
3. When acceptable to Engineer, and when required by high temperatures, low humidity, or other adverse placing conditions, use an approved water-reducing retarding admixture.

3.7 FINISH OF FORMED SURFACES:

A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a

minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 SLAB FINISHES:

A. Float Finish:

1. Apply float finish to slab surfaces to receive trowel finish and other finishes specified.
2. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(f) 18 (floor flatness) and F(l) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to uniform, smooth, granular texture.

B. Trowel Finish:

1. Apply where exposed-to-view, and where slab surfaces are to be covered with tile, paint, resilient flooring, carpet, or other thin film finish coating system.
2. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(f) 20 (floor flatness) and F(l) 17 (floor levelness) measured according to ASTM E 1155. Grind smooth surface defects which would telegraph through applied floor covering.

C. Trowel And Fine Broom Finish: Where tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

D. Non-Slip Broom Finish: Apply at exterior concrete steps, ramps, walks, and mowing strips, and as indicated.

E. Concrete Sealer: Comply with manufacturer's instructions.

F. Concrete Stain: Comply with manufacturer's instructions.

3.9 CONCRETE CURING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures; maintain concrete above 50°F. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less that 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as specified.

1. Provide moisture curing by keeping concrete surface continuously wet by covering with water, by water-fog spray, or by covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
2. Provide moisture-cover curing by covering concrete surface with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Provide curing and sealing compound on interior slabs left exposed; and to exterior slabs, walks, and curbs, as follows:

    a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
    b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

C. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in

place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor toppings, and other flat surfaces by application of appropriate curing compound. Final cure concrete surfaces to receive finish flooring by moisture-retaining cover, unless otherwise directed.

3.10 REMOVAL OF FORMS:

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of work, may be removed after cumulatively curing at not less than 50°F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may be removed after 14 days if concrete has attained at least 75% of design minimum compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

3.11 REUSE OF FORM:

A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or otherwise damaged form material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Engineer.

3.12 MISCELLANEOUS ITEMS:

A. Filling In: Fill in holes and openings left in concrete for the passage of work by other trades after their work is in place. Mix, place, and cure concrete to blend with in-place construction. Provide all other miscellaneous concrete filling required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to hard, dense finish and corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations. Set anchor bolts for machines and equipment to template at correct

elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

3.13 CONCRETE SURFACE REPAIRS:

A. Repair and patch defective areas with cement mortar of the same type and class as the original concrete, immediately after removal of forms. Cut out honeycomb, rock pockets, voids over 1/2" diameter, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface, before placing cement mortar in the same manner as adjacent concrete. Proprietary patching compounds may be used when acceptable to Engineer.

1. Smooth, Exposed-To-View Surfaces: Blend cements so that, when dry, patching mortar will match color of surrounding concrete. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
2. Concealed Formed Surfaces: Repair defects that adversely affect the durability of the concrete. If defects cannot be repaired remove and replace the concrete.
3. Other repair methods may be used, subject to acceptance by Engineer.

3.14 FIELD SAMPLING AND TESTING:

A. The following samples and tests will be performed by an independent testing laboratory approved by Owner and Engineer. Refer to paragraph 1.4 C. for responsibility for payment of tests.

B. Samples:

1. Field samples shall be made and cured in accordance with ASTM C 31, for each concrete strength, at the rate of 4 test cylinders and one slump test for each 50 cubic yards of concrete from each day's pour. In accordance with ASTM C 173 Volumetric Method, or ASTM C 231 Pressure Method, make air content check for each set of test cylinders. Air content and slump shall be checked and recorded at both truck discharge and point of placement for pumped concrete from the first load each day.
2. Test cylinders as follows: One at 7 days, two at 28 days, and reserve the remaining for testing after a longer period as required by Engineer, if the 28 day tests do not meet the required strength.
3. The taking of samples from small pours of 10 cubic yards or less may be omitted at the discretion of the Engineer.
4. Additionally, test slump every 25 cu. yds, recording location for report.
5. When early form removal is requested, field cure cylinders tested at 7 or less days to determine sufficient strength.

C. Testing:

1. Where average strength of any group of 3 cylinders falls below the minimum compressive strength or if individual cylinder falls more than 500 psi below minimum compressive strength specified, the Engineer shall have the right to require that test specimens be cut from the structure. Specimens shall be selected by Engineer from location in structure represented by test specimen or specimens which failed.
2. Specimens shall be secured, prepared, and tested in accordance with ASTM C 42, within a period of 60 days after placing concrete.
3. Concrete shall be considered to meet the strength requirement of this specification if it meets the strength requirements of paragraph 5.6.4 of ACI 318.
4. Should laboratory analysis indicate that the proper concrete mix has not been used by the Contractor, all such concrete poured using the improper mix shall be subject to rejection.
5. The cost of cutting specimens from the structure, patching the resulting holes, and making the laboratory analysis shall be borne by the Contractor.
6. The holes from which the cored samples are taken shall be packed solid with no slump concrete proportioned in accordance with the ACI 211 "Recommended Practice for Selecting Proportions of No-Slump Concrete". The patching concrete shall have the same design strength as the specified concrete.
7. If any of the specimens cut from the structure fail to meet the requirements outlined in paragraph 5.6.4 of ACI 318, the Engineer shall have the right to require any and all defective concrete to be replaced, and all costs resulting therefrom shall be borne by the Contractor.

D. Contractor Sampling: In addition to the slump tests specified above, the contractor shall keep a cone (mold) and rod apparatus on the job site for random testing of batches. When concrete does not meet the specified slump requirements, and when directed by the Engineer, immediately perform a slump test in accordance with ASTM C 143. Concrete not meeting the slump requirements shall be removed from the job site.

3.15 PROTECTION:

A. No wheeling, working, or walking on finished surfaces will be allowed for 16 hours after the concrete is placed.

B. Provide plywood or other acceptable protective cover at all traffic areas throughout the job.

C. Protect exposed concrete floors, steps, and walks from paint and other materials or equipment which may mar or damage these surfaces.

3.16 CLEAN-UP

A. Do not allow debris to accumulate. Clean up all concrete and cement materials, equipment and debris upon completion of any portion of the concrete work, and upon completion of entire cast-in-place concrete work.

END OF SECTION

UNDER-SLAB GAS BARRIER / VAPOR RETARDER
(Class A)

PART 1 – GENERAL

1.1 SUMMARY
- A. Products Supplied Under This Section
  1. Gas Barrier / Vapor Retarder, Seam Tape, and Pipe Boots

1.2 REFERENCES
- A. American Society for Testing and Materials (ASTM)
  1. ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs
  2. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
  3. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials
  4. ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
  5. ASTM D 1434 Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting
- B. Radon Diffusion Coefficient K124/02/95
- C. American Concrete Institute (ACI)
  1. ACI 302.1R-6 & 7 Section 3.2.3 Vapor Retarder

1.3 SUBMITTALS
- A. Testing/Specifications
  1. Laboratory test results showing compliance with ASTM & ACI Standards.
  2. Manufacturer's samples, literature.
  3. Manufacturer's installation instructions for placement and seaming.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Provide a Gas Barrier / Vapor Retarder that meets the following:

1. ASTM E-1745 Standard for Plastic Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
   a) Must meet all Class "A" criteria.

2. ASTM D 1434 Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting
   a) Methane Permeance:
   1.7×10^{-10} m²/d·atm or 0.32 GTR ml/m²•D•ATM

3. K124/02/95 Radon Diffusion Coefficient: $< 1.1 \times 10^{-13}$ m²/s

- Absolute Barrier Y30 BAC or Y40 BAC by Raven Industries, 800-635-3456 or approved equal

Other Manufacturer accepted meeting the above specification:

- GSE Environmental, GSE Ultraflex LLDPE 40 mil

2.2 ACCESSORIES

A. Seam Tape
   1. VaporBond Plus Tape by Raven Industries, 800-635-3456 or other 4” wide gas barrier tape approved by the gas barrier / vapor retarder manufacturer.
   2. VaporBoot Tape by Raven Industries, 800-635-3456 or 2” wide stretchable butyl rubber tape.
   3. Butyl Seal Tape by Raven Industries, 800-635-3456 or approved equal 2” wide double-sided reinforced butyl rubber seaming tape.

B. Pipe Boots
   1. Raven VaporBoot Plus pipe boots or other manufacturer’s supplied pipe boot system.

PART 3 – EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by architect
   1. Level and tamp or roll aggregate, sand or tamped earth base.

3.2 INSTALLATION

A. Install Gas Barrier / Vapor Retarder:
   1. Installation shall be in accordance with manufacturer’s instructions and ASTM E 1643. (Instructions on architectural or structural drawings should be reviewed and followed.)

      A. Unroll vapor barrier with the longest dimension parallel with the direction of the pour and pull open all folds to full width.
      B. Lap vapor barriers over footings and seal to the vertical foundation walls with 2-Sided Raven Butyl Seal tape.
      C. Overlap joints a minimum of 12 inches and seal in-between overlap with 2-Sided Butyl Seal tape then center the 4” wide gas barrier tape approved by gas barrier / vapor retarder manufacturer over the seal overlap.
      D. Seal around sewer pipes, support columns or any other penetration with pipe boots creating a monolithic membrane between the surface of the slab and moisture sources below as well as at the slab perimeter.
      E. When gas barrier is used as a part of an active control system for radon gas and other VOCs, a ventilation system will be required. When installed as a passive system it is still recommended to include a ventilation system that could be converted to an active system later.
      F. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 12 inches and taping all four sides with 4” wide gas barrier tape approved by vapor retarder / gas barrier manufacturer.

OPERATING PLAN

TUCKER UNIT
Compost Facility
2400 State Farm Road
Tucker, AR 72168

March 8, 2022

TUCKER UNIT

COMPOST FACILITY

TUCKER, ARKANSAS

OPERATING PLAN

MARCH 2022

TUCKER UNIT
Compost Facility
2400 State Farm Road
Tucker, AR 72168

Prepared by:

PMI
3512 South Shackleford
Little Rock, Arkansas 72205
501-221-7122

1.0 SITE INFORMATION

The Tucker Unit (Tucker) Compost Facility is located at 2400 State Farm Road near Tucker, Jefferson County, Arkansas, Section 19, T-3-S, R-8-W approximate latitude 34° 26' 15.94" N and longitude 91° 54' 23.69" W, see Vicinity Map, Sheet 2. The Tucker compost facility is located within the highly secure Tucker Unit complex. The Tucker Unit's property is continuously monitored by Tucker staff and video surveillance.

The Tucker compost facility is equipped with two composters that receive organic waste from the correctional facility. The organic waste is composted in the Ecodrum composters for use in a variety of applications.

The Tucker compost facility and storage areas are sheltered under a metal roof that slopes north and south. The metal roof prevents rainfall from coming into direct contact with the compost facility and storage areas. There are two drainage ditches located northeast and southwest of the compost facility. Stormwater north of the facility flows east past the compost facility, and then southwest until reaching Wabbaseka Bayou. Stormwater south of the facility flows southwest into a Wabbaseka Bayou. Both drainage ditches flow southeast. The stormwater continues flowing southeast until reaching South Alligator Bayou. Because all stormwater is diverted away from, and/or around the facility, the facility does not restrict the flow of the base flood, reduce water storage capacity of the floodplain, or result in washout of solid waste.

2.0 OPERATING PLAN

Principal of Operation

The Tri-Form Poly Inc. Ecodrum™ Composter is an ecologically friendly system for converting organics into composting material to reduce or eliminate pathogens so the compost can be used in a variety of applications.

The Ecodrum™ Composter consists of a large plastic drum that rotates to mix the content as it

turns. Two and up to five sections can be used to form the ecodrum. The ecodrums of the composters at Tucker are made up of five sections each. Turning the drum introduces oxygen into the mixture to support the aerobic activity in the material and mixes the contents to insure composting throughout.

Vanes and projections on the inside surface of the drum move the material through the drum as it rotates. Rubber rolls on 2 shafts on each side of the bottom of the frame rotate the drum. Both shafts are driven through an electric motor, speed reducing gearbox and roller chain drive system.

Each composter is equipped with a loading door for placing food waste and bulking material (wood chips) into the drum. Larger units are also designed with a re-bulking door on the second or third segment of the composter. Each door is equipped with 3 over-center latches with retainers to secure the doors when closed. Temperature probes are located in the bottom of the drum to monitor the temperature of the composting mixture. A temperature of 131° F for at least 3 continuous days per recommendation from U.S. Composting Council is required to reduce or eliminate all potential pathogens.

The anticipated food waste quantity delivered to the compost facility is 1,500 lbs per day. The food waste is generated in the kitchen where it is sorted immediately following food preparation. The sorted food waste is then disposed of in the ~~EARU~~ Tucker Unit facility's dumpster. The food waste is transported from the dumpster, in barrels, to the compost facility where it is directly inserted into the composters. Food waste will not be stored at the compost facility, and shall be transported to the compost facility as necessary. Incoming food waste will be measured by barrels delivered per day, and the average weight of each barrel depending on the food items cooked. If the composters are inoperable, the food waste will remain in the facility's dumpster, and transported to a DEQ permitted landfill.

Note that any PMI's reference to "EARU" in their permit application for Tucker Unit should be ignored and replaced with "Tucker Unit"

The discharge (rear) end of the drum is designed with a cone which allows the operator to collect the discharge and prevent the discharge from covering the end of the composter. Any discharge covering the end of the composters will be removed immediately, and added to the compost storage bay.

The composters discharge the compost into the compost storage bay. Upon discharge, the compost may immediately be used for land application. The compost storage bay has a maximum capacity of 23 cubic yards, and should never exceed this capacity. Only the compost storage bay is permitted to hold discharged compost. The discharged compost should only be transported from the compost storage bay for land application. A front end loader will be used to remove the finished product from the compost storage bay for land application. The front end loader and the composter are the only mechanical equipment needed for the composting process.

The composter's in-vessel design eliminates odor, noise, dust, vectors, littler, and leachate discharge during the composting process. Moisture is controlled by the addition of wood chips as necessary. The composter design does not generate residuals. Of the total volume of the 1,500 lbs of food waste per day, plus bulking agent, approximately 60% of the original volume results in a finished compost product due to condensing during the compost process. The compost storage bay within the compost facility rest upon a concrete slab that is enclosed by 6-foot-tall, wood siding, walls and a metal roof to prevent any leachate from escaping the storage areas.

Each unit is equipped with a snorkel tube and suction fan to draw air through the composter on a regular basis to provide fresh oxygen into the system to support the aerobic process.

All controls are located on a pedestal on the left front corner in a control box. Both the timing, frequency and length of operation of the suction fan and drum rotation can be set in the control box. A ladder(s) is provided to assist the operator to access the loading and re-bulking doors. Rollers at the center of the front section of the drum turn in a groove to hold the entire drum assembly in position during operation.

Operation, control, and maintenance of the compost facility is the responsibility of the operator. The operator must be on site during all hours of operation. The compost facility's operator must be a licensed operator in accordance with APC&EC Regulation No. 27. The compost facility operating hours will be for one hour after each meal provided by Tucker. The permit applicant is responsible for operation, control, and maintenance of the compost facility. The permit applicant

will ensure that Tucker staff follows the operation guidelines set by the manufacturer starting with the Pre-Operation Checklist. Bulking agents will be added to the composter at the recipe ratios suggested by the manufacturer and the rotations per day will be set for 1-10 times per day for the Ecodrum 560. Based on the weight of the organic material and amount of bulking in the drum, the duration of air pulses will be set between 2-10 minutes. The composter is equipped with a control panel for adjustment of controls. Detailed operational procedures can be found in Section 4.13 of the accompanying manufacturer O&M document.

The composters are rated for a maximum capacity of 750 lbs per day per unit of compostable material at 131°F.

3.0 COMPOST MATERIAL QUALITY ASSURANCE / QUALITY CONTROL

Tucker will maintain the compost material according to DEQ Regulation 22 Chapter 8. Specifically, Tucker will test the compost material following the requirements of Reg. 22.807(c), Table 2, see below.

Table 2 Compost Quality Verification

PARAMETER	UNIT	LIMIT	TEST METHOD
Soluble salts – electrical conductivity	mmhos/cm	N/A	NCR Publication 221, Method 14; or EPA 9050A.
Pathogens	PFRP	N/A	EPA, 40 CFR ' 503 Appendix B(B)(1).
Fecal coliform	MPN/g	1000	Standard Methods 9221 E. or 9222 D.
Salmonella	MPN/4g	3 or less	Standard Methods 9260 D.
pH	s.u.	5.5-8.5	NCR Publication 221, Method 14; or EPA 9045.
Arsenic	mg/kg	41	AOAC 975.03b(b) and EPA dry wt. 6010A or 7061A; or EPA 3050 and 6010A or 7061A.
Cadmium	mg/kg	39	AOAC 975.03B(b) and EPA dry wt. 6010A or 7130; or EPA 3050 and 6010A or 7130.
Chromium	mg/kg	1200	AOAC 975.03B(b) and EPA dry wt. 6010A or 7190; or EPA 3050 and 6010A or 7190.
Copper	mg/kg dry wt.	1500	AOAC 975.03B(b) and EPA 6010A or 7210; or EPA 3050 and 6010A or 7210.

Lead	mg/kg dry wt.	300	AOAC 975.03B(b) and EPA 6010A or 7420 or 7421; or EPA 3050 and 6010A or 7420 or 7421.
Mercury	mg/kg dry wt.	17	AOAC 971.21; or EPA 7471A.
Molybdenum	mg/kg dry wt.	54	AOAC 975.03B(b) and EPA 6010A or 7480 or 7481; or AOAC 985.01 and EPA 6010A or 7480 or 7481; or EPA 3050 and 6010A or 7480 or 7481.
Nickel	mg/kg dry wt.	420	AOAC 975.03(b) and EPA 6010A or 7520; or EPA 3050 and 6010A or 7520.
Selenium	mg/kg dry wt.	36	AOAC 975.03B(b) and EPA 7740 or 7741A; or EPA 3050 and 7740 or 7741A.
Zinc	mg/kg	2800	AOAC 975.03B(b) and EPA 6010A or 7950; or EPA 3050 and EPA 6010A or 7950.

Compost material will be sampled and tested annually.

4.0 CONTINGENCY OPERATIONS

In the event of a power outage, natural disaster or fire, Tucker will stop the compost operation and dispose of raw materials to a permitted landfill. Tucker will dispose of raw compost material waste at either the Jefferson County Class 1 Landfill, Chicot County Class 1 Landfill, or Union County Class 1 Landfill. In the event of a fire, the compost facility will be equipped with a fire extinguisher.

5.0 REPORTING AND RECORD KEEPING

Tucker will follow the requirements of DEQ Reg. 22.808 (b) (c) for reporting and record keeping of generated compost. Tucker will follow the requirements listed below:

1. Compost analysis results which include the name of the testing laboratory;
2. Quantity, type and source of incoming waste;
3. Quantity and types of recovered recyclables, as appropriate;

4. Quantity of compost produced;
5. Quantity of compost sold/distributed, and markets;
6. Quantity of disposed residue, date and location of disposal;
7. Daily temperature readings and retention times during PFRP;
8. Leachate management records and summaries;
9. Monitoring results of stormwater runoff and/or site discharges as required by facility NPDES permits;
10. Application documents, permits, design drawings, operating plans, modifications, Department correspondence;
11. Annual reports and data for compiling annual reports.

5.1 ANNUAL REPORT

Tucker will submit an annual report to DEQ, summarizing the results of the requirements listed above, covering the period of January through December. The annual report will be submitted to DEQ by March 31 of each year covering the previous year.

OPERATING GUIDELINES

entegrity
energy. integrity.

FACILITY OPERATING GUIDELINES

Guidelines should be posted at the entrance to the facility

1. The composting facility is not open to the public.
2. Only food waste material from the correctional facility is to be composted.
3. No outside organic material will be accepted.
4. The composting facility has no posted operating hours and will only be loaded under supervision by Arkansas Department of Corrections staff.
5. The composter should be operated in accordance with this operating procedure.
6. If wet compost exits the Ecodrum composter, the wet material should immediately be added back to the front of the drum.

ADC
Arkansas Department of Correction



SITE: _____

MONTH: _____

ECODRUM COMPOSTER QC LOG SHEET

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DATE	ORGANICS LBS	BULKING LBS	TEMPERATURE °F			MOISTURE %	NOTES	OPERATOR
			FRONT	REAR	OUTSIDE			
1								
2								
3								
4								
5								
6								
7								
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28								
29								
30								
31								

NOTES:
1. Temp: Front temperature probe should read >131°F; not to exceed 160°F
2. Moisture: Moisture should test between 50-60% at the second door or exit
3. Capacity: Do not overfill the Ecodrum, to allow enough room for air flow

Tri-Form Poly Inc.

ecodrum™





ECODRUM™ COMPOSTER

COMPUTER CONTROL

OPERATOR'S MANUAL

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1 INTRODUCTION

Congratulations on your choice of a Tri-Form Poly Inc. Ecodrum™ Composter and welcome to Tri-Form Poly Inc.'s quality line of composting equipment. This equipment is designed and manufactured to meet the needs of a discriminating buyer in the industry for composting of organic material.

Safe, efficient and trouble free operation of your new Ecodrum™ Composter requires that you, and anyone else who will be operating or maintaining the Ecodrum™ Composter, read, understand and practice ALL of the Safety, Operation, Maintenance and Trouble Shooting recommendations contained within this Operator's Manual.



This manual applies to Ecodrum™ Composters controlled by a computer system manufactured by Tri-Form Poly Inc. Certain options may be available to specifically tailor the Ecodrum™ Composter to your operation and may not be included in this manual. Please contact the manufacturer regarding additional information about these options. Use the Table of Contents and Index as a guide to find specific information.

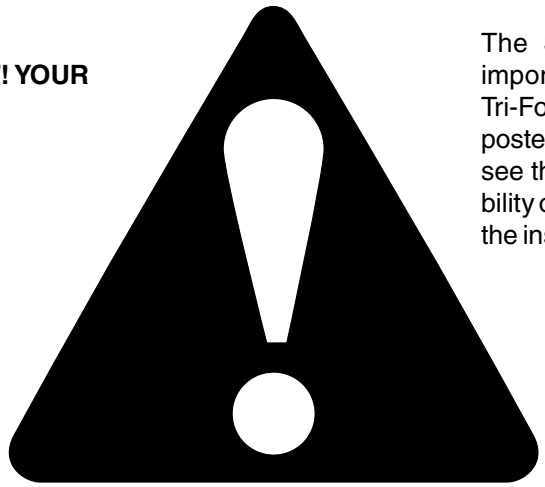
Keep this manual handy for frequent reference and so that it will be passed on to new operators or owners. Call your Ecodrum™ Composter dealer if you need assistance, information or additional copies of this manual.

MACHINE ORIENTATION - The snorkel is on the front and the discharge is on the rear. The controls are on the left side of the frame.

2 SAFETY

SAFETY ALERT SYMBOL

This Safety Alert symbol means
ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!



The Safety Alert symbol identifies important safety messages on the Tri-Form Poly Inc. Ecodrum™ Composter and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons

Accidents Disable and Kill
Accidents Cost
Accidents Can Be Avoided

SIGNAL WORDS:

Note the use of the signal words **DANGER, WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guide-lines:

SI NO LEE INGLES, PIDA AYUDA A AIGUIEN QUE SI LO LEA PARA QUE LE TRADUZCA LAS MIDIDAS DE SEGURIDAD.

DANGER - Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components which, for functional purposes, cannot be guarded.

WARNING - Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION - Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

If you have any questions not answered in this manual or require additional copies or the manual is damaged, please contact your dealer or Tri-Form Poly, Inc. • Phone: (204) 746-6401 • Fax: (204) 746-8404 •132 Charles Ave. W, Morris, MB R0G 1K0 • Email: info@triformpoly.com • http://www.ecodrumcomposter.com

SAFETY

YOU are responsible for the **SAFE** operation and maintenance of your Tri-Form Poly Inc. Ecodrum™ Composter. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Composter be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices while operating the Composter.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but, also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this machine is familiar with the procedures recommended and follows safety precautions. Remember, most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Ecodrum™ Composter owners must give operating instructions to operators or employees before allowing them to operate the machine, and at least annually thereafter.

- The most important safety device on this equipment is a SAFE operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. Most accidents can be avoided.

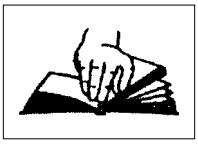
- A person who has not read and understood all operating and safety instructions is not qualified to operate this machine. An untrained operator exposes himself and bystanders to possible serious injury or death.

- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment.

- Think SAFETY! Work SAFELY!

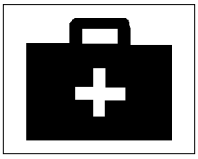
2.1 GENERAL SAFETY

1. Read and understand the Operator's Manual and all safety signs before supplying power, operating, maintaining or adjusting the Composter.

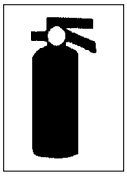


2. Only trained, competent persons shall operate the Composter. An untrained operator is not qualified to operate this machine.

3. Provide a first-aid kit for use in case of an accident. Store in a highly visible place.



4. Provide a fire extinguisher for use in case of an accident. Store in a highly visible place.



5. Install and properly secure all guards and shields before operating.

6. Wear appropriate protective gear. This list includes but is not limited to:



   - Protective shoes with slip resistant soles
   - Protective glasses or face shield
   - Rubber gloves
   - Hearing protection
   - Respirator
   - Protective clothing

7. Turn machine OFF, shut down and lockout power supply and wait for all moving parts to stop be-fore adding animal mortality, servicing, adjusting, maintaining, repairing or cleaning. (Safety lockout devices are available through your Tri-Form Poly Inc. dealer parts department).

8. Always wear the appropriate safety gear to protect yourself including but not limited to face shield, protective clothing, respirator and rub-ber gloves. Do not take chances with the safety of yourself or others.

9. Know the emergency medical center number for your area.

10. Review safety related items with all operators annually.

2.2 EQUIPMENT SAFETY GUIDELINES

1. Safety of the operator and bystanders is one of the main concerns in designing and developing a machine. However, every year many accidents oc-cur which could have been avoided by a few sec-onds of thought and a more careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following pre-cautions in this section. To avoid personal injury or death, study the following precautions and insist those working with you, or for you, follow them.

2. In order to provide a better view, certain photo-graphs or illustrations in this manual may show an assembly with a safety shield removed. However, equipment should never be operated in this con-dition. Keep all shields in place. If shield removal becomes necessary for repairs, replace the shield prior to use.

3. Replace any safety sign or instruction sign that is not readable or is missing. Location of such safety signs is indicated in this manual.

4. Never use alcoholic beverages or drugs which can hinder alertness or coordination while oper-ating this equipment. Consult your doctor about operating this machine while taking prescription medications.

5. **Under no circumstances should young chil-dren be allowed to work with this equipment. Do not allow persons to operate or assemble this unit until they have read this manual and have developed a thorough understanding of the safety precautions and of how it works.** Review the safety instructions with all users annually.

6. The operator should be a responsible, properly trained and physically able person familiar with machinery and trained in this equipment's operations.

7. Never exceed the limits of a piece of machinery. If its ability to do a job, or to do so safely, is in ques-tion - **DON'T TRY IT.**

8. Do not modify the equipment in any way. Unauthorized modification result in serious injury or death and may impair the function and life of the equipment.

9. In addition to the design and configuration of this implement, including Safety Signs and Safety Equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence, and proper training of personnel involved in the operation, transport, maintenance, and storage of the machine. Refer also to Safety Messages and operation instruction in each of the appropriate sections of the auxiliary equipment and machine Manuals. Pay close attention to the Safety Signs affixed to the auxiliary equipment and the machine.

2.3 STORAGE SAFETY

1. Store the Ecodrum™ Composter on a firm level surface.

2. If required, make sure the unit is firmly blocked up.

3. Make certain that all door latches are secured with their lock pins before storing.

4. Store away from areas of human activity.

5. Do not allow children to play on or around the stored Ecodrum™ Composter.

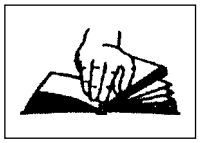
6. Unplug power cord and lock out power by turning off master control panel and padlocking the door shut to prevent electrocution or unauthorized start up of the Ecodrum™ Composter.

2.4 SAFETY TRAINING

1. Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator or bystander.

2. In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of this equipment.

3. It has been said, "The best safety feature is an informed, careful operator." We ask you to be that kind of an operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. Accidents can be avoided.



4. **Working with unfamiliar equipment can lead to careless injuries. Read this manual, and the manual for your auxiliary equipment, before assembly or operating, to acquaint yourself with the machines. If this machine is used by any person other than yourself. It is the machine owner's responsibility to make certain that the operator, prior to operating:**

   a. Reads and understands the operator's manuals.

   b. Is instructed in safe and proper use.

5. Know your controls and how to stop the Composter and any other auxiliary equipment quickly in an emergency. Read this manual and the one provided with your other equipment.

6. Train all new personnel and review instructions frequently with existing workers. Be certain only a properly trained and physically able person will operate the machinery. A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to possible serious injury or death. If the elderly are assisting with work, their physical limitations need to be recognized and accommodated.

2.5 SAFETY SIGNS

1. Keep safety signs clean and legible at all times.

2. Replace safety signs that are missing or have become illegible.

3. Replaced parts that displayed a safety sign should also display the current sign.

4. Safety signs are available from your authorized Distributor or Dealer Parts Department or the factory.

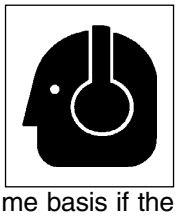
How to Install Safety Signs:

- Be sure that the installation area is clean and dry.
- Be sure temperature is above 50°F (10°C).
- Determine exact position before you remove the backing paper. (See Section 3).
- Remove the smallest portion of the split backing paper.
- Align the sign over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the sign in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of sign backing paper.

2.6 PREPARATION

1. Never operate the Composter and auxiliary equipment until you have read and completely understand this manual, the auxiliary equipment Operator's Manual, and each of the Safety Messages found on the safety signs on the Composter and auxiliary equipment.

2. 
Personal protection equipment including hard hat, face shield or protective glasses, safety shoes, and rubber gloves are recommended during assembly, installation, operation, adjustment, maintaining, repairing, or moving the machine. Do not allow long hair, loose fitting clothing or jewelery to be around equipment.

3. 
PROLONGED EXPOSURE TO LOUD NOISE MAY CAUSE PERMANENT HEARING LOSS! Motors or equipment attached can often be noisy enough to cause permanent, partial hearing loss. We recommend that you wear hearing protection on a full-time basis if the noise in the Operator's position exceeds 80db. Noise over 85db on a long-term basis can cause severe hearing loss. Noise over 90db adjacent to the Operator over a long-term basis may cause permanent, total hearing loss. **NOTE:** Hearing loss from loud noise (from tractors, chain saws, radios, and other such sources close to the ear) is cumulative over a lifetime without hope of natural recovery.

4. Clear working area of debris, trash or hidden obstacles that might be hooked or snagged, causing injury, damage or tripping.

5. Operate only in daylight or good artificial light.

6. Be sure machine is properly anchored, adjusted and in good operating condition.

7. Ensure that all safety shielding and safety signs are properly installed and in good condition.

8. Before starting, give the machine a "once over" for any loose bolts, worn parts, cracks, leaks and make necessary repairs. Always follow maintenance instructions.

2.7 INSTALLATION SAFETY

1. Disconnect and remove all mechanical locks, anchor chains and any other transport devices that would hinder or prohibit the normal functioning of the Ecodrum™ Composter upon start up. Serious damage to the machine and/or personal injury to the operator and bystanders may result from attempting to operate the machine while mechanical locking devices are still attached.

2. Position the machine on firm, level ground before operating.

3. Level the frame before using or loading.

4. Have at least one extra person available to assist when elevating, moving or connecting to other equipment.

5. Make certain that sufficient amperage, at the proper voltage and frequency (60Hz) is available by following ANSI/NFPA 70 Wiring Standard before connecting power. If you are uncertain, have a licensed electrician provide power to the machine.

6. Have a licensed electrician provide 240 V single phase 20 amp power to the Composter.

2.8 LOCK-OUT TAG-OUT SAFETY

1. Establish a formal Lock-Out Tag-Out program for your operation.

2. Train all operators and service personnel before allowing them to work around the Composter.

3. Provide tags at the work site and a sign-up sheet to record tag out details.

2.9 OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, adjusting or repairing the Composter.

2. Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Tri-Form Poly Inc. dealer parts department) and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.

3. Wear appropriate Personal Protective Equipment (PPE).



4. Always wear the appropriate safety gear to protect yourself including but not limited to face shield, protective clothing, respirator and rub-ber gloves. Do not take chances with the safety of yourself or others.

5. Install and properly secure all guards and shields before operating.

6. Keep hands, feet, hair and clothing away from all moving parts.

7. Clear the area of bystanders, especially small chil-dren, before starting.

8. Make sure all control switches are in the off posi-tion before connecting power supply.

9. Before supplying electrical power to the machine, be sure that you have adequate amperage at the proper phase and voltage to run it. If you do not know or are unsure, consult a licensed electrician.

10. Keep the working area clean and dry.

11. Review safety instructions annually.

2.10 MAINTENANCE SAFETY

1. Read and understand all the information contained in the Operator's Manual regarding operating, ser-vicing, adjusting, maintaining and repairing.

2. Turn machine OFF, shut down and lock out pow-er supply (safety lockout devices are available through your Tri-Form Poly Inc. dealer parts de-partment) and wait for all moving parts to stop be-fore servicing, adjusting, maintaining or repairing.



3. Follow good shop practices:

   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.

4. Make sure all guards and doors are in place and properly secured when operating Composter.



5. Do not work on Composter electrical system unless the power cord is un-plugged or the power supply is locked out. Lock-out tag-out power source before performing any maintenance work.

6. Always wear the appropriate safety gear to protect yourself including but not limited to face shield, protective clothing, respirator and rub-ber gloves. Do not take chances with the safety of yourself or others.

2.11 ELECTRICAL SAFETY

1. Have only a qualified licensed electrician supply power to the machine by following ANSI/NFPA 70 Wiring Standard.

2. Make certain that the Ecodrum™ Composter is properly grounded at the power source.

3. Make certain that all electrical switches are in the OFF position before plugging the Composter in.

4. Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Tri-Form Poly Inc. dealer parts department) and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.

5. Disconnect power before resetting any motor or breaker overload.

6. Replace any damaged electrical plugs, cords, switches and components immediately.

7. Do not work on Ecodrum™ Composter electrical system unless the power cord is unplugged or the power supply is locked-out tagged-out.



2.12 BIO-SECURITY

1. Review and follow all bio-security protection protocols specified by local, state/provincial and federal laws and regulations.

2. Follow all instructions for bio-security protection provided by U.S. Composting Council and EPA regulation 3:19 that specifies composting material temperature must be maintained above 131° F for 3 continuous days to eliminate all pathogens, weed seeds and viruses.

3. Refer to information from U.S. Composting Council and EPA if you have questions about the bio-security of your application.

4. Always wear appropriate Personal Protective Equipment (PPE) whenever operating or servicing composter.

2.13 COMPOSTING SAFETY

1. Review operating, environmental and composting safety with personnel frequently to remind them of required procedures.

2. Always wear appropriate Personal Protective Equipment (PPE) whenever operating or servicing composter. This list includes but is not limited to:



   - Hard hat
   - Face shield or goggles
   - Rubber gloves
   - Fluid repellent coveralls
   - Slip resistant safety shoes
   - Respirator or breathing protection

3. Do not allow personnel with a compromised immune system to be around or work on the composter.

4. Pathogens can create animal mortality that can be transferred to humans.

5. Do not contact animal mortality, fluids or odors to prevent any transfer.

6. Noxious odors and smells such as ammonia may be present on composting sites. Personnel that are sensitive to these odors should stay away from the operation.

7. Always maintain compost material temperature above 131° F for at least 3 continuous days per recommendations from U.S. Composting Council to reduce or eliminate all pathogens, weed seeds and viruses.

2.14 EMPLOYEE SIGN-OFF FORM

Tri-Form Poly Inc. follows the general Safety Standards specified by the American Society of Agricultural and Biological Engineers (ASABE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining a Tri-Form Poly Inc. built machine must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up.

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

SIGN-OFF FORM

DATE	EMPLOYEE'S SIGNATURE	EMPLOYER'S SIGNATURE

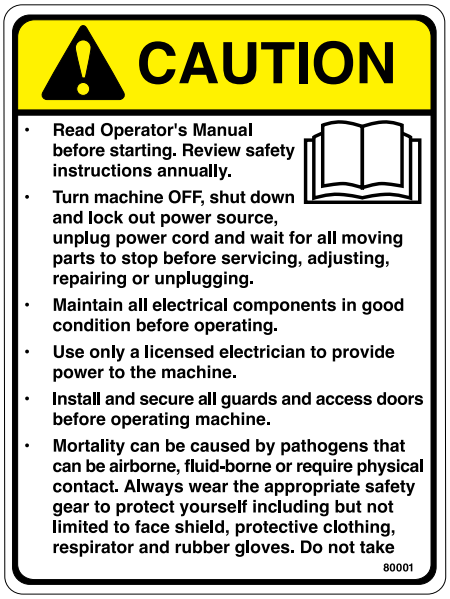
3 SAFETY SIGN LOCATIONS

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various Safety Signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



A



B



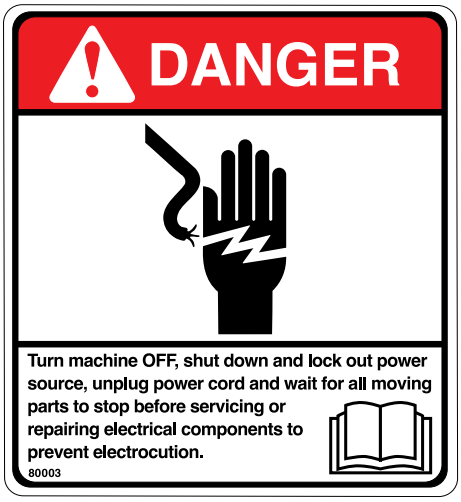
REMEMBER - If Safety Signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various Safety Signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



C



D



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- Think SAFETY! Work SAFELY!





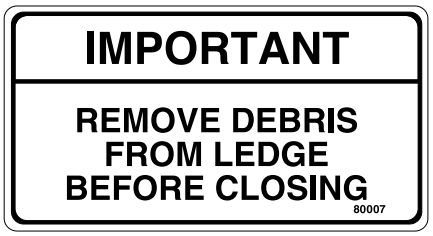
E



F







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- Think SAFETY! Work SAFELY!





REMEMBER - If Safety Signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

4 OPERATION

OPERATING SAFETY

- Read and understand the Operator's Manual and all safety signs before operating, maintain-ing, adjusting or repairing the Composter.
- Turn machine OFF, shut down and lock out power supply (safety lockout devices are avail-able through your Tri-Form Poly Inc. dealer parts department) and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.
- Wear appropriate Personal Protective Equipment (PPE).
- Always wear the appropriate safety gear to protect yourself including but not limited to face shield, protective clothing, respirator and rubber gloves. Do not take chances with the safety of yourself or others.
- Install and properly secure all guards and shields before operating.
- Keep hands, feet, hair and clothing away from all moving parts.
- Clear the area of bystanders, especially small children, before starting.
- Make sure all control switches are in the off position before connecting power supply.
- Before supplying electrical power to the machine, be sure that you have adequate amperage at the proper phase and voltage to run it. If you do not know or are unsure, consult a licensed electrician.
- Keep the working area clean and dry.
- Review safety instructions annually.

4.1 TO THE NEW OPERATOR OR OWNER

The Ecodrum™ Composter is designed to transform organic material and carbon material into compost with reduced levels of pathogens, weed seeds and virus-es. Be familiar with the machine before starting.

It is the responsibility of the owner or operator to read this manual and to train all other operators before they start working with the machine. In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, and prudence of personnel involved in the operation, transport, maintenance and storage of equipment or in the use and maintenance of facilities.

Follow all safety instructions exactly. Safety is everyone's business. By following recommended procedures, a safe working environment is provided for the operator, bystanders and the area around the worksite. Untrained operators are not qualified to operate the machine.

Many features incorporated into this machine are the result of suggestions made by customers like you. Read this manual carefully to learn how to operate the machine safely and how to set it to provide maximum efficiency. By following the operating instructions in conjunction with a good maintenance program, your Ecodrum™ Composter will provide many years of trouble-free service.

4.2 MACHINE COMPONENTS

Principal of Operation

The Tri-Form Poly Inc. Ecodrum™ Composter is an ecologically friendly system for converting organics into composting material to reduce or eliminate pathogens so the compost can be used in a variety of applications.

The Ecodrum™ Composter consists of a large plastic drum that rotates to mix the content as it turns. Two and up to 5 sections can be used to form the ecodrum. Turning the drum introduces oxygen into the mixture to support the aerobic in the material and mixes the contents to insure composting throughout. Vanes and projections on the inside surface of the drum move the material through the drum as it rotates. Rubber rolls on 2 shafts on each side of the bottom of the frame rotate the drum. Both shaft are driven through an electric motor, speed reducing gearbox and roller chain drive system.

Each composter is equipped with a loading door for placing animal mortality and bulking material into the drum. Larger units are also designed with a re-bulking door on the second or third segment of the composter. Each door is equipped with 3 over-center latches with retainers to secure the doors when closed.

Temperature probes are located in the bottom of the drum to monitor the temperature of the composting mixture. A temperature of 131° F for at least 3 continuous days per recommendation from U.S. Composting Council is required to reduce or eliminate all potential pathogens.

The discharge (rear) end of the drum is designed with a cone which allows the operator to collect the discharge and prevent the discharge from covering the end of the composter.

Each unit is equipped with a snorkel tube and suction fan to draw air through the composter on a regular basis to provide fresh oxygen into the system to support the aerobic process.

All controls are located on a pedestal on the left front corner in a control box. Both the timing, frequency and length of operation of the suction fan and drum rotation can be set in the control box. A ladder(s) is provided to assist the operator to access the loading and re-bulking doors.

Rollers at the centre of the front section of the drum turn in a groove to hold the entire drum assembly in position during operation.

A Drum Section
B Snorkel
C Suction Blower
D Suction Motor
E Roller Drive Motor
F Roller Drive Gearbox
G Roller Drive System
H Control Pedestal
J Control Box
K Roll Drive
L Drum Stabilizer Roller
M Door Open Support
N Loading Door
O Re-Bulking Door
P Door Access Ladder
Q Temperature Gauge
R Discharge Cone
S Compost Discharge
T Ecodrum™ Facilities



FIG. 1 MACHINE COMPONENTS


M
K
F
E


J


A
Q
K


J


T
A
A
J
G
C


A
R
S
S


T
O
N
A
A
A
P
K
S

4.3 MACHINE BREAK-IN

Although there are no operational restrictions on the Ecodrum™ Composter when used for the first time, it is recommended that the following mechanical items be checked:

A. Read Ecodrum™ Composter and auxiliary equipment manuals before starting.

B. After 100 hours (break-in):

1. Change oil in gearbox using ISO 320 gear oil.

C. After operating for 1 week:

1. Retorque all fasteners.
2. Check that all electrical connections are tight and cords are routed out of the way or protected.
3. Check the alignment and tension of the roller drive system. Realign or tighten as required.
4. Check all drive sprockets to make sure none has moved. Re-align and tighten any sprocket that has moved.
5. Check the alignment and sealing of all snorkel air system junctions. Realign or tighten as required.
6. Check the integrity of the door(s) and latches plus compost removal systems. Realign, tighten or re-seal as required.
7. Remove hose from air exhaust system and clean it and the snorkel.

D. After 4 weeks:

1. Repeat steps 1 through 7 of Section B.
2. Then go to the regular servicing and maintenance schedule as defined in the Maintenance Section.

4.4 PRE-OPERATION CHECKLIST

Safe and efficient operation of your new Ecodrum™ Composter requires that each operator reads and follows all safety precautions and operating procedures contained in this section. Performing the following pre-operation checklist is important for personal safety as well as for continued mechanical soundness and longevity of your new Tri-Form Poly Inc. Ecodrum™ Composter. The checklist should be performed before operating the Ecodrum™ Composter and prior to each operation thereafter.

1. Lubricate the machine according to the schedule prescribed in the "Maintenance Section".

2. Insure that proper protective gear is in good repair and available for use by each operator. Make certain that each operator uses the protective gear. Protective gear includes but, is not limited to:



- Hard hat
- Rubber gloves
- Safety glasses or face shield
- Full length protective clothing
- Steel toed boots with slip resistant soles.
- Hearing protection
- Respirator

3. Insure that all safety guards and shields are in good repair and securely in place.

4. Check that the roller drive system is properly aligned and tensioned. Adjust if necessary as outlined in the "Maintenance Section".

5. Check the alignment and sealing of all snorkel air system junctions. Realign or tighten as required.

6. Make sure that all electrical switches are in the OFF position before supplying power.

7. Check that all electrical connections are tight and cords are routed out of the way or protected.

8. Be sure the working area is clean and dry to prevent tripping or slipping.

9. Check the integrity of the door(s) and latches plus compost removal systems. Realign, tighten or re-seal as required.

4.5 PRINCIPALS OF COMPOSTING

Composting is the controlled biological decomposition and conversion of solid organic material into a humus-like material called compost. This process is a natural transformation of organic materials into a material with environmentally beneficial applications. Composting is an aerobic process, meaning it requires oxygen. This process uses various microorganisms such as bacteria, fungi, etc to break down the organic compounds into simpler substances.

Composting organics and food waste is a viable process with a beneficial use. It reduces pathogens, diseases and undesirable weed seeds. Properly managing air, moisture and nutrients, the process can transform large quantities of organic material into compost in a relatively short period of time.

There are different types of composting which use different technologies, but the composting principles are all the same. The different types are:

1. Aerated (turned) Windrow Composting.
2. Aerated Static Pile Composting.
3. In-Vessel Composting.
4. Vermicomposting.

There are many benefits to using cured compost in a horticulture application. These benefits include but are not limited to:

1. Increases the soils structure and ability to hold water and nutrients.
2. Can reduce the need for pesticides by increasing the soil's biological activity.
3. Offsets the use of natural resources (e.g., peat moss) for mulch.
4. Diverts valuable organic materials from landfills.
5. Adds organic matter and nutrients to soil, reducing the need for chemical fertilizers.
6. Encourages slow release of nitrogen and lowers the carbon to nitrogen ratio, making nitrogen more available to plants.
7. Kills pathogens and weed seeds.
8. Prevents soil erosion.



FIG. 2 COMPOSTER DISCHARGE



FIG. 3 COMPOSTER

4.6 COMPOSTING REQUIREMENTS

In order to create a satisfactory compost, it is essential to have a favorable carbon to nitrogen ratio, as well as sufficient moisture level and adequate oxygen. Carbon provides both an energy source and the basic building block making up about 50% of the microbial cells (wood chips, shavings, peanut hulls, etc). Nitrogen is a crucial component of proteins, nucleic acids, amino acids, enzymes and co-enzymes necessary for cell growth and function. The ideal ratio of C:N for active composting is 25:1 to 30:1. Ratios of 20:1 up to 40:1 will consistently give good results. A minimum of 5% oxygen concretion within the pore spaces of composting materials is recommended (air contains about 21%).

During composting, the microorganisms consume oxygen while feeding on the organic matter. In addition to providing oxygen, aeration removes heat, water vapor and other gases trapped within the composting materials. The most efficient temperatures for composting are between 130 F and 160 F. At these temperatures, your organic matter will break down quicker and there will be little to no pathogens, diseases, weed seeds and insect larvae in the compost.

Water provides the medium for chemical reactions and for the transportation of nutrients. It also allows microorganisms to move from place to place. Ideally, you are looking for a moisture level between 50-60%. Activity ceases when the moisture level drops below 15% and when moisture levels are above 60%; the water displaces much of the air in the pore spaces of the composting materials, which limits air movement and leads to anaerobic conditions.

Heat accumulation in a compost pile can rise above 160° F due to microbial activity and the insulating qualities of the composting materials. When the temperature reaches this level, many of the microbes die or become dormant. Temperatures should be monitored and heat loss should be accelerated by force aeration.



Wood Chips



Shavings



Peanut Hulls

FIG 4 BULKING MATERIAL (TYPICAL)

4.6.1 IN VESSEL COMPOSTING DEFINITION:

A process in which compostable material is enclosed in a drum, silo, bin, tunnel, reactor or other container for the purpose of producing compost and maintained under uniform conditions of temperature and moisture where air-borne emissions are controlled.

In vessel composters use a forced aeration and / or mechanical agitation to control conditions and promote rapid composting.

4.6.2 IN VESSEL COMPOSTING ADVANTAGES:

1. Composting can be more closely controlled, leading to taster decomposition and more consistent product quality.

2. Effects of weather are minimized.

3. Less manpower is required to operate the system and staff is less exposed to composting material.

4. Can often be done on-site which saves collection costs.

5. Less land area is required.

6. Process air and leachate can be more easily collected and treated.

7. Public acceptance of the facility are better.

8. Can accommodate various types and amounts of organic waste (e.g., odorous bio solids and food).



FIG. 5 ADDING BULKING (TYPICAL)

4.7 SELECTING AND SIZING AN IN-VESSEL COMPOSTER FOR OPERATION

Each application must review the type and size of its operation to select the model of unit appropriate for use. Review each of the following items to establish the model size prior to selecting the model.

4.7.1 MODEL 560 COMPOSTER

The Ecodrum 560 composter is sized to handle a nominal 750 lbs per day of organic material. Bulking agent is then added to the 750 lbs to create the proper compost mixture.



4.8 RECIPE GUIDE

The composter must have the animal mortality and bulking material loaded in the appropriate ratios to obtain consistent and desirable results. Each operator needs to review and follow the recommended recipe for combining animal mortality and bulking material. These recommendations will maintain the ideal mixture for composting.

These 3 main factors that must be monitored:

1. Carbon to nitrogen ratio should be between 20:1 and 40:1. Carbon is represented by bulking material and nitrogen by the animal mortality.

2. Moisture should be below 60% by weight. It is the bulking material that reduces the amount of water and the average moisture level in your compost.

3. Bulking materials should be dry, porous and bulky in texture.

   Bulking material:
   Use dried pine shavings, peanut hulls or other carbon sources as directed by your Ecodrum™ representative. Poultry litter varies and can have up to 50% moisture, so it should never be the bulk of your carbon sources but added in addition if space in the composter is not an issue.

   Always load the bulking material in first followed by the animal mortality.

NOTE

1 bag = 5.5 cubic feet, TSC Store branded pine wood chips.



FIG. 10 COMPOSTER



Wood Chips



Shavings



Peanut Hulls

FIG 11 BULKING MATERIAL (TYPICAL)

TABLE 1

Recipe Ratios:	Oranics	Bulking Agent
Food Waste (volume Ratio)	1 cu. ft.	2 cu. ft.

4. Store extra bulking material next to the composter for convenience when loading.



FIG. 12 STORED (TYPICAL)



4.9 ROTATION GUIDE

The Ecodrum™ is a rotary drum composter and as such operates primarily through timed series of rotations.
There are 2 main reasons that it is important to rotate the Ecodrum:

1. Provides aeration which uniformly supplies oxygen to the bacteria involved in the composting operation.

2. Mixes the material in the drum to ensure complete composting.



FIG. 13 ROTATION DRIVE

Use the following table provides the suggested range of daily rotations for each model.

TABLE 2

Model	Rotations per Day
Model 260	1 - 4 times per day
Model 360	1 - 6 times per day
Model 460	1 - 8 times per day
Model 560	1 - 10 times per day

Some Ecodrum™ models include a re-bulking door in addition the loading door. Mortalities should not be added into this door.

NOTE:

Due to the variables in every composting situation, the purchaser alone is responsible for the operation of the Ecodrum™ according to the US Composting Council standards.

4.10 AIR GUIDE

Each application and model of Ecodrum™ needs to be set according to the weight of the organic material and the amount of bulking in the drum. Set the fans using the following table as a general guide on how much the fans run.

The following table provides the suggested range of hourly air pulses for each model:

TABLE 3

Model	Duration of Air Pulses
Model 260	1 - 4 minutes
Model 360	2 - 6 minutes
Model 460	2 - 10 minutes
Model 560	2 - 10 minutes

NOTE

During winter months or freezing conditions it may be necessary to reduce the length of air pulses to ensure stable temperatures inside the drum.



FIG. 14 AIR HOSE

4.11 CONTROLS

Each Ecodrum™ composter is equipped with a control panel mounted on a pedestal located on the left front corner of the frame. Read and be familiar with the operation of the Omron control system by reviewing its manual.

1. **Computer Control Panel:**

   a. **Display Screen:**
   This panel displays all the screens with the parameters and some of the switches used by the operator to monitor and set the operation of the composter.

   b. **F Switches:**

   - System: Depress this switch to bring up the Home screen on the display.
   - F1: Not used at this time.
   - F2: Not used at this time.
   - F3: Depress this switch to bring up the 'Password' screen to access Fan running times.
   - F4: Not used at this time.

   c. **ON/OFF Switch:**
   This 2 position rotary switch controls the power to the control box. Turn counterclockwise to turn control box off and clockwise to turn on.

   d. **Emergency Stop:**
   This red push-pull switch is the emergency off switch for the composter. Depress this switch to turn the machine off. Use this switch if an emergency arises to stop the unit. Correct emergency before re-starting machine. Twist and pull the switch out to turn the power on again to operate unit.

   e. **Power Present Light:**
   This light is illuminated when there is power to the control box.



FIG. 15 ELECTRONIC CONTROL PANEL

2. **Controller Screen:**
Review this section to understand the location, name and function of each switch on the controller. Go to Start-Up section to see the screen display entries.

   a. **Small:**
   Touch this switch to go to Small mortality set-up screen.

   b. **Medium:**
   Touch this switch to go to Medium mortality.

   c. **Medium/Large:**
   Touch this switch to go to Medium/Large mortality.

   d. **Large:**
   Touch this switch to go to Large mortality.

   e. **Idle:**
   Touch this switch to go to the Idle settings.

   f. **Home:**
   Touch this switch to go to Home screen.

   g. **Manual:**
   Touch this switch to go to the Manual setting screen.

   h. **Cycle Setup:**
   Touch this switch to go to the Cycle Setup screen.

   i. 🔧:
   Touch this (🔧 wrench) switch to go to Maintenance settings screen.

   j. **System:**
   Touch this switch to go to the screen to set time and day.

   k. **F1, F2 and F4:**
   F1, F2 and F4 are not used.

   l. **F3:**
   Touch and hold F3 for 3 seconds to bring up the password screen to get to the Fan Running Time screen.

3. **Temperature Gauge:**
Each drum section can be equipped with a temperature gauge. The drum turns until the temperature probe is in the material at the bottom of the drum. The composting process can only take place when the mixture temperature is kept above 131° F continuously for recommendation from U.S. Composting Council.

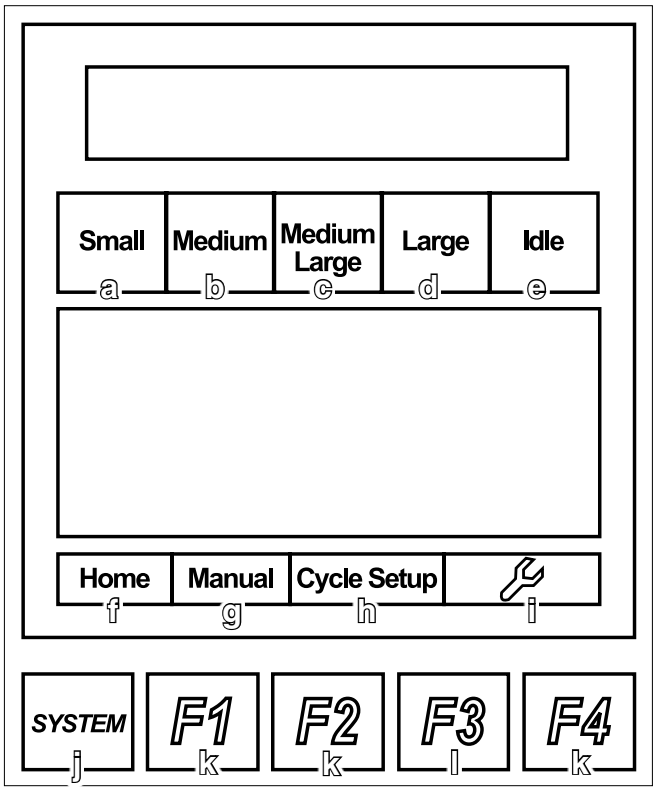


FIG. 16 CONTROLLER SCHEMATIC



FIG. 17 TEMPERATURE GAUGE (TYPICAL)

Generally the second section of each composter is equipped with a temperature gauge. An additional gauge can be installed in sections 3, 4 or 5 to provide more information on the temperature profile in the complete machine.

4.11.1 STARTUP & COMPUTER CONTROL BOX PROGRAMMING

Each operator should read the controller operator's manual to learn how to program controller and how it works. Basically the controller requires that the operator/customer sets the time and date, cycles, start and finish times plus idle times.

Review and follow these steps to program the controller and start using the composter:

1. Review the controller schematic from the previous section to understand the names and functions of the controllers.



FIG. 18 CONTROLLER

2. Turn power on at the master panel to provide power to the controller. The green "Power Present" light will be illuminated.



FIG. 19 POWER PRESENT

3. Turn the system switch to its ON position and wait for the OCS to appear.



On



OCS

FIG. 20 SYSTEM SWITCH

4. Touch the 'System' switch to go to the Home screen.



System



Home

FIG. 21 HOME SCREEN

5. Touch 'Cycle Setup" switch to go to the Networks screen.



FIG. 22 NETWORKS

6. Touch the DOWN cursor key to move down to "Set Time/Date" line.

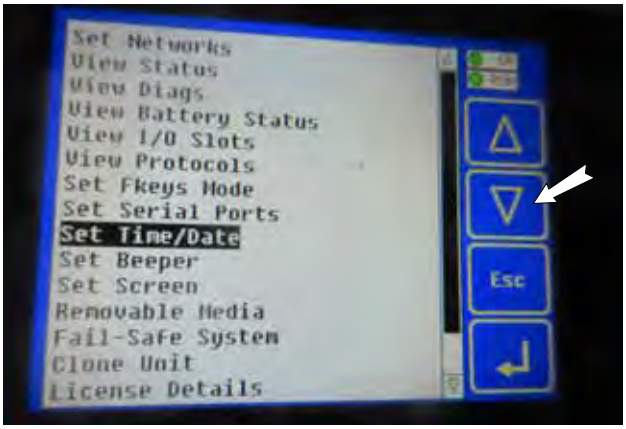


FIG. 23 SET DATE AND TIME

7. Touch ENTER ↵ switch to go to time and date screen.

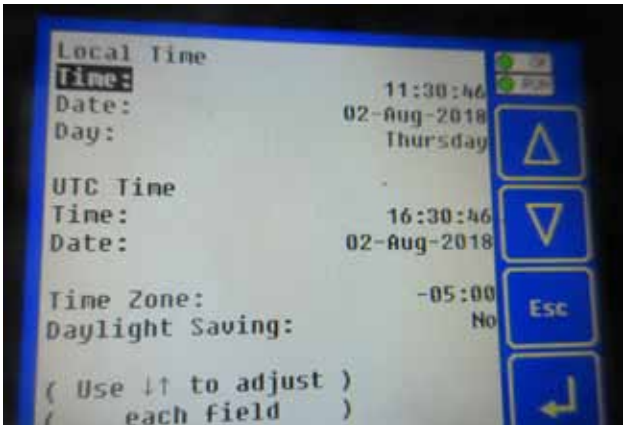


FIG. 24 DATE/TIME SCREEN

8. Touch ENTER ↵ switch to go to the adjusting screen.



Time



Date

FIG. 25 TIME AND DATE

9. Touch ESC to return to HOME screen after the time and date have been set.



FIG. 26 HOME SCREEN

10. Touch the SMALL switch to 'Global Settings' screen.



Fan OFF

11. Touch the FAN OFF switch to turn the Fan ON.



Fan ON

FIG. 27 GLOBAL SETTINGS

12. Touch the "Small" switch to go the the Small Group Settings screen.



FIG. 28 SMALL GROUP SETTINGS SCREEN

13. Touch the DAYS switch to set the number of days. Use the keyboard or cursor buttons to set.



FIG. 29 SETTINGS

14. Touch ENTER to to input days into the memory and return to the Small Group Settings screen.



Screen

15. Touch BATCHES PER DAY switch to go to the adjusting screen. Use the key pad or cursor keys to set.



Adjusting

FIG. 30 BATCHES PER DAY

16. Repeat the adjusting sequence to set Rotations per Batch and Fan Time to go to settings screen. Enter the appropriate data. Touch ENTER to return to Group settings screen.

NOTE

Divide the anticipated growth cycles into 4 sections (by days in each section). Enter the number of days into each of the SMALL, MEDIUM, MEDIUM/LARGE and LARGE group settings. At the end of each cycle, move the system to the next larger group and reprogram system.

As a general guideline, enter 2 batches per day and 2 rotations per batch. Increase these vales if required to improve composting function.



FIG. 31 SMALL SYSTEM SET

17. Touch the FAN TIME (min) switch to go to the fan Time Screen. Use the key pad or cursor keys to add, delete or change the fan times. It is recommended that the fan be set to run no longer than 14 minutes. In this way, the fan cycle will be completed before the drum rotation function starts. The system is designed to lock out the fan when the drum rotation takes place.

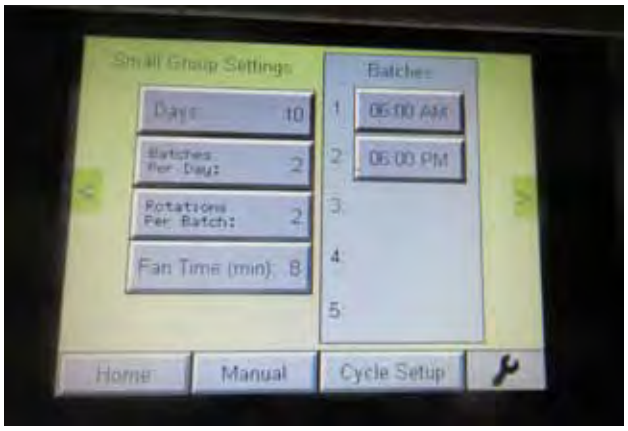
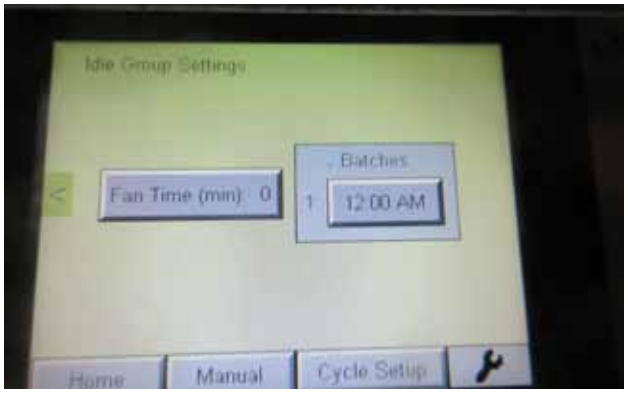


FIG. 32 FAN TIME

18. Touch the cursor key on either side of the group settings screen to change to a different screen or touch HOME to start over.



Medium



Large

FIG. 33 OTHER GROUP SCREENS

19. Touch the right cursor to reach the "Idle Group Settings" screen.

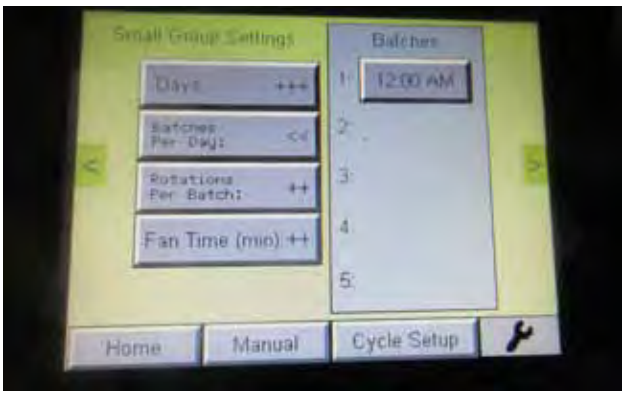
NOTE

Use this screen to set the fan when the unit is not being used. Typical times include between animal growing cycles when it is desirable to leave bulking in composter to prevent complete reloading when starting again.



Idle Group

20. Touch FAN TIME switch to go to adjusting screen. Use key pad or cursor keys to set time. Touch ENTER to return to Idle Settings screen.



Adjusting

FIG. 34 IDLE SETTINGS

21. Touch Manual Switch to go to Drum Manual Operation.

22. Screen shows drum and fan status and number of rotations per drum.

    a. Touch the appropriate switch to select the number of drum rotations.

    b. Turn fan OFF. Fan should not run when drum is rotating to prevent material from getting into the snorkel tube.



Fan OFF



Fan ON

FIG. 35 MANUAL OPERATION

23. Touch HOME to return to Home screen.

24. Touch and hold F3 for 5 seconds to go to Fan Operating Times System.

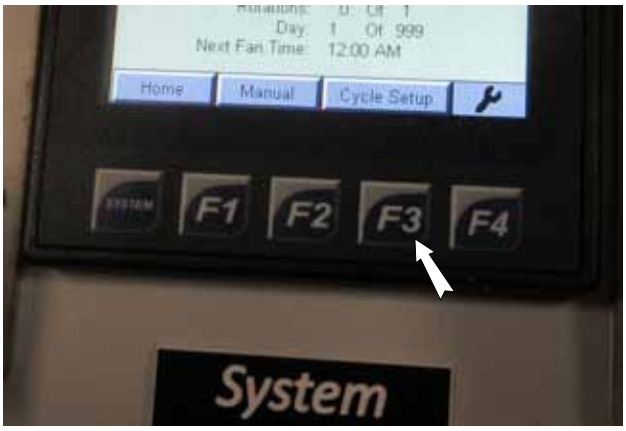


FIG. 36 F3

26. The Password screen will come up.



Password

27. Touch the PASSWORD switch and the adjusting screen will appear.

28. Enter the password TRIFORM with the key pad.



Adjusting

FIG. 37 PASSWORD SCREEN

29. Touch the ENTER key to go to fan timer screen.

30. Touch the line that requires changing to go to the adjusting screen.

NOTE

There are 24 lines to run fan once every hour of each day. The controller comes from the factory set to run for 15 minutes per hour. In most instances, this ets the fan to run too much and needs to be run less.

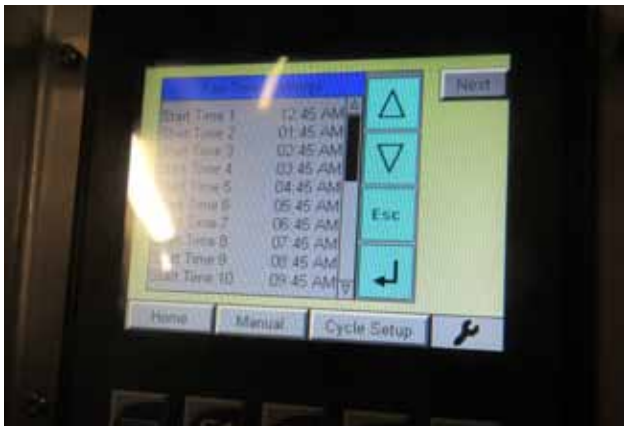


FIG. 38 FAN TIME SCREEN

31. Return to the HOME screen.

32. Contact your Tri-Form representative if you have any more questions about programming the controller.

4.12 COMPOSTER PREPARATION

The machine must be properly prepared and set prior to use. Be sure that the following items have been done.

1. **Electrical:**
   Use only a licensed electrician to provide power to the machine controller and air exhaust system. Be sure to follow all local wiring codes and ANSI/NFPA 70 Wiring Standard. Route the power lines so they do not interfere with the operation and maintenance of the machine. 240 volt, single phase power is required. A 25 amp fuse is recommended in the master panel.

2. **Training:**
   Establish a lock-out policy for your work site and train everyone in how it is implemented. Do not allow anyone to operate the machine or on the work site unless they follow the tag-out policy.

3. **Level Surface:**
   Be sure that the base is supported equally and the frame is on a firm base/surface (concrete is recommended). Mount or lag to a suitable foundation or stand. It is recommended that there be a 2 meter (6 foot) clearance zone on all sides of the machine for cleaning and maintenance procedures.

4. **Compost Material Flow System:**
   Review the need to bring bulking material and animal mortality to the loading and re-bulking doors. Provide a system to bring it to the machine, store it and place in the doors. Also, plan for a system to remove composting material from the discharge. A plywood barrier around the discharge is recommended. It is useful to have one or more storage bins to cure the compost after it is discharged from the composter.

   Keep working area neat and clean to prevent slipping or tripping.



FIG. 39 LEVEL SURFACE (TYPICAL)



Bulking - Loading



Discharge - Common Installation

FIG. 40 MATERIAL FLOW (TYPICAL)

4.13 OPERATION

OPERATING SAFETY

- Read and understand the Operator's Manual and all safety signs before operating, maintain-ing, adjusting or repairing the Composter.
- Turn machine OFF, shut down and lock out power supply (safety lockout devices are avail-able through your Tri-Form Poly Inc. dealer parts department) and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.
- Wear appropriate Personal Protective Equipment (PPE).
- Always wear the appropriate safety gear to protect yourself including but not limited to face shield, protective clothing, respi-rator and rubber gloves. Do not take chances with the safety of yourself or others.
- Install and properly secure all guards and shields before operating.
- Keep hands, feet, hair and clothing away from all moving parts.
- Clear the area of bystanders, especially small children, before starting.
- Make sure all control switches are in the off position before connecting power supply.
- Before supplying electrical power to the machine, be sure that you have adequate amperage at the proper phase and voltage to run it. If you do not know or are unsure, consult a licensed electrician.
- Keep the working area clean and dry.
- Review safety instructions annually.

Follow this procedure when using the Ecodrum™ Composter:

1. Review Section 4.4 to determine the required model of composter for your operation.
2. Review Section 4.6 Machine Preparation and follow all the instructions.
3. Review and follow the pre-operation checklist (See Section 4.4).
4. Review the location and function of all controls (See Section 4.5) and how to program them.
5. Be sure the Ecodrum™ Composter is positioned to allow access for loading, bulking, removing and storing the compost material.



FIG. 41 MACHINE (TYPICAL)

6. Initial setup:

   a. Turn composter off, unplug power cord and lock-out tag-out master power panel.

   b. Bring bulking material and organic material to the ladder assessing the loading door.

   c. Check and verify that all the hinges and latches are working and in good condition.



Hinges



Latches

FIG. 42 DOOR

   d. Open the loading door and rest it against its support.



Open

   e. Cover the bottom of the Ecodrum™ with 12 to 18 inches (300 to 450 mm) of dry wood shavings (or another equivalent bulking material) from the drive end to at least 6 feet (2 m) past the loading door.

   f. Moisten the shavings under the loading door slightly to encourage bacterial growth.

NOTE

This is the only time water should ever be added.



Bulking

FIG. 43 LOADING

g. Add the organic material.

h. Cover the orgaincs with another 6 to 12 inches (150 to 300 mm) of dry wood shavings or equivalent.

i. Clean all the door sealing area to prevent any interference.

j. Close and secure the latches.

IMPORTANT

Damage to the door and hinges can occur if the latches aren't closed and secured with their retainers.

k. It is recommended that the Ecodrum™ be ro-tated only once per day for the first 7 days to allow composting activity to begin.

l. Additional organics may be added during this time.

m. When the operating temperature reaches 131° F or higher, go to the regular operating procedure.

NOTE

For other operating conditions, contact your Ecodrum™ representative for assistance.



FIG. 44 CLOSED



FIG. 45 TEMPERATURE

7. **Starting:**
The composter is designed to operate on its own without an operator in attendance. Both the drum turning and the blower in the air-exhaust system are controlled by the times set by the modules in the control box. After the initial setup loading has been completed and the composting temperature reached, the controller should be placed it's AUTO mode to operate the unit. Be sure to program the drum rotate and air exhaust per the recommenda-tions in the best practices and in consultation with your dealer and Ecodrum™ representative.

8. **Stopping:**

   a. Wait until the composter drum has stopped turning and the loading and re-bulking doors are on top.

   b. Turn the drum rotation and fan switches off.

   c. Unplug the power cord and lock-out tag-out master power panel if performing any service or maintenance work.

9. **Emergency Stopping:**
Turn all switches off and unplug power cord if an emergency occurs. Correct emergency condition before resuming operation.

10. **Loading:**
Material needs to be placed into the composter through either the loading or re-bulking doors at various times. Each application has its own set of conditions that must be satisfied for the composter to operate effectively and efficiently. Better results are obtained when the organics are loaded daily rather than loading them every few days. Loading daily provides the best results.

    When loading follow this procedure:

    a. Allow the drum to turn until the loading and re-bulking doors are on top.

    b. Place the drum control in its off position.

    c. Bring the organics and bulking mate-rial to the composter.

    d. Unlatch and open the loading or re-bulking doors as appropriate.



Machine (Typical)



Control Box

FIG. 46 STARTING/STOPPING



FIG. 47 DRUM CONTROL

e. Place the organics or bulking material in the composter per the recommended bulking ratios defined in section 4.8.

IMPORTANT

Do not deviate from the bulking ratio recommendations to insure complete composting of the organic material.

f. Place half the recommended bulking in the composter.

g. Place the organics into the composter on top of the first half of the bulking material.

h. Place the last half of the bulking material on top of the organics.

i. Close and secure the door(s).

j. Place the drum control into its AUTO mode to resume work.



Loading



Re-Bulking

FIG. 48 DOORS

11. **Temperature Gauges:**
Temperature is a critical indicator of the aerobic reaction in the composter. The desired temperature range is between 131° and 161° F. Each drum section can be equipped with a temperature gauge to allow monitoring the temperature along the full length of the composter.

Outside ambient extremes of hot or cold temperatures requires the operator to monitor the gauges closely.

Refer to the Troubleshooting Section for suggestions when observing temperatures outside of the suggested range.



FIG. 49 TEMPERATURE GAUGES (TYPICAL)



Top



2 Sides

FIG. 50 ENCLOSURES (TYPICAL)

12. **Overloading:**
Although the Ecodrum™ composter is designed with a large capacity, it can be overloaded. Overloading becomes apparent when lumps or clumps appear in the discharge.

Always place the lumps or bumps back into com-poster for additional composting.

A list of items to reduce the chance of overloading include but is not limited to:

a. Reduce the amount of organic material being loaded at any one time to prevent overloading.

b. Increasing the turn cycles/day will also in-crease the composting rate.

c. Maintain the temperature of the mixture be-tween 131° and 160° F continuously for 3 days per recommendation from U.S. Composting Council.

In cases where the size of the operation has in-creased, it may be necessary to increase the size of the composter or add another unit.



FIG. 51 DISCHARGE (TYPICAL)



FIG. 52 TEMPERATURE GAUGE

13. **Information:**
Ecodrum™ composter follows the general guide-lines provided by the US Composting Council Standards. Always refer to these guidelines if you have any questions.

15. **Sampling:**
Maintain the temperature in the composter at 131° F continuously for 3 days per recommendation from U.S. Composting Council to kill all pathogens, weed seeds and viruses. To verify that the pathogens have been eliminated, testing companies are available to evaluate the discharge mixture and send a report verifying that all the pathogens, weed seeds and viruses have been eliminated. A sample print-out is provided in the appendix. Work with your dealer and the Ecodrum™ representative to determine which testing agency is closest to you for the test.

Follow the procedure when taking a sample:

a. Go to the storage bin where the mixture has cooled.



FIG. 53 BINS (TYPICAL)

b. Wearing latex gloves, use the scoop to take an approximately 1 quart sample of the mixture from the centre of the pile.

c. Place the sample in a zip lock bag. Remove the air and zip lock the bag.

d. Place the bag in another zip lock bag. Remove the air from the bag and zip lock the bag.

e. Contact Ecodrum™ for a copy of the Compost Sample Submitted form to go with the sample.

f. Place the sample and form into a USPS Priority Mail small flat rate box for shipping.



FIG. 54 SAMPLING SCOOP (TYPICAL)

Contact your dealer or Ecodrum™ representative if you have any questions about the report.

16. Snorkel:

The air exhaust system is designed with a tube that is mounted inside the composter drum to pull air out of the system and is called the snorkel. A sleeve in the loading end of the drum holds the snorkel tube at an angle to minimize the chance of organics or bulking material falling into the exhaust system. Always mount it at a 30° angle from vertical per the schematic.

Remove the top hose clamp on the tube and use a shop vacuum to remove all the debris from the snorkel. Use a stiff wire to dislodge any debris stuck to the tube. Clean weekly to prevent debris from restricting the air flow through the system.

IMPORTANT

It is the responsibility of the customers to load safely.



FIG. 55 OPEN DOOR (TYPICAL)



Tube



Schematic



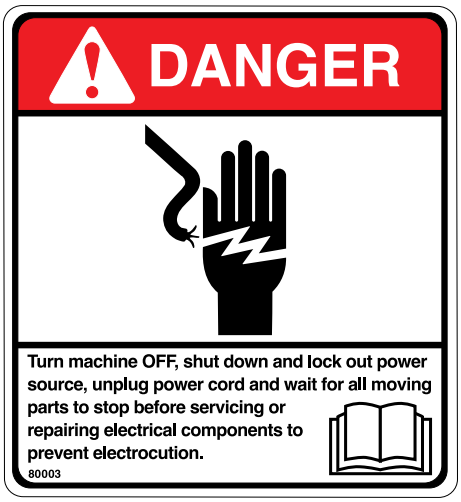
Installed

FIG. 56 SNORKEL

17. **Control Box Fuses (Automatic Version):**
Each control box is designed with fuses to protect their electrical systems from shorts or overloads. Check the integrity of the fuses by pulling their mounting frames forward and down to expose the fuses.

Check the integrity of each fuse and replace with a genuine Ecodrum™ replacement part if blown. Always check the fuse if there is an electrical problem with the unit.

Close fuse mounting frame.





Control Box



Door Open



Fuses Down

FIG. 57 CONTROL BOX FUSES

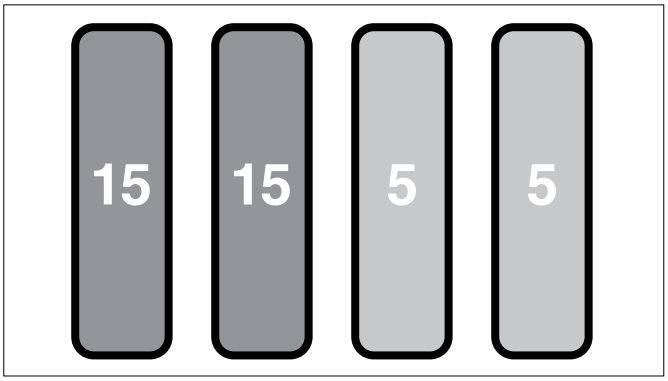
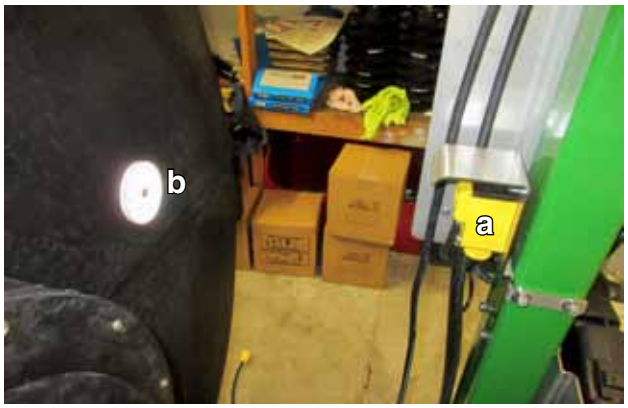


FIG. 58 FUSE SIZES (AMPS)

18. **Drum Position Control:**
Each composter is designed to rotate to mix and aerate the composting material in the drum. These rotations are actuated per the programming in the control boxes. The system is designed to stop at a pre-set point in the rotation that places the door(s) at the top of the drum for loading and bulking.

A photo sensor and reflector are used to determine the position of the drum when the door(s) are on the top. When activated, it will stop the turning or rotating function.

Clean the reflector and photo sensor if they get dirty with window cleaner and maintain the electrical integrity of the system.



a. Photo Sensor b. Reflector

FIG. 59 DRUM POSITION CONTROL

4.14 STORAGE/CLEANING

STORAGE SAFETY

- Store the Ecodrum™ Composter on a firm level surface.
- If required, make sure the unit is firmly blocked up.
- Make certain that all door latches are secured with their lock pins before storing.
- Store away from areas of human activity.
- Do not allow children to play on or around the stored Ecodrum™ Composter.
- Unplug power cord and lock out power by turning off master control panel and padlocking the door shut to prevent electrocution or unauthorized start up of the Ecodrum™ Composter.

4.13.1 PLACING IN STORAGE

The machine should be thoroughly inspected and prepared for storage. Repair or replace any worn or damaged components to prevent any unnecessary down time at the beginning of the next season. Follow this procedure:

1. Clean the inside of the composter by:
    a. Run composter until all material is discharged.
    b. Load 4 bags of bulking into the loading door and close door.
    c. Set the controls for the drum to continuous run mode.
    d. Run until all clean bulking comes out of the discharge.
2. Turn the power OFF at the master electrical panel and lock out.
3. Unplug and remove power cord from machine.
4. Use a shop vacuum to thoroughly clean the outside of the frame, drum, drives, doors, discharge outlet and air exhaust system.
5. Thoroughly wash the machine using a pressure washer to remove all dirt, mud, debris or residue from the outside of the machine.
6. Inspect the electrical cords, lines, junction boxes and motor. Tighten any loose connections. Replace any cord that is badly cut, nicked or abraded. Replace any damaged components.
7. Check all rotating parts for entangled material. Remove.



FIG. 60 STORED (TYPICAL)

8. Touch up all paint nicks and scratches to prevent rusting.

4.13.2 REMOVING FROM STORAGE

When preparing to use the machine at the start of the season, follow this procedure:

1. **Check**
    a. Electrical systems and components.
    b. Drum, rollers, drive system, air exhaust system, door and rollers.
    c. All hardware. Tighten as required.
2. Replace any defective components.
3. Go through the pre-operation checklist (Section 4.5) before starting.

5 SERVICE AND MAINTENANCE

MAINTENANCE SAFETY

- Read and understand all the information contained in the Operator's Manual regarding operating, servicing, adjusting, maintaining and repairing.
- Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Ecodrum™ dealer parts department), relieve hydraulic pressure and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.
- Make sure all guards and doors are in place and properly secured when operating the Ecodrum™ Composter.
- Follow good shop practices:

- Keep service area clean and dry.
- Be sure electrical outlets and tools are properly grounded.
- Use adequate light for the job at hand.

- Do not work on Ecodrum™ Composter electrical system unless the power cord is unplugged or the power supply is locked out. Lock-out tag-out power source before performing any maintenance work.

5.1 SERVICE

5.1.1 FLUIDS AND LUBRICANTS

1. **Grease:**
   Use an SAE multi-purpose high temperature grease with extreme pressure (EP) performance rating meeting or exceeding the NLGI #2 rating for all requirements.

2. **Gearbox Oil:**
   The gearbox must be filled with ISO 320 gear oil or equivalent for all operating conditions. Oil level should always be above the red dot in the sight glass.

   Gearbox capacity:

Model 260, 360	120 gearbox	2.6 liter	(2.7 US qt)
Model 460, 560	135 gearbox	4.6 liter	(4.8 US qt)

NOTE

Change oil after operating for 100 hours when machine is new. Then change gearbox oil annually.

3. **Roller Chain Lubrication:**
   Use a standard spray lubricant for all operating conditions.

4. **Storing Lubricants:**
   Your machine can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture and other contaminants.

5.1.2 GREASING

Refer to Section 5.1.1 for recommended grease. Use the Maintenance Checklist provided to keep a record of all scheduled maintenance.

1. Use only a hand-held grease gun for all greasing. Air powered greasing systems can damage the seals on bearings and lead to early bearing failure.

2. Wipe grease fitting with a clean cloth before greasing to avoid injecting dirt and grit. Replace grease fitting cap after greasing.

3. Replace and repair broken fittings immediately.

4. If a fitting will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.

5. **Bearings:**
   Only sealed bearings are used on the Composter. Sealed bearings should never be greased more often than every 3 months. Do not over-grease. Do not give bearing more than 2 shots of grease each time it is greased. (Once the bearing seal is broken, the bearing must be greased each day or the bearing will fail.).

5.1.3 SERVICING INTERVALS

Weekly

1. Clean air exhaust hose and snorkel by removing hose clamps.

WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.



Top Clamp



Bottom Clamp



Tube



Schematic

FIG. 61 AIR EXHAUST SNORKEL SYSTEM (HOSE CLAMPS)

2. Inspect electrical system and all components.



Control Box



Photo Cell



Exhaust Motor

FIG. 62 ELECTRICAL SYSTEM

3. Clean up work area to prevent tripping or slipping.



Door



Left



Right



Discharge

FIG. 63 CLEANING (TYPICAL)

Monthly

1. Check oil level in gearbox. Top up as required.



FIG. 64 SIGHT GLASS (TYPICAL)

2. Grease 1½" bearing on drum rotation drive rolls with 2 shots of grease.



FIG. 65 1½" BEARING (TYPICAL)

3. Check rubberized rollers for unusual surface wear.

NOTE

Call Ecodrum™ representative for help if you have any questions.



Left Side



Right Side

FIG. 66 RUBBERIZED ROLLERS (TYPICAL)

Quarterly or Every Three Months

1. Lubricate guide wheel bearing with 2 shots of grease.



FIG. 67 GUIDE WHEEL (TYPICAL)

2. Oil drive system roller chain by removing end guards and using spray lube.

⚠ WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.



End Guard (Typical)



Right Side



Left Side

FIG. 68 OILING ROLLER CHAIN

3. Check roller chain tension and alignment.



Tension



Alignment

FIG. 69 ROLLER CHAIN

WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.

Annually

1. Change gearbox oil.
   a. Sight glass.
   b. Drum plug.
   c. Fill plug.
   d. Fill/breather plug.
   e. Drain plug.

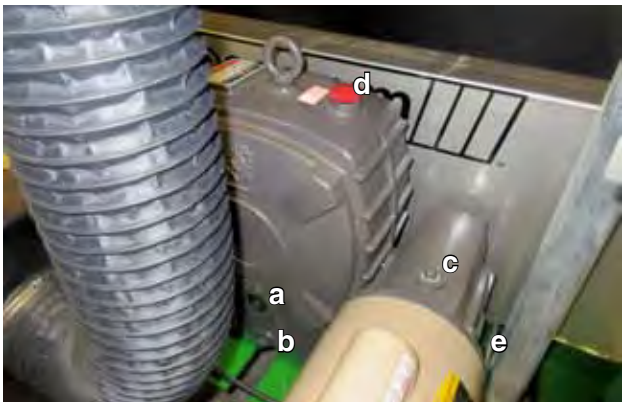


FIG. 70 DRIVE GEARBOX

5.1.4 SERVICE RECORD

See Lubrication and Maintenance sections for details of service. Copy this page to continue record.

ACTION CODE: CL CLEAN G GREASE CK CHECK
CH CHANGE

MAINTENANCE																	
HOURS																	
SERVICED BY																	
Weekly																	
CL Air Exhaust Hose & Snorkel																	
CK Electrical System & All Components																	
CL Work Area																	
Monthly																	
CK Oil Level in Gearbox																	
G 1½" Bearing - Drum Rotation Guide																	
CK Rubberized Rollers																	
Quarterly or Every 3 Months																	
G Guide Wheel Bearing																	
G Drive System Roller Chain																	
CK Roller Chain Tension & Alignment																	
Annually																	
CH Gearbox Oil																	

5.2 MAINTENANCE

By following a careful service and maintenance program on your machine, you will enjoy many years of trouble-free use.

5.2.1 ELECTRICAL SYSTEM INSPECTION

Electricity provides power to the motors driving the machine. To maintain the integrity of the system and provide a safe working environment for the operator, it is important that a daily inspection be done to make sure that all systems and components are in good working condition. To provide a safe working environment, have a licensed electrician provide power to the machine.

When inspecting the electrical system and components, follow this procedure:

1. Place all controls in the OFF or neutral position.

2. Turn power OFF at the master panel and lock-out before starting the inspection.

IMPORTANT

Do not operate the machine unless the master panel is equipped with a lock-out device. Always engage lock-out device before performing any maintenance work. Lock-out devices are available from your dealer or the factory.

3. Inspect all electrical components looking for:

   a. Damaged plugs.

   b. Frayed wires.

   c. Cut or cracked insulation.

4. Replace any damaged components immediately.

5. Be sure all components are grounded.

6. Be sure there is no water or moisture in any junction box or enclosure. Dry the components before turning power on. Be sure that all compartments seal properly when closed.



a. Fan b. Drive c. Control Box

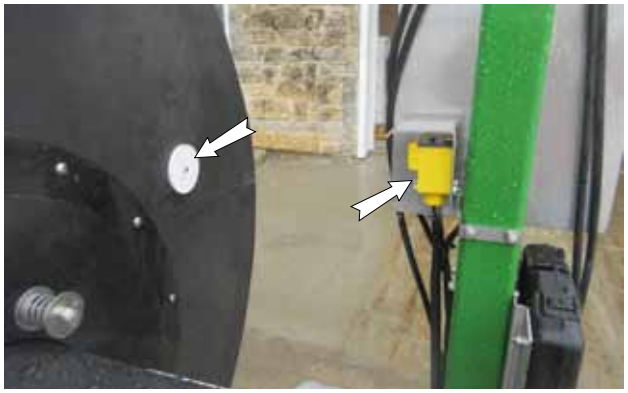


Photo Cell



Door Open

FIG. 71 ELECTRICAL COMPONENTS (TYPICAL)

5.2.2 GEARBOX OIL

Drum rotation is driven by an electric motor through a high reduction ratio gearbox. The gearbox is equipped with a sight glass, drain plug, fill plug and breather. Every month, the oil level should be checked. Annually, the oil should be replaced. Check more frequently if there are leaks around any of the plugs or shaft seals.

When checking oil level or changing oil, follow this procedure:

1. Run the machine until the gearbox is warm. Warm oil will remove more contaminants than cold, stagnant oil.

2 Turn machine OFF, shut down and lockout power supply and wait for all moving parts to stop before servicing, adjusting, maintaining, repairing or cleaning. (Safety lockout devices are available through your Ecodrum™ Composter dealer parts department).

   a. Sight Glass.

   b. Drain plug.

   c. Fill plug.

   d. Fill/breather plug.

   e. Drain plug.

3. **Checking Oil Level:**

   a. Observe the red dot in the sight glass.

   b. When the oil is above or covers the red dot, it is at the correct level.

   c. If required, add oil through the fill or breather plug.

   d. Reinstall and tighten breather or fill plugs.

4. **Changing Oil:**

   a. Place a container under the drain plug.

   b. Remove the drain (2 plugs), fill and breather plugs.

   c. Allow 10 minutes for oil to drain.

   d. Reinstall and tighten drain plugs.

NOTE:
It may be necessary to add teflon tape or pipe sealant to the drain plug threads prior to installation to prevent leakage.

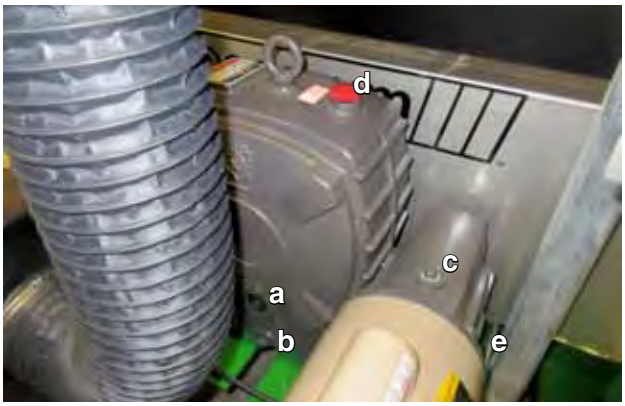


FIG. 72 DRIVE GEARBOX

   e. Add new gear oil. Use the sight glass to determine the correct amount of oil.

   f. Add 2 liters of oil into d and 0.7 liters through c for model 120 gearbox.

   g. Add 4 liters of oil into d and 0.6 liters through c for model 135 gearbox.

   h. Check to make sure the air passage through the breather plug is open.

   i. Reinstall and tighten the fill and breather plugs.

   j. Dispose of the used oil in an environmentally safe manner.

5. **Cleaning Breather:**

   a. Remove breather plug from gearbox.

   b. Inspect vent passage.

   c. If plugged, soak in solvent overnight (plug hole to prevent dirt entering gearbox).

   d. Use a high-pressure air hose to blow debris out of passage. Carefully use a probe to clear the passage if caked in dirt.

   e. Reinstall and tighten breather plug.

IMPORTANT
Always clean the breather if any leaks are noticed around the shaft seal.

5.2.3 DRIVE CHAIN TENSION, ALIGNMENT OR REPLACEMENT

A roller chain is used to transmit power to the rollers that rotate the composting drum. The tension and alignment of the drive chain and sprockets should be checked quarterly to insure proper function. Replace the drive chain when damaged or badly worn. To maintain drive chain, follow this procedure:

1. Place all controls in their OFF or neutral position.

2. Turn the power OFF at the master panel and lock-out.

3. Remove the cover over the chain drive system and lay to one side.

4. **Tension:**
   Chain is tensioned correctly when the center of the long span can be deflected 6 mm (1/4 inch) or 1 link can be rotated 30°. The chain should not skip sprocket teeth during start-up and normal operation.



FIG. 73 DRIVE SYSTEM

5. **Adjusting Tension:**
   Chain tension is adjusted using the idler sprocket position. To adjust chain tension, follow this procedure:

   a. Loosen idler sprocket mounting bolt(s).

   b. Slide the idler sprockets to the appropriate position to set the tension each chain.

   c. Check the sprocket alignment.

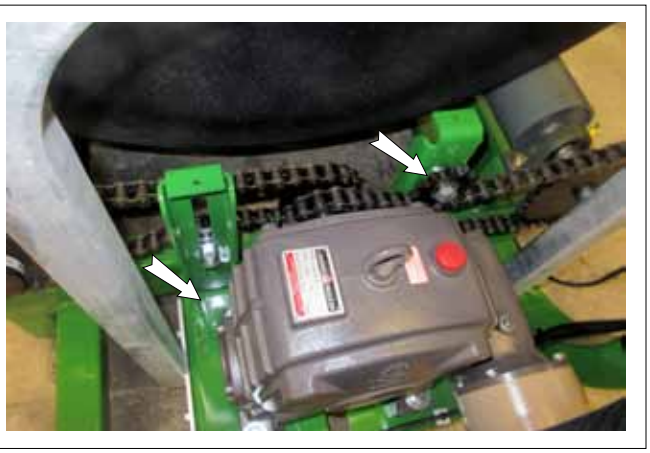


FIG. 74 IDLER SPROCKET

WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.

   d. Tighten the idler sprocket mounting bolt(s) to their specified torque.

   e. Install and secure guard over chain drive system.

6. **Chain Replacement:**

   a. Move idler sprocket into its loosest position.

   b. Remove chain connector link(s) and chain(s).

   c. Replace chain with genuine Ecodrum™ Composter replacement parts.

   d. Move idler sprockets as required to set chain tension.

   e. Check chain tension during the first 10 hours of operation and reset as required.

   f. Go to regular Service schedule as defined in Section 5.1.3.

7. **Alignment:**
   Always check and maintain sprocket alignment by laying a straight edge across the sprocket faces. Adjust if sprocket faces vary more than 0.7 mm (1/32 inch).

   To adjust sprocket alignment, follow this procedure:

   a. Lay a straight edge across sprocket faces.

   b. Determine which sprocket requires adjustment.

   c. Loosen sprocket hub set screw.

   d. Tap sprocket into the required position.

   e. Tighten sprocket hub set screw.

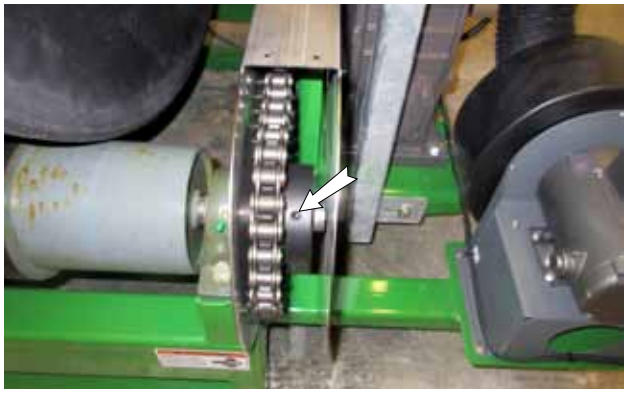
   f. Recheck alignment and readjust as needed.







Alignment



Right Sprocket Set Screw



Left Sprocket Set Screw

FIG. 75 SPROCKET ALIGNMENT (TYPICAL)

5.2.4 ROLLER CHAIN OILING

It is recommended that the roller chains in the drum turning drive system be oiled quarterly to obtain the expected performance and life. Time and the elements can affect the condition of the chain and shorten its life unless it is oiled on a regular basis.
To oil the chain, follow this procedure:

1. Place all the controls in their off position.

2. Remove the end covers of the chain drive system.

3. Turn the power on and place the drum control in its MANUAL mode.

4. Operate the system in the manual mode.

5. Use spray lube to lubricate the chain as the drive turns.

WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.

6. Turn the power off when lubricant has been applied to the entire length of each chain.

7. Install and secure the end covers.

8. Tighten fasteners to their specified torque.

9. Place control system back into its AUTO mode and resume work.



Cover Installed (Typical)



Right End



Left End

FIG. 76 CHAIN OILING

6 TROUBLE SHOOTING

The Tri-Form Poly Inc. Ecodrum™ Composter uses a large rotating drum to transform organic material into a compostable mixture. It is a simple system that works well with minimal maintenance.

In the following section, we have listed many of the causes and solutions to the problems that you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this trouble shooting section, please contact your local Ecodrum™ Composter dealer, distributor or the factory. Before you call, please have this Operator's Manual and the serial number from your machine ready.

PROBLEM	CAUSE	SOLUTION
Machine will not start/run.	No power.	Plug in power cord.
		Turn power on at master panel.
	Blown fuse.	Replace fuse in control box or master panel.
Lumps of material in discharge.	Moisture level too high.	Add bulking material in loading or re-bulking door.
		Increase bulking ratio for additional composting.
	Overloading composter.	Recycle material back through composter.
	Temperature too low.	Protect from cold ambient temperatures.
		Moisture level too high inside Ecodrum • Add bulking material. • Increase bulking ratio.
		Low oxygen level in compost. • Increase airflow. • Remove obstructions in air exhaust system.
Flies and maggots around composter.	Moisture level too high.	Add bulking material.
	Debris around composter.	Remove compost from discharge area.
		Keep work area clean.
Ammonia smell.	High nitrogen levels.	Add bulking material.
		Increase bulking ratio.
Drum does not stop rotating.	Dirty photo cell and reflector.	Clean photo cell and reflector.
	Burnt out photo cell.	Replace photo cell.
Temperature too low.	Material too wet.	Snorkel plugged. Clean snorkel system.
		Fan not working. Check fan system. Repair or replace as required.
Low temperature.	Cold ambient.	Reduce air flow through machine.
		Provide protection from temperature and wind by building a shed or enclosure around composter.

PROBLEM	CAUSE	SOLUTION
Low temperature.	High ambient.	Reduce airflow through machine.
		Reduce effect of shed or enclosure.
Cold composter temperature with cold ambient.	Composter temperature below 131° F.	Reduce airflow through machine.
		Provide protection from temperature and wind by building a shed or enclosure around composter.
Cold composter with high ambient temperature.	Composter temperature below 131° F.	Reduce airflow through machine.
		Reduce effect of shed or enclosure.
Hot composter with cold ambient.	Composter temperature above 161° F.	Increase airflow through machine.
		Reduce effect of shed or enclosure.
Hot composter with hot ambient.	Composter temperature above 161° F.	Increase airflow through machine.
		Provide protection from temperature and wind by building a shed or enclosure around composter.

7 INSTALLATION

The installation of the Ecodrum™ composter requires some advance planning and preparation to insure proper and efficient operation and results. Select an area where an enclosure can be constructed if required to minimize any weather effects from wind, rain and other elements - this is particularly important for colder climates as the compost temperature needs to be above at 131° F continuously for 3 days per recommendation from U.S. Composting Council for composting to occur. There are a wide variety of configurations acceptable for the composter. Review your specific application with your dealer and Ecodrum™ representative to establish the installation appropriate to fit your needs.

Review these items when preparing a location for the composter:

1. **Location:**
   Select an area with at least 5 feet of open space between the composter and any adjacent buildings or equipment. This space or clearance is required to provide access to all sides of the frame for loading, servicing or cleaning the machine.
   Also select the area where a shelter or enclosure can be added if appropriate. Shelters are appropriate for protection from cold weather, wind, rain and direct sun (hot temperatures).

   Space or clearance is also recommended on the loading side for equipment to bring both animal mortality and bulking to the loading and re-bulking doors. Space is also recommended at the discharge end that will allow for a loader or skid steer to remove the discharge and move it to storage bins for final composting and cool down.

   Position at storage bins next to the discharge to allow for discharge and curing. Refer to local regulations for use of composted materials.



Composter



Discharge



Storage

FIG. 77 LOCATION

2. **Foundation and Base:**
The base must be level and firm. Concrete is recommended to prevent any uneven support to the frame. Concrete is also very helpful in wet inclem-ent weather conditions.

Concrete provides a good base for both personnel and equipment under all environmen-tal conditions. A good foundation provides a good base when loading organic material or bulking at any time.



FIG. 78 CONCRETE BASE (TYPICAL)

3. **Shelves:**
Although steps are provided to access the loading and rebulking doors, positioning shelves or a table next to the ladder(s) to support organic material or bulking material when placing in the composter is very helpful.

Positioning a hoist, crane or loader to assist in lift-ing heavy organic material is recommended. Do not take chances with the safety and well-being of personnel with heavy weights and off-balance access.



Adjacent



Separate

FIG. 79 SHELVES (TYPICAL)

4. **Discharge:**
   Each discharge is equipped with a cone to move the compost away from the drum as it leaves the composter. It is recommended to place a piece of cut-out plywood around the cone to reduce the chance of compost falling back on the machine. The plywood also allows for the use of a loader or skid steer to remove compost from the discharge and move it to a storage bin.



FIG. 80 DISCHARGE CONE

5. **Storage Bins:**
   It is useful to have storage bins located close to the composter discharge area to minimize transport times.



Single Bin



3 Bins

FIG. 81 STORAGE BINS (TYPICAL)

6. **Power:**
Composter are designed to require single phase 240 volt power at 20 amps. Position the composter with access to this type of electrical service. Always have a licensed electrician provide power to your unit with fuses in the master power panel and a lockable power panel to prevent unauthorized operation.



FIG. 82 POWER PLUG (TYPICAL)

7. **Wind Direction:**
The exhaust fan is designed to pull dry air through the drum to control the moisture level in the mixture. Position composter to minimize the effect of ambient wind. Protect discharge if required.



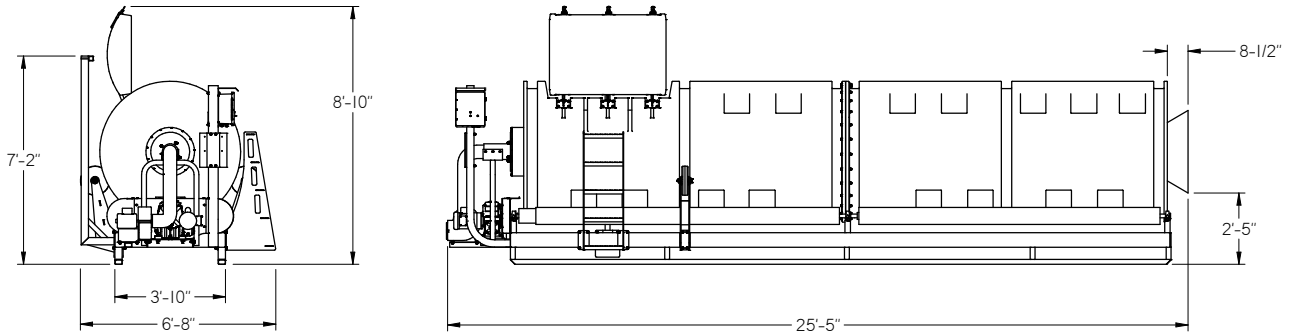
FIG. 83 DISCHARGE

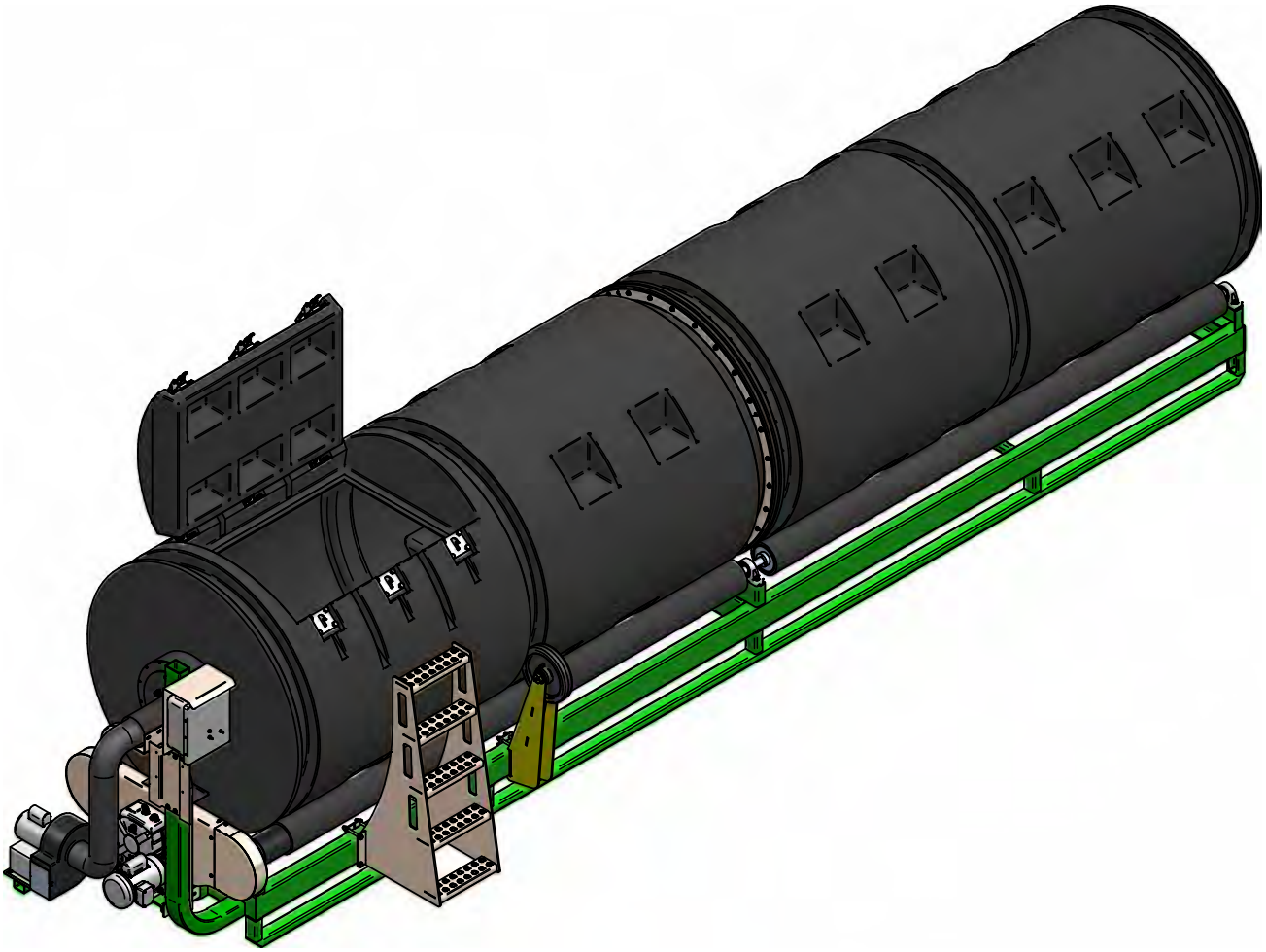
8 SPECIFICATIONS

8.1 MECHANICAL

Model	Length	Width	Height	Weight	Power Volts/ Amps
260	25' 5"	6' 8"	8' 10"	5000 lbs.	220/20
360	36' 6"	6' 8"	8' 10"	7000 lbs.	220/20
460	46' 9"	6' 8"	8' 10"	8500 lbs.	220/20
560	57' 11"	6' 8"	8' 10"	11000 lbs.	220/20

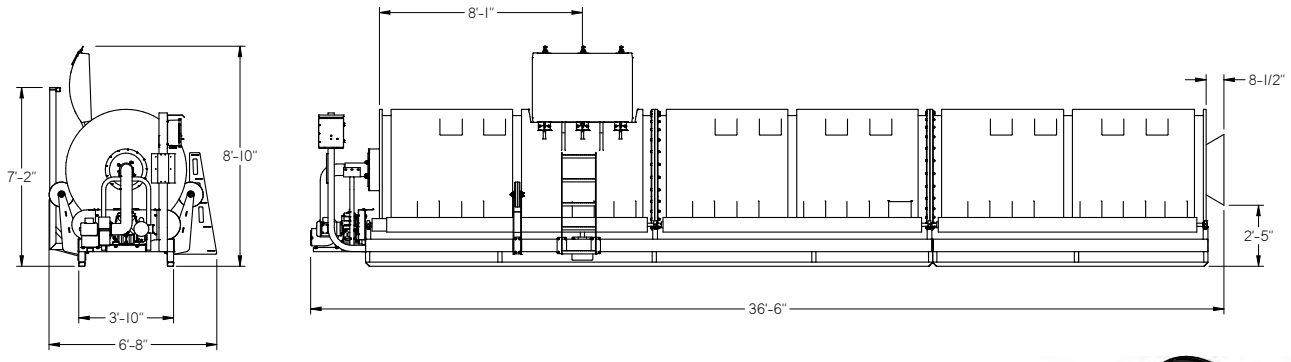
Model 260

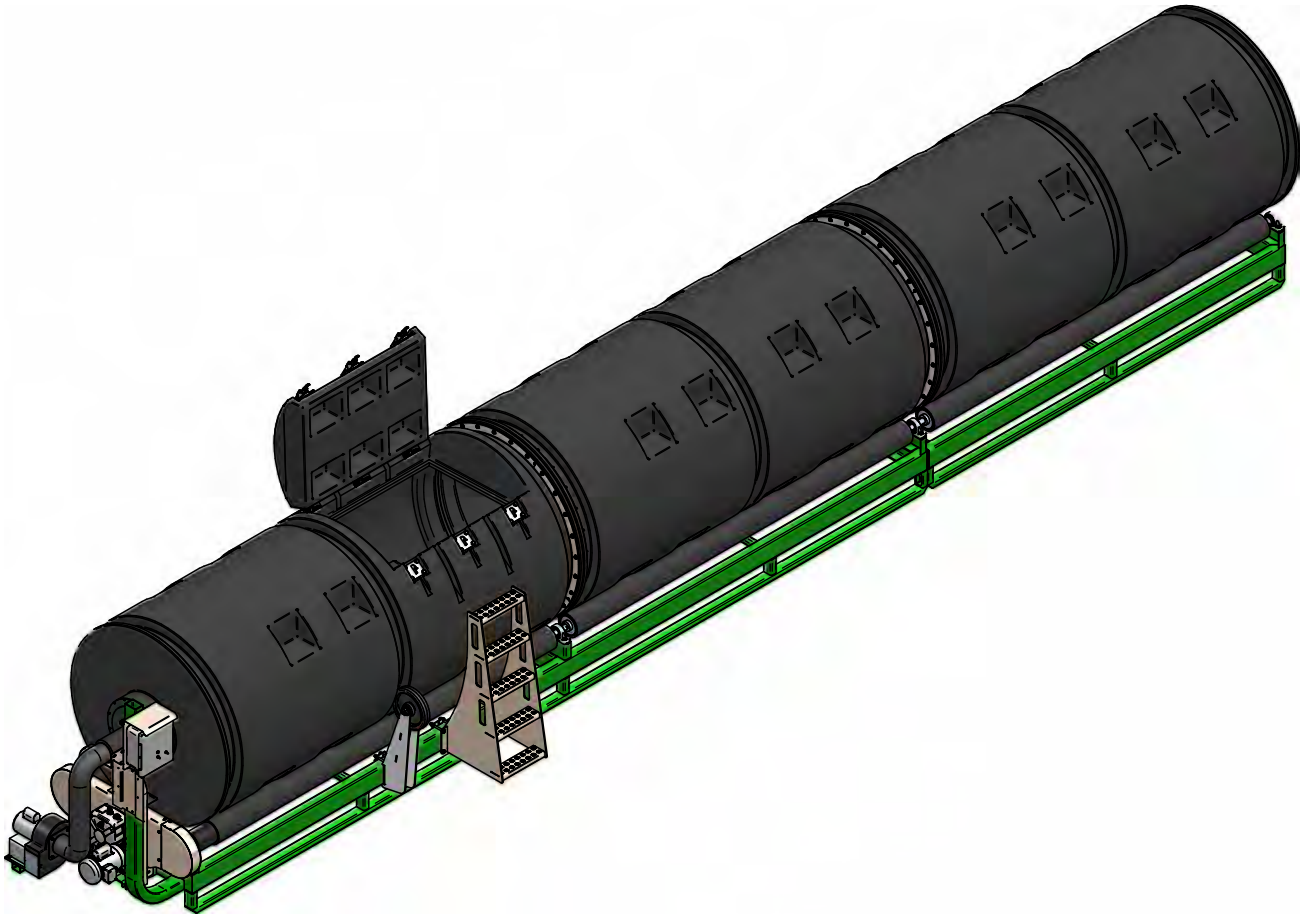




SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

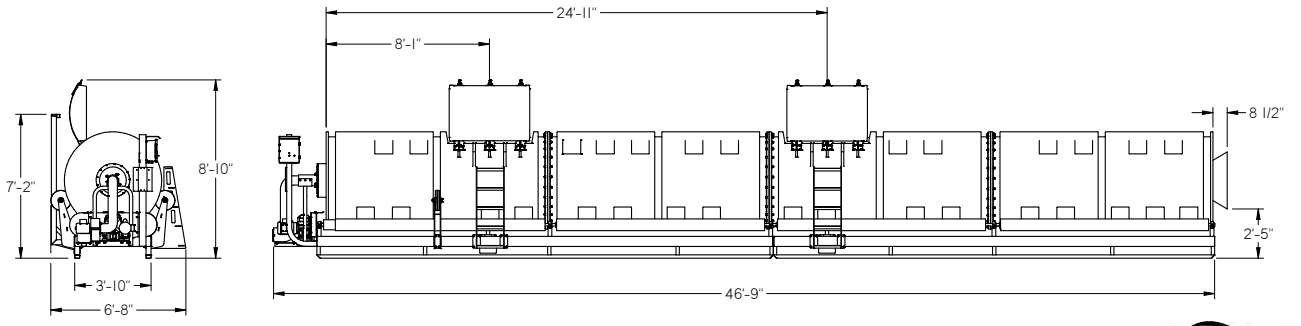
Model 360

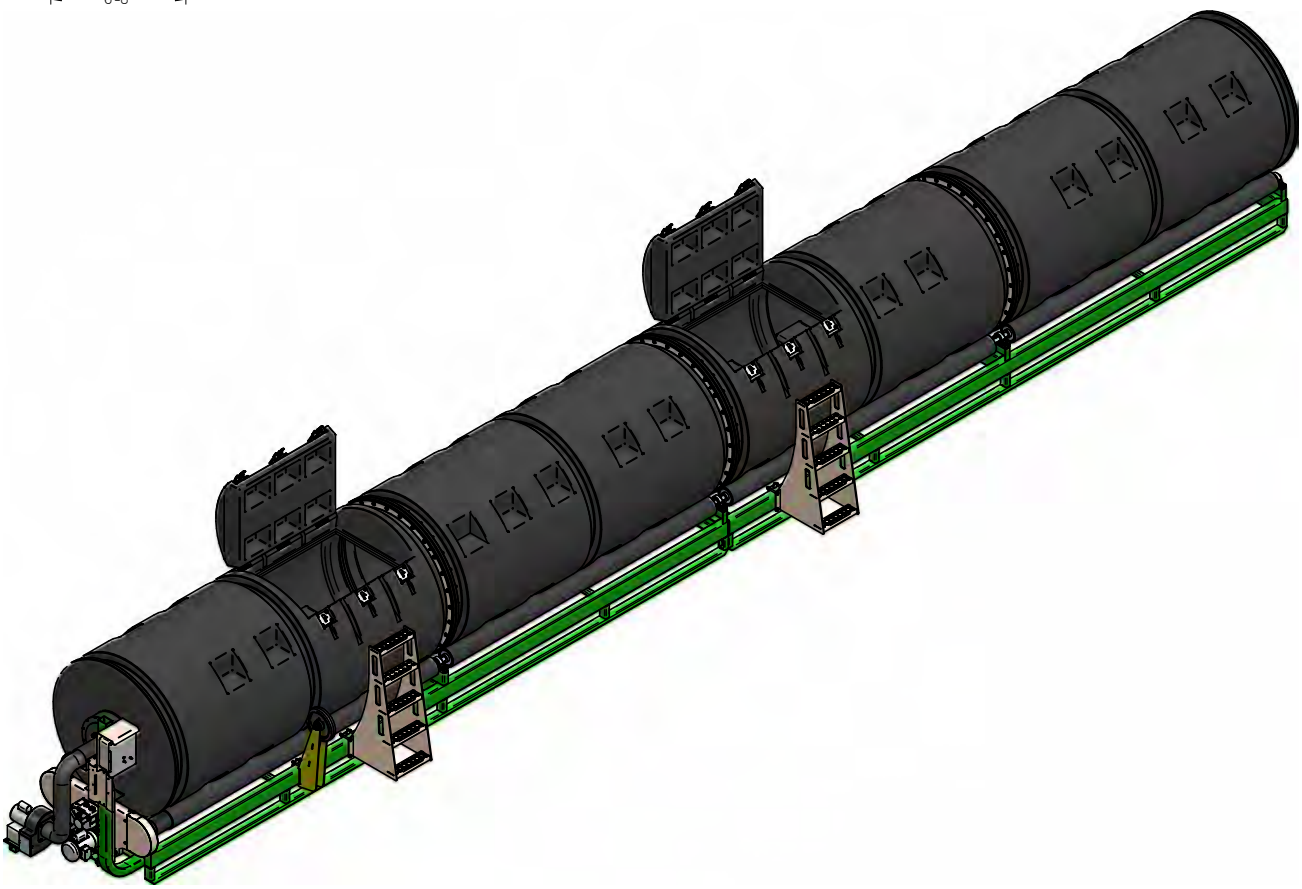




SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

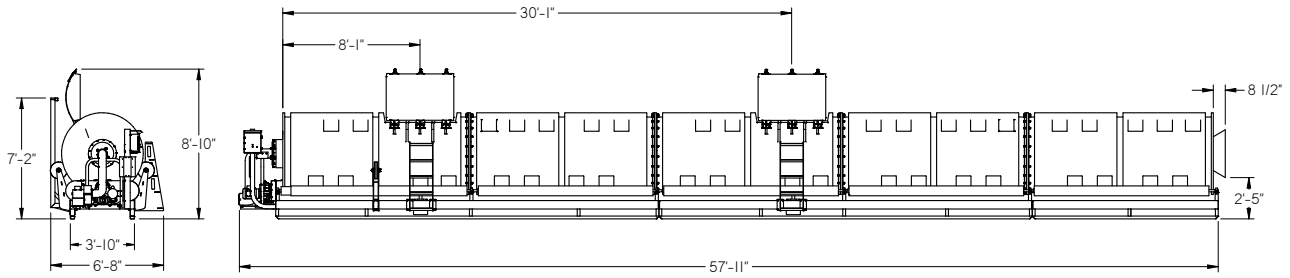
Model 460

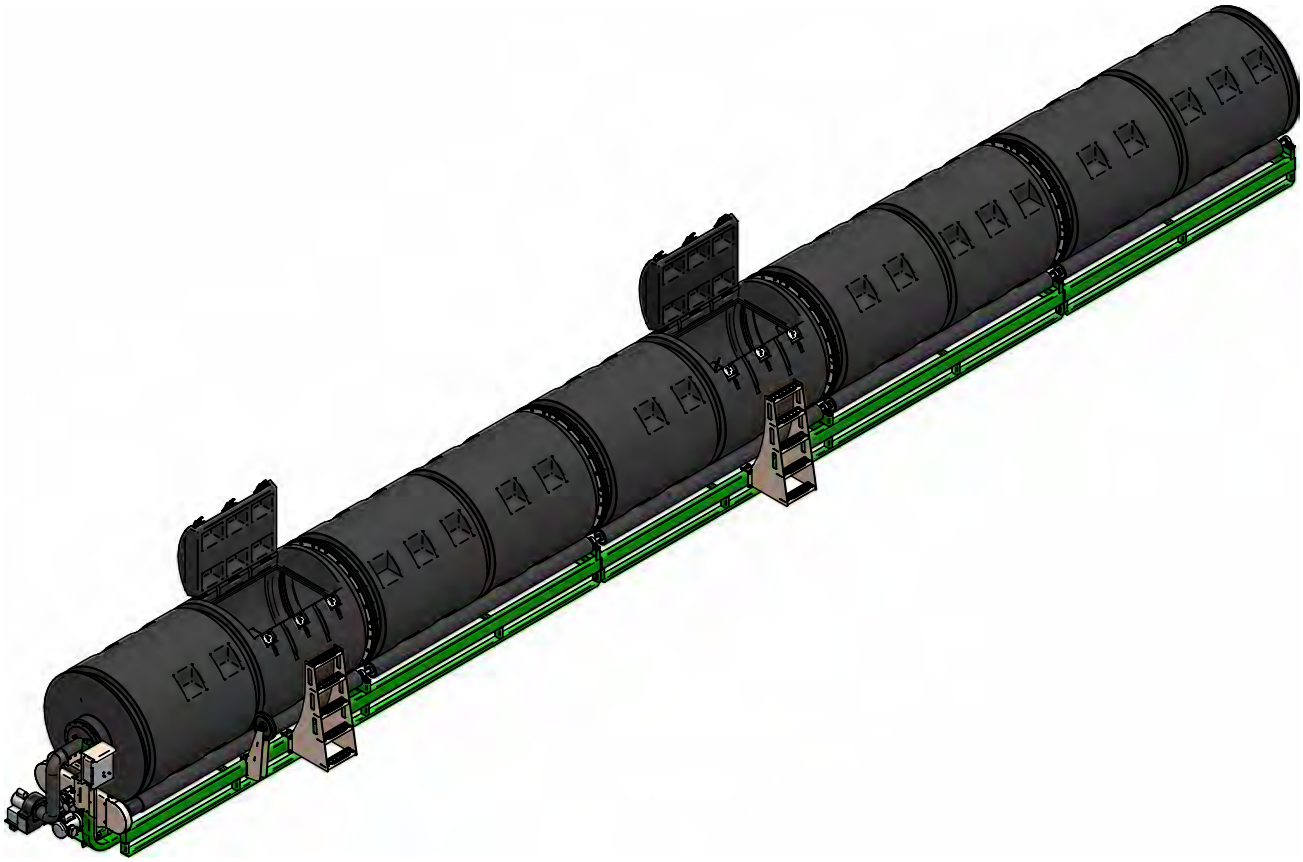




SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Model 560





SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

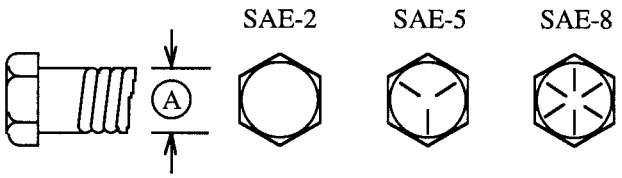
8.2 BOLT TORQUE

CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

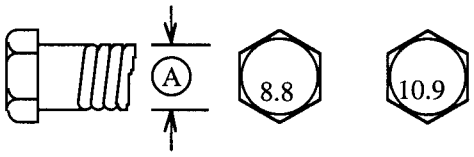
ENGLISH TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque*					
	SAE 2		SAE 5		SAE 8	
	(N.m.)	(lb-ft)	(N.m.)	(lb-ft)	(N.m.)	(lb-ft)
1/4"	8	6	12	9	17	12
5/16"	13	10	25	19	36	27
3/8"	27	20	45	33	63	45
7/16"	41	30	72	53	100	75
1/2"	61	45	110	80	155	115
9/16"	95	60	155	115	220	165
5/8"	128	95	215	160	305	220
3/4"	225	165	390	290	540	400
7/8"	230	170	570	420	880	650
1"	345	225	850	630	1320	970



METRIC TORQUE SPECIFICATIONS

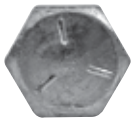
Bolt Diameter "A"	Bolt Torque*			
	8.8	10.9		
	(N.m.)	(lb-ft)	(N.m.)	(lb-ft)
M3	.5	.4	1.8	1.3
M4	3	2.2	4.5	3.3
M5	6	4	9	7
M6	10	7	15	11
M8	25	18	35	26
M10	50	37	70	52
M12	90	66	125	92
M14	140	103	200	148
M16	225	166	310	229
M20	435	321	610	450
M24	750	553	1050	774
M30	1495	1103	2100	1550
M36	2600	1917	3675	2710



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

* Torque value for bolts and capscrews are identified by their head markings.





SUGGESTED ASSEMBLY TORQUE VALUES



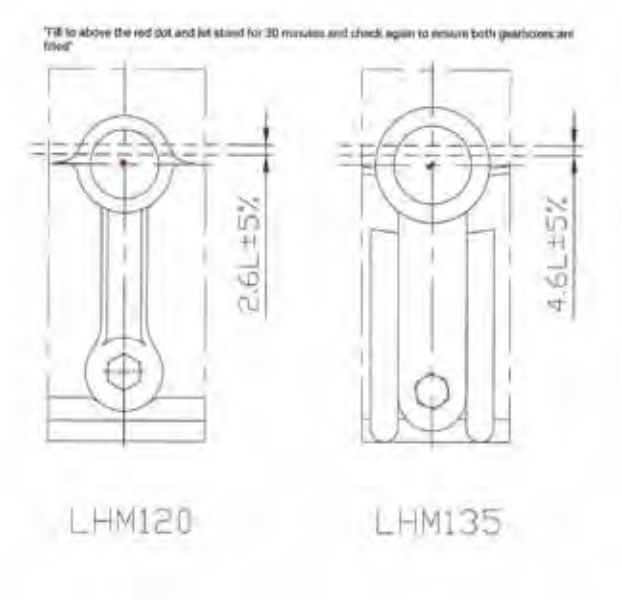
	USS/SAE GRADE 5					USS/ SAE GRADE 8				
Diameter & Threads Per Inch	Tensile Strength Min. PSI	Proof Load LB	Clamp Load LB	Torque Dry FT LB	Lubricated FT LB	Tensile Strength Min. PSI	Proof Load LB	Clamp Load LB	Torque Dry FT LB	Lubricated FT LB
1/4-20	120,000	2,700	2,020	8	6.3	150,000	3,800	2,850	12	9
1/4-28	120,000	3,100	2,320	10	7.2	150,000	4,350	3,250	14	10
5/16-18	120,000	4,450	3,340	17	13	150,000	6,300	4,700	24	18
5/16-24	120,000	4,900	3,700	19	14	150,000	6,950	5,200	27	20
3/8-16	120,000	6,600	4,950	30	23	150,000	9,300	6,980	45	35
3/8-24	120,000	7,450	5,600	35	25	150,000	10,500	7,900	50	35
7/16-14	120,000	9,050	6,780	50	35	150,000	12,800	9,550	70	50
7/16 20	120,000	10,100	7,570	55	40	150,000	14,200	10,650	80	60
1/2-13	120,000	12,100	9,050	75	55	150,000	17,000	12,750	110	80
1/2-20	120,000	13,600	10,200	85	65	150,000	19,200	14,400	120	90
9/16-12	120,000	15,500	11,600	110	80	150,000	21,800	16,350	150	110
9/16-18	120,000	17,300	12,950	120	90	150,000	24,400	18,250	170	130
5/8-11	120,000	19,200	14,400	150	110	150,000	27,100	20,350	210	160
5/8-18	120,000	21,800	16,350	170	130	150,000	30,700	23,000	240	180
3/4-10	120,000	28,400	21,300	260	200	150,000	40,100	30,100	380	280
3/4-16	120,000	31,700	23,780	300	220	150,000	44,800	33,500	420	310
7/8-9	120,000	39,300	29,450	430	320	150,000	55,400	41,600	600	450
7/8 14	120,000	43,300	32,450	470	350	150,000	61,100	45,800	670	500
1-8	120,000	51,500	38,600	640	480	150,000	72,700	54,500	910	680
1-14	120,000	57,700	43,300	720	540	150,000	81,500	61,100	1,020	760

When using anti-seize, reduce the lubed chart reading by 20% to properly torque. Always lubricate and use lubed torque values.

NOTES:
The above recommended assembly torques are offered as a guide only. Torque specifications, especially for critical joints, should be determined under actual assembly conditions due to the many variables involved which are difficult to predict and do affect the torque-tension relationship.
The above recommended clamp loads are based on 75% of the minimum specified proof loads for each grade and size.

Torques for Grades 5 and 8 were calculated based on the following relationship:
T = R D P
Where:T = Torque (ft lb)
D = Nominal Diameter (in)
P = Clamp Load (lb)
R = Tightening Coefficient
The value of R is assumed to be equal to .20 for dry, unplated conditions and equal to .15 for lubricated, including plated, conditions. Actual values of R can vary between .05 and .35 for commonly encountered conditions.

8.3 GEARBOX SPECIFICATIONS



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TRI-FORM POLY INC.

132 Charles Ave. W,
Morris, MB R0G 1K0

Phone: 204-746-6401
Fax: 204-746-8404

PRINTED IN CANADA
REVISED AUGUST 2018

PART NUMBER: 80102

Tri-Form Poly

January 11, 2019

Re: Ecodrum™ loading rates

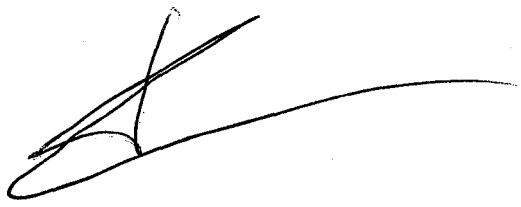
To whom it may concern,

The Ecodrum™ model 560 is rated for at least 750lb per day of compostable material at 131°F.

As composting is a biological process, the actual capacity of any Ecodrum model may be affected positively or negatively by factors such as material to be composted, bulking material, moisture levels and the C:N ratio.

Please don't hesitate to contact us at anytime.

Regards,



Timothy Epp

Ecodrum™ in-vessel composter
e tepp@triformpoly.com
m 204 955 7913

FACILITY CLOSURE PLAN

TUCKER UNIT
Compost Facility
2400 State Farm Road
Tucker, AR 72168

March 10, 2022

TUCKER UNIT

COMPOST FACILITY
TUCKER, ARKANSAS

FACILITY CLOSURE PLAN

MARCH 2022

TUCKER UNIT
Compost Facility
2400 State Farm Road
Tucker, AR 72168

Prepared by:

PMI
3512 South Shackleford
Little Rock, Arkansas 72205
501-221-7122

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LIST OF DRAWINGS

Sheet Number 1: Vicinity Map

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Appendix A: Engineer's Opinion of Closure Costs

1.0 SITE INFORMATION

The Tucker Unit (Tucker) Compost Facility is located at 2400 State Farm Road near Tucker, Jefferson County, Arkansas, Section 19, T-3-S, R-8-W approximate latitude 34° 26' 15.94" N and longitude 91° 54' 23.69" W, see Vicinity Map, Sheet 1. The Tucker compost facility is located within the highly secure Tucker Unit complex.

The Tucker compost facility receives organic waste from the correctional facility. The organic waste is composted in the Ecodrum composters for use in a variety of applications.

This Closure Plan addresses the requirements for an in-place closure of the compost facility at Tucker. The closure plan is a basis for determining an estimate of the cost to close the facility in-place.

The Closure Plan addresses the requirements set forth by Arkansas Department of Environmental Quality (ADEQ).

The closure cost estimate provides an estimate of the items and cost of items to properly close facility. The Closure Plan addresses the steps planned to close the various components of the compost facility.

2.0 CLOSURE PLAN

2.1 Tucker Compost Facility Closure and Notification Requirements

The subsections below describe the requirements established by ADEQ to properly close the Tucker compost facility.

ADEQ will be notified at least 60 days prior to any planned closure activities at Tucker compost facility.

2.1.1 Estimated Closure Cost

ADEQ requires the estimated closure cost to be calculated assuming that ADEQ must retain a third party contractor to perform the closure activities and the composters are at their maximum capacity at the time of closure. This should represent a worst case scenario for the closure cost. The total estimated closure of, not only the composters, but the ancillary components related to the composters. The estimated closure cost includes the following items:

1. Closure of the composters;
2. Closure of the loading platform;

The cost estimate will be updated annually by September 15th based on the proposed operation and capacity of Tucker compost facility through October 1st of the following year. The Engineer's Opinion of Closure Costs is presented in Appendix A.

2.1.2 Recordkeeping and Reporting Requirements

A copy of the approved Tucker Compost Facility Closure Plan will be maintained at the facility. Tucker will maintain records of Tucker compost facility until ADEQ authorizes destruction of the records. Tucker will maintain a record of changes or revisions to the facility. Tucker will provide initial and updated closure cost estimates to ADEQ Solid Waste Division as requested.

2.2 Closure Procedures

The closure of Tucker compost facility will be accomplished by removing the composters. The general scope of work associated with the closure of the facility is as follows:

- Notify ADEQ of plans to close the facility;
- Remove and dispose of any solid waste;
- Remove and dispose of any composted waste;

- Remove and dispose of composters
- Remove and dispose of miscellaneous equipment and appurtenances that are not to be abandoned in-place;

* Waste solids and other solid wastes associated with the closure will be disposed of in a Class 1 landfill.

Closure procedures will be monitored and documented in accordance with good engineering practices. Final closure of the site will be complete when all wastes have been removed and disposed, permitted components have been closed in accordance with this plan and final closure certification has been submitted to ADEQ. The closure certification will include documentation of disposal of all wastes.

2.3 Closure Schedule

ADEQ will be notified of the closure of Tucker compost facility. Closure will begin within sixty (60) days following the notification to ADEQ. Table I is an estimated schedule (in work days) of the closure of the composters assuming the composters are at a maximum capacity at the time of closure.

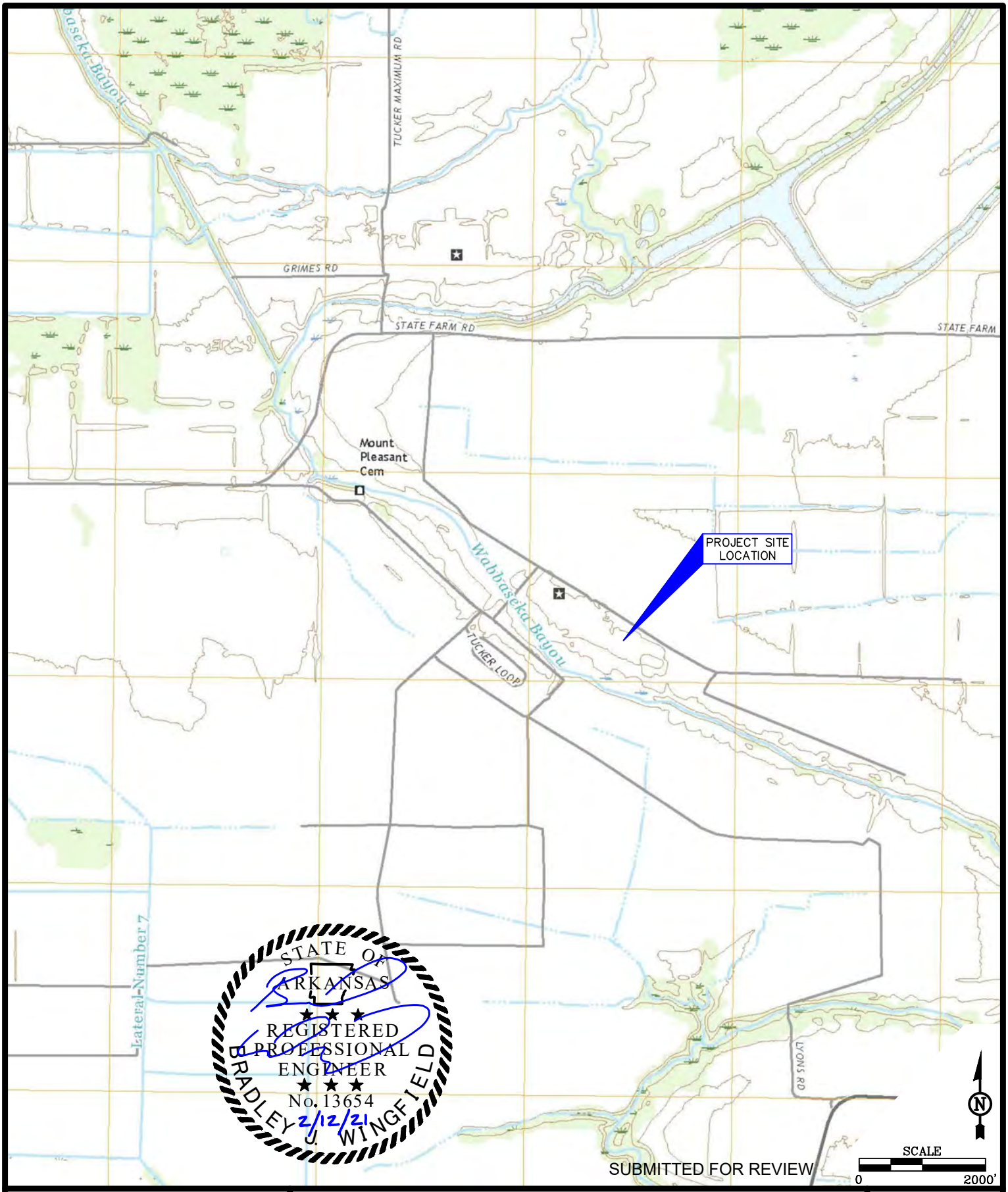
TABLE I

Tucker Unit Compost Facility
Closure Schedule

Closure Activity/Tasks	Number of Work Days to Complete
• Removal and disposal of solid waste	1
• Removal and disposal of compost	1
• Removal and disposal of composters	5
• Removal and disposal of miscellaneous appurtenances	1
• **Estimated Total Time to Complete Closure**	**8**

The closure of Tucker compost facility will require approximately 8 working days assuming maximum volume at the time of closure.

DRAWINGS



STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 13654
BRADLEY J. WINGFIELD
2/12/21

SUBMITTED FOR REVIEW

CIVIL ENGINEERING AND ENVIRONMENTAL SERVICES
3512 South Shackleford Road
Little Rock, Arkansas 72205
(501) 221-7122 fx: (501) 221-7775

VICINITY MAP

COMPOST FACILITY
TUCKER UNIT
ARKANSAS DEPARTMENT OF CORRECTIONS

JOB NUMBER: ENTY-12162

SHEET NO.: 2

SUBMITTED:	BW	DRAWN:	CG	CHECKED:	BW	DATE:	FEB. 10, 2021

FILE: E:\ENTY-12162 - ADC COMPOSTING SITES\TUCKER ADEQ PERMIT APP\DRAWINGS\TUCKER PERMIT DRAWINGS.DWG

APPENDIX A

Engineer's Opinion of Closure Costs

Tucker Unit
3/10/2022
Preliminary Estimate of Cost
by PMI, Little Rock, AR

Item	Item Description	Units	Estimated Quantity	APC&EC Reg. 22 Factor of Safety	Unit Cost	Total Cost
1	Removal & Disposal of Solid Waste	TON	0.75	1.5	$150.00	$168.75
2	Removal & Disposal of Compost	CY	23	1.5	$50.00	$1,725.00
3	Removal and Disposal of Composter	LS	2	N/A	$5,000.00	$10,000.00
4	Removal and Disposal of Miscellaneous/Appurtenances	LS	1	N/A	$500.00	$500.00

Subtotal =	$12,393.75
Contingency (10%) =	$1,239.38
Estimated Construction Total=	$13,633.13

RPID: 511 **Parcel:** 001-00469-000 **Jefferson County Rural Property Record Card - 2021** **Card:** 1 of 1

Ownership Description

Name: STATE FARM
ATTN ARK DEPT OF CORR A/P
PO BOX 6408

PINE BLUFF AR 71611-6408

Subd.: 30819 SEC 19 TWP 3 S RNG 08 W
S-T-R: 19-03-08 **Acres:** 756.38
T.D.: 020 2 DOLLARWAY-RURAL
Location: 2400 STATE FARM (TUCKER UNIT MH PK) RD
Legal: ALL 756.38 ACRES

Type: EG Ex.Gov
Taxable: EX Exempt
Neigh: 30819
Owner: 439951
Status: **Tax Status:** EG
Block: **Lot:**
City: RURAL
Map:
Old PID:

Assessment Summary

Year	2000	%	1999	%
Land				
Bldgs				
Total				

Review Record

Date	By	Reason	Land	Buildings	Total
6/29/2018	SDH	RA			
4/23/2015	LRW				
4/9/2015 LRW PU NEW SWMH ON LOT 19 2015 AS IMP ONLY BILLY OTTINGER SEE 001-00469-094; ALSO					
7/1/2013	SDH	RA			
6/25/2008	RCP	RA			
5/24/2000		RV			
1/1/1996					

Trend	Street	Utilities	Topography	Landscaping
Improving	Concrete	No Water	High	Excellent
Static	Asphalt	No Sewer	Low	Good
Declining	ChatSeal	No Gas	Rough	Average
New	Gravel	No Electric	Flat	Poor
Old	Dirt	No Telephone	Sloping	None

Building Permit Record

Date	Amount	Purpose	Note
3/19/2014			4/9/2015 LRW PU NEW SWMH ON LOT 19 2015 AS IMP
9/26/2012			6/27/13 LRW NO MH ON CARD 13 T.O MH'S GONE FROM
5/3/2012			6/27/13 LRW NO MH ON CARD 13 T.O MH'S GONE FROM

Ownership Record

Date	Book	Page/Inst#	Amount	Type	Grantee
1/1/1910	000	0000			STATE FARM

Land Record

RURAL\30819\001-00469-000-01-2016

Use	Location	Symbol	Soil	Acres	Rate	O	Adj	%	Value	NC	HS
CU			19	129.805	6000.00				778,830		
E			01	201.012	.00						
E			02	124.087	.00						
E			04	285.819	.00						
E			12	1.274	.00						
T			01	3.636	70.00				255		
T			12	10.747	125.00				1,343		

Total: 780,450



RPID: 511 **Parcel:** 001-00469-000 **Jefferson County Rural Property Record Card - 2021** **Card:** 1 **of** 1

Occupancy	Construction	1st Flr	Total Liv	Grade	Age	YC	YR	Cond	Replace	Rem %	Physical	Functional	External	Actual	NC	HS
MobileH	ONE FrameStd	840	840	5	10			A	14,560	69	10,047			10,047		
OB/YI Total Contributory Value (RCN x Accrued Depreciation x Market Adjustment + Flatted Items + Other Additives)														100		
Total														10,150 V		

Ext Wall
- Low Cost
- ý Standard
- Comb M/F
- MasonVen
- Other

Foundation
- Open Pier
- Closed Pier
- Slab
- Other

Floor Struct
- Wood SubF
- Elev Slab
- Slab Grade
- Other

Insulation
- Floor
- Wall
- Ceiling

Heat/Cool
- None
- Hot Air/F
- F/W Furn
- Central
- Elec Base
- Elec Ceil
- Other

Floor Cover
- None
- Softwood
- HW Sheath
- HW Parq
- Linoleum
- CarpetTile
- Cer Tile
- Stone
- Other

Basement
- Unfinished
- Finished
- Fin Part

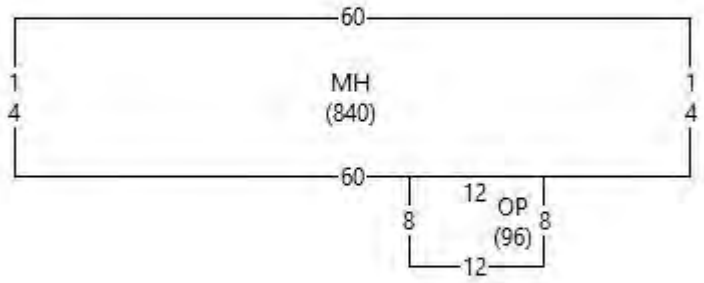
Roof Type
- Hip
- Mansard
- Gambrel
- Arched
- Gable
- Flat
- Dormer
- Shed
- Other

Roof Cover
- Asp Shing
- Fib Shing
- Wd Shing
- Wd Shakes
- Clay/Slate
- Roll Metal
- Other

Plumbing
Full
Half
Extra

Fireplaces
Type
Count

Sketch Area



AACU14*60 ABR35CR12*8

4/15/2015: SITS ON LOT 17 "FEMA TRLR #T127" ; WHITE/BLUE SHUTTERS

Outbuildings and Yard Improvements

Item	Type	Qty1	Qty2	UM	QR	Age	Rate	Grade	Rem %	Value	NC	HS
WD							100.00 F	1.000		100		
Total										100		

Building Computation

Base Price		16.25
+/- Grade	1.000	
Story Hgt Factor	1.000	
Grade Adj Factor	1.000	
Composite Factor		1.000
Adj Price per SF		16.25
Total Base SF		840
Base Value		13,650

Adjustments to Base

Item	S.F./Qty	Rate	Total
Foundation			
Floor Structure			
Ins Floor			
Ins Wall			
Ins Ceiling			
Heat & Cool			
Floor Cover			
Roof Cover			
Plumbing			
Fireplace			
Basement			

Base Structure and Additive Items

Item	Area	Rate	Factor	REL	Total	NC	HS
A MH	840	16.25	1.000		13,650		
B OP	96	11.86	.799		910		

Total of Above	14,560
Market Adjustment	1.000
Total Structure RCN	14,560

Inspected: LNT 10/5/2017 Contact: PI
Revisited: LRW 6/27/2013 Int.Est?:
Entered: LNT 10/5/2017 Sk. File:
Printed: 1/24/2022 Status:

SOUTHEAST ARKANSAS
SOLID WASTE MANAGEMENT BOARD

Brad Wingfield, P.E.
Principal – Engineering Division
PMI | 3512 S. Shackleford Rd. | Little Rock, AR 72205

After reviewing the documents and plans for the Compost Operating Plan submitted by you for the Tucker Prison, located at 2400 State Farm Road, England, AR 72046. The Southeast Arkansas Regional Solid Waste Management Board agrees to all of the parameters and guidelines set forth In the operating plan and desires to see this project move forward and has no reservations or the requirement for any further information.

Sincerely

Shane Knight

Director of Solid Waste & Recycling
Southeast Arkansas Economic Development District, Inc.
P.O. Box 6806
Pine Bluff, AR 71611
870.536.1971 (Office)
501.317.0276 (Cell)
870.536.7718 (Fax)

McCLELLAND CONSULTING ENGINEERS, INC.
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7302 Kanis Road
Little Rock, AR 72204
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mce.us.com

APPENDIX I
ABSOLUTE BARRIER Y30 BAC PERFORMANCE BROCHURE

ABSOLUTE BARRIER® Y30BAC

HIGH PERFORMANCE LLDPE/EVOH GEOMEMBRANE GAS BARRIER

Viaflex

PRODUCT DESCRIPTION

Absolute Barrier® Y30BAC is a seven-layer co-extruded geomembrane consisting of very flexible, linear-low-density polyethylene (LLDPE) with an inner core of chemically resistant EVOH barrier resin, designed specifically as a barrier against radon, methane and VOCs. High strength LLDPE provides exceptional tear and impact resistance. A robust stabilization package that exceeds the industry standard; provides long-term protection from thermal oxidation and ultraviolet degradation in exposed applications.

PRODUCT USE

Absolute Barrier® Y-Series is designed to stop gas vapor migration on Brownfield sites, in residential and commercial buildings, as well as geomembrane containment and covering systems. When installed under concrete slabs as a gas barrier, a passive system is recommended to include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans. Y30BAC is over 800 times less permeable to methane gas than LLDPE vapor barriers in a comparable thickness.

Absolute Barrier® performs extremely well preventing the degradation of EPS geofoam by protecting it from harsh VOCs including direct gasoline or diesel fuel contact.

Absolute Barrier® Y30BAC is a highly effective, temporary and long-term, landfill caps with VOC diffusion coefficients ranging from 40 to 240 times less than standard 80 mil HDPE geomembranes. Contaminants found in leachate and gas in municipal and hazardous waste landfills can migrate through standard HDPE; contributing to both atmospheric and groundwater contaminations. Absolute Barrier® Y-Series is an effective barrier to a wide range of VOCs including benzene, toluene, trichloroethylene, perchloroethylene, and many others.

SIZE & PACKAGING

Absolute Barrier® Y30BAC is available in 16' c-fold or in fabricated panels up to 50,000 sq. ft. All fabricated panels are accordion folded and tightly rolled onto a heavy-duty core for ease of handling and time saving installation.



EPS Geofoam Protection

PRODUCT	PART #
ABSOLUTE BARRIER®	Y30BAC

APPLICATIONS

- EPS Geofoam Protection
- Landfill Cap
- Temporary Landfill Gas Cover
- Floating Gas Cover
- Underslab VOC Barrier
- Underslab Radon Barrier
- Underslab Methane Barrier
- Underslab Vapor Barrier
- Remediation Cover / Liner
- Leachate Collection Ponds
- Odor Control Barrier
- Secondary Containment

Absolute Barrier®

THE ULTIMATE IN GAS CONTAINMENT

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ABSOLUTE BARRIER® Y30BAC

HIGH PERFORMANCE LLDPE/EVOH GEOMEMBRANE GAS BARRIER

		ABSOLUTE BARRIER® Y30BAC			
		IMPERIAL		METRIC	
PROPERTIES	TEST METHOD	MINIMUM	TYPICAL	MINIMUM	TYPICAL
Appearance		Black		Black	
Thickness	ASTM D5199	30 Mils Average	30 Mils Nominal	0.76 mm Average	0.76 mm Nominal
Weight		150 lbs/msf		732 g/m^2	
Tensile Strength at Break	ASTM D6693	85 lbs/in	100 lbs/in	149 N/cm	175 N/cm
Tensile Elongation at Break	ASTM D6693	500 %	600 %	500 %	600 %
Tear Strength	ASTM D1004	18 lbs	22 lbs	80 N	98 N
Puncture Resistance	ASTM D4833	60 lbs	75 lbs	267 N	334 N
Oxidation Induction Time (OIT) or High Pressure OIT (HPOIT)	ASTM D3895 ASTM D5885	100 min 400 min	250 min -	100 min 400 min	250 min -
Carbon Black Content [7]	ASTM D4218	2.0 %	2.3 %	2.0 %	2.3 %
Carbon Black Dispersion	ASTM D5596	Pass			
Benzene Permeance	See Note [6]	2.13 x 10^{-10} m^2/sec or 1.93 x 10^{-13} m/s			
Toluene Permeance	See Note [6]	2.95 x 10^{-10} m^2/sec or 7.77 x 10^{-14} m/s			
Ethylbenzene Permeance	See Note [6]	2.31 x 10^{-10} m^2/sec or 1.78 x 10^{-14} m/s			
M & P-Xylenes Permeance	See Note [6]	2.19 x 10^{-10} m^2/sec or 2.03 x 10^{-14} m/s			
O-Xylene Permeance	See Note [6]	2.07 x 10^{-10} m^2/sec or 1.83 x 10^{-14} m/s			
Methane Permeance	ASTM D1434	< 4.93E^{-13} m/s			
Hydrogen Sulfide	See Note [9]	1.45E^{-09} m/s			
Trichloroethylene (TCE)	See Note [6]	1.44 x 10^{-10} m^2/sec or 5.60 x 10^{-15} m/s			
Perchloroethylene (PCE)	See Note [6]	1.35 x 10^{-10} m^2/sec or 5.57 x 10^{-15} m/s			
Cold Temperature Impact	ASTM D746	-40° F		-40° C	
Maximum Static Use Temperature		180° F		82° C	
Low Temperature Bend Test	ASTM D2136	-70° F			
FACTORY SEAM REQUIREMENTS					
Bonded Seam Strength	ASTM D6392 Mod. [5]	57 lbs/in.	75 lbs/in.	100 N/cm	131 N/cm
Seam Peel Adhesion	ASTM D6392 Mod. [5]	45 lbs/in.	60 lbs/in.	79 N/cm	105 N/cm

[5] Viaflex performs seam testing at 20" per minute.

[6] Aqueous Phase Film Permeance

Permeation of Volatile Organic Compounds through EVOH Thin Film Membranes and Coextruded LLDPE/EVOH/LLDPE Geomembranes, McWatters and Rowe, Journal of Geotechnical and Geoenvironmental Engineering© ASCE/ September 2015. (Permeation is the Permeation Coefficient adjusted to actual film thickness - calculated at 1 kg/m^3.) The study used to determine PCE and TCE is titled: Evaluation of diffusion of PCE & TCE through high performance geomembranes by Di Battista and Rowe, Queens University 8 Feb 2018.

[7] No carbon black in barrier layers.

[9] The study used to determine diffusion coefficients is titled: Hydrogen Sulfide (H_2S) Transport through Simulated Interim Covers with Conventional and Co-Extruded Ethylene-Vinyl Alcohol (EVOH) Geomembranes.

Absolute Barrier® Y30BAC is a seven-layer co-extruded geomembrane consisting of very flexible, linear-low-density polyethylene (LLDPE) with an inner core of chemically resistant EVOH barrier resin, designed specifically as a barrier against radon, methane and VOCs. High strength LLDPE provides exceptional tear and impact resistance. A robust stabilization package that exceeds the industry standard; provides long-term protection from thermal oxidation and ultraviolet degradation in exposed applications.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance, odor transmission, longevity as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. VIAFLEX MAKES NO WARRANTIES AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage. Limited Warranty available at www.viaflex.com

Scan QR Code to download technical data sheets.

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APPENDIX J

AMENDMENTS TO OPERATION PLANS

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DESIGNED TO SERVE

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Little Rock, AR 72204
(501) 371.0272 P | (501) 371.9932 F
mce.us.com

January 12, 2026

David Isaacs,
Engineer, Division of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118
501.682.0744

RE: **Amendments to Tucker Unit's Operation Plans**
Tucker Compost Facility (not Max)
Permit Tracking Number: 0318-SC; AFIN: 35-00112
Cross Reference Identifier(s): 80202, 80881, 82843

Dear David Issacs,

We are providing Amendments for the Tucker Unit's Operation Plans to provide clarification for the Tucker Unit for DEQ's compliance requirements.

AMENDMENTS TO OPERATION PLANS

1. Any Reference to "Operator" in the Operation Plans shall be understood as sufficiently licensed operator.

2. The Operation Plans for Tucker Max Unit Compost Facility has a more thorough description of monitoring so the staff shall use that one for both, without any conflict in the two.

3. Waste is to be at least 131ºF and maintained for at least 3 continuous days, prior to extraction from the composter.

4. Compost Waste shall be fully treated prior to removal from the covered and concrete padded facility. This should be confirmed with
    a. Earthy, Pleasant Smell
    b. No longer warm
    c. Absence of steam or heat
    d. Moisture content similar to that of a damp sponge

Regards,

Stephen M. Youngblood

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