CALL NO. 311

CONTRACT ID. 251012

MCCRACKEN COUNTY

FED/STATE PROJECT NUMBER FD06 073 NEW ROUTE

DESCRIPTION NEW ROUTE

WORK TYPE GRADE, DRAIN & SURFACE WITH BRIDGE

PRIMARY COMPLETION DATE 6/30/2027

LETTING DATE: December 11,2025

Sealed Bids will be received electronically through the Bid Express bidding service until 10:00 AM EASTERN STANDARD TIME December 11,2025. Bids will be publicly announced at 10:00 AM EASTERN STANDARD TIME.

PLANS AVAILABLE FOR THIS PROJECT.

REQUIRED BID PROPOSAL GUARANTY: Not less than 5% of the total bid.

TABLE OF CONTENTS

PART I SCOPE OF WORK

- PROJECT(S), COMPLETION DATE(S), & LIQUIDATED DAMAGES
- CONTRACT NOTES
- STATE CONTRACT NOTES
- ASPHALT MIXTURE
- INCIDENTAL SURFACING
- FUEL AND ASPHALT PAY ADJUSTMENT
- ASPHALT PAVEMENT RIDE QUALITY CAT A
- COMPACTION OPTION A
- TREE REMOVAL
- CONCRETE SLURRY
- ELECTRONIC DELIVERY MANAGEMENT SYSTEM (E-TICKETING) AGGREGATE
- EXPERIMENTAL KYCT AND HAMBURG TESTING
- RECYCLED ASPHALT PAVEMENT (RAP) STOCKPILE MANAGEMENT
- RIGHT OF WAY CERTIFICATION
- UTILITY IMPACT & RAIL CERTIFICATION NOTES
- RAILROAD NOTES
- DEPT OF ARMY - NATIONWIDE PERMIT
- WATER QUALITY CERTIFICATION
- KPDES STORM WATER PERMIT, BMP AND ENOI
- GUARDRAIL DELIVERY VERIFICATION SHEET

PART II SPECIFICATIONS AND STANDARD DRAWINGS

- STANDARD AND SUPPLEMENTAL SPECIFICATIONS
- [SN-1I] PORTABLE CHANGEABLE MESSAGE SIGNS
- [SN-11M] BARCODE LABEL ON PERMANENT SIGNS
- [SN-11N] LONGITUDINAL PAVEMENT JOINT ADHESIVE
- [SP-69] EMBANKMENT AT BRIDGE END BENT STRUCTURES

PART III EMPLOYMENT, WAGE AND RECORD REQUIREMENTS

- LABOR AND WAGE REQUIREMENTS
- EXECUTIVE BRANCH CODE OF ETHICS
- KENTUCKY EQUAL EMPLOYMENT OPPORTUNITY ACT OF 1978 LOCALITY / STATE
- PROJECT WAGE RATES / STATE FUNDED

PART IV BID ITEMS

PART I

SCOPE OF WORK

ADMINISTRATIVE DISTRICT - 01

CONTRACT ID - 251012

FD06 073 NEW ROUTE

COUNTY - MCCRACKEN

PCN - DE0730NEW2512
FD06 073 NEW ROUTE

NEW ROUTE NEW ACCESS ROAD FROM KY-305 NEAR KY-998 EXTENDING WEST TO THE OHIO RIVER MEGAPARK, A DISTANCE OF 01.18 MILES.ASPHALT SURFACE WITH GRADE & DRAIN SYP NO. 01-08702.00.

GEOGRAPHIC COORDINATES LATITUDE 37:05:55.00 LONGITUDE 88:43:15.00

ADT

COMPLETION DATE(S):

COMPLETED BY 06/30/2027	APPLIES TO ENTIRE CONTRACT
COMPLETED BY 10/31/2026	OPEN TO TRAFFIC

CONTRACT NOTES

INSURANCE

Refer to Kentucky Standard Specifications for Road and Bridge Construction, current edition.

PROPOSAL ADDENDA

All addenda to this proposal must be applied when calculating bid and certified in the bid packet submitted to the Kentucky Department of Highways. Failure to use the correct and most recent addenda may result in the bid being rejected.

BID SUBMITTAL

Bidder must use the Department's electronic bidding software. The Bidder must download the bid file located on the Bid Express website (www.bidx.com) to prepare a bid packet for submission to the Department. The bidder must submit electronically using Bid Express.

JOINT VENTURE BIDDING

Joint venture bidding is permissible. All companies in the joint venture must be prequalified in one of the work types in the Qualifications for Bidders for the project. The bidders must get a vendor ID for the joint venture from the Division of Construction Procurement and register the joint venture as a bidder on the project. Also, the joint venture must obtain a digital ID from Bid Express to submit a bid. A joint bid bond of 5% may be submitted for both companies or each company may submit a separate bond of 5%.

UNDERGROUND FACILITY DAMAGE PROTECTION

The contractor shall make every effort to protect underground facilities from damage as prescribed in the Underground Facility Damage Protection Act of 1994, Kentucky Revised Statute KRS 367.4901 to 367.4917. It is the contractor's responsibility to determine and take steps necessary to be in compliance with federal and state damage prevention directives. When prescribed in said directives, the contractor shall submit Excavation Locate Requests to the Kentucky Contact Center (KY811) via web ticket entry. The submission of this request does not relieve the contractor from the responsibility of contacting non-member facility owners, whom shall be contacted through their individual Protection Notification Center. Non-compliance with these directives can result in the enforcement of penalties.

REGISTRATION WITH THE SECRETARY OF STATE BY A FOREIGN ENTITY

Pursuant to KRS 176.085(1)(b), an agency, department, office, or political subdivision of the Commonwealth of Kentucky shall not award a state contract to a person that is a foreign entity required by KRS 14A.9-010 to obtain a certificate of authority to transact business in the Commonwealth ("certificate") from the Secretary of State under KRS 14A.9-030 unless the person produces the certificate within fourteen (14) days of the bid or proposal opening. If the

foreign entity is not required to obtain a certificate as provided in KRS 14A.9-010, the foreign entity should identify the applicable exception. Foreign entity is defined within KRS 14A.1-070.

For all foreign entities required to obtain a certificate of authority to transact business in the Commonwealth, if a copy of the certificate is not received by the contracting agency within the time frame identified above, the foreign entity's solicitation response shall be deemed non-responsive or the awarded contract shall be cancelled.

Businesses can register with the Secretary of State at https://secure.kentucky.gov/sos/ftbr/welcome.aspx .

SPECIAL NOTE FOR PROJECT QUESTIONS DURING ADVERTISEMENT

Questions about projects during the advertisement should be submitted in writing to the Division of Construction Procurement. This may be done by email to kytc.projectquestions@ky.gov. The Department will attempt to answer all submitted questions. The Department reserves the right not to answer if the question is not pertinent or does not aid in clarifying the project intent.

The deadline for posting answers will be 3:00 pm Eastern Daylight Time, the day preceding the Letting. Questions may be submitted until this deadline with the understanding that the later a question is submitted, the less likely an answer will be able to be provided.

The questions and answers will be posted for each Letting under the heading "Questions & Answers" on the Construction Procurement website (www.transportation.ky.gov/construction-procurement). The answers provided shall be considered part of this Special Note and, in case of a discrepancy, will govern over all other bidding documents.

HARDWOOD REMOVAL RESTRICTIONS

The US Department of Agriculture has imposed a quarantine in Kentucky and several surrounding states, to prevent the spread of an invasive insect, the emerald ash borer. Hardwood cut in conjunction with the project may not be removed from the state. Chipping or burning on site is the preferred method of disposal.

INSTRUCTIONS FOR EXCESS MATERIAL SITES AND BORROW SITES

Identification of excess material sites and borrow sites shall be the responsibility of the Contractor. The Contractor shall be responsible for compliance with all applicable state and federal laws and may wish to consult with the US Fish and Wildlife Service to seek protection under Section 10 of the Endangered Species Act for these activities.

ACCESS TO RECORDS

The state agency certifies that it is in compliance with the provisions of KRS 45A.150, "Access to contractor's books, documents, papers, records, or other evidence directly pertinent to the contract." The Contractor, as defined in KRS 45A.030, agrees that the contracting agency, the

Finance and Administration Cabinet, the Auditor of Public Accounts, and the Legislative Research Commission, or their duly authorized representatives, shall have access to any books, documents, papers, records, or other evidence, which are directly pertinent to this agreement for the purpose of financial audit or program review. The Contractor also recognizes that any books, documents, papers, records, or other evidence, received during a financial audit or program review shall be subject to the Kentucky Open Records Act, KRS 61.870 to 61.884. Records and other prequalification information confidentially disclosed as part of the bid process shall not be deemed as directly pertinent to the agreement and shall be exempt from disclosure as provided in KRS 61.878(1)(c).

BOYCOTT PROVISIONS

If applicable, the contractor represents that, pursuant to KRS 45A.607, they are not currently engaged in, and will not for the duration of the contract engage in, the boycott of a person or an entity based in or doing business with a jurisdiction with which Kentucky can enjoy open trade. **Note:** The term Boycott does not include actions taken for bona fide business or economic reasons, or actions specifically required by federal or state law.

If applicable, the contractor verifies that, pursuant to KRS 41.480, they do not engage in, and will not for the duration of the contract engage in, in energy company boycotts as defined by KRS 41.472.

LOBBYING PROHIBITIONS

The contractor represents that they, and any subcontractor performing work under the contract, have not violated the agency restrictions contained in KRS 11A.236 during the previous ten (10) years, and pledges to abide by the restrictions set forth in such statute for the duration of the contract awarded.

The contractor further represents that, pursuant to KRS 45A.328, they have not procured an original, subsequent, or similar contract while employing an executive agency lobbyist who was convicted of a crime related to the original, subsequent, or similar contract within five (5) years of the conviction of the lobbyist.

SPECIAL NOTE – BUY AMERICA REQUIREMENTS AND BUILD AMERICA, BUY AMERICA (BABA) ACT 05/05/2025

1.0 BUY AMERICA REQUIREMENT.

Follow the "Buy America" provisions as required by 23 U.S.C. § 313 and 23 C.F.R. § 635.410. Except as expressly provided herein all manufacturing processes of steel or iron materials including but not limited to structural steel, guardrail materials, corrugated steel, culvert pipe, structural plate, prestressing strands, and steel reinforcing bars shall occur in the United States of America, including the application of:

- Coating,
- Galvanizing,
- Painting, and
- Other coating that protects or enhances the value of steel or iron products.

The following are exempt, unless processed or refined to include substantial amounts of steel or iron material, and may be used regardless of source in the domestic manufacturing process for steel or iron material:

- Pig iron,
- Processed, pelletized, and reduced iron ore material, or
- Processed alloys.

The Contractor shall submit a certification stating that all manufacturing processes involved with the production of steel or iron materials occurred in the United States.

Produce, mill, fabricate, and manufacture in the United States of America all aluminum components of bridges, tunnels, and large sign support systems, for which either shop fabrication, shop inspection, or certified mill test reports are required as the basis of acceptance by the Department.

Use foreign materials only under the following conditions:

1) When the materials are not permanently incorporated into the project; or
2) When the delivered cost of such materials used does not exceed 0.1 percent of the total Contract amount or $2,500.00, whichever is greater.

The Contractor shall submit to the Engineer the origin and value of any foreign material used.

2.0 – BUILD AMERICA, BUY AMERICA (BABA)

Contractor shall comply with the Federal Highway Administration (FHWA) Buy America Requirement in 23 C.F.R. § 635.410 and all relevant provisions of the Build America, Buy America Act (BABA), contained within the Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, §§ 70901-52 enacted November 15, 2021. The BABA requires iron, steel, manufactured products, and construction materials used in infrastructure projects funded by federal financial assistance to be produced in the United States. Comply with 2 C.F.R § 184.

BABA permits FHWA participation in the Contract only if domestic steel and iron will be used on the Project. To be considered domestic, all steel and iron used, and all products manufactured from steel and iron must be produced in the United States and all manufacturing processes, including application of a coating, for these materials must occur in the United States. Coating includes all processes that protect or enhance the value of the material to which the coating is applied. This requirement does not preclude a minimal use of foreign steel and iron materials, provided the cost of such materials does not exceed 0.1% of the total contract amount under the Contract or $2,500.00 whichever is greater.

BABA permits FHWA participation in the Contract only if all "construction materials" as defined in the Act are made in the United States. The Buy America preference applies to the following construction materials incorporated into infrastructure projects: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); Fiber optic cable; optical fiber; lumber; engineered wood; and drywall. Contractor will be

required to use construction materials produced in the United States on this Project. The Contractor shall submit a certification stating that all construction materials are certified to be BABA compliant.

3.0 FINAL RULE – FHWA'S BUY AMERICA REGULATION TO TERMINATE GENERAL APPLICABILITY WAIVER FOR MANUFACTURED PRODUCTS

- **March 17, 2025** (effective date): For all Federal-aid projects obligated on or after March 15, 2025, all iron or steel products, as defined in § 635.410(c)(1)(iii), must comply with FHWA's Buy America requirements for steel and iron in § 635.410(b). In addition, for all Federal-aid projects obligated on or after March 15, 2025, per § 635.410(c)(2), articles, materials, and supplies should be classified as an iron or steel product, a manufactured product, or another product as specified by law or in 2 CFR part 184 (such other products specified by law or in 2 CFR part 184 include "excluded materials" and "construction materials"); an article, material, or supply must not be considered to fall into multiple categories.
- **October 1, 2025:** The final assembly requirement will become effective for Federal-aid projects obligated on or after October 1, 2025. This means that, for manufactured product to be Buy America compliant, for Federal-aid projects obligated on or after October 1, 2025, final assembly of the manufactured product must occur in the United States.
- **October 1, 2026:** The 55 percent requirement will become effective for Federal-aid projects obligated on or after October 1, 2026. This means that, for manufactured product to be Buy America-compliant, for Federal-aid projects obligated on or after October 1, 2026, all manufactured products permanently incorporated into the project must both be manufactured in the United States (satisfy the final assembly requirement) and have the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States be greater than 55 percent of the total cost of all components of the manufactured product (satisfy the 55 percent requirement).

4.0 – ADDITIONAL REQUIREMENTS

The Contractor has completed and submitted, or shall complete and submit, to the Cabinet a Buy America/ Build America, Buy America Certificate prior to the Cabinet issuing the notice to proceed, in the format below. After submittal, the Contractor is bound by its original certification.

A false certification is a criminal act in violation of 18 U.S.C. § 1001. The Contractor has the burden of proof to establish that it's in compliance.

At the Contractor's request, the Cabinet may, but is not obligated to, seek a waiver of Buy America requirements if grounds for the waiver exist under 23 C.F.R. § 635.410(c) or will comply with the applicable Buy America requirements if a waiver of those requirements is not available or not pursued by the Cabinet.

Please refer to the Federal Highway Administration's Buy America webpage for more information.

Buy America - Construction Program Guide - Contract Administration - Construction - Federal Highway Administration (dot.gov)

BUY AMERICA / BUILD AMERICA, BUY AMERICA (ACT) MATERIALS CERTIFICATE OF COMPLIANCE

The Contractor hereby certifies that it will comply with all relevant provisions of the Build America, Buy America Act, contained within the Infrastructure Investment and Jobs Act, Pub. L. NO. 117-58, §§ 70901-52, the requirements of 23 U.S.C. § 313, 23 C.F.R. § 635.410 and 2 C.F.R § 184.

Date Submitted:_____

Contractor:_____

Signature:_____

Printed Name:_____

Title:_____

NOTE: THIS CERTIFICATION IS IN ADDITION TO ANY AND ALL REQUIREMENTS OUTLINED IN THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND/OR SPECIAL NOTES CONTAINED IN THE PROJECT PROPOSAL.

SPECIAL NOTE FOR RECIPROCAL PREFERENCE

RECIPROCAL PREFERENCE TO BE GIVEN BY PUBLIC AGENCIES TO RESIDENT BIDDERS

By reference, KRS 45A.490 to 45A.494 are incorporated herein and in compliance regarding the bidders residency. Bidders who want to claim resident bidder status should complete the Affidavit for Claiming Resident Bidder Status along with their bid in the electronic bidding software. Submittal of the Affidavit should be done along the bid in Bid Express.

April 30, 2018

ASPHALT MIXTURE

Unless otherwise noted, the Department estimates the rate of application for all asphalt mixtures to be 110 lbs/sy per inch of depth.

INCIDENTAL SURFACING

The Department has included in the quantities of asphalt mixtures established in the proposal estimated quantities required for resurfacing or surfacing mailbox turnouts, farm field entrances, residential and commercial entrances, curve widening, ramp gores and tapers, and road and street approaches, as applicable. Pave these areas to the limits as shown on Standard Drawing RPM-110-06 or as directed by the Engineer. In the event signal detectors are present in the intersecting streets or roads, pave the crossroads to the right of way limit or back of the signal detector, whichever is the farthest back of the mainline. Surface or resurface these areas as directed by the Engineer. The Department will not measure placing and compacting for separate payment but shall be incidental to the Contract unit price for the asphalt mixtures.

FUEL AND ASPHALT PAY ADJUSTMENT

The Department has included the Contract items Asphalt Adjustment and Fuel Adjustment for possible future payments at an established Contract unit price of $1.00. The Department will calculate actual adjustment quantities after work is completed. If existing Contract amount is insufficient to pay all items on the contract with the adjustments, the Department will establish additional monies with a change order.

ASPHALT PAVEMENT RIDE QUALITY CATEGORY A

The Department will apply Pavement Rideability Requirements on this project in accordance with Section 410, Category A.

OPTION A

Be advised that the Department will accept compaction of asphalt mixtures furnished for driving lanes and ramps, at 1 inch (25mm) or greater, on this project according to OPTION A in accordance with Section 402 and Section 403 of the current Standard Specifications. The Department will require joint cores as described in Section 402.03.02 for surface mixtures only. The Department will accept compaction of all other asphalt mixtures according to OPTION B.

SPECIAL NOTE

For Tree Removal

McCracken County
NEW ACCESS ROAD FROM KY-305 NEAR KY-998, EXTENDING WEST TO THE OHIO RIVER MEGAPARK
Item No. 01-8702

NO CLEARING OF TREES 5 INCHES OR GREATER (DIAMETER BREAST HEIGHT) FROM **MAY 15 THROUGH JULY 31**

If there are any questions regarding this note, please contact Danny Peake, Director, Division of Environmental Analysis, 200 Mero Street, Frankfort, KY 40601, Phone: (502) 564-7250.

SPECIAL NOTE FOR CONCRETE SLURRY

If diamond grinding, grooving or any other process which produces slurry is required on roadways or bridges, the contractor shall ensure that all concrete slurry associated with these processes is collected, managed, and disposed of appropriately. The waste material shall be disposed of at a permitted disposal facility, in accordance with the Kentucky Standard Specifications for Road and Bridge Construction and the Environmental Performance Standards outlined in 401 KAR 47:030, or managed as a material for beneficial reuse. Any fines or remediation related to improper disposal shall be the sole responsibility of the contractor.

Disposal of concrete slurry will not be paid separately and shall be considered incidental to other bid items.

8/20/2019

SPECIAL NOTE FOR ELECTRONIC DELIVERY MANAGEMENT SYSTEM (e-Ticketing) AGGREGATE

This Special Note will apply when indicated on the plans or in the proposal. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction current edition.

1.0 DESCRIPTION. Incorporate an e-Ticketing Delivery Software for weighed aggregate material delivered to the project to report loads and provide daily running totals of weighed aggregate material for pay items and incidental work during the construction processes from the point of measurement and loading to the point of incorporation to the project.

2.0 MATERIALS AND EQUIPMENT. Contractor shall supply material data in JavaScript Object Notation (JSON) documents to the KYTC e-Ticketing Delivery Software (KYTC e-Ticketing Portal) via Application Programming Interface (API) or direct connection. Test and verify that ticket data can be shared from the original source no fewer than 30 days prior to material placement activities. An e-Ticketing Delivery Software supplier can provide a qualified representative for on-site technical assistance during the initial setup, pre-construction verifications, and data management and processing as needed during the Project to maintain material data delivery capabilities. Virtual meetings may be hosted in lieu of on-site meetings when deemed appropriate by the Engineer.

Provide e-Ticketing Delivery Software that will meet the following:

1. The e-Ticketing Delivery Software shall be fully integrated with the Contractor's Load Read-Out scale system at the material source location.

2. The e-Ticketing Delivery Software shall provide real-time delivery to KYTC e-Ticketing Portal.

3. Transmit any updates to the ticket data within 5 minutes of a change.

3.0 CONSTRUCTION. Provide the Engineer with the manufacturer's specifications and all required documentation for data access at the pre-construction conference.

A. Construction Requirements

1. Install and operate software in accordance with the manufacturer's specifications.

2. Verify that all pertinent information is provided by the software within the requirements of this Special Note.

B. Data Deliverables

Provide to the Engineer a means in which to gather report summaries by way of iOS apps, web pages, or any other method at the disposal of the Engineer. The Engineer may request data at any time during the project.

1. Aggregate Material

a. **Real-time Continuous Data Items**

Provide the Engineer access to JSON documents capable of being transmitted through the KYTC's e-Ticketing Portal that displays the following information in real-time with a web-based system compatible with iOS and Windows environments.

- Each Truck
  - Supplier Name
  - Supplier Address
  - Supplier Phone
  - Plant location
  - Date
  - Time at source
  - Project Location

- Contract ID#
- Carrier Name
- Unique Truck ID
- Description of Material
- Load Number
- Gross, Tare and Net Weight
- Weighmaster

4.0 MEASUREMENT. The Department will measure the electronic delivery management system as a lump sum item.

5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

1. Payment is full compensation for all work associated with providing all required equipment, training, and documentation.

2. Payment will be full compensation for costs related to providing the e-Ticketing Delivery Software, including integration with plant load-out systems, and report viewing/exporting process. All quality control procedures including the software representative's technical support and on-site training shall be included in the Contract lump sum price.

Code	Pay Item	Pay Unit
26248EC	ELECTRONIC DELIVERY MGMT SYSTEM-AGG	LS

May 5, 2025

SPECIAL NOTE FOR EXPERIMENTAL KYCT AND FIELD RUT TESTING
June 2025 Update

1.0 General

1.1 Description. The KYCT (Kentucky Method for Cracking Test) and the IDEAL-RT/IDT-HT test results will help determine if the mixture is susceptible to cracking and rutting. During the experimental phase, data will be gathered and analyzed by the Department to determine the durability and stability of the bituminous mixes. Additionally, the data will help the Department to create future performance-based specifications which will include the KYCT and field rutting test methods.

2.0 Equipment

2.1 KYCT Testing Equipment. The Department will require a Marshall Test Press with digital recording capabilities. Other CT testing equipment may be used for testing with prior approval by the Department.

2.2 Water Baths. One or more water baths will be required that can maintain a temperature of 77^{o} +/- 1.8^{o} F with a digital thermometer showing the water bath temperature. Also, one water bath shall have the ability to suspend gyratory specimen fully submerged in water in accordance with AASHTO T-166, current edition.

2.3 Field Rutting Tests. I f t he contractor elects to perform the IDEAL-RT test, in conformance with ASTM D8360-22, the acquisition of the “Option A” or “Option B” test fixture is required. If the IDT-HT is desired, the test press utilized for the KYTC is sufficient. The Department shall approve all test configurations at their discretion.

2.4 Gyratory Molds. Gyratory molds will be required to assist in the production of gyratory specimens in accordance with AASHTO T-312, current edition.

2.5 Ovens. Adequate (minimum of two ovens) will be required to accommodate the additional molds and asphalt mixture necessary to perform the acceptance testing as outlined in Section 402 of the Kentucky Standard Specifications for Road and Bridge Construction, current edition.

2.6 Department Equipment. The Department will provide gyratory molds, PINE 850 Test Press with digital recordation, and CT testing equipment to assist during this experimental phase so data can be gathered.

3.0 Testing Requirements

3.1 Acceptance Testing. Perform all acceptance testing and aggregate gradation as according with Section 402 and Section 403 of the Kentucky Standard Specifications for Road and Bridge Construction, current edition.

3.2 KYCT Testing. Perform crack resistance analysis (KYCT) in accordance with the current Kentucky Method for KYCT Index Testing during the plant production of all surface mixtures. Conform to KYTC Specifications for Mix Design approvals. All production testing is currently informational.

3.2.1 KYCT Frequency. Obtain an adequate sample of hot mix asphalt to ensure the acceptance testing, gradation, and KYCT gyratory samples can be fabricated and is representative of the bituminous mixture. Acceptance specimens shall be fabricated first, then after the specified amount of oven conditioning, fabricate the KYCT samples with the gyratory compactor in accordance with Section 2.4 of this Special Note. Analysis of the KYCT specimens will be required one per sublot produced from the same asphalt material and at the same time as the acceptance specimen is sampled and tested.

3.2.2 Number of Specimens and Conditioning. Fabricate specimens in accordance with the Kentucky Method for KYCT Index Testing. Contrary to the method, for field specimens, fabricate three replicates for cracking resistance analyses and three replicates for rutting resistance analyses. The specimens shall be compacted at the temperature in accordance with KM 64-411.

Contrary to the Kentucky Method, plant produced bituminous material shall be short-term conditioned immediately after sampling for two hours uncovered in the oven at compaction temperature in accordance with KM 64-411.

While the fabricated specimens are allowed to cool in air (fan is permissible) for 30 minutes +/- 5 minutes, find the bulk specific gravity of each specimen according to AASHTO T166. Next, condition the replicates in a 77 °F water bath for 30 minutes +/- 5 minutes. To ensure confidence and reliability of the test results provided by KYCT testing and Field Rut testing, reheating of the asphalt mixture is prohibited.

3.2.3 Long Term Aging CT's. For long-term aging and cracking resistance considerations in mix design, mix and condition 3 specimens uncovered for 20 hours at compaction temperature in accordance with KM 64-411. Perform KYCT testing in accordance with KM 64-450 and record the results on the Long-Term KYCT tab of the latest version of the MixPack.

3.2.4 Record Times. For each sublot, record the time required between drying aggregates in the plant to KYCT specimen fabrication. The production time may vary due to the time that the bituminous material is held in the silo. Record the preconditioning time when the time exceeds the one-hour specimen cool down time as required in accordance with The Kentucky Method for KYCT Index Testing. The preconditioning time may exceed an hour if the technician is unable to complete the test on the same day or within the specified times as outlined in The Kentucky Method for KYCT Index Testing. The production time and the preconditioning time shall be recorded on the AMAW.

3.2.5 File Name. As according to section 7.12 of The Kentucky Method for KYCT Index Testing, save the filename with the following format: "CID_Approved Mix Number_Lot Number_Sublot Number_ Date"

3.3 Field Rut Testing. Perform the rut resistance analysis (IDEAL-RT or IDT-HT) in accordance with ASTM D8360-22 or ALDOT458, respectively. Contrary to ASTM D8360 & ALDOT458, precondition the test specimens in a water bath or forced draft oven at 50 °C +/- 1 °C for 60 +/- 5 min before completing the test.

3.3.1 Field Rut Testing Frequency. Perform one test per lot of mixture produced. The plant produced bituminous material sampled for the field rut test does not have to be obtained at the same time as the acceptance and KYCT sample. If the field rut test sample is not obtained at the same time as the KYCT sample, determine the Maximum Specific Gravity of the KYCT sample in accordance with AASHTO T-209 coinciding with the test specimens.

3.3.2 Number of Specimens and Conditioning. Fabricate in accordance with the Kentucky Method for KYCT Index Testing. Contrary to the method, for field specimens, fabricate three

replicates for rutting resistance analyses. The specimens shall be compacted at the temperature in accordance with KM 64-411. Contrary to the Kentucky Method, plant produced bituminous material shall be short-term conditioned immediately after sampling for two hours uncovered in the oven at compaction temperature in accordance with KM 64-411.

3.3.3 Record Times. Record the production time as according to section 3.2.3 in this special note. Also record the time that the specimens were fabricated. All times shall be recorded on the AMAW.

3.3.4 File Name. Record all field rut data in the latest version of the AMAW.

4.0 Data

Submit the AMAW and all test data that was obtained for acceptance, gradation, KYCT, and field rut testing within five working days once all testing has been completed for a lot to Central Materials Lab and the District Materials Engineer. Also, any data and or comments that the asphalt contractor or district personnel deem informational during this experimental phase, shall also be submitted to the Central Materials Lab and the District Materials Engineer. Any questions or comments regarding any item in this Special Note can be directed to the Central Office, Division of Materials, Asphalt Branch.

5.0 Payment

Any additional labor and testing equipment that is required to fabricate and test the KYCT and field rut specimens shall be considered incidental to the asphalt surface line item. The Department will perform the testing for the KYCT and field rut specimens if a producer does not possess the proper equipment.

June 12th, 2025

SPECIAL NOTE FOR RECYCLED ASPHALT PAVEMENT (RAP) STOCKPILE MANAGEMENT

I. GENERAL

The use of reclaimed asphalt pavement (RAP) from Department projects or other approved sources in hot mix asphalt (HMA) or warm mix asphalt (WMA) shall be subject to stockpile management and handling of material as described in this section.

The Department approves RAP on a stockpile basis, following the process set forth in this method. The contractor's responsibilities in the process are as follows:

- To obtain the Department's approval of all RAP prior to its use on a Department project and to deliver test data and samples as required
- To monitor and preserve the quality and uniformity of the approved material during storage and handling, adding no unapproved material to the existing stockpile
- To comply with the Department's requirements regarding replenishment of approved stockpiles

The Department will approve RAP based on its composition and variability in gradation and asphalt content, and on visual inspections of the stockpile, which the Department may conduct at its discretion. The Department may withdraw approval of a stockpile if the requirements of this specification are not followed in good faith.

The Maximum Percentage Allowed in a mix design will be based on these criteria and on the category of RAP source, as defined in this document.

II. APPROVAL PROCESS

Qualified asphalt producers (listed in List of Approved Materials-Asphalt Mixing Plants) may submit requests for RAP stockpile approval to the Asphalt Branch, Division of Materials, in the Annual Certification for Previously Approved Asphalt Mixing Plants and Related Equipment. The requester shall provide test results as prescribed in Part IID. The Division of Materials may, at their discretion, collect samples or inspect a RAP stockpile consistent with Section IIE.

Upon completion of the review of testing results and, if applicable, visual inspection, the Division of Materials, Asphalt Branch will approve or disapprove the material by letter and will assign a Stockpile Identification Number for each approved RAP stockpile. Note: The contractor's average gradation and asphalt content, as listed in the approval letter, shall be the gradation used in subsequent mix designs. The approval letter will state the applicable limits on the use of the material in mix designs and will summarize the Department's findings, listing the average gradation and asphalt content from the contractor's tests and the corresponding values found by the Department. Where the Maximum Percentage Allowed is low due to variability, the contractor may elect to improve the uniformity of the material by further processing and may again sample, test, and request approval for the material.

No material shall be added to a stockpile after it has been approved, except as provided in Parts V, VI, and VII below.

IIA. RAP Quality Management Plan

For a contractor to receive approval to use RAP on any department project, a RAP Quality Management Plan must first be approved by the department. The RAP Quality Management Plan shall be submitted to the

Division of Materials annually for approval as part of the Contractor's Quality Control Plan/Checklist. The Quality Management Plan is required to demonstrate how the Contractor will provide consistency and quality of material utilized in all asphalt mixes produced for use on Department projects. The Quality Management Plan shall include:

- Unprocessed RAP Stockpiles
  - Designation of stockpile(s) as single or multiple source
  - Designation of stockpile(s) as classified or unclassified
  - Designation of stockpile(s) as captive or continuously replenishing
  - Plan for how stockpile(s) is built (layers, slope, etc.)
  - Plan to minimize stockpile(s) contamination
- Processing and Crushing
  - Equipment used to feed screener or crusher
  - Excavation process based on equipment type
- Processing Millings
  - Single Project or Source
    - Screening, Fractionation, or Crushing plan
  - Multiple Source
    - Process to achieve uniform material from stockpile
    - Screening, Fractionation, or Crushing plan
- Processed RAP Stockpiles
  - Minimization of segregation
  - Minimization of moisture

IIB. RAP Stockpile Placement

All processed RAP stockpiles shall be placed on a sloped, paved surface. The requirement for a paved surface may be waived by the Cabinet if the Contractor's RAP Quality Management Plan demonstrates effective material handling that will minimize deleterious material from beneath the processed stockpile entering the plant. *No processed stockpile will be placed directly on grass or dirt.*

IIC. Stockpile Identification Signs

RAP stockpiles shall be identified with posted signs displaying the gradation of material in the stockpile (course, intermediate, or fine). These signs shall be made of weatherproof material and shall be highly visible. Numerals shall be easily readable from outside the stockpile area. If a stockpile exists in two or more parts, each part must have its own sign.

IID. Standard Approval Procedure

The Contractor shall obtain random samples representative of the entire stockpile and shall have each sample tested for gradation and asphalt content according to KM 64-426, KM 64-427, and AASHTO T308. The material samples must be in its final condition after all crushing and screening. At least one sample shall be obtained for each 1,000 tons of processed RAP, with a minimum of five samples per stockpile. Sampling shall be performed according to the method prescribed for asphalt mix aggregates in the Department's Materials Field Testing and Sampling Manual and KM 64-601. The minimum sampling size (after quartering) for tests of RAP samples is 1,500 g. except for samples containing particles more than one inch in diameter, for which the minimum is 2,000 g.

To request approval of a RAP stockpile, submit the following documents to the Division of Materials. It is the requester's responsibility to correctly address, label, and deliver these submittals:

• Submit request for approval at beginning of the paving season as part of the Annual Certification for Previously Approved Asphalt Mixing Plants and Related Equipment.

• If requesting approval after paving season begins, submit memo, including stockpile portion of the inspection list for Annual Certification for Previously Approved Asphalt Mixing Plants and Related Equipment, to Division of Materials.

• Reports of the tests prescribed above using the Stockpile <INSERT NAME> document.

• A drawing of the plant site showing the location of the stockpile to be approved *and all other stockpiles on the premises*

Mail, deliver or email the request form, with test reports and site drawing, to:

Kentucky Transportation Cabinet
Division of Materials
ATTN: Asphalt Branch Manager
1227 Wilkinson Boulevard
Frankfort, Kentucky 40601

Robert.Semones@ky.gov

IIE. Tests and inspections by the Department

The Department shall have the right to observe the collection of samples, or to perform the sampling and testing as a verification of contractor submittal. As a condition of approval, the Department may at any time inspect and sample RAP stockpiles for which approval has been requested and may perform additional quality control tests to determine the consistency and quality of the material.

The approval letter issued by the Department will include any results of verification testing performed by the Cabinet. The approved contractor results should be used by mix design technicians in the design calculations.

III. RAP STOCKPILE TIERED MANAGEMENT AND EFFECTIVE BINDER CONTENT

The stockpile management and approval requirements will be tiered based on the maximum cold feed percentages as defined in this section and Table 1. below.

Table 1. Tiered Testing Requirements

Mix Type	0-≤12%	12-≤20%	20-≤35%
Surface	Tier 1	Tier 2	Tier 3
Base	Tier 1	Tier 2	Tier 3

NOTE: All asphalt mixes and binder selection will be subject to Section 409 of the current Standard Specifications.

The following requirements will apply based on the percentage of RAP in the mix.

Tier 1

Tier 1 mixes (less than or equal to 12% RAP) will be subject to the requirements of sections IIA, IIB, and IIC.

Tier 2

Tier 2 mixes (12% to less than 20% RAP) will be subject to the requirements of Section II in its entirety and Table 2 requirements.

Tier 3

Tier 3 Asphalt Base mixes with 20% to less than 35% RAP, Tier 3 Asphalt Surface mixes with 20% to less than 30% RAP will be subject to Section II in its entirety and Table 2 requirements.

IV. MAXIMUM PERCENTAGE OF RAP ALLOWED

The Maximum Percent of RAP allowed in mix designs shall be the lowest percentage determined by the gradation and asphalt content of the RAP, as established under the criteria below, and requirements listed in Section III.

Limits according to range in gradation and bitumen content

The Maximum Percent of RAP Allowed, based on gradation and asphalt content, shall be determined by the Department using the standard deviation of these values. This standard deviation will be calculated using data provided by the contractor from at least five samples. While the contractor is required to provide the data from these tested samples, the Department retains the discretion to perform its own sampling and testing to support or verify its findings. An apparent outlier shall not be considered in determining these ranges. Where one result appears to be unrepresentative of the whole, two or more additional samples shall be tested. The outlying value of all tests shall then be excluded from the range. The maximum percentage of RAP allowable shall be the lowest percentage determined according to Table 2 below.

Table 2. Maximum Percent RAP According to Variability in Test Results

	Standard Deviation as calculated above:		
Surface			
% asphalt content	< 0.4	< 0.5	
% passing No. 200 sieve	< 1.25	< 1.5	
% passing Median Sieve	< 4.0	< 5.0	
	Allowable RAP Cold Feed %		
	Tier 3 - 20%-30%	Tier 2 - 12%-20%	Tier 1 - 0%-12%
Base			
% asphalt content	< 0.5	< 0.75	
% passing No. 200 sieve	< 1.5	< 2.25	
% passing Median sieve	< 5.0	< 7.0	
	Allowable RAP Cold Feed %		
	Tier 3 - 20%-35%	Tier 2 - 12%-20%	Tier 1 - 0%-12%

NOTE: These allowances notwithstanding, the Contractor is required to maintain the mixture within the Mixture Control Tolerances of Kentucky Method 443.
The percentage allowable in mix designs shall be limited to meet the design criteria for viscosity established in the Standard Specifications.

V. GENERAL STOCKPILE REQUIREMENTS AND REPLENISHMENT

V.A. Single Pavement Source

Early approval of material from a single pavement source. When a new stockpile is to consist entirely of millings removed from a single existing pavement, the stockpile may be approved based on samples taken during the milling and processing operations, prior to completion of milling. The initial stockpile may be approved as either a new stockpile or a new stockpile in continual replenishment status.

For continual replenishment status, samples shall be taken from the processed stockpile after it reaches 1,000 tons. A total of five initial samples, plus one additional sample for every 1,000 tons, is required. As prescribed in Part II above, the contractor shall test all samples and deliver the test results, together with a letter request for approval in Continual Replenishment status, to the address indicated. The stockpile shall be subject to initial approval as prescribed above in Part II. Once approved, it may be replenished without further approvals as provided in Part VII below.

V.B. Heterogeneous or contaminated material

Asphalt pavement millings containing traffic detection loops, raised pavement markers, or other debris must be separated and excluded before stockpiling RAP for approval for use in KYTC asphaltic concrete mixtures.

No material other than RAP from an approved stockpile shall be included in mixtures for State projects. The following materials are specifically excluded:

• Material contaminated with foreign matter such as liquids, soil, concrete, or debris

• Plant waste, especially waste containing abnormal concentrations of bitumen, drum build-up, or material from spills or plant clean-up operations

The following materials shall not be added to or placed in proximity to an approved stockpile but may be accumulated in a separate stockpile and submitted for approval according to Part III:

- Production mixtures returned to the plant for any reason.
- Mis-proportioned mixtures, especially those generated at start-up.

VI. REPLENISHMENT OF STOCKPILES

An approved RAP stockpile may be replenished with Department approval, provided the replenishment material meets all necessary requirements for approval and maintains uniformity in gradation and asphalt content as outlined in this document.

VI.A. Procedure and approval criteria

The procedure for requesting approval of a stockpile replenishment, that is not in continual replenishment status, shall be the same as for approval of an original stockpile, and the material for the replenishment shall meet all criteria for approval as a new stockpile. RAP proposed for replenishment shall be sampled and tested by the Contractor for gradation and asphalt cement as prescribed in Section II above. The Laboratory shall

review these results and provide approval for use in Department asphalt mix designs, according to Table 2 above.

VI.B. Effect of replenishment on existing approved mix designs

Replenishment of a stockpile may render certain mix designs invalid, depending on the percent RAP allowed in the design and on the difference in average properties between the old and new stockpiles. A replenished stockpile may be used as the RAP ingredient in an existing approved design provided that:

1. The Maximum Percent Allowed for the replenishment stockpile equals or exceeds the percent RAP called for in the mix design. In no case may the Maximum Percent Allowed be exceeded.

However, if a mix design calls for up to 5.0 percent more than the Maximum Percent Allowed for the replenishment, the *design* may be adjusted, with approval, to use the lower percent allowed, provided that the production mixture continues to meet all acceptance criteria. For example, a design which calls for 20 percent RAP may be adjusted and produced with 15 percent if it continues to meet for acceptance.

VII. CONTINUAL REPLENISHMENT WITHOUT RE-APPROVAL

At the request of the contractor, a previously approved stockpile may be placed in Continual Replenishment Status and may be replenished any number of times without re-approval provided that:

1. Replenishment is within six months of the last stockpile addition.
2. The contractor shall continue to monitor and test the materials added to the stockpile and shall forward these results to the Division of Materials for every 1,000 tons of RAP added to the stockpile.
3. The contractor must certify that replenishment materials are free of contaminants.
4. The Department shall be notified by letter to the Director of the Division of Materials that the stockpile is being replenished on a continual basis.
5. The RAP Maximum Percent Allowed for continual replenishment shall be limited by Sections III and IV.

Note: Upon request, one 20-pound sample bag of RAP for each Continual Replenishment Stockpile shall be submitted to the Division of Materials for petrographic analysis every 12 months.

The Department may inspect, sample, and test such stockpiles at its discretion and may, upon determining that the stockpile is unsuitable, withdraw approval of the material and all mix designs which include it. Approval of the stockpile may be withdrawn at any time based upon extreme or erratic ingredient proportions, unsuitable ingredients, or poor performance, as determined by the Division of Materials, Asphalt Branch. The Department will conduct periodic comparison testing on the opposite quarters of samples submitted by the Contractor for special replenishment approval category. The approval of the stockpile may be withdrawn if

erroneous information was found on the contractor's testing and/or improper sampling procedures were involved after a thorough investigation.

VIII. DEPLETION OF STOCKPILE AND EXPIRATION OF APPROVAL

When a stockpile has been fully depleted, the Contractor may replenish it within 24 months after the date of depletion; a depleted stockpile not replenished after 24 months will be removed from the approved list and may not be replenished.

Approval of a stockpile may be withdrawn if, in the finding of the Division of Materials, Asphalt Branch, the total amount of material used in new mixtures equals the total tonnage of the original stockpile plus all approved replenishments. Six years from the original approval of a stockpile or from its most recent replenishment, a stockpile shall be presumed to be depleted, and its approval shall expire. This shall apply to all stockpiles, regardless of status or history of use.

IX. RECORDS

The Contractor shall maintain records at the plant site on all RAP stockpiles. These records shall be available for inspection by representatives of the Department and shall include the following:

- All test results.
- The Department's approval letter for each stockpile and replenishment, together with the Contractor's requests for approval and all data submitted therewith.
- A current drawing of all stockpile locations at the plant site, including unapproved stockpiles, showing stockpile numbers of all stockpiles approved for State work.

X. RELOCATION OF STOCKPILE

If material from an approved RAP stockpile is to be moved to another location, the contractor shall seek approval from the Department prior to its further use on State projects. A letter request shall be submitted to the Division of Materials indicating the current stockpile location, the total quantity of material to be moved, and the amount, if any, to remain in the current location. The Division of Materials will issue an approval letter applicable to the new location.

June 18, 2025

TEAM KENTUCKY TRANSPORTATION CABINET

KENTUCKY TRANSPORTATION CABINET
Department of Highways
DIVISION OF RIGHT OF WAY & UTILITIES

TC 62-226
Rev. 01/2016
Page 1 of 1

RIGHT OF WAY CERTIFICATION

☒ Original	☐ Re-Certification	RIGHT OF WAY CERTIFICATION	
ITEM #	**COUNTY**	**PROJECT # (STATE)**	**PROJECT # (FEDERAL)**
1-8702.00	McCracken	1100 FD04 073 8684501R	n/a
PROJECT DESCRIPTION			
New Access Road from KY 305 near KY 998			

☐ **No Additional Right of Way Required**

Construction will be within the limits of the existing right of way. The right of way was acquired in accordance to FHWA regulations under the Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970, as amended. No additional right of way or relocation assistance were required for this project.

☒ **Condition # 1 (Additional Right of Way Required and Cleared)**

All necessary right of way, including control of access rights when applicable, have been acquired including legal and physical possession. Trial or appeal of cases may be pending in court but legal possession has been obtained. There may be some improvements remaining on the right-of-way, but all occupants have vacated the lands and improvements, and KYTC has physical possession and the rights to remove, salvage, or demolish all improvements and enter on all land. Just Compensation has been paid or deposited with the court. All relocations have been relocated to decent, safe, and sanitary housing or that KYTC has made available to displaced persons adequate replacement housing in accordance with the provisions of the current FHWA directive.

☐ **Condition # 2 (Additional Right of Way Required with Exception)**

The right of way has not been fully acquired, the right to occupy and to use all rights-of-way required for the proper execution of the project has been acquired. Some parcels may be pending in court and on other parcels full legal possession has not been obtained, but right of entry has been obtained, the occupants of all lands and improvements have vacated, and KYTC has physical possession and right to remove, salvage, or demolish all improvements. Just Compensation has been paid or deposited with the court for most parcels. Just Compensation for all pending parcels will be paid or deposited with the court prior to AWARD of construction contract

☐ **Condition # 3 (Additional Right of Way Required with Exception)**

The acquisition or right of occupancy and use of a few remaining parcels are not complete and/or some parcels still have occupants. All remaining occupants have had replacement housing made available to them in accordance with 49 CFR 24.204. KYTC is hereby requesting authorization to advertise this project for bids and to proceed with bid letting even though the necessary right of way will not be fully acquired, and/or some occupants will not be relocated, and/or the just compensation will not be paid or deposited with the court for some parcels until after bid letting. KYTC will fully meet all the requirements outlined in 23 CFR 635.309(c)(3) and 49 CFR 24.102(j) and will expedite completion of all acquisitions, relocations, and full payments after bid letting and prior to AWARD of the construction contract or force account construction.

Total Number of Parcels on Project	18	EXCEPTION (S) Parcel #	ANTICIPATED DATE OF POSSESSION WITH EXPLANATION
Number of Parcels That Have Been Acquired			
Signed Deed	13		
Condemnation	5		
Signed ROE			

Notes/ Comments (Text is limited. Use additional sheet if necessary.)

LPA RW Project Manager		Right of Way Supervisor	
Printed Name		Printed Name	
Signature		Signature	Frances Westlie — Digitally signed by Frances Westlie Date: 2025.11.14 09:16:07 -06'00'
Date		Date	

Right of Way Director		FHWA	
Printed Name		Printed Name	
Signature	Kelly R. Divine — Digitally signed by Kelly Divine Date: 2025.11.14 09:19:48 -06'00'	Signature	
Date		Date	

UTILITIES AND RAIL CERTIFICATION NOTE

McCracken County
FD04 073 8684501U
NEW ACCESS ROAD FROM KY-305 NEAR KY-998, EXTENDING WEST TO THE OHIO RIVER MEGAPARK. (2-LANE INITIAL, 4-LANE ULTIMATE)(12CCN)(14CCR)(18CCN) (2022CCR) (2024CCR)
ITEM NUMBER: 01-8702.00

PROJECT NOTES ON UTILITIES

Please Note: The information presented in this Utility Note is informational in nature and the information contained herein is not guaranteed.

The contractor will be responsible for contacting all utility facility owners on the subject project to coordinate his activities. The contractor will coordinate his activities to minimize and, where possible, avoid conflicts with utility facilities. Due to the nature of the work proposed, it is unlikely to conflict with the existing utilities beyond minor facility adjustments. Where conflicts with utility facilities are unavoidable, the contractor will coordinate any necessary relocation work with the facility owner and Resident Engineer. The Kentucky Transportation Cabinet maintains the right to remove or alter portions of this contract if a utility conflict occurs. The utility facilities as noted in the previous section(s) have been determined using data garnered by varied means and with varying degrees of accuracy: from the facility owners, a result of S.U.E., field inspections, and/or reviews of record drawings. The facilities defined may not be inclusive of all utilities in the project scope and are not Level A quality, unless specified as such. It is the contractor's responsibility to verify all utilities and their respective locations before excavating.

The contractor shall make every effort to protect underground facilities from damage as prescribed in the Underground Facility Damage Protection Act of 1994, Kentucky Revised Statute KRS 367.4901 to 367.4917. It is the contractor's responsibility to determine and take steps necessary to be in compliance with federal and state damage prevention directives. The contractor is instructed to contact KY 811 for the location of existing underground utilities. Contact shall be made a minimum of two (2) and no more than ten (10) business days prior to excavation. The contractor shall submit Excavation Locate Requests to the Kentucky Contact Center (KY 811) via web ticket entry. The submission of

UTILITIES AND RAIL CERTIFICATION NOTE

McCracken County
FD04 073 8684501U
NEW ACCESS ROAD FROM KY-305 NEAR KY-998, EXTENDING WEST TO THE OHIO RIVER MEGAPARK. (2-LANE INITIAL, 4-LANE ULTIMATE)(12CCN)(14CCR)(18CCN) (2022CCR) (2024CCR)
ITEM NUMBER: 01-8702.00

this request does not relieve the contractor from the responsibility of contacting non-member facility owners, whom are to be contacted through their individual Protection Notification Center. It may be necessary for the contractor to contact the County Court Clerk to determine what utility companies have facilities in the area. Non-compliance with these directives can result in the enforcement of penalties.

NOTE: DO NOT DISTURB THE FOLLOWING FACILITIES LOCATED WITHIN THE PROJECT DISTURB LIMITS

Comcast (Paducah) – CATV

Kentucky Utilities – Electric

AT&T-AT&T KY – Communication

Paducah Water – Water

***All of the above utilities are along KY 358**

The Contractor is fully responsible for protection of all utilities listed above

Form Revised 6/24/16

UTILITIES AND RAIL CERTIFICATION NOTE

McCracken County
FD04 073 8684501U
NEW ACCESS ROAD FROM KY-305 NEAR KY-998, EXTENDING WEST TO THE OHIO RIVER MEGAPARK. (2-LANE INITIAL, 4-LANE ULTIMATE)(12CCN)(14CCR)(18CCN) (2022CCR) (2024CCR)
ITEM NUMBER: 01-8702.00

THE FOLLOWING FACILITY OWNERS ARE RELOCATING/ADJUSTING THEIR FACILITIES WITHIN THE PROJECT LIMITS AND WILL BE COMPLETE PRIOR TO CONSTRUCTION

Kentucky Utilities - Electric, Completion date: 5/31/2025*

AT&T-AT&T KY – Communication, Completion date: 5/31/2025*

Paducah Water – Water, Completion date: 6/30/2025*

Comcast – Communication, Completion date: 6/15/2025*

***All of the above utilities are along KY 358**

JPEC – Electric, Complete (Rudy Woods Road)

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE OWNER OR THEIR SUBCONTRACTOR AND IS TO BE COORDINATED WITH THE ROAD CONTRACT

Not Applicable

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE ROAD CONTRACTOR AS INCLUDED IN THIS CONTRACT

Not Applicable

RAIL COMPANIES HAVE FACILITIES IN CONJUNCTION WITH THIS PROJECT AS NOTED

Form Revised 6/24/16

UTILITIES AND RAIL CERTIFICATION NOTE

McCracken County
FD04 073 8684501U
NEW ACCESS ROAD FROM KY-305 NEAR KY-998, EXTENDING WEST TO THE OHIO RIVER MEGAPARK. (2-LANE INITIAL, 4-LANE ULTIMATE)(12CCN)(14CCR)(18CCN) (2022CCR) (2024CCR)
ITEM NUMBER: 01-8702.00

☐ **No Rail Involvement** ☒ **Rail Involved** ☐ **Rail Adjacent**

AREA FACILITY OWNER CONTACT LIST

Facility Owner	Address	Contact Name	Phone	Email
AT&T-AT&T KY - Communication	810 Kentucky Avenue Paducah KY 42003	Alan Shelby	2704445048	as7168@att.com
Comcast (Paducah) - CATV	3620 James Sanders Blvd. Paducah KY 42001	Christopher Seig	2702103499	christopher_seig@comcast.com
Jackson Purchase Energy Corp - Electric	6525 US 60 West	Travis Spiceland	2704427321	travis.spiceland@JPEnergy.com

Form Revised 6/24/16

UTILITIES AND RAIL CERTIFICATION NOTE

McCracken County
FD04 073 8684501U
NEW ACCESS ROAD FROM KY-305 NEAR KY-998, EXTENDING WEST TO THE OHIO RIVER MEGAPARK. (2-LANE INITIAL, 4-LANE ULTIMATE)(12CCN)(14CCR)(18CCN) (2022CCR) (2024CCR)
ITEM NUMBER: 01-8702.00

	Paducah KY 42001			
Kentucky Utilities - Electric	820 West Broadway Louisville KY 40202	Caroline Justice	5026273708	Caroline.Justice@lge-ku.com
Paducah and Illinois Railroad Company - Railroad	2151 N. Mill Street Jackson MS 39202	John Dinning	6019142658	John.Dinning@cn.ca
Paducah Water - Water	PO Box 2377 Paducah KY 42002	Jason Petersen	2704439627	jpetersen@pwwky.com

Form Revised 6/24/16

SPECIAL NOTES FOR
PROTECTION OF RAILROAD INTEREST

Illinois Central Railroad Company

I. AUTHORITY OF RAILROAD ENGINEER AND STATE ENGINEER:

A. *The authorized representative of the Railroad Company, hereinafter referred to as Railroad Engineer, shall have final authority in all matters affecting the safe maintenance of Railroad traffic of his Company including the adequacy of the foundations and structures supporting the Railroad tracks.*

B. *The authorized representative of the State, hereinafter referred to as the Engineer, shall have authority over all other matters as prescribed herein and in the Project Specifications.*

II. NOTICE OF STARTING WORK:

A. *The Contractor shall not commence any work on Railroad rights of way until he has complied with the following conditions:*

1. Given the Railroad written notice, with copy to the Engineer who has been designated to be in charge of the work, **at least ten (10) days in advance** of the date he proposes to begin work on Railroad rights of way. **If flagging service is required, such notice shall be submitted at least thirty (30) days in advance** of the date scheduled to commence work. The Railroad's Contact information is on the Summary Sheet.

2. Obtain written authorization from the Railroad to begin work on Railroad rights of way, such authorization to include an outline of specific conditions with which he must comply and execution of the Railroad's standard right of entry agreement.

3. Obtain written approval from the Railroad of Railroad Protective Insurance Liability coverage as required by paragraph 14 herein.

4. Furnish a schedule for all work within the Railroad rights of way as required by paragraph 7, B, 1.

B. *The Railroad's written authorization to proceed with the work shall include the names, addresses, and telephone numbers of the Railroad's representatives who*

are to be notified as hereinafter required. Where more than one representative is designated, the area of responsibility of each representative shall be specified.

III. INTERFERENCE WITH RAILROAD OPERATIONS:

A. *The Contractor shall so arrange and conduct his work that there will be no interference with Railroad operations, including train, signal, telephone and telegraphic services, or damage to the property of the Railroad Company or to poles, wires, and other facilities of tenants on the rights of way of the Railroad Company. Whenever work is liable to affect the operations or safety of trains, the method of doing such work shall first be submitted to the Railroad Engineer for approval, but such approval shall not relieve the Contractor from liability. Any work to be performed by the Contractor which requires flagging service or inspection service (watchman) shall be deferred by the Contractor until the flagging protection required by the Railroad is available at the job site.*

B. *Whenever work within Railroad rights of way is of such a nature that impediment to Railroad operations such as use of runaround tracks or necessity for reduced speed is unavoidable, the Contractor shall schedule and conduct his operations so that such impediment is reduced to the absolute minimum.*

C. *Should conditions arising from, or in connection with the work, require that immediate and unusual provisions be made to protect operations and property of the Railroad, the Contractor shall make such provisions. If in the judgment of the Railroad Engineer, or in his absence, the Engineer, such provisions are insufficient, either may require or provide such provisions, as he deems necessary. In any event, such unusual provisions shall be at the Contractor's expense and without cost to the Railroad or the State.*

IV. TRACK CLEARANCES

A. *The minimum track clearances to be maintained by the Contractor during construction are shown on the Project Plans. However, before undertaking any work within Railroad rights of way, or before placing any obstruction over any track, the Contractor shall:*

1. Notify the Railroad's representative **at least 72 hours in advance** of the work.

2. Receive assurance from the Railroad's flagging representative that arrangements have been made for flagging service as necessary.

3. Receive permission from the Railroad's representative to proceed with the work.

4. Ascertain that the Engineer has received copies of notice to the Railroad and of the Railroad's response thereto.

V. CONSTRUCTION PROCEDURES

A. General:

1. Construction work on Railroad property shall be:

   a) Subject to the inspection and approval of the Railroad.

   b) In accord with the Railroad's written outline of specific conditions.

   c) In accord with the Railroad's general rules, regulations and requirements including those relating to safety, fall protection and personal protective equipment.

   d) In accord with all Special Notes, Summaries, and Addendums.

2. The Railroad requires a submission of construction procedure that meets the requirements of these Special Notes and attachments. The Railroad's **submittal review period is thirty (30) days. Resubmissions will be reviewed within 2 weeks.**

B. Excavation and shoring:

1. The sub grade of an operated track shall be **maintained with edge of berm at least 10'0" from centerline of track and not more than 18 inches below top of rail, and a 1 vertical to 1.5 horizontal slope from that point outwards.** Contractor will not be required to make existing section meet this specification if substandard, in which case the existing section will be maintained.

2. The Contractor will be required to take special precaution and care in connection with excavating and shoring pits, and in driving piles, or sheeting for footings adjacent to tracks to provide adequate lateral support for the tracks and the loads which they carry, without disturbance of track alignment and surface, and to avoid obstructing track clearances with working equipment, tools or other material. The procedure for doing such work, including need of and plans for shoring, shall first be approved by the Engineer and the Railroad Engineer, but such approval shall not relieve the Contractor from liability.

3. The Contractor shall submit a detailed procedure for the installing of sheeting/shoring adjacent to Railroad Tracks.

4. Shoring protection shall be provided when excavating adjacent to an active track or railroad facility or as determined by the Railroad. Shoring will be provided in accordance with AREMA *Manual for Railway Engineering* Chapter 8, part 28; except as noted below.

5. Shoring may not be required if all of the following conditions are satisfied:

   a. Excavation does not encroach upon a 1½ horizontal: 1 vertical theoretical slope line starting 1'-0" below top of rail and at 12'-0" minimum from centerline of the track (live load influence zone).

   b. Track is on level ground or in a cut section and on stable soil.

   c. Excavation does not adversely impact the stability of a Railroad facility (i.e. signal bungalow, drainage facility, undergrade bridge, building, etc.)

   d. Shoring is not required by any governing construction code.

6. When the track is on an embankment, excavating the toe of the embankment without shoring may affect the stability of the embankment. Therefore, excavation of the embankment toe without shoring will not be permitted.

7. Trench boxes are prohibited for use on Railroad property within the theoretical live load influence zone.

8. The required protection is the cofferdam type that completely encloses the excavation. Where dictated by conditions, partial cofferdams with opened sides away from the track may be used. Cofferdams shall be constructed using steel piling, or when approved by the engineer, steel soldier piles with timber lagging. Wales and struts shall be provided and designed as needed. The following shall be considered when designing cofferdams:

   a. Shoring shall be designed to resist a vertical lice load surcharge of 1,880 lbs. per square foot, in addition to active earth pressure. The surcharge shall be assumed to act on a continuous strip, 8'6" wide. Lateral pressures due to surcharge shall be computed using the strip load formula shown in AREMA *Manual for Railway Engineering*, Chapter 8, Part 20.

   b. Allowable stresses in materials shall be in accordance with AREMA *Manual for Railway Engineering,* Chapter 7, 8, and 15.

   c. A construction procedure for temporary shoring shall be shown on the drawing.

   d. All shoring systems on or adjacent to Railroad right-of-way shall be equipped with railings or other approved fall protection.

e. A minimum horizontal clearance of 10’-0” from centerline of the track to face of nearest point of shoring shall be maintained provided a 12’-0” roadbed is maintained with a temporary walkway and handrail system.

9. The Contractor shall submit the following drawings and calculations (all shall be signed/sealed by a Professional Engineer) for the Railroad’s review and approval.

a. Six (6) sets of detailed drawings of the shoring systems showing sizes of all structural members, details of connections, and distances from centerline of track to face of shoring. Drawing shall show a section showing height of shoring and track elevation in relation to bottom of excavation.

b. Six (6) sets of calculations of the shoring design. The drawings and calculations shall be prepared by a Licensed Professional Engineer and shall bear the Engineer’s seal and signature. Shoring plans shall be approved by the Railroad’s construction engineering and inspection representative.

c. For sheeting and shoring within 18’-0” of the centerline of the track, the live load influence zone, and in slopes, the Contractor shall use interlocked steel sheeting (sheet pile).

d. Sheet pile installed in slopes or within 18’-0” of the centerline shall <u>not</u> be removed.

e. Sheet pile shall be cut off a minimum of 3’-0” below the finished grade, ditch line invert, or as directed by the Engineer. The ground shall be backfilled and compacted immediately after sheet pile is cut off.

f. A procedure for cutting off the sheet pile and restoring the embankment shall be submitted to the Engineer for review and acceptance.

C. Demolition Procedure:

1. Railroad tracks and other railroad property, including signals, structures, and other facilities, must be protected from damage during the procedure. No crane or equipment may be set on the rails or track structure and no material may be dropped on Railroad property.

2. The Contractor is required to submit a plan showing the location of cranes, horizontally and vertically, operating radii, with delivery or disposal locations shown. The location of all tracks and other railroad facilities as well as all obstructions such as wire lines, poles, adjacent structures, etc. must also be shown.

3. Crane rating sheets showing cranes to be adequate for **150% of the actual weight of the pick.** A complete set of crane charts, including crane, counterweight, and boom nomenclature is to be submitted.

4. Plans and computations showing the weight of the pick must be submitted. Calculations shall be made from plans of the existing and/or proposed structure showing complete and sufficient details with supporting data for the demolition or erection of the structure. If plans do not exist, lifting weights must be calculated from field measurements. If possible, field measurements shall be taken with a Railroad representative present.

5. A data sheet must be submitted listing the types, size, and arrangements of all rigging and connection equipment. The safe working load capacity of all rigging and connecting equipment shall be 150% above the calculated weight of the pick.

6. A complete procedure is to be submitted, including the order of lifts, time required for each lift, and any repositioning or re-hitching of the crane or cranes.

7. All erection or demolition plans, procedures, data sheets, etc. submitted must be prepared, signed and sealed by a Registered Professional Engineer.

8. The Railroad's representative must be present at the site during the entire demolition and erection procedure period.

9. All procedures, plans and calculations shall first be approved by the Engineer and the Railroad Engineer, but such approval does not relieve the Contractor from liability.

10. Loads shall not be supported while any trains are passing if that piece of equipment has the capacity to foul a 50' envelope in the event of an equipment failure.

11. The names and experience of the key Contractor personnel involved in the operation shall be included in the Contractor's means and methods submission.

12. Existing, obsolete, bridge piers shall be removed to a minimum of 3'-0" below the finished grade, final ditch line invert, or as directed by the Engineer.

13. A minimum quantity of 25 tons of Railroad approved track ballast may be required to be furnished and stockpiled on site by the Contractor, or as directed by the Engineer.

14. On-track or ground debris shields such as crane mats are prohibited.

15. Overhead Demolition Debris Shield – Shall be installed prior to the demolition of a bridge deck or other relevant portions of the superstructure.

    a. The demolition debris shield shall be erected from the underside of the bridge over the track area to catch all falling debris.

    b. The Contractor shall include the demolition debris shield installation/removal means and methods as part of the proposed Controlled Demolition procedure submission.

    c. The demolition debris shield shall provide 23'-0" minimum vertical clearance if the existing clearance is less than 23'-0" as approved by the Railroad. Horizontal clearance to the centerline of the track should not be reduced unless approved by the Engineer.

    d. The vertical clearance ATR (above top of rail) is measured from the top of rail to the lowest point on the overhead shielding system measured within a distance of 8'-0" out from each side of the track centerline.

    e. The demolition debris shield design and supporting calculations, all signed/sealed by a Professional Engineer, shall be submitted for review and acceptance.

    f. The demolition debris shield shall have a **minimum** design load of 50 pounds per square foot **plus** the weight of the equipment, debris, personnel, and other loads to be carried.

    g. The Contractor shall include the proposed bridge deck removal procedure in its demolition means and methods and shall verify that the size and quantity of the demolition debris generated by the procedure does not exceed the shield design loads.

h. The contractor shall clean the demolition debris shield daily or more frequently as dictated either by the approved design parameters or as directed by the Engineer.

16. Vertical Demolition Shield – This type of shield may be required for substructure removals in close proximity to track and other facilities, as determined by the Engineer.

    a. Prior to commencing the demolition activity, the Contractor shall install a ballast protection system consisting of geotextile to keep the railroad ballast from becoming fouled with construction or demolition debris and fines. The geotextile ballast protection system shall be installed and maintained by the Contractor for the project duration in accordance with the attached plan, or with additional measures as directed by the Engineer.

    b. The Contractor shall submit detailed plans, with detailed calculations, prepared and submitted by a Professional Engineer of the protection shield and ballast protection systems for approval prior to the start of demolition.

    c. Blasting will not be permitted to demolish a structure over or within Railroad right-of-way.

17. The Controlled Demolition procedure must be approved by the Railroad Engineer prior to undertaking work on the project.

18. The Contractor shall provide timely communication to the Railroad Engineer when scheduling the demolition related work so that the Engineer may be present during the entire demolition procedure.

19. At any time during demolition activities, the Engineer may require revisions to the previously approved procedures to address weather, site conditions or other circumstances which may create a potential hazard to rail operations or Railroad facilities. Such revisions may require immediate interruption or termination of ongoing activities until such time the issue is resolved to the Engineer’s satisfaction. The Railroad shall not be responsible for any additional costs or time claims associated with such revisions.

D. *Erection Procedure:*

The Contractor shall submit a detailed procedure for performing erection on/about Railroad property.

1. The Contractor shall submit six (6) copies of the detailed procedure for erection of the proposed structures over or adjacent to the tracks or right-of-way. This procedure shall include a plan showing the locations of cranes, horizontally and vertically, operating radii, with staging locations shown, including beam placement on ground or truck unloading staging plan. Plan should also include the location of all tracks, other railroad facilities; wires, poles, adjacent structures, or buried utilities that could be affected, showing that the proposed lifts are clear of these obstructions should be shown. No crane or equipment may be set on the rails or track structure.

2. Also included with this submittal the following information:

    a. As-Built Bridge Seat Elevations - All as-built bridge seats and top of rail elevations shall be furnished to the Engineer for review and verification at least 30 days in advance of construction or erection, to ensure that minimum vertical clearances as approved in the plans will be achieved.

    b. Computations showing weight of picks must be submitted. Computations shall be made from plans of the structure beams being erected and those plans or sections thereof shall also be included in the submittal; the weight shall include the weight of concrete or other materials including lifting rigging.

    c. Crane rating sheets showing cranes to be adequate for 150% of the actual weight of the pick. A complete set of crane charts, including crane, counterweight, maximum boom angle, and boom nomenclature is to be submitted. Safety factors that may have been “built in” to the crane charts are not to be considered when determining the 150% Factor of Safety.

    d. A data sheet shall be prepared listing the type, size and arrangements of slings, shackles, or other connecting equipment. Include copies of a catalog or information sheets for specialized equipment. All specific components proposed for use shall be clearly identified and highlighted in the submitted documents. The safe working load capacity of the connecting equipment shall be 150% above the calculated weight of the pick.

    e. A complete written procedure is to be included that describes the sequence of events, indicating the order of lifts and any repositioning or rehitching of the crane or cranes.

f. A time schedule for each of the various stages must be shown as well as a schedule for the entire lifting procedure. The proposed time frames for all critical sub tasks (i.e., performing aerial splices, installing temporary bracing, etc.) shall be furnished so that the potential impact(s) to Railroad operations may be assessed and eliminated or minimized.

g. The names and experience of the key Contractor personnel involved in the operation shall be included in the Contractor's means and methods submission.

h. Design and supporting calculations prepared by the Professional Engineer for items including the temporary support of components or intermediate stages shall be submitted for review. A guardrail will be required to be installed in a track where a temporary bent is located within twelve (12) feet from the centerline of that track.

3. The proposed Erection procedure must be approved by the Engineer prior to undertaking work on the project.

4. The Contractor shall provide timely communication to the Engineer when scheduling the erection related work so that the Engineer may be present during the entire erection procedure.

5. At any time during construction activities, the Engineer may require revisions to the previously approved procedures to address weather, site conditions or other circumstances which may create a potential hazard to rail operations or Railroad facilities. Such revisions may require immediate interruption or termination of ongoing activities until such time the issue is resolved to the Engineer's satisfaction. The Railroad shall not be responsible for any additional costs or time claims associated with such revisions.

E. Blasting:

1. The Contractor shall obtain advance approval of the Railroad Engineer and the Engineer for use of explosive on or adjacent to Railroad property. The request for permission to use explosives shall include a detailed blasting plan. If permission for use of explosives is granted, the Contractor will be required to comply with the following:

a) Blasting shall be done with light charges under the direct supervision of a responsible officer or employee of the Contractor and a licensed blaster.

b) Electric detonating fuses shall not be used because of the possibility of premature explosions resulting from operation of two-way train radios.

c) No blasting shall be done without the presence of an authorized representative of the Railroad. **At least 10 days advance notice** to the person designated in the Railroad's notice of authorization to proceed (see paragraph 2B above) will be required to arrange for the presence of an authorized Railroad representative and such flagging as the Railroad may require.

d) Have at the job site adequate equipment, labor and materials and allow sufficient time to clean up debris resulting from the blasting without delay to trains, as well as correcting at his expense any track misalignment or other damage to Railroad property resulting from the blasting as directed by the Railway's authorized representative. If his actions result in delay of trains, the Contractor shall bear the entire cost thereof.

e) Explosives shall not be stored on Railroad Property.

f) At any time during the blasting activities, the Engineer may require revisions to the previously approved procedures to address weather, site conditions, or other circumstance which may create a potential hazard to rail operations or Railroad facilities. Such revisions may require immediate interruption or termination of ongoing activities until such time the issue is resolved to the Engineer’s satisfaction. The Railroad shall not be responsible for any additional costs or time claims associated with such revisions.

2. The Railroad representative will:

a) Determine the approximate location of trains and advise the Contractor the approximate amount of time available for the blasting operation and clean-up.

b) Have the authority to order discontinuance of blasting if, in his opinion, blasting is too hazardous or is not in accord with these Special Notes.

F. Track Monitoring:

The Contractor shall submit for Railroad review and approval, a detailed track monitoring program to detect both horizontal and vertaical movement of the track and roadbed, a minimum of 30-days in advance of start of work.

1. For the installation of temporary or permanent shoring systems, including but not limited to soldier piles and lagging, and interlocked steel sheeting on or adjacent to the Railroad's right-of-way, the contractor may be required to submit a detailed track monitoring program for the Railroad's approval prior to performing any work near the Railroad's right-of-way.

2. The program shall specify the survey locations, the distance between the location points, and frequency of monitoring before, during, and after construction. The Railroad reserves the right to modify the survey locations and monitoring frequency as necessary during the project.

3. The survey data shall be collected in accordance with the approved frequency and immediately furnished to the Engineer for analysis.

4. If any movement has occurred as determined by the Engineer, the Railroad will be immediately notified. The Railroad, at its sole discretion, shall have the right to immediately require all contractor operations to be ceased, have the excavated area immediately backfilled and/or determine what corrective action is required. Any corrective action required by the Railroad or performed by the Railroad including monitoring of corrective action of the contractor will be at project expense.

G. Maintenance of Railroad Facilities:

1. The Contractor will be required to maintain all ditches and drainage structures free of silt or other obstructions which may result from his operations and provide and maintain any erosion control measures as required. The Contractor shall provide erosion control measures during construction and use methods that accord with applicable state standard specifications for road and bridge construction, including either (1) silt fence; (2) hay or straw barrier; (3) berm or temporary ditches; (4) sediment basin; (5) aggregate checks; and (6) channel lining. The Contractor will promptly repair eroded areas with Railroad rights of way and to repair any other damage to the property of the Railroad or its tenants at the Contractor's expense.

2. All maintenance and repair of damages due to the Contractor's operations shall be done at the Contractor's expense.

H. Storage of Materials and Equipment:

1. Materials and equipment shall not be stored where they will interfere with Railroad operations, nor on the rights of way of the Railroad Company without first having obtained permission from the Railroad Engineer, and such permission will be with the understanding that the Railroad Company will not be liable for damage to such material and equipment from any cause and that the Railroad Engineer may move or require the Contractor to move, at the Contractor's expense, such material and equipment. In no instance shall material be stored closer than 25-feet to the nearest rail.

2. All grading or construction machinery that is left parked near the track unattended by a watchman shall be effectively immobilized so that it cannot be moved by unauthorized persons. The Contractor shall protect, defend, indemnify and save Railroad, and any associated, controlled or affiliated corporation, harmless from and against all losses, costs, expenses, claim or liability for loss or damage to property or the loss of life or personal injury, arising out of or incident to the Contractor's failure to immobilize grading or construction machinery.

I. Cleanup:

1. Upon completion of the work, the Contractor shall remove from within the limits of the Railroad rights of way, all machinery, equipment, surplus materials, falsework, rubbish or temporary buildings of the Contractor, and leave said rights of way in a neat condition satisfactory to the Chief Engineer of the Railroad or his authorized representative.

VI. DAMAGES:

A. The Contractor shall assume all liability for any and all damages to his work, employees, equipment and materials caused by Railroad traffic.

B. Any cost incurred by the Railroad for repairing damages to its property or to property of its tenants, caused by or resulting from the operations of the Contractor, shall be paid directly to the Railroad by the Contractor.

VII. FLAGGING SERVICES:

A. When Required:

1. Flagging services will not be provided until the contractor's insurance has been reviewed & approved by the Railroad.

2. Under the terms of the agreement between the Department and the Railroad, the **Railroad has sole authority to determine the need for flagging** required to protect its operations. In general, the requirements of such services will be whenever the Contractor's personnel or equipment are likely to be, working on the Railroad's rights of way, or across, over, adjacent to, or under a track, or when such work has disturbed or is likely to disturb a railroad structure or the railroad roadbed or surface and alignment of any track to such extent that the movement of trains must be controlled by flagging. If any element (workers, equipment, tools, scaffolding, etc.) may exist or fall within 25-feet of the edge of track, a flagman is necessary.

3. Normally, the Railroad will assign one flagman to a project; but in some cases, more than one may be necessary, such as yard limits where three- (3) flagmen may be required. However, if the Contractor works within distances that violate instructions given by the Railroad's authorized representative or performs work that has not been scheduled with the Railroad's authorized representative, a flagman or flagmen may be required until the project has been completed.

B. Scheduling and Notification:

1. Not later than the time that approval is initially requested to begin work on Railroad rights of way, Contractor shall furnish to the Railroad and the Department a schedule for all work required to complete the portion of the project within Railroad rights of way and arrange for a job site meeting between the Contractor, the Department, and the Railroad's authorized representative. Flagman or Flagmen may not be provided until the job site meeting has been conducted and the Contractor's work scheduled.

2. **The Cabinet's Engineer will be responsible for procuring flagmen, however, it is the Contractor's responsibility to notify the Engineer when they are needed.** The Contractor will be required to give the Engineer **at least 10 working days of advance written notice** of intent to begin work within Railroad rights of way. If it is necessary for the Railroad to advertise a flagging job for bid, it **may take up to 90-days to obtain service**. Once begun, when work is suspended at any time for any reason, the Contractor will be required to give the Engineer **at least 3 working days of notice** before resuming work on Railroad rights of way. Such notice shall include sufficient details of the proposed work to enable the Railroad representative to determine if flagging will be required. If such notice is in writing, the Contractor shall furnish the Engineer a copy; if notice is given verbally it shall be confirmed in writing with copy to the Engineer. If flagging is required, no work shall be undertaken until the flagman, or flagmen is present at the job site. It **may take up to 30 days to obtain flagging initially** from the Railroad. When flagging begins the flagman is usually assigned by the Railroad to work at the project site on a continual basis until no longer needed and cannot be called for on a spot basis. If flagging becomes unnecessary and is suspended, it **may take up to 10 days to again obtain flagging services** from the Railroad. Due to labor agreements, it is necessary to give **5 working days notice before flagging service may be discontinued** and responsibility for payment stopped.

3. If, after the flagman is assigned to the project site, emergencies arise which require the flagman's presence elsewhere, and then the Contractor shall delay work on Railroad rights of way until such time as the flagman is again available. Any additional costs resulting from such delay shall be borne by the Contractor and not the Department or Railroad.

4. When demobilizing, the Contractor shall contact the Engineer, who will in turn contact the flagman to avoid unnecessary flagging charges. This communication shall be documented.

C. Payment:

1. **The Cabinet will be responsible for paying the Railroad directly for any and all costs of flagging, which may be required to accomplish the construction.**

2. The estimated cost of flagging is listed on the Summary Sheet. The charge to the Cabinet by the Railroad will be the actual cost based on the rate of pay for the Railroad's employees, or it's contractor, who are available for flagging service at the time the service is required.

3. Railroad work involved in preparing and handling bills will also be charged

to the Cabinet. Charges to the Cabinet by the Railroad shall be in accordance with applicable provisions of 23 CRF 140, Subpart I and 23 CRF 646, Subpart B. Flagging costs are subject to change. The above estimates of flagging cost are provided for information only and are not binding in any way.

D. Verification:

1. The Department will review and sign the Railroad flagman's time sheet, attesting that the flagman was present during the time recorded. Flagman may be removed by Railroad if form is not signed. If flagman is removed, the Contractor will not be allowed to re-enter the Railroad rights of way until the issue is resolved. Any complaints concerning flagman or flagmen must be resolved in a timely manner. If need for flagman or flagmen is questioned, please contact the Railroad's Representative listed on the Project Summary Sheet. All verbal complaints must be confirmed in writing by the Contractor within 5 working days with copy to the Highway Engineer. All written correspondence should be addressed to the Railroad's Representative listed on the Project Summary Sheet.

2. The Railroad flagman assigned to the project will be responsible for notifying the Project Engineer upon arrival at the job site on the first day (or as soon thereafter as possible) that flagging services begin and on the last day that he performs such services for each separate period that services are provided. The Project Engineer will document such notification in the project records. When requested, the Project Engineer will also sign the flagman's diary showing daily time spent and activity at the project site.

VIII. HAUL ACROSS RAILROAD:

A. Where the plans show or imply that materials of any nature must be hauled across a Railroad, unless the plans clearly show that the State has included arrangements for such haul in its agreement with the Railroad, the Contractor will be required to make all necessary arrangements with the Railroad regarding means of transporting such materials across the Railroad. The Contractor will be required to bear all costs incidental, including flagging, to such crossings whether services are performed by his own forces or by Railroad personnel.

B. *No crossing may be established for use of the Contractor for transporting materials or equipment across the tracks of the Railroad Company unless specific authority for is installation, maintenance, necessary watching and flagging thereof and removal, all at the expense of the Contractor, is first obtained from the Railroad Engineer.* ***The approval process for an agreement normally takes 90-days.***

IX. WORK FOR THE BENEFIT OF THE CONTRACTOR:

A. *All temporary or permanent changes in wire lines or other facilities which are considered necessary to the project are shown on the plans; included in the force account agreement between the State and the Railroad or will be covered by appropriate revisions to same which will be initiated and approved by the State and/or the Railroad.*

B. *Should the Contractor desire any changes in addition to the above, then he shall make separate arrangements with the Railroad for same to be accomplished at the Contractor's expense.*

X. COOPERATION AND DELAYS:

A. *It shall be the Contractor's responsibility to arrange a schedule with the Railroad for accomplishing stage construction involving work by the Railroad or tenants of the Railroad. In arranging his schedule he shall ascertain, from the Railroad, the lead time required for assembling crews and materials and shall make due allowance therefore.*

B. *Train schedules cannot be provided to the Contractor. It is the Contractor's responsibility to contact the Railroad in order to arrange "Track Time." This "Track Time" will be an agreed upon prearranged time period that the Railroad will, without undue burden, schedule no train traffic to facilitate the Contractor's work on or near Railroad right-of-way. Due to track operations, there is no guarantee for track time. This track time must be arranged* ***at least 7 days prior to the date of need.***

C. *No charge or claims of the Contractor against either the Department or the Railroad will be allowed for hindrance or delay on account of railroad traffic; any work done by the Railroad or other delay incident to or necessary for safe maintenance of Railroad traffic or for any delays due to compliance with these Special Notes.*

D. *The Contractor shall cooperate with others participating in the construction of the Project to the end that all work may be carried on to the best advantage.*

E. *The Railroad does not assume any responsibility for work performed by others in connection with the Project. No claims of the Contractor against the Railroad for any inconvenience, delay, or additional cost incurred by the Contractor on account of operations by others.*

XI. TRAINMAN'S WALKWAYS:

*A. Along the outer side of each exterior track of multiple operated track, and on each side of single operated track, an unobstructed continuous space suitable for trainman's use in walking along trains, extending to a line not less than 10 feet from centerline of track, shall be maintained. Any temporary impediments to walkways and track drainage encroachments or obstructions allowed during work hours while Railroad's protective service is provided shall be removed before the close of each day. If there is any excavation near the walkway, a handrail, with **15'-0" minimum clearance from centerline of track,** shall be placed.*

XII. GUIDELINES FOR PERSONNEL ON RAILROAD RIGHTS OF WAY:

A. All persons shall wear hard hats. Appropriate eye and hearing protection must be used. Working in shorts is prohibited. Shirts must cover shoulders, back and abdomen. Working in tennis or jogging shoes, sandals, boots with high heels, cowboy and other slip on type boots is prohibited. Hard-sole, lace-up footwear, zippered boots cinched with straps which fit snugly about the ankle are adequate. Safety boots are required.

*B. No one is allowed within **50' of the centerline of the track** without specific authorization from the flagman.*

C. All persons working near track when train is passing are to look out for dragging bands, chains and protruding or shifting cargo.

D. No one is allowed to cross tracks without specific authorization from the flagman.

*E. All welders and cutting torches working within **25' of track must stop when train is passing.***

F. No steel tape or chain will be allowed to cross or touch rails without permission.

XIII. GUIDELINES FOR EQUIPMENT ON RAILROAD RIGHTS OF WAY:

*A. No crane or boom equipment will be allowed to set up to work or park within **boom distance plus 15' of centerline of track** without specific permission from railroad official and flagman.*

B. No crane or boom equipment will be allowed to foul track or lift a load over the track without flag protection and track time.

C. All employees will stay with their machines when crane or boom equipment is pointed toward track.

D. All cranes and boom equipment under load will stop work while a train is passing (including pile driving).

E. Swinging loads must be secured to prevent movement while train is passing.

F. No loads will be suspended above a moving train.

*G. No equipment will be allowed within **50' of centerline of track** without specific authorization of the flagman.*

H. Trucks, tractors or any equipment will not touch ballast line without specific permission from railroad official and flagman.

*I. No equipment or load movement **within 50' or above a standing train or other equipment** without specific authorization of the flagman.*

*J. All operating equipment within **50' of track must halt operations when a train is passing**. All other operating equipment may be halted by the flagman if the flagman views the operation to be dangerous to the passing train.*

K. All equipment, loads and cables are prohibited from touching rails.

L. While clearing and grubbing, no vegetation will be removed from railroad embankment with heavy equipment without specific permission from the Railroad Engineer and flagman.

M. No equipment or materials will be parked or stored on Railroad's property unless specific permission is granted from the Railroad Engineer.

N. All unattended equipment that is left parked on Railroad property shall be effectively immobilized so that it can not be moved by unauthorized persons.

O. All cranes and boom equipment will be turned away from track after each work day or whenever unattended by an operator.

XIV. INSURANCE:

A. In addition to any other forms of insurance or bonds required under the terms of the contract and specifications, the Contractor will be required to carry insurance of the following kinds:

1. Commercial General Liability coverage at their sole cost and expense with limits of not less than **$5,000,000** in combined single limits for bodily injury and/or property damage per occurrence, and such policies shall name the Railroad as an additional insured. Contractor shall provide the Railroad with a complete waiver of subrogation, and remove any exclusion for coverage of work occurring within 50' of a railroad track pursuant to Endorsement CG 24.17.

2. Statutory Worker's Compensation and Employers Liability Insurance with

limits of not less than **$1,000,000**, which insurance must contain a waiver of subrogation against the Railroad and its affiliates.

3. Commercial automobile liability insurance with limits of not less than **$1,000,000** combined single limit for bodily injury and/or property damage per occurrence, and such policies shall name the Railroad as an additional insured.

4. Railroad protective liability insurance with limits of not less than **$5,000,000** combined single limite for bodily injury and/or property damage per occurrence and an aggregate annual limit of **$10,000,000**, which insurance shall satisfy the following additional requirements:

   a. The Railroad Protective Insurance Policy must be on the ISO/RIMA Form of Railroad Protective Insurance – Insurance Services Office (ISO) Form CG 00 35.

   b. The Railroad must be the named insured on the Railroad Protective Insurance Policy

   c. Name and Address of the Contractor must be shown on the Declarations page.

   d. Description of operations must appear on the Declarations page and must match the Project description, including project or contract identification numbers.

   e. Authorized endorsements must include the Pollution Exclusion Amendment – CG 28 31, unless using form CG 00 35 version 96 and later.

   f. Authorized endorsements may include:

      (i). Broad form Nuclear Exclusion – IL 00 21
      (ii). 30-day Advance Notices of Non-renewal or cancellation
      (iii). Required State Cancellation Endorsement
      (iv). Quick Reference or Index – CL/IL 240

   g. Authorized endorsements may not include:

      (i). A Pollution Exclusion Endorsement except CG 28 31
      (ii). A Punitive or Exemplary Damages Exclusion
      (iii). A “Common Policy Conditions” Endorsement
      (iv). And endorsement that is not named in Section 4 (e) or (f) above.
      (v). Poloicies that contain any type of deductible

5. All insurance companies must be A. M. Best rated A- and Class VII or better.

6. Such additional or different insurance as the Railroad may require.

B. Additional Terms:

1. Contractor must submit the original Railroad Protective Liability policy, Certificates of Insurance, and all notices and correspondence regarding the insurance policy to the contact listed on the Project Summary Sheet.

2. The Contractor may not begin work on the Project until it has received the Railroad's written approval or the required insurance.

C. Insurance policies shall follow the requirements of 23 CRF 646, Subpart A.

D. Evidence of insurance as required above shall be furnished to the address shown on the attached Summary Sheet for review by the Department and transmittal to the Railroad.

E. *If any part of the work is sublet, similar insurance and evidence thereof in the same amounts as required of the Prime Contractor shall be provided by or in behalf of the subcontractor to cover his operations. Endorsements to the Prime Contractor's policies specifically naming subcontractors and describing their operations will be acceptable for this purpose.*

F. All insurance herein before specified shall be carried until all work required to be performed under the terms of the contract has been satisfactorily completed within the limits of the rights of way of the Railroad as evidenced by the formal acceptance by the Department. Insuring Companies may cancel insurance by permission of the Department and Railroad or on ***thirty (30) days written notice*** *to the Department and Railroad Insurance Contacts as listed on the Project Summary Sheet.*

XV. FAILURE TO COMPLY:

A. *These Special Notes are supplemental and amendatory to the Kentucky Department of Highways' Standard Specifications for Road and Bridge Construction, Edition of 2008, and amendments thereof, and where in conflict therewith, these Special Notes shall govern.*

B. *In the event the Contractor violates or fails to comply with any of the requirements of these Special Notes:*

1. The Railroad Engineer may require that the Contractor vacate Railroad property.

2. The Engineer may withhold all monies due the Contractor on monthly statements.

3. Any such orders shall remain in effect until the Contractor has remedied the situation to the satisfaction of the Railroad Engineer and the Engineer.

XVI. PAYMENT FOR COST OF COMPLIANCE:

A. *No separate payment will be made for any extra cost incurred on account of compliance with these Special Notes. All such cost shall be included in prices bid for other items of the work as specified in the payment items.*

XVII. CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

A. *Prior to entry onto Railroad right of way, the contractor will be required to enter into a Right of Entry Agreement with the railroad. The Contractor is responsible for garnering this agreement and executing any terms and conditions stated therein, including any and all fees associated with this agreement, which shall not exceed $750.00. A blank agreement is provided in the bid package. When the contract is awarded, the Contractor shall sign the form and return it to the Cabinet with the contract before a work order is issued.*

Kentucky Transportation Cabinet
Division of Right of Way & Utilities

TC 69-008
Rev. 4-2020
Page 1 of 2

SUMMARY FOR KYTC PROJECTS THAT INVOLVE A RAILROAD

Date: 6/4/2025 *(enter using mm/dd/yyyy format)*

This project actively involves the below listed railroad company. This Project Summary provides an abbreviated listing of project specific railroad data. The detailed needs of the specified railroad company are included in the Special Notes for Protection of Railroad Interest in the proposal package. By submitting a bid, the contractor attests that they have dutifully considered and accepted the provisions as defined in both documents.

GENERAL ROAD PROJECT INFORMATION *(This section must be provided by KYTC)*

County: McCracken
Federal Number: N/A
State Number: FD04 073 8684501D; FD04 073 8684501U; FD04 073 8684501C
Route: PF 9999
Project Description: NEW ACCESS ROAD FROM KY-305 NEAR KY-998, EXTENDING WEST TO THE OHIO RIVER MEGAPARK
Item Number: 1 - 8702.00 **Highway Milepost:**

GENERAL RAIL INFORMATION *(The below sections must be provided by Railroad Company)*

Rail Company Name: Illinois Central Railroad Company
DOT# (if applicable): 296418W, 296693S **Railroad Milepost:**4.210, 0.130
Freight: Train Count (6am to 6pm): 6 **Train Count (6pm to 6am):** 4 **Train Count (24 hr total):** 10 **Max Speed:** 40mph
Passenger: Train Cnt. (6am to 6pm): 0 **Train Cnt. (6pm to 6am):** 0 **Train Cnt. (24 hr total):** 0 **Max Speed:** N/A
(This information is necessary to acquire the necessary insurances when working with Railroad Right of Way)

INSURANCE REQUIREMENTS

The named insured, description of the work and designation of the job site to be shown on the Policy are as follows:

(a) Named Insured: Paducah and Illinois Railroad Company
(b) The project description should be as indicated in the General Road Project Information section.
(c) The designation of the jobsite is the route, Milepost, and AAR-DOT# listed above.

FLAGGING INFORMATION

Flagging Estimate: KYTC will be responsible for paying all flagging costs. Contractor shall adhere to the Special Note for Railroad Flagging if applicable.

Hourly Rate:
$3,223.75 per day based on a 8 hour day effective as of the date of this document.

Work by a flagman in excess of 8 hours per day or 40 hours per week, but not more than 12 hours a day will result in overtime pay at 1 ½ times the appropriate rate. Work by a flagman in excess of 12 hours per day will result in overtime pay at 2 times the appropriate rate. If work is performed on a holiday, the flagging rate is 2 ½ times the normal rate.

Forecasted Rate Increases:
Rates will increase to $ per based on a hour day effective *(enter using M/d/yyyy format)*.

RAILROAD CONTACTS

(*to be provided by Railroad Company)*

General Railroad Contact:

Josh Gordon, Manager Public Works
2151 N. Mill Street Jackson, MS 39202
(Phone) (601) 914 2658
(Email) Josh.Gordon@cn.ca

Regional Representative (Roadmaster):

To be provided by RR upon insurance approval

(Phone)
(Email)

Insurance contact:

Josh Gordon, Manager Public Works
2151 N. Mill Street Jackson, MS 39202
(Phone) (601) 914 2658
(Email) Josh.Gordon@cn.ca

(Phone)
(Email)

Railroad Designer Contact:

Contractor ☐

Josh Gordon, Manager Public Works
2151 N. Mill Street Jackson, MS 39202
(Phone) (601) 914 2658
(Email) Josh.Gordon@cn.ca

Railroad Construction Contact:

Contractor ✠

Matt Donnelly
Public Projects Manager
Crouch Engineering

(Phone) 615-932-8144
(Email)
MDonnelly@CrouchEngineering.com

KENTUCKY TRANSPORTATION CABINET CONTACTS (*to be provided by KYTC)*

KYTC Railroad Coordinator:

Allen Rust, PE
Div. of Right of Way & Utilities
Kentucky Transportation Cabinet
200 Mero Street, 5th Floor East
Frankfort, Kentucky 40622
(Phone) 502-782-4950
(Email) allen.rust@ky.gov

KYTC Construction Procurement Director:

Rachel Mills, Director
Div. of Construction Procurement
Kentucky Transportation Cabinet
200 Mero Street, 3rd Floor West
Frankfort, Kentucky 40622
(Phone) 502-782-5152
(Email) Rachel.Mills@ky.gov

KYTC Construction Director:

Matt Simpson, Director
Div. of Construction
Kentucky Transportation Cabinet
200 Mero Street, 3rd Floor West
Frankfort, Kentucky 40622
(Phone) 502-564-4780
(Email) Matt.Simpson@ky.gov

The project specific information provided herein is valid as of the date indicated. However, the specific information may be subject to change due to the normal business operations of all parties. The terms and conditions defined here, and in the bid proposal in its entirety, are inclusive and constant.

IMPORTANT NOTICE

CORPORATIONS

License must be signed by the President or a Vice President of the Corporation or Company, or be accompanied by a certified resolution of the Board of Directors authorizing execution by a lesser official.

PARTNERSHIP

License must be signed by all of the partners.

MUNICIPALITIES OR GOVERNMENTAL AGENCIES

License must be accompanied by a certified resolution authorizing the official signing the License to execute on behalf of the Governmental Body. The resolution should not be certified by the same official who executed the License.

RIGHT OF ENTRY LICENSE AGREEMENT

Illinois Central Railroad Company (hereinafter called Railroad Company) hereby grants pursuant to this Right of Entry License Agreement (hereinafter called Licensee) to Licensee NAME attn. NAME AND ADDRESS telephone NUMBER, (hereinafter called Licensee), effective the date this License was signed by Railroad Company, license and permission, at Licensee's sole cost, risk and expense, to enter Railroad Company's property in the vicinity of Baltimore Church Road overpass Railroad milepost 30.51 on Chiles Subdivision for purposes related to replace overhead highway bridge in or near Dublin, KY on, over and near Railroad Company's tracks and right-of-way, as generally shown on Location Exhibit, attached hereto and made a part hereof.

Licensee shall pay to Railroad Company upon execution of this License the sum of **$1,000.00** for the privileges granted by this License. The aforesaid sum is not refundable in the event Licensee elects not to enter upon Railroad Company's property or in the event Railroad Company elects to terminate this License for any reason whatsoever.

Licensee shall not enter Railroad Company's premises for the purpose as set forth above without having first given Railroad Company's Engineering Manager or their authorized representative at least five (5) working days advance notice of the date Licensee plans to commence the work.

Railroad Company shall have the right, but not the duty, to require Licensee to furnish detailed plans prior to entry upon the premises and to view and inspect any activity or work on or above Railroad Company's property. If in the sole opinion of the authorized representative of Railroad Company any said activity or work is undesirable for any reason, Railroad Company shall have the right to terminate this License at once.

Railroad Company shall have the right, but not the duty, to restrict Licensee's activity on Railroad Company's property in any way that Railroad Company may, in its sole opinion, deem necessary from time to time and shall also have the right, but not the duty, to require Licensee to adopt and take any safety precautions that Railroad Company may, in its sole opinion, deem necessary from time to time. No work shall be performed or equipment located within twenty-five feet (25') of the centerline of the nearest railroad track without the expressed permission of Railroad Company's Engineering Manager or their duly authorized representative and then only when either the track has been removed from service or Railroad Company flag protection is provided.

Railroad Company may, at Licensee's sole cost, risk and expense, furnish whatever protective services it considers necessary, including, but not limited to, flag protection, and inspectors.

Licensee shall at all times conduct its work in accordance with any and all "Special Provisions" which may be appended hereto which, by reference hereto, are hereby made a part hereof.

AS A CONSIDERATION AND AS A CONDITION, WITHOUT WHICH THIS LICENSE WOULD NOT HAVE BEEN GRANTED, LICENSEE AGREES TO INDEMNIFY AND SAVE HARMLESS RAILROAD COMPANY, ITS PARENTS, AFFILIATES, AND THEIR DIRECTORS, OFFICERS, EMPLOYEES AND AGENTS AND TO ASSUME ALL LIABILITY FOR DEATH OR INJURY TO ANY PERSONS, INCLUDING, BUT NOT LIMITED TO, OFFICERS, EMPLOYEES, AGENTS, PATRONS AND LICENSEES OF THE PARTIES HERETO, AND FOR ALL LOSS, DAMAGE OR INJURY TO ANY PROPERTY, INCLUDING, BUT NOT LIMITED TO, THAT BELONGING TO THE PARTIES HERETO, TOGETHER WITH ALL EXPENSES, ATTORNEYS'

FEES AND COSTS INCURRED OR SUSTAINED BY RAILROAD COMPANY, WHETHER IN DEFENSE OF ANY SUCH CLAIMS, DEMANDS, ACTIONS AND CAUSES OF ACTION OR IN THE ENFORCEMENT OF THE INDEMNIFICATION RIGHTS HEREBY CONFERRED, IN ANY MANNER OR DEGREE CAUSED BY, ATTRIBUTABLE TO OR RESULTING FROM THE EXERCISE OF THE RIGHTS HEREIN GRANTED, OR THE FAILURE OF LICENSEE TO CONFORM TO CONDITIONS OF THIS LICENSE, WORK PERFORMED BY RAILROAD COMPANY FOR LICENSEE UNDER THE TERMS OF THIS LICENSE OR THE CONSTRUCTION, MAINTENANCE, REPAIR, RENEWAL, ALTERATION, CHANGE, RELOCATION, EXISTENCE, PRESENCE, USE, OPERATION OR REMOVAL OF ANY STRUCTURE INCIDENT THERETO, OR FROM ANY ACTIVITY CONDUCTED ON OR OCCURRENCE ORIGINATING ON THE AREA COVERED BY THIS LICENSE, REGARDLESS OF ANY NEGLIGENCE OF RAILROAD COMPANY, ITS OFFICERS, EMPLOYEES AND AGENTS. SAID LICENSEE AGREES ALSO TO RELEASE, INDEMNIFY AND SAVE HARMLESS RAILROAD COMPANY, ITS OFFICERS, EMPLOYEES AND AGENTS FROM ALL LIABILITY TO LICENSEE, ITS OFFICERS, EMPLOYEES, AGENTS OR PATRONS, RESULTING FROM RAILROAD OPERATIONS AT OR NEAR THE AREA IN WHICH LICENSE IS TO BE EXERCISED, WHETHER OR NOT THE DEATH, INJURY OR DAMAGE RESULTING THEREFROM MAY BE DUE TO WHOLE OR IN PART TO THE NEGLIGENCE OF RAILROAD COMPANY, ITS OFFICERS, EMPLOYEES OR AGENTS. AT THE ELECTION OF RAILROAD COMPANY, LICENSEE, UPON NOTICE TO THAT EFFECT, SHALL ASSUME OR JOIN IN THE DEFENSE OF ANY CLAIM BASED UPON ALLEGATIONS PURPORTING TO BRING SAID CLAIM WITHIN THE COVERAGE OF THIS SECTION.

Before commencing work and until this License shall be terminated, Licensee shall provide and maintain the following insurance in form and amount with companies satisfactory to and as approved by Railroad Company.

a. Statutory Workers Compensation and Employer's Liability insurance.

b. Automobile Liability in an amount not less than $1,000,000 dollars combined single limit.

c. Comprehensive General Liability (occurrence form) in an amount not less than $5,000,000 dollars per occurrence, with an aggregate limit of not less than $10,000,000 dollars. The Policy must name "Illinois Central Railroad Company and its Parents." as additional insureds in the following form:

Illinois Central Railroad Company
Attn: CN Mgr Insurance, Insurance Department
935 de La Gauchetiere St W
Montreal, Quebec H3B 2M9, Canada
514-399-6411 (office); 514-399-4296 (FAX)

If the commercial general liability policy required herein contains any exclusions related to doing business or undertaking construction or demolition on, near, or adjacent to railroad facilities; such exclusion must be removed through issuance of endorsement CG 24 17, or a similar endorsement approved by Railroad Company in its sole discretion prior to the commencement of work hereunder.

d. In the event the privileges provided herein to Licensee involve any work that could result in the discharge, spillage, disposal, release or escape of any Hazardous Material or petroleum product onto the Railroad Company's property, Licensee shall purchase and maintain in effect at all times during the term of this License a Contractor's Pollution Liability policy in an amount not less than two million dollars ($2,000,000) combined single limit (and with a deductible not to exceed $50,000) insuring Railroad against any and all damages, costs, liabilities and expenses

resulting from on- or off-site bodily injury (including death to any person), on or off-site loss, damage or destruction of property (including that belonging to the parties hereto), and on-or off-site cleanup costs (including expenses incurred in the investigation, removal, remediation, neutralization, or immobilization of contaminated soils, surface water, groundwater or any other contamination) growing out of or incidental to any discharge, spillage, disposal, release, or escape of any Hazardous Material or petroleum product arising therefrom. For purposes of this Agreement , the term "Hazardous Material" shall include, without limit, any flammable explosives, radioactive materials, hazardous materials, hazardous wastes, hazardous or toxic substances, or related materials defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. §§ 9601, et seq.), the Hazardous Material Transportation Act, as amended (49 U.S.C. §§ 1801, et seq.), the Resource Conservation and Recovery Act, as amended (42 U.S.C. §§ 6901 et seq.), the Toxic Substances Control Act, as amended (15 U.S.C. §§ 2601, et seq.), similar laws or ordinances enacted by any state, county or municipality in which the Property is located, or in the regulations adopted and publications promulgated pursuant to any of the above, as such laws or regulations now exist or may exist in the future.

Licensee is required to advise Railroad Company by thirty (30) day advance written notice when any work to be performed under this License may require Pollution Liability Insurance pursuant to the previous paragraph.

Before commencing work, Licensee shall deliver to Railroad Company a certificate of insurance evidencing the foregoing coverage, and upon request, Licensee shall deliver a certified, true and complete copy of the policy or policies at its sole cost and expense. The policies shall provide for not less than thirty (30) days prior written notice to Railroad Company of cancellation of or any material change in, the policies, and shall contain the waiver of right of subrogation.

It is understood and agreed that the foregoing insurance coverage is not intended to, and shall not, relieve Licensee from or serve to limit Licensee's liability under the indemnity provisions of this License or any applicable agreement.

It is further understood and agreed that, so long as this License shall remain in force or until the Licensee's work is complete and Licensee shall have vacated the Railroad Company's property (whichever shall be later), Railroad Company shall have the right, from time to time, to revise the amount or form of insurance coverage provided as circumstances or changing economic conditions may require. Railroad Company shall give Licensee written notice of any such requested change at least thirty (30) days prior to the date of expiration of the then existing policy or policies; and Licensee agrees to, and shall, thereupon provide Railroad Company with certificates reflecting such revised policy or policies thereof.

If a contractor is to be employed by Licensee, then, before any work is commenced hereunder, Licensee shall establish, to the reasonable satisfaction of Railroad Company, that either (i) the contractor has in place insurance policies covering its own work that comply with the required insurance coverages, limits and terms applicable to Licensee, or (ii) the contractor is fully covered under Licensee's insurance policies.

Railroad Company's exercise or failure to exercise any rights under this License shall not relieve Licensee of any responsibility under this License, including, but not limited to, the obligation to indemnify Railroad Company as herein provided.

Cost and expense for work performed by Railroad Company, as referred to in this License, shall consist of the actual cost of labor, materials, equipment and other plus Railroad Company's standard additives in effect at the time the work is performed.

This License is revocable at the option and discretion of Railroad Company upon notice to Licensee, and shall not be transferred or assigned. Unless sooner revoked by Railroad Company, extended at request of Licensee and granted by Railroad Company in writing, or relinquished by act of Licensee, **this License shall terminate on DATE**.

Upon termination of this License, Licensee shall remove all of its property, leaving Railroad Company's premises in a neat and safe condition satisfactory to Railroad Company's Engineering Manager or their authorized representative, failing which Railroad Company may remove said materials from its premises at Licensee's sole cost, risk and expense, or at its option, may deem such property as abandoned and henceforth owned by Railroad Company, with no compensation for Licensee whatsoever.

ILLINOIS CENTRAL RAILROAD COMPANY

By: _____

Josh Gordon

Manager of Public Works

Date signed:

ACCEPTED: _____

NAME

By: _____

Print Name: _____

Title: _____

Date signed: _____

REQUIREMENTS TO PROVIDE FLAGGING PROTECTION AND CABLE LOCATION FOR PROJECTS ON OR IN THE VICINITY OF CN PROPERTY

(Hereinafter called "Railroad")
(Revised: Effective December 4th, 2018)

NOTE: Flagging and/or Cable Locate fees may apply

A utility or contractor shall not commence, or carry on, any work for installation, maintenance, repair, changing or renewal of any FACILITY, under, over, on, or near RAILROAD property at any location without giving notice to the RAILROAD authorized representative at the RAILROAD's office located at Homewood, IL. If in the opinion of the RAILROAD the presence of an authorized representative of the RAILROAD is required to supervise the same, the RAILROAD shall render bills to the utility or contractor for all expenses incurred by it for such supervision. This includes all labor costs for flagmen or cable locate supplied by the RAILROAD to protect RAILROAD operation, and for the full cost of furnishing, installation and later removal of any temporary supports for said tracks, as the RAILROAD's Chief Engineer's Office may deem necessary.

A flagman is required any time any work is performed (i) under or across any Railroad track, regardless of whether said work involves a physical presence on the surface of the Railroad property; (ii) on the surface of the Railroad property within twenty-five (25) feet horizontally of the centerline of any railroad track; or (iii) on, near, or over Railroad property if the work may potentially encroach (intentionally or unintentionally) within twenty-five (25) feet from the centerline of any railroad track. Causes of potential encroachment include but are not limited to equipment that has the potential to swing, pivot, extend or mechanically fail. Potential encroachment must also account for a distance of one-half the length of the largest load that any equipment may lift. Additionally, Railroad reserves the right to require a flagman for work on Railroad property not meeting the above criteria when there are other conditions or considerations that would indicate the need for a flagman to safeguard Railroad's operations, property and safety of any person.

Cable Location
A cable location of RAILROAD owned facilities may be required prior to the start of any work based on the RAILROAD's review of the proposed project. The purpose of cable location is to identify and protect Signal & Communication cables that have been installed to provide power, signal control, and wayside communications. These cables are vital to a safe and reliable railway operation. The cable locate will be performed by a qualified RAILROAD employee.

The cost for a cable location is $350.00, and must be prepaid by check before RAILROAD will undertake the cable locate work.

Outside contractors are prohibited from driving on, along, or across any track that does not have a CN installed crossing. They may utilize an existing public crossing. The practice of allowing rubber tired equipment to operate over track with no crossing is strictly prohibited. Exceptions to this rule will require the express approval from CN Engineering.

Prior to any project being started, the RAILROAD requires a "Request for Flagging Services and Cable Location" form to be completed and submitted, including check for prepayment based on the number of days and hours flagging protection will be required and also prepayment for cable location as necessary. Separate checks must be issued for flagging protection and cable location. You must have an agreement with a CN railroad subsidiary, such as a Right of Entry, Permit, License, or Formal Agreement in addition to any necessary flagging before you may enter CN property.

Request for Flagging Services and Cable Location

U.S.

Requests and inquiries must be directed to:
Flagging-US
17641 South Ashland Ave.
Homewood, IL 60430
Flagging_US@CN.CA

Is this a continuation of an existing project? Yes ☐ No ☐

If YES, please provide your Service Order #_____

All blanks below must be completely filled in before any flagman request will be honored.
Work Authorization:

Right of Entry/License/Permit No.: _____ Dated: _____ Railroad: _____

Does your Right of Entry/License/Permit require a Railroad Cable Locate? **Yes ☐ No ☐**

You must have an agreement with a CN railroad subsidiary, such as a Right of Entry, Permit, License or Formal Agreement in addition to any necessary flagging before you may enter CN property.

Project Information: ***Please submit a detailed map of the location where protection is being requested.***

Street Location/Intersection_____ City/State_____

Railroad Milepost_____ Railroad Subdivision_____

Description of work being performed: _____

_____

Location for flagman to report: _____

Name of Site Contact: _____Site Contact Phone: (___) ___ - ____ Alt: (__) ___ -

Requested Dates/Times: ***Dates requested are subject to flagman availability. Minimum 5 business days advance notice required.***

Requested Dates for Flagging Protection: _____, _____, _____, _____, _____,_____,

_____, _____, _____, _____, _____, _____, _____, _____

Project Starting time: _____Anticipated Ending Time: _____ Anticipated # Hours per Day: _____
*Flagmen start and end time may vary based on type of protection required.

Billing Information: ***All blanks spaces must be filled out***

Company Name: _____Requestor Name: _____

Billing Address: _____

City: _____ State: _____ Zip: _____

Company Phone: _____ Company Fax: _____ E-Mail: _____

CN required online training must be completed before Flagman Protection will be scheduled.

Prepayment must be received before Flagging Protection will be scheduled. There is an 8 hour minimum per day. The base rate per day for Flagman Protection is $1,300.00 for 10 hours; this includes 2 overtime hours for flagman to set up/take down protection if needed. Additional overtime hours must be prepaid at the rate of $150.00 per hour. Weekends and Holidays must be prepaid at the overtime rate with a $1,500.00 / 10 hour minimum. Any prepayment for additional days or overtime not used can be refunded.

Railroad Cable Location must be prepaid, the cost is $350.00 per locate.

Separate Checks must be issued for Flagging Protection and Cable Location. Checks should be made payable to the railroad subsidiary listed on your Right of Entry/Permit/License or, Formal Agreement.

If additional days of protection are required they must be prepaid in advance. Rates Effective January 1st 2017.

THIS COMPLETED FORM MUST BE SENT WITH A MAP, PREPAYMENT CHECK(S), AND PROOF OF INSURANCE TO:
US-FLAGGING / 17641 SOUTH ASHLAND AVE. HOMEWOOD, IL 60430

I agree to pay for flagging services as requested: _____
(SIGN AND PRINT NAME)

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, LOUISVILLE DISTRICT
600 DR. MARTIN LUTHER KING JR PL
LOUISVILLE, KY 40202

April 11, 2025

Regulatory Division
South Branch
ID No. LRL-2023-00445-ncc

Ms. Emma Priger
Kentucky Transportation Cabinet (KYTC)
200 Mero Street
Frankfort, KY 40622

RE: KYTC Item No. 1-8702.00

Dear Ms. Priger:

Enclosed is Department of the Army (DA) Permit Number LRL-2023-00445-ncc authorizing KYTC Item No. 1-8702.00 to re-construct and extend the existing road between Kentucky Highway 1420 and the Kentucky Highway 305/358 corridor in McCracken County, KY. The construction of the proposed road improvement would permanently impact 8.56 acres of wetland and 518 linear feet of stream and temporarily impact 2.16 acres of wetland and 133 linear feet of stream.

Also enclosed is ENG Form 4336, "Notice of Authorization," which must be displayed at the construction site throughout construction.

Should any modification of the plans become necessary for any reason, approval from the District Engineer must be received prior to the start of work. Upon completion of the work authorized under this permit, the enclosed Completion Report form must be completed and returned to this office. Copies of this letter will be sent to the appropriate coordinating agencies (see enclosure for addresses).

If you have any questions concerning this matter, please contact the District Regulatory Office at the above address, ATTN: CELRL-RDS or contact Ms. Crystal Byrd directly at 606-784-9709 or crystal.d.byrd@usace.army.mil.

Sincerely,

Eric Reusch
Chief, Regulatory Division

Enclosures:

1. Form 1721
2. Completion Report

Enclosures Cont:

3. KYTC Item No. 1-8702.00 Project Plans
4. KYDOW WQC
5. FHWA KY Division's "2020 Programmatic Consultation on the Effects of Transportation Projects in Kentucky on the Indiana Bat and Gray Bat, (April 17, 2020)" and the "2015 Biological Opinion: Kentucky Field Office's participation in Conservation Memoranda of Agreement for the Indiana bat and/or Northern Long-eared Bat

Copies Furnished:

Ellen Mullins
Stantec Consulting Services
3052 Beaumont Centre Circle
Lexington, KY 40513
Ellen.mullins@stantec.com

Austin Fitzgerald
USEPA Region 4
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, GA 30303
Fitzergerald.Austin@epa.com

Bryan Killian
Water Quality Certification Section
Kentucky Energy and Environment Cabinet
300 Sower Blvd. Frankfort, KY 40601
401WQC@ky.gov; bryan.killian@ky.gov

DEPARTMENT OF THE ARMY PERMIT

Permittee: Kentucky Transportation Cabinet

Permit Number: LRL-2023-00445-ncc

Issuing Office: U.S. Army Engineer District, Louisville

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: The reconstruction, elevation, and extension of the existing road between the Kentucky Highway 305/358 corridor and Kentucky Highway 1420. The project would raise and extend "Bobo Road" with fill material to allow the roadway to remain open during high water events. The re-constructed road would require the use of one 12' by 8' concrete box culvert and equalizer pipe in Withrow Creek, one 54" pipe culvert and 2 equalizer pipes in an un-named tributary to Massac Creek, and 5 additional enclosed culverts to maintain site hydrology. The construction of the proposed road improvement and extension would require the discharge of fill material that would permanently impact 8.56 acres of wetlands and 518 linear feet of streams and temporarily impact 2.16 acres of wetlands and 133 linear feet of streams.

Project Location: Withrow Creek, un-named tributaries to Massac Creek, and adjacent wetlands of Massac Creek located near Kentucky Highway 305/358 corridor and Kentucky Highway 1420 in McCracken County, KY. (Latitude: 37.10410 N and Longitude: -88.74310)

Permit Conditions:

General Conditions:

1. The time limit for completing the authorized activity ends on **April 11, 2030**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification for this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of your permit.

Special Conditions:

1. All work authorized by this permit shall be performed in strict compliance with the attached plans entitled "Extension of Bobo Road Project in McCracken County, Kentucky KYTC Item No. 1-8702.0," dated April 19, 2024, which are a part of this permit. Any modification to these plans affecting the authorized work shall be approved by the U.S. Army Corps of Engineers, Louisville District (USACE) prior to implementation.

2. The Permittee shall comply with all conditions of the Section 401 Water Quality Certification No. 2014-138-7 issued by the Kentucky Division of Water (KDOW) on August 29, 2024, which are incorporated herein by reference.

3. This Department of the Army permit does not authorize you to take an endangered species, in particular the Indiana Bat (*Myotis sodalis*), and/or Gray Bat (*Myotis griscescens*). In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g., an ESA Section 10 permit, or a BO under ESA Section 7, with "incidental take" provisions with which you must comply). The enclosed U.S. Fish and Wildlife Service Biological Opinions (BOs) "Federal Highway Administration Kentucky Division's 2020 Programmatic Consultation on the Effects of Transportation Projects in Kentucky on the Indiana Bat and Gray Bat, (April 17, 2020)" and the "2015 Biological Opinion: Kentucky Field Office's participation in Conservation Memoranda of Agreement for the Indiana bat and/or Northern Long-eared Bat (Attachment) contain mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BOs. Your authorization under this Department of the Army permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the attached BOs, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BOs, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Department of the Army permit. The U.S. Fish and Wildlife Service is the appropriate authority to determine compliance with the terms and conditions of its BOs, and with the ESA.

4. To mitigate for the loss of 11.70 acre(s) of Indiana bat (*Myotis sodalis*) and Gray bat (*Myotis griscescens*) known summer and swarming habitat, the Permittee shall submit the appropriate contribution to the Imperiled Bat Conservation Fund (IBCF) in accordance with the processes outlined in the enclosed BOs. If changes to the amount or timeframe for tree removal are to occur, the Permittee shall email the Corps' project manager and the KFO at KentuckyES@fws.gov to determine if re-initiation of Section 7 consultation is required or a revision to the IBCF contribution is necessary. If a change to the project is necessary, no tree removal shall occur until additional coordination with the Corps and KFO is completed.

5. Clearing of trees 5-inches or greater in diameter breast height shall not occur during the occupied timeframe (May 15 to July 31) to minimize adverse effects to the federally listed bat species. If additional forested areas not previously considered in the DA permit application are to be cleared, the Permittee shall notify the Corps and the USFWS in advance of any additional tree clearing to determine if re-initiation of Endangered Species Act consultation is required.

6. Prior to the discharge of fill material, the Permittee shall provide to the Corps written proof of purchase of 26.8 stream adjusted mitigation units (AMUs) from the West Kentucky Wetwoods 2 Mitigation Bank and 1,230 stream AMUs from the Kentucky Department of Fish and Wildlife Resources (KDFWR) Stream and Wetland Mitigation Program. Credits must be purchased prior to the discharge of fill material into waters of the United States. Please note that the cost per credit is determined by KDFWR, in accordance with the requirements set forth in 33 CFR 332.8 and may increase or decrease. Inquiries regarding credit purchase may be made directly to KDFWR by calling Mike Hardin (502) 564-5101, by email at: Mike.Hardin@ky.gov, or in writing at: Kentucky Department of Fish and Wildlife Resources, Division of Fisheries, #1 Sportsman's Lane, Frankfort, Kentucky, 40601.

7. The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, construction debris, metal and plastic products, and concrete block with exposed reinforcement bars. Soils used for fill shall not be contaminated with any toxic substance in concentrations governed by Section 307 of the Clean Water Act. Unless otherwise authorized by this permit, all fill material placed in waters or wetlands shall be generated from an upland source.

8. The Permittee shall require its contractors and/or agents to comply with the terms and conditions of this permit in the construction and maintenance of this project and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this permit. A copy of this permit, including all conditions, drawings and attachments shall be available at the project site during the construction phase of this project. A description of the authorized work, as provided in the DA permit shall be displayed at the project site during construction.

9. Within 30 days from the date of completing the authorized work, the Permittee shall restore 2.16 acres of temporary wetland impacts and 133 linear feet of temporary stream impacts to pre- existing contours and elevations. The affected areas shall be re-vegetated, as appropriate to minimize erosion and ensure site stability.

Further Information:

1. Congressional Authorities. You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measure ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give you favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

andrew logsdon _____ 4/10/25

(PERMITTEE) *(DATE)*

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

_____ _____

L. Reyn Mann *(DATE)*
Colonel, U.S. Army
Louisville District Commander

_____ 4/11/2025

BY: Eric Reusch *(DATE)*
Chief, Regulatory Division
Louisville District

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ _____

(TRANSFEREE) *(DATE)*
(Transferee) (Date)

ENG FORM 1721, Nov 86 EDITION OF SEP 82 IS OBSOLETE *(33 CFR 325 (Appendix A))*

US Army Corps of Engineers®

U.S. Army Corps of Engineers (USACE)

NOTICE OF USACE PERMIT

THIS NOTICE OF AUTHORIZATION MUST BE CONSPICUOUSLY DISPLAYED AT THE SITE OF WORK

Form Approved - OMB No. 0710-0003 Expires 2027-10-31

For use of this form, see Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, and Section 103 of the Marine Protection, Research, and Sanctuaries Act, the proponent agency is CECW-COR.

Purpose: Recipients of USACE permits may be required to post this notification at their work site to inform interested parties of the USACE authorization for the work being completed

A permit to: Raise & extend the existing road between the Kentucky Highway 305/358 corridor and KY HWY 1420.

at: Massac Creek & ajdacent wetlands of the Ohio River at (37.10410,-88.74310)

has been issued to: Kentucky Transportation Cabinet on 2025-04-10

Address of Permittee: 200 Mero Street Frankfort KY 40622

Permit Number

LRL-2023-00445-ncc

For the District Commander

ENG FORM 4336, OCT 2024 PREVIOUS EDITIONS ARE OBSOLETE.

US Army Corps of Engineers®

U.S. Army Corps of Engineers (USACE)

NOTICE OF USACE PERMIT

THIS NOTICE OF AUTHORIZATION MUST BE CONSPICUOUSLY DISPLAYED AT THE SITE OF WORK

Form Approved - OMB No. 0710-0003 Expires 2027-10-31

For use of this form, see Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, and Section 103 of the Marine Protection, Research, and Sanctuaries Act, the proponent agency is CECW-COR.

Purpose: Recipients of USACE permits may be required to post this notification at their work site to inform interested parties of the USACE authorization for the work being completed

A permit to: Raise & extend the existing road between the Kentucky Highway 305/358 corridor and KY HWY 1420.

at: Massac Creek & ajdacent wetlands of the Ohio River at (37.10410,-88.74310)

has been issued to: Kentucky Transportation Cabinet on 2025-04-10

Address of Permittee: 200 Mero Street Frankfort KY 40622

Permit Number

LRL-2023-00445-ncc

For the District Commander

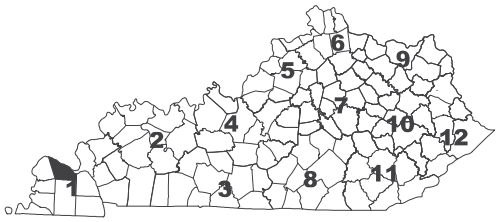
ENG FORM 4336, OCT 2024 PREVIOUS EDITIONS ARE OBSOLETE.

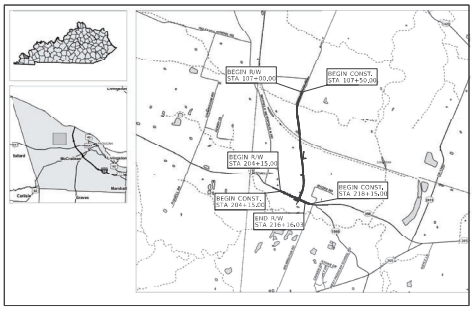
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

PLANS OF
PROPOSED PROJECT

NEW ROUTE
MCCRACKEN COUNTY
RIGHT OF WAY

KENTUCKY TRANSPORTATION CABINET





LAYOUT MAP

RIGHT OF WAY PLANS

Stantec

DESIGN CRITERIA

CLASS OF HIGHWAY	RURAL COLLECTOR
TYPE OF TERRAIN	LEVEL
DESIGN SPEED	45 MPH
REQUIRED K*SD	360 FT
REQUIRED PSD	700 FT
LEVEL OF SERVICE	X
ADT PRESENT (X)	X
ADT FUTURE (X)	X
DHV	X
D %	X
T %	X

GEOGRAPHIC COORDINATES

LATITUDE 37 DEGREES 05 MINUTES 55 SECONDS NORTH
LONGITUDE 88 DEGREES 43 MINUTES 15 SECONDS WEST

DESIGNED

% RESTRICTED SD	X
LEVEL OF SERVICE	X
MAX. DISTANCE W/O PASSING	X

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
R1	LAYOUT SHEET
R2 - R2A	TYPICAL SHEETS
R3	LEGEND AND UTILITY OWNERS
R4 - R15	PLAN AND PROFILE SHEETS
R16 - R17	RIGHT OF WAY SUMMARY SHEETS
R18	RIGHT OF WAY STRIP MAP
R19 - R20	COORDINATE CONTROL SHEETS

BOBO ROAD		KY 358			
LENGTH 4830 LIN. FT. 0.915 MILES		LENGTH 1400 LIN. FT. 0.265 MILES		LENGTH X LIN. FT. X MILES	LENGTH X LIN. FT. X MILES
ADDED / DEDUCTED FOR EQUALITIES X LIN. FT.	NOT INCLUDED	ADDED / DEDUCTED FOR EQUALITIES X LIN. FT.	NOT INCLUDED	ADDED / DEDUCTED FOR EQUALITIES X LIN. FT.	ADDED / DEDUCTED FOR EQUALITIES X LIN. FT.
				NOT INCLUDED	NOT INCLUDED
RAILROAD CROSSINGS NO. X LIN. FT.		RAILROAD CROSSINGS NO. X LIN. FT.		RAILROAD CROSSINGS NO. X LIN. FT.	RAILROAD CROSSINGS NO. X LIN. FT.
BRIDGES 31166 LIN. FT.		BRIDGES X LIN. FT.		BRIDGES X LIN. FT.	BRIDGES X LIN. FT.
X		X		X	X
X		X		X	X

PROJECT NUMBER:

PROJECT DESCRIPTION: EXTENSION OF BOBO ROAD

RECOMMENDED BY: _____ PROJECT MANAGER _____ DATE

PLAN APPROVED BY: _____ STATE HIGHWAY ENGINEER _____ DATE

GLENN A HARDIN 17441 LICENSED PROFESSIONAL ENGINEER STATE OF KENTUCKY

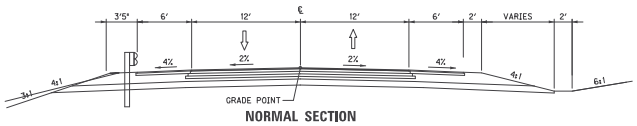
LETTING DATE:

ITEM NO. 1-8702.00 COUNTY OF MCCRACKEN

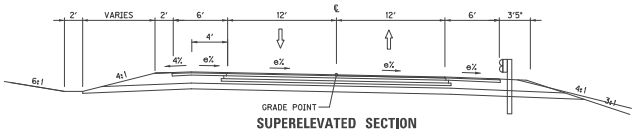
SHEET NO. R1

OpenRoads Designer v10.16.0.80 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\01_8702_LAYOUT_SHEET.DGN

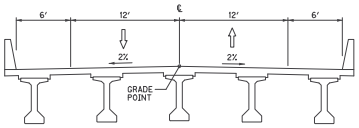
TYPICAL SECTIONS
BOBO ROAD



NORMAL SECTION



SUPERELEVATED SECTION



BRIDGE SECTION

RIGHT OF WAY
PLANS

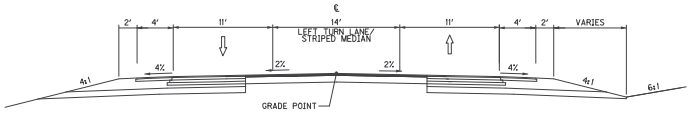
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: TYPICAL SECTIONS

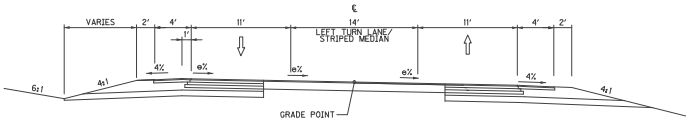
ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R2

OpenRoads Designer v10.16.2.267 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\01_8702_TYPICALS.DGN

TYPICAL SECTIONS
KY 358



NORMAL SECTION



SUPERELEVATED SECTION

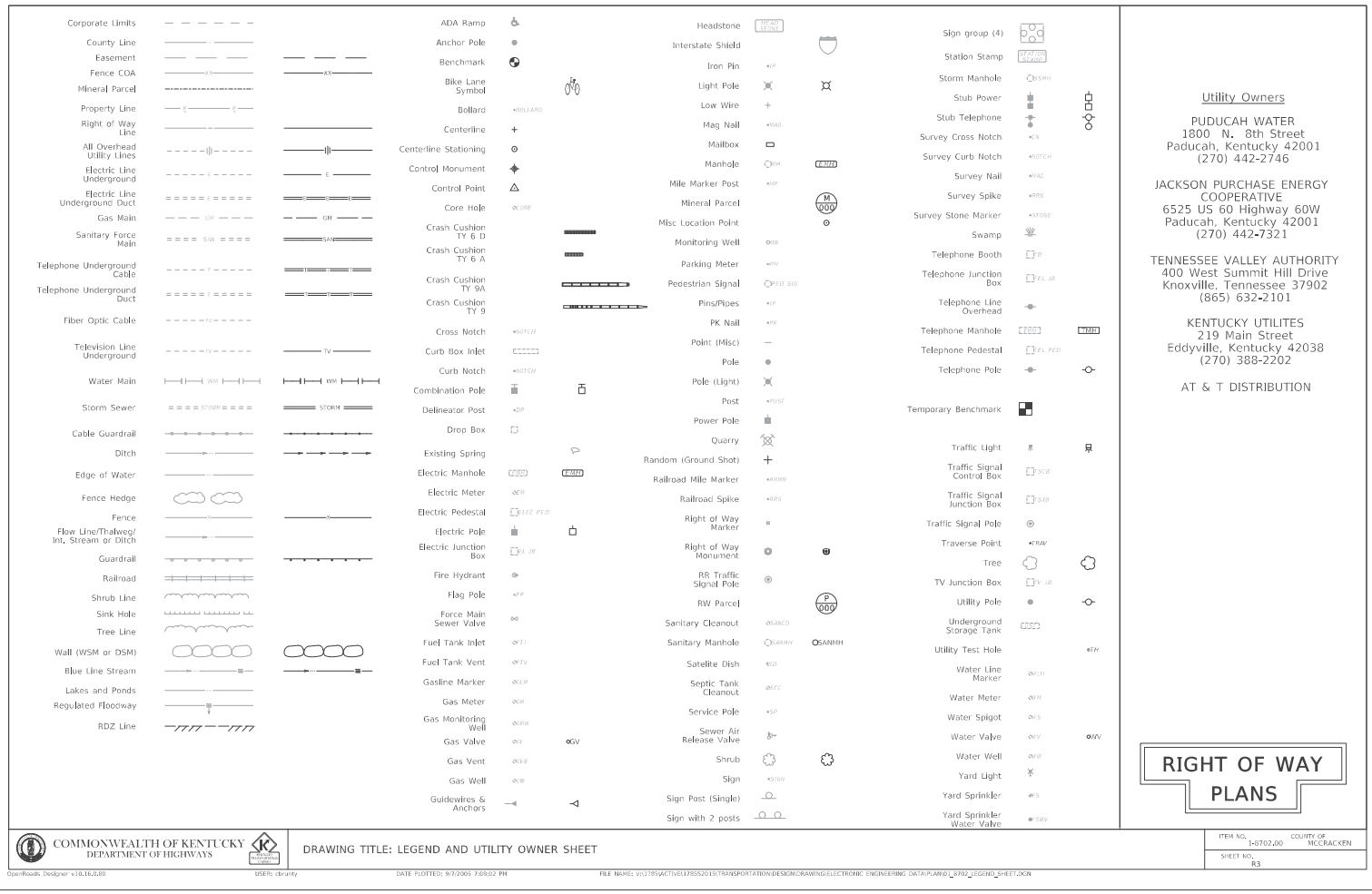
RIGHT OF WAY
PLANS

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: TYPICAL SECTIONS

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R2A

OpenRoads Designer v10.16.0.80 USER: cbrusby DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\01_8702_TYPICALS.DGN



Utility Owners

PUDUCAH WATER
1800 N. 8th Street
Paducah, Kentucky 42001
(270) 442-2746

JACKSON PURCHASE ENERGY COOPERATIVE
6525 US 60 Highway 60W
Paducah, Kentucky 42001
(270) 442-7321

TENNESSEE VALLEY AUTHORITY
400 West Summit Hill Drive
Knoxville, Tennessee 37902
(865) 632-2101

KENTUCKY UTILITES
219 Main Street
Eddyville, Kentucky 42038
(270) 388-2202

AT & T DISTRIBUTION

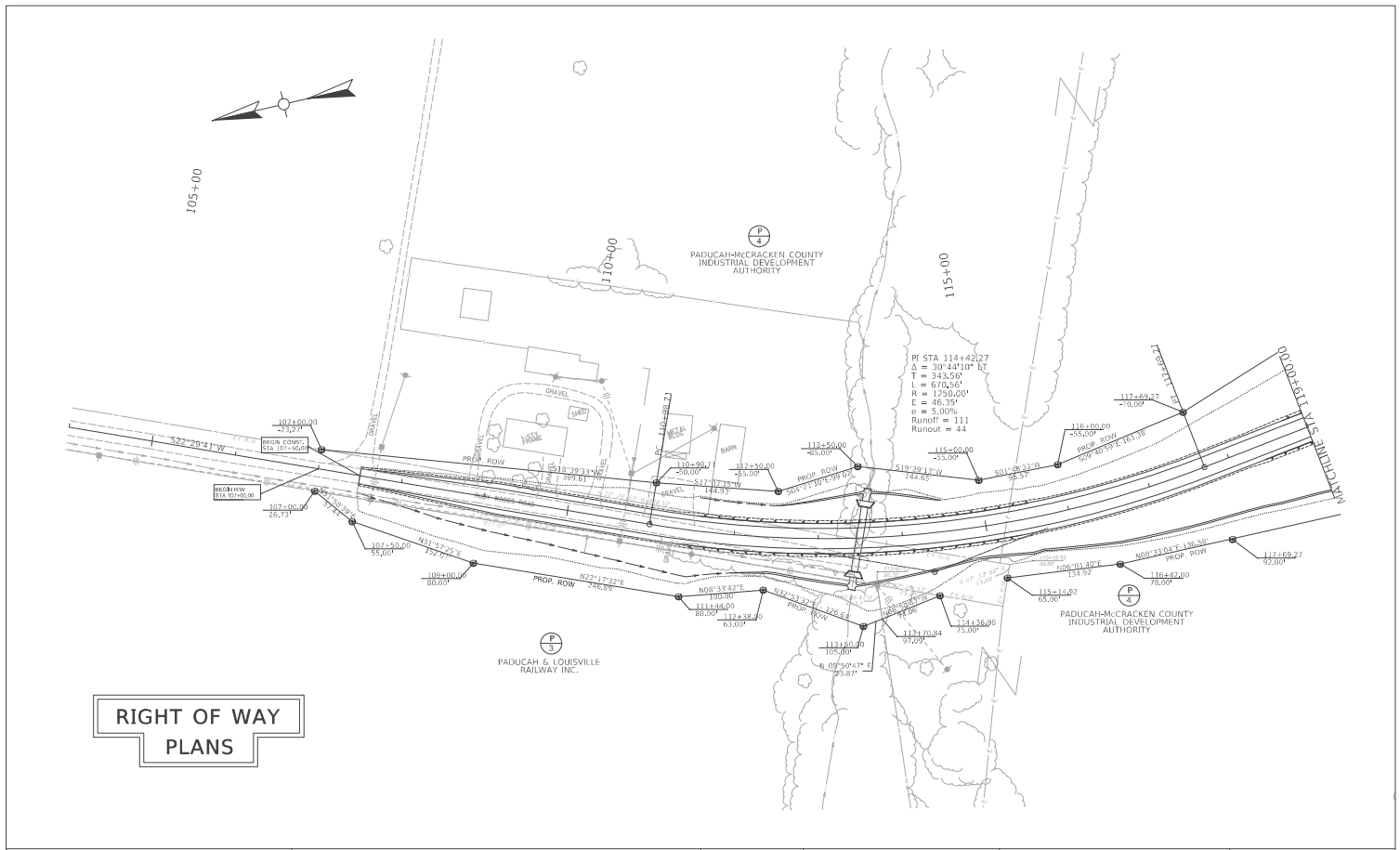
RIGHT OF WAY PLANS

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: LEGEND AND UTILITY OWNER SHEET

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R3

OpenRoads Designer v10.16.0.80 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\01_8702_LEGEND_SHEET.DGN



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: BOBO ROAD

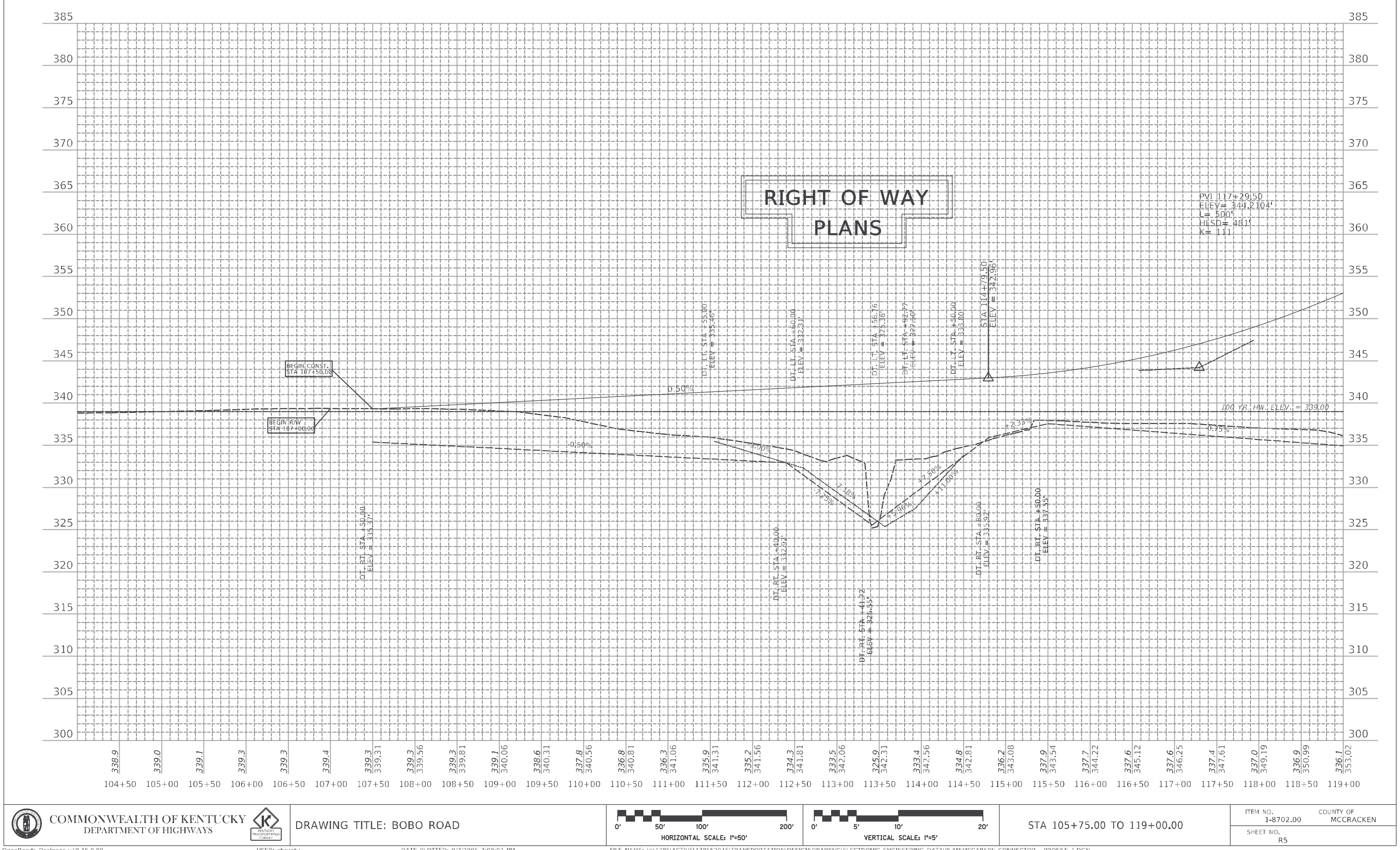
HORIZONTAL SCALE
SCALE: 1" = 50'

0' 50' 100' 200'

STA 105+75.00 TO 119+00.00

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R4

OpenRoads Designer v10.16.0.80 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\MEGAPARK_CONNECTOR - PLAN 1.DGN



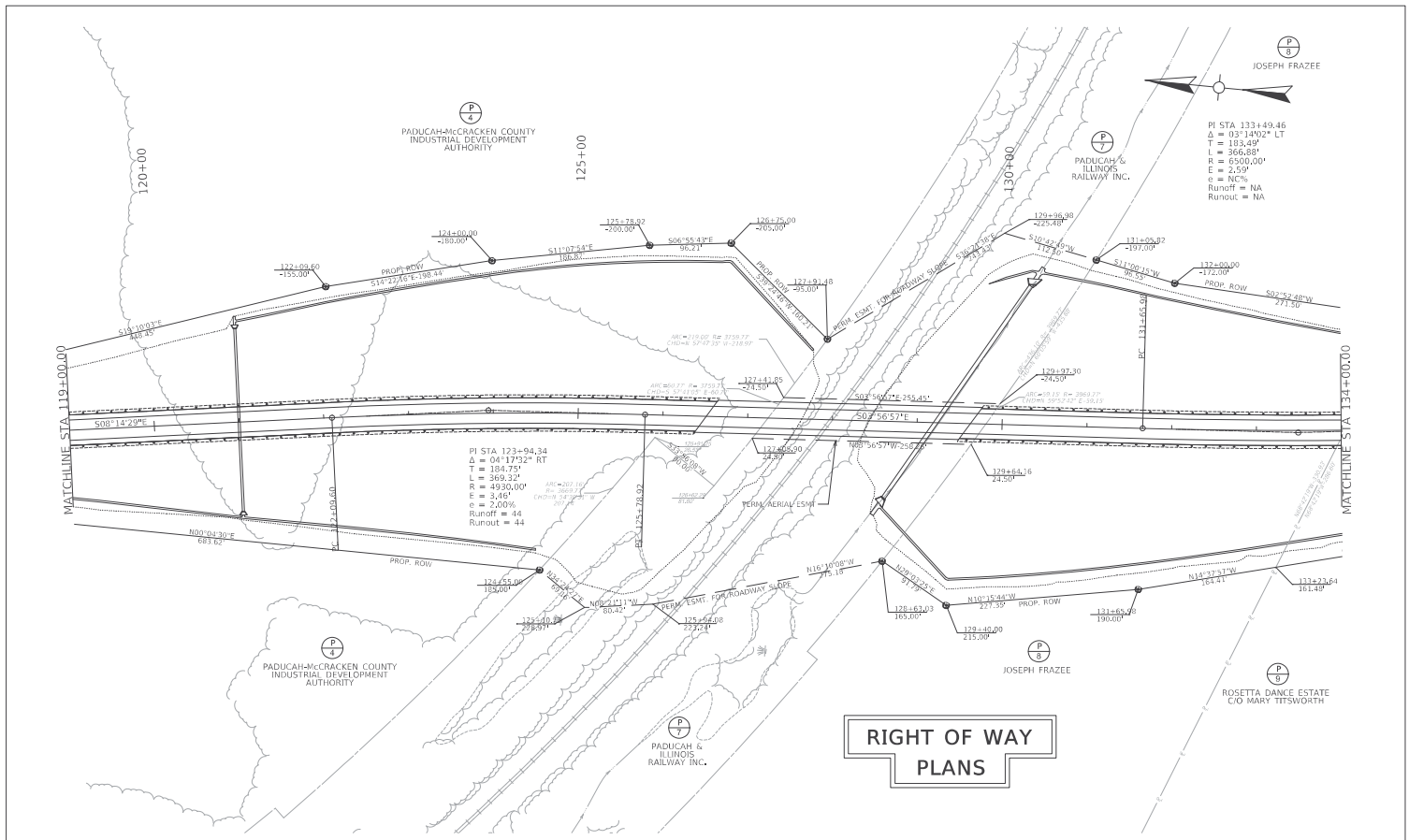
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

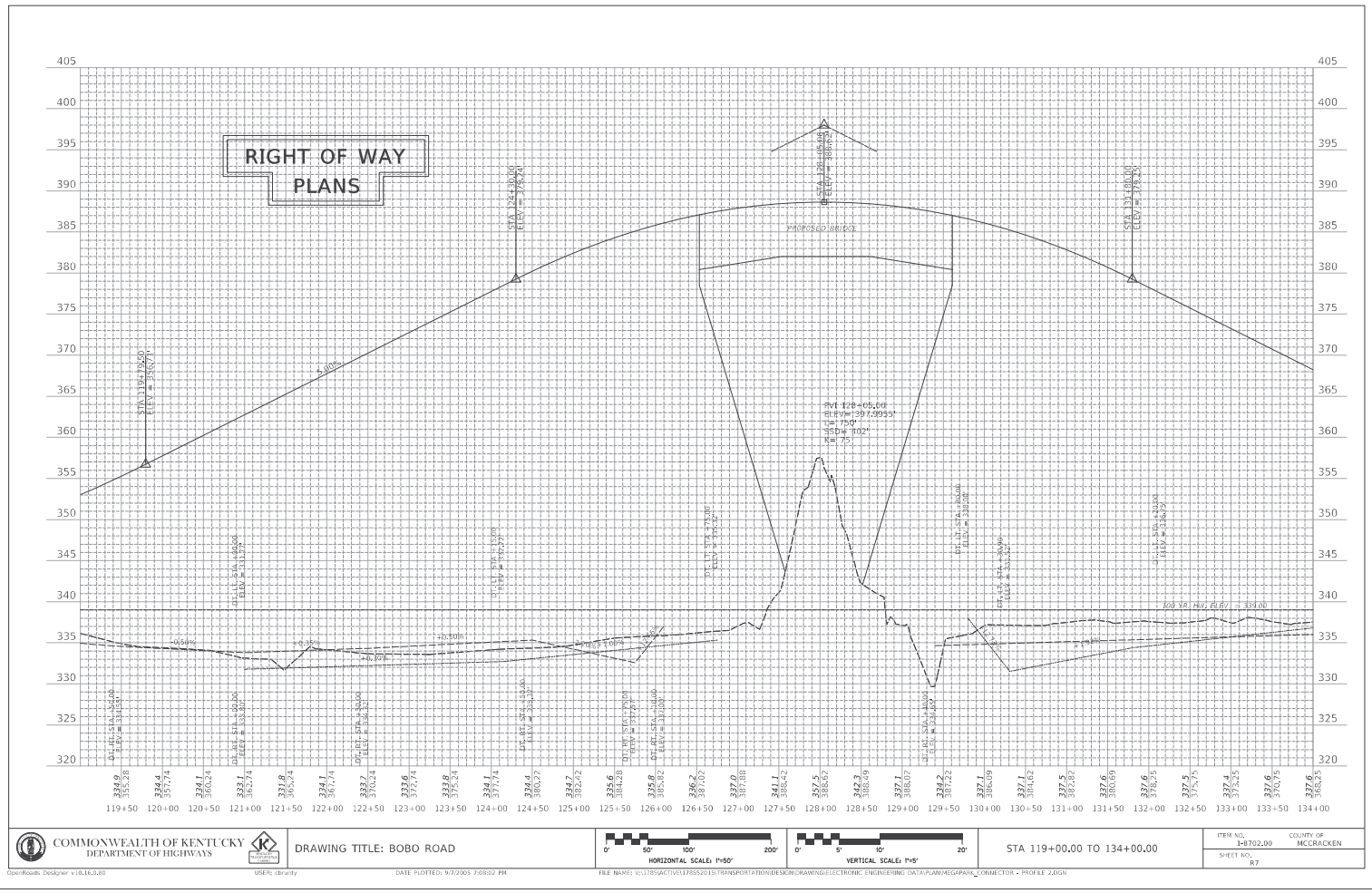
DRAWING TITLE: BOBO ROAD

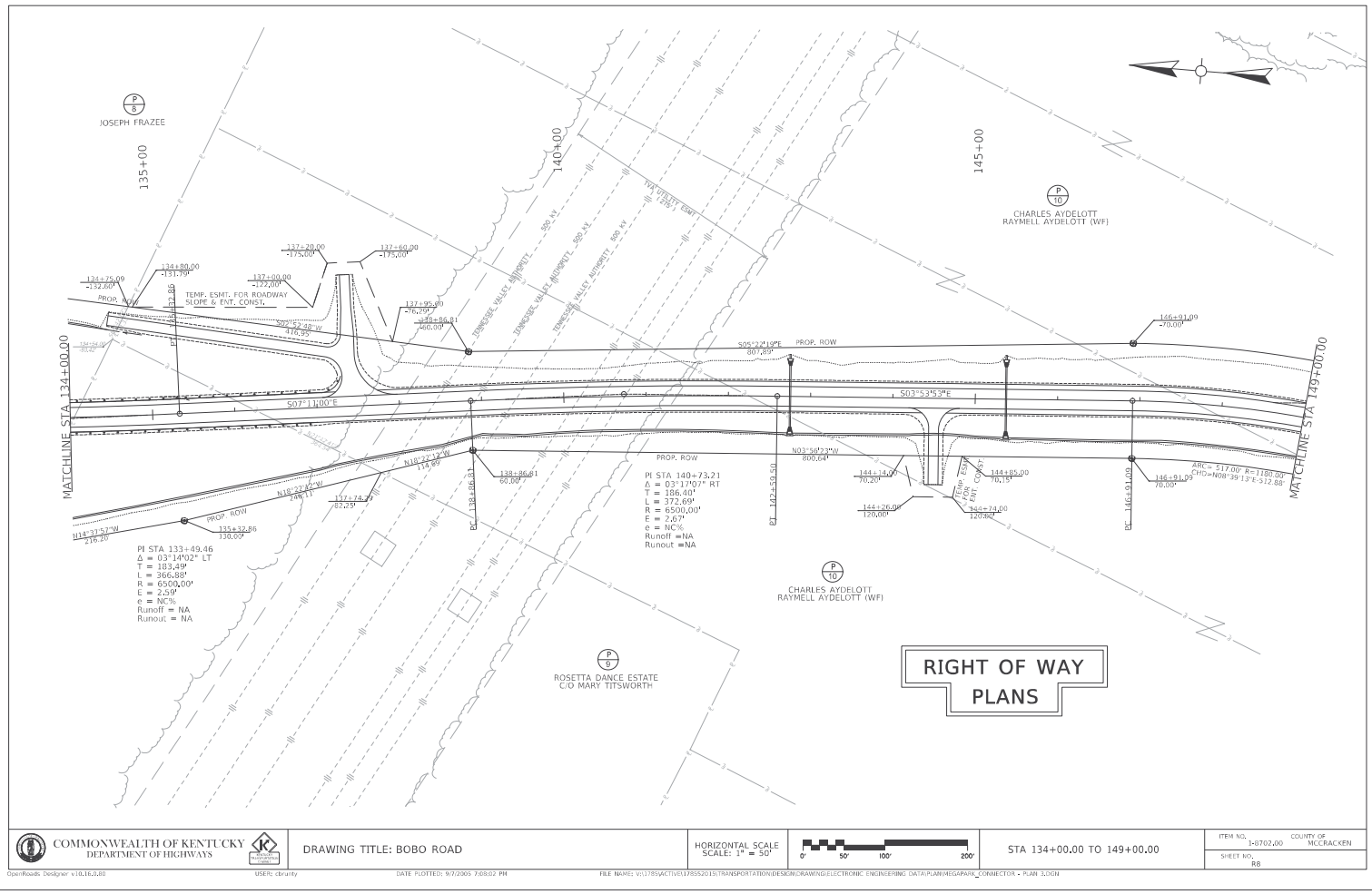
STA 105+75.00 TO 119+00.00

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R5

OpenRoads Designer v10.16.0.80 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\MEGAPARK_CONNECTOR - PROFILE 1.DGN


PADUCAH-McCRACKEN COUNTY INDUSTRIAL DEVELOPMENT AUTHORITY
JOSEPH FRAZEE
PADUCAH & ILLINOIS RAILWAY INC.
ROSETTA DANCE ESTATE C/O MARY TITSWORTH
MATCHLINE STA 119+00.00
MATCHLINE STA 134+00.00
PROP. ROW
PERM. ESMT FOR ROADWAY SLOPE
PERM. AERIAL ESMT
PI STA 123+94.34
Δ = 04°17'32" RT
T = 184.75'
L = 369.32'
R = 4930.00'
E = 3.46'
e = 2.00%
Runoff = 44
Runout = 44
PI STA 133+49.46
Δ = 03°14'02" LT
T = 183.49'
L = 366.88'
R = 6500.00'
E = 2.59'
e = NC%
Runoff = NA
Runout = NA
RIGHT OF WAY PLANS
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
DRAWING TITLE: BOBO ROAD
HORIZONTAL SCALE SCALE: 1" = 50'
0' 50' 100' 200'
STA 119+00.00 TO 134+00.00
ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R6
OpenRoads Designer v10.16.0.80
USER: cbrusby
DATE PLOTTED: 9/7/2005 7:08:02 PM
FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\MEGAPARK_CONNECTOR - PLAN 2.DGN


RIGHT OF WAY
PLANS
PROPOSED BRIDGE
PVI 128+05.00
ELEV = 397.9955'
L = 750'
SSD = 402'
K = 75
100 YR. HWY ELEV = 339.00
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
DRAWING TITLE: BOBO ROAD
HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=5'
STA 119+00.00 TO 134+00.00
ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R7
OpenRoads Designer v10.16.0.80
USER: cbrusby
DATE PLOTTED: 9/7/2005 7:08:02 PM
FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\MEGAPARK_CONNECTOR - PROFILE Z.DGN



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: BOBO ROAD

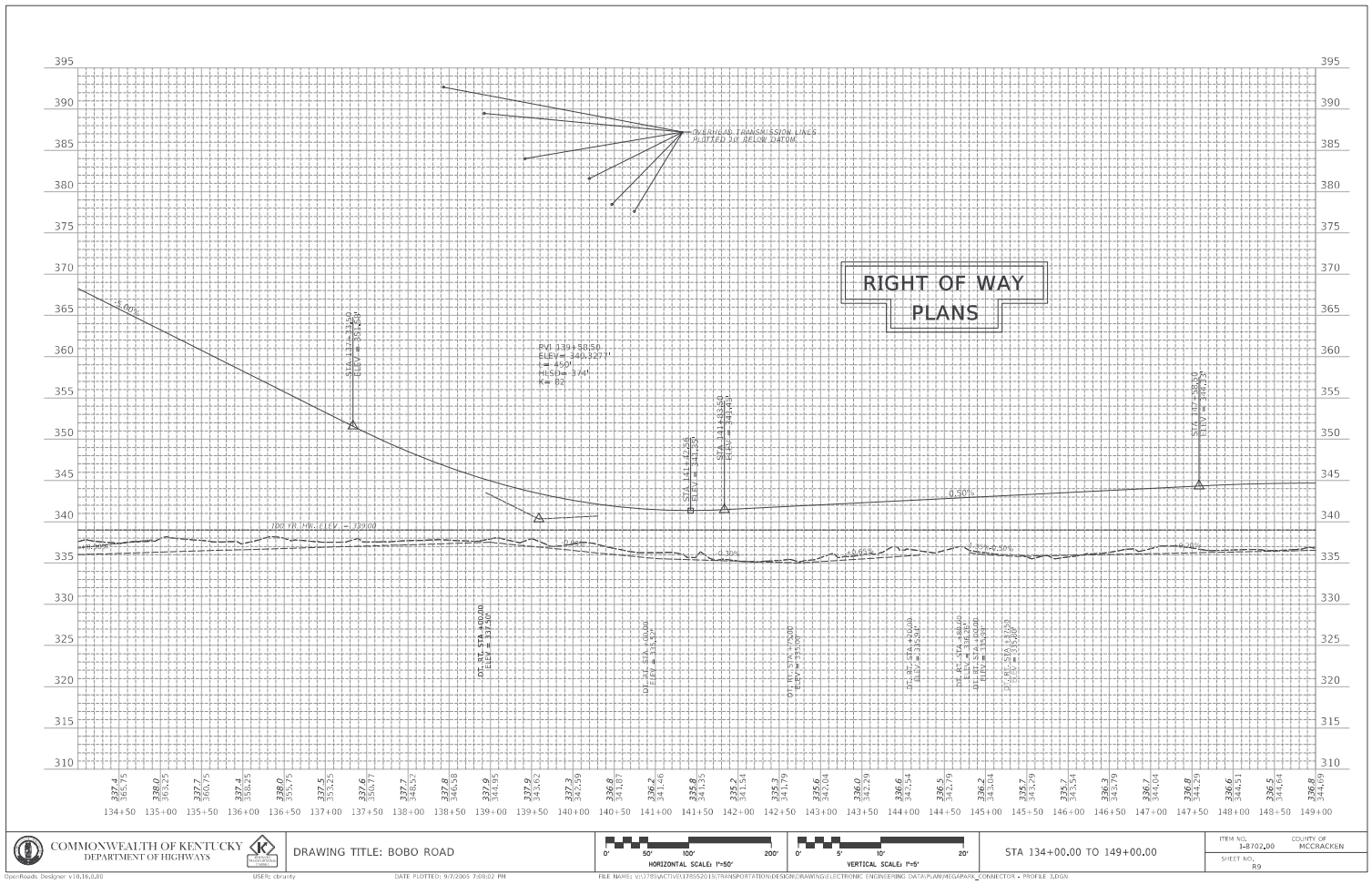
HORIZONTAL SCALE
SCALE: 1" = 50'

0' 50' 100' 200'

STA 134+00.00 TO 149+00.00

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R8

OpenRoads Designer v10.16.0.80 USER: cbrusty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\MEGAPARK_CONNECTOR - PLAN 3.DGN



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: BOBO ROAD

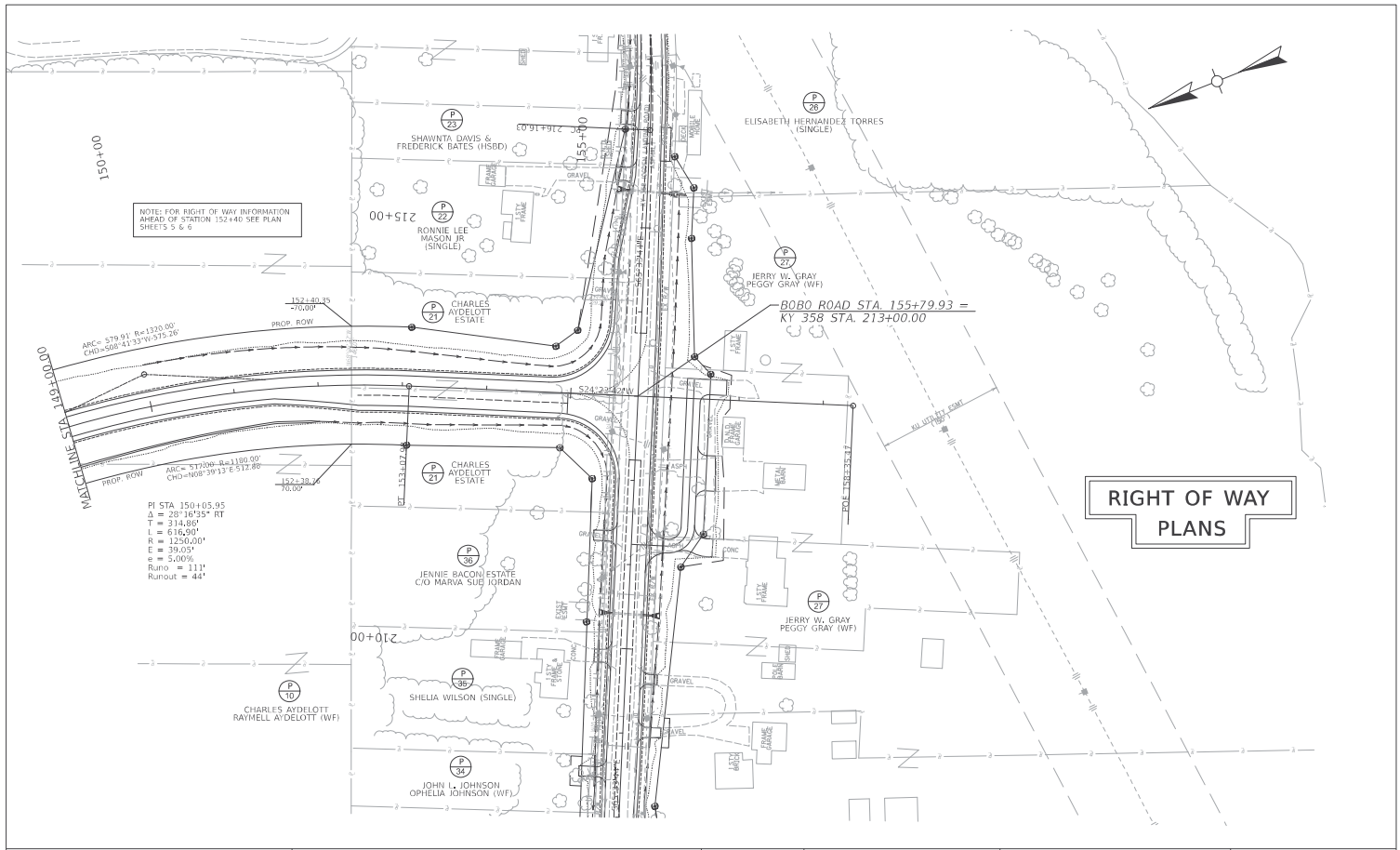
HORIZONTAL SCALE: 1"=50' (0' 50' 100' 200')

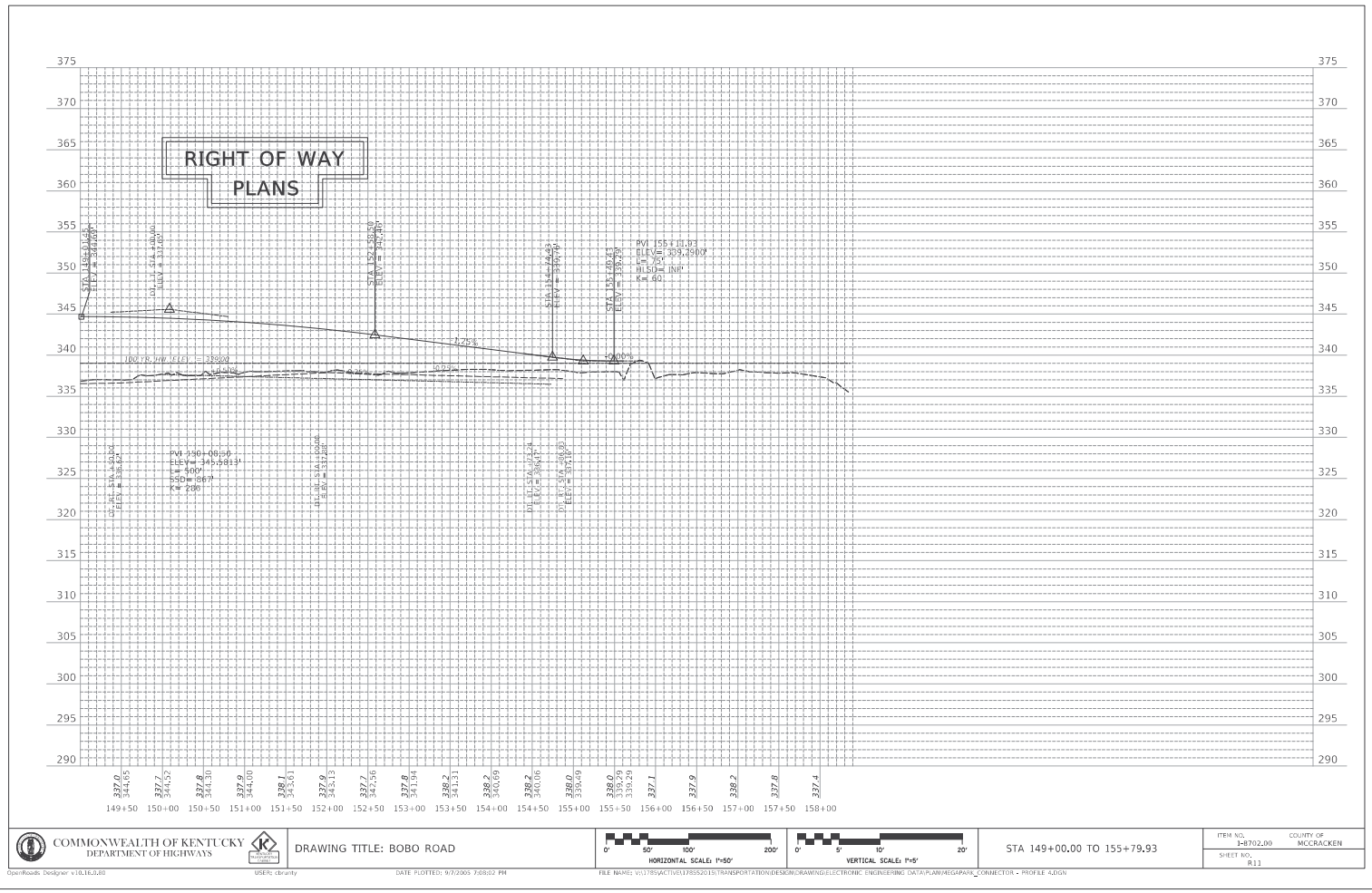
VERTICAL SCALE: 1"=5' (0' 5' 10' 20')

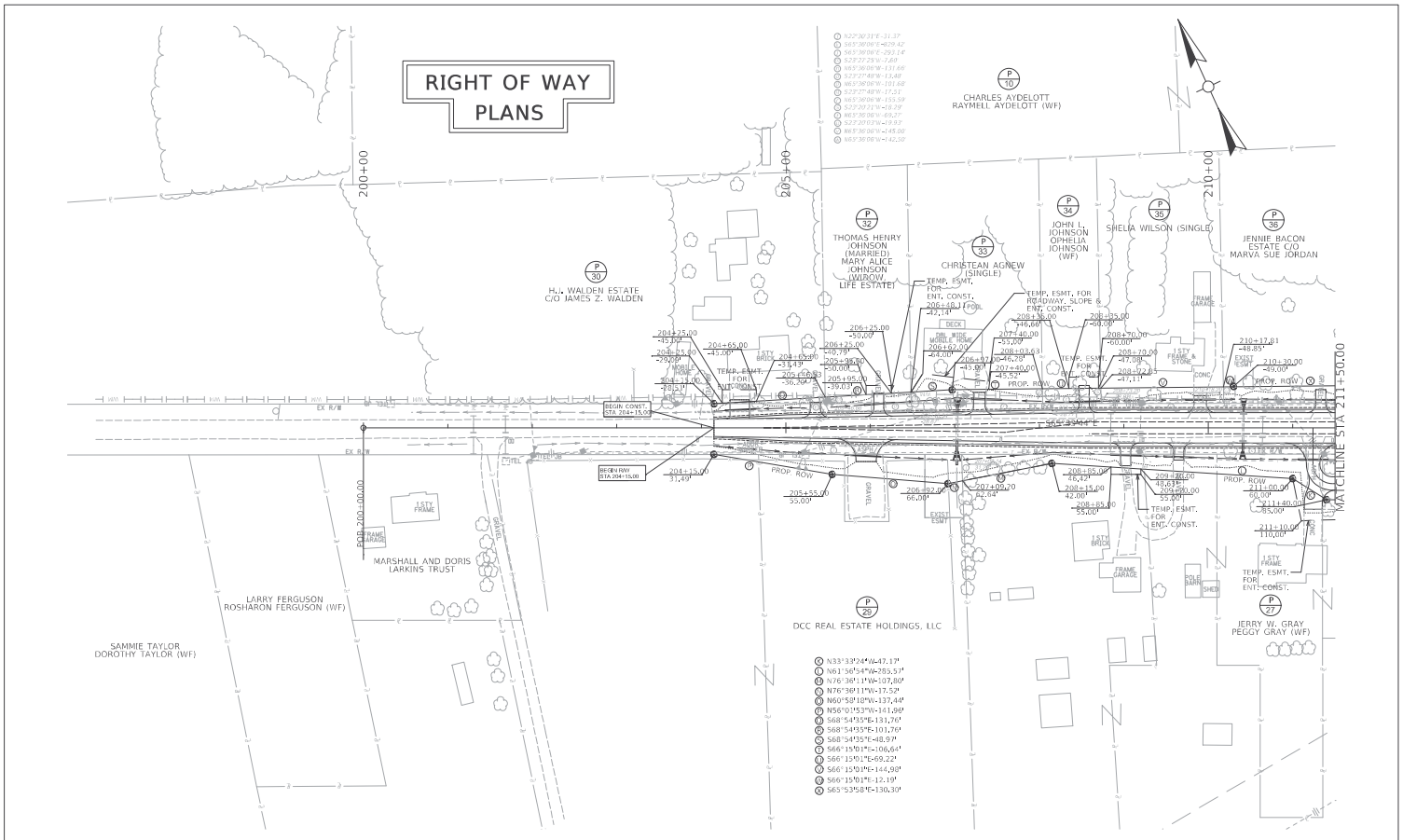
STA 134+00.00 TO 149+00.00

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R9

OpenRoads Designer v10.16.0.80 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\MEGAPARK_CONNECTOR - PROFILE 3.DGN


RIGHT OF WAY PLANS
BOBO ROAD STA. 155+79.93 = KY 358 STA. 213+00.00
NOTE: FOR RIGHT OF WAY INFORMATION AHEAD OF STATION 152+40 SEE PLAN SHEETS 5 & 6
PI STA 150+05.95
Δ = 28°16'35" RT
T = 314.86'
L = 616.90'
R = 1250.00'
E = 39.05'
e = 5.00%
Runo = 111'
Runout = 44'
SHAWNTA DAVIS & FREDERICK BATES (HSBD)
RONNIE LEE MASON JR (SINGLE)
CHARLES AYDELOTT ESTATE
ELISABETH HERNANDEZ TORRES (SINGLE)
JERRY W. GRAY PEGGY GRAY (WF)
JENNIE BACON ESTATE C/O MARVA SUE JORDAN
SHELIA WILSON (SINGLE)
CHARLES AYDELOTT RAYMELL AYDELOTT (WF)
JOHN L. JOHNSON OPHELIA JOHNSON (WF)
MAIN LINE STA 149+00.00
150+00
155+00
210+00
215+00
PROP. ROW
KU UTILITY ESMT
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
DRAWING TITLE: BOBO ROAD
HORIZONTAL SCALE SCALE: 1" = 50'
0' 50' 100' 200'
STA 149+00.00 TO 155+79.93
ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R10
OpenRoads Designer v10.16.0.80
USER: cbrusby
DATE PLOTTED: 9/7/2005 7:08:02 PM
FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\MEGAPARK_CONNECTOR - PLAN 4.DGN


RIGHT OF WAY
PLANS
375
370
365
360
355
350
345
340
335
330
325
320
315
310
305
300
295
290
149+50
150+00
150+50
151+00
151+50
152+00
152+50
153+00
153+50
154+00
154+50
155+00
155+50
156+00
156+50
157+00
157+50
158+00
100 YR. HW ELEV. = 339.00
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
DRAWING TITLE: BOBO ROAD
HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=5'
STA 149+00.00 TO 155+79.93
ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R11
OpenRoads Designer v10.16.0.80
USER: cbrunty
DATE PLOTTED: 9/7/2005 7:08:02 PM
FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\MEGAPARK_CONNECTOR - PROFILE R.DGN



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

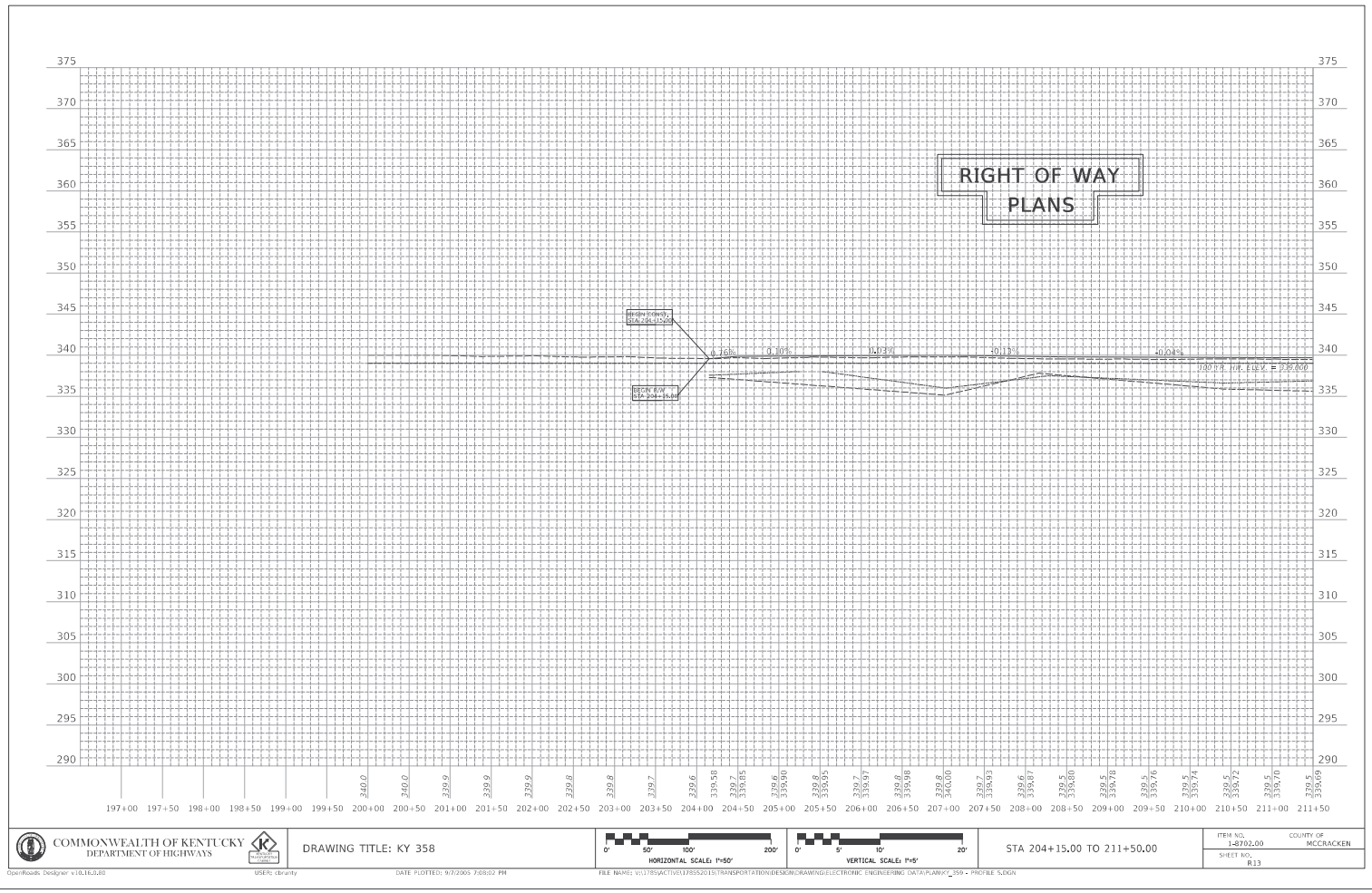
DRAWING TITLE: KY 358

HORIZONTAL SCALE
SCALE: 1" = 50'
0' 50' 100' 200'

STA 204+15.00 TO 211+50.00

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R12

OpenRoads Designer v10.16.0.80 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLANKY_358 - PLAN 3.DGN



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: KY 358

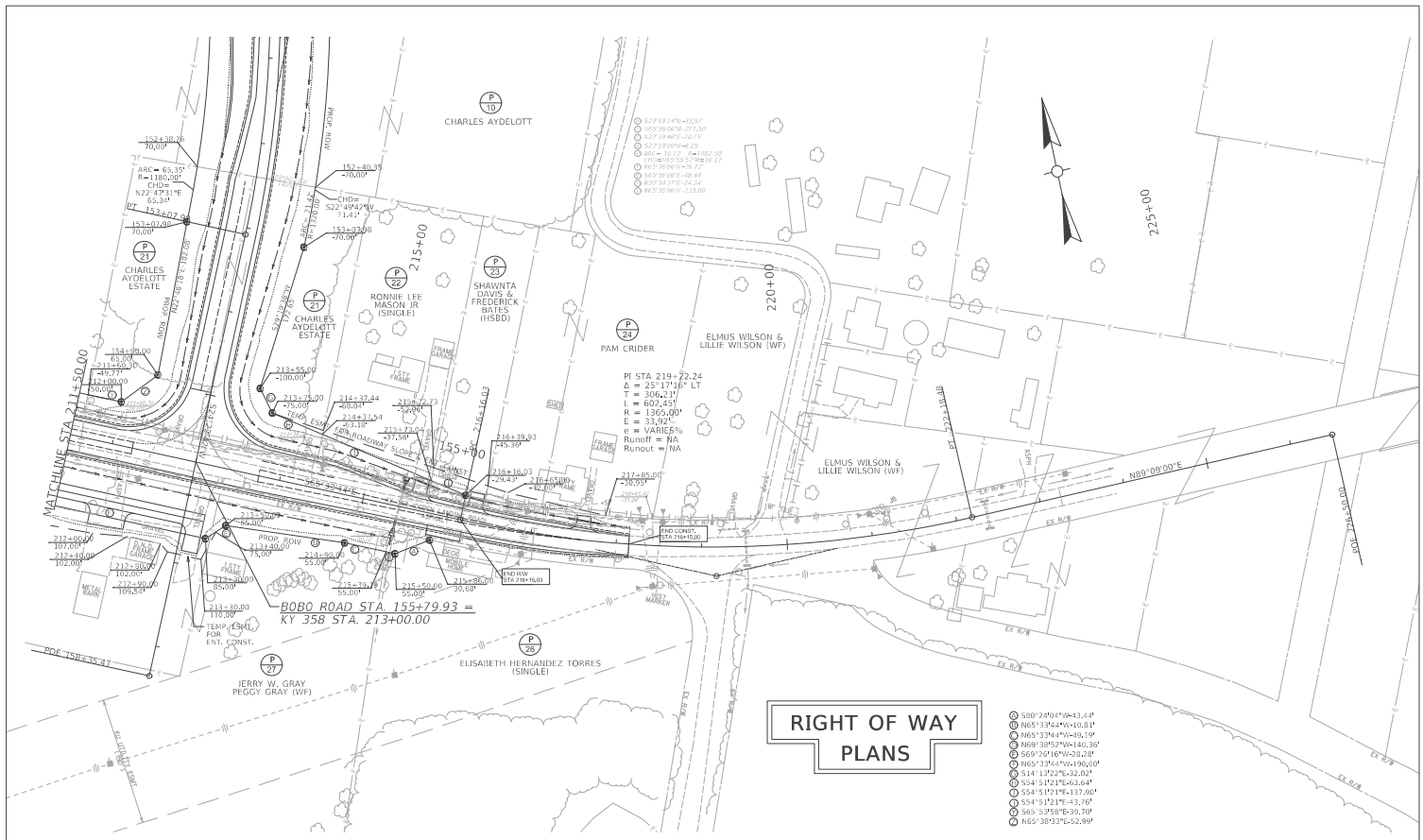
HORIZONTAL SCALE: 1"=50' (0' 50' 100' 200')

VERTICAL SCALE: 1"=5' (0' 5' 10' 20')

STA 204+15.00 TO 211+50.00

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R13

OpenRoads Designer v10.16.0.80 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLANKY_358 - PROFILE S.DGN



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: KY 358

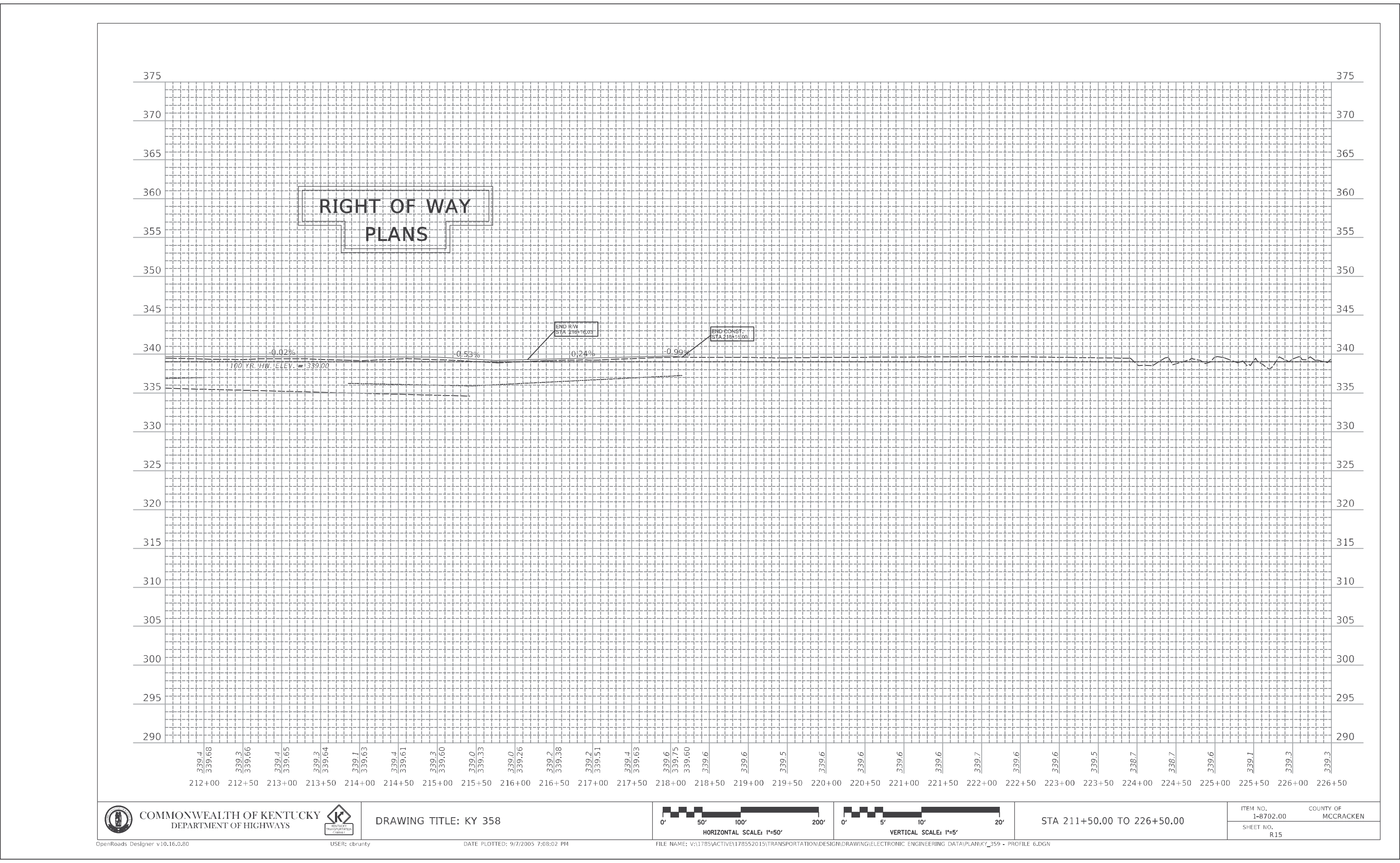
HORIZONTAL SCALE
SCALE: 1" = 50'

0' 50' 100' 200'

STA 211+50.00 TO 226+50.00

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R14

OpenRoads Designer v10.16.0.80 USER: cbrunty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLANS\KY_358 - PLAN &DGN


RIGHT OF WAY
PLANS
0.02%
0.53%
0.24%
0.99%
100 YR. HW. ELEV. = 339.00
212+00
212+50
213+00
213+50
214+00
214+50
215+00
215+50
216+00
216+50
217+00
217+50
218+00
218+50
219+00
219+50
220+00
220+50
221+00
221+50
222+00
222+50
223+00
223+50
224+00
224+50
225+00
225+50
226+00
226+50
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
DRAWING TITLE: KY 358
HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=5'
STA 211+50.00 TO 226+50.00
ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R15
OpenRoads Designer v10.16.0.80
USER: cbrunty
DATE PLOTTED: 9/7/2005 7:08:02 PM
FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\KY_359 - PROFILE 6.DGN

RIGHT OF WAY SUMMARY

PARCEL NO.	OWNER(S)	TOTAL AREA OF TRACT		PERMANENT R/W ACQUIRED		EASEMENTS		AREA SEVERED				EXCESS PURCHASED		PORTION REMAINING		SEWER SYSTEM TYPE	SEWER SYSTEM AFFECTED BY PROJECT		BUILDINGS ACQUIRED NUMBER				SOURCE OF TITLE	REMARKS*
						PERMANENT	TEMPORARY	LEFT		RIGHT							YES	NO	C	R	F	S		
		ACRES	SQ. FT.	ACRES	SQ. FT.	SQ. FT.	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.									
1	NOT USED																							
2	NOT USED																							
3	PADUCAH & LOUISVILLE RAILWAY INC.	44.04		0.675						43.365				43.365		4							DB 1144, PG 703	
4	PADUCAH-McCRACKEN COUNTY INDUSTRIAL DEVELOPMENT AUTHORITY	224.567		7.705				202.282		14.580				216.862		1		X					DB 1448, PG 381 DB 1169, PG 212	PLAT SECTION "K", PG 1433 PLAT SECTION "J", PG 929
5	NOT USED																							
6	NOT USED																							
7	PADUCAH & ILLINOIS RAILWAY INC.					130,549①										4								
8	JOSEPH FRAZEE	41.392		3.476				27.494		10.422				37.916		4							DB 1366, PG94 DB 1149, PG 346 DB 1100, PG 683	PLAT SECTION "K", PG 1433
9	ROSETTA DANCE ESTATE C/O MARY TITSWORTH	25.406		1.239						24.167				24.167		4							DB 510, PG 603	
10	CHARLES AYDELOTT RAYMELL AYDELOT (WF)	40.4		5.266			12,442	22.576		12.558				35.134		4							DB 721, PG 323 DB 721, PG 325 DB 721, PG 327 DB 721, PG 588	
11	NOT USED																							
12	NOT USED																							
13	NOT USED																							
14	NOT USED																							
15	NOT USED																							
16	NOT USED																							
17	NOT USED																							
18	NOT USED																							
19	NOT USED																							
20	NOT USED																							
21	CHARLES AYDELOTT ESTATE	2.00		1.065			152	0.463		0.472				0.935		4							DB 747, PG 133	
22	RONNIE LEE MASON JR. (SINGLE)	1.000		0.065			1368	0.935						0.935		1		X					DB 1146, PG 451	
23	SHAWNTA DAVIS FREDERICK BATES (HUSB.)		21780		178		1135		21602					21602		4						1	DB 1335, PG 398	
24	PAM CRIDER	1.50					1139									1		X					DB 1237, PG 379	
25	NOT USED																							
26	ELISABETH HERNANDEZ TORRES (SINGLE)	4.00		0.017						3.983				3.983		1		X					DB 1418, PG724	
27	JERRY W. GRAY PEGGY GRAY (WF)	18.70		0.597			5661			18.103				18.103		1		X					DB 666, PG 523 DB 813, PG 155 DB 1025, PG 246 DB 1459, PG 792	PLAT SECTION "K", PG 946
28	NOT USED																							
29	DCC REAL ESTATE HOLDINGS, LLC	6.24		0.142						6.098				6.098		4							DB 1425, PG 875	PLAT SECTION"K", PG 1568 PLAT SECTION "L", PG 116
30	H.J. WALDEN ESTATE C/O JAMES Z. WALDEN	5.64		0.012			590	5.628						5.628		1		X					DB 96, PG 380	

NOTE: PERMANENT R/W ACQUIRED + AREA SEVERED = TOTAL AREA OF TRACT

① INCLUDES 12,585 SQ. FT. FOR PERMANENT AERIAL EASEMENT

TYPE SEWER SYSTEM
1. PRIVATE - INDIVISUAL
2 PRIVATE - MULTI PARTY
3. PUBLIC
4. NONE
5. NOT APPLICABLE

BUILDINGS ACQUIRED CODE
C - COMMERCIAL
R - RESIDENTIAL
F - FARM
S - STORAGE

*INCLUDES HAZADOUS WASTE
UST- UNDERGROUND STORAGE TANKS

RIGHT OF WAY PLANS

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: RIGHT OF WAY SUMMARY

ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R16

OpenRoads Designer v10.16.0.80 USER: cbrusty DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\01_8702_ROW_RIGHT_OF_WAY_SUMMARY.DGN

RIGHT OF WAY SUMMARY

PARCEL NO.	OWNER(S)	TOTAL AREA OF TRACT		PERMANENT R/W ACQUIRED		EASEMENTS		AREA SEVERED				EXCESS PURCHASED		PORTION REMAINING		SEWER SYSTEM TYPE	SEWER SYSTEM AFFECTED BY PROJECT		BUILDINGS ACQUIRED NUMBER				SOURCE OF TITLE	REMARKS*
						PERMANENT	TEMPORARY	LEFT		RIGHT							YES	NO	C	R	F	S		
		ACRES	SQ. FT.	ACRES	SQ. FT.	SQ. FT.	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.									
31	NOT USED																							
32	THOMAS HENRY JOHNSON (MARRIED)		33541		1072		303		32469						32469	4							DB 903, PG 398	
33	CHRISTEAN AGNEW (SINGLE)	1.00		0.058			1302	0.942						0.942		1		X					DB 1017, PG 402	
34	JOHN L. JOHNSON OPHELIA JOHNSON (WF)		17424		1239		460		16185						16185	1		X					DB 766, PG 372	
35	SHELIA WILSON (SINGLE)	1.00		0.064				0.936						0.936		1		X					DB 1388, PG 220	
36	JENNIE BACON ESTATE C/O MARVA SUE JORDAN	1.00		0.067				0.933						0.933		4								

NOTE: PERMANENT R/W ACQUIRED + AREA SEVERED = TOTAL AREA OF TRACT

RIGHT OF WAY PLANS

TYPE SEWER SYSTEM
1. PRIVATE - INDIVISUAL
2 PRIVATE - MULTI PARTY
3. PUBLIC
4. NONE
5. NOT APPLICABLE

BUILDINGS ACQUIRED CODE
C - COMMERCIAL
R - RESIDENTIAL
F - FARM
S - STORAGE

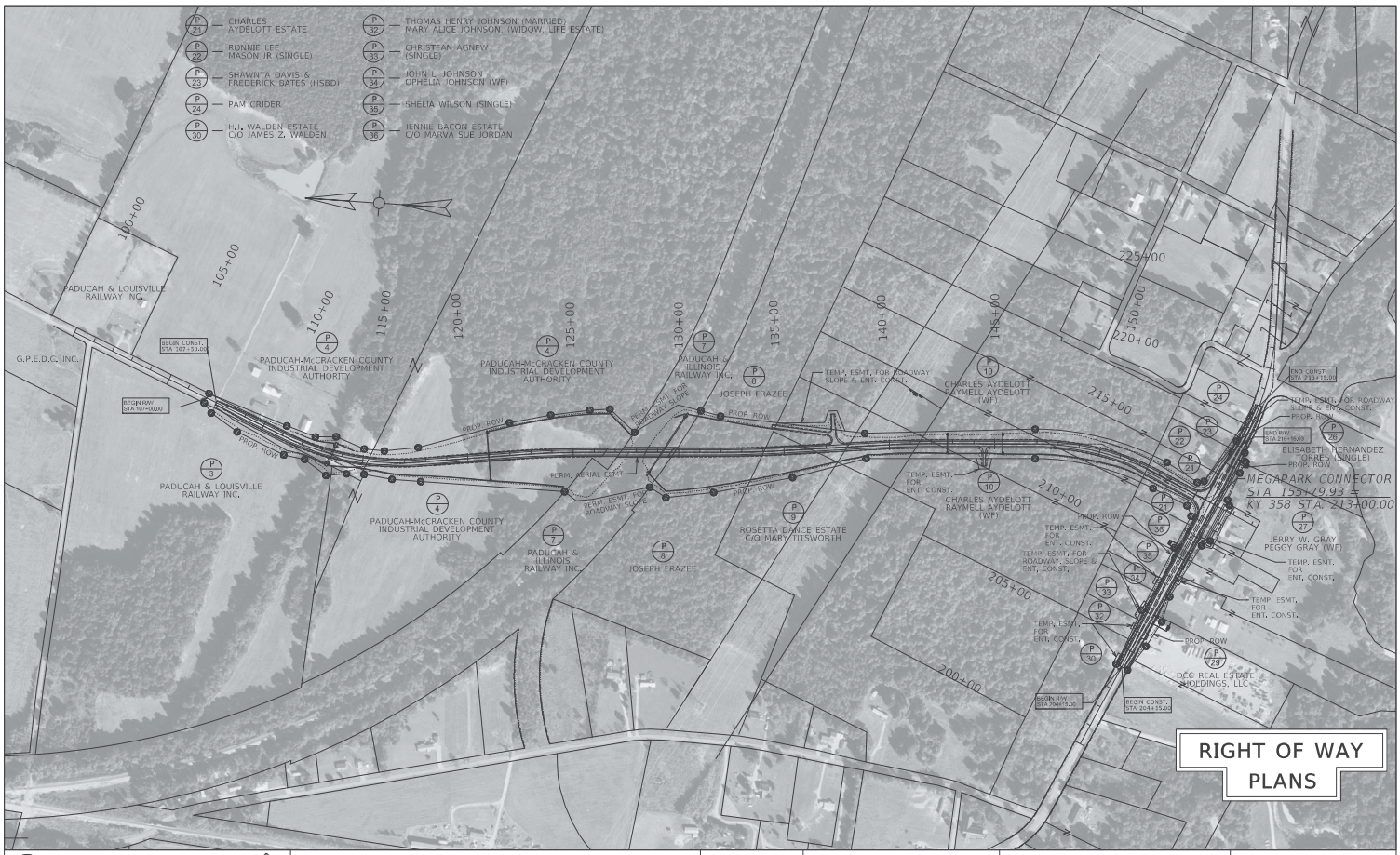
*INCLUDES HAZADOUS WASTE
UST- UNDERGROUND STORAGE TANKS

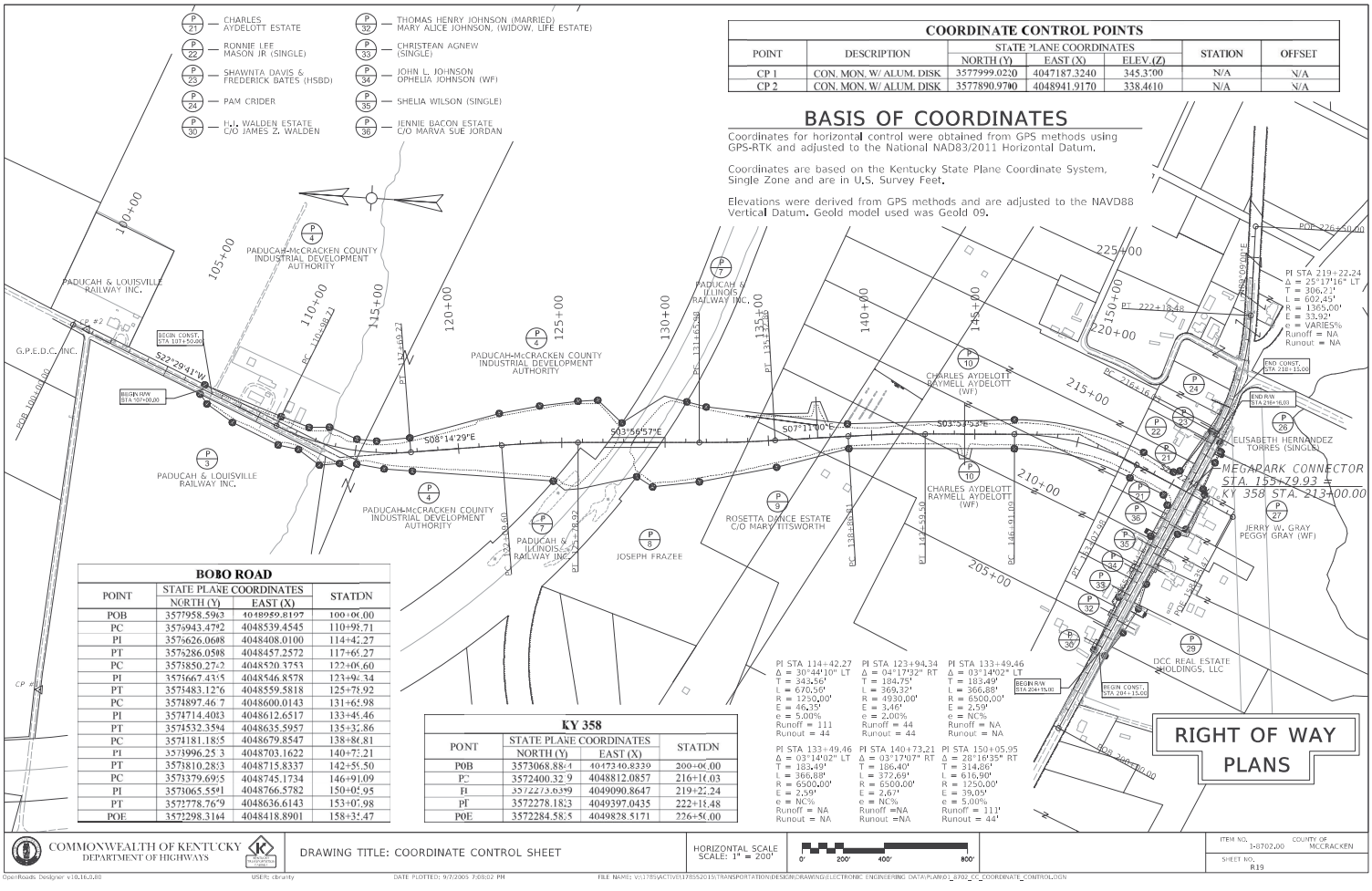
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: RIGHT OF WAY SUMMARY

ITEM NO. 1-8702.00 COUNTY OF MCCRACKEN
SHEET NO. R17

OpenRoads Designer v10.16.0.80 USER: cbrusby DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLANS\1_8702_ROW_RIGHT_OF_WAY_SUMMARY.DGN


P 21 — CHARLES AYDELOTT ESTATE
P 22 — RONNIE LEE MASON JR (SINGLE)
P 23 — SHAWNTA DAVIS & FREDERICK BATES (HSBD)
P 24 — PAM CRIDER
P 30 — H.L. WALDEN ESTATE C/O JAMES Z. WALDEN
P 32 — THOMAS HENRY JOHNSON (MARRIED) MARY ALICE JOHNSON, (WIDOW, LIFE ESTATE)
P 33 — CHRISTEAN AGNEW (SINGLE)
P 34 — JOHN L. JOHNSON OPHELIA JOHNSON (WF)
P 35 — SHELIA WILSON (SINGLE)
P 36 — JENNIE BACON ESTATE C/O MARVA SUE JORDAN
100+00
105+00
110+00
115+00
120+00
125+00
130+00
135+00
140+00
145+00
150+00
220+00
225+00
215+00
210+00
205+00
200+00
PADUCAH & LOUISVILLE RAILWAY INC.
G.P.E.D.C., INC.
BEGIN CONST. STA 101+34.00
BEGIN R/W STA 107+00.00
PADUCAH-McCRACKEN COUNTY INDUSTRIAL DEVELOPMENT AUTHORITY
PADUCAH & ILLINOIS RAILWAY INC.
JOSEPH FRAZEE
TEMP. ESMT. FOR ROADWAY SLOPE & ENT. CONST.
PROP. R/W
PERM. AERIAL ESMT.
PERM. ESMT. FOR ROADWAY SLOPE
CHARLES AYDELOTT RAYMELL AYDELOTT (WF)
ROSETTA DANICE ESTATE C/O MARY TITSWORTH
TEMP. ESMT. FOR ENT. CONST.
TEMP. ESMT. FOR ROADWAY, SLOPE & ENT. CONST.
END CONST. STA 218+15.00
END R/W STA 218+18.00
ELISABETH HERNANDEZ TORRES (SINGLE)
MEGAPARK CONNECTOR STA 155+79.93 = KY 358 STA 213+00.00
JERRY W. GRAY PEGGY GRAY (WF)
DCC REAL ESTATE HOLDINGS, LLC
BEGIN R/W STA 204+18.00
BEGIN CONST. STA 204+15.00
RIGHT OF WAY PLANS
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
DRAWING TITLE: RIGHT OF WAY STRIP MAP
HORIZONTAL SCALE 1" = 200'
0' 200' 400' 800'
ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R18
OpenRoads Designer v10.16.0.80
USER: cbrusity
DATE PLOTTED: 9/7/2005 7:08:02 PM
FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLANS\1_8702_ROW_STRIP_MAP.DGN


P 21 — CHARLES AYDELOTT ESTATE
P 22 — RONNIE LEE MASON JR (SINGLE)
P 23 — SHAWNTA DAVIS & FREDERICK BATES (HSBD)
P 24 — PAM CRIDER
P 30 — H.L. WALDEN ESTATE C/O JAMES Z. WALDEN
P 32 — THOMAS HENRY JOHNSON (MARRIED) MARY ALICE JOHNSON, (WIDOW, LIFE ESTATE)
P 33 — CHRISTEAN AGNEW (SINGLE)
P 34 — JOHN L. JOHNSON OPHELIA JOHNSON (WF)
P 35 — SHELIA WILSON (SINGLE)
P 36 — JENNIE BACON ESTATE C/O MARVA SUE JORDAN
COORDINATE CONTROL POINTS
POINT | DESCRIPTION | STATE PLANE COORDINATES NORTH (Y) | EAST (X) | ELEV. (Z) | STATION | OFFSET
CP 1 | CON. MON. W/ ALUM. DISK | 3577999.0220 | 4047187.3240 | 345.3'00 | N/A | N/A
CP 2 | CON. MON. W/ ALUM. DISK | 3577890.9700 | 4048941.9170 | 338.4610 | N/A | N/A
BASIS OF COORDINATES
Coordinates for horizontal control were obtained from GPS methods using GPS-RTK and adjusted to the National NAD83/2011 Horizontal Datum.
Coordinates are based on the Kentucky State Plane Coordinate System, Single Zone and are in U.S. Survey Feet.
Elevations were derived from GPS methods and are adjusted to the NAVD88 Vertical Datum. Geoid model used was Geoid 09.
PADUCAH & LOUISVILLE RAILWAY INC.
PADUCAH-McCRACKEN COUNTY INDUSTRIAL DEVELOPMENT AUTHORITY
PADUCAH & ILLINOIS RAILWAY INC.
G.P.E.D.C. INC.
CHARLES AYDELOTT RAYMELL AYDELOTT (WF)
ELISABETH HERNANDEZ TORRES (SINGLE)
JERRY W. GRAY PEGGY GRAY (WF)
ROSETTA DANCE ESTATE C/O MARY TITSWORTH
JOSEPH FRAZEE
DCC REAL ESTATE HOLDINGS, LLC
MEGAPARK CONNECTOR STA. 155+79.93 = KY 358 STA. 213+00.00
BEGIN CONST. STA 107+50.00
BEGIN R/W STA 107+00.00
END CONST. STA 218+15.00
END R/W STA 218+18.03
BEGIN R/W STA 204+15.00
BEGIN CONST. STA 204+15.00
POB 100+00.00
POE 226+10.00
S22°29'41"W
S08°14'29"E
S03°56'57"E
S07°11'00"E
S03°54'53"E
PI STA 219+22.24
Δ = 25°17'16" LT
T = 306.21'
L = 602.45'
R = 1365.00'
E = 33.92'
e = VARIES%
Runoff = NA
Runout = NA
PT 222+18.48
BOBO ROAD
POINT | STATE PLANE COORDINATES NORTH (Y) | EAST (X) | STATION
POB | 3577958.5963 | 4048959.8197 | 100+00.00
PC | 3576943.4792 | 4048539.4545 | 110+98.71
PI | 3576626.0688 | 4048408.0100 | 114+42.27
PT | 3576286.0508 | 4048457.2572 | 117+65.27
PC | 3575850.2762 | 4048520.3753 | 122+00.60
PI | 3575667.4315 | 4048546.8578 | 123+94.34
PT | 3575483.1276 | 4048559.5818 | 125+78.92
PC | 3574897.4677 | 4048600.0143 | 131+65.98
PI | 3574714.4013 | 4048612.6517 | 133+45.46
PT | 3574532.3594 | 4048635.5957 | 135+32.86
PC | 3574181.1815 | 4048679.8547 | 138+86.81
PI | 3573996.2533 | 4048703.1622 | 140+72.21
PT | 3573810.2833 | 4048715.8337 | 142+59.50
PC | 3573379.6955 | 4048745.1734 | 146+91.09
PI | 3573065.5591 | 4048766.5782 | 150+05.95
PT | 3572778.7679 | 4048636.6143 | 153+07.98
POE | 3572298.3144 | 4048418.8901 | 158+31.47
KY 358
PONT | STATE PLANE COORDINATES NORTH (Y) | EAST (X) | STATION
POB | 3573068.8864 | 4047340.8339 | 200+00.00
PC | 3572400.3279 | 4048812.0857 | 216+10.03
PI | 3572273.0399 | 4049090.8647 | 219+22.24
PT | 3572278.1823 | 4049397.0435 | 222+18.48
POE | 3572284.5875 | 4049828.5171 | 226+50.00
PI STA 114+42.27 Δ = 30°44'10" LT T = 343.56' L = 670.56' R = 1250.00' E = 46.35' e = 5.00% Runoff = 111 Runout = 44
PI STA 123+94.34 Δ = 04°17'32" RT T = 184.75' L = 369.32' R = 4930.00' E = 3.46' e = 2.00% Runoff = 44 Runout = 44
PI STA 133+49.46 Δ = 03°14'02" LT T = 183.49' L = 366.88' R = 6500.00' E = 2.59' e = NC% Runoff = NA Runout = NA
PI STA 133+49.46 Δ = 03°17'07" LT T = 183.49' L = 366.88' R = 6500.00' E = 2.59' e = NC% Runoff = NA Runout = NA
PI STA 140+73.21 Δ = 03°17'07" RT T = 186.40' L = 372.69' R = 6500.00' E = 2.67' e = NC% Runoff =NA Runout =NA
PI STA 150+05.95 Δ = 28°16'35" RT T = 314.86' L = 616.90' R = 1250.00' E = 39.05' e = 5.00% Runoff = 111' Runout = 44'
RIGHT OF WAY PLANS
COMMONWEALTH OF KENTUCKY DEPARTMENT OF HIGHWAYS
DRAWING TITLE: COORDINATE CONTROL SHEET
HORIZONTAL SCALE SCALE: 1" = 200'
0' 200' 400' 800'
ITEM NO. 1-8702.00
COUNTY OF MCCRACKEN
SHEET NO. R19
OpenRoads Designer v10.16.0.80
USER: cbrusty
DATE PLOTTED: 9/7/2005 7:08:02 PM
FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\01_8702_CC_COORDINATE_CONTROL.DGN

RIGHT OF WAY MONUMENTS

ROUTE	STATION	OFFSET	SIDE	TYPE	STATE PLANE COORDINATES NORTH (Y)	EAST (X)
BOBO ROAD	107+00.00	23.27'	LT	1	3577302.9533	4048713.4995
BOBO ROAD	107+00.00	26.73'	RT	1	3577322.0832	4048667.3038
BOBO ROAD	107+50.00	55.00'	RT	1	3577286.7030	4048622.0560
BOBO ROAD	109+00.00	80.00'	RT	1	3577157.6807	4048541.5684
BOBO ROAD	110+98.71	50.00'	LT	1	3576924.3518	4048385.6513
BOBO ROAD	111+44.00	80.00'	RT	1	3576929.2424	4048447.9160
BOBO ROAD	112+38.00	63.00'	RT	1	3576829.5714	4048432.9103
BOBO ROAD	112+50.00	55.00'	LT	1	3576785.7914	4048343.1460
BOBO ROAD	113+50.00	85.00'	LT	1	3576687.0559	4048350.6616
BOBO ROAD	113+50.00	105.00'	RT	1	3576723.2333	4048364.1376
BOBO ROAD	114+36.98	75.00'	RT	1	3576626.4704	4048379.1973
BOBO ROAD	115+00.00	55.00'	LT	1	3576550.6929	4048302.4080
BOBO ROAD	115+14.92	65.00'	RT	1	3576543.6142	4048381.6882
BOBO ROAD	116+00.00	55.00'	LT	1	3576455.1661	4048399.3906
BOBO ROAD	116+42.00	78.00'	RT	1	3576409.4413	4048367.5206
BOBO ROAD	117+69.27	92.00'	RT	1	3576272.8644	4048366.2071
BOBO ROAD	117+69.27	70.00'	LT	1	3576296.0841	4048326.5344
BOBO ROAD	122+09.60	155.00'	LT	1	3575872.4926	4048373.7746
BOBO ROAD	124+00.00	180.00'	LT	1	3575680.2600	4048723.0282
BOBO ROAD	124+55.00	185.00'	RT	1	3575589.2497	4048365.3129
BOBO ROAD	125+78.92	200.00'	LT	1	3575496.9022	4048759.1069
BOBO ROAD	126+75.00	205.00'	LT	1	3575401.3903	4048770.7134
BOBO ROAD	127+91.48	95.00'	LT	1	3575277.6143	4048368.9959
BOBO ROAD	128+63.03	165.00'	RT	1	3575188.3274	4048414.5412
BOBO ROAD	129+40.00	215.00'	RT	1	3575108.0929	4048369.9620
BOBO ROAD	131+05.82	197.00'	LT	1	3574971.0441	4048792.4033
BOBO ROAD	131+65.98	190.00'	RT	1	3574884.3758	4048410.4655
BOBO ROAD	132+00.00	172.00'	LT	1	3574876.2684	4048773.9737
BOBO ROAD	135+32.86	130.00'	RT	1	3574516.1039	4048306.6160
BOBO ROAD	138+86.81	60.00'	RT	1	3574173.6829	4048320.3256
BOBO ROAD	138+86.81	60.00'	LT	1	3574188.6880	4048739.3838
BOBO ROAD	146+91.19	70.00'	LT	1	3573384.3449	4048515.0190
BOBO ROAD	146+91.09	70.00'	RT	1	3573374.9368	4048575.3354
BOBO ROAD	153+07.98	70.00'	RT	1	3572807.6609	4048372.8554
BOBO ROAD	153+07.98	70.00'	LT	1	3572749.8748	4048700.3731
BOBO ROAD	154+90.00	65.00'	RT	1	3572639.8106	4048302.2808

RIGHT OF WAY MONUMENTS

ROUTE	STATION	OFFSET	SIDE	TYPE	STATE PLANE COORDINATES NORTH (Y)	EAST (X)
KY 358	204+15.00	20.51'	LT	1	3572923.1477	4047730.4470
KY 358	204+15.00	31.49'	RT	1	3572868.5231	4047705.6247
KY 358	205+55.00	55.00'	RT	1	3572789.2048	4047823.3578
KY 358	206+92.00	66.00'	RT	1	3572722.5125	4047943.5333
KY 358	206+97.00	45.00'	LT	1	3572821.4995	4047994.0067
KY 358	208+15.00	42.00'	RT	1	3572693.4765	4048065.4427
KY 358	210+30.00	49.00'	LT	1	3572687.3769	4048298.8282
KY 358	211+00.00	60.00'	RT	1	3572559.1828	4048317.4630
KY 358	211+40.00	85.00'	RT	1	3572519.8742	4048343.5367
KY 358	212+00.00	50.00'	LT	1	3572617.9579	4048454.0120
KY 358	213+30.00	85.00'	RT	1	3572441.2700	4048516.5147
KY 358	213+50.00	65.00'	RT	1	3572451.2041	4048342.9970
KY 358	213+55.00	100.00'	LT	1	3572599.3533	4048815.8106
KY 358	213+75.00	75.00'	LT	1	3572568.3196	4048823.6765
KY 358	214+90.00	55.00'	RT	1	3572402.3893	4048674.5915
KY 358	215+50.00	55.00'	RT	1	3572377.5670	4048729.2162
KY 358	215+86.00	30.68'	RT	1	3572384.8110	4048772.0506
KY 358	216+16.03	29.43	LT	1	3572427.1148	4048824.2608

RIGHT OF WAY PLANS

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: RIGHT OF WAY MONUMENTS

ITEM NO. 1-8702.00 COUNTY OF MCCRACKEN
SHEET NO. R20

OpenRoads Designer v10.16.0.80 USER: cbrusby DATE PLOTTED: 9/7/2005 7:08:02 PM FILE NAME: V:\1785\ACTIVE\178552015\TRANSPORTATION\DESIGN\DRAWING\ELECTRONIC ENGINEERING DATA\PLAN\01_8702_CC_COORDINATE_CONTROL.DGN

Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

August 29, 2024

Danny Peake
Kentucky Transportation Cabinet (KYTC)
200 Mero St
Frankfort, KY 40622

Re: §401 Water Quality Certification
Bobo Rd - McCracken Co
Extension of Bobo Road Project
WQC No: WQC2024-138-7
AI No.: 177955; Activity ID: APE20240001
KYTC Item No.: 1-8702.00
USACE ID No.: LRL-2023-00445-NCC
UT Massac Creek
McCracken County, Kentucky

Dear Mr. Peake:

Pursuant to Section 401 of the Clean Water Act (CWA) and 40 CFR 121.7(c), the Commonwealth of Kentucky certifies it has reasonable assurances that applicable water quality standards under Kentucky Administrative Regulations Title 401, Chapter 10, established pursuant to Sections 301, 302, 303, 304, 306, and 307 of the CWA, will not be violated by the above referenced project provided that the U.S. Army Corps of Engineers authorizes the activity under a federal license or permit, and the attached conditions are met.

Other permits from the Division of Water may be required for this activity. Projects that disturb one acre or more of land or is part of a larger common plan of development or sale that will ultimately disturb one acre or more of land require a Kentucky Pollution Discharge Elimination System (KPDES) Stormwater Permit; contact the Surface Water Permits Branch (502-564-3410 or SWPBSupport@ky.gov). A Groundwater Protection Plan is required if activities listed in Section 2(2) of 401 KAR 5:037 are conducted. A Water Withdrawal Application is required for activities proposing raw water withdrawals of 10,000 gallons per day or more; contact the Watershed Management Branch (502-564-3410).

All future correspondence on this project must reference **AI No. 177955**. **The attached document is your official Water Quality Certification; please read it carefully**. Please contact Bryan Killian by phone at 502-782-

4695 or email at bryan.killian@ky.gov if you have any questions.

Sincerely,

Samantha Vogeler

Samantha Vogeler, Supervisor
Water Quality Certification Section
Kentucky Division of Water

SV:BK
Attachment

cc: Emma Priger, KYTC: Frankfort (via email: emma.priger@ky.gov)
Andrew Logsdon, KYTC: Frankfort (via email: Andrew.Logsdon@ky.gov)
Dave Harmon, KYTC: Frankfort (via email: Dave.Harmon@ky.gov)
Norma Condra, USACE: Louisville District (via email: Norma.C.Condra@usace.army.mil)
Ellen Mullins, Stantec (via email: ellen.mullins@stantec.com)
Lee Andrews, USFWS: Frankfort (via email: kentuckyes@fws.gov)
Rhonda Lamb, Four Rivers Basin Coordinator (via email: rlamb@murraystate.edu)
Madeline Traylor, Paducah Regional Office (via email: madeline.traylor@ky.gov)

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Submittal/Action Requirements:

Condition No.	Condition
S-1	Prior to any construction activity, The Kentucky Transportation Cabinet shall submit to the Water Quality Section Project Manager a copy of the receipt of purchase of 26.8 wetland Adjusted Mitigation Units (AMUs) from an approved mitigation bank and purchase of 1,230 stream AMUs from an approved Kentucky in-lieu fee (ILF) program fund. Credits must be purchased prior to impacts. Mitigation banks and ILF programs are considered approved as defined in the April 10, 2008 Final Rule, 40 CFR Part 230: Compensatory Mitigation for Losses of Aquatic Resources. This condition is necessary to allow impacts to occur. Compensatory mitigation is the method to approve impacts and entire losses of a water resource. The Division can approve impacts and loss based on the confidence that the resource will be replaced and not result in a net loss of aquatic resources. Compensatory mitigation is the method of compliance for the Commonwealth's water quality standards. [33 CFR 332, 40 CFR 230, 401 KAR 10:031 Section 2(1)(a)]
S-2	KYTC shall notify the Water Quality Certification Project Manager or Supervisor of the scheduled start of construction activities at least two weeks before the start of construction. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
S-3	KYTC shall notify the Water Quality Certification Project Manager or Supervisor of substantial completion of construction no later than two weeks post-construction. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
S-4	KYTC shall submit as-built drawings within 90 days after substantial completion of construction to the Water Quality Certification Section Project Manager or Supervisor. This condition is necessary to monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Submittal/Action Requirements:

Condition No.	Condition
S-5	KYTC shall submit annual monitoring reports by the 31st of December each year for a period of not less than 1 year beginning with the first full growing season of planted vegetation. The beginning of the growing season is presumed to be March 1st. The report shall be written in accordance with the approved monitoring plans in the KDOW_NOD#2_ResponseMemo_07092024_final.pdf dated 7/8/2024. The report shall be submitted to the Water Quality Certification Section. Any changes to the approved monitoring must be approved by the Division of Water. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
S-6	KYTC shall submit request for the release of wetlands from monitoring requirements to the Water Quality Certification Section Project Manager or Supervisor. The report shall be submitted to the Water Quality Certification Section. Any changes to the approved monitoring plan must be approved by the Division of Water. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [KRS 224.10-100, KRS 224.1616(-050)(2), KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-1	The work approved by this certification shall be limited to 37.1025672, -88.7428042: - Reconstruct, raise, and extend Bobo Road in McCracken County largely on fill with overflow structures within floodplain areas and structures (bridges and/or box culverts) at each delineated stream crossing - 139 linear feet of permanent impacts to perennial steams - 379 linear feet of permanent impacts to intermittent streams - 8.56 acres of permanent impacts to wetlands - 48 linear feet of temporary impacts to perennial steams - 85 linear feet of temporary impacts to intermittent streams - 2.16 acres of temporary impacts to wetlands This condition is necessary to confirm activities approved by this certification. [401 KAR 10:030 Section 1, 401 KAR 9:010 Section 1(a)(2), KRS 224.10-100, KRS 224.70-110]
T-2	Any temporary impacts to wetlands must delineate as wetlands during the 1st monitoring report for the Division of Water to release the project from monitoring. For any temporarily impacted wetlands not delineating as wetlands post-construction 1 year, a corrective action plan must be submitted and approved by the Water Quality Certification Section. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-3	All work performed under this certification shall adhere to the design and specifications set forth in the following document(s): - Application for Permit to Construct Across or Along a Stream and/or Water Quality Certification received on 4/19/2024 - Pre-file Meeting Request received on 4/19/2024 - Certification Request received on 7/30/2024 - 1-8702 Ext Bobo Rd_Environmental Permitting_19April2024.pdf - SIGNED_Eng_Form_4345_2022Sep_23Feb2024.pdf - B1_Dec2023ORM Worksheet_23Feb2024.xlsm - B1_Eng_Form_6247_2023Nov17_23Feb2024_signed.pdf - Pre-Filing Meeting Request Form 2022.pdf - SIGNED_DOW7116_Application Form_23Feb2024.pdf - xmit email.msg - NOD #1 Bobo Rd - McCracken Co (AI 177955).pdf - Site Photos.pdf - NOD #2 Bobo Rd - McCracken Co (AI 177955).pdf - KDOW_NOD#1_ResponseMemo_070324.pdf - Attachment3_Bobo_connecting_water_rev.zip - Attachment4_bobo_boundary 2.zip - KDOW_NOD#2_ResponseMemo_07092024_final.pdf This condition is necessary to confirm activities approved by this certification. [401 KAR 10:030 Section 1, 401 KAR 9:010 Section 1(a)(2), KRS 224.10-100, KRS 224.70-110]
T-4	Mitigation for stream and/or wetland impacts shall begin prior to or concurrently with impacts. This condition is necessary to allow impacts to occur. Compensatory mitigation is the method to approve impacts and entire losses of a water resource. The Division can approve impacts and loss based on the confidence that the resource will be replaced and not result in a net loss of aquatic resources. Compensatory mitigation is the method of compliance for the Commonwealth's water quality standards. [33 CFR 332, 401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-5	KYTC is responsible for preventing degradation of waters of the Commonwealth from soil erosion. An erosion and sediment control plan must be designed, implemented, and maintained in effective operating condition at all times during construction. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-6	Heavy equipment (e.g. bulldozers, backhoes, draglines, etc.), if required for this project, should not be used or operated within the stream channel. In those instances where such instream work is unavoidable, then it shall be performed in such a manner and duration as to minimize re-suspension of sediments and disturbance to the channel, banks, or riparian vegetation. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-7	Erosion and sediment pollution control plans and Best Management Practices must be designed, installed, and maintained in effective operating condition at all times during construction activities so that violations of state water quality standards do not occur. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-8	Remove all sediment and erosion control measures after re-vegetation has become well-established. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-9	Any fill or riprap shall be of a composition that shall not cause violations of water quality standards by adversely affecting the biological, chemical, or physical properties of waters of the Commonwealth. If riprap is used, it shall be of a weight and size that bank stress or slump conditions shall not occur. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-10	No in-stream operations or activities shall be conducted during fish spawning season (April 1 through June 30), due to the potential impacts of increased sediment load and associated water quality and designated aquatic habitat impacts. This condition is necessary to monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 4(1)(c,h), KRS 224.10-100, KRS 224.70-110]
T-11	Sediment and erosion control measures (e.g., check-dams, silt fencing, or hay bales) shall not be placed within surface waters of the Commonwealth, either temporarily or permanently, without prior approval by the Kentucky Division of Water's Water Quality Certification Section. If placement of sediment and erosion control measures in surface waters is unavoidable, placement shall not be conducted in such a manner that may cause instability of streams that are adjacent to, upstream, or downstream of the structures. All sediment and erosion control measures shall be removed and the natural grade restored prior to withdrawal from the site. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-12	No water is to be released into the new channel until channel construction is complete and the new channel is stabilized. The existing channel is to be left undisturbed until water can be released into the new channel. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-13	Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction from entering the watercourse. This condition is necessary to prevent water pollution as prohibited by statute. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-14	To the maximum extent practicable, all in-stream work under this certification shall be performed during low flow. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-15	Removal of existing riparian vegetation shall be restricted to the minimum necessary for project construction. This condition is necessary to minimize negative effects to the environment, protect the use of the stream, and protect aquatic resources. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-16	Should stream pollution, wetland impairment, and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/564-2380. This condition is necessary to monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-17	This Water Quality Certification expires on August 28, 2029. This condition is necessary for the issuance of the certification. [KRS 224.10-100, KRS 224.16-050(2), KRS 224.70-110, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-18	Other permits from the Division of Water may be required for this activity. If this activity occurs within a floodplain, a Permit to Construct Across or Along a Stream may be required. Please contact the Floodplain Management Section Supervisor (502-564-3410) for more information prior to construction. If the project will disturb one acre or more of land, or is part of a larger common plan of development or sale that will ultimately disturb one acre or more of land, a Kentucky Pollution Discharge Elimination System (KPDES) Stormwater Permit shall be required. Please contact the Surface Water Permits Branch (502-564-3410 or SWPBSupport@ky.gov) for more information. A Groundwater Protection Plan is required if any of the activities listed in Section 2(2) of 401 KAR 5:037 are conducted. A Water Withdrawal Application is required for any activities proposing raw water withdrawals of 10,000 gallons per day or more. For technical assistance contact the Watershed Management Branch at 502-564-3410 or visit eec.ky.gov. This condition is necessary for confirm authorized impacts, the appropriate responsible party, monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, KRS 224.16-050(2), KRS 224.70-110]
T-19	If there is a transfer or conveyance of the project site during the issued WQC term for the approved activity, KYTC shall submit written notice to the Water Quality Certification Section Project Manager or Supervisor of the transfer or conveyance of the project site or any part of the project site at least 60 days prior to the transfer or conveyance of the project site. The notification shall include the WQC number; the Agency Interest (AI) No.; the name, mailing address, email address, and telephone number of the current owner; the name, mailing address, email address, and telephone number of the prospective transferee; the proposed effective date of transfer/conveyance; and a copy of the documentation evidencing the transfer/conveyance. Failure to comply with this condition does not negate the validity or enforceability of this certification. This condition is necessary for confirm authorized impacts, the appropriate responsible party, monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 9:010 Section 1(a)(2), KRS 224.10-100, KRS 224.70-110]

U.S. Army Corps of Engineers (USACE)

CERTIFICATION OF COMPLIANCE WITH DEPARTMENT OF THE ARMY PERMIT

For use of this form, see Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, and Section 103 of the Marine Protection, Research, and Sanctuaries Act; the proponent agency is CECW-COR.

Form Approved -
OMB No. 0710-0003
Expires 2027-10-31

The Agency Disclosure Notice (ADN)

The Public reporting burden for this collection of information, 0710-0003, is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PURPOSE: This form is used by recipients of U.S. Army Corps of Engineer Regulatory permits to certify compliance with the permit terms and conditions.

Your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the U.S. Army Corps of Engineers, Louisville District District, Regulatory Office.

The certification can be submitted by email at crystal.d.byrd@usace.army.mil or by mail at the below address:

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the U.S. Army Corps of Engineers, Louisville District District, Regulatory Office.

U.S. Army Corps of Engineers
Louisville District Office
Street Address: 600 Dr Martin Luther King Jr Place
City: Louisiville State: KY Zip Code: 40202

COMPLETED BY THE CORPS

Corps Action Number: LRL-2023-00445-ncc
Permit Type: Standard Permit
General Permit Number and Name (*if applicable*):
Name of Permittee: Kentucky Transportation Cabinet
Project Name: KYTC Item no. 1-8702
Project Location (*physical address*): BOBO Road
Padukah, KY
McCracken County, KY

PERMITTEE'S CERTIFICATION

Date Work Started: _____
Date Work Completed: _____

Enclose photographs showing the completed project (*if available*).

I _____ hereby certify that the work authorized by the above referenced permit has been completed in accordance with all of the permit terms and conditions, and that any required compensatory mitigation has been completed in accordance with the permit conditions.

Name	Date	Signature

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

April 17, 2020

Ms. Todd Jeter
Division Administrator
Federal Highway Administration
330 West Broadway
Frankfort, Kentucky 40601

Re: FWS 2019-F-1687; Programmatic Biological Opinion on the Effects of Transportation Projects in Kentucky on the Indiana Bat and Gray Bat

Dear Mr. Jeter:

This letter transmits the enclosed biological opinion (BO) of the U.S. Fish and Wildlife Service (Service) for the implementation of transportation projects throughout Kentucky (Action). Acting on behalf of the Federal Highway Administration (FHWA), the Kentucky Transportation Cabinet will implement the Action. The Service received your letter requesting formal consultation for the Action and the Biological Assessment (BA) on September 27, 2019. You determined that the certain components of the Action are likely to adversely affect the Indiana bat (*Myotis sodalis*) and gray bat (*Myotis grisescens*).

The enclosed BO answers your request for formal consultation, and concludes that the Action is not likely to jeopardize the continued existence of the species listed above. This finding fulfills the requirements applicable to the Action for completing consultation under §7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended.

The BA identified Conservation Measures to avoid and minimize effects on the Indiana bat and gray bat. Incidental take of listed species is exempted from the prohibitions against take under the ESA, provided the Action is implemented consistent with the manner identified in the BO.

Reinitiating consultation is required if the FHWA retains discretionary involvement or control over the Action (or is authorized by law) when:

a) the amount or extent of incidental take is exceeded;
b) new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not considered in this BO;

c) the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this BO; or
d) a new species is listed or critical habitat designated that the Action may affect.

A complete administrative record of this consultation is on file in our office at the letter-head address. If you have any questions about the BO, please contact Phil DeGarmo by phone at 502-695-0468 x46110 or by email at Phil_Degarmo@fws.gov.

Sincerely,

VIRGIL ANDREWS

Digitally signed by VIRGIL ANDREWS
Date: 2020.04.17 13:51:08 -04'00'

Virgil Lee Andrews, Jr.
Field Supervisor

Enclosure

cc: Danny Peake, KYTC (electronic)
Doug Dawson, KDFWR (electronic)
Eric Rothermel, FHWA (electronic)

Programmatic Biological Opinion

Effects of Transportation Projects in Kentucky on the Indiana Bat and Gray Bat

FWS Log #: 04EK1000-2019-F-1687

Prepared by:

U.S. Fish and Wildlife Service
Kentucky Field Office
330 W. Broadway Street, Room 265
Frankfort, KY 40601

VIRGIL ANDREWS Digitally signed by VIRGIL ANDREWS
Date: 2020.04.17 13:51:56 -04'00'

Virgil Lee Andrews, Jr.
Field Supervisor

April 17, 2020
Date

Contents

CONSULTATION HISTORY v
BIOLOGICAL OPINION 6
1 INTRODUCTION 6
2 PROPOSED ACTION 7
2.1 Action Components 7
2.1.1 Action Component 1: Planning 7
2.1.2 Action Component 2: Preliminary Design and Environmental 8
2.1.3 Action Component 3: Detailed Design / ROW and Utilities 8
2.1.4 Action Component 4: Construction 9
2.1.5 Action Component 5: Maintenance 11
2.1.6 Action Component 6: Operation 12
2.1.7 Action Component 7: Other/Emergency Actions 12
2.2 Action Area 12
2.3 Project Review Process 13
2.4 Conservation Measures 13
2.4.1 Indiana Bat 13
2.4.2 Gray Bat 15
2.5 Interrelated and Interdependent Actions 16
2.6 Summary 16
3 INDIANA BAT 17
3.1 Status of the species 17
3.2 Species Description 18
3.3 Life History 18
3.4 Habitat Characteristics and Use of the Indiana Bat 20
3.5 Numbers, Reproduction, and Distribution 22
3.6 Conservation Needs and Threats 23
4 ENVIRONMENTAL BASELINE 26
4.1 Action Area Numbers, Reproduction, and Distribution 26
4.2 Action Area Conservation Needs and Threats 28
5 EFFECTS OF THE ACTION 30

5.1 Stressor 1: Noise and Vibration 30
5.2 Stressor 2: Night Lighting 33
5.3 Stressor 3: Aquatic Resource Loss and Degradation 35
5.4 Stressor 4: Tree Removal 38
5.5 Stressor 5: Collision 47
5.6 Stressor 6: Alteration or Loss of Roosting Habitat (Bridges) 50
5.7 Summary of Effects 54
6 CUMULATIVE EFFECTS 54
7 CONCLUSION 55
8 INCIDENTAL TAKE STATEMENT 56
8.1 Amount or Extent of Take Anticipated 57
8.2 Reasonable and Prudent Measures 58
8.3 Terms and Conditions 58
8.4 Monitoring and Reporting Requirements 59
9 GRAY BAT 59
9.1 Status of the species 59
9.2 Species Description 59
9.3 Life History 60
9.4 Habitat Characteristics and Use of the Gray Bat 62
9.5 Numbers, Reproduction, and Distribution 63
9.6 Conservation Needs and Threats 65
10 ENVIRONMENTAL BASELINE 67
10.1 Action Area Numbers, Reproduction, and Distribution 68
10.2 Action Areas Conservation Needs and Threats 69
11 EFFECTS OF THE ACTION 70
11.1 Stressor 1: Noise and Vibration 71
11.2 Stressor 2: Night Lighting 74
11.3 Stressor 3: Aquatic Resource Loss and Degradation 76
11.4 Stressor 4: Tree Removal 79
11.5 Stressor 5: Collision 80
11.6 Stressor 6: Alteration or Loss of Roosting Habitat on Bridges 83

11.7 Summary of Effects 87
12 CUMULATIVE EFFECTS 88
13 CONCLUSION 88
14 INCIDENTAL TAKE STATEMENT 89
14.1 Amount or Extent of Take Anticipated 90
14.2 Reasonable and Prudent Measures 91
14.3 Terms and Conditions 91
14.4 Monitoring and Reporting Requirements 92
15 CONSERVATION RECOMMENDATIONS 92
16 RE-INITIATION NOTICE 93
LITERATURE CITED 94

CONSULTATION HISTORY

This section lists key events and correspondence during the course of this consultation. A complete administrative record of this consultation is on file in the Service's Kentucky Field Office.

April 2018 – July 2019	Early coordination meetings were held between the Federal Highway Administration (FHWA), Kentucky Transportation Cabinet (KYTC), and the Service to discuss project impacts and potential conservation measures.
September 27, 2019	The Service received a letter, dated September 27, 2019, and Biological Assessment (BA) from the FHWA requesting initiation of formal consultation on the Indiana bat and gray bat.
September 27, 2019	The Service responded to the FHWA, agreeing that the BA contains sufficient information to initiate formal consultation on adverse effects to the Indiana bat and gray bat, and formal consultation was initiated.
February 3, 2020	The Service and FHWA agreed in writing to extend the consultation timeframe one month.
February 9, 2020	The Service and FHWA agreed in writing to extend the consultation timeframe two weeks until March 23, 2020
March 19, 2020	The Service and FHWA agreed in writing to extend the consultation timeframe to allow sufficient time to review and comment on the draft document.
March 20, 2020	The Service submitted a draft Biological Opinion (BO) to the FHWA and the KYTC for their review.
April 8, 2020	The Service received comments on the draft BO.
April 17, 2020	The Service issued the final BO to the FHWA and the KYTC.

BIOLOGICAL OPINION

1 INTRODUCTION

A biological opinion (BO) is the document that states the opinion of the U.S. Fish and Wildlife Service (Service) under the Endangered Species Act of 1973, as amended (ESA), as to whether a Federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened; or
b) result in the destruction or adverse modification of designated critical habitat.

The Federal action addressed in this Programmatic BO is the Kentucky Transportation Cabinet's (KYTC) implementation of certain transportation projects throughout Kentucky (the Action) that would be funded or authorized by the Kentucky Division Office of the Federal Highway Administration (FHWA). FHWA supports State and local governments in the design, construction, and maintenance of the Nation's highway system through multiple funding programs. For the KYTC projects that involve federal permits, such as U.S. Army Corps of Engineers (USACE) permits under the Clean Water Act, the FHWA will generally be the lead federal agency for the purposes of consultation with the Service under Section 7 of the ESA. For the KYTC projects that involve Federal Land Management Agencies (FLMA), the FHWA would propose to use this programmatic consultation, initiate project specific consultation, or if applicable, use a consultation mechanism developed by the FLMA (e.g., existing consultations established for U.S. Forest Service, Tennessee Valley Authority, etc.). This BO considers the effects of the Action on the Indiana bat and gray bat. Together, these species will be referred to as the "covered" species.

Within the Action Area, the Service has designated critical habitat for the Indiana bat in Edmonson and Carter counties, Kentucky. Critical habitat has neither been designated nor is proposed for the gray bat. The Action will not affect Indiana bat critical habitat; therefore, this BO does not further address critical habitat.

A BO evaluates the effects of a Federal action, along with those effects resulting from interrelated and interdependent actions and effects from non-federal actions unrelated to the Action (cumulative effects), relative to the status of listed species and the status of designated critical habitat. A Service BO that concludes a proposed Federal action is *not* likely to jeopardize species and is *not* likely to destroy or adversely modify critical habitat fulfills the Federal agency's responsibilities under §7(a)(2) of the ESA of 1973, as amended.

"*Jeopardize the continued existence*" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02). "*Destruction or adverse modification*" means a direct or indirect alteration that appreciably diminishes the value of designated critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR §402.02).

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on October 28, 2019 [84 FR 44976]. This consultation was pending at that time, and we are applying the updated regulations to the consultation. As the preamble to the final rule adopting the regulations noted, "[t]his final rule does not lower or raise the bar on section 7 consultations, and it does not alter what is required or analyzed during a consultation. Instead, it improves clarity and consistency, streamlines consultations, and codifies existing practice." We have reviewed the information and analyses relied upon to complete this biological opinion in light of the updated regulations and conclude the opinion is fully consistent with the updated regulations.

2 PROPOSED ACTION

The proposed Action is the KYTC's implementation of projects funded or authorized by the FHWA in Kentucky. The KYTC maintains and constructs a wide variety of transportation infrastructure projects within Kentucky's 120 counties. The following provides a general description of the development, maintenance, and operation of these transportation infrastructure projects, and identifies components of the Action. These Action components have the potential to generate stressors that may affect the covered species or alter their environment. In addition, the FHWA and the KYTC are committed to implementing the conservation measures discussed below in order to avoid, minimize, and/or compensate for project effects to the covered species.

2.1 Action Components

There are several phases involved in the development, maintenance, and operation of transportation projects, and most projects are conducted in phases that are tied directly to funding authorizations for the entire project or specific phase. The phases in project development are considered the Action components of this proposed action and include:

1. Planning,
2. Preliminary Design and Environmental,
3. Detailed Design, Right-of-Way (ROW) and Utilities,
4. Construction,
5. Maintenance,
6. Operation, and
7. Other/Emergency Actions

However, not every KYTC project will include all seven Action components. For example, the Planning component is typically reserved for those projects where a large number of alternatives are assessed to fulfill a transportation need; the Utilities component is only necessary when relocation of existing utilities is required for construction; and emergency Actions cannot be predicted, and depending on the severity of the action, one or all of the aforementioned Action components may apply. Nonetheless, a more detailed description of each Action component follows, along with the identification of stressors that may affect the covered species.

2.1.1 Action Component 1: Planning

The planning component is comprised of gathering data, analysis, and public involvement. Corridors for possible highway improvements, either along existing or on new alignments, are analyzed for feasibility, public acceptability, potential to meet project purpose and need, and

environmental impacts. Review and compilation of existing data (e.g., crash data, traffic data, etc.) is undertaken, with some field verification.

- No stressors with the potential to affect the covered species and/or alter their environment have been identified during the planning component of the Action. FHWA has determined that the planning component will have no effect on the covered species, and we agree with this conclusion.

2.1.2 Action Component 2: Preliminary Design and Environmental

During the preliminary design component of a project, potential solutions to address transportation needs are better defined and are more thoroughly examined for feasibility. The design team creates alternatives for study and analysis. Environmental investigations, including aquatic and terrestrial species studies, are also conducted during this component. Some of these activities, such as mist netting, cave exploration, etc. could affect the covered species, but these activities are conducted only by qualified biologists who possess a Scientific Wildlife Collecting Permit from the Kentucky Department of Fish and Wildlife Resources (KDFWR) and a Section 10 Recovery Permit (Federal Fish and Wildlife Permit) from the U.S. Fish and Wildlife Service. Any intentional take as a result of these surveys is authorized under the Section 10 federal permit and is, therefore, not a component of the prosed action. The outcome of this component is the selection of the location and type of transportation improvement that will be implemented.

- No stressors with the potential to affect the covered species and/or alter their environment have been identified during the preliminary design and environmental component of the Action. FHWA has determined that this component will have no effect on the covered species, and we agree with this conclusion.

2.1.3 Action Component 3: Detailed Design / ROW and Utilities

After establishing the preliminary alignment and grade of the proposed project, a more detailed level of design is undertaken. Line and grade are adjusted to better meet conditions, and drainage structures are designed. As plans are defined in greater detail, right-of-way acquisition and utility relocations are examined. Right-of-way activities include determining the land acquisition needs for the project, conducting negotiations with property owners, and acquisition of land. Existing utilities are analyzed to determine if relocation is necessary for the project. Geotechnical investigations may also be conducted during this component.

During this component, there are very few activities that could potentially impact the covered species. Geotechnical investigations may require removal of forested habitat to access drilling areas and conduct drilling operations. This type of activity is typically minimized to prevent excessive habitat disturbance, primarily because the KYTC often does not yet own or have an easement on the area where the activity is undertaken. Forested habitats may also be removed during ROW and utility activities in association with the detailed design component, although this occurs infrequently due to added mobilization and project costs.

- Geotechnical investigations and ROW and utility work activities could result in the following stressors that may affect the covered species: noise and vibration and tree removal. These effects on the covered species would be similar to those discussed in the

following construction component and will be considered in conjunction with construction activities within the Effects of the Action Section of this BO.

2.1.4 Action Component 4: Construction

This Action component includes four primary sub-activities: 1) Site Preparation, 2) Bridge and Culvert Construction, 3) Roadway Construction, and 4) Post Construction.

Site Preparation

Site preparation may require removal of forested habitat to access the project site and prepare the area for construction. The KYTC anticipates the removal of approximately 1000 acres of forested habitat annually with projects considered in this consultation. This activity also includes implementation of Best Management Practices (BMPs) to avoid and minimize impacts to streams and other water bodies that may provide foraging habitat for the covered species.

Bridge and Culvert Construction

Bridge and culvert construction range from minor rehabilitation activities of existing structures to full structure replacement to construction of new structures at new locations. These activities are intended to extend the useful life of an existing structure or provide a new structure to maintain safe vehicular crossings. Bridge rehabilitation activities include maintenance and repair of existing structures and do not usually alter the existing form of the structure. The majority of bridge rehabilitation activities are limited to the repair or replacement of specific parts of the bridge deck, superstructure, or substructure and do not require complete replacement of major bridge components. Deck maintenance and repair are standard activities that typically occur on the top of the bridge deck. These activities include spall repair, crack sealing, barrier wall/railing repair, drain/scupper repair, and header/expansion joint repair. Repair of spalling and cracking on the bridge deck and barrier wall/railing requires the removal of loose or unsound material with jackhammers, concrete saws, milling or grinding equipment, or hydro-demolition equipment to expose sound material. Debris is collected using vacuum equipment, and the void is filled with the appropriate surfacing material (concrete or asphalt). Small surficial cracks can be repaired by sealing with epoxy or other suitable material to prevent water intrusion. Deck drains, scuppers, and other drainage structures that direct water away from the deck are typically maintained using hand tools, power washers, or compressed air to remove clogs. If severely deteriorated, pipes are cut using a cutting torch or other suitable tool, and a new section of pipe is added with a flexible coupler. Header and/or expansion joints allow expansion and contraction of the deck and are typically closed to prevent water intrusion. Closed joints typically consist of a concrete header with steel plates on the surface, with flexible material in the joint between the steel plates or under the plates. The sealing material in the joint can become dislodged, torn, or punctured and must be removed and replaced to reseal the joint. The steel plates of the expansion joints can become damaged by heavy vehicles or snow plows, and the concrete headers can be damaged or deteriorate. Depending on the severity of the damage and deterioration, a portion of the header or steel can be removed using a cutting torch or concrete saw.

Maintenance and repair activities on bridge superstructures and substructures include: spall and crack repair of girders/beams, caps-columns, end walls, and abutments; drilling/bolting of additional support members to metal beams; footer/piling repair; bearing replacement; metal

repainting; scour repair around piers and abutments; and temporary work structures. Similar to maintenance of concrete on the bridge deck, spall and crack repair requires the removal of loose and unsound material; however, smaller, hand equipment such as hammer drills and hammer/chisel are used on the superstructure and substructure to avoid compromising these structures. Debris is collected using vacuum equipment or other methods, and the void or crack is filled with the appropriate surfacing material. Small surficial cracks may be repaired by sealing with epoxy or other suitable material. Maintenance and repair of metal components may require bolting or welding of additional plates to the existing structure. These activities require hand tools to clean and install the new support material. Replacement of bridge bearings requires the temporary use of hydraulic jacks to eliminate loads and provide support until new bearings are installed. Painting of metal structure components may be performed as a separate activity or in conjunction with other repair activities. Prior to painting, the surface is cleaned to remove loose material, and paint is applied using air compressors. Overspray is controlled through the use of temporary barriers or drapes. Scour repair involves the placement of rip rap or other channel protection around existing piers and abutments to replace lost material around the bases of these structures and prevent future scouring. Temporary coffer dams may be placed around piers and abutments to isolate these areas during repairs, create a safe, dry workspace, and prevent material from entering the stream.

Methods used to access the superstructure and substructure during rehabilitation activities include ladders, scaffolding, and truck mounted booms. Temporary structures, such as work pads or crossings, may be required to access longer bridges that span streams. Work pads are typically constructed of large rock placed within the stream channel to create a safe work platform for equipment. Temporary crossings are installed across streams when traffic must be restricted from the bridge during construction and a detour is not available or feasible. Crossings generally consist of large pipes laid in the stream channel parallel to flow and covered with rock. The size and placement of the pipes is determined by the stream hydrology.

Bridge replacement activities include replacement of major bridge components and full replacement of the entire structure. These activities require high intensity construction activities using heavy equipment and result in significant impacts to the existing structure, as well as potential changes to structure form. Activities include removal and replacement of the deck, support beams/girders, piers, and abutments. Temporary work structures, including coffer dams, work pads, and crossings, may also be required for replacement activities.

Culvert rehabilitation and replacement activities are similar to those associated with bridge activities; however, culvert activities are typically smaller in scale and more limited in scope. Rehabilitation activities generally include spall and crack repair on concrete surfaces and patching of metal surfaces through bolting/welding of additional plates. Culvert replacement involves the removal of the existing structure and installation of a new structure at the same location with similar materials. New structures may be completely or partially pre-fabricated off site or constructed on site, and heavy equipment is typically required during installation.

Roadway Construction

Roadway construction ranges from spot improvements, widening, and reconstruction of existing roadways within existing or new alignments to the construction of new roadways with

completely new alignments. Activities associated with roadway construction may include demolition and removal of existing facilities, clearing, grubbing, excavation, blasting, grading, and reconstruction/construction of the roadway and associated structures. These activities typically require the use of heavy equipment, with activity intensity varying based on project type.

Post Construction
Following bridge, culvert, and/or roadway construction, the sites are stabilized and restored using a variety of techniques. Exposed areas are typically mulched and seeded and/or planted with shrubs or trees. Temporary access material is removed and areas are restored to a more natural grade and stabilized. This activity also includes implementation of permanent BMPs to avoid and minimize impacts to streams and other water bodies.

Construction Summary
The Construction component and its four primary sub-activities: 1) Site Preparation; 2) Bridge and Culvert Construction; 3) Roadway Construction; and 4) Post Construction will result in adverse effects on the covered species. The majority of these effects are due to removal or alteration of suitable roosting habitat. Suitable roosting habitat for Indiana bats consists of forested habitat, while suitable roosting habitat for gray bats is typically caves of cave-like habitat. However, both species will use certain bridges for roosting habitat. Conservation measures, such as sediment and erosion control measures, tree clearing restrictions during the timeframe when non-volant young are present, limiting impacts to no more than 250 acres of suitable, forested habitat per project, and avoidance of adverse effects on maternity colonies that utilize a bridge and hibernacula, will be implemented to avoid and minimize impacts to the species. Conservation measures that will be implemented as part of the proposed action are discussed below in section 2.4.

- We expect the construction component of the Action to generate the following stressors that may affect the covered species: noise and vibration, night lighting, aquatic resource loss and degradation, tree removal, collision, alteration or loss of roosting habitat of bridges. These stressors are discussed in detail within the Effects of the Action Section of this BO.

2.1.5 Action Component 5: Maintenance
In order to maintain safe roadways and ease congestion, the KYTC performs maintenance activities on roads and bridges year-round. The maintenance work is similar to the construction component but is typically on a much smaller scale and scope. The majority of the maintenance work performed does not result in significant adverse effects on the covered species. Some of these activities include installing/replacing guardrail and signage, striping, asphalt repair/patching, mowing of herbaceous growth within existing ROW, roadside ditch maintenance, removing debris from bridge piers, and repair existing lighting. Maintenance activities are anticipated to occur during daylight hours and will not require the use of lighting.

Occasionally, certain maintenance activities can have potential adverse effects on the covered species and those activities include slide repair, tree-trimming and clearing within existing ROW, herbicide application, and bridge/culvert maintenance. All of these activities are necessary to

extend the life of existing infrastructure, and have the ability to impact habitat for the covered species.

- Maintenance activities have the ability to alter or remove suitable habitat for the covered species. We expect the maintenance component of the Action to generate the following stressors that may affect the covered species: noise and vibration, aquatic resource loss and degradation, tree removal, alteration or loss of roosting habitat of bridges. These stressors are discussed in detail within the Effects of the Action Section of this BO.

2.1.6 Action Component 6: Operation

After a project is completed, the roadway/bridge is expected to continue in operation indefinitely. Operation activities include vehicle traffic and roadway illumination. These activities vary depending on road size, location, time of day/year, and have the potential to affect the covered species.

- We expect the operation component of the Action to generate the following stressors that may affect the covered species: noise and vibration, night lighting, aquatic resource loss and degradation, and collision. These stressors are discussed in detail within the Effects of the Action Section of this BO.

2.1.7 Action Component 7: Other/Emergency Actions

The KYTC occasionally has emergency actions that require immediate attention and repair. These include, but are not limited to, bridge collapse or damage, rock fall or slides that endanger a roadway, and other potentially hazardous situations. These activities often occur in concert with a declared state of emergency (usually after severe weather such as; flooding, ice storm, tornado, or heavy snowfall) and have the potential to have adverse effects on the covered species depending on project specific scenarios.

- We expect that activities associated with the emergency action component of the Action to generate the same stressors as those previously discussed in the construction component. Emergency actions will be considered in conjunction with construction activities within the Effects of the Action Section of this BO.

2.2 Action Area

For purposes of consultation under ESA §7, the Action Area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR §402.02). The action area for this consultation includes all lands within the geo-political boundaries of the Commonwealth of Kentucky and those portions of Missouri, Illinois, Indiana, Ohio, West Virginia, Virginia, and Tennessee that occur within 20 miles of the Kentucky state line (the Action Area). This Action Area recognizes that projects associated with the Action: (a) are likely to occur at scattered and undeterminable locations across the Commonwealth; (b) may cross into adjacent states; and (c) will vary in size and distribution on the landscape.

2.3 Project Review Process

The KYTC proposes to use a tiered programmatic approach for the project review process. This project review process will be used to determine if suitable habitat for any of the covered species is present within the affected area of a proposed project. The first tier involves the use of a Habitat Assessment Manual (HAM) developed by the KYTC in 2006, and revised in 2018 (See Appendix A of the BA). If habitat is determined, by a KYTC biologist or ecological consultant working for KYTC, not to be present for any of the covered species (as determined by the process contained within the HAM) then the project will have "no effect" on that particular species. Conversely, if habitat is present for one or more of the covered species, then the project will be evaluated as part of the second tier of the programmatic approach. The second tier involves the analysis of potential impacts (i.e., stressors) of proposed projects on the covered species and their habitats to determine if the project is likely to adversely affect the covered species. See Appendix B of the BA for an outline of the two-tiered methodology and a discussion of the programmatic project review process.

2.4 Conservation Measures

Conservation measures are those proposed actions taken to benefit or promote the recovery of the species. These actions taken by the federal agency (FHWA) or the applicant (KYTC) serve to avoid, minimize and/or compensate for project effects on the species under review and are included as an integral portion of the Action. The FHWA and the KYTC have committed to implement the following conservation measures as part of the Action:

2.4.1 Indiana Bat

Avoidance and Minimization Measures

1) The KYTC will utilize BMPs and sediment and erosion control measures to prevent non-point source pollution, control storm water runoff, and minimize sediment damage in order to avoid and reduce overall water quality degradation. Implementation would avoid and minimize negative effects on clean drinking water, aquatic insects that could be used as prey items by Indiana bats, and aquatic insect habitat. The BMPs proposed can be found in Appendix C of the BA.

2) The KYTC will restrict forested habitat removal during the time frame when non-volant Indiana bat pups could be present (June 1-July 31), minimizing the risk of potential effects on non-volant Indiana bats. If forested habitat removal during this timeframe is unavoidable, the KYTC will consult with the Service's Kentucky Field Office (KFO) on a project-specific basis in order to determine if use of the programmatic process is acceptable.

3) The KYTC will utilize the project review process discussed in Section 2.3 in order to determine potential project impacts on the Indiana bat. If a project requires the five types of impacts identified below, the KYTC will contact the KFO and request a project-specific consultation to consider those types of effects on the species and/or its habitat.
   a) Projects that identify caves, mine adits, rock shelters, and/or karst features that are suitable as either winter habitat and/or summer roosting habitat for the Indiana bat within a half mile of the project area.
   b) Project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity colony of Indiana bats.

c) Project impacts on a known Indiana bat maternity roost tree.
d) Project impacts within 1/2-mile of a known Indiana bat hibernacula (i.e., spring staging area).
e) Project impacts to more than 250 acres of suitable, forested habitat per project.

Compensation Measures

1) In order to offset unavoidable adverse effects on Indiana bats and their summer roosting and fall swarming habitat(s), the KYTC will contribute to the Imperiled Bat Conservation Fund (IBCF). The funds in the IBCF are used to permanently protect Indiana bat habitat in Kentucky for the conservation and recovery of the species. This mitigation measure would have a beneficial effect on the Indiana bat by ensuring that the species has suitable habitat available throughout their lifecycle. The contribution to the IBCF is expected to promote the survival and recovery of the species through protecting and managing existing forested habitat suitable to support the species, particularly those that would expand existing conservation ownerships and/or those in areas already known to be used by the species.

   The KYTC proposes that contributions to the IBCF will be determined and computed on a project-by-project basis and will be based on the following formula: (acreage of impact) X (median land cost) X (mitigation multiplier) = amount of contribution.

   The acreage of impact (Acreage) will be the number of acres of suitable Indiana bat forested habitat that a proposed project will adversely affect. For impacts to: a) continuous, unbroken habitat areas, the Acreage will be the number of acres to the nearest hundredth acre; b) areas containing widely spaced or less than 20 trees, the Acreage will be the number of trees that have been determined to exhibit those characteristics suitable for Indiana bat summer habitat (any tree over 5" diameter at breast height) present within the impacted area multiplied by 0.09 (the area occupied by a tree with a 35-foot crown radius); and c) projects containing both continuous, unbroken habitat and widely spaced, fragmented or less than 20 tree, Acreage will be determined using a combination of both calculation methods described above.

   Through an on-going assessment of bridges within the Commonwealth of Kentucky, the KYTC has reviewed 260 structures throughout the state. The assessed bridges have represented a variety of sizes and bridge types, including bridges from 21 to 727 feet long and bridge types, including channel beam, box beam, pre-stressed concrete beam, metal beams, box culverts, and numerous others. The majority (92%) of these structures were identified as either unsuitable for bats or no bats or signs of bat use were observed. The remaining bridges (8%) had bats of various species actively roosting on the structure or signs of bat use were observed. To determine the amount of potential roosting habitat for bats on each bridge, the bridge length and width were multiplied to calculate an acreage for each structure. Structures with documented bat use are generally larger than the average bridge, with a median size of 0.10 acre for bridges with bat use compared to 0.02 acre for all the bridges assessed to date. Based on this data, the KYTC proposes to use 0.10 acre per bridge to calculate the amount of suitable bat habitat loss for projects involving bridge impacts.

The median land cost will be the most recently published median agricultural land cost on a per acre basis. This cost is intended to provide an index of the estimated replacement cost of forested Indiana bat habitat in Kentucky. This number will be updated each time the United States Department of Agriculture publishes a new cost (typically the beginning of August).

The mitigation multiplier factor is derived from the habitat type that will be impacted and season when project impacts occur. The Indiana bat habitat map (attached as Appendix D in the BA) displays the habitat types that are based on the known records of Indiana bat captures and hibernacula locations. Table 1 shows each mitigation multiplier, based on habitat type, and the seasonal dates of each habitat type depicting when that habitat is expected to be active (i.e., in use) or inactive (i.e., not in use) by Indiana bats.

Table 1. Proposed Indiana Bat Mitigation Multiplier Matrix

Habitat Type	Active Season (**)	Active Dates	Inactive Season	Inactive Dates
Known Swarming	2.25 (2.75)	April 1 to Nov 14	1.75	Nov 15 – March 31
Known Summer	1.75 (2.25)	April 1 to Oct 14	1.25	Oct 15 – March 31
Unsurveyed	1.0 (1.5)	April 1 to Oct 14	0.5	Oct 15 – March 31

** Ratio for tree removal in June and July is in parentheses. Use of this ratio requires the KYTC's coordination with the KFO for project specific evaluation in advance of proposed impacts.
NOTE: For the purposes of the mitigation multiplier matrix, swarming active season dates also consider the active dates of known summer and unsurveyed habitat types because Indiana bats likely use known swarming areas during these active timeframes of their life cycle as well.

2) If it is determined that a different mitigation opportunity (i.e., range-wide ILF program, species mitigation bank, in-kind mitigation, etc.) is available and/or more appropriate, the KYTC will coordinate with the KFO to ensure project impacts are accounted for sufficiently.

2.4.2 Gray Bat

Avoidance and Minimization Measures

1) Potential impacts to gray bat foraging and aquatic resources will be minimized by limiting tree clearing along streams to the extent possible, avoiding and minimizing impacts to streams during construction, and implementation of BMPs as listed in Appendix C in the BA.

2) The KYTC will utilize the project review process discussed in Section 2.3 in order to determine potential project impacts on the gray bat. If a project requires the two types of impacts identified below, the KYTC will contact the KFO and request a project-specific consultation to consider those types of effects on the species and/or its habitat.
   a) Projects that identify caves, mine adits, rock shelters, and/or karst features that are suitable as either winter habitat and/or summer roosting habitat for the gray bat within a half mile of the project area.

b) Project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity and/or bachelor colony of gray bats.

Compensation Measure

1) In order to offset unavoidable adverse effects on gray bats utilizing bridges as roosting habitat, the KYTC is committed to funding the protection of a known gray bat maternity site and surrounding habitat. This conservation measure would have a beneficial effect on the gray bat by ensuring that the species has suitable habitat available for roosting and rearing of pups during the summer period of its lifecycle. Funding this conservation measure is expected to promote the survival and recovery of the species through protecting and managing existing year round roosting habitat suitable to support the species, particularly one that would expand conservation ownerships.

2.5 Interrelated and Interdependent Actions

A BO evaluates the effects of a proposed Federal action. For purposes of consultation under ESA §7, the effects of a Federal action on listed species or critical habitat include the direct and indirect effects caused by the Action, plus the direct and indirect effects caused by interrelated or interdependent actions. "Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR §402.02).

In its request for consultation, the FHWA did not describe any interrelated or interdependent actions to the Action. If any interrelated or interdependent actions are identified in the future, the FHWA will determine if it is appropriate to be the lead federal agency for the purposes of consultation with the Service under Section 7 of the ESA. Use of this programmatic consultation and authorized incidental take would be determined at that time in coordination with the KFO. This BO does not further address the topic of interrelated or interdependent actions to the Action.

2.6 Summary

The programmatic BA considered the KYTC's activities across the state and identified several action components. Specifically, the Detailed Design Component (geotechnical work, ROW, and utilities), Construction Component, Maintenance Component, Operation Component, and Other/Emergency Actions Component have been identified as action components having the ability to impact the covered species. Activities associated with the Detailed Design Component (geotechnical work, ROW, and utilities) and Other/Emergency Actions Component would be similar to those discussed in the Construction Component Section (Section 2.1.4). Subsequently, KYTC considered the effects of these components in conjunction with the Construction Component in the Effects of the Action Section of the BA. The BA also identified stressors for each of these action components (Construction, Maintenance, and Operation) and provided an analysis of how those stressors would affect the covered species and/or their habitat.

These action components (Construction, Maintenance, and Operation) may take up to 6 years to complete, depending on the complexity of any individual project. Effects on the covered species may occur through impacts to the species or changes to the species' baseline habitat conditions

(noise, lighting, water quality, and forested habitat, etc.) within the Action Area. Based on our evaluation of the BA and the aforementioned action components, the programmatic action will result in the following stressors as summarized in Table 2 below; these stressors and their effects on the covered species are discussed in the Effects of the Action Section of this BO.

Table 2. Stressors by Activity Component

	Activity Component		
Stressors	Construction	Maintenance	Operation
Noise and Vibration	X	X	X
Night Lighting	X		X
Aquatic Resource Loss and Degradation	X	X	X
Tree Removal	X	X	
Collision	X		X
Alteration or Loss of Roosting Habitat on Bridges	X	X	

3 INDIANA BAT

3.1 Status of the species

This section summarizes the best available data about the biology and current condition of the Indiana bat (*Myotis sodalis*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list the Indiana bat as endangered on March 11, 1967 (Federal Register 32[48]:4001) under the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U.S.C. 668aa[c]). The Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) subsequently extended full legal protection from unauthorized take to the species. Critical habitat was designated for the species on September 24, 1976 (41 FR 14914). Thirteen hibernacula, including 11 caves and two mines in six states, were designated as critical habitat.

The Service has published a recovery plan that outlines recovery actions (U.S. Fish and Wildlife Service (USFWS) 1983). Briefly, the objectives of the plan are to: (1) protect hibernacula; (2) maintain, protect, and restore summer maternity habitat; and (3) monitor population trends through winter censuses. An agency draft of a revised recovery plan was provided for public review and comment in the Federal Register on April 9, 1999, but has not yet been finalized. A revised draft recovery plan was noticed in the Federal Register for public review and comment on April 16, 2007 (USFWS 2007).

The Service's Bloomington, Indiana Field Office completed a 5-Year Review of the Indiana bat (USFWS 2009), which summarizes the current status of the species, its progress toward recovery, and the remaining threats to the species. The draft recovery plan and 5-Year Review are available at http://www.fws.gov/midwest/Endangered/mammals/inba/index.html and are hereby incorporated by reference. The 5-Year Review found that all of the required recovery criteria for the Indiana bat had not been achieved, so the species should remain at its current endangered status.

3.2 Species Description

The Indiana bat is a temperate, insectivorous, migratory bat that hibernates in caves and mines in the winter and summers in forested areas. It is a medium-sized bat, having a wing span of 9 to 11 inches and weighing only one-quarter of an ounce. It has brown to dark-brown fur and the facial area often has a pinkish appearance. The Indiana bat closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). It is distinguished from these species by its foot structure and fur color. The Indiana Bat Draft Recovery Plan (USFWS 2007) provides a comprehensive summary of the description of the species and is incorporated by reference.

3.3 Life History

The life cycle of the Indiana bat is summarized in Figure 1. The species hibernates in caves and mines in the winter (typically October through April) and migrates to forested summer habitat. When arriving at their traditional hibernacula in August-October, Indiana bats "swarm" for several weeks prior to hibernation. Some male bats may begin to arrive at hibernacula as early as July, but females typically arrive later. The time of highest swarming activity in Indiana and Kentucky has been documented as early September (Cope and Humphrey 1977). Swarming is a critical part of the life cycle when Indiana bats converge at hibernacula, mate, and forage until sufficient fat reserves have been deposited to sustain them through the winter (USFWS 1983). Swarming behavior typically involves large numbers of bats flying in and out of cave entrances throughout the night, while most of the bats continue to roost in trees during the day (Cope and Humphrey 1977). Body weight may increase by 2 grams within a short time, mostly in the form of fat. Copulation occurs on cave ceilings near the cave entrance during the latter part of the swarming period (USFWS 2007). Females may mate their first autumn, whereas males may not mature until the second year (USFWS 2007). By late September, many females have entered hibernation, but males may continue swarming well into October in what is believed to be an attempt to breed with late arriving females.

The initiation of hibernation may vary by latitude and annual weather conditions; however, most bats are hibernating by the end of November (USFWS 2007). Hibernation facilitates survival during winter when insect prey is unavailable. Hibernating Indiana bats cluster on cave ceilings from approximately October through April. Limited mating occurs throughout the winter and in early April as bats emerge (USFWS 2007).

Spring emergence occurs when outside temperatures have increased and insects (forage) are more abundant (Richter et al. 1993). Most Indiana bats emerge in late March or early April; the timing of annual emergence may vary across the range depending on latitude and annual weather conditions. Females emerge before males. Shortly after emerging from hibernation, the females become pregnant via delayed fertilization from the sperm that has been stored in their reproductive tracts through the winter (USFWS 2007). During the "staging" period, the bats forage for a few days or weeks near their hibernaculum before migrating to their traditional summer roosting areas.

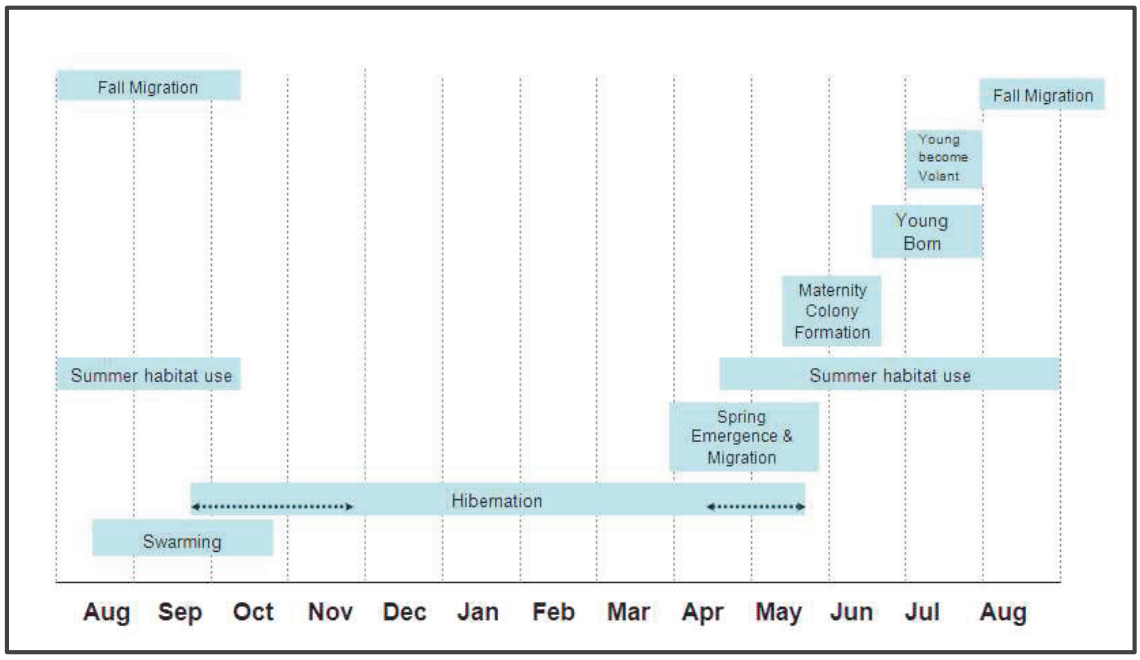


Figure 1. Indiana bat annual chronology (USFWS 2007).

Most populations leave their hibernacula to migrate to summer habitat by late April. Some reproductive females have been documented to migrate up to 357 miles (Winhold and Kurta 2006) to form maternity colonies; others have been found to form maternity colonies within only a few miles of their hibernacula (U.S. Army Garrison Fort Drum 2011). Males are commonly found roosting near the hibernacula but have also been documented to migrate long distances to their summer habitat (Kurta and Rice 2002). Migration is stressful for the Indiana bat, particularly in the spring when their fat reserves and food supplies are low. As a result, adult mortality may be the highest in late March and April.

Female Indiana bats, like most temperate members of the family Vespertilionidae, give birth to one young each year (Mumford and Calvert 1960, Humphrey et al. 1977, Thomson 1982). The proportion of female Indiana bats that produce young is not well documented. At a colony in Indiana, 23 of 25 female Indiana bats produced volant young during one year and 23 of 28 females the following year (Humphrey et al. 1977). Based on cumulative mist-netting captures over multiple years, Kurta and Rice (2002) estimated that 89% of adult females in Michigan maternity colonies were in reproductive condition (pregnant, lactating, or post-lactating).

Racey (1982) notes that a particular ratio of fat to lean mass is normally necessary for puberty and the maintenance of female reproductive activity in mammals. He suggests further that the variation in the age of puberty in bats is due to nutritional factors, possibly resulting from the late birth of young and their failure to achieve threshold body weight in their first autumn. Once puberty is achieved, reproductive rates frequently reach 100% among healthy bats of the family Vespertilionidae and young, healthy female bats can mate in their first autumn as long as their prey base is sufficient to allow them to reach a particular fat to lean mass ratio.

Studies by Belwood (2002) show asynchronous births among members of a colony. This results in great variation in size of juveniles (newborn to almost adult size young) in the same colony. Young Indiana bats are capable of flight within a month of birth. Young born in early June may be flying as early as the first week of July (Clark et al. 1987), with others flying from mid- to late July. Mortality between birth and weaning was found to be about 8% (Humphrey et al. 1977).

The average life span of the Indiana bat is 5 to 10 years, but banded individuals have been documented living as long as 14 and 15 years (Humphrey and Cope 1977). Using winter sampling of unknown-age bats over a 23-year period, Humphrey and Cope (1977) estimated annual survival. Female survivorship in an Indiana population was 76% for ages 1 to 6 years and 66% for ages 6 to 10 years. Male survivorship was 70% for ages 1 to 6 years and 36% for ages 6 to 10 years. Following 10 years, the survival rate for females dropped to only 4% (Humphrey and Cope 1977).

3.4 Habitat Characteristics and Use of the Indiana Bat

Winter Habitat

Indiana bats roost in caves or mines with configurations that provide a suitable temperature and humidity microclimate (Brack et al. 2003, USFWS 2007). Requirements for hibernacula are discussed in the draft Recovery Plan for the species (USFWS 2007).

Summer Habitat

Summering Indiana bats (males and females) use forested habitat for roosting, foraging, and commuting. Indiana bats are often associated with floodplain or riparian forests with large trees, scattered canopy gaps, and open understories (USFWS 2007). Research has showed adaptability in habitats used, including upland forests, forests altered by grazing, swine feedlots, row-crops, hay fields, residences, clear-cut harvests, and shelterwood cuts (Garner and Gardner 1992, USFWS 1999).

Suitability of a roost tree is determined by its condition (dead or alive), suitability of loose bark, solar exposure, spatial relationship to other trees, and tree's spatial relationship to water sources and foraging areas. Potentially suitable roost trees can be trees of any species with bark separating from the tree after the tree dies, senesces, or is injured and living species of hickories (*Carya* spp.) and large white oaks (*Quercus alba*) with shaggy bark. Many maternity colonies have been associated with oak-hickory and elm-ash-cottonwood forest types. Tree cavities, hollow portions of tree boles or limbs, and crevice and splits from broken tops occasionally have been used as roosts, usually by individual bats. Roost longevity is variable due to many factors, such as the rate at which bark sloughs off or the tree falls down. Some roosts may only be habitable for 1-2 years, but species with good bark retention, such as slippery elm (*Ulmus rubra*), cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), and various oaks (*Quercus* spp.) and hickories (*Carya* spp.) may provide habitat for 4-8 years (USFWS 1999).

Trees in excess of 40 cm (15.7 in) diameter-at-breast-height (dbh) are considered optimal for maternity colonies, but trees in excess of 22 cm (8.6 in) dbh are used as alternate roosts (USFWS 2002). Females have been documented using roost trees as small as 14 cm (5.5 in) dbh (Kurta 2005). The average size of roost trees used by males tends to be smaller than the roost trees used

by female maternity colonies; in one instance, a male was observed in a roost tree 6.4 cm (2.5 in) dbh (Gumbert et al. 2002).

Maternity colonies have been documented to use 8 to 25 roost trees per season (Callahan et al. 1997, Kurta et al. 2002). The extent and configuration of the roosting area is probably determined by availability of suitable roost trees. Distances between roosts can be a few meters to a few kilometers (Kurta et al. 1996, 2002). Primary roosts are generally larger in diameter and located in openings or at the edge of forest stands, while alternate roosts can either be in openings or the interior of the forest stand. Maternity colony movements among multiple roosts seem to depend on climatic changes, particularly solar radiation (Humphrey et al. 1977). Cool temperatures can delay fetal development and growth of juvenile young; selection of maternity roost sites may be critical to reproductive success. Kurta et al. (1993) suggest movement between roosts may be the way that bats deal with the ephemeral nature of roost trees. It is not known how many alternate roosts must be available to assure retention of a colony within a particular area, but large, nearby forest tracts would improve the potential for an area to provide adequate roosting habitat (Callahan 1993, Callahan et al. 1997).

Indiana bats feed on aquatic and terrestrial insects. Diet varies seasonally and among different ages, sexes, and reproductive status (USFWS 1999). Numerous foraging habitat studies have found that Indiana bats forage in closed to semi-open forested habitats and forest edges located in floodplains, riparian areas, lowlands, and uplands; old fields and agricultural fields are also used (USFWS 2007; Sparks et al. 2005). Indiana bats frequently forage along riparian corridors and obtain water from streams; ponds and water-filled road ruts in the forest uplands are also serve as water sources.

Very little research has focused on the use of travel corridors by Indiana bats. Apparently suitable, but distant, forest patches may not be available to Indiana bats unless they are connected by a wooded corridor; however, the maximum size of an opening Indiana bats may cross is not known. General observations and data collected incidentally in studies indicate that Indiana bats select forested corridors when commuting to avoid flying over open areas (ESI 2006; Murray and Kurta 2004). However, Indiana bats have been observed flying across gaps in habitat (Kniowski and Gehrt 2014) including major roads, though they are often deterred by traffic (Zurcher et al. 2010).

Home range, the area in which an Indiana bat forages, commutes, and roosts, may vary in size between seasons, sexes, and reproductive status of the females (Lacki et al. 2007). Menzel et al. (2005) tracked seven female and four male Indiana bats from May to August in Illinois. No significant differences in home ranges between males and females were observed, and home range estimates were subsequently grouped to obtain a mean summer home range of 144.4 hectares (357 acres). Watrous et al. (2006) calculated a mean home range of 83 hectares (205 acres) for 14 female Indiana bats in Vermont. Without site-specific data, the Service generally considers the potential home range for an Indiana bat to include all suitable habitat within 4 km (2.5 mi) of documented roost(s) (USFWS 2011), recognizing the area of actual use may be just a portion of that area.

Indiana bats show a high degree of fidelity to roost trees, roosting areas, and foraging areas (Gardner et al. 1991; Humphrey et al. 1977; Kurta et al. 1996, 2002; Kurta and Murray 2002; Gumbert et al. 2002). Bats using familiar foraging and roosting areas are thought to benefit from decreased susceptibility to predators, increased foraging efficiency, and the ability to switch roosts in case of emergencies or alterations surrounding the original roost (Gumbert et al. 2002).

Spring and Fall Habitat

In the spring, Indiana bats usually roost, forage, and commute in habitat similar to those selected during the summer. These areas are most typically within 10 miles of a P1/P2 hibernaculum and 5 miles of a P3/P4 hibernacula*; however, use of habitat areas that are farther than 10 miles from a P1/P2 hibernaculum or farther than 5 miles from a P3/P4 hibernaculum have been documented (Kiser and Elliot 1996; MacGregor et al. 1999; Rommé et al. 2002; Hawkins et al. 2005).

3.5 Numbers, Reproduction, and Distribution

Indiana bats are found over most of the eastern half of the United States. Winter surveys in 2016-2017 found hibernating Indiana bats dispersed across 17 states. However, over 95% of the estimated range-wide population hibernated in four states – Indiana (34%), Missouri (41.1%), Kentucky (11%), and Illinois (9.9%) (USFWS 2017). Summer distribution of the Indiana bat occurs throughout a wider geographic area than its winter distribution. Most summer occurrences are from the upper Midwest including southern Iowa, northern Missouri, much of Illinois and Indiana, southern Michigan, Wisconsin, western Ohio, and Kentucky. In the past decade, many summer maternity colonies have been found in the northeastern states of Pennsylvania, Vermont, New Jersey, New York, West Virginia, and Maryland. Maternity colonies have also been found in the south, including northern Arkansas, Georgia, Alabama, Mississippi (Copperhead 2017, Copperhead pers. comm. 2014), and southwestern North Carolina (Britzke et al. 2003, USFWS 2007). Non-reproductive summer records for the Indiana bat have also been documented in eastern Oklahoma, northern Mississippi, Alabama, and Georgia.

The data regarding Indiana bat abundance prior to federal listing are limited, but available information, summarized in the draft Recovery Plan (USFWS 2007), suggests that Indiana bats were once far more abundant than they were in the 1960s. When the Indiana bat was originally listed as endangered in 1967, there were approximately 883,300 bats, and most of these hibernated in a small number of hibernacula (Clawson 2002). Since the species was listed, its population numbers have apparently continued to decline through approximately 2001. Since being listed, large population declines have been observed, especially at hibernacula in Kentucky and Missouri. The range wide population estimate dropped approximately 57% from 1965 to 2001 (USFWS 2007). The range-wide, biennial population estimates had been increasing from 2001 to 2007, indicating that the species' long-term decline had been arrested and likely reversed (USFWS 2017). However, the arrival of White-Nose Syndrome (or "WNS"; see discussion below) is the probable cause of the observed range-wide decline since 2007. The Service

* Priority 1 (P1) hibernacula have a current or historical winter population of ≥ 10,000 Indiana bats; priority 2 (P2) have 1,000 -9.999 bats; priority 3 (P3) have 50-999 bats; and priority 4 (P4) have < 50 bats (USFWS 2007).

estimates the Indiana bat's 2019 range-wide population at 537,297 bats, which is a 4.0% decrease over the 2017 range-wide population estimate (Fig. 3).

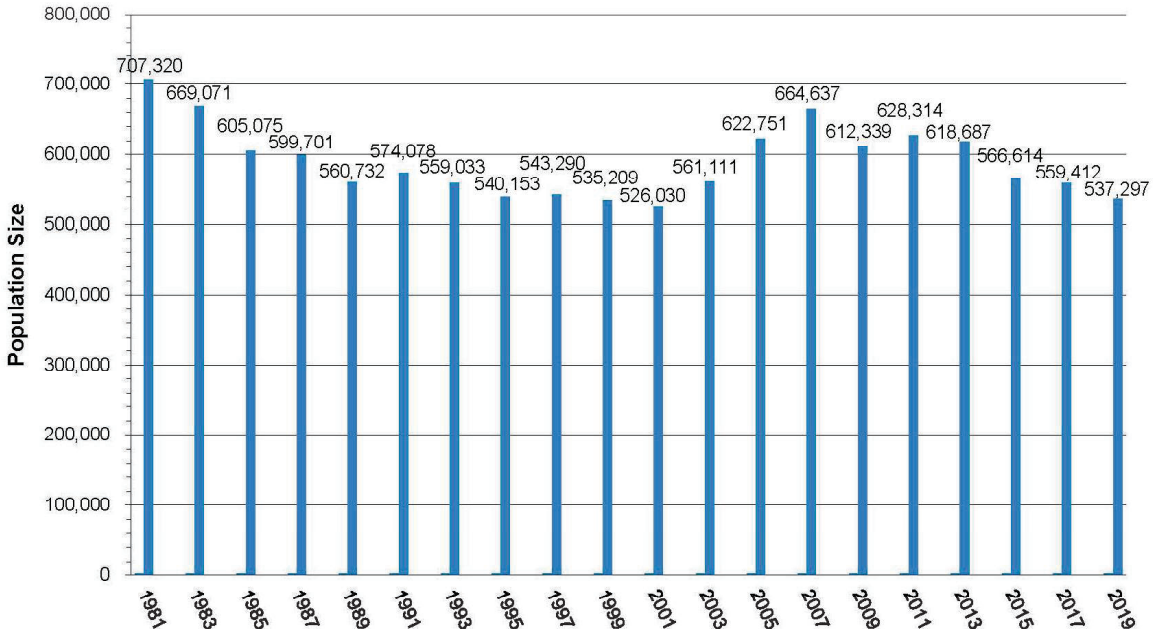


Figure 2. Indiana bat rangewide population estimates from 1981-2019.

3.6 Conservation Needs and Threats

Destruction/Degradation of Hibernacula

There are well-documented examples of modifications to Indiana bat hibernacula that affected the thermal regime of the cave and, thus, the ability of the cave to support hibernating Indiana bats, as summarized in the draft revised Recovery Plan (USFWS 2007). Generally, threats to the integrity of hibernacula have decreased since the time that Indiana bats were listed as endangered under the ESA. Increasing awareness of the importance of cave microclimates to hibernating bats and regulatory authorities under the ESA have reduced, but not eliminated, this threat. In addition to purposeful modifications, there are threats from stochastic events (*e.g.,* collapse in mines, flooding).

Loss/Degradation of Forested Habitat

Loss of forest cover and degradation of forested habitats have been cited as contributing to the decline of Indiana bats (USFWS 1983, Garner and Gardner 1992, Drobney and Clawson 1995, Whitaker and Brack 2002). Throughout the range of the Indiana bat, there is less forest now than there was prior to European settlement (Smith et al. 2003), particularly within the core of the species' range in the Midwest. Conversion to agriculture has been the largest single cause of forest loss. The conversion of floodplain and bottomland forests, recognized as high quality habitats for Indiana bats, has been a particular cause of concern (Humphrey 1978). More recently, since the 1950s, some marginal farmlands have been abandoned and allowed to revert

to forest and there has been a net increase in forest within the range of the Indiana bat, particularly in the Northeast (Smith et al. 2003). Forest cover has also increased within the Midwest Recovery Unit (Smith et al. 2003). Not only has the amount of forest cover increased since the 1950s, but also the average diameter of trees has increased (Smith et al. 2003), which may equate to an increased supply of suitable roost trees for Indiana bats.

Urbanization and development is currently the greatest contributor to forested habitat loss within the range of the Indiana bat (Wear and Greis 2002; U.S. Forest Service (USFS) 2005, 2006), which results in permanent conversion to land uses generally unsuitable for Indiana bats. At a study site in central Indiana, Indiana bats avoided foraging in a high-density residential area (Sparks et al. 2005), although maternity roosts have been found in low-density residential areas (Belwood 2002). Duchamp (2006) found that greater amounts of urban land use was negatively related to bat species diversity in north-central Indiana; several bat species, including the Indiana bat, were less likely to occur in landscapes with greater amounts of urban and suburban development. Development directly destroys habitat and fragments remaining habitat.

Forest cover is not a completely reliable predictor of where Indiana bat maternity colonies will be found on the landscape (Farmer et al. 2002). Indiana bat maternity colonies occupy habitats ranging from completely forested to areas of highly fragmented forest. Nonetheless, trends in forest cover are of interest relative to Indiana bats, with increasing forest cover suggesting at least the potential for improved habitat conditions. Conversely, in areas where almost all forest land has been lost, the absence of woodlands on the landscape certainly equates to less habitat than in prehistoric and early historic periods.

Throughout the range of the Indiana bat, forest conversion is expected to increase due to commercial and urban development, energy production and transmission, and natural changes. The 2010 Resources Planning Act Assessment projects forest losses of 6.5-13.8 million hectares (16–34 million acres) (or 4–8% of 2007 forest area) across the conterminous United States, and forest loss is expected to be concentrated in the southern United States, with losses of 3.6-8.5 million hectares (9–21 million acres) (USFS 2012). Forest conversion causes loss of potential habitat, fragmentation of remaining habitat, and if occupied at the time of the conversion, injury or mortality to individuals.

Disturbance of Hibernating Bats

The original recovery plan for the species stated that human disturbance of hibernating Indiana bats was one of the primary threats to the species (USFWS 1983). The primary forms of human disturbance to hibernating bats result from cave commercialization (cave tours and other commercial uses of caves), recreational caving, vandalism, and research-related activities. Progress has been made in reducing the number of caves in which disturbance threatens hibernating Indiana bats, but the threat has not been eliminated. Biologists throughout the range of the Indiana bat were asked to identify the primary threat at specific hibernacula, and "Human disturbance" was identified as the primary threat at 41% of Priority 1, 2 and 3 hibernacula combined.

White-nose Syndrome

WNS is an infectious wildlife disease caused by a fungus of European origin *Pseudogymnoascus destructans* (Pd), which poses a considerable threat to hibernating bat species throughout North America, including the Indiana bat. White-nose syndrome is responsible for unprecedented mortality of insectivorous bats in eastern North America (Blehert et al. 2009; Turner et al. 2011). No other threat is as severe and immediate for the Indiana bat as the disease WNS. Since the disease was first observed in New York in 2007 (later biologists found evidence from 2006 photographs), WNS has spread rapidly in bat populations from the East to the Midwest and the South.

WNS may affect behavioral changes in infected individuals. For example, at some WNS-affected sites, a shift of hibernating bats from traditional winter roosts to roosts unusually close to hibernacula entrances has been observed. Bats have also been observed flying outside of hibernacula during winter (often during the day) at some affected sites. At some sites, bat carcasses (particularly of the little brown bat) have been found outside affected hibernacula. Many infected bats do not survive the winter. The exact processes by which the fungal skin infection leads to death are not known, but depleted fat reserves (i.e., starvation) contribute to mortality (Reeder et al. 2012, Warnecke et al. 2012) and dehydration may also have a role (Willis et al. 2011, Cryan et al. 2013, Ehlman et al. 2013). It is also suspected that some of the affected bats that survive hibernation emerge in such poor condition that they die soon after emergence or during the summer. Among those bats that do survive, it appears that productivity of female survivors may be negatively affected (Francl et al. 2012; Pettit and O'Keefe 2017).

The Northeast Recovery Unit, where WNS was first observed in the winter of 2006-2007, lost over 70% of its Indiana bats between 2007 and 2015. At the time dead bats were first observed in the winter of 2006-2007, it is not known how long the (previously unidentified) fungus, Pd, had been present in affected sites. Based on subsequent observations as WNS spread, it appears that the arrival of the fungus in an area may precede large-scale fatality of bats by several years. Between 2011 and 2015 the Appalachian Recovery Unit, where WNS was confirmed in the winter of 2008-2009, declined by 84%. The Midwest Recovery Unit, where WNS was confirmed in the winter of 2010-2011, declined by 16% between 2011 and 2015. The Ozark-Central Recovery Unit, where WNS was confirmed in the winter of 2011-2012, declined by less than 1% between 2013 and 2015. As of 2016, WNS or Pd was confirmed in all the states within the species' range. We expect further declines in Indiana bat populations from the disease in the future. Additional information on WNS, which is constantly evolving, can be found online at http://whitenosesyndrome.org/.

Environmental Contaminants

With the restrictions on the use of organochlorine pesticides in the 1970s, this significant threat to Indiana bats was reduced. However, cholinesterase-inhibiting insecticides, organophosphates, and carbamates have now become the most widely used insecticides (Grue et al. 1997), and the impact of these chemicals on Indiana bats is not known. Because of the unique physiology of bats in relation to reproduction, high energy demands and sophisticated thermoregulatory abilities, much more research needs to be done with these pesticides and their effects on bats. These and other contaminants likely remain a significant and poorly

understood threat to Indiana bats. USFWS (2007) summarizes known and suspected contaminant threats to bats.

Climate Change

The capacity of climate change to result in changes in the range and distribution of wildlife species is recognized, but detailed assessments of how climate change may affect specific species, including Indiana bats, are limited. During winter, only a small proportion of caves provide the right conditions for hibernating Indiana bats because of the species' very specific temperature and humidity requirements. Surface temperature is directly related to cave temperature, so climate change that involves increased surface temperatures will inevitably affect the suitability of hibernacula. Impacts on the availability or timing of emergence of insect prey are also likely. Loeb and Winters (2013) modeled potential changes in Indiana bat summer maternity range within the United States; in their model, the area suitable for summer maternity colonies of Indiana bats was forecasted to decline significantly.

Wind Turbines

There is growing concern that Indiana bats (and other bat species) may be threatened by the recent surge in construction and operation of wind turbines across the species' range. Eight Indiana bat mortalities have been documented at wind turbines; five of those were during the fall migration period (USFWS 2014). Not all facilities conduct fatality monitoring and, even when monitoring is conducted, only a small proportion of dead bats are likely to be found. Based on this information, it is likely that additional Indiana bat mortality has occurred at these facilities and at other wind facilities throughout the range of the species.

4 ENVIRONMENTAL BASELINE

In accordance with 50 CFR 402.02, the environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

4.1 Action Area Numbers, Reproduction, and Distribution

The Action Area's surface land coverage (Kentucky plus a 20-mile buffer around the state line) is approximately 62,254 square miles, which represents approximately 11 percent of the total range of the Indiana bat. The occupied range of the species (i.e., the collective home ranges of all individuals) within both the total range and the Action Area is unknown but is likely considerably smaller than the total range and Action Area, respectively, due to the presence of unsuitable habitats and unoccupied suitable habitats within both. According to our records, the Indiana bat is known from numerous locations, distributed across the Action Area.

The Action Area lies near the center of the species' range and numerous records of the species occupying summer and winter habitat exist. Occurrences of the species are clearly tied to the availability of the suitable summer and winter habitat. Potential winter habitat is static (assuming no anthropogenic alterations occur) in the landscape, because the caves and other underground features the species relies on for winter habitats do not change locations. However, the species will move from one habitat area to another to take advantage of better conditions or to abandon habitat that humans or other factors have altered or disturbed.

Within the Action Area there are 165 known hibernacula. Eleven of these are Priority 1 hibernacula (defined as harboring current or historic winter populations greater than 10,000 individuals and not identified as an ecological trap) (USFWS, unpublished data 2019) and three of these are designated as critical habitat (USFWS 2007). These eleven Priority 1 hibernacula had a combined estimated population of 245,596 Indiana bats in 2019, which represent approximately 45.7 percent of the rangewide estimated population (537,297) and 93.8 percent of the Indiana bats known to hibernate within the Action Area (261,576) (USFWS, unpublished data 2019). Of these eleven hibernacula, five are located within the 20-mile buffer around the Commonwealth of Kentucky that forms the outer boundary of the Action Area, including the three largest hibernacula by population count.

Seventy-two of the 165 hibernacula occur in areas of existing public or private conservation ownership. Of particular note are the Daniel Boone and Shawnee National Forests that are managed by the U.S. Forest Service, Mammoth Cave National Park and Cumberland Gap National Park that are managed by the National Park Service, Carter Cave State Resort Park that is managed by the Kentucky Department of Parks, Harrison-Crawford State Forest that is managed by the Indiana Department of Natural Resources, and several parcels along Pine Mountain in Kentucky that are owned by a variety of state agencies and land trusts.

Summer records for the species occur across the Action Area, and over 60 maternity areas have been documented along with a number of locations for solitary males and non-reproductive females. Like the hibernacula, these known maternity colonies are scattered throughout the state with notable clusters of maternity colonies occurring near the Fort Knox Military Reservation, Jefferson Proving Ground Military Reservation, Mammoth Cave National Park, Daniel Boone National Forest, Shawnee National Forest, Pine Mountain, the coalfields of eastern Kentucky, and along the lower Ohio River floodplains.

In general, the habitat availability at known maternity sites appears to reflect the overall distribution of forest cover for the state. Outside of the maternity colonies found on Fort Knox Military Reservation and Mammoth Cave National Park, those maternity areas with an availability of at least 80 percent forest cover occur in the eastern third of the state where forestland cover frequently exceeds 75 percent. Similarly, in the western third of the state where percent of land in forest is typically below 50 percent, the availability of forested habitat for known Indiana bat maternity colonies is also below 50 percent. Based on the wide distribution and availability of summer habitat across the Action Area, Indiana bats can be expected to occur at any location where its habitat needs can be met. Summer presence / probable absence surveys for the Indiana bat within Kentucky have found an average occupancy rate of 1.5 percent for post-WNS survey sites in potential maternity habitat. Given this occupancy rate and the regular

discovery of new maternity colonies, the Service believes there are more maternity colonies within the Action Area than are currently documented.

4.2 Action Area Conservation Needs and Threats

It is difficult to identify specific factors affecting the Indiana bat's environment within the Action Area, because the Action Area has been defined as the Commonwealth of Kentucky and all portions of adjoining states that occur within 20 miles of the Kentucky border. This BO is based on analysis at a programmatic level rather than at an individual project scale. However, we are able to determine that there are a number of current and long-term land uses and demographic trends which could affect Indiana bats within the Action Area.

Forest Loss and Fragmentation

Unlike most winter sites, summer habitat for Indiana bats is typically not static. It changes over time in its location, quality, and quantity, and it is influenced by changes in land use, management and forest structure. Forest loss and fragmentation have significant impacts on the location, quality and quantity of available summer habitat. The Kentucky Division of Forestry has identified forest loss and fragmentation as key threats to Kentucky's forests (KDF 2010). Forest loss is simply the conversion of forestland to some other land use, while fragmentation is the breaking up of large forest tracts into smaller tracts. The predicted change in Kentucky's forestland found in Turner et al. (2004) anticipates that 31 of the 120 Kentucky counties will lose 1–-5% percent of their forestland by 2020, and no county will increase its forest by more than 2 percent. A county by county comparison of percent forest cover as represented in the 2001 and 2016 editions of the National Land Cover Database found this to be generally true.

In the early 1900's, forest loss was primarily due to agricultural conversion; today, surface mining and urban sprawl are driving the loss (KDF 2010). However, as some forest is lost, other land is becoming forested. This is evidenced by the relative stability of Kentucky's forested land use over the last fifty 50 years, which has consistently been just below 50 percent (Oswalt 2012). However, this stability is across the state and local trends vary.

While the state-wide forest availability has been stable, these forests have, on average, aged and support larger trees. The number of acres in seedling and poletimber-size stands has decreased while acres in sawtimber-sized stands increased. Sawtimber has a minimum dbh of 11 inches for hardwoods, and the greatest growth has been seen in the volume of trees with a dbh of 12 or more inches (Turner et. al 2004). This is important as larger-diameter trees presumably provide thermal advantages and more spaces for more bats to roost. As with most tree-roosting bats (Barclay and Kurta 2007), female Indiana bats probably select trees, especially primary roosts, that are larger in diameter than nearby, apparently suitable, but unoccupied trees (Kurta et al. 1996, 2002; Britzke et al. 2003; Palm 2003; Sparks 2003).

Fragmentation is already a significant detriment to Kentucky's forest health. Although nearly half the state is forested, less than 14 percent of these 12.4 million acres are forest interior (KDF 2010), meaning they occur as large forest blocks. Within large forest tracts of 1,000 or more acres, 50 percent of the forest is considered edge habitat (300 foot buffer), 22 percent is

small forest interior (less than 1,000 acres), and 28 percent is large forest interior (greater than 1,000 acres).

Forest loss and fragmentation can have significant impacts on Indiana bats, particularly at the local level. Any increase in conversion of forested land to agricultural and/or developed lands can be expected to further fragment and eliminate forested blocks of habitat that could be used by Indiana bats. The extent to which this effect will be offset by new forest regeneration is unknown; any regenerated forest will typically require decades before it becomes suitable roosting habitat. These habitat loss and degradation trends can be expected to receive increased scrutiny as protection of important summer habitat becomes a critical aspect of the species' recovery following the population declines due to white-nose syndrome (Johnson et al. 2012).

White-nose Syndrome

WNS was first discovered in one cave in Kentucky in 2011 but has since spread across the state. Mortality at infected sites first became apparent in 2013, with an increase in observed mortality in 2014. Preliminary reports indicate that Pd and/or WNS has been detected in approximately 74% of caves surveyed in Kentucky (T. Hemberger, pers. comm. 2017); however, many of those caves without positive records have not been surveyed in recent years. Indiana bats have shown declines at some hibernacula, and the overall post-WNS decline in Kentucky is estimated to be approximately 21% (USFWS 2019). Although the population and trend data following the arrival of WNS at Kentucky hibernacula is difficult to interpret, the data are currently not showing the near or total loss of Indiana bat populations that has been documented in the northeastern United States.

Because Indiana bats can migrate hundreds of miles from their hibernacula and WNS has been documented from Kentucky and all of the adjacent states, we expect that all the Indiana bats within the Action Area have been exposed to WNS. Therefore, Indiana bats in the Action Area are expected to be experiencing stress and reduced body weights from their exposure to WNS.

Other Factors

Numerous land use activities that could impact Indiana bats and that likely occur within the Action Area include: timber harvest, all-terrain vehicle (ATV) recreational use, recreational use of caves, underground and surface coal and limestone mining, gas production, and development associated with road, residential, industrial and agricultural development and related activities. These private actions are likely to occur within the Action Area, but the Service is unaware of any quantifiable information relating to the extent of private timber harvests within the Action Area, the amount of use of off-highway vehicles within the Action Area, or the amount of recreational use of caves within the Action Area. Similarly, the Service does not have any information on the amount or types of residential, industrial, or agricultural development that have or will occur within the Action Area. Therefore, the Service is unable to make any determinations or conduct any meaningful analysis of how these actions may or may not adversely and/or beneficially affect Indiana bats. All we can say is that it is possible that these activities, when they occur, may have adverse effects on Indiana bats and their habitats in certain situations (e.g., a private timber harvest during summer months within an unknown maternity colony may cause adverse effects to that maternity colony.). In stating this, however, we can only speculate as to the extent or severity of those effects, if any.

5 EFFECTS OF THE ACTION

In accordance with 50 CFR 402.02, effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see § 402.17).

The Service established additional requirements for making the determination of reasonably certain to occur, which must be followed after October 28, 2019, the effective date of new regulations under 50 CFR 402. After determining that the "activity is reasonably certain to occur," based on clear and substantial information, and using the best scientific and commercial data available, there must be another conclusion that the consequences of that activity (but not part of the proposed action or activities reviewed under cumulative effects) are reasonably certain to occur. In this context, a conclusion of reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available after consideration of three factors in 402.17(b)(1-3).

The 2019 regulatory changes do not alter how we will analyze the effects of a proposed action or the scope of effects. We will continue to review all relevant effects of a proposed action, as we have in past decades, but the Service determined it was not necessary to attach labels to the various types of effects through regulatory text. That is, we intend to capture all of those effects (now "consequences") previously listed in the regulatory definition of effects of the action – direct, indirect, and the effects from interrelated and interdependent activities – in the new definition. These effects are captured in the new regulatory definition by the term ''all consequences'' to listed species and critical habitat.

Based on the description of the Action and the species' biology, we have identified six stressor(s) to the Indiana bat (i.e., the alteration of the environment that is relevant to the species) that may result from the Action: (1) noise and vibration, (2) night lighting, (3) aquatic resource loss and degradation, (4) tree removal, (5) collision, and (6) alteration or loss of roosting habitat on bridges. Below, we discuss the best available science relevant to each stressor. Then, we describe the Stressor-Exposure-Response pathways that identify the circumstances for an individual bat's exposure to the stressor (i.e., the overlap in time and space between the stressor and an Indiana bat). Finally, we identify and consider how proposed conservation measures may reduce the severity of the stressor or the probability of an individual bat's exposure for each pathway.

5.1 Stressor 1: Noise and Vibration

Noise and vibration are stressors that may disrupt bats by causing individuals to flush from suitable roosting locations like bridges or suitable roost trees. Disruptions may occur during the day and/or night timeframes, and/or alter travel corridors and foraging behaviors. Bats may be exposed to this stressor during the construction, maintenance, and operation components of the Action. Significant changes in noise levels in an area could result in temporary to permanent alteration of bat behaviors. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats.

During the construction component of the Action, the felling of trees and operation of heavy equipment and tools will produce noise and vibrations. This could occur during any time of the year. During most of construction activities, the project area would be absent of trees and natural vegetation and will no longer provide habitat for the Indiana bat. Construction blasting may be conducted in areas that have previously been cleared of trees. Therefore, we expect that the exposure of Indiana bats to blasting would be reduced but not necessarily eliminated. This is because the distance between the blasting location and any remaining roost sites would increase after the initial tree removal occurs, but nearby forested areas would remain intact and available for occupation by Indiana bats.

Bats that currently use a project site would be exposed to noise and vibration from adjacent, facilities, interstate and major highways, and other urban, rural, and/or commercial land uses; therefore, we would expect them to be habituated to noise and vibration to some extent. During the operation component, noise and vibration will be limited to those effects caused by normal vehicular traffic. We expect Indiana bats to also become habituated to noise and vibration during operation.

Noise and vibration during the maintenance component are anticipated to be typically at or below levels caused by normal traffic. However, some maintenance activities may involve tree removal or bridge rehabilitation by use of heavy equipment and effects may be similar to those discussed above for construction activities. Bridge and roadway maintenance is expected to occur during daylight hours and will not disrupt foraging or commuting by bats.

Applicable Science

Bats exposed to noise and vibration may flush from their roost trees or bridges. Bats that flush during the daytime are at greater risk of harm due to predation (Mikula et al. 2016). Additionally, bats that flush their roost and/or avoid travel and foraging areas in response to this stressor may be harmed due to an increase in energy expenditure. Increased energy demands could have a significant effect on bats due to their low body mass. Because females require increased energy reserves during lactation (Kurta et al. 1989), an increased demand for energy in response to noise and vibrations could be especially detrimental to lactating females and, subsequently, their pups.

Studies have found that Indiana bats can tolerate some level of noise and vibration. For example, several construction projects, prior to documentation of white-nose syndrome, have occurred on Fort Drum adjacent to multiple known Indiana bat roosts (U.S. Army Garrison Fort Drum 2011). Construction around these project sites has been ongoing for multiple years during the active season. The last known capture and roosting locations of Indiana bats near these projects have been within approximately 800 and 400 meters (0.5 and 0.25 mi) of the construction activities, respectively. Further, military installations generally have large amounts of noise and disturbance, but Indiana bats have continued to occupy Fort Knox suggesting that noise from machinery may disturb colonies of roosting bats, but such disturbances would have to be severe to cause roost abandonment (Hawkins et al. 2008). Gardner et al. (1991) had evidence that Indiana bats continued to roost and forage in an area with active timber harvest. This suggested that noise and exhaust emissions from machinery could possibly disturb colonies of roosting

bats, but such disturbances would have to be severe to cause roost abandonment. Callahan (1993) noted the likely cause of the bats in his study area abandoning a primary roost tree was disturbance from a bulldozer clearing brush adjacent to the tree. In another study near 1-70 and the Indianapolis Airport, a primary maternity roost was located 1,970 ft. (0.6 km) south of 1-70 (3D/International, Inc. 1996). This primary maternity roost was not abandoned despite constant noise from the Interstate and airport runways. However, the roost's proximity to 1-70 may be related to a general lack of suitable roosting habitat in the vicinity, and due to the fact that the noise levels from the airport were not novel to the bats (i.e., the bats had apparently habituated to the noise) (USFWS 2002). Noise and vibration could cause an Indiana bat to flush from its roost, expending extra energy and making it more vulnerable to predation (Mikula et al. 2016). Novel noises would be expected to result in some changes to bat behaviors, but research suggests that bats can become habituated to this stressor.

Effects Pathway – Indiana Bat #1	
Activity: Construction and Maintenance	
Stressor: Noise and Vibration	
Exposure (time)	April 1 – November 14 (active timeframe); duration of activity
Exposure (space)	Roosting habitat throughout Action Area
Resource affected	Individuals (adults and juveniles)
Individual response	• Flushing from bridge roost or roost trees results in extra energy expenditure that can reduce fitness, and result in reduced survival / reproductive success. • Flushing from bridge roost or roost trees will increase chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Conservation Measures	Avoidance of project effects on: • A bridge structure that is known or has been identified as reasonably likely to support a maternity colony. • A known maternity roost tree. • A known Indiana bat hibernacula within ½ mile of the project area
Interpretation	Bats may become startled by the noise and/or vibrations and flush from their roosts. Most of the activities causing this stressor will occur concurrently with habitat removal or after the habitat has been removed when the species would no longer be present in the construction limits. Indiana bats exposed to this stressor during habitat removal are likely to respond in a way that would lead to adverse effects. Indiana bats exposed to this stressor during the construction and maintenance phase after habitat removal would be exposed to low levels of this stressor and, because of their current proximity to other sources of noise and vibration, we expect them to be habituated and to respond minimally to the stressor.
Effect	Harm
Amount or Extent of Adverse Effect	Because of the difficulty in determining the number of individual Indiana bats that will be adversely affected during this specific activity

	and stressor, the Service has determined that it is appropriate to consider the total amount of Indiana bats adversely affected by using the analysis for removal of summer and fall swarming habitat in this section. We believe that this reduces the potential to double count the number of individual Indiana bats impacted by the entire Action. A small, but indeterminable, portion of Indiana bats are expected to be injured or killed due to this activity and stressor. Disruption of normal behavior as a result of physical disturbance and/or habitat modification or degradation will account for the majority of adverse effects.

Effects Pathway – Indiana Bat #2	
Activity: Operation	
Stressor: Noise and Vibration	
Exposure (time)	April 1 – November 14 (active timeframe); indefinitely
Exposure (space)	Roosting and foraging habitat throughout Action Area
Resource affected	Individuals (adults, juveniles)
Individual response	• Flushing from bridge roost or roost trees results in extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Flushing from bridge roost, or roost trees will increase chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Interpretation	The activities causing this stressor during operation will occur after the habitat has been removed. Thus, Indiana bats exposed will be limited to those using habitat on the margins of a project site. The bats that remain within the area during the operation of a new roadway and/or bridge are already exposed to noise and vibration from adjacent facilities, interstate and major highways, and other urban, rural, and/or commercial land uses. We would expect them to be habituated to this. We do not expect the additional noise and vibration contributed by the proposed Action to significantly increase the stressor in the Action Area. We do not expect Indiana bats to respond to the additional noise and vibration during operation in a way that would be significant.
Effect	Insignificant

5.2 Stressor 2: Night Lighting

Lighting may be required during the construction and operation of the Action. During construction, temporary lighting is likely to only occur within a small portion of Action Area at any one time. Lights may be used during early morning and evening hours during periods of fewer daylight hours (i.e., fall and winter) and may be visible immediately outside the disturbance limits. Construction lighting is anticipated to be downward facing and not directed horizontally where it would illuminate potential roosting, foraging or commuting habitat.

Permanent lighting during the operation component is expected to be the same prior to construction for existing roadways and bridges. Roadways and bridges with lighting before construction are expected to have lighting afterwards, and lighting is not anticipated to be added to facilities without previous lighting. Permanent lighting may be added to new roadways/bridges; however, lighting will occur in areas that were cleared of potential foraging and commuting habitat during construction and is typically limited to highly developed areas. Maintenance activities are anticipated to occur during daylight hours and will not require the use of lighting.

Applicable Science

Studies document highly variable responses among species to artificial lighting. Some bat species seem to benefit from artificial lighting, taking advantage of high densities of insects attracted to light (Jung and Kalko 2010); however, other species may avoid artificial light (Furlonger et al. 1987, Rydell 1992) or not be affected (Stone et al. 2012). Lighting can cause delays in night bat activity (Stone et al. 2009; Downs et al. 2003). Effects of artificial lighting on bat activity may vary with season and moon phase (Jung and Kalko 2010).

While there is limited information regarding Indiana bats' response to increased light levels, slow-flying bats such as *Rhinolophus*, *Myotis*, and *Plecotus* species have echolocation and wing-morphology adapted for cluttered environments (Norberg and Rayner 1987) and emerge from roosts relatively late when light levels are low, probably to avoid predation by diurnal birds of prey (Jones and Rydell 1994). In Indiana, Indiana bats avoided foraging in urban areas, and Sparks et al. (2005) suggested that it may have been in part due to high light levels. Using captive bats, Alsheimer (2011) found that a closely related species, the little brown bat (*M. lucifugus*), was more active in the dark than light.

Effects Pathway – Indiana Bat #3	
Activity: Construction	
Stressor: Night Lighting	
Exposure (time)	April 1 – November 14 (active timeframe); duration of activity
Exposure (space)	Roosting, foraging, and commuting habitat in and near construction limits
Resource affected	Summer and swarming habitat, used by individuals (adults, juveniles)
Individual response	• Increased visibility to predators increases chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Indiana bats roosting underneath or in the bridge deck are unlikely to be affected by lighting on top of the bridge deck. Lighting will not be directed down toward night roosting bats. Additionally, should the activity alter the bridge allowing night lighting to reach roosting habitat, it is unlikely that the bats are still using the bridge (impacts associated with the alteration or loss of roosting habitat of bridges are addressed in Pathway # 16. Bats day roosting at the bridge may delay or avoid returning to the bridge at dawn. Lighting is unlikely to be used during this time, and

	bats that avoid the bridge likely have other available roosts in the immediate area. Lighting may cause bats to avoid using the bridge as a night roost; however, it is expected that bats can use alternate roosts in the area without significant additional energy expenditure. Indiana bats will likely avoid areas lit within roadway construction areas because they would be lit after they are cleared of forested roosting habitat. Foraging bats avoiding lighting can forage along other portions of a stream or nearby habitats. Commuting bats can use other travel routes to avoid lighting. Lighting is not expected to significantly affect the Indiana bat.
Effect	Insignificant

Effects Pathway – Indiana Bat #4	
Activity: Operation	
Stressor: Night Lighting	
Exposure (time)	April 1 – November 14 (active timeframe); indefinitely
Exposure (space)	Roosting, foraging, and commuting habitat throughout Action Area
Resource affected	Summer and swarming habitat, used by individuals (adults, juveniles)
Individual response	• Increased visibility to predators increases chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Indiana bats that use the periphery of a lit roadway will likely be habituated to lighting already in the area and not significantly impacted by the additional lighting of the operation of the proposed project.
Effect	Insignificant

5.3 Stressor 3: Aquatic Resource Loss and Degradation

Loss of aquatic resources may occur during the construction component of the Action. Some projects may require the filling of streams or ponds during realignment of existing facilities or the construction of new facilities. Stream realignment may also be required for some projects, resulting in loss of a portion of the existing stream channel. Loss of aquatic resources may also occur during culvert installation due to the replacement of the natural stream substrate with an artificial structure. Aquatic resource loss is not anticipated during the operation or maintenance components.

Aquatic resource degradation may occur during the construction, operation, and maintenance components of the Action. Water quality may be affected as a result of increased sedimentation due to ground disturbance and runoff during construction or through the introduction of environmental contaminants during construction, operation, and/or maintenance. Activities that reduce the quantity or alter the quality of aquatic resources could impact the Indiana bats, even if conducted while individuals are not present. The introduction of environmental contaminants to waterways also has the potential to negatively affect bats by exposing them to toxic substances.

Bridge rehabilitation and replacement projects have the greatest potential to degrade aquatic resources due to their proximity to streams. Potential degradation of streams from bridge rehabilitation during the construction component are expected to be minimal. The majority of rehabilitation activities will not require work within the stream, and impacts to water quality are expected to be absent or minimal. Rehabilitation activities that occur over or near the stream could result in debris, materials, equipment, or contaminants entering the stream. Temporary structures, such as crossings or work pads, may be required for some bridge rehabilitation and replacement activities to maintain traffic or access portions of the bridge that cannot be reached from land or the bridge deck. These structures will be placed in the stream channel and will cause temporary impacts to the substrate and aquatic habitat. Coffer dams may also be placed in streams to create a safe, dry work area around piers, footers, and abutments during structure repair and rehabilitation of scour areas. Temporary structures will be removed after rehabilitation is complete, and the stream will be restored to pre-construction conditions.

Degradation of streams could occur as a result of bridge replacement during the construction component. Removal and installation of piers, pilings, and abutments will require work within the stream channel and disturb the substrate, which could result in degradation of the stream though habitat alteration and sedimentation within and downstream of the bridge footprint. Temporary structures, including crossings, work pads, and coffer dams may also be required during bridge replacement.

Environmental contaminants used in conjunction with equipment during construction activities may also lead to degradation of aquatic resources. Hazardous materials used during construction may include: diesel fuel, gasoline, hydraulic fluids, oils, lubricants, solvents, adhesives, and battery chemicals. Spills and/or leakage of these materials into aquatic resources could affect water and stream habitat quality.

During operation, hazardous materials could enter aquatic resources from spills associated with traffic accidents or leaks from disabled vehicles. Activities associated with snow/ice and vegetation control include the application of chemicals directly to the road surface or adjacent right-of-way. De-icing agents and salt could be carried from the roadway to aquatic resources through surface runoff, leading to short-term effects to water quality. Herbicides may be applied along roadway rights-of-way and could enter aquatic resources through wind-induced drift or runoff.

Applicable Science

Indiana bats feed on aquatic and terrestrial insects. Numerous foraging habitat studies have found that Indiana bats often forage in closed to semi-open forested habitats and forest edges located in floodplains, riparian areas, lowlands, and uplands; old fields and agricultural fields are also used (USFWS 2007). Drinking water is essential, especially when bats actively forage. Indiana bats obtain water from streams, ponds and water-filled road ruts in forest uplands.

The Indiana bat's diet varies seasonally and among different ages, sexes, and reproductive status (USFWS 1999). Four orders of insects contribute most: Coleoptera, Diptera, Lepidoptera, and Trichoptera (Belwood 1979, Brack 1983, Brack and LaVal 1985, Lee 1993, Kiser and Elliot 1996, Kurta and Whitaker 1998, Murray and Kurta 2002, Whitaker 2004). Various reports differ

considerably in which of these orders is most important. Consistent use of moths, flies, beetles, and caddisflies throughout the year at various colonies suggests that Indiana bats are selective predators to a certain degree, but incorporation of other insects into the diet also indicates that these bats can be opportunistic (Murray and Kurta 2002). Brack and LaVal (1985) and Murray and Kurta (2002) suggested that the Indiana bat may best be described as a "selective opportunist."

Filling streams in the construction limits will permanently reduce aquatic insect habitat, which will reduce the amount of prey available to Indiana bats. The Action may also impact streams downstream of the construction limits. Negative impacts of sedimentation on aquatic insect larvae is well-documented. In a literature review, Henley et. al (2000) summarized how stream sedimentation impacts these communities. Sediment suspended in the water column affects aquatic insect food sources by physically removing periphyton from substrate and reducing light available for primary production of phytoplankton. Sediment that settles out of the water column onto the substrate fills interstitial spaces occupied by certain aquatic insect larvae. Increases in sedimentation can change the composition of the insect community in a stream. In a three-year study measuring sedimentation and macroinvertebrate communities before, after, and during disturbance from a highway construction site, Hendrick (2008) found increased turbidity and total suspended solids downstream from the construction that correlated with a shift in macroinvertebrate communities. The change, however, was not great, and the Hilsenhoff Biotic Index used to evaluate the effects decreased from "excellent" before construction to "good" after construction. The use of BMPs likely minimized the effects of the construction on the macroinvertebrate communities.

Effects Pathway – Indiana Bat #5	
Activity: Construction	
Stressor: Aquatic Resource Loss	
Exposure (time)	Indefinitely
Exposure (space)	Aquatic foraging habitat throughout the Action Area
Resource affected	Habitat, used by individuals (adults, juveniles)
Individual response	• Increased flight distances to access foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Indiana bats are expected to use other streams within the same and/or adjacent watersheds
Effect	Insignificant

Effects Pathway – Indiana Bat #6	
Activity: Construction and Maintenance	
Stressor: Aquatic Resource Degradation (**s**edimentation)	
Exposure (time)	Active timeframe, temporary
Exposure (space)	Aquatic foraging habitat in and downstream of project site
Resource affected	Habitat, prey (aquatic insects), used by individuals (adults, juveniles)

Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Conservation Measures	Implementation of BMPs to limit impacts to streams and downstream aquatic resources
Interpretation	The effects of sedimentation on aquatic resources are expected to be minimal due to the temporary nature of the activity and implementation of the conservation measures.
Effect	Insignificant

Effects Pathway – Indiana Bat #7	
Activity: Construction, Operation, and Maintenance	
Stressor: Aquatic Resource Degradation (pollutants)	
Exposure (time)	Indefinitely
Exposure (space)	Aquatic foraging habitat in and downstream of the project site.
Resource affected	Habitat, prey (aquatic insects), used by individuals (adults, juveniles)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Conservation Measures	• Implementation of BMPs to limit impacts to streams and downstream aquatic resources. • Ensure proper use of herbicides • Limiting use of deicing agents to only the amount necessary.
Interpretation	Implementation of the conservation measures are expected to minimize and/or prevent contamination from pollutants.
Effect	Insignificant

5.4 Stressor 4: Tree Removal

The Action would result in the removal and loss of up to 1000 acres of forested Indiana bat habitat per year and no more than 250 acres of habitat per project. The majority of this removal of forested habitats would occur during construction; however, a small amount may occur during maintenance activities and detailed design (e.g. geotechnical investigations). Trees removed during the April – November timeframe may be occupied by Indiana bats when they are removed. We do not know which trees would be removed during the active timeframe or exactly which trees Indiana bats would be occupying. The resulting forested habitat loss would be permanent. The loss of this habitat may create a gap in forested habitat between larger blocks of forested habitat within the Action Area and potential foraging corridors. In addition to the applicable science discussed below for "Loss of Summer Habitat (active and inactive timeframes)", we also consider the science for "Forest Loss and Fragmentation" for our analysis of this specific stressor.

The KYTC has determined that this Stressor, Tree Removal, may result in the following sub-stressors:

- Removal of summer habitat, active timeframe
- Removal of summer habitat, inactive timeframe
- Loss and fragmentation of forested habitats
- Removal of swarming habitat, active timeframe
- Removal of swarming habitat, inactive timeframe

Removal of Summer Habitat (Active Timeframe) - Applicable Science

Risk of injury or death from being crushed when a tree is felled is most likely to impact non-volant pups, but adults may also be injured or killed. This risk is greater for adults during cooler weather when bats periodically enter torpor and would be unable to arouse quickly enough to respond (i.e., flush and potentially avoid being in the roost when it is felled). Belwood (2002) reported on the felling of a dead maple in a residential lawn in Ohio that resulted in the death of one adult Indiana bat female and the displacement of 33 non-volant young. Three of the young bats were already dead when they were picked up, and two more died subsequently. The rest were apparently retrieved later by adult bats that had survived the felling of the tree.

In addition to the expenditure of additional energy to find new roost trees, the removal of primary or alternate maternity roosts can lead to the fragmentation or break up of the maternity colony (Sparks et al. 2003, Silvis et al. 2014). The effect of colony fragmentation on Indiana bats is unknown. However, Indiana bats presumably congregate in large maternity colonies due to the benefits it provides. Barclay and Kurta (2007) stated that Indiana bats benefit from the formation of maternity colonies through (1) information sharing about roosting and foraging habitats, (2) reduced predation risk, and (3) thermoregulatory advantages. However, this colonial behavior also comes with risks, such as increased parasite transmission and competition for resources.

Effects Pathway – Indiana Bat #8	
Activity: Construction and Maintenance	
Stressor: Tree Removal, Removal of Summer Habitat (active timeframe)	
Exposure (time)	April 1 – October 14 (active timeframe)
Exposure (space)	Forested habitat throughout the Action Area
Resource affected	Summer habitat (roost trees), individuals (adults, juveniles)
Individual response	• Bats struck by equipment or crushed by a felled tree will be injured or killed. • Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Colony fragmentation could decrease thermoregulation efficiency / decreased foraging efficiency that can decrease fitness and result in reduced survival / reproductive success. • Colony fragmentation will increase the risk of predation.
Conservation Measures	• Tree clearing restrictions will occur when non-volant pups would likely be present (June 1 – July 31). Consultation with the KFO would occur on a project specific basis in order to determine if tree

	clearing during the non-volant timeframe is acceptable under the programmatic process. • Avoidance of project effects on a known maternity roost tree. • Minimize project impacts to no more than 250 acres of suitable, forested habitat per project.
Interpretation	Bats occupying trees that are removed may be injured or killed. Injured bats may subsequently die. Those that survive will have to spend extra energy in addition to what is necessary to for foraging, pup rearing, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors (e.g., WNS), is likely to reduce fitness and subsequently reduce survival and reproductive success.
Effect	Harm

Removal of Summer Habitat (Inactive Timeframe) - Applicable Science

The potential for adverse effects of tree removal of Indiana bats during the inactive timeframe is rooted in the well-documented knowledge that Indiana bats exhibit strong fidelity to their summer roosting areas and foraging habitat (Kurta et al. 2002; Garner and Gardner 1992; USFWS 2007). Adverse effects to Indiana bats associated with the removal of forested habitats occur through several pathways that lead to a reduction in individual fitness as a result of increased energy expenditure. This evaluation is supported by numerous bat researchers, including Kurta and Rice (2002), who commented:

> *"The U.S. Fish and Wildlife Service often allows potential roost trees to be cut after Indiana bats leave for hibernation in order to make way for developments such as new bridges, highways, and housing projects. This policy understandably is intended to allow human developments to proceed while preventing direct "take" of Indiana bats. This practice, however, should be limited, because it destroys potential roost trees without establishing whether they actually are used by Indiana bats, which may leave the bats with no shelter when they return in spring in an energetically stressed condition. Upon returning, the bats have just completed 6-7 months of hibernation and an extensive migration, and they arrive already pregnant and at a time when air temperatures are low and food (flying insects) is scarce. Excessive precipitation and/or colder-than-average temperatures drastically reduce reproductive success of temperate bats (Grindal et al. 1992; Lewis 1993), and such negative effects likely would occur even during normal weather if Indiana bats do not have adequate shelter."*

Indiana bats must have the energetic resources to carry out the different phases of their lifecycle. Certain processes in their life cycle are particularly costly (Kunz et al. 1998). Indiana bats must enter into hibernation with enough fat reserves to survive the winter (Speakman and Rowland 1999) and, for females, to trigger ovulation and gestation following emergence (Zhao et al. 2003). After migrating to their summer habitat, Indiana bats must be prepared to cope with

spring conditions by having sufficient energy resources to thermoregulate during cooler weather conditions and at a time when prey is scarce (Kurta and Rice 2002). Additionally, they must have sufficient energy resources throughout the summer roosting period to cope with unpredictable stressors, such as unseasonably cold temperatures or high precipitation that can negatively affect reproductive success (Grindal et al. 1992) and survival.

Forested habitat loss or alteration during the hibernation season (i.e., while the bats are not present) harms Indiana bats by requiring the increased use of energy to respond to the habitat loss or alteration, when bats return to summer habitats. This is likely to impair essential behavior patterns associated with sheltering (roosting), breeding and/or feeding (foraging). This impairment, in turn, results in reduced survival and/or reproduction of the affected individuals. These effects are compounded in the Action Area because most of the returning bats are coming from hibernacula infected with white-nose syndrome (WNS). Individuals surviving WNS have additional energetic demands. For example, WNS-affected bats have less fat reserves than non-WNS-affected bats when they emerge from hibernation (Reeder et al. 2012; Warnecke et al. 2012) and have wing damage (Reichard and Kunz 2009, Meteyer et al. 2009) that makes migration and foraging more challenging. Females that survive the migration to their summer habitat must partition energy resources between foraging, keeping warm, maintain a successful pregnancy, rearing pups, and healing their own bodies.

Effects Pathway – Indiana Bat #9	
Activity: Construction and Maintenance	
Stressor: Tree Removal, Removal of Summer Habitat (inactive timeframe)	
Exposure (time)	Inactive timeframe (October 15 – March 31) removal will expose Indiana bats to effects from April 1 – October 14, for one season after removal.
Exposure (space)	Forested habitat throughout the Action Area
Resource affected	Summer habitat (roost trees), used by individuals (adults)
Individual response	• Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Colony fragmentation could decrease thermoregulation efficiency / decreased foraging efficiency that can decrease fitness and result in reduced survival / reproductive success. • Colony fragmentation will increase the risk of predation.
Conservation Measures	• Avoidance of project effects on a known maternity roost tree. • Minimize project impacts to no more than 250 acres of suitable, forested habitat per project.
Interpretation	Adult Indiana bats will experience adverse effects after they arrive at their summer roosting habitat the first year after tree removal. The extra energy to find new habitat is in addition to what is necessary for foraging, pup rearing, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors (e.g., WNS), is likely to result in adverse effects. Indiana bats are expected to adapt to

	this stressor in subsequent years after they have found new suitable habitat.
Effect	Harm

Amount or Extent of Adverse Effects - Summer Habitats

Analysis of the KYTC projects reviewed by the KFO between 2013 and 2018 found that impacts to known maternity habitat represented about 13.9 percent of the total forested impacts associated with these projects (USFWS, unpublished data, 2019). Assuming a similar level and distribution of impacts to maternity habitat across the 5,000 acres and 5 years of the Action, the Action will result in impacts to an estimated 695 acres of forested maternity habitat (5,000 acres X 0.139 = 695 acres). The Service assumes that maternity colonies require an average of 397 acres of habitat per colony (Menzel et. al 2005), that colonies do not overlap, and that each maternity colony represents 180 Indiana bats (60 adult females, 60 adult males, and 60 pups) (USFWS 2007). Based on these assumptions, the Action's effects on known summer maternity habitat would affect up to 360 Indiana bats:

- 695 acres of maternity habitat affected ÷ 397 acres per maternity colony ≈ 2 colonies; and
- 2 colonies X 180 bats per colony = 360 bats.

However, the Service finds it unlikely that all maternity colonies within the Action Area are known and is reasonably certain that all unknown suitable habitats have the potential to contain a maternity colony, unless survey data indicate otherwise.

The KFO reviewed Indiana bat presence/probable absence survey data in Kentucky post-WNS (2014-2017) and found that Indiana bats were detected at 1.5 percent (16 of 1,056 sites) of suitable mist-net sites (USFWS unpublished 2018 data). Applying this occupancy rate to the 4305 acres of potential maternity habitat predicts that 65 of these acres are occupied by maternity colonies. These 65 acres represent an approximately 1 maternity colony (180 Indiana bats):

- 5,000 acres suitable habitat – 695 acres known maternity habitat = 4305 acres potential maternity habitat;
- 4305 acres potential maternity habitat X 0.015 occupancy rate = 65 acres;
- 65 acres ÷ 397 acres per maternity colony = 0.2 potential maternity colonies; and
- ≈ 1 potential maternity colony X 180 bats per colony = 180 bats.

Combining the likely impacts to both known and potential summer maternity habitats, the Service anticipates that FHWA projects in known and potential summer habitat will affect up to 3 (2 + 1 = 3) Indiana bat maternity colonies or 396 (360 + 180 = 540) bats over a 5-year period. A small, but indeterminable, portion of these 540 Indiana bats are expected to be injured or killed by the Action. Disruption of normal behavior as a result of physical disturbance and/or habitat modification or degradation will account for the majority of adverse effects.

Impacts to non-maternity summer habitat are likely to affect non-reproductive adults. However, the Service has determined that it is appropriate to consider the total amount of non-reproductive adult Indiana bats adversely affected within non-maternity summer habitat by using the analysis

(above) for removal of summer (maternity) and fall swarming habitat in this section. We believe that this reduces the potential to double count the number of individual Indiana bats affected by the entire Action.

Loss and Fragmentation of Forested Habitats – Applicable Science

In addition to removal of roosting habitat, tree removal often results in the loss and fragmentation of forested habitats, resulting in the degradation of Indiana bat foraging and commuting habitat. Patterson et al. (2003) noted that the mobility of bats allows them to exploit fragments of habitat. However, they cautioned that reliance on already diffuse resources (e.g., roost trees) leaves bats highly vulnerable, and that energetics may preclude the use of overly patchy habitats.

In a fragmented landscape, Indiana bats may have to fly across less suitable or unsuitable habitat. This could pose greater risk from predators (e.g., raptors) (Mikula et al. 2016). Indiana bats consistently follow tree-lined paths rather than cross large open areas (Gardner et al. 1991, Murray and Kurta 2004). Murray and Kurta (2004) found that Indiana bats increased their commuting distances by 55% to follow these paths rather than flying over large agricultural fields. However, if these corridors are not available, Indiana bats may be forced over open areas. For example, Kniowski and Gehrt (2014) observed Indiana bat flying across open expanses of cropland >1 km (0.6 miles) to reach remote, isolated woodlots or riparian corridors.

Indiana bat maternity colonies in Illinois, Indiana, Michigan, and Kentucky have been shown to use the same roosting and foraging areas during subsequent years (Gardner et al. 1991; Humphrey et al. 1977; Kurta and Murray 2002; Kurta et al. 1996, 2002). Bats using familiar foraging and roosting areas are thought to benefit from decreased susceptibility to predators, increased foraging efficiency, and the ability to switch roosts in case of emergencies or alterations surrounding the original roost (Gumbert et al. 2002). Conversely, bats that must use new or inferior habitats after a loss or alteration of their normal forested habitat would not have these same benefits.

Racey and Entwistle (2003) discussed the difficulties of categorizing space requirements in bats, as they are highly mobile and show relatively patchy use of habitat (and use of linear landscape features), although connectivity of habitats has some clear advantages (e.g., aid orientation, attract insects, provide shelter from wind and/or predators). Carter et al. (2002) found Indiana bat roosts in a highly fragmented landscape in their southern Illinois, although both the number of patches and mean patch size were higher in the area surrounding roosts than around randomly selected points. Kniowski and Gehrt (2014) suggest longer or more frequent commuting flights will be required by Indiana bats in highly fragmented landscapes, with smaller, more distant suitable habitat patches, to obtain similar resources compared to landscapes with larger, more abundant habitat patches. This has been observed directly in Ohio where radio tagged bats in areas with limited forested cover moved further than those with greater forested cover (K. Lott, USFWS, pers. comm.).

Effects Pathway – Indiana Bat #10	
Activity: Construction and Maintenance	
Stressor: Tree Removal, Loss and Fragmentation of Forested Habitats	
Exposure (time)	One time removal; exposure will be permanent

Exposure (space)	Forested habitat throughout the Action Area
Resource affected	Forested habitat, used by individuals (adults, juveniles)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success. • Increased visibility to predators increases chances of predation.
Conservation Measures	Minimize project impacts to no more than 250 acres of suitable, forested habitat per project.
Interpretation	The loss of roost trees will adversely affect Indiana bats the first year after the removal of those trees (discussed in effects pathway #9). We expect them to find new roosting habitat that they will continue to use in subsequent years. The tree removal will create a larger gap in habitat between that Indiana bats may be using for foraging and commuting habitat. The gap would make access to these areas difficult, requiring more energy expenditure and/or exposure to predators, or would cut off access to habitat altogether. Individual Indiana bats that use the Action Area in the summer after habitat removal are expected to be harmed.
Effect	Harm
Amount or Extent of Adverse Effects	Because of the difficulty in determining the number of individual Indiana bats that will be adversely affected during this specific activity and stressor, the Service has determined that it is appropriate to consider the total amount of Indiana bats adversely affected by using the analysis for removal of summer and fall swarming habitat in this section. We believe that this reduces the potential to double count the number of individual Indiana bats impacted by the entire Action. A small, but indeterminable, portion of Indiana bats are expected to be injured or killed due to this activity and stressor. Disruption of normal behavior as a result of physical disturbance and/or habitat modification or degradation will account for the majority of adverse effects.

Removal of Fall Swarming Habitat – Applicable Science

The active fall swarming period is August 16 – November 14 and is a sensitive period for Indiana bats. This is when mating occurs and when bats are busy foraging to store sufficient fat reserves to survive winter hibernation. Suitable fall swarming habitat is comprised of forested/wooded habitats where they roost, forage, and travel, which is most typically within 5 to 10 miles of a hibernaculum. This includes forested patches as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure.

In general, Indiana bats use roosting, foraging, and commuting habitat(s) in the fall similar to those selected during the summer. Therefore, we are considering the applicable science discussed above for "Loss of Summer Habitat (active and inactive timeframes)", and "Forest Loss and Fragmentation" for our analysis of this specific sub-stressor.

Effects Pathway – Indiana Bat #11	
Activity: Construction and Maintenance	
Stressor: Tree Removal, Removal of Fall Swarming Habitat (active timeframe)	
Exposure (time)	August 16 – November 14 (active timeframe)
Exposure (space)	Forested habitat throughout the Action Area
Resource affected	Swarming habitat used by individuals (adults, juveniles)
Individual response	• Bats struck by equipment or crushed by a felled tree will be injured or die. • Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success. • Increased visibility to predators increases chances of predation.
Conservation Measures	• Avoidance of project impacts on forested habitat within ½-mile of a known Indiana bat hibernacula • Minimize project impacts to no more than 250 acres of suitable, forested habitat per project.
Interpretation	Bats occupying trees that are removed may be injured or killed. Injured bats may subsequently die. During a period when weight gain is critical to survival, additional energy spent searching for new roost trees also results in less time for foraging, both of which could result in reduced weight gain. It can be expected that lower weight gains during fall swarming could result in lower fitness in those stressed individuals as exhibited by reduced survival and/or reproductive success.
Effect	Harm

Effects Pathway – Indiana Bat #12	
Activity: Construction and Maintenance	
Stressor: Tree Removal, Removal of Swarming Habitat (inactive timeframe)	
Exposure (time)	Inactive timeframe (November 15 – August 15) removal will expose Indiana bats to adverse effects from August 16 – November 14, for one season after removal.
Exposure (space)	Forested habitat throughout the Action Area
Resource affected	Swarming habitat used by individuals (adults, juveniles)
Individual response	• Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced

	survival / reproductive success. • Increased visibility to predators increases chances of predation.
Conservation Measures	• Avoidance of project impacts on forested habitat within ½-mile of a known Indiana bat hibernacula • Minimize project impacts to no more than 250 acres of suitable, forested habitat per project.
Interpretation	Indiana bats will experience adverse effects after they arrive at their fall swarming habitat the first year after tree removal. The extra energy to find new habitat is in addition to what is necessary for foraging, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration and mating) or other stressors (e.g., WNS), is likely to result in adverse effects. Indiana bats are expected to adapt to this stressor in subsequent years after they have found new suitable habitat.
Effect	Harm

Amount or Extent of Adverse Effects – Swarming Habitats

According to the most recent winter counts conducted at known Indiana bat hibernacula, approximately 261,576 Indiana bats hibernate within the Action Area (USFWS unpublished 2019b data). Analysis of the KYTC projects reviewed by the KFO between 2013-2018 found that approximately 17.1 percent of forested habitat removal occurred within known swarming buffers (USFWS unpublished 2019a data). Impacts within the 10-mile swarming buffers around Priority 1 (P1) and Priority 2 (P2) hibernacula represent 13.6 percent of the total acres, and impacts within the 5-mile buffers around Priority 3 and Priority 4 (P3&4) hibernacula represent approximately 3.5 percent. Assuming a similar level and distribution of impacts to swarming habitat across the 5,000 acres, the Action will result in impacts to an estimated 855 acres (5,000 acres X 0.171 = 855 acres) of forested swarming habitat over a 5-year period.

We use the most recent winter count data to estimate the density of Indiana bats using Action Area swarming habitats that are within 10 miles of P1 and P2 hibernacula, and within 5 miles of P3&4 hibernacula, assuming within these circles an even distribution of bats and 50 percent forest cover:

- 245,596 bats in P1 hibernacula / 1.11 million acres of associated swarming habitat = 0.221 bats/acre;
- 14,683 bats in P2 hibernacula / 2.80 million acres of associated swarming habitat = 0.0052 bats/acre; and
- 1297 bats in P3&4 hibernacula / 1.99 million acres of associated swarming habitat = 0.00065 bats/acre.

P3&4 swarming habitats are combined due to the large number of sites and relatively low number of bats for these hibernacula. We do not combine P1 and P2 swarming habitats, because of the large difference in potential bat density. In order to estimate how many Indiana bats the Action will affect in swarming habitats (Table 3), these bat densities are applied to the acreage of swarming habitat that we are reasonably certain the Action will affect (13.6 percent of impacts to P1 and P2; 3.5 percent of impacts to P3&4). Since the KFO has tracked impacts to P1 and P2

swarming habitats jointly, we partition the estimated 13.6 percent of the Action's effects between these habitats assuming that Action effects are distributed in proportion to the availability of these two types in the Action Area, as follows:

- There are 3,906,477 acres of P1 and P2 swarming habitat within the Action Area;
- There are 1,105,148 acres of P1 swarming habitat within the Action Area;
- 1,105,148 acres P1 ÷ 3,906,477 acres of P1 and P2 = 0.28 of P1/P2 swarming habitat is P1;
- 0.28 X 0.136 of impacts in P1/P2 swarming habitat X 100 = 3.8 percent of expected impacts will occur in P1 swarming habitat;
- 13.6% – 3.8% of expected impacts that will occur in P1 swarming habitat = 9.8% of expected impacts that will occur in P2 swarming habitat.

"Total Acres Affected" in Table 3 below is calculated by applying the "Anticipated Percent of Impact" to the 5,000 acres of habitat covered under the Action. "Estimated Bat Density" is then applied to the "Total Acres Affected" to arrive at the estimated number of "Bats Affected Over 5 Years."

Table 3. Estimated number of Indiana bats affected by the Action within known swarming habitats (10-mile radius around known Priority 1 and 2 hibernacula; 5-mile radius around known Priority 3 and 4 hibernacula).

Swarming Habitat	Anticipated Percent of Impact	Total Acres Affected	Estimated Bat Density (Bats/Acre)	Bats Affected Over 5 Years
Priority 1	3.8	190	0.221	42
Priority 2	9.8	490	0.0052	3
Priority 3 & 4	3.5	175	0.00065	1
TOTAL	**17.1**	**855**		**46**

Very few, if any, of these 46 Indiana bats are expected to be injured or killed by the Action. Disruption of normal behavior as a result of physical disturbance and/or habitat modification or degradation will account for the majority of impacts.

5.5 Stressor 5: Collision

During the construction component of the Action, collisions could potentially occur between Indiana bats and construction vehicles and equipment. The majority of activities associated with these components will occur during daylight hours when flying bats are inactive. Some bridge replacement and road construction activities may occur at night (e.g., pouring of concrete); however, these activities will involve stationary or slow-moving vehicles. During the operation component, traffic will be present on roadways and bridges year-round and during the night. Vehicle collision may occur from dusk until dawn while Indiana bats are foraging and commuting. Collisions are not expected during the maintenance component due to these activities occurring during daylight hours.

Applicable Science

Collisions have been documented for Indiana bats and other myotids. Russell et al. (2009) assessed the level of mortality from road kills on a bat colony in Pennsylvania and collected 27 road-killed little brown bats and one Indiana bat. Butchkoski and Hassinger (2002) had previously studied this same colony in Pennsylvania and documented little brown bats that had apparently collided with vehicles along a major highway that separated the roosting habitat from the primary foraging areas. Russell et al. (2009) documented Indiana bat mortality at a site where the roost site was separated from the foraging areas by a major highway. This study noted that when bats crossed at open fields, they flew much lower than canopy height (< two meters), and when adjacent canopy was low, bats crossed lower and closer to traffic. Collision has also been documented for other myotids in Europe (Lesinski et al. 2011).

Collision risk of bats varies depending on time of year, location of a road in relation to roosting/foraging areas, flight characteristics of a species, traffic volume, and whether young bats are dispersing (Lesinski 2007, 2008; Russell et al. 2009; Bennett et al. 2011). In the Czech Republic, Gaisler et al. (2009) noted the majority of bat fatalities were associated with a road section between two artificial lakes. Lesinski (2007) evaluated road kills in Poland and determined that the number of young of year bats killed were significantly higher than adults. Also, low-flying gleaners (e.g., *Myotis daubentonii*) were killed more frequently than high-flying aerial hawkers (e.g., *Nyctalus noctula*). Indiana bats are considered a low-flying gleaner following canopy height and when there are breaks in the canopy, they fly lower than the adjacent canopy. Lesinski et al. (2011) indicated that a review of previously published literature on factors causing bats to be killed at roads are not consistent, and, therefore, it is difficult to predict exact sites where bats may be at risk. They also indicated that estimates represent a small portion of the number of bats actually killed.

It can be difficult to determine whether roads pose greater risk for bats colliding with vehicles or greater likelihood of deterring bat activity in the area (thus decreasing risk of collision). As discussed in the Noise and Vibration stressor section, many studies suggest that roads may serve as a barrier to bats (Bennett and Zurcher 2013; Bennett et al. 2013; Berthinussen and Altringham 2012; Wray et al. 2006). Bennett et al. (2011) indicated that three main characteristics contribute to the barrier effects of roads: traffic volume, road width, and road surface. Roads with very few vehicles and only two lanes had little effect on Indiana bat movement (Bennett et al. 2013). Zurcher et al. (2010) concluded that bats perceive vehicles as a threat and were more than twice as likely to reverse course if a vehicle was present than if it was absent. Berthinussen and Altringham (2012) found that bat activity and diversity was lower closer to roads, but that activity and diversity increased where there was continuity in trees and hedgerows. Kerth and Melber (2009) studied barbastelle bats (*Barbastella barbastellus*) and Bechstein's bats (*Myotis bechsteinii*) and found that roads restricted habitat accessibility for bats, but the effect was related to the species' foraging ecology and wing morphology. Foraging ecology of gleaning and woodland species were more susceptible to the barrier effect than high-fliers that feed in open spaces (Kerth and Melber 2009).

Effects Pathway – Indiana bat #13	
Activity: Construction	
Stressor: Collision	
Exposure (time)	April 1 – November 14 (active timeframe); duration of the activity
Exposure (space)	Bridge and roadway construction within the project area
Resource affected	Individuals (adults, juveniles)
Individual response	Mortality from collision with vehicles or equipment.
Interpretation	The most likely effect of collision between an Indiana bat and a moving vehicle is harm in the form of mortality. However, since most construction activities would occur during daylight hours, collisions would be avoided. Risk of collision with construction vehicles during night time is minimized by the slow speed of construction vehicles in the work area. Further, construction activities that occur from dusk through dawn hours are likely localized to one area and do not require a substantial amount of construction vehicle travel. Based on this information, construction vehicle collision with an Indiana bat is unlikely to occur; therefore, any potential effects are considered discountable.
Effect	Discountable

Effects Pathway – Indiana bat #14	
Activity: Operation	
Stressor: Collision	
Exposure (time)	April 1 – November 14 (active timeframe); indefinitely
Exposure (space)	Bridge and roadways, throughout the Action Area
Resource affected	Individuals (adults, juveniles)
Individual response	Mortality from collision with vehicles.
Interpretation	The risk of collision between a Indiana bat and vehicle travelling across a bridge while foraging is considered to be low due to the ability of bats to fly under bridges to avoid traffic and the reduced amount of traffic during evening hours when bats are active. However, collisions between bats and vehicles along roadways have been documented, and the bridge and roadways are expected to operate indefinitely. Exposure to this stressor is expected to harm an indeterminable number of Indiana bats within the Action Area.
Effect	Harm
Amount or Extent of Adverse Effects	Because of the difficulty in determining the number of individual Indiana bats that will be adversely affected during this specific activity and stressor, the Service has determined that it is appropriate to consider an average of one Indiana bat per year would be adversely affected. Indiana bats are expected to be injured or killed due to this activity and stressor, and effects are expected to occur indefinitely.

5.6 Stressor 6: Alteration or Loss of Roosting Habitat (Bridges)

Rehabilitation and replacement of bridges will result in alteration and loss of roosting habitat for Indiana bats during the maintenance and construction components. Bridge rehabilitation activities are generally considered as maintenance, and may occur in areas where bats typically roost on the superstructure and underside of the bridge deck. Activities such as patching and sealing of cracks on the superstructure, repairs to header/expansion joints in the deck, and cleaning of deck drains/scuppers could impact roosting bats and cause alteration or loss of roosting locations. Bridge replacement during construction will involve the removal of individual bridge components (i.e., deck, superstructure, and substructure) or the entire structure using heavy equipment and tools. Removal of the bridge deck will result in the loss of roosting habitat in the deck and will likely alter roosting locations on the superstructure. Impacts could also occur to Indiana bats roosting on these structures during removal. After replacement projects are complete, a bridge will be present at the same or similar location; however, the new structure may not provide roosting habitat, resulting in a potential loss of roosting habitat for Indiana bats.

Applicable Science

Indiana bats have been documented using bridges as roosting habitat during the spring, summer, and fall. No occurrences of this species hibernating in bridges during the winter have been reported. Concrete structures seem to be preferred for roosting due to their tendency to retain heat longer than other materials; however, metal and wood structures may also be used with less frequency. Indiana bats have been observed using bridges as both day and night roosts. Day roosts are typically used by bats between sunrise and sunset and consist of sheltered areas that provide protection from adverse weather conditions and predators (Keeley and Tuttle 1999, Kiser et al. 2002).

Night roosts are generally used by bats between sunset and sunrise to rest, digest food between foraging bouts, conserve energy, and avoid inclement weather (Ormsbee et al. 2007). Bridges with a concrete deck and concrete or metal girders seem to be preferred as night roosts (Keeley and Tuttle 1999, Kiser et al. 2002). This bridge type retains heat into the night, and the chambers between the girders trap heat rising from under the bridge and provide protection from wind, weather, and predators. Night-roosting bats are typically found on the vertical surface of the girder at the intersection with the underside of the deck. Areas near the bridge abutments and over land seem to be preferred over the central portion of the bridge and areas spanning water. Bridges that lack crevices/expansion joints or girders are rarely used as day or night roosts (Adam and Hayes 2000, Feldhamer et al. 2003, Ormsbee et al. 2007); however, structures with cave-like areas or other unique features that provide suitable roosting locations can also provide suitable roosting habitat.

Effects Pathway – Indiana Bat #15	
Activity: Maintenance (bridge rehabilitation)	
Stressor: Alteration or Loss of Roosting Habitat of Bridges	
Exposure (time)	April 1 – November 14 (active timeframe); duration of the activity
Exposure (space)	Bridges
Resource affected	Summer or swarming roosting habitat, individuals (adults, juveniles)
Individual response	• Flushing from bridge roost results in extra energy expenditure that can

	reduce fitness and result in reduced survival/reproductive success. • Flushing from bridge roost will increase chances of predation. • Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	Avoidance of project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity colony.
Interpretation	Bats may flush from their roosts on the bridge. Bats that flush during the daytime are at greater risk of harm due to predation. Additionally, bats that flush their roosts may be harmed due to an increase in energy expenditure. The most severe effects of flushing a bat from a bridge may result in harm if the bat was a female with a pup. The longer the female is absent, the more likely the effects to the pup would be significant. Bats that flush must also expend additional energy to locate other roosting habitat. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors, is likely to reduce fitness and subsequently reduce survival and reproductive success. Indiana bats exposed to this stressor while roosting on the bridge are likely to respond in a way that would lead to adverse effects.
Effect	Harm
Amount or Extent of Adverse Effects	Because of the difficulty in determining the number of individual Indiana bats that will be adversely affected during this specific activity and stressor, the Service has determined that it is appropriate to consider the total amount of Indiana bats adversely affected by using the analysis for removal of summer and fall swarming habitat in this section. We believe that this reduces the potential to double count the number of individual Indiana bats impacted by the entire Action. A small, but indeterminable, portion of Indiana bats are expected to be injured or killed due to this activity and stressor. Disruption of normal behavior as a result of physical disturbance and/or habitat modification or degradation will account for the vast majority of adverse effects.

Effects Pathway – Indiana Bat #16	
Activity: Construction (bridge replacement)	
Stressor: Alteration or Loss of Roosting Habitat of Bridges	
Exposure (time)	April 1 – November 14 (active timeframe); duration of the activity
Exposure (space)	Bridges
Resource affected	Summer or swarming roosting habitat, individuals (adults, juveniles)
Individual response	• Mortality during bridge removal. • Flushing from bridge roost results in extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Flushing from bridge roost will increase chances of predation. • Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced

	survival/reproductive success.
Conservation Measures	Avoidance of project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity colony.
Interpretation	Bats roosting in bridge may be injured or killed. Injured bats may subsequently die. Bats may flush from their roosts on the bridge. Bats that flush during the daytime are at greater risk of harm due to predation. Additionally, bats that flush their roosts may be harmed due to an increase in energy expenditure. The most severe effects of flushing a bat from a bridge may result in harm if the bat was a female with a pup. The longer the female is absent, the more likely the effects to the pup would be significant. Bats that flush must also expend additional energy to locate new roosting habitat. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors, is likely to reduce fitness and subsequently reduce survival and reproductive success. Indiana bats exposed to this stressor while roosting on the bridge are likely to respond in a way that would lead to adverse effects.
Effect	Harm
Amount or Extent of Adverse Effects	Because of the difficulty in determining the number of individual Indiana bats that will be adversely affected during this specific activity and stressor, the Service has determined that it is appropriate to consider the total amount of Indiana bats adversely affected by using the analysis for removal of summer and fall swarming habitat in this section. We believe that this reduces the potential to double count the number of individual Indiana bats impacted by the entire Action. A small, but indeterminable, portion of Indiana bats are expected to be injured or killed due to this activity and stressor. Disruption of normal behavior as a result of physical disturbance and/or habitat modification or degradation will account for the vast majority of adverse effects.

Effects Pathway – Indiana Bat #17	
Activity: Maintenance and Construction (bridge rehabilitation/replacement)	
Stressor: Alteration or Loss of Roosting Habitat of Bridges	
Exposure (time)	Inactive timeframe (November 15 – March 31) removal will expose Indiana bats to adverse effects from April 1 – November 14, for one season after removal.
Exposure (space)	Bridges
Resource affected	Summer and swarming roosting habitat, used by individuals (adults)
Individual response	• Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	Avoidance of project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity colony.
Interpretation	Adult bats will experience adverse effects after they arrive at their summer roosting habitat the first year after bridge rehabilitation/replacement. The extra energy to find new habitat is in

	addition to what is necessary for foraging, pup rearing, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors, is likely to result in adverse effects. Indiana bats are expected to adapt to this stressor in subsequent years after they have found new suitable habitat.
Effect	Harm
Amount or Extent of Adverse Effects	Because of the difficulty in determining the number of individual Indiana bats that will be adversely affected during this specific activity and stressor, the Service has determined that it is appropriate to consider the total amount of Indiana bats adversely affected by using the analysis for removal of summer and fall swarming habitat in this section. We believe that this reduces the potential to double count the number of individual Indiana bats impacted by the entire Action. A small, but indeterminable, portion of Indiana bats are expected to be injured or killed due to this activity and stressor. Disruption of normal behavior as a result of physical disturbance and/or habitat modification or degradation will account for the vast majority of adverse effects.

5.7 Summary of Effects

Table 4. A summary of the effects of the Action on the Indiana bat.

Stressors: *Activity*	Adverse	Insignificant/ Discountable
Noise and vibration: *construction and maintenance*	harm	
Noise and vibration: *operation*		insignificant
Night lighting: *construction and operation*		insignificant
Night lighting: *maintenance*		discountable
Aquatic resource loss: *construction*		insignificant
Aquatic resource degradation, sedimentation: *construction and maintenance*		insignificant
Aquatic resource degradation, pollutants: *construction, operation, and maintenance*		insignificant
Tree removal, summer habitat (active timeframe): *construction and maintenance*	harm	
Tree removal, summer habitat (inactive timeframe): *construction and maintenance*	harm	
Tree removal, forest loss and fragmentation: *construction and maintenance*	harm	
Tree removal, swarming habitat (active timeframe): *construction and maintenance*	harm	
Tree removal, swarming habitat (inactive timeframe): *construction and maintenance*	harm	
Collison (construction equipment): *construction*		discountable
Collison (vehicle): *operation*	harm	
Alteration or loss of roosting habitat of bridges (active timeframe): *maintenance* (rehabilitation)	harm	
Alteration or loss of roosting habitat of bridges (active timeframe): *construction* (replacement)	harm	
Alteration or loss of roosting habitat of bridges: *maintenance and construction* (rehab or replacement) (inactive timeframe)	harm	

6 CUMULATIVE EFFECTS

For purposes of consultation under ESA §7, cumulative effects are the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the proposed action are not considered, because they require separate consultation under §7 of the ESA.

Land use activities that may affect Indiana bats and that are likely to occur within the Action Area include: timber harvest, ATV recreational use, recreational use of caves, and development associated with road, residential, industrial, and agricultural development and related activities. These private actions are likely to occur within the Action Area, but the Service is unaware of any quantifiable information about the extent of private timber harvests within the Action Area, the amount of use of off-highway vehicles within the Action Area, or the amount of recreational

use of caves within the Action Area. Similarly, the Service does not have any information on the amount or types of residential, industrial, or agricultural development that have or will occur within the Action Area. Therefore, the Service is unable to make any determinations or conduct any meaningful analysis of how these actions may or may not adversely and/or beneficially affect the Indiana bat. It is possible that these activities may have cumulative effects on Indiana bats and their habitat in certain situations (e.g., a private timber harvest during summer months within an unknown maternity colony may cause adverse effects to that maternity colony). In stating this, however, we can only speculate as to the extent or severity of those effects, if any.

7 CONCLUSION

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of a BO under §7(a)(2) of the ESA, which is to determine whether a Federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened; or
b) result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

After reviewing the current status of the species, the environmental baseline for the Action Area, the effects of the Action and the cumulative effects, it is the Service's biological opinion that the Action is not likely to jeopardize the continued existence of the Indiana bat. The Action does not affect designated critical habitat for the Indiana bat; therefore, it is not likely to destroy or adversely modify critical habitat.

The Indiana bat is declining throughout its range as a result of WNS. Although the Action is not expected to reverse this decline, we have determined that the species' reproduction, numbers, and distribution will not be appreciably reduced as a result of the Action. This no jeopardy determination is supported by the analysis for the Effects of the Action and because:

- Except for the rare circumstance of felling trees while individuals, especially non-volant pups, are roosting in those trees, most of the Indiana bats affected will experience sub-lethal forms of harm.
- Most of the harm is expected to result in additional energy expenditures (reduced fitness) associated with a one-time loss or alteration of habitat. Affected bats are expected to fully recover from this harm within 1–2 years.
- Impacts to maternity colonies and their reproductive success are anticipated to be short-term (2–3 years) and would only affect a small proportion on the range-wide population.
- Impacts to the species reproduction and numbers will be limited by the avoidance and minimization measures implemented by the FHWA (e.g., exclusion of hibernacula, restrictions on tree removal during the non-volant and spring staging periods, and within close proximity to hibernacula).

- No reduction in the distribution of the species is expected as the Action Area occurs near the center of the species' range, and impacts from the Action are limited at both at the project and programmatic scales, and are dispersed across a large Action Area.

Further, the contribution to the Imperiled Bat Conservation Fund is expected to promote the survival and recovery of the species through protection and management of:

1) existing forested habitat that support potential maternity populations, particularly those that would expand existing conservation ownerships;
2) known priority hibernacula;
3) additional conservation lands that contain potential habitat for the species, particularly those that would expand existing conservation ownerships.

8 INCIDENTAL TAKE STATEMENT

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3). In regulations at 50 CFR §17.3, the Service further defines:

- "harass" as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering;"
- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" and
- "incidental take" as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

Under the terms of ESA §7(b)(4) and §7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement (ITS).

For the exemption in ESA §7(o)(2) to apply to the Action considered in this BO, the FHWA must undertake the non-discretionary measures described in this ITS, and these measures must become binding conditions of any permit, contract, or grant issued for implementing the Action. The FHWA has a continuing duty to regulate the activity covered by this ITS. The protective coverage of §7(o)(2) may lapse if the FHWA fails to:

- assume and implement the terms and conditions; or
- require a permittee, contractor, or grantee to adhere to the terms and conditions of the ITS through enforceable terms that are added to the permit, contract, or grant document.

In order to monitor the impact of incidental take, the FHWA must report the progress of the Action and its impact on the species to the Service as specified in this ITS.

8.1 Amount or Extent of Take Anticipated

This section specifies the amount or extent of take of the Indiana bat that the Action is reasonably certain to cause, which we estimated in the "Effects of the Action" section of this BO, using the best available data. We reference, but do not repeat, these analyses here.

We estimated the number of individuals reasonably likely to occur in the Action Area (see section 4, Environmental Baseline). We evaluated the potential for these individuals to be exposed to the stressors resulting from the proposed Action. Finally, we evaluated how the individuals' responses to their exposure to these stressors would apply to the statutory and regulatory definition of take (see section 5, Effects of the Action). From our evaluation, the proposed Action is reasonably certain to cause the incidental take of 587 individual Indiana bats. This taking is expected in the form of harm. The mechanisms of this taking and the basis for our estimation of its extent are described in section 5 (Effects of the Action) of this BO.

Table 5. Summary of Expected Incidental Take Resulting from the Action

Species	# of Individuals	Take Type
Indiana bat	540	Harm (Tree Removal, Summer Habitat)
Indiana bat	46	Harm (Tree Removal, Swarming Habitat)
Indiana bat	1 per year	Harm (Collision)

The Service anticipates the incidental taking of Indiana bats associated with this project will be difficult to detect for the following reasons:

- The individuals are small, mostly nocturnal, and when not hibernating, occupy forested habitats where they are difficult to observe;
- The Indiana bat forms small maternity colonies under loose bark or in the cavities of trees, and males and non-reproductive females may roost individually, which makes finding roost trees difficult;
- Finding dead or injured specimens during or following project implementation is unlikely; and
- Most incidental take is in the form of non-lethal harm and not directly observable.

Due to the difficulty of detecting take of Indiana bats caused by the proposed Action, the Service will monitor the extent of taking using the acreage of suitable habitat that projects remove or alter, which is up to 5,000 acres over a 5-year period, with no more than 1,000 acres occurring in any calendar year. This surrogate measure is appropriate because the majority of the anticipated taking will result from habitat removal/alteration and activities associated with that alteration, and because it sets a clear standard for determining when the extent of taking is exceeded.

8.2 Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures (RPMs) are necessary or appropriate to minimize the impact of incidental take caused by the Action on the Indiana bat.

RPM1. The FHWA will ensure that the programmatic process and conservation measures will be implemented, as appropriate, on a project-by-project basis as planned and documented in the BA and the BO.

RPM2. FHWA will coordinate with the KFO in order to develop a user's guide and/or key to assist in the implementation of the programmatic process in compliance with the programmatic consultation as documented in the BO.

RPM3. FHWA will coordinate with the KFO to develop a monthly accounting ledger that identifies specific roles and responsibilities, monitoring requirements, and other details regarding the use of the programmatic consultation.

8.3 Terms and Conditions

In order for the exemption from the take prohibitions of §9(a)(1) and of regulations issued under §4(d) of the ESA to apply to the Action, the FHWA must comply with the terms and conditions (T&Cs) of this statement, provided below, which carry out the RPMs described in the previous section. These T&Cs are mandatory. As necessary and appropriate to fulfill this responsibility, the FHWA must require the KYTC or any permittee, contractor, or grantee to implement these T&Cs through enforceable terms that are added to the permit, contract, or grant document.

T&C1. The FHWA shall conduct regular audits of specific projects and/or monthly ledgers to ensure proper adherence and consistent use of the programmatic consultation. FHWA shall contact the KFO within 30 days and provide a written explanation and plan of action of any irregularities identified because of the aforementioned audits. (This T&C is associated with RPM1).

T&C2. The FHWA shall develop a user's guide and/or key for the KYTC personnel implementing the programmatic process in order to maintain consistency. The guide shall clearly identify the key project factors, conservation measures, and the steps leading up to a proper species effects determination. The guide shall also include instructions on how to calculate and complete any required compensation and reporting requirements. Completion of this T&C shall occur within 30 days of the executed BO. (This T&C is associated with RPM2).

T&C3. The FHWA shall develop a monthly accounting ledger that is specific to each of the KYTC's monthly project letting schedules, and will include all covered projects, including those where conservation and/or compensation measures were not required. The ledger will identify those projects where compensation is required and the preferred method. Completion of this T&C shall occur within 30 days of the executed BO. Specific ledger information may include, but is not limited to, the following:

- Description of the proposed action (e.g., type of action, location, involved federal agencies);
- Verifies that the project is within the scope of the programmatic consultation;
- Provides details of impacts (e.g., acres of tree removal, timing of tree removal, bridge work); and
- Identifies all proposed conservation measures that will avoid, minimize and/or compensate the project's impacts. (This T&C is associated with RPM3).

8.4 Monitoring and Reporting Requirements

In order to monitor the impacts of incidental take, the FHWA, through coordination with the KYTC, shall report the progress of the Action and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(i)(3)). Completion of T&C3 shall be incorporated into this section providing the specific instructions for such monitoring and reporting. As necessary and appropriate to fulfill this responsibility, the FHWA must require any permittee, contractor, or grantee to accomplish the monitoring and reporting through enforceable terms that are added to a permit, contract, or grant document. Such enforceable terms must include a requirement to immediately notify the FHWA and the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation.

9 GRAY BAT

9.1 Status of the species

This section summarizes the best available data about the biology and current condition of the gray bat (*Myotis grisescens*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list the gray bat as endangered on April 28, 1976 (41 FR 17736) under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). No Critical habitat has been designated for the species.

The Service has published a recovery plan that outlines recovery actions (U.S. Fish and Wildlife Service (USFWS) 1982). Briefly, the objectives of the plan are to: (1) protect hibernacula; (2) maintain, protect, and restore summer maternity caves; and (3) monitor population trends through winter and summer censuses.

The Service's Columbia, Missouri Field Office completed a 5-Year Review of the gray bat (USFWS 2009), which summarizes the current status of the species, its progress toward recovery, and the remaining threats to the species. The draft recovery plan and 5-Year Review are available at http://www.fws.gov/midwest/Endangered/mammals/graybat/index.html and are hereby incorporated by reference. The 5-Year Review found that all of the required recovery criteria for the gray bat had not been achieved, so the species should remain at its current endangered status.

9.2 Species Description

The gray bat is one of the largest species in the genus *Myotis* in eastern North America with a wingspan 10.8 to 11.8 inches and weight between approximately 0.25 to 0.56 ounces. The gray bat can be distinguished from other species in the genus *Myotis* by: (1) the uniform color of its

dorsal fur in which hair shafts are gray from base to tip, (2) the wing membrane, which attaches at the ankle of the foot instead of at the base of the toes, and (3) a notch in the claws of the hind feet (Barbour and Davis 1969; Harvey et al. 1981; Decher and Choate 1995; Tuttle and Kennedy 2005). The calcar on gray bats is not keeled and the skull has a distinct sagittal crest (Harvey et al. 1981; Mitchell 1998).

9.3 Life History

Life Span

Recorded longevity for the gray bat is approximately 14 to 17 years, but may be longer (Harvey 1992; Tuttle and Kennedy 2005). The species reaches sexual maturity at two years of age (Tuttle 1976a).

Diet

Gray bats are highly dependent on aquatic insects, especially mayflies, caddisflies, and stoneflies. The species is an opportunistic forager, however, and consumes beetles and moths (Harvey 1994; Tuttle and Kennedy 2005). Juveniles have a tendency to forage more in woodlands and consume more beetles than adults, and eat a less diverse diet than adults eat, possibly because juveniles are more dependent on high concentrations of prey (Brack and Laval 2006).

Staging, Spring Migration and Summer Roosting

The annual activity period of gray bats is April to October (Best et al. 1997). Adult female gray bats emerge from their winter hibernating caves (hibernacula) in late March or early April, followed by juveniles of both sexes and adult males. Ovulation in females occurs soon after their emergence from hibernation (Guthrie and Jeffers 1938). Juveniles and adult males typically emerge between mid-April and mid-May (Tuttle 1976b). This period following hibernation, but prior to spring migration, is typically referred to as "staging". Most gray bats migrate seasonally between their hibernacula and maternity caves. Spring migration is hazardous because gray bats that do not have sufficient fat reserves have difficulties surviving the stress and energy-intensive migration period. Consequently, adult mortality is highest in late March and April (Tuttle and Stevenson 1977; U.S. Fish and Wildlife Service 1982).

The distance traveled by an individual colony during migration (spring and fall) varies depending on geographic location (U.S. Fish and Wildlife Service 1982). Each summer colony occupies a traditional home range that often contains several roosting caves scattered over up to a 70 square kilometers (km2) (43.5 square miles [mi2]) area, adjacent to a river or reservoir. Colony members are extremely loyal to their colony home range, with males and non-reproductive females dispersing and congregating in smaller groups in more peripheral caves within that area (Tuttle 1976b).

The reproductively active females congregate in a single, traditional maternity cave (usually the warmest one available) within the colony home range (Tuttle 1976b). Gestation in gray bats lasts 60 to 70 days, with birth (parturition) occurring in late May or early June. Females give birth to one offspring per year. The young clings to the mother for about a week, after which they remain in the maternity colony until they are able to fly (Mitchell and Martin 2002). Reproductive females must maintain high body temperatures at their relatively cool roosts, requiring larger amounts of energy, especially during the period of lactation from late May to

early July. During the period of peak demand, when young are roughly 20 to 30 days old, females sometimes feed continuously for more than 7 hours during a single night (U.S. Fish and Wildlife Service 1982).

Growth rates of non-volant (pre-flight) young are positively correlated with colony size (Tuttle 1975), because increasing numbers of bats clustering together reduce the thermoregulatory cost per individual (Herreid 1963, 1967). Growth rates are also affected positively by higher ambient cave temperatures (U.S. Fish and Wildlife Service 1982). Most young take flight in late June to mid-July by four weeks of age (at 20 to 25 days of age) (U.S. Fish and Wildlife Service 1982; Mitchell and Martin 2002). Where colonies have been reduced in size as a result of roost disturbance, days to volancy (flight) in young are sometimes increased up to 35 days following birth, and in severely reduced colonies, the young sometimes die before learning to fly (U.S. Fish and Wildlife Service 1982). For newly volant young, growth rates and survival are inversely proportional to the distance from their roost to the nearest aquatic (over a river or reservoir) foraging habitat (Tuttle 1976a). Although females continue to nurse their young for a brief period after they learn to fly, juveniles must learn how and where to hunt independently (Tuttle and Stevenson 1982).

Fall Migration, Swarming, Mating and Hibernation
Gray bats often migrate in large groups (Whitaker and Hamilton 1998a). Fall migration for gray bats occurs in approximately the same order as spring emergence, with females departing first (early September) and juveniles leaving last (mid-October). Gray bats have been documented to regularly migrate from 17 kilometer (km) (10.6 mi) to 437 km (271.6 mi) between summer maternity sites and winter hibernacula (Tuttle 1976b; Hall and Wilson 1966), with some individuals moving as much as 689 km (428.1 mi) to 775 km (481.6 mi) (Tuttle 1976b; Tuttle and Kennedy 2005).

Gray bats reach their hibernacula between August and October, with the females arriving first. "Swarming" and mating begin soon after the bats start arriving (Whitaker and Hamilton 1998a). Swarming behavior typically involves large numbers of bats flying in and out of cave entrances throughout night hours. After mating, females store sperm in their uteri through the winter (Guthrie and Jeffers 1938; Mitchell and Martin 2002). Following mating, some females enter hibernation as early as the first of September, and nearly all do so by early October (U.S. Fish and Wildlife Service 1982; Best et al. 1997). Males remain active for several weeks after mating, during which time fat reserves depleted during breeding are replenished. Juveniles of both sexes and adult males tend to enter hibernation several weeks later than adult females, but most are in hibernation by early November (Tuttle 1976b; Tuttle and Stevenson 1977; U.S. Fish and Wildlife Service 1982; Mitchell and Martin 2002).

Both males and females hibernate in the same caves (Martin 2007). Gray bat hibernacula are often made-up of individuals from large areas of their summer range (U.S. Fish and Wildlife Service 2009a). Based on band recovery data, Hall and Wilson (1966) calculated that a gray bat hibernaculum in Edmonson County, Kentucky, attracted individuals from an area encompassing 27,195 km2 (10.4 mi') in Kentucky, southern Illinois and northern Tennessee (Hall and Wilson 1966).

Hibernating bats arouse periodically from torpor (state of mental or physical inactivity), and each time a bat arouses it uses a significant amount of energy to warm its body and increase its

metabolic rate (80 FR 17987). The cost and number of arousals are the two key factors that determine energy expenditures of hibernating bats in winter (Thomas et al. 1990). For example, little brown bats *(Myotis lucifugus)* used as much fat during a typical arousal from hibernation as would be used during 68 days of torpor; arousals and subsequent activity may constitute 84% of the total energy used by hibernating bats during the winter (Thomas et al. 1990).

9.4 Habitat Characteristics and Use of the Gray Bat

Gray bats are cave obligate (or cave dependent) bats, meaning that with very few exceptions (in which cave-like conditions are created in man-made structures), gray bats only live in caves, not in abandoned barns or other structures as other species of bats are known to do. Less than 5% of all available caves are inhabited by gray bats (Mitchell and Martin 2002). Gray bats use caves differently throughout the year. Populations of gray bats tend to cluster in caves, utilized as hibernacula, during winter hibernation. In contrast, their populations disperse during spring to establish sexually segregated colonies (Sherman and Martin 2006). Females form maternity colonies (also known as summer maternity roosts), while males aggregate in non-maternity or bachelor colonies. These bachelor colonies also house yearlings of both sexes (Sasse et al. 2007). Gray bats also utilize a third type of cave, the dispersal cave, which they inhabit only during migration (Brack and LaVal 2006).

Winter Hibernacula Habitat

Gray bats prefer deep, cool caves for hibernacula with average temperatures ranging from 41 to 52° F. Multiple entrances and good airflow comprise the other characteristics that gray bats find desirable. Winter hibernacula are already cold when gray bats begin arriving in September (Mitchell and Martin 2002).

Summer Roosting Habitat

Gray bat summer caves are usually located along rivers and have temperatures ranging from 57 to 77° F (Mitchell and Martin 2002). Summer caves typically contain structural heat traps (including domed ceilings, small chambers and porous rock surfaces) that capture metabolic heat from clustered gray bats, allowing the nursery populations to succeed. Preferred summer colony caves are within 1 km (approximately 0.6-mi) of a body of water and are rarely more than 4 km (2.5 mi) from a lake or major river (Mitchell and Martin 2002). The average roosting density of gray bats is 1828 bats/square meter [m2] (10.8 square feet [ft2]) (Sherman and Martin 2006).

Gray bats are also known to use bridges and culverts as roosting habitat during the spring, summer, and fall. Concrete structures seem to be preferred due to their tendency to retain heat longer than other materials; however, metal and wood structures may also be used with less frequency. Gray bats have been observed using bridges and culverts as both day and night roosts. Bridges used as day roosts are typically constructed of concrete and contain vertical crevices, expansion joints, or other locations that allow bats to retreat into the bridge deck or superstructure (Keeley and Tuttle 1999, Feldhamer et al. 2003, Cleveland and Jackson 2013). Bridges with a concrete deck and concrete or metal girders seem to be preferred as night roosts (Keeley and Tuttle 1999, Kiser et al. 2002). This bridge type retains heat into the night, and the chambers between the girders trap heat rising from under the bridge and provide protection from wind, weather, and predators. Night-roosting bats are typically found on the vertical surface of the girder at the intersection with the underside of the deck, often near the bridge abutments. Areas over land seem to be preferred more than the central portion of the bridge and areas

spanning water. Bridges that lack crevices/expansion joints or girders are rarely used as day or night roosts (Adam and Hayes 2000, Feldhamer et al. 2003, Ormsbee et al. 2007); however, structures with cave-like areas or other unique features that provide suitable roosting locations can also provide suitable roosting habitat.

Culverts utilized by gray bats are typically concrete box culverts between five and 10 feet in height; however, this species may also use metal culverts with similar dimensions. These structures are generally 50 feet or longer and provide dark zones, protection from high winds, and are not susceptible to frequent flooding. Roosting locations preferred by gray bats include dark areas with crevices and structural imperfections. Culverts less than five feet high are not generally used as roosting habitat (Keeley and Tuttle 1999, USFWS 2009).

Foraging Habitat

Gray bats forage over water, including streams and reservoirs, in early evening hours where they consume night-flying insects, most of which have aquatic larval stages (Best et al. 1997), and in riparian forests near those water sources (Brack and LaVal 2006). Gray bat activity tends to be more concentrated over slower moving water or quiet pools than over areas of fast moving water. Foraging usually occurs below treetop height, but above 2 meters (m) (6.6 ft) (LaVal et al. 1977). Gray bats tend to fly downstream more often than upstream, suggesting a potential preference to forage over wider aquatic areas (more typical of lower stream reaches). The species tends to forage over extensive ranges, averaging 12.5 km (7.8 mi), spanning from approximately 2.5 km (1.6 mi) to 35.4 km (22 mi) (LaVal et al. 1977). When prey is abundant, gray bats have been shown to forage in small groups, especially during the early hours of the night; when prey is scarce, gray bats can become territorial. One to as many as 15, or more, gray bats may occupy foraging territories depending upon prey abundance Those territories tend to be controlled by reproductive females, which appear to claim the same territories, year after year (U.S. Fish and Wildlife Service 1982).

9.5 Numbers, Reproduction, and Distribution

The primary range of gray bats is concentrated in the cave regions of Alabama, Arkansas, Kentucky, Missouri and Tennessee, with smaller populations found in adjacent states, including a population in a quarry in Clark County, Indiana (Harvey et al. 1981; Brack et al. 1984; Harvey 1992; Harvey 1994; Mitchell 1998).

At the time the recovery plan was completed for the species (U.S. Fish and Wildlife Service 1982), gray bats were documented in approximately 290 caves (winter and summer caves) throughout 11 states (Alabama, Arkansas, Florida, Georgia, Illinois, Kansas, Kentucky, Missouri, Oklahoma, Tennessee and Virginia). The recovery plan did not include Indiana, where the species has since been documented (Brack et al. 1984; Brack 1985). Martin (2007) listed the species for 384 winter and/or summer caves scattered across 11 states, but that analysis also did not include Indiana (the 12th state within the range of the gray bat).

Overall, the gray bat's numbers have increased significantly in many areas (U.S. Fish and Wildlife Service 2009a). Rangewide, gray bats have been documented in a few hundred caves (U.S. Fish and Wildlife Service 1982). In Missouri alone, Elliott (2008) reported that gray bats had been documented in at least 219 caves or about 3.5% of all Missouri caves. This species'

range has expanded in some areas (e.g., Georgia, Indiana and Kansas), and gray bats are using many caves where use by the species had not been documented prior to the completion of the 1982 Recovery Plan (U.S. Fish and Wildlife Service 1982, 2009a). Martin (2007) reported nearly 500,000 gray bats at eight hibernacula, where there had only been about 25,000 recorded historically. Martin's (2007) estimate included Coach Cave, Kentucky, that increased from zero in 1995 to 337,750 in 2007.

Other impressive increases include the following: 33 in 1985 to 128,005 in 2006 at Blanchard Springs Caverns, Arkansas; 50 in 1982 to 139,740 in 2006 at Cave Mountain Cave, Arkansas; and 347 in 1965 to 139,364 in 2006 at Bellamy Cave, Tennessee. Similarly, Martin (2007) and Elliott (2008) reported that populations of gray bat at Coffin Cave, Missouri, increased from an estimate of 250,000 in 1977-1979 to 561,000 bats in 2005.

Tuttle (1979) postulated that gray bats have not expanded into areas outside their historical range, and Elliott (2008) estimated that despite an overall increase in gray bat numbers in Missouri, the overall state population of this species was still only about 46% of the maximum historic population. In other areas (e.g., Florida) the species has declined significantly at both hibernacula and maternity sites (U.S. Fish and Wildlife Service 2009a).

Ellison et al. (2003) statistically analyzed 1,879 observations of gray bats obtained from 334 roost locations (103 maternity roosts and 12 hibernacula) in 14 south-central and southeastern states. These authors reported upward, downward, or no trends for all sites analyzed. The Service interpreted an upward trend to be defined as an increasing population, a downward trend to be defined as a decreasing population and no trend to be defined as a stable population (U.S. Fish and Wildlife Service 2009a). Of the 103 maternal colonies examined, Ellison et al. (2003) determined that 94.4% (85.4% no trend; 9% upward trend) of the populations showed stable or increasing populations while 6% revealed a decreasing population. Stable or increasing populations were reported for 83% (58% no trend; 25% upward trend) of the 12 hibernating colonies examined. For populations where there was a downward population trend, decreases in population numbers were mostly attributed to continued problems with human disturbance.

Sasse et al. (2007) analyzed data from 48 gray bat maternity sites involving three subpopulations in Missouri, Arkansas and Oklahoma between 1978 and 2002, and calculated that 79% of the colonies were stable or increasing. Elliott (2008) examined population trends of gray bats at nine Priority 1 caves and concluded that although the species had increased by approximately 21% between 1980 and 2005, it had only reached roughly 37% of its maximum historic populations at these sites. Based on general population trends across the range of the species, Dr. Michael Harvey of Tennessee Technological University attempted to estimate changes in the species status. He reported that the species increased from approximately 1,575,000 to roughly 2,678,000 in 2002 and to approximately 3,400,000 in 2004 (Ellison et al. 2003; Martin 2007). Martin (2007) noted that gray bat population levels have increased approximately 104% since 1982, when the species recovery plan was completed (U.S. Fish and Wildlife Service 1982).

Based on recent surveys of Priority 1 hibernacula, the current rangewide population estimate for the gray bat is approximately 5.1 million individuals (USFWS unpublished 2019 data).

Current Winter Distribution
The major gray bat wintering caves (hibernacula) occur primarily in Alabama, Arkansas, Kentucky, Missouri and Tennessee (Martin 2007). Approximately 95% of gray bats hibernate in 17 caves within these five states: Alabama (1); Arkansas (5); Kentucky (2); Missouri (4); and Tennessee (5) (Harvey et al. 2005).

Current Summer Distribution
As mentioned under "Status and Distribution", gray bats are known to occur in 13 states, Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, North Carolina, Missouri, Oklahoma, Tennessee and Virginia. This species' range has expanded in some states (e.g., Georgia, Indiana, Kansas, and North Carolina), and gray bats are using many caves where use had not been documented prior to completion of the 1982 Recovery Plan (USFWS unpublished data)

Maternity Colonies
The total number of maternity colonies that historically exist rangewide is not known. The Gray Bat Recovery Plan (U.S. Fish and Wildlife Service 1982) identified a total of 29 P1 maternity colonies in Alabama (6), Arkansas (2), Florida (3), Kentucky (3), Illinois (I), Missouri (7), Oklahoma (1) and Tennessee (6). Primary maternity caves is defined as those occupied now or in the past by 50,000 or more gray bats in northern Alabama and in Tennessee west of the Cumberland plateau; 40,000 in Kentucky; 10,000 elsewhere except for Florida, Oklahoma, Arkansas, Kansas, and southern Alabama where the number is 1,000. Surveys, conducted at the caves inhabited by these 29 maternity colonies, indicate 48% of the populations (in 14 of the maternity caves) are increasing or stable (U.S. Fish and Wildlife Service 2009a).

9.6 Conservation Needs and Threats

The tendency of gray bats to form large colonies makes the gray bat especially vulnerable to population decline due to both intentional and unintentional human disturbance (Sherman and Martin 2006). The gray bat congregates in larger numbers at fewer winter hibernacula than any other North American bat. Approximately 95% of gray bats hibernate in 11 winter hibernacula, with 31% hibernating in a single cave located in northern Alabama (Mitchell and Martin 2002). This concentration of such a large proportion of the known population into so few caves constitutes the real threat to their survival (Mohr 1972).

While gray bat habitat locations were always "patchy", their habitats have become increasingly more isolated and fragmented with human perturbation (U.S. Fish and Wildlife Service 1982). Tuttle (1976a, 1979) reported human disturbance and vandalism in caves to be primary causes of decline and demonstrated a close relationship between decline and frequency of disturbance. Each disturbance during hibernation is estimated to use energy that otherwise could sustain a gray bat through 10 to 30 days of undisturbed hibernation (U.S. Fish and Wildlife Service 1982). Once a bat's energy stores are exhausted, it likely will leave the cave prematurely in search of food, dying outside the hibernaculum where its fate will go unnoticed. A single disturbance at maternity caves from late May through mid-July can result in the death of thousands of flightless young on roosts (U.S. Fish and Wildlife Service 1982). When flightless young are present in June and July, females attempting to escape a disturbance may drop their young in panic, leading to increased juvenile mortality (Sasse et al. 2007).

Other suspected factors contributing to the gray bat's decline include impoundment of waterways (creation of dams, which caused flooding of caves formerly used by the species), natural flooding, cave commercialization, pesticides, water pollution and siltation, and local deforestation (Sherman and Martin 2006). Gray bat preference for caves near rivers has made their roosts particularly vulnerable to inundation by man-made impoundments. The little information which does exists, indicates that many important caves, and probably their bat populations, were lost to impoundments (U.S. Fish and Wildlife Service 1982). An account by McMurtrie (1874), describes a cave in Alabama, since flooded by a reservoir, which was "inhabited by countless thousands of bats" and had guano piles 4.5 m (14.8 ft) deep. Long-time residents living within the TVA reservoir system have told of many other such caves now submerged (U.S. Fish and Wildlife Service 1982). Although timing of initial flooding may be a critical factor in whether the flooded populations were immediately destroyed, the gray bat's strong site fidelity and narrow ecological requirements may have made survival of displaced populations questionable, even if they escaped initial destruction (U.S. Fish and Wildlife Service 1982). Furthermore, the reservoirs increased public access to gray bat habitat; many caves previously long distances from population centers and roads were made easily accessible by boat (U.S. Fish and Wildlife Service 1982).

Some of the largest gray bat colonies ever known have been extirpated as a result of cave commercialization. Some responsible owners of commercial caves have protected sections of their caves that were critical to gray bats, and those bats may have benefited from such protection. At other commercial caves, entire gray bat colonies have been lost as a result of poorly designed gates (adversely affecting bat movements and/or cave microclimates, and/or facilitating predation) intended to protect bats (Tuttle 1977; U.S. Fish and Wildlife Service 1982).

Pesticide use and manufacturing have been one of the most prevalently studied contributions to the population decline of the gray bat. Pesticides linked with gray bat population declines include dichlorodiphenyltrichloroethane [DDT], Dichlorodiphenyldichloroethylene [DDE] and Dichlorodiphenyldichloroethane [DDD] (Bagley et al. 1987), and dieldrin and aldrin, which have also been linked to increased mortality in other bat species (Sasse et al. 2007). Gray bat populations in the Tennessee River area of northern Alabama were noted to have higher than normal mortality, which was attributed to large amounts of DDTR (a combination of DDT, DDD and DDE) flowing through waterways from a DDT manufacturing site located on the Redstone Arsenal near Huntsville, Alabama, since 1947 (Bagley et al 1987). Lethal chemical concentrations of DDT in the brains of adult bats were found to be about 1.5 times higher than in juveniles. Because gray bats feed on many types of insects with aquatic larval stages, it is believed that this food source may have been the root of the chemical concentrations (Bagley et al 1987). Many of the bats tested in different studies were non-volant juveniles and, thus, were likely to have only consumed milk; concentration of these chemicals via lactation appeared to have caused mortality in some of these juveniles. Even though the manufacture of DDT ceased in 1970 and the manufacture of dieldrin and aldrin in October 1974, heavy contamination of biota persisted for a number of years. However, guano samples, collected between 1976 and 1985 showed a decline of 41% in DDE from Cave Springs Cave and a decline of 67% in DDE from Key Cave (Bagley et al 1987).

Chemical pollution or siltation of waterways over which gray bats forage has been suspected of gray bat declines (U.S. Fish and Wildlife Service 1982). Gray bats are known to forage over rivers, streams and reservoirs (Tuttle 1976a; LaVal et al. 1977) where they capture a variety of insects, including large numbers of mayflies (Tuttle 1976b; Rabinowitz and Tuttle 1982), as well as stoneflies and caddisflies (Brack et al. 1984). All three groups of insects are thought to be quite sensitive to aquatic pollution (U.S. Fish and Wildlife Service 1982). While Carlander et al. (1967) found that some siltation benefitted nymphs of two species of mayflies, additional studies indicated other species were unable to survive on mud or silt substrate (Lyman 1943; Minshall 1967). A census of gray bats along heavily silted waterways in in Alabama and Tennessee found that all colonies declined (Tuttle 1979).

WNS is an infectious wildlife disease caused by a fungus of European origin, *Pseudogymnoascus destructans* (Pd), poses a considerable threat to hibernating bat species throughout North America. WNS is responsible for unprecedented mortality of insectivorous bats in eastern North America (Blehert et al. 2009; Turner et al. 2011). Since the disease was first observed in New York in 2007 (later biologists found evidence from 2006 photographs), WNS has spread rapidly in bat populations from the East to the Midwest and the South. WNS was first confirmed in gray bats in 2012 in Hawkins and Montgomery Counties, Tennessee. While no mortality has been observed in gray bats that can be linked to WNS, the confirmation that gray bats can be infected is a concern. The impact of WNS on gray bats is still unknown; however, it appears that gray bats do not succumb to WNS like other *Myotis* species.

Although some threats to various caves remain, overall, gray bat populations have exhibited an increase in population numbers and distribution throughout the species' range since completion of the 1982 recovery plan (U.S. Fish and Wildlife Service, 2009a). Wide population fluctuations of gray bat numbers have been documented at many maternity sites across the species' range, but there have been significant population increases in some of the major hibernacula (U.S. Fish and Wildlife Service 2009a).

Currently, as a whole, the range-wide status of the species is stable. Priority 1 hibernacula were surveyed during the winter of 2019, providing the most complete coverage in years (P1s are located in AL, AR, KY, MO, and TN). The 2019 range wide estimate is approximately 5.1 million bats (USFWS unpublished data). In 2017, the estimate was approximately 4.5 million bats and in 2013 it was about 2.8 million bats; however, it is impossible to determine a trend since not all caves were surveyed every year. The primary factors influencing the status include destruction or modification of habitat such as hibernacula, maternity sites and foraging habitat, (USFWS 2009a).

For a more detailed account of the species description, life history, population dynamics, threats, and conservation needs, refer to http://www.fws.gov/midwest/Endangered/mammals/graybat/index.html.

10 ENVIRONMENTAL BASELINE

In accordance with 50 CFR 402.02, the environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other

human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

10.1 Action Area Numbers, Reproduction, and Distribution

The Action Area lies near the center of the species range and numerous records of the species occupying summer and winter habitat exist. Higher concentrations of the species are known in the western and central portions of the Action Area and fewer occurrences in the eastern portions, with the largest concentrations of gray bats found in and around Mammoth Cave National Park in Edmonson County, Kentucky (USFWS 2009). Occurrences of the species are tied to the availability of suitable winter and summer habitat. Winter and summer habitat are static (assuming no anthropogenic alterations occur) in the landscape, because the caves and other underground features the species relies on do not change locations. However, the species will move from one habitat area to another to take advantage of better conditions or to abandon habitat that humans or other factors have altered or disturbed.

Several caves within the Action Area are known hibernacula, maternity, or bachelor colonies. Five of these are Priority 1 hibernacula (USFWS unpublished data 2019). These five Priority 1 hibernacula had a combined estimated population of 1.3 million gray bats in 2019, which represents approximately 25.5percent of the rangewide estimated population (5.1 million). Of these five hibernacula, two are located within the 20-mile buffer around the Commonwealth of Kentucky that forms the outer boundary of the Action Area.

Summer records for the species occur across the Action Area, and over 30 maternity sites have been documented along with a number of bachelor colonies and locations for solitary males and non-reproductive females. Similar to the hibernacula, these maternity colonies occur on public and private land. It is difficult to estimate the summer population within the Action Area because inventories of each site are not conducted in consecutive years in order to avoid repeated or over disturbance to the colony; however, we are able to document population trends at each roost and/or group of roosts, and those remain stable to increasing overall.

Multiple studies and surveys have reported gray bats roosting on bridges. One gray bat maternity colony is known to use a concrete box beam bridge over a large stream in central Kentucky, with the most recent estimated numbers ranging from 50 to more than 100 individuals (S. Martin, USFWS, pers. comm.). The colony roosts inside vertical expansion joints that are present between the concrete beams that comprise the bridge superstructure. Potential use of two additional concrete box beam bridges located upstream of the maternity colony has also been noted; however, these records have not been confirmed.

Through an on-going assessment of bridges within the Commonwealth of Kentucky, the KYTC has reviewed 260 structures throughout the state. The assessed bridges include a variety of sizes and bridge types, including bridges from 21 to 727 feet long and bridge types such as channel beam, box beam, pre-stressed concrete beam, metal beams, box culverts, and numerous others.

The majority (92%) of these structures were identified as either unsuitable for bats or no bats or signs of bat use were observed. The remaining bridges (8%) had bats (unidentified species) actively roosting on the structure or signs of bat use were observed.

Currently, the Service believes the status of the species within the Action Area is stable. P1 hibernacula and maternity population estimates within the Action Area have increased overall between 2013 and 2019.

10.2 Action Areas Conservation Needs and Threats

It is difficult to identify specific factors affecting the gray bat's environment within the Action Area, because the Action Area has been defined as the Commonwealth of Kentucky and all portions of adjoining states that occur within 20 miles of the Kentucky border. This BO is based on analysis at a programmatic level rather than at an individual project scale. However, we are able to determine that there are current and long-term land uses and demographic trends, which could affect gray bats within the Action Area.

Tuttle (1976a, 1979) reported human disturbance and vandalism in caves to be primary causes of decline and demonstrated a close relationship between decline and frequency of disturbance. In addition, some of the largest gray bat colonies ever known have been extirpated as a result of cave commercialization. Human disturbance, vandalism, and commercialization continue throughout the action area; however, although some threats to various caves remain, public education has improved conservation since Tuttle's reporting. Protection of lower priority caves is needed to maintain the species distribution across the landscape and reduce the potential of a catastrophic event to a single, densely populated hibernaculum or maternity cave.

A general overview of white-nose syndrome (WNS) and its effects on bat populations was previously provided in the section on the Status of the Species. WNS's effects within the Action Area are similar to those discussed within the range of the species. The impact of WNS on gray bats is still unknown; however, it appears that gray bats do not succumb to WNS like other *Myotis* species, as indicated by the stable population estimates of gray bats within the Action Area.

Other land use activities that could affect gray bats and that likely occur within the Action Area include timber harvest, all-terrain vehicle (ATV) recreational use, recreational use of caves, underground and surface coal and limestone mining, gas production, and development associated with road, residential, industrial and agricultural development and related activities. These private actions are likely to occur within the Action Area, but the Service is unaware of any quantifiable information relating to the extent of private timber harvests within the Action Area, the amount of use of off-highway vehicles within the Action Area, or the amount of recreational use of caves within the Action Area. Similarly, the Service does not have any information on the amount or types of residential, industrial, or agricultural development that have or will occur within the Action Area. Therefore, the Service is unable to make any determinations or conduct any meaningful analysis of how these actions may or may not adversely and/or beneficially affect gray bats. All we can say is that it is possible that these activities, when they occur, may have adverse effects on gray bats and their habitats in certain situations. In stating this, however, we can only speculate as to the extent or severity of those effects, if any.

11 EFFECTS OF THE ACTION

In accordance with 50 CFR 402.02, effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see § 402.17).

The Service established additional requirements for making the determination of reasonably certain to occur, which must be followed after October 28, 2019, the effective date of new regulations under 50 CFR 402. After determining that the "activity is reasonably certain to occur," based on clear and substantial information, and using the best scientific and commercial data available, there must be another conclusion that the consequences of that activity (but not part of the proposed action or activities reviewed under cumulative effects) are reasonably certain to occur. In this context, a conclusion of reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available after consideration of three factors in 402.17(b)(1-3).

The2019 regulatory changes do not alter how we will analyze the effects of a proposed action or the scope of effects. We will continue to review all relevant effects of a proposed action, as we have in past decades, but the Service determined it was not necessary to attach labels to the various types of effects through regulatory text. That is, we intend to capture all of those effects (now "consequences") previously listed in the regulatory definition of effects of the action—direct, indirect, and the effects from interrelated and interdependent activities—in the new definition. These effects are captured in the new regulatory definition by the term ''all consequences'' to listed species and critical habitat.

Based on the description of the Action and the species' biology, we have identified six stressor(s) to the gray bat (i.e., the alteration of the environment that is relevant to the species) that may result from the Action: (1) noise and vibration, (2) night lighting, (3) aquatic resource loss and degradation, (4) tree removal, (5) collision, and (6) alteration or loss of roosting habitat on bridges. Below, we discuss the best available science relevant to each stressor. Then, we describe the Stressor-Exposure-Response pathways that identify the circumstances for an individual bat's exposure to the stressor (i.e., the overlap in time and space between the stressor and a gray bat). Finally, we identify and consider how proposed conservation measures may reduce the severity of the stressor or the probability of an individual bat's exposure for each pathway.

We have focused the majority of our analysis for gray bats to those areas where the species and/or its habitat has the greatest potential for adverse effects to occur, which are bridges and related stream crossings. We believe this is appropriate due to the following:

- Gray bats primarily forage over open water bodies, such as rivers, streams, lakes, and reservoirs, and associated riparian areas;
- Gray bats are known to roost on bridges;
- Gray bat hibernacula and summer roost caves are excluded from this consultation;

- The mobility of gray bats allow them to adjust to ever-changing landscapes and forest fragmentation while commuting.

11.1 Stressor 1: Noise and Vibration

Noise and vibration are stressors that may disrupt bats by causing individuals to flush from suitable roosting locations like bridges, trees, rock shelters, etc. Disruptions may occur during the day and/or night timeframes, and/or alter travel corridors and foraging behaviors. Bats may be exposed to this stressor during the construction, maintenance, and operation components of the Action. Significant changes in noise levels in an area could result in temporary to permanent alteration of bat behaviors. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats.

Transportation projects approaching streams and bridge rehabilitation or replacement projects will result in noise and vibration during the construction, operation, and maintenance components. During the maintenance component, bridge rehabilitation may require heavy equipment and tools used to repair the bridge deck, superstructure, and substructure that will cause noise and vibration. Bridge replacements will also produce noise and vibration from the use of heavy equipment and tools during demolition and removal of existing bridge structure and construction of a new structure. During the operation component, noise and vibration from bridge rehabilitation and replacement will be limited to those effects caused by normal vehicular traffic.

The majority of activities during the maintenance component will be limited to the bridge deck or adjacent areas and will avoid potential roosting locations. However, some maintenance activities (e.g., painting, debris removal from piers, vegetative maintenance) may occur under the bridge near potential roosting locations. In general, maintenance activities will be localized to specific areas of a bridge and are generally completed over a short duration. Noise and vibration during the maintenance component varies and at times may be at or below levels caused by normal traffic. Bridge maintenance is expected to occur during daylight hours and will not disrupt foraging or commuting by bats.

Applicable Science

The effects of traffic noise on bats have been analyzed in several studies. For example, Schaub et al. (2008) found that captive greater mouse-eared bats (*Myotis myotis*) preferred silent chambers versus chambers with playback of close traffic noise 80 percent of the time. Berthinussen and Altringham (2012) conducted acoustic transects from 0 to 1,600 meters of a major road in the United Kingdom and found that bat (*Pipistrellus pipistrellus, Pipistrellus pygmaeus, Nyctalus* spp., and *Myotis* spp.) activity and species diversity increased with distance from the road. However, this could not be completely attributed to traffic noise. Noise levels decreased significantly with distance from the road, but 89 percent of the change occurred in the first 50 meters (164 feet) and no change was detected beyond 100 meters (328 feet). Ultimately, they found that the most likely explanation was a barrier effect from the road itself (opening).

Although noise can potentially affect the behavior of some bat species, studies have not shown measurable effects of military noise on bats. 3D/Environmental, Inc. (1996) examined the potential for various firing activities (e.g., demolitions, artillery, grenade simulators) and heavy

equipment operation to disturb hibernating Indiana bats and a maternity roost of gray bats on Fort Leonard Wood in Missouri. Their research found that sound from munitions and equipment generally attenuated prior to reaching roost sites. Additionally, research was conducted to determine the effects of military noise, primarily high-caliber weapons fire, on foraging bat activity on Fort Knox in Kentucky (Martin et al. 2004; Martin 2005). The study obtained measurements of bat vocalizations using ultrasonic bat detectors, thermal infrared (TIR) imagery, and military noise monitoring technology. Statistical analysis of bat vocalizations, TIR detection, and military noise data showed extremely large variations in bat response across space and time, and results indicated that elevated noise levels associated with high-caliber weapons fire, as tested, did not have a significant effect on bat navigation and foraging activity (Martin et al. 2004).

Bats roosting or foraging in all of the examples above have likely become habituated to noise and vibration. However, novel noises from equipment and activities associated with bridge rehabilitation and replacement would be expected to result in some changes to bat behavior. Changes in behavior are most likely to occur during the construction component and some maintenance activities when heavy equipment and tools will be used within or directly adjacent to roosting habitat. Bats that roost on bridges are expected to be habituated to noise and vibration associated with normal operation.

Effects Pathway – Gray Bat #1	
Activity: Construction and Maintenance	
Stressor: Noise and Vibration	
Exposure (time)	Active timeframe; duration of activity
Exposure (space)	Roosting (bridge)
Resource affected	Individuals (adults, juveniles)
Individual response	• Flushing from bridge roost results in extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Flushing from bridge roost will increase chances of predation. • Avoidance of the stressor can require extra energy expenditure, in order to find suitable roosting habitat, which can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	Avoidance of project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity and/or bachelor colony.
Interpretation	Bats may become startled by noise and/or vibration and flush from their roosts on the bridge. Bats that flush during the daytime are at greater risk of harm due to predation. Additionally, bats that flush their roosts may be harmed due to an increase in energy expenditure. The most severe effects of flushing a bat from a bridge may result in harm if the bat was a female with a pup. The longer the female is absent, the more likely the effects to the pup would be significant. Gray bats exposed to this stressor while roosting on the bridge are likely to respond in a way that would lead to adverse effects.
Effect	Harm
Amount or Extent of	Because of the difficulty in determining the number of individual gray

Adverse Effects	bats that will be adversely affected during this specific activity and stressor, the Service has determined that it is appropriate to consider the total amount of gray bats adversely affected by using the analysis for alteration or loss of roosting habitat of bridges in this section. We believe that this reduces the potential to double count the number of individual gray bats impacted by the entire Action. A small, but indeterminable, portion of gray bats are expected to be injured or killed due to this activity and stressor. Disruption of normal behavior because of physical disturbance and/or habitat modification or degradation will account for the vast majority of adverse effects.

Effects Pathway – Gray Bat #2	
Activity: Construction	
Stressor: Noise and Vibration	
Exposure (time)	Active timeframe; duration of activity
Exposure (space)	Foraging, and commuting habitat in and near construction limits
Resource affected	Individuals (adults, juveniles)
Individual response	Avoidance of the stressor can require extra energy expenditure, in order to find suitable foraging and commuting habitat, which can reduce fitness and result in reduced survival/reproductive success.
Interpretation	Gray bats that utilize these habitats during construction are expected to become habituated to noise and vibration or not be affected by this stressor in a significant manner. There is no data that shows that gray bats are likely to modify their foraging and commuting behaviors during temporary periods of elevated noise and vibrations; therefore, gray bats are not expected to respond to the stressor during construction in a way that would significantly affect foraging and commuting behaviors.
Effect	Insignificant

Effects Pathway – Gray Bat #3	
Activity: Operation	
Stressor: Noise and Vibration	
Exposure (time)	Active timeframe; indefinitely
Exposure (space)	Roosting (bridge), foraging, and commuting habitat throughout the Action Area
Resource affected	Individuals (adults, juveniles)
Individual response	• Flushing from bridge roost results in extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Flushing from bridge roost will increase chances of predation. • Avoidance of the stressor can require extra energy expenditure, in order to find suitable roosting, foraging, and commuting habitat, which can reduce fitness and result in reduced survival/reproductive success.
Interpretation	Gray bats that roost on bridges and/or forage and travel around these structures and roadways during operation are assumed to be habituated

	and respond minimally to this stressor; therefore, noise and vibration from operation are unlikely to cause bats to flush or alter use of its habitat. Gray bats are not expected to respond to the stressor during operation in a way that would be significant.
Effect	Insignificant

11.2 Stressor 2: Night Lighting

Transportation projects approaching streams and bridge rehabilitation or replacement projects may require lighting during the construction, operation, and maintenance components. Bridge rehabilitation activities are not expected to occur at night, with the exception of minor, temperature-sensitive activities limited to the bridge deck (e.g., pouring concrete). Lighting during bridge replacement will be minimal and localized to the work area, occurring in the early morning, late evening, and rarely at night. Construction lighting is anticipated to be focused downward at the bridge and not directed horizontally where it would illuminate potential foraging and commuting habitat. Bridge lighting during the operation component is anticipated to be the same as before rehabilitation/replacement activities. Bridges with lighting before rehabilitation/replacement are expected to have lighting afterwards; however, lighting is not expected to be added to bridges without previous lighting. Bridge maintenance is anticipated to occur during daylight hours and will not require the use of lighting.

Applicable Science

Studies document highly variable responses among bat species to artificial lighting. Some species seem to benefit from artificial lighting, taking advantage of high densities of insects attracted to light (Jung and Kalko 2010); however, other species may avoid artificial light (Furlonger et al. 1987, Rydell 1992) or not be affected (Stone et al. 2012). Artificial lighting can cause delays in nightly bat activity (Stone et al. 2009; Downs et al. 2003), and effects from lighting may vary with season and moon phase (Jung and Kalko 2010).

Some bat species appear to avoid lights. Downs et al. (2003) found that lighting of *Pipistrellus pygmaeus* roosts reduced the number of bats that emerged. In Canada and Sweden, *Myotis* spp. and *Plecotus auritus* were only recorded foraging away from street lights (Furlonger et al. 1987; Rydell 1992). Stone et al. (2009) found that commuting activity of lesser horseshoe bats (*Rhinolophus hipposideros*) in Britain was reduced dramatically and the onset of commuting was delayed in the presence of high pressure sodium lighting. Stone et al. (2012) also found that light-emitting diodes (LEDs) caused a reduction in *Rhinolophus hipposideros* and *Myotis* spp. activity. In contrast, there was no effect of lighting on *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus,* or *Nyctalus/Eptesicus* spp.

While there is little information regarding gray bats' response to artificial lights, other closely related *Myotis* species appear to avoid lighting. In Indiana, Indiana bats avoided foraging in urban areas, which may have been in part due to high light levels (Sparks et al. 2005). Using captive bats, Alsheimer (2011) found that the little brown bat (*Myotis lucifugus*) was more active in the dark than light. Based on the variable and contrasting responses by bats to artificial lighting, it is possible that gray bats could be affected by lighting associated with bridge rehabilitation and replacement.

Effects Pathway – Gray Bat #4	
Activity: Construction	
Stressor: Night Lighting	
Exposure (time)	Active timeframe; duration of activity
Exposure (space)	Roosting (bridge), foraging, and commuting habitat in and near the construction limits
Resource affected	Individuals (adults, juveniles)
Individual response	• Avoidance of day roost after foraging results in extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Increased visibility to predators increases chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	Avoidance of project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity and/or bachelor colony.
Interpretation	Gray bats roosting underneath or in the bridge deck are unlikely to be affected by lighting on top of the bridge deck. Lighting will not be directed down toward night roosting bats. Additionally, if the activity alters the bridge allowing night lighting to reach roosting habitat, it is unlikely that the bats would continue using the bridge (impacts associated with the alteration or loss of roosting habitat of bridges are addressed in Pathway # 13). Bats day roosting at the bridge may delay or avoid returning to the bridge at dawn. Lighting is unlikely to be used during this time, and bats that avoid the bridge likely have other available roosts in the immediate area (i.e., other bridges, cliff line/rock shelters, caves, or trees). Lighting may cause bats to avoid using the bridge as a night roost; however, we suspect that gray bats use alternate roosts in the area, as necessary and as previously discussed, without significant additional energy expenditure. Foraging bats avoiding bridge lighting can forage along other portions of the stream or nearby streams. Commuting bats can use other travel routes to avoid lighting. As a result of this combination of factors, lighting is not expected to significantly affect the gray bat.
Effect	Insignificant

Effects Pathway – Gray Bat #5	
Activity: Operation	
Stressor: Night Lighting	
Exposure (time)	Active timeframe; indefinitely
Exposure (space)	Roosting (bridge), foraging, and commuting habitat throughout the Action Area
Resource affected	Individuals (adults, juveniles)

Individual response	• Avoidance of day roost after foraging results in extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Increased visibility to predators increases chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success.
Interpretation	Gray bats roosting in the bridge and/or foraging and commuting near the road crossing during operation were likely using this habitat prior to rehabilitation/replacement. These bats will likely be habituated to lighting and not significantly impacted by this stressor.
Effect	Insignificant

11.3 Stressor 3: Aquatic Resource Loss and Degradation

Aquatic Loss

Loss of aquatic resources may occur during the construction component of the Action. Some projects may require the filling of streams or ponds during realignment of existing facilities or the construction of new facilities. Stream realignment may also be required for some projects, resulting in loss of a portion of the existing stream channel. Loss of aquatic resources may also occur during culvert installation due to the replacement of the natural stream substrate with an artificial structure. Transportation projects and bridge rehabilitation / replacement are not anticipated to result in overall significant loss of aquatic resources during the construction or operation component.

Aquatic Degradation (Sedimentation)

Potential degradation of aquatic resources from transportation projects and bridge rehabilitation during the construction component is expected to be minimal. The majority of these activities will not require work within streams or wetlands, and impacts to water quality are expected to be absent or minimal due to implementation of erosion and sediment control BMPs. Activities that occur over or near the aquatic resources could result in debris, materials, equipment, or contaminants entering them. Temporary structures, such as crossings or work pads, may be required for some bridge rehabilitation and replacement activities to maintain traffic or access portions of the bridge that cannot be reached from land or the bridge deck. These structures will be placed in the stream channel and will cause temporary impacts to the substrate and aquatic habitat. Cofferdams may also be placed in streams to create a safe, dry work area around piers, footers, and abutments during structure repair and rehabilitation of scour areas. Removal and installation of piers, pilings, and abutments will require work within the stream channel and disturb the substrate, which could result in degradation of the stream though habitat alteration and sedimentation within and downstream of the bridge footprint. Temporary structures will be removed after work is complete, and the stream will be restored to pre-construction conditions.

Aquatic Degradation (Pollutants)

During the operation component, hazardous materials from the roadway surface could enter streams through bridge deck drains and scuppers. Materials include oil, gasoline, diesel fuel, deicing agents, and other fluids associated with vehicular use of the bridge. These materials could enter streams directly from spills and leaks or through stormwater runoff, which could result in a short-term reduction in aquatic insects that provide prey for gray bats.

Bridge maintenance, such as painting and debris removal from piers/abutments, could result in minor degradation of aquatic resources. Paint could enter the stream through spills or runoff. Removal of debris that has collected against piers and abutments will result in temporary disturbance of the stream substrate and may lead to sedimentation downstream.

Herbicides may be used to control weed species along the right-of-ways and are generally applied once during the year either during the spring, summer, or fall. The herbicide application is applied during the day and in a method to minimize wind-induced drift. It is possible that some non-water safe herbicide could enter surface waters from either overspray or drift, which may affect bat's drinking water and/or cause bats to ingest chemicals through drinking or through bioaccumulation from eating affected insects. However, this is unlikely due to requirements that all herbicides be used in accordance to their label instructions and herbicide applicators should be appropriately licensed. Further, it is also unlikely since application would occur during the daytime and any chemical coming in contact with the water would have time to become diluted prior to bats foraging at night.

Applicable Science

Gray bats primarily forage over open water bodies, such as rivers, streams, lakes, and reservoirs, and associated riparian areas (Tuttle 1976, 1979; LaVal et al. 1977). While foraging, the gray bat consumes a variety of insects, most of which are aquatic-based (Brack and LaVal 2006). Insects in the orders Ephemeroptera, Tricoptera, and Plecoptera are especially important, as well as Lepidoptera, Coleoptera, and Diptera (Whitaker et al. 2001; Tuttle and Kennedy 2005). Juvenile gray bats tend to forage more frequently in riparian areas and woodlands near roosts and eat more beetles than adults (Brack and LaVal 2006).

Impacts to aquatic habitats can have detrimental effects on gray bats and their prey. Loss of aquatic habitats through fill will permanently reduce aquatic insect habitat, which will reduce the amount of prey available to gray bats. Sedimentation will also result in negative impacts to aquatic insect populations. Sediment suspended in the water column affects aquatic insect food sources by physically removing periphyton from the substrate and reducing light available for primary production of phytoplankton. In addition, sediment that settles out of the water column onto the substrate fills interstitial spaces occupied by certain aquatic insect larvae. Increases in sedimentation can also change the composition of the insect community in a stream (Henley et al. 2000). In a three-year study measuring sedimentation and macroinvertebrate communities before, after, and during disturbance from a highway construction site, Hendrick (2008) found increased turbidity and total suspended solids downstream from the construction that correlated with a shift in macroinvertebrate communities. The change, however, was not great, and the Hilsenhoff Biotic Index used to evaluate the effects decreased from "excellent" before construction to "good" after construction. The use of BMPs likely minimized the effects of the construction on the macroinvertebrate communities.

While foraging, gray bats may travel long distances, with individuals recorded up to 35 kilometers (22 miles) from their day roosts (LaVal et al. 1977, Tuttle and Kennedy 2005). Bats typically travel individually or in small groups that forage in an area for a short period before moving to another area. A radiotelemetry study in Alabama found that gray bats rarely foraged

in one area for more than an hour (Thomas and Best 2000). During another tracking study in Missouri, one female bat foraged for approximately one hour along a 0.5-kilometer section of a river. Another female was recorded traveling along a 0.6-kilometer section of river over 21 minutes (LaVal et al. 1977). These studies suggest that gray bats visit multiple foraging areas during the night and travel frequently between these areas.

Effects Pathway – Gray Bat #6	
Activity: Construction	
Stressor: Aquatic Resource Loss	
Exposure (time)	Indefinitely
Exposure (space)	Aquatic foraging habitat in and near the project site
Resource affected	Habitat, used by individuals (adults, juveniles)
Individual response	• Increased flight distances to access foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival/reproductive success.
Interpretation	Loss of ephemeral and intermittent streams do not likely provide important foraging habitat for gray bats because of their relative size and flow status. Loss of perennial stream length is anticipated to have a temporary impact locally; however, data indicates that gray bats visit multiple foraging sites in one evening. Therefore, gray bats are expected to utilize other perennial streams and waterbodies in the affected watershed, thus reducing the likelihood of significant effects.
Effect	Insignificant

Effects Pathway – Gray Bat #7	
Activity: Construction and Maintenance	
Stressor: Aquatic Resource Degradation **(**sedimentation)	
Exposure (time)	Active timeframe; temporary
Exposure (space)	Aquatic foraging habitat in and downstream of the project site
Resource affected	Habitat, prey (aquatic insects), used by individuals (adults, juveniles)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	Implementation of BMPs to limit impacts to streams and downstream aquatic resources.
Interpretation	The effects of sedimentation on aquatic resources are expected to be minimal due to the temporary nature of the activity and implementation of the conservation measures.
Effect	Insignificant

Effects Pathway – Gray Bat #8	
Activity: Construction, Operation, and Maintenance	
Stressor: Aquatic Resource Degradation (pollutants)	
Exposure (time)	Indefinitely
Exposure (space)	Aquatic foraging habitat throughout the Action Area
Resource affected	Habitat, prey (aquatic insects), used by individuals (adults, juveniles)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	• Implementation of BMPs to limit impacts to streams and downstream aquatic resources. • Limiting use of deicing agents to only the amount necessary. • Ensure proper use of herbicides
Interpretation	Implementation of the conservation measures are expected to minimize and/or prevent contamination from pollutants.
Effect	Insignificant

11.4 Stressor 4: Tree Removal

Tree removal will result in fragmentation of forested areas on the landscape and has the potential to impact travel corridors as well as foraging areas for the gray bat. Road construction and maintenance will result in the loss of forested habitat in both linear corridors and blocks of habitat varying in width and length. Minimal tree removal may occur during the construction component of bridge replacement; however, tree removal is not expected to occur during the operation component. Tree removal during stream crossings is typically limited to areas immediately adjacent to the existing bridge to provide access for equipment and the installation of temporary crossings and work pads. For the majority of bridge replacement projects, tree removal is minimal and consists of a small number of trees in the riparian corridor on each side of the bridge. This type of tree removal results in widening of the cleared area that was created during the original construction of the bridge. Some projects involve realignment of the roadway associated with the bridge, causing the bridge to be replaced immediately upstream or downstream of the existing bridge. In this case, a higher number of trees may likely be removed for site preparation, access, and other construction-related activities. After removal of the existing bridge, the former site is typically allowed to revegetate naturally, which may close or reduce the gap in the riparian corridor.

Applicable Science

Foraging gray bats seem to prefer streams and other waterbodies bordered by forested habitat, and may avoid foraging in areas where the forested riparian corridor has been cleared (LaVal et al. 1977). Gray bats also travel along the forest canopy from their roosts to foraging areas, and may travel considerable distances to follow fence rows or other linear forested corridors (Brady et al. 1982). Patterson et al. (2003) noted that the mobility of bats allows them to exploit fragments of habitat. This behavior is believed to be a measure to avoid predation by

aerial predators, such as screech owls, which have more difficulty capturing bats in the tree canopy (Tuttle 1979).

Effects Pathway – Gray Bat #9	
Activity: Construction and Maintenance	
Stressor: Tree Removal	
Exposure (time)	One time removal, exposure will be permanent
Exposure (space)	Forested habitat throughout the Action Area
Resource affected	Forested habitat, used by individuals (adults, juveniles)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival/reproductive success.
Interpretation	Gaps in the riparian corridor are present along the majority of streams; gray bats foraging in the vicinity of a bridge are expected to be habituated to the existing gap in the forested riparian corridor at the bridge. Minor widening of and/or creation of a new gap is unlikely to alter foraging behavior. The mobility of gray bats allow them to adjust to ever-changing landscapes and forest fragmentation while commuting. Bats affected by tree removal within foraging and/or commuting habitat are expected to utilize other portions of these habitats across the landscape.
Effect	Insignificant

11.5 Stressor 5: Collision

During the construction component of the Action, collisions could potentially occur between gray bats and construction vehicles and equipment. The majority of activities associated with these components will occur during daylight hours when bats are inactive. Some bridge replacement activities may occur at night (e.g., pouring of concrete); however, these activities will involve stationary or slow-moving vehicles and equipment primarily on the bridge deck. During the operation component, traffic will be present on roadways and bridges year-round and during the night. Vehicle collision may occur from dusk until dawn while gray bats are foraging and commuting. Collisions are not expected during the maintenance component due to these activities occurring during daylight hours.

Applicable Science

The current literature does not include data on collisions between gray bats and vehicles; however, collisions have been documented for Indiana bats and other myotids. Russell et al. (2009) assessed the level of mortality from road kills on a bat colony in Pennsylvania and collected 27 road-killed little brown bats and one Indiana bat. Butchkoski and Hassinger (2002) had previously studied this same colony in Pennsylvania and documented little brown bats that had apparently collided with vehicles along a major highway that separated the roosting habitat from the primary foraging areas. Russell et al. (2009) documented Indiana bat mortality at a site where the roost site was separated from the foraging areas by a major highway. This study noted that when bats crossed at open fields, they flew much lower than canopy height (< two meters),

and when adjacent canopy was low, bats crossed lower and closer to traffic. Collision has also been documented for other myotids in Europe (Lesinski et al. 2011).

Collision risk of bats varies depending on time of year, location of a road in relation to roosting/foraging areas, flight characteristics of a species, traffic volume, and whether young bats are dispersing (Lesinski 2007, 2008; Russell et al. 2009; Bennett et al. 2011). In the Czech Republic, Gaisler et al. (2009) noted the majority of bat fatalities were associated with a road section between two artificial lakes. Lesinski (2007) evaluated road kills in Poland and determined that the number of young of year bats killed were significantly higher than adults. Also, low-flying gleaners (e.g., *Myotis daubentonii*) were killed more frequently than high-flying aerial hawkers (e.g., *Nyctalus noctula*). Lesinski et al. (2011) indicated that a review of previously published literature on factors causing bats to be killed at roads are not consistent, and, therefore, it is difficult to predict exact sites where bats may be at risk. They also indicated that estimates represent a small portion of the number of bats actually killed.

It can be difficult to determine whether roads pose greater risk for bats colliding with vehicles or greater likelihood of deterring bat activity in the area (thus decreasing risk of collision). As discussed in the Noise and Vibration stressor section, many studies suggest that roads may serve as a barrier to bats (Bennett and Zurcher 2013; Bennett et al. 2013; Berthinussen and Altringham 2012; Wray et al. 2006). Bennett et al. (2011) indicated that three main characteristics contribute to the barrier effects of roads: traffic volume, road width, and road surface. Roads with very few vehicles and only two lanes had little effect on Indiana bat movement (Bennett et al. 2013). Zurcher et al. (2010) concluded that bats perceive vehicles as a threat and were more than twice as likely to reverse course if a vehicle was present than if it was absent. Berthinussen and Altringham (2012) found that bat activity and diversity was lower closer to roads, but that activity and diversity increased where there was continuity in trees and hedgerows. Kerth and Melber (2009) studied barbastelle bats (*Barbastella barbastellus*) and Bechstein's bats (*Myotis bechsteinii*) and found that roads restricted habitat accessibility for bats, but the effect was related to the species' foraging ecology and wing morphology. Foraging ecology of gleaning and woodland species were more susceptible to the barrier effect than high-fliers that feed in open spaces (Kerth and Melber 2009).

Gray bats flying along streams below bridges are less likely to be affected by the barrier effect or collision as bats flying at or near roadway level. While foraging, gray bats typically fly within three meters of the water's surface (Tuttle 1976). The majority of bridges that have the potential to create a barrier effect and pose a risk of bat collision are two to four-lane bridges that are generally more than three meters over streams. Gray bats foraging along streams will be unlikely to avoid or fly over these bridges when they can maintain their normal foraging height by going under the bridges. These bridges also typically contain concrete barrier walls or guardrails on each side of the bridge, forcing bats flying over bridges to be higher than the level of the roadway. Bridges that are less than three meters from the water's surface are typically one to two-lane structures with low traffic volumes, especially at night, that contain vehicles traveling at slower speeds. The potential for collisions between gray bats and vehicles on these bridges is considered low.

Effects Pathway – Gray Bat #10	
Activity: Construction	
Stressor: Collision	
Exposure (time)	Active timeframe; duration of the activity
Exposure (space)	Bridge and roadway construction within the project area
Resource affected	Individuals (adults, juveniles)
Individual response	• Mortality from collision with vehicles or equipment.
Interpretation	The most likely effect of collision between a gray bat and a moving vehicle is harm in the form of mortality. However, since most construction activities would occur during daylight hours, collisions would be avoided. Risk of collision with construction vehicles during night time is minimized by the slow speed of construction vehicles in the work area. Further, construction activities that occur from dusk through dawn hours are likely localized to one area and do not require a substantial amount of construction vehicle travel. Based on this information, construction vehicle collision with a gray bat is unlikely to occur; therefore, any potential effects are considered discountable.
Effect	Discountable

Effects Pathway – Gray Bat #11	
Activity: Operation	
Stressor: Collision	
Exposure (time)	Active timeframe; indefinitely
Exposure (space)	Bridge and roadways throughout the Action Area
Resource affected	Individuals (adults, juveniles)
Individual response	• Mortality from collision with vehicles.
Interpretation	The risk of collision between a gray bat and vehicle travelling across a bridge while foraging is considered to be low due to the ability of bats to fly under bridges to avoid traffic and the reduced amount of traffic during evening hours when bats are active. However, collisions between bats and vehicles along roadways have been documented, and the bridge and roadways are expected to operate indefinitely. Exposure to this stressor is expected to harm an indeterminable number of gray bats within the Action Area.
Effect	Harm
Amount or Extent of Adverse Effects	Because of the difficulty in determining the number of individual Indiana bats that will be adversely affected during this specific activity and stressor, the Service has determined that it is appropriate to consider an average of one Indiana bat per year that would be adversely affected. Indiana bats are expected to be injured or killed due to this activity and stressor, and effects are expected to occur indefinitely.

11.6 Stressor 6: Alteration or Loss of Roosting Habitat on Bridges

Rehabilitation and replacement of bridges will result in alteration and loss of roosting habitat for gray bats during the maintenance and construction components. Bridge rehabilitation activities are generally considered as maintenance and may occur in areas where bats typically roost on the superstructure and underside of the bridge deck. Activities such as patching and sealing of cracks on the superstructure, repairs to header/expansion joints in the deck, and cleaning of deck drains/scuppers could impact roosting bats and cause alteration or loss of roosting locations. Bridge replacement during construction will involve the removal of individual bridge components (i.e., deck, superstructure, and substructure) or the entire structure using heavy equipment and tools. Removal of the bridge deck will result in the loss of roosting habitat in the deck and will likely alter roosting locations on the superstructure. Impacts could also occur to gray bats roosting on these structures during removal. After replacement projects are complete, a bridge will be present at the same or similar location; however, the new structure may not provide roosting habitat, resulting in a potential loss of roosting habitat for gray bats.

Applicable Science

Gray bats have been documented using bridges as roosting habitat during the spring, summer, and fall. No occurrences of this species hibernating in bridges during the winter have been reported. Concrete structures seem to be preferred for roosting due to their tendency to retain heat longer than other materials; however, metal and wood structures may also be used with less frequency. Gray bats have been observed using bridges as both day and night roosts. Day roosts are typically used by bats between sunrise and sunset and consist of sheltered areas that provide protection from adverse weather conditions and predators (Keeley and Tuttle 1999, Kiser et al. 2002). Bridges used as day roosts by gray bats are typically constructed of concrete and contain vertical crevices, expansion joints, or other locations that allow bats to retreat into the bridge deck or superstructure (Keeley and Tuttle 1999, Feldhamer et al. 2003, Cleveland and Jackson 2013).

Night roosts are generally used by bats between sunset and sunrise to rest, digest food between foraging bouts, conserve energy, and avoid inclement weather (Ormsbee et al. 2007). Bridges with a concrete deck and concrete or metal girders seem to be preferred as night roosts (Keeley and Tuttle 1999, Kiser et al. 2002). This bridge type retains heat into the night, and the chambers between the girders trap heat rising from under the bridge and provide protection from wind, weather, and predators. Night-roosting bats are typically found on the vertical surface of the girder at the intersection with the underside of the deck. Areas near the bridge abutments and over land seem to be preferred over the central portion of the bridge and areas spanning water. Bridges that lack crevices/expansion joints or girders are rarely used as day or night roosts (Adam and Hayes 2000, Feldhamer et al. 2003, Ormsbee et al. 2007); however, structures with cave-like areas or other unique features that provide suitable roosting locations can also provide suitable roosting habitat.

Multiple studies and surveys have reported gray bats roosting on bridges. A gray bat maternity colony is known to use a concrete box beam bridge over a large stream in central Kentucky, with estimated numbers ranging from 50 to more than 100 individuals (S. Martin, USFWS, pers. comm.). The colony roosts inside vertical expansion joints that are present between the concrete beams that comprise the bridge superstructure. Potential use of two additional concrete box

beam bridges located upstream of the maternity colony has also been noted; however, these records have not been confirmed.

Gray bats have also been documented roosting in several concrete box beam bridges in western North Carolina (K. Etchison, North Carolina Wildlife Resources Commission, pers. comm.; J. Weber, Indiana State University, pers. comm.). Up to 1,000 individuals, including males and females, have been observed day-roosting throughout the summer in expansion joints between box beams at two separate bridges. Sporadic summer use of two other concrete box beam bridges has also been noted for smaller numbers of day-roosting gray bats. The same study also found gray bats day-roosting on several different bridges with concrete decks and concrete/metal girder superstructures, with over 300 bats roosting in vertical expansion joints in the bridge deck above columns and piers. The type of use (e.g., maternity colony, bachelor/non-reproductive colony) of these bridges has not been confirmed; however, it is possible that maternity colonies are using some of these bridges based on the number of individuals observed and the time of year.

Several observations of gray bats roosting on concrete girders at the intersection of the girder and bridge deck have been reported; however, these records typically consist of sporadic use by individual bats. During the North Carolina bridge study, two bats were found day-roosting at the intersection of girders and bridge decks (K. Etchison, North Carolina Wildlife Resources Commission, pers. comm.; J. Weber, Indiana State University, pers. comm.). Cervone et al. (2016) found two gray bats day-roosting under a concrete girder bridge on two different occasions, including one bat in April and a second bat in September. The timing of these occurrences suggest that these bats were using the bridge as a transient roost during the spring and fall migration periods. Gray bats have also been found day-roosting under a concrete girder bridge in southern Kentucky (S. Martin, USFWS, pers. comm.). Gray bats have been documented night-roosting at the intersection of girders and bridge decks, including 20 to 30 individuals found under two different bridges in northwest Georgia (Johnson et al. 2002). Other structures on bridges that provide sheltered areas may also be used as roosts. In North Carolina, a gray bat was found day-roosting in a clogged deck drainage pipe on a bridge (K. Etchison, North Carolina Wildlife Resources Commission, pers. comm.; J. Weber, Indiana State University, pers. comm.).

Gray bats show strong philopatry to their summer ranges and typically use the same roost sites year after year (Tuttle 1976, 1979; Martin 2007). Maternity colonies tend to concentrate at one roost site until the young are volant, then begin to alternate more frequently between other roost sites within their home range (Thomas 1994). Adult males and yearlings form bachelor colonies or small groups at roost sites separate from maternity colonies. These individuals typically alternate between roost sites more frequently than reproductive females.

Effects Pathway – Gray Bat #12	
Activity: Maintenance (bridge rehabilitation)	
Stressor: Alteration or Loss of Roosting Habitat of Bridges	
Exposure (time)	Active timeframe; duration of the activity
Exposure (space)	Bridges
Resource affected	Day or night roosting habitat, individuals (adults, juveniles)

Individual response	• Flushing from bridge roost results in extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Flushing from bridge roost will increase chances of predation. • Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	Avoidance of project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity and/or bachelor colony.
Interpretation	Bats may flush from their roosts on the bridge. Bats that flush during the daytime are at greater risk of harm due to predation. Additionally, bats that flush their roosts may be harmed due to an increase in energy expenditure. The most severe effects of flushing a bat from a bridge may result in harm if the bat was a female with a pup. The longer the female is absent, the more likely the effects to the pup would be significant. Bats that flush must also expend additional energy to locate other roosting habitat. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors, is likely to reduce fitness and subsequently reduce survival and reproductive success. Gray bats exposed to this stressor while roosting on the bridge are likely to respond in a way that would lead to adverse effects.
Effect	Harm

Effects Pathway – Gray Bat #13	
Activity: Construction (bridge replacement)	
Stressor: Alteration or Loss of Roosting Habitat of Bridges	
Exposure (time)	Active timeframe; duration of the activity
Exposure (space)	Bridges
Resource affected	Day or night roosting habitat, individuals (adults, juveniles)
Individual response	• Mortality during bridge removal. • Flushing from bridge roost results in extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success. • Flushing from bridge roost will increase chances of predation. • Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	Avoidance of project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity and/or bachelor colony.
Interpretation	Bats roosting in bridge may be injured or killed. Injured bats may subsequently die. Bats may flush from their roosts on the bridge. Bats that flush during the daytime are at greater risk of harm due to predation. Additionally, bats that flush their roosts may be harmed due to an increase in energy expenditure. The most severe effects of

	flushing a bat from a bridge may result in harm if the bat was a female with a pup. The longer the female is absent, the more likely the effects to the pup would be significant. Bats that flush must also expend additional energy to locate new roosting habitat. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors, is likely to reduce fitness and subsequently reduce survival and reproductive success. Gray bats exposed to this stressor while roosting on the bridge are likely to respond in a way that would lead to adverse effects.
Effect	Harm

Effects Pathway – Gray Bat #14

Activity: Maintenance and Construction, (bridge rehabilitation/replacement)	
Stressor: Alteration or Loss of Roosting Habitat of Bridges	
Exposure (time)	Inactive timeframe removal will expose gray bats to adverse effects during the active timeframe for one season after removal
Exposure (space)	Bridges
Resource affected	Day or night roosting habitat, used by individuals (adults)
Individual response	• Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success.
Conservation Measures	Avoidance of project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity and/or bachelor colony.
Interpretation	Adult gray bats will experience adverse effects after they arrive at their summer roosting habitat the first year after bridge rehabilitation or replacement. The extra energy to find new habitat is in addition to what is necessary for foraging, pup rearing, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors, is likely to result in adverse effects. Gray bats are expected to adapt to this stressor in subsequent years after they have found new suitable habitat.
Effect	Harm

Amount or Extent of Adverse Effects – Summer Roosting Habitat (Bridges)
Over the next 5-years, approximately 1,100 bridges associated with the Bridging Kentucky Program (BKY) are anticipated to be rehabilitated or replaced. In addition, KYTC anticipates an additional 40 bridge projects per year (i.e., ~200 projects over 5 years) that are not associated with BKY.

Through an on-going assessment of bridges within the Commonwealth of Kentucky, the KYTC has reviewed 260 structures throughout the state. The assessed bridges included a variety of sizes and bridge types, including bridges from 21 to 727 feet long and bridge types such as

channel beam, box beam, pre-stressed concrete beam, metal beams, box culverts, and numerous others. The majority (92%) of these structures were identified as either unsuitable for bats or no bats or signs of bat use were observed. The remaining bridges (8%) had bats (unidentified species) actively roosting on the structure or signs of bat use were observed.

Assuming a similar correlation of bridges that have bats actively roosting on the structure or signs of bat use across the anticipated 1,300 bridge projects and 5 years of the Action, the Action will result in impacts to an estimated 130 bridges deemed suitable as roosting habitat by bats (1,300 bridges X .10 = 130 bridges). For simplicity, we rounded to 10 percent of bridges with active roosting and/or signs of bat use.

As a conservation measure, the Action avoids project effects on a bridge structure that is known or has been identified as reasonably likely to support a maternity and/or bachelor colony. According to the applicable science, the number of day and/or night roosting gray bats observed using bridge structures varies but is typically less than 5 bats. Therefore, the Service assumes that five individual gray bats will day and/or night roost on a suitable bridge. Based on these assumptions, the Action's effects on bridges serving as roosting habitat would affect gray bats:

- 130 active roosting bridges X 5 bats per bridge = 650 bats.

The Service anticipates that FHWA projects will affect up to 650 gray bats over a 5-year period. A small, but indeterminable, portion of these 650 gray bats are expected to be injured or killed by the Action. Disruption of normal behavior as a result of physical disturbance and/or habitat modification or degradation will account for the vast majority of adverse effects.

11.7 Summary of Effects

Table 6. A summary of the effects of the Action on the gray bat

Stressors: Activities	Adverse	Insignificant/ Discountable
Noise and vibration (bridge roosting): *construction and maintenance*	harm	
Noise and vibration (foraging): *construction*		insignificant
Noise and vibration: *operation*		insignificant
Night lighting: *construction and operation*		insignificant
Night lighting: *maintenance*		discountable
Aquatic resource: *construction*		insignificant
Aquatic resource degradation, (sedimentation): *construction and maintenance*		insignificant
Aquatic resource degradation, (pollutants): *construction, operation,*		insignificant

and maintenance		
Tree removal: *construction and maintenance*		insignificant
Collison: *construction*		discountable
Collison: *operation*	harm	
Alteration or loss of roosting habitat on bridges: *maintenance* (rehabilitation)	harm	
Alteration or loss of roosting habitat on bridges: *construction* (replacement)	harm	
Alteration or loss of roosting habitat on bridges: *maintenance and construction* (rehab or replacement) (inactive timeframe)	harm	

12 CUMULATIVE EFFECTS

For purposes of consultation under ESA §7, cumulative effects are the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the proposed action are not considered, because they require separate consultation under §7 of the ESA.

Land use activities that may affect gray bats and that are likely to occur within the Action Area include: timber harvest, ATV recreational use, recreational use of caves, and development associated with road, residential, industrial, and agricultural development and related activities. These private actions are likely to occur within the Action Area, but the Service is unaware of any quantifiable information about the extent of private timber harvests within the Action Area, the amount of use of off-highway vehicles within the Action Area, or the amount of recreational use of caves within the Action Area. Similarly, the Service does not have any information on the amount or types of residential, industrial, or agricultural development that have or will occur within the Action Area. Therefore, the Service is unable to make any determinations or conduct any meaningful analysis of how these actions may or may not adversely and/or beneficially affect the gray bat. It is possible that these activities may have cumulative effects on gray bats and their habitat in certain situations (e.g., cave exploration during spring/summer months within an unknown maternity colony may cause adverse effects to that maternity colony). In stating this, however, we can only speculate as to the extent or severity of those effects, if any.

13 CONCLUSION

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of a BO under §7(a)(2) of the ESA, which is to determine whether a Federal action is likely to:

c) jeopardize the continued existence of species listed as endangered or threatened; or
d) result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and

recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

After reviewing the current status of the species, the environmental baseline for the Action Area, the effects of the Action and the cumulative effects, it is the Service's biological opinion that the Action is not likely to jeopardize the continued existence of the gray bat. No critical habitat has been designated for the gray bat.

The gray bat is stable throughout its range. We have determined that the species' reproduction, numbers, and distribution will not be appreciably reduced as a result of the Action. This no jeopardy determination is supported by the analysis for the Effects of the Action and because:

- Most of the harm is expected to be sub-lethal and result in additional energy expenditures (reduced fitness) associated with a one-time loss or alteration of habitat. Bats are expected to fully recover from this harm within 1–2 years.
- Impacts to maternity colonies and their reproductive success are not anticipated.
- Impacts to the species reproduction and numbers will be limited by the avoidance and minimization measures implemented by the FHWA (e.g., exclusion of hibernacula, restrictions on bridge work where a known or likely maternity or bachelor colony is present, and within close proximity to hibernacula).
- No reduction in the distribution of the species is expected as the Action Area occurs near the center of the species' range, and impacts from the Action are limited at both at the project and programmatic scales, and are dispersed across a large Action Area.

In order to offset unavoidable adverse effects on gray bats utilizing bridges as roosting habitat, the KYTC is committed to funding the protection of a known gray bat maternity site and surrounding habitat. This conservation measure would have a beneficial effect on the gray bat by ensuring that the species has suitable habitat available for roosting and rearing of pups during the summer period of their lifecycle. Funding this conservation measure is expected to promote the survival and recovery of the species through protecting and managing existing year round roosting habitat suitable to support the species, particularly one that would expand conservation ownerships.

Further, the conservation measure to fund the protection of a known gray bat maternity site and surrounding habitat is expected to promote the survival and recovery of the species by conserving additional lands that contain habitat for the species, particularly those that would expand existing conservation ownerships.

14 INCIDENTAL TAKE STATEMENT

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3). In regulations at 50 CFR §17.3, the Service further defines:

- "harass" as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal

behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering;"
- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" and
- "incidental take" as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

Under the terms of ESA §7(b)(4) and §7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement (ITS).

For the exemption in ESA §7(o)(2) to apply to the Action considered in this BO, the FHWA must undertake the non-discretionary measures described in this ITS, and these measures must become binding conditions of any permit, contract, or grant issued for implementing the Action. The FHWA has a continuing duty to regulate the activity covered by this ITS. The protective coverage of §7(o)(2) may lapse if the FHWA fails to:

- assume and implement the terms and conditions; or
- require a permittee, contractor, or grantee to adhere to the terms and conditions of the ITS through enforceable terms that are added to the permit, contract, or grant document.

In order to monitor the impact of incidental take, the FHWA must report the progress of the Action and its impact on the species to the Service as specified in this ITS.

14.1 Amount or Extent of Take Anticipated

This section specifies the amount or extent of take of the gray bat that the Action is reasonably certain to cause, which we estimated in the "Effects of the Action" section of this BO, using the best available data. We reference, but do not repeat, these analyses here.

We estimated the number of individuals reasonably likely to occur in the Action Area (see section 10, Environmental Baseline). We evaluated the potential for these individuals to be exposed to the stressors resulting from the proposed Action. Finally, we evaluated how the individuals' responses to their exposure to these stressors would apply to the statutory and regulatory definition of take (see section 11, Effects of the Action). From our evaluation, the proposed Action is reasonably certain to cause the incidental take of 651individual gray bats. This taking is expected in the form of harm. The mechanisms of this taking and the basis for our estimation of its extent are described in section 11 (Effects of the Action) of this BO.

Table 7. Summary of Expected Incidental Take Resulting from the Action

Species	# of Individuals	Take Type
Gray Bat	650	Harm (Summer Roosting Habitat, Bridges)

Gray Bat	1 per year	Harm (Collision)

The Service anticipates the incidental taking of gray bats associated with this project will be difficult to detect for the following reasons:

- The individuals are small, mostly nocturnal, and when not hibernating, occupy caves or cave-like habitats (i.e., bridges) where they are difficult to observe;
- Finding dead or injured specimens during or following project implementation is unlikely; and
- Most incidental take is in the form of non-lethal harm and not directly observable.

Due to the difficulty of detecting take of gray bats caused by the proposed Action, the Service will monitor the extent of taking using the number of suitable roosting structures (bridges) that projects remove or alter, which is up to 130 bridges over a 5-year period that have been determined to contain bats or show bat use. This surrogate measure is appropriate because the majority of the anticipated taking will result from habitat removal/alteration and activities associated with that alteration, and because it sets a clear standard for determining when the extent of taking is exceeded.

14.2 Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures (RPMs) are necessary or appropriate to minimize the impact of incidental take caused by the Action on the gray bat.

RPM1. The FHWA will ensure that the programmatic process and conservation measures will be implemented, as appropriate, on a project-by-project basis as planned and documented in the BA and the BO.

RPM2. FHWA will coordinate with the KFO in order to develop a user's guide and/or key to assist in the implementation of the programmatic process in compliance with the programmatic consultation as documented in the BO.

RPM3. FHWA will coordinate with the KFO to develop a monthly accounting ledger that identifies specific roles and responsibilities, monitoring requirements, and other details regarding the use of the programmatic consultation.

14.3 Terms and Conditions

In order for the exemption from the take prohibitions of §9(a)(1) and of regulations issued under §4(d) of the ESA to apply to the Action, the FHWA must comply with the terms and conditions (T&Cs) of this statement, provided below, which carry out the RPMs described in the previous section. These T&Cs are mandatory. As necessary and appropriate to fulfill this responsibility, the FHWA must require the KYTC or any permittee, contractor, or grantee to implement these T&Cs through enforceable terms that are added to the permit, contract, or grant document.

T&C4. The FHWA shall conduct regular audits of specific projects and/or monthly ledgers to ensure proper adherence and consistent use of the programmatic consultation. FHWA shall contact the KFO within 30 days and provide a written explanation and plan of action of any irregularities identified because of the aforementioned audits. (This T&C is associated with RPM1).

T&C5. The FHWA shall develop a user's guide and/or key for the KYTC personnel implementing the programmatic process in order to maintain consistency. The guide shall clearly identify the key project factors, conservation measures, and the steps leading up to a proper species effects determination. The guide shall also include instructions on how to calculate and complete any required compensation and reporting requirements. Completion of this T&C shall occur within 30 days of the executed BO. (This T&C is associated with RPM2).

T&C6. The FHWA shall develop a monthly accounting ledger that is specific to each of the KYTC's monthly project letting schedules, and will include all covered projects, including those where conservation and/or compensation measures were not required. The ledger will identify those projects where compensation is required and the preferred method. Completion of this T&C shall occur within 30 days of the executed BO. Specific ledger information may include, but is not limited to, the following:

- Description of the proposed action (e.g., type of action, location, involved federal agencies);
- Verifies that the project is within the scope of the programmatic consultation;
- Provides details of impacts (e.g., type bridge work); and
- Identifies all proposed conservation measures that will avoid, minimize and/or compensate the project's impacts. (This T&C is associated with RPM3).

14.4 Monitoring and Reporting Requirements

In order to monitor the impacts of incidental take, the FHWA, through coordination with the KYTC, shall report the progress of the Action and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(i)(3)). Completion of T&C3 shall be incorporated into this section providing the specific instructions for such monitoring and reporting. As necessary and appropriate to fulfill this responsibility, the FHWA must require any permittee, contractor, or grantee to accomplish the monitoring and reporting through enforceable terms that are added to a permit, contract, or grant document. Such enforceable terms must include a requirement to immediately notify the FHWA and the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation.

15 CONSERVATION RECOMMENDATIONS

§7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by conducting conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary activities that an action agency may undertake to avoid or minimize the adverse effects of a proposed action, implement recovery plans, or

develop information that is useful for the conservation of listed species. The Service has not identified any conservation recommendations for this BO.

16 RE-INITIATION NOTICE

Formal consultation for the Action considered in this BO is concluded. Reinitiating consultation is required if the FHWA retains discretionary involvement or control over the Action (or is authorized by law) when:

a) the amount or extent of incidental take is exceeded;
b) new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not considered in this BO;
c) the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this BO; or
d) a new species is listed or critical habitat designated that the Action may affect.

This consultation was assigned FWS ID #04EK1000-2019-F-1687. Please refer to this number in any correspondence concerning this consultation.

LITERATURE CITED

3D/International, Inc. 1996. 1996 field studies for interim mitigation for impacts to Indiana bats at the Indianapolis International Airport in Marion County, Indiana. 125pp.

Adam, M. D. and J. P. Hayes. 2000. Use of bridges as night roosts by bats in the Oregon Coast Range. Journal of Mammalogy 81(2):402-407.

Alsheimer, L.R. and K. Kazial. 2011. The effects of artificial night lighting on the Little Brown bat (*Myotis lucifugus*). Master's Thesis, SUNY Fredonia, NY.

Bagley, F.M., D.R. Clark, Jr., and WW. Johnson. 1987. Northern Alabama Colonies of the Endangered Gray Bat *Myotis grisescens:* Organochlorine Contamination and Mortality. Biological Conservation 43 (3): 213-225.

Barbour, R.W., and W.H.Davis. 1969. Bats of America. University Press of Kentucky, Lexington. 286pp.

Barclay, R. M. R. and A. Kurta. 2007. Ecology and behavior of bats roosting in tree cavities and under bark. *In* M.J. Lacki, J.P. Hayes, and A. Kurta (eds), Bats in forests: conservation and management. Johns Hopkins University Press, Baltimore, MD.

Belwood, J.J. 1979. Feeding ecology of an Indiana bat community with emphasis on the endangered Indiana bat, Myotis sodalist. M.S. Thesis, University of FLoriday, Gainesville, FL. 103pp.

Belwood, J.J. 2002. Endangered bats in suburbia: observations and concerns for the future. Pp. 193-198 *in* A. Kurta and J. Kennedy (eds.), The Indiana bat: biology and management of an endangered species. Bat Conservation International, Austin, TX.

Bennett, V. J., W. P. Smith, and M. G. Betts. 2011. Toward understanding the ecological impact of transportation corridors. General Technical Report. Pacific Northwest Research Station, USDA Forest Service.

Bennett, V.J., and A.A. Zurcher. 2013. When corridors collide: Road-related disturbance in commuting bats. The Journal of Wildlife Management 77(1):93-101.

Bennett, V.J., D.W. Sparks, and P.A. Zollner. 2013. Modeling the indirect effects of road networks on the foraging activities of an endangered bat. Landscape Ecology 28:979-991.

Berthinussen, A., and J. Altringham. 2012. The effect of a major road on bat activity and diversity. Journal of Applied Ecology 49:82–89.

Best, T., B. Milam, T. Haas, W. Cvilikas, and L. Saidak. 1997. Variation in diet of the gray bat (*Myotis Grisescens*). *Journal of Mammalogy* 78(2):569-583.

Blehert, D.S., A.C. Hicks, M. Behr, C.U. Meteyer, B.M. Berlowski-Zier, E.L. Buckles, J.T.H. Coleman, S.R. Darling, A. Gargas, R. Niver, J.C. Okoniewski, R.J. Rudd, and W.B. Stone. 2009. Bat white-nose syndrome: An emerging fungal pathogen? Science 323: 227.

Brack, V., Jr. 1983. The non-hibernating ecology of bats in Indiana with emphasis on the endangered Indiana bat, Myotis sodalis. Dissertation. Purdue University, West Lafayette, IN. 280 pp.

Brack, V., and R.K. LaVal. 1985. Food habits of the Indiana bat in Missouri. Journal of Mammalogy, 66:308-315.

Brack, V., Jr. and R.K. LaVal. 2006. Diet of the gray bat (Myotis grisescens): variability and consistency, opportunism, and selectivity. Journal of Mammalogy, 87(1):7-18.

Brack, V., Jr., R.E. Mumford, and V.R. Holmes. 1984. The gray bat *(Myotis grisescens)* in Indiana. *American Midland Naturalist* 111(1): 205.

Brack, V., Jr., S.A. Johnson, and R.K. Dunlap. 2003. Wintering populations of bats in Indiana, with emphasis on the endangered Indiana myotis, *Myotis sodalis*. Proceedings of the Indiana Academy of Science 112:61-74.

Brady, J.T., T.H. Kunz, M.D. Tuttle, and D.E Wilson. 1982. Gray Bat Recovery Plan. U.S. Fish and Wildlife Service, Denver, CO. 143 pp.

Britzke, E.R., M.J. Harvey, and S.C. Loeb. 2003. Indiana bat, *Myotis sodalis*, maternity roosts in the southern United States. Southeastern Naturalist 2(2):235-242.

Butchkoski, C. M., and J. M. Hassinger. 2002. Ecology of a maternity colony roosting in a building. Pp. 130–142 *in* A. Kurta and J. Kennedy, Eds. The Indiana bat: biology and management of an endangered species. Bat Conservation International, Austin, Texas, 253 pp.

Callahan, E.V., III. 1993. Indiana bat summer habitat requirements. M.S. Thesis, University of Missouri, Columbia, MO.

Callahan, E.V., R.D. Drobney, and R.L. Clawson. 1997. Selection of summer roosting sites by Indiana bats (*Myotis sodalis*) in Missouri. Journal of Mammalogy 78:818-825.

Carlander, K.D., C.A. Carlson, V. Gooch, and T.L. Wenke. 1967. Populations ofHexagenia mayfly naiads in pool 19, Mississippi River, 1959-1963. Ecology 48:873-878.

Carter, T. C., W. M. Ford, and M. A. Menzel. 2002. Fire and bats in the southeast and mid-Atlantic: more questions than answers? *In* Ford, W. M., Russell, K. R., and Moorman, C. E., Eds. The role of fire in nongame wildlife management and community restoration: traditional uses and new directions: proceedings of a special workshop.

Nashville, TN. USDA Forest Service, Northeastern Research Station, Newton Square, PA. p. 139-143, General Technical Report NE-288. http://www.fs.fed.us/ne.

Cervone, T.H., R.K. Yeager, and R.A. King. 2016. Bats Under an Indiana Bridge. Proceedings of the Indiana Academy of Science 125(2): 91-102.

Clark, B.K., J.B. Bowles, and B.S. Clark. 1987. Summer status of the endangered Indiana bat. The American Midland Naturalist 118(1): 32-39.

Clawson, R.L. 2002. Trends in population size and current status. Pp. 2-8 *in* A. Kurta and J. Kennedy (eds.), The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.

Cleveland, A.G. and J.G. Jackson. 2013. Environmental factors influencing the status and management of bats under Georgia (USA) bridges. Proceedings of the 2013 International Conference on Ecology and Transportation.

Cope, J.B. and S.R. Humphrey. 1977. Spring and autumn swarming behavior in the Indiana bat, *Myotis sodalist*. Journal of Mammalogy 58:93-95.

Copperhead Environmental Consulting, Inc. 2017. Spring Migration of Female Indiana Bats (*Myotis sodalis*) from Signature and Tobaccoport Saltpeter Caves in Tennessee. Report submitted to the U.S. Fish and Wildlife Service Tennessee Field Office.

Cryan P. M., C.U. Meteyer, D.S. Blehert, J.M. Lorch, D.M. Reeder, G.G. Turner, J. Webb, M. Behr, M. Verant, R.E. Russell, K.T. Castle. 2013. Electrolyte Depletion in white-nose syndrome bats. Journal of Wildlife Diseases 49:398-402.

Decher, J. and J.R. Choate. 1995. *Myotis grisescens*- Mammalian Species No.510. American Society of Mammalogists. 7pp.

Downs, N.C., V. Beaton, J. Guest, J. Polanski, S.L. Robinson, and P.A. Racey. 2003. The effects of illuminating the roost entrance on the emergence behavior of *Pipistrellus pygmaeus*. Biological Conservation 111:247-252.

Drobney, R.D. and R.L. Clawson. 1995. Indiana bats. Pp. 97-98 *in* E.T.LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac (eds.), Our living resources: a report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems. U.S. Department of the Interior, National Biological Service, Washington, DC. 530 pp. Available at: http://biology.usgs.gov/s+t/noframe/c164.htm

Duchamp, J.E. 2006. Modeling bat community structure and species distribution across fragmented landscapes within the Upper Wabash River Basin. PhD dissertation. Purdue University, West Lafayette, Indiana.

Ehlman, S.M., J.J. Cox, and P.H. Crowley. 2013. Evaporative water loss, spatial distributions, and survival in white-nose syndrome affected little brown myotis: a model. Journal of Mammalogy 94(3):572-583.

Elliott, W.R. 2008. Gray and Indiana bat population trends in Missouri. Pages 46-61 in Proceedings of the 18th National Cave & Karst Management Symposium, W.R. Elliott, ed; Oct. 8-12, 2007. National Cave and Karst Management Symposium Steering Committee. 320pp.

Ellison, L.E., T. J. O'Shea, M.A. Bogan, A.L. Everette, and D.M. Schneider. 2003. Existing data on colonies ofbats in the United States: Summary and analysis of the U.S. Geological Survey's bat population database. Pages 127-237 *in* T.J. O'Shea and M.A. Bogan, eds.: Monitoring trends in bat populations of the United States and territories: problems and prospects. U.S. Geological Survey, Biological Resources Division, Information and Technology Report, USGS/BRD/ITR-2003-0003. 274pp.

Environmental Solutions and Innovations, Inc. (ESI). 2006. Mist net and radio-telemetry surveys for the Indiana bat (*Myotis sodalis*) on Clover Construction Management's proposed Eagle Ridge Townhouses Project, Jefferson County, New York. Final Report. Environmental Solutions and Innovations, Inc., Cincinnati, Ohio.

Farmer, A.H., B.S. Cade, and D.F. Stauffer. 2002. Evaluation of a habitat suitability index model. Pp. 172-179 *in* A. Kurta and J. Kennedy (eds.), The Indiana bat: biology and management of an endangered species. Bat Conservation International, Austin, TX.

Feldhamer, G.A., T.C. Carter, A.T. Morzillo, and E.H. Nicholson. 2003. Use of bridges as day roosts by bats in southern Illinois. Publications, Paper 45.

Francl, K. E., W. M. Ford, D. W. Sparks, and V. Brack. 2012. Capture and reproductive trends in summer bat communities in West Virginia: Assessing the impact of white-nose syndrome. Journal of Fish and Wildlife Management 3(1): 33–42.

Furlonger, C.L., H.J. Dewar, and M.B. Fenton. 1987. Habitat use by foraging insectivorous bats. Canadian Journal of Zoology 65:284-288.

Gaisler, J., Z. Rehak, and T. Bartonicka. 2009. Bat casualties by road traffic (Brno-Vienna). Acta Theriologica 54:147–155.

Gardner, J.E., J.D. Garner, and J.E. Hofmann. 1991. Summer roost selection and roosting behavior of *Myotis sodalis* (Indiana bat) in Illinois. Unpublished report to Region-3 U.S. Fish and Wildlife Service, Fort Snelling, MN. 56 pp.

Garner, J.D., and J.E. Gardner. 1992. Determination of summer distribution and habitat utilization of the Indiana bat (*Myotis sodalis*) in Illinois. Unpublished Report. Endangered Species Coordinator, Region 3, Service, Twin Cities, MN.

Grindal, S.D., T.S. Collard, R.M. Brigham, R.M.R. Barclay. 1992. The influence of precipitation on reproduction by *Myotis* bats in British Columbia. American Midland Naturalist 128(2): 339-344.

Grue, C.E., P.L. Gibert, and M.E. Seeley. 1997. Neurophysiological and behavioral changes in non-target wildlife exposed to organophosphate and carbamate pesticides: thermoregulation, food consumption and reproduction. American Zoologist 37:369-388.

Gumbert, M. W., J. M. O'Keefe, and J. R. MacGregor. 2002. Roost fidelity in Kentucky Pp. 143-152 *in* A. Kurta and J. Kennedy (eds.), The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, TX.

Guthrie, M.J., and K.R. Jeffers. 1938. A cytological study of the ovaries of the bats *Myotis lucifugus andMyotis grisescens.* J. Morph. 62:528-557.

Hall, J.S. and N. Wilson. 1966. Seasonal populations and movements of the gray bat in the Kentucky area. *Am. Midl. Nat.* 75(2):317-324.

Harvey, M.J. 1992. Bats of the eastern United States. Arkansas Game and Fish Commission, Little Rock, AR. 46pp.

Harvey, M.J. 1994. Status of summer colonies of the endangered gray bat, *Myotis grisescens* in Tennessee. Unpub. Rep. to the Tennessee Wildlife Resources Agency. Tennessee Technological University, Cookeville, TN. 44pp.

Harvey, M.J., J.J. Cassidy and G.G. O'Hagan. 1981. Endangered bats of Arkansas: distribution, status, ecology, and management. Memphis State University, Department of Biology, Ecological Research Center Report to the Arkansas Game and Fish Commission, U.S. Forest Service, and National Park Service- Buffalo National River, Memphis, TN. 137pp.

Harvey, M.J., R.K. Redman, and C.S. Cheney. 2005. Endangered bats of Arkansas: Distribution, status, and ecology (2004-2005). Tennessee Technological University, Cookeville, TN, Annual Report to the Arkansas Game and Fish Commission.

Hawkins, J.A., J. Jaskula, A. Mann, and V. Brack, Jr. 2005. Habitat Conservation Plan: 2004 telemetry study of autumn swarming behavior of the Indiana bat (Myotis sodalis). Report prepared for the Indiana Department of Natural Resources, Indianapolis, IN. 25 pp. plus appendices.

Hawkins, J.A., P.L. Sewell, and M.W. Gumbert. 2008. Final Report: Indiana bat survey and anthropogenic stimuli study conducted at US Army Garrison Fort Knox and Brashears creek study sites during summer 2007. Final Report submitted to ICI Services, LLC.

Hendrick, L. B. 2008. Evaluation of the impacts of highway construction on sediment and benthic macroinvertebrates in Appalachian streams. PhD dissertation. West Virginia University, Morgantown, West Virginia.

Henley, W. F., M. A. Patterson, R. J. Neves, and A. D. Lemly. 2000. Effects of Sedimentation and turbidity on lotic food webs: a concise review for natural resource managers. Reviews in Fisheries Science. 8(2): 125-139.

Herreid, C.F., IL 1963. Temperature regulation of Mexican free-tailed bats in cave habitats. J. Mamm. 44:560-573.

Herreid, C.F., II. 1967. Temperature regulation, temperature preference and tolerance, and metabolism of young and adult free-tailed bats. Physiol. Zoo!. 40:1-22.

Humphrey, S.R. 1978. Status, winter habitat, and management of the endangered Indiana bat, *Myotis sodalis*. Florida Scientist 41:65-76.

Humphrey, S.R. and J.B. Cope. 1977. Survival rates of the endangered Indiana bat, *Myotis sodalis*. Journal of Mammalogy 58:32-36.

Humphrey, S.R., A.R. Richter, and J.B. Cope. 1977. Summer habitat and ecology of the endangered Indiana bat, *Myotis sodalist*. Journal of Mammalogy. 58:334-346.

Johnson, J.B., M.A. Menzel, J.W. Edwards, and W.M. Ford. 2002. Gray bat night-roosting under bridges. Journal of the Tennessee Academy of Science 0040-313X.

Johnson, J.B., W.M. Ford and J.W. Edwards. 2012. Roost networks of northern myotis (*Myotis sodalis*) in a managed landscape. Forest Ecology and Management 266:223-231.

Jones, G. and J. Rydell. 1994. Foraging strategy and predation risk as factors influencing emergence time in echolocating bats. Philosophical Transactions of the Royal Society of London Series B, Biological Sciences. 346:445-455.

Jung, K., and E.K.V. Kalko. 2010. Where forest meets urbanization: foraging plasticity of aerial insectivorous bats in an anthropogenically altered environment. Journal of Mammalogy 91(1):144-153.

Kentucky Division of Forestry. 2010. Kentucky Statewide Assessment of Forest Resources and Strategy. 627 Comanche Trail, Frankfort, Kentucky 40601. http://forestry.ky.gov/landownerservices/pages/forestlandassessment.aspx (dated June 2010)

Keeley, B.W. and M.D. Tuttle. 1999. Bats in American bridges. Bat Conservation International, Austin Texas.

Kerth G. and M. Melber. 2009. Species-specific barrier effects of a motorway on the habitat use of two threatened forest-living bat species. Biological Conservation 142: 270-279.

Kiser, J.D. and C.L. Elliott. 1996. Foraging habitat, food habits, and roost tree characteristics of the Indiana bat (*Myotis sodalis*) during autumn in Jackson County, Kentucky. Report prepared for Kentucky Department of Fish and Wildlife Resources, Nongame Program, Frankfort, KY. 65 pp.

Kiser, J.D., J.R. MacGregor, J.D. Bryan, and A. Howard. 2002. Use of concrete bridges as nightroosts in the Indiana Bat: biology and management of an endangered species. Bat Conservation International, Austin, Texas.

Kniowski, A.B., and S.D. Gehrt. 2014. Home range and habitat selection of the Indiana bat in an agricultural landscape. Journal of Wildlife Management 78(3):503-512.

Kunz, T.H., J.A. Wrazen, C.D. Burnett. 1998. Changes in body mass and body composition in pre-hibernating little brown bats (*Myotis lucifugus*). Ecoscience 5: 8-17.

Kurta, A. 2005. Roosting ecology and behavior of Indiana bats (*Myotis sodalis*) in summer. Pp. 29-42 *in* K.C. Vories and A. Harrington (eds.), Proceedings of the Indiana bat and coal mining: a technical interactive forum. Office of Surface Mining, U.S. Department of the Interior, Alton, IL. Available at: http://www.mcrcc.osmre.gov/PDF/Forums/Bat%20Indiana/TOC.pdf. (Accessed October 17, 2006).

Kurta, A. and S.W. Murray. 2002. Philopatry and migration of banded Indiana bats (*Myotis sodalis*) and effects of radio transmitters. Journal of Mammalogy 83:585-589.

Kurta, A. and H. Rice. 2002. Ecology and management of the Indiana bat in Michigan. Michigan Academician 33:361-376.

Kurta, A., and J.O. Whitaker, Jr. 1998. Diet of the endangered Indiana bat (*Myotis sodalis*) on the northern edge of its range. American Midland Naturalist 140:280-286.

Kurta, A., K.J. Williams, and R. Mies. 1996. Ecological, behavioral, and thermal observations of a peripheral population of Indiana bats (*Myotis sodalis*). Pages 102-117 *in* Bats and Forests Symposium (R. M. R. Barclay and R. M. Brigham, eds.). Research Branch, British Columbia Ministry of Forests, Victoria, British Columbia, Canada, Working Paper 23:1-292.

Kurta, A., S.W. Murray, and D.H. Miller. 2002. Roost selection and movements across the summer landscape. Pp. 118-129 *in* A. Kurta and J. Kennedy (eds.), The Indiana bat: biology and management of an endangered species. Bat Conservation International, Austin, TX.

Kurta A., G.P. Bell, K.A. Nagy, and T.H. Kunz. 1989. Energetics of pregnancy and lactation in free-ranging little brown bat (*Myotis lucifugus*). Physiological Zoology 62: 804–818.

Lacki, M. J., S. K. Amelon, and M. D. Baker. 2007. Foraging ecology of bats in forests *in* M.J. Lacki, J.P. Hayes, and A. Kurta (eds), Bats in forests: conservation and management. Johns Hopkins University Press, Baltimore, MD.

Laval, R.K., R.L. Clawson, M.L. LaVal and W. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats, with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. *J. of Mammal.* 58(4):592-599.

Lee, Y.F. 1993. Feeding ecology of the Indiana bat, *Myotis sodalist*, and resource partitioning with *Myotis keenii* and *Myotis lucifugus*. Unpubl. M.S. Thesis, the University of Tennessee, Knoxville, TN.

Lesinski, G. 2007. Bat road casualties and factors determining their number. Mammalia, 71, 138–142.

Lesinski, G., A. Sikora, and A. Olszewski. 2011. Bat casualties on a road crossing a mosaic landscape. European Journal of Wildlife Research 2010:1–7.

Lewis, S.E. 1993. Effect of climatic variation on reproduction by pallid bats (*Antrozous pallidus*). Canadian Journal of Zoology 71:1429-1433.

Loeb, S.C. and E.A. Winters. 2013. Indiana bat summer maternity distribution: effects of current and future climates. Ecology and Evolution 3(1): 103-114.

Lyman, F.E. 1943. A pre-impoundment bottom-fauna study of Watts Bar Reservoir area (Tennessee). Trans, Amer. Fish. Soc. 72:52-62.

MacGregor J., J. Kiser, M. Gumbert, and T. Reed. 1999. Autumn roosting habitat of male Indiana bats (*Myotis sodalis*) in a managed forest setting in Kentucky. Pp. 169-170 in J. Stringer and D. Loftis (eds), Proceedings 12th central hardwood forest conference, 1999 February 28-March 1-2, Lexington, KY. General Technical Report SRS-24. U.S. Department of Agriculture, Forest Service, Southern Research Station, Asheville, NC.

Martin, C.O. 2005. Effects of military training noise on bat behavior. U.S. Army Corps of Engineers Threatened and Endangered Species Research Update Newsletter, November 2005:3-4.

Martin, C.O. 2007. Assessment of the population status of the gray bat (*Myotis grisescens*). Status review, DoD initiatives, and results of a multi-agency effort to survey wintering populations at major hibernacula, 2005-2007. Environmental Laboratory, U.S. Army Corps of Engineers, Engineer Research and Development Center Final Report ERDC/EL TR-07-22. Vicksburg, Mississippi. 97pp.

Martin, C.O., R.F. Lance, B.M. Sabol, and L.L. Pater. 2004. An investigation of military training noise impacts on endangered bats. Paper B9-03 in B. C. Alleman and S. A. Downs, eds., Sustainable Range Management – 2004, Proceedings of the Conference on Sustainable Range Management, New Orleans, LA, 5-8 Jan 2004. Battelle Press, Columbus, OH.

McMurtrie, W. 1874. Bat-excrement. Am. Chem. March: 339.

Menzel, J.M., W.M. Ford, M.A. Menzel, T.C. Carter, J.E. Gardner, J.D. Garner, and J.E. Hofmann. 2005. Summer habitat use and home-range analysis of the endangered Indiana bat. Journal of Wildlife Management 69(1):430-436.

Meteyer, C.U., E.L. Buckles, D.S. Blehert, A.C. Hicks, D.E. Green, V. Shearn-Bochsler, N.J. Thomas, A. Gargas, and M.J. Behr. 2009. Histopathologic criteria to confirm white-nose syndrome in bats. Journal of Veterinary Diagnostic Investigation 21:411-414.

Mikula, P., F. Morelli, R.K. Lucan, D.N. Jones, P. Tryjanowski. 2016. Bats as prey of diurnal birds: a global perspective. Mammal Review 46: 160-174.

Minshall, J.N. 1967. Life history and ecology of *Epeorus pleura/is* (Banks) (Ephemeroptera: Heptageniidae). Amer. Midland Nat. 78:369-388.

Mitchell, W.A. 1998. Species profile: gray bat (*Myotis grisescens*) on military installations in the southeastern United States. U.S. Army Corps of Strategic Environmental Research and Development Program Technical Rep- SERDP-98-6, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS. 25pp.

Mitchell, W.A., and C.O. Martin. 2002. Cave- and Crevice-Dwelling Bats on USACE Projects: Gray Bat *(Myotis grisescens).*

Mohr, C.E. 1972. The status of threatened species of cave-dwelling bats. Bulletin of the National Speleological Society 34:33-47.

Mumford, R.E. and L.L. Calvert. 1960. *Myotis sodalis* evidently breeding in Indiana. Journal of Mammalogy 41:512.

Murray, S.W. and A. Kurta. 2002. Spatial and temporal variation in diet. Pp. 182-192 in A. Kurta and J. Kennedy (eds.), The Indiana bat: biology and management of an endangered species Bat Conservation International, Austin, TX.

Murray, S.W. and A. Kurta. 2004. Nocturnal activity of the endangered Indiana bat (*Myotis sodalis).* Journal of Zoology 262:197-206.

Norberg, U.M., J.M.V. Rayner. 1987. Ecological morphology and flight in bats (Mammalia: Chiroptera): wing adaptations, flight performance, foraging strategy and echolocation. Philosophical Transactions of the Royal Society of London B. 316, 335-427.

Ormsbee, P.C., J.D. Kiser, and S.I. Perimeter. 2007. Importance of night roosts to the ecology of bats. Chapter 5 in Forests: Conservation and management (M. J. Lacki, J. P. Hayes, and A. Kurta, Eds). John Hopkins University Press, Baltimore, Maryland. 368 pp.

Oswalt, Christopher M. 2012. Kentucky, 2010—forest inventory and analysis factsheet. e-Science Update SRS–057. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 6 p.

Palm, J. 2003. Indiana bat (*Myotis sodalis*) summer roost tree selection and habitat use in the Champlain Valley of Vermont. M.S. Thesis. Antioch University, Keene, NH.

Patterson, B.D., M.R. Willig, and R.D. Stevens. 2003. Trophic strategies, niche partitioning, and patterns of ecological organization. *In* T.H. Kunz and M.B. Fenton (Eds), Bat Ecology. The University of Chicago Press.

Pettit, J.L. and J.M. O'Keefe. 2017. Impacts of white-nose syndrome observed during long-term monitoring of a Midwestern bat community. Journal of Fish and Wildlife Management 8(1): 69-78.

Rabinowitz, A. R., and M. D. Tuttle. 1982. A test of the validity of two currently used methods of determining bat prey preferences. ACTA Theriologica 27, 21:283-293.

Racey, P.A. 1982. Ecology of bat reproduction. Pp. 57-104 *in* T.H. Kunz (ed.), Ecology of bats. Plenum Press, New York, NY. 425 pp.

Racey, P.A., and A.C. Entwistle. 2003. Conservation ecology of bats. *In* T.H. Kunz and M.B. Fenton (Eds), Bat Ecology. The University of Chicago Press.

Reeder, D. M., C. L. Frank, G. R. Turner, C. U. Meteyer, A. Kurta, E. R. Britzke, M. E. Vodzak, S. R. Darling, C. W. Stihler, A. C. Hicks, R. Jacob, L. E. Grieneisen, S. A. Borwnlee, L. K. Muller, and D. S. Blehert. 2012. Frequent arousal from hibernation linked to severity of infection and mortality in bats with white-nose syndrome. PLoS ONE 7:e38920.

Reichard, J.D. and T.H. Kunz. 2009. White-nose syndrome inflicts lasting injuries to the wings of little brown myotis (*Myotis lucifugus*). Acta Chiropterologica, 11(2):457-464.

Richter, A. R., S. R. Humphrey, J. B. Cope, V. Brack. 1993. Modified cave entrances: thermaleffect on body mass and resulting decline of endangered Indiana bats (*Myotis sodalis*). Conservation Biology, 7(2):407-415.

Rommé, R.C., A.B. Henry, R.A. King, T. Glueck, and K. Tyrell. 2002. Home range near hibernacula in spring and autumn. Pp. 153-158 in A. Kurta and J. Kennedy (eds.), The Indiana bat: biology and management of an endangered species Bat Conservation International, Austin, TX.

Russell, A.L., C.M. Butchkoski, L. Saidak, and G.F. McCracken. 2009. Road-killed bats, highway design, and the commuting ecology of bats. Endangered Species Research 8:49–60.

Rydell, J. 1992. Exploitation of insects around streetlamps by bats in Sweden. Functional Ecology 6(6):744-750.

Sasse, D.B., R.L. Clawson, M.J. Harvey, and S.L. Hensley. 2007. Status of populations of the endangered gray bat in the western portion of its range. *Southeast. Naturalist* 6(1):165-172.

Schaub, A., J. Ostwald, and B.M. Siemers. 2008. Foraging bats avoid noise. Journal of Experimental Biologist 211:3174-3180.

Sherman, A.R., and C.O. Martin. 2006. Rediscovery of the Gray Bat *(Myotis grisescens)* in Northeastern Mississippi. The Southwestern Naturalist. Vol. 51, No. 3, pp. 418-420.

Silvis, A., A.B. Kniowski, S.D. Gehrt, and W.M. Ford. 2014. Roosting and foraging social structure of the endangered Indiana bat (*Myotis sodalis*). PloS ONE 9(5):1-12.

Smith, W.B., P.D. Miles, J.S. Vissage, and S.A. Pugh. 2003. Forest resources of the United States, 2002. U.S. Department of Agriculture, Forest Service, North Central Research Station, St. Paul, MN. General Technical Report NC-241. 137 pp. Available at: http://www.ncrs.fs.fed.us/pubs/viewpub.asp?key=1987. (Accessed June 5, 2017).

Sparks, D.W. 2003. How does urbanization impact bats? Ph.D. Dissertation. Indiana State University, Terre Haute, IN.

Sparks D.W., M.T. Simmons, C.L. Gummer, and J.E. Duchamp. 2003. Disturbance of roosting bats by woodpeckers and raccoons. Northeastern Naturalist 10:105-8.

Sparks, D.W., J.O. Whitaker, Jr., and C.M. Ritzi. 2005. Foraging ecology of the endangered Indiana bat. Pp. 15-27 *in* K.C. Vories and A. Harrington (eds.), The Proceedings of the Indiana bat and coal mining: a technical interactive forum. Office of Surface Mining, U.S. Department of the Interior, Alton, IL.

Speakman, J.R. and A. Rowland. 1999. Preparing for inactivity: how insectivorous bats deposit a fat store for hibernation. Proc. Nutr. Soc. 58(1): 123-131

Stone, E.L., G. Jones, and S. Harris. 2009. Street lighting disturbs commuting bats. Current Biology 19:1123-1127.

Stone, E.L., G. Jones, and S. Harris. 2012. Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. Global Change Biology 18:2458-2465.

Thomson, C.E. 1982. *Myotis sodalis*. Mammalian Species. 163:1-5.

Thomas, D. P. 1994. A radiotelemetric assessment of the foraging ecology of the gray bat (*Myotis grisescens*) at Guntersville Reservoir, Alabama. M.S. Thesis, Auburn University, AL.

Thomas, D.P. and T.L. Best. 2000. Radiotelemetric Assessment of Movement Patterns of the Gray Bat (*Myotis grisescens*) at Guntersville Reservoir, Alabama. In B.R. Chapman and J. Laerm, eds., Fourth Colloquium of Conservation of Mammals in the Southeastern United States. Occasional Papers of the North Carolina Museum of Natural Sciences and the North Carolina Biological Survey, Number 12, Fall 2000.

Thomas, D.W., M. Dorais, and J.M. Bergeron. 1990. Winter energy budgets and cost of arousals for hibernating little brown bats, *Myotis lucifugus.* Journal of Mammalogy 71(3):475-479.

Turner, Jeffery A.; Oswalt, Christopher M.; Chamberlain, James L.; Conner, Roger C.; Johnson, Tony G.; Oswalt, Sonja N.; Randolph, Kadonna C. Kentucky's forests, 2004 Resour. Bull. SRS–129. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 101 p.

Turner, G.G., D.M. Reeder, and J.T.H. Coleman. 2011. A five-year assessment of mortality and geographic spread of white-nose syndrome in North American bats and a look to the future. Bat Research News 52(2): 13-27.

Tuttle, M.D. 1975. Population ecology of the gray bat *(Myotis grisescens):* factors influencing early growth and development. Occas. Papers Mus. Nat. Hist., Univ. Kansas 36:1-24.

Tuttle, M.D. 1976a. Population ecology of the gray bat (*Myotis grisescens*): Factors influencing growth and survival of newly volant young. *Ecol.* 57:587-595.

Tuttle, M.D. 1976b. Population ecology of the gray bat (*Myotis grisescens*): philopatry, timing and patterns of movement, weight, loss during migration, and seasonal adaptive strategies. Occasional Paper No. 54, University of Kansas Museum of Natural History, Lawrence. 38pp.

Tuttle, M.D. 1977. Gating as a means of protecting cave dwelling bats. Pages 77-82 *in* National Cave Management Symposium Proceedings, 1976. T. Aley and D. Rhodes, eds., Speleobooks, Albuquerque, New Mexico. 146 pp.

Tuttle, M.D. 1979. Status, causes of decline, and management of endangered gray bats. *J. of Wild. Manage.* 43(1):1-17.

Tuttle, M.D., and D.E. Stevenson. 1977. An analysis of migration as a mortality factor in the gray bat based on public recoveries of banded bats. Amer. Midland Nat. 97:235-240.

Tuttle, M.D., and D.E. Stevenson. 1978. Variation in the Cave Environment and its Biological Implications. *In* Zuber, R., et al. (eds.), Nat. Cave Manage. Symp. Proc., 1977. Speleobooks, Adobe Press, Albuquerque, NM.

Tuttle, M.D., and D.E. Stevenson. 1982. Growth and survival ofbats. Chapter 3, pp 105-150, *in* Ecology of Bats (T. H. Kunz, eds.). Plenum Press, New York.

Tuttle, M.D. and J. Kennedy. 2005. Field guide to eastern cave bats. Bat Conservation International, Inc., Austin, TX. 41pp.

U.S. Army Garrison Fort Drum. 2011. Biological Assessment on the proposed activities on the Fort Drum Military Installation, Fort Drum, New York (2012-2014) for the Federally-endangered Indiana bat (*Myotis sodalis*).

U.S. Fish and Wildlife Service. 1982. Gray bat recovery plan. Minneapolis, MN. 26pp. + appendices.

U.S. Fish and Wildlife Service (USFWS). 1983. Recovery Plan for the Indiana Bat. Twin Cities, MN.

U.S. Fish and Wildlife Service (USFWS). 1999. Final biological opinion for the proposed streambank stabilization and the Yano Range and upgrade of the Wilcox Tank Range at Fort Knox, Kentucky. USFWS Cookeville Field Office, Cookeville, TN. 18 pp.

U.S. Fish and Wildlife Service (USFWS). 2002. Final biological opinion on the application for an incidental take permit for the federally endangered Indiana bat (*Myotis sodalis*) for the Six Points Road interchange and associated development. USFWS Bloomington Field Office, Bloomington, IN. 36 pp.

U.S. Fish and Wildlife Service (USFWS). 2007. Indiana bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. Fort Snelling, MN.

U.S. Fish and Wildlife Service. 2009a. Gray bat *(Myotis grisescens)* 5-Year Review: Summary and Evaluation. Midwest Region - Region 3. Columbia, Missouri Ecological Services Field Office. Columbia, Missouri. 23 pp. and appendices and tables.

U.S. Fish and Wildlife Service (USFWS). 2009. Indiana bat (*Myotis sodalis*) Five-year Review: Summary and Evaluation. USFWS, Bloomington Field Office, Bloomington, IN.

U.S. Fish and Wildlife Service (USFWS). 2011. Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects. Available at: http://www.fws.gov/midwest/endangered/mammals/inba/WindEnergyGuidance.html

U.S. Fish and Wildlife Service (USFWS). 2014. Indiana Bat Fatalities at Wind Energy Facilities. https://www.fws.gov/midwest/wind/wildlifeimpacts/inbafatalities.html#Table1. Accessed 13 June 2017.

U.S. Fish and Wildlife Service (USFWS). 2017. Indiana bat Rangewide Population Estimates. Available online at: https://www.fws.gov/Midwest/endangered/mammals/inba/pdf/2017IBatPopEstimate5July2017.pdf.

U.S. Forest Service (USFS). 2005. A snapshot of the northeastern forests. U.S. Department of Agriculture, Forest Service, Northeastern Area, State and Private Forestry. Newton Square, PA. NA-IN-01-06. 23 pp. Available at: http://na.fs.fed.us/pubs/misc/snap_shot/ss.pdf. (Accessed: December 13, 2007).

U.S. Forest Service (USFS). 2006. NCRS–the changing Midwest assessment. U.S. Department of Agriculture, Forest Service, North Central Research Station, St. Paul, MN. Available at: http://www.ncrs.fs.fed.us/4153/deltawest/landcover. (Accessed: January 25, 2006).

U.S. Forest Service (USFS). 2012. 2010 Resources Planning Act Assessment. Gen. Tech. Rep. WO-87. Washington, D.C., 198pp.

Warnecke, L., J.M. Turner, T.K. Bollinger, J.M. Lorch, V. Misra, P.M. Cryan, G. Wibbelt, D.S.Blehert, and C.K.R. Willis. 2012. Inoculation of bats with European *Geomyces destructans* supports the novel pathogen hypothesis for the origin of white-nose syndrome. PNAS 109(18):6999-7003.

Watrous, K.S., T.M. Donovan, R.M. Mickey, S.R. Darling, A.C. Hicks, and S.L. von Oettingen. 2006. Predicting minimum habitat characteristics for the Indiana bat in the Champlain Valley. Journal of Wildlife Management 70(5):1228-1237.

Whitaker, J.O., Jr. 2004. Prey selection in a temperate zone insectivorous bat community. Journal of Mammalogy 85:460-469.

Whitaker, J.O., and W.J. Hamilton. 1998a. Gray Myotis, Gray Bat, *Myotis grisescens,* A.H. Howell. Page 87 *in* Mammals of the eastern United States, Third Edition. Comstock Publishing Associates, a Division of Cornell University Press, Ithaca, New York. 583 pp.

Whitaker, J.O., Jr. and V. Brack, Jr. 2002. Distribution and summer ecology in Indiana. Pp. 48-54 *in* A. Kurta and J. Kennedy (eds.), The Indiana bat: biology and management of an endangered species. Bat Conservation International, Austin, TX.

Whitaker, J. O., Jr., L. Pruitt, and S. Pruitt. 2001. The gray bat, Myotis grisescens, in Indiana. Proceedings of the Indiana Academy of Science 110:114-122.

Willis C. K. R, A. K. Menzies, J. G. Boyles, and M. S. Wojciechowski. 2011. Evaporative water loss is a plausible explanation for mortality of bats from white-nose syndrome. Integrated and Comparative Biology 51:364–373.

Winhold, L. and A. Kurta. 2006. Aspects of Migration by the Endangered Indiana Bat, *Myotis sodalis*. Bat Research News 47:1-11.

Wray S, Reason P, Wells D, Cresswell W and Walker H. 2006. Design, installation, and monitoring of safe crossing points for bats on a new highway scheme in Wales. *In* Proceedings of the 2005 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 369-379.

Zhao, J., T.H. Kunz, N. Tumba, L.C. Schulz, C. Li, M. Reeves, and E.P. Widmaier. 2003. Comparative analysis of expression and secretion of placental leptin in mammals. American Journal of Physiology Regulatory, Integrative and Comparative Physiology 285: 438–446.

Zurcher, A.A, D.W. Sparks, and V.J. Bennett. 2010. Why the bat did not cross the road. Acta Chiropterologica 12:337–340.

Personal Communications:

Copperhead Environmental Consulting, Inc. 2014. Migration and Summer Maternity Colony Range Map.

K. Lott. U.S. Fish and Wildlife Service.

Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

August 29, 2024

Danny Peake
Kentucky Transportation Cabinet (KYTC)
200 Mero St
Frankfort, KY 40622

Re: §401 Water Quality Certification
Bobo Rd - McCracken Co
Extension of Bobo Road Project
WQC No: WQC2024-138-7
AI No.: 177955; Activity ID: APE20240001
KYTC Item No.: 1-8702.00
USACE ID No.: LRL-2023-00445-NCC
UT Massac Creek
McCracken County, Kentucky

Dear Mr. Peake:

Pursuant to Section 401 of the Clean Water Act (CWA) and 40 CFR 121.7(c), the Commonwealth of Kentucky certifies it has reasonable assurances that applicable water quality standards under Kentucky Administrative Regulations Title 401, Chapter 10, established pursuant to Sections 301, 302, 303, 304, 306, and 307 of the CWA, will not be violated by the above referenced project provided that the U.S. Army Corps of Engineers authorizes the activity under a federal license or permit, and the attached conditions are met.

Other permits from the Division of Water may be required for this activity. Projects that disturb one acre or more of land or is part of a larger common plan of development or sale that will ultimately disturb one acre or more of land require a Kentucky Pollution Discharge Elimination System (KPDES) Stormwater Permit; contact the Surface Water Permits Branch (502-564-3410 or SWPBSupport@ky.gov). A Groundwater Protection Plan is required if activities listed in Section 2(2) of 401 KAR 5:037 are conducted. A Water Withdrawal Application is required for activities proposing raw water withdrawals of 10,000 gallons per day or more; contact the Watershed Management Branch (502-564-3410).

All future correspondence on this project must reference **AI No. 177955**. **The attached document is your official Water Quality Certification; please read it carefully**. Please contact Bryan Killian by phone at 502-782-

4695 or email at bryan.killian@ky.gov if you have any questions.

Sincerely,

Samantha Vogeler

Samantha Vogeler, Supervisor
Water Quality Certification Section
Kentucky Division of Water

SV:BK
Attachment

cc: Emma Priger, KYTC: Frankfort (via email: emma.priger@ky.gov)
Andrew Logsdon, KYTC: Frankfort (via email: Andrew.Logsdon@ky.gov)
Dave Harmon, KYTC: Frankfort (via email: Dave.Harmon@ky.gov)
Norma Condra, USACE: Louisville District (via email: Norma.C.Condra@usace.army.mil)
Ellen Mullins, Stantec (via email: ellen.mullins@stantec.com)
Lee Andrews, USFWS: Frankfort (via email: kentuckyes@fws.gov)
Rhonda Lamb, Four Rivers Basin Coordinator (via email: rlamb@murraystate.edu)
Madeline Traylor, Paducah Regional Office (via email: madeline.traylor@ky.gov)

KTC Water Quality Certification

Bobo Rd - McCracken Co

Facility Requirements

Permit Number: WQC2024-138-7

Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Submittal/Action Requirements:

Condition No.	Condition
S-1	Prior to any construction activity, The Kentucky Transportation Cabinet shall submit to the Water Quality Section Project Manager a copy of the receipt of purchase of 26.8 wetland Adjusted Mitigation Units (AMUs) from an approved mitigation bank and purchase of 1,230 stream AMUs from an approved Kentucky in-lieu fee (ILF) program fund. Credits must be purchased prior to impacts. Mitigation banks and ILF programs are considered approved as defined in the April 10, 2008 Final Rule, 40 CFR Part 230: Compensatory Mitigation for Losses of Aquatic Resources. This condition is necessary to allow impacts to occur. Compensatory mitigation is the method to approve impacts and entire losses of a water resource. The Division can approve impacts and loss based on the confidence that the resource will be replaced and not result in a net loss of aquatic resources. Compensatory mitigation is the method of compliance for the Commonwealth's water quality standards. [33 CFR 332, 40 CFR 230, 401 KAR 10:031 Section 2(1)(a)]
S-2	KYTC shall notify the Water Quality Certification Project Manager or Supervisor of the scheduled start of construction activities at least two weeks before the start of construction. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
S-3	KYTC shall notify the Water Quality Certification Project Manager or Supervisor of substantial completion of construction no later than two weeks post-construction. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
S-4	KYTC shall submit as-built drawings within 90 days after substantial completion of construction to the Water Quality Certification Section Project Manager or Supervisor. This condition is necessary to monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Submittal/Action Requirements:

Condition No.	Condition
S-5	KYTC shall submit annual monitoring reports by the 31st of December each year for a period of not less than 1 year beginning with the first full growing season of planted vegetation. The beginning of the growing season is presumed to be March 1st. The report shall be written in accordance with the approved monitoring plans in the KDOW_NOD#2_ResponseMemo_07092024_final.pdf dated 7/8/2024. The report shall be submitted to the Water Quality Certification Section. Any changes to the approved monitoring must be approved by the Division of Water. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
S-6	KYTC shall submit request for the release of wetlands from monitoring requirements to the Water Quality Certification Section Project Manager or Supervisor. The report shall be submitted to the Water Quality Certification Section. Any changes to the approved monitoring plan must be approved by the Division of Water. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [KRS 224.10-100, KRS 224.1616(-050)(2), KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-1	The work approved by this certification shall be limited to 37.1025672, -88.7428042: - Reconstruct, raise, and extend Bobo Road in McCracken County largely on fill with overflow structures within floodplain areas and structures (bridges and/or box culverts) at each delineated stream crossing - 139 linear feet of permanent impacts to perennial steams - 379 linear feet of permanent impacts to intermittent streams - 8.56 acres of permanent impacts to wetlands - 48 linear feet of temporary impacts to perennial steams - 85 linear feet of temporary impacts to intermittent streams - 2.16 acres of temporary impacts to wetlands This condition is necessary to confirm activities approved by this certification. [401 KAR 10:030 Section 1, 401 KAR 9:010 Section 1(a)(2), KRS 224.10-100, KRS 224.70-110]
T-2	Any temporary impacts to wetlands must delineate as wetlands during the 1st monitoring report for the Division of Water to release the project from monitoring. For any temporarily impacted wetlands not delineating as wetlands post-construction 1 year, a corrective action plan must be submitted and approved by the Water Quality Certification Section. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-3	All work performed under this certification shall adhere to the design and specifications set forth in the following document(s): - Application for Permit to Construct Across or Along a Stream and/or Water Quality Certification received on 4/19/2024 - Pre-file Meeting Request received on 4/19/2024 - Certification Request received on 7/30/2024 - 1-8702 Ext Bobo Rd_Environmental Permitting_19April2024.pdf - SIGNED_Eng_Form_4345_2022Sep_23Feb2024.pdf - B1_Dec2023ORM Worksheet_23Feb2024.xlsm - B1_Eng_Form_6247_2023Nov17_23Feb2024_signed.pdf - Pre-Filing Meeting Request Form 2022.pdf - SIGNED_DOW7116_Application Form_23Feb2024.pdf - xmit email.msg - NOD #1 Bobo Rd - McCracken Co (AI 177955).pdf - Site Photos.pdf - NOD #2 Bobo Rd - McCracken Co (AI 177955).pdf - KDOW_NOD#1_ResponseMemo_070324.pdf - Attachment3_Bobo_connecting_water_rev.zip - Attachment4_bobo_boundary 2.zip - KDOW_NOD#2_ResponseMemo_07092024_final.pdf This condition is necessary to confirm activities approved by this certification. [401 KAR 10:030 Section 1, 401 KAR 9:010 Section 1(a)(2), KRS 224.10-100, KRS 224.70-110]
T-4	Mitigation for stream and/or wetland impacts shall begin prior to or concurrently with impacts. This condition is necessary to allow impacts to occur. Compensatory mitigation is the method to approve impacts and entire losses of a water resource. The Division can approve impacts and loss based on the confidence that the resource will be replaced and not result in a net loss of aquatic resources. Compensatory mitigation is the method of compliance for the Commonwealth's water quality standards. [33 CFR 332, 401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-5	KYTC is responsible for preventing degradation of waters of the Commonwealth from soil erosion. An erosion and sediment control plan must be designed, implemented, and maintained in effective operating condition at all times during construction. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-6	Heavy equipment (e.g. bulldozers, backhoes, draglines, etc.), if required for this project, should not be used or operated within the stream channel. In those instances where such instream work is unavoidable, then it shall be performed in such a manner and duration as to minimize re-suspension of sediments and disturbance to the channel, banks, or riparian vegetation. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-7	Erosion and sediment pollution control plans and Best Management Practices must be designed, installed, and maintained in effective operating condition at all times during construction activities so that violations of state water quality standards do not occur. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-8	Remove all sediment and erosion control measures after re-vegetation has become well-established. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-9	Any fill or riprap shall be of a composition that shall not cause violations of water quality standards by adversely affecting the biological, chemical, or physical properties of waters of the Commonwealth. If riprap is used, it shall be of a weight and size that bank stress or slump conditions shall not occur. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-10	No in-stream operations or activities shall be conducted during fish spawning season (April 1 through June 30), due to the potential impacts of increased sediment load and associated water quality and designated aquatic habitat impacts. This condition is necessary to monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 4(1)(c,h), KRS 224.10-100, KRS 224.70-110]
T-11	Sediment and erosion control measures (e.g., check-dams, silt fencing, or hay bales) shall not be placed within surface waters of the Commonwealth, either temporarily or permanently, without prior approval by the Kentucky Division of Water's Water Quality Certification Section. If placement of sediment and erosion control measures in surface waters is unavoidable, placement shall not be conducted in such a manner that may cause instability of streams that are adjacent to, upstream, or downstream of the structures. All sediment and erosion control measures shall be removed and the natural grade restored prior to withdrawal from the site. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-12	No water is to be released into the new channel until channel construction is complete and the new channel is stabilized. The existing channel is to be left undisturbed until water can be released into the new channel. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-13	Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction from entering the watercourse. This condition is necessary to prevent water pollution as prohibited by statute. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-14	To the maximum extent practicable, all in-stream work under this certification shall be performed during low flow. This condition is necessary to prevent and minimize objectionable deposits and pollution and protect the use of the stream. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-15	Removal of existing riparian vegetation shall be restricted to the minimum necessary for project construction. This condition is necessary to minimize negative effects to the environment, protect the use of the stream, and protect aquatic resources. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-16	Should stream pollution, wetland impairment, and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/564-2380. This condition is necessary to monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 10:031 Section 2(1)(a), KRS 224.10-100, KRS 224.70-110]
T-17	This Water Quality Certification expires on August 28, 2029. This condition is necessary for the issuance of the certification. [KRS 224.10-100, KRS 224.16-050(2), KRS 224.70-110, KRS 224.70-110]

KTC Water Quality Certification
Bobo Rd - McCracken Co
Facility Requirements
Permit Number: WQC2024-138-7
Activity ID No.:APE20240001

ACTV0000000001 (AI 177955 - Bobo Rd) Road Extension:

Narrative Requirements:

Condition No.	Condition
T-18	Other permits from the Division of Water may be required for this activity. If this activity occurs within a floodplain, a Permit to Construct Across or Along a Stream may be required. Please contact the Floodplain Management Section Supervisor (502-564-3410) for more information prior to construction. If the project will disturb one acre or more of land, or is part of a larger common plan of development or sale that will ultimately disturb one acre or more of land, a Kentucky Pollution Discharge Elimination System (KPDES) Stormwater Permit shall be required. Please contact the Surface Water Permits Branch (502-564-3410 or SWPBSupport@ky.gov) for more information. A Groundwater Protection Plan is required if any of the activities listed in Section 2(2) of 401 KAR 5:037 are conducted. A Water Withdrawal Application is required for any activities proposing raw water withdrawals of 10,000 gallons per day or more. For technical assistance contact the Watershed Management Branch at 502-564-3410 or visit eec.ky.gov. This condition is necessary for confirm authorized impacts, the appropriate responsible party, monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, KRS 224.16-050(2), KRS 224.70-110]
T-19	If there is a transfer or conveyance of the project site during the issued WQC term for the approved activity, KYTC shall submit written notice to the Water Quality Certification Section Project Manager or Supervisor of the transfer or conveyance of the project site or any part of the project site at least 60 days prior to the transfer or conveyance of the project site. The notification shall include the WQC number; the Agency Interest (AI) No.; the name, mailing address, email address, and telephone number of the current owner; the name, mailing address, email address, and telephone number of the prospective transferee; the proposed effective date of transfer/conveyance; and a copy of the documentation evidencing the transfer/conveyance. Failure to comply with this condition does not negate the validity or enforceability of this certification. This condition is necessary for confirm authorized impacts, the appropriate responsible party, monitor the aquatic resources, minimize impact to aquatic resources, protect the use and designation of resources, allow more effective and efficient control practices, identify changes and conditions in ecological systems as a result of activities, and to warn of emergency conditions. [401 KAR 10:030 Section 1, 401 KAR 9:010 Section 1(a)(2), KRS 224.10-100, KRS 224.70-110]

Kentucky Transportation Cabinet

Highway District 1

And

_____(2), Construction

Kentucky Pollutant Discharge Elimination System Permit KYR10 Best Management Practices (BMP) plan

Groundwater protection plan

For Highway Construction Activities

For

Construct New Access from KY-358 to Bobo Rd (McCracken Co)

McCracken County, KY

Project: PCN ##-####

Revised 3/4/2016

Project information

Note – (1) = Design (2) = Construction (3) = Contractor

1. Owner – Kentucky Transportation Cabinet, District 1

2. Resident Engineer: (2)

3. Contractor name: (2)
   Address: (2)

   Phone number: (2)
   Contact: (2)
   Contractors agent responsible for compliance with the KPDES permit requirements (3):

4. Project Control Number (2)

5. Route (Address) 7710 Ogden Landing Rd. West Paducah, KY. 42086

6. Latitude/Longitude (project mid-point) 37.100964, 88.742915

7. County (project mid-point) - McCracken

8. Project start date (date work will begin): (2)

9. Projected completion date: (2)

KYTC BMP Plan for Project CID 01 – 8702.00

A. Site description:

1. Nature of Construction Activity (from letting project description) – Construct new access road from KY-358 to Bobo Rd.

2. Order of major soil disturbing activities (2) and (3)

3. Projected volume of material to be moved

4. Estimate of total project area (acres) 29.3 acres

5. Estimate of area to be disturbed (acres) 15.36 acres

6. Post construction runoff coefficient will be included in the project drainage folder. Persons needing information pertaining to the runoff coefficient will contact the resident engineer to request this information.

7. Data describing existing soil condition - The geologic mapping indicates that alluvial soils consisting of sand, silt, sandy gravel, and cherty rubble are present at the site. Large area of wetland and saturated soils present.

8. Data describing existing discharge water quality (if any) (1) & (2)

9. Receiving water name – Withrow Creek, West Fork Massac Creek, Massac Creek

10. TMDLs and Pollutants of Concern in Receiving Waters: Sedimentation/Siltation concerns downstream

11. Site map – Project layout sheet plus the erosion control sheets in the project plans that depict Disturbed Drainage Areas (DDAs) and related information. These sheets depict the existing project conditions with areas delineated by DDA (drainage area bounded by watershed breaks and right of way limits), the storm water discharge locations (either as a point discharge or as overland flow) and the areas that drain to each discharge point. These plans define the limits of areas to be disturbed and the location of control measures. Controls will be either site specific as designated by the designer or will be annotated by the contractor and resident engineer before disturbance commences. The project layout sheet shows the surface waters and wetlands.

12. Potential sources of pollutants:

The primary source of pollutants is solids that are mobilized during storm events. Other sources of pollutants include oil/fuel/grease from servicing and operating construction equipment, concrete washout water, sanitary wastes and trash/debris. (3)

B. Sediment and Erosion Control Measures:

1. Plans for highway construction projects will include erosion control sheets that depict Disturbed Drainage Areas (DDAs) and related information. These plan sheets will show the existing project conditions with areas delineated by DDA within the right of way limits, the discharge points and the areas that drain to each discharge point. Project managers and designers will analyze the DDAs and identify Best Management Practices (BMPs) that are site specific. The balance of the BMPs for the project will be listed in the bid documents for selection and use by the contractor on the project with approval by the resident engineer.

   Projects that do not have DDAs annotated on the erosion control sheets will employ the same concepts for development and managing BMP plans.

2. Following award of the contract, the contractor and resident engineer will annotate the erosion control sheets showing location and type of BMPs for each of the DDAs that will be disturbed at the outset of the project. This annotation will be accompanied by an order of work that reflects the order or sequence of major soil moving activities. The remaining DDAs are to be designated as “Do Not Disturb” until the contractor and resident engineer prepare the plan for BMPs to be employed. The initial BMP’s shall be for the first phase (generally Clearing and Grubbing) and shall be modified as needed as the project changes phases. The BMP Plan will be modified to reflect disturbance in additional DDA’s as the work progresses. <u>All DDA’s will have adequate BMP’s in place before being disturbed.</u>

3. As DDAs are prepared for construction, the following will be addressed for the project as a whole or for each DDA as appropriate:

   - Construction Access – This is the first land-disturbing activity. As soon as construction begins, bare areas will be stabilized with gravel and temporary mulch and/or vegetation.

- At the beginning of the project, all DDAs for the project will be inspected for areas that are a source of storm water pollutants. Areas that are a source of pollutants will receive appropriate cover or BMPs to arrest the introduction of pollutants into storm water. Areas that have not been opened by the contractor will be inspected periodically (once per month) to determine if there is a need to employ BMPs to keep pollutants from entering storm water.
- Clearing and Grubbing – The following BMP's will be considered and used where appropriate.
    - Leaving areas undisturbed when possible.
    - Silt basins to provide silt volume for large areas.
    - Silt Traps Type A for small areas.
    - Silt Traps Type C in front of existing and drop inlets which are to be saved
    - Diversion ditches to catch sheet runoff and carry it to basins or traps or to divert it around areas to be disturbed.
    - Brush and/or other barriers to slow and/or divert runoff.
    - Silt fences to catch sheet runoff on short slopes. For longer slopes, multiple rows of silt fence may be considered.
    - Temporary Mulch for areas which are not feasible for the fore mentioned types of protections.
    - Non-standard or innovative methods.
- Cut & Fill and placement of drainage structures - The BMP Plan will be modified to show additional BMP's such as:
    - Silt Traps Type B in ditches and/or drainways as they are completed
    - Silt Traps Type C in front of pipes after they are placed
    - Channel Lining
    - Erosion Control Blanket
    - Temporary mulch and/or seeding for areas where construction activities will be ceased for 21 days or more.
    - Non-standard or innovative methods
- Profile and X-Section in place – The BMP Plan will be modified to show elimination of BMP's which had to be removed and the addition of new BMP's as the roadway was shaped. Probably changes include:
    - Silt Trap Type A, Brush and/or other barriers, Temporary Mulch, and any other BMP which had to be removed for final grading to take place.
    - Additional Silt Traps Type B and Type C to be placed as final drainage patterns are put in place.
    - Additional Channel Lining and/or Erosion Control Blanket.
    - Temporary Mulch for areas where Permanent Seeding and Protection cannot be done within 21 days.
    - Special BMP's such as Karst Policy

- Finish Work (Paving, Seeding, Protect, etc.) – A final BMP Plan will result from modifications during this phase of construction. Probably changes include:
  - Removal of Silt Traps Type B from ditches and drainways if they are protected with other BMP's which are sufficient to control erosion, i.e. Erosion Control Blanket or Permanent Seeding and Protection on moderate grades.
  - Permanent Seeding and Protection
  - Placing Sod
  - Planting trees and/or shrubs where they are included in the project
- BMP's including Storm Water Management Devices such as velocity dissipation devices and Karst policy BMP's to be installed during construction to control the pollutants in storm water discharges that will occur after construction has been completed are : Channel Lining

C. Other Control Measures

1. No solid materials, including building materials, shall be discharged to waters of the commonwealth, except as authorized by a Section 404 permit.

2. Waste Materials

All waste materials that may leach pollutants (paint and paint containers, caulk tubes, oil/grease containers, liquids of any kind, soluble materials, etc.) will be collected and stored in appropriate covered waste containers. Waste containers shall be removed from the project site on a sufficiently frequent basis as to not allow wastes to become a source of pollution. All personnel will be instructed regarding the correct procedure for waste disposal. Wastes will be disposed in accordance with appropriate regulations. Notices stating these practices will be posted in the office.

3. Hazardous Waste

All hazardous waste materials will be managed and disposed of in the manner specified by local or state regulation. The contractor shall notify the Section Engineer if there any hazardous wastes being generated at the project site and how these wastes are being managed. Site personnel will be instructed with regard to proper storage and handling of hazardous wastes when required. The Transportation Cabinet will file for generator, registration when appropriate, with the Division of Waste Management and advise the contractor regarding waste management requirements.

4. Spill Prevention

The following material management practices will be used to reduce the risk of spills or other exposure of materials and substances to the weather and/or runoff.

- **Good Housekeeping:**

The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough product required to do the job
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of the product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site contractor will inspect daily to ensure proper use and disposal of materials onsite

- **Hazardous Products:**

These practices will be used to reduce the risks associated with any and all hazardous materials.

- Products will be kept in original containers unless they are not resealable
- Original labels and material safety data sheets (MSDS) will be reviewed and retained
- Contractor will follow procedures recommended by the manufacturer when handling hazardous materials
- If surplus product must be disposed of, manufacturers' or state/local recommended methods for proper disposal will be followed

The following product-specific practices will be followed onsite:

- **Petroleum Products:**

Vehicles and equipment that are fueled and maintained on site will be monitored for leaks, and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products onsite will be stored in tightly sealed containers, which are clearly labeled and will be protected from exposure to weather.

The contractor shall prepare an Oil Pollution Spill Prevention Control and Countermeasure plan when the project that involves the storage of petroleum products in 55 gallon or larger containers with a total combined storage capacity of 1,320 gallons. This is a requirement of 40 CFR 112.

This project (will / will not) (3) have over 1,320 gallons of petroleum products with a total capacity, sum of all containers 55 gallon capacity and larger.

- **Fertilizers:**

Fertilizers will be applied at rates prescribed by the contract, standard specifications or as directed by the resident engineer. Once applied, fertilizer will be covered with mulch or blankets or worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

- **Paints:**

All containers will be tightly sealed and stored indoors or under roof when not being used. Excess paint or paint wash water will not be discharged to the drainage or storm sewer system but will be properly disposed of according to manufacturers' instructions or state and local regulations.

- **Concrete Truck Washout:**

Concrete truck mixers and chutes will not be washed on pavement, near storm drain inlets, or within 75 feet of any ditch, stream, wetland, lake, or sinkhole. Where possible, excess concrete and wash water will be discharged to areas prepared for pouring new concrete, flat areas to be paved that are away from ditches or drainage system features, or other locations that will not drain off site. Where this approach is not possible, a shallow earthen wash basin will be excavated away from ditches to receive the wash water

- **Spill Control Practices**

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup**:**

- Manufacturers' recommended methods for spill cleanup will be clearly posted. All personnel will be made aware of procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area. Equipment and materials will include as appropriate, brooms, dust pans, mops, rags, gloves, oil absorbents, sand, sawdust, and plastic and metal trash containers.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contract with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate state/local agency as required by KRS 224 and applicable federal law.
- The spill prevention plan will be adjusted as needed to prevent spills from reoccurring and improve spill response and cleanup.
- Spills of products will be cleaned up promptly. Wastes from spill clean up will be disposed in accordance with appropriate regulations.

D. Other State and Local Plans

This BMP plan shall include any requirements specified in sediment and erosion control plans, storm water management plans or permits that have been approved by other state or local officials. Upon submittal of the NOI, other requirements for surface water protection are incorporated by reference into and are enforceable under this permit (even if they are not specifically included in this BMP plan). This provision does not apply to master or comprehensive plans, non-enforceable guidelines or technical guidance documents that are not identified in a specific plan or permit issued for the construction site by state or local officials. (1)

E. Maintenance

1. The BMP plan shall include a clear description of the maintenance procedures necessary to keep the control measures in good and effective operating condition.

- Maintenance of BMPs during construction shall be a result of weekly and post rain event inspections with action being taken by the contractor to correct deficiencies.

- Post Construction maintenance will be a function of normal highway maintenance operations. Following final project acceptance by the cabinet, district highway crews will be responsible for identification and correction of deficiencies regarding ground cover and cleaning of storm

water BMPs. The project manager shall identify any BMPs that will be for the purpose of post construction storm water management with specific guidance for any non-routine maintenance. (1)

F. Inspections

Inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All erosion prevention and sediment control measures will be inspected at least once each week and following any rain of one-half inch or more.
- Inspections will be conducted by individuals that have successfully completed the KEPSC-RI course as required by Section 213.02.02 of the Standard Specifications for Road and Bridge Construction, current edition.
- Inspection reports will be written, signed, dated, and kept on file.
- Areas at final grade will be seeded and mulched within 14 days.
- Areas that are not at final grade where construction has ceased for a period of 21 days or longer and soil stock piles shall receive temporary mulch no later than 14 days from the last construction activity in that area.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts.
- Sediment basins will be inspected for depth of sediment, and built-up sediment will be removed when it reaches 50 percent of the design capacity and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.
- All material storage and equipment servicing areas that involve the management of bulk liquids, fuels, and bulk solids will be inspected weekly for conditions that represent a release or possible release of pollutants to the environment.

G. Non – Storm Water discharges

It is expected that non-storm water discharges may occur from the site during the construction period. Examples of non-storm water discharges include:

- Water from water line flushings.
- Water form cleaning concrete trucks and equipment.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).
- Uncontaminated groundwater and rain water (from dewatering during excavation).

All non-storm water discharges will be directed to the sediment basin or to a filter fence enclosure in a flat vegetated infiltration area or be filtered via another approved commercial product.

H. Groundwater Protection Plan (3)

This plan serves as the groundwater protection plan as required by 401 KAR 5:037.

- Contractors statement: (3)

The following activities, as enumerated by 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan, will or may be may be conducted as part of this construction project:

_____ 2. (e) land treatment or land disposal of a pollutant;

_____ 2. (f) Storing, …, or related handling of hazardous waste, solid waste or special waste, …, in tanks, drums, or other containers, or in piles, (This does not include wastes managed in a container placed for collection and removal of municipal solid waste for disposal off site);

_____ 2. (g) …. Handling of materials in bulk quantities (equal or greater than 55 gallons or 100 pounds net dry weight transported held in an individual container) that, if released to the environment, would be a pollutant;

_____ 2. (j) Storing or related handling of road oils, dust suppressants, …., at a central location;

KYTC BMP Plan for Project CID 01 – 8702.00

_____ 2. (k) Application or related handling of road oils, dust suppressants or deicing materials, (does not include use of chloride-based deicing materials applied to roads or parking lots);

_____ 2. (m) Installation, construction, operation, or abandonment of wells, bore holes, or core holes, (this does not include bore holes for the purpose of explosive demolition);

Or, check the following only if there are no qualifying activities

_____ There are no activities for this project as listed in 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan.

The contractor is responsible for the preparation of a plan that addresses the

401 KAR 5:037 Section 3. (3) Elements of site specific groundwater protection plan:

(a) General information about this project is covered in the Project information;
(b) Activities that require a groundwater protection plan have been identified above;
(c) Practices that will protect groundwater from pollution are addressed in section C. Other control measures.
(d) Implementation schedule – all practices required to prevent pollution of groundwater are to be in place prior to conducting the activity;
(e) Training is required as a part of the ground water protection plan. All employees of the contractor, sub-contractor and resident engineer personnel will be trained to understand the nature and requirements of this plan as they pertain to their job function(s). Training will be accomplished within one week of employment and annually thereafter. A record of training will be maintained by the contractor with a copy provide to the resident engineer.
(f) Areas of the project and groundwater plan activities will be inspected as part of the weekly sediment and erosion control inspections
(g) Certification (see signature page.)

KYTC BMP Plan for Project CID 01 – 8702.00

Contractor and Resident Engineer Plan certification

The contractor that is responsible for implementing this BMP plan is identified in the Project Information section of this plan.

The following certification applies to all parties that are signatory to this BMP plan:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Further, this plan complies with the requirements of 401 KAR 5:037. By this certification, the undersigned state that the individuals signing the plan have reviewed the terms of the plan and will implement its provisions as they pertain to ground water protection.

Resident Engineer and Contractor Certification:

(2) Resident Engineer signature

Signed _____title_____, _____
Typed or printed name[2] signature

(3) Signed _____title_____, _____
Typed or printed name[1] signature

1. Contractors Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.

2. KyTC note: to be signed by the Chief District Engineer or a person designated to have the authority to sign reports by such a person (usually the resident engineer) in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601 Reference the Project Control Number (PCN) and KPDES number when one has been issued.

Sub-Contractor Certification

The following sub-contractor shall be made aware of the BMP plan and responsible for implementation of BMPs identified in this plan as follows:

Subcontractor

Name:
Address:
Address:

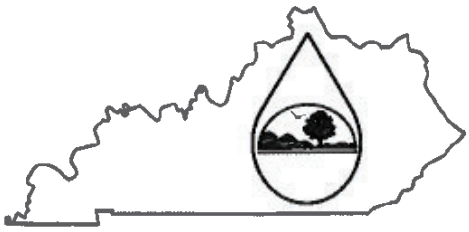
Phone:

The part of BMP plan this subcontractor is responsible to implement is:

I certify under penalty of law that I understand the terms and conditions of the general Kentucky Pollutant Discharge Elimination System permit that authorizes the storm water discharges, the BMP plan that has been developed to manage the quality of water to be discharged as a result of storm events associated with the construction site activity and management of non-storm water pollutant sources identified as part of this certification.

Signed _____title_____, _____
Typed or printed name[1] signature

1. Sub Contractor Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.



KENTUCKY POLLUTION DISCHARGE ELIMINATION SYSTEM (KPDES)

Notice of Intent (NOI) for coverage of Storm Water Discharge Associated with Construction Activities Under the KPDES Storm Water General Permit KYR100000

Click here for Instructions (Controls/KYR10%20Instructions.pdf)

Click here to obtain information and a copy of the KPDES General Permit. (https://eec.ky.gov/Environmental-Protection/Water/PermitCert/KPDES/Documents/KYR10PermitPage.pdf)

(*) indicates a required field; (✓) indicates a field may be required based on user input or is an optionally required field

Reason for Submittal:(*)	Agency Interest ID:	Permit Number:(✓)
Application for New Permit Coverage	Agency Interest ID	KPDES Permit Number

If change to existing permit coverage is requested, describe the changes for which modification of coverage is being sought:(✓)

ELIGIBILITY:
Stormwater discharges associated with construction activities disturbing individually one (1) acre or more, including, in the case of a common plan of development, contiguous construction activities that cumulatively equal one (1) acre or more of disturbance.

COVERAGE:
Applicants shall complete and submit the eNOI-SWCA a minimum of seven (7) days before the proposed date for commencement of construction activities. Applicants shall receive written notification from the Division of Water before being authorized to discharge under the terms of the KYR10 General Permit.

EXCLUSIONS:
The following are excluded from coverage under this general permit:
1) Are conducted at or on properties that have obtained an individual KPDES permit for the discharge of other wastewaters which requires the development and implementation of a Best Management Practices (BMP) plan;
2) Any operation that the DOW determines an individual permit would better address the discharges from that operation;
3) Any project that discharges to an Impaired Water listed in the most recent Integrated Report, §305(b) as impaired for sediment and for which an approved TMDL has been developed.

SECTION I -- FACILITY OPERATOR INFORMATION (PERMITTEE)

Company Name:(✓)	First Name:(✓)	M.I.:	Last Name:(✓)
KYTC	Kyle	MI	Poat

Mailing Address:(*)	City:(*)	State:(*)	Zip:(*)
5501 KY Dam Road	Paducah	Kentucky	42003

eMail Address:(*)	Business Phone:(*)	Alternate Phone:
Kyle.Poat@ky.gov	270-898-2431	270-994-1910

Additional Facility Operator information(Co-Permittee) required ?(*)
No

SECTION II – GENERAL SITE LOCATION INFORMATION

Project Name:(*)	Status of Owner/Operator(*)	SIC Code(*)
Bobo Road	State Government	1611 Highway and Street Constr

Company Name:(✓)	First Name:(✓)	M.I.:	Last Name:(✓)
KYTC	Kyle	MI	Poat

Site Physical Address:(*)
5501 KY Dam Road

City:(*)	State:(*)	Zip:(*)
Paducah	Kentucky	42003

County:(*)	Latitude(decimal degrees)(*) DMS to DD Converter (https://www.fcc.gov/media/radio/dms-decimal)	Longitude(decimal degrees)(*)
McCracken	37.098611	-88.720833

SECTION III -- SPECIFIC SITE ACTIVITY INFORMATION

Project Description:(*)

New Construction of Bobo Road - 2 Lane Road - McCracken County

Was the pre-development land used for agriculture ?(*)	Will there be demolition of any structure built or renovated before January 1, 1980 (*) ?
Yes	No

Select the type of construction site (check all that apply)(*)

- [ ] Single-Family Residential
- [ ] Multi-Family Residential
- [ ] Commercial
- [ ] Industrial
- [ ] Institutional
- [x] Highway or Road
- [ ] Utility
- [ ] Other

a. For single projects provide the following information

Total Number of Acres in Project:(✓)	Total Number of Acres Disturbed:(✓)
14	14
Anticipated Start Date:(✓)	**Anticipated Completion Date:(✓)**
11/1/2025	11/1/2027

b. For common plans of development provide the following information

Total Number of Acres in Project:(✓)	Total Number of Acres Disturbed:(✓)
# Acre(s)	# Acre(s)
Number of individual lots in development, if applicable:(✓)	**Number of lots in development:(✓)**
# lot(s)	# lot(s)
Total acreage of lots intended to be developed:(✓)	**Number of acres intended to be disturbed at any one time:(✓)**
Project Acres	Disturbed Acres
Anticipated Start Date:(✓)	**Anticipated Completion Date:(✓)**

List Building Contractor(s) at the time of Application:(✓)

Company Name
+

SECTION IV -- INFORMATION IS ALWAYS REQUIRED FOR ONSITE POINT OF DISCHARGE AND RECEIVING WATER

Discharge Point(s):(*)

	Unnamed Tributary?	Latitude	Longitude	Receiving Water Name	
1	Yes	37.107359	-88.743145	Ohio River	Delete
2	Yes	37.102855	-88.742081	Ohio River	Delete
3	Yes	37.096475	-88.744712	Ohio River	Delete
4	Yes	37.095610	-88.742036	Ohio River	Delete
+					

This grid can be edited either directly on this page or by editing the information in an excel sheet.
If you would like to edit this information in an excel sheet, first use the right button (export) to download the sheet.
After adding your data, save the sheet, and use the left button (import) to import the same file to this grid.

SECTION V – Section V MUST BE COMPLETED IF WITHIN A MS4 AREA

Name of MS4:

SECTION VI -- WILL THE PROJECT REQUIRE CONSTRUCTION ACTIVITIES IN A WATER BODY, FLOODPLAIN OR THE RIPARIAN ZONE?

Will the project require construction activities in a water body or the riparian zone?: (*)	No
If Yes, describe scope of activity:(✓)	Describe the scope of activity
Is a Clean Water Act 404 permit required?:(*)	No
Is a Clean Water Act 401 Water Quality Certification required?:(*)	No

SECTION VII -- NOI PREPARER INFORMATION

First Name:(*)	M.I.:	Last Name:(*)	Company Name:(*)
Kyle	MI	Poat	Company Name

Mailing Address:(*)	City:(*)	State:(*)	Zip:(*)
5501 KY Dam Road	Paducah	Kentucky	42003

eMail Address:(*)	Business Phone:(*)	Alternate Phone:
kyle.poat@ky.gov	270-898-2431	270-994-1910

SECTION VIII -- ATTACHMENTS

Facility Location Map:(*)	Upload file
Supplemental Information:	Upload file

SECTION IX -- CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:(*)	Title:(*)
Kyle Poat	CDE

First Name:(*)	M.I.:	Last Name:(*)
Kyle	MI	Poat

eMail Address:(*)	Business Phone:(*)	Alternate Phone:	Signature Date:(*)
kyle.poat@ky.gov	270-898-2431	270-994-1910	Date

Click to Save Values for Future Retrieval | Click to Submit to EEC

GUARDRAIL DELIVERY VERIFICATION SHEET

Contract Id: _____ **Contractor: _____**

Section Engineer: _____ **District & County: _____**

DESCRIPTION	UNIT	QTY LEAVING PROJECT	QTY RECEIVED@BB YARD
GUARDRAIL (Includes End treatments & crash cushions)	LF	_____	_____
STEEL POSTS	EACH	_____	_____
STEEL BLOCKS	EACH	_____	_____
WOOD OFFSET BLOCKS	EACH	_____	_____
BACK UP PLATES	EACH	_____	_____
CRASH CUSHION	EACH	_____	_____
NUTS, BOLTS, WASHERS	BAG/BCKT	_____	_____
DAMAGED RAIL TO MAINT. FACILITY	LF	_____	_____
DAMAGED POSTS TO MAINT. FACILITY	EACH	_____	_____

****Required Signatures before Leaving Project Site***

Printed Section Engineer's Representative_____ & Date_____

Signature Section Engineer's Representative_____& Date_____

Printed Contractor's Representative_____& Date_____

Signature Contractor's Representative_____& Date_____

****Required Signatures after Arrival at Bailey Bridge Yard (All material on truck must be counted & the quantity received column completed before signatures)***

Printed Bailey Bridge Yard Representative_____ & Date_____

Signature Bailey Bridge Yard Representative_____& Date_____

Printed Contractor's Representative_____& Date_____

Signature Contractor's Representative_____& Date_____

**Payment for the bid item remove guardrail will be based upon the quantities shown in the Bailey Bridge Yard received column. Payment will not be made for guardrail removal until the guardrail verification sheets are electronically submitted to the Section Engineer by the Bailey Bridge Yard Representative.

Completed Form Submitted to Section Engineer Date: _____ By: _____

PART II

SPECIFICATIONS AND STANDARD DRAWINGS

STANDARD SPECIFICATIONS

Any reference in the plans or proposal to previous editions of the *Standard Specifications for Road and Bridge Construction* and *Standard Drawings* are superseded by *Standard Specifications for Road and Bridge Construction, Edition of 2019* and *Standard Drawings, Edition of 2020.*

SUPPLEMENTAL SPECIFICATIONS

The contractor shall use the Supplemental Specifications that are effective at the time of letting. The Supplemental Specifications can be found at the following link:
http://transportation.ky.gov/Construction/Pages/Kentucky-Standard-Specifications.aspx

1I

SPECIAL NOTE FOR PORTABLE CHANGEABLE MESSAGE SIGNS

This Special Note will apply when indicated on the plans or in the proposal.

1.0 DESCRIPTION. Furnish, install, operate, and maintain variable message signs at the locations shown on the plans or designated by the Engineer. Remove and retain possession of variable message signs when they are no longer needed on the project.

2.0 MATERIALS.

2.1 General. Use LED Variable Message Signs Class I, II, or III, as appropriate, from the Department's List of Approved Materials.

Unclassified signs may be submitted for approval by the Engineer. The Engineer may require a daytime and nighttime demonstration. The Engineer will make a final decision within 30 days after all required information is received.

2.2 Sign and Controls. All signs must:

1) Provide 3-line messages with each line being 8 characters long and at least 18 inches tall. Each character comprises 35 pixels.
2) Provide at least 40 preprogrammed messages available for use at any time. Provide for quick and easy change of the displayed message; editing of the message; and additions of new messages.
3) Provide a controller consisting of:
   a) Keyboard or keypad.
   b) Readout that mimics the actual sign display. (When LCD or LCD type readout is used, include backlighting and heating or otherwise arrange for viewing in cold temperatures.)
   c) Non-volatile memory or suitable memory with battery backup for storing pre-programmed messages.
   d) Logic circuitry to control the sequence of messages and flash rate.
4) Provide a serial interface that is capable of supporting complete remote control ability through land line and cellular telephone operation. Include communication software capable of immediately updating the message, providing complete sign status, and allowing message library queries and updates.
5) Allow a single person easily to raise the sign to a satisfactory height above the pavement during use, and lower the sign during travel.
6) Be Highway Orange on all exterior surfaces of the trailer, supports, and controller cabinet.
7) Provide operation in ambient temperatures from -30 to + 120 degrees Fahrenheit during snow, rain and other inclement weather.
8) Provide the driver board as part of a module. All modules are interchangeable, and have plug and socket arrangements for disconnection and reconnection. Printed circuit boards associated with driver boards have a conformable coating to protect against moisture.
9) Provide a sign case sealed against rain, snow, dust, insects, etc. The lens is UV stabilized clear plastic (polycarbonate, acrylic, or other approved material) angled to prevent glare.
10) Provide a flat black UV protected coating on the sign hardware, character PCB, and appropriate lens areas.
11) Provide a photocell control to provide automatic dimming.

1I

12) Allow an on-off flashing sequence at an adjustable rate.
13) Provide a sight to aim the message.
14) Provide a LED display color of approximately 590 nm amber.
15) Provide a controller that is password protected.
16) Provide a security device that prevents unauthorized individuals from accessing the controller.
17) Provide the following 3-line messages preprogrammed and available for use when the sign unit begins operation:

/KEEP/RIGHT/⇒⇒⇒/
/KEEP/LEFT/⇐⇐⇐/
/LOOSE/GRAVEL/AHEAD/
/RD WORK/NEXT/**MILES/
/TWO WAY/TRAFFIC/AHEAD/
/PAINT/CREW/AHEAD/
/REDUCE/SPEED/**MPH/
/BRIDGE/WORK/***0 FT/
/MAX/SPEED/**MPH/
/SURVEY/PARTY/AHEAD/
/MIN/SPEED/**MPH/
/ICY/BRIDGE/AHEAD/ /ONE LANE/BRIDGE/AHEAD/
/ROUGH/ROAD/AHEAD/
/MERGING/TRAFFIC/AHEAD/
/NEXT/***/MILES/
/HEAVY/TRAFFIC/AHEAD/
/SPEED/LIMIT/**MPH/
/BUMP/AHEAD/
/TWO/WAY/TRAFFIC/

*Insert numerals as directed by the Engineer.
Add other messages during the project when required by the Engineer.

2.3 Power.

1) Design solar panels to yield 10 percent or greater additional charge than sign consumption. Provide direct wiring for operation of the sign or arrow board from an external power source to provide energy backup for 21 days without sunlight and an on-board system charger with the ability to recharge completely discharged batteries in 24 hours.

3.0 CONSTRUCTION. Furnish and operate the variable message signs as designated on the plans or by the Engineer. Ensure the bottom of the message panel is a minimum of 7 feet above the roadway in urban areas and 5 feet above in rural areas when operating. Use Class I, II, or III signs on roads with a speed limit less than 55 mph. Use Class I or II signs on roads with speed limits 55 mph or greater.

Maintain the sign in proper working order, including repair of any damage done by others, until completion of the project. When the sign becomes inoperative, immediately repair or replace the sign. Repetitive problems with the same unit will be cause for rejection and replacement.

Use only project related messages and messages directed by the Engineer, unnecessary messages lessen the impact of the sign. Ensure the message is displayed in either one or 2 phases with each phase having no more than 3 lines of text. When no message is needed, but it is necessary to know if the sign is operable, flash only a pixel.

When the sign is not needed, move it outside the clear zone or where the Engineer directs. Variable Message Signs are the property of the Contractor and shall be removed from the project when no longer needed. The Department will not assume ownership of these signs.

4.0 MEASUREMENT. The final quantity of Variable Message Sign will be

1I

the actual number of individual signs acceptably furnished and operated during the project. The Department will not measure signs replaced due to damage or rejection.

5.0 PAYMENT. The Department will pay for the Variable Message Signs at the unit price each. The Department will not pay for signs replaced due to damage or rejection. Payment is full compensation for furnishing all materials, labor, equipment, and service necessary to, operate, move, repair, and maintain or replace the variable message signs. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
02671	Portable Changeable Message Sign	Each

Effective June 15, 2012

SPECIAL NOTE FOR BARCODE LABEL ON PERMANENT SIGNS

1.0 DESCRIPTION. Install barcode label on sheeting signs. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction, current edition.

2.0 MATERIALS. The Department will provide the Contractor with a 2 inch x 1 inch foil barcode label for each permanent sheeting sign. A unique number will be assigned to each barcode label.

The Contractor shall contact the Operations and Pavement Management Branch in the Division of Maintenance at (502) 564-4556 to obtain the barcode labels.

3.0 CONSTRUCTION. Apply foil barcode label in the lower right quadrant of the sign back. Signs where the bottom edge is not parallel to the ground, the lowest corner of the sign shall serve as the location to place the barcode label. The barcode label shall be placed no less than one-inch and no more than three inches from any edge of the sign. The barcode must be placed so that the sign post does not cover the barcode label.

Barcodes shall be applied in an indoor setting with a minimum air temperature of 50°F or higher. Prior to application of the barcode label, the back of the sign must be clean and free of dust, oil, etc. If the sign is not clean, an alcohol swab shall be used to clean the area. The area must be allowed to dry prior to placement of the barcode label.

Data for each sign shall include the barcode number, MUTCD reference number, sheeting manufacturer, sheeting type, manufacture date, color of primary reflective surface, installation date, latitude and longitude using the North American Datum of 1983 (NAD83) or the State Plane Coordinates using an x and y ordinate of the installed location.

Data should be provided electronically on the TC 71-229 Sign Details Information and TC 71-230 Sign Assembly Information forms. The Contractor may choose to present the data in a different format provided that the information submitted to the Department is equivalent to the information required on the Department TC forms. The forms must be submitted in electronic format regardless of which type of form is used. The Department will not accept PDF or handwritten forms. These completed forms must be submitted to the Department prior to final inspection of the signs. The Department will not issue formal acceptance for the project until the TC 71-229 and TC-230 electronic forms are completed for all signs and sign assemblies on the project.

4.0 MEASUREMENT. The Department will measure all work required for the installation of the barcode label and all work associated with completion and submission of the sign inventory data (TC 71-229 and TC 71-230).

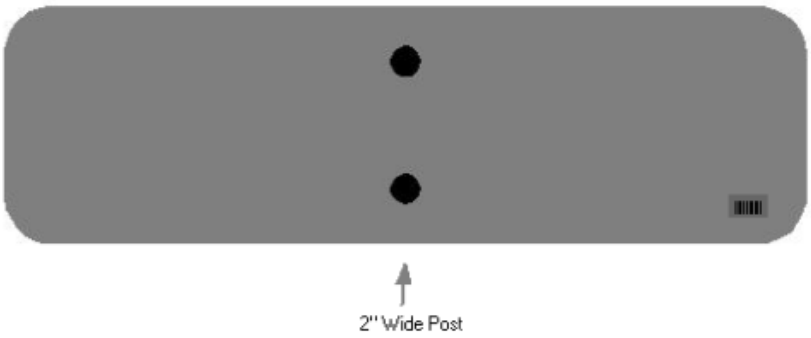
The installation of the permanent sign will be measured in accordance to Section 715.

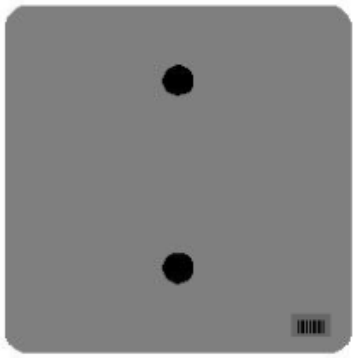
5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
24631EC	Barcode Sign Inventory	Each

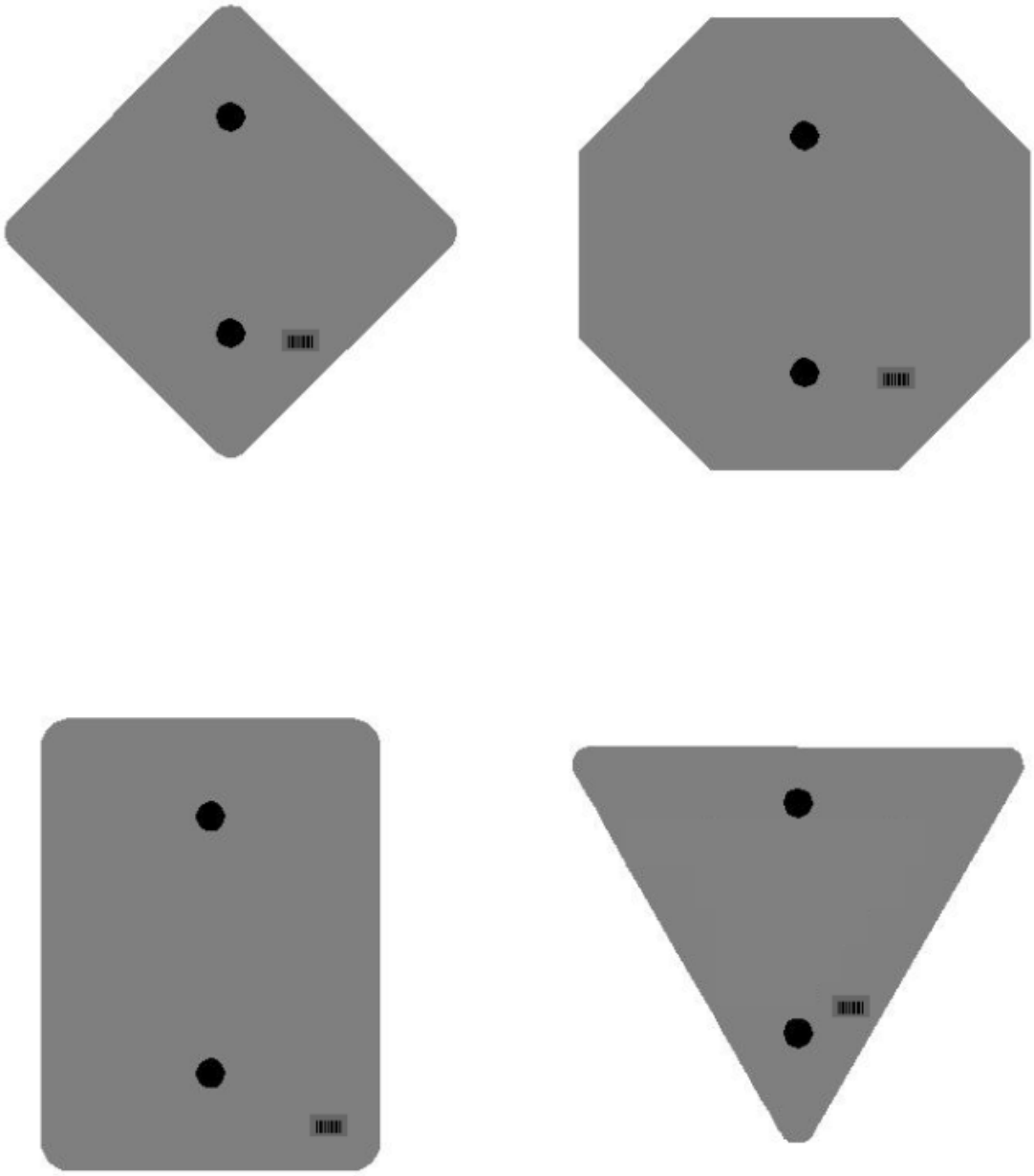
The Department will not make payment for this item until all barcodes are installed and sign inventory is complete on every permanent sign installed on the project. The Department will make payment for installation of the permanent sign in accordance to Section 715. The Department will consider payment as full compensation for all work required under this special note.

One Sign Post

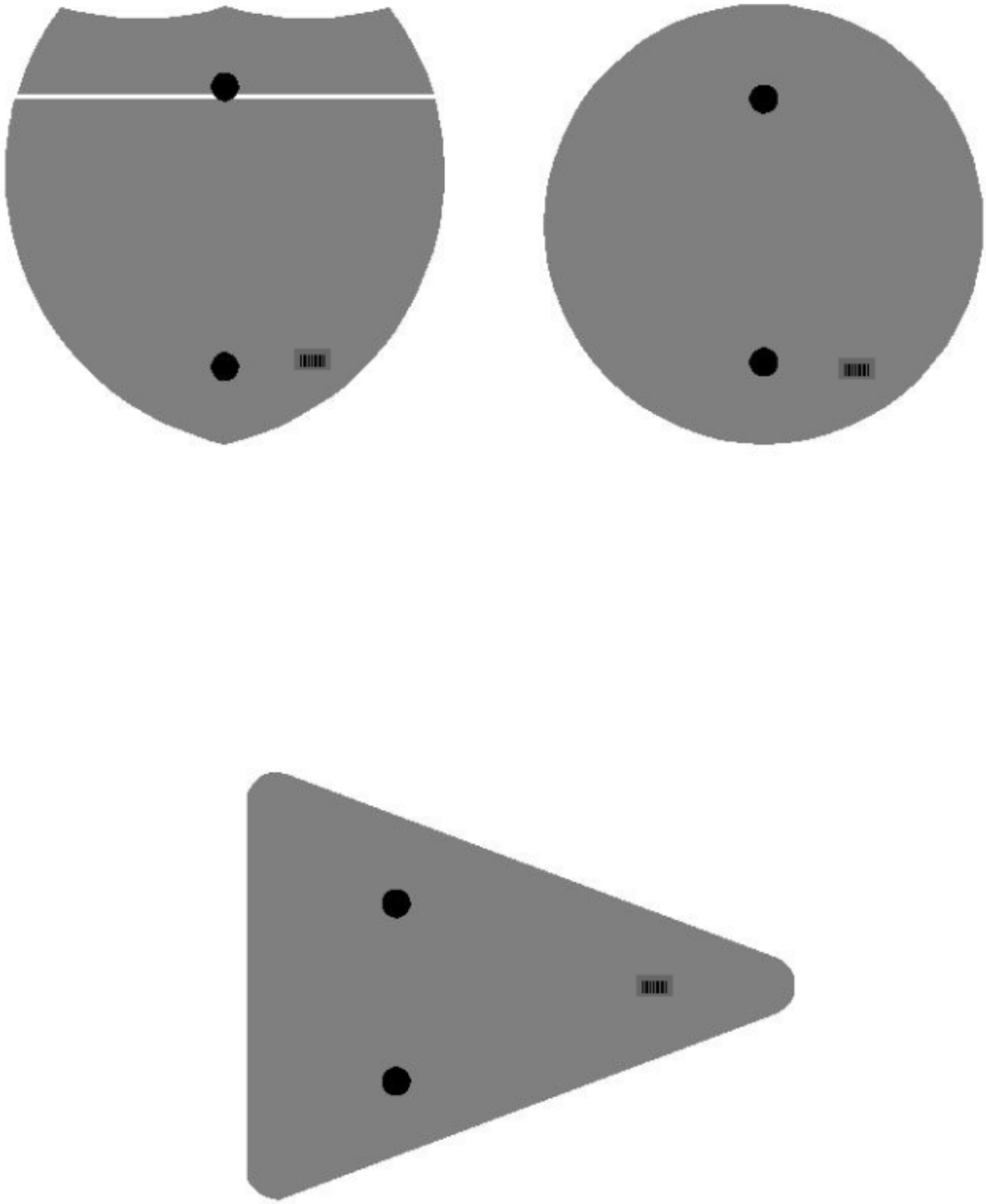




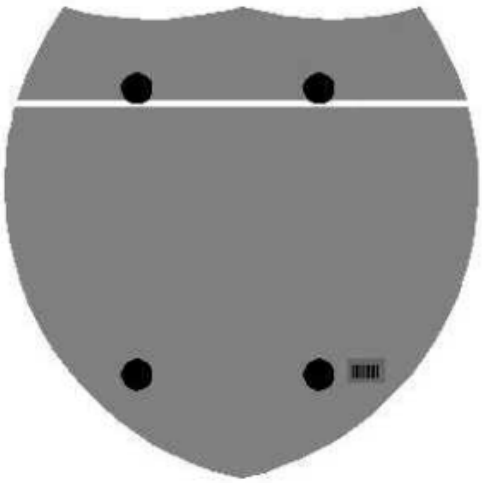
One Sign Post



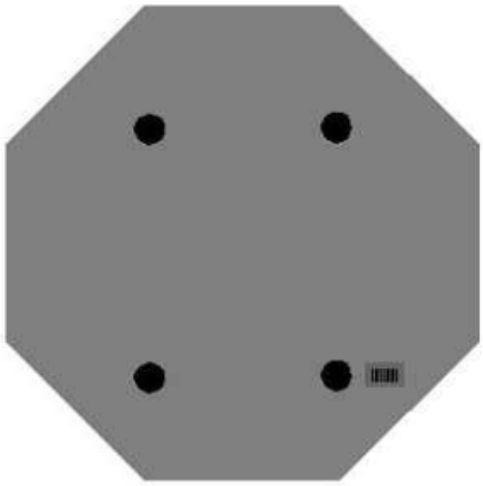
One Sign Post



Double Sign Post

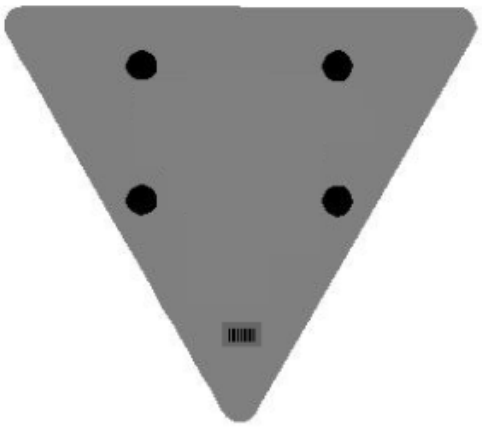


Interstate
Shield



48" Stop

2 Post Signs



11N

SPECIAL NOTE FOR LONGITUDINAL PAVEMENT JOINT ADHESIVE

1. DESCRIPTION. This specification covers the requirements and practices for applying an asphalt adhesive material to the longitudinal joint of the surface course of an asphalt pavement. Apply the adhesive to the face of longitudinal joint between driving lanes for the first lane paved. Then, place and compact the adjacent lane against the treated face to produce a strong, durable, waterproof longitudinal joint.

2. MATERIALS, EQUIPMENT, AND PERSONNEL.

2.1 Joint Adhesive. Provide material conforming to Subsection 2.1.1.

2.1.1 Provide an adhesive conforming to the following requirements:

Property	Specification	Test Procedure
Viscosity, 400 ° F (Pa·s)	4.0 – 10.0	ASTM D 4402
Cone Penetration, 77 ° F	60 – 100	ASTM D 5329
Flow, 140 ° F (mm)	5.0 max.	ASTM D 5329
Resilience, 77 ° F (%)	30 min.	ASTM D 5329
Ductility, 77 ° F (cm)	30.0 min.	ASTM D 113
Ductility, 39 ° F (cm)	30.0 min.	ASTM D 113
Tensile Adhesion, 77 ° F (%)	500 min.	ASTM D 5329, Type II
Softening Point, ° F	171 min.	AASHTO T 53
Asphalt Compatibility	Pass	ASTM D 5329

Ensure the temperature of the pavement joint adhesive is between 380 and 410 °F when the material is extruded in a 0.125-inch-thick band over the entire face of the longitudinal joint.

2.2. Equipment.

2.2.1 Melter Kettle. Provide an oil-jacketed, double-boiler, melter kettle equipped with any needed agitation and recirculating systems.

2.2.2 Applicator System. Provide a pressure-feed-wand applicator system with an applicator shoe attached.

2.3 Personnel. Ensure a technical representative from the manufacturer of the pavement joint adhesive is present during the initial construction activities and available upon the request of the Engineer.

3. CONSTRUCTION.

3.1 Surface Preparation. Prior to the application of the pavement joint adhesive, ensure the face of the longitudinal joint is thoroughly dry and free from dust or any other debris that would inhibit adhesion. Clean the joint face by the use of compressed air.

11N

Ensure this preparation process occurs shortly before application to prevent the return of debris on the joint face.

3.2 Pavement Joint Adhesive Application. Ensure the ambient temperature is a minimum of 40 ^{o} F during the application of the pavement joint adhesive. Prior to applying the adhesive, demonstrate competence in applying the adhesive according to this note to the satisfaction of the Engineer. Heat the adhesive in the melter kettle to the specified temperature range. Pump the adhesive from the melter kettle through the wand onto the vertical face of the cold joint. Apply the adhesive in a continuous band over the entire face of the longitudinal joint. Do not use excessive material in either thickness or location. Ensure the edge of the extruded adhesive material is flush with the surface of the pavement. Then, place and compact the adjacent lane against the joint face. Remove any excessive material extruded from the joint after compaction (a small line of material may remain).

3.3 Pavement Joint Adhesive Certification. Furnish the joint adhesive's certification to the Engineer stating the material conforms to all requirements herein prior to use.

3.4 Sampling and Testing. The Department will require a random sample of pavement joint adhesive from each manufacturer's lot of material. Extrude two 5 lb. samples of the heated material and forward the sample to the Division of Materials for testing. Reynolds oven bags, turkey size, placed inside small cardboard boxes or cement cylinder molds have been found suitable. Ensure the product temperature is 400°F or below at the time of sampling.

4. MEASUREMENT. The Department will measure the quantity of Pavement Joint Adhesive in linear feet. The Department will not measure for payment any extra materials, labor, methods, equipment, or construction techniques used to satisfy the requirements of this note. The Department will not measure for payment any trial applications of Pavement Joint Adhesive, the cleaning of the joint face, or furnishing and placing the adhesive. The Department will consider all such items incidental to the Pavement Joint Adhesive.

5. PAYMENT. The Department will pay for the Pavement Joint Adhesive at the Contract unit bid price and apply an adjustment for each manufacturer's lot of material based on the degree of compliance as defined in the following schedule. When a sample fails on two or more tests, the Department may add the deductions, but the total deduction will not exceed 100 percent.

11N

Pavement Joint Adhesive Price Adjustment Schedule						
Test	Specification	100% Pay	90% Pay	80% Pay	50% Pay	0% Pay
Joint Adhesive Referenced in Subsection 2.1.1						
Viscosity, 400 ° F (Pa•s)			3.0-3.4	2.5-2.9	2.0-2.4	≤1.9
ASTM D 3236	4.0-10.0	3.5-10.5	10.6-11.0	11.1-11.5	11.6-12.0	≥ 12.1
Cone Penetration, 77 ° F			54-56	51-53	48-50	≤ 47
ASTM D 5329	60-100	57-103	104-106	107-109	110-112	≥ 113
Flow, 140 ° F (mm) ASTM D 5329	≤ 5.0	≤ 5.5	5.6-6.0	6.1-6.5	6.6-7.0	≥ 7.1
Resilience, 77 ° F (%) ASTM D 5329	≥ 30	≥ 28	26-27	24-25	22-23	≤ 21
Tensile Adhesion, 77 ° F (%) ASTM D 5329	≥ 500	≥ 490	480-489	470-479	460-469	≤ 459
Softening Point, ° F AASHTO T 53	≥ 171	≥ 169	166-168	163-165	160-162	≤ 159
Ductility, 77 ° F (cm) ASTM D 113	≥ 30.0	≥ 29.0	28.0-28.9	27.0-27.9	26.0-26.9	≤ 25.9
Ductility, 39 ° F (cm) ASTM D 113	≥ 30.0	≥ 29.0	28.0-28.9	27.0-27.9	26.0-26.9	≤ 25.9

Code	Pay Item	Pay Unit
20071EC	Joint Adhesive	Linear Foot

May 7, 2014

SPECIAL PROVISION FOR EMBANKMENT AT BRIDGE END BENT STRUCTURES

This Special Provision will apply when indicated on the plans or in the proposal. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction, Current Edition.

1.0 DESCRIPTION. Construct a soil, granular, or rock embankment with soil, granular or cohesive pile core and place structure granular backfill, as the Plans require. Construct the embankment according to the requirements of this Special Provision, the Plans, Standard Drawing RGX 100 and 105, and the Standard Specifications, Current Edition.

2.0 MATERIALS.

2.1 Granular Embankment. Conform to Subsection 805.10. When Granular Embankment materials are erodible or unstable according to Subsection 805.03.04, use the Special Construction Methods found in 3.2 of the Special Provision.

2.2 Rock Embankment. Provide durable rock from roadway excavation that consists principally of Unweathered Limestone, Durable Shale (SDI equal to or greater than 95 according to KM 64-513), or Durable Sandstone.

2.3 Pile Core. Provide a pile core in the area of the embankments where deep foundations are to be installed unless otherwise specified. The Pile Core is the zone indicated on Standard Drawings RGX 100 and 105 designated as Pile Core. Material control of the pile core area during embankment construction is always required. Proper Pile Core construction is required for installation of foundation elements such as drilled or driven piles or drilled shafts. The type of material used to construct the pile core is as directed in the plans or below. Typically, the pile core area will be constructed from the same material used to construct the surrounding embankment. Pile Core can be classified as one of three types:

A) Pile Core - Conform to Section 206 of the Standard Specifications. Provide pile core material consisting of the same material as the adjacent embankment except the material in the pile core area shall be free of boulders or particle sizes larger than 4 inches in any dimension or any other obstructions that may hinder pile driving operations. If the pile core material hinders pile driving operations, take the appropriate means necessary to reach the required pile tip elevation, at no expense to the Department.

B) Granular Pile Core. Granular pile core is required only when specified in the plans. Select a gradation of durable rock to facilitate pile driving that conforms to Subsection 805.11. If granular pile core material hinders pile driving operations, take appropriate means necessary to reach the required pile tip elevation, at no expense to the Department.

C) Cohesive Pile Core. Cohesive Pile Core is required only when specified in the plans. Conform to Section 206 of the Standard Specifications and use soil with at least 50 percent passing a No. 4 sieve having a minimum Plasticity Index (PI) of 10. In addition, keep the cohesive pile core free of boulders, larger than 4 inches in any dimension, or any other obstructions, which would interfere with drilling operations. If cohesive pile core material interferes with drilling operations, take appropriate means necessary to maintain excavation stability, at no expense to the Department.

2.4 Structure Granular Backfill. Conform to Subsection 805.11

2.5 Geotextile Fabric. Conform to Class 1 or Class 2 in Section 214 and 843.

3.0 CONSTRUCTION.

3.1 General. Construct roadway embankments at end bents according to Section 206 and in accordance with the Special Provision, the Plans, and Standard Drawings for the full embankment section. In some instances, granular or rock embankment will be required for embankment construction for stability purposes, but this special provision does not prevent the use of soil when appropriate. Refer to the plans for specific details regarding material requirements for embankment construction.
Place and compact the pile core and structure granular backfill according to the applicable density requirements for the project. If the embankment and pile core are dissimilar materials (i.e., a granular pile core is used with a soil embankment or a cohesive pile core is used with a granular embankment), a Geotextile Fabric, will be required between the pile core and embankment in accordance with Sections 214 and 843 of the Standard Specifications.

When granular or rock embankment is required for embankment construction, conform to the general requirements of Subsection 206.03.02 B. In addition, place the material in no greater than 2-foot loose lifts and compact with a vibrating smooth wheel roller capable of producing a minimum centrifugal force of 15 tons. Apply these requirements to the full width of the embankment for a distance of half the embankment height or 50 feet, whichever is greater, as shown on Standard Drawing RGX-105.

When using granular pile core, install 8-inch perforated underdrain pipe at or near the elevation of the original ground in the approximate locations depicted on the standard drawing, and as the Engineer directs, to ensure positive drainage of the embankment. Wrap the perforated pipe with a fabric of a type recommended by the pipe manufacturer.

After constructing the embankment, excavate for the end bent cap, drive piling, install shafts or other foundation elements, place the mortar bed, construct the end bent, and complete the embankment to finish grade according to the construction sequence shown on the Plans or Standard Drawings and as specified hereinafter.

Certain projects may require widening of existing embankments and the removal of substructures. Construct embankment according to the plans. Substructure removal shall be completed according to the plans and Section 203. Excavation may be required at the existing embankment in order to place the structure granular backfill as shown in the Standard Drawings.
After piles are driven or shafts installed (see design drawings), slope the bottom of the excavation towards the ends of the trench as noted on the plans for drainage. Using a separate pour, place concrete mortar, or any class concrete, to provide a base for forming and placing the cap. Place side forms for the end bent after the mortar has set sufficiently to support workmen and forms without being disturbed.

Install 4-inch perforated pipe in accordance with the plans and Standard Drawings. In the event slope protection extends above the elevation of the perforated pipe, extend the pipe through the slope protection.

After placing the end bent cap and achieving required concrete cylinder strengths, remove adjacent forms and fill the excavation with compacted structure granular backfill material (maximum 1’ loose lifts) to the level of the berm prior to placing beams for the bridge. Place a geotextile fabric between embankment material and structure granular backfill. After completing the end bent backwall, or after completing the span end wall, place the compacted structure granular backfill (maximum 1’

loose lifts) to subgrade elevation. If the original excavation is enlarged, fill the entire volume with compacted structure granular backfill (maximum 1' loose lifts) at no expense to the Department. Do not place backfill before removing adjacent form work. Place structure granular backfill material in trench ditches at the ends of the excavation. Place Geotextile Fabric, over the surface of the compacted structure granular backfill prior to placing aggregate base course.

Tamp the backfill with hand tampers, pneumatic tampers, or other means approved by the Engineer. Thoroughly compact the backfill under the overhanging portions of the structure to ensure that the backfill is in intimate contact with the sides of the structure.

Do not apply seeding, sodding, or other vegetation to the exposed granular embankment.

3.2 Special Construction Methods. Erodible or unstable materials may erode even when protected by riprap or channel lining; use the special construction method described below when using these materials.

Use fine aggregates or friable sandstone granular embankment at "dry land" structures only. Do not use them at stream crossings or locations subject to flood waters.

For erodible or unstable materials having 50 percent or more passing the No. 4 sieve, protect with geotextile fabric. Extend the fabric from the original ground to the top of slope over the entire area of the embankment slopes on each side of, and in front of, the end bent. Cover the fabric with at least 12 inches of non-erodible material.

For erodible or unstable materials having less than 50 percent passing a No. 4 sieve, cover with at least 12 inches of non-erodible material.

Where erodible or unstable granular embankment will be protected by riprap or channel lining, place a geotextile fabric between the embankment and the specified slope protection.

4.0 MEASUREMENT.

4.1 Granular Embankment. The Department will measure the quantity in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204. The Department will not measure for payment any Granular Embankment that is not called for in the plans.

The Department will not measure for payment any special construction caused by using erodible or unstable materials and will consider it incidental to the Granular Embankment regardless of whether the erodible or unstable material was specified or permitted.

4.2 Rock Embankment. The Department will not measure for payment any rock embankment and will consider it incidental to roadway excavation or embankment in place, as applicable. Rock embankments will be constructed using granular embankment on projects where there is no available rock present within the excavation limits of the project.

4.3 Pile Core. Pile core will be measured and paid under roadway excavation or embankment in place, as applicable. The Department will not measure the pile core for separate payment. The Department will not measure for payment the 8-inch perforated underdrain pipe and will consider it incidental to the Pile Core.

4.4 Structure Granular Backfill. The Department will measure the quantity in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204. The

Department will not measure any additional material required for backfill outside the limits shown on the Plans and Standard Drawings for payment and will consider it incidental to the work.

The Department will not measure for payment the 4-inch perforated underdrain pipe and will consider it incidental to the Structure Granular Backfill.

4.5 Geotextile Fabric. The Department will not measure the quantity of fabric used for separating dissimilar materials when constructing the embankment and pile core and will consider it incidental to embankment construction.

The Department will not measure for payment the Geotextile Fabric used to separate the Structure Granular Backfill from the embankment and aggregate base course and will consider it incidental to Structure Granular Backfill.

The Department will not measure for payment the Geotextile Fabric required for construction with erodible or unstable materials and will consider it incidental to embankment construction.

4.6 End Bent. The Department will measure the quantities according to the Contract. The Department will not measure furnishing and placing the 2-inch mortar or concrete bed for payment and will consider it incidental to the end bent construction.

4.7 Structure Excavation. The Department will not measure structure excavation on new embankments for payment and will consider it incidental to the Structure Granular Backfill or Concrete as applicable.

5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
02223	Granular Embankment	Cubic Yards
02231	Structure Granular Backfill	Cubic Yards

The Department will consider payment as full compensation for all work required in this provision.

August 5, 2019

PART III

EMPLOYMENT, WAGE AND RECORD REQUIREMENTS

TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS

LABOR AND WAGE REQUIREMENTS
APPLICABLE TO OTHER THAN FEDERAL-AID SYSTEM PROJECTS

I. Application
II. Nondiscrimination of Employees (KRS 344)

I. APPLICATION

1. These contract provisions shall apply to all work performed on the contract by the contractor with his own organization and with the assistance of workmen under his immediate superintendence and to all work performed on the contract by piecework, station work or by subcontract. The contractor's organization shall be construed to include only workmen employed and paid directly by the contractor and equipment owned or rented by him, with or without operators.

2. The contractor shall insert in each of his subcontracts all of the stipulations contained in these Required Provisions and such other stipulations as may be required.

3. A breach of any of the stipulations contained in these Required Provisions may be grounds for termination of the contract.

II. NONDISCRIMINATION OF EMPLOYEES

AN ACT OF THE KENTUCKY
GENERAL ASSEMBLY TO PREVENT
DISCRIMINATION IN EMPLOYMENT
KRS CHAPTER 344
EFFECTIVE JUNE 16, 1972

The contract on this project, in accordance with KRS Chapter 344, provides that during the performance of this contract, the contractor agrees as follows:

1. The contractor shall not fail or refuse to hire, or shall not discharge any individual, or otherwise discriminate against an individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, national origin, sex, disability or age (forty and above); or limit, segregate, or classify his employees in any way which would deprive or tend to deprive an individual of employment opportunities or otherwise adversely affect his status as an employee, because of such individual's race, color, religion, national origin, sex, disability or age forty (40) and over. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor shall not print or publish or cause to be printed or published a notice or advertisement relating to employment by such an employer or membership in or any classification or referral for employment by the employment agency, indicating any preference, limitation, specification, or discrimination, based on race, color, religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, except that such a notice or advertisement may indicate a preference, limitation, or specification based on religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, when religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, is a bona fide occupational qualification for employment.

3. If the contractor is in control of apprenticeship or other training or retraining, including on-the-job training programs, he shall not discriminate against an individual because of his race, color, religion, national origin, sex, disability or age forty (40) and over, in admission to, or employment in any program established to provide apprenticeship or other training.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The contractor will take such action with respect to any subcontract or purchase order as the administrating agency may direct as a means of enforcing such provisions, including sanctions for non-compliance.

Revised: January 25, 2017

EXECUTIVE BRANCH CODE OF ETHICS

The Executive Branch Code of Ethics created by Kentucky Revised Statutes (KRS) Chapter 11A, effective July 14, 1992, establishes the ethical standards that govern the conduct of all executive branch employees. The Executive Branch Code of Ethics, which states, in part:

> KRS 11A.040 (7) provides:
>
> A present or former public servant listed in KRS 11A.010(9)(a) to (g) shall not, within one (1) year following termination of his or her office or employment, accept employment, compensation, or other economic benefit from any person or business that contracts or does business with, or is regulated by, the state in matters in which he was directly involved during the last thirty-six (36) months of his tenure. This provision shall not prohibit an individual from returning to the same business, firm, occupation, or profession in which he was involved prior to taking office or beginning his term of employment, or for which he received, prior to his state employment, a professional degree or license, provided that, for a period of one (1) year, he or she personally refrains from working on any matter in which he was directly involved during the last thirty-six (36) months of his or her tenure in state government. This subsection shall not prohibit the performance of ministerial functions, including but not limited to filing tax returns, filing applications for permits or licenses, or filing incorporation papers, nor shall it prohibit the former officer or public servant from receiving public funds disbursed through entitlement programs.
>
> KRS 11A.040 (9) states:
>
> A former public servant shall not represent a person or business before a state agency in a matter in which the former public servant was directly involved during the last thirty-six (36) months of his tenure, for a period of one (1) year after the latter of:
>
> a) The date of leaving office or termination of employment; or
> b) The date the term of office expires to which the public servant was elected.

This law is intended to promote public confidence in the integrity of state government and to declare as public policy the idea that state employees should view their work as a public trust and not to obtain private benefits.

If you have worked for the executive branch of state government within the past year, you may be subject to the law's prohibitions. The law's applicability may be different if you hold elected office or are contemplating representation of another before a state agency.

Also, if you are affiliated with a firm which does business with the state and which employs former state executive-branch employees, you should be aware that the law may apply to them.

In case of doubt, the law permits you to request an advisory opinion from the Executive Branch Ethics Commission, 1025 Capital Center Drive, Suite 105, Frankfort, Kentucky 40601; telephone (502) 564-7954.

Revised: March 11, 2025

Kentucky Equal Employment Opportunity Act of 1978

The requirements of the Kentucky Equal Employment Opportunity Act of 1978 (KRS 45.560-45.640) shall apply to this Contract. The apparent low Bidder will be required to submit EEO forms to the Division of Construction Procurement, which will then forward to the Finance and Administration Cabinet for review and approval. No award will become effective until all forms are submitted and EEO/CC has certified compliance. The required EEO forms are as follows:

- EEO-1: Employer Information Report
- Affidavit of Intent to Comply
- Employee Data Sheet
- Subcontractor Report

These forms are available on the Finance and Administration's web page under ***Vendor Information, Standard Attachments and General Terms*** at the following address: **https://www.eProcurement.ky.gov**.

Bidders currently certified as being in compliance by the Finance and Administration Cabinet may submit a copy of their approval letter in lieu of the referenced EEO forms.

For questions or assistance please contact the Finance and Administration Cabinet by email at **finance.contractcompliance@ky.gov** or by phone at 502-564-2874.

EMPLOYEE RIGHTS
UNDER THE FAIR LABOR STANDARDS ACT

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

FEDERAL MINIMUM WAGE
$7.25 PER HOUR
BEGINNING JULY 24, 2009

OVERTIME PAY

At least 1½ times your regular rate of pay for all hours worked over 40 in a workweek.

CHILD LABOR

An employee must be at least **16** years old to work in most non-farm jobs and at least **18** to work in non-farm jobs declared hazardous by the Secretary of Labor.

Youths **14** and **15** years old may work outside school hours in various non-manufacturing, non-mining, non-hazardous jobs under the following conditions:

No more than

- **3** hours on a school day or **18** hours in a school week;
- **8** hours on a non-school day or **40** hours in a non-school week.

Also, work may not begin before **7 a.m.** or end after **7 p.m.**, except from June 1 through Labor Day, when evening hours are extended to **9 p.m.** Different rules apply in agricultural employment.

TIP CREDIT

Employers of "tipped employees" must pay a cash wage of at least $2.13 per hour if they claim a tip credit against their minimum wage obligation. If an employee's tips combined with the employer's cash wage of at least $2.13 per hour do not equal the minimum hourly wage, the employer must make up the difference. Certain other conditions must also be met.

ENFORCEMENT

The Department of Labor may recover back wages either administratively or through court action, for the employees that have been underpaid in violation of the law. Violations may result in civil or criminal action.

Employers may be assessed civil money penalties of up to $1,100 for each willful or repeated violation of the minimum wage or overtime pay provisions of the law and up to $11,000 for each employee who is the subject of a violation of the Act's child labor provisions. In addition, a civil money penalty of up to $50,000 may be assessed for each child labor violation that causes the death or serious injury of any minor employee, and such assessments may be doubled, up to $100,000, when the violations are determined to be willful or repeated. The law also prohibits discriminating against or discharging workers who file a complaint or participate in any proceeding under the Act.

ADDITIONAL INFORMATION

- Certain occupations and establishments are exempt from the minimum wage and/or overtime pay provisions.
- Special provisions apply to workers in American Samoa and the Commonwealth of the Northern Mariana Islands.
- Some state laws provide greater employee protections; employers must comply with both.
- The law requires employers to display this poster where employees can readily see it.
- Employees under 20 years of age may be paid $4.25 per hour during their first 90 consecutive calendar days of employment with an employer.
- Certain full-time students, student learners, apprentices, and workers with disabilities may be paid less than the minimum wage under special certificates issued by the Department of Labor.

For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627

WHD U.S. Wage and Hour Division

WWW.WAGEHOUR.DOL.GOV

U.S. Department of Labor | Wage and Hour Division

WHD Publication 1088 (Revised July 2009)

PART IV

BID ITEMS

251012

PROPOSAL BID ITEMS

Report Date 11/17/25

251012

Section: 0001 - PAVING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00003		CRUSHED STONE BASE	13,651.00	TON		$	
0020	00008		CEMENT STABILIZED ROADBED	20,707.00	SQYD		$	
0030	00100		ASPHALT SEAL AGGREGATE	113.00	TON		$	
0040	00103		ASPHALT SEAL COAT	13.00	TON		$	
0050	00190		LEVELING & WEDGING PG64-22	602.00	TON		$	
0060	00212		CL2 ASPH BASE 1.00D PG64-22	931.00	TON		$	
0070	00214		CL3 ASPH BASE 1.00D PG64-22	4,836.00	TON		$	
0080	00301		CL2 ASPH SURF 0.38D PG64-22	483.00	TON		$	
0090	00312		CL3 ASPH SURF 0.50D PG64-22	1,468.00	TON		$	
0100	00356		ASPHALT MATERIAL FOR TACK	16.00	TON		$	
0110	02084		JPC PAVEMENT-8 IN	3,255.00	SQYD		$	
0120	02542		CEMENT	455.00	TON		$	
0130	02676		MOBILIZATION FOR MILL & TEXT	1.00	LS		$	
0140	02677		ASPHALT PAVE MILLING & TEXTURING	10.00	TON		$	
0150	20071EC		JOINT ADHESIVE	13,981.00	LF		$	
0160	21289ED		LONGITUDINAL EDGE KEY	2,060.00	LF		$	
0170	24969ED		LONGITUDINAL SAW CUT	2,430.00	LF		$	

Section: 0002 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0180	00021		DRAINAGE BLANKET-EMBANKMENT	3,100.00	CUYD		$	
0190	00078		CRUSHED AGGREGATE SIZE NO 2	4.00	TON		$	
0200	00080		CRUSHED AGGREGATE SIZE NO 23	1,900.00	TON		$	
0210	01000		PERFORATED PIPE-4 IN	273.00	LF		$	
0220	01010		NON-PERFORATED PIPE-4 IN	40.00	LF		$	
0230	01015		INSPECT & CERTIFY EDGE DRAIN SYSTEM	1.00	LS		$	
0240	01028		PERF PIPE HEADWALL TY 3-4 IN	4.00	EACH		$	
0250	01691		FLUME INLET TYPE 2	9.00	EACH		$	
0260	01987		DELINEATOR FOR GUARDRAIL BI DIRECTIONAL WHITE	92.00	EACH		$	
0270	02159		TEMP DITCH	4,243.00	LF		$	
0280	02160		CLEAN TEMP DITCH	2,122.00	LF		$	
0290	02230		EMBANKMENT IN PLACE	351,990.00	CUYD		$	
0300	02242		WATER	50.00	MGAL		$	
0310	02351		GUARDRAIL-STEEL W BEAM-S FACE	4,200.00	LF		$	
0320	02360		GUARDRAIL TERMINAL SECTION NO 1	1.00	EACH		$	
0330	02367		GUARDRAIL END TREATMENT TYPE 1	3.00	EACH		$	
0340	02369		GUARDRAIL END TREATMENT TYPE 2A	4.00	EACH		$	
0350	02429		RIGHT-OF-WAY MONUMENT TYPE 1	58.00	EACH		$	
0360	02432		WITNESS POST	58.00	EACH		$	
0370	02483		CHANNEL LINING CLASS II	185.00	TON		$	
0380	02484		CHANNEL LINING CLASS III	683.00	TON		$	

PROPOSAL BID ITEMS

251012

Report Date 11/17/25

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0390	02545		CLEARING AND GRUBBING 14 ACRES	1.00	LS		$	
0400	02562		TEMPORARY SIGNS	500.00	SQFT		$	
0410	02585		EDGE KEY	61.00	LF		$	
0420	02602		FABRIC-GEOTEXTILE CLASS 1	18,750.00	SQYD		$	
0430	02603		FABRIC-GEOTEXTILE CLASS 2	3,570.00	SQYD		$	
0440	02650		MAINTAIN & CONTROL TRAFFIC	1.00	LS		$	
0450	02671		PORTABLE CHANGEABLE MESSAGE SIGN	2.00	EACH		$	
0460	02697		EDGELINE RUMBLE STRIPS	2,062.00	LF		$	
0470	02701		TEMP SILT FENCE	4,243.00	LF		$	
0480	02703		SILT TRAP TYPE A	9.00	EACH		$	
0490	02704		SILT TRAP TYPE B	9.00	EACH		$	
0500	02705		SILT TRAP TYPE C	9.00	EACH		$	
0510	02706		CLEAN SILT TRAP TYPE A	9.00	EACH		$	
0520	02707		CLEAN SILT TRAP TYPE B	9.00	EACH		$	
0530	02708		CLEAN SILT TRAP TYPE C	9.00	EACH		$	
0540	02726		STAKING	1.00	LS		$	
0550	02774		PREFABRICATED WICK DRAIN	85,200.00	LF		$	
0560	04933		TEMP SIGNAL 2 PHASE	3.00	EACH		$	
0570	05950		EROSION CONTROL BLANKET	11,641.00	SQYD		$	
0580	05952		TEMP MULCH	83,345.00	SQYD		$	
0590	05953		TEMP SEEDING AND PROTECTION	62,509.00	SQYD		$	
0600	05963		INITIAL FERTILIZER	3.00	TON		$	
0610	05964		MAINTENANCE FERTILIZER	4.00	TON		$	
0620	05985		SEEDING AND PROTECTION	64,393.00	SQYD		$	
0630	05992		AGRICULTURAL LIMESTONE	78.00	TON		$	
0640	06403		FLEXIBLE DELINEATOR POST-B/W	75.00	EACH		$	
0650	06542		PAVE STRIPING-THERMO-6 IN W	21,165.00	LF		$	
0660	06543		PAVE STRIPING-THERMO-6 IN Y	12,717.00	LF		$	
0670	06546		PAVE STRIPING-THERMO-12 IN W	250.00	LF		$	
0680	06549		PAVE STRIPING-TEMP REM TAPE-B	2,400.00	LF		$	
0690	06550		PAVE STRIPING-TEMP REM TAPE-W	2,400.00	LF		$	
0700	06551		PAVE STRIPING-TEMP REM TAPE-Y	2,400.00	LF		$	
0710	06556		PAVE STRIPING-DUR TY 1-6 IN W	624.00	LF		$	
0720	06557		PAVE STRIPING-DUR TY 1-6 IN Y	624.00	LF		$	
0730	06568		PAVE MARKING-THERMO STOP BAR-24IN	24.00	LF		$	
0740	06574		PAVE MARKING-THERMO CURV ARROW	9.00	EACH		$	
0750	06576		PAVE MARKING-THERMO ONLY	2.00	EACH		$	
0760	06610		INLAID PAVEMENT MARKER-MW	25.00	EACH		$	
0770	06612		INLAID PAVEMENT MARKER-BY	109.00	EACH		$	
0780	10020NS		FUEL ADJUSTMENT	81,694.00	DOLL	$1.00	$	$81,694.00
0790	10030NS		ASPHALT ADJUSTMENT	32,536.00	DOLL	$1.00	$	$32,536.00
0800	20191ED		OBJECT MARKER TY 3	3.00	EACH		$	
0810	20458ES403		CENTERLINE RUMBLE STRIPS	1,030.00	LF		$	
0820	22883EN		CONCRETE WEDGE CURB	2,870.00	LF		$	
0830	24679ED		PAVE MARK THERMO CHEVRON	662.00	SQFT		$	
0840	25079ED		THRIE BEAM GUARDRAIL TRANSITION TL-2	4.00	EACH		$	
0850	26248EC		ELECTRONIC DELIVERY MGMT SYSTEM - AGG	1.00	LS		$	

251012

PROPOSAL BID ITEMS

Report Date 11/17/25

Section: 0003 - DRAINAGE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0860	00440		ENTRANCE PIPE-15 IN	304.00	LF		$	
0870	00441		ENTRANCE PIPE-18 IN	88.00	LF		$	
0880	00462		CULVERT PIPE-18 IN	317.00	LF		$	
0890	00464		CULVERT PIPE-24 IN	53.00	LF		$	
0900	00466		CULVERT PIPE-30 IN	188.00	LF		$	
0910	01210		PIPE CULVERT HEADWALL-30 IN	2.00	EACH		$	
0920	01433		SLOPED BOX OUTLET TYPE 1-18 IN	9.00	EACH		$	
0930	01434		SLOPED BOX OUTLET TYPE 1-24 IN	2.00	EACH		$	
0940	01450		S & F BOX INLET-OUTLET-18 IN	1.00	EACH		$	
0950	01650		JUNCTION BOX	1.00	EACH		$	
0960	02607		FABRIC-GEOTEXTILE CLASS 2 FOR PIPE	2,407.00	SQYD	$2.00	$	$4,814.00
0970	24026EC		PIPE CULVERT HEADWALL-54 IN	2.00	EACH		$	
0980	24668EC		STEEL ENCASEMENT PIPE SIZE	309.00	LF		$	

Section: 0004 - BRIDGE- ILLINOIS CENTRAL R/R BRIDGE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0990	02231		STRUCTURE GRANULAR BACKFILL	251.00	CUYD		$	
1000	02692		SETTLEMENT PLATFORM	2.00	EACH		$	
1010	03299		ARMORED EDGE FOR CONCRETE	264.00	LF		$	
1020	03340		STEEL PIPE-2 1/2 IN	84.00	LF		$	
1030	03343		STEEL PIPE-4 IN	84.00	LF		$	
1040	08003		FOUNDATION PREPARATION	1.00	LS		$	
1050	08020		CRUSHED AGGREGATE SLOPE PROT	463.00	TON		$	
1060	08033		TEST PILES	340.00	LF		$	
1070	08051		PILES-STEEL HP14X89	5,572.00	LF		$	
1080	08100		CONCRETE-CLASS A	277.00	CUYD		$	
1090	08104		CONCRETE-CLASS AA	433.00	CUYD		$	
1100	08150		STEEL REINFORCEMENT	55,360.00	LB		$	
1110	08151		STEEL REINFORCEMENT-EPOXY COATED	125,420.00	LB		$	
1120	08500		APPROACH SLAB	200.00	SQYD		$	
1130	08636		PRECAST PC I BEAM TYPE 5	1,407.00	LF		$	
1140	23378EC		CONCRETE SEALING	27,350.00	SQFT		$	
1150	23964EC		PROTECTIVE FENCE	540.00	LF		$	
1160	25028ED		RAIL SYSTEM SINGLE SLOPE - 40 IN	572.00	LF		$	
1170	26233EC		MOBILIZATION FOR CONCRETE SURF TREATMENT	1.00	LS		$	

Section: 0005 - BRIDGE- CULVERT 14' X 8' RCBC STA. 113+49.29

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1180	08003		FOUNDATION PREPARATION	1.00	LS		$	
1190	08100		CONCRETE-CLASS A	211.00	CUYD		$	
1200	08150		STEEL REINFORCEMENT	32,487.00	LB		$	

PROPOSAL BID ITEMS

251012

Report Date 11/17/25

Section: 0006 - MOBILIZATION AND/OR DEMOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1210	02568		MOBILIZATION	1.00	LS		$	
1220	02569		DEMOBILIZATION	1.00	LS		$	