

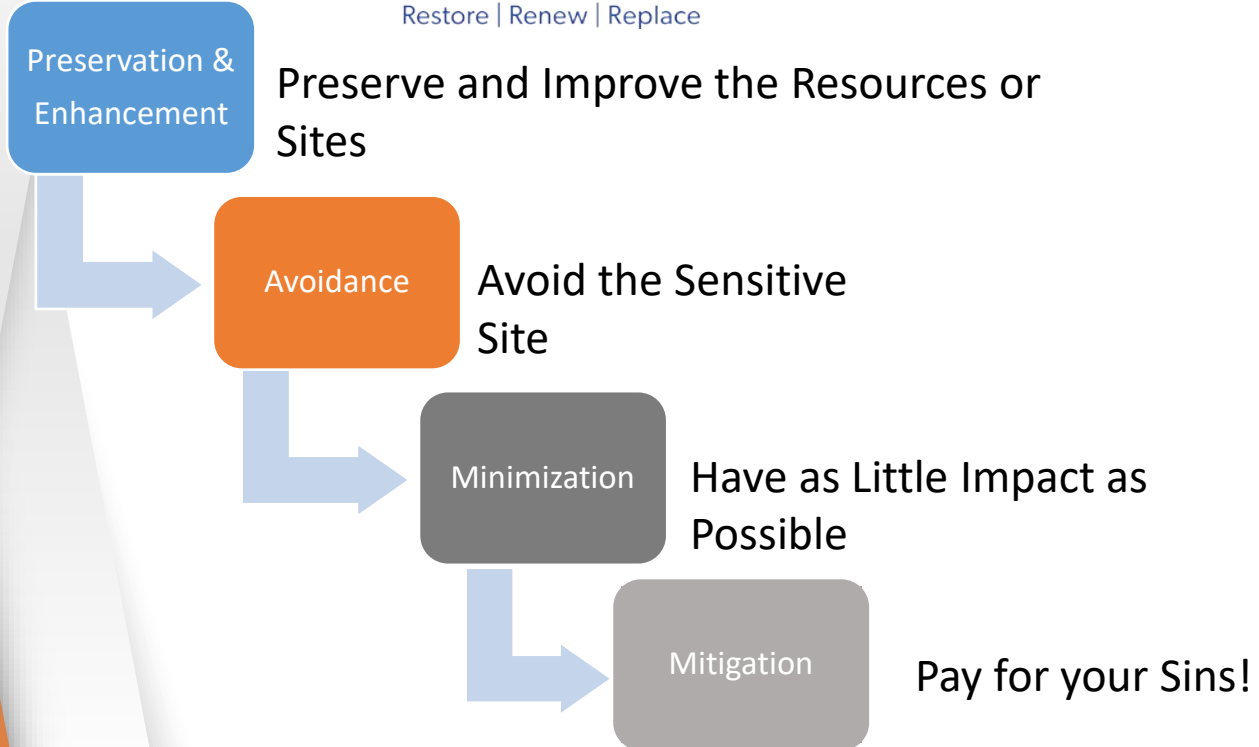
KYTC's First Bat Bridge Project





Restore | Renew | Replace

Environmental Philosophy





Env & Design



Coordination



Construction



KYTC - District 7



Construction Timeline

Letting

October 2019

Pre-Design

November 2019

Construction

January 2021—March 2021

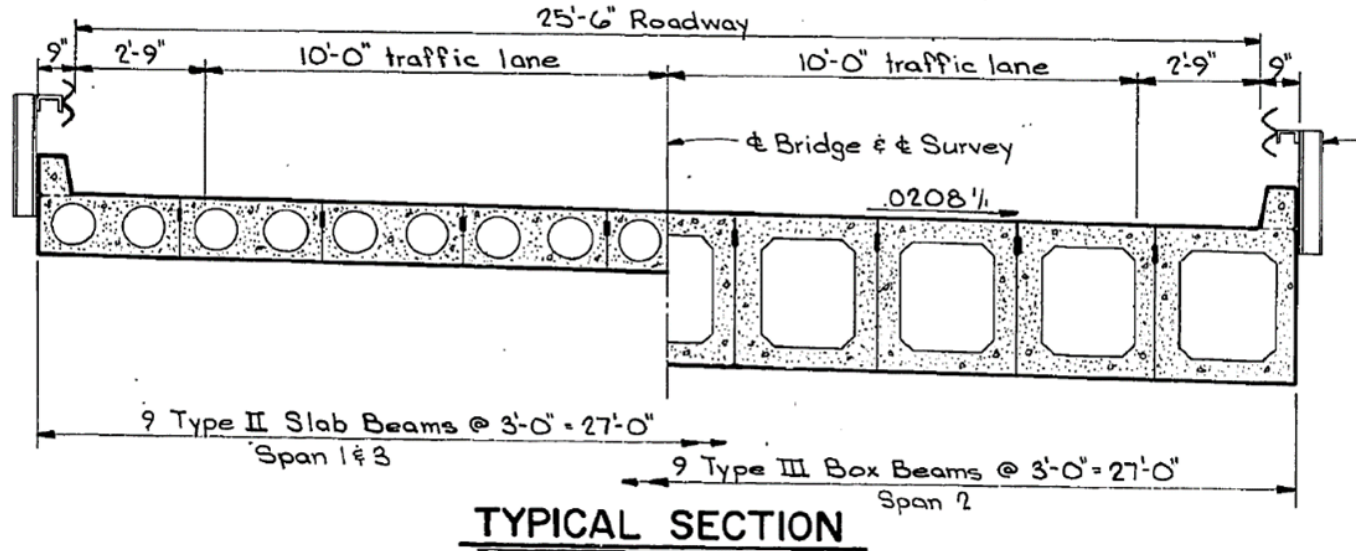
Gray bats in KENTUCKY

- Listed in 1976, decline due to habitat loss and conversion
- core range encompasses the cave regions of AL, northern AR, KY, MO, and TN, dispersed statewide in KY with a major hibernacula in Mammoth system.
- Caves year round, 95% of gray bats hibernate in less than 20 caves.
- Several caves in area of bridge have been known to house gray bats during the active season.
- Gray bats utilizing bridges as roost habitat around KY has been known to USFWS and researchers for years.

Habitat Assessment

- Biologists assessed the bridge in fall 2018 for potential T&E species habitat.
- A coordination meeting with USFWS led to knowledge of maternity colony and 1000s of bats (guess who?)
- Early 2019 we started our process of gathering as much info as possible about the colony and the bridge for the Biological Assessment.

Existing Bridge



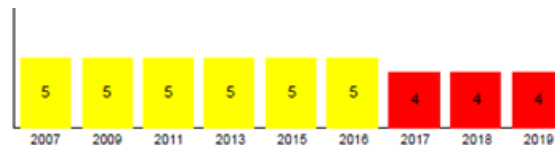
Existing Bridge

Substandard (12 months)

Poor		Heath Index:	79.39
SubStd:	Yes	SubStd Reason:	Weight
Inspection Type	Freq (92)	Last Insp (93)	Next Insp
Routine	12	1/16/2019	1/16/2020
Element	12	1/16/2019	1/16/2020
Fracture Critical (A)		1/1/1901	1/1/1901
Underwater (B)		1/1/2007	1/1/1901
Special Insp (C)		2/16/2017	1/1/1901

SUPERSTRUCTURE GEOMETRY

# of Main Spans (45):	3
# of Approach Spans (46):	0
Main Material (43 A):	5 Prestressed Concrete
Main Design (43 B):	05 Multiple Box Beam
Max Span Length (48):	73.00 ft.
Structure Length (49):	135.00 ft.
NBIS Length (37):	Long Enough
Temp Structure (103):	Not Applicable (P)
Skew (34):	20°
Structure Flared (35):	0 No flare
Parallel Structure (101):	No bridge exists
Approach Alignment (72):	4 Minimum Tolerable



SUPERSTRUCTURE CONDITION

Superstructure Rating (59):	4 Poor
Structure Evaluation (67):	3 Intolerable - Correct

Existing Bridge



Existing Bridge



- Required complete deck and super-structure replacement (27 beams)

Existing Bridge



Existing Bridge

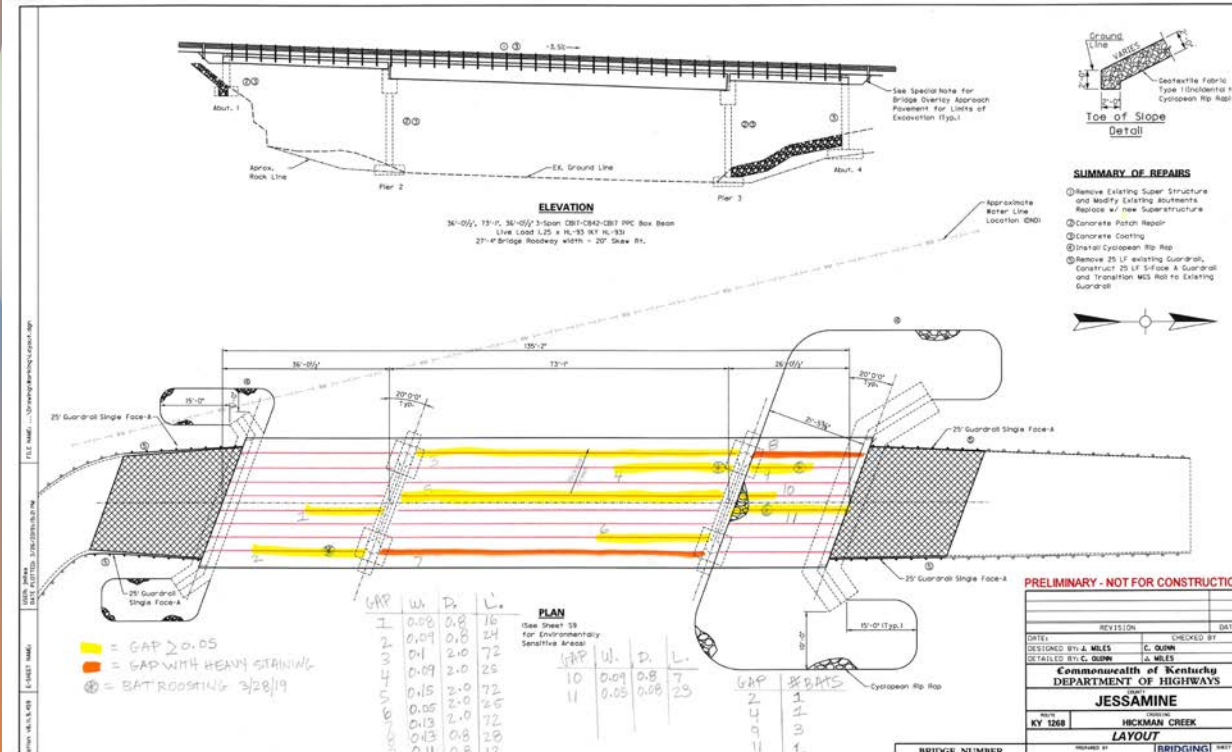


Platform Survey 2019



Performed by USFWS, KYTC, and Eco-Tech (now ICF) on May 10, 2019

Bat Concentration Areas (Preconstruction)



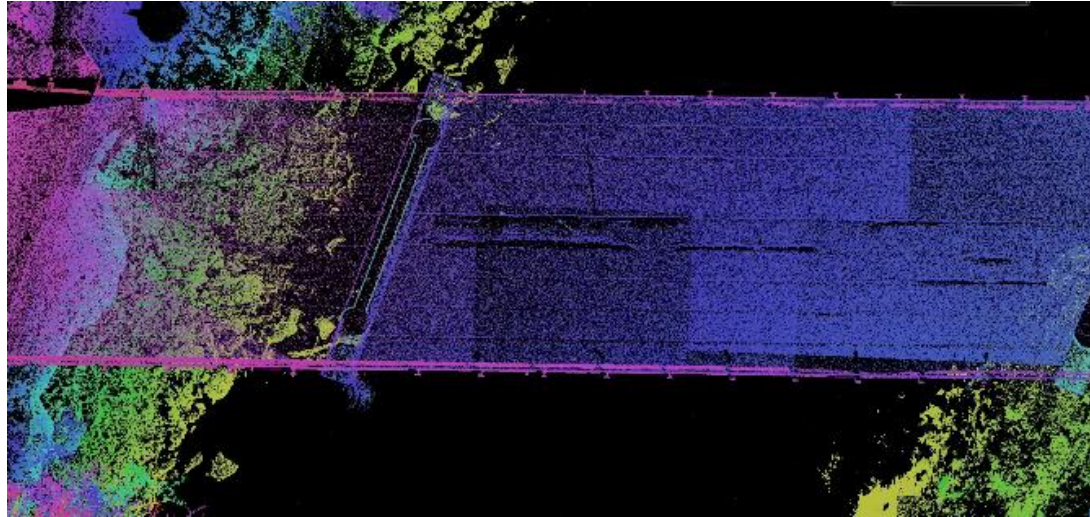
Houseguests



Why Concrete?

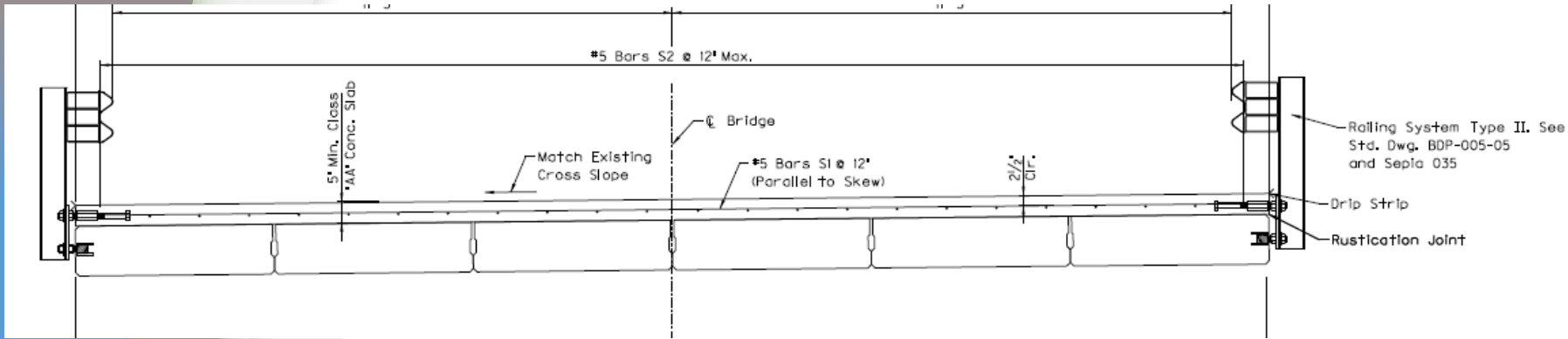
- Other bridge types also used by roosting bats but to a lesser amount.
- Stable appropriate temperature is key for any long-term use.
- Higher thermal mass of concrete allows structures to stay cool during day and warm at night, particularly valuable for maternity season.

A Closer Look



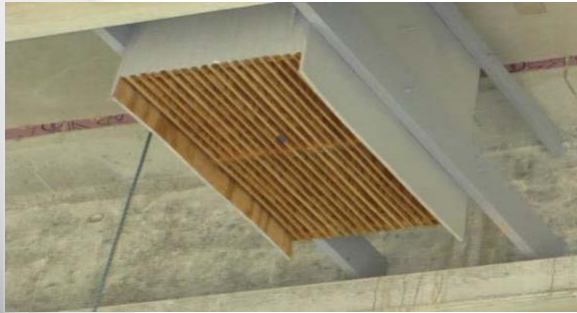
LiDAR and field measurements estimated that the existing bridge had ~572 linear ft of gaps greater than ½” width and 133 cubic ft of potential roosting area.

Typical Superstructure Replacement



Gaps between beams would be eliminated, destroying existing bat roosting habitat.

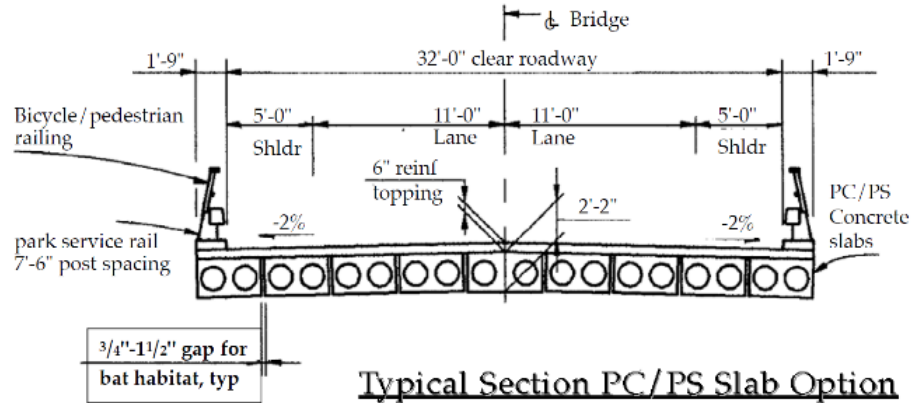
Roost Habitats



Bat Boxes are typically made of wood and will be a future maintenance issue. Potential to be damaged by vandals.

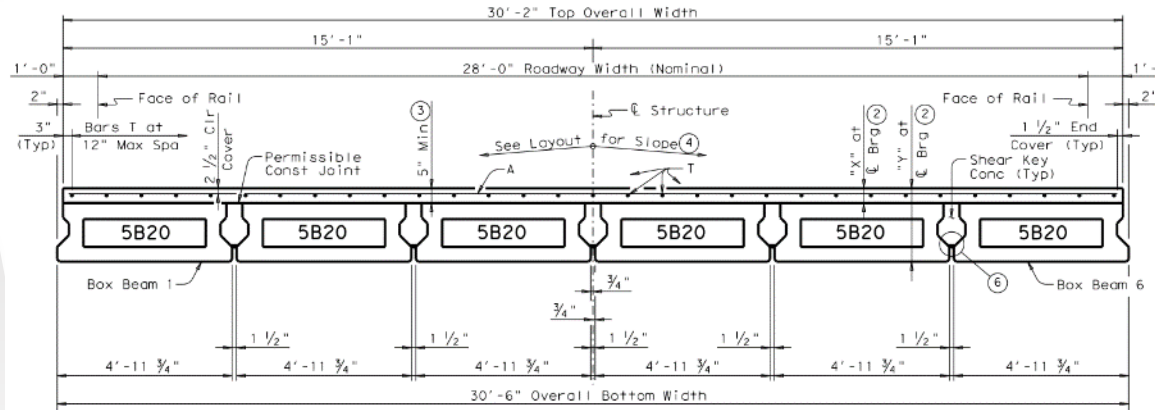
Roost Habitats

Structural options to provide bat friendly habitat.



“Oregon Superstructure”

Roost Habitats



"Texas Superstructure"

Biological Assessment

Commitments:

- All construction work from November 15-March 15.
- Pre-construction spot check to ensure vacancy.
- Construct bat friendly structure with $\frac{3}{4}$ inch – 1 $\frac{1}{2}$ inch gaps between concrete beams, protected from elements.
- Avoiding direct take and improving the available habitat allowed us to avoid Biological Opinion for this project.
- 5-year monitoring commitment by KYTC.
- Agree to re-consult post construction if USFWS feels it is prudent.

Pre-construction Meeting

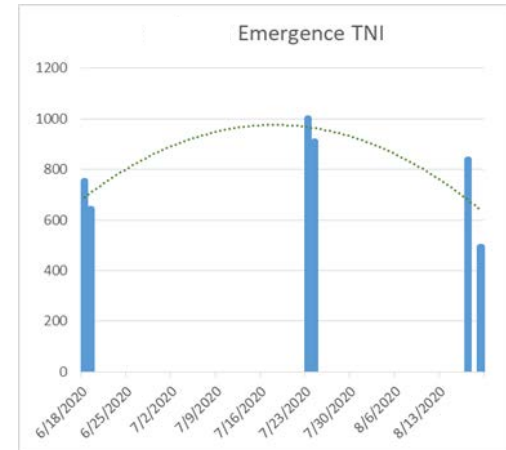
- Project let in fall 2019 and we met with the contractor to go over the commitments and to field any questions about the design.
- Decision was made to wait one year and start construction in late 2020.
- With a year gap before any impacts to the bridge were scheduled to occur we decided to do what we do best....collect more data!

Pre-Construction Monitoring



Emergence Counts for Baseline Data

Date (2020)	Night 1	Night 2
June 18-19	754	643
July 23-24	1002	912
August 17-19	839	496



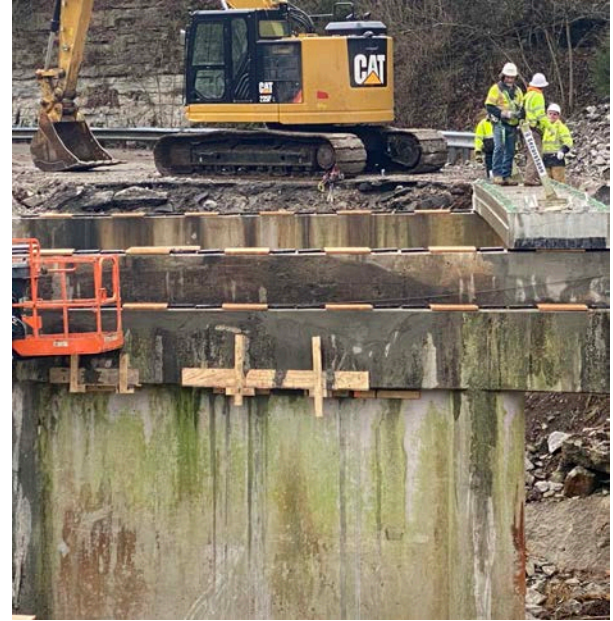
- ❑ Preconstruction spot check performed on January 7, 2021
- ❑ Entire structure was inspected for potential roosting individuals
- ❑ Gave contractors the green light for construction



Performed by Drew Powell and Triston Mullins

Construction





Construction completed on March 15, 2021

Rehabilitated Structure



Rehabilitated Structure



Rehabilitated Structure



Post Construction Monitoring



Emergence Counts for Year 1 Data		
Date (2021)	Night 1	Night 2
May 6-7	295	250
June 2-3	372	234
August 12 (Platform)	1,143 (18 EPFU, 1,125 MYGR)	





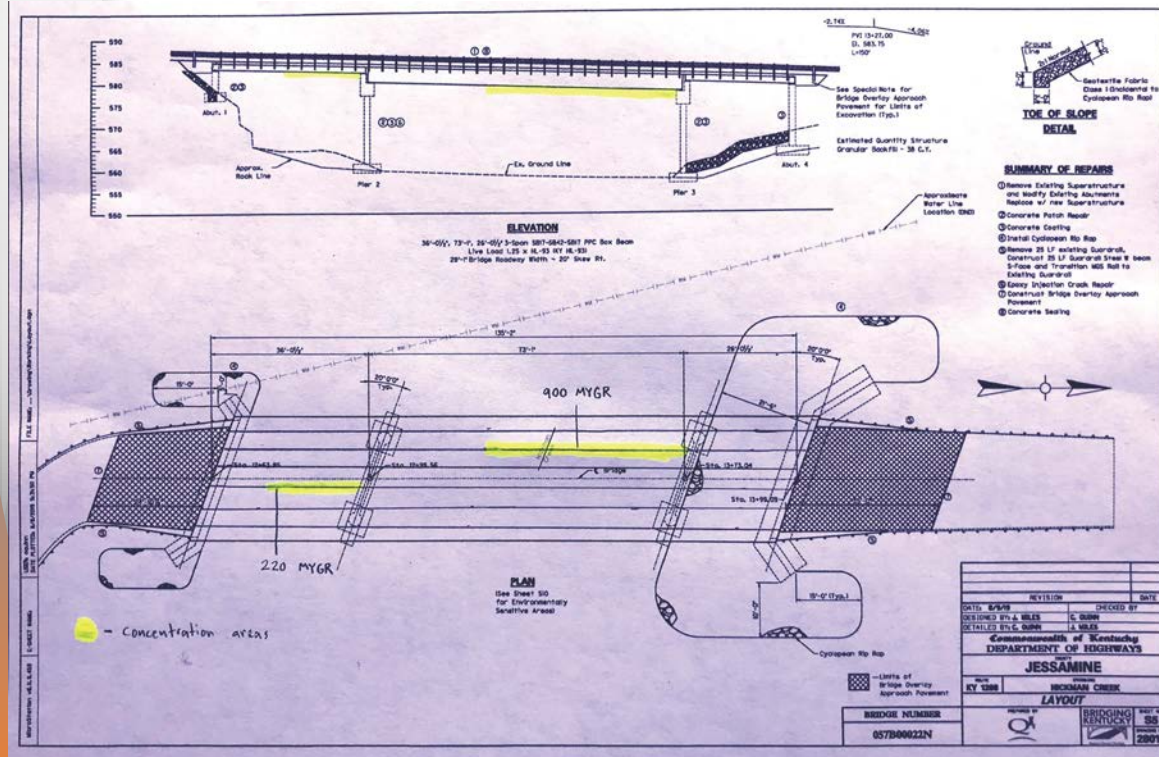
MYGR pups observed after emergence on June 2, 2021



Platform Survey 2021



Bat Concentration Areas (Post construction)



Year 2 Monitoring



Emergence Counts for Year 2 Data		
Date (2022)	Night 1	Night 2
May 2,4	50	48
June 13-14	1700!	1600!
August 16-17	1,248	1,206

What's next?

- Continue to monitor bridge until 2025.
- Assess future bridge rehab/replacement projects across the state for bat-friendly design potential. We already have found a couple more maternity colonies on KY bridges that need repair.
- Spread the good word!

Questions?

