

Standard Operating Procedures (SOP)  
NCDOT Preliminary Bat Habitat Assessments (Structures, Caves & Mines)

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# Standard Operating Procedures (SOP)

## NCDOT Preliminary Bat Habitat Assessments (Structures, Caves & Mines)<sup>1</sup>

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This document serves to explain the electronic bat habitat assessment form that you have uploaded as a data dictionary (.ddf) onto your GPS unit. This .ddf file was created using Pathfinder Office V5.3 software. The data dictionary contains four main feature types: Bridge, Culvert, Abandoned Structures and Caves/Mines. There is also an “Other” feature which allows the user to record comments about miscellaneous things you might need to locate in the field. Each feature contains a separate set of attributes that you will fill in for each structure or mine assessed. All features have “header” attributes (Observers, Project Number, Date, Time, Road Name, County, Bridge Number and Waterbody/Road Crossing). These headers need no further explanation so no details will be provided in this procedures manual for those attributes. This manual is arranged by feature, the attribute is written exactly as it appears in the data dictionary and its definition follows the colon.

The term “project footprint” is used throughout this document to mean the currently known potential extent of project impacts (i.e ROW, slope stakes, study area, etc.). Please refer to the individual scope of the project which will define the particular limits of this area. Appendix A, B & C in this document provide images and tables that will further assist in identifying attributes. **Upon completion of your field work, please follow the directions provided in Appendix D to setup the export in Pathfinder. You will need to configure the Export Setup so that it is the same as ours.** Otherwise, your attribute table may not contain all of the same information as our table.

Equipment needed to complete the assessments includes binoculars, spotlight and camera. Bridges and culverts can be surveyed for evidence of bat use any time of year. It is highly unlikely that bats will actually be present in bridges of the mountains and piedmont during winter months but evidence remains year round.

**\*\*Reminder:** when collecting points with your GPS unit you will need to remain still, do not move around the bridge to answer assessment questions unless you have the recording paused.

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<sup>1</sup>April 2020 latest version. February 2016 update: items marked with an asterisk (\*) in the text are no longer necessary to answer based on the Final 4(d) rule for NLEB. However, they remain in this SOP in case changes occur as the listing/consultation procedure continues to develop for this species. Please leave these sections blank on the data forms and in the accompanying data dictionary. Version 1, 2015.

### **Bridge Attributes:**

- **% Surrounding Habitat:** surrounding habitat will need to be assessed prior to field surveys using aerials and best professional judgment. These habitat types are based on National Land Cover Database (NLCD) classifications which were developed by the Multi-Resolution Land Characteristics (MRLC) consortium is a group of federal agencies who coordinate and generate consistent and relevant land cover information at the national scale. Fill in a number that represents the approximate percent of the following habitats found within 1 mile of the project footprint.
  - o Urban/Commercial
  - o Suburban/Residential
  - o Agricultural
  - o Herbaceous/Shrub/Grassland/Barren Land
  - o Deciduous Forest/ Evergreen Forest/ Mixed Forest
  - o Woody Wetlands /Herbaceous Wetlands/Open Water
- **\*Any trees >3" dbh in the project footprint:** this question is designed to capture the presence of potential roosting and foraging habitat for the northern long-eared bat, *Myotis septentrionalis*. Isolated trees >1000' from the nearest woodlot don't count.
- **Shaggy trees/snag/hollow >5" dbh: IN bat:** this question is designed to capture the presence of roosting habitat for the Indiana bat, *Myotis sodalis* within the project footprint. Provide photos of potential roost trees and put descriptions and locations in the notes section.
  - o IN Bat: how much sun do these trees rec: this question is a follow up to the question above about snags and hollows.
  - o IN Bat: list species of habitat trees: this question is also a follow up to the shaggy/snags/hollows question, list the tree species (i.e. *Abies fraseri*) that are snags/hollows or shaggy bark trees >5" dbh.
- The four questions dealing with Caves and Mines in the project footprint and vicinity (within 0.50 mile\* {see explanation in Appendix D}) will need to be assessed prior to field surveys using the Mineral Resources Data System shapefile. For a tutorial on how to do this see Appendix D, Locating Mines. Provide photo, descriptions and locations. While on site, the biologist should investigate (on foot) any potential winter roost sites that are **visible** within 500 feet of the bridge. Look for rock outcroppings, or other topographical features that may indicate the presence of a cave or unmapped mine.
- **Major Water Source in Project Footprint:** select one from the drop down menu that best describes the major water source in the project footprint. The .ddf only allows one selection so if there are multiple water sources, select the dominant type.
- **Suitable Drinking Habitat:** This question is intended to assess the movement of the water source in the project footprint. Is the water source is suitable for bats to access? Bats typically will not drink from areas of rushing water nor stagnant water areas. Are there areas of non-stagnant, smooth or slack water present with good water quality?
- **Artificial Light:** select if there is artificial lighting present that potentially cast light on the bridge. This could be in the form of nearby light poles, fixtures on the bridge, etc.
- **Guard Rails:** select the type of guard rail; see pictures and "Barrier Rail" in the Structure diagram in Appendix A.

- **Deck Type:** select the type of decking used, decking material is visible from underneath the bridge, do not confuse this with the wearing surface (i.e. asphalt on top of the bridge); see pictures and “Deck” in the diagram in Appendix A.
- **Beam Type:** select the types of beams used, see pictures and “Beams or Girders” in the diagram in Appendix A.
- **End/Back Wall Type:** select the types of end wall, see pictures and “Backwall” in the diagram in Appendix A.
- **Creosote Evidence:** for bridges with wooden components, are any of the timbers soaked in creosote? This will be obvious by the strong smell and/or presence of dark, oily stains on timbers.
- **Suitable Roosting Crevices:** this question is asking if the bridge has any vertical crevices that have potential for suitable bat roosts. Typically, crevices that support bats are ½” to 1 ¼” wide and anywhere from 4” to >12” deep. You will need to look under the bridge, along the guard rails and on the side of the bridge at the end bents to assess this question. An example of this is an expansion joint that bats are accessing from the underside of the bridge that is covered with a rubber compression seal or a type of poured sealant on the top of the bridge which protects them from rain. The picture on the right below is the view looking up at the bridge’s expansion joint from below. Sometimes the concrete guardrail has a very narrow crevice (½” to 1 ¼”) that will be sealed on top and open on the side, if you observe this, select yes to this question.



An example of of a suitable roosting crevice is an unsealed expansion joint along a guard rail/jersey barrier that bats could access which is deep enough to protect them from wind and rain, hence >12” deep.



- **Deck Drains:** bats have been found roosting in bridge deck drains that have been inadvertently top sealed. The drains have either been mistakenly paved over or the deck drains have been clogged with debris. This will need to be assessed from the underside of the bridge by directing light into each clogged deck drain.

- Height of Bridge Deck Above the Ground or Water: take into account the areas bats could use for roosting and estimate maximum feet above the ground or water.
  - Night Roost Habitat Protected: Are there vertical surfaces beneath the bridge deck for night roosting that are protected from wind and moisture?
  - Bridge Alignment: in which direction is the bridge oriented?
  - Hours of Sun Exposure to Bridge: select from the categories, consider full summer sun hours.
  - Human Disturbance Under the Bridge: an example of high disturbance would be if there are people living under the bridge. An example of low disturbance would be a bridge that spans a small, non-navigable stream.
- 

**The next few questions will only need to be answered if bats were observed or if there was evidence found of bats using the bridge:**

- Emergence Count Performed: did you perform an emergence count at dusk? If so, see Emergence Count procedure on page 7.
- Evidence of Bats Using Nests: did you observe any bats using birds/wasps nests under bridge?
- Evidence of Bats Using Bridge: did you observe any bats, urine staining or guano piles? See Appendix B for pictures of evidence.
- Type of Evidence: select the type of evidence you are observing, select all that apply.
- Bat Root Location Type: In the question above, you observed evidence of bats using the bridge. Was the evidence of bats in crevices or roosting out in the open/on the walls under the bridge?
- Bat Species Present: pick the species you observed from the list in Appendix C, if you are unable to see them well enough for a correct identification, then record that in the notes section. Try to take photos without disturbing the bats.
- Bat Species Present 2 & 3: record a second or third bat species here if observed.
- Number of Bats: number of bats observed using the bridge, this attribute is listed under each bat species so that for each bat species present you can list the number of bats observed for up to 3 different species.
- Notes: this field has 100 characters to record information such as shaggy trees/hollows and their locations, how many birds nests bats are using, if you see guano or urine staining, where exactly you have seen the bats, etc. For example: urine staining observed and guano piles in and around the western most expansion joint, under the eastbound traffic lane.

### **Culvert Attributes:**

- **% Surrounding Habitat:** surrounding habitat will need to be assessed prior to field surveys using aerials and best professional judgment. These habitat types are based on National Land Cover Database (NLCD) classifications which were developed by the Multi-Resolution Land Characteristics (MRLC) consortium is a group of federal agencies who coordinate and generate consistent and relevant land cover information at the national scale. Fill in a number that represents the approximate percent of the following habitats found within 1 mile of the project footprint.
  - o Urban/Commercial
  - o Suburban/Residential
  - o Agricultural
  - o Herbaceous/Shrub/Grassland/Barren Land
  - o Deciduous Forest/ Evergreen Forest/ Mixed Forest
  - o Woody Wetlands /Herbaceous Wetlands/Open Water
- **\*Any trees >3" dbh in the project footprint:** this question is designed to capture the presence of potential roosting and foraging habitat for the northern long-eared bat, *Myotis septentrionalis*.
- **Shaggy trees/snags/hollows >5" dbh:** this question is designed to capture the presence of roosting habitat for the Indiana bat, *Myotis sodalis* within the project footprint. Provide photos of potential roost trees and put descriptions and locations in the notes section.
  - o **How much sun do these trees receive:** this question is a follow up to the question above about snags and hollows.
  - o **List Species of Habitat Trees:** this question is also a follow up to the shaggy/snags/hollows question, list the tree species (i.e. *Abies fraseri*) that are snags/hollows or shaggy bark trees >5" dbh.
- The four questions dealing with **Caves and Mines in the project footprint and vicinity** (within 0.50 mile\* {see explanation in Appendix D}) will need to be assessed prior to field surveys using the Mineral Resources Data System shapefile (see tutorial in Appendix D). Provide photo, descriptions and locations. While on site, the biologist should investigate (on foot) any potential winter roost sites that are **visible** within 500 feet of the culvert. Look for rock outcroppings, or other topographical features that may indicate the presence of a cave or unmapped mine.
- **Major Water Source in Project Footprint:** select one from the drop down menu that best describes the major water source in the project footprint. The .ddf only allows one selection so if there are multiple water sources, select the dominant type.
- **Suitable Drinking Habitat:** This question is intended to assess the movement of the water source in the project footprint. Is the water source is suitable for bats to access? Bats typically will not drink from areas of rushing water nor stagnant water areas. Are there areas of non-stagnant, smooth or slack water present with good water quality?
- **Guard Rails:** select the type of guard rail; see pictures and "Barrier Rail" in the Structure diagram in Appendix A.
- **Concrete Box Culvert:** select Y/N
- **Structure Specific Questions:** A series of questions specific to the characters of the culvert that are self-explanatory.



- Human Disturbance and Traffic Under the Culvert: an example of high disturbance would be if there are people living inside a culvert which spans a busy highway. An example of low disturbance would be a culvert in a non-navigable stream.
- Emergence Count Performed: did you perform an emergence count at dusk? If so, see Emergence Count procedure on page 7.
- Evidence of Bats Using Nests: did you observe any bats using birds/wasps nests under bridge?
- Evidence of Bats Using Culvert: did you observe any bats, urine staining or guano piles? See Appendix B for pictures of evidence. If so, record exactly what you saw and where you saw it in the notes section.
- Bat Species Present: pick the species you observed from the list in Appendix C, if you are unable to see them well enough for a correct identification, then record that in the notes section. Try to take photos without disturbing the bats.
- Number of Bats: number of bats observed using the culvert, this attribute is listed again under each bat species so that for each bat species present you can list the number of bats observed for up to 3 different species.
- Bat Species Present 2 & 3: record a second bat species here if observed.
- Notes: this field has 100 characters to record information such as shaggy trees/hollows and their locations, how many birds nests bats are using, if you see guano or urine staining, where exactly you have seen the bats, etc.

#### **Abandoned Structures Attributes:**

- Structure Number: this is a number that you create to represent the abandoned structure you are assessing. Typically start with one and label it appropriately on a field map.
- Canopy Cover: determine which category defines the percent of closed canopy cover at structure.
- % Surrounding Habitat: surrounding habitat will need to be assessed prior to field surveys using aerials and best professional judgment. These habitat types are based on National Land Cover Database (NLCD) classifications which were developed by the Multi-Resolution Land Characteristics (MRLC) consortium is a group of federal agencies who coordinate and generate consistent and relevant land cover information at the national scale. Fill in a number that represents the approximate percent of the following habitats found within 1 mile of the project footprint.
  - o Urban/Commercial
  - o Suburban/Residential
  - o Agricultural
  - o Herbaceous/Shrub/Grassland/Barren Land
  - o Deciduous Forest/ Evergreen Forest/ Mixed Forest
  - o Woody Wetlands /Herbaceous Wetlands/Open Water
- Distance to Nearest Woodlot: is the closest woodlot further than 1,000' or less than 1,000' away?
- Water Source within 1 Mile: select one from the drop down menu that best describes the major water source within one mile. The .ddf only allows one selection so if there are multiple water sources, select the dominant type.
- Structure Type: select from list
- Structure Condition: select from list
- Roof Type: select from list

- Structure Description: 100 characters allowed in this field. Include information such as the location of the bats and signs of use, include a paper sketch.
- Is there regular human use or disturbance: select Y/N
- Structure Length, Width, Height: in feet
- Exterior Evidence of Bat Use on Structure: do you observe any guano or urine staining?
- Describe Bat Use on Exterior: If yes to above, describe what and where.
- Interior Airflow Noticeable: Is there noticeable airflow inside? Select Y/N
- Interior Air Temp vs Outside: select from list.
- Inaccessible Areas that could House Bats: Are there inaccessible areas of the structure that could house bats (e.g. attics, ceiling spaces). If yes, describe here.
- Evidence of Bats Roosting in Structure Interior: if evidence exists of bats roosting in the structure (guano, urine staining, piles of insect parts) then describe what and where, take pictures. **If there is evidence of bats but no bats are observed, please check the building for night roosting after 11PM.**
- Bat Species Present: pick the species you observed from the list in Appendix B, if you are unable to see them well enough for a correct identification, then record that in the notes section.
- Bat Species Present 2: record a second bat species here if observed.

**Abandoned Structure - Emergence Count** (Series of questions at the bottom of the Abandoned Structure Attribute of data dictionary)

**If there are parts of the structure that cannot be accessed for inspection, conduct an emergence count at sunset. It should begin ½ hour before sunset and continue for an hour or until it is too dark to see bats. Surveyors should position themselves outside so that emerging bats will be silhouetted against the sky. Do not conduct an emergence count if temperature is < 50 degrees F or if there is rain.**

- Temperature at Start of Emergence Count: outside air temperature.
- Time at Start of Emergence Count: this should be ½ hour before sunset.
- Time of Sunset
- Time at End of Emergence Count: record the time you end emergence count, this should be when it is too dark to see the bats.
- Emergence Count of Bats: number recorded leaving the structure.
- Bat Species Emerging: choose from the list if you are able to determine the species.
- Where Did Bats Exit Structure: describe where the bats exited.
- Notes: provide a description of the structure and where observers were placed for the emergence count. Provide a sketch of the structure indicating location of observers and exit points of bats, include this sketch in final report.



### **Caves/Mines Attributes:**

Entrance of abandoned mine portals, quarries or cave openings can be extremely dangerous because of the potential for ceiling collapse and presence of toxic gases. Safety and health problems may occur as a result of entering abandoned mines. It is not authorized or required by anyone to enter any potential hibernaculum that is or could be unsafe while implementing surveys. These procedures do not require any employee, consultant, lessee or other such designee to enter into any cave opening, quarry or mine portal.

- Entrance/Portal Number: this is a number that you create to represent the entrance to the cave or mine portal you are assessing. Typically start with 1 and label it appropriately on a field map.
- % Canopy Closure at Entrance: determine which category defines the percent of closed canopy cover over the portal to the mine or cave opening.
- Opening Type: select from list
- Opening Height x Width: in feet
- Length of Portal/Opening: in feet
- Internal Height: in feet
- Internal Width: in feet
- Slope up or down from Entrance: select from list, does the ground slope up toward the entrance or down into the entrance?
- Entrance Stable: select Y/N
- Direction of Airflow: select from list
- Amount of Airflow: select from list
- Internal Air Warmer or Cooler than Outside Temp: select from list
- Evidence of Collapse: select Y/N
- Ceiling Condition: capture the overall “texture” inside the cave/mine. For instance, are the walls and ceiling generally smooth, or are there lots of cracks, and crevices. Also, are the walls/ceiling crumbling? Loose rock inside?
- Depth of Water Internal Opening: in inches, record the depth of the water observed in the opening
- Any Evidence of Past Flooding: select Y/N
- Miles to Nearest Water Source: may need to be assessed prior to field surveys using GIS or maps.
- Foraging Signs: insect wings, legs, etc.
- Any Portals Known to be Connected: include this information, which portals are connected?
- Any Observed Side Passages: are there other passages you noticed in the cave or mine of note?
- Bat Species Present: pick the species you observed from the list in Appendix B, if you are unable to see them well enough for a correct identification, then record that in the notes section.
- Bat Species Present 2: record a second bat species here if observed.
- Notes: anything of note

# Appendix A

## Structure Diagram and Pictures



## Guard Rail Type:

- Concrete



This is considered a concrete guardrail, it has an aluminum top guard but if you see this, please call it concrete



- Timber



- Metal: Aluminum



## Steel





Deck Type:

- Concrete Deck



This is the common look of a concrete deck from below, also pictured are the concrete beams running parallel along the bridge.

The following pictures are showing a concrete deck that was poured using timber forms so it looks like timber but don't be fooled!



- Metal



A steel plank floor is usually corrugated metal forms on top of steel beams/girders with **asphalt** overlay (no concrete). The first picture above is of a repair job which helps visualize the layers of this type of bridge deck to see what the top of the corrugated metal looks like with asphalt removed. Therefore, if you see asphalt on top and corrugated metal underneath, it is likely a steel plank floor bridge. Look at the bottom of bridge pictured below. Typically, it will have drain holes where metal stay in place forms (discussed below) for concrete decks will not.



There is also something called a “stay in place” form which technically would have a concrete deck but for our purposes it’s more important to list the surface that the bats would attach to...the metal form.

Pictured is a “stay in place” metal form on top of steel beams which is pictured here prior to pouring the concrete deck. If you see corrugated metal like the kind the men are holding in the picture underneath of your assessment bridge and concrete on top, it is likely just metal “stay in place” forms for a concrete deck. Please select metal for this deck type even though we understand it technically is not metal.

- Timber Deck



- Open Grid Deck





Beam Type:

- None, this is an example of a deck type that does not have beams; it is a precast concrete cored slab.



- Concrete Beam



- Steel Beam



- Timber Beam



End/Back Wall Type:

- Concrete



- Timber



- Masonry



## Appendix B

### Evidence of Bats & Structures Pictures

The photo to the left is of bat guano on a vertical wall. Look closely at the picture on the right, from a distance it may seem as though those dark marks are guano.



But upon close inspection, they are chips in the concrete.







bat guano



urine staining and guano on ground



oil stains & dirt

urine staining

guano

oil stains & dirt





# Appendix C

## Abbreviations for NC Bat Species

**Abbreviations to Use for Known Bat Species in North Carolina 2014**

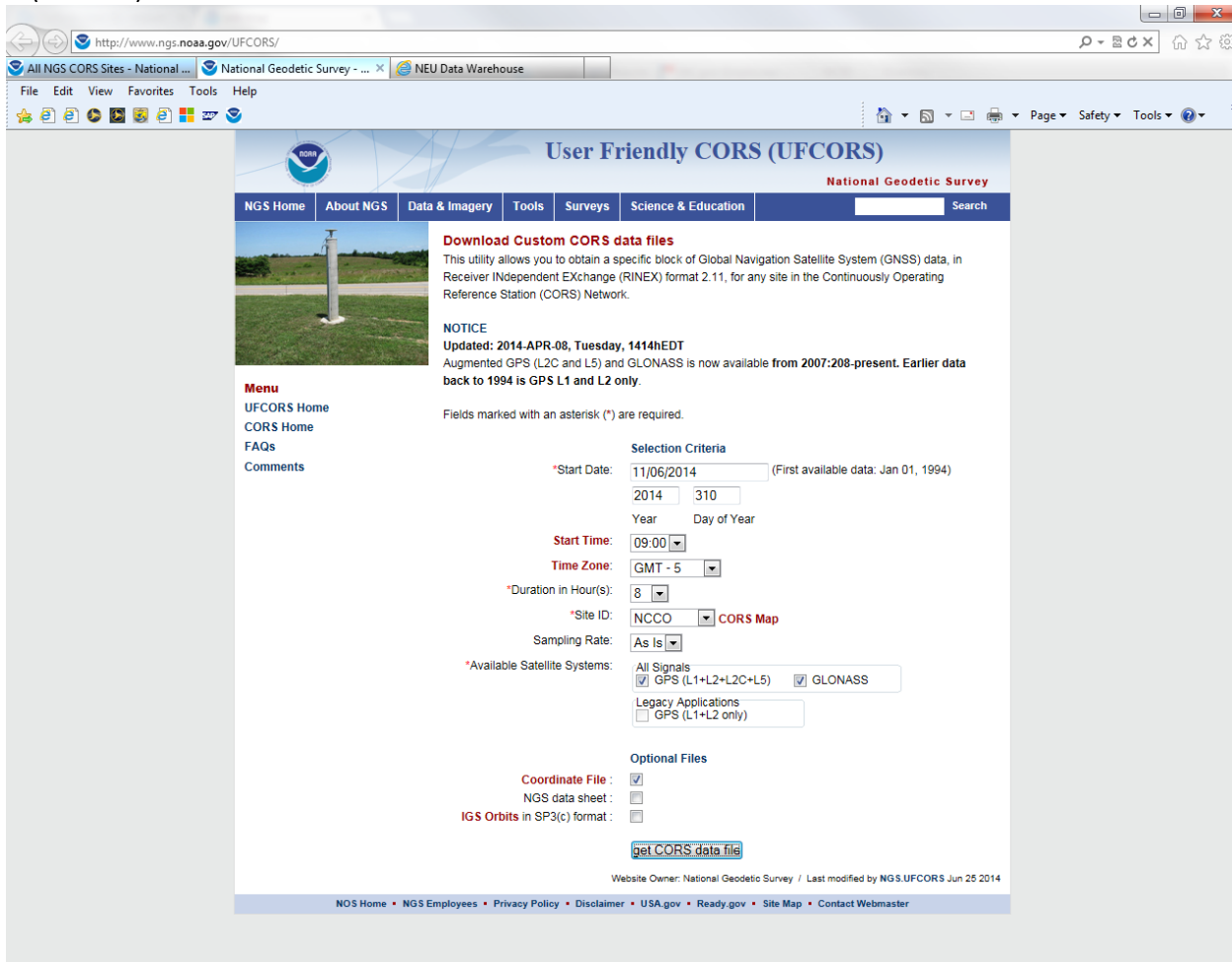
<b>CORA</b>	<i>Corynorhinus rafinesquii</i> Rafinesque's Big-eared Bat	<b>MYAU</b>	<i>Myotis austroriparius</i> Southeastern Bat
<b>COTO</b>	<i>Corynorhinus townsendii virginianus</i> Virginia Big-eared Bat	<b>MYGR</b>	<i>Myotis grisescens</i> Gray Bat
<b>EPFU</b>	<i>Eptesicus fuscus</i> Big Brown Bat	<b>MYLE</b>	<i>Myotis leibii</i> Eastern Small-footed Bat
<b>LANO</b>	<i>Lasionycteris noctivagans</i> Silver-haired Bat	<b>MYLU</b>	<i>Myotis lucifugus</i> Little Brown Bat
<b>LABO</b>	<i>Lasiurus borealis</i> Eastern Red Bat	<b>MYSE</b>	<i>Myotis septentrionalis</i> Northern Long-eared Bat
<b>LACI</b>	<i>Lasiurus cinereus</i> Hoary Bat	<b>MYSO</b>	<i>Myotis sodalis</i> Indiana Bat
<b>LAIN</b>	<i>Lasiurus intermedius</i> Northern Yellow Bat	<b>NYHU</b>	<i>Nycticeius humeralis</i> Evening Bat
<b>LASE</b>	<i>Lasiurus seminolus</i> Seminole Bat	<b>PESU</b>	<i>Perimyotis subflavus</i> Eastern Pipistrelle Bat/Tri-colored Bat
		<b>TABR</b>	<i>Tadarida brasiliensis</i> Brazilian/Mexican Free-tailed Bat

# Appendix D

## Differential Correction, Pathfinder Export Setup & Locating Mines

# Differential Correction Procedure

- 1) Go to the 'Data Friendly' CORS site: <http://www.ngs.noaa.gov/CORS/data.shtml> Click on User Friendly CORS (UFCORS)



- 2) Once there, choose the date you need, the time period, and the time zone (we are currently on Eastern Standard or GMT 5; it would change during daylight savings, Mar-Nov would be GMT-4 check calendar for exact dates of when daylight savings time starts in Mar and ends in Nov). **Make sure to check the Coordinate File Optional File.**

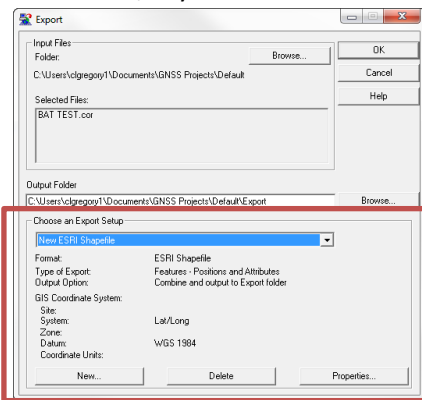
- 3) Select the appropriate site ID. All the site IDs for NC are listed here: <http://www.ngs.noaa.gov/CORS/data.shtml> and click on 'sortable list' to find a list of abbreviations for CORS sites and their status. Choose the one you want and hit 'submit'. **\*\*Some base stations don't upload data to the CORS site every day, so you may have to wait a couple days from when you took your points to correct them (for the NCRD {Raleigh} site, it typically takes about 3-4 days).**

4) The CORS site will spit out a zip file that you should save to whatever folder you like (I usually put it in my project's 'base' folder, which is created by Pathfinder when you start a new project). You then need to 'unzip' that file.

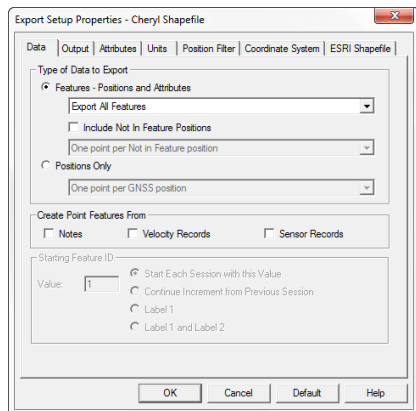
5) Now, go into Pathfinder and start the differential correction tool (**Utilities>Differential Correction**) like you normally would using your Trimble Field Data (.ssf) file that you already transferred off of your GPS unit. Use the defaults until you get to the 'base data' screen, select the 'folder search' toggle and browse to the folder where the unzipped CORS file is located. Then, and this is very important, select 'Use reference position from base provider' in the 'reference position' box (underneath 'base data') and find the CORS site you got your file from. Click 'next' and this will complete your correction.

## Export Setup

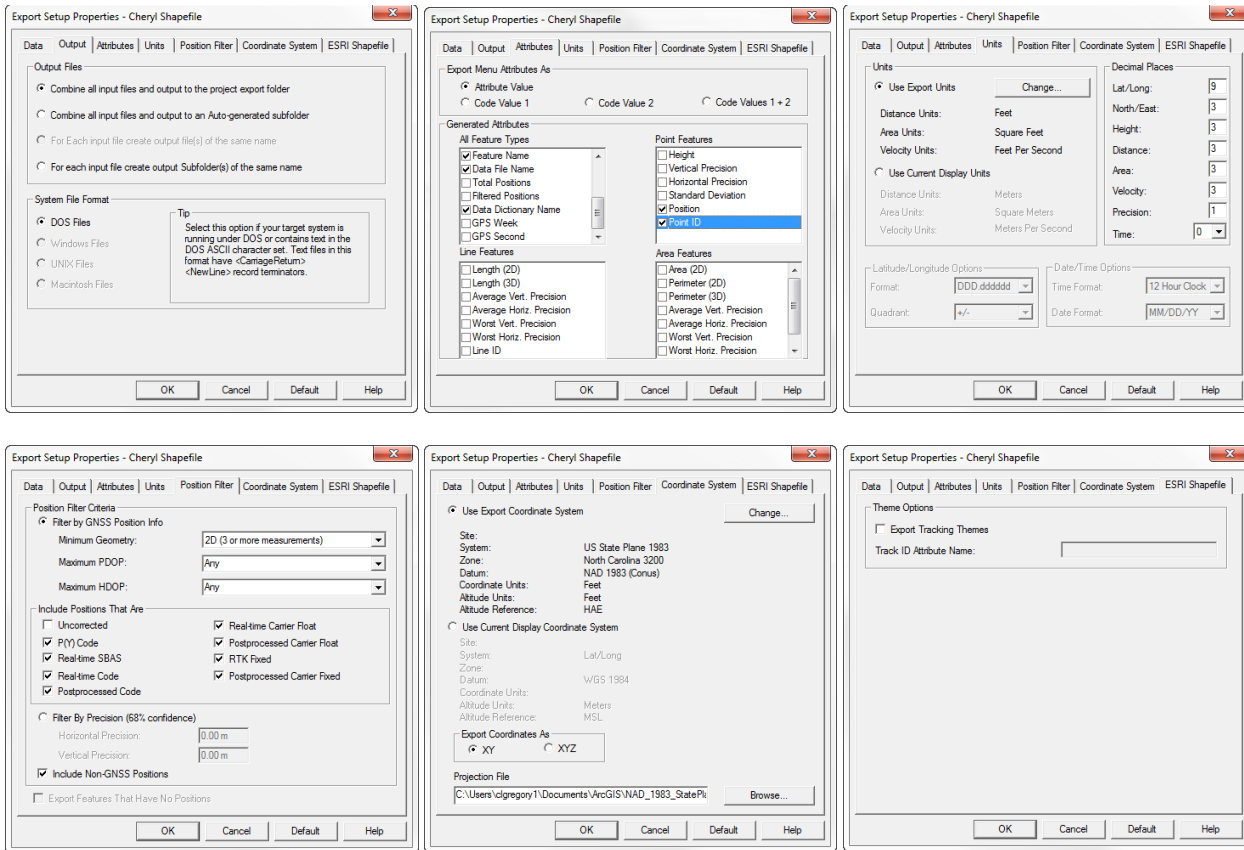
During the Export step in Pathfinder you will need to change the Export Setup so that it is the same as ours. Otherwise, your attribute table may not contain all of the same information as ours.



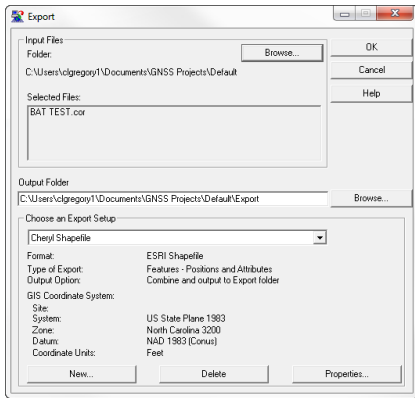
This is what you will change, select New...



Now go through each tab starting with Data and change the features to how they appear in the following Properties boxes (these examples are arranged from left to right tabs):



Select OK, and now your Export Setup should look like this, click ok again to Export .cor file into a .shp.



# Locating Mines Procedure

- 1) Go to the Mineral Resources On-Line Spatial Data USGS webpage <http://mrdata.usgs.gov/mrds/find-mrds.php> and fill in NC in the “state” field

Enter only what you know, leave the other fields blank

Site name begins with

in state North Carolina

or country (anywhere)

with commodity (any)


operation type (any)

ID number

Search

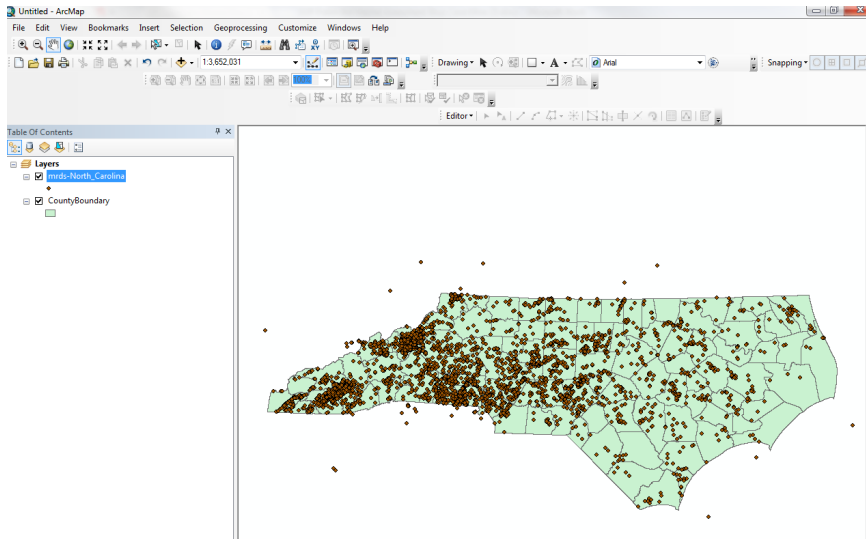
- 2) Choose format Shapefile and click Get Data

Choose format: Shapefile


- 3) A zip file is returned click on the link to the zip and download.
- 4) Extract the .zip by right clicking on the folder and selecting Extract All
- 5) Open ArcGIS and click the add data button 

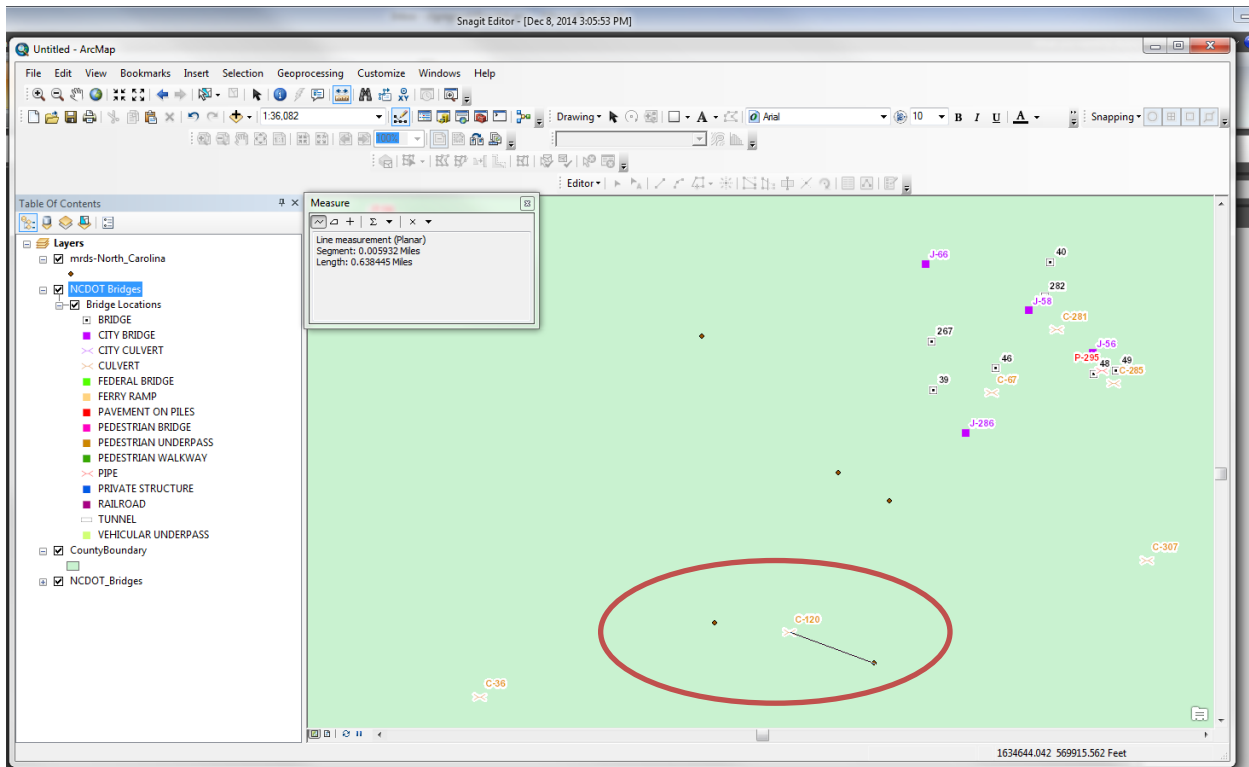



6) Select the .shp file you just unzipped, it should appear like the map below:

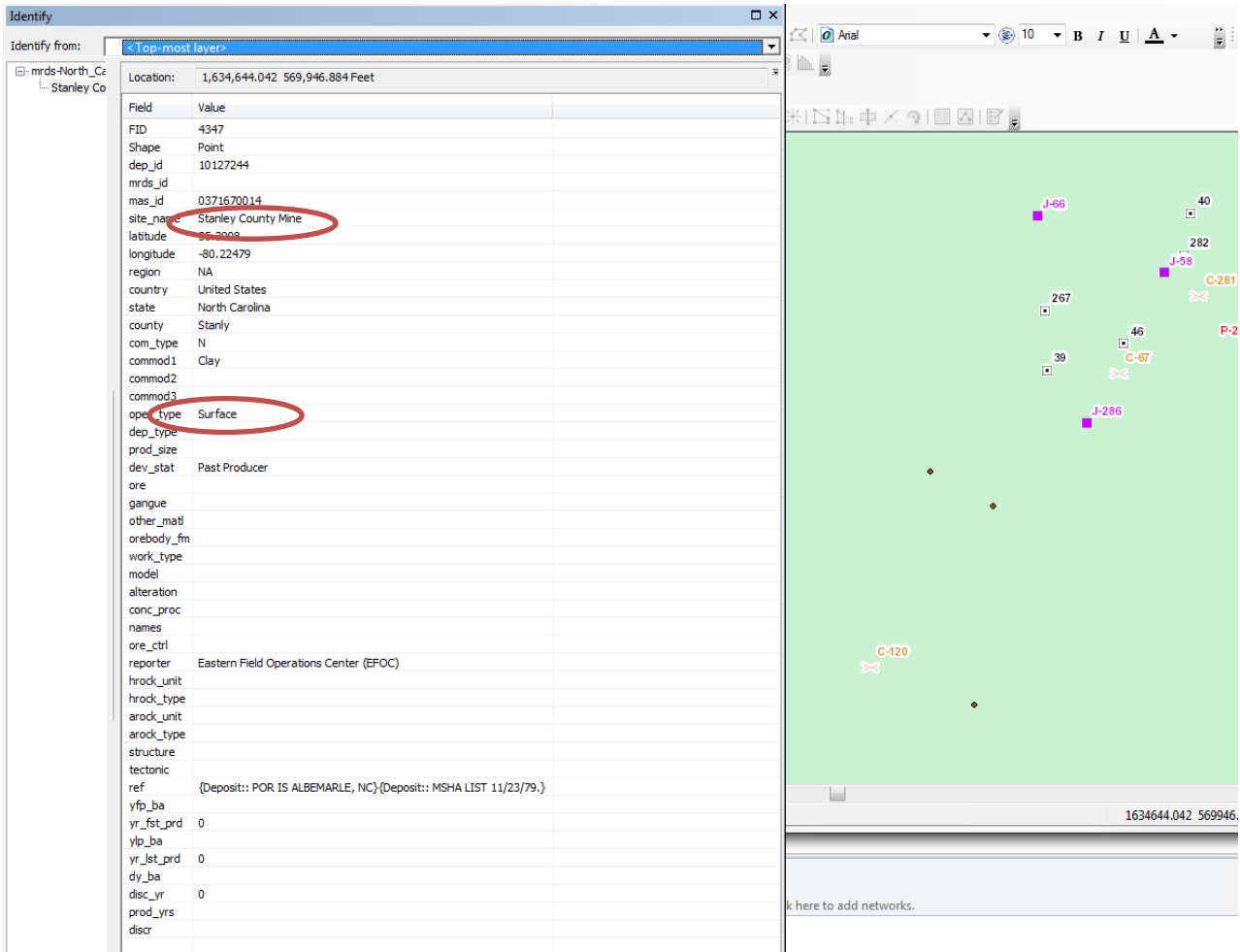


7) Now you can locate your project. Other common data layers can be found at the NCDOT GIS webpage <https://connect.ncdot.gov/resources/gis/Pages/GIS-Data-Layers.aspx> you can also do searches on NC One Map for layers <http://data.nconemap.com/geoportal/catalog/main/home.page>. If you have a mine in your project footprint, investigate further.

8) Use the measure tool in ArcGIS to measure 0.50 mile out from your project  to determine if any mines are within your project vicinity (0.50 mile). The example below says 0.6 but just pretend it says 0.5 miles for the purposes of this tutorial (**this step is no longer necessary per the Final 4(d) rule for NLEB**).



- 9) If you do locate a point within 0.50 mile of your project, make note what the distance is and click on the information button to obtain more details about the cave or mine. In the example above, the mine is pretty close...0.5 mile east of the culvert C-120 (my project). I click on the information icon  and I'll record the following details: Site Name and Operator Type: Stanley County surface mine (**this step is now only necessary if you find a mine found within the project footprint**).



The screenshot shows a GIS application with an 'Identify' window on the left and a map view on the right. The 'Identify' window displays a table of attributes for a selected point feature. The 'site\_name' and 'ope\_type' fields are circled in red. The 'ope\_type' value is 'Surface'. The map view shows a green area with various labeled points like J-66, C-120, J-286, etc.

Field	Value
Location:	1,634,644.042 569,946.884 Feet
FID	4347
Shape	Point
dep_id	10127244
mrds_id	
mas_id	0371670014
site_name	Stanley County Mine
latitude	35.9999
longitude	-80.22479
region	NA
country	United States
state	North Carolina
county	Stanly
com_type	N
commod1	Clay
commod2	
commod3	
ope_type	Surface
dep_type	
prod_size	
dev_stat	Past Producer
ore	
gangue	
other_matl	
orebody_fm	
work_type	
model	
alteration	
conc_proc	
names	
ore_ctrl	
reporter	Eastern Field Operations Center (EFOC)
hrock_unit	
hrock_type	
arock_unit	
arock_type	
structure	
tectonic	
ref	{Deposit:: POR IS ALBEMARLE, NC}{Deposit:: MSHA LIST 11/23/79.}
yfp_ba	
yr_fst_prd	0
yfp_ba	
yr_lst_prd	0
dy_ba	
disc_yr	0
prod_yrs	
discr	

- 10) If you do find subsurface or surface-subsurface mines within your project footprint you will need to investigate further. Sometimes using aerials will eliminate the need for a site visit. If aerials indicate that the mine is located in a non-forested area there is no need to conduct a site visit. Any subsurface mines in forested areas should be investigated.



# Bat Habitat Assessment Form

**NCDOT Bridges**

Observers: \_\_\_\_\_ TIP or DOT project number: \_\_\_\_\_  
 Date: \_\_\_\_\_ Road Name/SR Number: \_\_\_\_\_  
 County: \_\_\_\_\_ Bridge Number: \_\_\_\_\_  
 Waterbody/Road/Rail: \_\_\_\_\_

% Surrounding habitat w/in 1 mi. of project footprint (approx)  
 Urban/Commercial \_\_\_\_\_ Suburban/Residential \_\_\_\_\_  
 Herb/Shrub/Grassland \_\_\_\_\_ Agricultural \_\_\_\_\_  
 Deciduous/Evergreen/Mixed Forest \_\_\_\_\_  
 Woody Wetland/Herb Wetland/Open Water \_\_\_\_\_

Any trees >3" DBH within project footprint? N/A                      yes                      no

**Complete this section for Indiana bat counties (Cherokee, Clay, Graham, Haywood, Jackson, Macon, Rutherford, Swain)**

Any shaggy trees or snags >5" DBH?                      N/A                      yes                      no

If yes to shag/snag, how much sunlight do they receive during the day?    N/A                      1-3 hours                      4-6 hours                      7+ hours

If yes to shag/snag, list species of habitat trees >5" dbh \_\_\_\_\_

**If snags >5" DBH are present in sunlit areas, provide photos and location.**

**If large hollow trees are present, provide photos and location.**

Presence of:

	In project footprint		In vicinity (0.5 mi)	
Caves	yes	no	yes	no
Abandoned mines	yes	no	yes	no

**If 'yes' to any of the above, provide photos, description, and location.**

Major water source in project footprint:    N/A    river    stream/creek    pond    lake    swamp

Suitable drinking habitat in the form of non-stagnant, smooth or slack water?    yes    no    N/A

Structure specific questions:

Artificial lighting	unknown	yes	no	
Guard rails	none	concrete	timber	metal
Deck type	concrete	metal	timber	open grid
Beam type	none	concrete	steel	timber
End/back wall type	concrete	timber	masonry	
Creosote evidence				yes                      no
Suitable roosting crevices present (½ - 1¼" wide)				yes                      no
Deck drains				yes                      no

Max height of bridge deck above ground or water (ft): \_\_\_\_\_

Night roost habitat protected                      yes                      no

Bridge alignment:                      N/S                      E/W                      NW/SE                      NE/SW

Hours of sun exposure to bridge                      <3                      >3

Human disturbance under bridge                      high                      med                      low                      none

**Below section completed only if bats/evidence of bats observed:**

Emergence count performed? (If yes, complete form next page)    yes                      no

Evidence of bats using bird nests, if present?                      yes                      no

Evidence of bats using bridge? (photos needed)                      yes                      no

Type of Evidence                      guano                      staining                      bats observed

Roost Type                      crevice                      open area

Bat species present (list each species, locations and estimated number of each species):



## Structure Assessment - Emergence Count

If an emergence survey is needed, it should begin 1/2 hour before sunset and continue for an hour or until it is too dark to see bats. Surveyors should position themselves outside so that emerging bats will be silhouetted against the sky. Do not conduct emergence count if temp is < 50F or if there is rain.

Temperature at start of count: \_\_\_\_\_

Emergence count starting time: \_\_\_\_\_

Time of sunset: \_\_\_\_\_

Emergence count ending time: \_\_\_\_\_

Number of bats leaving structure: \_\_\_\_\_

Can bat genus/species be determined? \_\_\_\_\_

Describe where bats exited structure: \_\_\_\_\_

Comments, notes:

Provide a diagram of the structure, where observers were placed for the emergence count, and location of any points of ingress/egress for bats. Please include a north arrow.



# Bat Habitat Assessment Form

## NCDOT Culverts

Observers: \_\_\_\_\_ TIP or DOT project number: \_\_\_\_\_  
 Date: \_\_\_\_\_ Road Name/SR Number: \_\_\_\_\_  
 County: \_\_\_\_\_  
 Waterbody/Other crossing: \_\_\_\_\_

% Surrounding habitat w/in 1 mi. of project footprint (approx)

Urban/commercial _____	Suburban/residential _____
Herb/Shrub/Grassland _____	Agricultural _____
Deciduous/Evergreen/Mixed Forest _____	
Woody Wetland/Herb Wetland/Open Water _____	

Any trees >3" DBH within project footprint?      N/A      yes      no

**Complete this section for Indiana bat counties (Cherokee, Clay, Graham, Haywood, Jackson, Macon, Rutherford, Swain)**

Any shaggy trees or snags >5" DBH?      N/A      yes      no

If yes to shag/snag, how much sunlight do they receive during the day?      N/A      1-3 hours      4-6 hours      7+ hours

If yes to shag/snag, list spp of habitat trees >5" dbh \_\_\_\_\_

**If snags >5" DBH are present in sunlit areas, provide photos and location.**

**If large hollow trees are present, provide photos and location.**

Presence of:	In project footprint		In vicinity (0.5 mi)	
caves	yes	no	yes	no
abandoned mines	yes	no	yes	no

**If 'yes' to any of the above, provide description and location.**

Major water source in project footprint:      N/A      river      stream/creek      pond      lake      swamp

Suitable drinking habitat in the form of non stagnant, smooth or slack water areas?      yes      no      N/A

**Structure specific questions:**

Guard rails	none	concrete	timber	metal
Culvert material	concrete	timber	metal	
Number of barrels: _____	(double, triple, etc.)			
Culvert height: _____	Culvert width: _____		Culvert length: _____	
Culvert type	pipe	box	arch	other _____
Openings protected from high winds	yes	no		
Crevice present:	yes	no		
Rough surfaces, imperfections, bird nests	yes	no		
Human disturbance in culvert	high	med	low	none
Depth of water in culvert (if applicable) _____				

**Below section completed only if bats/evidence of bats observed:**

Emergence count performed? (If yes, complete form)      yes      no

Evidence of bats using bird nests, if present?      yes      no

Evidence of bats using culvert? (photos)      yes      no

Bat species present:

Notes (include description of bat location within culvert, excessive sedimentation buildup, drainage inlets inside culvert, etc.):



**If there is evidence of bats but no bats are observed, please check the building for night roosting after 11 PM. If there are parts of the structure that cannot be accessed for inspection, conduct an emergence count at sunset**

### **Structure Assessment - Emergence Count**



If an emergence survey is needed, it should begin 1/2 hour before sunset and continue for an hour or until it is too dark to see bats. Surveyors should position themselves outside so that emerging bats will be silhouetted against the sky. Do not conduct emergence count if temp is < 50F or if there is rain.

- Temperature at start of count: \_\_\_\_\_
- Emergence count starting time: \_\_\_\_\_
- Time of sunset: \_\_\_\_\_
- Emergence count ending time: \_\_\_\_\_
- Number of bats leaving structure: \_\_\_\_\_
- Can bat genus/species be determined? \_\_\_\_\_
- Describe where bats exited structure: \_\_\_\_\_

Comments, notes:

Provide a diagram of the structure, where observers were placed for the emergence count, and location of any points of ingress/egress for bats. Please include a north arrow.



# Bat Habitat Assessment Form

## NCDOT Caves & Mines

Observers: \_\_\_\_\_

TIP or DOT project number: \_\_\_\_\_

Date: \_\_\_\_\_

Road Name/SR Number: \_\_\_\_\_

County: \_\_\_\_\_

Portal entrance number: \_\_\_\_\_

% Canopy closure at portal (approx):	0-25	26-50	51-75	76-100
--------------------------------------	------	-------	-------	--------

Opening type:	cave	quarry	shaft
---------------	------	--------	-------

Opening height(ft): \_\_\_\_\_

Opening width(ft): \_\_\_\_\_

Length of portal opening(ft): \_\_\_\_\_

Internal height(ft): \_\_\_\_\_ Do not enter the portal to collect measurements if unsafe

Internal width(ft): \_\_\_\_\_

Slope up or down from entrance: up down

Entrance stable: yes no

Direction of airflow: into cave out from cave

Amount of airflow: heavy slight none

Internal temp: warmer than outside cooler than outside same

Evidence of collapse: yes no

Ceiling condition: \_\_\_\_\_

Depth of water internal opening(in.): \_\_\_\_\_

Any evidence of past flooding: yes no

Miles to nearest water source: \_\_\_\_\_

Foraging signs (evidence of bats: moth wings- take pictures): \_\_\_\_\_

Any portals known to be connected? Which? \_\_\_\_\_

Any observed side passages?: \_\_\_\_\_

Bat species present: \_\_\_\_\_

Additional notes: