

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



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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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¹ 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.

Bridge Attributes:

- The following three questions dealing with surrounding habitat will need to be assessed prior to field surveys using aerials and best professional judgment. The information obtained here is intended to assess summer roost habitat for bats in the immediate area surrounding the structure.
 - o % Urban/Commercial: fill in a number that represents the approximate percent of urban or commercial area within 1 mile of the project footprint.
 - o % Suburban/Residential: fill in a number that represents the approximate percent of suburban or residential area within 1 mile of the project footprint.
 - o Natural/Rural: fill in a number that represents the approximate percent of natural area within 1 mile of the project footprint. Rural is in the heading in order to include areas occupied by a few rural houses. Natural areas are classified as water, forest, shrubland, herbaceous and wetland.
 - o % Agricultural: fill in a number that represents the approximate percent of cultivated or planted area within 1 mile of the project footprint.
- *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 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.

- 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.
- Shallow Vertical Top-Sealed Cravices: this question is asking if the bridge has any vertical cravices that are ½” to 1 ¼” wide and 4-12” deep that **have a seal across the top**. You will generally need to look under the bridge 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 lower 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.



- Deep Vertical Unsealed Cravices: this question is asking if the bridge has any vertical cravices that are ½” to 1 ¼” wide and >12” deep that **DO NOT have a seal across the top**. 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 unsealed expansion joint along a guard rail that bats could access which is deep enough to protect them from wind and rain, hence >12” deep.



- 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.
- 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. 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.
- Bat Species Present 2: 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. For example: urine staining observed and guano piles in and around the western most expansion joint, under the eastbound traffic lane.

Culvert Attributes:

- The following three questions dealing with surrounding habitat will need to be assessed prior to field surveys using aerials and best professional judgment. The information obtained here is intended to assess summer roost habitat for bats in the immediate area surrounding the structure.
 - o % Urban/Commercial: fill in a number that represents the approximate percent of urban or commercial area within 1 mile of the project footprint.
 - o % Suburban/Residential: fill in a number that represents the approximate percent of suburban or residential area within 1 mile of the project footprint.
 - o Natural/Rural: fill in a number that represents the approximate percent of natural area within 1 mile of the project footprint. Rural is in the heading in order to include areas occupied by a few rural houses. Natural areas are classified as water, forest, shrubland, herbaceous and wetland.
 - o % Agricultural: fill in a number that represents the approximate percent of cultivated or planted area within 1 mile of the project footprint.
- *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.

- 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
- Culvert >5' Height Inside: select Y/N
- Culvert Length: enter the length in feet of the culvert from shoulder to shoulder under the roadway. Should be at least 200' to even look at.
- Openings Protected from High Winds? select Y/N
- Crevices Present: did you observe any crevices ½" to 1 ¼" wide within the culvert for bats to roost?
- Rough Surfaces, Imperfections or Bird's Nests: did you observe any?
- 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.
- Bat Species Present 2: 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. For example: urine staining observed and guano piles in and around the western most expansion joint, under the eastbound traffic lane.

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.
- The following questions dealing with surrounding habitat will need to be assessed prior to field surveys using aerials and best professional judgment.
 - o **% Urban/Commercial:** fill in a number that represents the approximate percent of urban or commercial area within 1 mile of the project footprint.
 - o **% Suburban/Residential:** fill in a number that represents the approximate percent of suburban or residential area within 1 mile of the project footprint.
 - o **Natural/Rural:** fill in a number that represents the approximate percent of natural area within 1 mile of the project footprint. Rural is in the heading in order to include areas occupied by a few rural houses. Natural areas are classified as water, forest, shrubland, herbaceous and wetland.
 - o **% Agricultural:** fill in a number that represents the approximate percent of cultivated or planted area within 1 mile of the project footprint.
- **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.

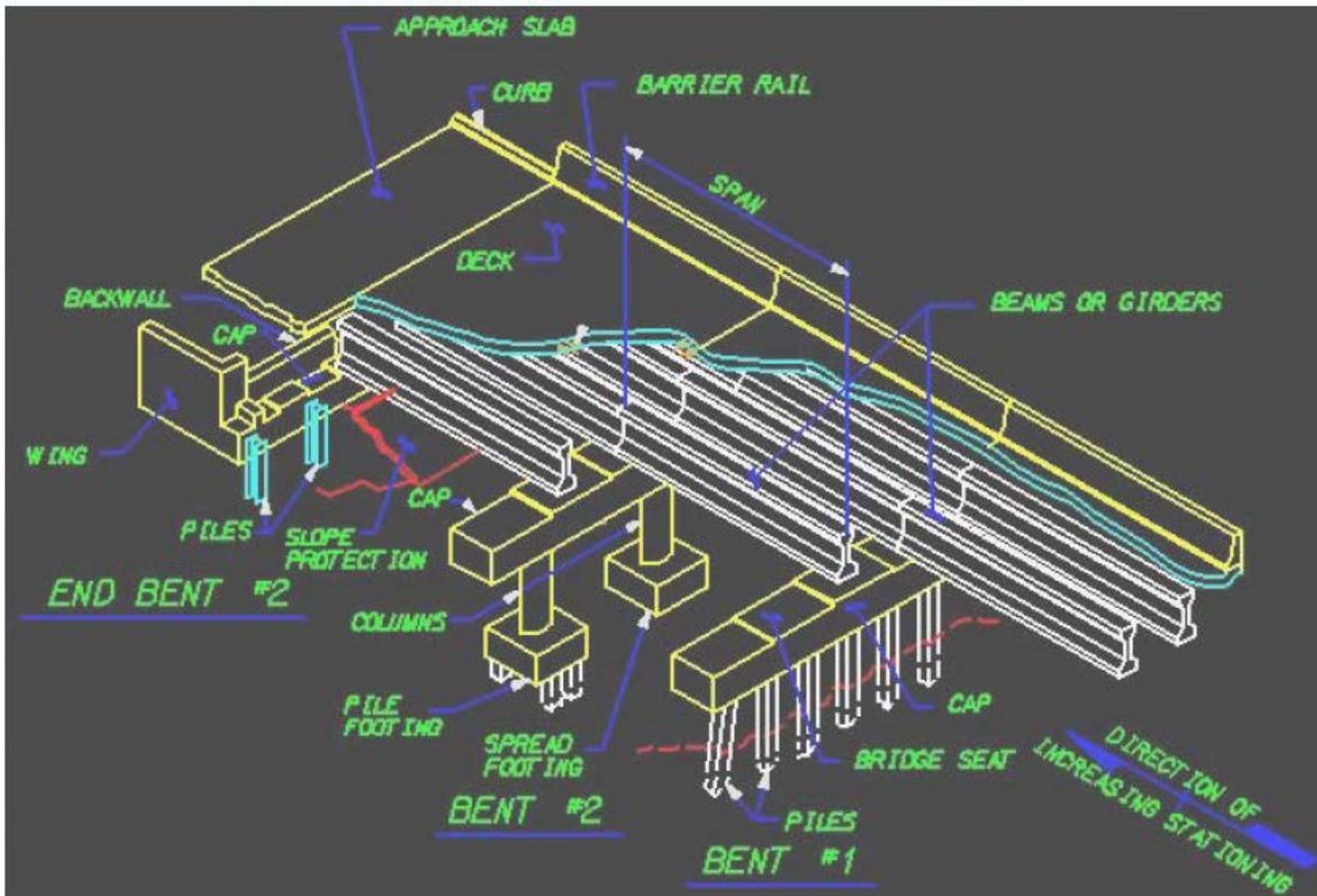
- Entrance/Portal Number: this is a number that you create to represent the entrance to the cave or mine portal you are assessing. Typically start with 1 and label it appropriately on a field map.
- % Canopy Closure at Entrance: determine which category defines the percent of closed canopy cover over 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

Structure Diagram



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



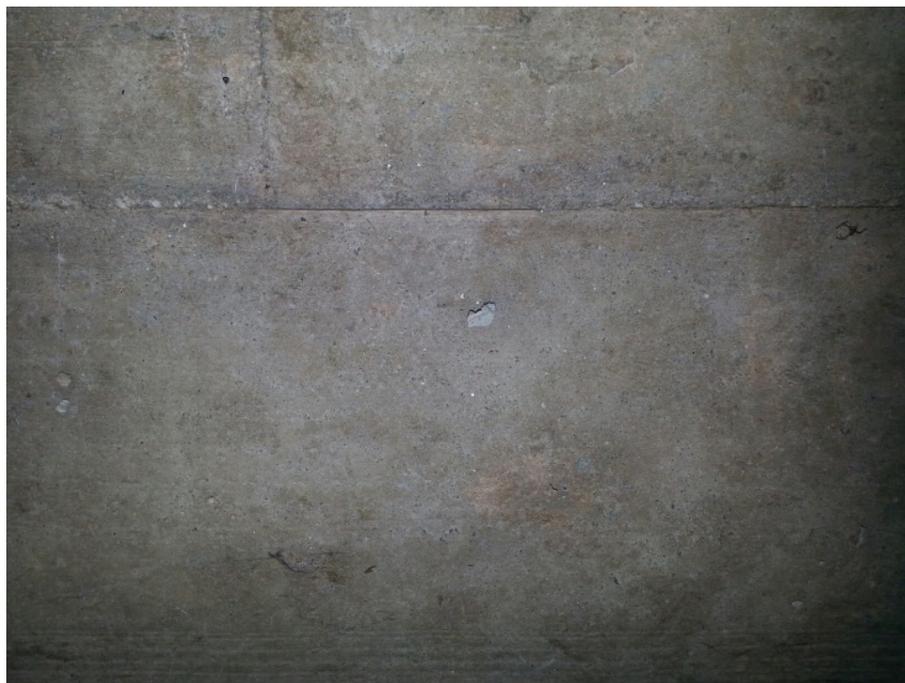
Appendix B

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.

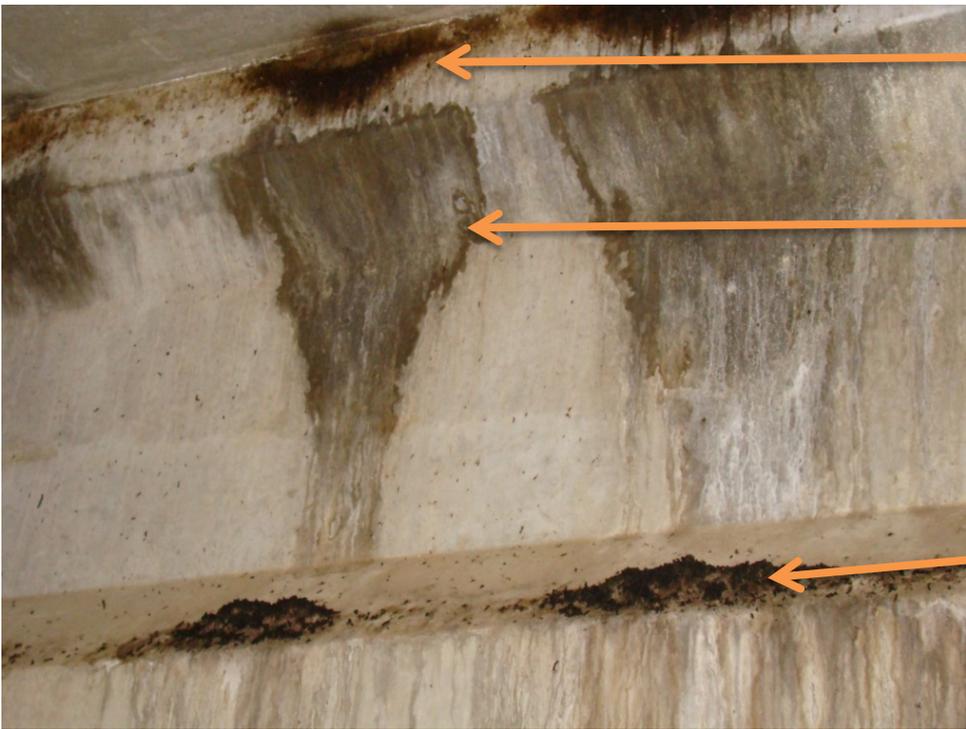




bat guano



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

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

User Friendly CORS (UFCORS)
National Geodetic Survey

Download Custom CORS data files
This utility allows you to obtain a specific block of Global Navigation Satellite System (GNSS) data, in Receiver INdependent EXchange (RINEX) format 2.11, for any site in the Continuously Operating Reference Station (CORS) Network.

NOTICE
Updated: 2014-APR-08, Tuesday, 1414hEDT
Augmented GPS (L2C and L5) and GLONASS is now available from 2007:208-present. Earlier data back to 1994 is GPS L1 and L2 only.

Fields marked with an asterisk (*) are required.

Selection Criteria

*Start Date: 11/06/2014 (First available data: Jan 01, 1994)
2014 310
Year Day of Year

Start Time: 09:00
Time Zone: GMT - 5

*Duration in Hour(s): 8
*Site ID: NCCO CORS Map
Sampling Rate: As Is

*Available Satellite Systems:
All Signals
 GPS (L1+L2+L2C+L5) GLONASS
Legacy Applications
 GPS (L1+L2 only)

Optional Files

Coordinate File:
NGS data sheet:
IGS Orbits in SP3(c) format:

[get CORS data file](#)

Website Owner: National Geodetic Survey / Last modified by NGS.UFCORS Jun 25 2014

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- 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.**

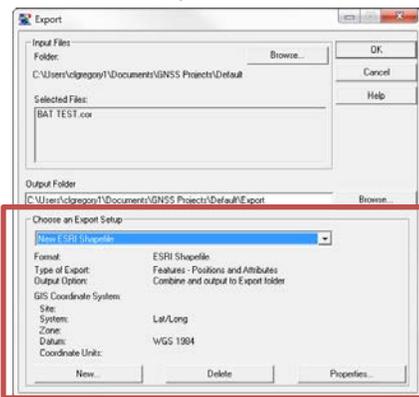
- 3) Select the appropriate site ID. All the site IDs for NC are listed here: <http://www.ngs.noaa.gov/CORS/data.shtml> and click on 'sortable list' to find a list of abbreviations for CORS sites and their status. Choose the one you want and hit 'submit'. **Some base stations don't upload data to the 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.

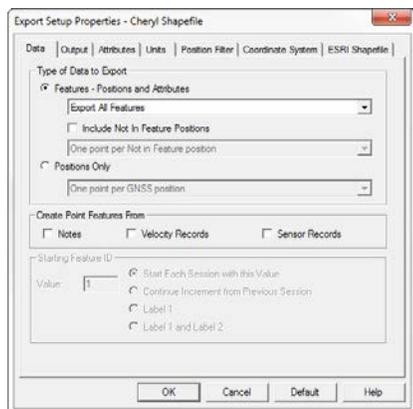
5) Now, go into Pathfinder and start the differential correction tool (**Utilities>Differential Correction**) like you normally would using your Trimble Field Data (.ssf) file that you already transferred off of your GPS unit. Use the defaults until you get to the 'base data' screen, select the 'folder 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

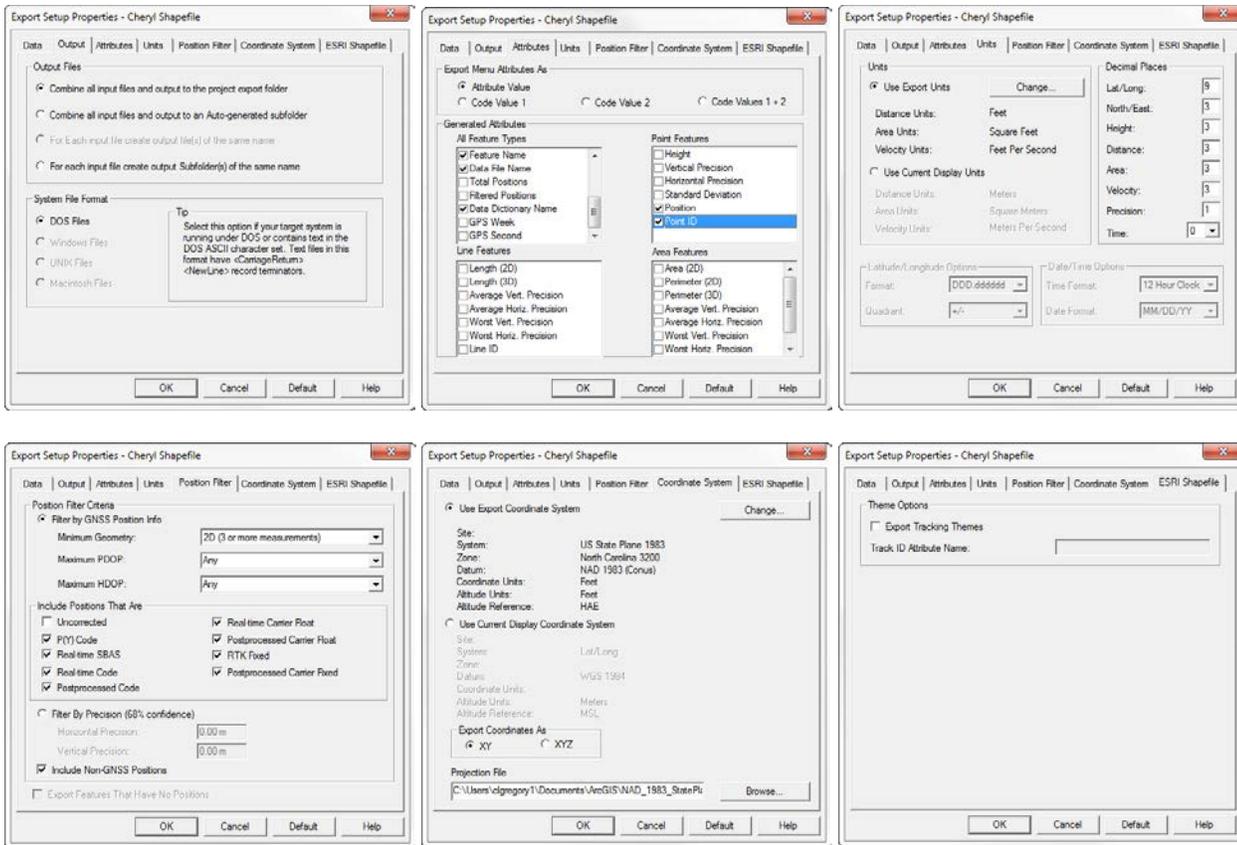
During the Export step in Pathfinder you will need to change the Export Setup so that it is the same as ours. Otherwise, your attribute table may not contain all of the same information as ours.



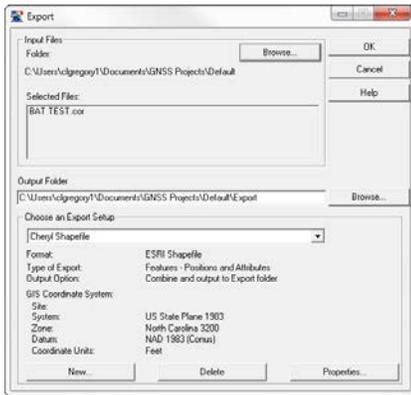
This is what you will change, select New...



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

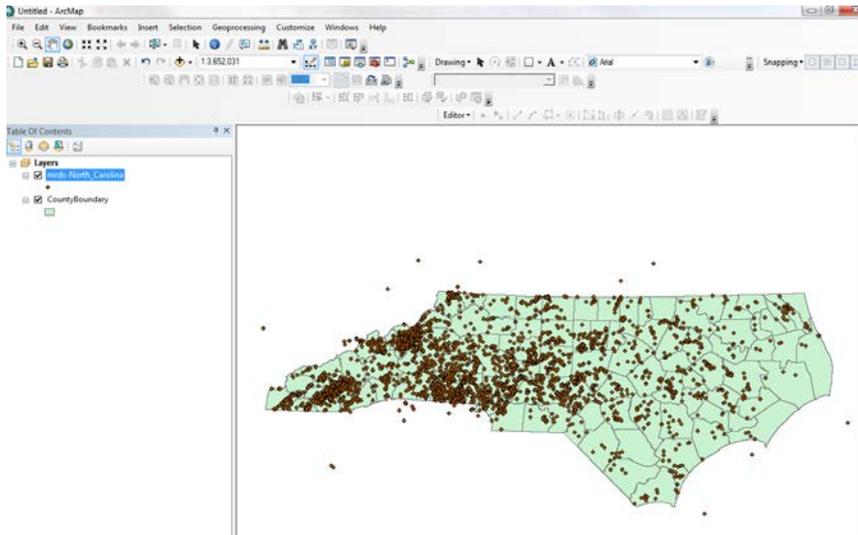
The screenshot shows a web browser window with the URL mrdata.usgs.gov/mrds/find-mrds.php. The page title is "Mineral Resources On-Line Spatial Data". Below the title is a navigation breadcrumb: "Mineral Resources > Online Spatial Data > Mineral Resources Data System". The main heading is "Search the Mineral Resources Data System". A search instruction reads: "Search here for records in the USGS Mineral Resource Data System database. Type the beginning of the name of the site, and select a state if you wish. The search will not show more than 10000 records." Below this is a search form with the following fields: "Site name" (with a dropdown menu set to "begins with" and an empty text box), "in state" (with a dropdown menu set to "North Carolina"), "or country" (with a dropdown menu set to "(anywhere)"), "with commodity" (with a dropdown menu set to "(any)"), "operation type" (with a dropdown menu set to "(any)"), and "ID number" (with an empty text box). A "Search" button is located at the bottom left of the form. At the bottom of the page, there is a footer with links for "Accessibility", "FOIA", "Privacy", and "Policies and Notices", along with contact information for the U.S. Department of the Interior | U.S. Geological Survey.

- 2) Choose format Shapefile and click Get Data

The screenshot shows a dropdown menu with the text "Choose format:" followed by a dropdown menu set to "Shapefile" and a "Get Data" button.

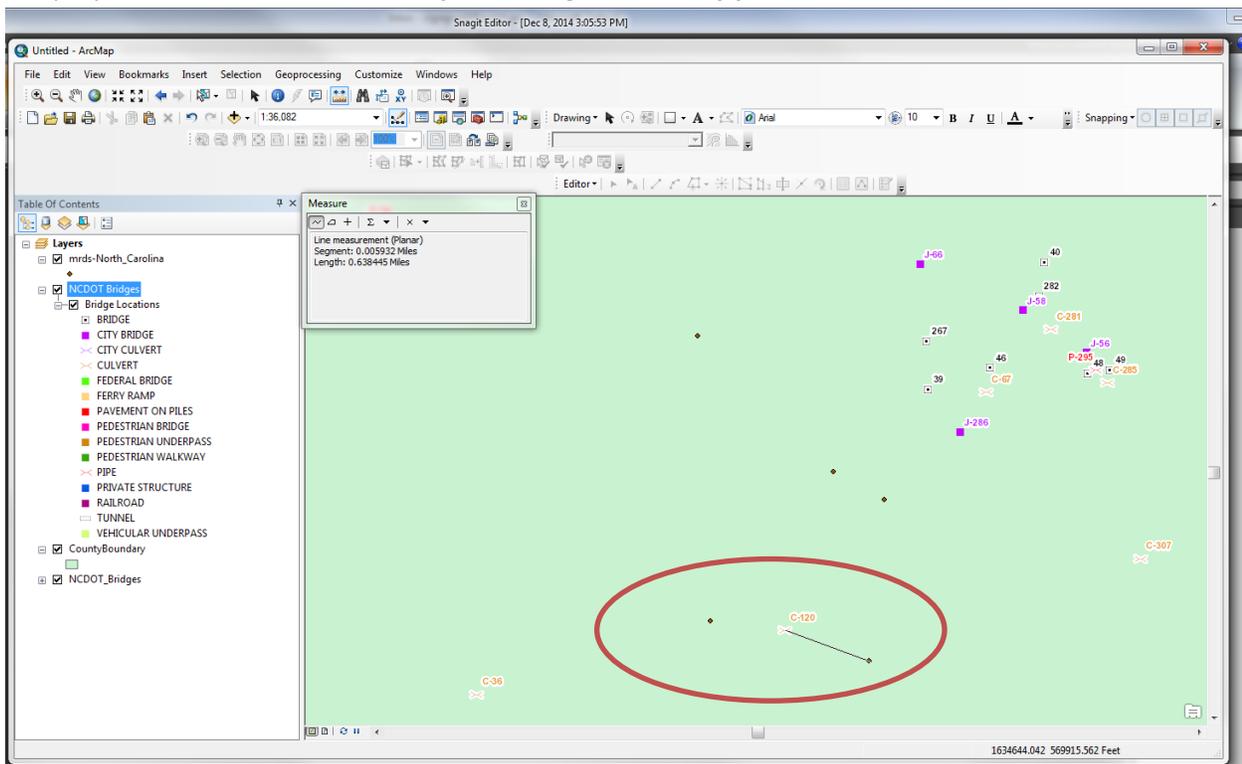
- 3) A zip file is returned click on the link to the zip and download.
- 4) Extract the .zip by right clicking on the folder and selecting Extract All
- 5) Open ArcGIS and click the add data button 

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

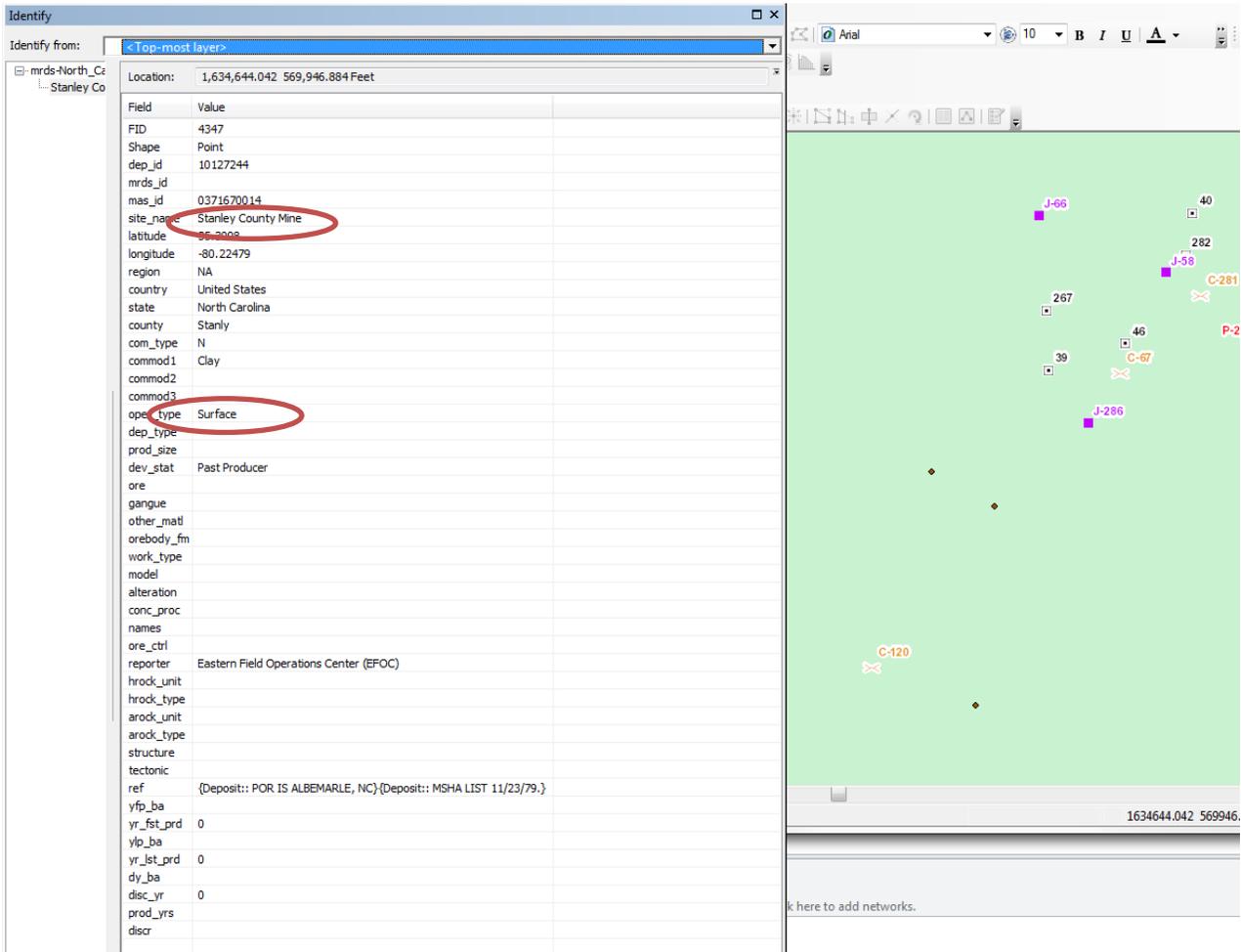


7) Now you can locate your project. Other common data layers can be found at the NCDOT GIS webpage <https://connect.ncdot.gov/resources/gis/Pages/GIS-Data-Layers.aspx> you can also do searches on NC One Map for layers <http://data.nconemap.com/geoportal/catalog/main/home.page>. If you have a mine in 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 the ArcGIS software interface. On the left, the 'Identify' window is open, displaying a table of metadata for a selected point feature. The 'site_name' field is 'Stanley County Mine' and the 'ope_type' field is 'Surface', both of which are circled in red. The map on the right shows a green area with several labeled points, including C-120, J-286, C-281, J-58, J-66, C-67, P-2, 40, 282, 267, 46, 39, and 267. The status bar at the bottom right shows the coordinates 1634644.042 569946.

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.



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/Time: _____

Road Name/SR Number: _____

County: _____

Waterbody: _____

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

Urban/commercial _____

Suburban/residential _____

Natural/rural _____

Agricultural _____

Any trees >3" DBH within project footprint?

yes

no

Any shaggy trees or snags >5" DBH?

yes

no

If yes to shag/snag, how much sunlight do they receive during the day?

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:

river

stream/creek

pond

lake

swamp

Suitable drinking habitat in the form of non stagnant, smooth or slack water areas?

yes no

Guard rails

none

concrete

timber

metal

Concrete box culvert

yes

no

Culvert >5' height inside

yes

no

Culvert length: _____

Openings protected from high winds

yes

no

Crevices present:

yes

no

Rough surfaces, imperfections, bird nests

yes

no

Human disturbance in culvert

high

low

none

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:

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/Time: _____

Road Name/SR Number: _____

County: _____

Portal entrance number: _____

% Canopy closure at portal (approx):	0-25	26-50	51-75	76-100
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Opening type:	cave	quarry	shaft
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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: