WILDLIFE SHENANIGANS

Zane Pannell
Michelle Hunt

August 2, 2018

History of the Great Smoky Mountains

1923

1936

History of the Great Smoky Mountains

Economic Benefits to the Region

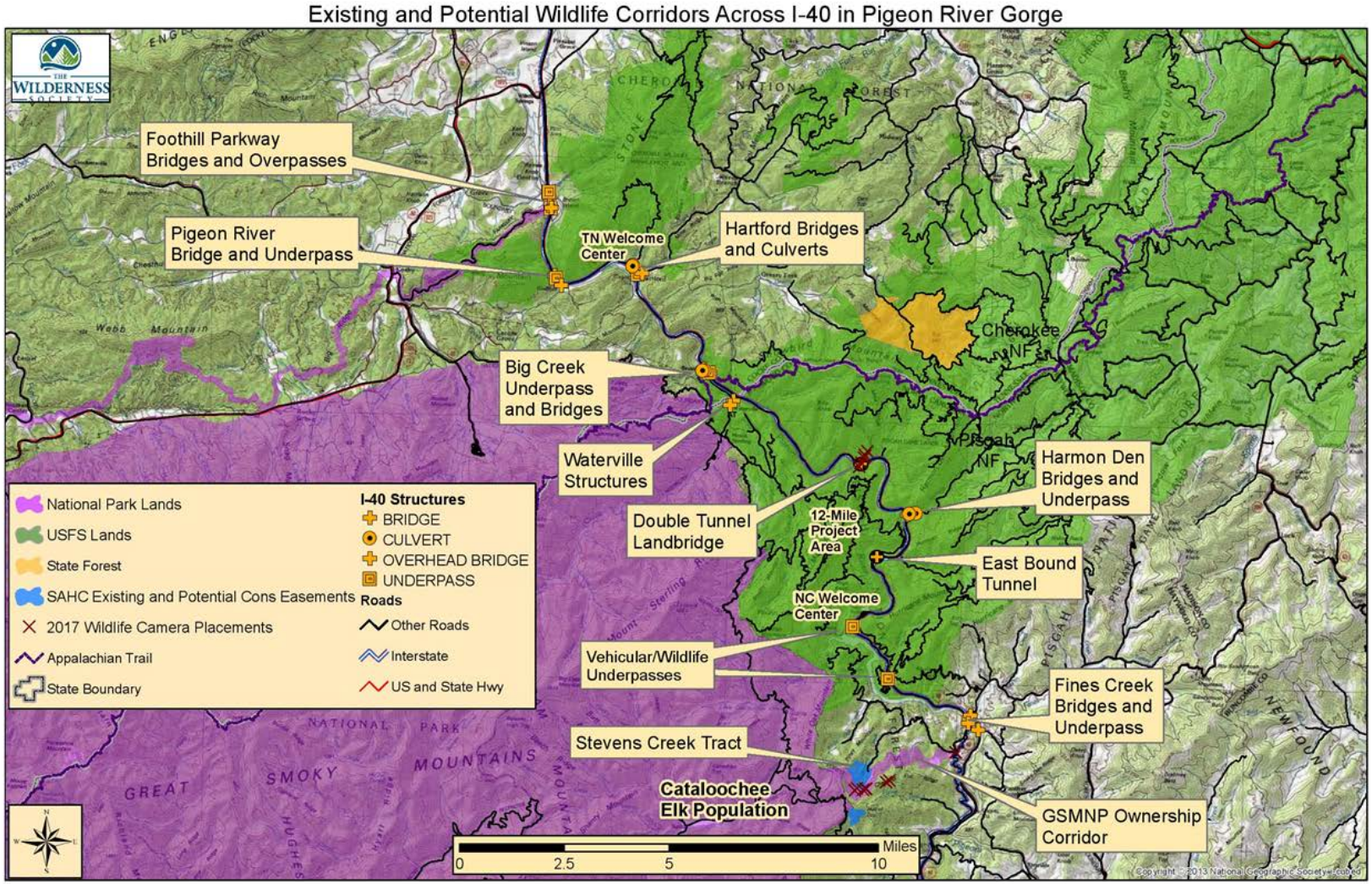
- Great Smoky Mountains National Park creates $953 Million in Economic Benefit
  - 11,421,203 visitors in 2018
  - Spending supported 13,737 jobs in the local area in 2018

Partnerships

Animal Mortality

- I-40 From MM 440 (near Pigeon River) to the TN/NC State Line
- 16 recorded deer crashes (2014 to 2018)
- 1 recorded coyote crash (2014 to 2018)
- 19 recorded bear crashes (2014 to 2018)
  - All Property Damage Crashes
  - All occurred at nighttime between 7:30 PM and 4:00 AM
  - All but 4 bear crashes occurred in October, November, December
  - Area has the highest vehicle-bear collisions in the state
- Research states 2/3 of all vehicle-animal collisions are not recorded

Project Area



TN TDOT Department of Transportation

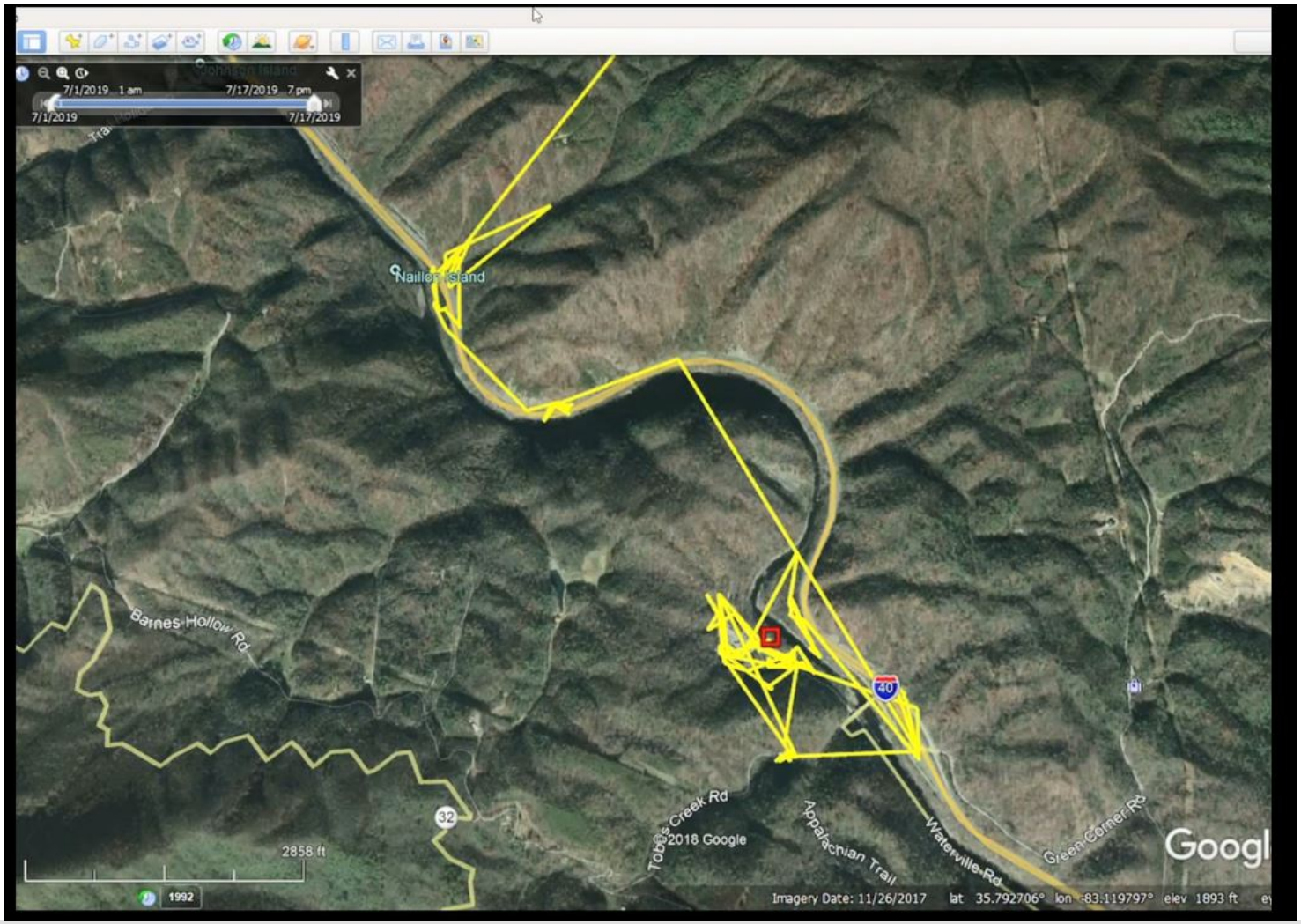
Camera Locations in Tennessee

Camera Locations

- Waterville Bridge

Elk 216 and Calf at Waterville

Elk 216 Collar Tracking



Camera Locations

- Mill Creek Culvert

Bear at Laurel Hollow

Bear at Groundhog Creek

Two Part Mitigation Strategy

+

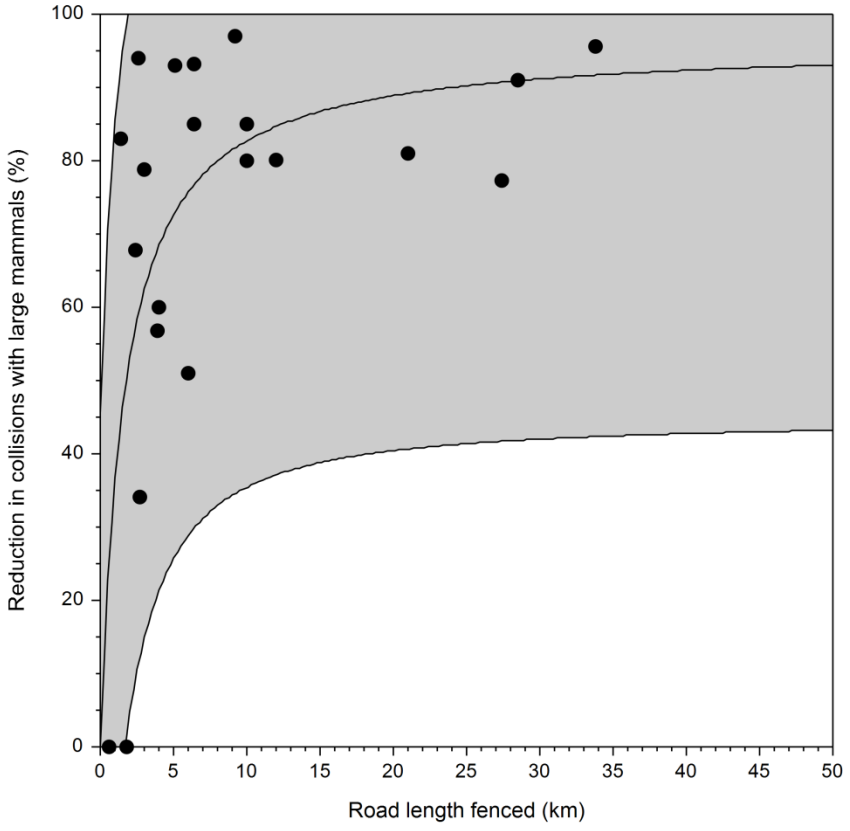
Species Specific Design

	Wildlife overpass	Open-span bridge	Large-mammal underpass	Medium-mammal underpass	Small- to medium-mammal pipe
Ungulates					
Deer sp.	●	●	●	⊗	⊗
Elk	●	●	●	⊗	⊗
Moose	●	●	●	⊗	⊗
Mountain goat	●	●	○	⊗	⊗
Bighorn sheep	●	●	○	⊗	⊗
Pronghorn	●	○	○	⊗	⊗
Carnivores					
Weasel	●	●	○	●	●
Pine marten	●	○	○	●	●
Fisher	●	●	○	⊗	⊗
Striped skunk	●	●	●	●	●
Badger	●	●	●	?	?
Wolverine	●	●	?	?	⊗
Bobcat	●	●	●	●	●
Canada lynx	●	●	?	?	⊗
Cougar	●	●	●	⊗	⊗
Fox1 (*V. vulpes, Urocyon*)	●	●	●	●	●
Fox2 (*V. macrotis, V. velox*)	●	●	○	?	?
Coyote	●	●	●	●	●
Wolf	●	●	○	⊗	⊗
Black bear	●	●	●	⊗	⊗
Grizzly bear	●	●	○	⊗	⊗

● Recommended/Optimum solution
○ Possible if adapted to local conditions
⊗ Not recommended
? Unknown, more data are required

Collision Reduction

- Marcel Huijser



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Effectiveness of short sections of wildlife fencing and crossing structures along highways in reducing wildlife–vehicle collisions and providing safe crossing opportunities for large mammals

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ABSTRACT

Wildlife fencing in combination with crossing structures is commonly regarded as the most effective and robust strategy to reduce large mammal–vehicle collisions while also maintaining wildlife connectivity across roads. However, fencing and associated measures may affect landscape esthetics and are sometimes considered costly and unpopular. Therefore fence length is often minimized. We investigated 1) whether short fenced road sections were similarly effective in reducing large mammal–vehicle collisions as long fenced road sections (literature review), and 2) whether fence length influenced large mammal use of underpasses (two field studies). We found that: 1) short fences (≤5 km road length) had lower (52.7%) and more variable (0–94%) effectiveness in reducing collisions than long fences (>5 km) (typically >80% reduction); 2) wildlife use of underpasses was highly variable, regardless of fence length (first field study); 3) most highway crossings occurred through isolated underpasses (82%) rather than at grade at fence ends (18%) (second field study); and 4) the proportional use of isolated underpasses (compared to crossings at fence ends) did not increase with longer fence lengths (up to 256 m from underpasses) (second field study). If the primary success parameter is to improve highway safety for humans by reducing collisions with large ungulates, the data suggest fence lengths of at least 5 km. While longer fence lengths do not necessarily guarantee higher wildlife use of underpasses as use varies greatly between locations, wildlife fencing can still improve wildlife use of an individual underpass.

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1. Introduction

Large mammal–vehicle collisions are abundant in many parts of the world (e.g. Groot Bruinderink and Hazebroek, 1996; Conover et al., 1995). Collisions with large ungulates typically result in the injury or death of the animals involved, substantial vehicle damage, and – in some cases – human injuries and fatalities (Allen and McCullough, 1976; Bissonette et al., 2008; Conover et al., 1995). Wildlife fencing in combination with wildlife crossing structures is commonly regarded as the most effective and robust strategy to reduce these types of collisions while also maintaining connectivity across highways for wildlife (review in Huijser et al., 2009). If wildlife fencing and crossing structures are designed based on the requirements of the target species, and if they are implemented and maintained correctly, the measures can reduce large mammal–vehicle collisions by 80–97% (Clevenger et al., 2001; Gagnon et al., 2015; Sawyer et al., 2012). In addition, the number of animal movements across overpasses or through underpasses, as well as the percentage of animals out of a local population that use the structures, can be substantial (Clevenger and Waltho, 2000; Sawaya et al., 2013; Sawyer et al., 2012).

Despite the benefits described above, wildlife fences, wildlife crossing structures and associated measures can be a contentious issue. Wildlife fences for large ungulates are typically 2.4 m high and can affect landscape esthetics (Evans and Wood, 1980). In addition, some landowners may also object to associated measures such as gates, wildlife guards, or similar measures at access roads as they may be time consuming or unpleasant to drive across. Furthermore, despite the wildlife crossing structures that may be present, fences are sometimes a problem for wide ranging large mammal species such as mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*) (Coe et al., 2015; Poor et al., 2012; Seidler et al., 2015). They can even be a

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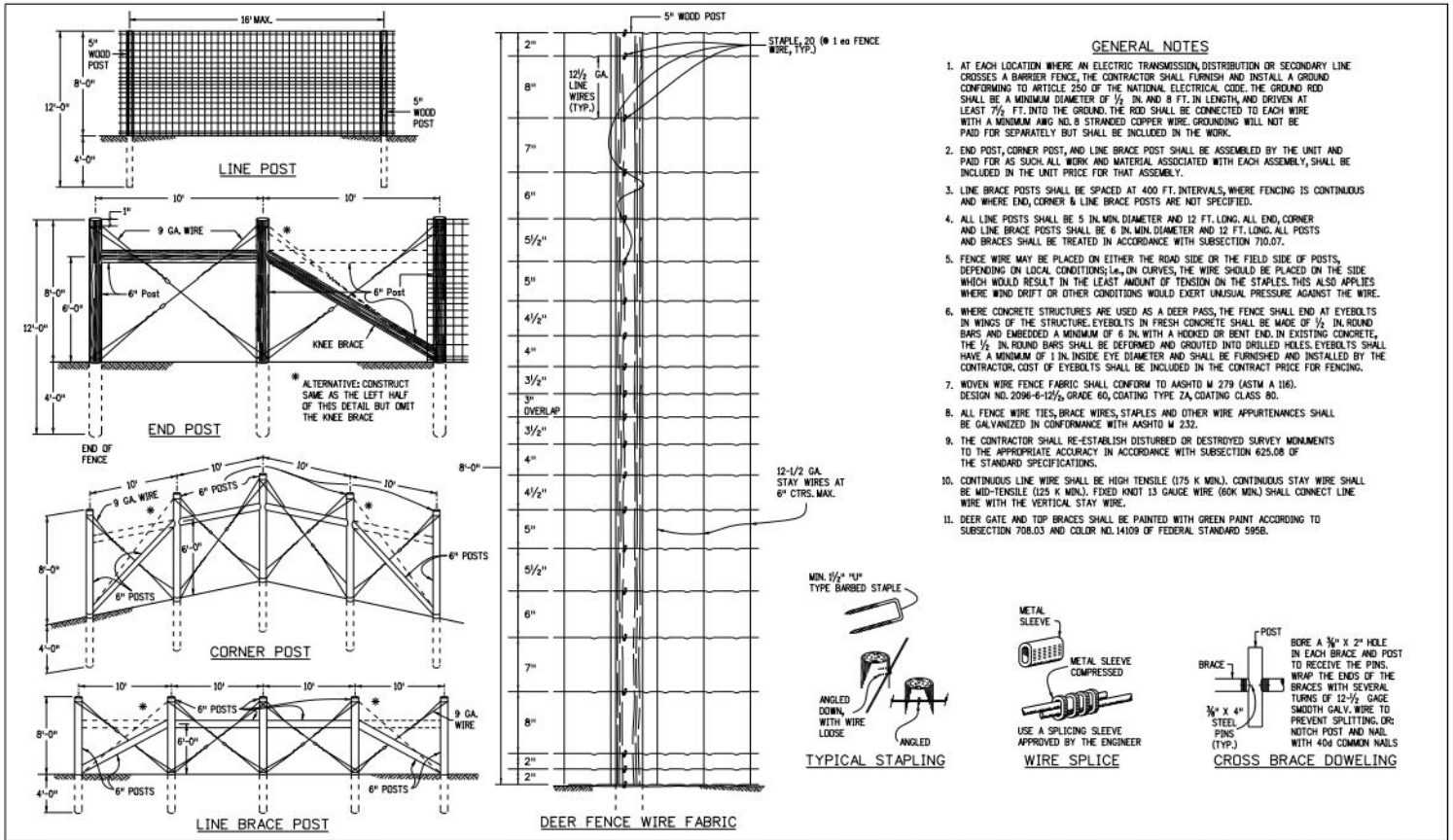
Design Standards



Design Standards

Unique Approaches

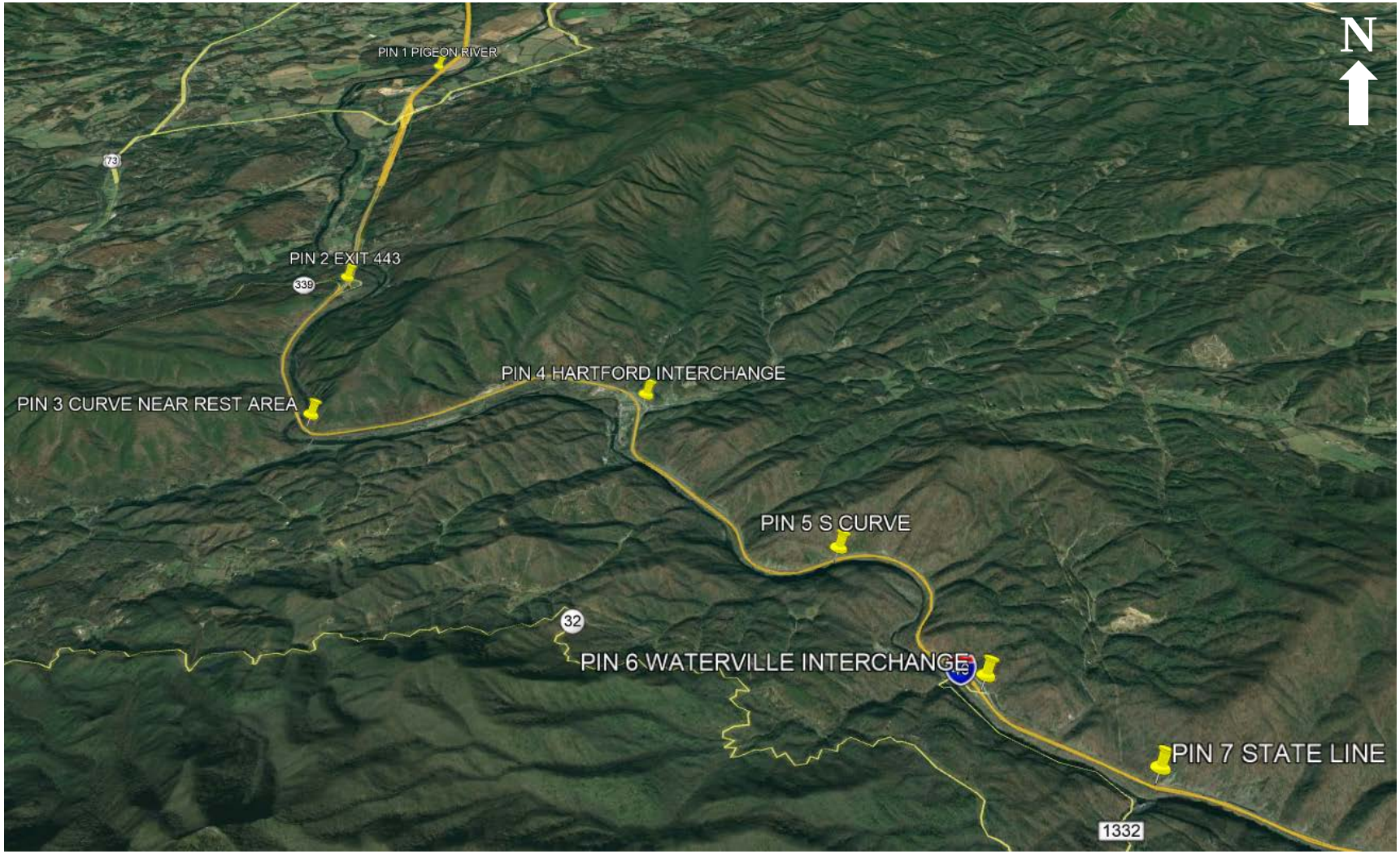
Unique Approaches

Cattle (Texas) Gates

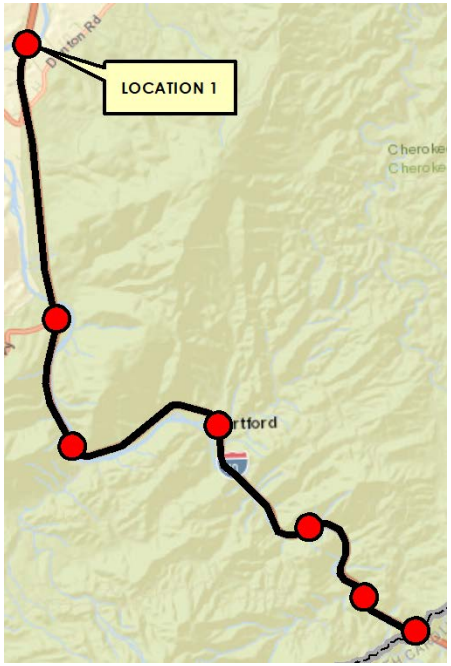
Electrified Cattle Guard

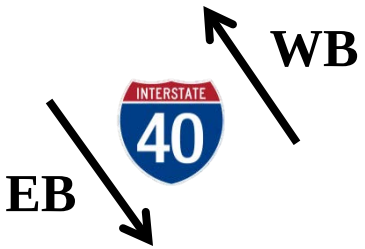
Electo-Mat

Cocke Co. I-40 Study Area



I-40 over Pigeon River





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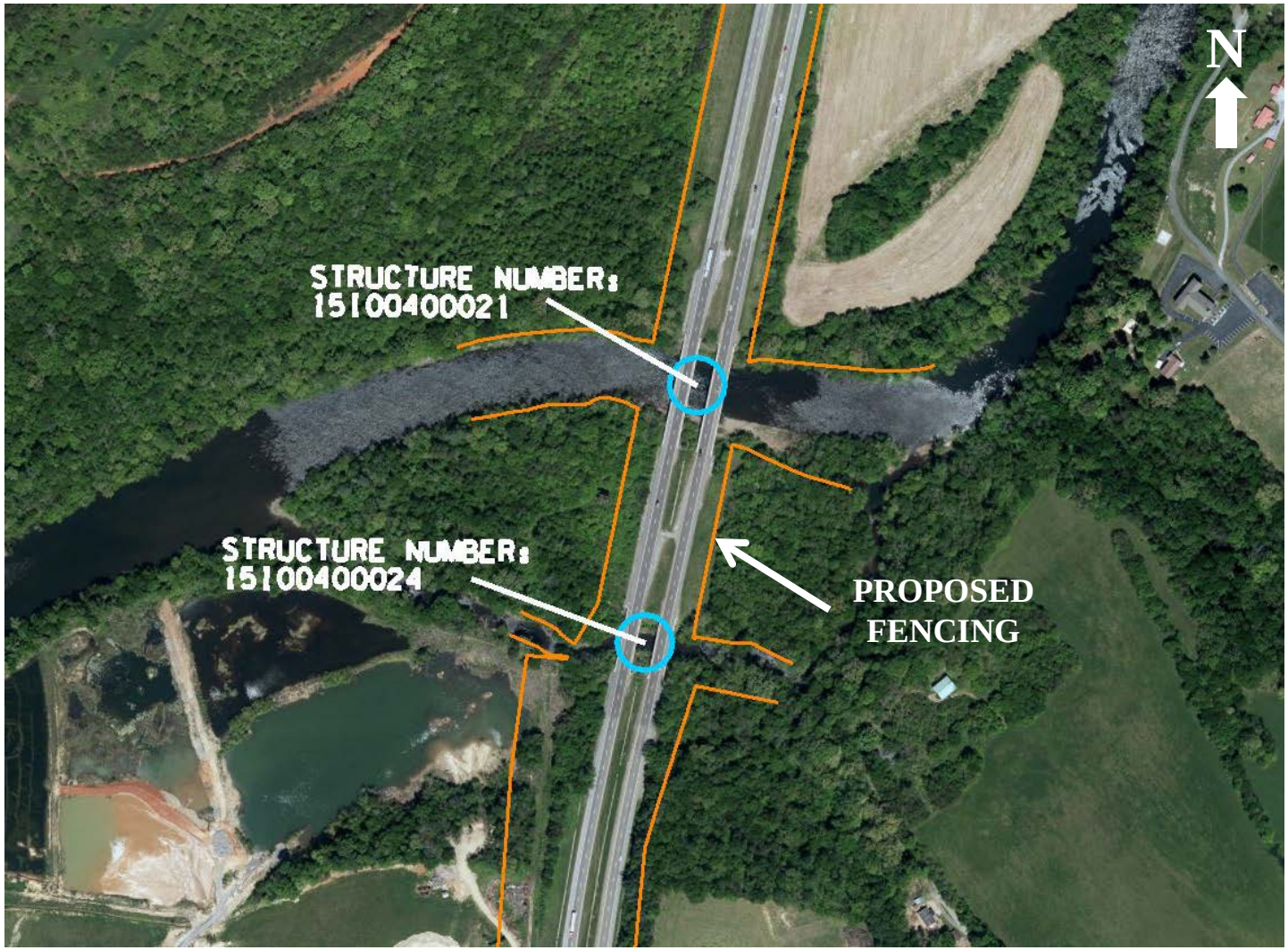

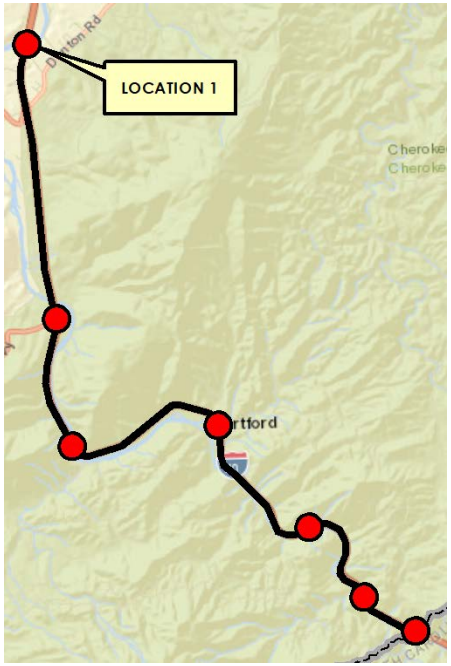

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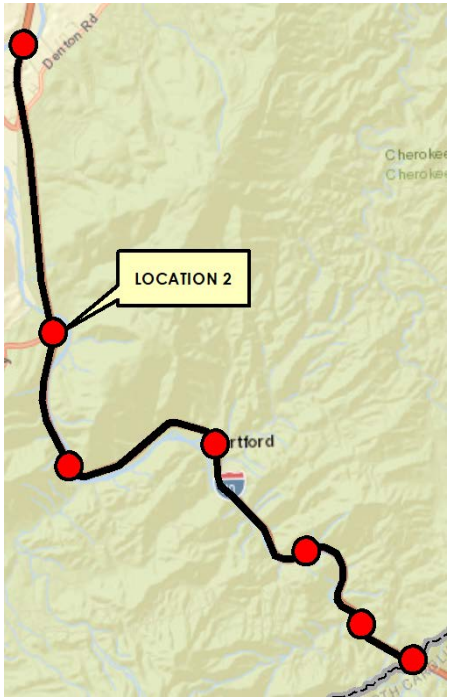

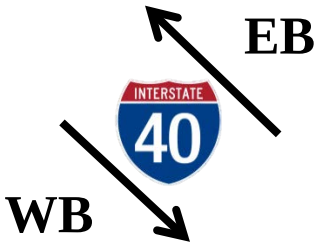

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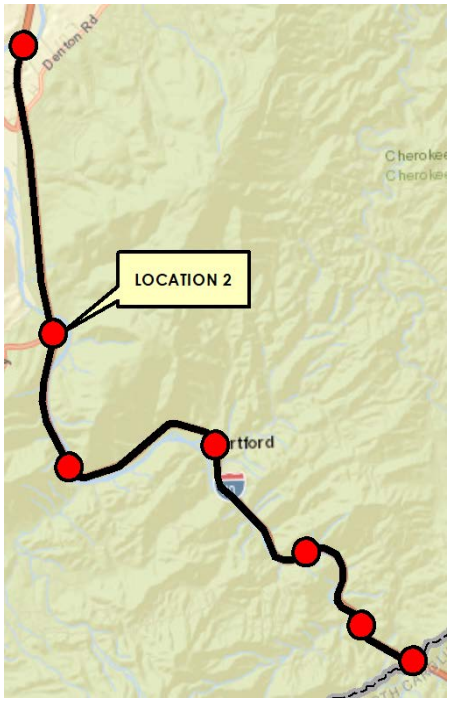

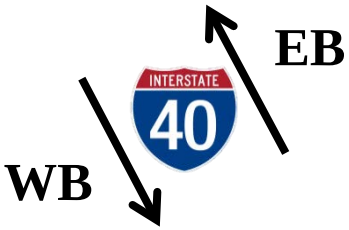

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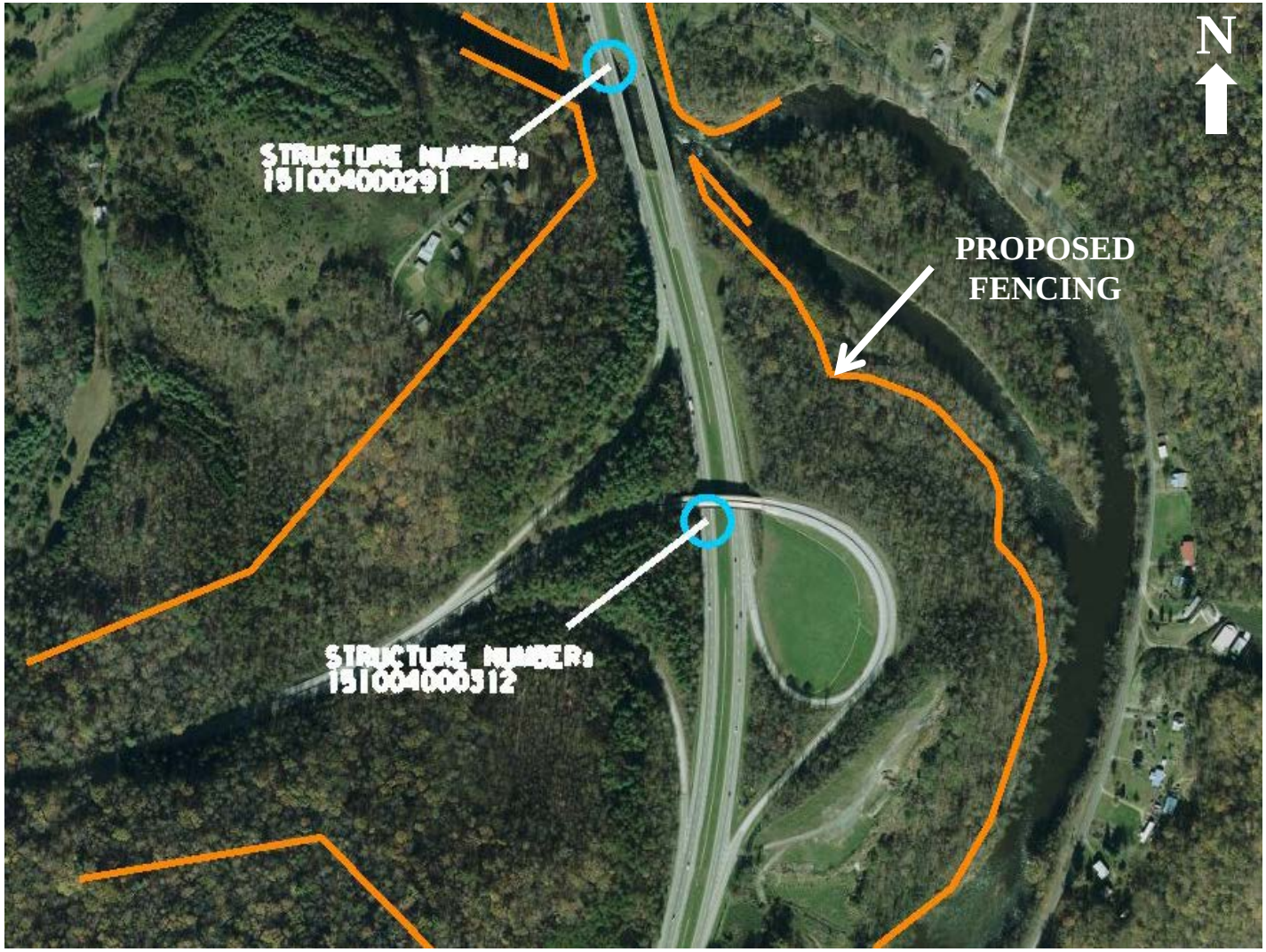
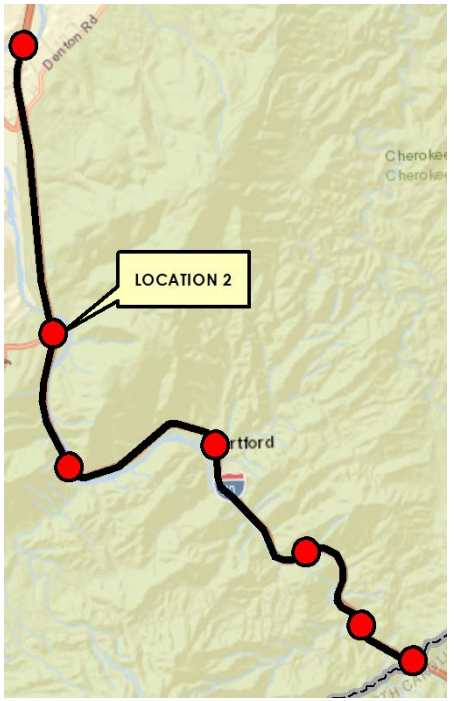
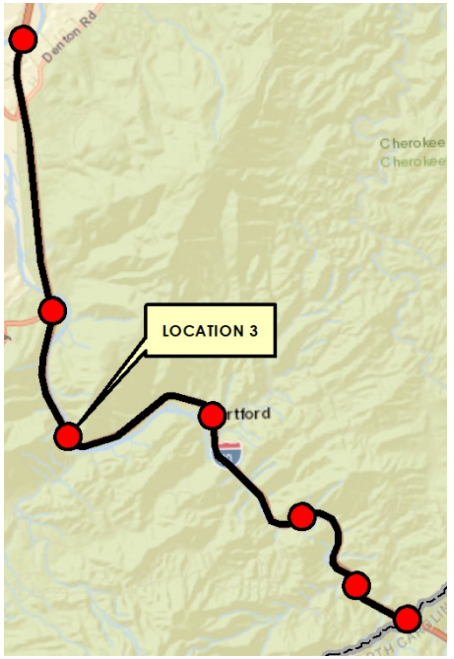
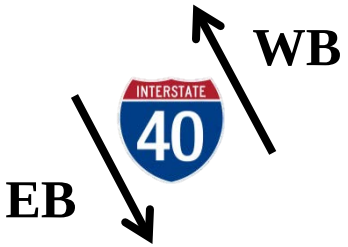




I-40 Curve near Rest Area





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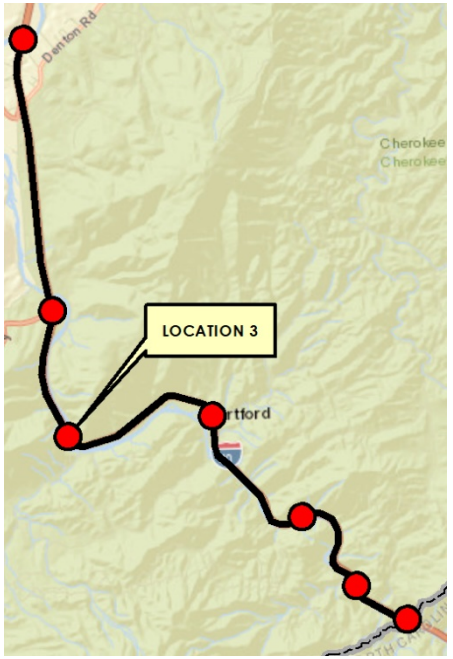

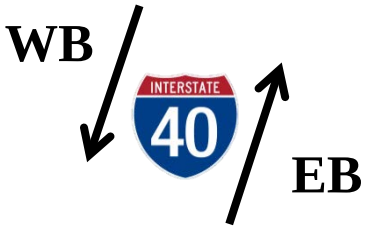

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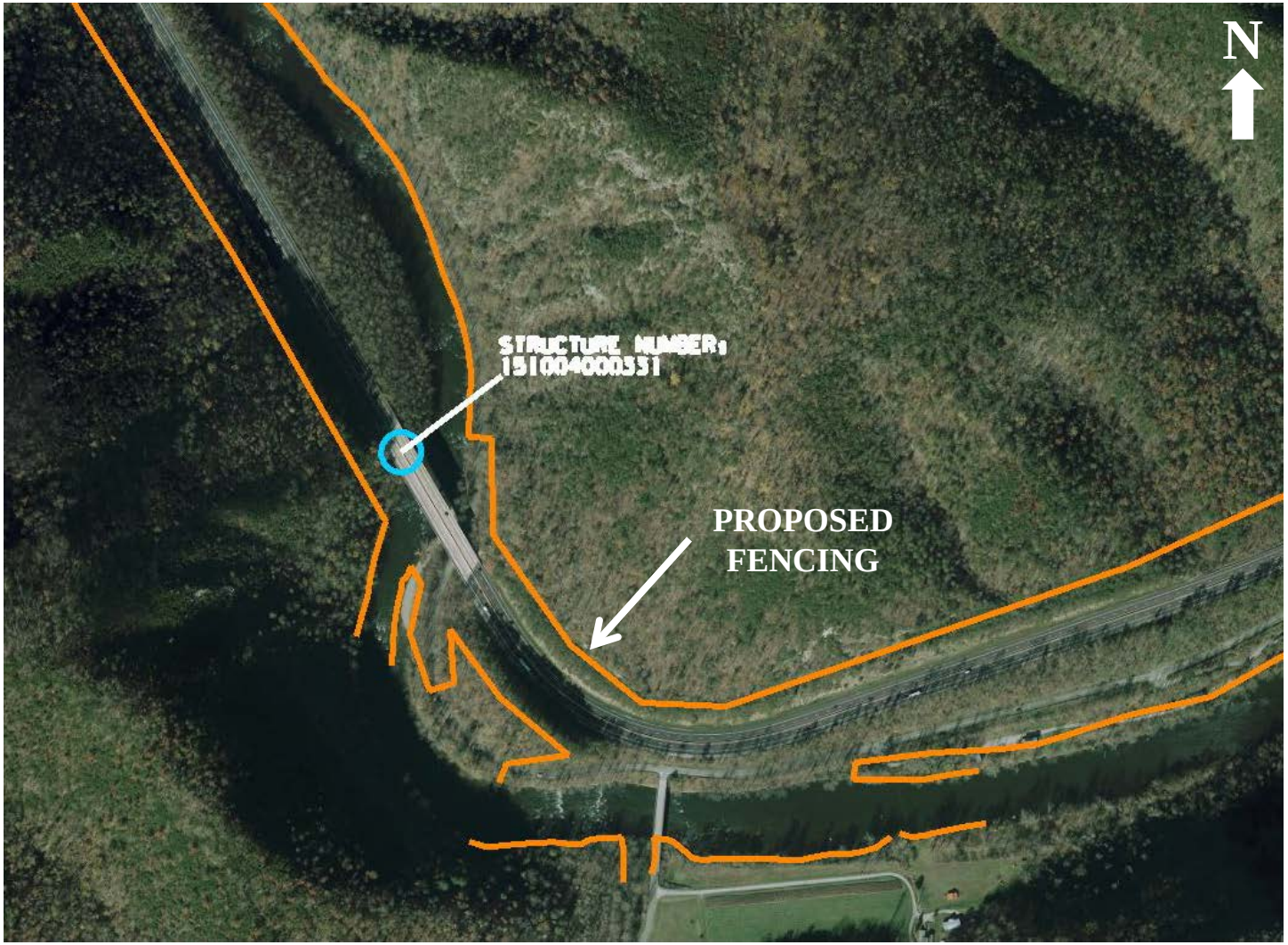

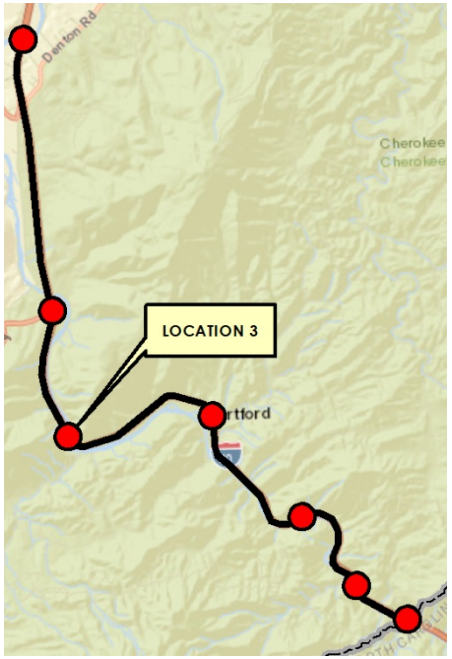

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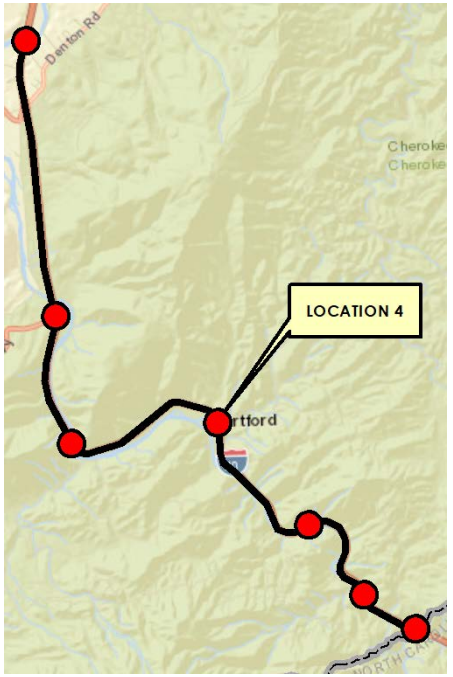

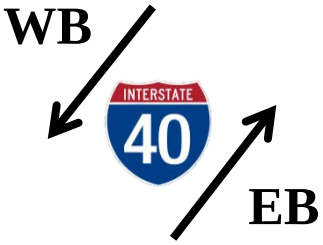

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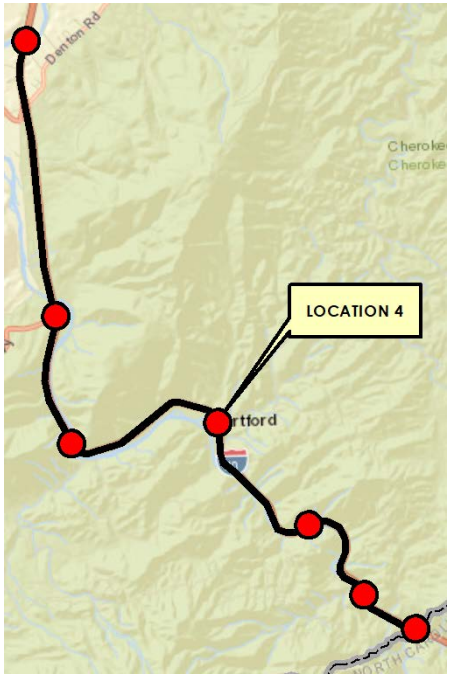

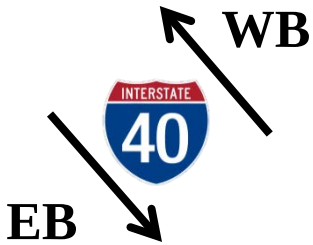

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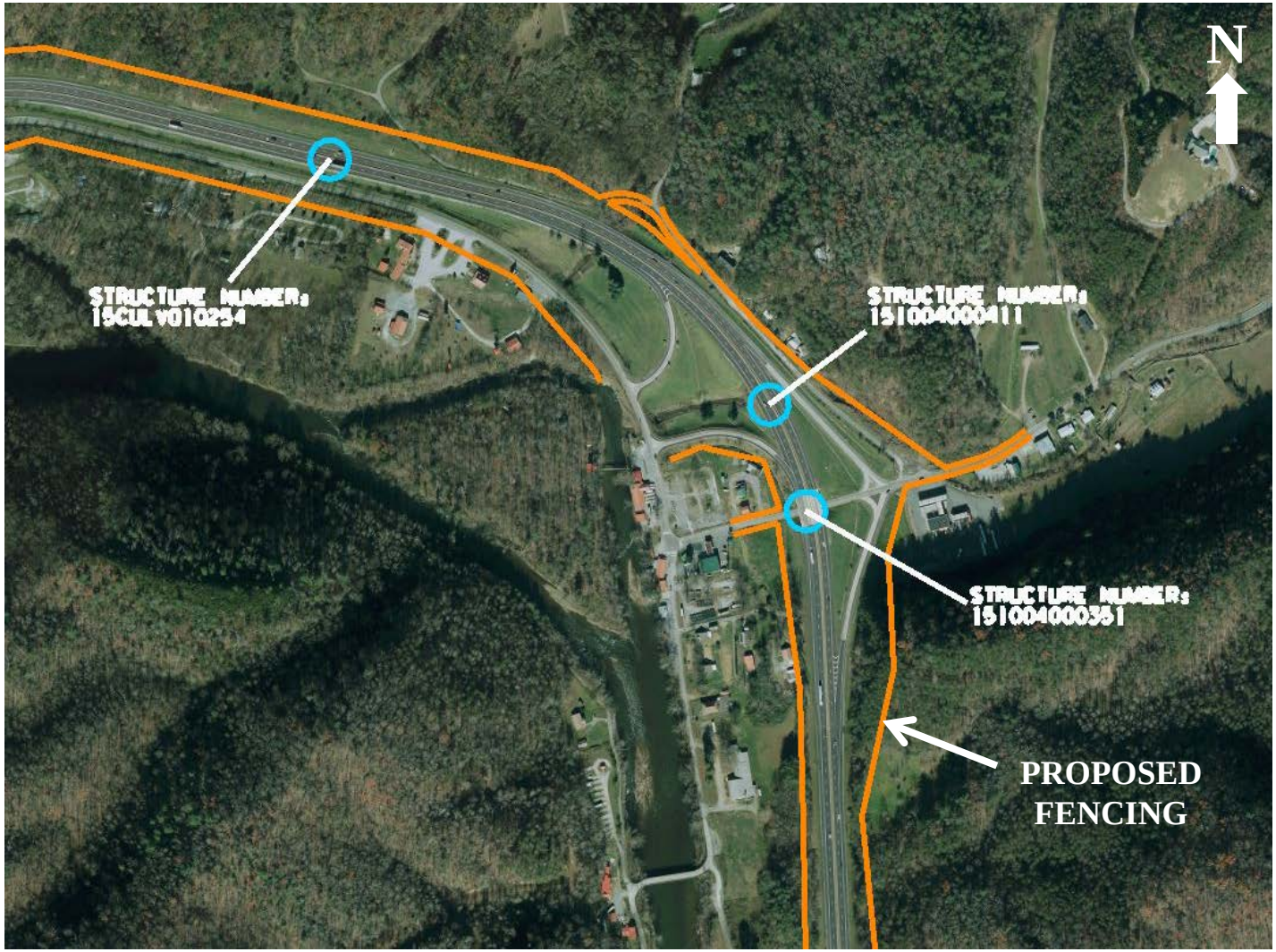
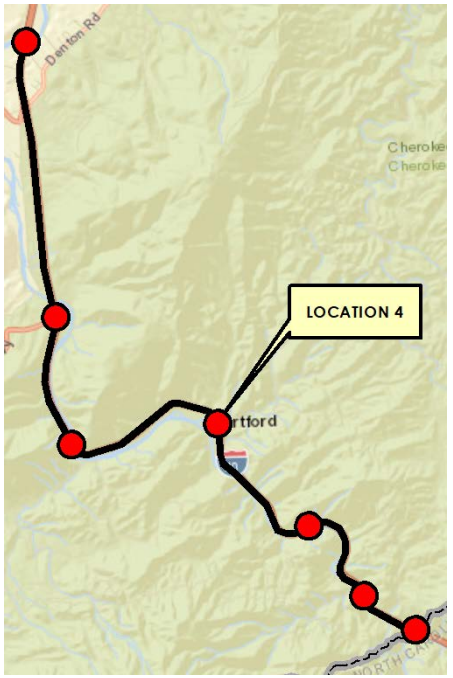
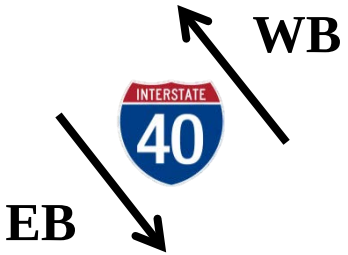
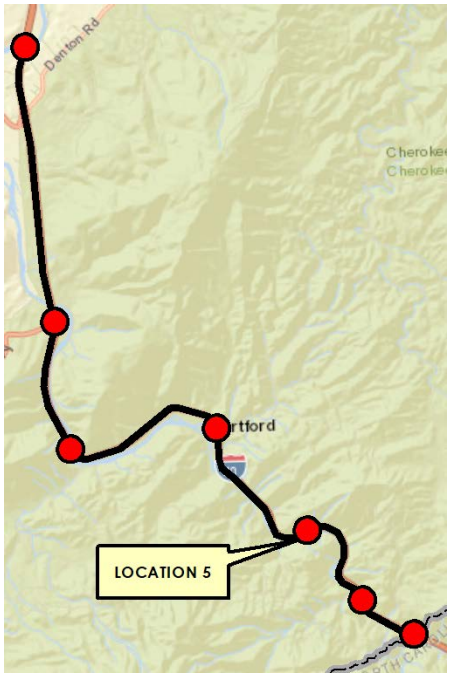
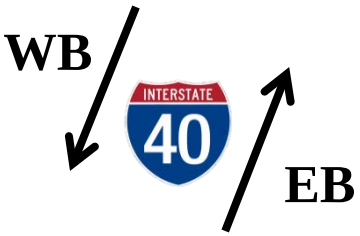






I-40 S-Curve





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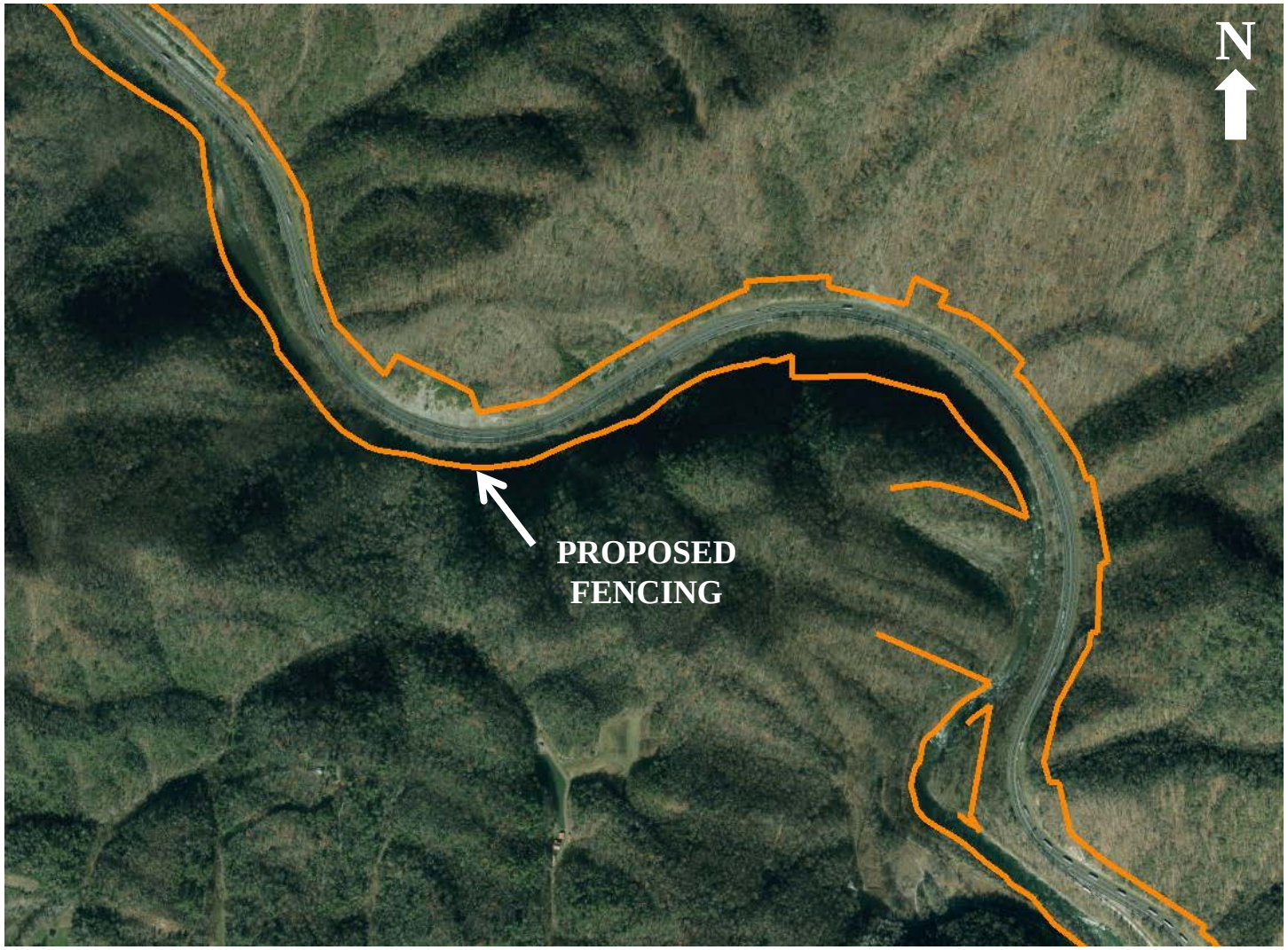

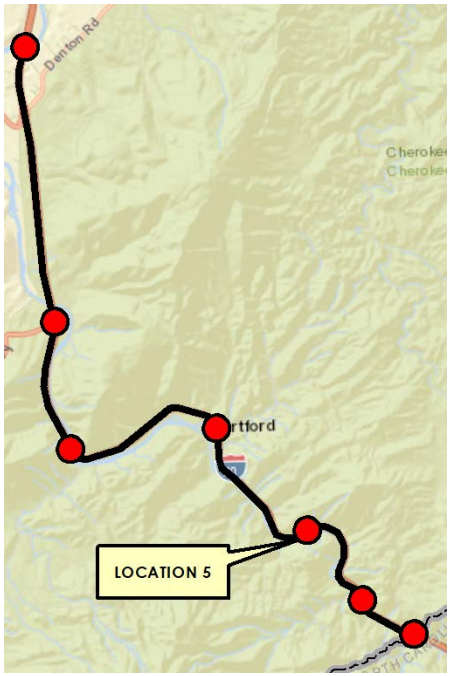

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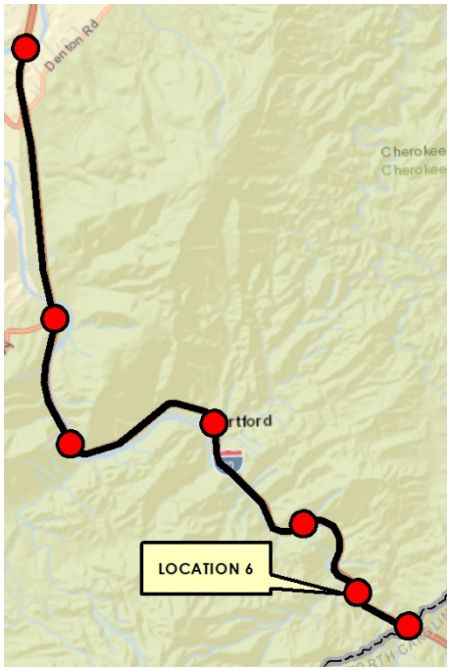

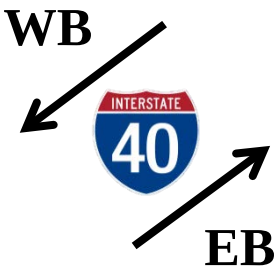

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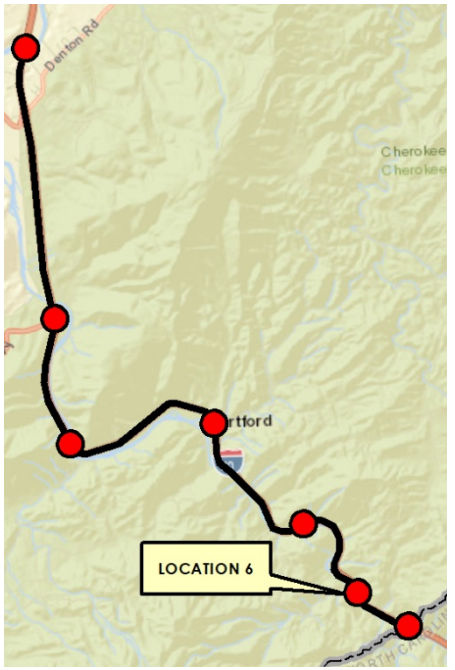

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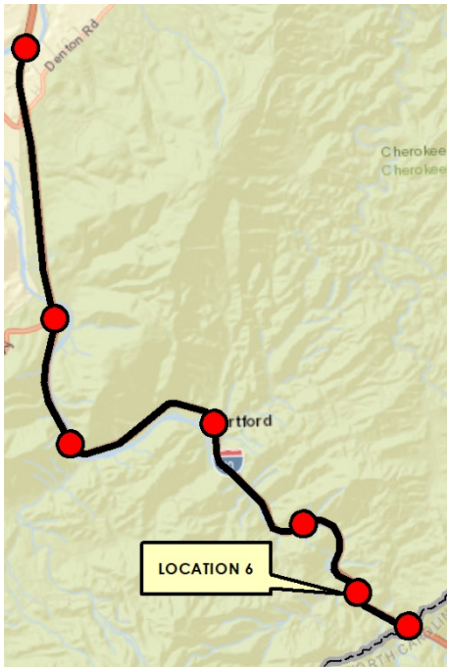
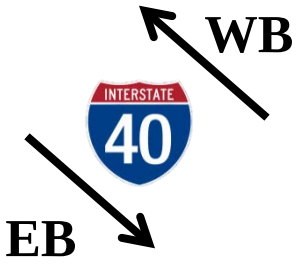
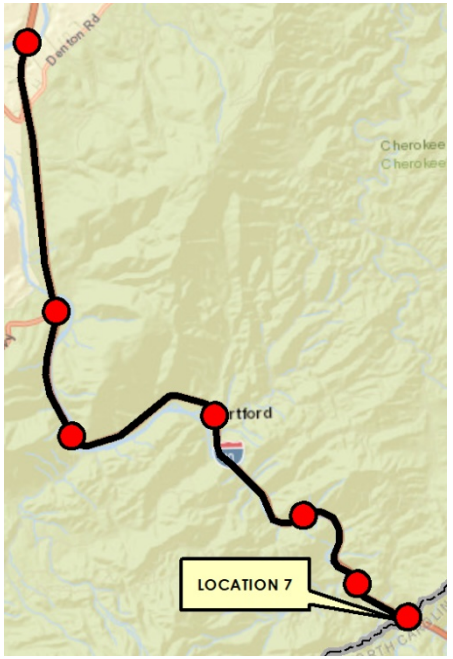
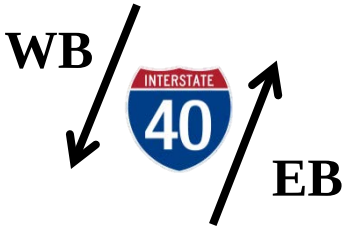




I-40 at TN/NC State Line





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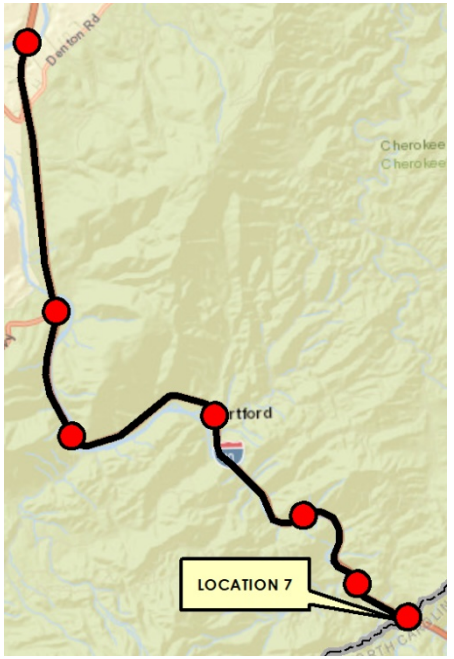
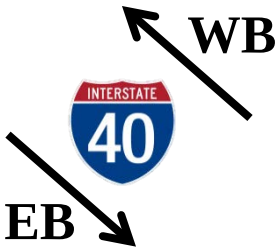
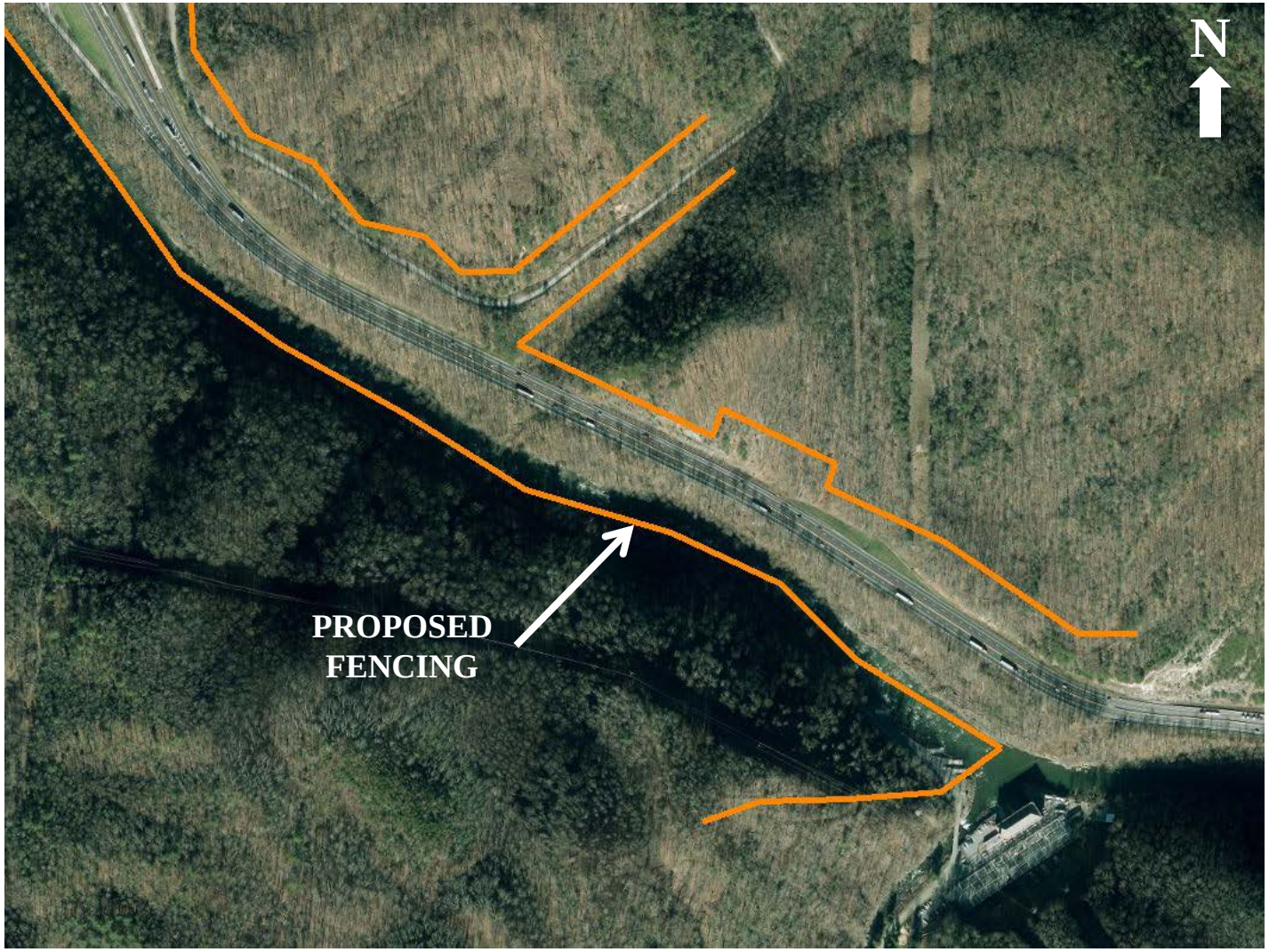
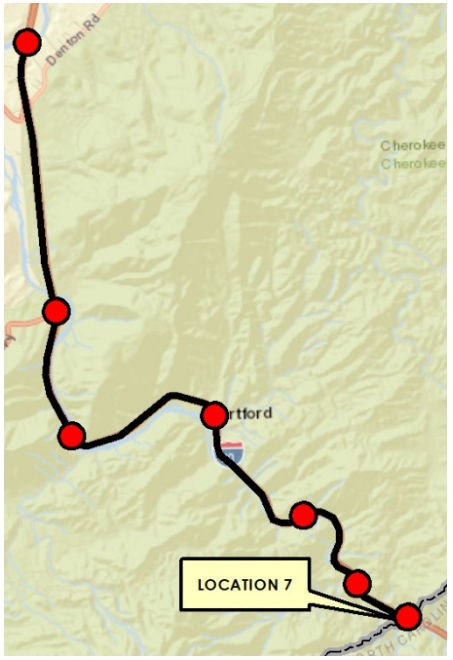
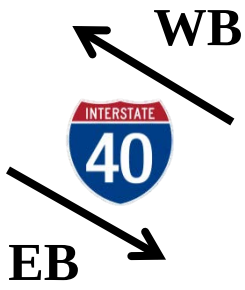




I-40 at TN/NC State Line







Partnerships

Questions

COME ON TERRY I AIN'T GOT ALL DAY!
YUR GONNA CROSS THIS DAMN OVERPASS IF I HAVE TO DRAG YOU MYSELF!
ERL