2022-2023 Wildlife Crossings Pilot Program

STECOAH GAP WILDLIFE CROSSING

Appalachian Development Highway System Corridor K
Graham County, NC

North Carolina Department of Transportation

August 1, 2023

Project Abstract

The Stecoah Gap wildlife crossing is part of improvements being constructed along Appalachian Development Highway System (ADHS) Corridor K in Graham County, North Carolina. As part of the Corridor K project, the North Carolina Department of Transportation (NCDOT) is constructing the wildlife crossing over NC 143 at Stecoah Gap. The wildlife crossing would address Administration priorities and other criterion as described below.

Safety | NC 143 is characterized as a narrow two-lane road with sharp curves, steep grades, and inadequate shoulders. This remote mountain terrain is prone to fog and rain which reduces driver visibility, making it difficult to detect hazards and judge distance. Despite Graham County's small population, it is a tourist destination for recreational driving and is the top county in multiple crash categories including speed-related and lane departure-related fatalities and serious injuries. There is also a history of crashes in the Stecoah Gap area. Without the proposed wildlife crossing, there is an increased potential for wildlife vehicle crashes (WVCs) in this area.

Climate Change and Sustainability | The project is set in the southern Appalachian Mountains, which is part of the Appalachian migratory superhighway. Stecoah Gap is located along the Appalachian National Scenic Trail (ANST) within the Nantahala National Forest and is comprised of pristine terrestrial communities that can maintain specific microclimates. As animals respond to climate change, they move to higher elevations and to more northern latitudes. The wildlife crossing facilitates sustainability by providing safe passage and connectivity to high quality habitats in permanent conservation.

Equity | The larger ADHS Corridor K project is grounded in equity principles with the directive to provide the residents of Appalachia with the infrastructure needed to improve economic conditions and quality of life. The wildlife crossing is located in a rural region of North Carolina with historically high poverty and unemployment. Graham County is identified as a "distressed" county by the Appalachian Regional Commission (ARC). The wildlife crossing will contribute to Administration priorities related to equity by helping facilitate construction of Corridor K in alignment with Graham County economic development goals related to ecotourism.

Workforce Development, Job Quality, and Wealth Creation | Graham County is at a key inflection point with regard to economic development. Historic barriers are being remedied as Corridor K is being constructed, new broadband is being installed, and other tourism-focused efforts are underway. These initiatives, coupled with economic drivers already in place and planned private investment, have created an unprecedented potential for transformation in Robbinsville and Graham County.

Monitoring and Research | There is still a large knowledge gap when it comes to dynamics of the human-wildlife interface and how animals are adapting to climate change. Research indicates that species are moving to higher elevations and latitudes in response to rising temperatures. Because the ANST is in permanent conservation, and in light of its unique microclimates and function as a migratory superhighway, the ANST is an important geography area where we can gather information and work to answer some of these questions.

Table of Contents

Project Narrative

1.0 Basic Project Information

1.1 Project Description and Background

The Stecoah Gap wildlife crossing is part of improvements being constructed on Appalachian Development Highway System (ADHS) Corridor K in Graham County, North Carolina. Figure 1 shows the project location. Figure 2 shows the ADHS Corridor K project corridor and location of the wildlife crossing.

As part of the Corridor K project, the North Carolina Department of Transportation (NCDOT) is constructing the wildlife crossing over NC 143 at Stecoah Gap. The Appalachian Trail (shown in yellow in Figure 2) will be relocated to the wildlife crossing and then realigned for a short distance. Fencing will be erected on each side of the wildlife crossing (on both the north and south sides), 0.5-mile on each approach, to direct animals to the crossing.

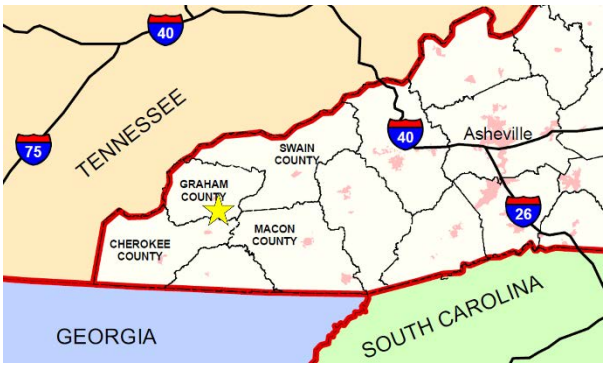


Figure 1: Project Location. *The ADHS Corridor K project is in Graham County, North Carolina within the southern Appalachian Mountains.*

ADHS Corridor K was first proposed under the Appalachian Regional Development Act of 1965 and, over the course of fifty years, reached various environmental review milestones but had not progressed through approval and on to construction. Much of the delay was due to environmental impacts associated with the original proposal (a four-lane, median divided highway on new location). In addition to impacting rich natural and cultural resources including pristine headwater riparian systems, challenging mountainous terrain, and Cherokee homesteads, there was also concern related to visual impacts from the Appalachian Trail and other vistas within the Nantahala National Forest.

Figure 2: Project Corridor. *The wildlife crossing will be constructed over NC 143 at Stecoah Gap near the current location of the Appalachian Trail crossing shown here.*

After a pause in 2011, the Corridor K project was restarted in July 2015 using a "fresh look" approach that emphasized early and continuous input and participation of local elected officials, local government, Tribal representatives, and federal/state regulatory and resource agencies. This team worked together to evaluate options to find a 'right-size' design that best addressed mobility and reliability needs while minimizing impacts.

Mobility and travel time reliability is a top priority for Graham County residents who frequently travel outside of Graham County to access medical care, employment, and education. Residents needed more predicable travel times that would not be largely affected by slow-moving vehicles, farm equipment, landslides, or fog.

The project team reviewed crash data and traffic analyses to assess whether the project would be a good candidate for improvements that would create alternating passing or climbing lanes along the entire project corridor. Frequently called a "2+1" design, this design approach is suitable where there are notable delays associated with slower moving vehicles but future traffic volumes do not justify a four-lane facility. This type of facility also helps minimize reckless/aggressive maneuvering by reducing "platoon" lengths and setting driver expectations for frequent opportunities to pass. The 2+1 design is a context-sensitive solution as it minimizes the project footprint and associated environmental impacts while providing mobility and travel time reliability benefits.

New Perspectives, New Directives

Corridor K was a Federal Highway Administration (FHWA) "Every Day Counts" project that successfully moved through the environmental review process by implementing a new approach that created an atmosphere of collaboration using the following principles:

- *Start fresh; adopt a new approach*
- *Drop past confines but keep the wisdom of what we've learned*
- *Be involved; provide resources and expertise*
- *Be creative, open-minded, flexible*
- *Collaborate, problem solve, bring others into the process*

With the exception of one location, the Corridor K project will add an alternating passing or climbing lane along the length of the corridor. Due to the mountainous terrain, climbing lanes in both directions were needed on NC 143 at Stecoah Gap. At approximately 3,165 feet above sea level, Stecoah Gap is a dip along the north-south ridgeline within the Nantahala National Forest and is crossed by the Appalachian National Scenic Trail (ANST). The roadway typical section at Stecoah Gap is shown in Figure 3. Figure 4 shows the mountainous terrain, NC 143, and the ANST in the Stecoah Gap area. Figure 5 shows a plan view schematic of the proposed wildlife crossing.

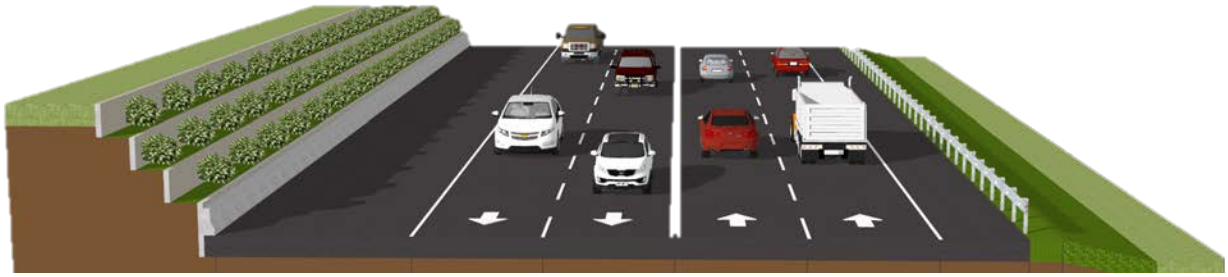


Figure 3: NC 143 Typical Section at Stecoah Gap. *Climbing lanes in both directions creates a four-lane cross-section at Stecoah Gap, creating a potential hazardous crossing for wildlife, ANST users, and motorists.*

Figure 4: Wildlife Crossing Location on NC 143 at Stecoah Gap. *This figure shows the steep roadway grades on NC 143 in both directions approaching Stecoah Gap (at 3,165 feet above sea level). The Appalachian Trail is shown in yellow and currently crosses NC 143 in the middle of the curve at Stecoah Gap.*

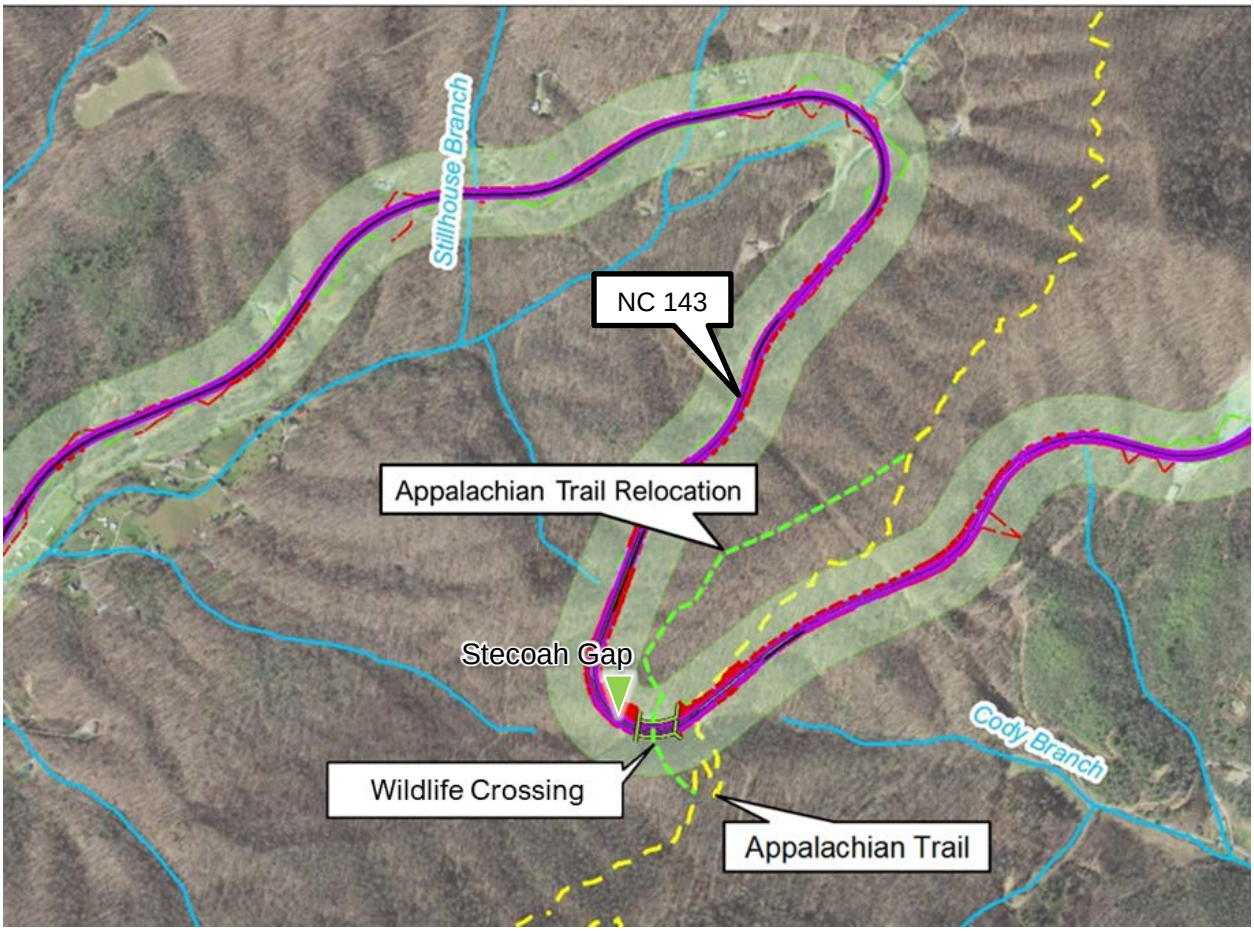


Figure 5: Wildlife Crossing Schematic. *As part of the Corridor K project, a wildlife crossing is proposed over NC 143 at Stecoah Gap. The ANST (shown in yellow) would be relocated to the wildlife crossing and the realigned for a short distance (shown in green). Fencing will be erected on each side of the wildlife crossing (on both the north and south sides), 0.5-mile on each approach, to direct animals to the crossing.*

The Corridor K project approach streamlined identification of the preferred alternative within fifteen months after initiating formal National Environmental Policy Act (NEPA) studies. Interagency coordination and the entire NEPA documentation process was completed within a two-year timeframe. The project team focused on integrated planning; creating space for local government representation; engagement of environmental advocacy organizations; early and continuous interagency coordination; and regular Tribal coordination to ensure protection of cultural and natural resources. Corridor K best practices are being incorporated into NCDOT's project delivery and project management guidance. Fifty years after the project's inception, NCDOT broke ground in October 2022 on ADHS Corridor K – one of the most complex transportation projects in the southeast United States.

The Transportation Core Team receiving the National Association of Environmental Professionals' Environmental Excellence Award for Environmental Management, Stewardship, Conservation, and/or Protection awarded to NCDOT in 2021 for the ADHS Corridor K project.

Building Partnerships

"*While previous attempts to fit a new transportation corridor within these environmental constraints had been frustrated, NCDOT, Stantec, and TGS approached the project planning process in a new and innovative way. First they* ***involved all stakeholders in a meaningful way****, listening to all issues and concerns and incorporating these issues and concerns into design considerations*."

- **The Wilderness Society**

"*The project's long, difficult history makes last week's milestone all the more* ***remarkable****. The new proposal will improve transportation and safety, protect and improve access for recreation, support local economies, and restore connectivity for wildlife like black bears. To get here, DOT* ***worked closely with stakeholders at every step,*** *including SELC and our partners, to solve problems and* ***earn community support***."

- Southern Environmental Law Center

"*Having worked on a number of highway projects that intersect the ANST in four different states, I will say the* ***management and facilitation of this project have been the best I have been involved with, the most thorough and most open to innovation*** *and explored the most alternatives for accomplishing the project goals*."

- Appalachian Trail Conservancy

1.2 Roadway Characteristics

NC 143 is part of the National Highway System and is classified as an Other Principal Arterial. It is one of three main routes in Graham County and provides connection between Robbinsville and Stecoah. NC 143 is characterized as a narrow two-lane road with sharp curves, steep grades, and inadequate shoulders.

NC 143 and other routes in Graham County frequently serve as the only detour when US 74 through the Nantahala Gorge (to the south and east of Graham County) is closed due to landslides. US 74 through the Nantahala Gorge experiences an average of one to two landslides a year, forcing the closure of the roadway up to several days each event. US 74 is designated as a Strategic Transportation Corridor for the east-west movement of goods across the state. As such, there is a high volume of through-traffic, including truck traffic, that is diverted to Graham County during US 74 closures. The wildlife crossing will provide safe passage for wildlife when higher volumes of traffic from US 74 are routed to NC 143.

In addition, construction of the Corridor K project will improve connectivity to Asheville and other points east of Graham County which aligns with local goals to grow ecotourism in the region which is likely to increase seasonal traffic along NC 143 and further underscore the need for a safe crossing at Stecoah Gap.

1.3 Wildlife Crossing Design Features

The wildlife crossing at Stecoah Gap is located on a sharp curve on NC 143 which requires a curved structure that is wider on the south side. As shown in Figure 6, the structure will be constructed with precast concrete arches that are approximately 154 feet on the north side and 206 feet on the south side of NC 143.

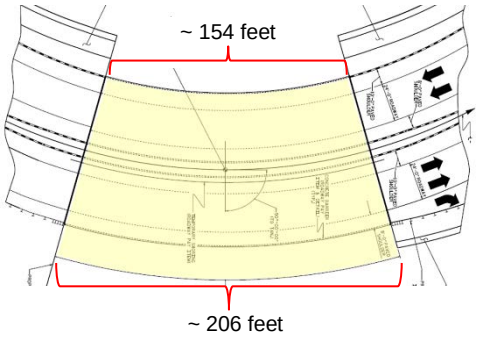


Figure 6: Wildlife Crossing Plan View.

The face of the wildlife crossing will receive an aesthetic treatment using concrete form liners to create the appearance of stacked stone tunnel entrances. A conceptual rendering of the wildlife crossing is shown in Figure 7. The wildlife crossing is adjacent to a series of benched retaining walls that are included in the project to minimize the roadway cross-section width and mitigate visual impacts from points along the ANST. Without the wildlife crossing, these walls could prohibit animals from moving across the highway, increasing the potential for wildlife-vehicle collisions.

Figure 7: Wildlife Crossing Conceptual Rendering.

The wildlife crossing will include a wide vegetated berm in the center to provide separation between the relocated ANST and the rest of the structure. This feature will offer refuge for animals that may be on the structure at the same time as ANST hikers. The wildlife crossing plan view is shown in Figure 8. Fencing will be erected to the east and west of the wildlife crossing for a distance of 0.5-mile on both the north and south sides to direct animals to the crossing. Low split rail fencing will be used on the structure to identify the ANST alignment and encourage hikers to stay on that portion of the structure.

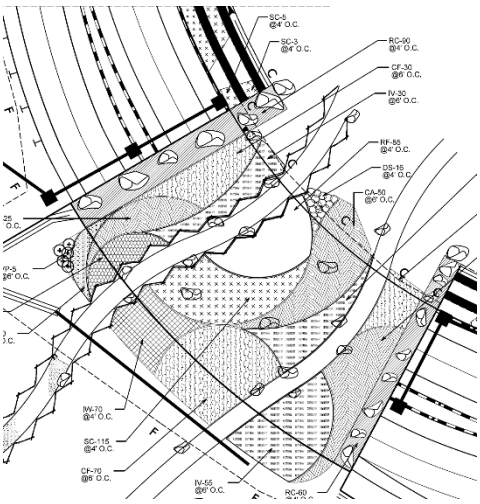


Figure 8: Wildlife Crossing Plan View. *The ANST will be lined with split rail fencing and constructed on one side of a seven-foot tall, vegetated berm to separate it from the rest of the wildlife crossing.*

A planting plan for the wildlife crossing and adjacent benched retaining walls was developed in coordination and approval from the US Forest Service (USFS), North Carolina Wildlife Resources Commission (NCWRC), and the US Fish & Wildlife Service (USFWS). The planting plan incorporates native species including those used by the golden winged warbler (*Vermivora chrysoptera*) (currently under review for listing under Section 7 of the Endangered Species Act). Detailed design plans and the planting plan are appended to this grant application.

1.4 Safety Context

Despite its small population of 8,044 people and rank as the 98th populated county in North Carolina[1] (out of 100 counties), Graham County consistently ranks 1st in the state (per residents 16 and older) for seven out of 11 categories of vehicular crashes.[2]

Graham County is:

#1 in intersection-related fatalities and serious injuries
#1 in lane departure-related fatalities and serious injuries
#1 in alertness-related fatalities and serious injuries
#1 in speed-related fatalities and serious injuries
#1 in motorcyclist-involved crashes and serious injuries
#1 in pedestrian, bicyclist, and personal mobility-involved fatalities and serious injuries
#1 in older driver-involved fatalities and serious injuries

During peak tourist seasons, there is an influx of drivers who are unfamiliar with the area and lack experience driving through mountainous terrain. These characteristics contribute to Graham County's disproportionately high crash rates. Graham County is known for its scenic roadways

[1] North Carolina Office of State Budget and Management (OSBM). 2021. County Population Estimates. Available at: https://www.osbm.nc.gov/facts-figures/population-demographics/state-demographer/county-population-estimates/county-population-estimates. Accessed July 24, 2023.

[2] North Carolina Department of Transportation (NCDOT). 2019. *North Carolina Strategic Highway Safety Plan*. Available at: https://connect.ncdot.gov/groups/echs/Documents/2019/2019%20NC%20SHSP.pdf. Accessed July 24, 2023.

that twist their way through the southern Appalachian Mountains. The “Tail of the Dragon” in western Graham County has over 318 curves in an 11-mile stretch and the Cherohala Skyway brings travelers to scenic vistas at elevations over 5,000 feet above sea level.

In addition to attracting thrill seekers interested in testing their driving skills, Graham County is known for its scenic views, vibrant autumn foliage, and seasonal birdwatching. Additionally, the annual Harvest Festival at the Stecoah Valley Cultural Arts Center draws visitors to the area each fall, when mating season is underway, further increasing the risk of wildlife vehicle collisions.

The Corridor K project includes wide, paved shoulders and geometric improvements that will help reduce the potential for certain types of vehicular accidents, but there are a number of factors that cannot be addressed through roadway design. As such, the wildlife crossing on NC 143 at Stecoah Gap is being constructed to prevent wildlife and pedestrian collisions at this location. Photographs 1 and 2 show the limited sight distance on NC 143 at the ANST crossing.

Photograph 1: Westbound NC 143 at the Appalachian National Scenic Trail. *The southern trailhead is just south of the parking lot. The northern trailhead is on the north side of NC 143. As shown here, the sharp curve on NC 143 limits sight distance at this location. Source: Google Streetview.*

Photograph 2: Eastbound NC 143 at the Appalachian National Scenic Trail. *The southern trailhead is just south of the parking lot. The northern trailhead is on the north side of NC 143. As shown here, the steep grade on NC 143 limits sight distance at this location. Source: Google Streetview.*

1.5 WVC History and Trends

Between 2015 and 2022, there were 53 documented wildlife collisions in Graham County, with four of those collisions occurring in the immediate vicinity of the proposed wildlife crossing, as shown in Figure 9. It is noted that the actual number of collisions is likely higher due to the following factors: crash databases typically exclude collisions with property damage less than $1,000; inconsistent reporting by drivers; lack of agency/law enforcement resources to collect detailed information; and injured animals can move away from the road before dying and are never found.[3] Additional data on wildlife vehicle crashes (WVCs) is included in Section 3.1.

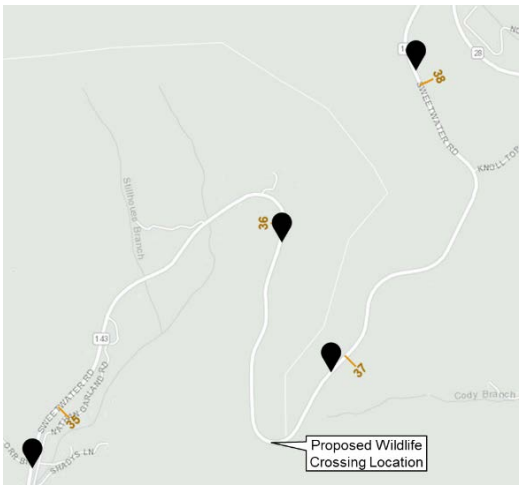


Figure 9: WVC history in vicinity of wildlife crossing (2015 – 2022).

1.6 Animal Use of the ANST

Research indicates that hiking trails are used by many animal species. While there are other factors involved – most notably the presence of available forest, seasonality, presence/absence of hunting, and overall level of human use – studies indicate that many species such as bear, bobcat, coyote, fox, deer, and other mammal species use hiking trails.[4]

A recent study conducted in the mountains of North Carolina found that there was not a consistent avoidance of hiking trails and that "most predators positively selected them."[5] It can be inferred that animals are likely using the ANST in Graham County to move north and south between different habitats.

A number of species have been documented using hiking trails like the ANST to move between various habitats. Photo credit: Earth Touch News

1.7 Conservation Context

A large portion (approximately 64%) of land in Graham County is part of the Nantahala National Forest, managed by the USFS. The wildlife crossing falls within the "Appalachian National Scenic Trail Corridor Management Area." This management area is unsuitable for timber production and is managed to maintain a natural, forested character and to maintain/improve habitat for threatened and endangered species, and USFS-designated rare species.[6] The wildlife crossing will further the USFS's habitat management goals for the ANST management area by

[3] US Department of Transportation (USDOT). 2008. Wildlife-Vehicle Collision Reduction Study. Available at: https://www.fhwa.dot.gov/publications/research/safety/08034/08034.pdf. Accessed July 25, 2023.

[4] Hale, P.L., W.J. McShea, R.P. Guralnick. 2012. Anthropogenic Influences on Macro-Level Mammal Occupancy in the Appalachian Trail Corridor. Available at: http://link.springer.com/article/10.1007/s12237-018-0378-7. Accessed July 25, 2023.

[5] Kays, R., A.W. Parsons, M.C. Baker, E.L. Kalies, T. Forrester, R. Costello, C.T. Rota, J.J. Millspaugh, W.J. McShea. 2016. Does hunting or hiking affect wildlife communities in protected areas? Available at: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.12700. Accessed July 25, 2023.

[6] US Department of Agriculture (USDA) Forest Service. 2023. Nantahala and Pisgah National Forests Final Land Management Plan. Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd1090063.pdf. Accessed July 25, 2023.

providing safe passage across lands that will be preserved in perpetuity.

As shown in Figure 10, the wildlife crossing is within the Nantahala National Forest, in a narrow portion of the forest at Stecoah Gap that provides connectivity to large tracts of protected lands that lead to water bodies that include Fontana Lake and the Little Tennessee River to the north and the Nantahala River to the south. Figure 11 provides additional context on the importance of the Appalachian region as vital core habitat.

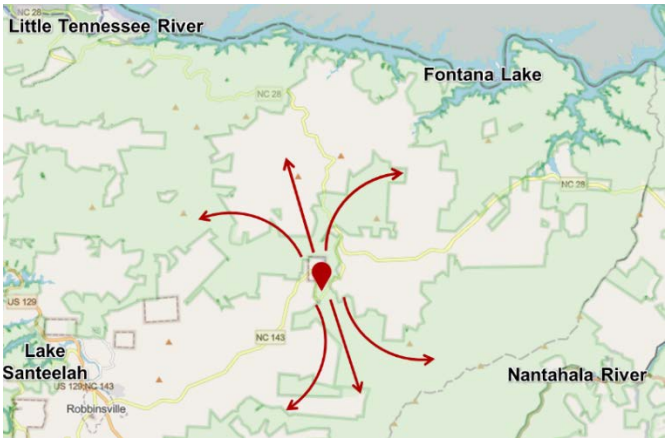


Figure 10: Conservation Context. *The wildlife crossing (at red pin) would facilitate safe passage for animals moving north and south within the Nantahala National Forest.*

1.8 Ecosystem Processes, Function, and Benefitted Species

The wildlife crossing is along the Appalachian Migratory Corridor, shown in Figure 12. This migratory superhighway stretches from northern Alabama and Georgia north to Maine and Nova Scotia. The varying terrain and diverse geology of the Appalachian Mountains creates microclimates that maintain more consistent air and water temperatures. This landscape has been termed "climate-change refugia" meaning that this habitat is likely to remain resilient to future climate threats.[7] Research indicates that both plant and animal species are moving an average of 36 feet higher in elevation each decade in response to climate change.[8] Animals are also moving northward in response to rising temperatures. Researchers estimate that species are shifting their ranges roughly 10 miles northward or southward closer to the poles every ten years.[9] This trend underscores the importance of providing habitat connectivity with wildlife crossings at higher elevations like Stecoah Gap.

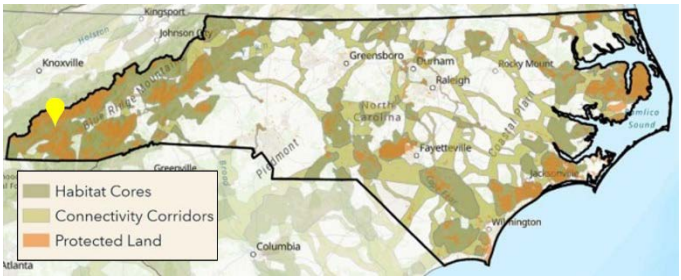


Figure 11: Eastern Wildway in North Carolina. *The Stecoah Gap wildlife crossing is centrally located in the US Eastern Wildway and a Habitat Core area of North Carolina. Source: Wildlands Network.*

As previously noted, certain large mammal species are likely to move through the region along the ANST corridor. Without the proposed wildlife crossing, some animals traveling northward would reach the long retaining wall on the north side of NC 143 and find themselves 'trapped' along the roadway corridor, increasing the potential for WVCs and mortality. Species likely to

[7] Haight J., E. Hammill. 2020. Protected areas as potential refugia for biodiversity under climate change. Biological Conservation Journal (Vol 241): 108258. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0006320719308778?via%3Dihub. Accessed July 25, 2023.

[8] Hale, D. 2021. Species Movement on the A.T. Landscape. Available at: https://appalachiantrail.org/official-blog/species-movement-on-the-a-t-landscape/. Accessed July 25, 2023.

[9] Jacobs, Emma. 2022. National Public Radio, North Carolina Public Radio. Canadian researchers seek paths for animals to migrate in response to climate change. July 19, 2022. Available at: https://www.npr.org/2022/07/19/1111740540/canadian-researchers-seek-paths-for-animals-to-migrate-in-response-to-climate-ch. Accessed July 25, 2023.

utilize the wildlife crossing include bear, elk (in future years as the nearby Great Smoky Mountain National Park resident population grows and expands territory), deer, bobcat, coyote, racoons, foxes, and other small mammals as well as birds, reptiles, and amphibians. In addition to providing safe passage, the wildlife crossing will be planted with native species that can provide habitat for butterflies and other insect species.

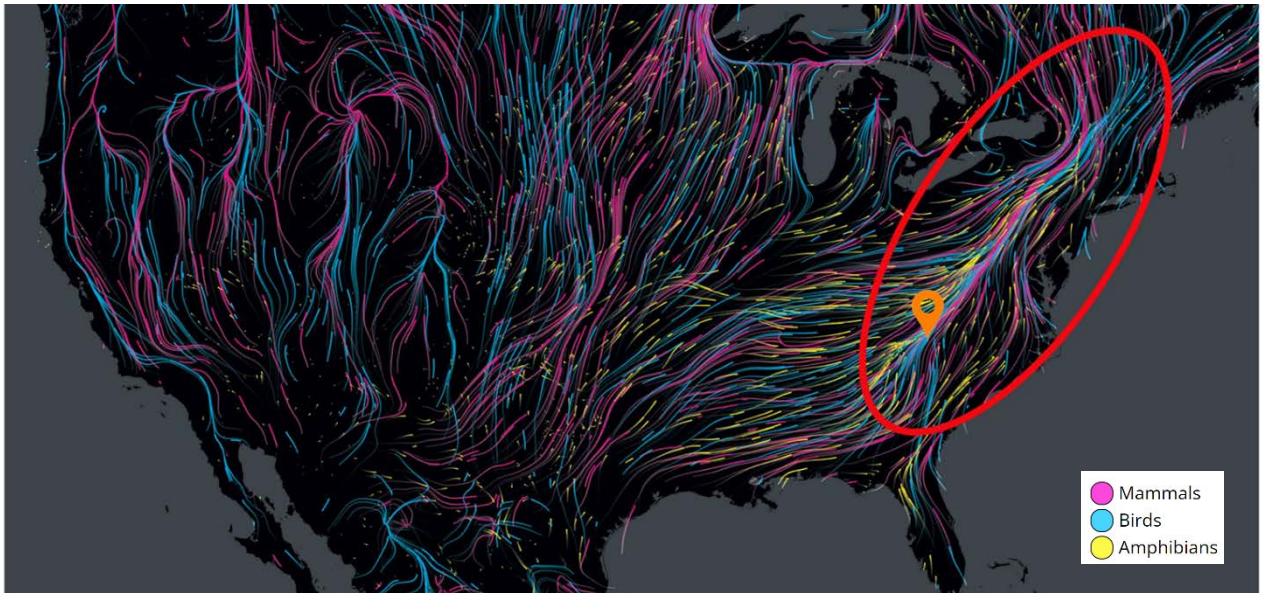


Figure 12: Appalachian Migration Corridor. *The wildlife crossing would facilitate safe passage for animals moving north and south along the Appalachian migratory superhighway. Source: The Nature Conservatory's Migrations in Motion. https://maps.tnc.org/migrations-in-motion/#4/38.38/-99.45*

1.9 Parties

NCDOT is an eligible applicant for the Wildlife Crossings Pilot Program (WCPP) funding and has long history of demonstrated experience with receipt and expenditure of Federal highway program funds and other Federal funding sources, including funding allocated for the Corridor K project as part of the ADHS. While there are a number of Federal, state, and local project partners, NCDOT is the sole applicant for this wildlife crossing grant and will be entirely responsible for the administration of awarded grant funds.

1.10 Socioeconomic Setting

Graham County is classified as a rural area as it is not inside a Federal Highway Administration (FHWA)-adjusted urban area with a population of 50,000 or more.[10] The entire county population is less than 9,000 people as of the 2020 census. As shown in Figure 13, almost half of the county (approximately 120 square miles) is designated as an Opportunity Zone (#37075920300). This opportunity zone encompasses the Town of Robbinsville (the county seat) and hosts town/county governments and a number of parcels owned by the Eastern Band of Cherokee Indians. Robbinsville is served by municipal water and sewer, contains multiple greenways and parks, and is the location of county elementary, middle, and high schools.

[10] USDOT Federal Highway Administration. 2023. Planning, Environment, Realty (HEP) HEPGIS. Available at: FHWA Adjusted Urban Area - FHWA HEPGIS Maps (dot.gov). Accessed July 27, 2023.

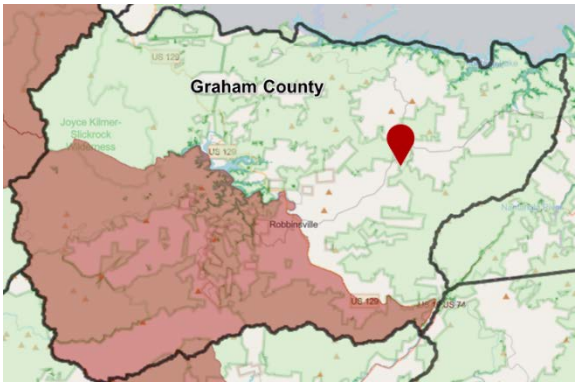


Figure 13: Graham County Opportunity Zone. *The wildlife crossing (shown with a red pin) is located east of the 120-sq mi opportunity zone.*

The proposed wildlife crossing, while not within the county's opportunity zone, will have a direct influence on the economic vitality of the county. It is important to note that the wildlife crossing is within the ANST Management Area of the Nantahala National Forest, which has management objectives that prohibit the area from being included in an opportunity zone. The wildlife crossing, however, will be an important feature for Graham County's growing ecotourism attractions. The wildlife crossing will contribute a unique feature along the Appalachian Trail that can be an educational resource for ecotourists and other seasonal visitors to Graham County.

Graham County is identified as a "Distressed County" by the Appalachian Regional Commission (ARC). ARC assigns this designation to counties within the lowest 10 percent and most economically depressed counties in the US. In addition, Graham County consistently ranks high for unemployment and poverty rates and is classified as a Tier I County by the NC Department of Commerce, ranking #25 in terms of economic distress out of a total of 100 counties.[11]

Graham County's tax base and potential for tax revenue growth is limited due to the fact that 64% of the county is part of the Nantahala National Forest and many areas of private lands are not suitable for development due to extreme terrain or lack of funding to expand infrastructure. Economic growth has also been stymied by the county's remoteness and limited roadway network. Information on how the wildlife crossing will support economic development in Graham County is discussed in Section 3.1.2.

2.0 Budget Narrative

This section describes the detailed budget for the wildlife crossing and identifies all funding sources.

2.1 Detailed Budget

Table 1 shows the estimated construction cost of the proposed wildlife crossing.

Table 1: Wildlife Crossing Construction Cost Estimate (July 28, 2023)

ITEM	COST
Precast concrete arches	$12,000,000.00
Tiered soil nail retaining wall	$16,112,620.00
Concrete for planter boxes	$1,924,690.60
Reinforcing steel for planter boxes	$589,595.00
Waterproof membrane	$47,959.69

[11] North Carolina Department of Commerce. 2023. 2023 North Carolina Development of Tier Designations. Available at: https://www.commerce.nc.gov/report-county-tiers-ranking-memo-current-year/download?attachment. Accessed July 28, 2023.

Table 1 (cont.): Wildlife Crossing Construction Cost Estimate (July 28, 2023)

ITEM	COST
Aesthetic concrete surface treatment	$34,890.00
MSE retaining wall	$632,976.00
Soil nail retaining wall	$454,410.00
Soil nail verification tests	$239,680.00
Soil nail proof tests	$108,605.00
Safety restraint system	$58,000.00
4-inch slope protection	$11,281.00
Landscaping	$1,087,245.39
ANST relocation	$169,060.00
Unclassified excavation	$1,440,972.54
Wildlife fence with posts	$1,733,400.00
Cattle guards	$55,576.95
Wildlife gates	$32,100.00
Wildlife jump outs	$22,399.95
TOTAL	**$36,755,462.12**

NOTES: All costs shown above fall under allowable "Construction" costs as defined in the instructions for Form 424C (Budget Information for Construction Programs).

2.2 Federal Funding

The entire ADHS Corridor K project is federally funded through the Appalachian Regional Development Act of 1965 (the Act). The Act finds that the Appalachian region "lags behind the rest of the Nation in its economic growth and that its people have not shared properly in the Nation's prosperity. The region's uneven past development, with its historical reliance on a few basic industries and a marginal agriculture, has failed to provide the economic base that is a vital prerequisite for vigorous, self-sustaining growth." The Act includes objectives for improving the economic conditions of the region, including: 1) provide the infrastructure necessary for economic and human resource development; 2) develop the region's industry; and 3) improve access of the region's businesses to the technical and financial resources necessary to development of the businesses. To accomplish these objectives, the Act includes the construction of the ADHS, a 3,025-mile network through the Appalachian region.

The Infrastructure Investment and Jobs Act (IIJA) reauthorized funding for the ADHS in the amount of $250 million each year from 2022 through 2026, totaling $1.25 billion dollars.[12]

2.3 Non-Federal (/Match) Funding

Table 2 shows the total project costs and costs that would be paid for with WCPP funds. Because the wildlife crossing is part of the ADHS, NCDOT is proposing to utilize ADHS funds as the state's match, as no state funding or other non-Federal funding was programmed for the project. Inflation has greatly affected construction costs for Corridor K, limiting the amount of ADHS funding available for the remaining section of Corridor K extending south and east out of

[12] US Department of Transportation. 2022. Authorized Funding under the Infrastructure Investment and Jobs Act (Public Law 117-58). Available at: https://www.transportation.gov/sites/dot.gov/files/2022-01/DOT_Infrastructure_Investment_and_Jobs_Act_Authorization_Table_%28IIJA%29.pdf. Accessed July 28, 2023.

Robbinsville on US 129 into Cherokee County. That portion of Corridor K is currently unfunded as all available ADHS funding is going toward the current project in Graham County. If NCDOT is awarded WCPP funding for the wildlife crossing, it would allow NCDOT to reallocate available ADHS funds to improve priority high crash locations along the remaining section of ADHS Corridor K.

Table 2 Wildlife Crossing Construction Cost Estimate (July 28, 2023)

ITEM	TOTAL COST	MATCH* (20%)	WCPP REQUEST (80%)
Precast concrete arches	$12,000,000.00	$2,400,000.00	$9,600,000.00
Tiered soil nail retaining wall	$16,112,620.00	$3,222,524.00	$12,890,096.00
Concrete for planter boxes	$1,924,690.60	$384,938.12	$1,539,752.48
Reinforcing steel for planter boxes	$589,595.00	$117,919.00	$471,676.00
Waterproof membrane	$47,959.69	$9,591.94	$38,367.75
Aesthetic concrete surface treatment	$34,890.00	$6,978.00	$27,912.00
MSE retaining wall	$632,976.00	$126,595.20	$506,380.80
Soil nail retaining wall	$454,410.00	$90,882.00	$363,528.00
Soil nail verification tests	$239,680.00	$47,936.00	$191,744.00
Soil nail proof tests	$108,605.00	$21,721.00	$86,884.00
Safety restraint system	$58,000.00	$11,600.00	$46,400.00
4-inch slope protection	$11,281.00	$2,256.20	$9,024.80
Landscaping	$1,087,245.39	$217,449.08	$869,796.31
ANST relocation	$169,060.00	$33,812.00	$135,248.00
Unclassified excavation	$1,440,972.54	$288,194.51	$1,152,778.03
Wildlife fence with posts	$1,733,400.00	$346,680.00	$1,386,720.00
Cattle guards	$55,576.95	$11,115.39	$44,461.56
Wildlife gates	$32,100.00	$6,420.00	$25,680.00
Wildlife jump outs	$22,399.95	$4,479.99	$17,919.96
TOTAL	**$36,755,462.12**	**$7,351,092.42**	**$29,404,369.70**

NOTES: NCDOT is proposing to utilize ADHS funds as the state's match, as no state funding or other non-Federal funding was programmed for the project. See additional details above.

3.0 Project Merit Criteria

This section describes how the wildlife crossing meets the WCPP's Primary and Secondary Merit Criteria.

3.1 Primary Merit Criteria

Criterion # 1.1: Reduction of Wildlife Vehicle Collisions

The winding roads of Graham County are a source of adventure for tourists, but they also increase the potential for WVCs, especially with an influx of tourists who may be unfamiliar with the area and its quickly changing weather conditions. NC 143 is also at an increased risk for WVCs due to the region's mountainous terrain and rich natural habitat. As noted in Sections 1.2, 1.4, and 1.5, there are a number of contributing factors that include sharp curves and steep grades on NC 143 at Stecoah Gap, and the proposed four-lane cross-section at Stecoah Gap, that make it difficult for drivers to react in time to prevent a collision. Furthermore, the remote mountain terrain is particularly prone to fog and rain which reduces driver visibility, making it difficult to detect hazards and judge distance. Also of note, many tourists drive motorcycles which increases the potential for fatalities and serious injuries in WVCs with large animals.

Large, upper elevation species such as Manitoban elk (*Cervus elaphus manitobensis*), and American black bear (*Ursus americanus*) find suitable habitat in this area. An initial herd of 52 elk was released in nearby Great Smoky Mountains National Park in 2001, which has grown to about 150 animals split into multiple herds.[13] Elk seek higher elevation for cooler temperatures and to avoid humans and insects. Although some elk herds have become accustomed to high levels of human activity, elk will generally choose areas with less disturbance by humans[14] making the project location ideal habitat. Manitoban elk bulls can weigh up to 700 pounds and cows up to 500 pounds. Black bears are currently thriving in North Carolina and are particularly abundant in the Nantahala National Forest. Male black bears can weigh up to 500 pounds and females up to 300 pounds.

White-tailed deer (*Odocoileus virginianus*) are also common in the area. As previously noted, between 2015 and 2022, there were 53 documented wildlife collisions in Graham County with four of those collisions occurring in the immediate vicinity of the proposed wildlife crossing, as shown in Figure 9. From 2020 to 2022, there were 23 animal-related crashes in Graham County resulting in $76,300 of damage.[15] Statewide, most crashes occur in November (22%) and occur during dawn or dusk, when deer are most active. Approximately 90% of these animal-related crashes are estimated to involve deer.

Species in the area will instinctively continue to cross this section of NC 143 in search of water sources and swaths of suitable habitat for survival. Large species such as elk, bear, and deer can cause serious injury and damage to vehicles. The wildlife crossing (combined with the use of associated highway fencing to guide animals to the crossing), will provide a critical connection for these animals, thereby reducing WVCs. The NCWRC and NCDOT have already collaborated over the past couple decades to build 26 wildlife crossing structures across the state that currently successfully provide wildlife passage.[16]

Criterion #1.2: Improvement of Terrestrial and Aquatic Habitat Connectivity

The Stecoah Gap section of NC 143 is currently a two-lane state highway that bisects a north-south ridgeline within the Nantahala National Forest. A new climbing lane in either direction (creating two additional lanes) and wide paved shoulders will be added at Stecoah Gap as part of the Corridor K project. In doing so, NC 143 will be widened by approximately 65 feet, further bisecting the ridgeline. This section of NC 143 is a key wildlife passage area. Animals are likely to move east and west across the north-south ridge that crossed NC 143 to access the many, rich and diverse habitats that occur at various elevations within the area. This portion of Graham County includes wide, open valleys, which provide favorable habitat for numerous animal species. Additionally, water sources exist both east and west of the roadway (most notably Sweetwater Creek, Beech Creek, Cody Branch, and Stecoah Creek), giving wildlife ample reason to traverse across NC 143.

---

[13] Kays, H. 2018. Wandering Elk dies following car crash: Overall prognosis positive for elk population. Available at: https://smokymountainnews.com/archives/item/25166-wandering-elk-dies-following-car-crash-overall-prognosis-positive-for-elk-population. Accessed July 28, 2023.

[14] Knight, J. 2023. Elk Management For Montana Landowners. Available at: https://animalrangeextension.montana.edu/wildlife/private_land_wildlife_mgmt/elk-mgmt.html. Accessed July 26, 2023.

[15] NCDOT, Transportation Mobility and Safety Division. North Carolina Animal Related Crashes 2020-2022, County Rankings and Crash Data. June 2023.

[16] North Carolina Wildlife Resources Commission (NCWRC). 2023. Wildlife Commission and Department of Transportation Renew Focus on Wildlife Passages to Reduce Wildlife-Vehicle Collisions. Available at: https://www.ncwildlife.org/Connect-With-Us/wildlife-commission-and-department-of-transportation-renew-focus-on-wildlife-passages-to-reduce-wildlife-vehicle-collisions. Accessed July 25, 2023.

Stecoah Gap lies within a narrow portion of the Nantahala National Forest. There are large tracts of protected lands to the north and south of NC 143. The wildlife crossing will allow for contiguous habitat, connecting the larger tracts of the Nantahala National Forest.

View of scenic vista east and south of the ANST crossing of NC 143. Source: AppalachianTrail.com

An Official Species List generated using the USFWS Information for Planning and Conservation (IPaC) tool is appended to this grant application. Notably, the IPaC Official Species List identified the gray bat (*Myotis grisescens*) (endangered), Indiana bat (*Myotis sodalist*) (endangered), northern long-eared bat (*Myotis keenii*) (endangered), and tricolored bat (*Perimyotis subflavus*) (proposed Endangered) as the threatened or endangered species with potential to be located within the wildlife crossing area. Additionally, the IPaC review identified monarch butterfly (*Danaus plexippus*), which is currently under consideration for listing under the Endangered Species Act, as likely to occur in the area.

Stecoah Gap at the ANST is known for its abundant variety of songbirds during the breeding season (April to May). Documented species include golden-winged warblers, indigo buntings (*Passerina cyanea*), chestnut-sided warblers (*Setophaga pensylvanica*), cerulean warblers (*Setophaga cerulea*), song sparrows (*Melospiza melodia*), eastern towhees (*Pipilo erythrophthalmus*), blackburnian warblers (*Setophaga fusca*), black-and-white warblers (*Mniotilta varia*), black-throated blue warblers (*Setophaga caerulescens*), black-throated green warblers (*Setophaga virens*), hooded warblers (*Setophaga citrina*), ovenbirds (*Seiurus aurocapilla*), northern parulas (*Setophaga americana*), dark-eyed juncos (*Junco hyemalis*), rose-breasted grosbeaks (*Pheucticus ludovicianus*), scarlet tanagers (*Piranga olivacea*), and wood thrushes (*Hylocichla mustelina*).[17] Many of these species require deciduous and mixed evergreen-deciduous woodlands. The golden-winged warbler breeds in shrubby habitats. After fledging, golden-winged warblers move into mature forest habitats. Mosaics of shrubby, open areas and mature forest habitats are important landscape features. As documented during the NEPA phase of the Corridor K project, golden-winged warblers are present in the area and plantings will include their preferred foraging habitat.

Cove hardwood habitat is well represented in the mountain ecoregion of North Carolina, including the Nantahala National Forest at Stecoah Gap. “Appalachian cove hardwood forests represent some of the most diverse ecosystems in the world outside of tropical zones. An amazing assortment of trees and herbaceous vegetation, coupled with topographic, microclimatic, and soil characteristics combine to provide an extremely productive habitat for numerous mammals, amphibians, and birds.” One issue of individual species associated with cove hardwood forests include isolation or extremely limited ranges of populations (e.g., cerulean warblers, crevice salamanders, green salamanders). This factor could lead to increasing chances of genetic depression or other negative consequences for the sustainability of populations.[18] Providing a vegetated safe passage over NC 143 will provide connection to contiguous habitat in larger tracts of the Nantahala National Forest north and south of NC 143.

[17] WildlifeSouth. 2017. Stecoah Gap – North Carolina. Available at: http://www.wildlifesouth.com/Locations/NorthCarolina/StecoahGap.html. Accessed July 27, 2023.
[18] NC Wildlife Action Plan. 2015. Cove Forests. Available at:

In addition to large animals like black bear, white-tailed deer, and elk, smaller animals like bobcat (*Lynx rufus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitis mephitis*), and eastern gray squirrel (*Sciurus carolinensis*) would benefit from the proposed wildlife crossing. Golden-winged warblers (*Vermivora chrysopter*) and timber rattlesnakes (*Crotalus horridus*) (protected under the state Endangered Species Act) are also known to inhabit mountainous areas.

Black bears prefer large expanses of uninhabited woodland with dense cover. Black bears prefer large expanses of uninhabited woodland with dense cover and they are thriving in the Nantahala National Forest.[19] In North Carolina, male black bears have a home range up to 80 square miles (50,000 acres) while females have a home range up to 8 square miles (5,000 acres), depending on food, shelter, and mates.[20] In general, bears travel farthest when food is harder to find (typically early spring), and male bears travel farther during mating season. Studies have found that roads can reduce black bear movement, and the crossing rate of bears has been found to be related to road type. Additionally, black bears have been found to avoid habitat along roads. Most populations of bears in North Carolina are not severely impacted by road mortality, however road mortality can have a very large impact on isolated populations.[21]

White-tailed deer prefer creek and river bottoms, oak ridges, pine forests, farmlands, or any other type of habitat that offers food, water, and shelter. In the mountain region, their home range is rarely more than 300 to 400 acres, however, bucks may range further during the fall mating season.[22] Deer collisions were the most common reported. Therefore, we can infer that deer are crossing NC 143 to access resources on the other side.

Elk live in a variety of habitats, such as deciduous and coniferous forests, swamps, clearcuts, meadows, and secluded valleys. In 2001 and 2002, elk were introduced into the Cataloochee area of the Great Smoky Mountains National Park. Since then, they have expanded their range into other nearby areas.[13] Most elk have traveled relatively little however, a few individuals have traveled up to 45 miles from Cataloochee. It is suspected they were looking for other elk or exploring new territories.[23] Their known range is mapped approximately 20 miles from the proposed crossing. Studies show that when near roads, elk tend to select areas of high vegetation cover. Additionally, a 2016 study found that elk strongly avoid road crossings, and that roads seem to be semi-permeable barriers to movement.[24]

The largest numbers of bobcat in North Carolina are found in wooded habitats of the Coastal Plain and Mountain regions. In the mountains, mature forests with openings or early successional forests are favorable. Bobcats have a home range that may cover a half mile to 30 square miles,

---

https://www.ncwildlife.org/LinkClick.aspx?fileticket=PoQqvVi6Qsk%3D&tabid=98&portalid=0. Accessed July 27, 2023.

[19] United States Department of Agriculture. 2014. Accessible Hunting and Fishing in Nantahala National Forest. Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3822097.pdf. Accessed July 27, 2023.

[20] NCWRC. 2017. Black Bear – North Carolina Wildlife Profile. Available at: https://www.ncwildlife.org/Portals/0/Conserving/documents/Profiles/Black-Bear_Profile.pdf. Accessed July 27, 2023.

[21] Jones, Elizabeth R., R. Lancia, P. Doerr. NC State University. 2008. The Effectiveness of Wildlife Crossing Structures for Black Bears in Madison County, North Carolina. Available at: https://connect.ncdot.gov/projects/research/RNAProjDocs/2006-14FinalReport.pdf. Accessed July 27, 2023.

[22] NC State Extension. 2019. White-Tailed Deer. Available at: https://content.ces.ncsu.edu/white-tailed-deer. Accessed July 27, 2023.

[23] North Carolina Wildlife Federation. 2017. Land of the Giants: The Inspiring Comeback of North Carolina Elk. Available at: https://ncwf.org/blog/comeback-of-north-carolina-elk/. Accessed July 27, 2023.

[24] Prokopenko, C.M.., M.S. Boyce, T. Avgar. "Characterizing Wildlife Behavioural Responses to Roads Using Integrated Step Selection Analysis." *Journal of Applied Ecology*, vol. 54, 2017, pp. 470-479. BES Journals, https://besjournals.onlinelibrary.wiley.com/doi/pdfdirect/10.1111/1365-2664.12768.

depending on habitat quality and the bobcat's sex and age. Male bobcat range is two to five times larger than that of a female. Wide roadways are known to serve as boundaries for bobcat home ranges as they rarely cross roadways and freeways.[25]

During the summer, the Indiana bat, northern long-eared bat, and tricolored bat may be found roosting underneath bark, in cavities of trees and snags, or dead trees. They prefer forests with a dense growth of underbrush covering a large tract. Highway construction and other types of development play a role in habitat loss by permanently removing viable roosting habitat. Summer habitat loss may result in longer flights between suitable roosting and foraging habitat, fragmentation of maternity colonies, and play a role in direct injury or mortality.[26] Additionally, some studies demonstrated that landscape features comprise the main set of factors influencing the likelihood of bat vehicle collisions. Habitats with dense forests in proximity to streams suggest that bats have a higher probability of being killed by vehicles while foraging.[27]

For monarchs to survive, a diversity of native flowering plants must be part of the landscape. Monarch butterflies rely on a single group of plants (milkweed) for their reproduction.[28] Plantings associated with the wildlife pass consist of native flowering trees, deciduous trees, and shrubs/native grass and perennial varieties. The native plantings of the wildlife crossing will provide nectar sources for the monarch butterfly.

3.2 Secondary Merit Criteria

Criterion #2.1: Leveraging Investments

As discussed in Section 2.2, the ADHS Corridor K project and the wildlife crossing are funded through the Appalachian Regional Development Act of 1965, created to offset the lack of public and private investment in the Appalachian region. As such, the project's context (i.e., that it is in a very remote, rural area with economic stress) precludes the viability of a public-private partnership (P3), joint venture, or other alternative funding option. Rather, NCDOT is working to leverage ADHS funding to the maximum extent possible by developing a 'right-sized' project that makes efficient use of federal funds while meeting community needs. As discussed in Section 1.1, the project development process focused on options to improve existing roads with a 2+1 design (alternating passing or climbing lanes) rather than propose to widen the entire project corridor to a four-lane, median-divided roadway or study expensive new location alternatives. To further leverage and make best use of ADHS funding, operations and maintenance costs were also a consideration during the alternatives analysis process.

It is also important to note that construction of the Corridor K project and wildlife crossing will spur private investment in Graham County. Economic development opportunity is discussed in the following section.

---

[25] Cerreta, A. 2021. Barriers to Dispersal and the Challenges Facing the Southern Expansion of Bobcats in New Jersey. Available at: https://udspace.udel.edu/server/api/core/bitstreams/a232ecbd-1e37-476d-901e-e15bbd25a640/content. Accessed July 27, 2023.

[26] US Fish & Wildlife Service (USFWS). 2023. Northern Long-eared Bat. Available at: https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis. Accessed July 28, 2023.

[27] Medinas, D.J., T. Marques, A. Mira. 2012. Assessing Road Effects on Bats: The Role of Landscape, Road Features, and Bat Activity on Road-kills. Available at: https://www.researchgate.net/profile/Denis-Medinas/publication/257677046_Assessing_road_effects_on_bats_The_role_of_landscape_road_features_and_bat_activity_on_road-kills/links/0f317534442acad12a000000/Assessing-road-effects-on-bats-The-role-of-landscape-road-features-and-bat-activity-on-road-kills.pdf Accessed July 28, 2023.

[28] North Carolina Wildlife Federation. 2022. Wildlife Species Spotlight: Monarch. Available at: https://ncwf.org/blog/monarch/. Accessed July 28, 2023.

NCDOT has not explored funding options outside the ADHS program as the project location's setting severely limit the viability and feasibility of funding alternatives.

Criterion #2.2: Economic Development and Visitation Opportunities

It is important to note that Graham County is at a key inflection point with regard to economic development. In the past, economic development was hindered by a limited transportation system, unreliable internet service, and the fact that alcoholic beverages were not legal in the county. These barriers to economic development are being lifted as construction of Corridor K is now underway, new broadband is being installed, and beer and wine have been legalized. These developments, coupled with the economic drivers already in place and planned private investment, have created an unprecedented potential for transformation in Robbinsville and Graham County.

Winding roads and scenic views attract motorists to Graham County.
Source: Graham County Visitors Guide

Graham County is a popular tourist destination in North Carolina. The Graham County Visitors Guide touts the county slogan as "Your Natural Destination", highlighting winding roads, unspoiled land, and an array of wildlife. Major draws for visitors include bird-watching, hiking, mountain biking, and other recreational opportunities along with scenic roads such as Tail of the Dragon, Cherohala Skyway, and Moonshiner 28, all which are popular motorcycle/sports car roads. According to the Graham County Chamber of Commerce, riders and drivers from all over the country and the world come to enjoy Graham County's mountain roads, with the Tail of the Dragon being the biggest attraction for thrill seekers. The Graham County Visitors Guide states, "Graham County is your natural destination for the auto touring of your dreams. Explore the curves, vistas, gravel adventures, and more." Despite historic constraints and barriers to economic development, there are dozens of economic drivers within Graham County that can be harnessed to improve the economic vitality of Graham County. Countywide economic drivers include the Appalachian Trail, Nantahala National Forest, Tsali Recreation Area, Joyce Kilmer Forest, Lake Santeetlah, Stecoah Valley Center, Fontana Village, Fontana Dam, Tapoco Lodge, and Snowbird Lodge. There are also a number of potential economic drivers within downtown Robbinsville. The newly designated downtown Robbinsville historic district brings tax incentives that are spurring private investment including a bed and breakfast, coffee shop, and bicycle shop. There are also plans for a new Junaluska Museum, Graham County Historical Museum, a permanent location for the county farmers market, and Graham County Saddle Club and Horse Arena within walking distance of Main Street.

"The highway will enhance the beloved characteristics of our spectacular mountains, lakes, streams, waterfalls, and promote Graham County's No. 1 sustainable industry: travel and tourism."

Connie Orr, Graham County Commissioner

Criterion #2.3: Innovation

The Corridor K project employed several innovative and unique approaches during the project development process that ultimately contribute to the prevention of WVCs and improve habitat connectivity.

- Studies restarted in 2015 were based on an exploratory approach that "right-sized" the project to meet local needs while also improving regional mobility.
- The Corridor K planning process represents a paradigm shift away from conventional project development processes and toward an integrated framework based on FHWA's Planning and Environment Linkages (PEL) approach.
- Project development activities referenced FHWA's Eco-Logical Approach to help accelerate project delivery.
- NCDOT utilized an alignment optimization tool called Quantm™ to evaluate preliminary costs and impacts for a multitude of corridors that were vetted in coordination with local government and agency representatives. The project's streamlined NEPA schedule was made possible largely by the use of Quantm and integrated planning efforts conducted prior to initiating formal NEPA studies.
- The wildlife crossing structure is a precast concrete arch that will receive an aesthetic treatment that, when covered and planted, will give the appearance of two individual tunnels. The benched retaining walls and associated irrigation/drainage systems as well as safety ladders are innovative features that will help prevent landslides and minimize maintenance efforts.
- GIS applications included an existing roadway conditions and environmental features database, a 3D GIS viewer to assess the project for visual impacts from viewpoints along the Appalachian Trail, and a GIS crowdsourcing application that allows team members to share feedback on proposed designs and study corridors.

A 3D online viewer allowed the project team and stakeholders to virtually collaborate during the height of the COVID-19 pandemic to determine where the wildlife crossing and ANST realignment would be located.

- A planting plan was developed in coordination with the USFS and for the wildlife crossing that utilizes native species consistent with the terrestrial communities in the Stecoah Gap area and known habitat preferred by the golden-winged warbler.
- The Corridor K project development process has influenced a paradigm shift for NCDOT where policies are being developed to consider how projects can be proactively planned to facilitate habitat connectivity and safe animal passage across roadway corridors.

Criterion #2.4: Education and Outreach

The wildlife crossing will be in an area with multiple opportunities for education and outreach. In addition to adding interpretive signs along the ANST, there is also opportunity to educate motorists visiting the Stecoah Gap picnic area via interpretative signs. These signs will be developed in coordination with the USFS, NCWRC, Appalachian Trail Conservancy (ATC), and other conservation partners to convey the purpose of the wildlife crossing, the need specific to Stecoah Gap, and how it will help prevent WVCs and promote habitat connectivity. Signs will also provide educational information on native species, pollinators, protected species in the area, the ANST migratory superhighway, and other facts about the crossing and adjacent habitats. The USFS, NCWRC, ATC, and other agencies have a depth of experience developing educational outreach materials like this and will lend their expertise in developing signage that is eye-catching and informative.

Criterion #2.5: Monitoring and Research

Monitoring and research on animal activity across the wildlife crossing will help further the research community's knowledge and understanding of broadscale wildlife movement patterns which in turn, will help NCDOT, other state transportation agencies, and regulatory/resource agencies make more-informed decisions when determining future wildlife crossing locations and conservation areas. There is still a large knowledge gap when it comes to dynamics of the human-wildlife interface. Research indicates that there are a number of interrelated activities that influence how animals use or avoid areas also used by humans, including trails like the ANST, but that more research is needed to understand the combined influence of multiple factors. As previously noted in Section 1.6, wildlife is known to use hiking trails, but usage is largely influenced by adjacent land uses, notably areas used for hunting.

More research is also needed to understand how animals are adapting to climate change. Research indicates that species are moving to higher elevations[7,8] and latitudes[9] in response to rising temperatures.

Because the ANST is in permanent conservation, and in light of its unique microclimates and function as a migratory superhighway, the ANST is an important geography to area where we can gather information and work to answer some of these questions. "The Appalachian Trail is the single most important corridor across the eastern United States. If it is to serve as a corridor between public lands for important wildlife, we must understand the attributes of an effective corridor and how to measure and monitor these attributes."[29]

[29] Erb, P., McShea, William, and Guralnick, Rober. Anthropogenic Influences on Ma Occupancy in the Appalachian Trail Corridor. National Library of Medicine, National Center for Biotechnical Information. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3412793/. Accessed July 16, 2023.

In addition to monitoring the crossing's use as a passageway, there is also opportunity to monitor the use of the crossing as habitat. As noted previously, the crossing will be planted with native species to encourage use as foraging habitat. There is also opportunity to study if and how bats use the crossing as roost habitat. It is known that bats seek out the type of thermal conditions that will be created by the structure. The depth of fill material on the structure and its long length along NC 143 will make temperatures underneath more thermally stable and the waterproof membrane will make the structure less prone to drainage issues at joints and between arch segments, which could be viable habitat for roosting bats. Although the precast concrete arch may be too smooth to support roosting, research has found evidence of bats roosting in the cracks and crevices of stone facades and have identified gaps between arch segments as potentially suitable roosts.[30]

Research will explore whether bats start to use the crossing's crevices for seasonal roosting or if roosting could be encouraged through the installation of add-on roosts that can be attached to the structure. This research could help inform how roost boxes could be used to direct bats away from expansion joints and other structural elements that require regular inspection. Research on bat use of bridges and culverts is an evolving body of work; research at the Stecoah Gap wildlife crossing will help further knowledge on this subject, in addition to expanding general knowledge on wildlife crossing use and habitat connectivity.

To help foster interagency collaboration between transportation planning and wildlife conservation, NCDOT and NCWRC recently entered into a Memorandum of Understanding (MOU) to demonstrate commitment to work together to improve infrastructure and safety on North Carolina roads for both wildlife and the traveling public. The NCWRC is a state government agency created in 1947 to conserve and sustain North Carolina's natural resources through research, scientific management, sustainable use and public input.

The MOU is intended to foster and enhance stewardship through communication and cooperative projects including project planning and coordination; public safety; maintenance and expansion of habitat connectivity and wildlife habitat conservation; inventory, monitoring, and biological studies; impacts to wildlife due to vehicles; habitat loss due to invasive species; and education. The wildlife crossing will be a key project under this MOU.

Criterion #2.6: Survival of Species

As noted in previous sections, a large number of species will utilize this crossing, including a number of federally protected species, USFS rare species, and state-designated species of concern. The wildlife crossing will be planted with native species that are known foraging habitat for species like the golden-winged warbler (a current candidate species anticipated to be listed as a federally protected species in the near future). In addition to plantings on the structure itself, NCDOT is committed to enhancing adjacent warbler foraging habitat along NC 143.

[30] Civjan, S., Dumont, E., Bennett, A. Berthaume, A. 2017. Investigation of Northern Long-Eared Bat Roosting Sites on Bridges. Prepared for the New England Transportation Consortium. Available at: newenglandtransportationconsortium.org/files/netcr100_14-2.pdf. Accessed July 14, 2023.

4.0 Project Readiness

4.1 Technical Feasibility

As discussed in previous sections, the Corridor K project has successfully moved through the NEPA environmental review process (including public engagement, agency coordination, an Environmental Assessment and Finding of No Significant Impact), state and federal permits have been obtained, and construction was initiated in October 2022.

Photograph 3: Eric Boyette, NC Secretary of Transportation; John Sullivan, FHWA North Carolina Division Administrator; Wanda Payne, NCDOT Division 14 Engineer; and other state, federal, and local government representatives at the Corridor K Groundbreaking Ceremony on October 3, 2022.

FHWA, Advisory Council on Historic Preservation (ACHP), USFS, North Carolina Historic Preservation Officer (SHPO), Eastern Band of Cherokee Indians, and NCDOT entered a Programmatic Agreement (PA) to ensure compliance under Section 106 of the National Historic Preservation Act. The PA outlines procedures for the "Cultural Resources Task Force" including timelines for periodic design reviews and consultation and processes in the event of unanticipated discovery.

Cost estimates contained in Section 2.0 are based on final designs developed using detailed topographic surveys and in-depth geotechnical studies.

Given the intensive agency coordination during the pre-NEPA and NEPA phases, implementation of the Section 106 PA, and completion of detailed geotechnical final design plans, the degree of potential technical and/or engineering risk related to the proposed wildlife crossing's scope, schedule, and budget is low. Final design plans for the wildlife crossing are appended to this grant application.

4.2 Project Schedule

As shown in Table 2, the Corridor K project has moved through all environmental review requirements, permitting, and right-of-way acquisition and is now under construction. Table 3 shows the construction schedule for the proposed wildlife crossing.

Table 2: Completed Milestones and Ongoing Construction Coordination

Activity	Start	Finish
State and local planning approvals (via NEPA process)	2015	2021
NEPA and other Federal environmental reviews/approvals	2019	2021
Permitting	2021	Ongoing
Design completion	2020	2022
Right-of-way acquisition	2021	2021
Approval of plans, specifications, and estimates	2021	Ongoing
Procurement	2022	2022
Project partnership and implementation agreements	2015	Ongoing

Table 3: Wildlife Crossing Construction Schedule

Activity	Start	Finish
Grading	01/31/24	03/06/26
Walls	01/01/24	03/31/26
Concrete face	05/01/24	02/04/26
Wildlife crossing	01/06/25	01/08/26

4.3 Required Approvals

As discussed in Section 1.1, the Corridor K planning approach bridged the gap between long-range transportation planning and NEPA. New studies started in 2015 were based on an exploratory approach that "right-sized" the project to meet local needs while also improving regional mobility. Given the project's complex nature and long history, additional investigations were needed prior to articulating the project's scope and initiating new studies under NEPA. First steps focused on: developing a full understanding of stakeholder needs and current priorities; exploring preliminary options and vetting concepts with the public; and engaging regulatory and resource agencies early in the process to reach consensus on project-related decisions, proposed study corridors, and potential early mitigation strategies. This early effort allowed NCDOT and FHWA to gage agency sentiments, stakeholder preferences, and local priorities to help refine the project's scope and avoid conducting detailed studies for options that would likely prove non-viable. This iterative process allowed for the exploration and subsequent refinement of the project scope and study corridors within the bounds of a "pre-NEPA" process.

Upon entering the NEPA stage, project development followed the NEPA/404 Merger Process, which integrates NEPA review with Section 404 permitting to streamline project development and permitting for complex projects. It is a shared-decision-making process that allows agencies to discuss and reach agreement on various project decisions (called Concurrence Points).

As shown in Table 2, the Corridor K project has completed the NEPA process and has obtained authorization for construction. Ongoing coordination with federal and state agencies is being conducted through the NEPA/404 Merger process and processes described in the Section 106 PA. Environmental documents and associated technical studies, agency coordination, public engagement materials, and other project information can be found on the Corridor K project website.

Although no additional public engagement is anticipated during the construction phase, NCDOT maintains communication with Graham County government and residents on construction schedules and other logistics to help facilitate the maintenance of traffic and minimize temporary delays during construction.

It is also worthy to reiterate that the focus on improving existing roadways and the incorporation of the wildlife crossing in the Corridor K project was a direct result of public engagement, notably with Graham County residents, environmental advocacy organizations, and ANST stakeholders.

Given the high degree of coordination and engagement conducted with agencies, stakeholders, and the public during the pre-NEPA and NEPA processes, there is low to no risk associated with environmental approvals that could adversely affect project obligation and completion. Specific project components that could prevent the project from obtaining needed environmental

approvals or significantly extend the time for approvals were addressed in the NEPA review stage with detailed project commitments and implementation processes, including the Section PA procedures.

4.3.1 Federal Transportation Requirements Affecting State and Local Planning

In addition to being part of the ADHS, the Corridor K project is included in the State Transportation Improvement Plan and Graham County Transportation Plan, which was developed in coordination with the regional Rural Planning Organization (RPO). Moreover, at the time this project was restarted in 2015, the Southwestern NC RPO signed a resolution requesting that NCDOT, FHWA, ARC, and other agencies enter into a "truly collaborative effort to deliver the uncompleted portion of Corridor K for the residents of southwestern NC" with the opinion that Corridor K will "provide the transportation infrastructure necessary to support the economic development ad critical connectivity needs of the region."[31]

4.3.2 Assessment of Project Risks and Mitigation Strategies

As discussed throughout this grant application, project risks, such as unknown project impacts, contention, or lack of necessary approvals are not notable risks associated with this project.

The primary risk associated with construction of the wildlife crossing is ongoing inflation and the effect it has on project delivery. With this risk in mind, NCDOT remains committed to allocating the necessary resources and funding to construct Corridor K and the vital wildlife passage at Stecoah Gap on the construction timeline shown in Table 3.

5.0 Alignment with Administration Priorities

This section summarizes how the wildlife crossing addresses Administration priorities. See cross-referenced sections for additional information on each of these subjects.

- **Safety (Section 1.4) |** Despite Graham County's small population, it is a tourist destination for recreational driving and is the top county in multiple crash categories including speed-related and lane departure-related fatalities and serious injuries. There is also a history of crashes in the Stecoah Gap area. Without the proposed wildlife crossing, there is an increased potential for WVCs in this area.
- **Climate Change and Sustainability (Sections 1.7, 3.1, 3.2) |** The project is set in the southern Appalachian Mountains, which is part of the Appalachian migratory superhighway from northern Alabama to Maine and other parts northward. Stecoah Gap is located along the ANST in the Nantahala National Forest and is comprised of pristine terrestrial communities including rich coves and other forest types that can maintain specific microclimates. As animals respond to climate change, the ability to move to higher elevations, different microclimates, and to more northern latitudes will provide vital to the survival of species. The wildlife crossing facilitates sustainability by providing safe passage for wildlife in an area that will be preserved in perpetuity and provides connectivity to other lands in permanent conservation.

[31] Southwestern Commission: Rural Planning Organization. Resolution of the Southwestern NC Rural Planning Organization Transportation Advisory Committee to Request that NCDOT Expedite Project Development and Delivery of Corridor K. Signed March 23, 2015. Mike Fitzgerald, RPO TAC Chairman and Rose Bauguess, RPO Coordinator.

- **Equity (Section 1.10) |** The wildlife crossing is located in a rural region of North Carolina with historically high poverty and unemployment. Graham County is identified as a "distressed" county by the ARC. The ADHS Corridor K project is grounded in equity principles with the directive to provide the residents of Appalachia with the infrastructure needed to improve economic conditions and quality of life. The wildlife crossing will contribute to Administration priorities related to equity by helping facilitate construction of Corridor K in alignment with Graham County economic development goals related to ecotourism.
- **Workforce Development, Job Quality, and Wealth Creation (Sections 1.10 and 3.2) |** Graham County is at a key inflection point with regard to economic development. Historically, economic development has been by stymied by the small amount of developable land in the county, limited transportation system, unreliable internet service, and other prohibitive conditions. These barriers are being remedied as Corridor K is being constructed, new broadband is being installed, and other tourism-focused efforts[32] are underway. These initiatives, coupled with economic drivers already in place and planned private investment, have created an unprecedented potential for transformation in Robbinsville and Graham County.

> "[Corridor K] gives us the opportunity to enhance lives in Graham County and opportunities for health care and education and it opens doors for economic development. It will increase options on how to get to Graham County while still maintaining the beauty of this area."
>
> Eric Boyette, Secretary of the North Carolina DOT

[32] Smoky Mountain News. New trail unveiled in Graham County. November 2, 2022. Available at: https://smokymountainnews.com/archives/item/34604-new-trail-unveiled-in-graham-county. Accessed July 17, 2023.

Appendix

Wildlife Crossing Design Plans

Planting Plan

USFWS IPaC Official Species List

Letters of Support

Wildlife Crossing Design Plans

This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.
This file or an individual page shall not be considered a certified document.

WILDLIFE FENCE LAYOUT

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	2B-1
RW SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 35018 ENGINEER JIMMY L. TERRY

7/27/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST., STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

REVISIONS 8/17/99

NAD 83/2011

–L– STA. 409+00.00, 52.87' RT
END WILDLIFE FENCE
(AT EXISTING ROW)
SEE DETAIL SHEET 2C–6

409+00.00
28.00RT

–L– STA. 409+00±, 70.45' LT
END WILDLIFE FENCE
SEE DETAIL SHEET 2C–6

409+00.00
41.50RT

408+04.26±
33.50LT

408+25.00
37.00RT

406+72.00±
28.00RT±

406+72.00±
32.00RT±

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

406+38.00±
32.00RT±

406+38.00±
28.00RT±

405+74.97
28.00RT

403+05.00±
26.50RT±

404+25.50
26.50RT

403+05.00±
57.08RT±

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

402+85.00±
58.04RT±

402+85.00±
26.50RT±

–L– NC 143

R=786.5'

399+38.59
26.50RT

398+75±
28.83RT

WILDLIFE FENCE ALONG
RETAINING WALL #29A
SEE SHEET 2C–7

396+75±
31.93RT

395+90±
37.69RT

WILDLIFE FENCE
ALONG RETAINING
WALL #29
SEE SHEET 2C–7

393+90±
40.82RT

393+22.00±
50.00RT±

393+22.00±
60.00RT±

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

392+90.00±
60.00RT±

392+90.00±
50.00RT±

392+00±
39.93RT

WILDLIFE FENCE ALONG
RETAINING WALL #28
SEE SHEET 2C–7

390+00±
45.16RT

389+25±
47.85RT

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

385+19.00
51.50RT

384+31.00
144.00RT

384+58.00
120.00RT

PROP. CATTLE GUARD
SEE DETAIL SHT 2C–8

PROP. WILDLIFE GATE
SEE DETAIL SHT 2C–6

EXISTING
APPALACHIAN
TRAIL
(DO NOT
DISTURB)

384+11.00
149.00RT

384+04.00
123.00RT

388+69.50
53.13LT

388+69.50
64.13LT

EXISTING APPALACHIAN TRAIL
(TO BE ABANDONED AND
OBLITERATED ONCE NEW TRAIL
IS COMPLETED)

PROP. CATTLE GUARD
SEE DETAIL SHT 2C–8

383+50±
65.61RT

WILDLIFE FENCE
ALONG
RETAINING WALL #42
SEE SHEET 2C–7

WILDLIFE FENCE ALONG
RETAINING WALL #19B
SEE SHEET 2C–7

PROP. WILDLIFE GATE
SEE DETAIL SHT 2C–6

END LAND BRIDGE
–L STA 382+30±

382+30.00
70.50LT

PROP. CATTLE GUARD
SEE DETAIL SHT 2C–8

380+50.00
132.13RT
TIE TO WALL

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

WILDLIFE FENCE ALONG
RETAINING WALL #19A
SEE SHEET 2C–7

BEGIN LAND BRIDGE
–L STA 380+50±

376+10.00±
66.00LT±

380+50.00
70.50LT

PROP.
WILDLIFE
GATE SEE
DETAIL
SHT 2C–6

376+65±
67.00LT
56.00LT

380+28.64
133.41RT

380+38.00±
107.00RT±

380+36.00±
54.09RT±

R=377'

R=387'

378+15±
48.00RT

379+10.00
48.00RT

376+65±
56.00LT
45.16LT

375+25±
48.00RT

374+05.01
46.00RT

373+73.00
46.00RT

WILDLIFE FENCE ALONG
RETAINING WALL #18
SEE SHEET 2C–7

PROP. CATTLE GUARD, 2@16'
SEE DETAIL SHT 2C–8

373+50.00±
44.50RT±

373+50.00±
67.32RT±

373+16.00±
44.50RT±

373+16.00±
67.78RT±

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

369+81.00
44.50RT

369+72±
50.21RT

WILDLIFE FENCE ALONG
RETAINING WALL #16
SEE SHEET 2C–7

366+70±
50.11RT

366+15.00±
62.00RT±

366+18.10±
74.39RT±

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

365+85.00±
71.00RT±

365+87.89±
82.54RT±

365+37.82
86.81RT

364+50.28
46.01RT

R=73'

362+83.93
44.38RT

R=680'

358+81.45
38.50RT

356+98.29
38.50RT

355+17.00±
38.50RT±

355+17.00±
65.00RT±

R=798.5'

354+83.00±
38.50RT±

354+83.00±
65.00RT±

354+13.94
38.50RT

R=798.5'

352+25.00
38.50RT

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

–L– STA. 352+25.00, 51.42'±RT
BEGIN WILDLIFE FENCE
(AT SHOULDER POINT)
SEE DETAIL SHEET 2C–6

–L– STA. 352+25.00, 61.00' LT
BEGIN WILDLIFE FENCE
SEE DETAIL SHEET 2C–6

352+25±
46.00LT

WILDLIFE FENCE ALONG
RETAINING WALL #15
SEE SHEET 2C–7

–L– NC 143

368+35±
52.00LT

WILDLIFE FENCE ALONG
RETAINING WALL #17
SEE SHEET 2C–7

369+40.00
37.00LT

369+40±
29.74LT

PROP. WILDLIFE GATE
SEE DETAIL SHT 2C–6

–L– NC 143

375+76.00±
66.00LT±

375+76.00±
48.00LT±

375+26±
43.00LT

376+10.00±
48.00LT±

PROP. JUMP OUT
SEE DETAIL SHEET 2C–9

WILDLIFE FENCE ALONG
RETAINING WALL #19B
SEE SHEET 2C–7

APPROX. PROPOSED
APPALACHIAN TRAIL
LOCATION

APPROX. PROPOSED
APPALACHIAN TRAIL
LOCATION

REFER TO INSET A FOR APPROX.
APPALACHIAN TRAIL LOCATION
ACROSS AND SOUTH OF
LANDBRIDGE AND FOR APPROX.
SPUR TRAIL LOCATION.

TIE IN LOCATION
BETWEEN EXISTING
APPALACHIAN TRAIL
AND THE ALIGNMENT
OF THE NEW TRAIL.

WILDLIFE FENCE ALONG
RETAINING WALL #19A
SEE SHEET 2C–7

INSET A

EXISTING APPALACHIAN
TRAIL (DO NO DISTURB)

APPROX. PROPOSED
APPALACHIAN TRAIL
LOCATION

APPROX. PROPOSED
SPUR TRAIL FOR
APPALACHIAN TRAIL
TO PARKING LOT

APPROX. PROPOSED
APPALACHIAN TRAIL
LOCATION ACROSS
LANDBRIDGE

TIE IN LOCATION
BETWEEN EXISTING
APPALACHIAN TRAIL
AND THE ALIGNMENT
OF THE NEW TRAIL.

NOTE: CONTRACTOR TO EXTEND WILDLIFE FENCE AND GATES AROUND CATTLE GUARD TO PROPERLY SEAL OFF ANIMAL ACCESS AS DIRECTED BY THE ENGINEER.

NOTE: JUMP OUT LOCATIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER.

NOTE: CONTRACTOR TO CONSTRUCT ~5,550 LF OF NEW APPALACHIAN NATIONAL SCENIC TRAIL.

NOTE: CONTRACTOR TO BE RESPONSIBLE FOR ~2,050 LF OF THE OBLITERATION OF ABANDONED TRAIL.

7/14/2022
X:\NCDOT\A-0009\Roadway\Proj\A-0009CB Plan Sheets\A-0009CB_Rdy_Detail Sht_2B-01(Wildlife Fence Layout).dgn
User:jlterry

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	2B-2
RW SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 35018 ENGINEER JIMMY L. TERRY
Jimmy Terry
7/27/2022

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038697 ENGINEER DAVID B. PETTY
David B. Petty
7/27/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

8/17/99

CONC. DITCH BEHIND RETAINING WALL SEE SHEET 32 DETAIL 32A

PROP. RETAINING WALL #19A TIERED WALLS W/9' WW WILDLIFE FENCE & CONCRETE DITCH BEGIN –L– STA. 376+65± END –L– STA. 380+50±

PROP. RETAINING WALL #19B TIERED WALLS W/9' WW WILDLIFE FENCE & CONCRETE DITCH BEGIN –L– STA. 382+30± END –L– STA. 393+22±

NOTE: CONTRACTOR SHALL ENSURE MAX FILL ON CROWN OF EACH ARCH DOES NOT EXCEED 14 FEET.

BEGIN LAND BRIDGE –L– STA. 380+50±

END LAND BRIDGE –L– STA. 382+30±

GRASS LINED SWALE SEE SHEET 32 DETAIL 32C

CONCRETE DITCH SEE SHEET 32 DETAIL 32D

CLASS II RIPRAP KEYED–IN 7 TONS, NO GEO

PROP. RETAINING WALL #19C RT OF –L– STA 380+50±

CONC. DITCH BEHIND RETAINING WALL SEE DETAIL 32A

CLASS B RIPRAP KEYED–IN 5 TONS, NO GEO

CONCRETE DITCH SEE SHEET 32 DETAIL 32D

PROP. RETAINING WALL #42 W/9' WW WILDLIFE FENCE BEGIN –L– STA. 382+30± END –L– STA. 383+50±

CONC. DITCH BEHIND RETAINING WALL SEE SHEET 32 DETAIL 32A

CONCRETE SILL SEE SHEET 32 DETAIL 32B

PROP. CONC. 4' STEPS (3EA) TIE TO EXIST. STEPS

TB JB W/MH

TB 2GI

AT–1

TYPE B–77

TYPE B–77 CURB INLET

JB W/MH

15" RCP–III

15" RCP–IV

18" RCP–IV

12" CMP

18" CMP

24" BST

EXISTING R/W

WD HANDRAIL

WD STEPS

APPALACHIAN TRAIL

BST PARKING

TIMBERS

BOLLARDS

GRADE TO DRAIN REMOVE

S 30°01'24" W 137.99'

S 18°13'23" E 357.46'

109 TABERNACLE BAPTIST CHURCH DB 205 PG 226

113

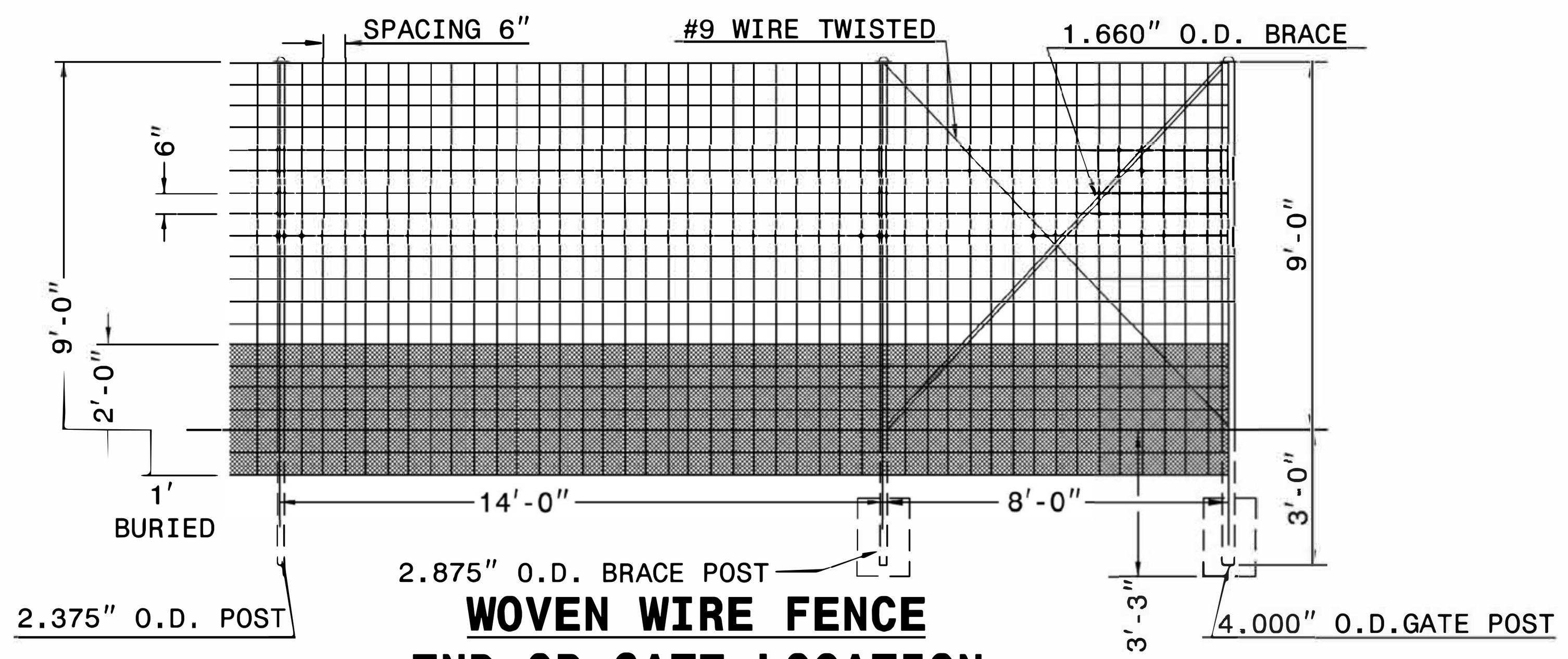
GRAPHIC SCALE 20' 0' 20' 40' 60'

6/3/2022
K:\NCDOT\A-0009\Roadway\Proj\A-0009CB Plan Sheets\A-0009CB_Rdy_Detail Sht_2B-02\Landbridge Grading\dgn
10:05:08 AM

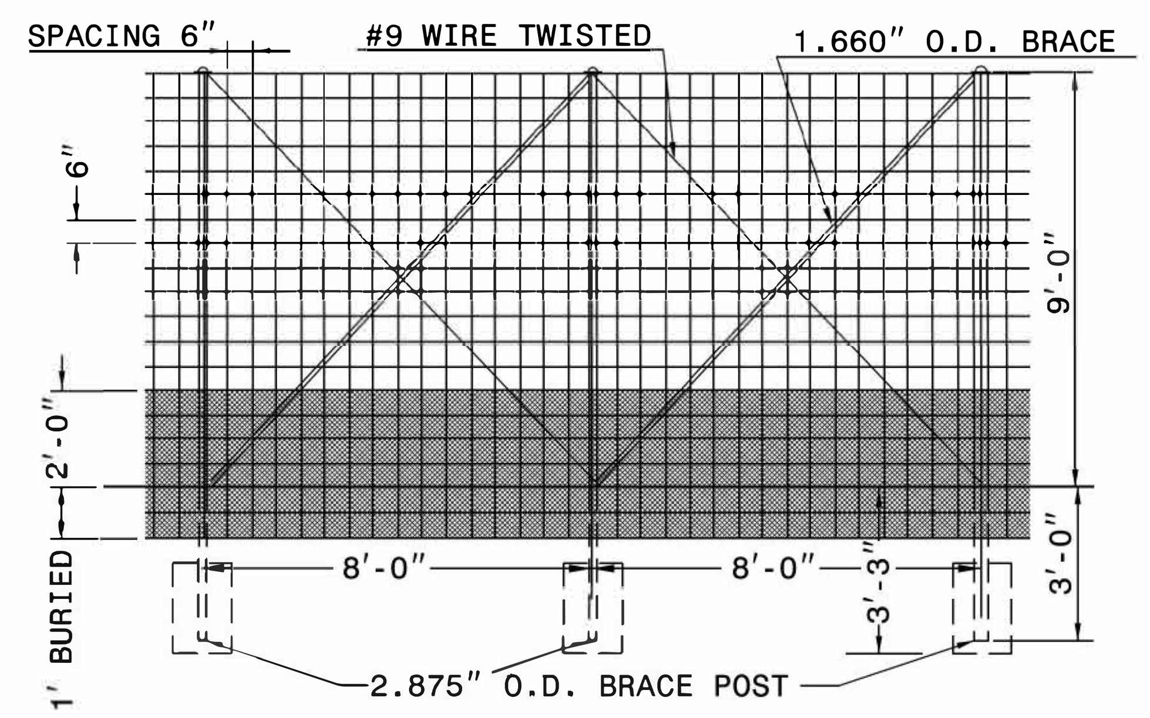
8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	2C-6



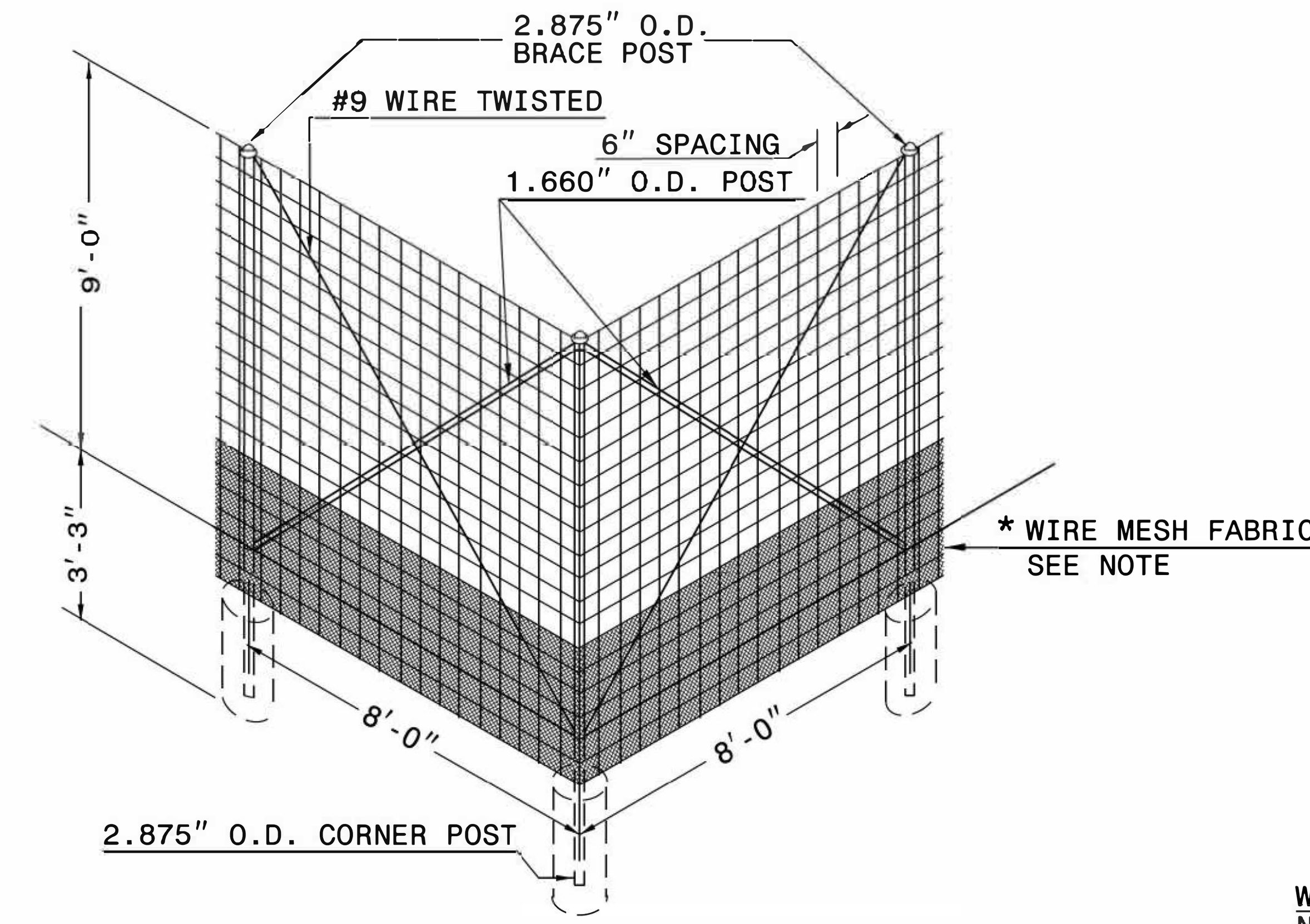
WOVEN WIRE FENCE END OR GATE LOCATION



LINE BRACES

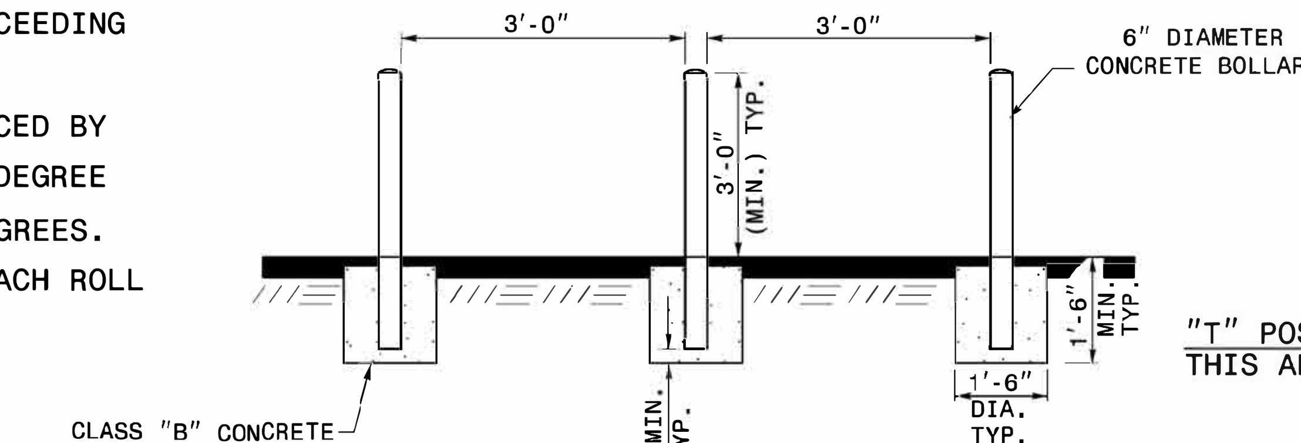
PLACE THE BRACE WIRE AROUND THE POST. DRAW THE WIRE TAUT BY TWISTING BETWEEN EACH POST. THIS APPLIES TO ALL BRACE WIRES.

ERECT LINE BRACES BETWEEN END, CORNER OR GATE POSTS AT INTERVALS NOT EXCEEDING 324 FEET.
THIS MAXIMUM INTERVAL MAY BE REDUCED BY THE ENGINEER ON CURVES WHERE THE DEGREE OF CURVATURE IS GREATER THAN 3 DEGREES.
PLACE LINE BRACES AT THE END OF EACH ROLL OR PIECE OF WOVEN WIRE.



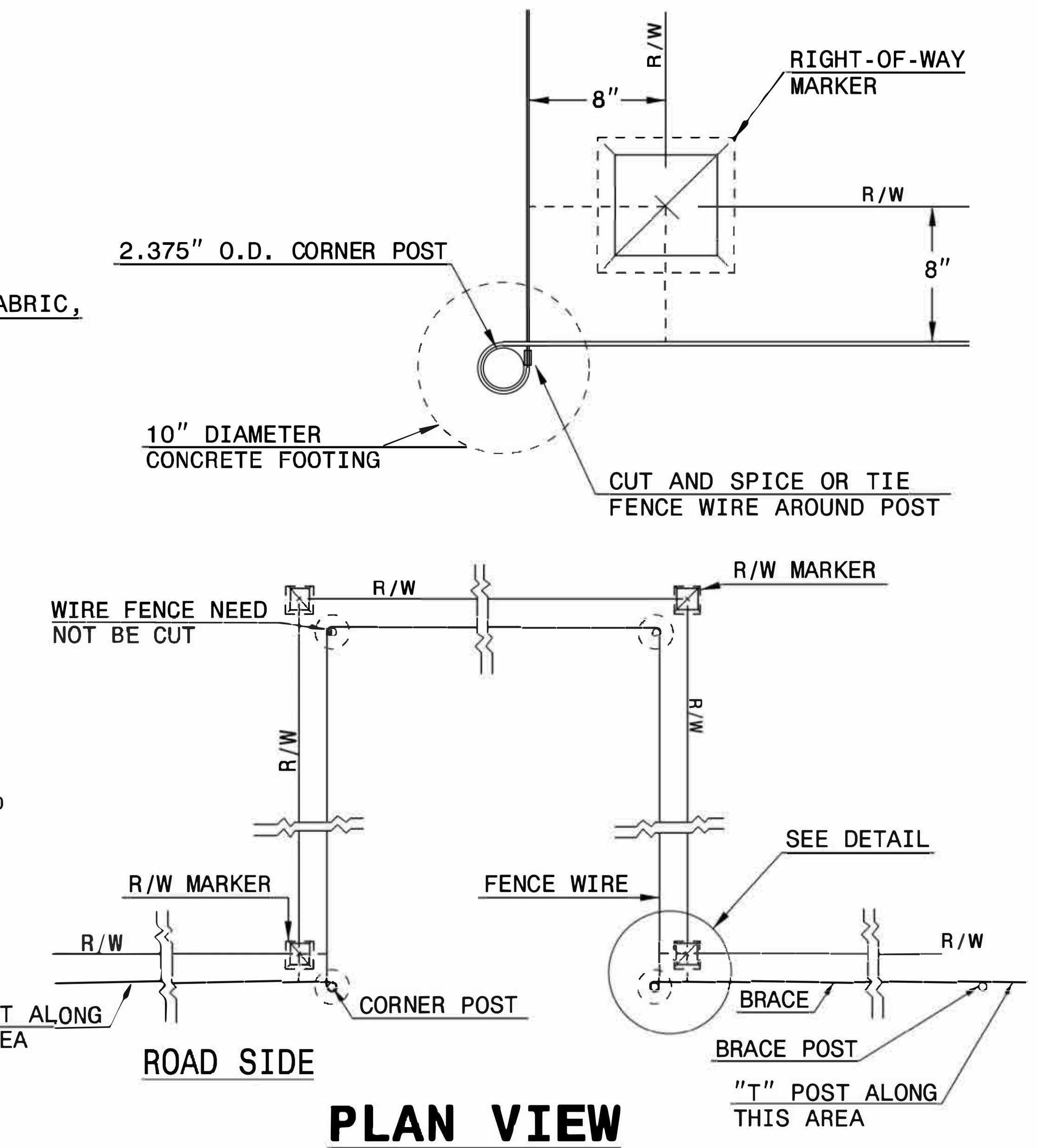
FENCE CORNER

USE WHEN CORNER ANGLE IS 15° OR GREATER

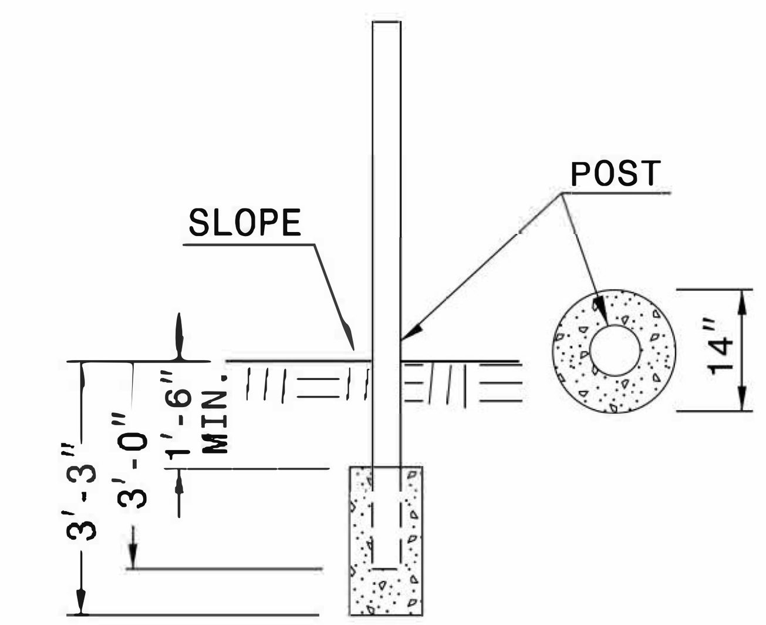


BOLLARDS FOR BLOCKING DRIVEWAYS AND OTHER ENTRANCES

INSTALL IN ADDITION TO FENCE WHERE SHOWN IN PLANS OR WHERE DIRECTED BY THE ENGINEER



PLAN VIEW

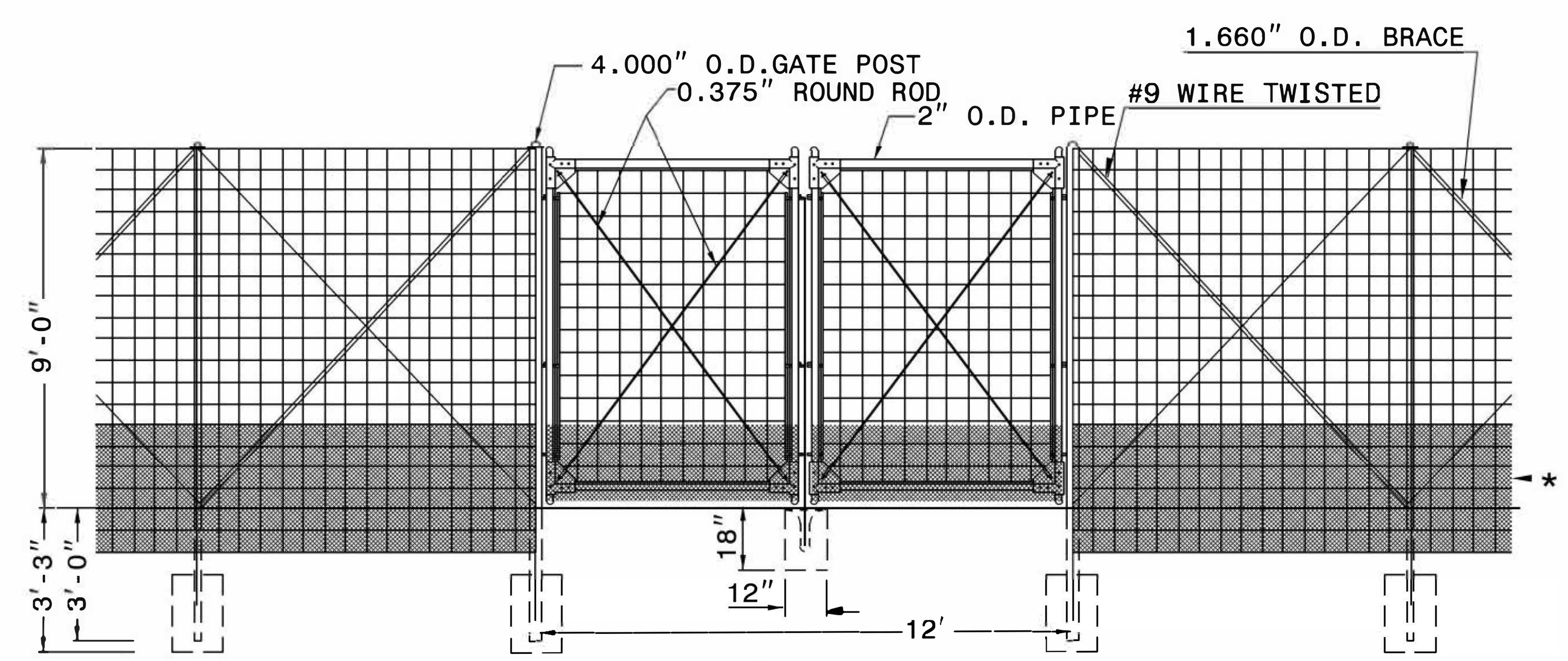


DETAIL OF POST ANCHOR

USE CONCRETE FOOTING ON ALL CORNER, END, GATE AND BRACE POSTS.

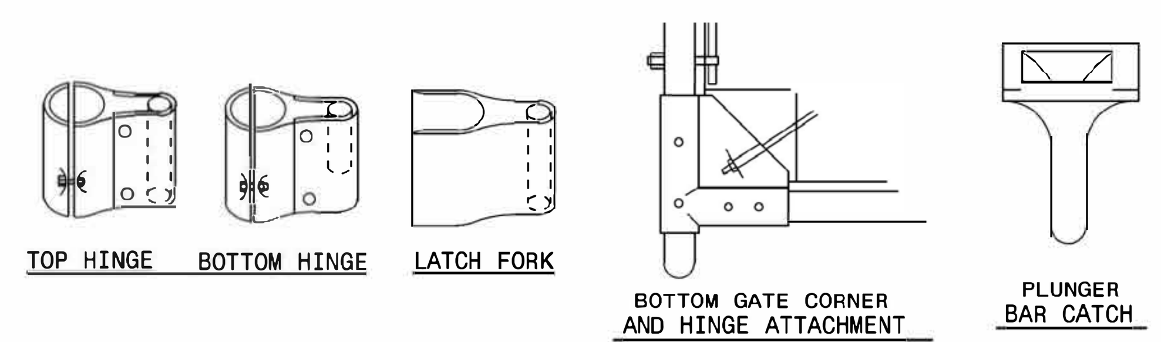
GENERAL NOTES:

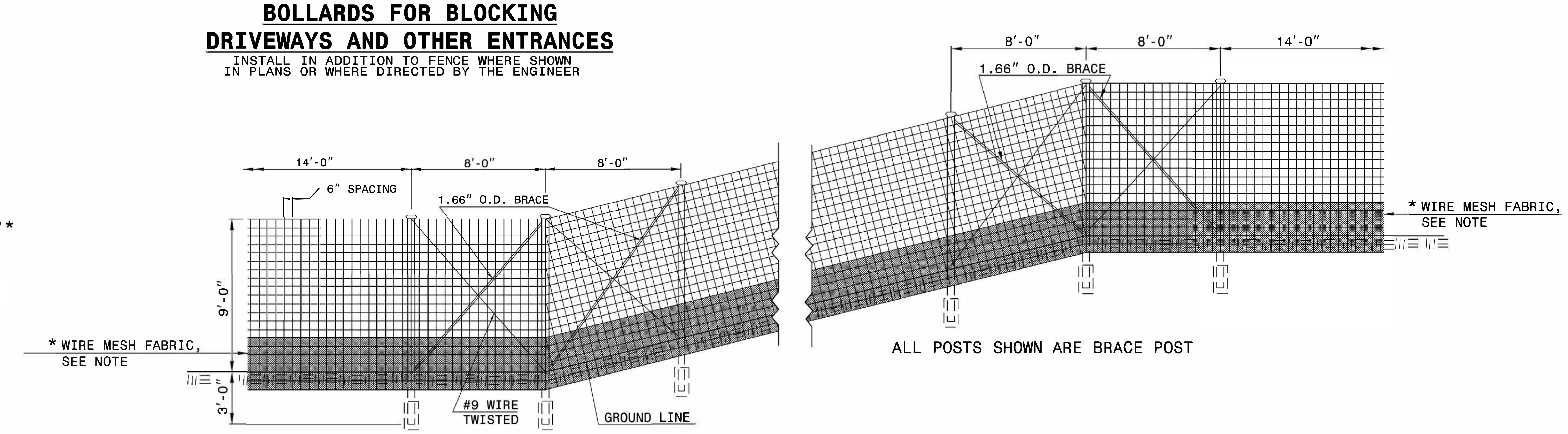
- INSTALL THE FENCE FACING THE PROPERTY OWNER EXCEPT ON HORIZONTAL CURVES GREATER THAN THREE DEGREES, INSTALL THE FENCE TO PULL AGAINST ALL POSTS.
- IN LIEU OF 2.375" O.D. TUBULAR POSTS 2½" x 2½" x¼" ANGLE SECTIONS MAY BE USED.
- IN LIEU OF 1.660" O.D. TUBULAR BRACES 2" x 2" x¼" ANGLE SECTIONS MAY BE USED.



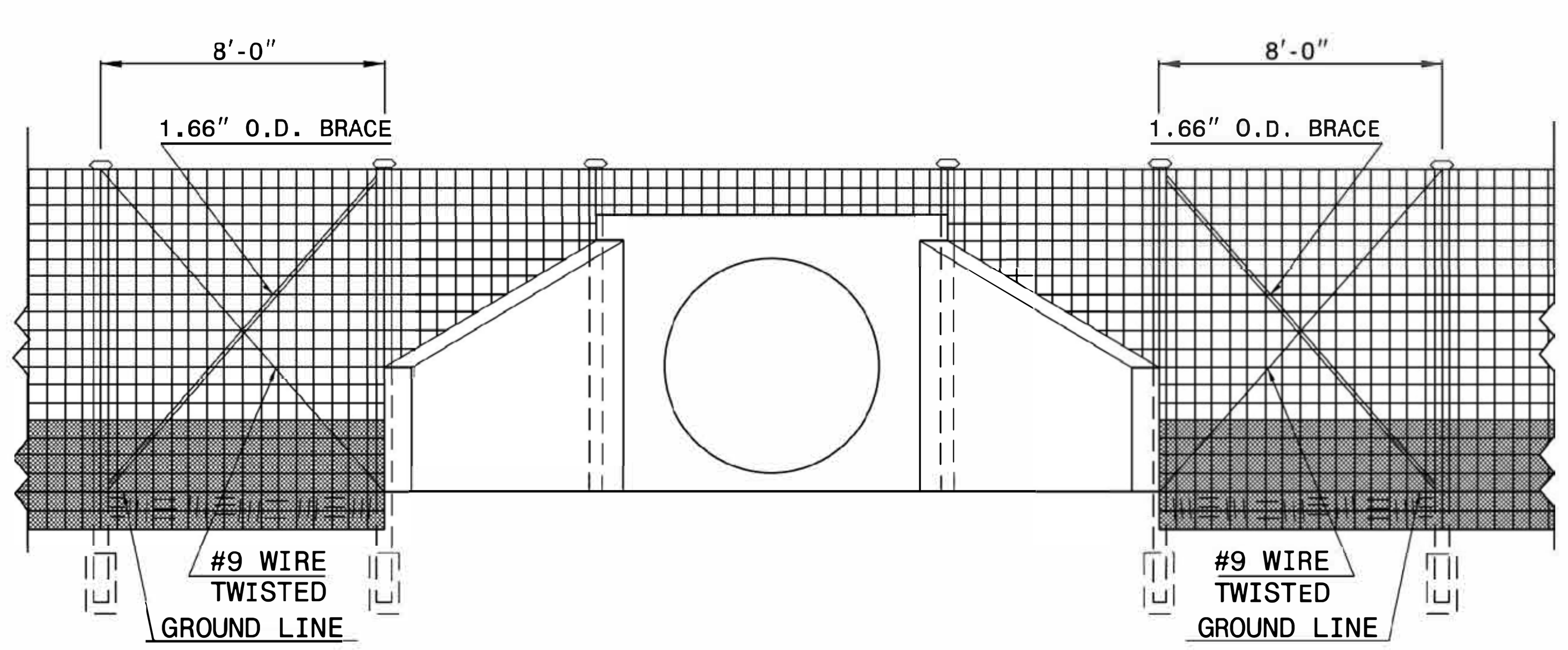
GATE

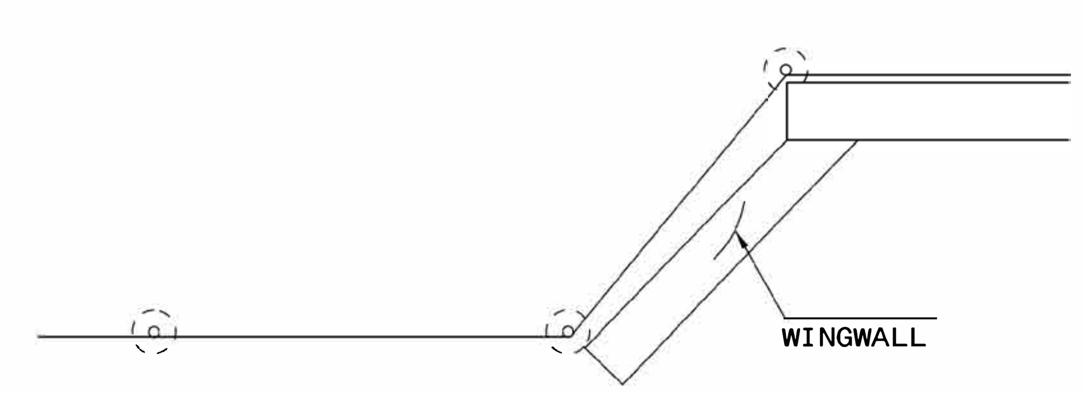
USE LATCH DEVICE APPROVED BY THE ENGINEER. HINGE ASSEMBLY, AS DETAILED, IS SUGGESTED. SUBSTITUTION MAY BE MADE SUBJECT TO THE APPROVAL OF THE ENGINEER.



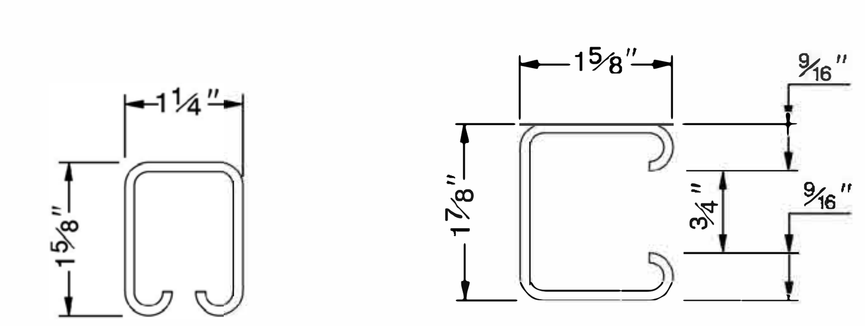


DETAIL SHOWING METHOD OF CONSTRUCTING FENCE ON SHARP BREAK IN GRADE





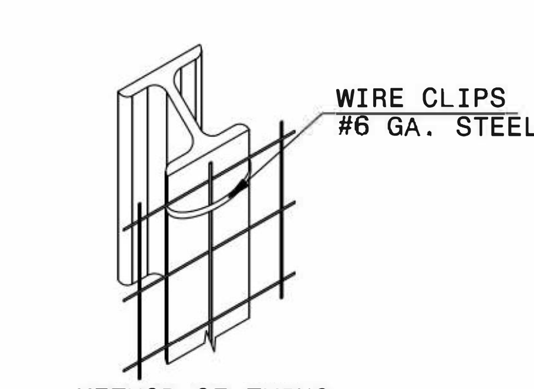
PLAN



BRACE RAIL (ROLL FORMED)

LINE POST (ROLL FORMED)

ROLL FORMED LINE POST MAY BE DRIVEN TO A MINIMUM OF 3'-0" IN LIEU OF CONCRETE ANCHOR, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.



METHOD OF TYING FABRIC TO "H" POST

7/27/2022

* — ¼" X ¼" OPENING, 23 GAUGE HOT DIPPED GALVANIZED WIRE MESH.

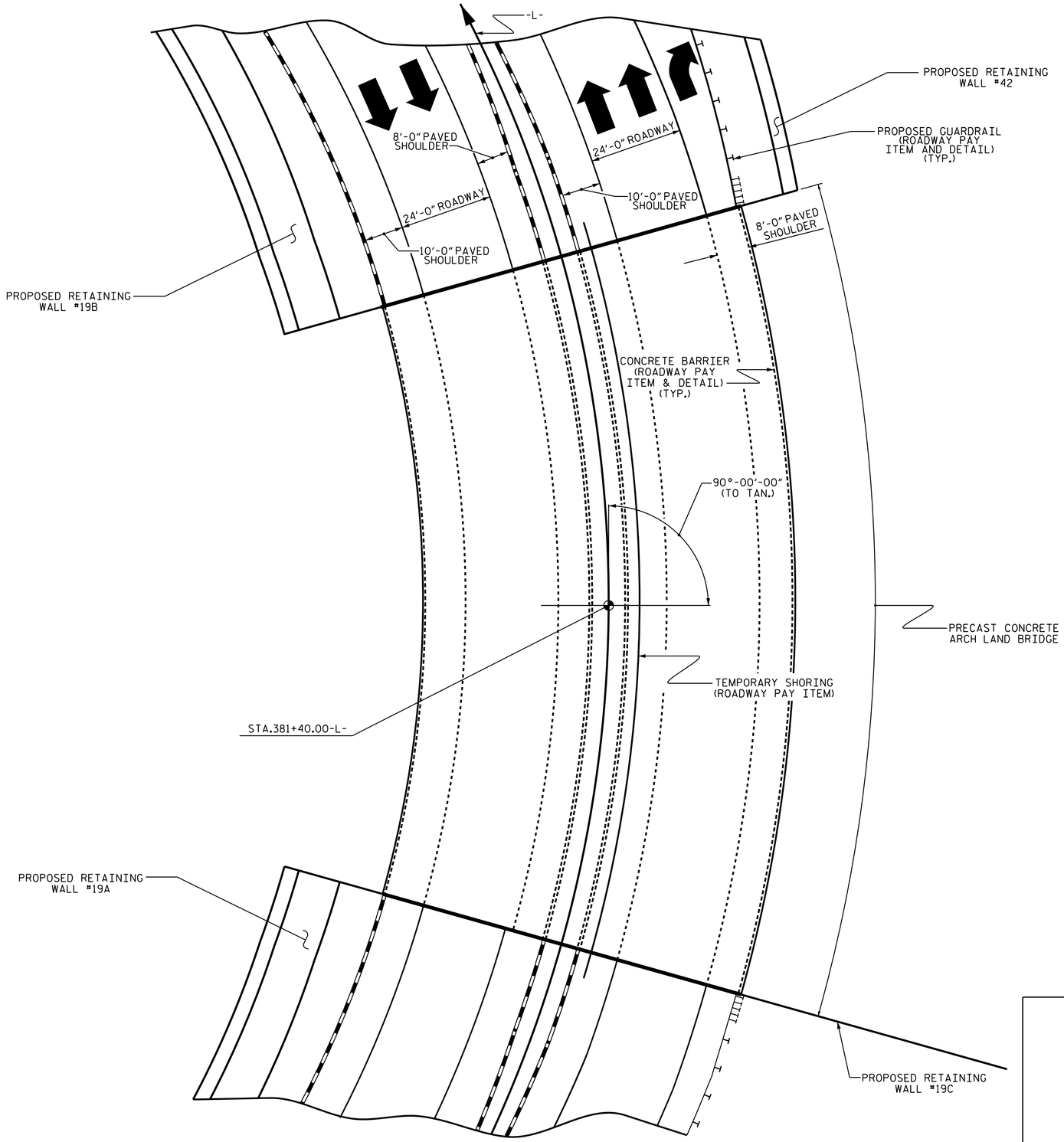
— MESH TIES @ 24' CENTERS TO WELDED FABRIC. 18 GA OR 20 GA STAINLESS STEEL.

CONTRACTS STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

WILDLIFE FENCE

ORIGINAL BY: K A KEMPF DATE: 10/30/12
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: kkempf\english\wildlifence.dgn

$$$$$$SYSTIME$$$$$ \Wildlife Fencing Details.dgn $USER$



PI STA. = 388+01.79
Δ = 150°-28'-04.5'' (LT.)
D = 17°-24'-54.5''
L = 864.01'
T = 1248.21'
R = 329.00'

HORIZONTAL CURVE DATA -L-

6.7245% -7.1756%

PI = 384+15.00 -L-
EL = 3,157.47
VC = 1,470

GRADE DATA -L-

PLAN

ARCH PEDESTALS & FOOTINGS NOT SHOWN FOR CLARITY

PROJECT NO. A-0009CB

GRAHAM COUNTY

STATION: 381+40.00 -L-

SHEET 2 OF 6

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR. ENGINEER
Marshall G. Cheek, Jr.
DocuSigned by: 0F3A4DCA0...
7/27/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRECAST CONCRETE ARCH LAND BRIDGE

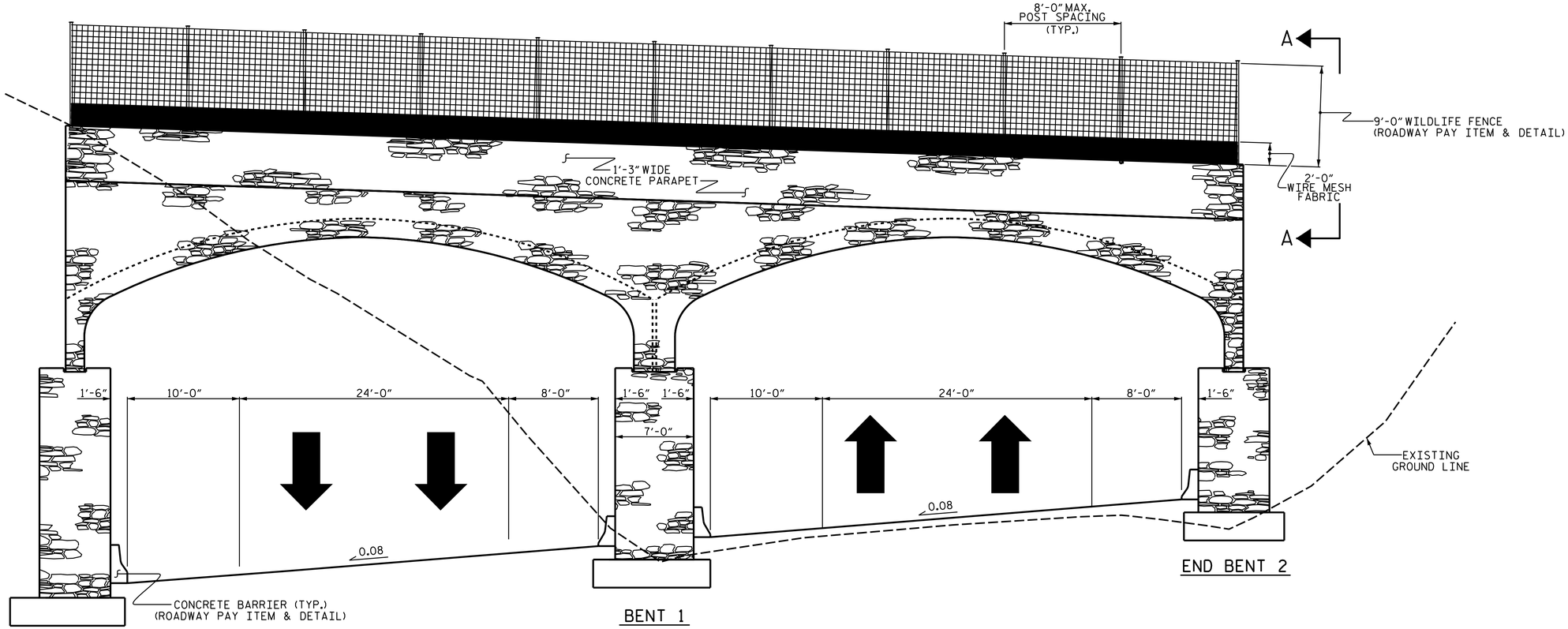
OVER NC 143 BETWEEN SR 1282 AND NC 28

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			6

STR #1

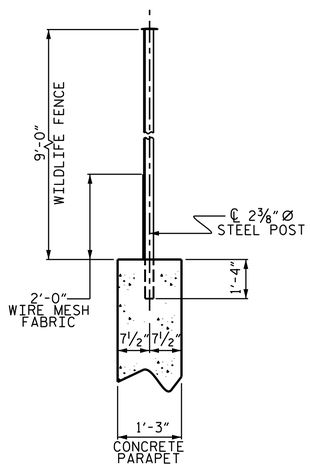
DRAWN BY : S.B. WILLIAMS DATE : 3-22
CHECKED BY : MGC DATE : 3-22

6/1/2022
X:\NCDOT\A-0009\Structures\A-0009CB\STR #1 Landbridge\Arch Bridge\A-0009_SMU_ PGD_370000.dgn
User:sbwilliams



ELEVATION

(LOOKING UPSTATION)



SECTION A-A

NOTES

THE WILDLIFE FENCE POST SHALL BE EMBEDDED INTO THE PARAPET IN A SLEEVE OR BLOCKOUT AND ANCHORED WITH AN EPOXY OR CONCRETE GROUT ANCHORING SYSTEM. THE POST HOLE OPENING SHALL BE A MINIMUM OF ½" LARGER THAN THE OUTER DIAMETER OF THE POST. FOR WILDLIFE FENCE, SEE ROADWAY SPECIAL PROVISIONS.

PROJECT NO. A-0009CB

GRAHAM COUNTY

STATION: 381+40.00 -L-

SHEET 3 OF 6

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR. ENGINEER

7/27/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRECAST CONCRETE ARCH LAND BRIDGE

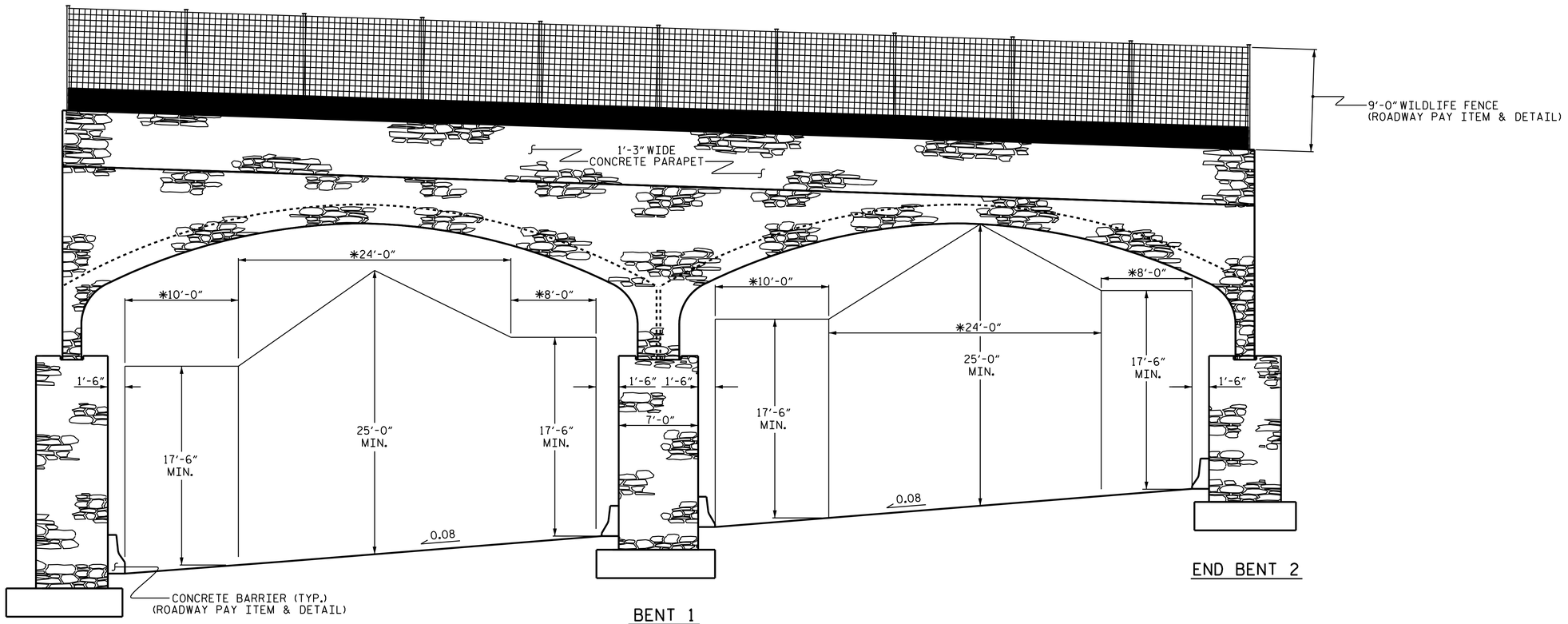
OVER NC 143 BETWEEN
SR 1282 AND NC 28

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-3
1			3			TOTAL SHEETS
2			4			6

STR #1

DRAWN BY : S. B. WILLIAMS DATE : 2-22
CHECKED BY : MGC DATE : 3-22

6/1/2022
X:\NCDOT\A-0009\Structures\A-0009CB\STR #1 Landbridge\Arch Bridge\A-0009_SMU_ PGD_370000.dgn
User:sbwilliams



VERTICAL CLEARANCE

(LOOKING UPSTATION)

*RADIAL DIMENSION

THE CROWN OF EACH ARCH SHALL BE BUILT TO THE SAME ELEVATION WHILE MAINTAINING MINIMUM VERTICAL CLEARANCES.

PROJECT NO. A-0009CB

GRAHAM COUNTY

STATION: 381+40.00 -L-

SHEET 4 OF 6

NORTH CAROLINA PROFESSIONAL Engineer SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

7/27/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRECAST CONCRETE ARCH LAND BRIDGE

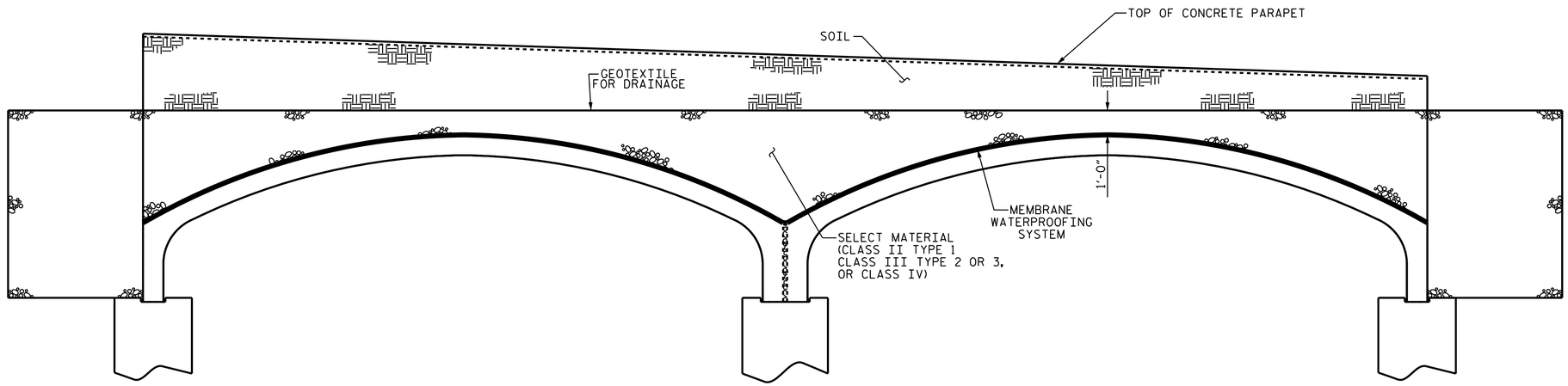
OVER NC 143 BETWEEN
SR 1282 AND NC 28

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-4
1			3			TOTAL SHEETS
2			4			6

STR #1

DRAWN BY : S. B. WILLIAMS DATE : 2-22
CHECKED BY : MGC DATE : 3-22

6/1/2022
X:\NCDOT\A-0009\Structures\A-0009CB\STR #1 Landbridge\Arch Bridge\A-0009_SMU_ PGD_370000.dgn
User:sbwilliams



PARTIAL SECTION THRU BRIDGE

WILDLIFE FENCE NOT SHOWN FOR CLARITY

PROJECT NO. A-0009CB

GRAHAM COUNTY

STATION: 381+40.00 -L-

SHEET 5 OF 6

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR. — Marshall G. Cheek, Jr.

7/27/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRECAST CONCRETE ARCH LAND BRIDGE

OVER NC 143 BETWEEN
SR 1282 AND NC 28

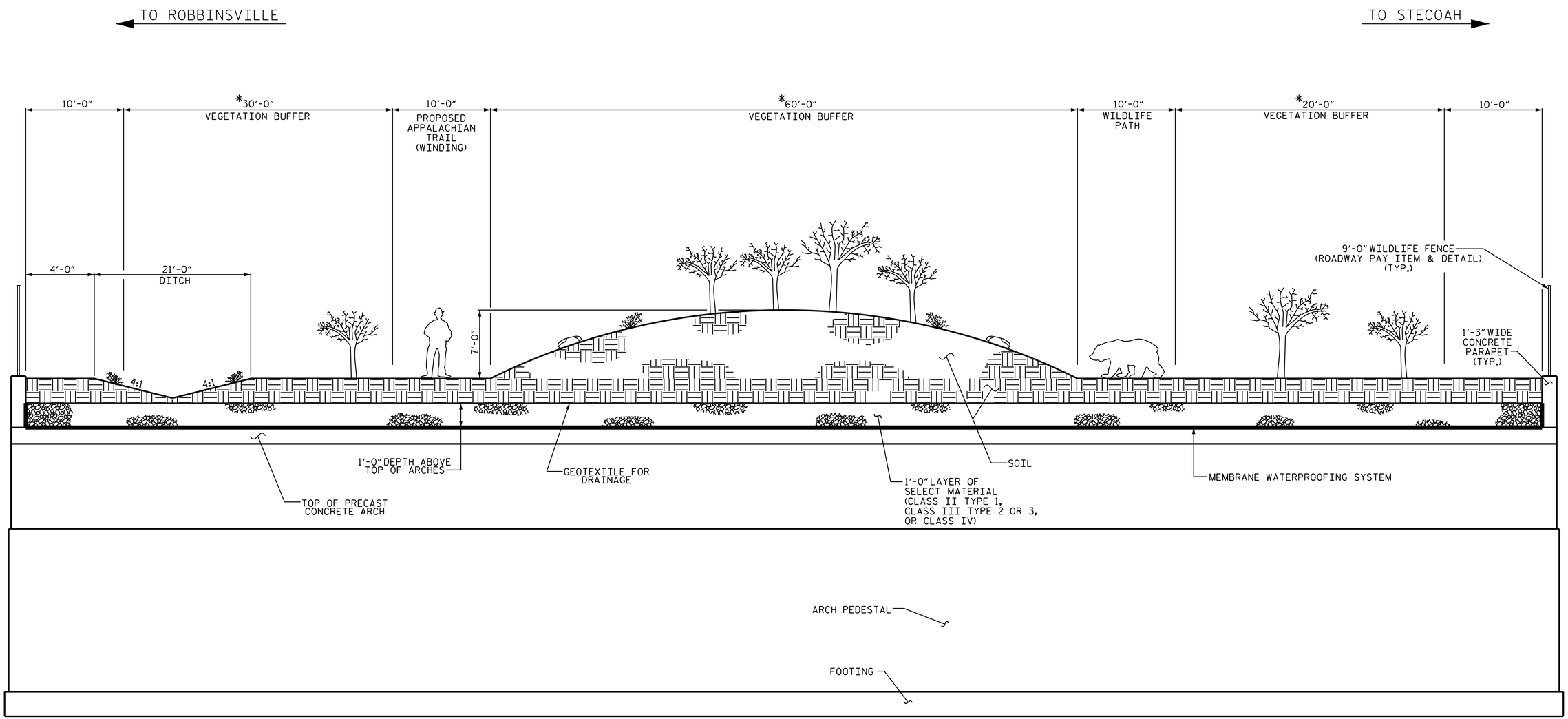
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			6

STR #1

DRAWN BY : S. B. WILLIAMS DATE : 3-22

CHECKED BY : MGC DATE : 3-22

6/1/2022
X:\NCDOT\A-0009\Structures\A-0009CB\STR #1 Landbridge\Arch Bridge\A-0009_SMU_ PGD_370000.dgn
User:sbwilliams



LAND BRIDGE TYPICAL

FOR LAND BRIDGE GRADING PLAN, SEE ROADWAY PLANS

* MINIMUM DIMENSION IS MEASURED FROM INSIDE RADIUS ON THE CURVE

THE CONTRACTOR SHALL ENSURE THAT THE MAXIMUM FILL ON THE CROWN OF EACH PRECAST CONCRETE ARCH DOES NOT EXCEED 14'.

PROJECT NO. A-0009CB

GRAHAM COUNTY

STATION: 381+40.00 -L-

SHEET 6 OF 6

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR. — Marshall G. Cheek, Jr. — SEAL F3A4DC43...

7/27/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
706 HILLSBOROUGH STREET
SUITE 200
RALEIGH, NC 27603
PH. (919) 773-8887
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRECAST CONCRETE ARCH LAND BRIDGE

OVER NC 143 BETWEEN SR 1282 AND NC 28

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			6

STR #1

DRAWN BY : S. B. WILLIAMS DATE : 2-22

CHECKED BY : MGC DATE : 3-22

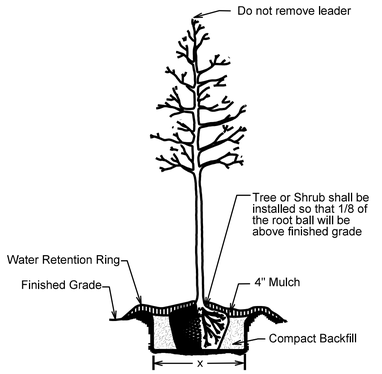
6/1/2022
X:\NCDOT\A-0009\Structures\A-0009CB\STR #1 Landbridge\Arch Bridge\A-0009_SMU_ PGD_370000.dgn
User:sbwilliams

Planting Plan

This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

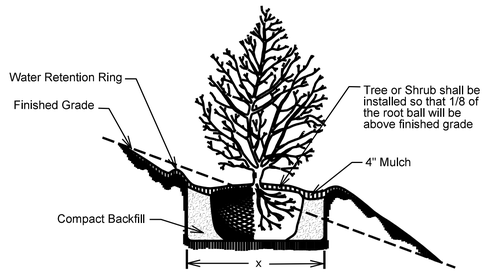
The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.
This file or an individual page shall not be considered a certified document.

07/09/97



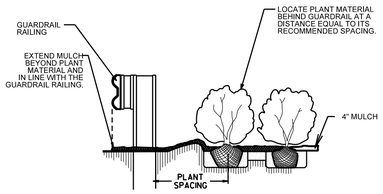
TREE OR SHRUB PLANTING DETAIL

(LEVEL GROUND)



TREE OR SHRUB PLANTING DETAIL

(SLOPING GROUND)



GUARDRAIL MULCHING DETAIL

* Detail to be used when approved by the Engineer.

NOTES:

SCHEDULE FOR PLANT HOLE SIZE:
CONTAINER OR ROOT BALL SIZE

X = 2 TIMES THE DIAMETER OF THE CONTAINER OR THE ROOT BALL DIAMETER

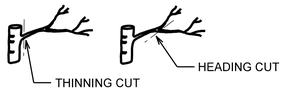
FERTILIZER SHALL BE APPLIED AT TIME OF PLANTING.. FERTILIZER SHALL BE A SLOW RELEASE PELLET OR TABLET. FORMULATION SHALL BE APPROVED BY ENGINEER IN THE FIELD.

RATES SHALL BE PER MANUFACTURERS RECOMMENDATIONS AND APPROVED BY THE ENGINEER IN THE FIELD. THOUROUGHLY MIX WITH TOPSOIL , BACKFILL OR SCARIFIED SOIL.

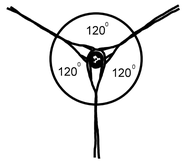
REMOVE BURLAP FROM TOP OF BALL BEFORE BACKFILLING AROUND BALL IS COMPLETE

SEE STANDARD SPECIFICATIONS FOR PLANT BED HERBICIDE TREATMENT

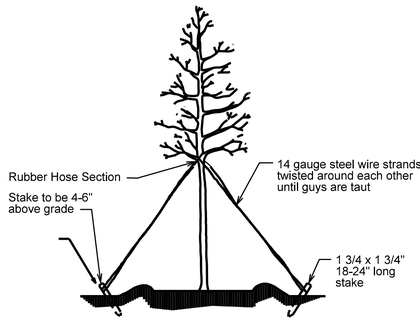
When mulched bed is adjacent to guard rail run mulch to front edge of guard rail - see detail



PRUNING CUTS



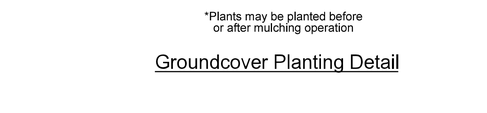
GUY SPACING DETAIL



TREE GUYING DETAIL

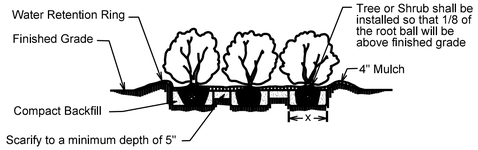
(FOR TREES 10' OR LARGER)

* Utilize guying detail only if requested by the Engineer.

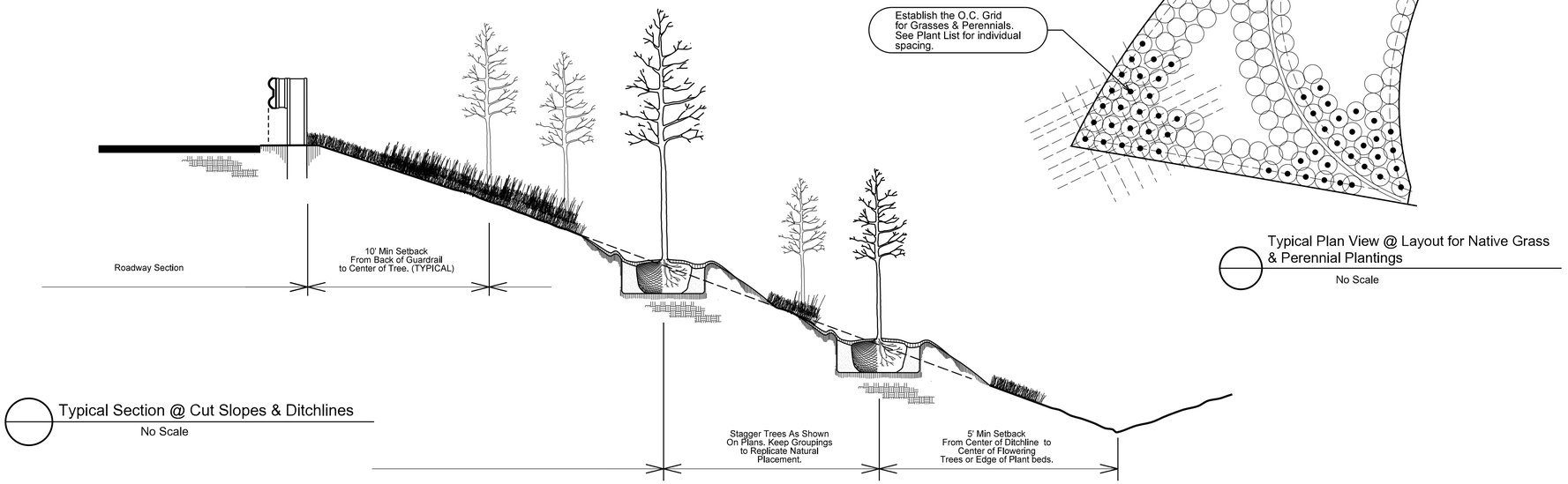


*Plants may be planted before or after mulching operation

Groundcover Planting Detail

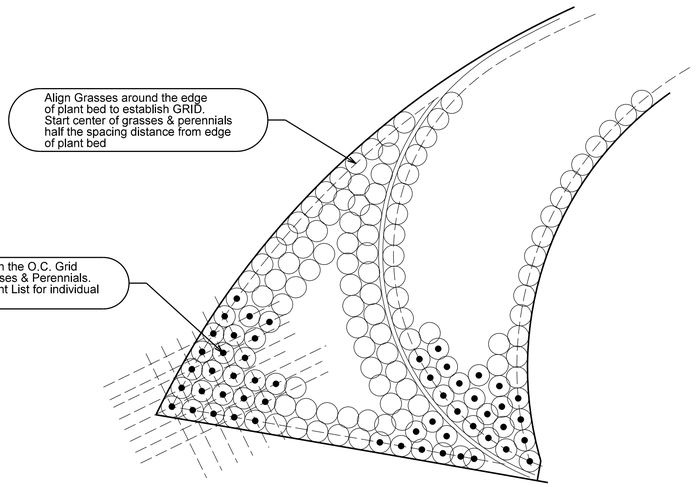


Shrub Bed Planting Detail



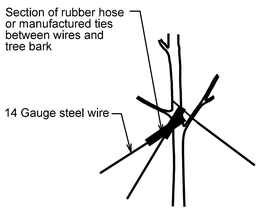
Typical Section @ Cut Slopes & Ditchlines

No Scale

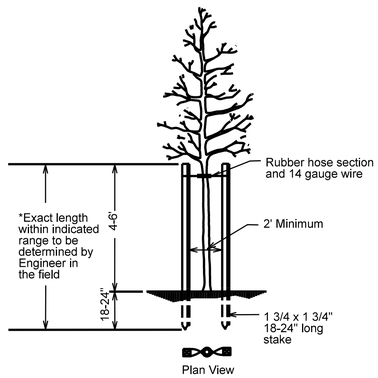


Typical Plan View @ Layout for Native Grass & Perennial Plantings

No Scale



GUY TYING DETAIL



STAKING DETAIL

(FOR TREES 6' TO 10')

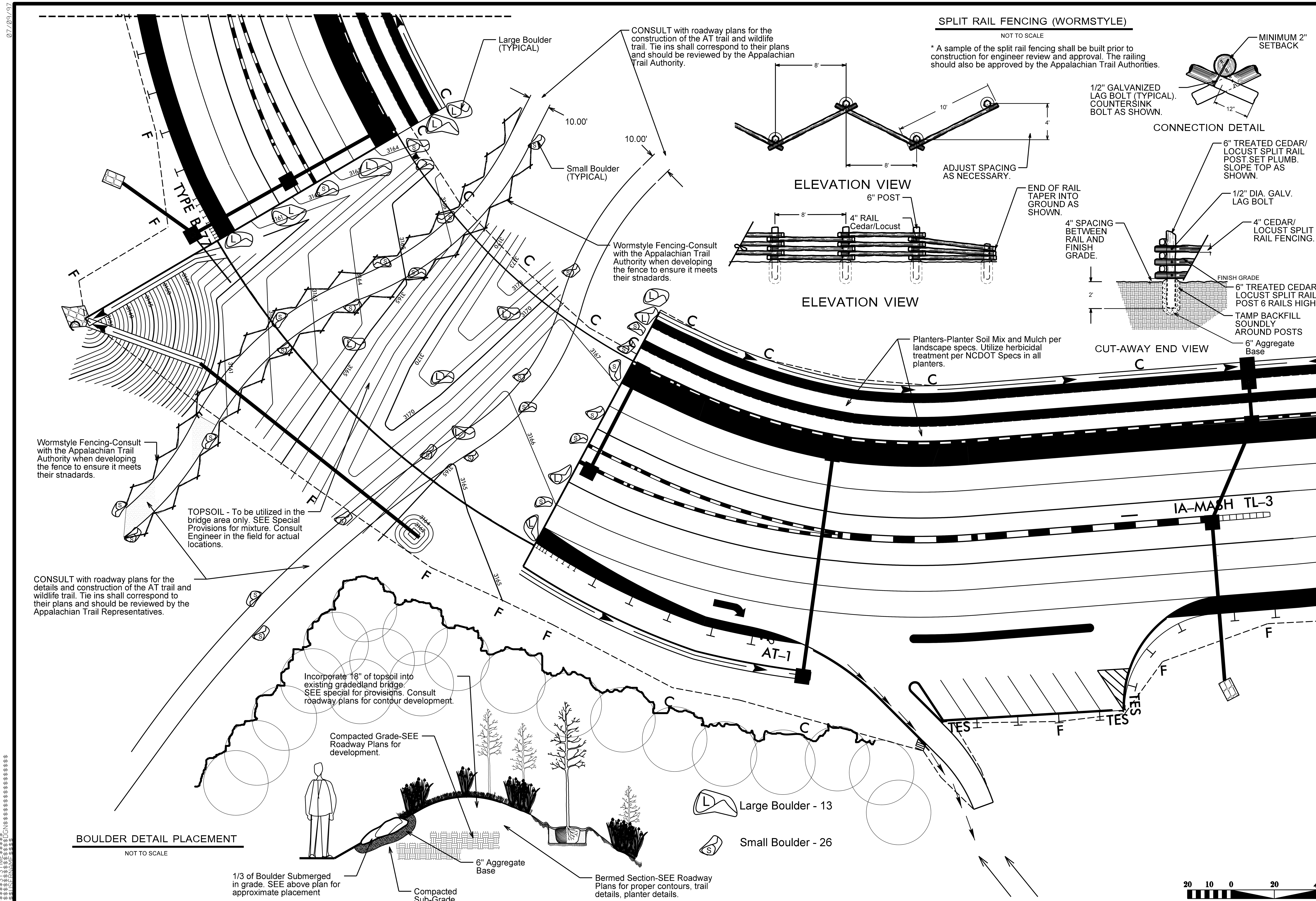
* Utilize staking detail only if requested by the Engineer.

SHEET NO.
L 2
PROJECT REF. NO.
A-0009CB

A-0009 Land Bridge Enhancements & Aesthetics
Graham County, North Carolina
Over NC 143 between SR 1282 & NC 28

N.C. Department of Transportation
Roadside Environmental Unit - Aesthetic Engineering Section
Planting Details

L2



SHEET NO.
L4
PROJECT REF. NO.
A-0009CB

A-0009 Land Bridge Enhancements & Aesthetics
Graham County, North Carolina
Over NC 143 between SR 1282 & NC 28

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N.C. Department of Transportation
Roadside Environmental Unit - Aesthetic Engineering Section
Site Layout Plan

L4

$$$$$SYSTIME$$$$$
$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

07/09/97

QUANTITY	UNIT	KEY	BOTANICAL NAME	COMMON NAME
			Small Flowering Trees (LARGE)	
	EA	AAL	Amelanchier arborea	Serviceberry
	EA	ASL	Aralia spinosa	Devil's-Walking-Stick
	EA	CPL	Crataegua phaenopyrum	Washington Hawthorne
	EA	OAL		
			Small Flowering Trees (SMALL)	
	EA	AA	Amelanchier arborea	Serviceberry
	EA	CC	Cercis canadensis	Redbud
	EA	CV	Chionathus virginicus	Fringe Tree
	EA	CP	Crataegua phaenopyrum	Washington Hawthorne
	EA	HT		
	EA	OA		
			Deciduous Trees (LARGE)	
12	EA	AFL	Aesculus flava	Yellow Buckeye
12	EA	FGL	Fagus grandifolia	American Beech
10	EA	QAL	Quercus alba	White Oak
15	EA	QCL	Quercus coccinea	Scarlet Oak
			Shrubs / Native Grass and Perennial Varieties	
	EA	CF	Calycanthus floridus	Sweet Shrub
	EA	CA	Clethra acuminata	Mountain Pepperbush
	EA	CS	Cornus amomum	Silky Dogwood
	EA	DS	Diervilla sessilifolia	Bush Honeysuckle
	EA	IW	Ilex verticillata	Winterberry
	EA	IV	Itea virginica	Virginia Sweetspire
	EA	RF	Rhododendron calendulaceum	Flame Azalea
	EA	RC	Rubus canadensis	Blackberry
	EA	SC	Sambucus canadensis	Elderberry
	EA	VC	Vaccinium corymbosum	Smooth Highbush Blueberry
	EA	VP	Viburnum prunifolium	Black haw

FGL-2
QCL-3
AFL-9
BOULDERS
WORMSTYLE FENCING
WORMSTYLE FENCING
AFL-3
QAL-2
AT TRAIL
QCL-4
QCL-5
WILDLIFE TRAIL
BOULDERS
109
FGL-10
PL 100.00'
PL 180.00'
QAL-8
QCL-3
+52.19 EX. R/W
+52.19 100.00'
IA-MASH TL-3
AT-1
TES
TES
20 10 0 20 40

SHEET NO.
L6
PROJECT REF. NO.
A-0009CB

A-0009 Land Bridge Enhancements & Aesthetics
Graham County, North Carolina
Over NC 143 between SR 1282 & NC 28

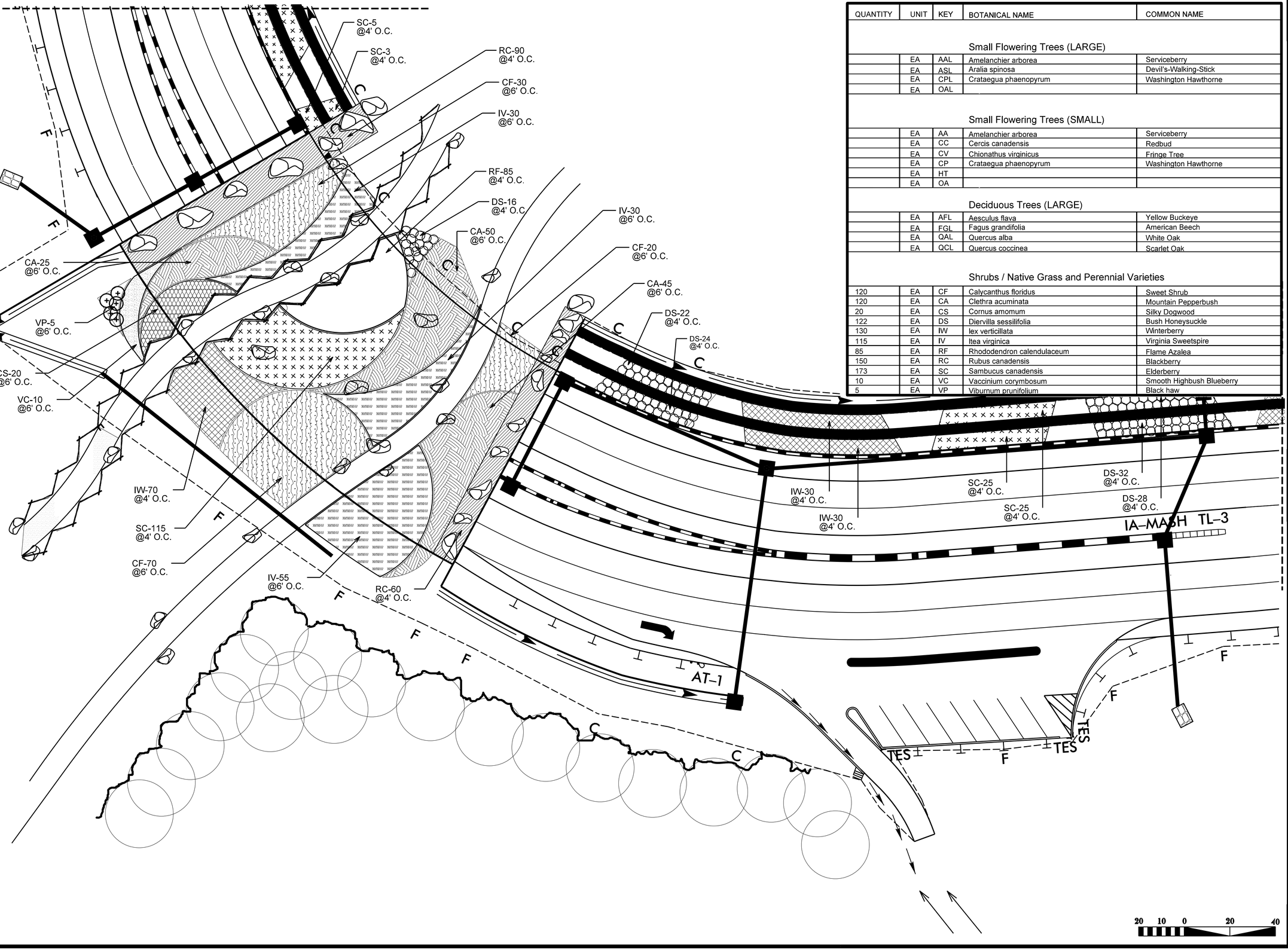
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N.C. Department of Transportation
Roadside Environmental Unit - Aesthetic Engineering Section
Landscape Plan – Large Trees

L6

$$$$SYSTIME$$$$
$$$$SYSFILE$$$$
$$$$SYSCELL$$$$
$$$$SYSSCALE$$$$
$$$$USER$$$$
$$$$DGN$$$$

07/09/97



QUANTITY	UNIT	KEY	BOTANICAL NAME	COMMON NAME
			Small Flowering Trees (LARGE)	
	EA	AAL	Amelanchier arborea	Serviceberry
	EA	ASL	Aralia spinosa	Devil's-Walking-Stick
	EA	CPL	Crataegua phaenopyrum	Washington Hawthorne
	EA	OAL		
			Small Flowering Trees (SMALL)	
	EA	AA	Amelanchier arborea	Serviceberry
	EA	CC	Cercis canadensis	Redbud
	EA	CV	Chionathus virginicus	Fringe Tree
	EA	CP	Crataegua phaenopyrum	Washington Hawthorne
	EA	HT		
	EA	OA		
			Deciduous Trees (LARGE)	
	EA	AFL	Aesculus flava	Yellow Buckeye
	EA	FGL	Fagus grandifolia	American Beech
	EA	QAL	Quercus alba	White Oak
	EA	QCL	Quercus coccinea	Scarlet Oak
			Shrubs / Native Grass and Perennial Varieties	
120	EA	CF	Calycanthus floridus	Sweet Shrub
120	EA	CA	Clethra acuminata	Mountain Pepperbush
20	EA	CS	Cornus amomum	Silky Dogwood
122	EA	DS	Diervilla sessilifolia	Bush Honeysuckle
130	EA	IW	Iex verticillata	Winterberry
115	EA	IV	Itea virginica	Virginia Sweetspire
85	EA	RF	Rhododendron calendulaceum	Flame Azalea
150	EA	RC	Rubus canadensis	Blackberry
173	EA	SC	Sambucus canadensis	Elderberry
10	EA	VC	Vaccinium corymbosum	Smooth Highbush Blueberry
5	EA	VP	Viburnum prunifolium	Black haw

20 10 0 20 40

SHEET NO.
L7
PROJECT REF. NO.
A-0009CB

A-0009 Land Bridge Enhancements & Aesthetics
Graham County, North Carolina
Over NC 143 between SR 1282 & NC 28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

N.C. Department of Transportation
Roadside Environmental Unit - Aesthetic Engineering Section
Landscape Planting – SHRUB(S)

L7

07/09/97

QUANTITY	UNIT	KEY	BOTANICAL NAME	COMMON NAME
			Small Flowering Trees (LARGE)	
9	EA	AAL	Amelanchier arborea	Serviceberry
17	EA	ASL	Aralia spinosa	Devil's-Walking-Stick
12	EA	CPL	Crataegua phaenopyrum	Washington Hawthorne
9	EA	OAL		
			Small Flowering Trees (SMALL)	
5	EA	AA	Amelanchier arborea	Serviceberry
9	EA	CC	Cercis canadensis	Redbud
12	EA	CV	Chionathus virginicus	Fringe Tree
15	EA	CP	Crataegua phaenopyrum	Washington Hawthorne
3	EA	HT		
	EA	OA		
			Deciduous Trees (LARGE)	
	EA	AFL	Aesculus flava	Yellow Buckeye
	EA	FGL	Fagus grandifolia	American Beech
	EA	QAL	Quercus alba	White Oak
	EA	QCL	Quercus coccinea	Scarlet Oak
			Shrubs / Native Grass and Perennial Varieties	
	EA	CF	Calycanthus floridus	Sweet Shrub
	EA	CA	Clethra acuminata	Mountain Pepperbush
	EA	CS	Cornus amomum	Silky Dogwood
	EA	DS	Diervilla sessilifolia	Bush Honeysuckle
	EA	IW	Iex verticillata	Winterberry
	EA	IV	Itea virginica	Virginia Sweetspire
	EA	RF	Rhododendron calendulaceum	Flame Azalea
	EA	RC	Rubus canadensis	Blackberry
	EA	SC	Sambucus canadensis	Elderberry
	EA	VC	Vaccinium corymbosum	Smooth Highbush Blueberry
	EA	VP	Viburnum prunifolium	Black haw

CP-5
ASL-4
CV-6 @16' O.C.
CPL-6 @12' O.C.
OAL-3 @16' O.C.
ASL-3
CC-6 @16' O.C.
CP-5
ASL-5
CC-6 @16' O.C.
OAL-6 @12' O.C.
AAL-6 @12' O.C.
AAL-3 @16' O.C.
CPL-6 @16' O.C.
CV-6 @16' O.C.
HT-6 @16' O.C.
ASL-5
OA-5
AA-5
CP-5
OA-5
IA–MASH TL–3
AT–1
TES
TES
TES
F
C

20 10 0 20 40

SHEET NO.
L8
PROJECT REF. NO.
A-0009CB

A-0009 Land Bridge Enhancements & Aesthetics
Graham County, North Carolina
Over NC 143 between SR 1282 & NC 28

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N.C. Department of Transportation
Roadside Environmental Unit - Aesthetic Engineering Section
Landscape Plan–Small Tree(s)

L8

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DGNFILE$$$$
$$$$PLOTSCALE$$$$
$$$$PLOTDATE$$$$

USFWS IPaC Official Species List

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Graham County, North Carolina

Local office

Asheville Ecological Services Field Office

(828) 258-3939
(828) 258-5330

160 Zillicoa Street
Asheville, NC 28801-1082

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Gray Bat *Myotis grisescens* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Whooping Crane *Grus americana* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/758	EXPN

Reptiles

NAME	STATUS
Bog Turtle *Glyptemys muhlenbergii* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6962	SAT

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Virginia Spiraea Spiraea virginiana Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1728	Threatened

Lichens

NAME	STATUS
Rock Gnome Lichen Gymnoderma lineare Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3933	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

Additional information can be found using the following links:

- Eagle Managment https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list,click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

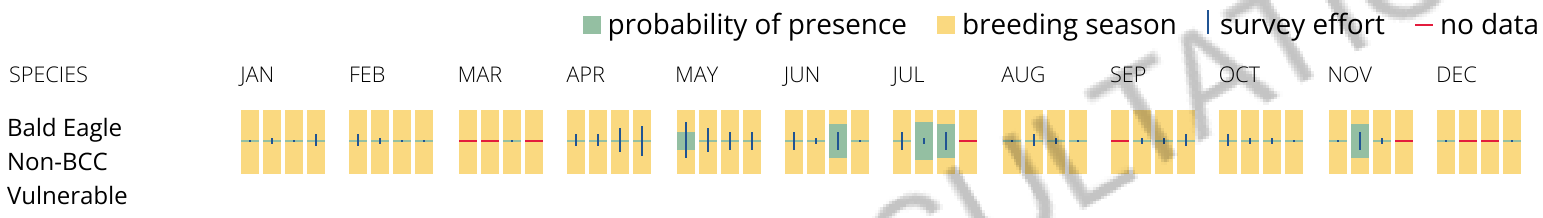
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Aug 31

Black-billed Cuckoo Coccyzus erythropthalmus — Breeds May 15 to Oct 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9399

Bobolink Dolichonyx oryzivorus — Breeds May 20 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Canada Warbler Cardellina canadensis — Breeds May 20 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Cerulean Warbler Dendroica cerulea — Breeds Apr 27 to Jul 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/2974

Chimney Swift Chaetura pelagica — Breeds Mar 15 to Aug 25

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Eastern Whip-poor-will Antrostomus vociferus — Breeds May 1 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Golden-winged Warbler Vermivora chrysoptera — Breeds May 1 to Jul 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8745

Kentucky Warbler Oporornis formosus — Breeds Apr 20 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1A

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1A
- PFO1A

FRESHWATER POND

- PUBHh
- PUBHx

RIVERINE

- R5UBH
- R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Letters of Support

Wildlands NETWORK

July 31, 2023

US Department of Transportation
Federal Highway Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

To Grant Selection Committee Members:

Thank you for the opportunity to comment on the spending request for the proposed Appalachian Development Highway System Corridor K highway overpass in western North Carolina.

Wildlands Network works across North America to prevent biodiversity loss and promote climate change resilience through science-based research and innovative policy. Our work preserves and restores key ecosystems, allowing wildlife to move across their historic habitat ranges. Therefore, we focus on advancing projects that reduce, minimize or eliminate collisions caused by wildlife attempting to cross roads and other transportation infrastructure.

On behalf of Wildlands Network, I would like to express full support for the proposed land bridge project to facilitate wildlife crossing across NC Highway 143. Not only will this create safe passage for wildlife, but also for recreationists traveling along the Appalachian Trail.

Western North Carolina is renowned for its natural resources, scenic beauty, and access to public lands for recreation. Building this structure over NC 143 will mitigate roadway hazards and reconnect crucial habitat for many wildlife species, and also serve as inspiration for future innovative NCDOT projects across the state.

Gratefully,

Nikki Robinson

Nikki Robinson
North Carolina Project Manager

Wildlands Network
14 O'Henry Street, Suite 306 A
Asheville, NC 28803

wildlandsnetwork.org

Appalachian Regional Commission

Division of Critical Infrastructure

To Whom It May Concern:

The completion of the Appalachian Development Highway System is an especially important strategic goal of the Appalachian Regional Commission (ARC). The 3090-mile corridor system is more than 90% complete or under construction today. The 284 miles that remain to be completed have tended toward being the most expensive sections of the highway corridors, often with significant environmental challenges.

That has proven to be true with ADHS Corridor K in western North Carolina. The remaining 18 miles were initially planned as a 4-lane divided expressway, mostly on new location in the Natahala National Forest. Over the years, this plan became much more difficult to implement because of growing costs and environmental concerns.

In 2015, the North Carolina Department of Transportation (NCDOT) and the Federal Highway Administration (FHWA) decided to take a fresh look at the project with an emphasis on collaboration with all stakeholders. The goal of the approach was to develop a "right-sized" design that would best address mobility and reliability goals while minimizing impacts. Importantly, the plan would also meet the design criteria of the ADHS.

Now, after working diligently with all stakeholders over several years, the NCDOT and FHWA Project Team has achieved a resounding success. They have worked collaboratively with local elected officials, the public, environmental resource agencies, and environmental advocacy groups to find a "win-win" solution.

The ARC has been a close observer of this effort, every difficult step of the way. An initial effort by the NCDOT and the Local Development District was to take a "step back" and ensure proper planning considerations by helping the greater region develop a strategic vision for best achieving economic development and accessibility for area. The Project Team has then demonstrated exceptional planning and management of the environmental decision-making process, actively working to reduce impacts and preserve the natural environment. The Team has utilized modern technologies to best demonstrate a full consideration of multiple alignment alternatives. Finally, the Project Team has ensured that the public involvement process included a "seat at the table" for all stakeholders. This collaborative approach was recently recognized in a very complementary article written be the Southern Environmental Law Center, a group that had originally expressed concerns about the project.

Therefore, the Appalachian Regional Commission is proud to provide a hearty endorsement of the work of the NCDOT-FHWA "A-0009" Project Team. As the project proceeds to construction in 2021, ARC is pleased that Corridor K is yet another step closer to completion in North Carolina.

"Well Done!"

Sincerely,

Thomas J. Smith, P.E.
Senior Transportation Advisor

www.arc.gov

1666 CONNECTICUT AVENUE, NW, SUITE 700
WASHINGTON, DC 20009-1068

PH. 202 884 7700

mountaintrue.
Protecting the Places We Share.

October 29, 2020

Diane Wilson
Senior Public Involvement Officer
North Carolina Dept. of Transportation
1598 Mail Service Center
Raleigh, NC 27699-1598

Re: Comments on Environmental Assessment for STIP Project No. A-0009C

Dear Ms. Wilson,

MountainTrue respectfully submits the following comments with regard to the Environmental Assessment for the "Corridor K, Appalachian Highway Development System" project in Graham County, North Carolina. MountainTrue is an incorporated 501(c)(3) nonprofit organization dedicated to creating and sustaining a healthy environment by championing resilient forests, clean waters, and healthy communities, promoting clean energy, and increasing civic engagement in policy-making in the Southern Blue Ridge Mountains. Thank you for the opportunity to comment.

I am pleased to be writing to you today to express MountainTrue's full support for the Preferred Alternative that would improve the existing alignments of US 129, NC 143 and NC 28 between Robbinsville and Stecoah, increasing shoulder widths and adding passing/climbing lanes where necessary. We agree with the decision to remove the Andrews to Robbinsville portion of the project to better focus on delivering improved mobility and reliability between the existing four-lane section on NC 28 at Stecoah and US 129 in Robbinsville. The Preferred Alternative results in no new significant fragmentation of forests and minimizes impacts to existing homes and businesses.

MountainTrue also fully supports the proposed land bridge to facilitate the crossing of wildlife and pedestrians across NC 143 at one of the widest parts of the improved highway. Building this structure and relocating the Appalachian Trail onto it, would mitigate negative visual and noise impacts of the highway crossing and prevent unsafe slick conditions during freezing temperatures that other types of pedestrian crossings might create. Safe passage for wildlife will minimize vehicle crashes and fatalities of both wildlife and humans.

From a healthy communities perspective, we also fully support the addition of sidewalks from Robbinsville High School to the intersection of US 129 and Five Point Road and the multi-use path in Stecoah. These project additions, along with the land bridge will positively impact pedestrian mobility and safety within the project area.

29 North Market Street, Suite 610 Asheville, NC 28801 828.258.8737
611 N. Church Street Hendersonville, NC 28792 828.692.0385
90 Tennessee St., Suite D Murphy NC 28906 828.837.5414
164 South Depot Street Boone, NC 28607 828.719.7624

mountaintrue.org

WATERKEEPER ALLIANCE MEMBER

We appreciate the project's commitment to intensive study of acid-producing rock in the areas of excavation and total encapsulation of the material if the results warrant such an extreme level of mitigation for the protection of water quality in the project area.

Our only suggestion for project improvement is to consider purchasing a wider right-of-way along Stecoah Creek and fully restoring the dimension, pattern and profile of the stream as part of the mitigation plan for impacts to Waters of the U.S. The original meanders of the stream are still visible on the aerial photographs presented for this project. Mitigating stream impacts onsite is the first preference of watershed managers, if a viable location is available. We believe it is and we would love to see this section of stream restored, rather than simply moved out of the way of the road improvements and mitigated elsewhere.

Thank you for a thorough and well-presented Environmental Assessment of this project! Since it seems we don't get to make such positive statements often enough, I'll say it again: MountainTrue fully supports this project as proposed!

Sincerely,

Callie D. Moore
Western Regional Director

1074 Arbor Drive • Lakemont GA 30552 • P:865-742-1774 • info@waysouth.org

WaysSouth Comments on Environmental Assessment
North Carolina Department of Transportation (NCDOT) STIP Project A-0009C
October 30, 2020

WaysSouth is excited about the project and identifies no major environmental concerns. We wholeheartedly support the Environmental Assessment for the proposed alternative (Alternative 1). We believe that the Assessment will support a Finding of No Significant Impact (FONSI) and that the Least Environmentally Damaging and Practicable Alternative was identified. We believe the project will improve transportation within Graham County and will enhance connectivity with the broader western North Carolina area. We also believe that the project minimizes environmental degradation, supporting the region's impressive biodiversity, while allowing residents continued enjoyment of their mountain communities and streams. Finally, the size, scope, and cost of the project is reasonable given the area's transportation needs.

We share the concerns of Graham County, Robbinsville, and the local communities that improvements are needed in their transportation infrastructure. The project's preferred alternative recognizes that the transportation needs of the area can be met by improving the connection between Robbinsville and Stecoah. This project avoids especially harmful impacts by following the existing route rather than cutting across forested lands and neighborhoods. The proposal adds passing lanes where possible, resulting in a mostly three-lane facility. The road maintains the economic viability of downtown Robbinsville by avoiding a bypass. Dedicated turn lanes are proposed at several locations, including Robbinsville High. Some new sidewalks are included, including around Robbinsville High, which will enhance appearance and usability for Robbinsville residents and visitors. The Hydetown Road greenway in Stecoah Valley will also add to the value of the facility for local residents. We are gratified that DOT has minimized the impacts to homes (9) and businesses (5). We are pleased that the controversial routes across the mountain formerly proposed – either through Tatham Gap or up Jutts Creek – are eliminated.

The Appalachian Trail crossing at Stecoah Gap will be accomplished by a land bridge to facilitate both human and wildlife crossings, and to maintain a more natural appearance. The crossing will certainly improve safety for pedestrians, wildlife, and traffic. The design visualization of the

crossing looks lovely and this concept should greatly improve the appearance and utility of the existing crossing. We believe this innovative crossing will serve as a model for other projects in North Carolina, and that the crossing may become a tourist attraction in and of itself. The crossing is at an important boundary for biodiversity, where climbing lanes coming up each side of the gap would have made crossing the road perilous for wildlife. The historical parking area will be maintained and enough space will be available for turning around. The tiered and vegetated retaining wall will improve the appearance of the highway when approaching the gap. Also, lessons learned may be applicable to other similar scenarios.

WaysSouth commends NCDOT for producing a design that will meet the transportation needs of the residents of western NC, and will have minimal negative impact on the environment because traversing through undisturbed forest and streams is minimized. Additionally, this approach results in a project that makes economic sense – a right-sized roadway will preserve what makes rural Graham County so special – the forests, the mountains, the streams, and the wildlife. We appreciate various mitigation efforts to minimize impacts on endangered species such as the Indiana bat and northern long-eared bat, e.g., no tree clearing from October to April. We note the planned development of a plan in concert with the US Army Corp of Engineers to minimize and mitigate the effects of unavoidable impacts to streams and wetlands under the Clean Water Act. We are also pleased that NCDOT will work with the Forest Service to avoid planting invasive and non-native species, and to continue maintenance in the future to minimize their spread along the rights of way.

We appreciate the project commitments to mitigate negative impacts. We appreciate the project's commitment to develop a Project Special Provision to deal with handling and treating any acid-producing waste material generated during construction, and to appropriately place the material involving total encapsulation if necessary. That the initial surveys find only small outcrops of the acid-producing rock suggests that these approaches are feasible and will be protective of the region's stream waters and aquatic life. We also appreciate the coordination with the Wildlife Resources Commission to build buffers around trout-supporting streams during construction, and to time construction (avoided during January to April) to minimize impacts. We note that several archaeological sites were identified, and we appreciate those being eligible for listing on the National Register of Historic Places, and we also appreciate specific mentions of mitigation for certain existing historical properties.

WaysSouth would like to also extend thanks to DOT and its consultants for involving the environmental community and WaysSouth in their planning process. WaysSouth has been interested in this portion of Corridor K for at least a decade, and in the past we were disappointed to oppose the project because of its unacceptable impacts on the conservation values of western NC. Since the announcement of the project restart in early 2019, DOT and its consultants conducted open meetings with environmental stakeholders, and later participated in a local meeting to discuss the project with concerned Stecoah Valley residents and Graham County leaders. Further, our ideas for design alternatives at the intersection of NC28 and NC143, and at the Appalachian Trail crossing were welcomed, and DOT and consultants participated in several *ad hoc* meetings to discuss our suggestions. We are so pleased to have

worked in a collaborative and transparent manner with DOT and its consultants, and the leaders of this project should be commended for their efforts.

In summary, WaysSouth supports the Environmental Assessment for this project, and we remain ready to assist you in future efforts.

Sincerely,

Melanie Mayes, PhD
Chair of WaysSouth

APPALACHIAN TRAIL CONSERVANCY®

25 November 2020

National Association of Environmental Professionals

Re: 2021 National Environmental Excellence Awards

Dear NAEP National Environmental Excellence Awards Deliberators:

I am writing in support of the nomination of “Corriodor K” and the NCDOT and FHWA for award consideration.

I represent the Appalachian Trail Conservancy (ATC), the 501(c)(3) organization whose mission is to protect, manage and advocate for the Appalachian National Scenic Trail (A.T. or ANST). We work in close partnership with the volunteers of 31 A.T. maintaining Clubs, the National Park Service and USDA Forest Service to accomplish that task. Proposed in 1921, becoming a continuous Trail from Georgia to Maine in 1937, and designated the first National Scenic Trail by the National Trails System Act in 1968, the A.T. is the most ecologically diverse unit of the National Park System and is under consideration for listing on the National Register of Historic Places. Despite being equivalent in size to Rocky Mountain NP, the NPS Appalachian National Scenic Trail has only ten employees – the ATC and A.T. volunteers enable the A.T. to flourish as resource of national and international significance.

I have been involved with “Corridor K” since 1983, as the initial EIS was winding up. Since then, there have been several iterations of how this project will deal with providing improved transportation access to Graham County, NC and with the project’s intersection with the ANST.

The current, and it appears final, preferred alternative for “Corridor K” for accomplishing these two objectives has involved persistence, careful listening to project stakeholders, and innovative thinking by the project leaders of the NCDOT and FHWA.

The ATC believes the outcome, involving improved, safer traffic flow for residents of Graham County and an improved crossing of NC143 by the A.T., utilizing the first land bridge for the A.T., has provided cost effective and innovative win/win solutions to dealing with the concerns of Graham County residents and ANST Section 4f and Section 106 requirements.

Having worked on a number of highway projects that intersect the ANST in four different states, I will say the management and facilitation of this project have been the best I have been involved with, the most thorough and most open to innovation and explored the most alternatives for accomplishing the project goals.

ATC is pleased with the proposed outcomes for this project and we are happy to provide support for a National Environmental Excellence Award for “Corridor K”, NCDOT and FHWA.

Sincerely,

Morgan Sommerville
Regional Director

GEORGIA, NORTH CAROLINA AND TENNESSEE REGIONAL OFFICE
160 A Zillicoa Street, P.O. Box 2750, Asheville, NC 28801 | Phone: 828.254.3708 | Fax: 828.254.3754 | www.appalachiantrail.org

November 25, 2020

National Association of Environmental Professionals
2150 N 107th St. Suite 205
Seattle WA 98133

Dear NAEP:

The Wilderness Society supports the Corridor K project for a 2021 National Environmental Excellence Awards. The Wilderness Society (TWS) was intimately involved in the Corridor K project. From many standpoints this project was a model of what project development and design should be for environmental excellence.

There were significant environmental challenges inherent in the Corridor K project. In fact, the environmental challenges had prevented the successful completion of the project for decades. The Corridor K project was part of Appalachian Regional Commission transportation projects identified in the 1960s. Most of the highways envisioned in these plans have been built. The uncompleted sections of Corridor K represent the most difficult and environmentally sensitive sections remaining of the ARC highway system. The completion has been frustrated because prior attempts to complete the project would have represented unacceptable environmental damage. TWS and other groups had opposed previous project proposals because the routes would have degraded important conservation and cultural resources. TWS had identified the study area to include some of the most important remaining wildlands in the East. In fact a national study by TWS scientists rated some of the lands within the study area as ranking in the top tier of public lands in the US in a measure of conservation value that included measures of biodiversity, ecosystem representation, ecological integrity, and connectivity.

While previous attempts to fit a new transportation corridor within these environmental constraints had been frustrated, NCDOT, Stantec, and TGS approached the project planning process in a new and innovative way. First, they involved all stakeholders in a meaningful way, listening to all issues and concerns and incorporating these issues and concerns into design considerations. They also stepped back from project constraints that were outdated and asked themselves and stakeholders what the most pressing and important needs were currently and in the future. Finally, they looked at environmental concerns on an equal basis with transportation design needs. NCDOT, Stantec, and TGS did not use the usual approach of developing a design that solves engineering and design issues that would later be examined from an environmental standpoint to see if environmental issues could be mitigated. Instead, they used their experts, other agencies, and the public to take a fresh and comprehensive look at current and future transportation needs in the project area, as well as identify the details of environmental and cultural values and concerns. They then engaged in an extensive and meaningful design process that treated transportation, environmental, and cultural needs in an equivalent and balanced way. This has allowed diverse stakeholders to come together in support of a plan that meets

transportation needs while also prioritizing and safeguarding environmental and cultural values in the project area.

The project design was adaptive and used unique design features to solve issues and problems as they emerged. The approach taken in the design process allowed room for uncovering issues and complications throughout the design process. Rather than coming up with finalized designs or design alternatives early in the process, NCDOT, Stantec, and TGS remained open to new information and new designs throughout the process. The process developed scenarios, but these scenarios were open to refinement or abandonment, subject to analysis and public feedback.

The selection of scenarios leading to the development of alternatives and the chosen alternative was also adaptive and creative. Two examples come to mind for this. One scenario that was considered would have eased engineering challenges by improving a planned intersection, reducing road grade, and reducing winter hazards. However, it became clear during analysis and public input that this scenario would have cut through an existing small community, exposed acid bearing rock, and threatened water sources. Through extensive discussions and analysis involving the public the scenario was changed instead to a highway relocation of a limited stretch of highway that helped address the intersection and slope issues as well as the winter hazard issue. This alternative saved the impacts to the community, community water sources, and exposure of acid rock.

Another example of adaptive and creative design features occurred when TWS and other members of the environmental community realized that one of the best scenarios would interrupt wildlife movement in a critical wildlife corridor between national forest lands that led to nearby national park lands. Currently, this corridor is interrupted by a two-lane highway, but the highway design called for 4-lanes in the most critical portion of this connection. Although this issue emerged fairly late in the design process, NCDOT, Stantec, and TGS listened with an open mind to the concerns as well as possible solutions. They engaged with environmental groups to search for solutions. In the end they proposed a land bridge crossing of this section of highway. The land bridge is designed to accommodate both wildlife as well as Appalachian Trail hikers. As with so many aspects of the Corridor K design, the comprehensive solutions that looked at environmental and cultural solutions as well as transportation solutions offer more than the sum of their individual parts. The land bridge will be an improvement over current conditions for wildlife connectivity. The naturalized setting of the land bridge will offer a more natural crossing for the Appalachian Trail preserving its primitive and historical character. Besides protecting wildlife, the land bridge will likely greatly reduce the chance of vehicle collisions with wildlife, thus also offering greater human safety on the highway.

The project implemented available funding to creatively solve a variety of long-standing issues. Funds had flowed into resources available for the project through the Appalachian Regional Commission (ARC). However, these funds were far below what were needed to complete the project under the original vision of the project. Completing Corridor K posed not only environmental difficulties, but the highway engineering difficulties of the originally proposed routes were daunting. In fact, the originally envisioned highway would have been so

difficult and expensive to build and so environmentally destructive, that it likely never would have been completed.

The original visions of the 1960s highway system and how the ARC highways fit in with the overall highway system were obsolete. The ARC highways were originally envisioned to connect major urban areas in the region – Corridor K was a connector between Asheville, NC and Chattanooga, TN. However, other highways, including the Interstate system, have accomplished this. Where the transportation system is lacking, especially in the project area, is reliably connecting small communities to jobs and amenities and to the broader transportation system. These communities also should be prime destinations for tourism because they have tremendous untapped resources in their public lands and rich cultural heritage. The original highway vision would not only have degraded the environmental and cultural values of these small communities, but it would have essentially bypassed the small communities to move traffic past these communities without stopping. The final Corridor K project instead creates the infrastructure that will meet the transportation needs of residents of these communities to get out for jobs and amenities. It also creates the infrastructure for visitors to get to these communities as destinations rather than as a view seen on the way to somewhere else.

For decades completion of this section of Corridor K had been frustrated by the engineering difficulties and the environmental sensitivity of the lands proposed as routes for Corridor K. On the one hand, some interests insisted rightly that transportation needs were not being met. On the other hand, other interests insisted rightly that the solutions had unacceptable environmental and cultural impacts. This deadlock had existed for decades while legitimate transportation needs were not being met.

What broke this decades long deadlock was NCDOT, Stantec, and TGS stepping outside the usual way of framing the issue. The task had always been seen as designing a transportation route looking at the engineering constraints, and only then looking at environmental issues that result from route alternatives to see if they can be mitigated at all. The approach used by NCDOT, Stantec, and TGS was creative and innovative. They took engineering, environmental, and cultural issues and constraints together as a whole to solve together. The difference comes from valuing environmental and cultural values along with transportation needs and design. They also carefully looked at and defined the real transportation needs as they presented themselves today and, in the future, not what they were defined as decades ago.

A broad representation of stakeholders and interests will benefit from this project design and its implementation. By addressing environmental and cultural issues along with transportation design issues, many synergies have developed even beyond what many of us envisioned. Originally TWS and other conservation groups focused on limiting any environmental impacts of a Corridor K route. This will certainly occur. The Corridor K design does confine impacts to areas already impacted and limits any additional impact. However, by installing a land bridge that will enhance a wildlife corridor, this should actually improve wildlife connectivity in this area beyond what it currently is. For transportation needs, the highway designs will indeed improve transportation infrastructure so that residents have more dependable routes for jobs and amenities. It also will facilitate people who want to come to the area for recreation and tourism, which could boost the local economy.

However, the design can be better appreciated as a more comprehensive infrastructure than just transportation infrastructure. Because this infrastructure fits with the public lands and cultural resources in Western North Carolina, it enhances these values and the ability to enjoy these values in addition to improving transportation infrastructure. The resulting scenic highway will likely be part of the attraction of visiting this part of Western North Carolina because it contributes to rather than detracts from the environment. The land bridge that will serve both the Appalachian Trail and wildlife connectivity will likely become a feature people look for because it is infrastructure that connects the natural world to the human world in an elegant way that allows the infrastructure to serve its purpose without causing harm to the natural world. The solutions offered by NCDOT, Stantec, and TGS for Corridor K serve well their transportation purposes, but they are much more than this. Because of their sensitivity to environmental and cultural issues they can serve as infrastructure that connects the human environment to the natural and the cultural environment.

For these reasons, TWS strongly supports Corridor K for a National Environmental Excellence Award.

Sincerely,

Hugh Irwin
Landscape Conservation Planner
The Wilderness Society
P.O. Box 817
Black Mountain, NC 28711
828-357-5187