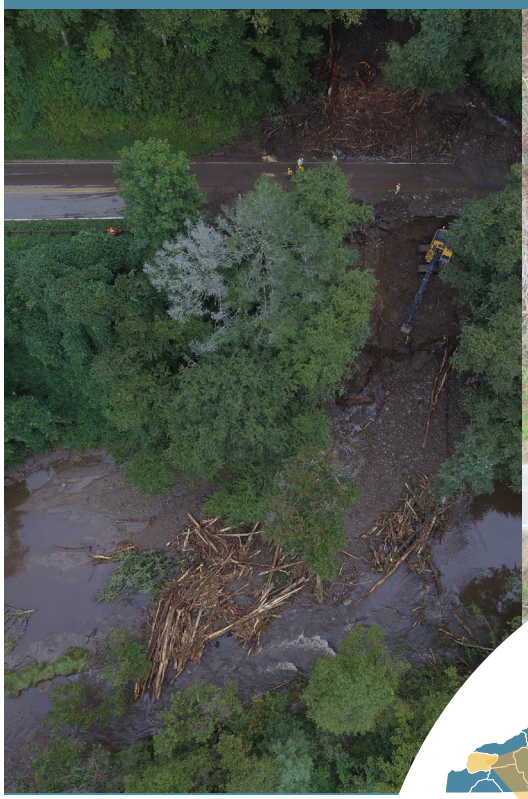
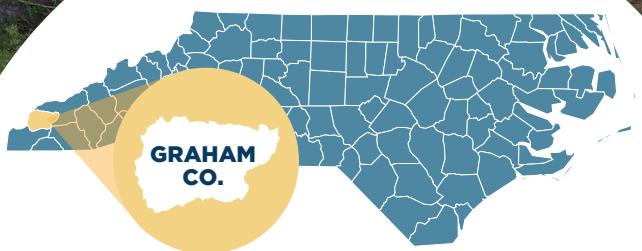
GRAHAM

Greater Rural Access and Highways to Accelerate Mobility

BICYCLE & PEDESTRIAN | CLIMBING LANES | UPGRADES | ITS COMPONENTS | SAFETY | STATE OF GOOD REPAIR | WILDLIFE CROSSING

Merit Criteria





USDOT RAISE Investment Program
GRANT APPLICATION
FEBRUARY 2023

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Safety
Page: 1

The Project will reduce roadway fatalities and crashes and improve response times for emergency vehicles by introducing climbing and passing lanes and widening shoulders. In Robbinsville, where there is a disproportionate number of zero-vehicle households, new sidewalks will improve safety for non-motorized travelers.

Environmental Sustainability
Page: 3

The Project will replace retaining walls and improve embankments to make the corridor more resilient to natural disasters and extreme weather events. The Project also improves the region's resiliency by modernizing the corridor to serve as a reliable alternative to US 19/74 during flooding, landslides, and other emergency events. The Project will reduce travel time throughout the corridor, which will lead to reduced greenhouse gas (GHG) emissions. New bicycle and pedestrian facilities will promote a modal shift to active transportation. The Corridor K project won the National Association of Environmental Professionals Environmental Excellence Award in Environmental Management, Stewardship, Conservation, and Protection in 2021.

Quality of Life
Page: 5

The Project expands active transportation in Graham County, thereby improving public health outcomes and increasing access to healthcare, education, employment, and other essential services. Additionally, the Project's travel time savings and congestion reductions will decrease vehicle fuel and maintenance costs, lessening transportation cost burdens on local residents.

Economic Competitiveness and Opportunity
Page: 8

The Project will improve travel time reliability and freight mobility by modernizing the roadway and introducing signal coordination and other ITS components. The new land bridge and expanded parking at Stecoah Gap will draw more visitors to the Appalachian National Scenic Trail (ANST), increasing revenue for local businesses reliant on tourism and fostering the region's long-term economic growth.

Mobility and Community Connectivity
Page: 10

The Project's multimodal components increase accessibility for non-motorized travelers in Historically Disadvantaged Communities. Moreover, realignments to the ANST, including a new land bridge, will improve mobility for local residents and visitors to the region.

State of Good Repair
Page: 11

The Project will restore and modernize the corridor while creating new multimodal infrastructure in a remote community. The Project will also mitigate system vulnerabilities by improving the reliability of this critical infrastructure asset in an underserved area.

Partnership and Collaboration
Page: 12

NCDOT partnered with a multitude of local, regional, and national organizations in the Project's planning and design. Representatives from environmental groups, Tribal Partners, and economic development organizations were all active participants. Robust engagement of residents and community-based organizations integrated equity considerations throughout the life-cycle of the Project.

Innovation
Page: 14

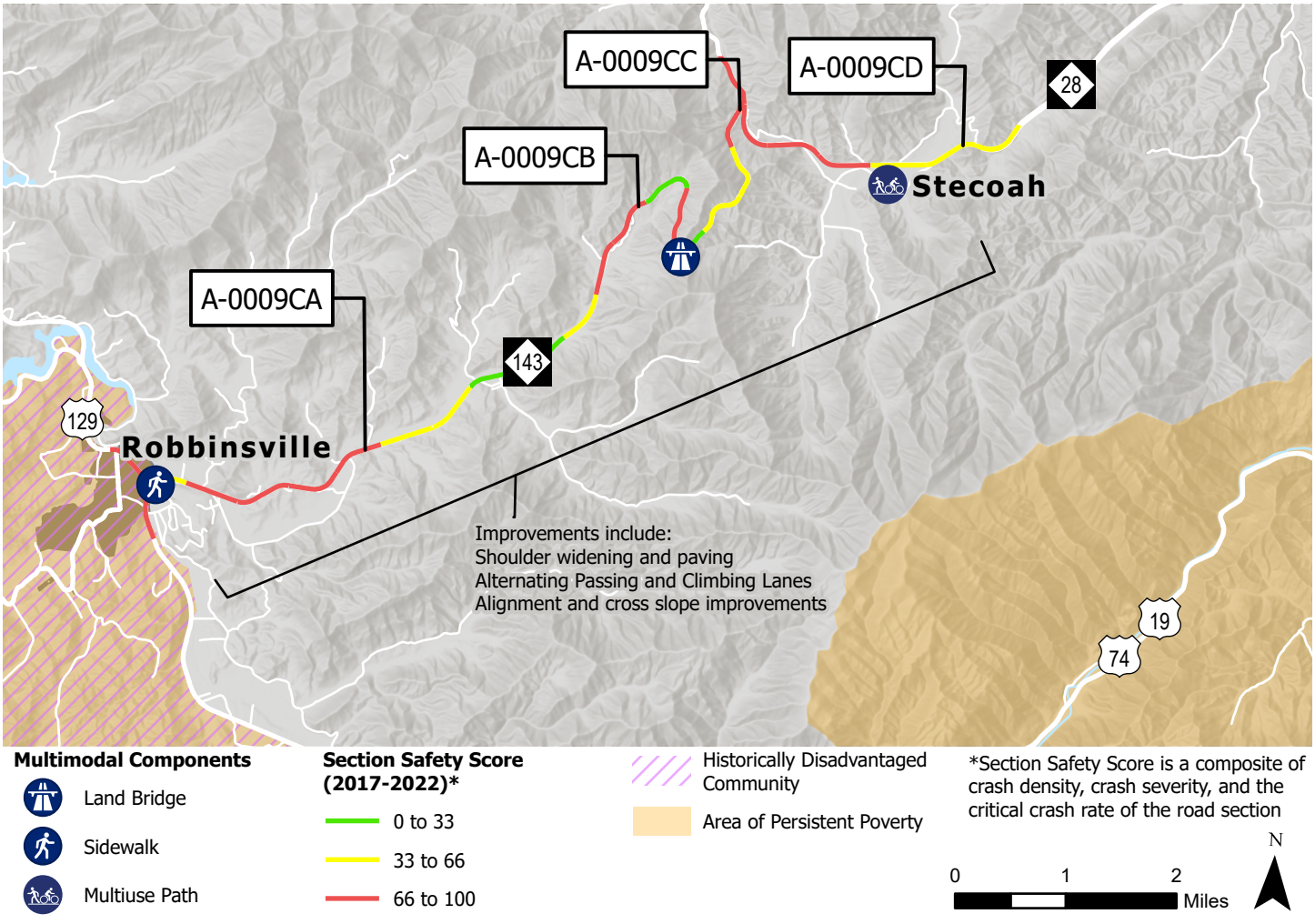
During planning and design for the Project, several innovative technologies were used such as Quantm 3D, an alignment optimization program; Ground Penetrating Radar to avoid areas of potential archaeological and ecological importance; and innovative methods to determine travel time reliability using a 365-day simulation model.

Safety

Injury crashes are exceedingly common in rural areas; according to the USDOT, 43 percent of highway fatalities occur on rural roads despite only 19 percent of the American population residing in rural communities. Improving safety for both motorized and non-motorized travelers is a primary purpose of GRAHAM. By constructing new multimodal facilities, implementing roadway improvements, and improving travel time reliability, the Project will protect motorists as well as vulnerable road users from safety risk, supporting the Safer Roads objective of the USDOT's National Roadway Safety Strategy Plan (NRSSP) by incorporating design elements to prevent crashes from occurring. GRAHAM also supports the NRSSP Post-Crash Care objective to improve emergency medical services (EMS) delivery by decreasing EMS travel time.

Design Improvements

The steep grades, narrow lanes, sharp curves, lack of passing and climbing lanes, and inadequate shoulders characteristic of the Project roads creates unsafe travel conditions and affects vehicle speed and vehicle control, particularly for large trucks. The mountainous 12-mile stretch contains many sharp curves that limit line-of-sight, and grades as high as 8 percent increase the risk of vehicles losing control or running off the road. Inadequate or non-existent shoulders and the narrowness of the existing lanes further exacerbate safety risks to both motorized and non-motorized travelers. Between 2017 and 2022 there were 270 crashes on the Project roads, including 4 fatal crashes and 16 serious injury crashes. The elevated safety scores of the Project roads, calculated based on crash density, crash injury severity and the critical crash rate, reflects this poorer highway safety performance.



GRAHAM will address these safety concerns in several ways. By constructing paved shoulders where no or inadequate shoulders currently exist, GRAHAM will provide a safe area for motorists to pull over and help drivers safely recover from lane departures. The addition alternating climbing and passing lanes (2+1 design) will reduce the potential for lane departure-related crashes associated with drivers passing in areas of limited sight distance. These improvements will prevent 19 crashes annually over the first 20 years of GRAHAM's completion and will save $37.6 million in roadway safety and modernization costs, discounted at 7 percent.

Emergency Response

EMS response times of 10 minutes or longer are associated with higher crash fatality rates in rural areas. Health outcomes also worsen when emergency response is delayed. Graham County's rate of heart-disease related deaths is above the state average, and ranks 80th in the State for overall health factors, according to 2022 North Carolina County Health Rankings. GRAHAM's roadway design improvements will enhance EMS delivery by decreasing EMS travel time. Addressing EMS deficiencies in rural areas also aligns with the goals of the USDOT's Rural Opportunities to Use Transportation for Economic Success (ROUTES) initiative. The Project's 2+1 design, shoulders improvements, and signal coordination in Robbinsville will save an estimated eight minutes per vehicle in emergency response time for portions of the populations of Graham, Swain, Cherokee, Jackson, and Macon Counties. Safety benefits from increased emergency access are valued at $11.5 million, discounted at 7 percent.

Non-motorized Travelers

GRAHAM will also protect non-motorized travelers and vulnerable road users from safety hazards. New sidewalks in Robbinsville, the land bridge at Stecoah Gap, and the multi-use path in Stecoah will separate these users from motorized travelers, allowing cyclists and pedestrians to exercise and travel along or across the corridor without risk of collision with motorists. Residents within the Project's study area are particularly vulnerable due to a higher reliance on multimodal travel options. In Robbinsville 18.9 percent of homes do not have a vehicle, compared to an average of 5.6 percent of households in North Carolina lacking vehicle access, emphasizing the need for a safe and connected pedestrian network in the town. By adding sidewalks along US 129 and NC 143, GRAHAM will close a gap in the existing network, improving residents' access to Robbinsville High School and other important destinations in downtown Robbinsville.

Lastly, the new land bridge at the ANST crossing of NC 143 will provide a safer, grade separated passage to protect wildlife and provide tourists and hikers with a safe way to cross NC 143. The land bridge and wildlife fencing will decrease wildlife-involved crashes by providing a grade-separated means of safe passage for native species. According to FHWA HRT-08-034, vehicle collisions with deer and other large animals occur most frequently on high-speed, rural, two-lane roads like NC 143 and NC 28. Other species of wildlife found in Graham County, such as black bear and wild boar, have migratory patterns that follow the ANST corridor.

GRAHAM will improve pedestrian facilities in Robbinsville, NC

Environmental Sustainability

Environmental sustainability is one of the primary purposes of the Project, and addressing climate change and environmental justice are essential components of the project. GRAHAM will address these issues by improving the resiliency of at-risk infrastructure to the region's geotechnical hazards on this regionally significant corridor. Drainage and culvert improvements will offer flood protection while also facilitating the passage of aquatic species. The Project will add climbing and passing lanes, as well as Intelligent Transportation Systems (ITS) components and signal coordination in Robbinsville, that will reduce travel time delays during emergency closures of US 19/74, These improvements will reduce Greenhouse Gas (GHG) emissions associated with vehicle congestion and idling. Lastly, project components like sidewalks, a land bridge connecting the ANST, and a multi-use path will promote a modal shift to active transportation.

GHG Reductions

According to North Carolina Department of Environmental Quality's (NCDEQ's) 2022 GHG Inventory, the transportation sector creates the largest share of GHG emissions in North Carolina, accounting for 36 percent of emissions in the State between 2005 and 2018. GHG emissions not only drive global climate change processes, but they negatively impact local conditions through poor air quality, hotter temperatures, and natural hazards like increased flood events. North Carolina Executive Order (EO) 246 outlines state goals to reduce GHG emissions to at least 50 percent below 2005 levels by 2030 and to achieve net-zero emissions as soon as possible but no later than 2050.

GRAHAM aligns with these statewide decarbonization plans and will decrease transportation-related GHG emissions by reducing travel times and minimizing delays and idling that lead to congestion through the Project's 2+1 design and ITS components (see **Project Description** and **Economic Competitiveness and Opportunity** for discussion of travel time reliability). These design and ITS improvements save an estimated average of eight minutes per trip in the corridor; while signal coordination and signal timing plans for various high-volume traffic scenarios in Robbinsville will save as estimated 24 seconds per trip. These travel time reductions will reduce GHG emissions associated with congestion, idling, and detours, equating to a reduction of more than 20,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) over twenty years and a $2.0 million emissions savings benefit (discounted at 7 percent and 3 percent for CO_2). Moreover, the addition of DMS and Dynamic Trailblazers will alert travelers to potential delays along US 19/74 due to landslides, vehicular incidents, and maintenance delays, to more efficiently direct traffic to and along the detour routes.

Regional Resiliency

The Project corridor is particularly important during emergency events as it serves as the only travel alternative and detour during closures of US 19/74, which experiences frequent landslides and flooding. As storms and other hazards occur more frequently and with greater intensity due to climate change, it is critical that residents have a reliable and safe way to travel during a variety of weather events.

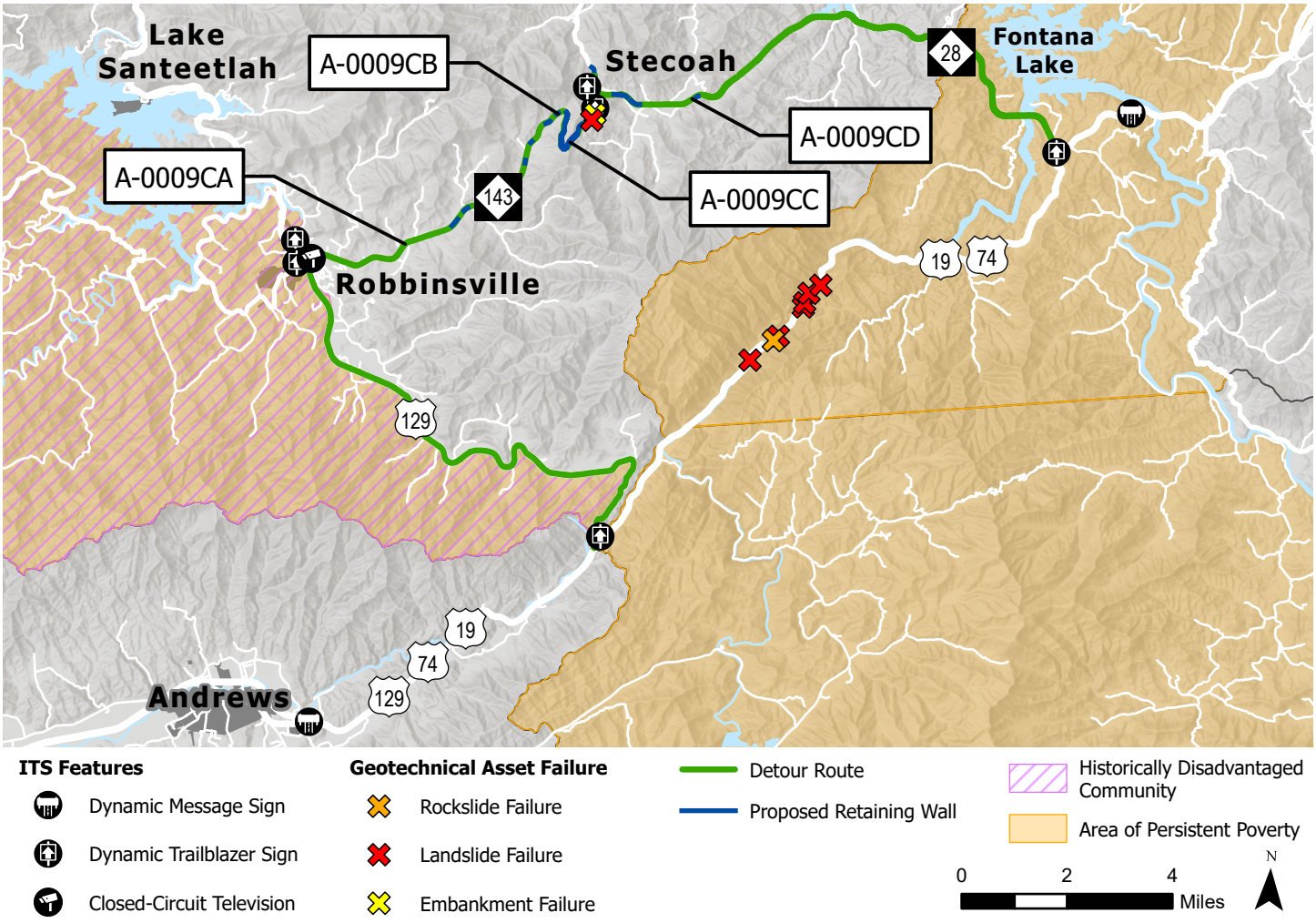
In alignment with the NCDOT 2021 Resilience Policy and the 2020 North Carolina Climate Risk Assessment and Resilience Plan, GRAHAM will improve the resilience of critical at-risk infrastructure to the impacts of climate change by bringing the Project roadways into a state of good repair and improving the corridor with design and structural elements that include new embankments, retaining walls, shoulders, drainage pipes, and culverts. According to the NCDOT Geotechnical Asset Management (GAM) mapping tool, the segment of NC 143 in the Stecoah Gap has previously experienced an embankment failure and landslide. Shored mechanically stabilized earth (SMSE) fill walls will be constructed to address large slope failures and improve resilience to geotechnical failures related to colluvium deposits found in the area. The Project will stabilize and reduce slopes along the roadways and add a multi-bench rock cut

with concrete barrier, vegetated embankments, and more catchment between slopes and travel lanes. When constructing steeper fill slopes, rock embankments and rock plating will be utilized to minimize impacts to streams, wetlands, and archaeological sites.

The Project corridor also has several areas that the NCDOT and North Carolina Emergency Management (NCEM) Roadway Inundation Tool (RIT) shows are susceptible to ground inundation. To ensure the corridor can withstand a 50-year storm event, 13 major and 75 minor stream crossing structures were evaluated for improvement. New drainage pipes and two dry detention stormwater basins will more effectively manage stormwater flow and prevent flooding, ensuring the Project roads remain a safe and viable route during a storm. New culverts and stream crossing improvements such as sills and baffles will also manage stormwater while supporting the passage of aquatic species by maintaining a normal depth of flow and velocities, as well as preserving channel widths. Grass lined ditches will be added as an additional stormwater control measure to improve the water quality of local streams.

Active Transportation

The Project will support a modal shift to active transportation by constructing a new multi-use path in Stecoah, new sidewalks in Robbinsville, and a land bridge to provide a grade-separated crossing of NC 143 along the ANST. The new sidewalks will fill a gap in the existing network to improve pedestrian access to destinations within Robbinsville, notably Robbinsville High School.



Quality of Life

Improving the quality of life for local residents is one of the primary purposes of the Project. GRAHAM will improve quality of life by reducing the financial burden of transportation through travel time savings from better road conditions, improving reliable and safe access to daily destinations such as employment, essential services, and recreational amenities, and promoting public health by adding new active transportation facilities such as sidewalks, a multi-use path, and land bridge to improve mobility and safety for pedestrians on the ANST. The Project also proactively addresses equity by improving transportation facilities for vulnerable road users and transportation disadvantaged populations in an economically distressed area. The Project will allow these populations to access opportunities more reliably and safely, and increase transportation options for the proportionally high number of zero-vehicle households.

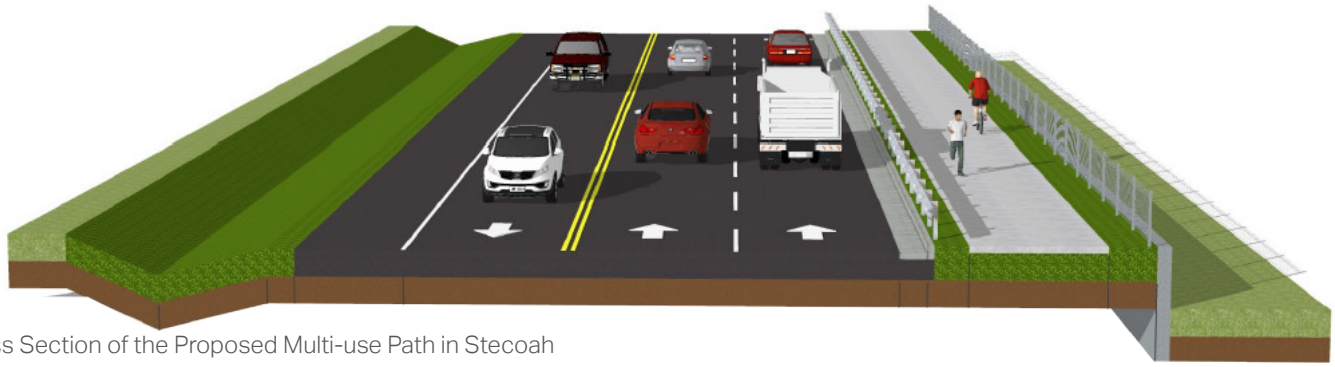
Reduced Transportation Costs

The Bureau of Transportation Statistics' Household Spending on Transportation data shows that transportation accounts for the second largest household expenditure category after housing. Rural households devote 20 percent of their total household spendings on transportation, which is more than urban households. Graham County residents are especially vulnerable to rising transportation costs, as they must travel between one and three hours to access the closest hospitals and health care resources in Sylva, NC; Asheville, NC; Knoxville, TN; and Chattanooga, TN. The cost burden of owning and operating a vehicle is further exacerbated by the volatile fuel prices, supply chain issues, and inflation the nation is currently experiencing.

GRAHAM will reduce transportation costs for travelers on the Project corridor through travel time savings and improved roadway conditions. By adding climbing and passing lanes, widening and adding shoulders, and using ITS components to reduce delays on Project roads during closures of US 19/74, the Project will reduce congestion and decrease the vehicle fuel that is wasted while idling. Bringing the roadways into a state of good repair will also minimize damage to vehicles and decrease maintenance costs.

Improved Access

The Project will improve access to employment and essential goods and services such as healthcare, education, grocery stores, and recreation by modernizing a critical roadway. According to the US Census Bureau's 2016-2020 ACS 5-year estimates, 25 percent of residents in Graham County work outside of the county (see Demographic Snapshot Tool on **Supplemental Materials website**), and the Project roads are one of the primary travel routes for regional travel. In addition, Graham County residents rely on the Project roads to reach educational institutions and healthcare facilities both within and outside of the county. The Graham County EMS Director estimates that the Project corridor serves around 2,000 emergency trips a year. The design and condition of the Project roads, including the lack of safe passing opportunities and inadequate and nonexistent shoulders current can lead to congestion and delays, while the aging infrastructure is vulnerable to slope failures and landslides, which can result in road closures. The



Cross Section of the Proposed Multi-use Path in Stecoah

Project will add climbing and passing lanes, widen shoulders, and construct design improvements to reduce emergency response times and create a safe, reliable, and efficient route for residents to access opportunities and life-saving medical care.

Improved Public Health

GRAHAM will improve public health by promoting active transportation through the addition of sidewalks in Robbinsville, a multi-use path in the Stecoah Valley, bikeable shoulders, and a land bridge to provide a grade-separated crossing of NC 143 along the ANST. According to the CDC's National Center for Chronic Disease Prevention and Health Promotion, rural communities often have fewer opportunities to be physically active compared to their urban counterparts, which can lead to disproportionately negative health outcomes for rural populations. Through the Project's public involvement efforts, the community identified a portion of the Stecoah Valley as a popular walking route and noted that residents and tourists currently walk and bicycle along a roadway with narrow shoulders and vehicles that may be traveling up to 55 miles per hour (mph). The Project will add a multi-use path along the NC 28 portion of the walking loop to support safe walking and bicycling. In Robbinsville, the Project adds sidewalks to improve pedestrian access to destinations such as Robbinsville High School and Ingles grocery store. The Project also adds a land bridge to facilitate safe crossing of NC 143 for hikers and tourists on the ANST. Lastly, the Project will construct eight-foot paved bikeable shoulders from Robbinsville through Stecoah Valley. These multi-modal facilities will promote active transportation and physical activity for improved public health outcomes. The benefit of walking for health and recreation totals $200,000, discounted at 7 percent.

Proactively Address Equity

The Project will proactively address equity by improving motorized and non-motorized travel for transportation disadvantaged residents in rural Graham County. The Project's improvements will enhance access to opportunities both locally and across the region. GRAHAM will complete one of the last sections of the Appalachian Development Highway System (ADHS), which was established to improve roadways for populations in Appalachia who often experience higher rates of poverty and other socioeconomic disparities as a result of unique challenges such as the region's physical isolation and topography. The Appalachian Regional Commission's Access in Appalachia Primer report highlights the connection between transportation access and social and economic opportunities for residents in places such as Graham County.

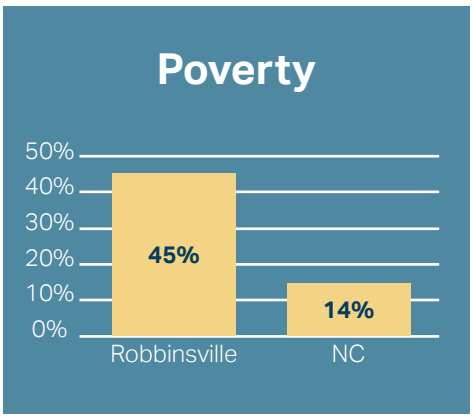
The Project components are located in a Historically Disadvantaged Community (CensusTract 37075920300), two Areas of

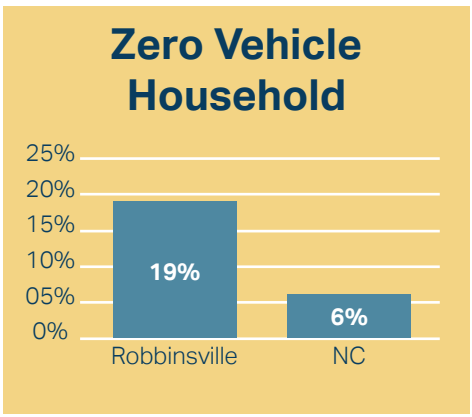
The Project components are located across:

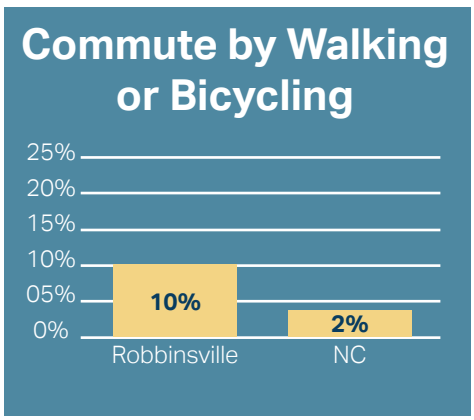
One Historically Disadvantaged Community (HDC)

Two Areas of Persistent Poverty (APPs)

Two census tracts identified as disadvantaged by the Justice40 Initiative







Persistent Poverty (Census Tracts 37075920300 and 37173960301), as well as tracts identified by the Justice40 Initiative as disadvantaged (Census Tracts 37075920300 and 37075920100). In Robbinsville, 45 percent of the population lives below the poverty line compared to 14 percent in North Carolina (See Demographic Snapshot Tool in **Supplemental Materials Website**). In addition, 10 percent of residents in Robbinsville commute to work by bicycling or by walking compared to two percent in the State, highlighting the importance of multi-modal infrastructure to support these populations. The Project will proactively address equity through roadway improvements and new multi-modal facilities that will close gaps in the existing network and better connect disadvantaged residents to employment, education, healthcare, recreational opportunities, and other essential services.

"Our region has enjoyed the immeasurable benefits of the completed sections of the Appalachian Development Highway System, which have been instrumental in connecting rural western North Carolina communities to education, healthcare, and job opportunities. It is time to complete Corridor K so that Graham County residents have an equal opportunity to benefit from the transformative impact that these transportation investments can provide"

Russ Harris, Executive Director
Southwestern Commission Council of Governments

Economic Competitiveness and Opportunity

Graham County faces ongoing economic challenges. The Southwestern Commission's Region A Toolbox projects low population growth for the county (8.8 percent) through 2030. Southwestern Commission data also shows the region's 2019 unemployment rate is higher than the state average at 5.6 percent as of 2019. Within Robbinsville, 44.9 percent, of residents live in poverty, far exceeding the statewide average of 14 percent. GRAHAM will promote economic competitiveness and opportunity in this economically distressed region by improving travel time reliability and reducing delays to improve freight mobility, facilitate tourism opportunities, and promote long-term economic growth. Additionally, the project adopts inclusive economic development by utilizing Minority- and Women-owned Disadvantaged Business Enterprises (DBEs).

Travel Time Reliability

Travel times on the Project roads can be unpredictable. The project roads are located in mountainous terrain, with grades between three and eight percent and sharp curves that reduce sight distance. Speed limits on the project roads range from 25 mph in tight curve sections to 55 mph in straighter sections. Lane widths are narrow and there are limited passing opportunities over substantial distances due to the prevalence of sharp curves and steep grades. By implementing a 2+1 design in strategic locations, the Project will improve mobility and travel reliability in each direction and during the peak period by allowing vehicles to pass trucks and slower vehicles safely and efficiently, while maintaining direction of travel and minimizing crossings into the opposing lane of traffic (see traffic studies on **Supplemental Materials website**). Travel time reliability will be further improved with the introduction of ITS components, including closed-circuit television (CCTV) and signal coordination in Robbinsville, which will reduce congestion and delay during detour events.

GRAHAM will result in travel time savings of seven minutes per vehicle, and cumulatively result in travel time savings of $57.9 million, discounted at 7 percent. The Project's travel time savings and reliability improvements will also result in $5.4 million in operating cost savings for freight traffic and trucks, while the ITS components will quickly alert travelers on US 19/74 of road closures, delays, and detour routes ahead of decision points, saving VMT and VHT and resulting in a detour cost savings of $83.6 million, discounted at 7 percent.

Tourism

Graham County's economy is strongly tied to recreational tourism; Graham County's Outdoor Recreation Economic-Building Strategy & Report found that visitor expenditures reached $29.4 million in 2018. A 2015 report by the American Hiking Society found that this revenue generates economic activity twenty times its original value. Western NC's $206 million craft-based economy is also highly dependent on tourism, as visitors drive 62 percent of art gallery sales in the region. The Project includes several improvement that will draw tourists to the county's preeminent attractions. An additional two parking spaces at the ANST trailhead along NC 143 gap will allow more tourists and hikers to access this nationally significant attraction within Graham County. An increase in ANST through-hikers would boost the county's economy; a 2019 report by the NC Department of Commerce found that overnight visitors spend three times as much as single-day trip visitors in western NC. As an accessible means to observe wildlife and a unique landscape feature, the ANST land bridge will likely become an attraction in its own right, a precedent set by other transportation infrastructure in Appalachia like the New River Gorge Bridge in West Virginia and the Lynn Cove Viaduct in North Carolina. The multi-use path in Stecoah will bring residents and visitors alike closer to one of Graham County's cultural hubs, the Stecoah Valley Cultural Arts Center. The Graham County Strategic Tourism Plan identifies this artistic venue, while widely viewed among local stakeholders as one of the county's strongest draws, as an untapped asset. The multi-use path will improve non-motorized access to this important destination, connecting them to local roads and a nearby walking path.

The Projects travel time savings and reliability savings will also aid the tourism sector. Tourism development stakeholders have maintained the importance of improving highways for the growth of the industry in the region. ARC reports that a third of these stakeholders consider "better roads" to be "extremely important".

Freight Mobility

Agriculture is also a significant economic driver in western NC. USDA's annual statistical bulletin for North Carolina shows that Graham County's 123 farms generated over $3 million in sales in 2021, and there are over 1,000 farms in the region (see **BCA Technical Memo**). A reliable transportation network is necessary for growers to bring produce from farm to market and for consumers to reach them at the market or at the farm itself. The Project's roadway improvements will increase freight mobility for farmers and the agricultural industry in the region, reducing delays, shipping costs, and ultimately cost for agricultural products. Travel time savings will cut transportation associated expenses and provide agricultural market accessibility benefits for farmers in Graham and neighboring counties at a value of $29.0 million, discounted at 7 percent.

DBE Participation

The Project will include participation from minority owned and women owned businesses and DBEs. NCDOT has robust DBE outreach and certification programs to promote the participation of disadvantaged businesses in NC transportation projects. All three let sections of the Project utilize DBEs for construction: DBE participation is anticipated to reach six percent for A-0009CA and four percent for A-0009CB and A-0009CC. NCDOT will continue to strive to include robust participation by DBEs in A-0009CD upon receipt of the additional funding needed to complete this last section of the project.

Improves Mobility and Community Connectivity

Improving mobility and community connectivity is a primary purpose of the Project. GRAHAM will accomplish these improvements by modernizing the Project corridor to serve as a safe and reliable route for Graham County Transit's demand response services. The Project will also improve mobility for non-motorized travelers in underserved communities through new multimodal facilities which close gaps in the network and increase community connectivity.

Transit Connectivity

The Project will improve system-wide connectivity and access to transit by modernizing a roadway that serves as a critical route for Graham County's transit operations. Graham County operates a demand response and subscription service for residents to reach medical appointments, continuing education programs, shopping, nutrition, and other key services and goods located in the region. Approximately 19 percent of households in Robbinsville and 7 percent of Graham County households do not have access to a personal vehicle. Graham County's transit service is crucial to support these residents (See Demographic Snapshot Tool on **Supplemental Materials website**).

According to the Graham County Transit Director, the service operates 24 days a month and provides transportation to an average of 1,505 riders during this time. Nearly all of these trips use the Project corridor, but congestion and delays resulting from the current roadway conditions creates service delays and challenges. GRAHAM will improve transit access by increasing the corridor's capacity and efficiency through a 2+1 design as well as by adding and widening paved shoulders. The Project will also strengthen the corridor's resilience to climate change by repairing and improving drainage features, slopes, retaining walls and embankments to ensure this route is safe and reliable for Graham County's transit services. The value of time saved for transit users from travel time savings is $300,000, discounted at 7 percent.

Graham County Transit Staff. Photo courtesy of the Graham Star

Accessibility and Mobility

GRAHAM will increase accessibility for local non-motorized travel through the addition of sidewalks, paved shoulders and a multi-use path. The Project will also support regional non-motorized travel on the ANST by adding a grade-separated land bridge for hikers to safely cross NC 143. These multimodal Project features will comply with Americans with Disability Act (ADA) requirements and will support residents in Historically Disadvantaged Communities to access economic, social, and recreational opportunities.

The Project's multimodal components were developed with robust community participation that helped to identify gaps in the existing pedestrian and bicycle network (See **Partnership and Collaboration**). The multi-use path addresses a community-identified need to support existing pedestrian and bicyclist activity in the Stecoah Valley, while the new sidewalks in Robbinsville addresses a gap in the pedestrian network, thereby improving access to educational opportunities, essential services, and other important destinations in downtown Robbinsville. The paved shoulders not only provide a vital transportation alternative within Robbinsville but also provides an alternate access to many recreational facilities within the Great Smoky Mountain National Park, Cherokee and Nantahala National Forest and Joyce Kilmer National Park.

State of Good Repair

Outdated infrastructure creates serious maintenance challenges and safety issues, decreases travel time reliability and increases travel-related costs, decreases mobility, and leads to less resilient infrastructure. The Project's outdated infrastructure assets impair mobility, reduces travel time reliability, and decrease the overall resiliency of the corridor. GRAHAM will modernize and restore the Project's roads and mitigate system vulnerabilities by correcting deficient drainage systems and deteriorating pavement conditions, improving cross slopes and drainage, stabilizing steep slopes, widening travel lanes, addressing geotechnical hazards, and widening/adding shoulders along the corridor. These improvements will prolong the useful life of the roadway and reduce future maintenance costs.

Construction for the Project will also reduce future asset renewal costs by avoiding or delaying major rehabilitation and replacement of pavement, guardrails, drainage pipes and headwalls, and replacement of one bridge. Without the Project, these improvements will be required as early as 2025. The Project's operations and maintenance (O&M) costs avoided totals $10.2 million, discounted at 7 percent. After construction is completed, the Project roads have 40 useful years remaining past the end of the analysis period. The value of the remaining useful life for the Project discounted at 7 percent is $28.9 million.

By reducing necessary maintenance and rehabilitation needs, GRAHAM will also mitigate ongoing system vulnerabilities by reducing delays. In a region vulnerable to route closures from flooding and landslides, these events create delays which hinder regional travel and freight movement. On NC 143 alone, there are on average thirteen annual closures with detours due to maintenance, lasting 3.45 hours on average per incident. Over 5,000 motorists a day on average will benefit from improvements made by the Project. US 129, NC 143, and NC 28 together form the only detour for emergency closures on US 19/74; by modernizing and improving the state of good repair of the Project roads, GRAHAM will bolster NCDOT's ability to maintain this critical corridor in a state of good repair into the future.

GRAHAM will also create new multimodal infrastructure in remote communities that will be maintained in a state of good repair. The new sidewalks in Robbinsville and the multimodal path in Stecoah will close gaps in the existing network and expand travel options for non-motorized travelers. Transportation disadvantaged populations and vulnerable road users represent a greater share of the population served by the Project when compared to the State (see **Project Location**). ADA-compliant bicycle and pedestrian facilities maintained in a state of good repair are essential for vulnerable road users' ability to navigate their communities and access employment, educational opportunities, and essential services.

GRAHAM will improve pavement conditions

Guardrails will be repaired and improved

Slopes and soil stability will be improved

Partnership and Collaboration

One of the hallmarks of GRAHAM is the strong partnerships developed and leveraged during project development. A broad range of representatives from Federal and State planning agencies, environmental advocacy groups, and Tribal Partners were integral to the Project Team.

NCDOT and FHWA conducted meaningful engagement efforts aligned with the Promising Practices for Meaningful Public Involvement in Transportation Decision-Making to intentionally consider the needs and desires of residents and community-based organizations to ensure equity considerations for underserved communities are meaningfully integrated throughout the lifecycle of the project. The COVID-19 pandemic created unexpected opportunities for more flexible meeting formats and broader community representation during engagement activities. While the first public meetings in 2019 were held in person, the 2020 public hearing and comment period relied on virtual public involvement, which was able to engage stakeholders who do not participate in more traditional approaches.

NCDOT has made significant efforts to equitably and meaningfully involve residents, particularly the region's transportation disadvantaged populations and vulnerable road users, as well community-based organizations. NCDOT intentionally leveraged this feedback to improve the transportation decision-making process for A-0009C. These efforts were recognized in 2021 when the Project was awarded the National Environmental Excellence Award for Environmental Management, Stewardship, Conservation and/or Protection by the National Association of Environmental Professionals (NEAP). The intentional coordination across a broad cross section of the community resulted in the inclusion of several multimodal elements, including pedestrian accommodations in Robbinsville, the ANST land bridge, and a multi-use path in Stecoah.

Stakeholder meetings coordinated by NCDOT and FHWA centered around the impacts the project would have on the ANST and United States Forest Service (USFS) lands. Environmental advocacy groups, local business stakeholder groups, and Tribal Partners participated in the Project coordination through a "Fresh Start" approach that aimed to identify and address concerns as they arose by emphasizing early and continuous

GRAHAM's Project Partners

Government Representatives

- Appalachian Regional Commission (ARC)
- Southwestern Rural Planning Organization
- Graham County Commissioners and County Manager
- Swain County Commissioners and County Manager
- Graham County Economic Development Director
- Cherokee County
- NCDOT
- FHWA

Environmental Stakeholders

- Appalachian Trail Conservancy
- Southern Environmental Law Center
- WaysSouth
- Mountain True
- Wilderness Society
- Defenders of Wildlife
- Hiwassee River Watershed Coalition

Tribal Partners

- Muscogee Creek Nation
- Catawba Indian Nation
- Cherokee Nation
- Eastern Band of Cherokee Indians
- United Keetoowah Band of Cherokee Indians

input from the Project Team. Early meetings (2011-2015) for the Project focused on developing and reaching consensus on the planning approach to the Project, while subsequent meetings (2016-2020) focused on subjects related to the Project's implementation. Between 2011 and 2015, the Project was paused in order to conduct a regional study, develop County Comprehensive Transportation Plans, and resume connected studies with the "Fresh Start" approach to collaboration and public involvement. During the 2019 meetings, 144 comment sheets, emails, and online forms along with two petitions that received 494 subject-specific comments were received by the project team and provided guidance on design elements. After receiving those comments, the Project Team was able to eliminate design options with strong public opposition. These efforts have resulted in a project alignment that meets the purpose and need of the Project while beings sensitive to the region's unique cultural, natural, and human environment.

In an effort to expand the opportunity for participation by DBEs and create opportunity for smaller firms to participate in Project implementation, A-0009C was split into sections in order to encourage local and regional contractors and subcontractors to bid on the project. Furthermore, NCDOT included strong labor standards and incentives for construction firms that offer apprenticeships as part of the bidding process.

"Corridor K is several decades in the making, and we certainly have faced and overcome many challenges to get where we are today," Austin said. "Thanks to collaboration, we were all able to come together and find solutions that will better serve our community and the state."

Wanda H. Austin, PE CPM
Division 14 Engineer, NCDOT

PARTNERSHIP & COLLABORATION

ENGAGEMENT PROCESS

2015 FRESH APPROACH

Re-initiate studies with a "Fresh Start" approach, focusing on collaboration to avoid schedule delays and identify concerns. The process emphasized early and continuous input with local officials, tribal staff, and federal/state regulatory and resource agencies that comprised the "Project Team."

2017-2018 PROJECT TEAM MEETINGS

NCDOT and FHWA emphasized that local input would drive the project. The Project Team met numerous times over the course of 2017 and 2018 and included coordination with USACE, local officials, and Tribal Partners.

2019 PUBLIC MEETINGS

Public meetings were held in Robbinsville and Andrews in February 2019 for the Project. The locations fell within an underserved community as defined by EO 13985. and meetings included underrepresented communities.

2020 PUBLIC HEARING

A virtual public hearing with a subsequent 30-day comment period was held during which time citizens submitted comments on the recommended alternative.

2021 FINDING OF NO SIGNIFICANT IMPACT (FONSI)

The FONSI completed the NEPA environmental review process, incorporating proposed project impacts and mitigation measures resulting from comments received, agency coordination since the Environmental Assessment (EA) was approved, and documentation of comments related to the EA. Fifty-nine (59) subject specific comments were received during the virtual public hearing incorporated in the FONSI.

Innovation

There are several innovative features of GRAHAM, from innovative technologies incorporated during planning and design to innovative project delivery methods.

3.1 Innovative Technologies

Travel time reliability measures the consistency or dependability of travel times from day to day or across different times of the day. NCDOT used a 365-day simulation model of the study area for both the build and no-build scenarios to determine the travel time reliability of the Project. This model determined the travel time for every vehicle over a one-year period based on actual variations in demand collected from aggregated location-based data for 2019. By using the 95th percentile travel times, this approach was able to robustly estimate and quantify delay reductions on specific routes during the heaviest traffic days. By increasing travel time reliability, the Project reduces barriers to opportunity faced by transportation disadvantaged populations and vulnerable road users in the region.

Another advanced technology used during project development is ground penetrating radar (GPR). GPR is traditionally used to identify septic systems, however NCDOT leveraged this technology to identify potential areas that may serve as archeologically significant to the ECBI tribe and ecological anomalies to avoid during construction. Both the 365-day simulation and GPR created significant cost-savings and reduced impacts to the environment and community.

The ANST land bridge is a physical representation of how the Project mitigates barriers to opportunity and emphasizes the importance of public involvement, as the land bridge was initially proposed by the public and environmental advocacy groups. The land bridge will facilitate wildlife and pedestrian transversing the ANST across NC 143. The FONSI provides several avoidance, minimization, and mitigation measures for potential adverse impacts to the ANST users and USFS lands.

Finally, NCDOT used the Quantm software tool to best evaluate design options for optimal roadway alignments. Quantm uses a three-dimensional model to evaluate thousands of potential routes between two given points, looking for routes that meet the model's design standards—such as speed limit and maximum grade—and identifying locations where tunnels or bridges are likely needed to maintain the desired design standards. Quantm also used NCDOT cost data to estimate construction costs. The use of the software saved valuable time and budget to arrive at a consensus among the stakeholders sooner.

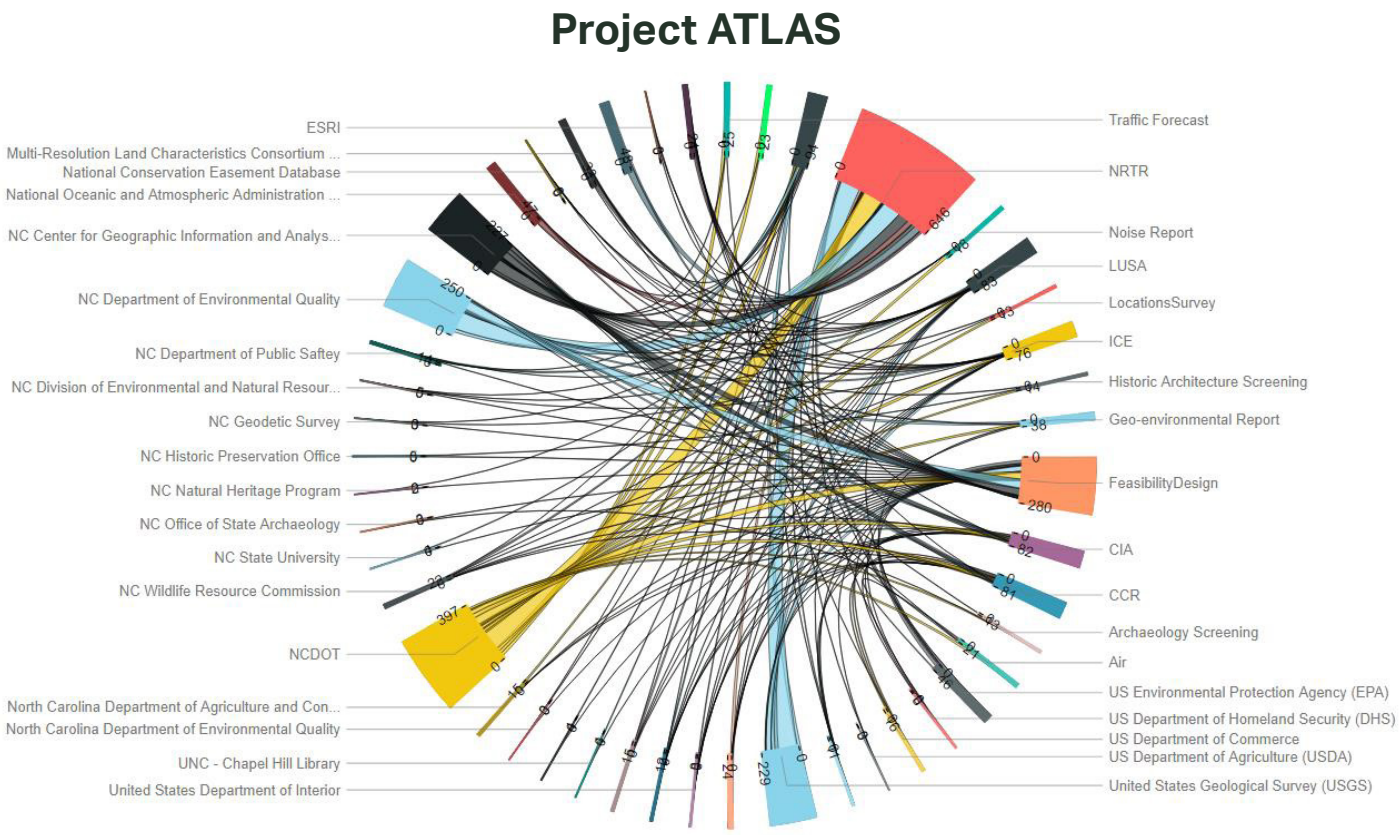
GRAHAM incorporates an innovative land bridge to facilitate pedestrian and wildlife crossings of NC 143 along the ANST

3.2 Innovative Project Delivery

The preliminary engineering phase of STIP Project A-0009C took a Planning and Environmental Linkages (PEL) approach to project development prior to entering the environmental review phase. This collaborative and integrative "Fresh Start" approach (see **Partnership and Collaboration**) allowed stakeholders provide input on environmental, community, and economic goals and use this information to inform the project development and environmental review process. Through the PEL process, NCDOT engaged Tribal Partners early and often, which was critical because of potential impacts associated with the Trail of Tears and potential right-of-way impacts to Tribal lands.

Another project delivery innovation NCDOT leveraged during the environmental review process is Advancing Transportation through. Linkages, Automation, and Screening (Project ATLAS). ATLAS is a web-based platform that consolidates spatial data from a variety of sources into a single interface with several GIS tools for screening and mapping environmental features and constraints. The ATLAS Workbench provides a forum for managing projects and storing documents. Since its release in 2019, over 1,100 NCDOT and private engineering firm consultant staff have been trained in its use. Data from Project ATLAS was used to screen for a wide range of natural and human environmental conditions along the Project corridor, setting the foundation for accelerating project delivery.

NCDOT also leveraged its Integrated Project Delivery (IPD) and Merger processes for a more effective and efficient project development process. GRAHAM implemented Initial Project Coordination methods outlined by NCDOT (2019) in the process of NCDOT's shift toward Integrated Project Delivery. Following the Internal Scoping process among NCDOT and Project Team members, NCDOT used the Merger Process to achieve regulatory concurrence on project decisions to garner streamlined permit approvals.



Project ATLAS is a robust GIS-based platform designed to improve business processes and provide a data access and storage framework to support informed project development

USDOT Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Application

February 2023

GRAHAM

Greater Rural Access and Highways to Accelerate Mobility

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