



DEVELOPING A SCHOOL TO TRANSPORTATION WORKFORCE PIPELINE IN NORTH CAROLINA

Recommendations to North Carolina Department of Transportation for Enhancing Transportation Career Opportunities for HBCUs and MSI Students



This report was prepared by the U.S. DOT's Volpe National Transportation Systems Center on behalf of the North Carolina Department of Transportation. Its purpose is to make recommendations for strengthening minority representation in the state's transportation workforce. The content of this publication is for information use only.

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SUMMARY RECOMMENDATIONS FOR NCDOT

This report contains several actions for NCDOT to consider taking while catalyzing a minority student-focused school-to-career pipeline program. The list below summarizes the recommendations contained in this report.

RECOMMENDATIONS FOR EXISTING NCDOT PROGRAMMING:

1. Expand existing NCDOT K-12 programs such as DOT Volunteers and Construction Career Days to include a broader range of transportation-related skills such as transportation planning, operations, computer science, finance, etc.
2. Develop communications materials that help students and educators explicitly connect each relevant degree program with transportation programs. NCDOT should keep lists of HBCU/MSI career fairs and related opportunities and schedule class visits to help students put a face to transportation careers, answer their questions, etc.
3. Consider integrating innovation concepts and challenges into existing National Summer Transportation Institutes.
4. Consider incorporating “in-service training” during internship program to help students contextualize transportation careers as making a difference in their communities, using national best practices described in this report as a model.
5. Consider partnering with HBCUs/MSIs to carry out statutorily-required public engagement efforts, planning exercises, etc., on behalf of NCDOT. These institutions are members of the communities where NCDOT is completing state transportation projects and would be good ambassadors on behalf of the DOT, while at the same time providing students and professors real world experience in non-engineering transportation projects.
6. Develop opportunities for HBCU students who are already engaged with NCDOT through internships or other programming to become “transportation ambassadors” to K-12 classrooms.

NEW PROGRAMS TO CONSIDER:

1. Programming for middle and high school students to expose them to emerging transportation technology, innovation, and entrepreneurship such as drone delivery technologies or transportation and logistics-focused small businesses.
2. Explore a partnership with the Carolina Small Business Development fund campus incubators, which are already located at several North Carolina HBCU campuses.
3. Establish an Alumni Network for graduates of NCDOT’s student programming. Keep in contact with these students through a listserv and social media channels to continue engagement with them as they develop their career trajectories.
4. Articulate skillsets NCDOT finds most desirable in new hires (data analysis, entrepreneurship, environmental stewardship, computer science, etc.) and partner with HBCUs/MSI which have corresponding degree programs at HBCUs/MSI in the state and work with professors and staff in that department to incorporate transportation content in the curriculum.

INTRODUCTION

This report identifies gaps, opportunities, and potential solutions to strengthen connections between North Carolina’s Historically Black Colleges and Universities (HBCUs)/Minority Serving Institution (MSI) students and transportation career opportunities in the state. The report defines a framework to generate interest among HBCU students in transportation and related careers, and to bridge the gaps between students and the specific skills and professional experience required to enter transportation careers.

The North Carolina Department of Transportation (NCDOT) has already developed many of the necessary programs and components to build an industry-leading school-to-work pipeline program encouraging minority students to enter the transportation field. However, there are opportunities to increase internal coordination, amplify the reach and impacts of these disparate efforts, and more effectively build the transportation pipeline in North Carolina.

This report recommends a four-part framework of activities for NCDOT to strengthen the school-to-work pipeline. Referred to as “buckets” in this document, the four parts include:

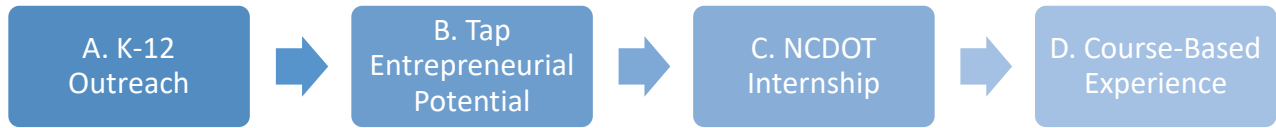
1. Engaging students at an early age to develop interest in transportation careers;
2. Leveraging North Carolina HBCUs’ and MSIs’ comparative advantage in entrepreneurship programming;
3. Developing and providing experiential learning in the workplace; and
4. Furthering and refining work skills through course-based and community-oriented learning.

The proposed framework was developed following interviews with national and state workforce development leaders and a review of current research on the topic. From these sources, the following characteristics are found to define successful school-to-work pipeline programs:

- They engage with students at an early age and continue to involve them throughout secondary and post-secondary education levels.
- They provide students a variety of opportunities to build career skills, gain professional experience, and identify mentors.
- They identify and capitalize on existing skillsets among the students.

This report builds upon these findings to describe the most effective methods for engaging students in a workforce pipeline program and identify initiatives across the nation that have been successful in this type of effort. Next, the report analyzes current efforts at NCDOT and describes how each fits into the proposed framework, and identifies methods for enhancing this programming to strengthen the pipeline program at NCDOT.

The Four-Part Transportation Workforce Pipeline Proposed for NCDOT:



NCDOT already offers an array of K-12 programs. These involve expanding the range of transportation-specific skills and opportunities highlighted through this programming, and ground programming in real-world challenges faced by transportation agencies.

Leverage HBCUs’ existing strengths in entrepreneurship to spur students to consider transportation career options, generate new opportunities for them to engage in traditional transportation careers as well as fast-growing, technology-driven roles.

NCDOT could Amplify the impact of its existing internship programs through post-internship engagement dedicating training and professional development time for students over the course of the internship.

Experiential and community-based coursework at HBCUs could be geared towards designing effective public engagement strategies, refining students’ transportation planning and analysis skills, and exposing students to the broad social impacts of transportation decisions.

This framework is designed to provide students at North Carolina’s HBCUs with the skills and opportunities needed to excel in a broad range of roles within the transportation field, while drawing upon the strengths of NCDOT’s existing programming and opportunities. Each of the four buckets will be discussed further starting on page 5 of this report.

ENGAGING STUDENTS IN TRANSPORTATION

Recent research shows that today’s students – particularly people of color, women, and those from low-income backgrounds – tend to be drawn to careers that “give back” to their communities and are framed in the context of important connected to current social issues.^{1,2} Transportation engineering students express a desire to “make a difference,” and coursework that emphasizes multimodal, environmental, and public service has been shown to increase student engagement. Experiential service learning opportunities help explicitly link social impact with course material, and are another way to respond to student interests for career satisfaction. Service learning is similar to internships or cooperative education programs, but places a stronger emphasis on the student’s relationship to the surrounding community. NCDOT’s existing programming, spanning each of the four buckets described in this report, puts the department in good position to pitch transportation careers to HBCU and MSI students through a service learning lens which help students understand transportation as a career field which can make a real impact in communities and the built environment.

Research also indicates that generating early interest in a field among students is crucial; programs directed at middle and high-school students are essential for building a transportation workforce.³

¹ Stephanie S. Ivey, et al., *Attracting Students to Transportation Engineers: Gender Differences and Implications of Student Perceptions of Transportation Engineering Careers* (Transportation Research Record No. 2320, 2012).

² Sarah Hernandez and Stephen Ritchie, *Motivating Students to Pursue Transportation Careers* (Transportation Research Record No. 2480, 2015).

³ *Ibid*

Exposing students to the wide range of paths and skillsets required for transportation jobs is key during this important period of development. In engineering, for example, some students may underestimate their ability to succeed when skills like creative problem solving and communication are not highlighted among the necessary skillsets for the work.

A successful pipeline program first stimulates student interest in the field—in this case, transportation—and then works to translate that interest into skill-building in preparation for a career. In turn, engaging students at an early age helps them to set goals to graduate. HBCUs offer a unique opportunity to reach students who are historically underrepresented in the transportation field. HBCU graduates represent award degrees to a disproportionately large number of Black STEM workers and researchers due to a cooperative peer culture, faculty support, and array of available research opportunities.⁴ Engaging these students to consider transportation career opportunities and providing a clear school-to-work pipeline offers an opportunity to help provide access to good jobs while filling a vital need in the state’s transportation workforce.

After stimulating interest, the most effective transportation workforce development programs connect students to the “real-world” implications of their studies and convey the diversity of opportunities available within the field. [myFutureNC](#), a statewide, cross-sectoral nonprofit organization focused on educational attainment, has called for stronger links between North Carolina’s students and the practical applications of their studies. In a [policy brief](#) on the topic, the organization ties high dropout rates in North Carolina high schools and colleges to a disconnect between academic learning and professional skills. The policy brief calls for work-based learning programs in the state. The study’s three policy recommendations are to reform the educational system to incorporate more work-based learning; to create clear pathways to employment for students; and to develop tools for tracking educational outcomes. These policy recommendations directly connect to NCDOT’s existing workforce pipeline development efforts, and can be used to help shape future programming.

EXISTING NCDOT STUDENT PROGRAMMING AND THE FOUR PART FRAMEWORK

NCDOT offers a broad array of educational opportunities through its [Education Initiatives Program](#). Three major initiatives – the School to Career Pathways Initiative, the NCDOT Internship Network, and DOT Volunteers – are intended to help NCDOT attract and recruit talent and develop a workforce to meet the state’s transportation demands. The sections below identify specific initiatives and programs corresponding to the four-part school-to-work proposed in this report. In the case of the entrepreneurship track, the following section identifies initiatives both within and beyond NCDOT that already seek to connect North Carolina’s HBCU students with entrepreneurship opportunities.

1 K-12 OUTREACH: EXISTING ACTIVITIES AT NCDOT AND IN THE STATE

- **Aviation Art Contest:** NCDOT’s Division of Aviation sponsors an annual North Carolina Aviation Art Contest to engage young people in aviation and aeronautics. For the 2019 contest, participants were asked to create original art inspired by the theme “My Dream to Fly.” The competition drew 2,793 entries from students representing 243 schools in 67 counties.

⁴ Laura W. Perna, et al. *Identifying Strategies for Increasing Degree Attainment in STEM: Lessons from Minority Serving Institutions* (New Directions for Institutional Research No. 148, 2010).

- **DOT Volunteers:** The DOT Volunteers program pairs NCDOT staff with students from grades K-12 and engages them in discussions about careers in the transportation field. The program seeks to promote women and minorities in engineering; expose students to the transportation industry; and ultimately, recruit talent to NCDOT.
- **Introduce a Girl to Engineering Day:** This event offers female students the opportunity to engage in hands-on activities related to transportation and attend question-and-answer sessions with women engineers at NCDOT. These sessions cover daily duties and skills necessary for their jobs and encourage young women to stay engaged in STEM coursework.
- **Model Bridge-Building Competition:** In partnership with Carolinas Associated General Contractors and the American Council of Engineering Companies of North Carolina, NCDOT hosts this statewide competition to encourage students to develop math and science skills that are used in transportation, construction, and engineering careers. Students work in teams and present their model bridges to a panel of judges. Teams are scored based on a written report, oral presentation, a design drawing, and the model bridge's structural efficiency.
- **Construction Career Days:** These events, hosted annually, allow students to better understand what a career in construction and include displays of a range of construction equipment, tutorials on construction techniques, and information sessions on what a career in construction involves and how to enter the field.
- **National Summer Transportation Institute Program:** This national program, sponsored by the Federal Highway Administration, brings students to college campuses for free 2- to 4-week programs that introduce them to careers in all modes of transportation. NCDOT offers eight NSTI programs at institutions around the state. North Carolina A&T State University hosts the longest-running NSTIP in the state; in 2019, the university hosted its 27th cohort through the Transportation Institute in the College of Business and Economics. The program introduced 14 high school students to career opportunities in transportation and supply-chain management over the course of five and a half weeks. Through coursework and field trips, it demonstrates how STEM skills are used in transportation across a range of modes.

2 TAP ENTREPRENEURIAL POTENTIAL: EXISTING ACTIVITIES

- **HBCU Small Business Incubators:** The [Carolina Small Business Development Fund](#) runs incubators at five HBCUs in North Carolina. Started in 2014 with the aim of exposing HBCU students to career opportunities in the finance industry, this initiative has evolved to encompass partnerships with HBCUs to expand access to entrepreneurial training, resources, and capital. The Fund has partnered with Shaw University to launch the [Innovation and Entrepreneurship Center \(IEC\)](#) in the Southeast Raleigh neighborhood, which has struggled to develop economically. The IEC provides a space for training, events, co-working, incubation, and creativity that serves both Shaw University students and local entrepreneurs. At Elizabeth City State University, the Fund helps manage the [Eastern Women's Business Center](#), which provides tailored training and coaching to three interns per semester. Both programs aim to provide students with hands-on experience and skills.
- **Entrepreneurship-focused National Summer Transportation Institute:** One of 2019's NSTI Programs (described in the previous section) was hosted by Roanoke-Chowan Community College and offered entrepreneurship-focused programming to students.

③ NCDOT INTERNSHIP: EXISTING ACTIVITIES

In cooperation with the Education Initiatives Program, NCDOT's Office of HBCU Outreach has developed several college programs and internships for undergraduates, graduate students and recent graduates interested in careers in STEM and/or the transportation field. Two of these programs are specifically geared towards HBCUs:

- **HBCU/MSI Internship Program:** Recent graduates or rising juniors, seniors, or graduate students enrolled full-time at an accredited HBCU/MSIs can apply for this internship. In 2019, there were 41 internships available across a range of DOT roles, including engineering, information technology, computer science, accounting, communications, environmental science, and planning. Though most internships are based in Raleigh, there are several positions available at NCDOT regional offices around the state.
- **HBCU/MSI Transportation Scholarship:** Each year, NCDOT offers students currently enrolled at accredited HCBUs and MSIs in North Carolina the opportunity to apply for this \$2,500 scholarship. The scholarship may support both undergraduate and graduate studies in transportation-related fields. NCDOT encourages students to apply from a range of disciplinary areas, including sciences; business; human development; aviation; engineering; public policy and planning; law; and transportation.

④ COURSE-BASED EXPERIENCE: EXISTING ACTIVITIES

NCDOT's School to Career Pathways Initiative is part of the agency's Education Initiatives Program. The Initiative aims to attract students to STEM fields early and provides them opportunities that will reinforce concepts related to transportation and engineering. These initiatives target students from grades K-12 to graduate school. Several of the key initiatives are described below. The agency offers lesson plans, handouts, and other materials for K-12 educators interested in teaching students about safety and other transportation-related matters.

- **Let's Go NC!:** Let's Go NC! offers lesson plans, activities, and instructional videos for instructors to teach and encourage children to practice and develop safe pedestrian and bicycle behaviors while promoting healthy transportation choices. Each lesson includes discussion and demonstration of core concepts, a skill-building activity, and a video to accompany lesson review. The goal of these activities is to help children transfer that knowledge into an automatic response in behavior. *Let's Go Walking!* and *Let's Go Biking!* are each designed to teach concepts and skills to for developmentally appropriate teaching levels: kindergarten and first grade; second and third grade; and fourth and fifth grade. Each lesson builds upon the skills learned in the previous lesson. The content is customized based on needs and concerns from North Carolina teachers and stakeholders.
- **Highway Stormwater Program:** This program offers sample lesson plans, posters, presentations and other materials for teaching students the importance of preventing and reducing stormwater pollution. Lessons include topics such as "Rain Showers and Sentence Flowers" and "Eco-Friendly Party Social" and are geared towards different groups within the K-12 range.
- **SummerSTEM:** This is a full-day immersion workshop for educators. Between 10-20 teachers, either elementary- or secondary-level, visit NCDOT each July to learn about transportation-oriented field trip opportunities, classroom coursework materials such as Let's Go NC! and the Highway Stormwater Program. They also learn about the various career and internship opportunities available to students in the transportation field. The program is not currently available to college-level instructors.

NCDOT also offers an internship program specifically geared towards integrating classroom and practical experience:

- **Cooperative Education Program:** This is a career-oriented, professional-level program for short-term training in civil engineering. The primary purpose to integrate classroom and practical experience; a student works during alternating semesters and usually shares an assignment with another student. While one works on the job, another attends classes. Qualified applicants must be referred through a college or university co-op program.

NATIONAL EXAMPLES & BEST PRACTICES

Several programs around the country offer insights into the range of approaches utilized to engage students in specific career tracks, including transportation. These programs employ several of the best practices described above: a focus on real-world applications; use of community-oriented programming; and attention to the broad range of professional skills needed in the transportation field.

PennDOT Statewide Challenge: The [Pennsylvania Department of Transportation \(PennDOT\) Innovations Challenge](#) Pennsylvania Department of Transportation (PennDOT) focuses on a broad range of transportation skills beyond engineering, with particular emphasis on innovation and technology. Now in its third year, the Challenge is a statewide competition that asks teams of high school students to solve transportation challenges rooted in real-world conditions. Students work together in teams of two to four to develop a solution to the stated challenge, and are evaluated according to criteria that include innovation, benefits to the community, and cost savings. Winners are selected from PennDOT regional offices and compete for a statewide prize in Harrisburg, PA.

The challenge seeks to elicit creative, technical solutions. The 2019 program presented students with the following issue real agency challenge. PennDOT spends \$13 million annually on roadside cleanup in addition to the work done by over 5,000 “Adopt-a-Highway” volunteers. The question for students was: “Aside from laws, programs and educational campaigns, what cost-effective, innovative solution can be developed in the next five to ten years to help PennDOT more efficiently, effectively and safely control litter along roadways?” In the 2018 cycle, 123 teams responded to a challenge asking students to find innovative methods to encourage drivers to slow down in work zones. The winners of that competition developed an application that would allow users to see their work zone violations in real time, rewarding or penalizing drivers with “points” for their behavior.

The statewide challenge model allows agencies to target specific skillsets or questions of importance to an agency. Students benefit from the opportunity to engage directly with State DOT staff, enabling them to learn how to develop professional relationships and finding mentors.

FHWA Nationwide Challenge: The [Federal Highway Administration’s Center for Transportation Workforce Development](#) manages several programs, including the [Transportation Technology Tournament](#), which are designed to increase the number of post-secondary students pursuing

transportation-related careers. Now in its second year, the Tournament is jointly hosted by AASHTO's National Operations Center of Excellence and the US DOT's Intelligent Transportation Systems Joint Program Office (ITS-JPO). The tournament provides a forum for students to work directly with public agencies to solve real-world transportation problems utilizing ITS and Transportation Systems Management and Operations (TSMO) solutions. Students respond to challenges submitted by State DOTs.

After submitting an initial contest application identifying the team and the challenge problem, students work with academic advisors to learn about ITS and TSMO solutions via online training programs. The 2018 Tournament featured nine teams, four of which were chosen as finalists to compete in the live event at the Institute of Transportation Engineers 2018 Annual Meeting. The eight teams in the 2019 Tournament addressed a range of topics, including wrong-way driving; corridor management; pedestrian safety; automated shuttles and public transportation; and curbside management.

Like the PennDOT Innovation Challenge, the Tournament is focused on real-world challenges and technology-driven solutions. The competition's structure also allows for mentoring, skill-building, and personal engagement with transportation professionals.

LA Metro Targeted Training/Internship Program: LA Metro, which operates the rail system for Los Angeles County, has a [Transportation Career Academy Program](#) that provides summer internship opportunities to junior and senior high school students who are transit dependent, reside in LA County, live near to a Metro Rail station, and attend a school located near Metro's rail expansion efforts. The program has several goals, including exposing students to transportation careers; connecting high school coursework to real-world work experience; providing on-the-job experience for specific career pathways; and establishing mentorship relationships. The program helps students gain skills and provides on-the-job work experience in specific technical areas. The seven-week, paid program is structured around a four-day workweek and Friday "in-service training" days.

The internship is targeted towards student populations that are highly affected by LA Metro's transportation planning decisions, offering students an opportunity to learn about real-world transportation issues while enabling LA Metro to engage and learn from members of the local community. Dedicated on-the-job training days offer opportunities for students to build technical skills important for transportation careers.

Kentucky-FAME Hybrid Education/Apprenticeship: The [Kentucky Federation for Advanced Manufacturing Education \(KY FAME\)](#) is a partnership of regional manufacturers. The program aims to create a pipeline of highly skilled manufacturing workers by improving the skill level of employees in the manufacturing industry; improving the image of the industry; promoting career pathway opportunities; and supporting the creation of additional skills training. Once accepted into the program, students work towards certification as an Advanced Manufacturing Technician (AMT) through local community colleges and work part-time with a local employer "sponsor" who agrees to provide competitive pay, hands-on instruction, and a flexible schedule. The program employs both traditional apprenticeships and an "earn and learn" model in subjects like electricity, fluid power, mechanics, fabrication, and robotics. Students earn between 68-71 college credit hours and have two years of work experience by the end of the program.

Students who complete the program receive the AMT certification as well as an Associate’s Degree in Applied Science. They are also able to transfer their education from KY Fame towards a bachelor’s degree; a partnership between KY Fame and Northwood University allows students to transfer all AMT credits towards a Manufacturing Bachelor of Business Administration degree.

The program is devised in close partnership with local employers, ensuring that the technical skills targeted through the curriculum align with the industry’s needs. In addition, the marketing element of the program offers clear parallels to the transportation industry; shifting perceptions of the type of work, level of pay, and technological element of the industry is important to both fields in attracting a talented workforce.

GAP ANALYSIS AND ALTERNATIVE APPROACHES

NCDOT already offers programming under each of the four components of the proposed school-to-work pipeline framework. This analysis focuses on identifying gaps in this existing programming and suggesting ways the agency could amplify or expand existing offerings:

Framework Component	Existing Programming	Gaps Identified	Suggested Activities
K-12 Outreach	<ul style="list-style-type: none"> • Aviation Art Contest • DOT Volunteers • Introduce a Girl to Engineering • Model-Bridge Building Competition • Construction Career Days • National Summer Transportation Institute Program 	<ul style="list-style-type: none"> • Current programming is primarily limited to construction and engineering-related topics. • There is relatively little programming that addresses community planning, policy, or other non-engineering issues in transportation that would enable students to build practical experience grounded in contemporary challenges. 	<ul style="list-style-type: none"> • Expand offerings of existing programs (DOT Volunteers, Construction Career Days) to include broader range of transportation-related skills (e.g., planning, operations, and computer science). • Introduce new programs for primary and secondary school students targeting technology and innovation in transportation. Draw on the example of the PennDOT Innovation Challenge. • Consider potential integration of innovation challenge into coursework of NSTIs. • Integrate content addressing real-world challenges experienced by NCDOT. • Explore options to develop HBCU students who are already engaged with NCDOT as “ambassadors” to K-12 classrooms.
Tap Entrepreneurial Potential	<ul style="list-style-type: none"> • OJT’s professional services academy through Winston-Salem State University 	<ul style="list-style-type: none"> • Entrepreneurship programming is primarily focused on contracting and construction trades. • There are relatively few efforts that engage with 	<ul style="list-style-type: none"> • Explore partnership or engagement with Carolina Small Business Development Fund campus incubators. • Bring message of transportation innovation to HBCU

		<p>college students interested in entrepreneurship.</p> <ul style="list-style-type: none"> • There is not current dedicated messaging about what a transportation career is and can be. 	<p>entrepreneurship programs through outreach to students and faculty through class visits, aiding in curriculum development, etc.</p> <ul style="list-style-type: none"> • Integrate key entrepreneurship skills into a statewide innovation challenge (suggested in K-12 Outreach).
NCDOT Internship	<ul style="list-style-type: none"> • HBCU/MSI program • HBCU/MSI Transportation Scholarship 	<ul style="list-style-type: none"> • There are currently few formal connected networks of program alumni that could serve as a mentorship and networking pool. • Internships could further emphasize on-the-job training. 	<ul style="list-style-type: none"> • Establish alumni network connected through listserv and social media channels. Continually engage through invitations to events, talks, job postings, and networking events. • Consider adding one day every 1-2 weeks devoted to “in-service training” during internships, similar to LA Metro’s Career Academy program (described in Section 3 of this report).
Course-Based Experience	<ul style="list-style-type: none"> • School to Career Pathways Initiative • SummerSTEM workshops • Cooperative Education Program 	<ul style="list-style-type: none"> • There is limited programming for transportation skills and careers beyond engineering. • There are few programs that involve community-oriented experience. 	<ul style="list-style-type: none"> • Establish practicum curriculum that allows students to assist in developing and implementing NCDOT’s required public engagement. • Consider partnering with HBCUs/MSIs to aid in public engagement efforts, planning exercises, or other task that could be completed via a one- or two-semester seminar in conjunction with NCDOT. Leverage the department’s Division of Highway’s PICSviz, who have expressed interest in potentially partnering with HBCUs for community outreach efforts.

From the table above, three broader areas of work emerge for NCDOT to consider as it builds a transportation workforce pipeline to the state’s HBCUs and MSI students. The following broader actions are recommendations for the department:

1. **Develop cohesive messaging that conveys the full range of opportunities available within the transportation field and emphasizes both social impact and technology.**

NCDOT staff recognize the need to expand the universe of what students consider a “transportation career.” To accomplish this, NCDOT should advance consistent messaging around the diverse array of opportunities within the transportation profession. One approach is through programming – most of NCDOT’s offerings for students are STEM-oriented, which may inadvertently send the message to

students in planning, design, communications, the humanities, and others that they may not be qualified for transportation careers. Instead, the agency could deliver a message that transportation requires a broad set of skills and offers a tangible way to contribute to their communities, and/or engage in the emerging, exciting technology-driven side of the field. Beyond programming, NCDOT could also engage in targeted messaging through outreach to schools and students. When NCDOT representatives attend career fairs and other public engagements, the agency should focus on delivering this inclusive message.

- Develop communication materials targeted for high school students and their counselors that describe all of the department’s skill-building and enrichment offerings in one place. The materials should make explicit connections to how these opportunities could build upon one another, and might lead to enhanced job prospects in field that would allow students to make a difference in their communities.
2. **Improve coordination among NCDOT offices and departments undertaking similar HBCU and educational initiatives in order to maximize impact and reduce redundancies.**

There are several unrealized opportunities for coordination and collaboration across offices within NCDOT. In order to reduce redundancy, effectively communicate opportunities and career pathways to students, and ensure a balanced, coherent program of student outreach, the agency should consider regularly convening staff working on related initiatives across offices and departments within NCDOT. There are several potential ways to accomplish this:

- Identify an existing meetings that currently include relevant NCDOT departments and establish a designated agenda item for report-outs on HBCU-related outreach and education programming; if no such meetings exist currently, establish a regular coordination meeting.
- Establish a new group for cross-departmental coordination. For example, FHWA convenes dozens of specialized working groups that study specified issues that cut across program offices. As one example, the Digital Infrastructure Multi-Modal Working Group convenes program managers whose work relates to digital infrastructure. Other working groups, such as the [Sustainable Pavements Technical Working Group](#), have been established specifically to integrate a broad range of stakeholder feedback and input into FHWA’s efforts. Either of these models – a collection of internal leaders working across departments, or a group that includes external stakeholders with an interest in the subject matter – could be a good fit for NCDOT’s HBCU efforts.
- Consider developing a new monthly “HBCU Student Outreach Working Group,” which could include the following offices and programs:
 - Office of the Chief Deputy Secretary, Historically Black Colleges and Universities (HBCU) / Minority Institutions of Higher Education (MIHE)
 - Office of the Chief Deputy Secretary, Office of Civil Rights (OCR)
 - Office of the Chief Operating Officer, Division of Highways, PICSviz
 - Office of the Chief Operating Officer, Division of Planning and Programming
 - External Stakeholders (optional), including HBCU/MSI representatives.

3. **Define explicit connections among the various program offerings at NCDOT to build and communicate the transportation pipeline.**

While high-quality programming currently exists across NCDOT, it is likely that students are not aware of all of these opportunities.

- If not already doing so, build a listserv that contains the contact information of all students who engage with any individual NCDOT program within the larger pipeline. NCDOT should use a listserv to stay in contact with students and make them aware of upcoming opportunities, share success stories, and to help them define their next steps to move into a transportation pipeline. As this list should be used by program leaders across many offices within the department, some method of coordination among senders should be developed to ensure the listserv does not contact the students communicate too often. This may be a function of the working group in recommendation number two.
- Consider creating and maintaining a LinkedIn group page to provide students and pipeline stakeholders a professional networking platform. Doing so will provide a social platform for all stakeholders—including NCDOT, pipeline students of all ages, parents, and potential employers—to have a space to converse, passively remaining engaged and apprised of transportation opportunities, and provide an additional avenue for the department to push out information about opportunities and resources. This group would be an excellent opportunity to connect all alumni of NCDOT internships and other programs with one another to help catalyze a broader community, highlight the current students participating in programs and their work, and expose students to broader networks of transportation professionals.

CONCLUSION

NCDOT’s existing programs, while robust and effective, would benefit from additional coordination among the various divisions and offices within the department. It is recommended that NCDOT’s main task moving forward be to develop synergies within the existing offerings, and to strengthen department communications efforts to make HBCU and MSI students more aware of its student-focused opportunities. Special attention should be given to describing transportation as a profession that welcomes students from a diverse array of degree programs and backgrounds, and that opportunities are not limited to only engineering students. Finally, NCDOT should develop procedures and mechanisms to keep in contact with students after they have participated in any program and build a student-focused social platform that allows students to continue exploring transportation; doing so not only creates an ecosystem of transportation-interested students within North Carolina, but also creates a pool of candidates to whom NCDOT and other transportation agencies can publicize and fill openings in transportation careers.

