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Just Questions By: Emily McGraw, PE, NCDOT State Maintenance Engineer



At the dawn of 2020, could you have imagined that by the ides of March, the world would be entirely different? This change would not be caused by an economic meltdown, although we have seen one, nor would it be caused by a war. This substantial world change would come to us in the form of a virus. This unseen blight has changed everything! It has changed our environment, how we work, how we interact with others, how we shop, how we learn, and the list goes on and on. This virus has impacted us personally and professionally.

Personally — COVID-19 has impacted us all. Many companies and state governments sent workers home to work. Schools closed their doors and established virtual learning. Families were encouraged to stay home and minimize interactions with others. Businesses closed, and four months later, many still are. Groceries and other supplies were suddenly in short supply. Places of worship closed their doors as well and developed virtual and drive in worship services. March Madness was cancelled! The NCAA cancelled other sporting events and Major League Baseball was delayed until late July. Professional golf began having tournaments without fans. Football season is around the corner and we don't know when or if it will resume. If they play, chances are they will be playing only conference opponents, and will there be spectators in attendance?

We began looking at "essential personnel" in a different manner. Sure, medical workers have always been considered essential, but had we considered mail carriers, the amazon driver and grocery store workers as essential? New terms have been introduced including social distancing and contact tracing. We have learned the three Ws – wear a mask, wait six feet apart and wash your hands. We all have questions ranging from the simple to the complex. Questions such as:

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Division Environmental Officer - A position built on relationships and field experience

By: Chad Coggins, Division 4 Environmental Officer

Division Spotlight

Before I venture to share a little about the Division Environmental Officer (DEO) position within Highway Division 4, I feel an obligation to give a division perspective on the recent partialdecentralization that we all have experienced over the past few years. Admittedly, with a lot of the project preconstruction responsibilities shifting to the division it was not all smooth sailing. There were definite growing pains, steep learning curves, and hurdles that occurred while "on the job" at the division level.



But it was during this monumental effort to deliver projects with the speed and quality requested of us, that our longstanding and, in some cases, newly formed relationships with Technical Services and the regulatory agencies helped answer questions and resolve the many issues we encountered. The technical expertise and willingness to assist as needed from our co-workers in the Century Center and within our partnering agencies is an impressive and invaluable resource and deserves a much overdue thank you. I personally feel the "communication silos" that have plagued NCDOT in the past have (Continued on page 5)

Preparing for More Effective Project Data Development and Streamlined Permitting

Carla Dagnino, CPM, EAU Environmental Coordination & Permitting Group Leader



Below are two initiatives that the Environmental Coordination & Permitting Group (ECAP) are currently working towards implementation in early Summer 2020. Coordination with units in preconstruction (Units), agency representatives and the Highway Division 1-14 are ongoing.

The Study Area Line

History

At the beginning stage of a NCDOT road and/or bridge project, a study area will be developed to gather the environmental data within the limits of construction. The data gathered will be used to guide the designers towards avoidance and minimization of environmental impacts that may be the cause of the roadway project. In many cases, the study area is considered during further improvement on design as the project moves through the planning and design phases.

The study area has historically been developed during the planning stage of a project and different methods to determine the limits of design and construction may have been used in the past. For example, a study area may have been developed by drawing a line on a map, photocopying, and sending out to the Units for surveys. In more recent times, the study area is developed as a design file and distributed to the appropriate Units to conduct their surveys. In addition, the study area was not housed where all design units (Roadway, Utilities, or Hydraulics) can easily find and reference when or if further improvements or design are needed. This will be a problem while the project goes through the stages of planning and development that may involve a design change, utility relocation, or new stormwater controls. Study areas that are not inclusive of all design needs result in additional survey work and possible



delays.

In 2010 a guidance was developed pertaining to the movement of the WET file during different stages of the project once the file was developed. This helped to determine the responsibilities of Natural Environment Section (now ECAP) as well as Location & Surveys, Roadway Design, Roadside Environmental, and Hydraulics units to maintain integrity of the file and the study area. The study area was never part of this file that went through the various reviews from the Units in NCDOT.

A current version of the study area file could be located in different filing systems, but for all projects that have been started in the last few years, the file is most likely located on



SharePoint or Project Store. The study areas may currently be developed by design and planning engineers, but may not include all the input needed by the Feasibility Studies and Utilities units as well as the NCDOT's stormwater programs, etc.

Proposed New Process for the Study Area Line:

As part of a collaborative process for gathering input from technical units; Project Management, Structures Management, Roadway Design, and Feasibility Studies units, and Highway Divisions 1-14 would create the study area. The study area line will be a MicroStation file also created in Geographic Information Systems format (shapefile) for Advancing Transportation through Linkages, Automation and Screening (ATLAS). A line style previously created with EA will be changed to "study area". Technical units would collect data in that study area and per the teams or unit's resources (*i.e.* Historic Architecture, Location & Surveys), evaluate a (Technical Article continued from page 2)

larger area if needed.

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Once the study area is developed using the correct line style, the files will be located on the Preconstruction SharePoint site, under the Project Management library (folder). Eventually the MicroStation file may migrate to a location in the ProjectWise site. The technical units will collect data in that study area and per the teams or unit's resources (*i.e.* Historic Architecture, Location & Surveys), evaluate a larger area if needed. During various stages of planning and design, the Units will reference the study area file to ensure that proposed work will not extend past the study area line. If the any work will extend outside of the designated study area line, the file will be amended with a different color and date representing the new areas for survey. The design unit will notify the appropriate project manager who would then contact the technical units to request that the additional area be evaluated.

Benefits from this change



New or changed designs for a bridge or road project will always have the study area referenced in. Project Management, Roadway Design, Hydraulics, Utilities, etc. will stay within the current limits or will create an expanded study area line and provide it to the necessary Units in NCDOT for further evaluation. Providing this information for a project early in the design and planning stages will be advantageous to streamlining the project delivery.

Representatives from several central units in NCDOT recently met to discuss implementation of a study area procedure. Input from this staff and Highway Division personnel will result in a guidance memo that will go to the far reaches of NCDOT for the use of the new study area line.

New Permit Impact Summary Table

History

Back in the late 1990s, the Hydraulics Unit and the Planning &



Environmental (P&E) Branch coordinated the development of the Wetland and Surface Water Impacts Summary Table. At the start, Hydraulics came up with the drawings and impact numbers, but the impacts were not clearly ex-

			WETLAND IMPACTS						SURFACE WATER IMPACTS			
							Hand			Existing	Existing	
			Permanent	Temp.	Excavation	Mechanized	Clearing	Permanent	Temp.	Channel	Channel	Nati
Site	Station	Structure	Fill In	Fill In	in	Clearing	in	SW	SW	Impacts	Impacts	Stre
No.	(From/To)	Size / Type	Wetlands	Wetlands	Wetlands	in Wetlands	Wetlands	impacts	impacts	Permanent	Temp.	Des
			(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ft)	(ft)	(ft
1	-L- Sta. 33+19 - 33+86	24" RCP III						0.01		79		
1	-L- Sta. 33+86 - 34+00	Bank Stabilization						< 0.01	< 0.01	10	10	
2	-L- Sta. 34+86 - 35+30	Fill	< 0.01			< 0.01		< 0.01	< 0.01	17	13	
3A	-RPB- Sta. 36+62 - 38+03	3 @ 7' x 8' RCBC Extension						0.15		314		
3A	-RPB- Sta. 36+82 - 37+16	Bank Stabilization						0.02	0.03	73	5	
3B	-RPC- Sta. 21+50	3 @ 7' x 8' RCBC Extension						0.47		1040		
	to -Y- Sta. 46+56	and 4 @ 8' x 10' RCBC										
3B	-Y- Sta. 45+89 - 46+95	Bank Stabilization						< 0.01	< 0.01	19	15	
3C	-Y2- Sta. 10+00	Sediment Removal (RCBC)							< 0.01		8	
4	-RPC- Sta. 20+01 - 22+35	Fill, PSH, Step Pool	0.34		0.02	0.15						
5	-RPC- Sta. 20+01 - 22+36	Channel Relocation, Step Pool						0.02	< 0.01	156	12	
6	-Y- Sta. 45+32 - 45+70	Channel Relocation			0.02							
											-	-
												-
					-						-	-
					-							-
					-						-	-
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					-						-	-
_					-						-	-
	04		0.05		0.04	0.40		0.07	0.04	4700		-
UTAL	a.		0.35		0.04	0.10		0.07	0.04	1708	03	0

plained nor were the impact locations clearly shown on the drawings. Hydraulic engineers realized this and with the help of the permit writers in the P&E Branch, the impact sheets were developed showing the type of impacts (fill, channel change, relocation, bank stabilization, permanent, temporary, etc.) the location of impacts (station and site numbers) and impact totals for the project.

Currently, Hydraulics Unit and ECAP are using a slightly different version of the impact sheets developed almost 20 years ago.

How is the Current Table Used for Projects?

The Wetland and Surface Water Impacts Summary Table is used during project final design review – and for Merger projects Concurrence Point 4C (CP 4C) agency review of final plans showing stream and impact numbers for all jurisdictional features on the project. The table is submitted with the permit drawings for the permit writer to review and compare with impacts in the National Environmental Policy Act document and to determine the mitigation requirements for the project. The

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will I always need to wear a facemask when going to the grocery store? When will toilet paper, cleaning supplies and other paper products not be in short supply? Where can I get hand sanitizer? How many have tested positive? How many have been hospitalized? How many have died from this? Possibly at the heart of it all, how long will this go on?

In August, most public school students will begin their school year at home on a computer. Colleges are encouraging more online work in addition to modifying the school calendar to potentially minimize the impacts of a second wave of this virus. Will 2021 look different? Will the class of 2021 have the opportunity to go to the prom and have a public graduation? Will we be able to enjoy the celebrations of life and remember those in death the ways we are accustomed to? These are all legitimate questions.

Professionally — I vividly remember sending team members to work at home that middle week of March and I followed them soon thereafter. We began

(Technical Article continued from page 3)

impact table is included in the permit application and is used to create impact tables for the Pre-Construction Notification and in the cover letter for individual permits (IPs). Eventually the same table is referenced and submitted with the permits for the project and used during compliance inspections with regulatory agencies

New Changes to the Table

Almost two years ago, the US Army Corps of Engineers requested to see more information on the table for easier review during final design meetings. The ECAP Group took this as an opportunity for a significant change to the table that will expedite the review and permitting process. The ECAP Group along with the Hydraulics Unit has started the framework of updating the Wetland and Surface Waters Impacts Summary Sheet that is part of the CP 4C Meetings for Merger projects and permit drawings for all projects. Meetings have occurred with other Units in NCDOT and there are scheduled meetings with the agencies to ensure that all the necessary information will be included on the impact sheets. See below for some

using products such as Microsoft Teams in order to more effectively communicate with one another. Private industry has indicated that teleworking is here to stay. Google just announced that employees may not return to their offices until July 2021. The CEO of Twitter recently announced that employees may work from home permanently. Buses have not run for the state's public school systems since March and it is unclear when they will roll again. Professional conferences are cancelled and replaced with virtual meetings. What are the impacts of reduced commuting and travel? Revenues are down substantially, not just in North Carolina but across the nation. I had the opportunity to participate virtually in an annual American Association of State Highway and Transportation Officials Maintenance Committee meeting in July and heard similar concerns across the states. Many state departments of transportation have furloughed their employees – we experienced that here. The impact of reduced travel exacerbates the flaw in transportation's primary funding source - the gas tax. For years, transportation officials have expressed the need to redefine how transportation projects are

of the changes that will likely be incorporated into the new impact summary sheet.

- 1. Additional column that will represent a standard list for the type of impact
- 2. Additional columns that will show the characteristics of the features
- 3. Column that will show the wetland and stream classification
- 4. Stream names and Natural Resource Technical Report site name
- 5. Mitigation ratios

Benefits from the changes

The Merger CP 4C reviews and the permit drawing reviews for non-merger projects will have the inclusive stream and wetland characteristic information that is normally part of the permit application either in the PCN or in the tables included in the letter that accompanies the permit application for an IP. For Merger projects, this will provide the agencies with one table that includes stream and wetland characteristics, imfunded. Improvements in fuel efficiency affecting transportation funding revenues has been discussed for years and many had offered the alternative of vehicle miles traveled as the solution. If companies allow teleworking permanently, is this really the solution? Also, with increased teleworking will the need still exist for many of the planned expansion projects? These are foundational questions that have no answers, nor will the answers be forthcoming soon.

So, moving forward, what do we do?

The next right thing.

We virtually hug loved ones, maintain our social distancing, wear masks, and wash our hands while using our available technology to check in with our family, friends and colleagues. Whatever work is in our hands, we execute it excellently. We walk forward knowing uncertainty has always been ahead of us.

pact types, and mitigation requirements to review during the Permit Drawing Review and subsequent permit application. Tables that were originally part of the permit application cover letter can be eliminated and in place will be the impact summary table with all the necessary information for the agencies' review and permitting of the project. For Merger projects, the agencies have seen this table and will be familiar with the sites and impact data when the same table becomes part of the permit application. For non-merger projects, the table will provide the agencies the information needed in one place and not searching for the information. This will expedite the review and permitting process.

dramatically improved.

As part of the decentralization effort, came the creation of project development groups within each division and as a result the DEOs finally found a "home" to belong. For years, DEOs were stuck out to the side in the organizational chart as a standalone group of two biologists (in my case one), who reported to the division engineer or division construction engineer. Now, however, we

have a team to interact with regularly and a hierarchy of positions and skills to aspire to. Within the project development group, the DEOs initially take on the role of National Environmental Policy Act/ State Environmental Policy Act lead. In this role, we help manage consultants and guide project managers through document completion. For smaller projects and maintenance activities, we typically perform the environmental field work nec-

essary to complete the Natural Resource Technical Reports (NRTRs), and often complete the environmental documents ourselves. From document completion through the right of way (R/W) plan phase, we provide insight into incorporating avoidance and minimization measures in designs, offer a critical eve during hydraulics review, and of course, keep the agencies informed of potential impacts and issues. Once R/W plans are complete the DEOs and project managers' (PM) paths start to diverge. The PMs begin to manage R/W acquisition and final plan development while the DEOs oversee the completion of permit drawings and submit permit applications. During this step, we use our knowledge of construction to make sure impacts adequately cover the most probable footprint associated with a project based on access, type of equipment to be used, and possible construction methods.

Once permits are in hand, DEOs have the unique opportunity to cross over

from preconstruction to the construction and maintenance phases of a project. Unlike preconstruction activities, the construction environmental oversight role is not built on technical skills and expertise but solely on relationships and field experience. Relationships with contractors and inspectors usually begins in a formal manner at the project preconstruction meeting. This is where clear expectations of the project are expressed to the contractor in addition to a general review of permit condi-

tions, permit drawings, and green sheet commitments. From this meeting, a more relaxed informal onsite permit meeting is scheduled with all involved parties, to reiterate permit conditions and build relationships with the field personnel actually building the projects. During these meetings, permit conditions and drawings are discussed in more detail as

> they relate to the actual project location. Inspectors and contractors will often open up to us at these and subsequent field meetings (if they trust us to give sound advice) about constructability issues or other constraints they see based on the plans, permits, and environment. In many of these situations, the DEOs armed with permit conditions and agency expectations, as well as a variety of construction field experience, can usually give sound advice on how to resolve many issues. Some issues that come up often on projects are access, dewatering, culvert inlet/outlet stabilization, backfilling of box culverts, tying in and stabilizing ditches that flow to jurisdictional waters, building and stabilizing floodplain benches and channel relocations as well as various erosion control Best Management Practice questions.

> In addition to our relationship with construction personnel, our relationship with the regulatory agencies is an important component of project success as well. During large complex projects, we typically

initiate a monthly onsite permit review with the environmental agencies. This is where we can examine and resolve challenging issues as well as highlight to the agencies some of our successes. These meetings seem to build confidence and trust among our agency partners that environmental compliance is in the forefront of NCDOT's efforts. This also gives DE-Os a chance to calibrate our compliance oversight and improve the advice we give to contractors when the agencies are not around.

The success of a DEO depends on building and maintaining relationships with others, spending time in the field observing and learning how projects are built, and determining what works and does not work through experience. These relationships, experiences, and a solid understanding of environmental law and intent provides a much-needed bridge/ liaison between engineers, construction personnel, and environmental regulators. Division Environmantal Officers are in a unique position to wear many hats and experience a variety of daily interactions and challenges. Just for a frame of reference, for the past five years, Division 4's preconstruction group has managed an average of 100 projects per year with an average Preliminary Engineering expenditure of \$10 million per year. Our construction office has managed an average of 75 construction contracts a year with an average payout of around \$130 million per year and our maintenance forces have had an average annual allocation of \$32 million in which to maintain our infrastructure. In addition to this workload, the two major hurricanes that hit the East in recent years had an \$87 million price tag in Division 4. So needless to say, there has been plenty to keep us busy.

With 14 divisions in the state across a wide variety of landscapes and habitats. I am sure there are subtle differences, unique challenges, and valuable insights that DEOs can share that will bring value to this newsletter's audience. I hope moving forward a DEO/ division column can find a place in future newsletters.



Pipe Liner Program

By: Andy Jordan, PE, NCDOT Hydraulics Unit and Charles Smith, PE, AECOM

As NCDOT's infrastructure ages, a growing concern for maintenance personnel is the integrity of buried pipes. Pipe liners provide an economical solution to extending the life of these pipes. Over recent years pipe lining technology has changed rapidly. There are several new methods of installing the material and even different types of material to install. Division maintenance staff and project engineers struggle to find standards or guidance on the different types of linings. Most Engineers are only familiar with one or two types of pipe lining and have no additional information to support design decisions other than self-research. The NCDOT Hydraulics Unit, in conjunction with Structures Management Unit and Materials & Tests Unit, has undertaken efforts to start a pipe rehabilitation program to enhance the effectiveness of pipe liner use on NCDOT projects. A central location has been created to store and share pipe lining information. This site includes information on host pipe evaluation, selecting pipe liner type, design standards and mapping examples of installations.

Pipe liners are a class of pipe rehabilitation method in which a liner is placed within an existing deteriorated host pipe. Liners can be structural replacements of the fully deteriorated host pipe; designed to completely withstand soil, ground water, and traffic loads. Liners can also be designed to act as a coating to prevent further deterioration of a host pipe. Cases where excavation cost or traffic disruption are too great to remove and replace an existing pipe are ideal candidates for pipe lining.

Objectives of the NCDOT Pipe Liner Program are:

- Equip NCDOT Highway Divisions 1-14 and central staff with tools to:
 - Evaluate and select pipes which can be structurally and hydraulically restored using pipe liners.
 - Select a range of appropriate pipe liner types for use under given site conditions.
 - O Include contract language within construction contracts to govern design, contractor submittals, testing, and facilitate acceptance or rejection of installed product.
- Inventory a representative sample of installed pipe liners throughout North Carolina to allow evaluation of liner durability and performance into the future.
- Compile a body of existing academic research literature, departments of transportation practice literature, and industry standards literature to be available to participants.

• Create an information sharing platform for pipe liner research participants.

The NCDOT Pipeliner Rehabilitation SharePoint site is the clearing house for information designed to achieve these objectives.



Link: <u>https://ncconnect.sharepoint.com/sites/</u> NCDOTPipeRehabilitation/SitePages/Home.aspx



NCDOT Pipe Liner Manual available on the NCDOT Pipe Liner Program Share-Point page

The SharePoint site contains a design manual and special provision for use by contract personnel for inclusion in Transportation Improvement Program contracts. The special provision is based on the state of the pipe liner industry and is more comprehensive in depth and scope than previous pipe liner special provisions which tended to reference only the Approved Products List.

A pipe liner *Inventory Map* is a Geographic Information Systems-based application on the Share-Point site that contains a selection of installed lin-

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ers throughout the state. Division and central personnel are encouraged to add pipe liner sites to the Inventory Map through the *Add New Inventory* menu item. The goal is to create a means for Highway Divisions 1-14 to contact one another to share experiences on liner installations, performance, and contractors; as well as provide a means to conduct periodic inspections on liner durability through the years.

For more information on pipe liner resources, or use of the NCDOT Pipeliner Rehabilitation SharePoint site, please contact the Hydraulics Unit.



Before and after pictures of a failing CMP, pipe was slip lined.







Existing CMP lined using the Centrifugally Cast Concrete Pipe (CCCP) method.

Employee Spotlight

Do you know Jamille Robbins?

Jamille is the Public Involvement, Community Studies and Visualization (PICSViz) Group Leader at the North Carolina Department of Transportation (NCDOT) in Raleigh. He coordinates and supervises public outreach efforts throughout the Department, including the Project Management and Transportation Program Management units, Rail Division, Division of Aviation, and the State's fourteen Highway Divisions.

His job duties also include overseeing the development of computer-generated imagery services, community impact assessments and indirect/cumulative effects analyses to other units throughout the Department.

The PICSViz Group works with project design engineers to ensure that projects are designed in a way that incorporates community concerns, while facilitating a transportation decision making process that balances community concerns with other environmental initiatives. This enables the Department to better meet the requirements of laws governing public involvement and community impact analysis while also creating a positive environment for the public to influence the project development process.

A graduate of NC State with a degree in Mechanical Engineering, Jamille worked as a Project Manager/Design Engineer for International Vault, LLC. As a young engineer, he managed projects from initial design request, conducted Quality Assurance/Quality

Control of fabrication/ manufacturing, and developed bill of lading for shipping.

He came to NCDOT in February 2005 as a Senior Public Involvement Officer where,



for over eight years, he conducted public involvement efforts for a variety of transportation projects, including high-profile and controversial projects throughout the state. In March 2013, he was promoted to Public Involvement Group Leader, and in 2017 this group grew to include Community Studies and Visualization. Consequently, the group became known as the PICSViz Group.

Here at NCDOT, Jamille has graduated from the Legacy Leadership Program, received his Project Management Certificate from NC State, and earned his Lean Six Sigma Yellow Belt.

He is a member of the Transportation Research Board's Committee on Public Engagement & Communications. This committee focuses on research, integration of tools, guidance, and best practices for engagement and communication with the public, stakeholders, and decision-makers during the planning, development, and delivery of transportation projects and policies. Their goal is transportation decisions that reflect an understanding of current



and emerging community, regional, statewide, and federal needs, values, and issues.

Jamille also serves on the core team for Federal Highway Administration's Every Day Counts 5 Virtual Public Involvement Initiative (EDC5 VPI). Since joining the EDC5 VPI Core Team, he has traveled to Albany and Syracuse, NY; St Louis, Missouri; Richmond, VA; and Washington, DC to present at regional summits, provide technical assistance to states and conduct peer exchanges. Most recently, due to the pandemic, after months of planning, a peer exchange with CalTrans in San Francisco was cancelled, and the team pivoted to a virtual peer exchange which was very successful.

A true team builder, Jamille firmly embraces the proverb: "If you want to go quick, go alone. If you want to go far, go together." He lives the management philosophy that it's all about the Team, creating a collaborative work environment, seeking input and feedback before making decisions, and encouraging staff to be successful; believing that if his team is successful, so is he.

Life is a journey you take one day at a time, just ask Jamille, he'll tell you, "*It's chess not checkers!*"



Traffic Noise Model (TNM) 2.5 is the Federal Highway Administration (FHWA) software the state departments of transportation (DOTs) use to analyze traffic noise for highway projects. With this software, noise analysts build three-dimensional models of a project area, incorporating best available data for existing conditions and MicroStation design files for the future

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build condition. These models are built with a lot of detail and include buildings, terrain features, and traffic. The noise models allow us to predict existing noise levels at any location under loudest traffic conditions, predict where future noise impacts will occur, and evaluate various noise wall scenarios to determine if noise abatement is feasible and reasonable.

Being proficient in TNM is absolutely essential to any highway traffic noise analyst, and taking the TNM



training course is a key step in developing proficiency. The TNM 2.5 course is a week-long training offered twice a year by Bowlby and Associates, and has always, until this year, been in -person in Tennessee. The two traffic noise engineers in my group, Nidhi Sheth and Lucious McEachin, were approved to attend this training in April. But then, alas, COVID... So Bowlby adapted by postponing the course a few months and reconfiguring it into an on-line class using Zoom. Nidhi and Lucious completed the class in July and found it to be a great experience. (Both used their personal laptops for the class to avoid getting into any information technology trouble using Zoom.) Here are some of the things they said about it:

- The course was engaging and although virtual, it was still very hands-on.
- Course participant levels of TNM experience ranged from 0 to 20+ years. It was very interesting to meet people from different places with different levels of experience.
- Instructors were organized, knowledgeable of material, fun, and patient with participants. This allowed them to transfer information to us effectively.
- Throughout this training, we covered topics from fundamentals of traffic noise to modeling various noise walls using TNM 2.5 software, and our understanding in these areas definitely grew. But although we learned new information, these lessons showed us how strong of a foundation our Traffic Noise & Air Quality mentors have helped us to develop! The work experience we had gained at NCDOT before taking the training really prepared us well and increased our ability to understand the materials and better apply the principles.
- It improved our thought process in reviewing traffic noise reports and traffic noise models, and it

also helped us understand the noise policy's relationship with FHWA/National Environmental Policy Act/ State Environmental Policy Act procedures.

- We also discussed questions in light of the noise policies of each state DOT represented in the course. This helped us gain an understanding of how NCDOT's noise policy differs from that of other states.
- While it was unfortunate that we could not attend in person, the Zoom platform was quite possibly the most ideal set up, given our current circumstances. Specifically, Zoom granted us the ability to break off into small groups and one-on-one help sessions where we could interact with instructors for more individualized assistance while eliminating mass distraction for the overall group. This is not a capability that we would have had with the in-person class. Also, Zoom allowed us to take part in discussing any visual document by using annotation tool, which proved quite helpful.

It gave me great joy to hear their enthusiasm for all they learned and hear the intelligent questions they started asking on the other side of the training. They are eager to apply what they have learned on future projects, which certainly makes my job easier!

