



AASHTO Committee on Construction

Annual Meeting Minutes

August 11, 2019 – August 15, 2019

Franklin Marriott Cool Springs

Franklin, Tennessee



Monday August 12th

Tennessee DOT Welcome – Paul Degges, TDOT Deputy Commissioner, Chief Engineer

- Tennessee DOT system has 15,000 miles of roadway, over 8000 bridges.
- In 2018, there over 1000 traffic fatalities, express to need to greatly improve that number.
- Focus on workforce development
 - Only 9% of TDOT eligible for retirement
 - Need for mentoring and training

AASHTO Welcome & Update – Casey Soneria, AASHTO COC Liaison

- 226 registered attendees
 - 38 States represented
 - 15 FHWA
 - 62 Private Industry & Academia
- Covered the Committee in Construction organizational structure
- Membership – Getting Involved!
- Communication benefits
- Publication
 - Construction Spec in in copyediting process
 - Each TS has set of queries to respond to
 - Edits made based on query results
 - Publication of 10th edition expected in mid –late fall.

FHWA Update – Rob Elliot, Technical Director, CPM Team

- FHWA policy on Electronic Records
 - No explicit policy for electronic contract record
 - ◆ Follow your State policy
 - ◆ Keep for 3yrs from date of final acceptance
- Inspector General Audit finding
 - March 13, 2019 – “FHWA Lacks Adequate Oversight and Guidance for Engineer’s Estimates”
 - May 29, 2019 – “Inadequate Data and Guidance Hinder FHWA Force Account Oversight”
- Revisions to FHWA Policy on Material or Product Selection
 - November 14, 2018 FHWA published a Notice of Proposed Rule Making to revise regulatory policy.
 - FHWA received 107 comments (16 State DOTs, 14 associations, 22 manufacturers or suppliers, 4 construction companies, and numerous individuals).
 - A final rule is anticipated in mid-to-late 2019.
 - Docket web site: <https://www.regulations.gov/docket?D=FHWA-2018-0036>
- Every Day Counts
 - Every State advanced 14 or more of the 43 innovations promoted in the first

- four EDC rounds, and 28 States adopted 30 or more innovations.
 - See FHWA website for education connection
 - Gearing up for a 2yr EDC5
 - ◆ Implementation initiative on UAS
- FHWA Resource Center
 - Workshops, Peer Exchanges available
 - Recommends NHI CA for claims courses

NTPEP Update (TDOT Story) – Danny Lane, TDOT

- \$1 million ROI for \$20K for TDOT
- TDOT 2016 HFTO Test deck
 - Bridge deck preservation
- Qualified Products list
 - Over 5,259 products evaluated
 - 42 categorized lists
 - State email needed to access
- Audit Program NAP
 - 1267 audited facilities
 - NTPEP cert. needed for reinforcing steel manf. to remain on TDOT product list

I-24 Smart Corridor – Brad Freeze, Traffic Operation Division Director, TDOT

- Traffic incident account for 27% of congestion in 2015
- Project limits approx.. 28 miles on I-24 and SR-1, also 30 miles of connector route between the two
- Phase I
 - Selective Gap Closure Communication network
 - Ramp Accel/Decel lane extensions
 - Emergency refuge areas/pull offs
 - 152 DSRC locations
 - Operational imp. - Incentivized towing, improved comm., TMC upgrades
- Phase II
 - Active Freeway Management Build Out (dynamic speed/lane/merge control)
 - Signal Detection Upgrade
 - Traffic Signal Re-timing and Scenario Planning
- Phase III
 - Ramp Metering
 - Network Completion
 - Integrated Corridor Management Decision Support System
 - Full center to center integration

How Does the Construction Industry Stack up in the STEM World of Careers – Dr. Heather Brown, Professor, Middle Tennessee State University

- STEM- Science, Technology, Engineering, Math
 - Need to attract young people
- What led you to a Construction career?
 - Demand, strong work ethic, trouble shooter

- Science and Math strengths
- Out of the box thinker
- “School of hard knocks” mentality a barrier to connecting with youths
- Career and Technical Education (CTE)
 - Aimed at high school
 - 16 career clusters and 79+ pathway available
 - Trade school on the rise
 - Encourage engineers to teach after retirement
 - 17 State offer free community college
- Civil Engineering ranks in the top STEM jobs
 - Job in construction in demand
- Other initiatives
 - SkillsUSA
 - GoBuild
 - ACE mentor program
- What can your company do now
 - Get involved in a local high school, community college , university by providing internship, job shadowing, apprentice programs, site tours, guest lectures
 - Transfer knowledge from “boomers” to “millennials” with internal mentor programs
 - Retirees- consider a teaching role
 - Hire passionate and develop your employees

Technical Subcommittee Meetings:

Safety Environmental, and Workforce Development

- Place holder

Integrated Construction Technologies

1. Introductions – everyone introduced themselves including organization
2. Mission of Subcommittee – Chair explained new goal of the Committee is to follow an organized structure including a work plan and documenting efforts that went into the plan. Discussed the mission and purpose of ICT. Greg Mulder will check his information for the previous mission and purpose. Chair will distribute current mission and purpose via email. The mission and purpose will be discussed on the first conference call with the goal to provide a broader understanding of the purpose of the ICT. Also discussed the new structure for voting members on subcommittees. Each state present will have one vote even if they aren’t the official voting member of the Committee.
3. Membership – will be updated with sign in sheet. Can consultants be friends of the committee? Yes
4. State Hot Topics, pain points. Use to determine action plan for next year and possible research.
 - General - 5G is coming. Focus and interest will increase.
 - Iowa

- Drones – have a few drones deployed. Folks are skeptical what are they going to be used for. Getting accustomed to what they can be used. Thinking about EandS Control. Can drone be programmed to recognize features? Trying to use technology to leverage resources. How can we use? Need framework and structure. Need to get files organized. FHWA getting contract in place to hold EDC5 Peer Exchanges for UAS Michigan has Phase 3 research ongoing for UAS. Oregon using drones for training purposes and press releases. Also using lidar for quantities. Utah, Oregon, Alabama, NC others are the leaders.
- e-Ticketing – mass concrete pours. Command Alkon working with AASHTOWare. Command Alkon working on a network. Webportal allows for hand entry for smaller producers.
- Louisiana
 - Growing pains with drones, 3D modeling and how to get inspectors up to speed with e-Construction
 - Smart work zones done on a few projects. Don't have a standard spec.
 - Doing statewide implementation with HeadLight.
 - Trying to get workforce trained and their buy-in.
- Wyoming
 - Trying to get contractors on board with uploading certifications
 - State police have a couple drones
 - Haven't tried e-Ticketing
- Georgia
 - Concerns with auditing electronic systems.
- South Dakota
 - Management of data emails, record retention
- Delaware
 - Paper processes are a challenge in electronic system and not being able to make changes.
 - FHWA doing study how to transfer data
- Illinois
 - e-Ticketing for asphalt
 - 3D Models starting to make investment for inspection staff. There is a gap between design and how we oversee 3D Models in construction.
 - Equipment watch costs – disparity across states discussed. Consider doing a survey. Have a new product called CostTrax. Is this an AASHTO/AGC issue? AGC Rep said they would consider. New Hampshire has one license and pays \$3500/yr.
- New Hampshire
 - Technology overload. Late to the game. Dabbling in everything. 3D Models to a certain level. Providing to contractors for use. Still doing plans.
 - Peer exchange using rovers, etc. to check. NH doesn't have a coordinate network. Trying to subscribe to one.
 - Drones used to model rock and ledges to get accurate quantities. What is the benefit?

- e-Construction moving forward but only part way.
- GIS integration with mobile devices
- Lack of resources – time, funding other obstacles including HR
- Don't have a document management system
- Pennsylvania
 - Maintaining the executive commitment to move beyond the current status into 3D Models including virtual reality, data integration into asset management systems along with verification of 3D models being constructed properly.
 - e-Ticketing – Have performed multiple pilots for asphalt. Trying to determine the path for full implementation including concrete and aggregate deliveries. There are many operating software systems being used at the various producers.
- Oregon
 - Smart Work Zones for queues
 - Number of citations being given. 2500 in 21 weeks. 26 DUI's issued.
 - Trucking association helped pass funding increase. Now having negative impact on allowable work hours
 - e-Tickets – want to eliminate by mapping each layer with lidar
 - ADA requirements
 - Intelligent compaction – getting out of it because of no positive return.
- Alabama
 - Everything
 - Piloting 5 projects for e-Ticketing
 - RFID tags
- Arizona
 - Trying to go paperless. Currently writing an RFQ
 - Looking for lessons learned
- Michigan
 - 3D Models – Using a project PDF. Taking a layering system to look at only layer such as drainage only. Allows Bluebeam to be used better. Need a crossover system similar to DSN. Getting to a better more mainstream model.
 - Monitoring pavement system into more of a GIS system to make payments
 - Asset collection during construction. Trying to train inspection staff what to pick up during construction to place into inventory system.
 - Research to help build digital workforce.
- Florida
 - Digital inspection – trying to figure out how to break down models for field inspection.
 - As- builts are going to become asset management data.
- Minnesota
 - Going all-in with Intelligent Compaction. Incentives on thermal bars.
 - e-Ticketing being pursued
 - 3D models starting
 - RFP for document management system

- Kansas
 - Data management
 - AASHTOWare implementation
 - Vermont
 - Using Ground Penetration Radar to evaluate utilities
 - Increased federal share by 5% when using innovative delivery methods
 - FHWA
 - Who is representing COC on Joint Technical Committee on Electronic Engineering Standards? There are 3 main committees.
 - FHWA Studying impact of AV on infrastructure. How to get ready. Industry asking for pavement markings to be ready
 - Utah
 - e-Ticketing
 - All in with digital delivery – lots of challenges. Starts with software vendors. Need consistency from software to consume the model
 - Tennessee
 - PlanGrid is being used on all plans
 - AASHTOWare – how to get all contractor payroll systems linked
 - 3D models starting in-house
 - Drones – regions starting to use. Contractors wanting to use for quantities.
 - How to get e-Ticketing off the ground? Is it really working?
 - Intelligent compaction – how to use and what for.
 - Indiana
 - Trying to determine what is e-Construction? Trying to get agency and industry buy-in. What resources are needed?
 - Payrolls getting submitted on time. Have created own application and just launched.
 - Ohio
 - Digital verification with 3D
 - ***Note for 2020 – if this format continues, with all the technology that is available, members should come with a defined list and focus on Top 3; can expound on remaining list as those issues are presented and discussed.***
5. FY 2020 Action/Work Plan – The following will be evaluated moving forward on our conference calls:
- 3D Design & Inspection
 - e-Plans
 - Culvert pipe inspection
 - Small cell, 5G
 - UAS
 - e-Ticketing
 - RFID
 - A-Game
 - BIM, GIS
 - Smart Work Zones
 - Data Management

- Equipment Watch
- Document Management
- Misc Technology to keep up with

6. Potential NCHRP Research topics:

- Chair of Research Subcommittee kicked off the discussion and explained the Technical Subcommittee Vice Chairs will bring topics to Research Subcommittee. 2 ideas will be advanced from the Committee on Construction which will be finalized on a conference call next week.
- The following ideas were discussed, and the Subcommittee selected the following two will be taken forward to the Research Committee:

Electronic Management of Data

Problem Statement: As technology increases and State DOT's migrate towards paperless construction, electronic management of data becomes increasingly important. Currently many states struggle with how to capture that data and save it in a manner that can be used in the future.

Research necessary: A research synthesis is necessary to evaluate processes and procedures currently used by state DOT's to retain design and construction data for long term management of transportation systems.

Florida, Utah, Oregon and Pennsylvania are willing to help with the Statement needs.

3D Modeling Guide for Construction Inspectors

Problem Statement: The design and survey communities are advancing 3D Modeling and design at a quick pace nationwide. The goal varies by state by generally the goal is to eliminate 2D Plan sets and make the 3D model the design of record. The construction contractors have been utilizing 3D models to increase their efficiencies utilizing Automated Machine Guidance and building BIM Models for such applications as bridge beam erection plans and crane optimization. Field Inspection staff have very limited exposure to this technology and inspection processes and procedures have yet to be developed on a national level. Some states who are piloting 3D models generally have 2D plans still available. When this transformation occurs 2D plans will be eliminated as a deliverable, so it will be critical to have guidance and training developed for field inspectors.

Research Objective: Research current lead states who are piloting 3D Modeling to identify challenges encountered and the state of the practice they have developed for inspection verification. Such things as Survey tolerances, mobile viewers, separate model layers and who updates the models post construction need to be identified and procedures developed. Develop inspection procedures and processes to comply with FHWA Oversight requirements.

Deliverable: Develop a "How to Guide" on How to handle the inspection process for our field inspectors to be able to verify and update the model or data.

Benefits: This guide will serve as a valuable tool for DOT's and partners to train field inspection staff and allow them to update their associated inspection and document requirements.

Florida, South Dakota and Pennsylvania are willing to help with the Statement

needs.

Roadway & Structures

- John opened with welcoming the members, self-introductions and a brief overview of the meeting agenda items.
- First item was a discussion about identifying or developing a mission statement, nobody in attendance recalled an official mission statement, so we will have to develop one.
- Second item was items of interest of the members:
 - Rumble strip repair how do states repair after originally cut?
- Most said mill out, repave and re-cut
 - Contractor quality control program for bridge steel field welding
- CT has gold, silver, bronze levels of contract requirements, but all welding has an inspection quality measures, a secondary discussion regarding splice welding
- Welding pile splice – issue is not following proper welding procedures
- CT says they require certified welding inspection on welding activities
 - Contract time restrictions driving delays
- Most states agreed restrictions are causing delay of various degree
 - Require Environmental inspection / NPDS Plan – what states are doing for project review and enforcement?
- Contractor soil stabilization / erosion control plans developed by contractors' site specific requires daily logs from Contractor, plan of remediation and possible violation / fine for non-compliance
- Post pipe installation inspection - are states using a mandrel or laser profile or video?
- KY & Penn using laser & mandrel, some states have a list of certified laser subs for inspection
- Guardrail MASH or 350 terminals – post construction audits?
- ME finding many installation issues with new terminals, bolts in incorrect places, slot guard & rail installed backwards, cable loose, plates incorrect height from pavement. ME developed post- installation audit form
 - Weathering steel performance – also plexiglass stay in place forms.
 - Low concrete compressive strength breaks – Contractors stating sampling is the issue, states require ACI cert sampler / inspection staff Cores or Swiss hammer for post placement verification, most states assign pay factors for compressive strength
- Potential research topics :
 - Longitudinal Grinding on bridge decks, skid resistance, smoothness requirements, how to seal after grinding?

Contract Administration

1. **Welcome / Administrative Issues** – Earl Glenn (Mississippi DOT) introduced himself and welcomed everyone to the meeting. Earl distributed a sign-in sheet to the group and requested that all check their contact information and update and revise as necessary (a final attendance list is appended to these minutes).

Earl introduced Vice Chairs: Jason Gutting (Michigan DOT) & Jason Blankenship (Tennessee DOT); Secretary, Sue Eiseman (Kansas DOT); Advisor, Jerry Yakowenko (FHWA). Recommend Research Coordinator as Gary Angles (Ohio DOT), Committee approved.

Sue Eiseman has stepped down as Secretary for 2019-2020 year. Anne Gorczyca (MA DOT) has volunteered. Committee approved.

2. Overview of 2018-2019 work plan items

On Monday, August 12th, Earl moderated a discussion of the 2018-2019 Section work plan items and coordinators for these items provided overview presentations as follows:

- a. Guide Specifications Updates 100, 200 and appendix (alternative contracting) (Sue Eiseman (KS DOT), Jason Gutting (MI DOT), and Chris Costello (DE DOT)
- b. Price adjustment clauses including Steel & Iron Survey – last one in 2016 (Jerry Yakowenko (FHWA), Jeff Benefield (AL DOT), and Denys Tak (WA DOT). It is complete and posted on the AASHTO web site at the following address:
<https://construction.transportation.org/resources/surveys/>).
- c. New Methods - High Tech Process Survey (defined further LIDAR, UAV, Non-destructive testing, GPR, etc.) (Earl Glenn, Jr. (MS DOT), Jesus Sandoval-Gil (AZ DOT), and Jason Gutting (MI DOT). It is complete and posted on the AASHTO web site at the following address:
<https://construction.transportation.org/resources/surveys/>).

3. Potential Research Problem Statements

- a. Mike (LA) – Increased Cost Effect – What is causing cost growth from a contractor's perspective? (exp. Lane closure & time restrictions, material requirements, means & methods, etc.) 11 (Votes)
- b. Eric – Subjects of Disputes in the current climate 7 (Votes)
- c. Dan (FL) – Flexibility on Lane Closures Duration (VI – Time Bank) 7 (Votes)
- d. Anne (MA) Best Scheduling tools for Construction 6 (Votes)
- e. Doug Gransberg – Pre-Construction Administration Guide for CMGC and Guidebook Progressive DB contract administration for Transportation Projects. (5/8) (Votes) Alternate.
- f. Doug Gransberg - Update Best Value (BV) Procurement Guidelines 1 (Votes)
- g. Delivery of Technology Services on Highway Assets using Alternative Project Delivery Methods 1 (Votes)
- h. Chris Harper – Guidebook on Agency Staffing Levels and Skill Sets for Alternative Contracting Methods 2 (Votes)
- i. Chris Harper – Alignment and Cost Benefit Analysis of Data Interoperability Standardization 0 (Votes)
- j. Chris Harper –Strategies for the implementation of Unmanned Aircraft Systems for the Inspection of Storm water Management Practices along Linear Projects 5 (Votes)

- k. Chris Harper – A guide of Automate Project Progress Control and Oversight by Leveraging LIDAR and 3D/4D Information Models 2 (Votes)
- l. Chris Harper – Creating Collaboration between Public and Private Sectors on Requirements for Digital Project Delivery Products 1 (Votes)
- m. Eric – No excuse clauses 3 (Votes)
- n. Eric – What criteria are states looking at for pre-qualification or post qualification and lack of sharing of information 6 (Votes)
- o. State procedures of storing large volumes of Electronic data 2 (Votes)

Gary Angles represented the Section at the Research Steering Group meeting.

The Section members provided discussion and feedback on each of these and recommended that Statements (a-d) be advanced as recommended new research projects to the Subcommittee's Research Steering Committee next week.

4. Discussion of the proposed 2019-2020 work plan.

The Section members discussed potential new work plan items from the following list of issues in order of votes:

- a. Guide Specifications Updates 100, 200 and appendix (alternative contracting). Sue Eiseman (KS DOT), Jason Gutting (MI DOT), and Chris Costello (DE DOT)
- b. How do other states handle pricing of general conditions costs and time related costs for change orders? Scott Lowe - Lead (Trauner), Mike Vosburg(LA DOT), Jeremy Reed (VT DOT)
- c. No excuse bonuses. Anne Gorczyca – Lead (MA DOT), Earl Glenn (MS DOT), Kevin Harrington (SC DOT)
- d. Utilities. Nick Fields – Lead (GA DOT), Jeff Benefield (AL DOT), Jason Blankenship (TN DOT)
- e. Finishing projects on time/time element restrictions/contract time/contract completion/ Incentive/Disincentive for construction projects. Earl Glenn – Lead(MS DOT) Jason Gutting (MI DOT), Gina Gallegos (TX DOT)
- f. RR Flagging Coordination, Agreements, Costs, dealing with RR during design and right of entry.
- g. Risk Sharing on Contracts Survey (DB)
- h. Subcontractor approval process
- i. Best Value Procurement
- j. Progressive Design Build Guide
- k. Staffing for Alt Contracting Methods
- l. Material Acceptance Procedures & Acceptance Process Survey
- m. Project Oversight with Lidar
- n. Preconstruction Delivery Guide
- o. What alternative are states using for funding other than federal funding?

5. Discussion Regarding Potential Presentations at the 2020 COC Meeting Contract Administration Section

The Section members discussed potential presentations for the Contract Administration Section portion of the 2020 Committee Meeting in Bellevue, Washington. Suggestions for potential presentations are listed below. The Section members prioritized these potential presentations by voting for the top four presentations. The recorded vote count is listed in parenthesis after each subject.

The Contract Administration Section leadership will discuss these suggestions and develop a final list during the monthly conference calls in 2019-2020 in order of votes.

1. Anything from Washington DOT on Contract Administration
2. Improving construction & plan quality
3. Project Alternative Scheduling Methods
4. Markup, general conditions survey presentation
5. Fraud prevention
6. DRB – Standing Board for Area and Statewide Project Specific
7. ID/IQ Contracting
8. DB subsurface and utility guide

6. States Hot Topics

- a. Finishing projects on time/time element restrictions/contract time/contract completion/ Incentive/Dis construction projects DE/FL/TN/SC/LA/CO
- b. How to manage photos taken on projects ND
- c. Earthwork calculations getting contractors to agree to final quantities ND
- d. Earthwork Calculations Designer vs Payment GA
- e. Frivolous claims VT
- f. Fabricated materials quality MA
- g. E construction/Technology TN/OK
- h. Steel Pole timely delivery TN
- i. E ticketing MI
- j. Scheduling MI
- k. RR Flagging Coordination, Agreements, Costs, dealing with RR during design and right of entry MI/TN/WY
- l. Material Delivers (i.e. delineator posts) MI
- m. Unbalanced bidding WI
- n. Collusion detection
- o. Quality Assurance
- p. Protest clauses
- q. Utilities SC
- r. Escalating Costs/ High Bids OK/VA
- s. Contract Default AL
- t. Project Delays DE
- u. Erosion & Sediment controls DE

- v. Traffic Control Plans TN
- w. Grade Control issues TN
- x. Increased number of claims LA
- y. Contract admin DB
- z. Requiring procedure to incentive managing construction projects CO
- aa. Environmental Compliance issues – VA/OH
- bb. Contractor Agency Personnel Training – lose of expertise WY
- cc. Wildlife requirement issues WY
- dd. Stable State Funding Program CT
- ee. Contractor QC CT
- ff. Engineering and Construction Document control CT
- gg. DRB – DRB
- hh. Prompt Payment – OH
- ii. Consistence Statewide – OH
- jj. Consultant Costs – CT

Tuesday August 13th

Safety, Environmental, and Workforce Development Session – Moderators, Jim Knott, Section Secretary, Nebraska DOT and Stephen Lani, Nevada DOT

Application of MASH Test Criteria to Crashworthy Work-Zone Traffic Control Devices – Dr. Jennifer Schmidt, University of Nebraska

- Midwest Roadside Safety Facility
 - Research Organization at Univ. of Nebraska since late 1980's
 - Find cost-effective solutions to reduce serious injury and fatal accidents
 - Develop and evaluate safety features
- Temporary Barriers
 - Portable Concrete Barrier (PCB)
 - Segmented barriers for use in limited duration applications
 - Many state DOTs use different barrier shapes and connections
 - Each may perform differently and may need to be evaluated separately
- NCHRP project 22-36 PCB
 - Free Standing
 - ◆ Midwest F-Shape
 - ◇ 32" tall x 22.5" x 12.5'
 - ◇ Pin and loop connection
 - ◇ Passed crash testing
 - ◇ PCBs perform different with MASH
 - ◇ Dynamic deflection increased 76%
 - Anchored
 - ◆ Midwest F-shape Bolt-Through

- ◇ Concrete road surfaces
 - 1" offset from drop-off
 - ◇ Anchorage
 - Three 1.125" dia. A307 threaded rods on traffic-side face
 - Epoxy or bolt through
 - Test WITD-1 :passed
 - ◆ Midwest F-Shape Asphalt Tie-down
 - ◇ Test WITD-2: Fail
- MASH TL -4 Single- Slope PCB
 - ◆ 42" single-slope with X-bolt
 - ◇ 33" dynamic deflection unrestrained (MASH 4-12)
 - ◇ 7.1" dynamic deflection restrained (MASH 4-12)
- TL-3 Low-Profile TCB
 - ◆ 26" tall x 30' long T-shaped profile
 - ◆ Longitudinal bolts connect segments
 - ◆ 25" dynamic deflection (MASH 3-11)
- Type II Barricade
 - Non-proprietary
 - 8-ft wide x 60" tall
 - 8¼" tall HDPE rails
 - 14-ga perforated square steel tube
 - 2 warning lights mounted on front side of barricade
 - 30" x 48" x 0.08" aluminum sign
 - MASH 3-71: Passed
 - MASH 3-72: Passed
- Work-Zone Signs
 - Many are proprietary and not tested to MASH
 - Preliminary study indicated some existing sign systems may not pass MASH criteria
 - Successful non-proprietary system
 - 12-ga perforated square steel tube
 - 36" x 36" x 0.1" aluminum sign panel
- Other Research and Testing
 - NCHRP 03-119 – evaluation of barricades and work-zone signs (on-going)
 - Development of new PCBs (on-going)
 - Testing of other PCB configurations (on-going)
 - Other proprietary and non-proprietary systems
 - ◆ Channelizers, delineators, signs, barricades, etc.
 - ◆ https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity
 - ◆ <https://www.roadsidepooledfund.org/mash-implementation/search/>

Recycle and Reuse of Asphalt Products – Mike Huner, Huner Consulting

- RAP use has increased 15-20% since 2009
- NAPA info series 138 (Asphalt Pavement Survey)
 - 2017 estimates
 - ◆ 21.5 million barrels of liquid asphalt binder

- ◆ 72 million tons of aggregate
 - ◆ \$2.2 Billion in SAVINGS
- Binder control being looked for over stiffening
- Asphalt Industry remains the country's most diligent recycler
- 99% of RAP being put into new pavements
- 944,000 tons of RAS utilized in asphalt mix in 2017
- Industry continues to recycle other materials
 - Utilized more than 1.9m scrap tires in 2016
- Cold Central plant recycling
 - RAP Pile 1", Mixing plant, Emulsion tanker, water tanker
 - 100% Coating 3.5% emulsion 1.5% water

Center for Environmental Excellence and You – Melissa Savage, AASHTO Director of the Center for Environmental Excellence

- History
 - Established in 2001 in partnership with FHWA.
 - Goals:
 - ◆ promote environmental stewardship
 - ◆ encourage innovative ways to streamline the transportation delivery process.
 - ◆ Serve as a resource for transportation professionals seeking technical assistance, training, information exchange, partnership-building opportunities, and quick and easy access to environmental tools
- Oversight
 - Center's Technical Working Group oversees the work of the Center providing guidance and oversight in task selection and management
 - TWG includes representatives from AASHTO Committees, Subcommittees, Metropolitan Planning Organizations, FHWA and other resource agencies including: EPA, US Army Corp, US Fish & Wildlife
 - TWG meets quarterly by teleconference and annually in person to select tasks
- Environmental Topics and Disciplines
 - 20 environmental topics covered on the website
 - 6 Disciplines – Planning, Design, **Construction**, Maintenance, Operations, Project Delivery
 - Center website: <http://environment.transportation.org>
- Product & Services
 - Communities of Practice:
 - ◆ Storm water
 - ◆ Environmental Justice
 - [Peer Exchanges](#)
 - [Webinar Series](#)
 - Case Studies
 - Databases:
 - ◆ Programmatic Agreements (PAL)
 - ◆ Environmental Case Law (CLUE)
 - ◆ [Transportation & Environmental Research Ideas \(TERI\)](#)
 - Center website: <http://environment.transportation.org>

- Practitioner's Handbooks
 - 18 handbooks available on a variety of topics

Investing in Workforce Development – Delaine Linville, Tennessee DOT

- Focus
 - Strategic Organizational Planning
 - ◆ Millions in Consulting fee saved
 - ◆ 12 new job series created
 - ◆ 1000+ new employee
 - ◆ shared services model
 - Talent Development
 - ◆ TDOT Learning Network
 - ◇ 512 Active courses
 - ◇ 4,136 users
 - ◇ 15 unique channels
 - ◇ 10,712 courses completed
 - ◇ 240 student interns
 - 43 converted to full time
 - ◇ 315 Entry level Engineers
 - ◇ 100+ CE Master's Program Graduates
 - ◇ TRAC- 3 modules, 25 TDOT volunteers, 187 teachers trained, 100+ schools impacted
 - Employee Experience
 - ◆ Alternative Work space
 - ◆ 70% Capable of Working Remotely
 - ◆ Agile Project Mgmt.
 - ◆ Cross functional teams

Inspectors Development Panel Presentations – Gina Gallegos, Construction Division Director, Texas DOT and Randall Over, Project Manager, Columbus Community College

Construction Inspector Development Program (IDP)

- Why needed
 - Reduction in experienced construction staff
 - Increased number of projects
 - Lack of training across the industry
 - Limited time to cross-train existing personnel
- Five main facets
 - Career path for Construction Inspectors
 - Construction Inspector Boot Camp focused on new inspectors
 - On the Job Training
 - ◆ Construction Division personnel available as requested and needed statewide
 - ◆ District-focused training for personnel

- Internal Resources
 - ◆ Online Training
 - ◆ Classroom Training
 - ◆ Internal Videos
 - ◆ IDP Manual
 - ◆ Dedicated staff to provide assistance as requested
- Third-Party Training
 - ◆ Texas Asphalt Pavement Association
 - ◆ American Concrete Institute
- Inspector Development Manual
 - Available to staff statewide in hard copy and online
 - Resource to help find answers to specific inspection questions
 - References standard specs, special provisions, plans, test procedures, materials specs, manuals, and AASHTO/ASTM
- Construction Inspector Boot Camp
 - 2 week voluntary camp
 - Gradation upon completion
- On the Job Training
 - OJT is an important part of developing a knowledgeable and competent inspector.
 - Inexperienced inspectors are routinely trained in the field by more experienced senior inspectors.
 - The IDP is not meant to be a substitute for good old fashioned OJT, but provides additional resources to assist with OJT.
 - IDP is a tool to be used to aid in the development and refreshment of skills, knowledge, and best practices that are best learned on the project.

The ODOT – Columbus State Construction Inspection Workforce Program (CIWP)

- What: A joint effort of Columbus State, ODOT & ACEC Ohio to create a workforce of job-ready entry level consultant construction inspectors – the next generation of highway & bridge construction inspectors (career pathway)
- Why:
 - Shortage of Qualified & Experienced Inspectors
 - Increased Complexity of Inspection
 - Formal industry supported programs that include formal education, certification & internships
 - Large and numerous highway & bridge projects in Ohio and surrounding states
 - Partnering w/Urban Community Colleges
- Columbus State CIWP
 - Education
 - ◆ 38 Credit Hours of Civil Engineering Technology, Construction Management and Surveying Courses
 - Certification
 - ◆ National Institute for Certification in Engineering Technologies (NICET) Levels I&II Highway Inspection & ODOT Required Certifications/Testing of ACI Level I, Ohio Asphalt, Ohio Aggregate/ACI Aggregate and ODOT Traffic Work Zone Safety

- Internship
 - ◆ Formal 12-month paid internship working for an ODOT qualified engineering consultant on ODOT or ODOT-related projects
- Goals & Deliverables
 - Goal of 1st CIWP “Graduates” Prequalified as Ohio DOT Consultant Construction Inspectors – Late 2020
 - Curriculum Supportive of Becoming Certified w/NICET Levels I&II and passing ODOT required certifications and tests w/Education Credit Towards NICET Levels I&II Experience Requirements
 - CSCC as “One Stop Shop” for Students (and Employers)
 - Program Tri-Fold Brochure & Weblink, Outreach Plan to Existing CSCC Students and Career Technical High Schools
 - Agreement w/ODOT and ACEC Ohio for Formal Internships
 - Benchmark w/State DOT’s, Community Colleges & Industry Advisory Group
 - Program Guidebook June 30, 2019

Identify, Train, Place (A Playbook to Build Tomorrow’s Highway Construction Workforce) - Karen Bobo, Director, FHWA Center for Transportation Workforce Development

- The Challenge: Firms having difficulty filling position
 - 8% - 29% predicted demand change for various skill sets (including Const.) in the next decade.
- The Commitment
 - September, 2015: AASHTO/AGC/ARTBA Joint Committee Issued a Position Paper: *“Attracting, Developing & Training a Qualified Workforce”*
 - Highlights:
 - ◆ Difficulty Recruiting Women/Minorities into Transportation Careers
 - ◆ Little Coordination for Workforce by Industry and State DOTs
 - ◆ Recommend AGC, ARTBA, AASHTO, FHWA work cooperatively to address industry workforce development
 - ARTBA, AGC, AASHTO, FHWA Senior Managers met with Deputy Assistant Secretary, DOL Employment and Training Administration
- The Partnership
 - American Association of State Highway and Transportation Officials (AASHTO)
 - Associated General Contractors (AGC)
 - American Road and Transportation Builders Association (ARTBA)
 - U.S. Department of Labor, Employment and Training Administration (ETA)
 - U.S. Department of Transportation, Federal Highway Administration (FHWA)
- The Pilot
 - 12 States: Engage partners, Identify successful practices, Improve workforce skills, Approaches that can be replicated
- The Playbook
 - Identify Train Place
 - ◆ Concise set of plays to help others form working groups
 - ◆ Consolidates themes found from the locations
 - ◆ Game-ready examples of success
 - ◆ Case studies from cities/states

- ◆ Living, growing document
- Leverage OJT/ SS for HCWP
 - OJT/SS and HCWP: Same goal to support workforce development
 - HCWP provides for expanded partnerships and greater public workforce system engagement
 - OJT/SS funds can be used for HCWP; Must meet OJT/SS eligibility requirements and follow funds release process.
 - Transportation contribution to leveraging Workforce Board funds for highway construction workforce development

AASHTOWare Update – Janet Treadway, Project Business Administrator, Ohio DOT

- AASHTOWare Project (licensees in 50 agencies)
 - Powerful enterprise-wide software suite
 - Manages entire contract and construction lifecycle
 - Designed by transportation professionals for transportation professionals
 - Web-based software with external access options
 - Mobile Apps
 - Cloud hosting availability
 - 30+ years in production
- Benefits
 - Data stored in single location
 - Single standard security model
 - Captures information at the source
 - Easy reporting of information from the various modules
- Project Construction & Materials
 - Covers Construction and Materials Management Process
 - ◆ Michigan, Minnesota, Missouri, Montana, and Idaho in production
 - ◆ Several agencies currently implementing
 - AASHTOWare Project 4.2 - August 2019
 - ◆ Submit other users' Daily Work Report for approval
 - ◆ Add multiple items to a single acceptance record on an existing Daily Work Report
 - ◆ Location referencing with x, y, and z coordinates
 - 2 Full AASHTOWare Project Releases in 2020
 - ◆ AASHTOWare Project 4.3 – February 2020, AASHTOWare Project 4.4- August 2020
 - ◆ Focus on bug fixes and critical issues
 - ◆ Issues resolved and enhancements delivered quicker
 - Mobile tester available September 10th
- Project Bids
 - AASHTOWare Project Bids 3.0 – September 2019
 - ◆ Import agency fields to AASHTOWare Project Preconstruction™
 - ◆ Add date, currency, percent, and number input fields
 - ◆ Allow conditional programming
 - ◆ DBE related improvements
 - AASHTOWare Project Bids has officially replaced AASHTOWare Project Expedite™

- ◆ Expedite sunset date was June 30, 2019
 - ◆ All agencies (44) are now in production with Bids
- Project Data Analytics
 - Works directly off the unified database
 - Software as a Service (SaaS)
 - ◆ Minimal IT
 - ◆ Rapid feature delivery
 - ◆ Anytime, anywhere access by all
 - Easy to use analysis tools for data driven solutions
 - Construction Dashboards Development
 - Construction Data Analysis Potential
 - 11 Agencies funded solicitation
 - 4 year project now underway
 - ◆ Delivery new production ready software every 2 weeks

Research Technical Committee Working Meeting

- Place holder

Contract Administration Session – Earl Glenn, Section Chair, Mississippi DOT

Post Construction Review and Best Practices Panel

Brent Sweger, Kentucky Transportation Cabinet

Phillip Murdof, North Dakota DOT

Skip Powe, Alabama DOT

Gary Angles, Ohio DOT

Jason Gutting, Michigan DOT

- Post Construction Review (PCR) created as a deliberate opportunity to learn and improve from our collective experiences
- Constructability Reviews
 - Tries to ensure the perspective of construction is considered during design.
 - Errors & omissions
 - Things affecting bid ability
 - Things affecting buildability – for example is there going to be enough ROW or easements to get the equipment into an area to do the work
- Post-Construction Reviews
 - Tries to bring feedback from the realities of construction back to designers.
 - Construction staff and the project designers to talk.
 - ◆ Resident engineer & inspectors
 - ◆ State designers & consultants
 - ◆ Contractor.
 - We talk about:
 - ◆ What were some of the issues you faced?

- ◆ What problems from the plans?
- ◆ What change orders resulted?
- ◆ What could have been avoided or done differently during design?
- ◆ How did you deal with the issue?
- Meeting format
 - ◆ QAB moderates
 - ◆ 5 minutes of background about the project.
 - ◆ Pics during construction. Often, that will spark people to want to talk.
 - ◆ Selectively go through the change orders.
 - ◆ Hour and a half.
- Goals
 - ◆ Important way for designers to learn about the project they spent so much of their life working on
 - ◆ Occasionally on issues, we talk about why a designer chose to do things a certain way.
 - ◆ QAB learn and see what issues are bigger picture across the state.
 - ◆ Brief report
 - ◆ Within 30 days after project is finale

FHWA Research – Analysis of Material Source Mergers and Acquisitions (M&A) on Project Delivery – Jason Bittner, Applied Research Associates

- M&A is infrequently analyzed
- M&A activity has the potential to affect the construction industry
 - Competition
 - Market control
 - Materials pricing
- Inequitable market control and price increases can have significant effects on
 - Bidding processes
 - Consumer behaviors
 - Market characteristics (including entry/exit, growth, labor and workforce)
- Important to understand types and motivations for mergers
 - Horizontal - Between Companies Operating Competing in same Industry
 - ◆ Motivation= Economies of scale
 - ◆ Outcome = Reduces competition
 - Vertical – Operating in the same industry but diff. stages of production
 - ◆ Motivation= Integration
 - ◆ Outcome= Control over additional phases of production
 - Concentric – Same industry but not same product
 - ◆ Motivation= Diversification
 - ◆ Outcome = Increasing Market Share
 - Conglomerate- Related companies but not necessarily in same markets
 - ◆ Motivation= Diversification and Investment growth
 - ◆ Outcome – Management Synergy
 - ◆ M &A in Construction
 - No more frequent than in other industries
 - Anecdotally most M&A activity in this field happened over a decade ago or very recent

- Most M&A activity in this field does not involve large enough volume to warrant additional scrutiny
- However, recent court actions and proceedings in mid-Atlantic region has cast some new light in this area
- Bid and project Data Collected and Analyzed
 - To assess M&A activity on pricing
 - Thirty states targeted for initial analysis divided by AASHTO regions
 - Looked at 10 years data and anecdotal information on M&A activity
- Findings from Data Analysis
 - Data identified spikes and items of interest
 - ◆ We found several potential examples of bid pricing inconsistency around M&A activities
 - ◆ No clear evidence that could link to M&A
 - ◇ Some factors emerged: macroeconomic factors (all bid prices changed consistently), ARRA funding, changes in project scopes, variety of mobilization or other costs, low engineer's estimates
- Antitrust analysis
 - Desk scan and review of prior merger cases in markets related to the roadbuilding industry
 - Review of how the FTC/USDOJ Horizontal Merger Guidelines have been applied to these mergers in the highway materials and construction fields
- Trends in case laws
 - Homogeneity: Roadbuilding materials are almost universally regarded as homogeneous products.
 - Narrow geographies:
 - ◆ High transportation costs
 - ◆ Barriers to entry
 - ◆ High sunk costs
 - Market Entry: No cases where the potential entry or creation of a new entity was sufficiently realistic to offset anticompetitive effects.
 - ◆ Rather, market entry was only feasible when an established competitor was able to purchase divested assets.
 - Herfindahl-Hirschman Index can be used to determine market share
- Literature review and findings
 - Price increases accompanied mergers in all cases, regardless of the policy action taken (2003-2013) (not limited to construction materials)
 - ◆ Increases vary based on policy action taken however all had increases
 - Michigan study found one materials merger resulted in 18% increase in price, but two others found no statistical increase
 - ◆ Interesting additional finding: 6.0% lower price for each doubling in the number of bidders on a project and 5.6% lower for each doubling in the quantity of asphalt
 - ◆ After first two years, however, the 18% increase regressed to comparable levels
- General Finding
 - In Wisconsin, Oregon, and Georgia, there does not appear to be significant recent mergers amongst roadbuilding materials suppliers. Even in Tennessee,

where some recent consolidation has occurred, the case studies did not reveal a corresponding anti-competitive result

- ◆ However, great deal of consolidation prior to study years
- ◆ State DOT staff can identify effects of potential mergers and offer ideas for divestitures to minimize effects on competition
- ◆ Sharing information across the “community” is essential.
- Preliminary Observations and Next Opportunities
 - While we were unable to find a “smoking gun” there are some practices that warrant additional conversation
 - Overall, working with industry is crucial to improve estimating practices
 - Reliance on engineer’s estimates / desire for independent estimation
 - Continue to perform trend analysis to monitor market conditions and identify non-competitive behaviors
 - Study results will be available this Fall
 - National webinar will provide additional information and more details on the Case Studies
 - Further monitoring should be considered – and at least regularly reported for industry information

Claim Disputes-Lesson Learned Panel

Chris Costello, Delaware DOT

Michael Beer, Minnesota DOT

Earl Glenn, Mississippi DOT

Kerry Bates, Virginia DOT

Ken Roberts, Schiff, Hardin Law Firm

Scott Lowe, Trauner Consulting

Lessons Learned in Delaware – Chris Costello

- District perspective
 - Small to medium Dispute
 - No overhead to deal with them
 - Managing day to day issues in conflict resolution
- Manage your Effort
 - Disputes are marathons, not sprints
 - Have a plan and don’t let people obsess
 - As a Construction District, your biggest opponent may not be the contractor.
 - Once a dispute grows large, everyone wants a say. Be ready to heard the cats, it’s crucial.
 - Build a Narrative
- Letters to contractors should contain a common theme, tell a story
- The more the decision maker hears and reads your narrative, the better
- Contractors make the issues seem complicated, owners need to make the issues seem simple.
- Take time early in the dispute to start crafting the narrative. Contractors do this all the time, but we as owners seem more reluctant.
 - Writing Letters

- ◆ Take the time to prove facts carefully, but make your story the centerpiece.
- ◆ Make long letters easy to read with summaries and topic sentences
- ◆ Repeat your theme
- ◆ Don't "Strenuously Object!"
- Focus
 - ◆ (1) Entitlement, (2) Impact or Causation, (3) Damages
 - ◆ We're taught to argue about entitlement and look at IDRs to calculate damages.
 - ◆ Frequently, the real issue is causation and we don't see it, especially in smaller disputes.
 - ◆ Even though it seems wrong to admit you are wrong, that's often the correct action.
- Negotiating
 - ◆ Know your reservation point
 - ◆ If you hear something new and don't know what to do, STOP!
 - ◆ If you don't know, audit!!!
 - ◆ Write everything down when you negotiate, they do.
- Settling
 - ◆ When exchanging writings, make sure both sides acknowledge
 - ◆ If you change the contract, make sure to consider all of the consequences
 - ◆ If you settle now, will they want more later?
 - ◆ Consider worst case scenarios. Your slam-dunk argument could fail
- Delays
 - Capturing all sources of delays is difficult
 - Can't rely solely on forensic schedule analysis, the staff needs to see the issues and act on them
 - TIA's are for prospective delays
 - Don't fall into the trap of letting the contractor bundle delays
 - Day to Day Practices
 - ◆ Be consistent and don't ruin your narrative
 - ◆ Follow up all meetings with an email or minutes
 - ◇ This is hard when you are busy, but it's very important
- Things that seem very obvious today will be quickly forgotten tomorrow
 - ◆ Keep issue logs to help organize and apply the narrative
- Manage the Field Staff
 - ◆ Don't let field staff argue with the contractor's office
 - ◆ You have to build the job, so try to build it
 - ◆ Follow the contract, even when it isn't convenient
 - ◆ Desire to reward good behavior and punish bad is human nature, but don't fall in that trap
 - ◆ Be careful with electronic communications
- Fighting Back
 - ◆ Being patient is not the same as being passive
 - ◆ Think about ways to fight back - Counterclaims
 - ◆ Was the work substandard? If so, can I prove it? How do I value it?

- ◆ Did the contractor follow the contract? If not, did the contractor wrongfully benefit? If so, prove it.
- **Claim Disputes-Lesson Learned Panel – Michael Beer, Ken Roberts, Scott Lowe**
 - The Project
 - ◆ Project had been in development for many years.
 - ◆ The design was governed by environmental constraints due to the wild and scenic river.
 - ◆ Design-Bid-Build, not Design-Build.
 - ◆ Foundations let separately from the bridge.
 - ◆ Three bidders; lowest bid was approximately \$330M; highest bid was approximately \$410M.
 - ◆ The contract duration was 956 days, with one time extension of 124 days. The dispute was based on a project substantial completion delay of 198 days.
 - ◆ The main spans were precast, post-tensioned, and extradosed (with cable stays). Piers were cast-in-place.
 - ◆ Some of the approach spans were also precast, but the largest approach spans were cast-in-place.
 - The Parties
 - ◆ The project was jointly funded by two state DOTs.
 - ◆ The design team was not a joint venture, but consisted of two large engineering firms, with one as the lead and another as a subcontractor.
 - ◆ The contractor was a joint venture of two, large construction firms, one of which was a subsidiary of an even larger firm.
 - ◆ Two firms split the task of construction engineering tasks.
 - ◆ Two firms split the design and fabrication of the forms for the precast segments.
 - ◆ The rebar subcontractor was not able to complete the project and had to be replaced by the general contractor.
 - The Project was Partnered
 - ◆ There was a large change order agreed to approximately 18 months into the project.
 - ◆ The issues in dispute arose primarily after this change was executed, but the issue of waiver was important.
 - ◆ The initial dispute was essentially presented as a total cost claim.
 - ◆ Ultimately, the dispute was composed of 11 major components; delay and acceleration were each separate components.
 - ◆ The owner attempted to resolve the dispute with a significant initial offer, which was rejected by the contractor with no counter.
 - ◆ A certified claim was not filed.
 - Basic Partnering Requirement
 - ◆ Partnering will be required on this Contract.....
 - ◇ The primary objective is to open the lines of communication with the stakeholders to include effective and efficient Project performance and completion on schedule, within budget and in accordance with the Contract Documents.

- Escalation of Issues
- To resolve issues in a timely and effective manner, representatives of the parties shall meet regularly and explore resolution for each issue at the lowest level possible (i.e., Project Task Force Team first, Project Management Team next, and Executive Management Team last). If both parties determine, in good faith, that effective resolution is not possible at the current level, then the issue will be elevated to the next level in the partnering process. If both parties make such a determination during partnering at the Executive Management Team level, then the dispute will be elevated in accordance with Section S-32.2 (CLAIMS FOR COMPENSATION ADJUSTMENT) of these Special Provisions.
- Cost of Facilitation
- All Partnering costs shared equally between MnDOT and the Contractor.
- Claims
 - ◆ **Claims for Compensation Adjustment and Disputes**
 - ◆ If issue resolution efforts through Partnering are not successful, disputes shall be resolved through Section S-32 (CLAIMS FOR COMPENSATION ADJUSTMENT) of these Special Provisions and MnDOT 1517.
 - ◆ **S-32.1 NOTICE OF CLAIM:** At the time the Contractor gives written notice of the claim, the Contractor and the Department shall immediately begin to keep and maintain complete and specific records to the extent possible. The records shall consist of, but are not limited to, cost and schedule records concerning the details of the perceived claim. Unless otherwise agreed to in writing, the Contractor shall continue with and carry on the work and progress during the pendency of any claim, dispute, decision or determination by the Engineer, and any arbitration proceedings.
 - ◆ A number of Notices of Potential Claim(s) were submitted.
 - ◆ A formal claim was not submitted or certified.
 - ◆ The mediation process provided for in S-32 was not used.
- Dispute
 - ◆ The number of days of delay in dispute was 198 for the project substantial completion date and more days that related to the acceleration effort.
 - ◆ There were at least 11 separate components to the dispute; each component of the dispute consisted of several issues.
 - ◆ 2 of the 11 issues were settled early in the process.
 - ◆ Many of the issues were allegedly design related and the remaining related to project administration.
- Participant and Presenters
 - ◆ For the contracting team – Senior managers from the parent contracting firm, senior managers from the JV partners, a scheduling expert, a design expert, and the principals of each of the construction engineering firms.
 - ◆ For the owner’s team – Senior managers from Minnesota and Wisconsin DOTs, FHWA Assistant Division Administrator, CE&I consultant, a claims consultant, and an accountant.
 - ◆ For the design consultant’s team – Senior members of both firms involved in the design, a construction expert, a rebar installation expert, and a claims consultant.
- The Process

- ◆ There were 25 multi-day meetings with a duration of 2 to 5 days over a period of 2 years.
- ◆ There were 60 facilitation sessions.
- ◆ There were dozens of Power Point slide presentations and thousands of slides prepared.
- ◆ No Talking heads or 5 minute sound bites
- ◆ Process development: Parties' prior participation in similar process on other major projects.
- ◆ No canned formula.
- ◆ Cute won't cut it.
- ◆ Complex claims require a proper dialogue, involving
 - ◇ Thoughtful discussion
 - ◇ Active listening
 - ◇ Digestion of information
 - ◇ Continued discussion

- ◆ A Prolonged facilitation – free dialogue, breaks, and response opportunities – allowed Parties to:
 - ◇ Find common ground
 - ◇ Hold the Parties accountable
 - ◇ Eliminate false disagreements
- ◆ Does not exist in arbitration or litigation and very rarely seen in mediation.
- ◆ Every claim has three parts:
 - ◇ Entitlement
 - ◇ Impact
 - ◇ Cost
- ◆ Every presentation has to address all of these parts
- Entitlement
 - ◆ Develop a full understanding of the contractor's position and arguments regarding the issue.
 - ◆ What does the contract say regarding the contractor's position?
 - ◆ What are the facts that support or undermine the contractor's position?
 - ◆ Based on the contractor's position, the contract, and the facts, was there a change?
 - ◆ Don't Stop at Entitlement
- Impact: How did the issue impact the project?
 - ◆ Added work?
 - ◆ Delay?
 - ◆ Inefficiency?
 - ◆ Mitigation?
- Delay
 - ◆ The business of analyzing delays was like the Wild West; there were no laws.
 - ◆ It's important to agree on how to measure delay.
- Costs
 - ◆ This can be challenging.

- ◇ An audit is an extremely useful tool.
- ◇ Make sure you understand exactly how your contract works, especially as it relates to actual costs versus force account costs.
- ◇ When claims have many parts, look closely for potential overlap or double-dipping; particularly with regard to overhead.
- ◇

VDOT Construction Contract Claims – Kerry Bates

- **Claims Statistics**
 - 2018 Calendar Year
 - Over 200 Active Construction and Maintenance Projects worth approx. \$2.9 Billion
 - 57 Projects with Notices of Intent to File a Claim (NOIs)
 - ◆ Approx. 25% of VDOT's Projects
 - ◆ TOTAL No. of NOIs: 132
 - ◇ 29 NOIs resolved by Change Order or otherwise withdrawn by Contractor before final acceptance
 - ◇ 103 NOIs unresolved
 - In CY 2018, 16 Claims submitted:
 - ◆ 6 claims resolved by State Construction Engineer [Step 1 in 2-Step Claims Process]
 - ◆ 3 claims resolved by Deputy Commissioner [Step 2 in Claims Process]
 - ◆ 7 claims unresolved – Possible Litigation
 - Total of Claims: \$11,033,578.41 [≈ 0.4% of total contract value]
 - Range in Dollar Amount of Claims: from \$3,222 to \$4.3 Million
 - 10 Claims Included Request for Refund of Liquidated Damages -Total Amount: \$1,001,490
 - Biggest Delta: Claim Amnt. \$3.4 Million vs. Settlement Amnt. \$72,987
 - 1 lawsuit pending - from 2017 claim
- **Claims – Procedures**
 - Statutory – *Code of Virginia* provides a basic process for submittal and consideration of contractor claims
 - Contractual – VDOT *Road & Bridge Specifications* follow the statutory process and provide additional terms and conditions to implement that process
- **Claim Process – During The Project**
 - “Notice of Intent to File a Claim” or “NOI” given at:
 - ◆ (1) Time of the Occurrence, or
 - ◆ (2) Before beginning of the work on which the claim is based
 - Contractor required to:
 - Provide list of materials, equipment and labor for which additional compensation will be requested, and facilities for Department to keep actual cost records
 - Compare and reconcile records with Department each day
 - Only actual costs are considered
- **Claim Process – After The Project**
 - **Administrative Claim Process**
 - ◆ **Claim** - Contractor must submit certified claim within 60 days after Final Estimate

- ◆ **Step 1** – Department’s Decision by State Construction Engineer
 - ◇ 90-day period to review & analyze
 - ◇ Informal meeting to discuss claim; attorneys & consultants allowed
 - ◇ No record
 - **Step 2** – Commissioner’s Decision by Deputy Commissioner
 - ◆ 45-day period to review & analyze
 - ◆ Informal appearance to discuss claim; attorneys & consultants allowed
 - ◆ Audio recording, but no record i.e., no testimony or evidence presented
- Claims Process – Litigation
 - Litigation –
 - ◆ Circuit Court (hears all civil cases for more than \$25,000)
 - ◆ No jury
 - ◆ Legal action is start of new process - not an appeal from administrative decision
 - Alternative Dispute Resolution
 - ◆ Non-Binding Mediation allowed and frequently used
 - ◆ Binding Arbitration prohibited by law
- Claims Process – In Court
 - The Virginia Supreme Court strictly enforces the statutory claims procedures
 - ◆ The VDOT claims statutes detail the proper form and procedure for submitting a claim and, therefore, compliance with the requirements is mandatory, and part of the substantive cause of action authorized
 - Virginia Courts *routinely* dismiss claims when the Contractor fails to satisfy the claims requirements
 - ◆ Failure to submit a timely written NOI or Claim is fatal
 - ◆ *Not* actual notice, verbal notice, or meeting minutes
 - ◆ *Not* invoices or letters submitted after work / services performed
- Claims – Lessons Learned Pre-NOI
 - COs / IGEs – for changes (unilateral if necessary)
 - Monthly Progress Schedules & SIAs – monitor progress and analyze delays
 - DWRs - record FACTS, such as weather conditions, site conditions, labor and equipment on site, materials used, test reports, and where work is or isn’t being prosecuted
 - Progress Meetings - Minutes of meetings may be the only record of Department’s or Contractor’s statements, actions, and plans
 - Photos / Plan Grid – Periodic photos documenting progress and conditions
 - Document everything! *“If it is not documented, it did not happen”*
 - Diaries / DWRs – track labor, materials and equipment involved in claim
 - Meetings - discuss the disputed items, the issues involved, and expectations of records to be maintained and how they are to be compared / reconciled - keep and circulate meeting minutes
 - Photos / Plan Grid – show the work in dispute and the project as a whole
- Claim – Lesson Learned
 - Training –
 - ◆ NHI / FHWA Claims Course
 - ◆ Change Order Training
 - Contract Administration

- ◆ Enforce the Contract Requirements
- ◆ Change Order Support
- ◆ NOI / Claims Support
- Revise Contract Documents
 - ◆ Revise specifications to help avoid or manage claims
 - ◇ 2016 Specifications added method for calculating delay costs, Differing Site Conditions, Termination for Convenience
 - ◇ Supplement Specifications annually, replace every 4 - 5 years
- Revise contracts based on court decisions and legislation
 - ◆ Compensation for Changes, Additional Quantities, Extra Work
- Administer contract issues ASAP - keep ball in Contractor's court
 - ◆ Responses to Shop Drawings, RFIs, Notices of Delay, NOIs
 - ◆ Rejection of Unacceptable work - reject without delay + tell Contractor in writing what is being rejected and why + request corrective action plan
 - ◆ Resolution of changes with Change Orders – Bilateral if possible - Unilateral if necessary.

Georgia I-285 P3 – Stephen Lively

- Major Mobility Invest Program (MMIP)
 - \$11 billion program
 - 11 projects
 - ◆ 3 Major Interchange Projects
 - ◆ 4 Major Express Lanes Projects
 - ◆ 3 Major Interstate Widening Projects
 - ◆ 1 Commercial Vehicle Lanes Project
 - Innovative Delivery and public-private partnerships to accelerate projects
 - P3 Division
 - ◆ Working to deliver major projects quickly
 - ◆ Aligning resources of P3 and design-build delivery
 - ◆ Focusing on major mobility project
 - MMIP Delivery Model
 - ◆ Program Management Consultant (PMC):
 - ◇ Represents Georgia DOT
 - ◇ Provides oversight of the entire program
 - ◆ General Engineering Consultants (GECs):
 - ◇ Project-specific
 - ◇ Performs pre-let and post-let work
 - ◆ **Developers**
 - ◇ Contractors performing final design and construction
 - Anticipated Project Delivery Models
 - ◆ Design-Build
 - ◆ Design-Build-Finance
 - ◆ Design-Build-Finance-Maintain
 - How Delivery Models are Determined
 - ◆ Timeframe for delivery
 - ◆ Project size and available funding

- ◆ Opportunity of innovation and risk allocation
- Statewide Benefits and ROI
 - ◆ \$1.10 benefit for every \$1 invested
 - ◆ 44% reduction in transit vehicle travel time
 - ◆ 15% travel time relief in 2040
 - ◆ 13% reduction in traffic fatalities/serious injuries
 - ◆ 13% fleet cost reduction
 - ◆ 45 minutes in planning time saving
 - ◆ 13% drop in pollution due to less congestion/faster travel times
- Georgia Express Lanes Network
 - Network around Atlanta: I-85, I-75, I-285, I-20, SR 400
 - Mobility Partnerships
 - ◆ GDOT
 - ◇ Responsible for planning, constructing, maintaining, and improving the state's roads, bridges, and interstates.
 - ◆ Metro Atlanta transit operators are responsible for operations of various transit options available including heavy rail, light rail, and bus transit system and the advancement of transit in the metro area.
 - ◆ State Road & Tollway Authority
 - ◇ Collects toll revenue and responsible for operations for express lane systems within Georgia.
 - Express Lanes Benefits
 - ◆ More Reliable Travel Times
 - ◆ More Consistent Travel Speeds
 - ◆ Increased Transit Options and Opportunities
 - ◆ Positively impact regional economic growth
 - ◆ Positively impacts air quality
 - ◆ Revenue generation
 - Express Lanes Rules of Operations
 - ◆ Peach PASS
 - ◆ No Trucks or Trailers
 - ◆ Everyone pay
 - ◇ No vehicle occupancy/vehicle type exemptions
 - ◇ Only registered transit vehicles, vanpools, and emergency vehicles are toll-exempt
 - ◆ Dynamic pricing
 - ◇ Prices rise and fall to maintain performance (e.g., speed of 45 mph)
 - ◆ System-to-system connectivity
 - ◇ Provided between express lane corridors
 - ◆ Northwest Corridor Express Lanes Success
 - ◇ Rush hour has been reduced by over 1 hour in both the morning and evening commutes
 - ◇ Total trips: 6.1 million
 - ◇ Travel speeds are 30% faster in the express lanes than in the general purpose lanes
 - ◇ Average daily fare: \$2.32

- ◇ Weekday trip average: 25,500
- ◇ GP lanes are up to 20 mph faster than they were before the express lanes opened

Wednesday August 14th

Roadway and Structure Session –Moderator- John Hancock, Section Chair, Georgia DOT

MemFix4 CMGC in Tennessee/Nashville ABC – Will Reid, Assistant Chief Engineer of Operations, Tennessee DOT

- **CMGC Process**
 - Construction Manager - General Contractor
 - Why CMGC?
 - Designer works directly for the Department
 - Contractor chosen based on qualifications and fee
 - Taskforce – TDOT – CM - Designer
 - Weekly Task Force Meetings During Design
 - Work closely with stakeholders
 - Independent Cost Estimator (ICE)
 - RFP selects both the Designer and CM
- **Goals of GMGC**
 - Expedite complex project delivery
 - Design based on contractor capabilities and DOT expectations
 - Mutually agreed distribution of risk
 - Provide the best product in the shortest time frame at an agreed upon price (one contractor, one price)
 - Owner retains greater control of design vs. design-build
 - Early involvement of third parties during design (utilities, railroad, cities, major stakeholders)
 - Daily peer exchange
- **Starting A CMGC Program**
 - TDOT wanted a “New Tool in the Tool Box”
 - Enabling Legislation in July 2014
 - Up to Three Pilot Projects
 - Constraints on Maximum Contract Size (\$)
 - Time Frame – Pilot Program Expires in July 2019
 - Defines the Selection Process
 - ◆ Does not require prior CMGC experience
 - ◆ Defines Selection Committee for the CM
 - ◆ Independent Cost Estimator (ICE)
 - ◆ Bid by CM must be within 10% of ICE or In-House Estimate
- **Challenges in project area**
 - Seismic zone
 - No piles

- Sandy soil
- No bed rock
- Several physical constraints
 - ◆ Significant utilities
 - ◆ Commercial businesses
 - ◆ High traffic volumes
- Railroad involvement
- Project Objectives
 - Provide an eight-lane I-240 mainline (complete the planned widening of I-240).
 - Improve four deficient bridges over I-240:
 - ◆ Replace WB & EB Poplar Avenue.
 - ◆ Replace NS Railroad Bridge (owned by TDOT).
 - ◆ Rehab or replace Park Avenue.
 - Improve horizontal and vertical clearances.
 - Minimize construction time and impacts by using Accelerated Bridge Construction (ABC).
 - Satisfy the public project requirements of NS Railroad.
 - Initial Design Phase –Spring 2016 to Construction Complete –July 2019
- Project specifics info.
 - WB/EB Poplar Piers
 - ◆ Original footings have no piles
 - ◆ Full encasement: Fast and Simple
 - ◇ 7 $\frac{5}{8}$ " Micropiles
 - ◇ Vertical or 1:4 batter
 - ◇ 20' casing + 33' bond zone
 - ◆ Narrow work zone
 - ◆ Challenges
 - ◇ Wall pier has high stiffness and mass for seismic
 - ◇ Seismic loads on micropiles
 - 291 kips – compression per micropile
 - 121 kips – tension per micropile
 - 28 kips – lateral bending load per micropile
 - ◇ LUSAS used for seismic modeling
 - ◇ Sensitivity of pier design required use of A706 rebar
 - ◇ Micropiles
 - 7 $\frac{5}{8}$ " x 0.5" Micropiles
 - API N80 Casing
 - 58 Installations for WB Pier
 - 56 Installations for EB Pier
 - Cased Length 20 Feet (+/-)
 - Bond Zone Length 33 Feet (+/-)
 - Benefits of CMGC:
 - Design -> Construction Efficiency
 - Buy America Act
 - 9" vs. 7 $\frac{5}{8}$ "
 - Walnut Grove Bridge Farm

- ◆ Bridge Farm for construction of superstructure
 - ◇ Self-propelled modular transport
 - North Folk Southern RR bridge
 - ◆ Bridge Slide
 - ◆ Maintain RR traffic
- CMGC Project Benefits
 - ABC resulted in less than 1 year of lane closures
 - Design developed to expedite construction
 - Micro piles – maximized efficiency
 - Designed for tight working conditions with contractor input
 - Minimized utility relocations
 - Efficient issue identification – timely responses
 - Contractor aware of design intent when developing bid

I-59/20 Birmingham CBD Bridge Replacement – Skip Powe, State Construction Engineer, Alabama DOT, Adam Patterson, Project Manager, Volkert, Inc.

- Why Replace
 - More than 45 years old
 - Traffic over 170,000 vpd
 - Design ADT was a fraction
 - Deck failing
 - Capacity issues
 - Ingress and egress issues for ramps
- Phase (A,B,1,2,3)
 - Phase A
 - ◆ Completed in Sept 2017
 - ◆ Prime: Bell & Associates
 - ◆ Final: \$18,352,692
 - ◆ Included 31st & 12th Bridges
 - Phase 1
 - ◆ Completed in October 2016
 - ◆ Prime: Brasfield & Gorrie
 - ◆ Final: \$7,205,605
 - ◆ Several Bridge Widening
 - ◆ ITS Project included
 - Phase B
 - ◆ Place OGFC on I-65 and west end of CBD Bridges
 - ◆ Let by end of 2019
 - ◆ Work done in Spring and Summer 2020
 - ◆ Plans still being developed
 - Project Challenges
 - ◆ Confined downtown space
 - ◆ Environmental/Historical aspects
 - ◆ Public outreach
 - ◆ Norfolk Southern RR
 - ◆ Alabama Power buried 115kV oil-cooled line
 - ◆ Geology is pinnacle rock

- ◆ MOT
- ◆ New D-B/Alternative contracting state law (ATCs)
- ◆ No Excuse I/D
- ◆ Bridge lighting
- ◆ Public space project under
- ◆ 2021 World Games
- ◆ Utilities
- Public Outreach Critical
- Unique Aesthetic lighting
- Including Space Conceptual Master Plan
- Total Cost
 - ◆ For 5 contracts: Approx. \$741 million
 - ◆ CE&I: Approx. \$110 million (budgeted)
 - ◆ Additional: ROW and Utilities+ Phase B
- See Presentations for visual story

Electronic Contract Documents – Mike Kennerly, Director, Office of Design Iowa DOT

- Our universe is changing
 - eConstruction
 - Automated Machine Guidance (AMG)
 - LIDAR
 - Visualization
 - Animations
 - 3D Highway Design
 - 3D Bridge Design
 - Paperless Business Models
 - Asset Management Data Collection Efforts
 - UAV's
- How We got Started
 - We initiated our AMG effort in 2003, with the goal to our first AMG project in 2 years.
 - We met with contractor McAninch Corp who went to win the 2005 Award of Excellence from ENR for their work in AMG.
 - We met with Caterpillar, Topcon, and Trimble
 - Our first AMG project was in 2006, a 2.6-mile section of the 4-lane reconstruction of IA 60, in northwest Iowa.
 - We had 3 contractors, two used Trimble equipment and one used Topcon. It gave us experience providing files and working with both systems which was extremely valuable.
 - From 2006 until 2015 we provided files pre-letting along with the regular bidding documents for the contractors use.
 - The files remained for information only.
 - ◆ Electronic information shall not be considered a representation of actual conditions to be encountered during construction. Providing the Contractor this information does not relieve the Contractor from the responsibility of making an investigation of conditions to be encountered, including but not limited to site visits, and basing the bid on information obtained from these

investigations and professional interpretations and judgment. Contractor assumes the risk of error if the information is used for any purposes for which the information was not intended. Assumptions the Contractor makes from this electronic information or manipulation of the electronic information *is at their risk*.

- Excerpt from: 1105.16 Automated Machine Guidance
 - Contractor may use equipment with AMG that results in meeting the same accuracy requirements as conventional construction as detailed in the Standard Specifications.
 - B. Use this section in conjunction with Section 2526 unless construction survey is being provided by the Engineer.
 - C. Electronic files.
 - 1. Available electronic files will be provided by the Contracting Authority with the Proposal Form. **This information is available at the Office of Contracts' website.**
 - Additional Contractor Responsibilities.
 - 1. Provide a rover, readily available for Engineer to use, during duration of contract.
 - 2. Provide Engineer up to 8 hours of formal training on Contractor's AMG systems.
 - 3. Contractor bears all costs, including but not limited to cost of actual reconstruction of work that may be incurred due to errors in application of AMG techniques. Grade elevation errors, rework resulting from errors or failures of AMG system, and associated quantity adjustments resulting from Contractor's activities are at no cost to Contracting Authority. Delays due to late submittals or satellite reception of signals to operate AMG system will not result in adjustment to contract unit prices or justification for granting contract extensions.
 - 4. Check and recalibrate, if necessary, AMG system at beginning of each work day.

- 1105.04 Conformity with and Coordination of the Contract Documents
 - A. In case of a discrepancy between contents of the contract documents, the following items listed by descending order shall prevail:
 - ◆ 1. Addendum
 - ◆ 2. Proposal Form
 - ◆ 3. Special Provision
 - ◆ 4. **Plans**
 - ◆ 5. Standard Bridge Plans, Standard Culvert Plans, and Standard Road Plans
 - ◆ 6. Developmental Specifications
 - ◆ 7. Supplemental Specifications
 - ◆ 8. General Supplemental Specifications
 - ◆ 9. Standard Specifications
 - ◆ 10. Materials I.M.
 - ◆ 11. Notice to Bidders

- B. **Electronic support files**, if available, will be provided prior to letting and are for information only. Should there be a discrepancy between an electronic support file and a contract document, the contract document shall govern.
- Excerpt from: 1105.16 Automated Machine Guidance
 - b. Machine Control Surface Model Files (including topsoil placement where required on the plans): Documentation file describing all of surface models, typically in LandXML format. Areas where a surface model is not provided, Contractor may, at no additional cost to Contracting Authority, develop required surface models to facilitate AMG.
 - c. Alignment Data Files: Documentation file describing alignment information both horizontal and vertical, typically in LandXML format.
- What We Learned
 - Create a partnership with the AGC. We met with them when we started and we continue to meet with them once or twice a year to evaluate how we are doing, and where they are going.
 - Transitioning for your designers is key.
 - ◆ Reviewing 3D deliverables
 - ◆ Signing and Sealing Electronic Documents
 - ◆ Understanding how the files are used by the contractor, what adjustments they are making.
 - Trust is an aspect often overlooked.
 - ◆ Contractor
 - ◆ Designers
 - ◆ Contract Administration Staff
- From 2006 to 2015
 - 2006 First AMG Project
 - 2009 Moved to first true 3D Software for Design
 - 2015 The Next Step
- The Next Step
 - Electronic Files as the Controlling Document
 - ◆ Change the perception and use of the electronic document. Move from At-risk to Value Added.
 - ◆ How do we preserve the integrity of the electronic documents.
 - ◆ We needed to find the right project, in this case that was one that had both grading and paving.
 - ◆ How would this impact contract administration
 - ◆ Industry readiness
 - ◆ We needed to learn more about what happens to the files once they leave our hands.
 - ◇ How do you control changes to the model
 - ◇ Can we incorporate some of that into our process
 - ◆ We selected a project that we thought had all of the elements that would give us good feedback and included several disciplines.
 - ◆ We added a Special Provision by addendum elevating the electronic files above the paper\pdf plans.
 - ◆ We indicated that if any changes needed to be made that the Department would be responsible for making the necessary changes.

- ◆ We made it mandatory for machine guided grading and optional for paving.
- ◆ We did not change our process for this project.
- Excerpts from SP-120279 SPECIAL PROVISIONS FOR CONFORMITY WITH AND COORDINATION OF THE CONTRACT DOCUMENTS
 - ◆ In case of a discrepancy between contents of the contract documents, the following items listed
 - ◆ by descending order shall prevail:
 - ◆ 1. Addendum
 - ◆ 2. Proposal Form
 - ◆ 3. Special Provision
 - ◆ **4. Digital Contract Files.**
 - ◆ 5. Plans
 - ◆ 6. Standard Bridge Plans, Standard Culvert Plans, and Standard Road Plans
 - ◆ 7. Developmental Specifications
 - ◆ 8. Supplemental Specifications
 - ◆ 9. General Supplemental Specifications
 - ◆ 10. Standard Specifications
 - ◆ 11. Materials I.M.
 - ◆ A. With the exception of small or irregular areas, **Automated Machine Guidance** according to Article 1105.17 **will be required** for the **grading** and paving on this project.
 - ◆ **B. Digital Contract Files.**
 - ◇ 1. Digital Files contained within the 81-1691-021_E_Files_(DataFiles).zip file package listed below (**files are listed in descending order of precedence**):
 - a. LandXML Geometry file: hv_dsn_021.xml within the “Alignment_Data_Files” subfolder.
 - b. LandXML surface files: All LandXML files within the “Machine_Control_Surfaces” subfolder.
 - c. Three dimensional line string CADD files: All DXF files contained within the “DXF_Files” subfolder.
 - ◇ 2. See Appendix A for names, time stamps, and sizes of official files.
 - ◇ 3. The digital files are available for download at the following web site for the project listed above: <http://www.iowadot.gov/contract/lettings.html>
 - ◆ 1105.04, D.
Replace the Article:
The Contractor shall not take advantage of any apparent error, omission, or discrepancy in the contract documents. The Engineer will be permitted to make such correction in interpretation as may be deemed necessary for the fulfillment of the intent of the contract documents subject to compensation as provided in Articles 1109.03, 1109.04 and 1109.16. Written notice of changes in the contract documents will be given to the Contractor by the Engineer. **Field adjustment of digital contract files, if necessary, will be completed by the Engineer.**
- Project IA 196 in Sac County Grade and Pave
 - ◆ Project Information

- ◇ Length: 8 miles
- ◇ Earthwork Quantity: 432,651 Cubic Yards
- ◇ Paving Quantity 148,618 Square yards
- ◇ Two Bridge Replacements: Over the Raccoon River and Cedar Creek
- ◇ Replacement of a Single Box Culvert
- ◆ In conjunction with the completion of the US 20 Corridor in Northwest Iowa
- ◆ The Results
 - ◇ The successful low bidder was a joint venture between Peterson Contractors Inc. and Godbersen-Smith. Cedar Valley Corp. was selected as sub for the Paving.
 - ◇ Letting Results: (Grade and Pave Project only)
 - Programmed Amount: \$18,915,000
 - Awarded Amount: \$18,854,801.68
 - ◇ No adjustments in electronic files needed by the contractor
 - ◇ Contractor typically transfers risk to the engineering consultant on traditional GPS projects.
 - ◇ Reduced costs for contract survey.
 - ◇ No difference in their bid, if anything it reduced costs.
 - ◇ The contractor preferred this approach. Less risk.
 - ◇ No difference or issues for the contract administration staff. Although initially concerned now supportive.
- ◆ What We Learned: Readiness Is Key
 - ◇ Designers
 - Software
 - Processes
 - Staff
 - ◇ Consultants
 - Software
 - Processes
 - Staff
 - Post letting
 - ◇ Contractors
 - Equipment Investment
 - Experience\Trust
 - Staff
 - Post letting
 - ◇ Contract Administration
 - Equipment investment
 - Experience\Trust
 - Staff
 - ◇ This represents a significant investment in equipment, software and training.
 - ◇ Is your agency putting out for bid enough grading and paving projects to warrant then investment?
 - ◇ What is their level of experience working with AMG?

- ◇ Is the contractor developing their own models, or modifying the models provided by the transportation agency?
- ◇ Have the contractors requested the electronic files?
- ◇ The industries may be at different level in terms of their adoption of AMG
- ◆ Where We are Today
 - ◇ In 2016 we let 6 projects where the files were the controlling document, if the contractor elected to use AMG for either grading or paving.
 - ◇ In 2017 we added a supplemental specification to all in-house designed projects that indicated that if a contractor elected to use AMG that the files were the controlling document.
 - ◇ For in-house designed projects only, all grading, grade and pave, and paving projects are let with the Special Provision elevating the electronic files over the plans if the contractor elects to use AMG.
 - ◇ We have not transitioned Consultant designed projects at this time, although we hope to have a couple of pilots next year.
 - ◇ We are in the process of transitioning from Bentley SS4 to Open Roads Designer.
 - ◇ Our goal is to let our first pilot of an electronic plan next years in conjunction with our transition to Open Roads Designer.
 - ◇ Transition the plan for a contract document to an asset management tool
- ◆ Moving Forward
 - ◇ Staging
 - ◇ Constructability
 - ◇ Renderings
 - ◇ Animations
 - ◇ Virtual Reality

Northwest Corridor Express Lane Project –

Stephen Lively, P3, Construction Program Manager, Georgia DOT

Bill Little, Senior Program Director, Parsons Transportation Group

Zach Folmar, Senior Project Manager, Archer Western Contractors

- Project Description
 - 29.7 miles of **reversible express lanes** along I-75, Georgia's most congested highway, and along I-575
 - 6 separate express-lane-only interchanges were constructed
 - Dynamically tolled to assure reliable travel times
 - Opened for use September 8, 2018
 - First Design-Build-Finance contract managed by GDOT
 - Saved approximately \$110 million through innovative design and alternative technical concept
- Project History

- 2004 – state receives unsolicited proposal from industry
- 2006 – DOT accepts proposal
- 2007 – DOT discusses innovative delivery alternatives
- 2010 – DOT releases RFQ for a DBFOM
- 2011 – DBFOM changed to a DBF
- 2013 – project awarded to Northwest Express Roadbuilders (NWER)
- Joint Venture
 - 60% Archer Western
 - 40% Hubbard
- Construction Schedule
 - NTP (2) - Start of Construction: October 2014
 - 11 interim ITS milestones
 - 17 NOIs
- Safety Culture
 - Making it personnel/Engagement:
 - Project Engineer’s review THA’s at least 3 times a week,
 - A lot of training
 - Blue Hard Hats for New Employees with Experienced Employee
 - ◆ 30-60-90 Day Challenge
- Design And Construction
 - Settlement Impacts to Existing Utilities
 - ◆ **Problem**
 - ◇ Settlement predictions from standard laboratory testing in Piedmont Residuum Soils are not reliable and typically overstate compared to actual settlements measured.
 - ◇ Original settlement prediction at Wall 74 (from laboratory testing) was **8 inches**
 - ◇ More in-depth investigation
 - New settlement prediction is 4 inches
 - Protective Slab Concepts
 - ◆ The Express Lanes pass directly over existing deep drainage (box culverts), significantly increasing the dead load to the structures. The typical design would require a new exterior MSE (Mechanically Stabilized Earth) retaining wall in areas of low terrain, but this posed a difficult structural/geotechnical problem.
 - ◇ Innovative Solution:
 - Parsons developed an innovative “protective slab” concept– a structural slab directly above the existing culvert, designed to transfer the weight of the soil above the slab directly to piles founded on the underlying bedrock. The large loads from material above the protective slabs resulted in very robust protective structures.
 - Accelerated Bridge Construction (ABC) Methods
 - ◆ Top Down Construction
 - ◇ Utilized pre-cast hammerhead pier caps for a 3,500-foot-long bridge to provide site access

- ◇ Used drilled shaft foundation to minimize excavation and disturbance to the wetlands
- ◇ Method minimized impacts to the public by avoiding extensive lane closures of southbound I-75 and resulted in reduced construction cost and time.
- ◆ Straddle Bent Construction
 - ◇ Very tight geometry controls
 - ◇ Two-stage precast concrete straddle bent cap solution was utilized to meet geometry restraints, minimize impacts to traffic, and provide an economical and high-quality construction solution.
 - ◇ Most of the bridge to be cast on-site, adjacent to the roadway, in turn minimizing the number of cast-in-place components.
- Partnering
 - ◆ GDOT Manager of Contract
 - ◆ NWER developer responsible for design, construction, and quality management for the project (Archer Western, Hubbard Construction, Parsons Transportation Group, and Moreland Altobelli)
 - ◆ HNTB served as the Project Management Consultant for the Department. Their team included a project manager, project controls, commercial business lead, design consultant, construction lead, communications representative, and office support position. Additional positions, while not solely dedicated to the project included, tolling, environmental, and traffic. Mention Benefit of using consultant's over GDOT employees.
 - ◆ Atkins served as the Owner's Verification Firm for the project. They served as the owner's oversight of Moreland Altobelli, the developers Construction Quality Assurance Firm. 10% check based upon the Construction Quality Assurance Plan.
 - ◆ Michael Baker served as the owner's on sight Design Review Consultant. They were charged with reviewing the design submittals throughout the life of the project.
 - ◆ State Road and Tollway Authority served as the state's owner of the contract as GDOT cannot enter in to a project that is not fully funded. In addition to "holding" the contract, SRTA owns the tolling aspect of the project and is responsible for on-boarding/testing the equipment installed by the developer.
 - ◆ FHWA was on the project weekly for the 1st two years of the project and daily for the last two years of the project. FHWA provided high level oversight of the project and provided reviews for management of the project and change management.
 - ◆ Internal GDOT served in various aspects of the project: 1) SME 2) review of quarterly materials presentation and 3) messaging various aspects of the project.
 - ◆ Local Governments and Community Improvement Districts were coordinated with during the project as they held ongoing projects that were impacted themselves or were impacting the Northwest Corridor, in addition to managing traffic.

- ◆ NOTE: All Co-located
- ◆ Executive Partnering Meeting
 - ◇ Better team relationship/moral
 - ◇ Overcoming differences of opinion
 - ◇ Executive involvement from both sides
 - ◇ Resolve Major Issues
- ◆ Internal/ External Communication
 - ◇ Design/Construction Resolution Ladder
 - Max time frames for each level
- Quality Model
 - ◆ Construction
 - ◇ The quality model for the project was set through the Construction Quality Assurance Plan which was an agreement between the Department and FHWA. The plan required frontline or 100% construction inspection to be held by the developers Construction Engineering and Inspection Consultant, Moreland Altobelli (MA). MA was responsible for inspecting and accepting the work. They performed all testing and inspection as required GDOT Specifications, Manuals, Sampling and Testing Guides. The materials were then accepted through the validation process of the Owners Verification Firms testing or 10% testing. Acceptance of the materials required validation or agreement through statistical analysis or through the non-conformance process as detailed by the agreement/contract.
 - ◆ JV
 - ◇ Quality is essential to ensuring a safe, on-time, and on-budget project that leaves our customers a product we can be proud of
 - ◇ Safe/Quality Job is usually a profitable project.
 - ◇ built it "Right the First Time".
 - ◇ Quality to Us is just as important as Safety
 - ◇ Implementing QIR to track, discuss and fix quality related issues.
 - ◆ Design
 - ◇ Plan-Act-Check-Excel (PACE) is the controlling concept that defines quality management.
 - ◇ Design development process and reviews:
 - Interdisciplinary Review
 - Constructability Review
 - Independent Design Review
 - ◇ External Reviews:
 - Agency and Regulatory Reviews
 - Over-The-Shoulder (OTS) Reviews
 - Comment Incorporation
- Lesson learned
 - ◆ Wins
 - ◇ Co-Location
 - ◇ Public Outreach
 - ◇ DBF Agreement and Quality Model from Owner Perspective

- ◇ Coordination with OMAT and FHWA to obtain Materials Certificate
 - ◇ E-construction
- ◆ Recommendations for Major Projects
 - ◇ Aggressive Project Start-Up
 - ◇ Project Progression
 - ◇ Early Coordination for Tolling/Operations Implementation
 - ◇ Project Closeout
- Overall Value
 - ◆ Since opening on September 8, 2018, the express lanes are providing predictable travel times and options which improve the quality of life for the traveling public.
 - ◆ The Northwest Corridor Express Lanes offer drivers and transit customers a host of benefits including:
 - ◇ More reliable trip times
 - ◇ Improved traffic flow
 - ◇ More travel options for motorists and transit customers
 - ◇ A more free-flowing trip
 - ◇ Cost-free trips for transit riders and registered vanpools
 - ◆ The Express Lanes use Dynamic Tolling, which insures reliable and predictable travel times in the express lanes.
 - ◆ On average commuters using the Express Lanes have experienced approximately 45 minutes in travel time savings.
 - ◆ Commuters using the I-75 General Purpose lanes are also recognizing travel time benefits from the opening of the Express Lanes.

Thursday August 15th

Research Session, Moderator, Jason Humphrey, Section Chair, South Dakota DOT

How the Committee on Construction Can Collaborate with NCHRP and TRB – Amir Hanna, Senior Program Officer, Transportation Research Board (TRB)

- Why get involved in NCHRP and TRB's Construction Committees?
 - Help TRB and NCHRP better serve state DOTs and transportation stakeholders
 - Help state DOTs and the Committee better benefit from TRB activities and NCHRP products
- TRB
 - Technical Activities (annual meeting)
 - ◆ 11 groups
 - ◆ 200 Committees
 - ◆ Led by Technical Activities Council (TAC)
 - ◆ 9 Committees in Construction Section
 - Consensus and Advisory Studies (TRB Special Reports)
 - Cooperative Research Programs
 - ◆ Highway

- ◆ Transit
 - ◆ Airports
 - ◆ Behavioral Traffic Safety
- How can I get involved in TRB's Construction Committees?
 - Explore the make-up of the Section
 - Find committees that are working on topics of interest to you
 - **You do not have to be a Member of the committee to get involved**
 - Connect with the chair of the committee
- Committee Functions
 - Engagement in Topic Area
 - ◆ TRB Annual Meeting
 - ◇ Sessions: Paper-based and invited speakers
 - ◇ Workshops
 - ◇ Committee Meetings: Exchanges and presentations
 - ◆ Specialty workshops/conferences
 - ◆ Mid-year meeting
 - ◆ Networking
 - ◆ Responses to requests for information
 - ◆ Referral to other experts
 - Stimulate Research
 - ◆ Developing and publishing RNS
 - ◆ Submitting RNS to research organizations:
 - ◇ NCHRP (through AASHTO, DOT or FHWA)
 - ◇ Pooled Funds (Championed by a DOT or FHWA)
 - ◇ others
 - ◆ Defining and publishing critical issues
 - ◆ Identifying cross-cutting issues and stakeholders
 - Synthesize Research
 - ◆ Developing TRB e-Circulars
 - ◆ Sponsoring special webinars, workshops, and conferences
 - ◆ Publishing compendiums of special papers
 - ◆ Recommending topics for NCHRP, ACRP, and TCRP Synthesis series
 - Encourage diverse participation on committee
 - Recommend papers for award consideration
 - Cosponsor special activities with other committees or organizations
 - Conduct periodic strategic planning and self-evaluations (TSP)
 - Upon request, serve or nominate others to serve on project panels, etc.
- Sign Up as a Friend of a Committee
 - Send a note to the committee Chair about your interest
 - Consider volunteering to:
 - ◆ review research papers
 - ◆ work on a committee project
 - ◆ give a presentation
 - ◆ or preside at a session of the annual meeting or a specialty conference.
- Construction Management_{AFH10}

- A Workforce to be able to support construction management and executing new skillsets
- Advanced technology: CIM, BIMS, AV, Mobile IT
- Performance impacts from accelerated construction and new QA/QC methods and more...
- Project Delivery Methods_{SAFH15}
 - Promote evolution of Alternative Delivery
 - Better handoff to operations, focus more on the facility
 - Quantify P3 value-for-money
 - Focus on O&M cost of P3 vs. non P3
 - Reduce barriers to implementation (legislative, public sentiment, bundling projects)
 - Insurance requirements
- Quality Assurance Management_{SAFH20}
 - QA of base course, subgrade, bridge superstructure and decks, preservation (going beyond the pavement surface materials)
 - Data analytics & digital models
 - Interconnectedness of the lifecycle
 - Connecting as-built data with QA
 - Nontraditional QA processes for alternative delivery
- Emerging Design and Construction Technologies_{SAFH30}
 - Technologies outside the transportation sector
 - Additive manufacturing (3D printing)
 - Automated construction
 - Robotic inspection
 - Wireless power transfer
 - LiDAR
 - Human interaction and how to use it properly
 - NASA, DOD, Major Tech Companies
- Construction of Bridges and Structures_{SAFH40}
 - Integrating new Materials and Construction techniques
 - UHPC as a stay-in-place formwork
 - Digital Contracting
 - Tangible aspects of girder connections, integral piers and how to design not to crack
 - Mass concrete still a huge issue
- Concrete Pavement Construction and Rehab._{SAFH50}
 - Rapid setting concrete
 - Timing selection and application of preservation, how it affects rehabilitation
 - Roller Compacted Concrete and RCC Pavements
 - Performance of different dowel bars, long term
 - Building (and designing) for durability
- Fabrication and Inspection of Metal Structures_{SAFH70}
 - New means and methods to
 - ◆ Increase production rate of fabrication
 - ◆ Increase reliability
 - ◆ Decrease rejection occurrences

- ◆ Accelerate QC
 - ◆ Decrease cost
- Further adoption of digital radiography
- PAUT inspection
- Virtual assembly and fit-up
- Disadvantaged Business Enterprises^{SAFH80}
 - Aspect of DBE regulations that cause unintended consequence to DBEs, contractor, and DOT/Agency Staff
 - Factors that would promote Regional DBE Certification Cooperatives
 - DGBE Commitment Submittals / impact of Responsibility vs. Responsiveness
 - Best Practices for Construction and Professional Services Contracts
- NCHRP
 - Goal- Oriented Research Program
 - Responds to state DOT needs: DOTs and AASHTO committees propose research topics; AASHTO R&I Committee selects projects.
 - Ensures applicability of the results: Practitioners from State DOTs and other sectors of the highway industry participate in monitoring the research.
 - Produces practical, ready-to-use results: Research products are prepared as guides, manuals, specifications, test methods, tools, etc. for use by state DOTs and other organizations, and adoption by AASHTO.
 - A year of NCHRP
 - ◆ Evaluation
 - ◇ Oct – Dec
 - ◇ Problem Statements due Nov 1
 - ◆ Program Formulation
 - ◇ Jan – Mar
 - ◆ Program Approval
 - ◇ Apr – Jul
 - ◆ Panel formulation
 - ◇ May – Jul
 - ◆ Proposal Process
 - ◇ Aug – Nov
 - ◆ Agency Selection
 - ◇ Oct – Feb
 - ◆ Research Phase Begins
 - ◇ Between Mar & Apr
 - How can I get involved in NCHRP
 - ◆ Submit problem statements
 - ◆ Participate in Panels
 - ◆ Participate in the research
 - ◆ Disseminate research findings
 - ◆ Implement/use research products
 - Submit Problem Statements
 - ◆ Research Projects: Practical-to-implement solutions to pressing problems facing the industry
 - ◆ Synthesis Projects: Reports on current knowledge and practice (no detailed direction/recommendation)

- ◆ Activities to advance Committee business (Project 20-123, Support for AASHTO Committees and Councils)
- ◆ Domestic Scan Program (Project 20-68)
- ◆ Implementation Activities (Project 20-44)
- Participate in Panels
 - ◆ Research Project Panels: Develop RFP, Review proposals, select contractor, review progress and final reports, provide oversight, interact with peers
 - ◆ Synthesis Project Panels: Develop scope of work, select consultant, review survey, review draft and final reports
 - ◆ Project 20-123 panels: Represent AASHTO Committee and its intent.
 - ◆ Domestic Scans: Help plan activity, select consultant, review report, share state practices with other members and with other agencies.
- Participate in Research
 - ◆ Research Projects: Respond to surveys, provide case studies, provide test sites, provide data
 - ◆ Synthesis Projects: Respond to surveys, provide case studies
 - ◆ Domestic Scans: Be host state or participating state, provide information
- Disseminate Research Results
 - ◆ Review published reports; identify those useful for construction personnel:
 - ◇ Recommend for AASHTO adoption/publication
 - ◇ Recommend for the webinar series
 - ◇ Recommend for a workshop
 - ◇ Report on your use of research results
 - ◇ Write TR News or Research Pays Off articles
- Implement/Use Research Products
 - ◆ Resources are available through NCHRP Project 20-44, *Accelerating the application of Research Results* to
 - ◇ Assist with the publication process
 - ◇ Organize webinars, demos, workshops, etc.
 - ◇ Conduct training
 - ◇ Prepare briefing materials
- NCHRP FY 2020 - Summary
 - ◆ 11 Continuation and special projects: \$7.740 million
 - ◆ 58 New projects (includes 2 syntheses): \$25.590 million
 - ◇ Total 69 projects (\$33.330 million) in about 20 problem areas (bridges, maintenance, materials, pavements, traffic, security, safety, etc.)
- NCHRP FY 2020 New Projects

	<u>Submitted</u>	<u>Programmed</u>
Member Dept.	34 (\$14.025)	11 (\$5.045)
AASHTO Com.	77 (\$31.105)	46 (\$20.195)
FHWA	3 (\$1.000)	1 (0.350)
TOTAL	114 (\$46.130)	58 (\$25.590)
COC	2	2
- 2020 Projects related to Construction
 - ◆ Project 03-140: Application of RFID and Wireless Technologies for Highway Construction

- ◆ Project 23-05: Addressing Construction Inspector Qualifications for the Future: Best Practices for Education, Training, and Certification
- ◆ Project 14-43: Guide Construction Specifications for Cold In-place Recycling and Cold Central Plant Recycling
- ◆ Project 14-44: Construction Specifications for Pavement Treatments: Slurry Seals and Tack Coats
- ◆ Project 15-69: Utility Conflict Impact During Highway Construction
- 2021 Program
 - ◆ July 15, 2019: Solicitation of FY 2021 problem statements
 - ◆ Nov. 1, 2019: End date for problem statements – New template
 - NCHRP & FHWA review
 - Review to submitter/submitter comment
 - Problem statements to R&I Committee and RAC for comment and ratings
 - Summary report with R&I/RAC comments and rating, and overall rankings to R&I.
 - ◆ April 14-15, 2020: R&I Committee meeting/project selection

NCHRP Research Update: Systematic Approach for Determining Construction Contract Time – David Jeong , Texas A&M University / Doug Gransberg, Iowa State University

- **NCHRP 0-114A Update A Guidebook**
 - Background
 - ◆ Contract time is the maximum time allowed in the contract for completion of all work contained in the contract documents (FHWA 2002)
 - ◆ Excessive contract time is costly, extends the construction crew’s exposure to traffic and prolongs the inconvenience to the public.
 - ◆ Insufficient contract time results in higher bids, overrun of contract time, increased claims, substandard performance, and safety issues.
 - ◆ Proper contract time is a win-win for DOT, contractors, and the public
 - Research Goal
 - ◆ *The objective of this research is to develop a guidebook that DOTs can use to establish and maintain a systematic approach to determining credible and defensible contract times for projects using conventional and alternative contracting methods (e.g., design-bid-build without or with completion incentives and disincentives, design-build, and construction-manager/general-contractor (CMGC))*
 - Data Collection
 - ◆ Literature review: FHWA guidelines, NCHRP reports, DOT manuals, journal and conference papers, etc.
 - ◆ Surveys and interviews
 - ◆ Collected Data from 44 out of 50 States
 - Guidebook Structure
 - ◆ Generic Framework for CTD
 - ◇ Types of contract time, project type classification, major components and influential factors
 - ◆ CTD for design-bid-build projects with/without incentives.
 - ◆ CTD for alternative contracting methods.

- ◆ Relationship of contract time to risk management.
- ◆ Strategies for post-project contract time evaluation and feedback loop.
- Research Focus on Contract Time
 - ◆ Types:
 - ◇ **Working Days**
 - Five days per week, six days per week, etc.
 - 8 hours a day, 10 hours a day
 - Non-working days
 - ◇ **Calendar Days**
 - Calendar days
 - Calendar days plus working days
 - Calendar days set by contractor (A+B)
 - ◇ **Fixed Completion Date**
 - Fixed completion date
 - Completion date plus working days
 - ◆ 6 Project Categories used
 - ◇ Different Characteristics,
 - ◇ Work components
 - ◇ Schedule requirements
- Overall CTD Procedure
 - ◆ Contract time types: working days, calendar days, and completion date.
 - ◆ Criteria for selecting types of contract time:
 - ◇ + Does work have to be completed by a specific date?
 - ◇ + Traffic level
 - ◇ + Impact on the adjacent businesses
 - ◆ Ideally, PDE would be the sole basis for the CTD.
 - ◆ However, there are many “milestones and completion date constraints” (e.g., funding issues and political commitments) that drive a DOT to select a contract completion date that is not the same as a scheduling method-based estimate of project duration.
 - ◆ For a simple project, milestones and completion date constraints can dictate the contract time of the project, and that contract time may not be verified by PDE. However, it is advisable that DOTs should always estimate project duration based on scheduling methods and compare with constraint-based contract time to ensure that the established time is realistic for contractors or that it does not give contractors too much lag time, which causes unnecessary disruptions to the public (ITD 2011).
- Project Duration Estimation
 - ◆ There are two major approaches for estimating construction time, i.e., a) production rate-based approach or bottom-up approach and b) project parameter-based approach or top-down approach.
 - ◆ The most popular practice is a bottom-up approach that uses project activities, resources, activity relationships, calendar constraints, and other factors to determine project duration. In this approach, two mostly used scheduling methods are the bar chart method for small and simple projects and the critical path method (CPM) for major and complex projects.

- ◆ The project parameter-based approach relies on the correlation between the input data (e.g., project size, project location, project type, and quantities of major work items) and the output (e.g., the actual project duration) to build parametric models for predicting the project duration of a new project. With this approach, schedulers do not need to calculate production rates of activities or develop activity logic. Several state highway agencies such as KYTC, Ohio DOT, and Colorado DOT have applied top-down methods for establishing construction time.
- Current Scheduling Methods by Highway Agencies
 - ◆ CPM: Critical path method
 - ◆ PERT: Program evaluation and review technique
 - ◆ LS: Linear scheduling
 - ◆ MCS: Monte Carlo simulation
 - ◆ LPS: Last planner system
 - ◆ MR: Multiple regression
 - ◆ ANN: Artificial neural network
 - ◆ CBR: Case-based reasoning
- Procedure for Bottom –up PDE, Production, MDT – Production Rates Estimation Tool, Integrated Working Calendar
 - ◆ Refer to presentation slides
- Milestones and Completion Date Constraints
 - ◆ Working in the winter is typically “less productive, more expensive, and more disruptive to the traveling public” (IDOT 2017).
 - ◆ Interviewees from Minnesota have replied that contract time in many cases is decided based on the weather constraints due to the short construction season in their state, and the contractors are required to speed up their operations to complete the projects as required.
 - ◆ *) Some projects need to be completed before a specific date to allow for the start of construction of their subsequent projects;
 - ◆ *) Political commitments such as a request from an affected city asking a DOT to finish a project by a specific date due to a local event.
 - ◆ *) Project completion dates may be set before the tourist season, if possible, to prevent the negative influences on both sides (ADOT 2015).
 - ◆ *) Some other examples of events that can dictate the completion date are State Fairs, farming operations, school start and end dates (IDOT 2017).
 - ◆ *) The program specifies the number of projects that need to be completed in each fiscal year and the corresponding allocated funding. Therefore, a project should be finished before the end of its planned fiscal year.
- CTD for Alternative Contracting Methods (ACMs)
 - ◆ Two complications to DB CTD
 - ◇ Owners select ACMs to compress project delivery periods, which makes assuming a linear relationship between contract time in DBB and DB project incorrect.

- ◇ Some DB projects do not begin construction until the final design is approved by DOT, whereas others release design work packages for construction as soon as they are complete.
- ◆ Impossible to accurately generalize a rational method to directly estimate the contract time difference when a project is delivered using DB
- ◆ Proposed solution
 - ◇ Compare similar DBB and DB project contract periods
 - ◇ Develop a sliding multiplier that operates within a range
 - ◇ Requires scheduler to use its professional judgement as to how the specific characteristic of the given will relate to the parameters found in the multiplier's range
- ◆ Major Research Milestones
 - ◇ Face to Face meeting with the Panel **Sep 10, 2019**
 - ◇ Validation Workshop **Nov 15, 2019**
 - ◇ Draft Guidebook **Dec 31,2019**
 - ◇ Final Guidebook **March 31,2020**

TRB Special Report: Renewing the National Commitment to the Interstate Highway System: A Foundation for the Future – Chris T. Hendrickson, Carnegie Mellon University

- National Research Council Study
 - Fixing America's Surface Transportation Act of 2015 asked the Transportation Research Board to conduct “a study on the actions needed to upgrade and restore the Dwight D. Eisenhower National System of Interstate and Defense Highways to its role as a premier system that meets the growing and shifting demands of the 21st century.”
 - Consensus study, report appeared Dec. 2018.
- As-Built Interstate
 - 48,000 miles
 - 3 Transcontinental East-West Routes, 7 North-South Routes
 - Interstate only a small portion of all roadway
 - ◆ 1% miles
 - ◆ 9% bridges
- Interstate Consequences
 - Largest Public Works Project with huge long term economic and spatial impacts.
 - Recurring and increasing congestion
 - Lower crash rate than other roads
 - Freeway revolt in many urban areas
 - New processes and roles: Environmental Impact Statements, Public Hearings, Political Decision-Making
- Looming challenges ahead
 - Persistent and growing backlog of deficiencies (\$149B)
 - Challenges
 - ◆ Aging assets

- ◆ Increasing demand
 - ◇ 160% vs 90% (1980-2015)
 - ◆ Demand for more geographic coverage
 - ◆ Transformation of vehicle fleet
 - ◆ Climate change impacts
 - ◆ Expectations for safety gains
 - ◆ Declining revenues
- Bottom line
 - Unless a commitment is made to remedying the system's deficiencies and preparing for the challenges that lie ahead, the system risks becoming
 - ◆ increasingly unreliable and congested
 - ◆ far more costly to operate, maintain, and repair
 - ◆ vulnerable to the effects of a changing climate and extreme weather.
- Committee's study process
 - Met with over 100 experts and users
 - Commissioned papers
 - ◆ Demographics
 - ◆ Economic projections
 - ◆ Travel demand
 - ◆ Climate change
 - ◆ Connected and Automated Vehicles
 - Case studies
 - Modeling
- Analytical tools
 - There are no modeling tools currently available that are able to:
 - ◆ Fully capture the alternatives available to enhance capacity or manage the systems
 - ◆ Model policy, capacity or management changes at the national network level
 - ◆ Model responses to prices or other system management strategies
 - Available tools
 - ◆ Highway Economic Requirements System (HERS)
 - ◆ National Bridge Investment Analysis System (NBIAS)
 - ◆ Pavement Health Track (PHT)
- Findings
 - Current level of spending is not sufficient
 - ◆ Recent combined state and federal capital spending on the Interstates, approx. \$20-25 billion per year
 - Need for major re-investment
 - ◆ Mostly for rehabilitation and reconstruction
 - ◆ \$45–\$70 billion annually over the next 20 years will be needed to undertake the long-deferred rebuilding of pavements and bridges and to accommodate and manage growing user demand.
 - ◆ Additional funding needed to boost system's resilience and expanding its geographic coverage.

- Blueprint for Action
 - 10 Recommendations that include
 - ◆ Program actions, including changes to law
 - ◆ Funding
 - ◆ Standards needs
 - ◆ Data and modeling needs
 - Central to the blueprint for action is **federal leadership**, starting with the resolve of Congress to reestablish the Interstate Highway System's premier status and to ensure that this status is no longer allowed to slip.
- Recommendations
 - Legislate an Interstate Highway System Renewal and Modernization Program (RAMP)
 - Address Current/Emerging Demands to Extend Interstate System and Remediate Economic, Social and Environmental Disruptions
 - Assess Integrity of Pavements and Bridges to Identify Where Full Reconstruction is Needed
 - Increase & Index Federal Fuel Tax as a Bridge to Longer Term Funding
 - Allow States Flexibility to Impose Tolling on General-Purpose Interstate Highways
 - Prepare for Tolling & Per Mile Charges in Interstate System
 - Fund U.S. DOT to Develop Modeling Tools to Track Full Condition of Interstate Assets
 - Plan for Connected, Autonomous, Shared and Electric Vehicles
 - Assess Vulnerability and Resilience of Interstate System to Climate Change
 - Ascertain Interstate System's Contribution to Carbon Emissions & Recommend Improvements
- Implementing Ramp would
 - Restore forward looking vision for the Interstate
 - Restore one of the nation's most valuable infrastructure assets
 - Reinforce federal/state partnership
 - Reinforce reliance on user fees
 - Prepare the US for the next generation transportation system

Development and Use of As-Built Plans by State DOTs – Tim Taylor, Kentucky Transportation Center

- NCHRP Synthesis 50-12
 - Objective and Methodology
 - ◆ **NCHRP Synthesis:** “current knowledge and state of practice”
 - ◆ **50-12 Objective:** Document how as-built plans are developed, used, and updated for various delivery methods by State Transportation Agencies
 - ◆ **Methodology**
 - ◇ Literature Review

- ◇ State Transportation Agency Survey
 - *(Distributed to AASHTO COC/COD)*
- Structured Interviews for Case Examples
- Survey responses from 42 States (84%)
 - ◆ Documented Definition of as-built plans
 - ◇ 13% Unsure
 - ◇ 37% No
 - ◇ 50% Yes
 - ◆ Documented as-built development procedure
 - ◇ 7% Unsure
 - ◇ 24% No
 - ◇ 68% Yes
 - ◆ Most information documented: Underground DOT infrastructure
 - ◆ Most common capture method: Hand written and electronic notes
 - ◆ Most common platform: paper plan mark ups
 - ◆ Developing As-built Plans
 - ◇ 52% In house employees
 - ◇ 45% In house employees and outside entities
 - ◇ 3% outside entities only
 - ◇ In house staff: mostly Construction
 - ◇ Outside entity: mostly Contractor and Design Consultant
 - ◆ Documented as-built approval process?
 - ◇ 39% Yes
 - ◇ 54% No
 - ◇ 7% Unsure
 - ◆ Documented as-built storage process
 - ◇ 75% Yes
 - ◇ 25% No
 - ◆ As-Built Storage Systems
 - ◇ Mostly Electronic Document Management System
 - DOT Developed Bentley Projectwise
 - Falcon System
 - FileNet
 - OnBase
 - Microsoft Sharepoint
 - Microsoft Access
 - ◆ As-Built Updates After Construction Completion
 - ◇ 76% No
 - ◇ 11% Yes
 - ◇ 13%Unsure
 - ◆ *Capture Method* was listed as #1 As-built improvement needed
- Future Research Needs

- ◆ Improvements in as-built data capture methods was the most frequently cited (94% of respondents) area of needed improvement in current STA as-built processes.
- ◆ Improve the overall efficiency of the as-built creation process.
- ◆ Incorporate as-built data into asset management systems.

What it was and what it is – The Journey of As-Built Plans – Beau Quarles, Assistant State Construction Engineer, Georgia DOT

- As-Built Plans – What it was
 - Construction staff had 2 sets of full size plans in field office
 - ◆ Contract set (for information only/no markups)
 - ◆ As-Built Set
 - ◇ Use on Construction revisions
 - ◇ Redline markups
 - 1 half size “working” set
 - ◆ Half size was carried in truck and used to redline field changes
 - Construction staff would transfer redlines from half size set to the As-Built set in the field office
 - At end of project, construction staff would submit hard copy of As-Built plans to the District office and mail to General Office for scanning and records
- Shop Drawing – What it was
 - Shop Drawings Submittals
 - ◆ Contractor submits 7 hard copies to project staff for distribution
 - ◆ Project staff then mails hard copies to appropriate office/offices for review
 - ◆ Markups are sent back to project staff
 - Issues with shop drawing submittals
 - ◆ Shop drawings sent through mail carrier or driven to the appropriate office
 - ◆ Shop drawings could sit in mail room/on desk for multiple days or weeks before being delivered
 - ◆ Contactor could receive up to 7 copies of markups with duplicate markups and have to compile all comments from each copy.
 - As-Built Plans – What it is
 - ◆ Implementation of Electronic As-Built Plans
 - ◇ Starting with December 2017 Letting, all as-built plans will be marked up using Bluebeam and uploaded to ProjectWise.
 - ◆
 - Bluebeam
 - ◇ Bluebeam is a software application that allows users to markup, takeoff, organize, and collaborate with PDF files.
 - ◇ Why Bluebeam
 - Integrated with ProjectWise

- Geared towards engineering practices
- User friendly
- Already owned software
- ◇ Bluebeam License
 - First purchase of licenses, October 12, 2015
 - 50 network licenses shared between whole department
 - Mainly used in preconstruction and document markups
 - FY 18 had 350 network licenses
 - Shared between whole department
 - FY 19 purchased 500 network licenses
 - Shared between whole department
- ◇ Mobile Devices
- ◇ **Getac Tablet**
 - Hardware
 - Purchased 303 tablets for construction staff in 2017
 - Docking station
 - 22 inch monitor
 - Wireless mouse and keyboard for field use
 - Programs
 - ProjectWise
 - Microsoft Suite
 - Bluebeam
 - Google Earth
 - **I-Phone**
 - All construction staff provided
 - Hot spot enabled in order to remote connect to network
- ◆ Electronic As-Built Plans Process
 - ◇ Construction staff access project plans through ProjectWise.
 - Each project has predefined folder structure for construction documents/plans
 - Connect to network from mobile hot spot
 - Allows staff to redline plans real-time in field if network connection is available.
 - All work is within Bluebeam and uploaded in ProjectWise.
 - ◇ End of project an email is sent to the Engineering Document Management (EDM) staff for processing
 - EDM staff assigns document/plan type
 - Set public access for external viewing
- ◆ Shop Drawing Review Process
 - ◇ Shop drawings submitted through ProjectWise Deliverables
 - PW Deliverables is cloud-based transmittal/submittal creation, tracking, and management service
 - Tracks receipt and status of submittals
 - Alerts individuals when submittals arrive and are due
- ◆ Shop Drawing Reviews using Bluebeam

- ◇ How are markups/responses combined into one PDF if you have multiple reviewers?
 - Individual identified in ProjectWise Deliverables workflow will combine all responses into one PDF
- ◆ Comparing Document in Bluebeam
- ◆ Two options to compare multiple documents in Bluebeam
 - ◇ Compare Documents
 - Used to compare two PDFs and highlight the differences in split screen view.
 - ◇ Overlay Pages
 - Converts each document to a different color and stacks them on top of each other as layers in a new PDF.
- ◆ Feedback From Project Staff
 - ◇ **Pros:**
 - Expedite review times for shop drawing approvals, traffic control plan submittals, RFIs
 - Single submittal with all markups back to submitter for shop drawings
 - Reduce the need for paper, scanners, and plotter
 - ◇ **Cons**
 - NEW PROCESS – Getting buy in from seasoned staff
 - No network access = duplicate work
 - Difficult to use in the field
 - Locating correct plan sheets (each sheet is own file in ProjectWise)
 - Viewing tablet due to sun glare
- ◆ Looking ahead
 - ◇ Utilize Bluebeam Studio Session
 - Online collaboration tool
 - Users can add markups to the same PDF document together in real-time using Studio Sessions, or individually at any time while session is active
 - All markup activity is tracked in the Record
 - All markups are linked back to the Session PDF
 - Built-in chat aids communication during collaboration
 - Allow construction and preconstruction reviews to take place remotely and paperless.
 - Online collaboration tool
 - Users can add markups to the same PDF document together in real-time using Studio Sessions, or individually at any time while session is active
 - Allow construction and preconstruction reviews to take place remotely and paperless.

Goodbye Paper, Hello PlanGrid – Jamie Waller, Assistant Director of Construction, Tennessee DOT

- Plan Distribution
 - Old Process
 - ◆ Step 1.
 - ◇ Print shop receives the plans from design.
 - ◆ Step 2.
 - ◇ Print shop prints the plans.
 - ◆ Printing Cost / Year
 - ◇ \$175k - \$225k (Does not include shipping)
 - ◆ Step 3.
 - ◇ Plans [full size included] are sent to regions and mailed overnight to contractor.
 - ◇ Process Disruption.
 - Revision is issued.
 - ◆ Step 1a.
 - ◇ Print shop receives the revised sheets from design.
 - ◇ Print shop prints the revised sheets.
 - ◆ Step 2a.
 - ◇ Revised sheets [full size included] are sent to regions and mailed overnight to contractor.
 - ◆ Repeat steps.
 - ◆ For every plan set and revision.
 - ◆ Summary.
 - ◇ Process is long and outdated.
 - ◇ Overnight shipping is expensive.
 - ◇ An unavoidable delay in receiving plans and/or revisions.
 - PlanGrid
 - ◆ Plans collaboration software designated by the Department
 - ◆ Houses all plans and contract related documents in a singular location
 - ◆ Distribute revisions within minutes
 - How does this work?
 - ◆ Step 1
 - ◇ Create the project
 - ◆ Step 2
 - ◇ Upload Sheets
 - ◆ Step 3
 - ◇ Add team members
 - ◆ Need a Revision
 - ◇ Step 1a
 - Open Project
 - ◇ Step 2a
 - Upload Revised Sheets
 - ◇ Sheet instantly distributed to team

- ◆ PlanGrid also allows for:
 - ◇ Request for Information (RFI)
 - ◇ Document Management
 - ◇ Field Reports
 - ◇ Assign Tasks
 - ◇ Submittals
 - ◇ Photos
- ◆ TDOT & PlanGrid
 - ◇ Effective with the March 29, 2019 letting.
 - ◇ Any contractor awarded a contract must register with PlanGrid prior to the Preconstruction Meeting (excluding no plans contracts).
 - ◇ All correspondence related to the project or plans revisions and any request for information (RFI) will be communicated through this tool.
 - ◇ Current TDOT Statistics
 - 685 Users (State Employees)
 - 453 Projects
 - 82,719 Sheets uploaded
 - 300 Photos uploaded
 - 6,932 Documents uploaded
 - 514 Tasks created
 - 39 Requests for Information submitted
 - 70 Field Reports created
 - ◇ Future
 - RFI currently used in construction field offices
 - Push to other divisions to get issues from the field resolved directly by each Division within PlanGrid

Oregon's DOT's 3D Plans - Concept through Construction – Joe Squire, State Construction & Materials Engineer, Oregon DOT

- ODOT's Integrated Approach
 - Mobile LiDAR Survey
 - 3D Design & ProjectWise
 - e-Construction
 - Inspector Positioning
 - Automated Machine Guidance
 - Future Concept
- Traffic-Roadway Section Bulletin
 - Purpose
 - ◆ To provide clarification concerning the required content, process/workflows, delivery timelines, and quality control of digital 3D Roadway Design data for Oregon's Statewide Transportation Improvement Program (STIP) projects.

- Digital Engineer Seal
 - Adopted by Oregon's Professional Engineer Board in 2008
- Electronic Bidding
- Types of LiDAR
 - Static
 - Mobile
 - ◆ Terrestrial
 - ◇ Land
 - ◇ Water
 - Airborne
 - ◆ Fixed Wing (high altitude)
 - ◆ Helicopter (low altitude)
 - ◆ Unmanned
- Mobile Scanning & Survey -@ 55mph
 - ODOT scanned roadway generated as a 3-D point cloud with ¼ - inch tolerances
 - Return on Investment (ROI*) net benefit of over \$1 million per year
 - Measure Vertical Clearance
 - Scaffold Failure Investigation
- 3D Design & ProjectWise
 - 3D design & plan set created from mobile mapping and fill-in survey
 - ProjectWise for central storage & collaboration
 - ROI* exceeds \$1,500,000 net savings per year, expected to grow with wider usage
- Oregon DOT Specs for 3D Contractors
 - Specifications around AMG and 3D Models
 - ◆ Definitions
 - ◆ Order of Precedence
 - ◆ Tolerances
 - ◆ 3D Model review
 - Survey requirements for AMG work
 - ◆ Grade Verification by contractor & DOT
 - New tools for DOT inspectors
 - Training for DOT inspectors
- 3D Model Review – Special Provision 00305
 - **00305.00 Scope** - Provide construction survey work according to the current edition on the date of Advertisement, of the ODOT "Construction Surveying Manual for Contractors". This manual is available on the web at:
 - ◆ http://www.oregon.gov/ODOT/ETA/Documents_Geometronics/Construction-Survey-Manual-Contractors.pdf
 - In addition to the requirements of the ODOT "*Construction Surveying Manual for Contractors*", establish Engineering Stationing at (__foot) intervals for the length of the project along the shoulder of the highway.

Maintain the stationing so it is visible throughout construction of the project.

- **00305.05 3D Engineered Models** - If the Contractor elects to use the 3D Engineered Models to control the work, provide unstamped 3D Construction Models according to 00150.35 which include the following:
 - ◆ A detailed outline and list of the pay items and Work that will be controlled by the 3D Construction Models.
 - ◆ A narrative outlining any differences between the Agency-prepared 3D Engineered Models and the 3D Construction Models.
 - ◆ A copy of the 3D Construction Models that will be used by the Contractor's equipment for machine guidance or verification, that include and represent the Agency-prepared 3D Engineered Models with changes identified in the narrative. Provide files in LandXML format or as directed.
- Wireless Uploads - Trimble Business Center to Field
- CNC Milling Machine
 - ◆ Used to carve 3D Model
 - ◆ K&E Excavating
- 3D Model from the transmitted Bid Plans, used for:
 - ◆ Constructability
 - ◆ Staging
 - ◆ Crew-level discussions
- AMG is Competitive when bidding
- Stakeless Construction based on 3D Design
 - Improves safety, reduces personnel in work zone, & shortens construction time
 - GPS Machine Guidance - rough grading
 - Laser Survey Machine Guidance - fine grading
 - Better slope shaping improves erosion prevention measures
 - Roadway milled to a Profile
 - ◆ Smoother and longer lasting pavements
 - Paved to a Profile
 - ◆ Laser guidance results in faster construction
 - ◆ Self-Steering & Profile
- Future Concepts
 - Survey Grade GNSS Tablet
 - Can be used handheld or attached to a rod
 - ◆ Oregon DOT has devices assigned to each crew
 - ◆ Training & support is provided across the State
 - Measuring quantity and location
 - Bridge deck delamination surface preparation
 - ◆ Paid by the square yard
 - Snow Blowing US26 near Mt. Hood
 - ◆ *How to avoid guardrail & road edge even at night*
 - New technology and collaboration for speed change implementation

- Ground Penetrating Radar
 - ◆ A Work in Progress
 - ◆ *Utilities, Bridge Decks, Pavements?*
- 3D Pavement Milling
- Could this replace truck tickets?
 - ◆ *Original surface*
 - ◆ *Milled Surface*
 - ◆ *New Surface*
 - ◆ *Density*

Work Zones and Orphans – Jay Norris, Occupational Health and Safety Director
Tennessee DOT

- Reviewing the performance of work zone traffic control measures
 - 13 Died in 2018
 - 2108 Statewide Work Zone Crash Summary
 - ◆ One project had 50% (160) of the crashes
 - ◇ Review traffic control staging and setup in detail
 - ◇ Make adjustments where necessary
 - Involve Law enforcement
 - ◆ Mention of a total of 101 stops between 9A-3P during an operation
 - Consider Variable Speed Work Zone signage
 - ◆ Less restrictive, may improve adherence
 - States need to be Catalyst for Change
 - ◆ 3 employee deaths in 2016
 - ◆ Hit home when personal: friends, family, and coworkers
 - ◆ TDOT *Work 4 Us* campaign
 - ◆ Everyone has someone depending on them
 - ◆ Hands Free Tennessee
 - ◇ State Law begins July 1, 2019

Integrated Construction Technologies Subcommittee meeting

7. Potential NCHRP Research topics – The subcommittee voted on four possible topics that came out of the research subcommittee. The results of the voting were 17-3D Model Guide for Inspectors, 10 – Electronic Management of Data, 5 – Construction Cost Increases and 2-Technology for Work Zone Safety
8. Developed Draft Action Plan as follows:
 - Review Guide spec questions – Sections 600 and 700; Skip will send an email to review comments asap.
 - Surveys w deadlines
 - 3D modeling – Identify how many states, how many pilots, strategic plans, specifications. Send a survey in October/November. JAF to discuss with Casey if other surveys related have been done.

- Equipment Watch usage – Illinois’ discussions on cost issues as well as standby, owned equipment, what type of license; target sending survey in January.
 - Workzone technology – partner with Safety Subcommittee on states of practice. Send MD automated speed enforcement study out.
 - UAS – possible for states of practice in preparation if we do presentation in Washington.
 - Discuss survey done by Contract Administration in one of our calls.
 - National Outreach
 - Peer exchanges, other conferences - sharing info on events to the Subcommittee.
 - Add to agenda template.
 - Continued dissemination of state of the practice.
 - Review pooled fund studies.
 - Coordination with other AASHTO Committees
Design 3D – what surveys.
 - Training webinars – TC3, EDC Newsletter, and webinars; great opportunities to see what new technologies are being piloted and implemented.
 - Research update – please share what is happening in your state.
 - Strategic plan – take excerpts for technology to discuss moving forward.
 - Assign responsibilities – delegation and more due dates; best way to ensure progress on issues.
9. Potential Presentations for 2020 – 3hrs on Tuesday most likely
- RFID – Lamar’s for 2019 that was postponed
 - 3D Design & Inspection – more focused on one platform
 - e-Ticketing – synthesis; updates, new apps, concrete, producers’ perspective
 - UAS – focused more on construction uses
 - Workzone technology – Skip will reach out about survey
 - 5G – what is ROW Committee doing; Skip will reach out. May be 2021 focus

2020 COC Annual Meeting in Bellevue, Washington

