Material Selection and Pavement Design – Accelerated Construction

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What is Accelerated Construction?

- **Accelerated construction entails all the aspects of getting a project built rapidly including project selection, planning, contracting, design, traffic control, construction methods, publicity, and contingences.**

- **The barriers as well as the opportunities associated with accelerated construction operations include materials availability and delivery, equipment capabilities and limitations, quality control/quality assurance (QC/QA) procedures, workforce availability, economic incentives, public information, and safety considerations among others.**

- **Accelerated Construction Guidelines – December 2017**
Accelerated Construction Guidelines – Key Points

- Emergency versus Planned Accelerated Construction
- Guidelines for TxDOT Projects
  - Project Selection and Planning
  - Contracting Methods
  - Design
  - Contractor Selection
  - Involvement of Contractor
  - Construction Considerations
- References
Accelerated Construction Guidelines – Key Points

- Design
  - General Considerations
  - Geometric Design
  - Bridge Design
  - Drainage Design
  - Pavement Design
  - Roadside Safety Design
  - Traffic Control and Job Sequencing
  - Project Duration
Accelerated Construction Guidelines - Pavement Design

- Pavement Design
  - Pavement Recycling
  - Stabilization of Subgrade/Base Items
  - Reconstruction of Old Concrete Pavement
  - Special Considerations
    - Widening Projects
    - Curb and Gutter Section

- The number of materials that need to be placed in a pavement section should be minimized. The use of stabilized layers often reduces the number of materials that are required.

- Alternatives should be evaluated from a performance and constructability point of view.
Pavement Design (continued)

- This section references the Pavement Design Guide, which is now called the Pavement Manual and can be found on the MNT website.

- In place recycling avoids the removal and replacement of materials from the job site.

- The use of asphalt stabilized base materials rather than flexible base will reduce the overall thickness of the pavement layer. Asphalt base can be placed at a higher production rate than flexible base materials.
  
  • The length of time to cure some materials prior to placing subsequent layers should be evaluated on a project-by-project basis.

- Rigid pavement reconstruction techniques: bonded concrete overlay, unbonded concrete overlay, cracking and seating or rubblizing the existing pavement and then overlaying with ACP, or an ACP overlay of the existing concrete pavement.
Pavement Design (continued)

- All the regular issues with pavement design still exist.
- The pavement design phase should take into account those materials that are needed and even those that are most likely to be utilized in your area. If there are items/sources that are not typically used, thoughts even down to the need for qualified technicians to inspect and test should be noted.
- The Pavement Manual should be consulted for material selection and design of accelerated options.
- **REMEMBER:** *Accelerated Construction is NOT intended to Accelerate Maintenance!!!!!*
Construction Considerations

- Work Plan and Work Sequence
- Workforce
- Work Space
- Equipment
- Quality Control/Quality Assurance/ Acceptance
- Information Exchange
Construction Considerations – (continued)

- Accelerated construction is not possible without a carefully crafted plan prior to construction and one that is adjusted continuously and at key intervals during the construction process.

- Decisions need to be made at the lowest workforce level on the project as possible.

- Securing right-of-way to provide space should be considered by TxDOT and made available to all contractors.

- The work plan should allow for equipment downtime for maintenance and repair.
  - Redundant critical equipment should be on hand
  - The development of equipment should continue so that the capabilities to move material quickly from one location to another can be improved.
Construction Considerations – (continued)

- QC/QA

  - QUALITY CANNOT BE SACRIFICED ON ACCELERATED CONSTRUCTION PROJECTS!

  - Decisions related to materials acceptance need to be made in a timely fashion.

  - Technicians used for sampling and testing should be certified, and laboratories in which testing is performed should be accredited.

- Regularly scheduled meeting should be established at the initiation of the project. Additional meetings should be held when necessary. Key Contractor and TxDOT personnel should be expected to attend.
QUALITY CANNOT BE SACRIFICED ON ACCELERATED CONSTRUCTION PROJECTS!

DO NOT ACCELERATE CONSTRUCTION IN A WAY THAT WILL RESULT IN ACCELERATED MAINTENANCE!!!
Asphalt Foamed Base Project – Cass County; FM 3129

- Location Map and Typical Section
Mixture Design provided by MTD
- Richard Izzo, Soils and Aggregates Section Director
- Materials and Tests Division
- (512) 506-5907
Foamed Asphalt Base Project – Cass County; FM 3129; Process
TTI Evaluation and Conclusions
Provided by Stephen Sebesta

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Conclusions included:

- Foamed asphalt base modulus on average is within the expected range of 200 – 300 ksi
- Section is holding up well to trafficking, even without the one-course, with almost no raveling
- No major items of concern at this time
  - SB OWP by DPS check station may be monitored; this is the zone of highest deflection observed on the work completed to date
    - ~ STA 405+91 to 387+86
  - Techniques to mitigate occurrences of edge instability at early trafficking appeared effective
    - Future projects should consider shoulder width in design stage, particularly if heavy truck traffic must be allowed same day
    - Future FDR work should particularly be careful of excessive moisture at time of treatment especially when early traffic is required
Foamed Asphalt Base Project – Cass County; FM 3129; Current Status
Location Map and Typical Section
Foamed Asphalt Base Project – Harrison County; FM 9

- Mixture Design provided by MTD
  - Richard Izzo, Soils and Aggregates Section Director
  - Materials and Tests Division
  - (512) 506-5907
Foamed Asphalt Base Project – Harrison County; FM 9; Process
FWD Summary Results

- TTI Evaluation and Conclusions
  Provided by Stephen Sebesta
  - S-Sebesta@tti.tamu.edu
Conclusions included:

- FDR base modulus with foamed asphalt on average exceeds the assumed 150 ksi from design
  - AVG was 175 ksi
  - Current recommendation for foamed asphalt layer design is 200 ksi. This value was not met on FM9.
- The subgrade modulus AVG of ~ 13 ksi is significantly higher than the assumed value in design. Any observed high deflections should not be caused by subgrade support.
- SB IWP was poorest result. 15% of data in SB IWP had deflections exceeding the threshold from design.
- Should monitor particularly the last 2 mi. in SB direction, and retest project in ~ 3 – 6 months.
  - Evaluate if the results have changed and evaluate if local adjustment to FDR layer modulus with foamed asphalt is required.
Foamed Asphalt Base Project – Harrison County; FM 9; Current Status
Questions

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