Topics

- Pavement Type Selection in Design Build
- I–64 Pavement Type Selection and Pavement Methods
- I–64 Recycling Practices
- Alternate Pavements in Design Bid Build
- Alternate Technical Concepts in Design Bid Build
MoDOT Design Build Philosophy

- Goal Oriented
- Flexible
- Confidential
- Empowered Teams
- BOLD
Instructions to Proposers (ITP)

- How to organize proposal
- Criteria to be evaluated
- Focused on goals and desired outcome
- Best Value scored on point system
- Stipend amount
Pavement Scoring on Design Build

- Submittal Requirements (for I–64)
  - Pavement design method, including all design inputs
  - Design life
  - Rehab cycles required for design life provided
  - Pavement typical sections
  - Pavement and base thickness
  - Distress predictions
  - Minimum friction number
Pavement Scoring on Design Build

Evaluation Criteria (for I–64)

- Evaluated based on quantitative and qualitative benefits, including:
  - Provides long pavement life
  - Minimal rehab cycles
  - Skid resistance
  - Smoothness
  - Low structural distress
Items Provided to Teams (I–64)

- SUE
- Geotechnical borings
- Traffic counts & forecasts
- MoDOT Pavement Design Guide (FYI)
- Existing as-built plans (FYI)
- Pavement Condition Survey (FYI)
I–64 Winning Proposal Pavements

- Jointed plain concrete pavement (JPCP) for new pavement associated with the I–64 mainline, ramp, and shoulder areas
- Unbonded JPCP overlay in mainline areas where the existing and proposed grades accommodated an overlay
- Mechanistic–Empirical (M–E) design
HOW MUCH CONCRETE?

- 261,235 cubic yards of concrete pavement
- 456,156 tons recycled material
- 157,381 linear feet of concrete barrier
- 60,000 cubic yards of structural concrete
- 456 concrete beams
Mainline Concrete Paving
Mainline Concrete Pavement

- Conservative traditional methods
  - Traditional “string” paving
  - Paved 2–lanes at a time with bob sled
    - Bob sled depth is critical
  - 12” rock base from crushed pavement
  - Astroturf drag (pulled in front of cure machine)

- Time savings from road closure = efficient operations
Recycle Old Roadway

- Old roadway crushed
- Used as new roadbed
- Reduced hauling costs
- Reduced rock costs
- Reduced landfill costs
Pavement Recycling
Manage Quality

- Contractor accountable for quality
- Contractor’s Quality Manual
  - Quality Management Plan (QMP)
  - Design Quality Management Plan (DQMP)
  - Construction Quality Management Plan (CQMP)
- Quality Manager reports directly to Executive management of Contractor
- MoDOT oversight and acceptance testing
Quality Oversight

- Sampling of Requirements and Activities based on risk
  - MoDOT cannot view everything
    - What has the greatest consequence of failure?
    - What is most likely to fail?
- Verification Testing
Quality is Collaborative

- Weekly Quality Task Force Meetings
  - Contractor’s Quality Staff
  - Contractor’s Production Staff
  - MoDOT

- Constant Communication

- Co-Location
Pavements on Traditional Design Bid Build
Alternate Pavement Bidding
maximizing competition

CONCRETE

ASPHALT
M–E Pavement Design Guide

- Beneficial component of making the Alternate Pavement Bidding process successful.
- Design method had common input parameters for both pavement types.
- Adopted by AASHTO as state of the art design method.
- Had industry support to make it successful.
Alternate Pavement Design

- ‘Structurally Equivalent’ concrete and asphalt construction and rehabilitation solutions
- Life Cycle Cost Analysis Adjustment factor applied to the asphalt bid
Alternate Pavements – Policy

- Alternate pavement design with a LCCA factor for projects with 7500 sq yd in a continuous area
- New full depth and major rehabilitation construction
- Optional pavement designs without a LCCA factor for smaller paving quantities
Method of Measurement

- New PCC and HMA measured in square yards
- Unbonded overlays measured in cubic yards for furnishing and square yards for placing
- HMA overlay (on rubblized PCC) measured in wet tons
Alternate Design
Life Cycle Costs

- LCCA used solely to determine adjustment factor for 45-year design life

- Life cycle costs considered
  - Initial Construction
  - Maintenance
  - Rehabilitation
  - Salvage value
  - User costs
Rehabilitation Assumptions

- **Asphalt**
  - Mill and fill wearing course at 20 years in driving lanes
  - Mill and fill wearing course at 33 years across whole surface

- **Concrete**
  - Diamond grind whole surface and perform full-depth repairs on 1.5% of surface area at 25 years
**Adjustment Factor**

\[
\text{Adjustment Factor} = \frac{\text{Present Worth of Future Asphalt Rehab}}{\text{Present Worth of Future Concrete Rehab}}
\]
Alternate Bid Selection

Low bidder = lower of (PCC bid price) vs. (HMA bid price + adjustment factor)
Alternate Bid Example

- 11 miles of grading and paving new dual lane highway
- Adjustment factor = $1,500,000
- Low HMA construction bid = $25,000,000
- Low HMA bid for comparison = $26,500,000
- Low PCC construction bid = $26,450,000
- Winner ➔ low PCC bid
- Adjustment factor HAS impact
Alternate Pavement Update for Jobs Thru Dec 2010 with LCCA Factor

- 187 Alternate Projects to Date ($2.234 bil)
  - 174 Full Depth ($2.052 bil)
  - 13 Rehabilitation ($182.1 mil)

- Full Depth
  - 59 Asphalt Awards ($539.4 mil)
  - 115 Concrete Awards ($1.513 bil)

- Rehabilitation
  - 1 Asphalt Award ($2.6 mil)
  - 12 Concrete Awards ($179.5 mil)
Optional Shoulder Designs

- **A2 design**
  - 5 ¾” HMA
  - 5 ¾” PCC

- **A3 design**
  - 3 ¾” HMA
  - 4” PCC (also roller compacted option)
An independent third party peer review was performed in late 2005 by a respected national consultant on MoDOT’s alternate pavement bidding process.

“It appears that MoDOT has developed a balanced, innovative program that could serve as a national model for other highway agencies throughout the nation and beyond.”
Alternate Technical Concepts

What is an ATC?

- Proposal document contains proposed base design
- Components of project or entire project open to alternate design solutions for approval prior to bid
- Value Engineering in the Pre-bid stage
- ATC must be equal or better than base design
- ATC must meet all state and federal requirements
- Contractor may choose to bid pre-approved ATC or base design
- Award determined by low-bid
MoDOT ATC Process

- Introductory Pre-bid Meeting
- Contractor presents idea to ATC Team
- ATCs evaluated based on clearly defined criteria
- ATC Team accepts or rejects alternate design
- ATC plans designed by MoDOT to biddable quantities
- Contractor may bid on approved ATC
- If ATC Contractor is successful low bidder, final plans are developed after award
State DOTs Use of ATCs

- Evaluated ATCs with Design Build
- Evaluated ATCs with Design Bid Build

MoDOT logo
DBB ATC vs. Design Build

- Base design is provided
- Award based on low bid; not qualification based selection
- Contractor/consultant not selected prior to bid
- Can incorporate ATC process at any time in plans development
- More bidders/competition for smaller contractors
Conclusions

- MoDOT Flexibility & Innovative Contracts:
  - Motivates contractor
  - Offers incentives
  - Reduces contract time
  - Promotes competition
  - Leads to Cost savings
  - Brings Innovations to MoDOT
Questions