How Does Finishing Play a part?

Why do we care?

Common Pavement Distress
- Surface Defects
  - Map Cracking
  - Shrinkage Cracking
  - Scaling
  - Polishing/Loss of skid resistance
- Joint Spalls
- Transverse Cracks
- Longitudinal Cracks
- Corner Breaks
- Shattered Slabs
- Joint Seal Damage
- Materials Related Distress
  - ASR
  - Chloride Damage

Subgrade Fundamentals
- Construction always starts with the subgrade
- Grade uniformity more important than grade strength
  - Soil type
  - Moisture content
  - Density
- Grade control influences the pavement
- Do not sacrifice stability for anything!
  - Construction platform

Placing Concrete
- A placer should be used when dowel or tie bar baskets are in use
- Spreaders may be used at contractor discretion
- Limit Free Fall
- Moist Subgrade

Placing Concrete on Grade
• One time water addition
• Do not exceed W/CM ratio
• Be Careful around reinforcement

Stringline
• Rigid stakes
• Quality line
• No perceptible sagging
• “Eyeball” for staking errors
• Re-survey staking errors
• Adjust stake spacing to fit conditions

Slip Form Pavers

Paving Sensors
• Control alignment and elevation of the paver
• Sensitivity Controls
• Each track controlled separately
Stringless Paving

Augers and Plows

VIBRATORS
- Operate at 4,000 – 8,000 VPM
- 18” Spacing
- Electronic monitoring device: Paving shall stop if a vibrator ceases to function
  - If the power drops, vibrators need to stop

Dowel Bar Inserter
Tie Bars

- Center bars use Tie Bar Inserter
- Side bars hydraulically inserted

Oscillating Correcting Beam/ Tamper Bars

What affects the Slab behind the paver

- Workability/ reaction to vibration of the mix
- Paver setup and operation
  - Consistent head in front of the paver
  - Auger direction
  - Vibrator Frequency
  - Finishing pan angle
  - Paver speed
    - Should be adjusted based on anticipated concrete delivery to the paver
    - Minimize adjustments during production
    - Better to stop than to slow down paver during production

Finishing

- Straightedges/ V-Floats may be used
- Minimal Hand Finishing

How much finishing is too much?

- Standard Finishing
  - Single pass with bump cutter or straightedge
  - Float the edges and broom for texture
  - Isolated areas of re-finishing

- Too Much
  - Based on Judgement
  - Rebuilding entire edge
  - Fixing entire width for more than a few feet
  - Re-working material that has reached initial set
Proper Correction Techniques Behind the Paver

- Set form if area is on the edge
- Add additional material that contains aggregate
- Vibrate for consolidation
- Refinish

- If initial set has begun, repairs should not be attempted
- Should not be done following placement of curing compound
- Surface does not need to be perfect, minor defects are better left alone

Minor Defects

Minor Defects

Screeds

Types:
- Bridge Deck
- Laser
- Truss
- Roller

- Screeds should be wider than the forms

Bridge Deck

Laser Screed
Truss Screed

Roller Screed

Finishing Aids

- Evaporation Retarders ≠ Finishing Aids

Colloidal Silica Finishing Aids

- Designed to improve workability under hot, dry and windy conditions
- Increases Abrasion and Impact Resistance
- Increases surface compression strength
- Creates a denser, less permeable surface

Texture

- Burlap Drag
- Should not pull up rocks or create voids in surface

Rumble Strips, C&G, Safety Edge
Why do we care about smoothness?

- Smoother roads last longer
- Smoother roads are safer
- Smoother roads save drivers money

What affects smoothness

- Mix design
- Project Phasing
- Paver Setup
- Roadway Geometry
- Stringline or 3D model
- Temperature
- Finishing

Smoothness Equipment

- High Speed Profiler (10-80mph)
- Lightweight Profiler (5-15mph)
- Real-Time
- Straightedge

How do we measure smoothness

- International Roughness Index (IRI)
  - Accumulated motion of vehicle suspension divided by distance traveled - units are in/mi
  - Evaluated per wheel path
  - Evaluated in 1/10th mile sections
- Requirements differ by type of roadway
  - Interstate: 82 in/mi
  - Urban roadway: 100 in/mi

Questions?