HIR on Oklahoma Turnpikes

Tammy Robinson, P.E.,

Division Engineer

EST, Inc.

Stephen A . Cross, PhD, PE
Professor, Oklahoma State
Executive Director
Pavement Recycling &
Reclaiming Center

HIR on Oklahoma Turnpikes

Tammy Robinson, P.E.,

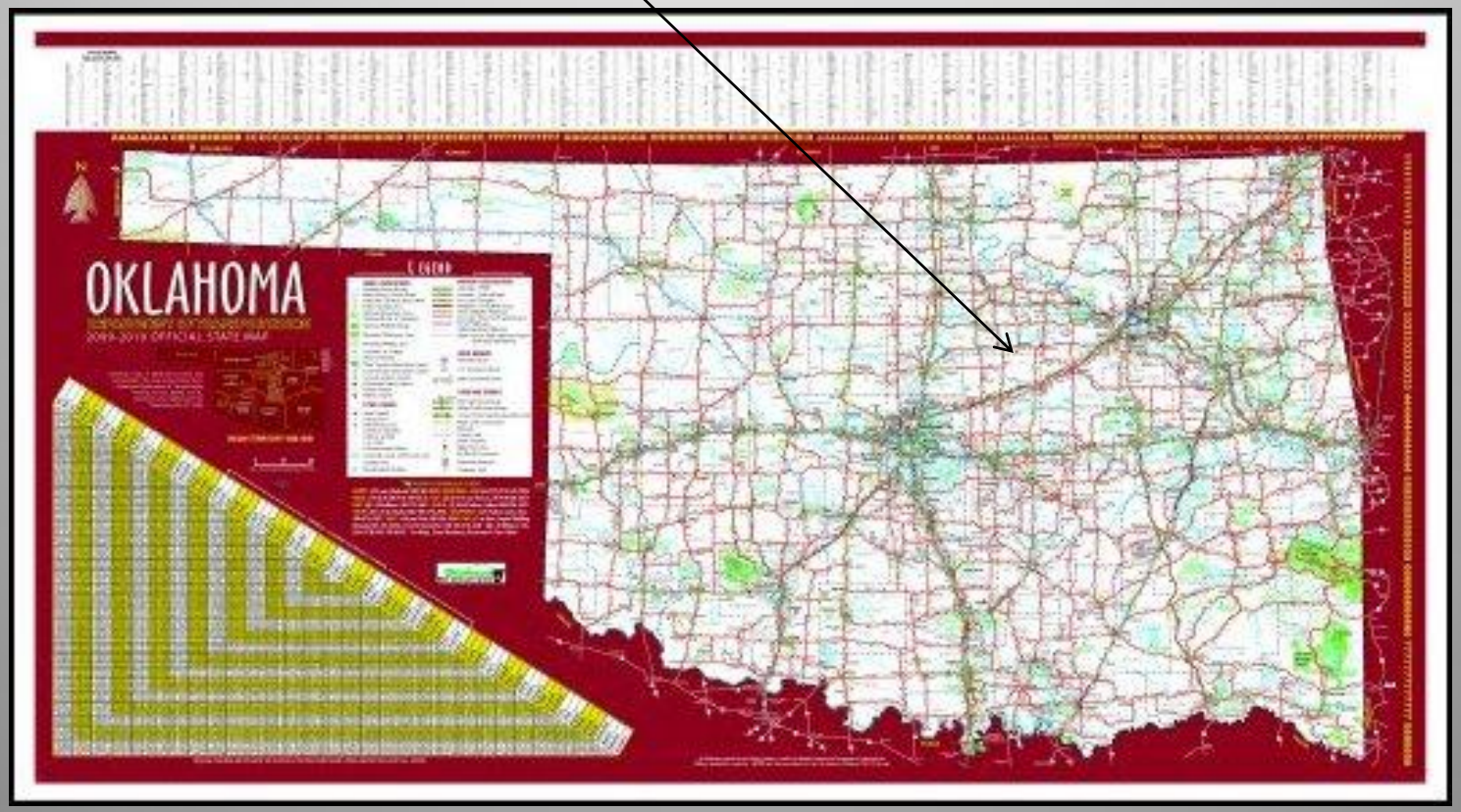
Former Construction Engineer

Oklahoma Turnpike Authority

OKLAHOMA TURNPIKE AUTHORITY

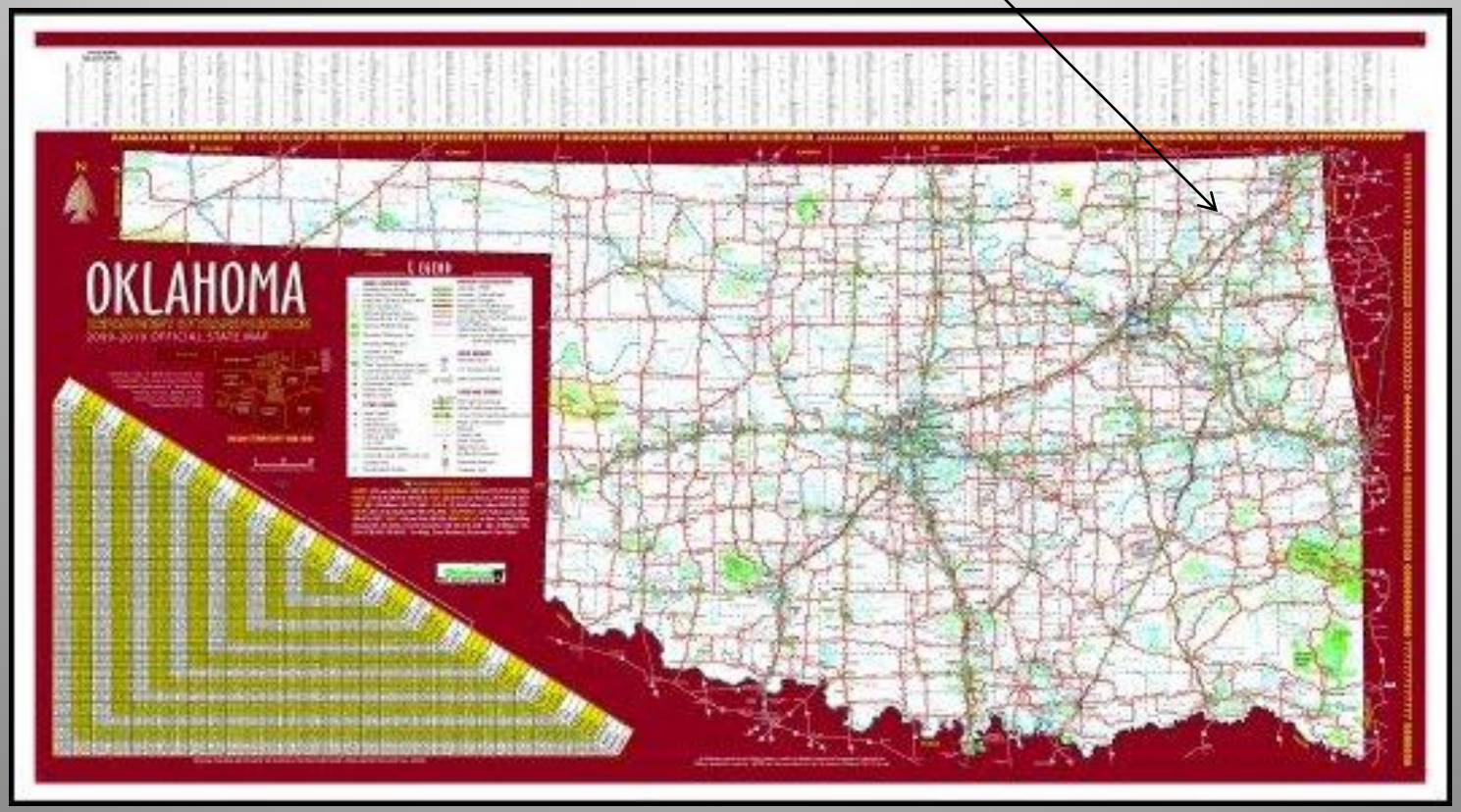
Turner Turnpike

- I-44 Between Tulsa and Oklahoma City
- Opened to traffic May 1953, 29,000 ADT
- Full-depth asphalt, 86 miles in length



Will Rogers Turnpike

- I-44 Between Tulsa and Joplin, MO
- Opened to traffic June 1957; 34,000 ADT
- Full-depth asphalt, 88.5 miles in length



Turner & Will Rogers Turnpikes

- Average HMA thickness 14 inches, portions 24 inches thick
- No longer use thick HMA overlays - bridge clearance issues
- Managed as perpetual pavements
- Both won Perpetual Pavement Awards
- Use Ultra-Thin Bonded Wearing Course (UTBWC) due to minimal cross slope

OTA Maintenance Contract Design Selection Process

- **Performs detailed Engineering Report**
- **Report typically includes options for:**
  - ✓**10, 15 and 20 year pavement life**
  - ✓**Reconstruction Option, typically 35-40 year pavement life**

OTA Maintenance Contract Design Selection Process

- **Engineering Obstacles:**
  - ✓ **Concrete median barrier with limited area for "build up"**
  - ✓ **Maintenance of existing bridge clearances**
  - ✓ **Limited Funding Available**

June 2006, 1-mile HIR Demo
Turner Turnpike, MP 194

- **HIR WB Driving Lane**
- **Mill & Fill (inlay) WB Passing Lane**
- **Both Lanes Capped Ultra-Thin Bonded Wearing Course**

Surface Recycling

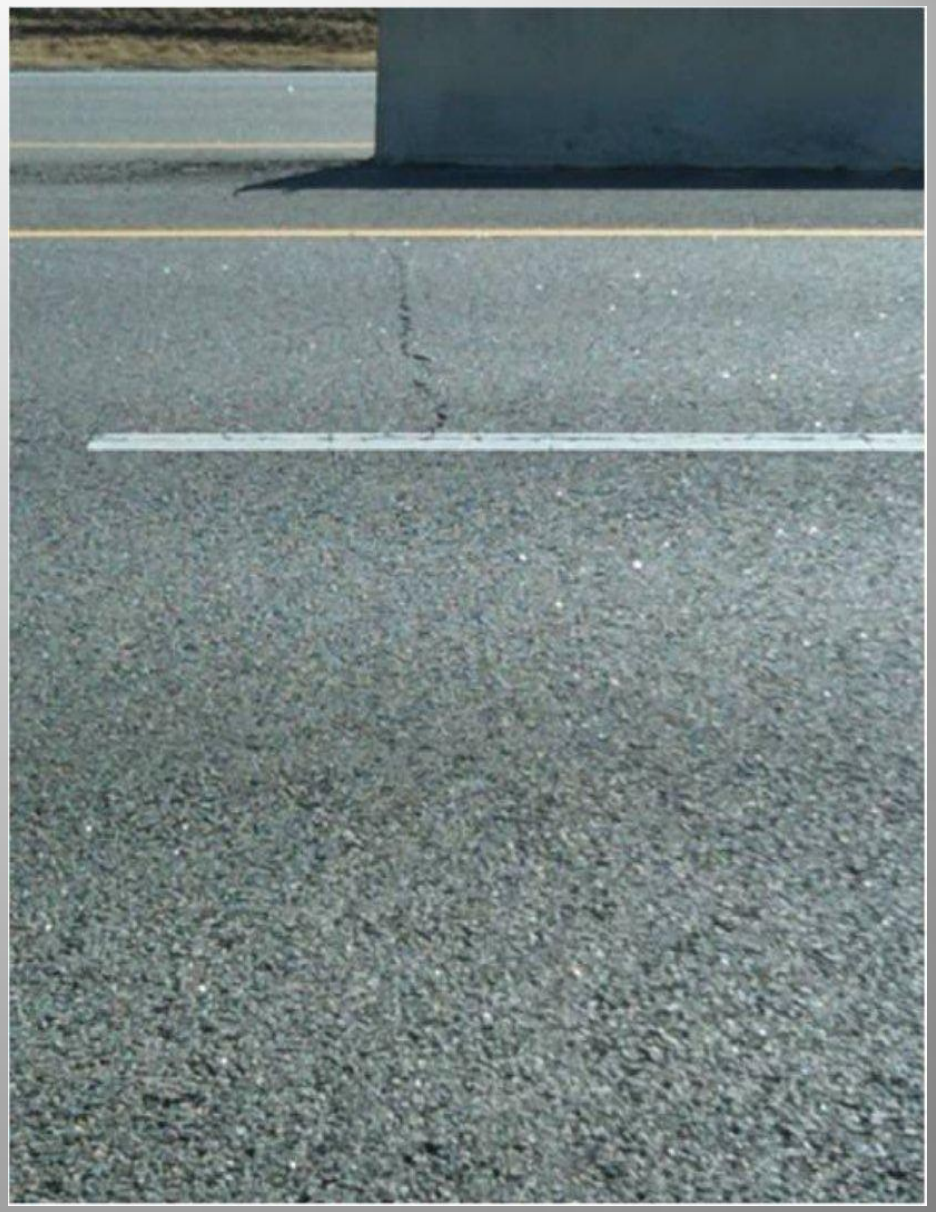
- **Small milling drums removed ¼ inch material each unit**
- **Emulsified asphalt recycling agent**

Surface Recycling

- Placed using paver windrow elevator
- Compacted using HMA procedures

HIR Demo Performance

- Turner Turnpike experiences heavy truck traffic ~ 20%
- 2 years after the Demo
  - ✓ Passing Lane (MF) shows a crack thru the UTBWC
  - ✓ Outside/Driving Lane (HIR) did not exhibit any signs of crack propagation



Why consider HIR?

- Ability to Utilize Short-term Lane Closures
- Elimination of Edge Drop-offs
- Reduced Exposure of Milled Surfaces to Elements
- Cost Comparison
- Speed of Construction

Potential Obstacles ….

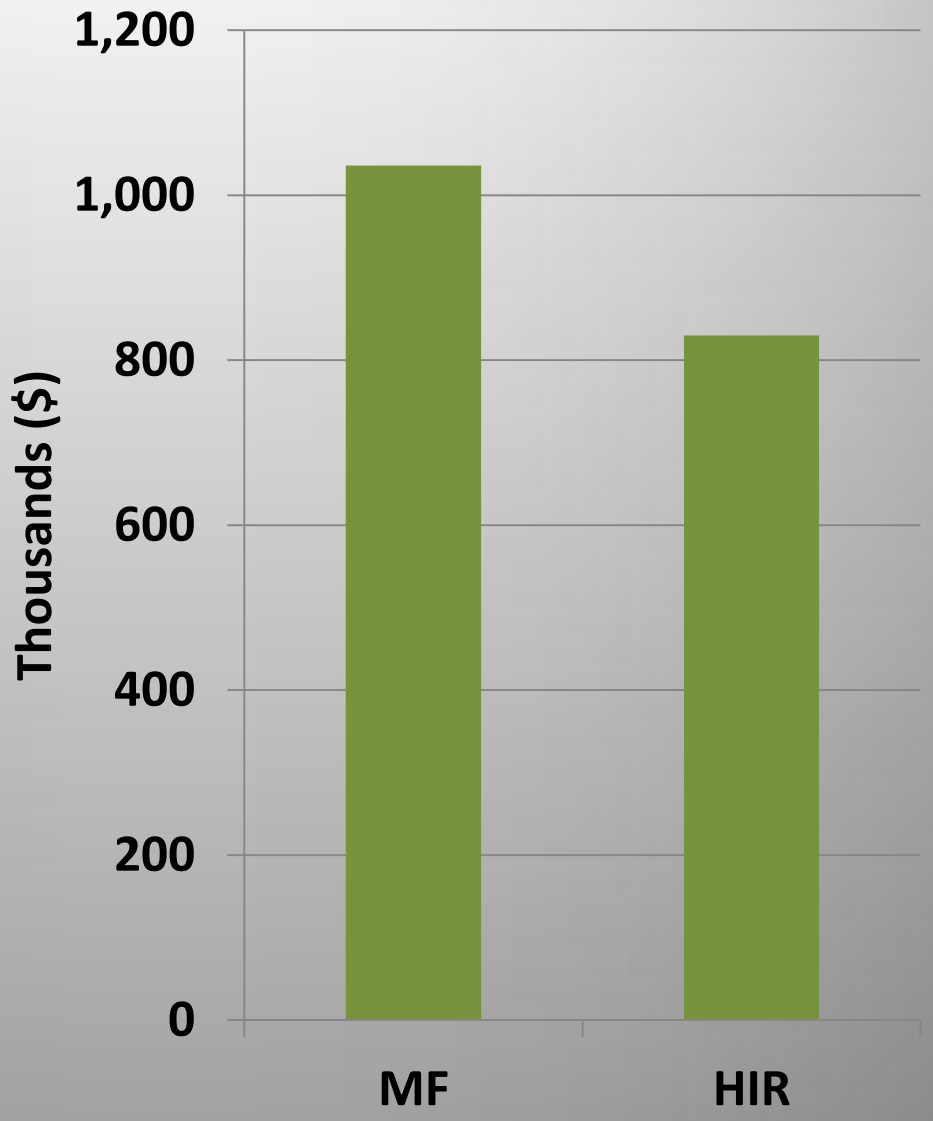
- Requires suitable base to support equipment
- OTA considers this option on preservation/ rehabilitation contracts that will receive a wearing course.

When HIR becomes desirable…

- **2” (MF) inlay of driving lanes using Virgin Mix**
  - ✓ **Superpave S4 (PG 76-28 OK), NMS = ½ inch (12.5 mm)**
  - ✓ **Average Cost = $68/ton**
  - ✓ **Average cost 2” inlay, 13 ft wide, 1 mile long: ~ $58,100**
- **2” inlay (MF) of driving lanes using HIR**
  - ✓ **Hot-in-Place Recycled Asphalt Concrete = $3.75/SY**
  - ✓ **Hot-in-Place Asphalt Emulsion = $750/ton**
  - ✓ **Average cost of 2” HIR, 13 ft wide, 1 mile long: ~ $41,500**
- **Both would receive UTBWC**

When HIR becomes desirable…

- Cost Savings on a 5 mile contract, 4 lanes wide
  - ✓$332,000 savings
  - ✓30% reduction in cost
- 100% Recycled Material



How does OTA ensure quality ?

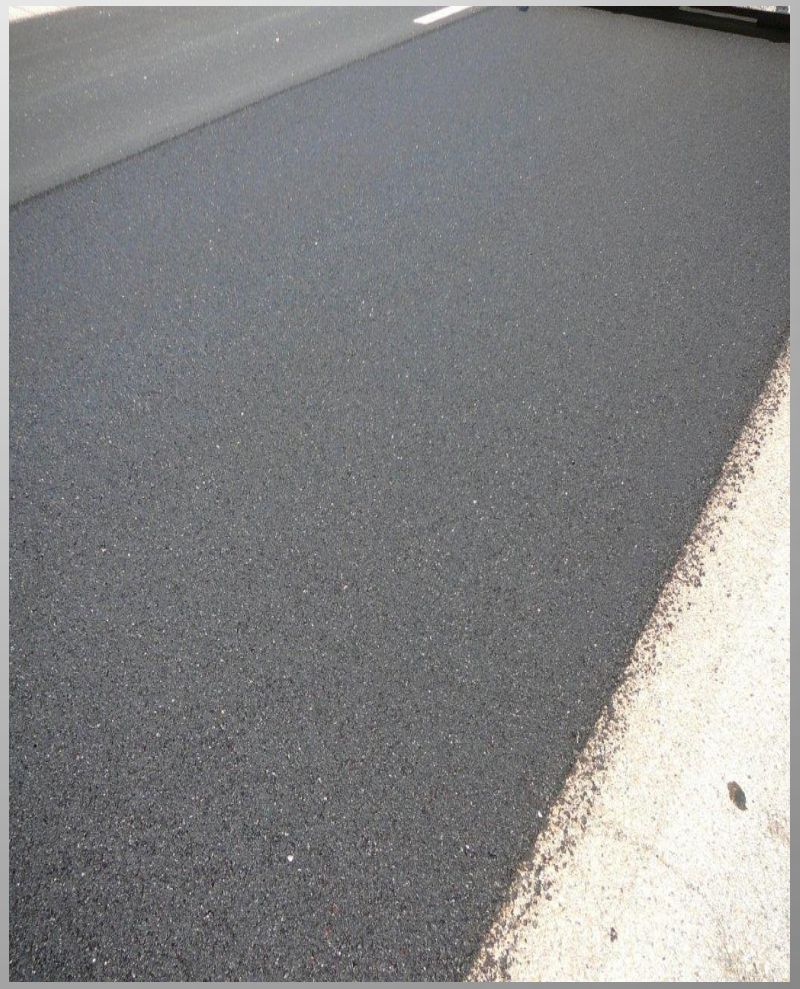
- **Quality Control Testing**
  - ✓ **Asphalt Emulsion Content**
  - ✓ **Maximum Specific Gravity (G_{mm})**
  - ✓ **Depth Checks every ¼ mile**
- **Compaction Requirement**
  - ✓ **Require same compaction as HMA**
  - ✓ **Minimum 92.0% of G_{mm} at JMF emulsion content**
  - ✓ **Test by cores or nuclear gauge**

$$$ Time is Money $$$

- Utilize temporary lane closures, working hours only
- 3.5 lane miles/day HIR vs. 1-1.5 lane miles/day of inlay (MF)
- Weather event: can pick up equipment and move off road quickly
- Return traffic 45 minutes to 1 hour

HIR Contracts

- Performed HIR on 25% of T and WR Turnpikes
- Completed Contracts
  - ✓ T-MC-96, 40 lane miles
  - ✓T-MC-97, 24 lane miles
  - ✓WR-MC-112, 38 lane miles
  - ✓WR-MC-113A, 27 lane miles
- Current Contracts
  - ✓WR-MC-117, 19 lane miles
- Upcoming Contracts
  - ✓ WR-MC-113B, 17 lane miles
  - ✓Considering inclusion on other maint. contracts



Questions ???

Tammy Robinson

EST, Inc.

615 North Hudson, Third Floor

Oklahoma City, OK 73102

(405) 815-3600 office

(405) 815-4080 fax

(405) 206-5119 cell

tammy@estinc.net

www.estinc.net

David Murdock

OTA

405-424-7492

dmurdock@pikepass.com

www.pikepass.com