

# *UBOL Fabric Interlayer Research & UCOCP Design Procedure Pooled Fund*

**NCC Spring 2012 Meeting**  
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*Office of Materials and Road Research*



# ***Use of Non-Woven Fabric Interlayer for Unbonded Concrete Overlays***

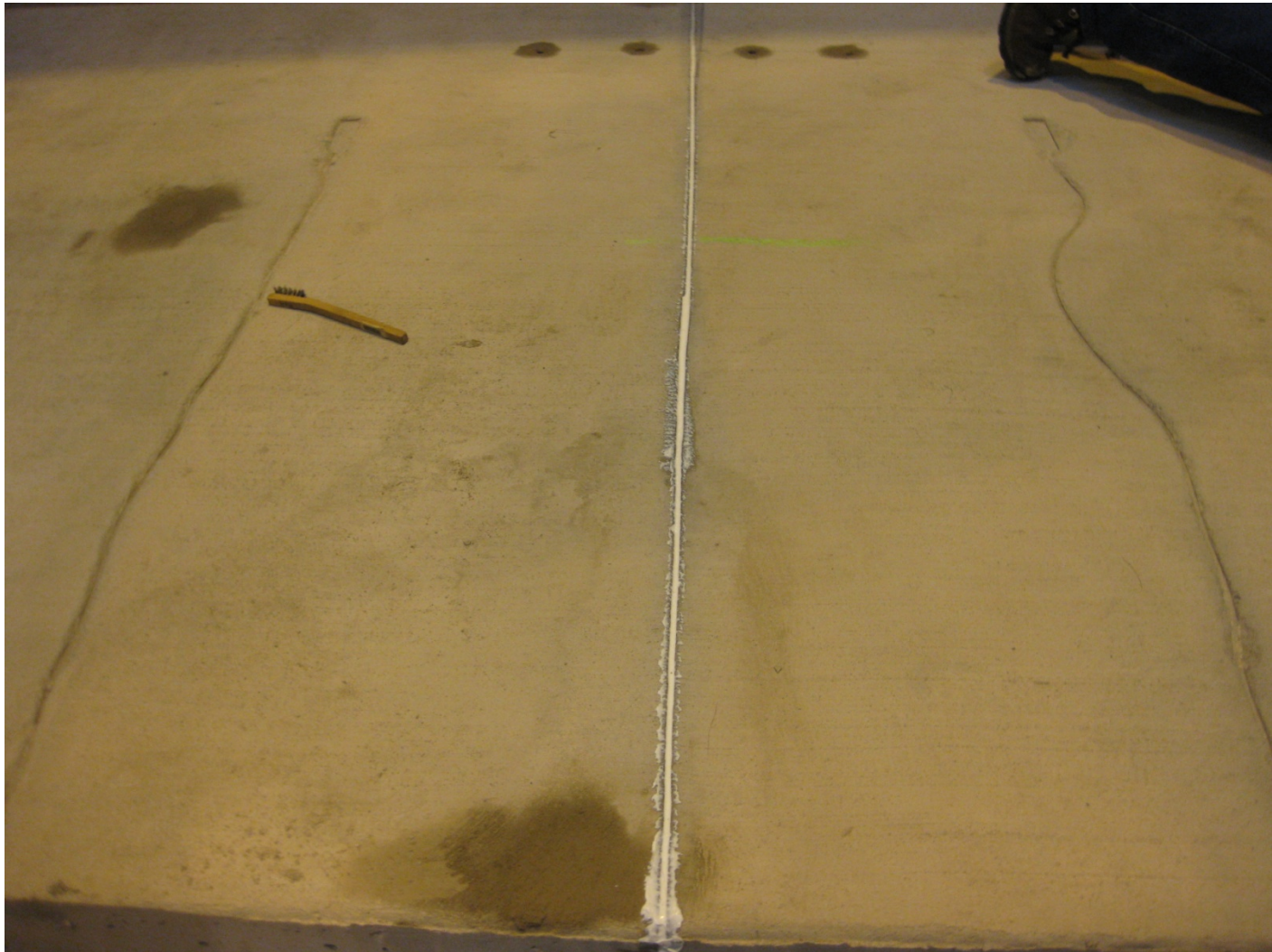
- P.I. Lev Khazanovich, University of Minnesota
- Objectives:
  - Develop performance data for UBOL with fabric interlayer
  - Determine whether fabric supplies sufficient cushioning for overlay
  - Evaluate drainage characteristics of fabric interlayer

# ***Use of Non-Woven Fabric Interlayer for Unbonded Concrete Overlays***

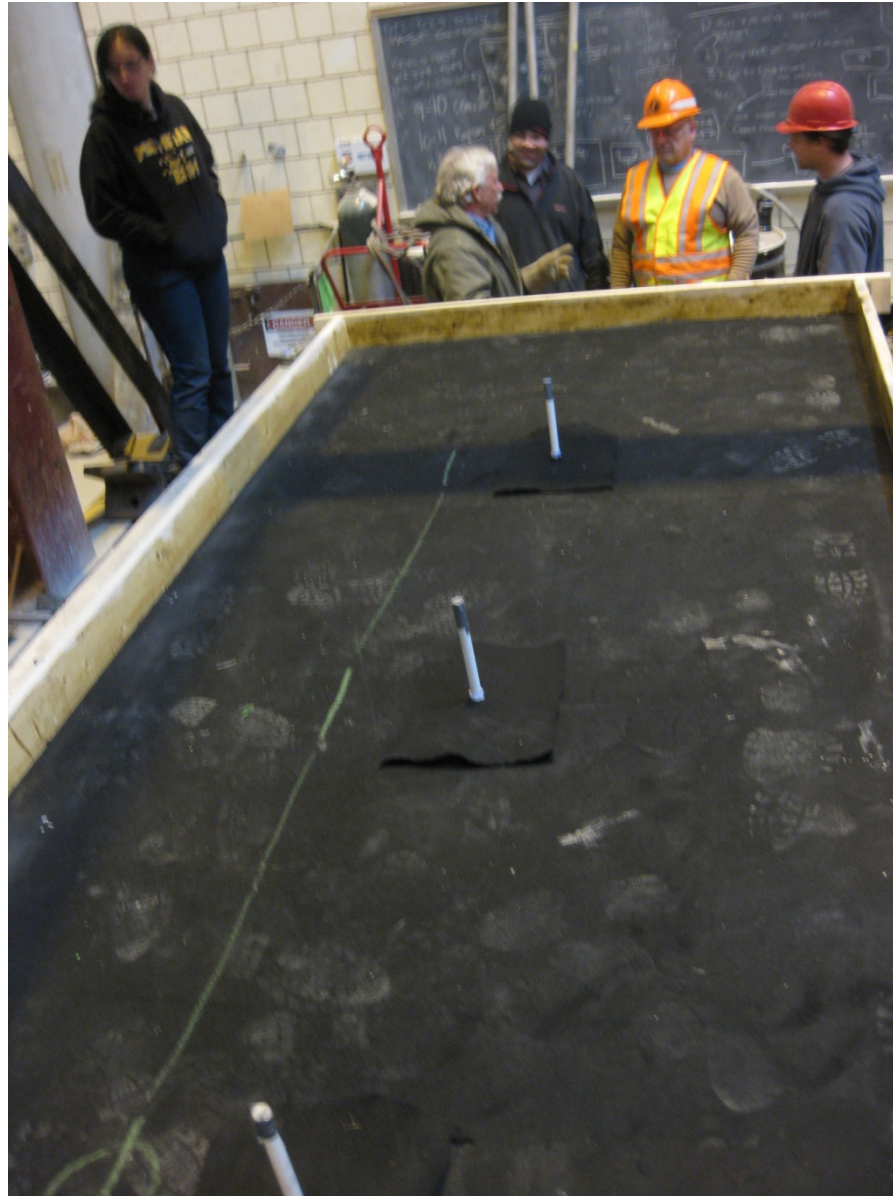
- Experimental Design:
  - 2 test sections loaded by “Minne-ALF2”
  - 6’ wide by 15’ long slab
  - Minimum of 7 million load repetitions per test section
  - Alternating 9000 lbs loads across underlying crack/joint
  - Increased loads (if needed) to fail overlay slab
  - October 31, 2012 estimated completion date



Test Section 1 – Base slab = 5" thick



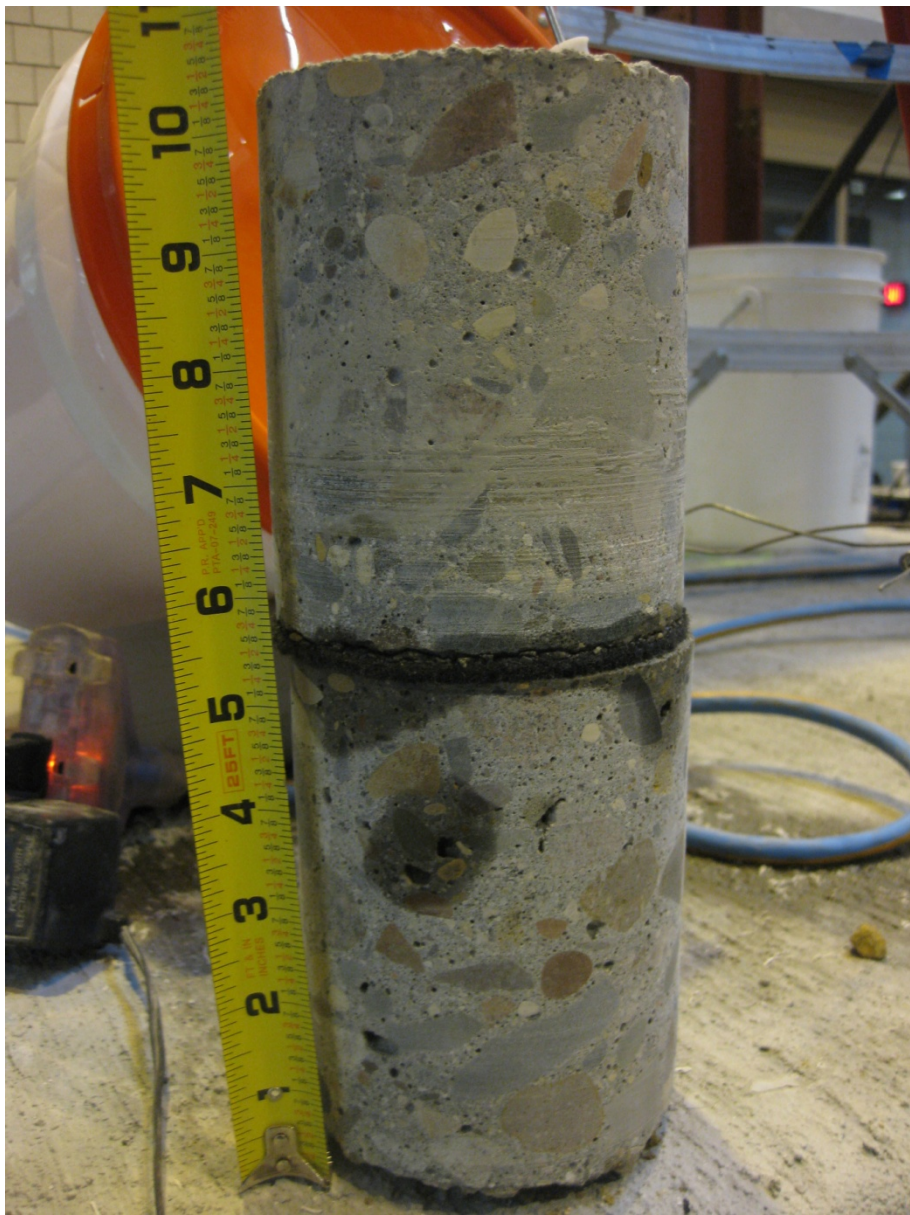
Sawed joint & moisture sensor block-outs



Fabric & water inlets installed



Gutter on down slope edge of 5" thick overlay







Drainage experiment set-up

# ***Use of Non-Woven Fabric Interlayer for Unbonded Concrete Overlays***

- Test Section 1:
  - Measured deflections of 5” base slab for one week
    - No crack formed, had to saw joint
  - Fabric and 5” concrete overlay constructed
    - 7 million reps at dual 9000 lbs loads (no cracks)
    - Increased loads to dual 15000 lbs to fail overlay (cracks?)
  - Conducted drainage study (static & during loading)
- Test Section 2 (proposed)
  - 5” thick base slab with 3” overlay
  - Subject to TAP approval

# ***MnROAD Cells 505 & 605***

## ***Thin Unbonded Concrete Overlay on Fabric Interlayer***

- Design details:
  - Original (1993) 7.5" thick PCC slabs
    - Panel sizes: 20'Lx14'W (D), 20'Lx13'W (P)
    - ½ natural joints, ½ mechanically cracked
  - Removed (2008) 1" PASSRC + 4" thick PCC overlay
    - Panels sizes: 15'Lx14'W (D), 15'Lx13'W (P)
  - Constructed (2011) 5" thick overlay on fabric interlayer
    - Panel sizes: 6'L x 7'W (D), 6'Lx6.5'W (P)

# Development of an Improved Design Procedure for Unbonded Concrete Overlays

- Pooled Fund Proposal 1309
  - 3 year study
  - \$480,000 proposed budget (\$20k/yr from 8 states)
  - Current partners: GA, IA, KS, MI, MN (lead), OK
  - Commitments=\$360,000
  
- Patterned after TPF 5-165 Whitetopping Design Procedure project
  - Stand-alone spreadsheet design for UCOCPC (DARWin ME compatible)
  - No overlay thickness limit (3"-12"?)
  - Characterization of and guidelines for interlayers
  - Project selection criteria

# Development of an Improved Design Procedure for Unbonded Concrete Overlays

- Scope of work

- Literature review and summary of existing UCOCPP design procedures, and survey of performance of experimental and in-service UCOCPP projects.
- Develop separator layer (interlayer) design parameters and performance model(s) for various materials based on field performance and limited laboratory testing (if needed).

# Development of an Improved Design Procedure for Unbonded Concrete Overlays

- Scope of work (con't.)
  - Develop new, or improve existing UCOCPP pavement response and performance prediction models that incorporate
    - Slab thickness (3" to 12"?)
    - Panel size
    - Joint load transfer mechanisms
    - Axle load configuration
    - Condition of the existing pavement
    - Climate (nation-wide) (Utilize existing models)
    - Performance of a separator layer over time

# Development of an Improved Design Procedure for Unbonded Concrete Overlays

- Scope of work (con't.)
  - Develop a unified national mechanistic-empirical design procedure for unbonded concrete overlays of existing concrete and composite pavements.
  - Procedure should consist of a self-contained spreadsheet or software program
    - Formulated for adoption into DARWin-ME in the future.
  - Must accommodate a variety of climate conditions, axle load configurations, underlying pavement conditions, and time dependent performance of the separator layer.

# Development of an Improved Design Procedure for Unbonded Concrete Overlays

- Scope of work (con't.)
  - Develop user manual
  - Provide project selection criteria
    - Existing guidelines
    - Improved guidelines based on feasible designs.



# Development of an Improved Design Procedure for Unbonded Concrete Overlays

- Benefits of project design
  - Freedom to use existing models or develop new ones as needed
  - Potential to create or evaluate innovative designs
    - Thin or Ultra-thin UCOCOP
    - Interlayer types:
      - New or milled HMA (dense or porous)
      - Fabric
    - CRCP overlay over JPCP (may require additional funds?)