Caltrans/PCMAC Bridge Workshop

Caltrans District 4 Precast Concrete Pavement Rehabilitation Project

November 17, 2011

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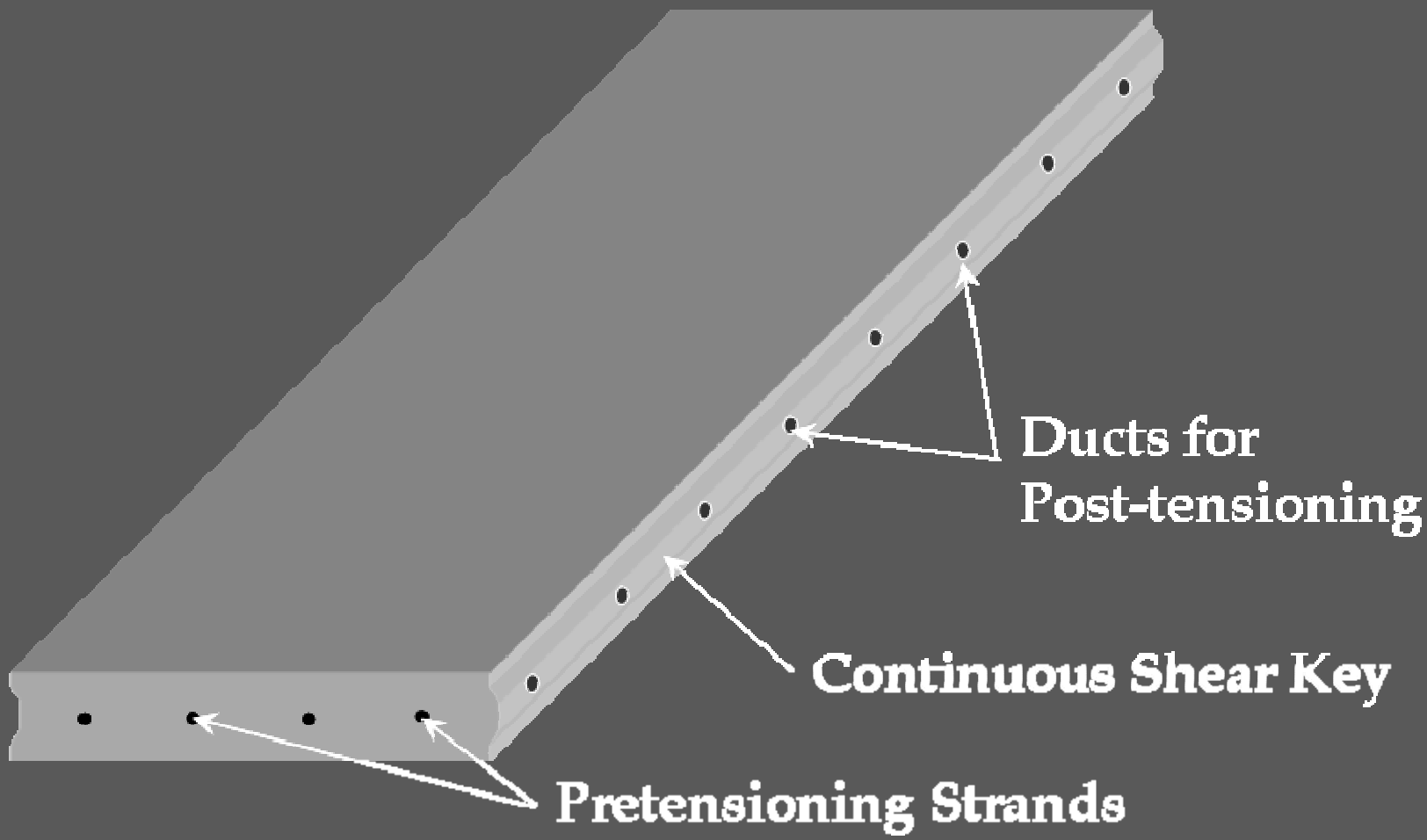
Caltrans – District 4

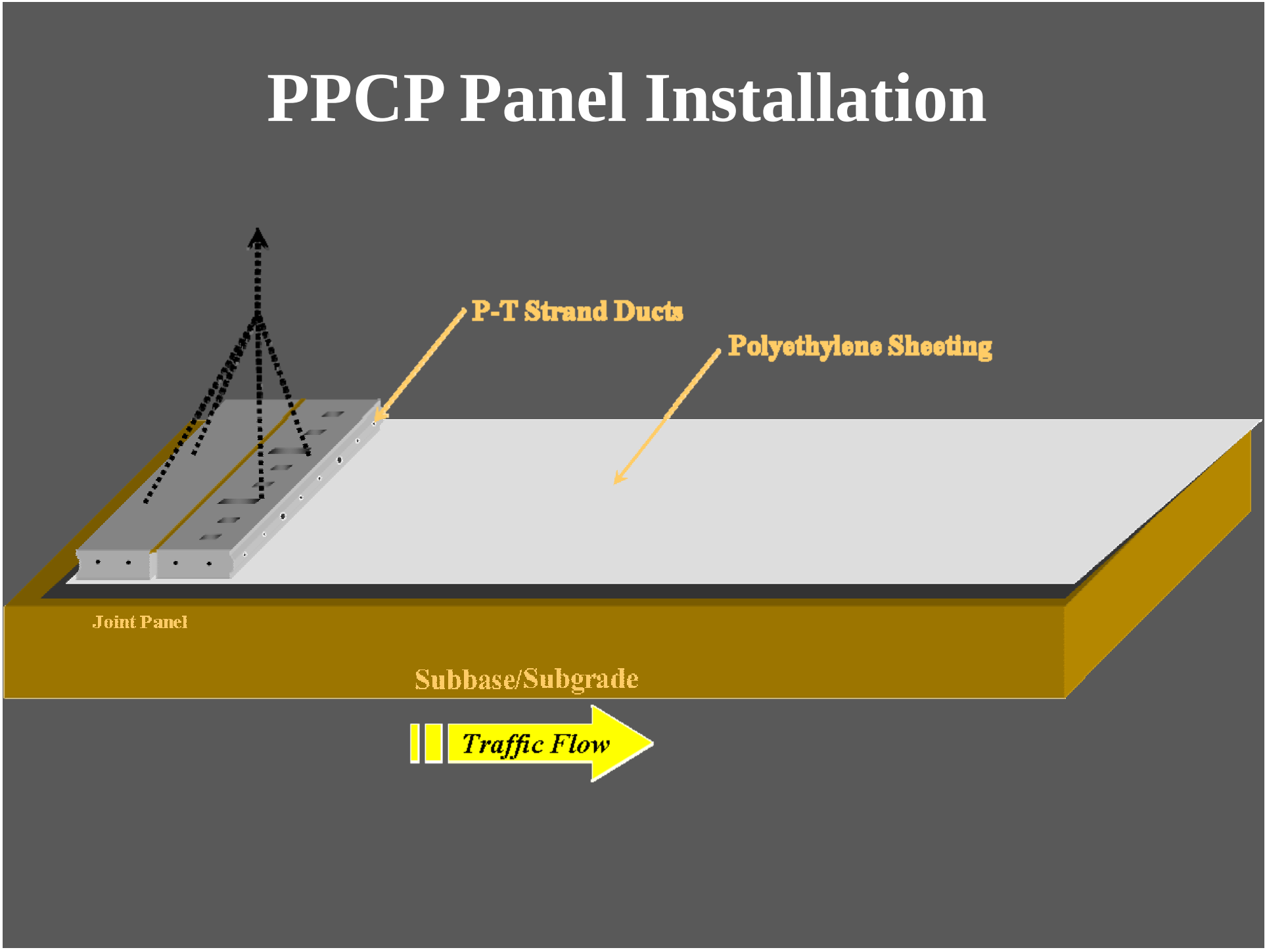

Grind and replace (RHMA)
Precast
Precast
Cast in place and precast

Existing Conditions

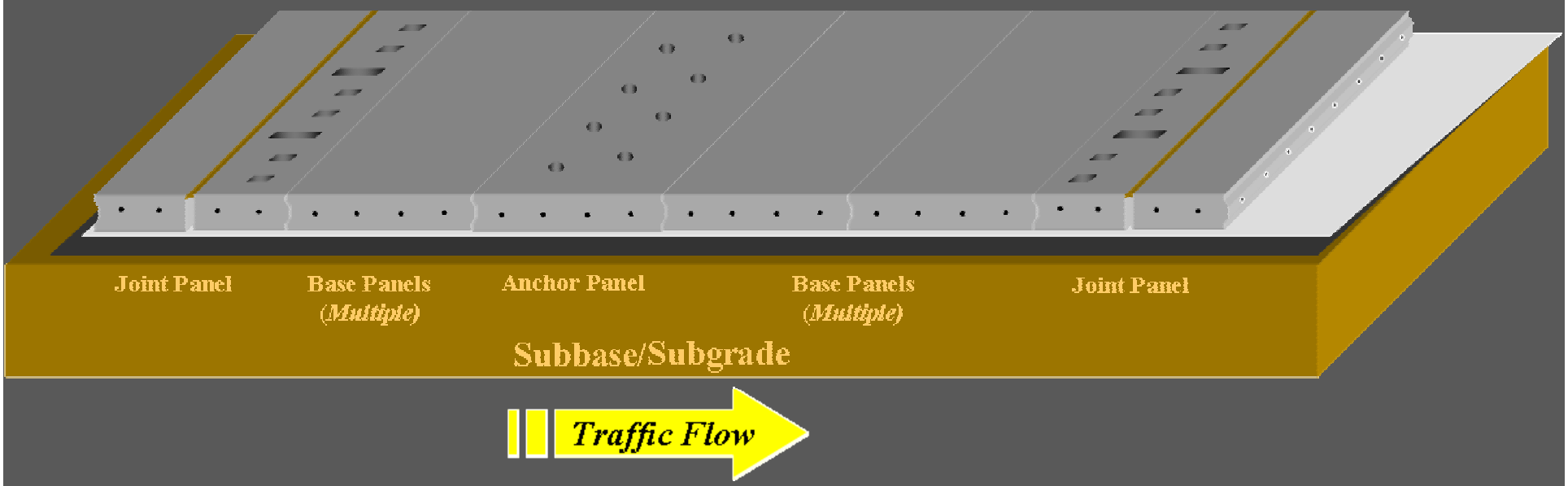
Typical PPCP Panel



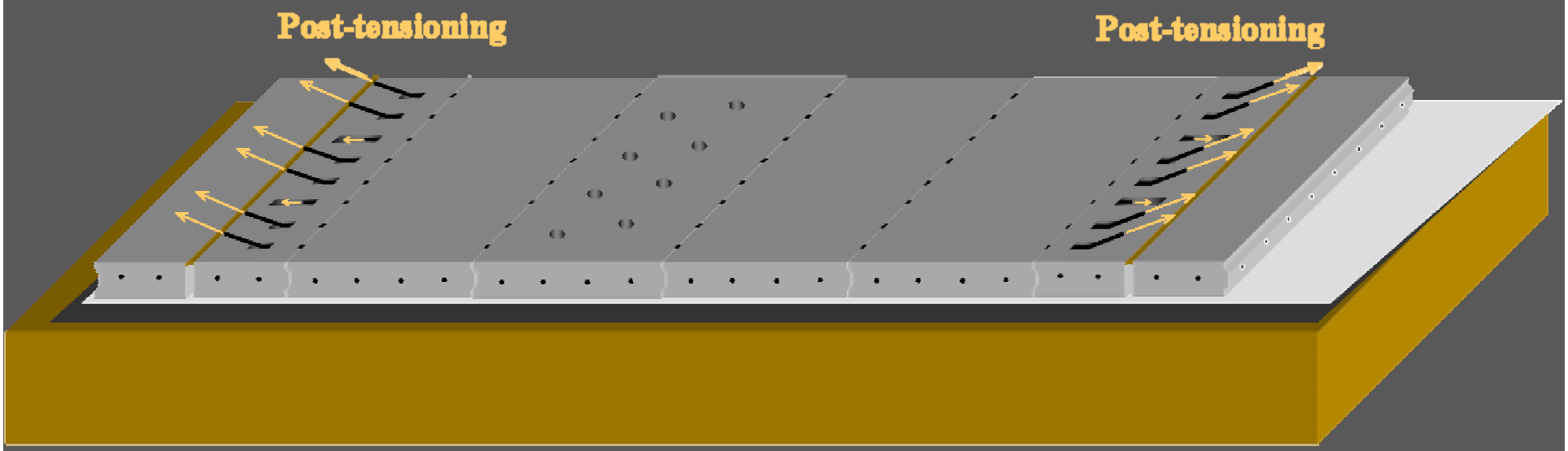
PPCP Panel Installation



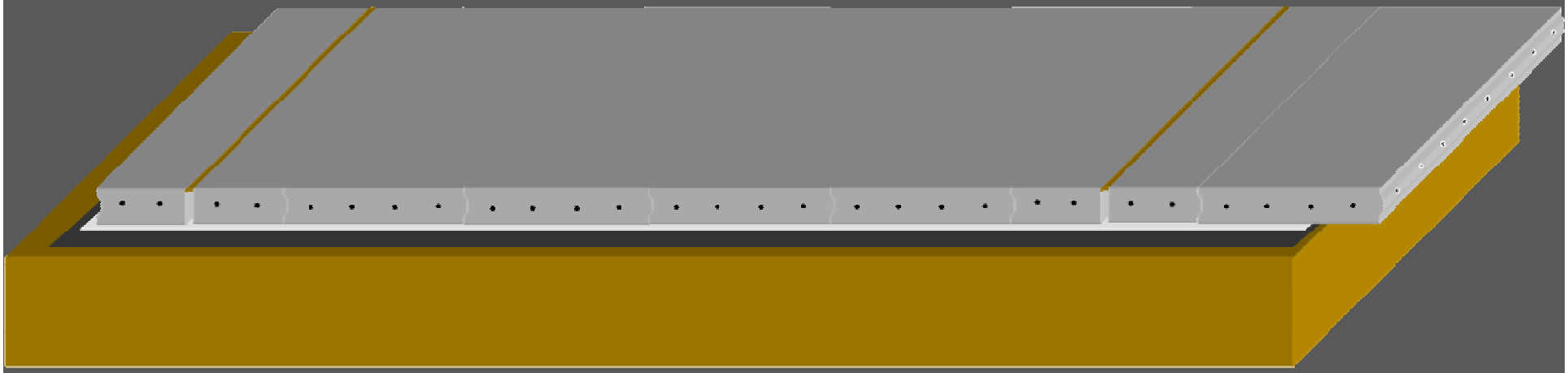
PPCP Panel Installation



PPCP Panel Installation



PPCP Panel Installation



Typical FHWA PPCP Panels

PPCP Design Changes (Con-Fab)

- Eliminate anchor (blockout) pockets – end stressing throughout.
- Longer panels, up to 36’. Reinforced with 2- way pretensioned strands
  - Longer slab lengths, up to 216’

- 3 post-tension ducts (2” diameter), unlike original FHWA design (6 ducts).

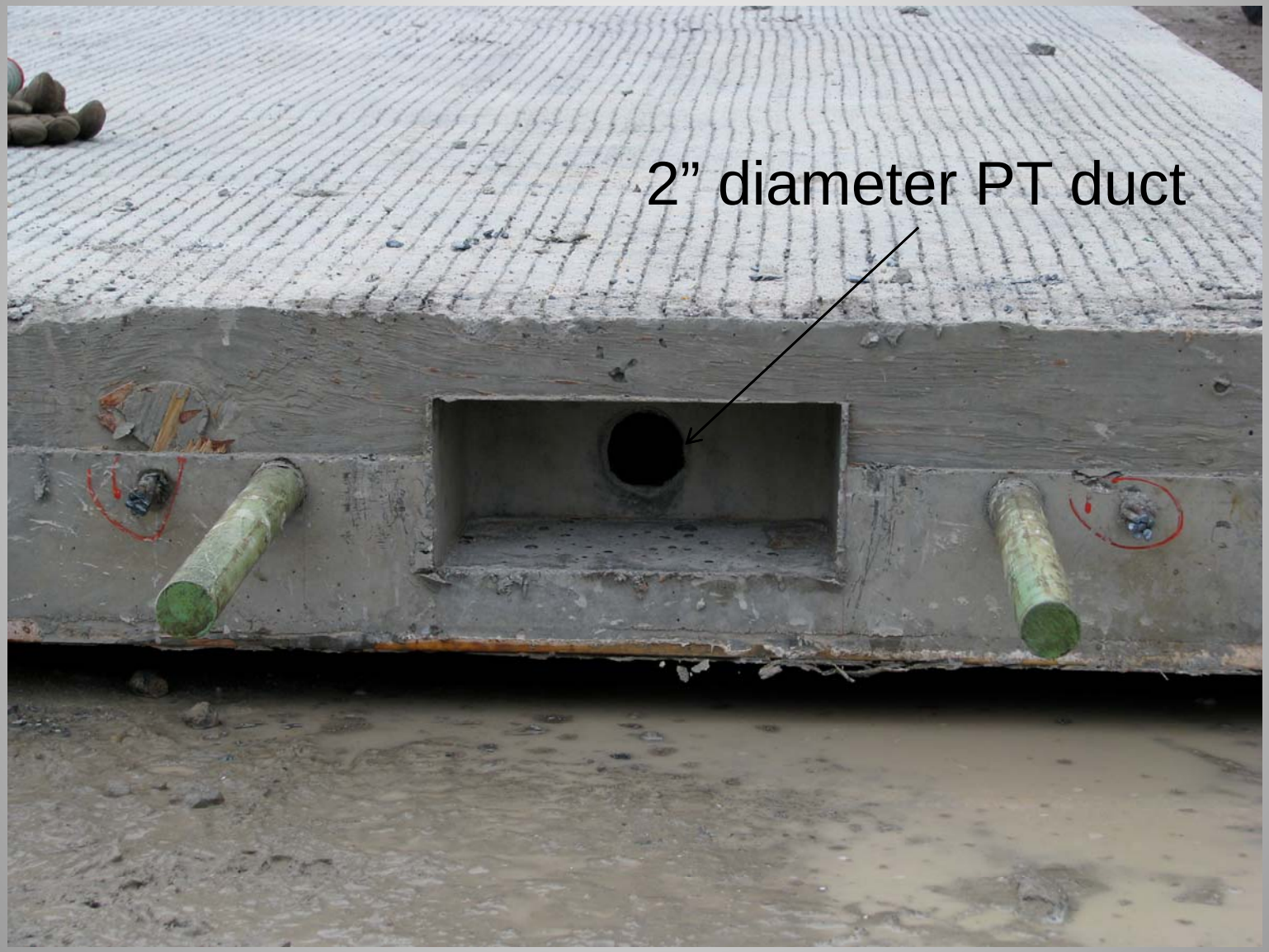
PPCP Design Changes

PPCP Design Changes

Recessed pocket for gasket minimizes grout leakage

Cutaways in keyways for post
Tension ducts, allows for alignment

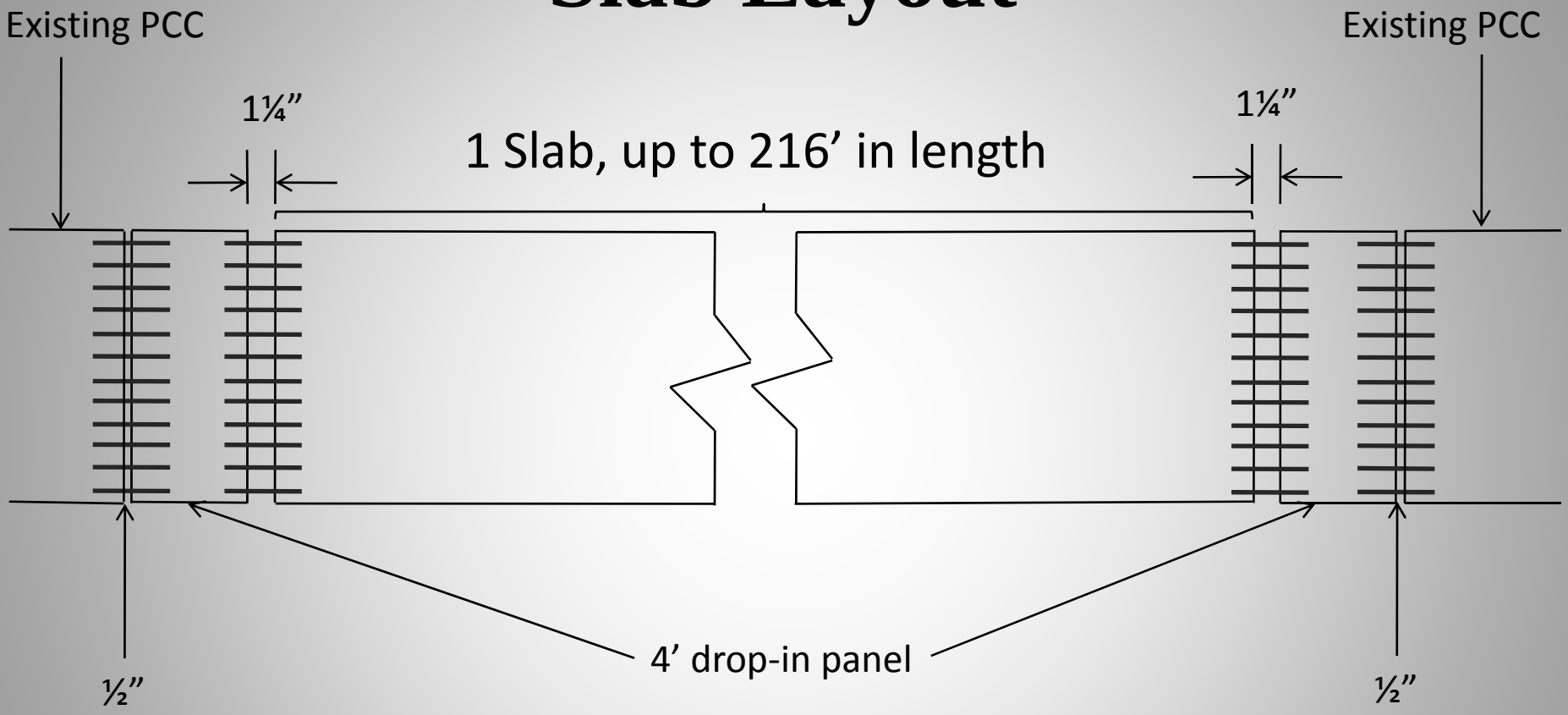
End Blockouts for PT



Panels Stamped

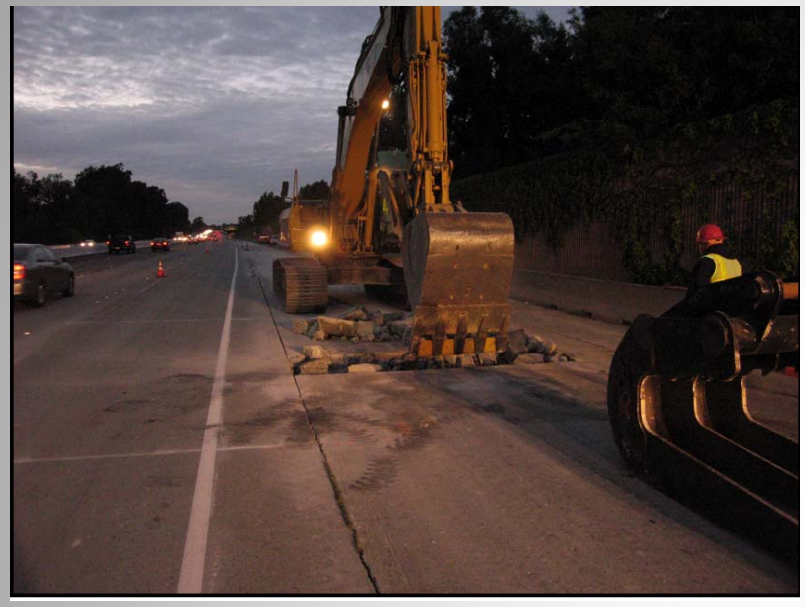
4’ Drop-In Panel

Slab Layout


Existing PCC
Existing PCC
1¼”
1¼”
1 Slab, up to 216’ in length
½”
4’ drop-in panel
½”

Installation of Precast Panels

Demolition

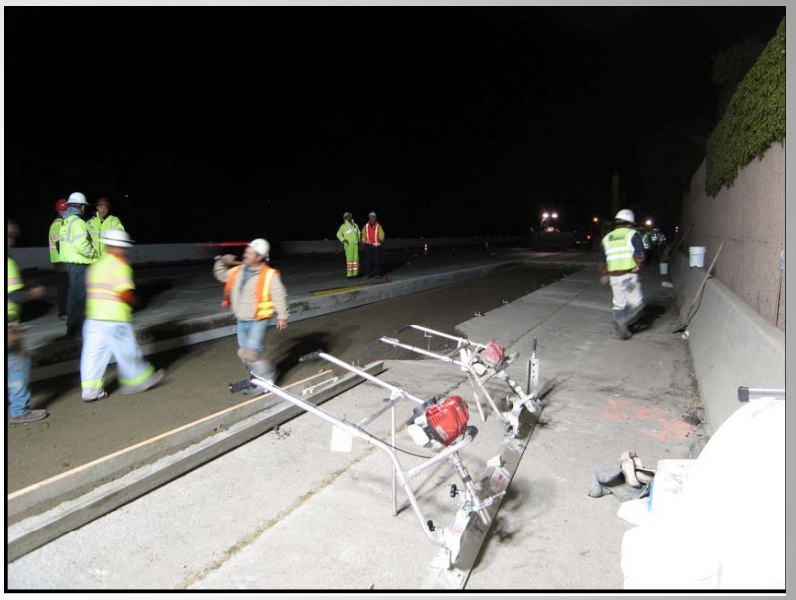


- Includes the removal of distressed pavement and underlying base.

Grading and Compacting Base

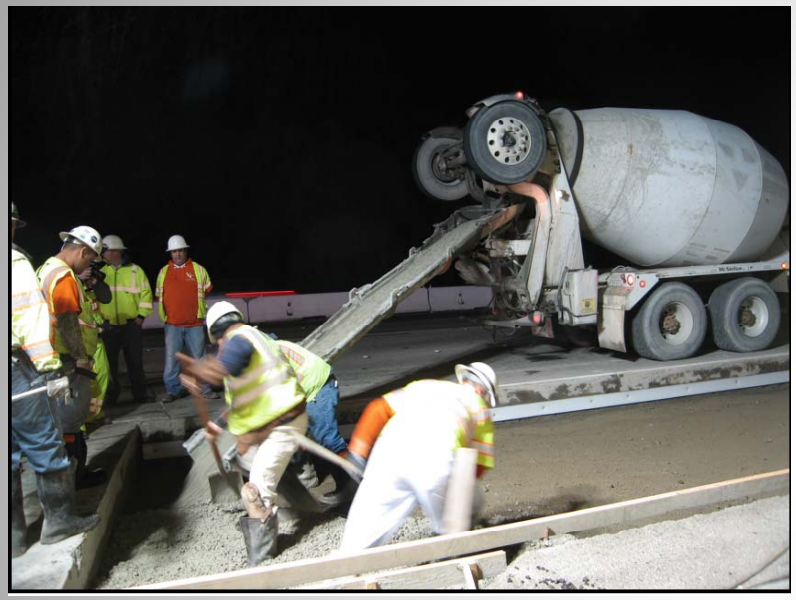
- Grade and proofroll the subbase material in preparation for rapid setting lean concrete base (LCB-RS).

Drill Dowel Slots, Insert Joint Filler



- Use gang drill to ensure longitudinal alignment when dowels are inserted.

Pour and Grade LCB-RS



- Must achieve and opening age compressive strength of 725 psi prior to opening to traffic, and is 6” thick.

Place Bond Breaker, Install Panel

- Once LCB-RS reaches compressive strength of 100 psi (~2 hours), place bond breaker and install PPCP panel (Figure 11).

- Feed PT strands (6 permanent, epoxy coated and 2 temporary uncoated).

- Apply temporary post tensioning after second panel is placed.

Final Post-tensioning

- After last panel is placed, remove temporary strands and perform final post tension on epoxy coated strands (5600 psi).

•Place temporary drop-in panel until next night. Roadway is opened to traffic at the end of the workshift.

PT duct and Underslab Grouting

- Next night remove temporary drop-in panel and pump grout into PT duct and inject underslab grout.

- Underslab grout is used to fill any voids or minor undulations on the LCB-RS.

Insert Dowels, place permanent 4’ drop-in panel

- After all the PT ducts and underslab grouting is complete, permanent drop-in panels are placed at ends and slots grouted.

- PPCP slab section is complete and opened to traffic.

Diamond Grind/Seal Joints

- Insert joint filler material along isolation joint.
- Diamond Grind
- Seal Joints

JPPCP Panel Installation

- Dowels are inserted in existing pavement prior to placing JPPCP panel.

- All JPPCP panels were cast to fit excavations and dowel bar slots grouted the same night.


McPHERSON
CRANE

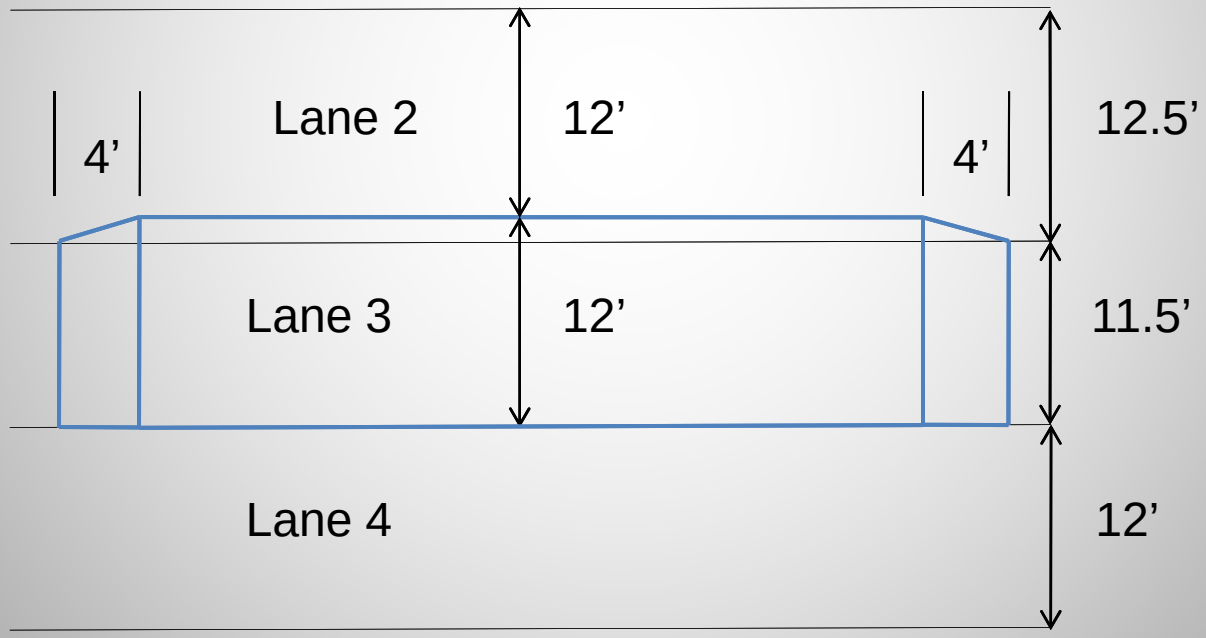
PRECAST
JPCP

Improvements from Original FHWA Design Concept

- Little to no leakage in joints during PT grouting operation.
- Less number of joints as a result of longer panels.
- Two-way pretensioning.
- Better production rates (during installation)
    - 224’ PPCP+200’ JPPCP (8-9 hr work window, 2 crews)

Fabrication/Installation Challenges

- Tapered panels where lane widths vary.




4’ tapered drop-in panel

Installation Challenges

- Under a structure (17’ clearance)

Installation Challenges

- Ensure proper grade of LCB-RS.

- Ensure dowels are aligned longitudinally

- Check elongation of epoxy coated strand, d=PL/AE

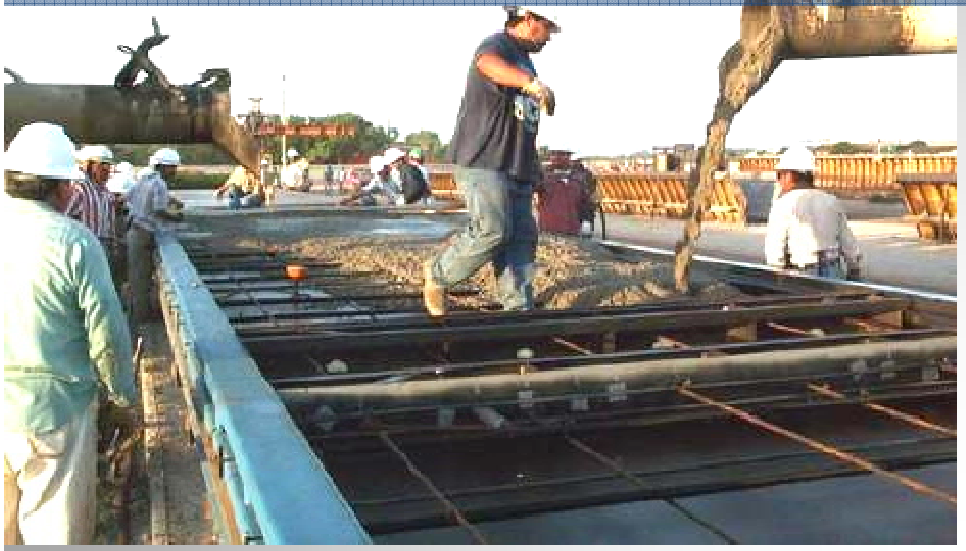
- Spalls due to handling or installation

- Isolation joints >>½”

- Accurately laying out transverse sawcuts

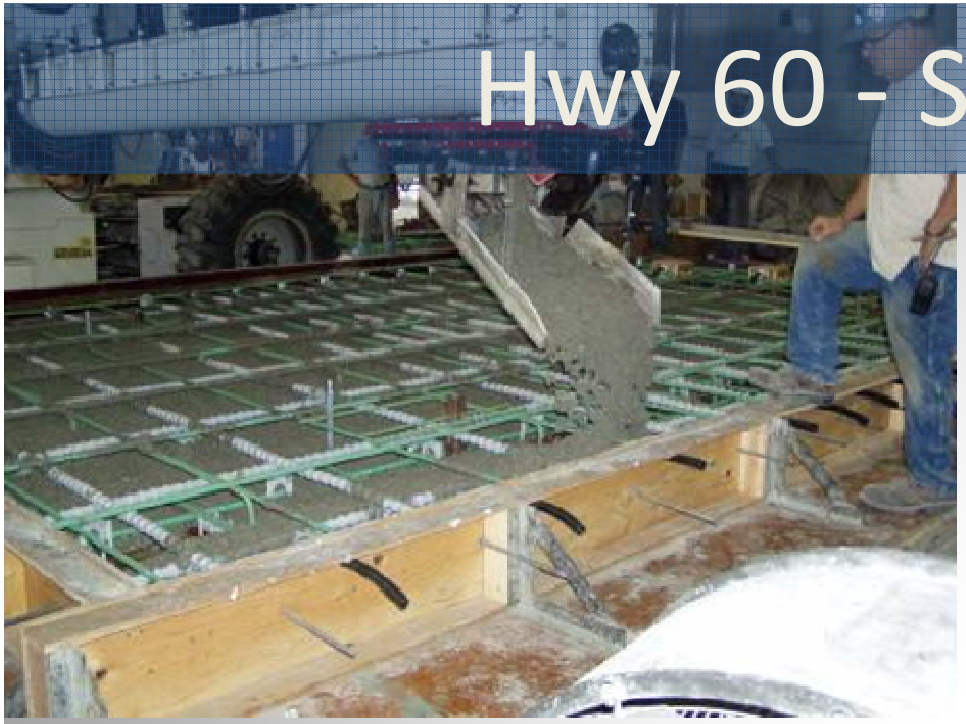
- Inaccurate Transverse Sawcuts

Interstate 35 (FR) - Georgetown, TX

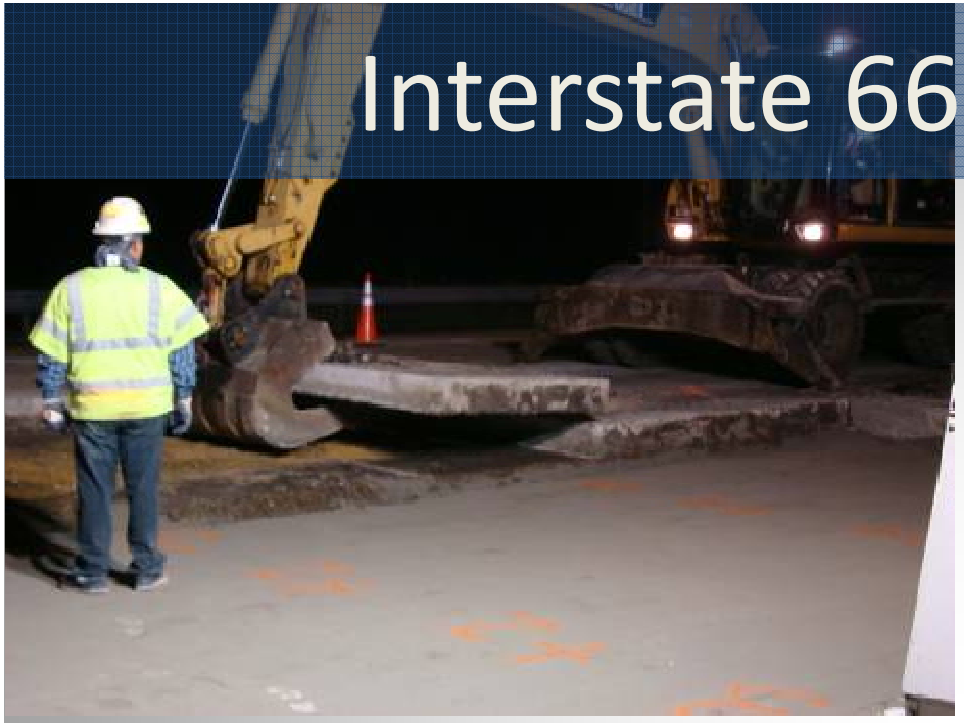


Interstate 10 - El Monte, CA

Hwy 60 - Sheldon, IA



Interstate 66 – Fairfax, VA



Java, Indonesia

Photos courtesy of Tommy Nantung, INDOT

Future Designs

- Precast Approach Slabs
  - Look at concepts from Iowa/Utah.
  - Develop design for California

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