Rapid Intersection Reconstruction in Washington State, USA

Suneel N. Vanikar, P.E.

- Federal Highway Administration
  United States Department of Transportation
- Team Leader – Pavement Design and Analysis
- suneel.vanikar@dot.gov

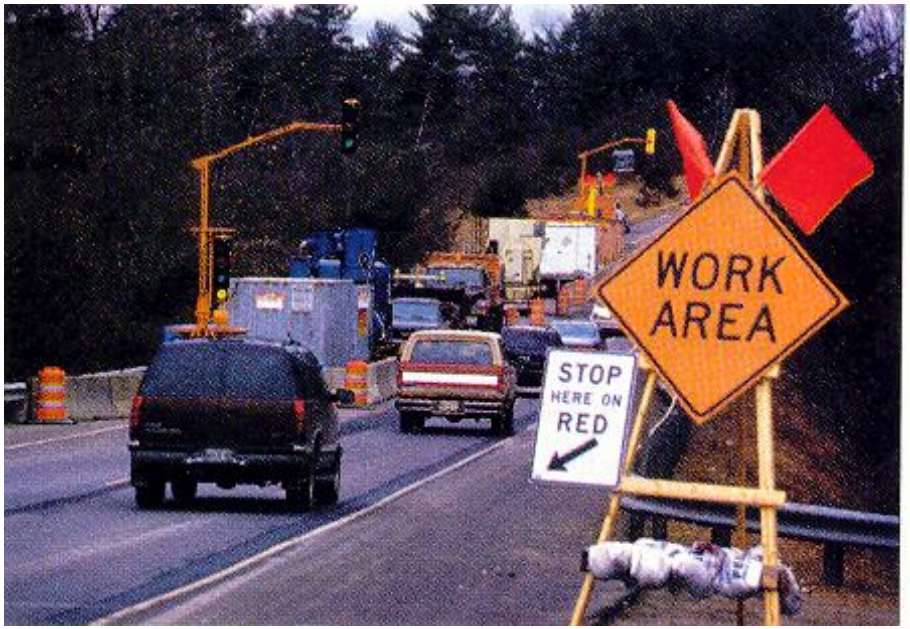
THE SITUATION

- Need to repair / rehabilitate concrete pavements "as quick as possible"

Versus

- Extended lane closures

- Durability concerns



SOLUTION: LONGER-LASTING RAPID REPAIR AND REHABILITATION TECHNIQUES

- Shorter pavement life cannot be accepted as the price of rapid renewal.

- We must engineer rapid rehabilitation:
  - To be performed rapidly.
  - To cause minimum traffic disruptions.
  - To produce long-life pavements.

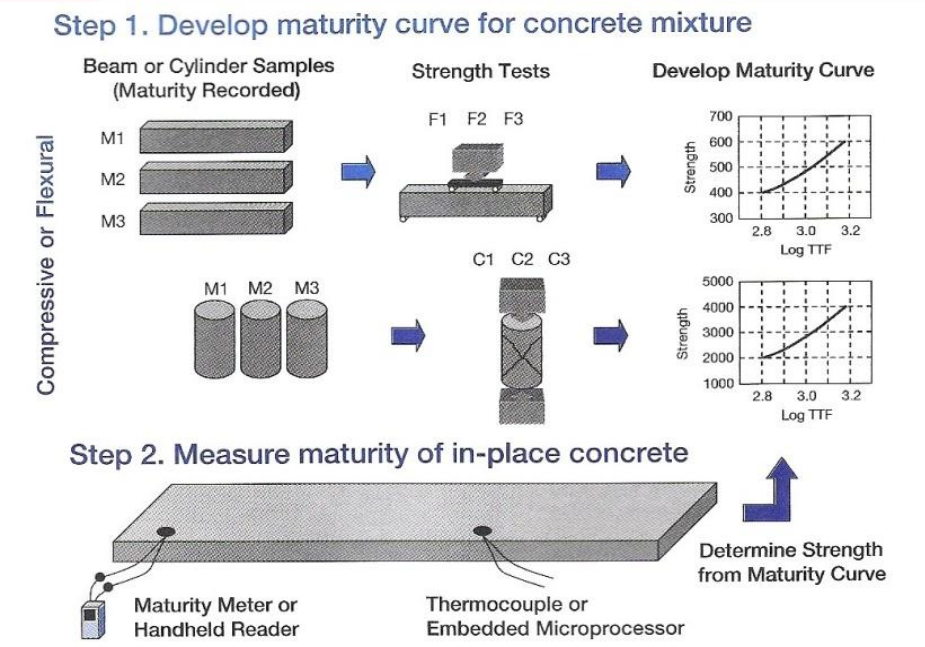
SPEED OF REHABILITATION

- Need:
  - Minimize length of lane cloures during peak hours on high volume highways to minimize impacts to users.
- How?
  - Full closures- nighttime, weekend, or extended
  - Partial closures- maintain traffic flow
- Technology
  - Using established conventional industry procedures.
  - Using innovative technologies
    - High early strength concrete materials
    - Precast pavements

STRENGTH TESTING FOR ACCELERATED PROJECTS

- Use concrete maturity for opening to traffic
  - Monitor concrete temperature and strength

- Use conventional testing for strength acceptance at 14 or 28 days.



WEEKEND INTERSECTION RECONSTRUCTION

- Washington State Department of Transportation wants to reconstruct urban high volume intersections with concrete.

- Typical process:
  - Three day closure- 7 pm Thursday to 6 am Monday.
  - $2400/hour penalty if closure extends beyond 6 am Monday.
  - Extensive public relations campaign (meetings, flyers, radio, alternate routes).
  - Typically, 12 inch (300 mm) concrete & f'c of 2,500 psi (17 Mpa) at 12 hours or at opening to traffic.

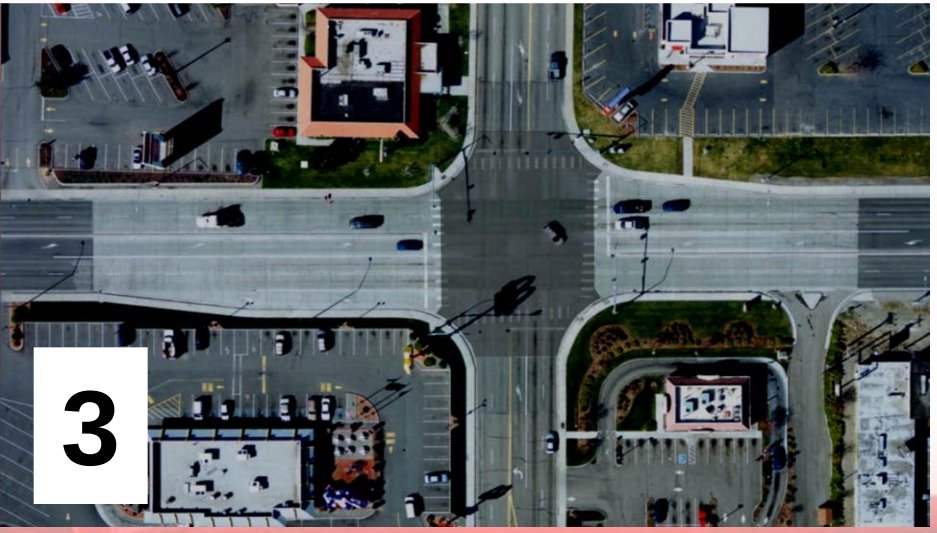
PAVEMENT DESIGN

- 12 inch (305 mm) PCC slab over crushed stone base.
- 12 to 16.4 ft (3.5 to 5.0 m) transverse joint spacing.
- 1.5 in (38 mm) diameter dowels bars.
- 0.625 in (15.8 mm) diameter tie bars.

MIX DESIGN

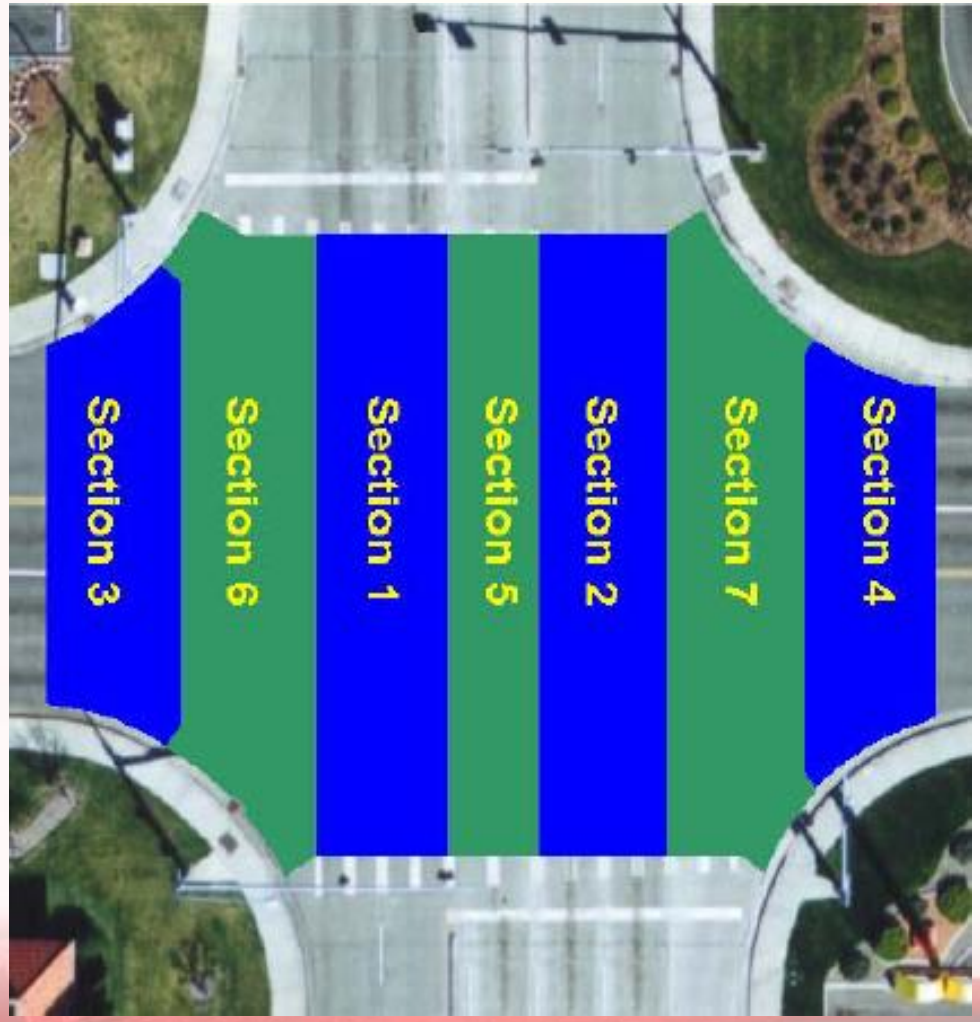
- Compressive strength requirement:
  - 2,500 psi (17.2 Mpa) in 24 hours
- Cement (Type III)
- W/C 0.36
- Air 6.3%

INTERSECTION OF STATE ROUTE 395 & KENNEWICK



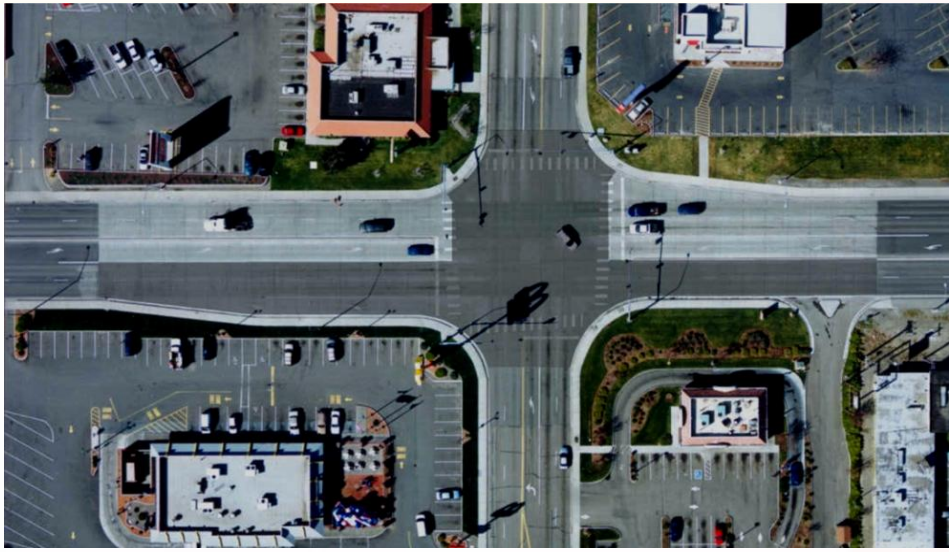
- Stages 1 through 3 constructed under traffic (periodic shifting of traffic)

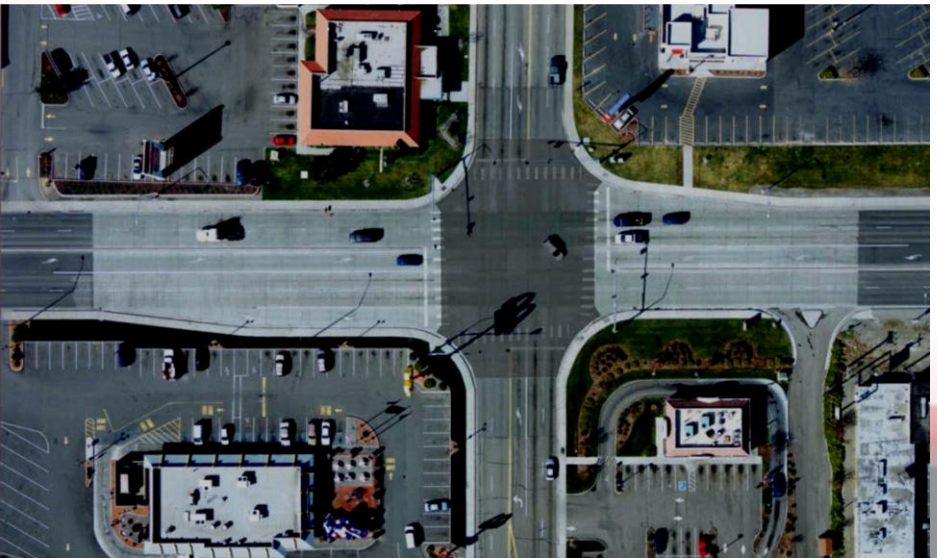
STAGE 4



- Entire intersection closed for 3-days over a weekend (55 hours).
- Existing HMA pavement and base removed.
- New concrete placed in 2 major pours.
- Placement locations altered within each pour.

INTERSECTION OF STATE ROUTE 395 7 KENNEWICK AVENUE





PUBLIC NOTIFICATION

- Informational fliers handed out to residences and businesses within 500 ft (152 m) of project.

- TV and radio announcements.

- Email notification and website updates.

WHAT WORKED WELL FOR WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

- Experienced crews
- Standby equipment
- Easier project site access
- Defined staging area in plans
- Complete scheduling
- Intense public notification
- Well thought out back-up plans
- Cooperation of Washington State specialty groups and contractors

SUMMARY

- Conventional rapid repair technology has improved.

- Effective construction traffic management is a key to rapid rehabilitation project success.

- Rapid re-opening to traffic is possible.

- Washington State Department of Transportation now routinely uses the above-described rapid rehabilitation technique in its program of urban PCC pavement intersection reconstruction.

THANK YOU ● MERCI ● GRACIAS

Suneel N. Vanikar, P.E.

FHWA- Office of Asset Management, Pavement, and Construction

suneel.vanikar@dot.gov