SAN ANTONIO DOWNTOWN "Y"

Gary L. Fitts, P.E.

Feature Article,

San Antonio Express-News
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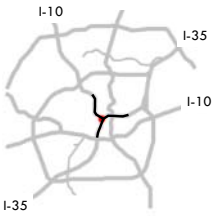
A few weeks later…

- John Kight called to discuss the article and ideas for bringing some of the successes from the Downtown Y projects to light
- Lunch meeting to discuss this, followed by e-mail correspondence:
  - John Kight
  - David Kight
  - Frank Jaster
  - Brett Hagerty
  - Gary Fitts

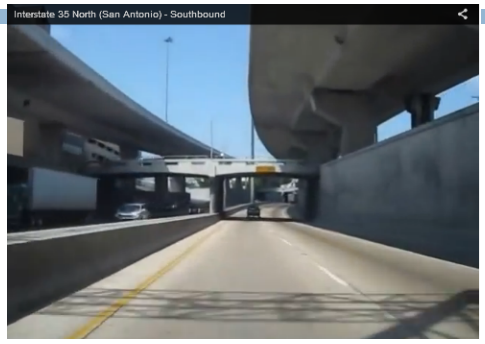
Location-Downtown San Antonio, Interchange, I-35 and I-10



San Antonio Downtown Y-Background

- Original highways built in the late 1940's and 1950's as US81 and US87
- Much of the mileage of both highways were depressed, with cross streets passing over the highways
  - Bounded by cast-in-place retaining walls, often over 15 ft high
- Over time:
  - Traffic multiplied
  - Highway geometric standards changed

Depressed Roadway, I-35 SB



http://www.texashighwayman.com/i35n_vid2.shtml

Approach

- Add lanes above, using segmental bridge construction
  - Cast in place foundations, support structures
  - Match-cast elements prepared off-site, assembled in placed and post-tensioned
- Reconstruct new mainlane pavements
  - Deep cut sections routinely flood after heavy rain
  - Re-route San Pedro Creek to bypass downtown
- Rehabilitate, widen existing mainlanes away from immediate downtown, frontage roads

Downtown Y Projects

- Initial bridge project (I-35, SBL bridges) designed by structural consultants, subsequently by SDHPT Bridge Division
- Pavement evaluation, design performed in-house at the District
- Plans developed in-house by "Special Design Section" at the San Antonio District office
- Most design work took place 1982-1986
- Over 20 individual projects

Key Players

- District Engineer, Mr. Raymond Stotzer, P.E.
  - Later became Engineer-Director for TxDOT
- Head of Special Design Section, Frank Holzmann, Sr., P.E
  - Later became State Highway Design Engineer
- John Kight, P.E.
  - Took over for Mr. Holzmann after he moved to Austin

More of the Team…

- David Kight, Materials and Tests Division
- Richard Magers, P.E., District Laboratory Engineer
- Henry Hardy, Assistant District Laboratory Engineer
- Frank Jaster, P.E., District Materials Engineer

Design Objectives

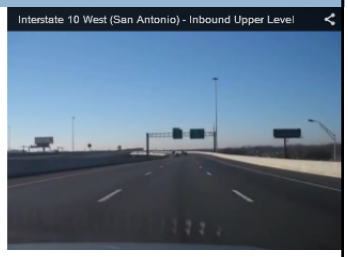
- Deliver the projects while maintaining traffic capacity during construction
- Design to be constructible, and to perform
- Develop Plan Notes, Special Provisions and Special Specifications as needed

Novel approaches

- Designed segmental bridges to be surfaced with HMA
- Designed mainlane pavement structures to resist deflection under traffic load and damage when flooded in depressed areas
- Considered the surface friction histories of aggregates used in pavement and bridge construction, and identified requirements that allowed for long-term performance

Where are we now, after 25-30 years?

- Minimal raveling
- No delamination
- No rutting
- Good friction numbers



http://www.texashighwayman.com/i10w_vid3.shtml

Why did this perform?

- Required materials necessary to do the job for these conditions
  - Hard, non-absorptive aggregates
  - AC-40 (probably PG70-16)
    - Remember, this was all built before SHRP
  - Heavy tack coat (A-R sealcoat)
  - Attention to detail during construction

PCC Riding Surfaces

- History of very poor friction on local concrete pavements and bridge surfaces
- Evaluated various aggregate qualities and surfaces locally and in other urban districts
- Modified 1982 Standard Specifications by Special Provisions to require min. 60% acid insoluble residue for fine aggregates
- Has been incorporated into TxDOT Standard Specifications

Concrete Pavement Construction

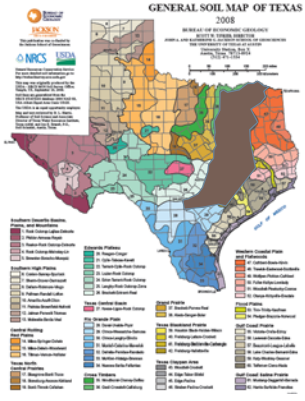
- First significant use of an asphalt stablized base layer as a subbase for concrete pavement
- Provided non-erodible subbase, and smooth profile for slipforming

What didn't work so well…

- Strip-type interlayers to delay reflection cracking in HMA overlays of JRCP
  - Difficult to install
  - Ineffective at working joints
  - In hindsight, might have considered sawcut and seal over joints

Texas Soils

- Rolling topography
- High plasticity
- Widely varying rainfall
  - Cycles between drought and flood



http://blackland.tamu.edu/files/2015/07/General-Soil-Map-of-Texas.pdf

Other learnings

- Expansive clay soils were problematic
  - Slope stability-especially on cut slopes
  - Long wavelength roughness-differential in profile exceeding 9 inches, in places!
- Whenever possible, avoid cutting into high PI clays
- "Stage construction" probably the most cost effective approach, compared to attempting to modify, or remove and replace poor soil
  - Design and manage the pavement to be re-profiled, i.e., plan to mill and resurface periodically

Thanks!