Concrete Pavements for Ramps and Interchanges

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Agenda

- History
- Pavement selection reasons
- Other PCC advantages
- Lessons learned
- Conclusion

History

- In the late 1990s and early 2000s GDOT was dealing with Air Quality non-attainment issues in the Atlanta metro area. Projects programmed in the Atlanta area were delayed and GDOT needed a way to efficiently spend Federal-aid dollars coming in under ISTEA/SAFETEALU.
- The GDOT maintenance office conceived a program of interchange replacement.

History

- The program used a standard design that saved design effort and time. This enabled the program to be put in place very quickly within about 18 – 24 months rather than the normal 5 – 7 years via the normal PDP. Almost 100 interchanges across GA were replaced under this program.
- The program's pavement design was not optimized for the individual interchange traffic loadings.

History

- Instead rigid PCC pavement was selected as a conservative approach to a single design that would be used for many different traffic loadings.
- Specifically, the program implemented the familiar standard design - 12 inches JDCP, on 3 inches of 19mm SP on 12 inches of GAB.

History

- In 2000/2001 with the approval of FHWA the GDOT extended the use of this standard design and GDOT Design offices incorporated it into interstate interchange projects beyond the original maintenance program.
- In the ensuing years this has been applied to many more interchanges across GA.

Reasons for PCC design selection

I-285 Camp Creek Northbound Off Ramp

Reasons for PCC design selection

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Reasons for PCC design selection

I-285 Hollowell Parkway

Reasons for PCC design selection

I-285 E. Ponce DeLeon Northbound Off Ramp

Reasons for PCC design selection **Durability**

- The enormous rutting and shoving in these photos is not unusual where there is significant truck traffic. HMA does not absorb/resist the shear forces generated by rapidly accelerating or decelerating ramp truck traffic very well.
- In this environment rigid pavement works the best.

Other aspects of PCC Durability

- Concrete actually hardens over time. After its first month in place, concrete continues to slowly gain 10 percent in strength during its life.

- **Concrete pavements frequently outlast their designed life expectancy** and traffic loads. The durability of concrete minimizes the need for annual repairs or maintenance. When repairs are necessary, they are typically smaller in scope than HMA pavements.

Other PCC Advantages
Safety

- **Visibility** - Concrete reflects light, which increases visibility and can save on street lighting costs.
- **Reduced wet spray** – Since concrete never ruts. There's NO risk of water accumulating in ruts and causing hydroplaning.
- **Traction** - Concrete pavements are easily "roughed up“ with tining or diamond grinding during and after construction to create a surface that provides superior traction.

Other PCC Advantages **Smoothness**

- **Concrete stays smooth** - The rigidity of concrete pavements allows it to keep its smooth riding surface long after construction. Smoothness is an important issue for users. Smooth pavements are safer, more comfortable transportation surfaces.

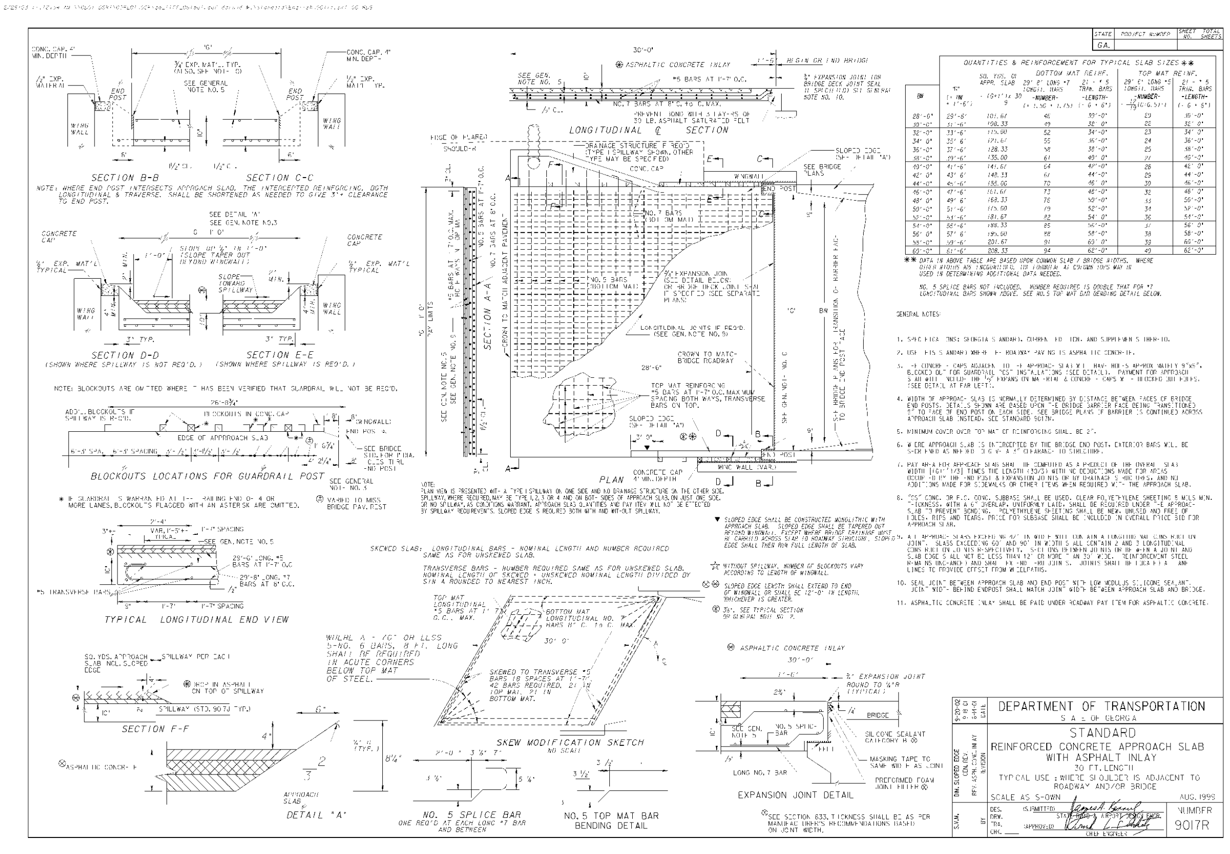
- **Smooth roads save fuel** - Concrete's hard surface makes it easier for rolling wheels. Studies have even shown that this can increase truck fuel efficiency.

Other PCC Advantages
Versatility

- **Variable life expectancy** - Concrete pavements can be designed to last from 10 to 50 years, depending upon the system needs.
- **Ideal for distressed pavements** - Whitetopping, a process of placing a thin layer of reinforced concrete over prepared asphalt, is a cost-effective, expedient method of rehabbing old pavements. Concrete overlays over old PCC pavements are also possible and are being thoroughly used in GA.
- **Rapid paving** - Concrete pavement can be built and open to traffic in as little as 12 hours. This is ideal for a mill and inlay in a high traffic area.

Lessons learned

- Don’t taper PCC ramp pavements. Pour them lane-width wide and make the taper with tape.
- Use HMA to PCC transition sections like the GA’s 9017 R.
- Making the area between the PCC ramp terminals and the PCC bridge approach slab monolithic PCC is often a good practice.


DEPARTMENT OF TRANSPORTATION
STANDARD
REINFORCED CONCRETE APPROACH SLAB
WITH ASPHALT INLAY
9017R

GA Std 9017 R

Conclusion

- From our perspective PCC durability is its main advantage for interchange ramp pavements. The durability of concrete minimizes the need for annual repairs or maintenance. When repairs are necessary, they are typically smaller in scope than HMA pavements.

- The three to four fold increase in lifespan makes the life cycle cost of concrete ramp pavements an excellent long-term value.