

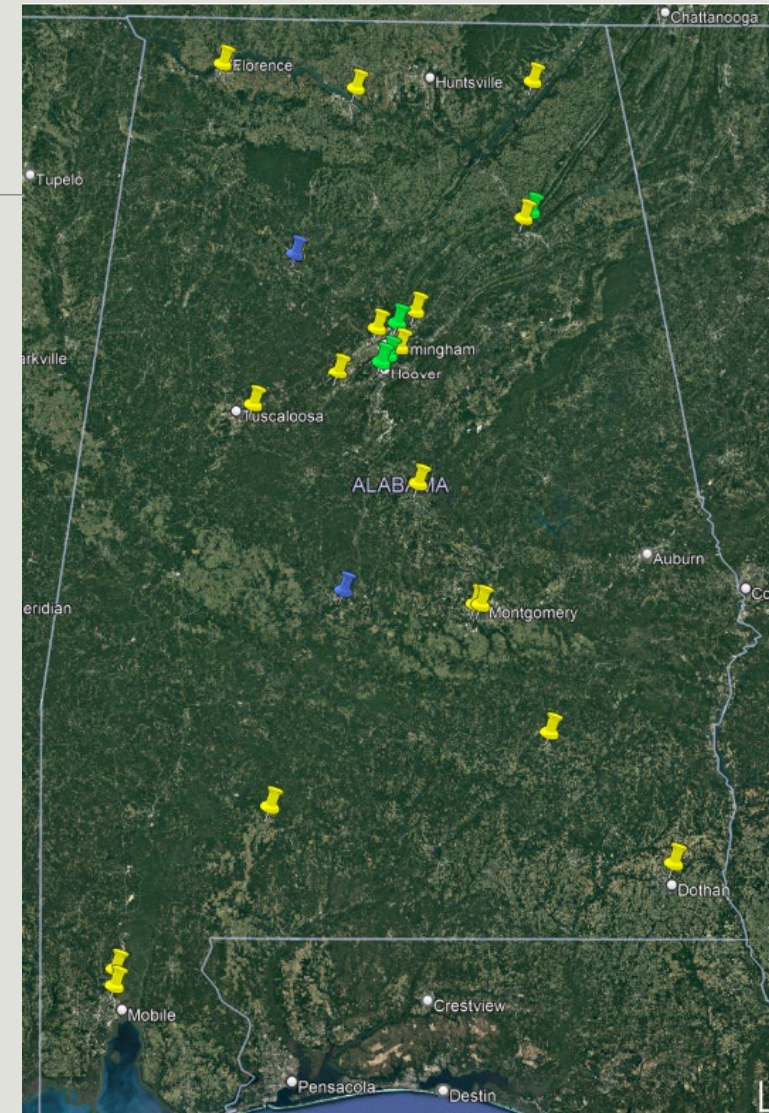
Lessons Learned on Concrete Intersection Construction

Mr. Will Gray

Managing Partner | A.G. Peltz Group LLC | Birmingham, AL

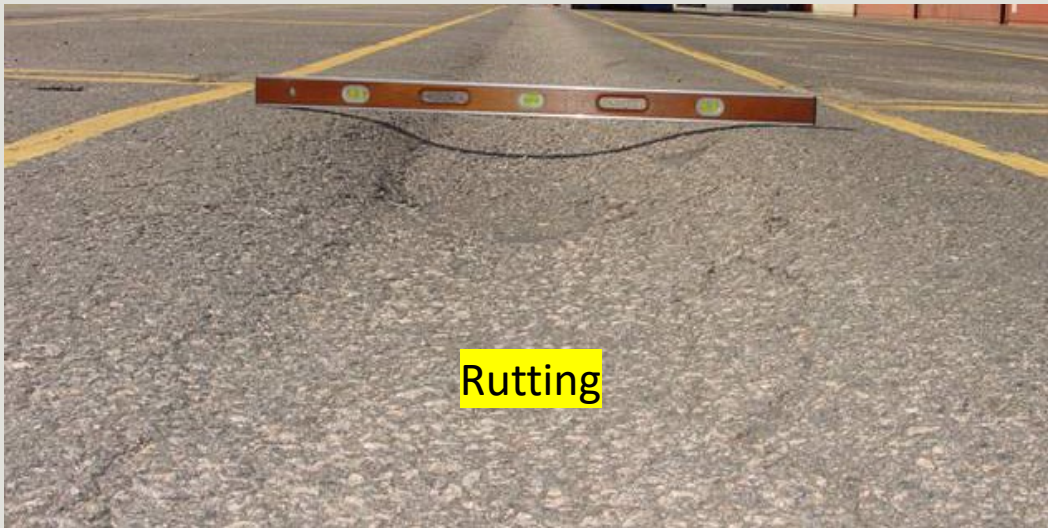
Overview and Background

- In 1978, Approximately 42% of Alabama's Interstate roadways were constructed with concrete. Most of the concrete roadways in service today have been in service for 40+ years.
- Since that time there have been very few new concrete roadway projects.
- In 1992, four intersections were selected to be reconstructed utilizing concrete.
 - The intersections were durable but had rough ride qualities
- In 2005, another seven intersections were selected to be reconstructed with concrete.
 - Five of the seven have performed well with good ride qualities. Two were ultra thin whitetopping projects and were removed and replaced.



Why Concrete Intersections

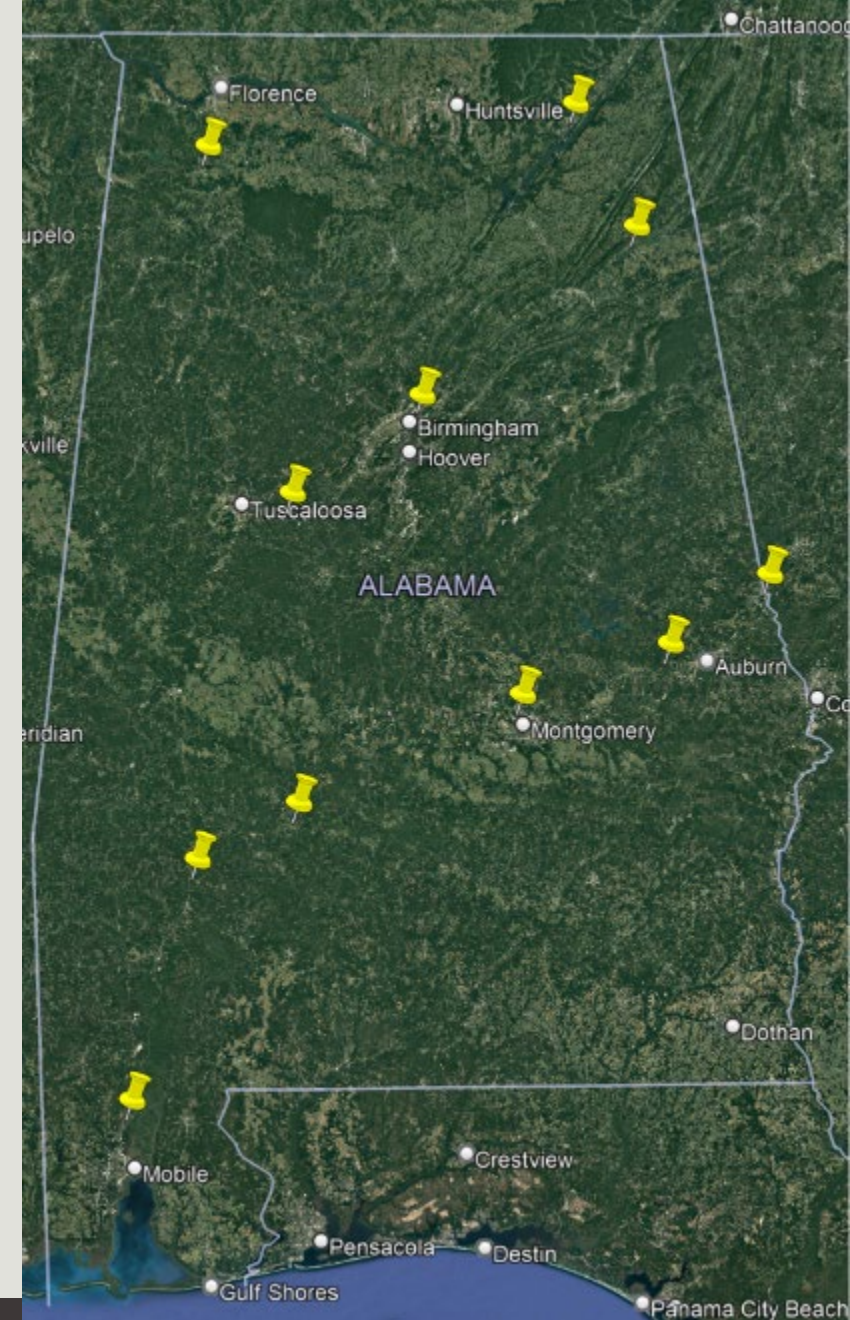
Flexible pavement systems often experience distress under heavy loading when there are repetitive turning and stop/start actions. This often causes rutting and shoving at these locations.



Concrete pavement in these locations will eliminate these problems as rigid pavements are generally not susceptible to these actions.

Current Intersection Program

- In 2022, the current program began with eleven projects let to date. Eight of which are now complete and in service.
- Jackson County – 2563 SY of 9” Pavement – Complete and in service.
- Montgomery County – 9500 SY of 12” Pavement – Complete and in service.
- Clarke County – 1870 SY of 12” Pavement – Complete and in service.
- Colbert County – 4168 SY of 10”, 11”, & 12” Pavement – Complete and in service.
- Mobile County – 1452 SY of 10” Pavement – Complete and in service.
- Wilcox County – 5230 SY of 9” Pavement – Complete and in service.
- Lee County – 5050 SY of 12” Pavement – Complete and in service.
- Cherokee County – 8348 SY of 12” Pavement – Complete and in service.
- Tuscaloosa County – 19600 SY of 10” Pavement – Under Construction.
- Jefferson County – 1203 SY of 10” Pavement – Under Contract.
- Chambers County – 17389 SY of 9” Pavement – Under Contract.



Current Intersection Program



Tuscaloosa County

Lee County

- 850 foot reconstruction of SR14 at the Vulcan Materials quarry entrance.
- 5050 SY of 12" pavement.
- Project constructed in three phases to maintain traffic flow.
- Project utilized Temporary Signals to maintain one lane traffic flow during construction.



Wilcox County

- 800 foot reconstruction of SR10 at the SR28 intersection
- 5230 SY of 9" pavement.
- Roadway was closed utilizing detours to facilitate construction.
- Mainline of SR10 was reopened to traffic as soon as complete while remainder of intersection remained closed until completed.



Tuscaloosa County

- 2900 foot reconstruction of US11 at two locations.
- 19600 SY of 10” pavement.
- Constructed in five phases to maintain traffic flow and business access.
- Project is utilizing Temporary Traffic signals and DADS to maintain one lane traffic flow as well as business and driveway flow.

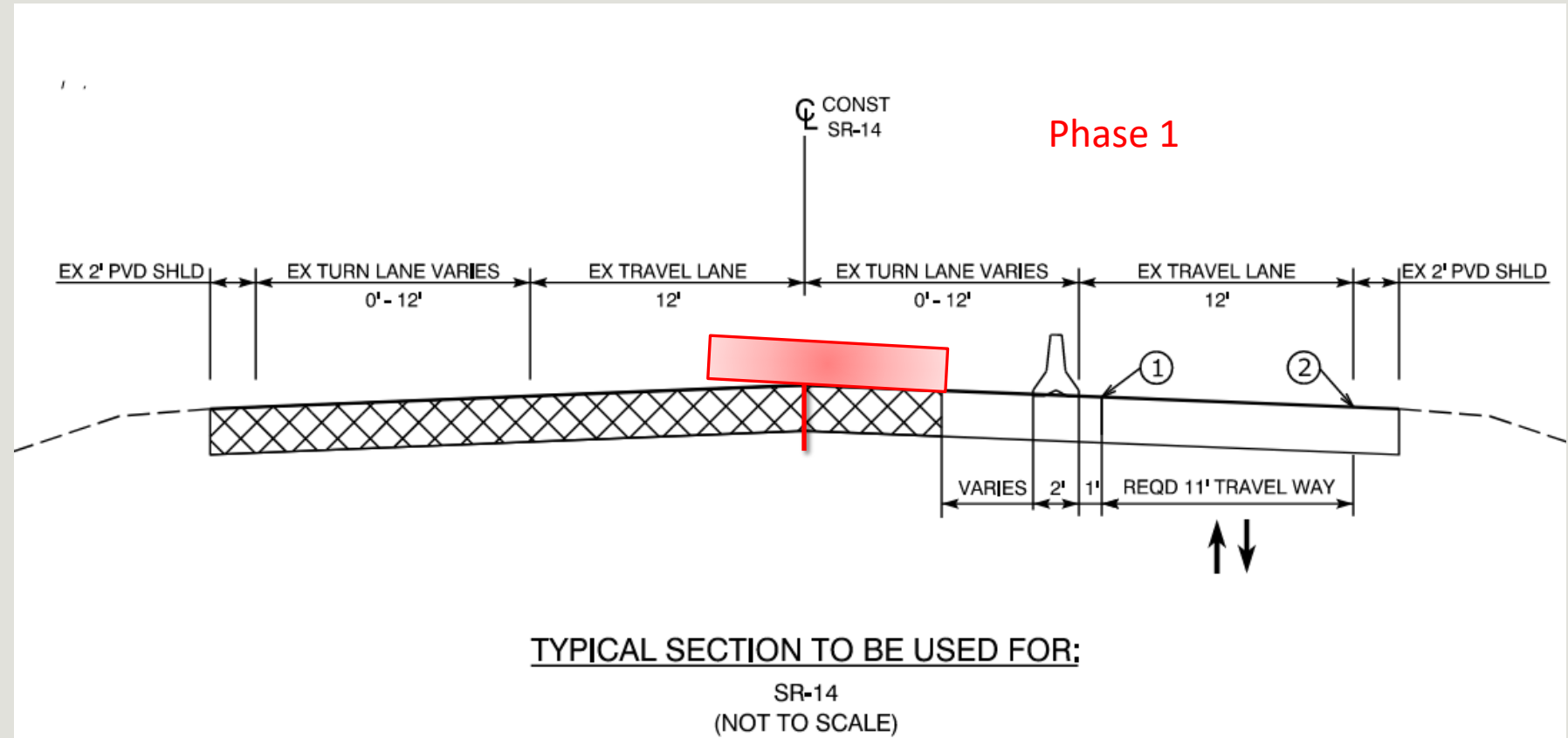


Lessons Learned – Plan Review

- Joint layout matches proposed traffic control?
- Roadway crown locations?
- Shoulder slopes that match the adjacent roadway?
- Joint layout matches future traffic lanes?
- Lanes that vary in width?



Joint Layout, Traffic Control, and Roadway Crown Locations



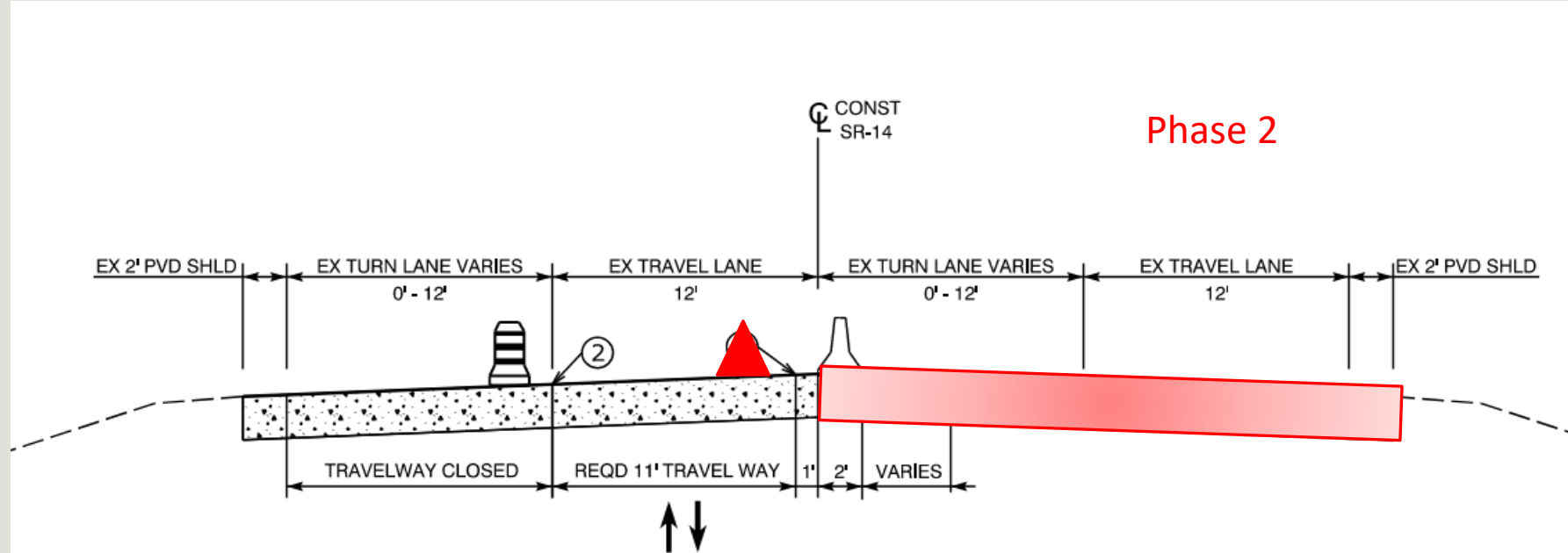
te 200

PLAN SUBMITTAL



ALABAMA DEPARTMENT
OF TRANSPORTATION

Joint Layout and Roadway Crown Locations



TYPICAL SECTION TO BE USED FOR:

SR-14
(NOT TO SCALE)

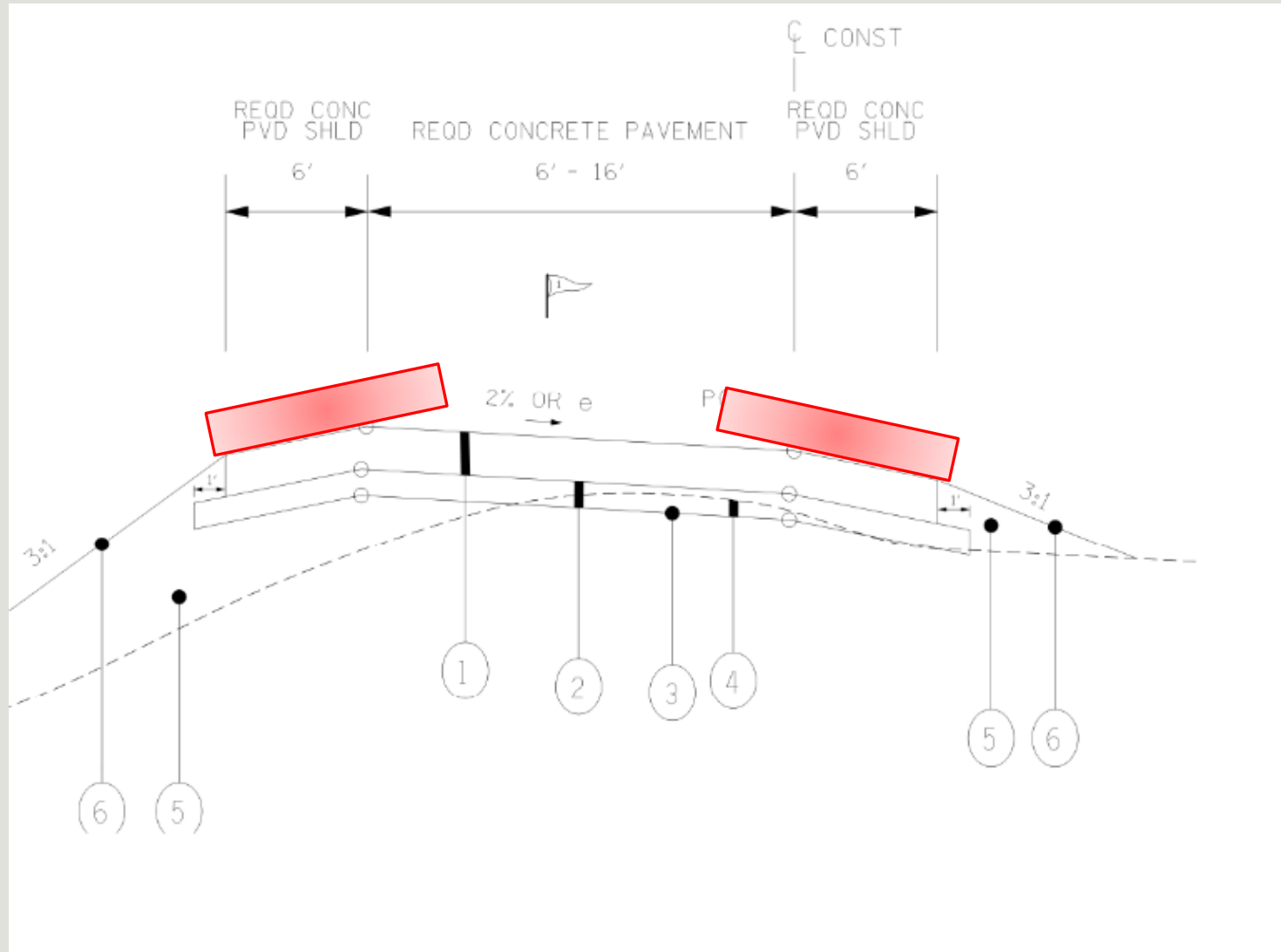
PLAN SUBMITTAL



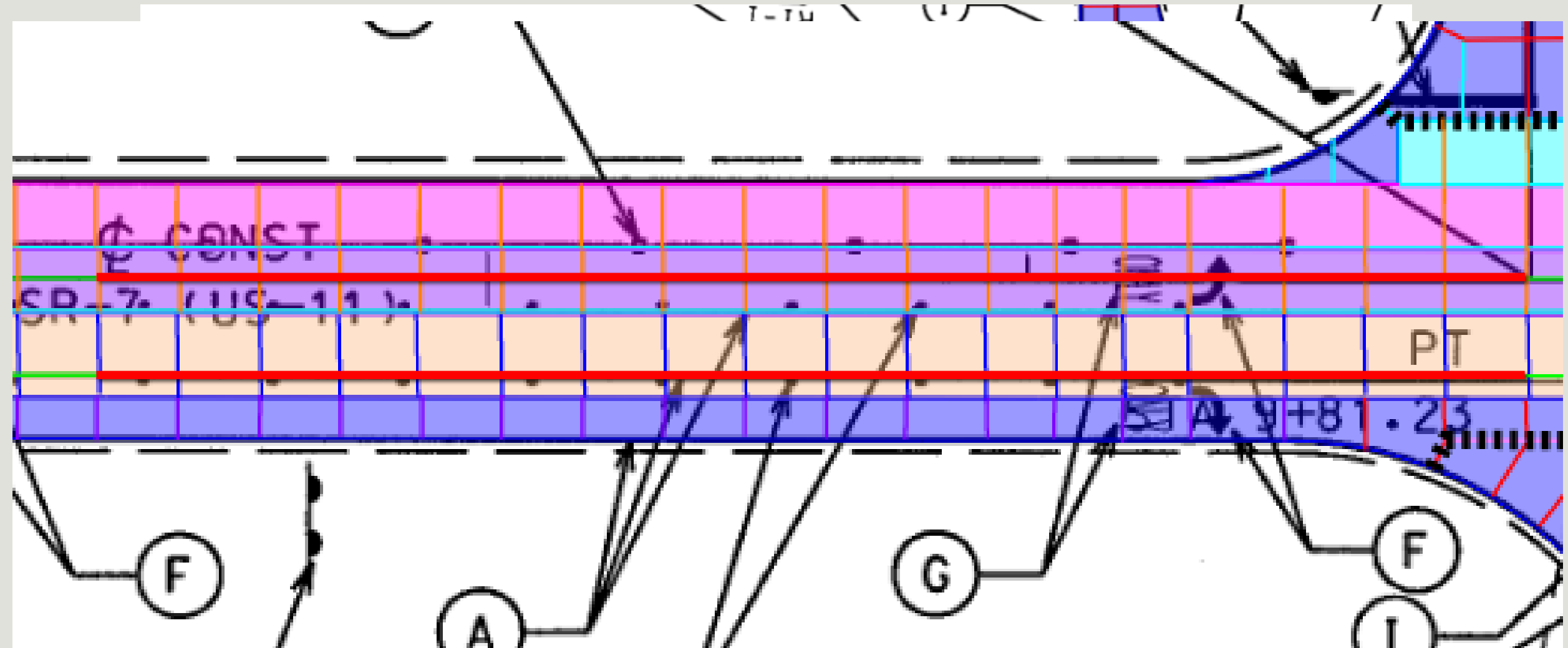
**ALABAMA DEPARTMENT
OF TRANSPORTATION**

HO

Shoulder Slopes Match Adjacent Roadway

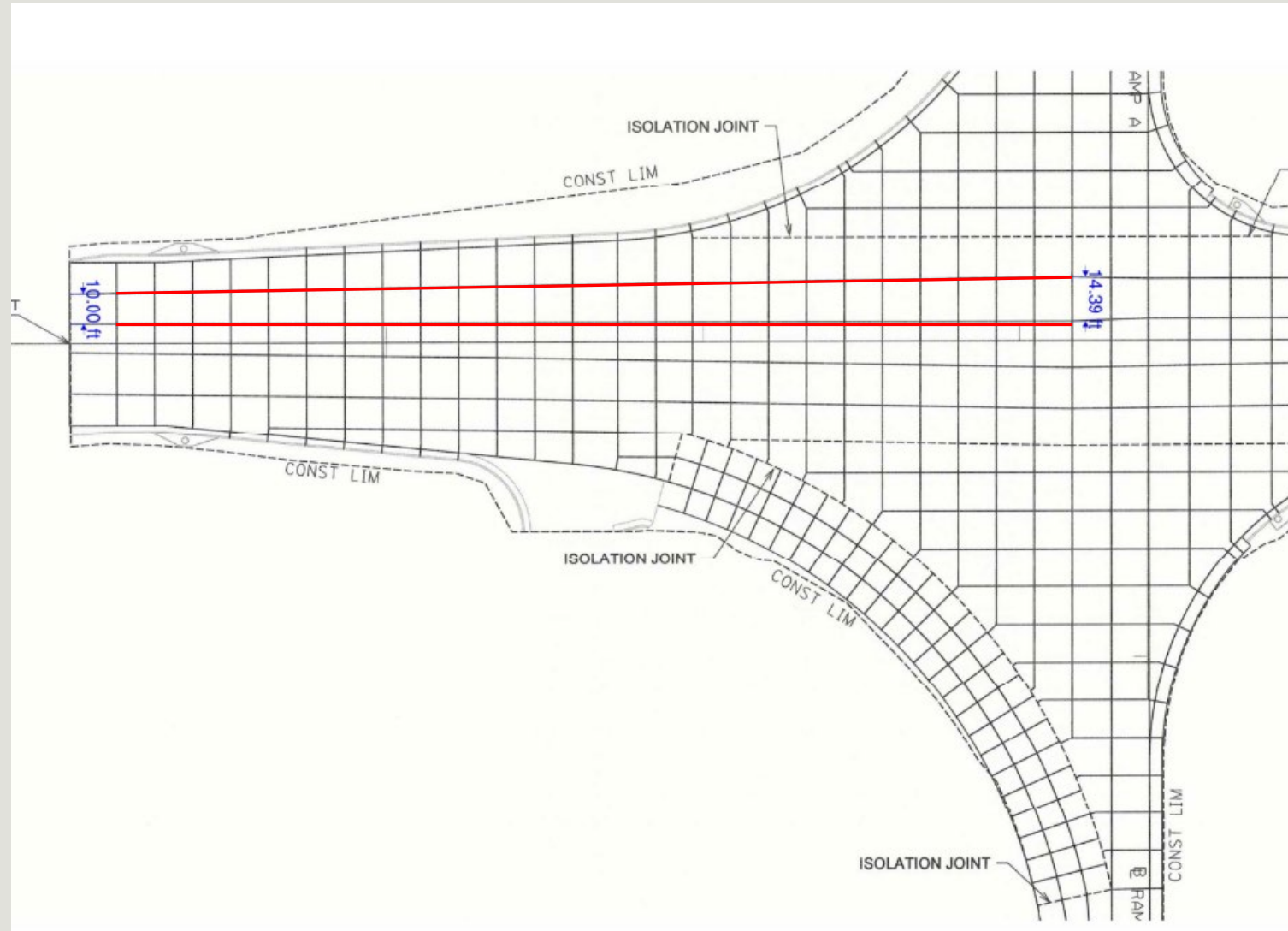


Joint Layout Matches Future Traffic Lanes



Lanes That Vary in Width

Since Slipform Pavers utilize rigid screed widths, variable width lanes become handwork which reduces quality and raises cost.



Lessons Learned – Specification Review



- Concrete Strength Requirements.
- Required Placement Equipment.
- Pavement Smoothness Requirements

ALABAMA DEPARTMENT OF TRANSPORTATION

Project Specific Special Provision

DATE: August 23, 2022

PSSP No. 22-PS0147

SUBJECT: Concrete Pavement for Intersections,
Project No. RACR-063-007-010, Tuscaloosa County.

Alabama Standard Specifications, 2022 Edition, SECTION 450 shall be revised as follows:

SECTION 450

PORTLAND CEMENT CONCRETE PAVEMENT

450.01 Description.

Article 450.01 shall be replaced by the following:

Concrete Strength Requirements

The only acceptance criteria for strength in the special provision is 3000 psi at 48 hours. Therefore any pavement concrete must meet this requirement.

While some sections must be opened early to traffic, the bulk of the paved areas on these projects have been closed in excess of 48 hours.

Allowing acceptance at 7 days for areas that do not need to be opened early would reduce the material cost of the concrete significantly.



Required Placement Equipment

- Special Provision has requirements for placement equipment.
- Slipform Paver should be utilized on all placements that are feasible. Highest Quality.
- Self Propelled Triple Drum Roller Screed with Internal Vibration for larger inaccessible placements.
- Single Tube Roller Screed for small and irregular shaped placements.

Pavement Quality



Pavement Smoothness Requirements

- Special Provision has modified smoothness requirements.
- Smoothness Requirements should be enforced on through lanes that are of sufficient length for testing.
- When proper equipment is utilized and care is taken during construction, smoothness requirements can be met without additional remedial work (grinding).

PSSP No.: 22-PS0147
Page 5 of 5

TABLE I	
Mean Roughness Index Inches/Mile/Section {meters/Kilometer/Section}	Contract Price Adjustment Percent of Pavement Unit Bid Price
Under 45 {Under 0.7}	105
45 to less than 90 {0.7 to less than 1.4}	$105 - (MRI - 45) / 9$ { $105 - (MRI - 0.7) / 0.14$ }
90 to less than 120 {1.4 to less than 2.0}	100
120 thru 170 {2.0 thru 2.8}	$100 - (MRI - 120) / 2.5$ { $100 - (MRI - 2.0) / 0.04$ }
Over 170 {Over 2.8}	Unacceptable

Where diamond grinding is performed to bring the Mean Roughness Index to 120 inches per mile or less, payment for the test section will be a maximum of 100 % of the contract price.

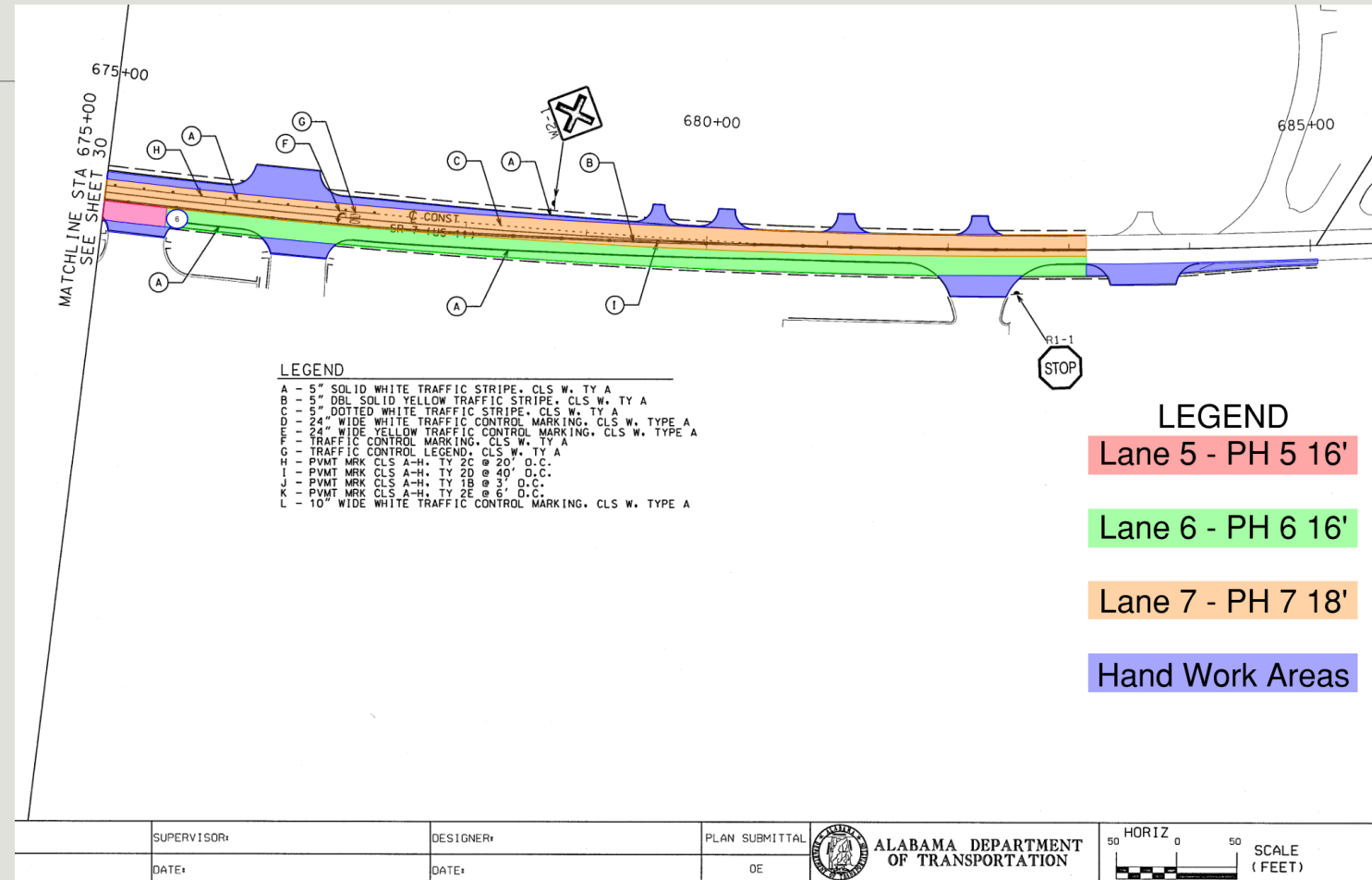
Lessons Learned – Construction



- Development of a Paving Plan that maximizes the use of Slipform Paver.
- Proper Clearance for Placement Equipment.
- Stringless Grade Control.
- Evaluation of Design Grades for Smoothness.
- Selecting Suppliers and Delivery Routes that can meet Production Goals.
- Striping Materials.

Paving Plan Development

- Developing a very specific paving plan that maximizes utilization of the slipform paver therefore improving the overall quality of the pavement.
- This may require some modification of jointing plans if it places joints in wheelpaths, etc.



Proper Clearance for Placement Equipment

- Pavement Plan and Existing Pavement Removal must take into consideration clearance for Placement Equipment.
- Track Lines need to be stable to produce smooth pavements.



Stringless Machine Control

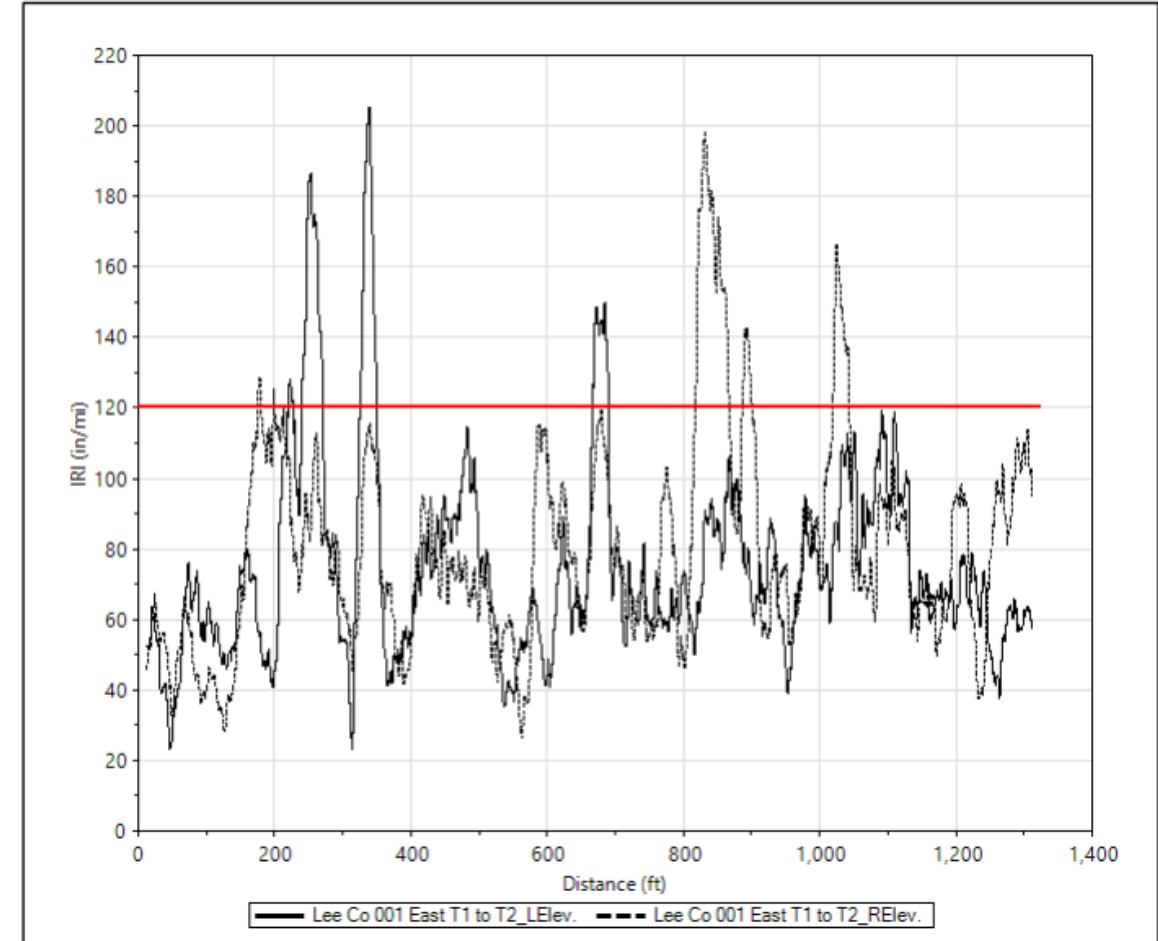
- Intersection Construction allows very little space for reference lines, especially if traffic must be maintained.
- Machine Control Systems offer higher level of accuracy than reference line systems.



Evaluation of Design Grades for Smoothness

- Design Grades provided for Construction should be checked to estimate the level of smoothness that can be achieved.
- It is impossible to build a smooth road if the input information will not allow it.

Results



Achieving Production Goals

- Select Concrete Suppliers that can meet required hourly production rates.
- Plan Placements so they do not restrict future material deliveries.
- Plan for Ingress and Egress of material delivery trucks.
- Consistent stop/starts of paving machine decrease pavement quality and increase pavement roughness.



Striping Material

- Tapes have shown poor resilience to heavy traffic and turning motions when placed on concrete pavement.
- Consider requiring High Performance Thermoplastic (Thermoaccel) striping materials in these areas.



Future –Where do we go from here?



- Larger Projects – especially on heavily loaded roadways. Very small projects are difficult to construct while achieving good results.
- Alternate Mixing and Delivery Equipment
 - Volumetric Mixing Plants



Questions?

