DEPARTMENT OF TRANSPORTATION

STATE OF GEORGIA

INTERDEPARTMENTAL CORRESPONDENCE

FILE PI No. 0012722 Chatham
SR 21 from SR 30 to I-95 DDI

OFFICE Materials and Testing
DATE 11/14/2014

D. E. T. for

FROM Charles A. (Chuck) Hasty, P. E., State Materials Engineer

TO Darryl Van Mater, P.E., State Innovative Program Delivery Engineer
Attention: Andrew Hoenig, P.E., Project Manager

SUBJECT Pavement Evaluation Summary
DDI along SR 21 from SR 30 Including I-95 Interchange

As requested, this Office has prepared a pavement evaluation summary for this project. The results of this work are attached.

If additional information is needed, please contact A J Jubran of the Pavement Design Branch at 404-608-4771.

CAH: AJJ

Attachments
Pavement Evaluation Summary
Project Location Map

Copy: Karon Ivery, District Engineer, Jesup
Attention: Joseph Capello, Area Engineer, Savannah
Sheila Hines, State Bituminous Construction Engineer, Forest Park

PAVEMENT EVALUATION SUMMARY

For

Chatham County
PI No. 0012722

1. *LOCATION / DESCRIPTION*

The proposed quick operational improvement project would consist of reconfiguring the existing I-95/SR 21 interchange to a diverging diamond interchange. The project would modify lane configurations and storage lengths on all SR 21 and ramp approaches, and upgrade the signalized intersections to accommodate the interchange reconfiguration. The project would also add a left lane dropping at the intersection of SR 21 to SR 30

2. *PAVEMENT CONDITION SUMMARY*

The existing pavement along SR 21, within the limits of this project, is in fair to poor condition based on the findings of our field investigation. The predominant distress is Level 2 Load cracking in Lanes 2.

3. *PAVEMENT RECOMMENDATION SUMMARY*

The recommended pavement sections for this project are summarized in the following table:

Location	Construction Limits	Construction Recommendation	Description
SR 21	Proj Limits	Overlay With Overlay Structure 1	Overlay Existing Northbound Lanes
SR 21	Project Limits	Overlay With Overlay Structure 2	Mill and Inlay Existing Southbound Lanes

4. *OVERLAY SECTIONS*

We understand that this interchange will be re-configured in a future project that is planned within the next ten years. An overlay section consisting of an SMA layer and a 19 mm SP Polymer Modified Layer, has been in service along I-95 for more than ten years. Using this information, and given that the overlay is needed for a similar period of time, we recommend the following sections:

We recommend that the NB lanes existing pavement on SR 21, within the project limits, be milled and inlayed 5.0 inches. After milling and immediately prior to inlaying, we recommend that any remaining visible surface cracks are sealed with Type M crack sealant, as per Section 407 of the Standard Specifications. The following overlay structure is recommended for northbound lanes:

Northbound Lanes Overlay Structure 1

Pay Item Number	Material	Course	Thickness	Spread Rate
400-3604	12.5 mm SMA	Surface	2 inches	220 lbs /yd^2
402-3190	19 mm Superpave Poly-Mod	Binder	2 inches	220 lbs /yd^2
415-5000	Open Graded Crack Relief	Interlayer	1 inch	105 lbs /yd^2

We recommend also that the SB lanes existing pavement on SR 21, within the project limits, be milled and inlayed 6.0 inches. After milling and immediately prior to inlaying, we recommend that any remaining visible surface cracks are sealed with Type M crack sealant, as per Section 407 of the Standard Specifications. The following overlay structure is recommended for the southbound lanes:

Southbound Lanes* Overlay Structure 2

Pay Item Number	Material	Course	Thickness	Spread Rate
400-3604	12.5 mm SMA	Surface	2 inches	220 lbs /yd^2
402-3190	19 mm SP Poly-Mod	Binder	3 inches	330 lbs /yd^2
415-5000	Open Graded Crack Relief	Interlayer	1 inch	105 lbs /yd^2

*In addition to the proposed overlay section for southbound lanes, additional reconstruction and restoration work may be needed in portions that have a less competent structure or as determined by the engineer.

5. *PAVEMENT DISTRESSES*

Level 1 and Level 2 Load cracking was observed in both directions in both lanes, with the majority of Level 2 Load cracking is in lanes 2. All cored locations exhibited load related top down cracking.

In the north bound lanes top down cracking was partial depth. Pavement structure was also more consistent, suggesting that those lanes were added by project PI 0001667.

South Bound lanes are more severely distressed than northbound lanes due to difference in base and pavement thickness. In the south bound lanes cracking was full depth. The south bound lanes also exhibited a transverse reflective cracking with approximately 20 ft. spacing. A soil cement base underlies the SB Lanes.

The following, is a summary of distresses that were encountered during the field investigation of this project:

Rutting	Due to heavy traffic volume on SR 21, rutting measurements were not obtained but were estimated to be approximately ½ inch.
Load Cracking	On SR 21, Level 1 and Level 2 was observed in both directions and both lanes. The majority of Level 2 Load cracking was in lanes 2. All cored locations exhibited load related top down cracking. In four locations, load cracking extended full depth. One location exhibited alligator cracking.
Block/ Transverse Cracking	On SR 21 Level 1 block/ transverse cracking was observed in some locations.
Reflection Cracking	On SR 21, Level 2 reflection cracking was confined to the Southbound lanes. Crack spacing was approximately 20 ft. With an underlying soil cement base, the "reflection" pattern is a reflection of shrinkage cracks in the cementitious base.
Raveling	On SR 21, raveling was observed in one location within the project limits. The same location had Level 4 Load (Alligator) cracking.

6. *CORES*

Cores were recovered from 8 locations in the travel lanes of this project to determine the thicknesses and condition of the existing pavement section / sections. The results of this work are presented in the table below:

Core Number	Exit Description/ Roadway	Milepost	Asphalt Core Length, in	Core Condition	Underlying Material
1	NBLN 2	14.230	15.00	2" cracking top/down	GAB
2	NBLN 2	14.920	13.00	6" cracking top/down	GAB
3	SBLN 1	15.041	11.00	9" cracking top/down	Soil Cement
4	SB RT Turn	14.894	11.00	11" cracking top to bottom	Soil Cement
5	SBLN 1	14.899	9.50	9.50" cracking top to bottom	GAB
6	SBLN 1	14.560	9+/-	9" cracking top to bottom	Soil Cement
7	SBLN 1	14.526	5.50	5.50" cracking top to bottom	GAB
8	SBLN 2	14.253	3.00	3" cracking top down	?

7. *OTHER INFORMATION*

- The use of asphalt mixes recommended in this report meet the "Guidelines for Superpave and Other Mix Type Selection" revised on March 18, 2011.
- We recommend that an extra 10% of the original milling quantities be set up for variable depth milling (pay item 432-5010). This material should be used as directed by the Engineer in areas where extra depth milling and patching may be required because of the in-situ condition of the underlying mix.
- After milling the / on asphalt pavements, we recommend the use of high-strength pavement reinforcement fabric over cracks with a width greater than 0-3/16 inch, as per Section 446 of the Standard Specifications, where the asphalt overlay to be placed is greater than 2 inches in thickness on interstate projects.
- Design Considerations for SR 21
  - 10 year design
  - Performance of similar overlay along I-95
  - Mill 5 inches of the existing North Bound Lanes pavement
  - Mill 6 inches of the existing South Bound Lanes pavement
- We recommend milling the asphaltic concrete pavement, as per Section 432 of the Standard Specifications.
- For ramps (if only ramp work and no mainline work), we recommend the use of Portland Cement Concrete, as per Section 439 of the Standard Specifications.
- A soil survey has not been completed for this project.

Reported By: **A. J. Jubran, P. E.**
State Pavement Engineer

Reviewed By: **Eugene Utsalo, P.E.**
Pavement Design Engineer

PROJECT LOCATION MAP