DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE: MSL-0003-00(161) & MSL-0003-00(246) **OFFICE:** Engineering Services
Coweta/Meriwether/Troup
P. I. Nos.: 0003161 & 0003246
I-85 Widening from north of Forest Road to north of S.R. 34

DATE: August 10, 2005

FROM: Brian Summers, P.E., Project Review Engineer BRW

TO: Brent Story, P.E., State Road and Airport Design Engineer

SUBJECT: **IMPLEMENTATION OF VALUE ENGINEERING STUDY ALTERNATIVES**

Recommendations for implementation of Value Engineering Study Alternatives are indicated in the table below. Incorporate alternatives recommended for implementation to the extent reasonable in the design of the project.

ALT No.	Description	Savings PW & LCC	Implement	Comments
1	Widen the entire length of highway to the inside	-$1,924,099 (cost increase)	No	Excess pavement will not be utilized for a long time. Also, additional cost for drainage was not included.
3	Lower the roadway at the eleven bridge sites	$296,507	No	Due to possible conflicts with the existing bridge substructure and additional staging concerns.
4	Use a 4.75 mm flexible mix for the interlayer beneath the Continuous Reinforced Concrete Pavement Course	$5,921,698	No	The current recommendation by OMR is to use 3" - 19 mm Superpave Asphaltic Concrete as the interlayer.
5	Use a 9.5 mm flexible mix for the interlayer beneath the Continuous Reinforced Concrete Pavement Course	$11,580,862	No	The current recommendation by OMR is to use 3" - 19 mm Superpave Asphaltic Concrete as the interlayer.
6	Meet the 16.5 minimum vertical clearance	$1,128,281	No	Does not meet GDOT Policy to have 17' vertical clearance when jacking a bridge.
7A	Shift improvements to the inside and use Concrete Median Barriers and a piped drainage system in the 88' median	$5,060,400	No	Cost savings does not appear to reflect the additional costs that would be associated with modifying the bridge caps and replacement of deck sections.

ALT No.	Description	Savings PW & LCC	Implement	Comments
7B	Shift improvements to the inside and use Cable Guardrail and a piped drainage system in the 88' median	$10,024,031	No	Cost savings does not appear to reflect the additional costs that would be associated with modifying the bridge caps and replacement of deck sections. The Cable Median Barrier should still be considered.
7C	Shift improvements to the inside and use Cable Guardrail and a ditch drainage system in the 88' median	$11,999,284	No	Cost savings does not appear to reflect the additional costs that would be associated with modifying the bridge caps and replacement of deck sections. The Cable Median Barrier should still be considered.
8	Meet 16' minimum clearance	$1,949,702	No	Does not meet GDOT Policy to have 17' vertical clearance when jacking a bridge.
11	Eliminate the new Game/Right of Way Fence	$4,036,706	No	Does not meet current GDOT Guidelines pertaining to replacement of existing fences.
12	Do no work on Big Poplar Road Bridge	$281,385	No	Does not meet GDOT minimum vertical clearance.
13	Build Big Poplar Road Bridge to future interchange standards as part of these projects	Design Suggestion	Yes	Should be considered and coordinated with future project and reflected in the IJR, Concept Report, etc.
14	Make the Big Poplar Road Interchange a part of these projects	Design Suggestion	No	Could cause delays in the development of this project.
15	Use Pre-Welded Reinforcing Mats in lieu of hand-tie mats for Pavement Reinforcement	Design Suggestion	Yes	OMR does not have a problem with using Pre-Welded Reinforcing Mats.
20,22 & 23	Use a thinner pavement section while maintaining operational requirements	$5,637,642	No	Is not equal or better than what was proposed in the original design.
21	Increase Continuous Reinforced Concrete thickness and increase Reinforcing Bar spacing	Design Suggestion	No	Is not equal or better than what was proposed in the original design.
24	Use pavement "turndown" to reduce width of full depth shoulders	$409,475	No	Would trap moisture under the Continuous Reinforced Concrete Slabs.

A meeting was held on June 2, 2005 to discuss the above recommendations. David Painter of FHWA, Jason McCook, Andy Casey and Stanley Hill of Road Design, and Brian Summers and Ron Wishon of the Office of Engineering Services were in attendance. Additional information and justification was provided by e-mail on August 5 & 8, 2005.

The above reflects the consensus of those in attendance and those that provided comments.

Approved: _____ **Date:** 8/12/05
David E. Studstill, Jr., P. E., Chief Engineer

Approved: _____ **Date:** 3/28/06
FA: **Robert Callan, P. E., FHWA Division Administrator**

REW

Attachments

c: Gus Shanine/David Painter, FHWA
Andy Casey
Jason McCook
Stanley Hill
Marc Mastronardi
Lamar Pruitt
Debra Benton
Derrick Cameron
Paul Liles
Vince Wilson
Lisa Myers

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE MSL-0003-00(161) & (246)
Coweta, Meriwether & Troup Counties
PI # 0003161 & 0003246

OFFICE Road Design

DATE May 18, 2005

FROM Brent A. Story, P.E., State Road & Airport Design Engineer

TO Brian Summers, P.E., Project Review Engineer

SUBJECT **VE Study Response**

This is the response to the VE study conducted on February 17-18, 2005, for the above referenced projects. The VE study recommendations are listed in the table below.

ALT. NO.	DESCRIPTION	RESPONSES/ACTION TAKEN
1	Widen to the inside	No Action Taken.
3	Locally lower road to eliminate bridge jack	No Action Taken. May expose the footing of the bridge pier/bent.
4	Use 4.75 mm flexible mix for interlayer	No Action Taken. See Attachment for explanation.
5	Use 9.5 mm stone matrix asphalt mix for interlayer	No Action Taken. See Attachment for explanation.
6	Meet the 16.5 foot minimum vertical clearance	No Action Taken. GDOT's policy is to meet 17' vertical clearance when jacking a bridge.
7A	Shift improvements to the inside and use concrete median barrier and closed drainage system with 88 foot median	No Action Taken. See Attachment for explanation.
7B	Move construction on the 88 foot median to inside and use piped drainage and cable guardrail	No Action Taken. See Attachment for explanation.
7C	Move Construction on the 88 foot median to inside and use ditch drainage and cable guardrail	No Action Taken. See Attachment for explanation.
8	Meet the 16 foot minimum vertical clearance	No Action Taken. GDOT's policy is to meet 17' vertical clearance when jacking a bridge.
11	Eliminate the new game/right-of-way fence	No Action Taken. GDOT has a policy to replace all existing L/A fence with the new taller game fence.
12	Do no work on the Big Poplar Road bridge	No Action Taken. Please see #13 for explanation.
13	Build Big Poplar Road Bridge to future interchange standards as part of these projects	No Action Taken. Need an approve IJR prior to design. Outside the scope of work.
14	Make Big Poplar Road interchange a part of current projects	No Action Taken. Need an approve IJR prior to design. Outside the scope of work.

15	Use pre-welded reinforcing mats in lieu of hand-tie mats for pavement reinforcing	Will implement. See Attachment for explanation.
20,22,23	Use a thinner pavement section while maintaining operational requirements	No Action Taken. See Attachment for explanation.
21	Increase continuous reinforced concrete thickness and increase reinforcing bar spacing	No Action Taken. See Attachment for explanation.
24	Use pavement "turndown" to reduce pavement width	No Action Taken. See Attachment for explanation.

BAS:JLM:CAC:ss

Attachment

cc: David Painter – FHWA
Buddy Gratton, Director of Preconstruction
David Graham, State Construction Engineer
Attn: Marc Mastronardi, Construction Liaison Engineer
Thomas Howell, District Engineer- District Three
Attn: Lamar Pruitt, District Construction Engineer
Thomas Howell, District Engineer-District Three
Attn:Debra Benton, District Environmentalist
Georgene Geary, State Materials & Research Engineer
Attn: A.J. Jubran, Pavement Design Engineer
Keith Golden, State Traffic Safety & Design Engineer
Attn: Derrick Cameron, Traffic Design Supervisor
Paul Liles, State Bridge & Structural Design Engineer
Attn: Vince Wilson, Assistant Design Group Leader
David Mulling, Project Review Engineer
Attn: Lisa Myers, Design Review Engineer Manager
Stanley Hill, Design Group Manager

Alternative #4: Use 4.75 mm Superpave mix for the interlayer course beneath the CRCP instead of the 19 mm Superpave mix.

The comparison is being done for a 3 inch layer of 19 mm SP and for a 2 inch layer of 4.75 mm SP.

The difference in thickness favors the 4.75 mm SP from a quantities point of view.

The 4.75 mm SP mix has a larger surface area than the 19 mm SP. A larger surface area requires more asphalt content to achieve the same film coating called for in Mix Design Level A.

Also the 4.75 mm SP mix is not a commonly used mix by GDOT except for low volume roads.

Alternative #5: Use 9.50 mm SMA flexible mix for the interlayer course beneath the CRCP instead of the 19 mm Superpave mix.
The comments are for a 3 inch layer of 19 mm SP and for a 3 inch layer of 9.50 mm SMA.

The 9.5 mm SMA mix uses polymer modified asphalt. Polymer modified asphalts are more costly than neat asphalts.

The 9.5 mm gradation has a larger surface area than that of the 19 mm gradation. This increase in surface area will require more asphalt to achieve the same film coating for a given mix design level.

The 9.5 mm SMA mix has more targeted uses. The 19 mm SP mix is a standard asphalt mix, with several applications, which makes its price lower than the 9.5 mm SMA mix.

Alternative #4 and Alternative #5:

The standard interlayer material is 3 inches of 19 mm Superpave.

Alternative # 7A- Shift Improvements to Inside and Concrete Median Barrier:

In our opinion as it relates to the bridges please note:
To provide (a) S1 barrier with gap (1'-5 ½"), (b) a 22 foot travel width for two lanes, (c) a temporary barrier and edge clearance (3'-0") and (d) bar lap length of 2'-4", a total length of 28'-9 ½" is required. The available length from I85 mainline to NBL or SBL existing exterior beam is 26'-6". It appears the 1st interior deck section would still require replacement.
If you could accomplish the recommendation, the existing cantilever cap would require modifications as its shear capacity would be exceeded by the new loading conditions. It does not appear that the VE Study addresses this condition.
To enclose the 88 regions at the Bethlehem Church Road intersection and the SR 14 and CSX intersection would require two additional beams and 16'-9" of new deck per site. The net effect would be no bridge cost savings. It does not appear that the cost estimate in the VE study addresses this.
The bridge savings identified on sheet 8 of 9 Alternative No. 7A shows a total bridge length (all directions) Project 246 to be 7,065 LF. In our estimate this length is +/- 1046 ft.

Alternative # 7B- Shift Improvements to Inside and Cable Guardrail:
Same implications as Alternative 7A as it relate to the Bridge widening.
Further in our opinion, Cable Guardrail is not very widely used in Georgia. To our knowledge, there are no Standards, construction Details and Construction Specifications available for this work.
Also some temporary pavement work will require in order to provide 4 ft. separation between edge of travel and construction work area.

Alternative # 7C- Shift Improvements to Inside and Cable Guardrail and Median Ditch:
Same implications as Alternative 7A as it relate to the Bridge widening.
Further in our opinion, Cable Guardrail is not very widely used in Georgia. To our knowledge, there are no Standards, construction Details and Construction Specifications available for this work.
Also some temporary pavement work will require in order to provide 4 ft. separation between edge of travel and construction work area.

Alternative #15: Use pre-welded reinforcing mats in-lieu of hand tied mats

OMR has no problem with the use of pre-welded reinforcing mats.

Alternatives #20, 22, 23: Use a thinner pavement section while maintaining operational needs

The VE study proposes to reduce the 11 inch slab thickness by any of the following three methods:

Use of higher strength concrete & higher strength steel
Use of higher strength concrete with same steel
Use of same strength concrete with higher strength steel

OMR does not concur with any of those recommendations.

Normal strength concrete is preferred for constructability purposes. However, on typical Interstate construction, high strength concrete is used.

If a higher strength concrete is used, there is a higher potential for the slabs to develop curling and warping stresses, than with normal concrete.

Warping and curling stresses are residual stresses. With normal temperature fluctuations experienced in the field, there is an increased potential for distresses associated with warping and curling to cause pavement failure.

Higher strength steels are typically less ductile than lower strength steels near the yield point. It is not believed that this point will ever be reached during the service life of the pavement. So a higher strength, higher cost steel will not add any value.

Alternative #21: Increase CRCP thickness and increase re-bar spacing

This contradicts Items 20, 22, 23.

Alternative #24: Use pavement turndown to reduce the width of full depth shoulder

As shown on the sketches, the proposed pavement turndown is 1 foot wide and 2 feet deep. It is located at the edge of the CRC slab, and rests above a 3 inch 19 mm SP interlayer, which has been placed above the GAB layer.

Precipitation moisture seeps through cracks. The 19 mm SP layer normally allows for the drainage of this moisture to the edges. The GAB is an impermeable layer.

The turndown configuration creates a dam that traps moisture under the CRC slab. This configuration inhibits the free drainage of infiltration moisture and long term will impact the performance of the CRC pavement.

Summers, Brian

From: Myers, Lisa
Sent: Thursday, May 19, 2005 12:36 PM
To: Summers, Brian; Mulling, David
Subject: FW: SUSPECT: MSL-0003-00(161)&(246) Comments on GDOT responses

Here are some comments from David Painter about the Coweta, Meriwether, Troup (PI No. 0003161 & 0003246) VE Study. I printed out a copy and put them with the responses on the pile of VE Reports.

I will copy you with my response to David.

Lisa Myers
Design Review Engineer Manager/VE Coordinator

GA DOT - Engineering Services
2 Capitol Square Room 266
Atlanta, GA 30334

404-651-7468

-----Original Message-----
From: Painter, David [mailto:David.Painter@fhwa.dot.gov]
Sent: Thursday, May 19, 2005 11:57 AM
To: Myers, Lisa
Subject: SUSPECT: MSL-0003-00(161)&(246) Comments on GDOT responses

1. Alt 4 - What is GDOT's evaluation or conclusion about this alternative?
2. Alt 5 - The comparison was not between 3" of 19 MM SP and 3" of 9.5MM SMA. It was between 3" of 19 MM SP and 1" of 9.5MM SMA. What is GDOT's evaluation or conclusion about this alternative?
3. Alt 7A - The VE study did not include a bar lap length of 2'4". This is a valid criticism, but there could be ways to address this. Without the bar lap length everything fits.
Also how is the shear capacity of the existing cap exceeded by the new loading conditions? For the bridges located in an 88 foot wide median, I do not understand how the net effect could be no bridge cost savings if no existing deck removal is needed.
4. Alts 7B & C - There are two cable guardrail specifications for the four cable gdrail project which I believe are being let to construction next month. There is a fifth project on the Stone Mtn freeway with uses still another spec. I believe that this project is in the same letting. So a lack of specification info is insufficient grounds for not considering this VE alternative. There may indeed be some temporary pavement needed between the work area and the traveled way. This is a valid criticism. What is GDOT's evaluation or conclusion about these alternatives?
5. Alt 21 - This alternative does not contradict Alts 20, 22 and 23 since they are completely separate items. What is GDOT's evaluation or conclusion about this alternative?
6. Alt 24 - The comment that the turndown could trap moisture underneath the pavement is a valid criticism. I agree.

Thank you,

David Painter
MSE, PE
Tel: 404 562-3658

Wishon, Ron

From: Issa, Moussa
Sent: Friday, August 05, 2005 6:01 PM
To: Casey, Andy
Cc: Myers, Lisa; McCook, Jason; Jubran, Abdallah; Wishon, Ron
Subject: RE: VE Study Implementation - MSL-0003-00(161) & MSL-0003-00(246) Coweta/Meriwether/Troup {P.I. Nos. 0003161 & 0003246}

Andy,
My only concern is the level of friction between the CRC pavement and the type of Asphalt interlayer considered. The interlayer friction is very critical to the early thermal movement at the time of construction, especially for CRC pavements. This should be reduced to control CRC slab movement and therefore control crack spacing and enhance the pavement long-term performance. While crack spacing can be controlled to some extent by the reinforcing steel, the dominant factor is the friction. We have seen some slides from Virginia , presented by "Butch" and showing early cracks development. Again which interlayer to use??

If 3" 19mm Superpave (Superpave are know to be permeable mixes) is used, we have to make sure it is part of a properly designed internal drainage system for long-term pavement performance.

Thanks,
Moussa

From: Casey, Andy
Sent: Friday, August 05, 2005 2:19 PM
To: Wishon, Ron
Cc: Myers, Lisa; McCook, Jason; Jubran, Abdallah; Issa, Moussa
Subject: RE: VE Study Implementation - MSL-0003-00(161) & MSL-0003-00(246) Coweta/Meriwether/Troup {P.I. Nos. 0003161 & 0003246}

Ron,

Since the implementation meeting we had back in June, the lab has designed and approved numerous pavement structures with a 3" interlayer. I will make the assumption that the 3" 19 mm SP interlayer is the thickness and type of mix that we are going with.

If anyone has something different please speak now; if not I think we can put this issue to rest and complete the VE Study Implementation.

Thank you,

C. Andy Casey, P.E.
Design Group Manager
Georgia Department of Transportation
Phone: 404-657-9757
Fax: 404-657-0653

From: Wishon, Ron
Sent: Thursday, August 04, 2005 2:00 PM
To: McCook, Jason; Casey, Andy
Cc: Myers, Lisa
Subject: RE: VE Study Implementation - MSL-0003-00(161) & MSL-0003-00(246) Coweta/Meriwether/Troup {P.I. Nos. 0003161 & 0003246}

Have you heard anything on this yet?

Thanks,

Ron

From: McCook, Jason
Sent: Wednesday, July 06, 2005 8:14 AM
To: Rabun, JT; Jubran, Abdallah
Cc: Wishon, Ron; Hill, Stanley
Subject: FW: VE Study Implementation - MSL-0003-00(161) & MSL-0003-00(246) Coweta/Meriwether/Troup {P.I. Nos. 0003161 & 0003246}

Gentlemen,

A VE study was conducted on I-85 (P.I. Nos. 0003161 & 0003246) which resulted in two alternates (No. 4&5) which are related to the proposed pavement structure, this is to request that a response or comment be prepared so that the VE study implementation can be completed. If you need additional information in regards to these items please contact me or Stanley Hill.
Thanks,

Jason L. McCook
Asst. State Road & Airport Design Engineer
Georgia Department of Transportation
Phone: 404.657.8249
Fax: 404.657.0653

From: Wishon, Ron
Sent: Wednesday, July 06, 2005 7:52 AM
To: McCook, Jason; Casey, Andy; Hill, Stanley
Cc: Myers, Lisa
Subject: VE Study Implementation - MSL-0003-00(161) & MSL-0003-00(246) Coweta/Meriwether/Troup {P.I. Nos. 0003161 & 0003246}

When we last met on the above noted projects, you were waiting on some additional information from the Lab concerning Alt. Nos. 4 & 5. Have you received that information yet? We need to get this VE Study finalized as soon as possible. Thanks!

Ron Wishon
Assistant Project Review Engineer
Engineering Services
Room 264
404-651-7470
404-463-6131 (FAX)

Wishon, Ron

From: Jubran, Abdallah
Sent: Monday, August 08, 2005 4:07 PM
To: Casey, Andy; Wishon, Ron
Cc: Myers, Lisa; McCook, Jason; Issa, Moussa
Subject: RE: VE Study Implementation - MSL-0003-00(161) & MSL-0003-00(246) Coweta/Meriwether/Troup {P.I. Nos. 0003161 & 0003246}

Andy and Ron,

When we hosted the NHI Pavement Design Course about two years ago, Dr. Darter pointed out the importance of having an asphalt interlayer between a CRC pavement and the base it is constructed on, even if that base is an existing slab. The intent is to have the CRC and Base move relatively independent of each other, and minimize their friction.

In the past, a 5 inch layer of Econocrete or alternately a 5 inch layer of 25 mm SP were specified. Between both alternates, Econocrete eventually lost favor. We have been using the AC interlayer.

We now recommend a 3 inch layer of 19 mm SP instead of 5 inches of 25 mm SP. The 3 inch AC Interlayer thickness is supported by Dr. Darter, as well as by previous investigations on interlayer thickness.

A. J. Jubran, P.E.
Pavement Management Branch Chief
404-363-7582
404-363-7684 fax

From: Casey, Andy
Sent: Friday, August 05, 2005 2:19 PM
To: Wishon, Ron
Cc: Myers, Lisa; McCook, Jason; Jubran, Abdallah; Issa, Moussa
Subject: RE: VE Study Implementation - MSL-0003-00(161) & MSL-0003-00(246) Coweta/Meriwether/Troup {P.I. Nos. 0003161 & 0003246}

Ron,

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If anyone has something different please speak now; if not I think we can put this issue to rest and complete the VE Study Implementation.

Thank you,

C. Andy Casey, P.E.
Design Group Manager
Georgia Department of Transportation
Phone: 404-657-9757
Fax: 404-657-0653

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Sent: Thursday, August 04, 2005 2:00 PM
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Cc: Myers, Lisa

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Thanks,

Ron

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Asst. State Road & Airport Design Engineer
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Phone: 404.657.8249
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Ron Wishon
Assistant Project Review Engineer
Engineering Services
Room 264
404-651-7470
404-463-6131 (FAX)

Value Engineering STUDY RESPONSES

Projects MSL-0003-00(161) P.I. No. 0003161 and MSL-0003-00 (246) P.I. No. 0003246

Item 4: Use 4.75 mm Superpave mix for the interlayer course beneath the CRCP instead of the 19 mm Superpave mix.

The comparison is being done for a 3 inch layer of 19 mm SP and for a 2 inch layer of 4.75 mm SP.

1. The difference in thickness favors the 4.75 mm SP from a quantities point of view.

2. The 4.75 mm SP mix has a larger surface area than the 19 mm SP. A larger surface area requires more asphalt content to achieve the same film coating called for in Mix Design Level A.

3. Also the 4.75 mm SP mix is not a commonly used mix by GDOT except for low volume roads.

Item 5: Use 9.50 mm SMA flexible mix for the interlayer course beneath the CRCP instead of the 19 mm Superpave mix.

The comments are for a 3 inch layer of 19 mm SP and for a 3 inch layer of 9.50 mm SMA.

1. The 9.5 mm SMA mix uses polymer modified asphalt. Polymer modified asphalts are more costly than neat asphalts.

2. The 9.5 mm gradation has a larger surface area than that of the 19 mm gradation. This increase in surface area will require more asphalt to achieve the same film coating for a given mix design level.

3. The 9.5 mm SMA mix has more targeted uses. The 19 mm SP mix is a standard asphalt mix, with several applications, which makes its price lower than the 9.5 mm SMA mix.

Items 4 and Item 5: The standard interlayer material is 3 inches of 19 mm Superpave.

Item 15: Use pre-welded reinforcing mats in-lieu of hand tied mats

OMR has no problem with the use of pre-welded reinforcing mats.

Item 20, 22, 23: Use a thinner pavement section while maintaining operational needs

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1. Use of higher strength concrete & higher strength steel
2. Use of higher strength concrete with same steel
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This contradicts Items 20, 22, 23.

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As shown on the sketches, the proposed pavement turndown is 1 foot wide and 2 feet deep. It is located at the edge of the CRC slab, and rests above a 3 inch 19 mm SP interlayer, which has been placed above the GAB layer.

Precipitation moisture seeps through cracks. The 19 mm SP layer normally allows for the drainage of this moisture to the edges. The GAB is an impermeable layer.

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