DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE: NHS00-0005-00(320) Dooly
P.I. No.: 0005320
I-75 @ SR 215 Interchange Modifications

OFFICE: Engineering Services

DATE: July 7, 2009

FROM: Ronald E. Wishon, Project Review Engineer *REW*

TO: Bobby Hilliard, PE, State Program Delivery Engineer
Attn.: Steve Adewale

SUBJECT: IMPLEMENTATION OF VALUE ENGINEERING STUDY ALTERNATIVES

The VE Study for the above project was held March 16-19, 2009. Responses were received on June 9, 2009. Recommendations for implementation of Value Engineering Study Alternatives are indicated in the table below. The Project Manager shall incorporate the VE alternatives recommended for implementation to the extent reasonable in the design of the project.

ALT #	Description	Potential Savings/LCC	Implement	Comments
ROADWAY (RD)				
RD-1	Install stop signs instead of signals at ramp terminals	$165,452	No	Signal warrant analysis indicates a signal is warranted for the 2013 open year for both NB and SB ramps; therefore signals will remain in the project.
RD-3	Use 2 foot inside paved shoulder in lieu of 4 foot paved shoulder on ramps	$275,233	Yes	This will be done. The Project Manager will request a Design Variance once the VE Implementation letter is approved.
RD-5	Construct a Type A Partial Cloverleaf	$1,603,832	No	This cannot be done, since RD-23 will be done.
RD-6	Use asphalt in lieu of concrete on the ramps	$473,725	No	Truck traffic volume is relatively high, 18% for design year 2033. Due to rapid accelerating and decelerating of the truck traffic, rutting and shoving of the asphalt will occur, requiring frequent maintenance of the ramps.
RD-8	Construct Tippettville Road connection as a T-intersection on both ends	$241,560	Yes	This will be done.

ALT #	Description	Potential Savings/LCC	Implement	Comments
ROADWAY (RD) continued				
RD-16	Eliminate area lighting	$1,650,000	Yes	This will be done. Discussions between the Project Manager and the District after the implementation meeting indicated that the District requested that lighting be included in the project; however, the local government has not signed a lighting agreement. Lighting will be removed from the project, and added back if a lighting agreement is signed.
RD-20	Reduce paved shoulder on SR 215 from 6.5 feet to 4 feet	$146,173	Yes	This will be done. The Project Manager will request a Design Variance once the VE Implementation letter is approved.
RD-21	Reduce the paved shoulder on SR 215 from 6.5 feet to 2 feet	$263,110	No	This cannot be done since RD-21 will be done.
RD-23	Construct an upgraded Tight Urban Diamond interchange	$8,886,331	Yes	This will be done. The current approved concept report indicates a spread diamond interchange will be constructed. Once the VE Implementation letter has been approved, the concept report will be revised.
BRIDGE (BR)				
BR-1	Use 8 foot shoulders on the bridge	$140,800	Yes	This will be done.
BR-2	Use two span bridge with MSE walls (walls parallel to I-75) and use 8 foot shoulders.	$432,575	No	The 230 ft. two span bridge recommended in the VE Study report will not accommodate future typical section of I-75.

An implementation meeting was held on July 1, 2009. Bobby Hilliard, Stanley Hill, Steve Adewale and David Lyons with the Office of Program Delivery, Rajeev Shah, Sajid Iqbal and Shawn Reese with Parsons, Christy Poon-Atkins with FHWA, and Ron Wishon, Lisa Myers and Matt Sanders with Engineering Services were in attendance.

Additional information was provided by email from Christy-Poon Atkins July 1, 2009 and by phone from Steve Adewale and Christy Poon-Atkins on July 7, 2009.

The results above reflect the consensus of those in attendance and those who provided input.

Approved: Gerald M Ross **Date:** 7/9/09
Gerald M. Ross, PE, Chief Engineer

Approved: Richard Wayne Fedora **Date:** 7/13/2009
for **Rodney Barry, PE, FHWA Division Administrator**

REW/LLM
Attachments
c: R. Wayne Fedora/Christy Poon-Atkins - FHWA
Genetha Rice Singleton
Paul Liles/Bill Duvall/Bill Ingalsbe/Stanley Kim
Stanley Hill/Steve Adewale/David Lyons
David Millen/Tom Queen
Lamar Pruitt
Ken Werho
Katherine Russett
Lisa Myers
Matt Sanders

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE: NHS-0005-00(320), Dooly County
P.I. No. 0005320
I-75 @ SR 215 Interchange Modifications

OFFICE: Program Delivery

DATE: June 9, 2009

FROM: Bobby Hillard, P.E., State Program Delivery Engineer Bobby Hillard

TO: Ron Wishon, State Project Review Engineer

SUBJECT: **Value Engineering Study-Responses**

Reference is made to the recommendations that were contained in the Value Engineering Study Report dated March 27, 2009 for the above referenced projects. Our responses and recommendations are as follows:

1) Value Engineering Recommendation No. RD-1 - Install signals when warranted *(Cost Savings - $165,452)*

Approval of VE Recommendation No. RD-1 is not recommended.

- The traffic analysis indicates that the unsignalized intersection of Union St. (SR 215)/SB Ramps operate at LOS F during the PM peak hour for the 2013 open year. Also, the signal warrant analysis indicates that a traffic signal is warranted for the 2013 open year for both NB and SB ramp terminals. (See Attachment 1)

2) Value Engineering Recommendation No. RD-3 - Use 2' inside paved shoulder in-lieu of 4' paved shoulder on ramps *(Cost Savings - $275,333)*

Approval of VE Recommendation No. RD-3 is recommended.

- The recommendation of use of 2' inside paved shoulder meets the AASHTO policy guide recommendations that when providing paved shoulders on ramps, "For one way operation, the sum of the right and left shoulders width should not exceed 10 to 12 ft. (AASHTO A Policy on Geometric Design of Highways and Streets, 2004, Pg. 838, bullet #1). By providing excess shoulder width, it will encourage parking on the ramps and attempts to use this wider paving as an additional lane.

3) Value Engineering Recommendation No. RD-5 - Construct a partial cloverleaf-A *(Cost Savings - $1,603,832)*

Approval of VE Recommendation No. RD-5 is not recommended.

- As per AASHTO A Policy on Geometric Design of Highways and Streets, 2004, Pg. 788, cloverleaf's have a principal disadvantage of long circuitous route for left turn volume. In addition, with low design speed, the loop ramps have inherent operation deficiencies and are generally not preferred. Even though, the partial cloverleaf-A interchange will have cost savings of approximately $1.6 Million, it is comparatively lower than Value Engineering Recommendation No. RD-23 of constructing a tight urban diamond interchange, which has cost savings of approximately $8.9 Million.

4) **Value Engineering Recommendation No. RD-6 - Use of asphalt in-lieu of concrete ramps *(Cost Savings - $473,725)***

Approval of VE Recommendation No. RD-6 is not recommended.

- As per the traffic data from GDOT OEL, the 24 hour truck traffic is 18% for the design year 2033. Due to rapid accelerating and decelerating high ramp truck traffic, rutting and shoving of the asphalt pavement will occur. This will result in frequent maintenance of asphalt ramps. Though the initial construction cost will be low for asphalt pavements, overall life cycle cost is high as compared to the concrete pavements. (See Attachment 2)

5) **Value Engineering Recommendation No. RD-8 - Construct Tippettville Road connection as a "T" intersection on both ends *(Cost Savings - $241,560)***

Approval of VE Recommendation No. RD-8 is recommended.

- This reconfiguration will align Tippettville Road opposite to American Way, thereby eliminating two closely spaced T-intersections along SR 215. In addition, the old Tippettville Road will become a cul-de-sac. This will improve safety along SR 215.

6) **Value Engineering Recommendation No. RD-16 - Eliminate area lighting system *(Cost Savings - $1,650,000)***

Approval of VE Recommendation No. RD-16 is recommended.

- According to AASHTO A Policy on Geometric Design of Highways and Streets, 2004, Pg. 290, it is desirable and sometimes essential to provide fixed source lighting at interchanges. Without lighting, there may be a noticeable decrease in the usefulness of the interchange at night; there would be more cars slowing down and moving with uncertainty at night than during daylight hours. In addition, elimination of interstate lighting may potentially increase night-time accidents.
- However, considering the low incidents of accidents over a three year period from 2005-2007 and cost savings by not providing lighting system, VE Recommendation RD-16 is accepted.

7) **Value Engineering Recommendation No. RD-20 - Reduce paved shoulder from 6.5' to 4' on SR 215 *(Cost Savings - $146,173)***

Approval of VE Recommendation No. RD-20 is not recommended.

- GDOT's Design Policy Manual (Table 6.2 GDOT Design Standards for Collector Roadways, Chapter 6 Cross Section Elements, Pg. 6-3) requires standard 6.5 ft. paved shoulder based on the functional classification and design speed of the roadway
- Reducing paved shoulder width from 6.5 ft to 4 ft. will require approval of design variance.
- However, Value Engineering Recommendation RD-21 is preferred over RD-20.

8) **Value Engineering Recommendation No. RD-21 - Reduce paved shoulder from 6.5' to 2' on SR 215 *(Cost Savings - $263,110)***

Approval of VE Recommendation No. RD-21 is recommended.

- GDOT's Design Policy Manual (Table 6.2 GDOT Design Standards for Collector Roadways, Chapter 6 Cross Section Elements, Pg. 6-3) requires standard 6.5 ft. paved shoulder based on the functional classification and design speed of the roadway.
- Reducing paved shoulder width from 6.5 ft to 2 ft. will require approval of design variance.
- Also, according to AASHTO A Policy on Geometric Design of Highways and Streets, 2004, Pg. 314, "where bicyclists and pedestrian are to be accommodated on the shoulders, a minimum usable shoulder width of 4 ft. should be used". There exists two bike route facilities in the vicinity of the project namely, (1) Dooly County Bike Route, which starts in downtown Vienna, Georgia along SR 215 and continues north along SR90 (2) Cross-state Bike Route, which runs in the east-west direction along US 41/SR 90. However, these facilities are approximately 1.5 miles west of

the proposed interchange improvement limits, and so the requirement of a 4' shoulder as per AASHTO recommendation is not necessary on SR 215 within the project limits.

- The existing shoulder width on either end of this project is 2-ft, thus, this VE recommendation is preferred over RD-20 as it would result in more cost savings.

9) Value Engineering Recommendation No. RD-23 - Build an upgraded Tight Urban Diamond Interchange (TUDI) ***(Cost Savings - $8,886,331)***

Approval of VE Recommendation No. RD-23 is recommended.

- According to GDOT's Regulation for Driveway and Encroachment Control Table 3-3 Spacing of Signalized Intersection, the minimum spacing between two signalized intersections should be 1000 ft., which was used as the configuration to space the ramp intersections for the preferred concept alternative.
- Though the additional pavement area required for the TUDI will be slightly more than what is recommended in the report, there will be significant right-of-way cost savings by building an upgraded Tight Urban Diamond Interchange (TUDI).

10) Value Engineering Recommendation No. BR-1 - Use 8' shoulder on the bridge ***(Cost Savings - $140,800)***

Approval of VE Recommendation No. BR-1 is recommended.

- In accordance with the AASHTO publication "A Policy on Geometric Design of Highways & Streets," Collector Roads and Streets, 2004, p. 426, Exhibit 6-6, the minimum roadway width on the bridge for roadways with design year volume of over 2000 vehicles/day will be equal to the approach roadway surfaced width, which will be carried over across the structures.
- In addition, GDOT TOPPS Policy 4265-10 explicitly provides the bridge width clear distance to be traveled way plus 8 ft. shoulders on either side.

11) Value Engineering Recommendation No. BR-2 - Two span bridge with MSE walls (wall alignment parallel to I-75) ***(Cost Savings - $432,575)***

Approval of VE Recommendation No. BR-2 is not recommended.

- The two span bridge of length 230 ft. as recommended will not accommodate the future typical section of I-75 as included in the concept report of the subject project.

Attachment 1

5/19/2009

Signal Warrant Analysis for the Intersections of SR 215 @ I-75 Ramps

SR 215 @ I-75 SB Ramp Intersection

Peak Hour Volumes	2013 (Opening Year) AM	2013 (Opening Year) PM
Major St		
EB THU	180	255
EB RT		
WB LT	190	205
WB THU	215	160
Major ST Total	**585**	**620**
Minor St		
SB LT	140	205
SB RT	38	60
Minor St Total	178	265
Meet warrant? (MUTCD Fig.4C-4)	**No**	**Yes**

Major st right-turn volume is eliminated from the analysis since this movement always has the right of way.

Left-turn volume is high (half of the total approach traffic). **Consider major st as a 2-lane road.**

Consider that 50% of right-turn volume will be affected by major st through traffic. Since minor st right-turn volume is low, consider as **1-lane minor st.**

SR 215 @ I-75 NB Ramp Intersection

Peak Hour Volumes	2013 (Opening Year) AM	2013 (Opening Year) PM
Major St		
EB LT	95	90
EB THU	225	370
WB THU	310	280
WB RT		
Major ST Total	**630**	740
Minor St		
NB LT	95	85
NB RT	90	83
Minor St Total	**185**	**168**
Meet warrant? (MUTCD Fig.4C-4)	**Yes**	**Yes**

EB LT volume is low comparing to the total approach traffic (30% for AM and 20% for PM). Consider as a **1-lane major street.** But left-turn volume should be considered in the total approach traffic.

Major st right-turn volume is eliminated from the analysis since this movement always has the right of way.

1. No traffic count data is available, and 8-hr and 4-hr warrants were not looked at.
2. Only ADT and DHV are available and Peak Hr Warrant was looked at.
3. Speed limit for major street (SR 215) is 55 mph so Figure 4C-4 (MUTCD) was used.

LT volume is low comparing to the approach traffic (35% for AM and 31% for PM). Consider as 1-lane minor st.

Consider that 50% of right-turn volume will be affected by major st through traffic.

AMERICAN CONCRETE PAVEMENT ASSOCIATION PUBLICATIO

Attachment 2

Equivalent Designs: Concrete vs. Asphalt

This summary publication outlines recommended designs for the three most common road classifications, including life cycle cost analysis.

One key component of comparing pavements is developing equivalent designs. In this analysis the equivalent designs were developed using design procedures from each pavement industry. The concrete thickness was based on ACPA's new state-of-art StreetPave design software and the asphalt thickness was determined using the Asphalt Institute's procedure. By using both industry-recognized procedures, local agencies can make informed pavement decisions based solely on the estimated total load carry capacity for a given design period.

StreetPave incorporates a life-cycle cost module so designers can evaluate the total costs passed on to the taxpayers for 30 to 40 years or longer.

Asphalt paving prices are related to oil prices. The latest economic indicators from Engineering News Record show asphalt paving prices are continuing to increase during this extended period of oil price inflation. Ready-Mix concrete has increased less than 6% over the past year and has leveled off in recent months. Below are graphic representations of both concrete and asphalt prices over the past twelve months, reported in ENR's June 2006 issue.

READY-MIX CONCRETE

PRICES HAVE LEVELED OUT AFTER STRONG FIRST QUARTER GAINS.

Source: ENR Construction Economics Dept.

PAVING ASPHALT

THIS MONTH'S 10% PRICE INCREASE WAS THE LATEST IN A STRING OF LARGE PRICE HIKES.

Source: ENR Construction Economics Dept.

The examples illustrated in this chart were for a Mean Average Annual Temperature (MAAT) of 45 degrees Fahrenheit. Figure 1, shows the various MAAT regions for determining asphalt pavement thicknesses. Concrete pavements are not sensitive to environmental temperatures and thicknesses do not increase with rising mean average ambient temperatures.

MEAN ANNUAL TEMPERATURE (MAAT)

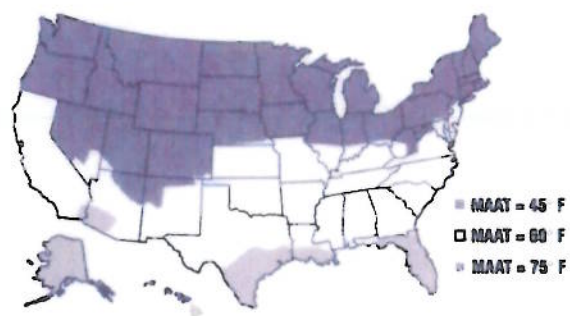


Figure 1: Increases in MAAT from 45 to 60 or 60 to 75 requires additional asphalt thickness.

20 CITY AVERAGE

ITEM	UNIT	PRICE MONTH	% CHG. YEAR	% CHG.
ASPHALT PAVING				
PG 58	Ton	269.51	+10.1	+41.6
Cutback, MC800	Ton	297.94	+1.6	+12.9
Emulsion, RAPID SET	Ton	253.04	+2.9	+14.9
SLOW SET	Ton	250.14	+2.7	+12.7
PORTLAND CEMENT				
Type one	Ton	92.89	-0.7	+6.7
MASONRY CEMENT				
70-lb. bag	Bag	6.27	+1.4	+7.8
GRAVEL				
1-1/2" down to 3/4"	Ton	10.72	0.0	+4.1
3/4" down to 3/8"	Ton	10.40	0.0	- 0.7
CRUSHED STONE				
Base course	Ton	8.13	0.0	- 1.4
Concrete course	Ton	8.58	0.0	+1.0
Asphalt course	Ton	9.06	+0.1	+0.4
SAND				
Concrete	Ton	7.98	+0.1	+3.6
Masonry	Ton	8.81	+0.1	+5.6
CONCRETE READY-MIX				
3,000 psi	cy	84.35	+0.2	+5.4
4,000 psi	cy	88.55	+0.3	+5.7
5,000 psi	cy	92.99	+0.2	+6.2
STD. MODULAR BRICK	M	343.91	+0.1	+1.4
CONCRETE BLOCK				
Normal-weight 8" x 8" x 16"	C	125.93	+0.1	+3.3
Lightweight: 8" x 8" x 16"	C	148.59	+0.1	+12.0
12" x 8" x 16"	C	170.07	+0.2	+1.7
MASONS LIME	Ton	198.22	0.0	+3.3

Table 1: Data reported in ENR June 2006 Issue

LIFE-CYCLE COST ANALYSIS

Concrete Properties

1. Flexural Strength 600 psi
2. Reliability 80%
3. k-value 100
4. Design Life 30 years

Asphalt Properties

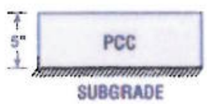
1. MAAT 45 degrees F
2. Modulus of Resilience (subgrade support) 3000 psi
3. Design Life 30 years

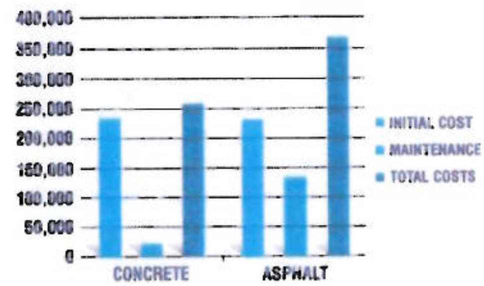
The life-cycle cost analysis (LCCA) provided with each road classification shows the initial, rehabilitation, and maintenance costs for the equivalent concrete and asphalt sections. In these examples, concrete strength was 4000 psi and the design did not include integral curbs. If either the concrete strength were increased or an integral curb and gutter were used as design options, the initial concrete cost would be reduced. The LCCA example is based on:

1. ENR June 2006 Issue 20 City Average prices
2. Initial Costs 1-mile 12' wide pavement with curbs place separately
3. Design Period 40 years
4. If integral curbs are placement with concrete pavement an additional $45,000 can be saved on initial costs

RESIDENTIAL

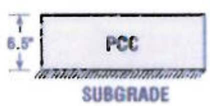
(ADTT 3 trucks/day, 11,500 ESALs, 2-lane with curbs) initial costs

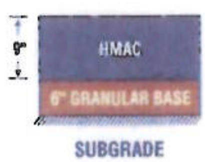


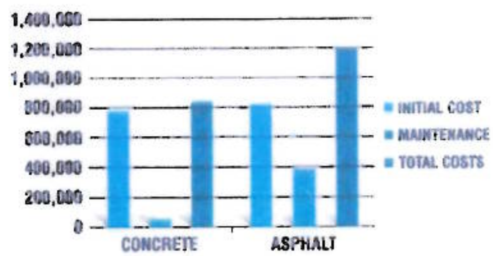


COLLECTOR

(ADTT 100 trucks/day, 405,000 ESALs, 2-lane with curbs)

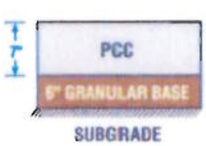


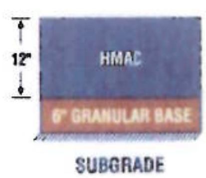


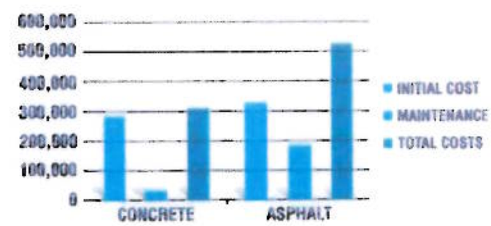


MINOR ARTERIAL

(ADTT 500 trucks/day, 3,500,000 ESALs, 4-lane with curbs)







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Web: www.pavement.com

Washington DOT - PAVEMENT GUIDE.

1 INTRODUCTION

Basically, all hard surfaced pavement types can be categorized into two groups, flexible and rigid. Flexible pavements are those which are surfaced with bituminous (or asphalt) materials. These can be either in the form of pavement surface treatments (such as a bituminous surface treatment (BST) generally found on lower volume roads) or, HMA surface courses (generally used on higher volume roads such as the Interstate highway network). These types of pavements are called "flexible" since the total pavement structure "bends" or "deflects" due to traffic loads. A flexible pavement structure is generally composed of several layers of materials which can accommodate this "flexing". On the other hand, rigid pavements are composed of a PCC surface course. Such pavements are substantially "stiffer" than flexible pavements due to the high modulus of elasticity of the PCC material. Further, these pavements can have reinforcing steel, which is generally used to reduce or eliminate joints.

Each of these pavement types distributes load over the subgrade in a different fashion. Rigid pavement, because of PCC's high elastic modulus (stiffness), tends to distribute the load over a relatively wide area of subgrade (see Figure 2.1). The concrete slab itself supplies most of a rigid pavement's structural capacity. Flexible pavement uses more flexible surface course and distributes loads over a smaller area. It relies on a combination of layers for transmitting load to the subgrade (see Figure 2.1).

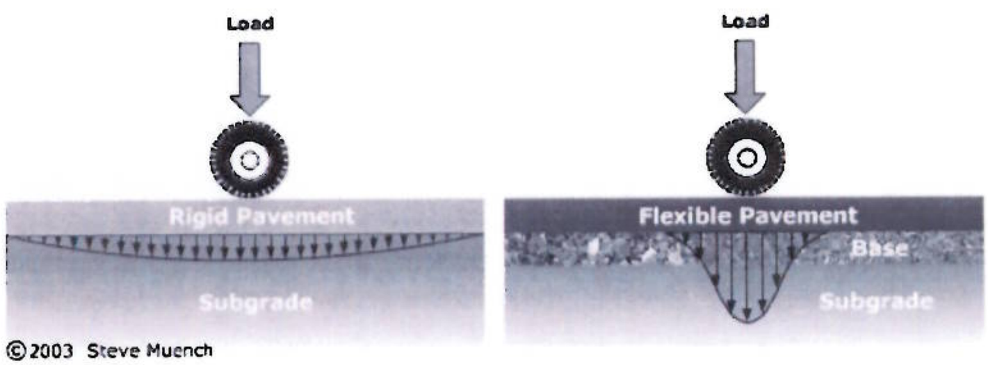

Figure 2.1: Rigid and Flexible Pavement Load Distribution

Overall, it may be somewhat confusing as to why one pavement is used versus another. Basically, state highway agencies generally select pavement type either by policy, economics or both. Flexible pavements generally require some sort of maintenance or rehabilitation every 10 to 15 years. Rigid pavements, on the other hand, can often serve 20 to 40 years with little or no maintenance or rehabilitation. Thus, it should come as no surprise that rigid pavements are often used in urban, high traffic areas. But, naturally, there are trade-offs. For example, when a flexible pavement requires major rehabilitation, the options are generally less expensive and quicker to perform than for rigid pavements.

This section will discuss flexible and rigid pavements and the basic characteristics and types of each.

TRANSPORTATION RESEARCH BOARD – TRB – Record 1749.

Journal Article

Life-Cycle Cost Comparison of Asphalt and Concrete Pavements on Low-Volume Roads; Case Study Comparisons

Journal	Transportation Research Record: Journal of the Transportation Research Board
Publisher	Transportation Research Board of the National Academies
ISSN	0361-1981
Issue	Volume 1749 / 2001
DOI	10.3141/1749-05
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Abstract

The costs of pavement construction, maintenance, and rehabilitation are primary factors considered by most local agencies in the selection of pavement type [hot-mix asphalt concrete (HMAC) or portland cement concrete (PCC)] for new construction. The optimal use of agency funds for any given project can be determined only through an economic analysis of all associated agency costs and the performance of the pavement. Life-cycle cost analyses were performed on HMAC and PCC highway pavements in Olmsted and Waseca Counties, Minnesota. The Means Heavy Construction Historical Cost Index and the Minnesota Department of Transportation Surfacing Indices were used to convert all expenditures over time into equivalent constant-dollar values. Direct comparisons were made on roadway sections with similar traffic volumes, ages, and environmental conditions. For Olmsted County, the favored pavement type depended somewhat on the cost index values that were used in the analysis; however, index selection had no effect on the outcome for the Waseca County comparisons. When the results were normalized for traffic volumes (i.e., cost per lane mile per million vehicles carried), PCC pavements were clearly more cost-effective in all Olmsted County cases and all but one Waseca County case, regardless of the cost index value used. PCC pavements generally incurred significantly lower maintenance and rehabilitation costs than HMAC roadways in both counties.

References

References secured to subscribers.

Pavement Costs and Quality

by Robert G. Packard

When it comes time to build or rebuild a road or street, the owner agency needs answers to several questions: what type of pavement; initial cost and cost of upkeep; quality of service; how long will it last? This "consumer's report" summarizes recent information and references on these topics.

Pavement service life

Many state highway agencies have recorded service lives for different types of pavement. The average age of pavements prior to resurfacing varies considerably, but for concrete, it may be as much as 25 to 40 years. As shown in Table 1, this is about 1½ to 2 times greater than the service life of asphalt pavements. When economic analyses are made, a longer service life with low maintenance cost reflects the long term benefits of concrete performance.

In addition to the longer service life, it is important to recognize that concrete pavements carry considerably more traffic because concrete is often selected for higher traffic routes. A national survey of heavily trafficked pavements showed that concrete carried an average of four times more daily truck traffic than asphalt.[8]

Pavement performance

Besides keeping records of the service lives, most state highway departments track the performance of pavements throughout their life. Many have developed performance curves or equations. This information is useful for predicting remaining pavement life for life cycle cost analysis. The examples given here are typical.

Washington. Based on comprehensive surveys of pavement conditions, age, and traffic, the performance curves shown in Fig. 1 were developed. It was found that new asphalt pavements decrease in condition rating about 150 to 200 percent faster than concrete pavements, and that asphalt overlays decrease about 50 percent faster than new asphalt pavements.[9]

Oregon. All concrete pavements on the state system are performing well, with some in service for more than 30 years. Older concrete pavements have carried two to six times more traffic than designed for, yet maintain serviceability indexes greater than 3.0 (good condition).[10]

Kentucky. Based on surveys of pavements constructed since 1962, 41 percent of concrete pavements have been overlaid at an average age of 20 years; 59 percent are still exposed and, of these, about half are 23 to 31 years old. Ninety four percent of asphalt pavements have been overlaid at an average age of 12 years.[7]

Illinois. Concrete pavements on the Illinois Interstate System have performed far better than they were designed to do, lasting an average of 20 years during which time they carried 2.7 to 4.0 times the design truck traffic.[11]

Louisiana. A study of pavements constructed between 1963 and 1967 showed that 14 percent of concrete pavements were overlaid at an average age of 18 years while 86 percent survive at an average age of 20. Seventy seven percent of asphalt pavements were overlaid at 14 years.[12]

Table 1 — Service life, years*

Agency (Refs. 1 - 7)	Concrete	Asphalt
Wisconsin	20 - 25†	12 - 14†
Minnesota	35	20 (12)‡
Kentucky	20+	12+
New York	20 - 25+	10 - 13
Colorado	27	6 - 12
FHWA (1985)	13 - 30	6 - 20
FHWA (1971)	25	15

* Heavy-duty highways.
† 25 percent longer if drained.
‡ 1½ in. overlay at 12 years, thick overlay at 20 years.

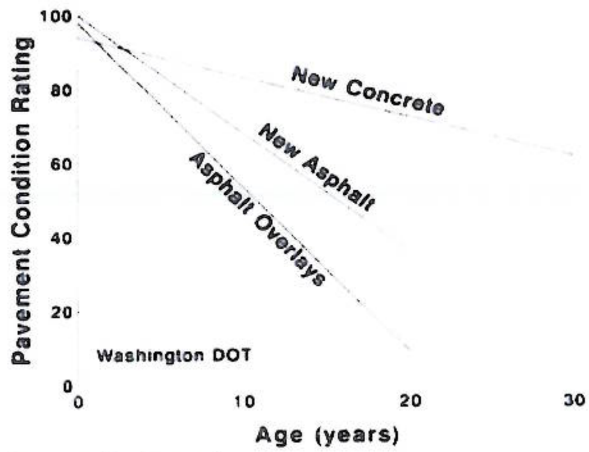

Fig. 1 — Washington's performance curves

Service lives of overlays

Fig. 2, based on the Ohio DOT data,[13] shows the condition rating (PCR) of overlays over a seven year period. Although none of the overlays has failed, asphalt's PCR is decreasing about 350 percent faster than concrete's. This loss is about the same as for the lower curve in Fig. 1, the performance prediction curve for asphalt overlays developed by the Washington SDOT.

Pavement costs

Due to the many variables involved, it is difficult to directly compare the costs of concrete and asphalt pavements. However, two notable examples of direct comparisons on the same stretch of roadways are available (same conditions of traffic, soils, climate, etc.).[14,15] Although the cost data are dated, the comparison between concrete and asphalt is valid

Table 2 — Life cycle cost analysis

Pavement type	Initial cost	Interim cost	Present worth, interim costs	Total life-cycle cost	Annual cost
Concrete (joint seal, 17.5 years)	$224,935	$6959	$3221	$228,156	$13,073
Asphalt, full depth (overlay, 20 years)	$212,378	$80,789	$33,503	$245,881	$14,087

Costs in dollars/mi., 4.5 percent discount rate, maintenance cost excluded

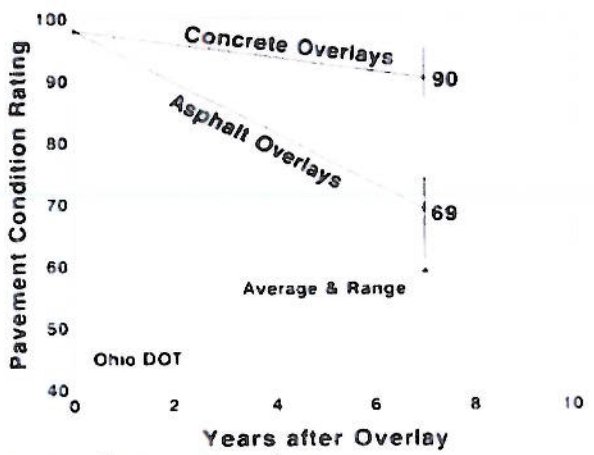

Fig 2 — Ohio's overlay performance

Table 3 — Rehabilitation costs

	Average life	Cost per mile	Cost per mile per year
Asphalt overlay (4 in.)	11.7 years	$62,790	$5367
Concrete overlay (6 in.)	23.2 years	$101,250	$4364

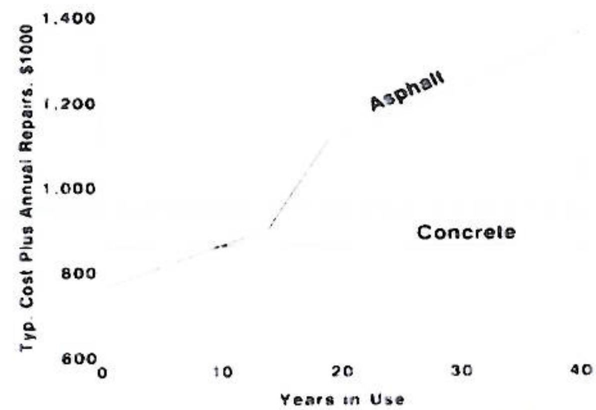

Fig 3 — California cost data for streets (based on California State Controller's Office, Annual Reports on Local Streets and Roads)

in a relative way. On U.S. 77 in Oklahoma, concrete was initially more expensive than asphalt ($419,000 vs. $316,000 for 4 miles of each type); maintenance costs made up the difference. Asphalt maintenance for the 24-year period of the test totaled $128,000 including two resurfacings; concrete maintenance was $9545.

Indiana test results were similar. Asphalt was originally $3000 per mile cheaper than concrete, but maintenance brought the asphalt total to $79,835 per mile, while the total cost of concrete, including maintenance, was $71,315 per mile. These are actual costs without adjustments for interest and inflation.

Life cycle costs

The most effective method of comparing the costs of pavement types is by life-cycle cost analysis. This considers initial and future costs (maintenance and overlays) of each alternative by taking into account both the effects of inflation and interest rates over a specified pavement analysis period.

When concrete and asphalt pavements are both designed for the same conditions, concrete will usually, but not always, have a somewhat higher initial cost. However, on a life cycle cost basis, the longer service life and low maintenance costs for concrete pavements usually result in an equal or lower present worth expenditure and annual cost for concrete. The example in Table 2 was developed by the highway department of a midwestern state.[16] This agency does not include routine maintenance costs which would have made a greater differential between concrete and asphalt.

Maintenance costs (routine annual costs excluding major rehabilitation) vary considerably depending on the pavement facility, age and condition of pavement, agency policy, availability of funds, and many other factors. They may vary from several hundred to several thousand dollars per mile depending on whether it is a road or street under local jurisdiction or a major roadway on a state's interstate system. In the latter case, the comparative cost between asphalt and concrete (average annual maintenance costs for the service life of pavement) may be about two or three to one.

For lower classifications, local agencies often spend very little on concrete maintenance so the ratio of costs rises to much higher values, perhaps as high as eight to one. Fig. 3 shows typical costs for California streets. Here, virtually no money was spent for concrete maintenance over a span of many years.

Rehabilitation costs

Table 3 shows the costs and service lives of asphalt and concrete overlays as reported in a 1989 survey of highway agencies.[17] Concrete did cost more initially, but with longer service life, the cost per year is less.

A similar situation exists for Iowa's county roads.[18] Five or six inch concrete overlays may cost up to 50 percent more than a 2 or 3 in. asphalt overlay, but the concrete would last at least twice as long. Based on publicly available information,[18] costs for whitetopping on Iowa county roads in 1993 average $36.40 per cubic yard of concrete plus $2.56 per square yard of pavement. This translates to $115,000 per mile for a 6 in. concrete overlay.

Equivalent designs

Initial costs, service lives, and rehabilitation costs all depend on the structural adequacy (thickness) of the pavement and subsequent overlays. Obviously, a pavement of inadequate design will have a lower first cost, but it will wear out faster and cost more to fix. Thus, when different pavement types are compared, it is vital that realistic and equitable designs be used. Design methods such as those provided in the 1993 AASHTO Guide[19] are a sound basis for making side-by-side comparisons using the same design inputs for both pavement types. This is conveniently done with the Pavement Analysis Software (PAS)[20] which computes thicknesses based on the 1993 AASHTO Guide. PAS is also used to make life-cycle cost comparisons.

Summary

The true value of any pavement, whether a major highway, city street, or local road, is determined by assessing several factors. As shown in this report, the best decision between pavement types of equivalent design is based not solely on initial pavement cost, but is almost always dependent on subsequent costs and length of service life.

References

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2. "Method of Pavement Type Selection," Engineering Standards, Minnesota Department of Transportation, 1983 (current as of Jan. 1994).

3. Kentucky Bureau of Highways, Pavement Conditions Evaluation Form Sheets dated through 1993.

4. Vyce, John M., "A Life Cycle Cost Analysis for Asphalt and Concrete Pavements," Special Report 82, Engineering and Development Bureau, New York State Department of Transportation, Feb. 1988.

5. Information from Colorado Department of Transportation, 1992.

6. Noel, L. M., "What Do Pavements Cost?" *Civil Engineering*, American Society of Civil Engineers, Nov. 1985.

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8. Darter, M. I. and Barenberg, E. J., "Zero-Maintenance Pavements: Results of Field Studies on the Performance Requirements and Capabilities of Conventional Pavement Systems," FHWA-RD-76-105, Interim Report, Federal Highway Administration, April 1976.

9. Bednar, James, "Pavement Performance Curves: Four Case Studies," *Public Roads*, Federal Highway Administration, Dec. 1989.

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11. Hall, K. T., Darter, M. I., and Rexroad, W. M., "Performance of Bare and Resurfaced JRCP and CRCP on the Illinois Interstate Highway System—1991 Update," Research Report 532-1, Illinois Department of Transportation, Oct. 1993.

12. Temple, W. H. and Rokeway, D. N., "Life Cycle Cost and Loading Characteristics of AASHTO Designed Rigid and Flexible Pavements in Louisiana," TRR 1215, Transportation Research Board, 1989.

13. Ohio Department of Transportation, Pavement Condition Ratings 1984-1992.

14. Oklahoma Legislative Test Road, Oklahoma Highway Department Report to the Legislature, 1979.

15. "Indiana Test Road Progress Report Number 10," Indiana State Highway Commission, Jan. 1974.

16. Olstead, E. L., "Applications of Life Cycle Cost Analysis: MNDOT Process for Pavement Surface Type Determination," Symposium on the Economics and Engineering of Concrete Pavements, University of New Brunswick, May 1989.

17. "The Cost of It All," *Better Roads*, Dec. 1989.

18. Smith, Gordon, "Whitetopping Spells Relief in Iowa," *Concrete Construction*, Nov. 1993.

19. *Guide for Design of Pavement Structures*, American Association of Highway and Transportation Officials, 1993.

20. "Pavement Analysis Software," American Concrete Pavement Association, MC016P, 1993.

Selected for reader interest by the editors.

ACI member **Robert G. Packard** is director of engineering and design for the American Concrete Pavement Association. He is a consulting member of ACI Committee 325, Concrete Pavements.

Denver Business Journal - May 8, 2000
/denver/stories/2000/05/08/story6.html

DENVER BUSINESS JOURNAL

Friday, May 5, 2000

CDOT weighs concrete vs. asphalt

Denver Business Journal - by Paula Aven Business Journal Staff Reporter

The project hasn't even been put out for bid yet, but already the competition for the I-25 widening project is getting fierce.

Both the Colorado Asphalt Paving Association and the American Concrete Pavement Association claim to have the best solution to the highway problems clogging up the southeast transportation corridor.

The great asphalt vs. concrete debate has been raging for years, and it seems as if concrete has been winning out for most major highway reconstructions in the state, said Dan Hopkins, a spokesman for the **Colorado Department of Transportation**. Concrete is stronger than asphalt and is usually preferred on projects with higher volumes of traffic. Interstate 25 logs about 250,000 cars a day, he said.

But the asphalt industry is not ready to roll over and play dead just yet. It has brought forth a tri-level paving scheme that has been used on all of the major highway systems in Europe and is thought to be just as strong as concrete, with a longer shelf life.

"Each of them has a very distinct strength in certain areas. You see a great deal of asphalt paving in the mountains because it absorbs heat quicker and melts the snow quicker. You see more concrete paving where you have heavy loads and a greater volume of traffic," said Mark Wachal, president of Recycled Materials Co. in Arvada.

Recycled Materials Co. is the business in charge of recycling the runways and roads at the former Stapleton International Airport.

Both materials' strength is predicated on how strong and competent a subgrade or base they're sitting on.

The idea is to allow the water to percolate out of the roadway rather than stagnate beneath it where it can cause damage to the roadbed.

"Asphalt is a flexible pavement and has the capability of moving slightly. In case of our weather changes and temperature changes, asphalt has the ability to be a little more flexible and not crack. It also has the downside at times of rutting with heavy traffic in a given path," said Wachal.

Tom Peterson, executive director of the Colorado Asphalt Paving Association, already has pitched the tri-level paving plan to the Department of Transportation.

The process, which was used to construct Germany's autobahn system, includes three very different layers of asphalt. The layer on the bottom is flexible and impermeable. The aggregate is highly compacted with 3 percent voids (or air pockets).

The middle layer is the load-bearing section; the thickest element within the pavement structure. It has 4 to 7 percent air pockets. The top layer is between 40 to 60 millimeters thick to optimize surface elements.

This is a "long-life design, which prevents cracking from the bottom," said Peterson. That is important because if a road cracks from the bottom, the entire road has to be replaced. If it cracks from the top, maintenance can be done on the surface to extend the life of the road.

The Colorado/**Wyoming Chapter of the American Concrete Pavement Association** pointed out in its proposal to the Department of Transportation that concrete pavement costs less, lasts longer and is safer.

Concrete costs "are not subject to foreign pricing influences. The cost of concrete pavement has remained stable over the last 10 years and has even decreased during the last two years," said the report.

The group added that "concrete pavement requires little or no maintenance. CDOT estimates that 22 years will pass before a major rehabilitation is required on concrete, while major asphalt overlays are required every 8 years on asphalt pavement. Annual maintenance costs per lane mile for concrete are one-twelfth those of asphalt."

Textured concrete pavement has better skid resistance than asphalt, is brighter at night and does not have black ice, the group said. It also "increases fuel efficiency for trucks by up to 20 percent," according to a study by the Federal Highway Administration.

A draft RFP is expected to go out in July and after getting comments from contractors and consultants, the final RFP will go out sometime in the fall.

"We anticipate at this point having the design build contractor no later than May of 2001," said Hopkins.

Myers, Lisa

From: Christy.Poon-Atkins@dot.gov
Sent: Wednesday, July 01, 2009 4:41 PM
To: Myers, Lisa
Cc: Adewale, Steve (Adesoji); Leon.Kim@dot.gov; R.Wayne.Fedora@dot.gov
Subject: RE: VE impl. meeting Dooly Co I-75

Hi Lisa,
As a follow-up to my comments in the meeting, I wanted to send you a few other items to think about in addition to my comments during the meeting. Please see the comments noted below.

- VE Recommendation No.RD-23 – if the Department would like to implement a TUDI instead of a regular Full Diamond Interchange the following items should be incorporated.
  - Both intersections must be signalized. (Which more so supports the installation of signals, invalidating a recommendation to not install signals.)
  - Signalization must be coordinated
  - Left turn storage on the crossroad must be in advance of the first intersection; not between the ramps.
    - FHWA <u>concurs</u> with this change. Please ensure that it is consistent with the approved concept report and IMR. If it is not consistent, please prepare and submit the appropriate deliverables (revised and/or new documents) to FHWA GA Division Office for review and approval (**<u>A revised concept report with a current traffic analysis attached should suffice for this project</u>**). Please let me know if you have any questions.
- VE Recommendation No.RD-1 – from the traffic analysis provided, the interchange ramps will fail without the installation of signals. Also based on the Department's current decision on VE Recommendation No.RD-23, signals are required to be installed and coordinated. FHWA does not concur with not installing signals with this project.
- VE Recommendation No.RD-3 – a 2ft inside paved shoulder along with a 10ft outside paved shoulder along the ramps is consistent with the AASHTO policy with respect to the <u>combined paved shoulder width of 12ft</u>. FHWA <u>concurs</u> with changing the inside paved shoulder width to 2ft as long as the appropriate steps are taken to ensure consistency with the GDOT policy.
- VE Recommendation No.RD-16 – As noted in AASHTO policy (also noted as a point on the VE study responses), without lighting, there may be a noticeable decrease in the usefulness of the interchange at night; there would be more cars slowing down and moving with uncertainty at night than during daylight hours. In addition, elimination of interstate lighting may potentially increase night-time accidents. FHWA GA Division Office has some concern with the reconstruction of an interchange without pertinent safety features. However, installing the lighting with a future project may be an option to consider. Please provide further justification to support not installing the lighting with this project (include a copy of the lighting agreement with the County).
- VE Recommendation No.RD-20 – this recommendation is not consistent with the GDOT requirement of 6.5ft. FHWA GA Division Office has some concern with reducing the shoulder to a width that is not sufficient to safely accommodate ped/bike traffic within the project limits, if the need arises. Therefore, FHWA GA Division Office <u>concurs</u> with changing the paved shoulder width to <u>4ft</u>. Please ensure that the appropriate steps are taken for consistency with the GDOT policy.
  - VE Recommendation No.RD-21 – Reduce paved shoulder from 6.5ft to 2ft on SR 215. FHWA GA Division Office has some concern with reducing the shoulder to a width that is not sufficient to safely accommodate ped/bike traffic within the project limits, if the need arises. Therefore, FHWA GA Division Office <u>does not concur</u> with changing the paved shoulder width to <u>2ft</u>.
- VE Recommendation No.BR-1 – Use 8ft shoulders on the bridge. The FHWA GA Division Office <u>concurs</u> with this recommendation to use 8ft. shoulders.

- VE Recommendation No.BR-2 – a two span bridge with MSE walls would go against prior agreements in conjunction with project CSNHS-M003-00(340) for the extension of a culvert along I-75. FHWA does not concur with incorporating a MSE wall at the bridge location along I-75.

Please let me know if you have any questions on any of the VE recommendation for the subject project.

Thank you,

Christy L. Poon-Atkins, P.E.
Districts 2 & 3 Transportation Engineer
Federal Highway Administration, Georgia Division
61 Forsyth Street, S.W. Suite 17T100
Atlanta, GA 30303
Phone: (404) 562-3638 Fax: (404) 562-3703

From: Myers, Lisa [mailto:lmyers@dot.ga.gov]
Sent: Wednesday, July 01, 2009 9:04 AM
To: Poon-Atkins, Christy (FHWA)
Subject: VE impl. meeting Dooly Co I-75

Hi Christy – we were wondering if you were planning to come to the Implementation meeting this morning?

Lisa Myers, AVS ☺
Transportation Engineer Assistant Administrator - VE Coordinator

GA DOT - Engineering Services
One Georgia Center - 5th Floor
600 W. Peachtree Street NW
Atlanta, GA 30308

Voice: 404-631-1770
Fax: 404-631-1956
lmyers@dot.ga.gov

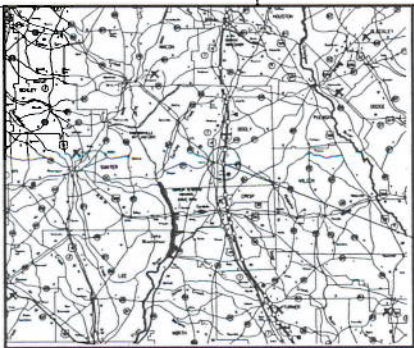
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NHS-0005-00(320)	1	

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED
I-75 INTERCHANGE AT SR 215
DOOLY COUNTY

FEDERAL AID PROJECT
NHS-0005-00(320)

FEDERAL ROUTE NO - I-75
STATE ROUTE NO - SR 215 / SR 401
GEORGIA D.O.T. P.I. NO. 0005320


LOCATION SKETCH

PROJECT LOCATION

THIS PROJECT HAS BEEN PREPARED USING THE HORIZONTAL GEORGIA COORDINATE SYSTEM OF 1984 (NAD 1983/94 WEST ZONE, AND THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

NOTE:
ALL REFERENCES IN THIS DOCUMENT, WHICH INCLUDES ALL PAPERS, WRITINGS, DOCUMENTS, DRAWINGS, OR PHOTOGRAPHS USED, OR TO BE USED IN CONNECTION WITH THIS DOCUMENT, TO "STATE HIGHWAY DEPARTMENT OF GEORGIA", "STATE HIGHWAY DEPARTMENT", "GEORGIA STATE HIGHWAY DEPARTMENT", "HIGHWAY DEPARTMENT", OR "DEPARTMENT" WHEN THE CONTEXT THEREOF MEANS THE STATE HIGHWAY DEPARTMENT OF GEORGIA, AND SHALL BE DEEMED TO MEAN THE DEPARTMENT OF TRANSPORTATION.

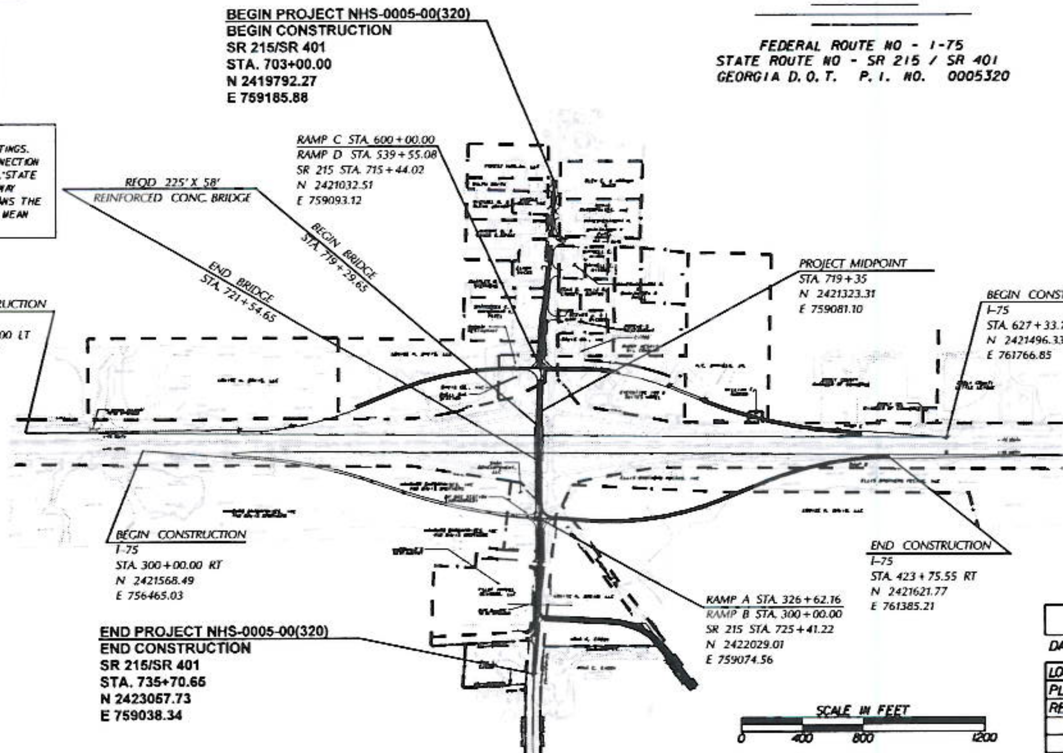
DESIGN DATA
FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
TRAFFIC A.D.T.: 11400 V.P.D (2013) - S.R. 215
TRAFFIC A.D.T.: 17000 V.P.D (2033) - S.R. 215
TRAFFIC D.H.V.: 1485 V.P.H (2033) - S.R. 215
DIRECTIONAL DIST.: 64%
% TRUCKS: 14%
24 HR. TRUCKS %: 18%
SPEED DESIGN: 55 MPH

LENGTH OF PROJECT	COUNTY No. 93 Project No. NHS-0005-00(320) P.I. NO. 0005320
	MILES
NET LENGTH OF ROADWAY	0.58
NET LENGTH OF BRIDGES	0.043
NET LENGTH OF PROJECT	0.62
NET LENGTH OF EXCEPTIONS	0
GROSS LENGTH OF PROJECT	0.62

THIS PROJECT IS 100% IN DOOLY COUNTY AND IS 100% IN CONG. DIST. NO. 2.

PROJECT DESIGNATION: EXEMPT

DESIGNED IN ENGLISH UNITS.



SCALE IN FEET
0 400 800 1200

PARSONS
6390 TRIANGLE PARKWAY, SUITE 100
NORCROSS, GA 30092

PREPARED BY: ______ DESIGN

RECOMMENDED FOR SUBMISSION BY: ______ DESIGN

SUBMITTED BY: ______ STATE DESIGN ENGINEER

DATE	CHIEF ENGINEER
LOCATION AND DESIGN APPROVAL DATE	- -
PLANS COMPLETED	- -
REVISIONS	

THE DATA, TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS OR IN ANYWAY INDICATED THEREBY, WHETHER BY DRAWINGS OR NOTES, OR IN ANY OTHER MANNER, ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED, AND DO NOT BIND THE DEPARTMENT OF TRANSPORTATION IN ANY WAY. THE ATTENTION OF BIDDER IS SPECIFICALLY DIRECTED TO SUBSECTIONS 102.04, 102.05, AND 104.03 OF THE SPECIFICATIONS.

PRECONSTRUCTION STATUS REPORT FOR PI:0005320

PROJ ID : 0005320 — **I-75 @ SR 215**
COUNTY : Dooly
LENGTH (MI) : 0.90
PROJ NO.: NHS00-0005-00(320)
PROJ MGR: Adewale, Steve
OFFICE : Program Delivery
CONSULTANT: Turnkey Consultant, (Contract with GDOT)
SPONSOR : GDOT
DESIGN FIRM: Parsons Transportation Group, Inc.

MPO: Not Urban
TIP #:
MODEL YR :
TYPE WORK: Interchange
CONCEPT: ADD 4R(MED 20)
PROG TYPE: Safety
Prov. for ITS: N
BOND PROJ :

DOT DIST: 3
CONG. DIST: 2
BIKE: N
MEASURE: E
NEEDS SCORE: 4
BRIDGE SUFF: 76.49

MGMT LET DATE :
MGMT ROW DATE : 12/15/2010
SCHED LET DATE :
WHO LETS?: Prepare Plans for Shelf
LET WITH :

SCHED START	*SCHED FINISH*	*ACTIVITY*	*ACTUAL START*	*ACTUAL FINISH*	%
		Concept Development	9/29/2005	2/3/2009	100
		Concept Meeting	5/22/2008	5/22/2008	100
		PM Submit Concept Report	9/10/2008	9/10/2008	100
		Receive Preconstruction Concept Approval	10/1/2008	10/24/2008	100
		Management Concept Approval Complete	**10/27/2008**	**2/3/2009**	100
	7/28/2009	Value Engineering Study	12/10/2008		83
		Public Information Open House Held	10/30/2007	10/30/2007	100
	5/6/2010	**Environmental Approval**	**1/29/2008**		14
		Mapping	11/2/2005	12/7/2005	100
7/20/2009	8/21/2009	Field Surveys/SDE			0
8/25/2009	**9/23/2010**	**Preliminary Plans**			0
12/1/2009	5/25/2010	Preliminary Bridge Design			0

PROGRAMMED FUNDS

Phase	Approved	Proposed	Cost	Fund	Status	Date Auth
PE	2007	2007	1,612,700.00	L050	AUTHORIZED	12/15/2003
PE	2004	2004	400,000.00	Q05	AUTHORIZED	12/15/2003
ROW	2009	2011	13,647,208.00	L050	PRECST	
UTL	2010	LR	1,575,141.10	L050	PRECST	
CST	LR	LR	32,388,362.50	L050	PRECST	

PE Cost Est Amt:	1,612,700.00	Date:	
PE Cost Est Amt:	400,000.00	Date:	
ROW Cost Est Amt:	11,920,000.00	Date:	3/20/2009
Utility Cost Est Amt:	967,000.00	Date:	3/20/2009
CST Cost Est Amt:	19,883,645.00	Date:	5/6/2009

STIP AMOUNTS

Phase	Cost	Fund
PE	0.00	Q05
PE	0.00	L050
ROW	265,000.00	L050
UTL	0.00	L050
CST	0.00	L050

PDD: SEP02 LR: Assigned to Road Design 10/3/02. No activity. New truck stop. 9/9/03. Needed before 311665. 2/24/04.
Bridge: BRIDGE REQUIRED
Design: SA| Parsons Project is Task Order thru Env. Screening
EIS: CE|NotApvd|OnSchRW||Russet(5-4-09)
LGPA: VIENNA SGN DO UTIL 7-28-03|DOOLY SGN DO UTIL 8-7-03|RESCISSION LETTER SENT TO DOOLY & VIENNA 7-22-05.
Permits: NEED IMPACTS TO DETERMINE
Programming: #1 6-07|#2 12-08|#3 6-09
Traffic Op: KSB| SEND PLANS FOR REVIEW WHEN PFPR SET|1-19-07 $?*
Utility: Need 1st sub plans 01/09/09
EMG: 2130 (H5(94)-W/V88) DOT=M/S; C=D; REFLY 6561/07

District Comments

LOCALS NEED THIS BEFORE SR 27 INTERCHANGE - INDUSTRIAL DEV. OCCURRING ALONG W/NEW UTILITY [8-30-03] - PE ACTIVITIES NEED TO GET GOING [9-9-03] - NEED SOONER THAN LR [2-24-04] - FLIPPED W/311665 [8/12/04] - TURN-KEY [4/27/05]| Project added to FY-07 Turnkey Prjct list by TEA (CAH) 022306|;NEPA [8-21-06]; NEED 07 PE AUTH [3-6-07];PIOH 10-30-07 [9-24-07];NOW TASK ORDER [2-8-08]. Initial Concept Team meeting held May 8, 2007. IMR under review by the FHWA Concept team meeeting held May22, 2008.

DESIGN: 1. Concept report approved, 2/2/2009.
2. VE Study,3/10/09

Prel. Parcel CT:		**Total Parcel in ROW System:**		**Cond. Filed:**		**Acquired by:** DOT	***DEEDS CT:***
Under Review:		**Options - Pending:**		**Relocations:**		**Acquisition MGR:**	
Released:		**Condemnations- Pend:**		**Acquired:**		**R/W Cert Date:**	