Form C-104
Rev. 09/2008

VALUE ENGINEERING CHANGE PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION

Date 1/5/2009

Contract ID 081121-703
County BATES
Contractor IDEKER, INC.
Designed By
VECP# 09-03 (to be completed by C.O.)

Job No. J7P0860
Original Bid Cost 9248342.45
By PAUL IDEKER
Phone 816-364-3970
VECP ☐ or VECP/PDU ☒

1. Description of existing requirements and proposed change(s). Advantages/Disadvantages
   Existing:(1)Typ. Sect. 1.5" SP095C PG70-22 overlay, 1.5" BP-2 shoulders (12' lanes with shoulders)
   (2)Typ. Sect. 3" SP095C pg70-22 overlay, 3" BP-2 shoulders (12' lanes with shoulders)
   Disadvantages: Greater cost, greater use of natural resources, increased contruction time
   Proposed: Type C U.B.A.W.S., 0.5" BP-3 Shoulders (14' & 16' lanes with 8' shoulder), on sections requiring greater structure bottom course would consist of 1.5" SP095C 70-22 & 1.5" BP-2 shldrs. (Concrete section would only require U.B.A.W.S.)

2. Estimate of reduction in construction costs. $2,240,000.00

3. Prediction of any effects the proposed change(s) will have on other department costs, such as maintenance and operations.
   Potential longer life cycle - Decreased maintenance costs
   Increased surface drainage - reduces up spray and increases traction for safety
   Decreased time required to complete project - less inspection costs for MoDOT and less inconvenience to traveling public
   Reduces Modot's liability to increasing asphalt cement index

4. Anticipated date for submittal of detailed change(s) of items required by Section 104.6 of the Specifications.

   1/12/2009
   (date)

5. Deadline for issuing a change order to obtain maximum cost reduction, noting the effect of contract completion time or delivery schedule.

   1/20/2009 (date)
   Material suppliers need to begin producing in order to meet schedule (effect)

6. Dates of any previous or concurrent submission of the same proposal.

   n/a
   (date and/or dates)

Additional Comments:
Please see attached spreadsheet itemizing the potential savings.

**** Portion Below This Line To Be Filled Out by MoDOT ****

Comments: My concern is that the intent of the project is to add structure to the pavement & whether the UBAWS creates that situation. Whether future overlays would be possible without removal is a concern as well.

[signature] 1-6-08

Submitted By Resident Engineer — Date

Comments: We strongly disagree with this proposal. We are trying to build up the structure of our ~~ma~~ major route pavements. This material is a good surface course, but will not function well as an intermediate lift. Even the SIM Materials engineers agreed with this.

☐ Approval Recommended
☒ Rejection Recommended

Becky Baltz 1-7-08

District Engineer — Date

Comments: PROPOSAL REJECTED FOR REASONS STATED BY DISTRICT.

☐ Approval Recommended
☒ Rejection Recommended

David D. [signature] by [initials] 1-21-09

~~Federal Highway Administration~~
~~Required for FHWA Full Oversight Projects~~ N/A — Date

Comments:

☐ Approval
☐ Rejection

State Construction and Materials Engineer — Date

Distribution: Resident Engineer, Project Manager, District Construction & Materials Engineer, State Construction & Materials Engineer, Value Engineering Administrator – MoDOT, P. O. Box 270, Jefferson City, MO 65102

MEMORANDUM

Missouri Department of Transportation
Construction & Materials
District 7

TO: ~~Dave Ahlvers~~ Dennis Bryant
State Construction & Materials Engineer

FROM: Michael C. Middleton M.C.M.
District Construction & Materials Engineer

RECEIVED
JAN 09 2009
Construction & Materials - ECI

DATE: January 8, 2009

SUBJECT: Contract 081121-703
Job No. J7P0860
Route 71, Bates County
Value Engineering Proposal

Attached you will find three copies of a Value Engineering Proposal from Ideker, Inc. on the above referenced project for your review and signature. I do not recommend approval of this Value Engineering Proposal.

Please return two copies to my attention, retaining the third copy for your records.

Thank you.

IDEKER, INC.

Earth Moving • Concrete • Asphalt

Attention: Mike Middleton

January 6, 2009

Mr. Randall Aulbur, P.E.
Resident Engineer
Nevada Project Office
600 West Outer Road North
Nevada, MO 64772

RE: PRACTICAL DESIGN PROPOSAL
JOB J7P0860, ROUTE 71, BATES COUNTY

Dear Mr. Aulbur:

Based on previous conversations with Mr. Mike Middleton, it is my understanding that MoDOT does not currently have the funds available to complete the above mentioned contract In its entirety. It appears MoDOT will accept the base bid and decline optional sections A and B. Mr. Middleton expressed that he was very interested in any ideas that would save money, but did not believe MoDOT would be interested in an "Ultrathin Bonded Asphalt Wearing Surface" as a Practical Design Proposal. As I continue look for potential cost saving scenarios, I keep coming back to the undeniable cost saving potential of U.B.A.W.S. Paving this project with U.B.A.W.S. would allow MoDOT to complete the project in its entirety for roughly the cost on the original base bid.

Please review the attached practical design proposal for the above referenced project. Based on the existing condition of Route 71, I believe that U.B.A.W.S. is an ideal proposal due to the fact it addresses economical, environmental and safety issues in which we all feel are vital to the future success of MoDOT. U.B.A.W.S. is a great preventative maintenance tool for structurally sound pavements and has been proven to prolong the life of the existing pavement.

Listed below are some of the advantages of U.B.A.W.S.:

- Potential longer life cycle – ref attached FHWA papers
- Decreased maintenance costs
- Safety in the work zone – Construction time will be approx. half the time as original contract HMA.
- Decrease disruption to traveling public
- Increased surface drainage – reduces up spray and increases traction for safety
- Greater rutting resistance
- Smoothness – Ideker averaged 9 inches per mile profile on previous U.B.A.W.S. project
- Greater positive effect on environment i.e. less usage of natural resources
- Reduces MoDOT's liability due to rising asphalt cement index
- Bonuses for smoothness, TSR, Densities, etc. will not be applicable

4614 S. 40th St. • P.O. Box 7140 • St. Joseph, Missouri 64507 • Ph. (816) 364-3970 • FAX. (816) 364-4783

I do believe this is a great opportunity for MoDOT to save money and receive a product that will greatly enhance the life of the pavement. I look forward to further discussing this with you at your earliest convenience.

Sincerely,

Paul Ideker
Ideker, Inc.

Route 71 U.B.A.W.S. Practical Design Proposal

***The below quantities and unit prices are estimated for general acceptance

As-Bid Original Plan Quantities (effected quantities only)

Discription	Quantity	Unit	$/unit	
SP095C PG 70-22	83575.5	Tons	$ 70.39	$ 5,882,879.45
BP-2	42787	Tons	$ 58.70	$ 2,511,596.90
Tack	66350	Gals	$ 2.18	$ 144,643.00
			Total	$ 8,539,119.35

Practical Design Proposed Quantities

UBAWS 16' and 14' lanes
Entire project to receive UBAWS top lift

Discription	Quantity	Unit	$/unit	
ubaws mainline	926376	S.Y.	$ 4.75	$ 4,400,286.00
ubaws ramps	86778	S.Y.	$ 4.75	$ 412,195.50
				$ 4,812,481.50

Only sections specified to receive 3" overlay to receive bottom lift
*deducted SP095C and BP-2 quantities from concrete sections

Discription	Quantity	Unit	$/unit	
SP095C 70-22	9487	Tons	$ 70.39	$ 667,789.93
BP-2	2402	Tons	$ 58.70	$ 140,997.40
Tack	7376	Gals	$ 2.18	$ 16,079.68
				$ 824,867.01

8' Shoulder (0.5" BP-3)

Discription	Quantity	Unit	$/unit	
1/2" BP-3	8455	Tons	$ 75.00	$ 634,125.00
Tack	12352	Gals	$ 2.18	$ 26,927.36
				$ 661,052.36
			TOTAL	$ 6,298,400.87

Total Difference (Combined Savings) $ 2,240,718.48

U.S. Department
of Transportation

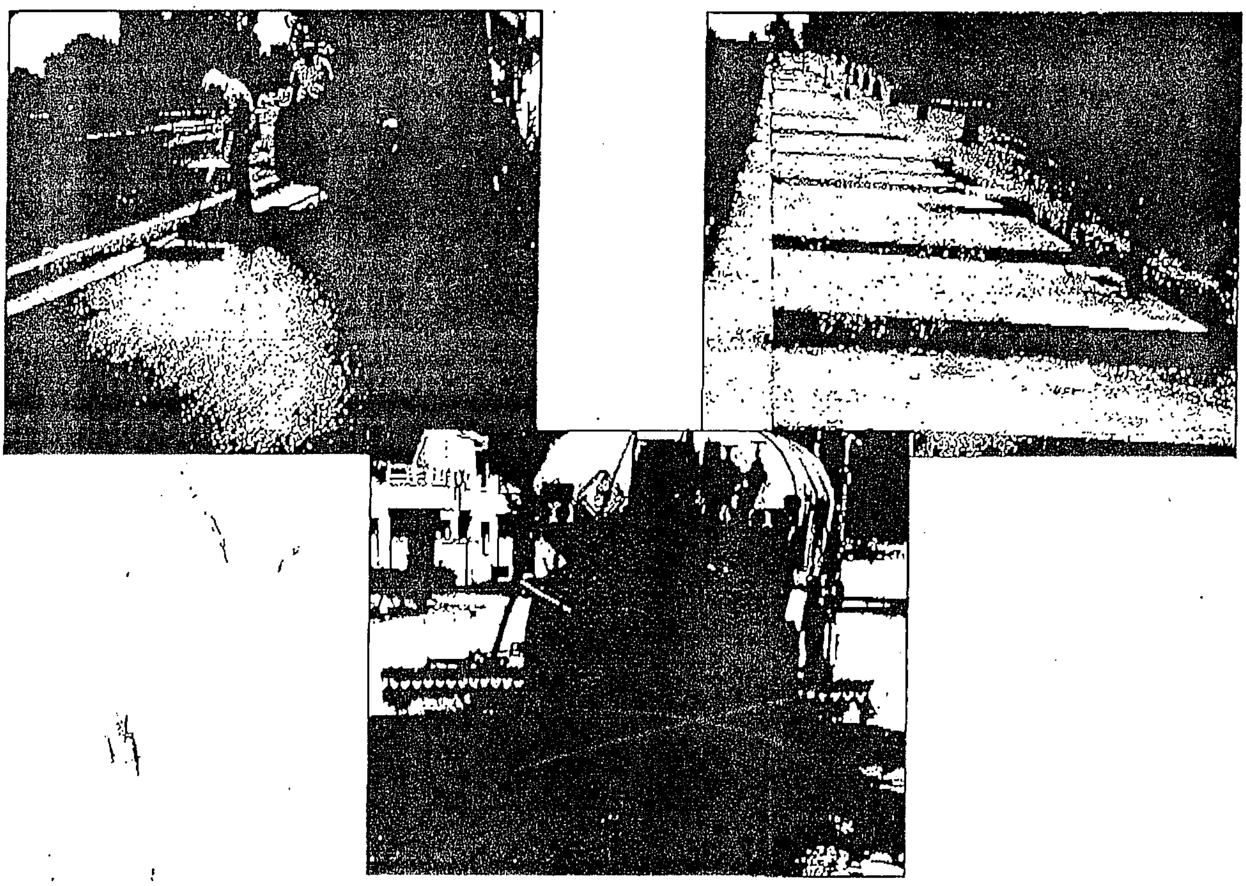
Federal Highway
Administration

Publication No. FHWA-NHI-0X-XXX
October 2007

NHI Course No. 131115

Pavement Preservation: Preventive Maintenance Treatment, Timing, and Selection

Participant Workbook



NATIONAL HIGHWAY INSTITUTE
Training Solutions for Transportation Excellence

IACET

Thin HMA Overlays

HMA Treatments

General Information

Treatment Description: Plant-mixed combinations of asphalt cement and aggregate applied to the pavement in thicknesses between about 19 and 38 mm (0.75 and 1.50 in:. Dense-graded, open-graded, and stone matrix mixes are all used.

Pavement Conditions Addressed: Low-severity cracking; raveling/weathering (loose material must be removed:; friction loss; roughness; low-severity bleeding; low-severity block cracking (may perform better with additional milling:. Thin overlays may also be used to correct rutting (requires use of separate rut-fill application:.

Application Limitations: Thin HMA overlays are not recommended when structural failures exist (e.g., fatigue cracking:, extensive pavement deterioration exists, or if there is high-severity thermal cracking. Surface should be uniform to ensure uniform compaction.

Climate Considerations□Thin HMA overlays perform well in all climatic conditions. Actual performance will vary according to factors that affect weathering and raveling of bituminous surfaces.

Traffic Considerations: Performance is not affected by different ADT or percent trucks. Thin HMA overlays are not structural layers and as such should not be subjected to strain from loadings. Such layers may be subject to top-down cracking under certain combinations of loadings, environmental conditions, and pavement structures.

Construction Considerations: Surface must be clean. A tack coat prior to overlay placement will help improve the bond to the existing surface. Thin HMA overlays dissipate heat rapidly and, therefore, depend upon minimum specified mix placement temperatures and timely compaction.

Expected Life: 7 to 10 years in a preventive maintenance mode.

Typical Costs: \$1.□9 to \$2.88/m² (\$1.25 to \$2.□1/yd²:.

Measure of Effectiveness for Thin HMA Overlays

Corrects	[illegible]
• Poor friction • Roughness • Raveling • Minor rutting • Minor surface defects • Bleeding	• Cracking • Moisture damage

Prevents/Delays	Negatively Affects
• Cracking • Raveling • Roughness	Stripping

The combination of cold milling and the application of a thin HMA overlay is a viable option for improving rideability and surface friction, reducing hydroplaning and tire splash (using an open graded friction course), and improving the profile, crown, and cross slope.

Ultra-Thin Friction Courses

HMA Treatments

General Information

Treatment Description: Relatively new treatment in the U.S. Consists of a gap-graded, polymer-modified 10 to 20 mm (0.4 to 0.8 in) HMA layer placed on a tack coat formed by the application of a heavy, polymer-modified asphalt emulsion.

Pavement Conditions Addressed: low-severity cracking (high-severity can be addressed with cold milling); raveling/weathering (loose material must be removed); high-severity friction loss; low-severity roughness; and low-severity bleeding. Provides very minimal improvement in structural capacity and may retard fatigue cracking. Not suited for rutted pavements.

Application Limitations: Ultra-thin friction courses are not recommended when structural failures exist (e.g., significant fatigue cracking and deep rutting) or if there is high-severity thermal cracking. They also are not appropriate where there is extensive pavement deterioration, or little remaining life.

Climate Considerations: This treatment performs effectively in all climatic conditions.

Traffic Considerations: Capable of withstanding high ADT volumes and truck traffic better than many other thin treatments.

Construction Considerations: Current processes are proprietary and require special paving equipment and licenses to place the mix. Localized structural problems should be repaired prior to overlay application.

Expected Life: 7 to 12 years in a preventive maintenance mode.

Typical Costs: \$3.00 to \$8.00/m^2 (\$3.50 to \$4.00/yd^2)

Measure of Effectiveness for Ultra-Thin Friction Courses

Corrects	[illegible]
• Poor friction • Minor roughness • Raveling • Minor bleeding • Minor surface defects	• Cracking • Moisture damage

Prevents/Delays	Negatively Affects
• Raveling • Roughness	None

An ultra-thin friction course is an alternative to chip seals, microsurfacing, or thin HMA overlays as it effectively addresses minor surface distresses and increases surface friction.

Paul Ideker

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Here is some more information HMA vs NovaChip off of the FHWA website.

http://fhwapap34.fhwa.dot.gov/NHI-PPTCG/index.htm

Chapter 9: Thin Functional Hot Mix Asphalt Overlay Projects

1.0 Introduction

For the purposes of this advisory, functional overlays are defined as thin treatments using a hot mix system. A thin treatment for the purposes of this chapter is a non-structural layer and is applied as a preservation or maintenance treatment, either corrective or preventive. Nationally, thin treatments are less than 37.5 mm (1.5 inches) in thickness.

2.1 What is a Dense Graded Overlay?

Dense graded mixtures have an aggregate structure that is continuously graded (sized) from the largest to the smallest aggregate in the system. They are mixed in a continuous drum type hot mix plant or a batch plant. Many asphalt grades can be used in these mixes. The asphalt selected should reflect properties for different climatic and anticipated distress conditions. For example, certain performance graded binders (PG Grades) are used to prevent thermal cracking caused from a single severe temperature drop (3) and/or during cooler (night) paving conditions. Chemically Modified Crumb Rubber Asphalt (CMCRA) is not usually used in dense graded mixtures due to the more difficult compaction characteristics associated with thin layers and less resistance to reflective cracking.

Aggregate gradations for dense graded mixes may be found in an agency's Standard Specifications. For thin overlays of 25 to 37 mm (1 to 11/2 in), the stone size should be limited to a maximum of one-half the thickness of the layer. Hence, 19 mm (0.75 in) is not usually used and 12.5 mm (0.5 in) medium mixes are usually the upper limit. A typical aggregate gradation for a dense-graded mix is shown in Figure 10. Table 4 shows a typical set of aggregate physical requirements.

2.2.1 Distresses Addressed

Conventional dense graded thin overlays should only be placed on structurally sound pavements because, while they can improve functional performance (i.e., ride quality), they offer little structural improvement. They can be used to mitigate the following distresses present in an existing pavement:

- Raveling
- Oxidation

- Minor cracking
- Minor surface irregularities
- Skid problems

When used in association with a SAMI, or fabric interlayer, they may also retard reflective cracking. In addition, performance graded asphalts can be used to address low temperature cracking and reflective cracking.

2.2.2 Primary Distress Modes

Dense graded thin overlays exhibit the following distress modes:

- Permanent deformation due to heavy traffic and high temperatures.
- Fatigue cracking due to repeated traffic loading.
- Reflection cracking due to cracks in the existing pavement reflecting up through the overlay.
- Raveling due to a number of factors including oxidation and hardening of the binder, water damage, low binder content, and low compaction.
- Stripping (water damage) caused by binder-aggregate incompatibility.
- De-lamination due to poor compaction and/or tack coat practices.

Often these can be addressed by selection of the correct binder and proper mix design. The principal failure modes of dense graded thin overlays are de-lamination, raveling and cracking due to poor compaction. Thin layers cool faster than thick layers reducing the time available for proper compaction. Thus, if a thin overlay is not compacted to the target proportion of air voids, it will tend to be less cohesive and may ravel or de-laminate.

2.2.3 Job Selection

Thin blanket overlays should only be used on sound pavements where minor defects may be present and all construction requirements can be met, especially compaction. Variables that affect job selection include:

- Traffic Loading: In low volume roads, variations in traffic need to be taken into account. Selection should be based on the worst-case scenario. For high volume roads, the principal failure modes are fatigue cracking and permanent deformation. To resist fatigue cracking a thin blanket can be used to extend the pavement life for 1-3 years depending on the mix type.
- Existing Pavement Condition: Dense graded thin overlays should only be used on pavements that do not possess a significant amount of distress. For example, existing pavements with significant quantities of medium to high severity fatigue cracking are poor candidates for a thin overlay. Conversely, pavements that possess distresses that affect the functional performance of the existing pavement (e.g., rideability, poor skid resistance, oxidation, etc.) are generally good candidates for thin overlays provided that a structural enhancement of the existing pavement is not required. Sometimes a thin overlay (with a SAMI) is placed over poor roads to prolong the period until rehabilitation.
- Environment: With proper mix design (i.e., appropriate binder type and content for a given aggregate type and gradation) these mixes have been successfully used in a range of climates. In all climates fatigue cracking can be the principal mode of failure. In hot climates permanent deformation (rutting) can be the principal mode of failure whereas in climates where large temperature swings occur, thermal cracking can be the principal mode of failure. Use of a dense graded thin overlay must take into account the climate in which it is placed in order to avoid distresses that commonly occur in a particular climate.
- A reactive practice would be to typically overlay medium to high fatigue cracked pavements to slow deterioration and prevent pot holes from occurring. The thin overlay would be a stop gap treatment until the proper rehabilitation or reconstruction action can be taken.

2.2.4 Service Life and Costs

Dense graded thin overlays have been shown to last 2 to 10 years, but more commonly last between 4 and 6 years (1). The life of the overlay is directly affected by the condition of the receiving pavement, the climate (environmental conditions) in which the overlay was placed, and the traffic loading experienced by the overlay. For example, a thin overlay placed on a pavement in poor condition would not be expected to last as long as one placed on a pavement in good condition. Similarly, a thin overlay placed on a pavement in good condition but with heavy traffic would not be expected to last as long as one placed on the same pavement, but with much lighter traffic.

Chapter 10: Ultra-Thin, Hot Mixed Asphalt, Bonded Wearing Course Projects

Highway agencies throughout the world face increasing demands and decreasing resources to maintain and preserve their highway networks. The demand to "do more with less" has been an operating slogan for many of these agencies. Historically, the emphasis has been on new facility construction, and rehabilitation or reconstruction of existing facilities. However, most agencies are currently in a maintenance and/or preservation mode, a trend that can be expected to continue in the foreseeable future.

Pavement preservation is a method by which roads are treated before significant failure has occurred. This has the advantage of allowing action before user complaints, and also saving the agency money over the life of the pavement.

1.0 Introduction

A bonded wearing course (BWC) is a gap graded, ultra thin hot-mix asphalt (HMA) mixture applied over a thick polymer-modified asphalt emulsion membrane. The emulsion membrane seals the existing surface and produces high binder content at the interface of the existing roadway surface and the gap-graded mix all in one pass. The gap-graded HMA provides an open surface texture to allow water to flow through the surface. A BWC can be applied and opened to traffic quickly, usually within 15 minutes, without sanding or tracking. Bonded wearing courses are primarily used in high traffic areas as a surface treatment over HMA and PCC surfaces. It can be placed over structurally sound pavements as a maintenance treatment, and may also be used in new construction and rehabilitation projects as the final wearing course.

3.0 Project Selection

3.1 Distress & Application Considerations

While a bonded wearing course is a flexible pavement surface, it is not considered a structural layer. A BWC is a viable application for treating structurally sound, worn pavements and has shown some ability to retard cracking due to its membrane and gap-graded aggregate structure. BWC's are used on both flexible and PCC pavements to correct non-structural surface defects such as skid resistance, noise dampening and splash-and-spray control. They are typically selected for use when speed of construction and user delay are issues. Table 7 outlines the appropriate surface distresses on which a BWC can be placed. Note that the definitions of pavement condition in Table 7 are taken from SHRP Manual P-338 (1).

Table 7: Distress Severity or Extent That Can Be Treated With a BWC (2)

Pavement Type	Cracking	Patching/ Potholes	Surface Deformation	Surface Defects	Joint Deficiencies
	1. Longitudinal & Transverse	Patches:		Bleeding: Moderate	

AC	(Medium) 2. Block (Moderate) 3. Edge (Moderate)	Moderate Potholes: Moderate	Rutting: <12.5 mm Shoving: No	Polished Agg: OK Raveling: Severe	N/A
PCC	1. Corner Breaks (Moderate) 2. Material Related Distress (Low) 3. Longitudinal (Moderate) 4. Transverse (Moderate)	N/A	N/A	Map cracking and scaling: <10 m^2 to 100 m^2	Spalling: Moderate
Note: For PCC, a BWC will not treat blowups, pumping, faulting of joints, or crack widths > 9.5 mm					

3.2.1 Performance

Although never measured, bonded wearing courses have been estimated to last 7 to 12 years (3, 4, 5). The main method of failure is wear; that is, the surface oxidizes and is abraded over time. Premature failure occurs from placement on highly deflecting and cracked surfaces; base failures and delamination occur when placed on dirty or poorly prepared surfaces.

The main performance benefits associated with using a BWC are improved skid resistance, reduced traffic noise, increased ride quality and spray reduction. Figures 1 and 2 shows how the characteristics of a BWC compare with those of other mixture types (3, 4, 7). The figures indicate that a BWC retains good skid resistance characteristics over time and that it is comparable to other wearing courses that provide good skid resistance characteristics. The skid resistance of a BWC varies with increasing speed in a manner similar to stone mastic asphalt (SMA) as shown in Figure 2.

It can be seen that BWCs rate well in comparison to other surface treatments. The data listed in Table 8 have been collected from several sources (3, 7). Splash and spray are important surface characteristics and may be measured in various ways. One method is by hydraulic conductivity. This is done by pressing a special cylinder against the road surface and measuring conductivity. A high number indicates faster drainage. Table 8 shows the results of hydraulic conductivity tests performed on three surface treatments. As the results indicate, BWCs had the highest drainage characteristics of the three surface treatments types tested.

VALUE ENGINEERING CHECK SHEET

N/A

TYPE OF WORK

(Check one that applies)

- ❑ Bridge/Structure/Footings
- ❑ Drainage Structures (RCP, RCB, CMP's, ect.)
- ❑ TCP/MOT
- X Paving (PCCP, ect.)
- ❑ Grading/MSE Walls
- ❑ Signal/Lighting/ITS
- ❑ Misc. ______________________________

SUMMARY OF PROPOSAL

(If needed, condense summary to a couple of lines)

______Use UBAWS for overlay in lieu of SP095

SCANNING OF DOCUMENT

If the proposal is large, please mark or make note, which pages need to be scanned into the database. If there are special instructions, make note of them here.

_______Scan proposal only.