Project file

Memorandum

U.S. Department
of Transportation
Federal Highway Administration

Subject: CA PFH 112-1(1) SOUTH FORK SMITH RIVER ROAD PAVEMENT RECOMMENDATIONS

Date: July 6, 2005

From: Steve Deppmeier, Pavements Engineer

To: Ryan Tyler, Project Manager
Frank Grannis, Lead Designer

The projected traffic loading from data distributed on June 28, 2005 by Frank Grannis will not generate significant pavement loading and thus CFLHD's minimum pavement structural section will be incorporated.

Existing pavement were as follow:

Bridge	Sample Id	HACP	HACP Condition	Base	Subgrade
Rock Creek	C-RC1	6"	Low severity transverse & longitudinal joint cracking	3"	9" – 3' A-1-a (0) GP-GM PI = 5
Boulder Creek	C-BC1	3.5"	Low severity transverse & longitudinal joint cracking	2"	5.5" – 3' A-2-4 (0) SC-SM; R = 40 PI = 5
Steven Memorial	C-SM1	2.5"	Low severity transverse & longitudinal joint cracking	3"	5.5" – 2' A-1-a (0) GC-GM PI = 4
Hurdy Gurdy	C-HG1	4"	Low severity transverse & longitudinal joint cracking	2"	6" – 5' A-1-b (0) SM; R = 73 PI = 1

All surfaces had been chip sealed within the last 3 to 5 years. No significant cracking or other distress was noted within the bridge approach areas.

Subgrade was good material, being classified as A-2-4 or better. A soil resilient modulus of 9500 psi, or design R-Value of 40 was used in the pavement calculations.

Traffic loading is light, with an ADT of 211 for the design year of 2008. A 2% growth factor was applied, generating only an ADT of 314 for 2028. Trucks constitute only 1% of the vehicle classifications.

Rock Creek Bridge Approach: very little pavement distress, HACP 6 inches.

Hurdy Gurdy Bridge Approach: again, very little pavement distress, HACP 4 inches.

Pavement Recommendations

Based on the above, including that the existing pavement is 2.5 inches to 6 inches thick, the following is the recommended pavement design:

3 inches HACP
6 inches Base Course
SN = 2.16

The above is CFL's minimum pavement structural section for a 4R project.

Note: At the contractor's discretion the existing pavement can be recycled and used for base course, fill material, or for temporary detour surfacing.

Pavement Materials

- The HACP should be 403 HACP if less than 5000 tons, or if greater than 5000 tons and placed in only one construction season, specify 402 HACP, Class B, Grading E, with a Type V smoothness.
- Antistrip additive will be Type III (Hydrated Lime) at 1%.
- The asphalt cement should be PG 64-16 if after the state converts to the PG binder grades. If the state has not convert, then the asphalt cement should be AR-4000.
- The 3 inch depth HACP shall be placed in two lifts.
- Tack coat at 0.10 gal/yd^2 is required between lifts and should either be a CSS-1, CSS-1h, SS-1, or SS-1h emulsion.
- A fog seal at 0.10 gal/yd^2 should be included in the contract. The emulsion type can be a CSS-1, CSS-1h, SS-1, SS-1h.
- A prime coat should be applied on the aggregate base material prior to paving. The emulsion type should either be CSS-1, CC-1h, SS-1, or SS-1h. For determining quantities use an application rate of 0.27 gal/yd^2. An item for blotter material should be included at 14.75 lb/yd^2.

Attachments: ADT Summary
DARWin Pavement Calculations
Laboratory Results
May 2004 Material Quotation Sheet by Granite Construction

CC: Mike Voth, Lead Pavements Engineer
Materials

Project Name	CA PFH 112-1(1) South Fork Smith River Road
Date	28-Jun-05
Designer	Grannis

	Existing Traffic Data	Fn	Design Year Traffic
Year	2008		2028
ADT	211	1.488152	314
20 ADT	314		467
DHV	21		31
D %	50		50
T %	1		1

edit outlined items only

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

Flexible Structural Design Module

South Fork Smith River

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	177,348
Initial Serviceability	4.2
Terminal Serviceability	2
Reliability Level	75 %
Overall Standard Deviation	0.49
Roadbed Soil Resilient Modulus	9,500 psi
Stage Construction	1
Calculated Design Structural Number	2.14 in

Rigorous ESAL Calculation

·formance Period (years)	20
Way Traffic (ADT)	675
..ıber of Lanes in Design Direction	1
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	60 %

Vehicle Class	Percent of ADT	Annual % Growth	Average Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs over Performance Period
2	93	1	0.0008	0	2,410
4	2	1	0.2	0	12,958
7	5	1	1	0	161,979
Total	100	-	-	-	177,348

Growth	Simple
Total Calculated Cumulative ESALs	177,348

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(in)	Width (ft)	Calculated SN (in)
1	HACP	0.44	1	3	-	1.32
2	Base Course	0.14	1	6	-	0.84
Total	-	-	-	9.00	-	2.16

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Flexible Structural Design Module

South Fork Smith River

Flexible Structural Design

Structural Number	2.16 in
Initial Serviceability	4.2
Terminal Serviceability	2
Reliability Level	75 %
Overall Standard Deviation	0.49
Roadbed Soil Resilient Modulus	9,500 psi
Stage Construction	1
18-kip ESALs Over Initial Performance Period	189,303

Rigorous ESAL Calculation

Performance Period (years)	20
Way Traffic (ADT)	314
Number of Lanes in Design Direction	1
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	60 %

Vehicle Class	Percent of ADT	Annual % Growth	Average Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs over Performance Period
2	96	1	0.0008	0	1,157
4	2	1	0.2	0	6,028
7	2	1	1	0	30,140
Total	100	-	-	-	37,326

Growth	Simple
Total Calculated Cumulative ESALs	37,326

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(in)	Width (ft)	Calculated SN (in)
1	HACP	0.44	1	3	-	1.32
2	Base Course	0.14	1	6	-	0.84
Total	-	-	-	9.00	-	2.16

U.S. Department of Transportation
Federal Highway Administration

Central Federal Lands Highway Division Laboratory

An AASHTO and ISO Accredited Laboratory

AASHTO R18 ISO/IEC 17025

Report of Soil or Aggregate Tests

Project: California PFH 112-1 (1) South Fork Smith River

Submitted By: Charlie Martinez and Steve Deppmeier

Date Reported: 12/13/2004

Sample Number	Lab Number		04-1832-SB	04-1833-SB	04-1834-SB	04-1835-SB	04-1836-SB
	Field Number		B-C4 SPT 2,3,4	P-C5 SPT #1	B-D2 SPT 1,2,3	B-DN 1 SPT #2	B-DN 1 SPT 3,4
Sample Location	Station or Location		MP 10.7	MP 10.93	MP 13.5	Sta 2+15	Sta 2+15
	Offset		5' Left	3' Left	5' Right	6' Left	6' Left
	Depth		7.0'-18.5'	3.5'-5.0'	2.0'-15.0'	8.5'-10.0'	13.5'-20.0'
AASHTO T 11, T 27 & T 88 Washed Sieve Analysis % Passing	3"	75.0 mm					
	1 1/2"	37.5 mm	100	100	100		
	1"	25.0 mm	97	90	86	100	100
	3/4"	19.0 mm	88	78	76	94	99
	1/2"	12.5 mm	73	65	64	85	96
	3/8"	9.5 mm	64	59	53	78	94
	#4	4.75 mm	47	45	28	56	86
	#8	2.36 mm					
	#10	2.00 mm	36	32	19	44	70
	#16	1.18 mm	31	26	16	38	61
	#30	600 µm					
	#40	425 µm	23	19	11	27	43
	#50	300 µm					
	#100	150 µm	17	14	8	19	28
	#200	75 µm	14	11	6.1	14	19
		20 µm					
		2 µm					
		1 µm					
AASHTO T 255	Moisture, %						
AASHTO T 89 & T 90	Liquid Limit		25	24	24	25	NV
	Plasticity Index		5	5	5	6	NP
Soil Classification	AASHTO M 145		A-1-a (0)	A-1-a (0)	A-1-a (0)	A-1-a (0)	A-1-b (0)
	ASTM D 2487		GC-GM	GP-GC	GP-GC	GC-GM	SM
AASHTO T 190	R –Value						
AASHTO T 288	Min. Resistivity, ohm-cm						
AASHTO T 289	pH						
AASHTO Method	Optimum Moisture, %						
	Maximum Dry Density, pcf						

Distribution:

	Num. / Project File
Laboratory	Darrell Harding
Geotechnical	Charlie Martinez
Pavements	Steve Deppmeier
Materials	1 Copy

Remarks:

Reported By:

Darrell Harding

Form FHWA 1702 Rev. 12/01

QUOTATION

Material	Price per Ton
3/8" Asphalt Concrete	45.75
1/2" Asphalt Concrete	43.25
3/4" Asphalt Concrete	43.50
3/4 Aggregate Base	13.00
1 1/2" Aggregate Base	13.00
Washed Sand	13.00
De-Icing Sand	13.00
3/8" Chips	13.75
1/4" Chips	13.75
3/8" Washed Rock	13.00
SC800 (Pre Mix)	52.50

Location where materials will be Available CARDINITE CONSTRUCTION CO
1390 SOUTH BANK ROAD
CRESCENT CITY CA

Submitted By: TIM BRENNAN
Date: 5-24-04