

INTER OFFICE MEMORANDUM

7/9/2007

TO: Mr. Charles D. Clements, Engineer of Roadway Design

FROM: Mike Fugett, Staff Design Engineer

SUBJECT Paving Type Recommendation
 Job No. 090224
 Bella Vista Bypass Toll Facility (F)
 Route 71 Section 19
 Benton County

The attached pavement design for the subject project is submitted for approval. The following information is a summary of the design.

1. Comparison of alternatives **Main Lanes and Ramps:**

Description	Alt. No. 1	Alt. No. 2	Alt. No. 3
ACHM Surface Course (1/2")	2"		
ACHM Binder Course (1")	3"		
ACHM Base Course (1 1/2")	8"		
Aggregate Base Course (Class 7)	6"		
PCC Pavement (11" U.T.)		11"	11"
Cement Stab. Crushed Stone Base Crs.		6"	6"
ACHM Surface Course (3/8")		1"	1"
Shoulder Type	ACHM	ACHM	PCCP
Calculated Structural No. or Thickness	5.92	11"	11"
Required Structural No. or Thickness	5.85	10.32"	10.32"
Net Present Value	\$46,495,124	\$43,830,465	\$51,261,213

2. Traffic Volume: 2008 ADT 40000
 2028 ADT 56000
 Percent Trucks 11%

3. Comments: Alternate 2 is submitted for approval.
 R Value of 20 received from Materials Division
 Pavement Designs will be used for Main Lanes and Ramps
 18 k ESAL's and Truck % have been verified by Planning and Research Division

Alternative 2 submitted for approval:


 Roadway Design Engineer.

12-5-07
 Date

APPROVED:


 Asst. Chief Engineer - Design

12-6-07
 Date

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

Flexible Structural Design Module

Bella Vista Bypass Toll Facility (F)
Job 090224
Route 71 Section 19
Benton County
Main Lanes - Alt. 1 - Asphalt

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	13,008,600
Initial Serviceability	4.5
Terminal Serviceability	2.5
Reliability Level	90 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	4,305 psi
Stage Construction	1
Calculated Design Structural Number	5.85 in

Specified Layer Design

<u>Layer</u>	<u>Material Description</u>	<u>Struct Coef. (Ai)</u>	<u>Drain Coef. (Mi)</u>	<u>Thickness (Di)(in)</u>	<u>Width (ft)</u>	<u>Calculated SN (in)</u>
1	ACHM SURFACE CRSE. (1/2 in)	0.44	1	2	-	0.88
2	ACHM BINDER CRSE. (1 in)	0.44	1	3	-	1.32
3	ACHM BASE CRSE. (1 1/2 in)	0.36	1	8	-	2.88
4	AGGREGATE BASE CRSE. (CL. ...	0.14	1	6	-	0.84
Total	-	-	-	19.00	-	5.92

Job No. 090224

ALT. NO. 1 20 YEAR DESIGN

LAYER	MATERIAL DESCRIPTION	STRUCTURAL COEFFICIENT	THICKNESS (INCHES)	CALCULATED SN
1	ACHM SURFACE COURSE (1/2")	0.44	2	0.88
2	ACHM BINDER COURSE (1")	0.44	3	1.32
3	ACHM BASE COURSE (1 1/2")	0.36	8	2.88
4	AGGREGATE BASE COURSE	0.14	6	0.84
TOTAL			19	5.92

SN REQUIRED FOR DESIGN: 5.85

Job Length 73300.0 feet = 13.882 miles
 Bridge Length 2768.7 feet = 0.524 miles
 Roadway Length 70531.3 feet = 13.358 miles

TOTAL ROADWAY LENGTH = 70531.3

COST ESTIMATE FOR ONE STATION (one side)

ITEM	WIDTH (feet)	DEPTH (inches)	QUANTITY	UNIT	PRICE	COST
MAIN LANES						
**ACHM Surface Course (1/2")	26	2.00	31.78	Ton	70.41	\$2,237.63
**ACHM Binder Course (1")	26.58	3.00	48.73	Ton	66.15	\$3,223.49
**ACHM Base Course (1 1/2")	27.5	8.00	134.44	Ton	61.80	\$8,308.39
Aggregate Base Course (Class 7)	26	6.00	101.00	Ton	18.00	\$1,818.00
Tack Coat	54.41	.03 gal/sq.yd.	18.14	Gal.	2.00	\$36.28
SHOULDERS						
Inside						
**ACHM Surface Course (1/2")	4.00	2.00	4.89	Ton	70.41	\$344.30
Aggregate Base Course (Class 7)		varies	120.25	Ton	18.00	\$2,164.50
Outside						
**ACHM Surface Course (1/2")	8.00	2.00	9.78	Ton	70.41	\$688.61
Aggregate Base Course (Class 7)		Varies	137.25	Ton	18.00	\$2,470.50
**ASPHALT BINDER PG 76-22					SUB-TOTAL:	\$21,291.70
					+15% E & C:	\$3,193.76

TOTAL: \$ 24,485.46

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

Rigid Structural Design Module

Bella Vista Bypass Toll Facility (F)
Job 090224
Route 71 Section 19
Benton County
Main Lanes - Alt. 2 - Concrete

Rigid Structural Design

Pavement Type	JPCP
18-kip ESALs Over Initial Performance Period	21,035,680
Initial Serviceability	4.5
Terminal Serviceability	2.5
28-day Mean PCC Modulus of Rupture	630 psi
28-day Mean Elastic Modulus of Slab	3,500,000 psi
Mean Effective k-value	176 psi/in
Reliability Level	90 %
Overall Standard Deviation	0.35
Load Transfer Coefficient, J	2.7
Overall Drainage Coefficient, Cd	1
Calculated Design Thickness	10.32 in

Effective Modulus of Subgrade Reaction

<u>Period</u>	<u>Description</u>	<u>Roadbed Soil Resilient Modulus (psi)</u>	<u>Base Elastic Modulus (psi)</u>
1	Winter	4,305	780,000
2	Spring	4,305	780,000
3	Summer	4,305	780,000
4	Fall	4,305	780,000

Base Type	Cement Stabilized Crushed Stone Base Course & Bond Breaker
Base Thickness	6 in
Depth to Bedrock	10 ft
Projected Slab Thickness	11 in
Loss of Support Category	1
Effective Modulus of Subgrade Reaction	176 psi/in

ALT. NO. 2 20 YEAR DESIGN

LAYER	MATERIAL DESCRIPTION	THICKNESS (INCHES)
1	PCC Pavement (jointed, non-reinforced)	11
2	ACHM SURFACE COURSE (3/8")	1
3	CEMENT STABILIZED CRUSHED STONE BASE COURSE	6
TOTAL		18

PCCP Slab Thickness Required by Design 10.32

Job Length 73300.0 feet = 13.882 miles
 Bridge Length 2768.7 feet = 0.524 miles
 Roadway Length 70531.3 feet = 13.358 miles

TOTAL ROADWAY LENGTH = 70531.3

COST ESTIMATE FOR ONE STATION (one side)

ITEM	WIDTH (feet)	DEPTH (inches)	QUANTITY	UNIT	PRICE	COST
MAIN LANES						
PCC Pavement	26.00	11.00	288.89	Sq. Yd.	40.00	\$11,555.60
ACHM Surface Course (3/8")	30.00	1.00	18.33	Ton	70.41	\$1,290.62
Process. Cement Stab. Crushed Stone Base	30.00	6.00	333.33	Sq. Yd.	5.75	\$1,916.65
Aggr. in Cem Stab Crushed Stone Base Crs.	30.00	6.00	109.67	Ton	12.00	\$1,316.04
Cement Stabilized Crushed Stone Base Crs.	30.00	6.00	7.00	Ton	135.00	\$945.00
Tack Coat	30.00	0.03 gal/sq yd	10.00	Gal	2.00	\$20.00
SHOULDERS						
Inside						
ACHM Surface Course (1/2")	4.00	2.00	4.89	Ton	70.41	\$344.30
Aggregate Base Course (Class 7)		Varies	101.50	Ton	18.00	\$1,827.00
Outside						
ACHM Surface Course (1/2")	8.00	2.00	9.78	Ton	70.41	\$688.61
Aggregate Base Course (Class 7)		Varies	117.00	Ton	18.00	\$2,106.00
SUB-TOTAL:						\$22,009.82
+15% E & C:						\$3,301.47

TOTAL: \$ 25,311.29

ALT. NO. 3 20 YEAR DESIGN

LAYER	MATERIAL DESCRIPTION	THICKNESS (INCHES)
1	PCC Pavement (jointed, non-reinforced)	11
2	ACHM SURFACE COURSE (3/8")	1
3	CEMENT STABILIZED CRUSHED STONE BASE COURSE	6
TOTAL		18

PCCP Slab Thickness Required by Design 10.32

Job Length 73300.0 feet = 13.882 miles
 Bridge Length 2768.7 feet = 0.524 miles
 Roadway Length 70531.3 feet = 13.358 miles

TOTAL ROADWAY LENGTH = 70531.3

COST ESTIMATE FOR ONE STATION (one side)

ITEM	WIDTH (feet)	DEPTH (inches)	QUANTITY	UNIT	PRICE	COST
MAIN LANES						
PCC Pavement	26.00	11.00	288.89	Sq. Yd.	40.00	\$11,555.60
ACHM Surface Course (3/8")	30.00	1.00	18.33	Ton	70.98	\$1,301.06
Process. Cement Stab. Crushed Stone Base	30.00		333.33	Sq. Yd.	5.75	\$1,916.65
Aggr. in Cem Stab Crushed Stone Base Crs.	30.00	6.00	109.67	Ton	12.00	\$1,316.04
Cement Stabilized Crushed Stone Base Crs.	30.00	6.00	7.00	Ton	130.00	\$910.00
Tack Coat	30.00	0.03 gal/sq yd	10.00	Gal	2.00	\$20.00
SHOULDERS						
Inside						
PCC Pavement	4.00	11.00	44.44	Sq. Yd.	40.00	\$1,777.60
Aggregate Base Course (Class 7)		Varies	80.00	Ton	18.00	\$1,440.00
Outside						
PCC Pavement	8.00	11.00	88.89	Sq. Yd.	40.00	\$3,555.60
Aggregate Base Course (Class 7)		Varies	70.00	Ton	18.00	\$1,260.00
SUB-TOTAL:						\$25,052.55
+15% E & C:						\$3,757.88

TOTAL: \$ 28,810.43

7/9/2007

**MAINTENANCE & REHABILITATION STRATEGY
FOR RURAL FOUR LANE DIVIDED
ASPHALT PAVEMENTS**

YEAR NO.	TREATMENT
12	COLD MILL ASPHALT PAVEMENT (1" U.T.)
	3" ACHM OVERLAY
20	COLD MILL ASPHALT PAVEMENT (4" U.T.)
	6" ACHM OVERLAY
	INSTALL GUARDRAIL
30	COLD MILL ASPHALT PAVEMENT (1" U.T.)
	3" ACHM OVERLAY

**ROAD USER COST IS CONSIDERED NEGLIGIBLE.
AGENCY COST IS CONSIDERED NEGLIGIBLE.**

**MAINTENANCE & REHABILITATION STRATEGY
FOR RURAL FOUR LANE DIVIDED
CONCRETE PAVEMENTS**

YEAR NO.	TREATMENT
15	JOINT REHAB ALL JOINTS
	CONCRETE PATCH 3% OF PAVEMENT AREA
	GRIND 20% OF PAVEMENT AREA
25	CONCRETE PATCH 5% OF PAVEMENT AREA
	CLEAN & FILL JOINTS
	6" ACHM OVERLAY
	INSTALL GUARDRAIL
35	

**ROAD USER COST IS CONSIDERED NEGLIGIBLE.
AGENCY COST IS CONSIDERED NEGLIGIBLE.**

**LIFE CYCLE COST ANALYSIS
ALTERNATIVE NO. 1**

7/9/2007

CONSTANT YEAR 2010 DOLLARS USED

ROADWAY LENGTH (ft.) =

70,531

YEAR	YR NO.	ITEM	QUANTITY	UNIT	UNIT COST	COST	
2008	0	INITIAL CONSTRUCTION					
		**ACHM Surface Course (1/2in.)	65,523	Ton	70.41	4,613,474	
		**ACHM Binder Course (1in.)	68,740	Ton	66.15	4,547,151	
		**ACHM Base Course (1 1/2in.)	189,644	Ton	61.80	11,719,999	
		Aggregate Base Course (Cl. 7)	505,707	Ton	18.00	9,102,726	
		Tack Coat	25,589	Gallon	2.00	51,178	
		15% E & C				4,505,179	
SUBTOTAL						34,539,707	
DISCOUNTED COST						34,539,707	
2020	12	MAINTENANCE & REHABILITATION					
		Cold Milling Asphalt Pavement	376,165	Sq. Yd.	1.33	500,299	
		Tack Coat	94,041	Gallon	2.12	199,367	
		**ACHM Surface Course Overlay (1/2in.)	82,756	Ton	74.70	6,181,873	
		Topsoil Furnished and Placed	784	Cu. Yd.	5.57	4,367	
SUBTOTAL						6,885,906	
DISCOUNTED COST						4,401,420	
2028	20	MAINTENANCE & REHABILITATION					
		Cold Milling Asphalt Pavement	376,165	Sq. Yd.	1.33	500,299	
		Tack Coat	94,041	Gallon	2.12	199,367	
		**ACHM Surface Course Overlay (1/2")	65,515	Ton	74.70	4,893,971	
		**ACHM Binder Course Overlay (1")	82,756	Ton	70.18	5,807,816	
		Guardrail (Type A)	4,000	Feet	14.90	59,600	
		Guardrail Terminal (Type 2)	20	Each	2156.30	43,126	
		Thrie Beam Guard Rail Terminal	20	Each	1526.69	30,534	
		Topsoil Furnished and Placed	784	Cu. Yd.	5.57	4,367	
SUBTOTAL						11,539,080	
DISCOUNTED COST						5,472,983	
2038	30	MAINTENANCE & REHABILITATION					
		Cold Milling Asphalt Pavement	376,165	Sq. Yd.	1.33	500,299	
		Tack Coat	94,041	Gallon	2.12	199,367	
		**ACHM Surface Course Overlay (1/2in.)	82,756	Ton	74.70	6,181,873	
		Topsoil Furnished and Placed	784	Cu. Yd.	5.57	4,367	
SUBTOTAL						6,885,906	
DISCOUNTED COST						2,249,264	
2043	35	MAINTENANCE & REHABILITATION					
		Salvage Value - Asphalt Pavement	344,818	Cu. Yd.	(1.80)	(620,672)	
SUBTOTAL						(620,672)	
DISCOUNTED COST						(168,250)	

**ASPHALT BINDER PG 76-22

TOTAL NET PRESENT VALUE FOR THIS ALTERNATIVE

\$46,495,124

**LIFE CYCLE COST ANALYSIS
ALTERNATIVE NO. 2**

7/9/2007

CONSTANT YEAR 2010 DOLLARS USED

ROADWAY LENGTH (ft.) =

70,531

YEAR	YR NO.	ITEM	QUANTITY	UNIT	UNIT COST	COST
2009	0	INITIAL CONSTRUCTION				
		PCC Pavement (11" U.T.)	407,514	Sq. Yd.	40.00	16,300,560
		**ACHM Surface Course (3/8")	25,857	Ton	70.98	1,835,330
		**ACHM Surface Course (1/2")	20,694	Ton	70.41	1,457,065
		Process. Cement Stab. Crushed Stone Base Crse.	470,202	Sq. Yd.	5.75	2,703,662
		Aggregate in Cem Stab Crushed Stone Base Crs	154,703	Ton	12.00	1,856,436
		Cement Stabilized Crushed Stone Base Crse.	9,874	Ton	130.00	1,283,620
		Aggregate Base Course (Cl. 7)	308,220	Ton	18.00	5,547,960
		Tack Coat	14,106	Gal	2.00	28,212
		15% E & C				4,647,695
SUBTOTAL						35,660,540
DISCOUNTED COST						35,660,540
2024	15	MAINTENANCE & REHABILITATION				
		Joint Rehab	385,569	Lin. Ft.	3.98	1,534,565
		R & D Concrete Pavement for Patching	12,225	Sq. Yd.	36.60	447,435
		PCCP Patching (11" U.T.)	12,225	Sq. Yd.	109.68	1,340,838
		Grinding PCCP	81,502	Sq. Yd.	2.39	194,790
		Scarify & Recompact Shoulders	188,083	Sq. Yd.	4.24	797,472
		**ACHM Surface Course (1/2")	20,694	Ton	74.70	1,545,842
SUBTOTAL						5,860,942
DISCOUNTED COST						883,496
2034	25	MAINTENANCE & REHABILITATION				
		R & D Concrete Pavement for Patching	20,376	Sq. Yd.	36.60	745,762
		PCCP Patching (11" U.T.)	20,376	Sq. Yd.	109.68	2,234,840
		Clean & Fill Joints	385,569	Lin. Ft.	3.98	1,534,565
		**ACHM Surface Course Overlay (1/2")	65,515	Ton	74.70	4,893,971
		**ACHM Binder Course Overlay (1")	131,031	Ton	70.18	9,195,756
		Tack Coat	17,868	Gallon	2.12	37,880
		Guardrail (Type A)	4,000	Lin. Ft.	14.90	59,600
		Guardrail Terminal (Type 2)	20	Each	2156.30	43,126
		Thrie Beam Guard Rail Terminal	20	Each	1526.69	30,534
		Topsoil Furnished and Placed	7,210	Cu. Yd.	5.57	40,160
SUBTOTAL						18,816,194
DISCOUNTED COST						7,406,243
2044	35	MAINTENANCE & REHABILITATION				
		Salvage Value - Concrete Pavement	376,165	Sq. Yd.	-0.29	(109,088)
		Salvage Value - Asphalt Pavement	184,948	Cu. Yd.	-1.80	(332,906)
SUBTOTAL						(441,994)
DISCOUNTED COST						(119,814)

**ASPHALT BINDER PG 64-22

TOTAL NET PRESENT VALUE FOR THIS ALTERNATIVE

\$43,830,465

**LIFE CYCLE COST ANALYSIS
ALTERNATIVE NO. 3**

7/9/2007

CONSTANT YEAR 2010 DOLLARS USED

ROADWAY LENGTH (ft.) =

70,531

YEAR	YR NO.	ITEM	QUANTITY	UNIT	UNIT COST	COST	
2009	0	INITIAL CONSTRUCTION					
		PCC Pavement (11" U.T.)	595,592	Sq. Yd.	40.00	23,823,680	
		ACHM Surface Course (3/8")	25,857	Ton	70.98	1,835,330	
		Process. Cement Stab. Crushed Stone Base Crse.	470,202	Sq. Yd.	5.75	2,703,662	
		Aggregate in Stabilized Crushed Stone Base Crse.	154,703	Ton	12.00	1,856,436	
		Cement in Stabilized Crushed Stone Base Crse.	9,874	Sq. Yd.	130.00	1,283,620	
		Aggregate Base Course (Cl. 7)	211,593	Ton	18.00	3,808,674	
		Tack Coat	14,106	Gal.	2.00	28,212	
		15% E & C				5,300,942	
SUBTOTAL						40,640,556	
DISCOUNTED COST						40,640,556	
2024	15	MAINTENANCE & REHABILITATION					
		Joint Rehab	479,611	Lin. Ft.	3.98	1,908,852	
		R & D Concrete Pavement for Patching	16,927	Sq. Yd.	36.60	619,528	
		PCCP Patching (11" U.T.)	16,927	Sq. Yd.	109.68	1,856,553	
		Grinding PCCP	112,850	Sq. Yd.	2.39	269,712	
SUBTOTAL						4,654,645	
DISCOUNTED COST						2,660,273	
2034	25	MAINTENANCE & REHABILITATION					
		R & D Concrete Pavement for Patching	28,212	Sq. Yd.	36.60	1,032,559	
		PCCP Patching (11" U.T.)	28,212	Sq. Yd.	109.68	3,094,292	
		Clean & Fill Joints	479,611	Lin. Ft.	3.98	1,908,852	
		**ACHM Surface Course Overlay (1/2")	65,515	Ton	74.70	4,893,971	
		**ACHM Binder Course Overlay (1")	131,031	Ton	70.18	9,195,756	
		Tack Coat	17,868	Gallon	2.12	37,880	
		Guardrail (Type A)	4,000	Lin. Ft.	14.90	59,600	
		Guardrail Terminal (Type 2)	20	Each	2156.30	43,126	
		Thrie Beam Guard Rail Terminal	20	Each	1526.69	30,534	
		Topsoil Furnished and Placed	7,210	Cu. Yd.	5.57	40,160	
SUBTOTAL						20,336,730	
DISCOUNTED COST						8,004,741	
2044	35	MAINTENANCE & REHABILITATION					
		Salvage Value - Concrete Pavement	564,248	Sq. Yd.	-0.29	(163,632)	
SUBTOTAL						(163,632)	
DISCOUNTED COST						(44,357)	

**ASPHALT BINDER PG 64-22

TOTAL NET PRESENT VALUE FOR THIS ALTERNATIVE

\$51,261,213

JOB INFO

Job No. 090224

Bella Vista Bypass Toll Facility (F)
Route 71 Section 19

4 Lane divided highway with 10' outside shoulder and 6' inside shoulder.

Job Length	73300.000 feet =	13.883 miles
Bridge Length	2768.700 feet =	0.524 miles
Roadway Length	70531.300 feet =	13.358 miles

Number of Underpasses =	5
Number of Bridges =	15

INITIAL CONSTRUCTION COST ANALYSIS PARAMETERS

TODAY	PAVING			
YEAR	YEAR	YEARS	INFLATION	F/P
2008	2010	2	3.0%	1.0609

LIFE CYCLE COST ANALYSIS PARAMETERS

DISCOUNT RATE 3.8%

YEAR	FACTOR
0	1.0000
1	0.9634
2	0.9281
3	0.8941
4	0.8614
5	0.8299
6	0.7995
7	0.7702
8	0.7420
9	0.7149
10	0.6887
11	0.6635
12	0.6392
13	0.6158
14	0.5932
15	0.5715
16	0.5506
17	0.5305
18	0.5110
19	0.4923
20	0.4743
21	0.4569
22	0.4402
23	0.4241
24	0.4086
25	0.3936
26	0.3792
27	0.3653
28	0.3519
29	0.3391
30	0.3266

JOB INFO

31	0.3147
32	0.3032
33	0.2921
34	0.2814
35	0.2711

7/9/2007

Job No. 090224

ITEM LIST

ITEM	UNIT	2008 UNIT PRICE	2010 UNIT PRICE
INITIAL CONSTRUCTION			
**ACHM Surface Course (1/2")	Ton	70.41	
* ACHM Surface Course (3/8")	Ton	70.98	
**ACHM Binder Course (1")	Ton	66.15	
**ACHM Base Course (1 1/2")	Ton	61.80	
Tack Coat	Gallon	2.00	
Aggregate Base Course (CL. 7)	Ton	18.00	
PCC Pavement (11" U.T.)	Sq. Yd.	40.00	
Processing Cement Stabilized Crushed Stone Base Crse.	Sq. Yd.	5.75	
Aggregate in Cem Stab Cr Stone Bs Crse	Ton	12.00	
Cement in Cem Stab Cr Stone Bs Crse	Ton	130.00	
MAINTENANCE & REHABILITATION			
**ACHM Surface Course Overlay (1/2")	Ton	70.41	74.70
**ACHM Binder Course Overlay (1")	Ton	66.15	70.18
Tack Coat	Gallon	2.00	2.12
Grinding PCCP	Sq. Yd.	2.25	2.39
Joint Rehab	Lin. Ft.	3.75	3.98
PCCP Patching (11" U.T.)	Sq. Yd.	103.38	109.68
R & D Concrete Pavement for Patching	Sq. Yd.	34.50	36.60
Cold Milling Asphalt Pavement (< 4")	Sq. Yd.	1.25	1.33
Guardrail (Type A)	Lin. Ft.	14.04	14.90
Guardrail Terminal (Type 2)	Each	2032.52	2156.30
Thrie Beam Guard Rail Terminal	Each	1439.05	1526.69
Topsoil Furnished and Placed	Cu. Yd.	5.25	5.57
Seal Reflective Cracks	Lin. Ft.	1.86	1.97
ACHM Patching of Existing Asphalt Roadwy	Ton	81.32	86.27
Clean & Seal Joints	Lin. Ft.	3.75	3.98
Scarify & Recompact Shoulders	Sq. Yd.	4.00	4.24
Salvage Value of Asphalt Pavement	Cu. Yd.	(1.70)	(1.80)
Salvage Value of Concrete Pavement	Sq. Yd.	(0.27)	(0.29)

18K EQUIVALENT AXLE LOADS

6/14/2007

JOB NUMBER: 090224
 JOB TITLE: 0
 LOCATION: Rt. 71 Sec. 19
 N of 71B interchange

COUNTY: Benton

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
2007 ADT	11	40000	35600	4400
2027 ADT	11	56000	49840	6160
AVERAGE ADT	11	48000	42720	5280

DD = .60 F-FACTOR = 3.683 SN = 5 SI= 2.50

SINGLE AXLES			TANDEM AXLES		
WEIGHT GROUP	# OF AXLES	18K EQ	WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	781	0.16	UNDER 2,000	22	0.00
2,001- 4,000	3326	6.65	2,001- 4,000	94	0.03
4,001- 6,000	1115	11.15	4,000- 6,000	115	0.11
6,001- 8,000	738	25.11	6,001- 8,000	174	0.52
8,001-10,000	1070	94.16	8,001-10,000	283	1.98
10,001-12,000	997	188.50	10,001-12,000	402	5.62
12,001-14,000	526	189.33	12,001-14,000	446	12.03
14,001-16,000	250	155.62	14,001-16,000	380	17.85
16,001-18,000	126	126.26	16,001-18,000	277	21.35
18,001-20,000	75	113.84	18,001-20,000	242	29.22
20,001-22,000	35	77.23	20,001-22,000	210	37.87
22,001-24,000	20	60.55	22,001-24,000	192	49.99
24,001-26,000	10	40.87	24,001-26,000	225	82.06
26,001-28,000	5	29.38	26,001-28,000	272	134.42
28,001-30,000	3	19.08	28,001-30,000	311	204.60
30,001-32,000	2	16.17	30,001-32,000	341	292.24
32,001-34,000	1	10.17	32,001-34,000	304	331.02
34,001-36,000	1	12.63	34,001-36,000	251	346.86
36,001-38,000	0	0.00	36,001-38,000	178	302.19
38,001-40,000	0	0.00	38,001-40,000	140	292.12
			40,001-42,000	107	269.26
			42,001-46,000	81	242.54
			46,001-48,000	55	195.01
			48,001-50,000	31	127.50
			50,001-52,000	19	90.67
			52,001-54,000	15	81.70
			54,001-56,000	9	57.00
			56,001-58,000	4	26.84
			58,001-60,000	2	17.41
TOTALS	9082	1176.84	TOTALS	5179	3270.05

S/A 18K EAL= 1177 T/A 18K = 3270 AUTO 18K = 9
 TOTAL 18K EAL= 4455
 WORKED BY: 0

18K EQUIVALENT AXLE LOADS

6/14/2007

JOB NUMBER: 090224
 JOB TITLE: 0
 LOCATION: Rt. 72 Sec. 19
 N of 71B Interchange

COUNTY: Benton

	% TRUCKS	TOTAL VEHICLES	PASSENGER VEHICLES	COMMERCIAL VEHICLES
2007 ADT	11	40000	35600	4400
2027 ADT	11	56000	49840	6160
AVERAGE ADT	11	48000	42720	5280

DD = .60 F-FACTOR = 3.683 D = 10 SI= 2.50

SINGLE AXLES

TANDEM AXLES

WEIGHT GROUP	# OF AXLES	18K EQ	WEIGHT GROUP	# OF AXLES	18K EQ
UNDER 2,000	781	0.16	UNDER 2,000	22	0.00
2,001- 4,000	3326	6.65	2,001- 4,000	94	0.05
4,001- 6,000	1115	11.15	4,000- 6,000	115	0.23
6,001- 8,000	738	23.63	6,001- 8,000	174	0.87
8,001-10,000	1070	86.67	8,001-10,000	283	3.40
10,001-12,000	997	174.54	10,001-12,000	402	10.04
12,001-14,000	526	177.76	12,001-14,000	446	20.95
14,001-16,000	250	150.12	14,001-16,000	380	30.77
16,001-18,000	126	126.26	16,001-18,000	277	36.60
18,001-20,000	75	119.12	18,001-20,000	242	49.27
20,001-22,000	35	84.31	20,001-22,000	210	64.17
22,001-24,000	20	68.94	22,001-24,000	192	84.79
24,001-26,000	10	48.46	24,001-26,000	225	139.77
26,001-28,000	5	36.02	26,001-28,000	272	230.83
28,001-30,000	3	23.95	28,001-30,000	311	354.48
30,001-32,000	2	20.71	30,001-32,000	341	511.51
32,001-34,000	1	13.26	32,001-34,000	304	592.20
34,001-36,000	1	16.62	34,001-36,000	251	623.34
36,001-38,000	0	0.00	36,001-38,000	178	554.60
38,001-40,000	0	0.00	38,001-40,000	140	543.52
			40,001-42,000	107	508.49
			42,001-46,000	81	464.86
			46,001-48,000	55	379.04
			48,001-50,000	31	251.03
			50,001-52,000	19	180.60
			52,001-54,000	15	163.97
			54,001-56,000	9	116.29
			56,001-58,000	4	55.14
			58,001-60,000	2	36.28
TOTALS	9082	1188.34	TOTALS	5179	6007.07

S/A 18K EAL= 1188 T/A 18K = 6007 AUTO 18K = 9
 TOTAL 18K EAL= 7204
 WORKED BY: 0

Fill – Sta. 934 to 937

Due to the height of the fill and the bridge configuration proposed by Bridge Design, this fill will need to be constructed of rock material. If rock material is used, side slopes should be constructed no steeper than 2:1.

- Fills – Sta. 1003 to 1009**
- Sta. 1013 to 1019**
- Sta. 1020 to 1022**
- Sta. 1045 to 1048**
- Sta. 1086 to 1088**
- Sta. 1106 to 1108**

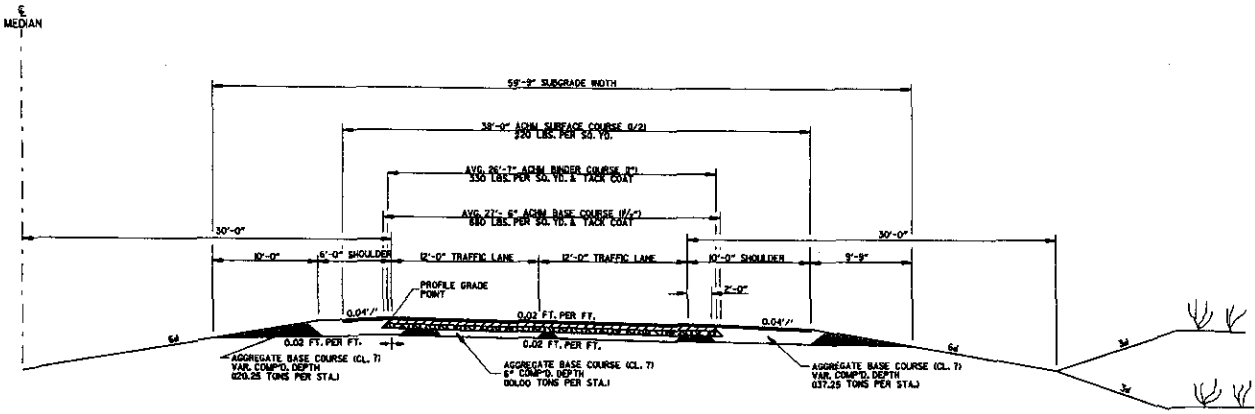
These locations consist of fills that are less than 50 feet in height. They should be constructed of locally available material with slopes no steeper than 3:1. The locally available unspecified material is anticipated to be clay with variable amounts of chert gravel.

- Fill – Sta. 1109 to 1114**
- Sta. 1118 to 1120**

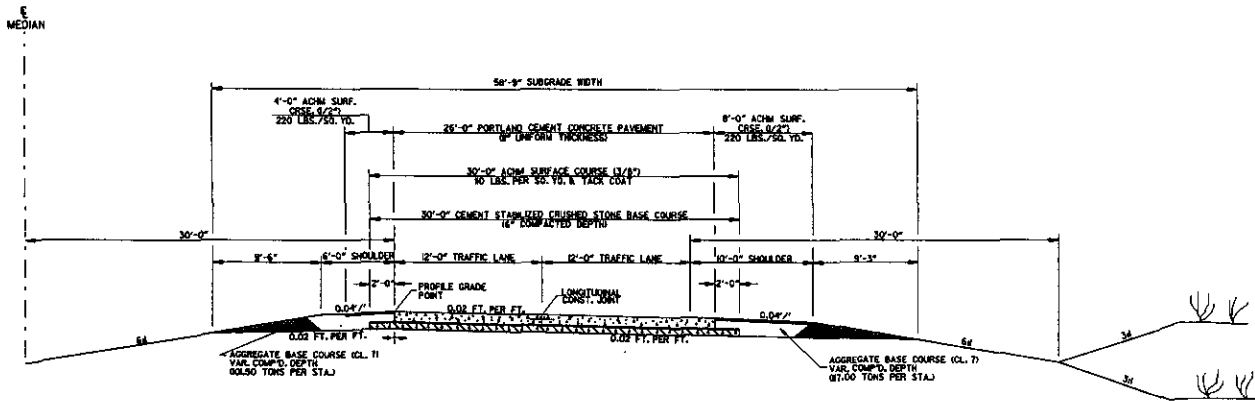
These fills should be constructed of rock material. It is anticipated that some of the rock excavated from the adjacent cut (Station 1120 to 1126) will be used for these fills. This will allow the fill slopes between the ramps and the mainlanes to be constructed as steeply as 1.5:1 greatly reducing or eliminating the need for a retaining wall. Materials Division personnel are currently working with Roadway Design to specifically address the transition zone between these fills and the adjacent rock cuts.

Soil Support

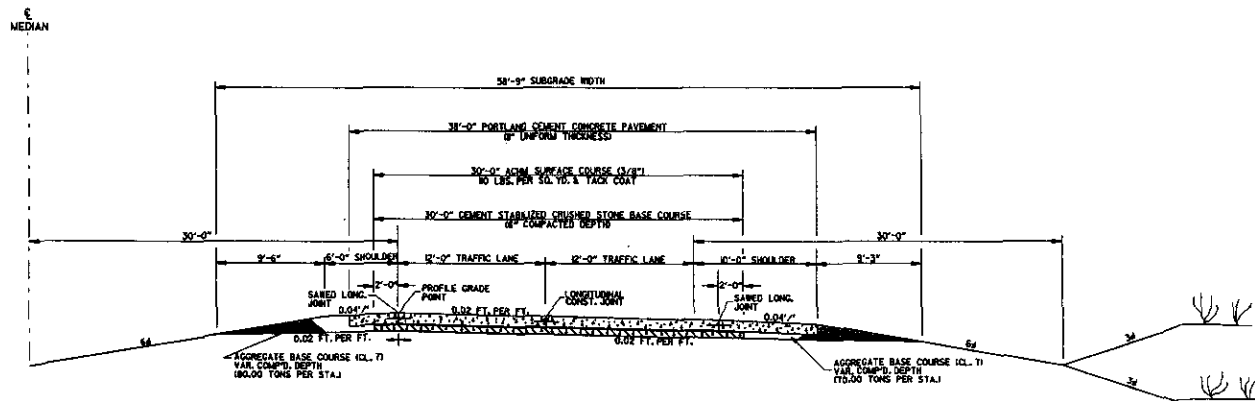
The subgrade material is anticipated to be reddish brown, gravelly (chert fragments) clay to clayey gravel (chert fragments). Based on laboratory tests performed on representative samples, it is recommended that an R-Value of 20 be utilized for design purposes. Also the Resilient Modulus results for this project provided in Table 1.



ALTERNATE NO. 1



ALTERNATE NO. 2



ALTERNATE NO. 3

TYPICAL SECTION OF IMPROVEMENTS

PRELIMINARY
SUBJECT TO REVISION

DATE REVISION	DATE FILED	DATE REVISION	DATE FILED	REVISION NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
				5	ARK.	090224		
2 TYPICAL SECTION OF IMPROVEMENTS								