

# FRAP IN HMA

## A CONTRACTOR'S PERSPECTIVE

Presented By: Steve Kennedy

Rock Road Companies, Inc.

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# CONSIDERATIONS WITH FRAP

- ▣ Effective screening of the millings at  $3/16$ " screen size.
- ▣ Multiple RAP components need to be added at high capacity both accurately and consistently.
- ▣ Both the removal and in the case of the SMA, the addition, of elevated amounts of dust had to be controlled accurately and consistently.
- ▣ Significant cost savings



# FRAP SCREENING PROCESS



- ▣ ASTEC Fold N Go 2612V high frequency screening deck





# ISTHA FRAP PRODUCTS



Passing 3/8"  
& Retained on 3/16"



Passing 3/16"



# ISTHA 3/16" RET FRAP

RAP #1
3/16" ret
4166-03
Rock Road
3.9
25.0
24.2
#6
100.0
100.0
100.0
99.3
56.6
28.6
21.2
16.8
12.3
8.9
6.7

**RAP #1**  
**3/16" Ret @**  
**25% Agg**

**RAP #1**  
**3/16" Ret**  
**@ 3.9% AC**

**RAP #1**  
**3/16" Ret**  
**6.7%**  
**P200**



# ISTHA 3/16" MINUS FRAP

RAP #2
- 3/16"
4166-03
Rock Road
Rock Road
6.0
15.0
14.2
#6
100.0
100.0
100.0
100.0
99.6
84.5
57.0
38.7
25.8
19.1
14.8

**RAP #2**  
**3/16"**  
**Minus @**  
**6.0% AC**

**RAP #2**  
**3/16"**  
**Minus @**  
**15% Agg**

**RAP #2**  
**3/16"**  
**Minus**  
**14.8%**  
**P200**





# ROCK ROAD PLANT #4066-07



- ▣ Rock Road Companies Beloit Plant , #4066-07 is a 2003 Dillman counter flow duo-drum plant capable of producing approximately 600 TPH



# MULTIPLE RAP BINS



- ▣ Two additional RAP bins were added to the plant bringing the total to three





# DUST CONTROL SYSTEM



75 Ton Silo

10k Ib Weigh Pod

10k Ib Weigh Pod

50 hp Blower



# ISTHA FRAP N70 BCS MIX DESIGN

## Bituminous Mixture Design

Design Number :

Lab preparing the design ? (PP,PL,IL,etc)

Producer Name & Number -->

Material Code Number ---->

4166-03	Rock Road
19522R	BIT CONC BC N70 19.0 R

Agg No. Size	#1	#2	#3	#4	#5	RAP #1	RAP #2	ASPHALT
	042CM11	031CM16	039FM20	037FM01	004MF01	3/16" rel	- 3/16"	10125
Source ( PROD # )	52402-13	52400-26	52400-26	52400-26	52202-08	4166-03	4166-03	5627-02
( NAME )	Rock Road	Rock Road	Rock Road	Rock Road	Linwood	Rock Road	Rock Road	Amoco
( LOC )	Van Allen	Townline	Townline	Townline	Linwood		Rock Road	Whiting
Total Mix Blend	27.5	24.0	8.0	0.0	0.5	3.9	6.0	<--%AC in RAP
						25.0	15.0	
Total Agg. Blend	28.2	24.7	8.3	0.0	0.5	24.2	14.2	

Agg No. Sieve Size	#1	#1	#2	#3	#4	#6	#6	Aggregate Blend
1" ( 25.0mm )	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3/4" ( 19.0mm )	88.6	100.0	100.0	100.0	100.0	100.0	100.0	96.8
1/2" ( 12.5mm )	43.4	100.0	100.0	100.0	100.0	100.0	100.0	84.1
3/8" ( 9.5mm )	23.3	97.0	100.0	100.0	100.0	99.3	100.0	77.5
No.4 ( 4.75mm )	3.8	24.0	99.1	99.7	100.0	56.6	99.6	43.5
No.8 ( 2.36mm )	3.0	4.0	65.5	87.6	100.0	28.6	84.5	26.7
No.16 ( 1.18mm )	2.9	3.0	34.3	73.4	100.0	21.2	57.0	18.1
No.30 ( 600µm )	2.9	2.0	19.2	52.6	100.0	16.8	38.7	13.0
No.50 ( 300µm )	2.9	2.0	10.9	17.7	100.0	12.3	25.8	9.4
No.100 ( 150µm )	2.3	2.0	6.0	1.6	98.0	8.9	19.1	7.0
No.200( 75µm )	1.8	2.0	4.0	0.6	90.5	6.7	14.8	5.5



# TYPICAL IDOT N70 BCS MIX DESIGN

## Bituminous Mixture Design

Design Number : → 00BIT0953

Lab preparing the design ? (PP, PL, L, etc)

PP

Producer Number & Name →

4066-07

Rock Road Companies

@ Janesville

← Plant Location

Material Code Number →

19522R

BIT CONC BINDER CSE N70 REC 19.0 mm

0

Agg No. Size	#1	#2	#3	#4	#5	MF	RAP	ASPHALT	
	042CM11	031CM16		039FM20	037FM01	004MF01	017CM16	10127	
Source ( PROD # )	52402-13	52400-26		52400-26	52400-26	52202-08	4066-07	5627-13	
( NAME )	Rock Roads	Rock Roads		Rock Roads	Rock Roads	LINWOOD	Rock Road	BP	
( LOC )	Van Allen	Townline		Townline	Townline	LINWOOD	Beloit	Bartlett, IL	
( ADD. INFO )									
Aggregate Blend:							RAP % →	15.0	
							AC in RAP →	4.4	
	25.0	43.0	0.0	8.5	7.0	1.5	15.0	100.0	

Agg No. Sieve Size	#1	#2	#3	#4	#5	MF	RAP	Aggregate Blend
1" ( 25.0mm )	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3/4" ( 19.0mm )	91.0	100.0	100.0	100.0	100.0	100.0	100.0	97.8
1/2" ( 12.5mm )	39.0	100.0	100.0	100.0	100.0	100.0	100.0	84.8
3/8" ( 9.5mm )	16.0	99.0	100.0	100.0	100.0	100.0	97.0	78.1
No.4 ( 4.75mm )	5.0	19.0	100.0	98.0	98.0	100.0	74.0	37.2
No.8 ( 2.36mm )	4.0	4.0	100.0	66.0	83.0	100.0	55.0	23.9
No.16 ( 1.18mm )	3.0	3.0	100.0	36.0	69.0	100.0	42.0	17.7
No.30 ( 600µm )	3.0	3.0	100.0	21.0	49.0	100.0	33.0	13.7
No.50 ( 300µm )	3.0	2.1	100.0	12.0	17.0	100.0	23.0	8.8
No.100 ( 150µm )	3.0	2.1	100.0	7.0	2.0	92.0	16.0	6.2
No.200 ( 75µm )	2.3	2.1	100.0	4.8	0.8	78.0	11.7	4.9





# COST SAVINGS PER LANE MILE

- Assumed 12' Lane Width, 112 lb/SY/in, 2.5" Binder Lift Thickness, and \$350/Ton AC

	IDOT N70 BCS	ISHTA N70 BCS
Mix Tons	986	986
Opt. % AC	4.7	4.8
% F/RAP	15	40
F/RAP % AC	4.4	4.7
Vir. AC add	4.04	2.92
Vir. AC cost	\$13,942.04	\$10,076.92

- AC Cost Savings of **\$3866** per 12' lane mile per 2.5" Lift; AC Savings of **\$3.92** per mix ton



# COST SAVINGS PER LANE MILE

- Assumed 12' Lane Width, 112 lb/SY/in, 2.5" Binder Lift Thickness, \$8.00/Ton Avg. Vir. Agg. and \$4.00/Ton Avg. F/RAP processing costs

	IDOT N70 BCS	ISHTA N70 BCS
Mix Tons	986	986
% F/RAP	15	40
Vir. Agg %	85	60
Proc. & Agg cost	\$7296.40	\$6310.40

- Agg. Cost Savings of **\$986** per 12' lane mile per 2.5" Lift; Agg. Savings of **\$1.00** per mix ton



# COST SAVINGS PER LANE MILE

	IDOT N70 BCS	ISHTA N70 BCS
Mix Tons	986	986
% F/RAP	15	40
Vir. Agg %	85	60
Proc. & Agg cost	\$7296.40	\$6310.40
Vir. AC cost	\$13,942.04	\$10,076.92
Proc.,Agg,AC cost	\$21,238.44	\$16,387.32

- ▣ Total Cost Savings of **\$4851.12** per 12' lane mile per 2.5" Lift; Total Savings of **\$4.92** per mix ton





# CONCLUSIONS

- ▣ Considerable time and investment is required to produce high FRAP HMA
- ▣ The use of FRAP allows for increased recycling, which saves precious natural resources, while maintaining the same high quality standards accepted in the industry
- ▣ Significant cost savings are realized, benefitting the taxpayers, contractors and the purchasing agency