



Design Summary

Mix Type: RC Type 5-01

Date: March 21, 2023

Project: Various

Mix Design No.: K0503G

Material Description	Percent	Source			
Greenwood 3/4" (#754)	25.0	Greenwood, MO			
Greenwood Dry 3/8" (#932)	9.0	Greenwood, MO			
Greenwood MS (#952)	15.0	Greenwood, MO			
Holliday Nat Sand	10.0	Randolph, MO			
Trap/Granite Quarry ManSand	6.0	Ironton, MO			
Harrisonville 3/8"	5.0	Harrisonville, MO			
Baghouse Fines	(Designed w/ 0.5%)	Asphalt Plant			
KC Fine RAP	23.0	Ideker Asphalt Plant			
KC Coarse RAP	7.0	Ideker Asphalt Plant			
Phillips 66 PG58-28	4.6	Phillips 66 - Kansas City, MO			
Sieve Size (Sieve No.)	Job Mix Formula	Master Grading Limits % Passing		JMF Tolerance	Sieve Gap
37.5 mm (1-1/2")	100.0			±5	
25.0 mm (1")	100.0		100.0	±5	
19.0 mm (3/4")	100.0	95.0	100.0	±5	
12.5 mm (1/2")	89.7			±5	
9.5 mm (3/8")	82.8			±5	
4.75 mm (#4)	62.6			±5	
2.36 mm (#8)	40.3	28.0		±4	
1.18 mm (#16)	28.9			±4	
600 mm (#30)	20.4			±4	
300 mm (#50)	11.9			±4	
150 mm (#100)	7.2				
75 um (#200)	5.5	2.0	6.0	±2	
Mixture Property		Design Value		Spec. Min.	Spec. Max.
Optimum Binder Content, %		4.6		-----	-----
Air Voids (V _A), %		3.7		2	5
Voids in Mineral Aggregate (VMA), %		13.9		13	-----
Virgin AC Added %		3.15		-----	-----
AC From RAP		1.45		-----	-----
Voids Filled with Asphalt (VFA), %		73		65	75
Dust Proportion (Based on Effective Binder Content)		1.1		0.6	1.4
%G _{mm} @ N _{ini}		89.0		-----	90.5
%G _{mm} @ N _{max}		97.4		-----	98.0
TSR		80.9		75.0	-----
Fractured Faces (% with 1 face / % with 2 faces)		100 / 96		85 /	-----
				-----	-----
Flat & Elongated (F&E) (5:1), %		3		-----	20.0
				-----	-----
Unit Weight, pcf		148.8			
Mixing Temperature, °F		300 - 315			
Compaction Temperature, °F		282 - 292			
Combined Bulk Specific Gravity of Aggregate, G _{sb}		2.641			
Combined Apparent Specific Gravity of Aggregate, G _{sa}		2.715			
Effective Specific Gravity of Aggregate, G _{se}		2.657			
Binder Specific Gravity (@ 77 °F), G _b		1.030			



IDEKER, INC.
4614 South 40th Street
PO Box 7140
St. Joseph, MO 64507
(816) 364-3970 FAX (816) 364-4783

Project Information

Mix Type:	RC Type 5-01	Date:	March 21, 2023
Project No:	Various	County:	Various
Route:	Various	Mix Design No:	K0503G
Compaction Type:	Superpave Gyrotory	Number of Gytrations:	75 Gyros (Nmax)

Virgin Aggregates

Description	Material ID	Quarry Location	Ledge	% Absorption	% Chert	P.I.	Gsb	Gsa	C142	C131	C88	Org. Content
Greenwood 3/4" (#754)	----	Greenwood, MO	BF 1-4	1.5	0	-----	2.608	2.715	0.1	24	Na - 7	
Greenwood Dry 3/8" (#932)	----	Greenwood, MO	BF 1-4	1.6	0	-----	2.604	2.716	0.1	24	Na - 7	
Greenwood MS (#952)	----	Greenwood, MO	BF 1-4	1.9	0	1	2.581	2.717	0.1	24	Na - 7	0.01
Holliday Nat Sand	----	Randolph, MO	Sand	0.6	0	-----	2.626	2.665				0.10
Trap/Granite Quarry ManSand	----	Ironton, MO	Traprock	0.7	0	-----	2.605	2.652				
Harrisonville 3/8"	----	Harrisonville, MO	BF	2.5	0	-----	2.545	2.718	0.3	30	Mg - 1	
Baghouse Fines	----	Asphalt Plant	----	0.0	0	-----	2.720	2.720				

Recycled Materials

Description	Material ID	Producer	Source	AC Content	Gmm	Gse
KC Fine RAP	----	Ideker Asphalt Plant	MoDot Projects	5.1	2.525	2.741
KC Coarse RAP	----	Ideker Asphalt Plant	MoDot Projects	3.9	2.585	2.752

Asphaltic Cement

Description	Material ID	Producer	PG Grade	Sp. Gr.	Mixing Temp	Compaction Temp
Phillips 66 PG58-28	----	Phillips 66 - Kansas City, MO	PG58-28	1.030	300 - 315	282 - 292

Chemical Additives / Mineral Fillers

Description	Material ID	Producer / Location	Sp. Gr.	Percent / Dosage

Additional Comments

Gradation without Bag House Fines

Sieve Size	Greenwood 3/4" (#754)	Greenwood Dry 3/8" (#932)	Greenwood MS (#952)	Holliday Nat Sand	Trap/Granite Quarry ManSand	Harrisonville 3/8"	Baghouse Fines	KC Fine RAP	KC Coarse RAP		Cold Feed	Blend	JMF	
	25.0	9.0	15.0	10.0	6.0	5.0	(Designed w/ 0.5%)	23.0	7.0		100.0	100.0	Master Limits	
37.5 mm (1-1/2")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		70.0	100.0		
25.0 mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		70.0	100.0		100
19.0 mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		70.0	100.0	95	100
12.5 mm (1/2")	62.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	89.0		60.5	89.7		
9.5 mm (3/8")	39.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	72.0		54.8	83.8		
4.75 mm (#4)	6.0	49.0	99.0	99.0	98.0	50.0	100.0	90.0	41.0		39.0	62.6		
2.36 mm (#8)	4.0	10.0	74.0	89.0	56.0	15.0	100.0	54.0	29.0		26.0	40.2	28	
1.18 mm (#16)	4.0	8.0	30.0	81.0	32.0	5.0	100.0	45.0	25.0		16.5	28.6		
600 mm (#30)	3.0	7.0	15.0	61.0	18.0	5.0	100.0	33.0	19.0		11.1	20.0		
300 mm (#50)	3.0	6.0	9.0	20.0	9.0	4.0	97.0	22.0	14.0		5.4	11.4		
150 mm (#100)	3.0	5.0	7.0	1.1	5.0	4.0	95.0	14.0	10.0		2.9	6.8		
75 um (#200)	2.1	4.0	4.1	0.6	1.8	3.9	93.0	10.1	7.2		1.9	5.0	2	6
Gsb	2.608	2.604	2.581	2.626	2.605	2.545	2.720	2.741	2.752			2.641		
Gsa	2.715	2.716	2.717	2.665	2.652	2.718	2.720	2.741	2.752			2.715		
Pb								5.15	3.87					

Gradation with Bag House Fines

Sieve Size	Greenwood 3/4" (#754)	Greenwood Dry 3/8" (#932)	Greenwood MS (#952)	Holliday Nat Sand	Trap/Granite Quarry ManSand	Harrisonville 3/8"	Baghouse Fines	KC Fine RAP	KC Coarse RAP		Cold Feed	Blend	JMF	
	25.0	9.0	14.5	10.0	6.0	5.0	0.5	23.0	7.0		100.0	100.0	Master Limits	
37.5 mm (1-1/2")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		70.0	100.0		
25.0 mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		70.0	100.0		100
19.0 mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		70.0	100.0	95	100
12.5 mm (1/2")	62.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	89.0		60.5	89.7		
9.5 mm (3/8")	39.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	72.0		54.8	82.8		
4.75 mm (#4)	6.0	49.0	99.0	99.0	98.0	50.0	100.0	90.0	41.0		39.0	62.6		
2.36 mm (#8)	4.0	10.0	74.0	89.0	56.0	15.0	100.0	54.0	29.0		26.1	40.3	28	
1.18 mm (#16)	4.0	8.0	30.0	81.0	32.0	5.0	100.0	45.0	25.0		16.8	28.9		
600 mm (#30)	3.0	7.0	15.0	61.0	18.0	5.0	100.0	33.0	19.0		11.5	20.4		
300 mm (#50)	3.0	6.0	9.0	20.0	9.0	4.0	97.0	22.0	14.0		5.8	11.9		
150 mm (#100)	3.0	5.0	7.0	1.1	5.0	4.0	95.0	14.0	10.0		3.3	7.2		
75 um (#200)	2.1	4.0	4.1	0.6	1.8	3.9	93.0	10.1	7.2		2.3	5.5	2	6
	2.608	2.604	2.581	2.626	2.605	2.545	2.720	2.741	2.752			2.642		
	2.715	2.716	2.717	2.665	2.652	2.718	2.720	2.741	2.752			2.715		
Pb								5.15	3.87					

HOT MIXED ASPHALT PROPERTIES

Location:	Mosby, MO	AC Specific Gravity (G_b)=	1.030
Compaction:	Superpave Gyratory	Effective Specific Gravity of Aggregate (G_{se})=	2.657
Grade AC: Phillips 66 PG58-28	Number of Gyration: 75 Gyros (N_{max})	Bulk Specific Gravity of Aggregate (G_{sb})=	2.641

General					Weights			Mix Volume	Specific Gravities		Volumes		Unit Weight	Voids				
Specimen Number	Asphalt Content (%)	Height N_{ini} (mm)	Height N_{des} (mm)	Height N_{max} (mm)	In Air (g)	In Water (g)	SSD (g)	Volume (cc)	N_{des} Bulk Gmb	TMD Gmm	Aggregate Volume (cc)	AC by Volume (%)	Unit Weight (pcf)	VA (%)	VMA (%)	VFA (%)	%Gmm @ N_{ini} (%)	%Gmm @ N_{max} (%)
1A	4.1	124.50	115.40	114.10	4703.4	2750.8	4712.5	1961.7	2.371				147.9				87.6	95.6
1B	4.1	124.70	115.30	113.90	4703.1	2745.5	4713.4	1967.9	2.361				147.3				87.1	95.3
1C	4.1																	
Average									2.366	2.508	85.9	9.4	147.6	5.7	14.1	59.9	87.3	95.5
2A	4.6	122.90	113.70	112.40	4714.1	2767.3	4720.2	1952.9	2.386				148.9				89.1	97.5
2B	4.6	123.10	113.80	112.50	4713.7	2762.4	4717.8	1955.4	2.383				148.7				88.9	97.3
2C	4.6																	
Average									2.385	2.477	86.1	10.7	148.8	3.7	13.9	73.1	89.0	97.4
3A	5.1	122.00	112.50	111.30	4710.5	2764.9	4712.6	1947.7	2.393				149.3				89.8	98.5
3B	5.1	122.70	112.60	111.30	4708.3	2767.5	4710.7	1943.2	2.395				149.4				89.5	98.7
3C	5.1																	
Average									2.394	2.456	86.0	11.9	149.4	2.5	14.0	81.9	89.7	98.6
4A	5.6																	
4B	5.6																	
4C	5.6																	
Average															100.0	100.0		

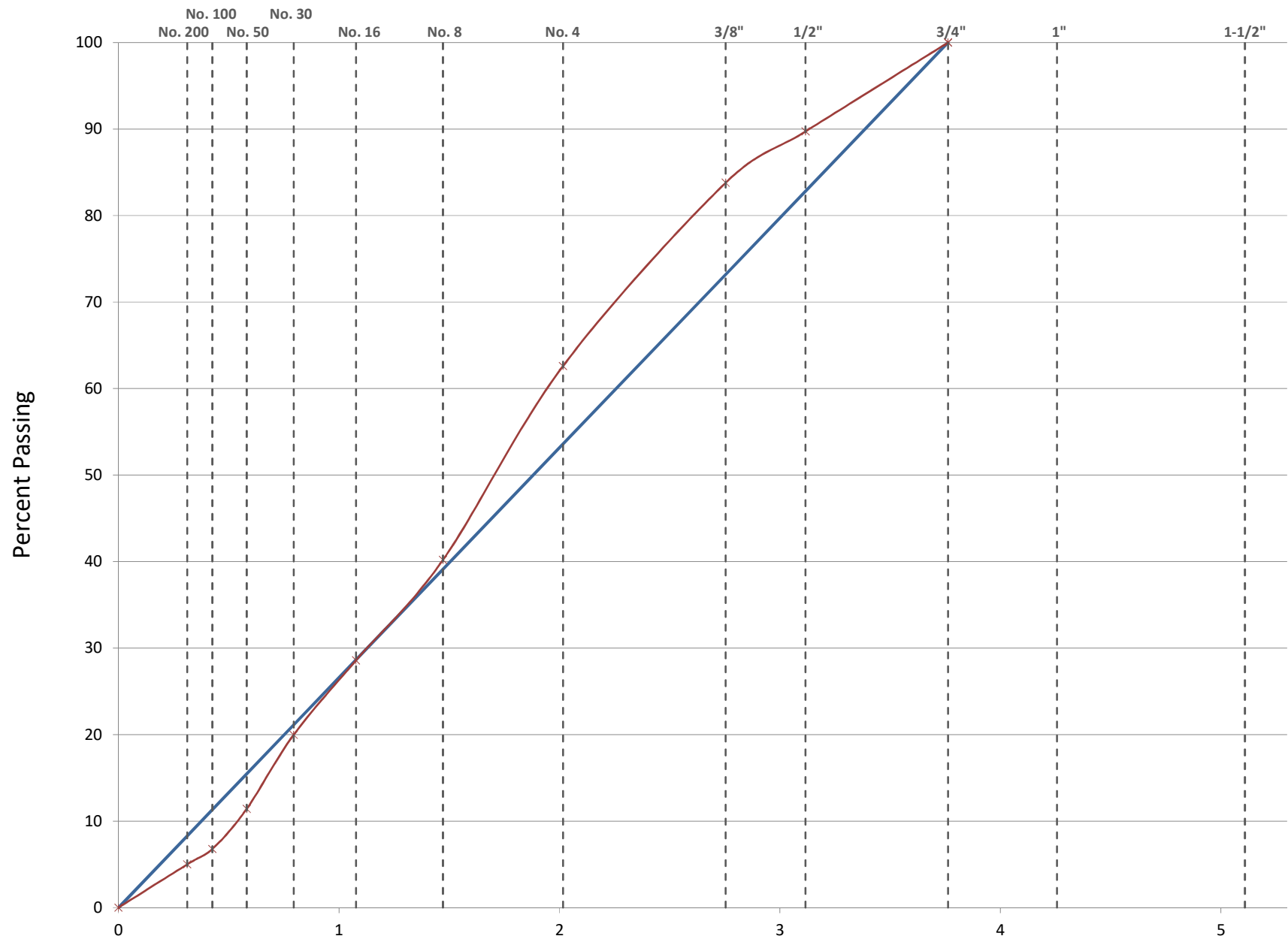
Binder Content, %	Effective Binder, %	Dust Proportion
4.1	3.9	1.3
4.6	4.4	1.1
5.1	4.9	1.0
5.6	5.4	0.9

Mix Type: RC Type 5-01

Date: 03/21/23

Project: Various

Theoretical Maximum Specific Gravity (AASHTO T209 / ASTM D 2041)								
AC Content	4.1	4.1	4.6	4.6	5.1	5.1	5.6	5.6
	Bowl #1	Bowl #2	Bowl #1	Bowl #2	Bowl #1	Bowl #2	Bowl #1	Bowl #2
Weight of Sample	1514.6		1527.5		1530.6			
Weight of Sample (dry back)	1514.6		1527.5		1530.6			
Weight of flask (Calibration)	1345.4		1345.4		1345.4			
Weight of flask filled with water and sample	2256.0		2256.2		2252.8			
G _{mm}	2.508		2.477		2.456			
Average G_{mm}	2.508		2.477		2.456			
G _{mm} (dry back)	2.508		2.477		2.456			
Average G_{mm} (dry back)	2.508		2.477		2.456			



--- Max Density Line

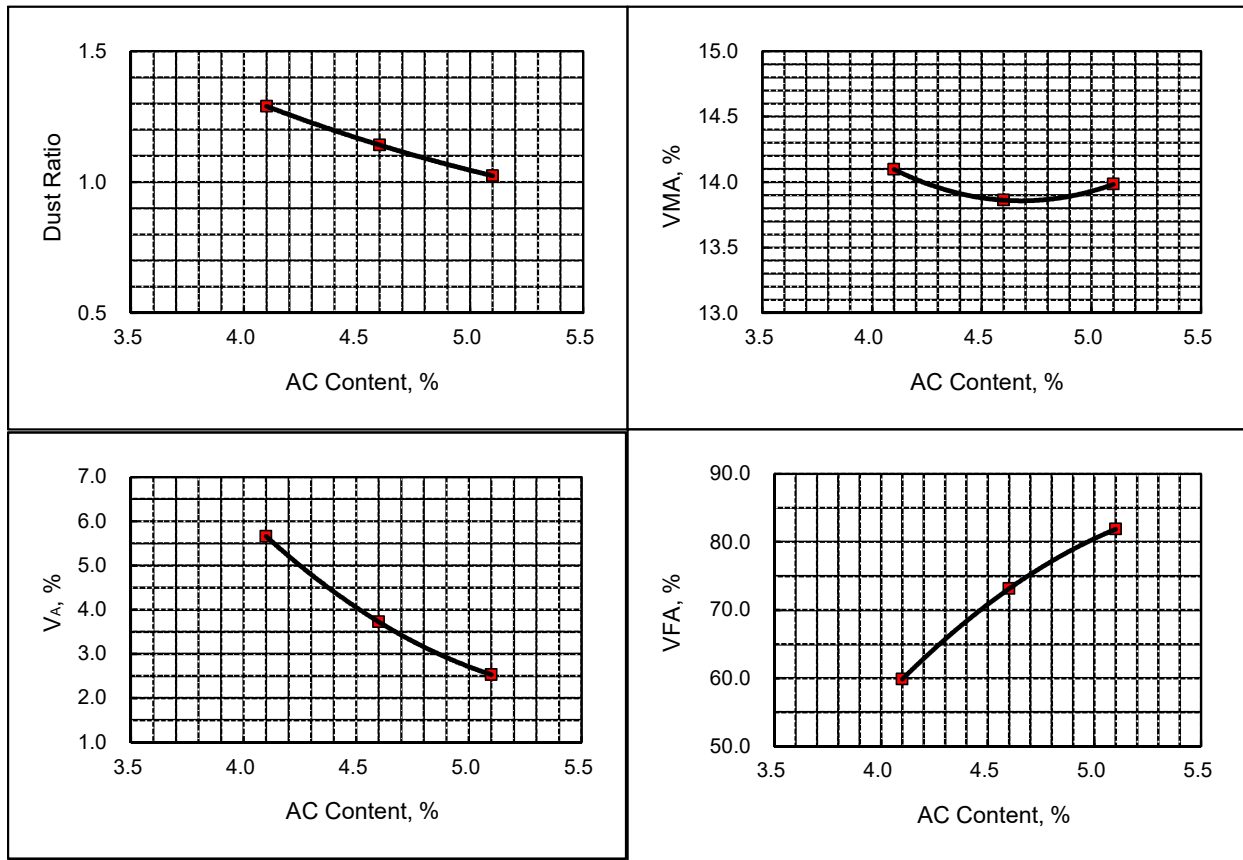
0.45 Power Chart

--x-- Gradation

HOT MIXED ASPHALT PROPERTY CURVES

Mix Type: RC Type 5-01

Project: Various



AC Content (%)	Dust Ratio	VMA (%)	VFA (%)	V _A (%)
4.1	1.3	14.1	59.9	5.7
4.6	1.1	13.9	73.1	3.7
5.1	1.0	14.0	81.9	2.5
5.6	0.9	100.0	100.0	