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KANSAS CITY, MO 64106

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Letter of Transmittal

Attention: Ryan McGinnis, P.E.
Schlagel & Associates, P.A.
14200 W 107th Street
Lenexa, KS 66215

Project: Winterset 13th Plat ESS JOB# 17-W-20 Date: 8/5/2020

New Submittal 08

Transmittal No. 1

Resubmittal

Previous Transmittal No.

Specification Section	Description	Supplier	Action
City Of Lee Summit MO	Asphalt Mix Designs	Seal - O - Matic	For Review

Signed: Dustin Levell

Contractor: Emery Sapp and Sons, Inc.

Remarks:

☒ Reviewed ☐ Not Required for Our Review
☐ Rejected ☐ Revise and Resubmit
☐ Revise Where Noted. Resubmittal Not Required
By: EM SCHLAGEL & ASSOCIATES, P.A. Date: 8/19/2020

Reviewed By: [Signature]

Date: 08/19/2020



Design Summary

Mix Type: Type 5-01

Date: April 29, 2020

Project: Various

Mix Design No.: M0501M

Material Description	Percent	Source			
Greenwood 3/4" (#754)	29.0	Greenwood, MO			
Greenwood Dry 3/8" (#932)	20.0	Greenwood, MO			
Greenwood MS (#952)	20.0	Greenwood, MO			
Bingham Drag Sand	5.0	Picher, OK			
Holliday Nat Sand	15.0	Randolph, MO			
Greenwood Screens (#965)	11.0	Greenwood, MO			
Baghouse Fines	(Designed w/ 0.5%)	Asphalt Plant			
Phillips 66 PG64-22	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")	89.5			±5	
9.5 mm (3/8")	84.3			±5	
4.75 mm (#4)	61.7			±5	
2.36 mm (#8)	39.9	28.0		±4	
1.18 mm (#16)	23.7			±4	
600 mm (#30)	14.9			±4	
300 mm (#50)	10.6			±4	
150 mm (#100)	7.1				
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), %		4.0		3	5
Voids in Mineral Aggregate (VMA), %		13.1		13	-----
Virgin AC Added %		4.60		-----	-----
Voids Filled with Asphalt (VFA), %		70		65	75
Dust Proportion (Based on Effective Binder Content)		1.3		0.6	1.4
%G _{mm} @ N _{ini}		89.5		-----	90.5
%G _{mm} @ N _{max}		97.8		-----	98.0
TSR		83.1		80.0	-----
Fractured Faces (% with 1 face / % with 2 faces)		100 / 96		85 /	-----
Flat & Elongated (F&E) (5:1), %		2		-----	20.0
Unit Weight, pcf		147.6			
Mixing Temperature, °F		300 - 315			
Compaction Temperature, °F		282 - 292			
Combined Bulk Specific Gravity of Aggregate, G _{sb}		2.596			
Combined Apparent Specific Gravity of Aggregate, G _{sa}		2.698			
Effective Specific Gravity of Aggregate, G _{se}		2.641			
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:	Type 5-01	Date:	April 29, 2020
Project No:	Various	County:	Various
Route:	Various	Mix Design No:	M0501M
Compaction Type:	Superpave Gyrotory	Number of Gyration:	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	-----	2.610	2.717	0.1	24	Na - 7	
Greenwood Dry 3/8" (#932)	----	Greenwood, MO	BF 1-4	1.6	0	-----	2.609	2.723	0.1	24	Na - 7	
Greenwood MS (#952)	----	Greenwood, MO	BF 1-4	1.7	0	1	2.575	2.693	0.1	24	Na - 7	0.01
Bingham Drag Sand	----	Picher, OK	Chat	1.4	0	-----	2.558	2.652				0.05
Holliday Nat Sand	----	Randolph, MO	Sand	0.7	0	-----	2.623	2.670				0.10
Greenwood Screens (#965)	----	Greenwood, MO	BF 1-4	1.7	0	2	2.557	2.677				0.01
Baghouse Fines	----	Asphalt Plant	----		0	-----	2.550	2.550				

Recycled Materials

Description	Material ID	Producer	Source	AC Content	Gmm	Gse

Asphaltic Cement

Description	Material ID	Producer	PG Grade	Sp. Gr.	Mixing Temp	Compaction Temp
Phillips 66 PG64-22	----	Phillips 66 - Kansas City, MO	PG64-22	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

[illegible]

Gradation with Bag House Fine

[illegible]

HOT MIXED ASPHALT PROPERTIES

Location: Mosby, MO AC Specific Gravity (G_c)= 1.030

Compaction: Superpave Gyratory Effective Specific Gravity of Aggregate (G_{se})= 2.641

Grade AC: Phillips 66 PG64-22 Number of Gyration: 75 Gyros (N_{max}) Bulk Specific Gravity of Aggregate (G_{sb})= 2.596

General			Weights			Mix Volume	Specific Gravities		Volumes		Unit Weight	Voids			Marshall Info							
Specimen Number	Asphalt Content (%)	Average Height (in.)	In Air (g)	In Water (g)	SSD (g)	Volume (cc)	Bulk Gmb		TMD Gmm	Aggregate Volume (cc)	AC by Volume (%)	Unit Weight (pcf)	VA (%)	VMA (%)	VFA (%)	Measured (lb)	Flow (in.)	Ht @ Nini (mm)	Ht @ Nmax (mm)	%Gmm @ Nini (%)	%Gmm @ Nmax (%)	
1A	4.1		1207.1	697.8	1215.6	517.8	2.331					145.5						125.1	112.9	88.5	97.1	
1B	4.1		1200.4	695.7	1209.7	514.0	2.335					145.7						124.9	112.9	88.6	97.2	
1C	4.1		1201.5	696.5	1211.0	514.5	2.335					145.7										
Average							2.334					2.490	86.2	9.3	145.6	6.3	13.8	54.5				
2A	4.6		1200.3	697.8	1204.3	506.5	2.370					147.9						124.1	112.4	89.4	97.8	
2B	4.6		1199.8	696.8	1204.1	507.3	2.365					147.6						124.6	112.3	89.6	97.7	
2C	4.6		1199.7	696.4	1204.7	508.3	2.360					147.3										
Average							2.365					2.463	86.9	10.6	147.6	4.0	13.1	69.5				
3A	5.1		1196.7	695.0	1198.7	503.7	2.376					148.3						122.8	111.4	90.5	98.4	
3B	5.1		1203.4	697.4	1206.1	508.7	2.366					147.6						122.6	111.2	90.6	98.5	
3C	5.1		1201.4	696.4	1202.7	506.3	2.373					148.1										
Average							2.371					2.441	86.7	11.7	148.0	2.8	13.3	78.6				
4A	5.6																					
4B	5.6																					
4C	5.6																					
Average																100.0	100.0					

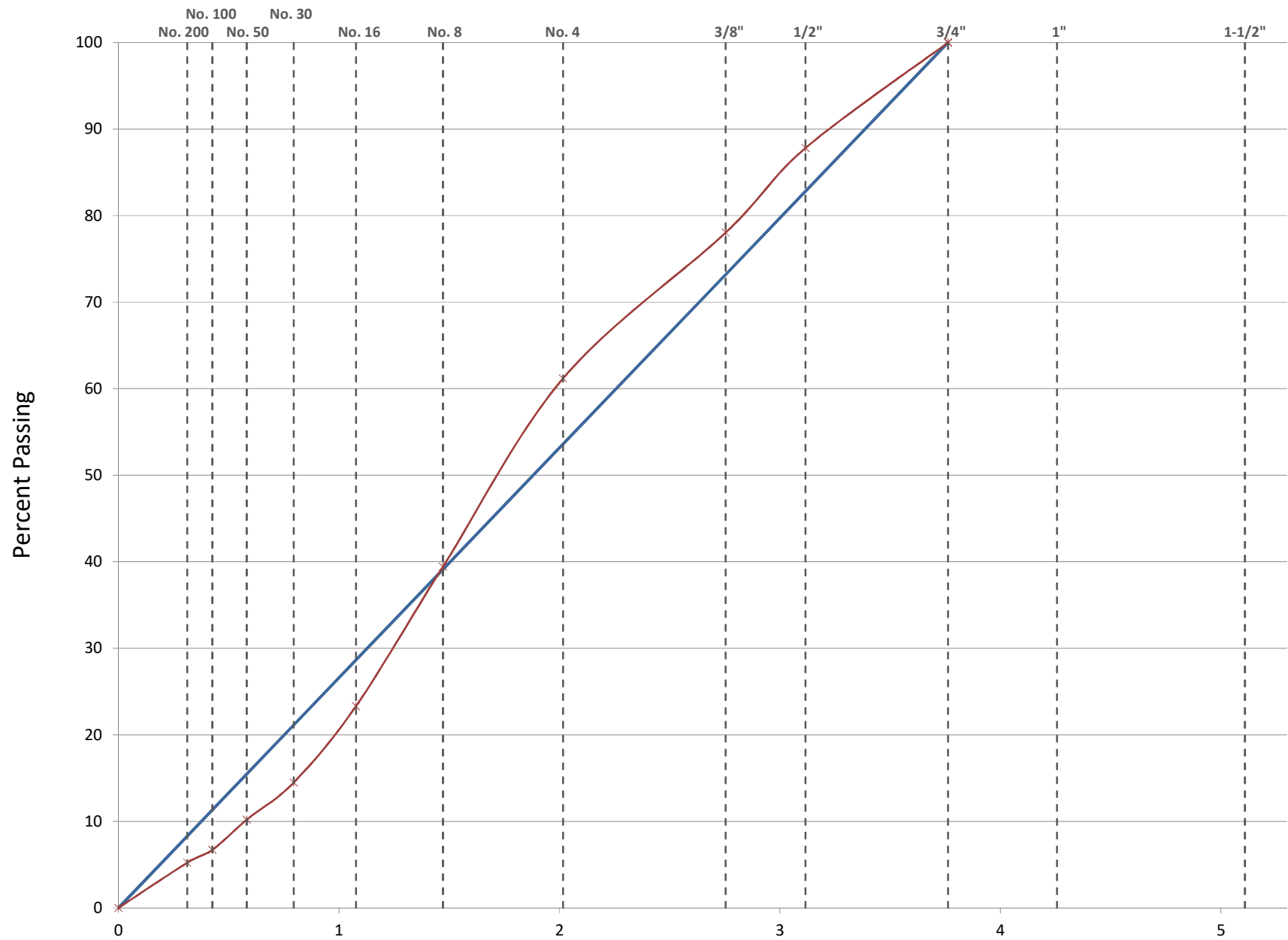
Binder Content, %	Effective Binder, %	Dust Proportion
4.1	3.5	1.5
4.6	4.0	1.3
5.1	4.5	1.2
5.6	5.0	1.0

Mix Type: Type 5-01

Date: 04/29/20

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	1564.2		1645.8		1605.4			
Weight of Sample (dry back)								
Weight of flask (Calibration)	1591.7		1591.7		1591.7			
Weight of flask filled with water and sample	2527.8		2569.4		2539.4			
G _{mm}	2.490		2.463		2.441			
Average G_{mm}	2.490		2.463		2.441			
G _{mm} (dry back)								
Average G_{mm} (dry back)								

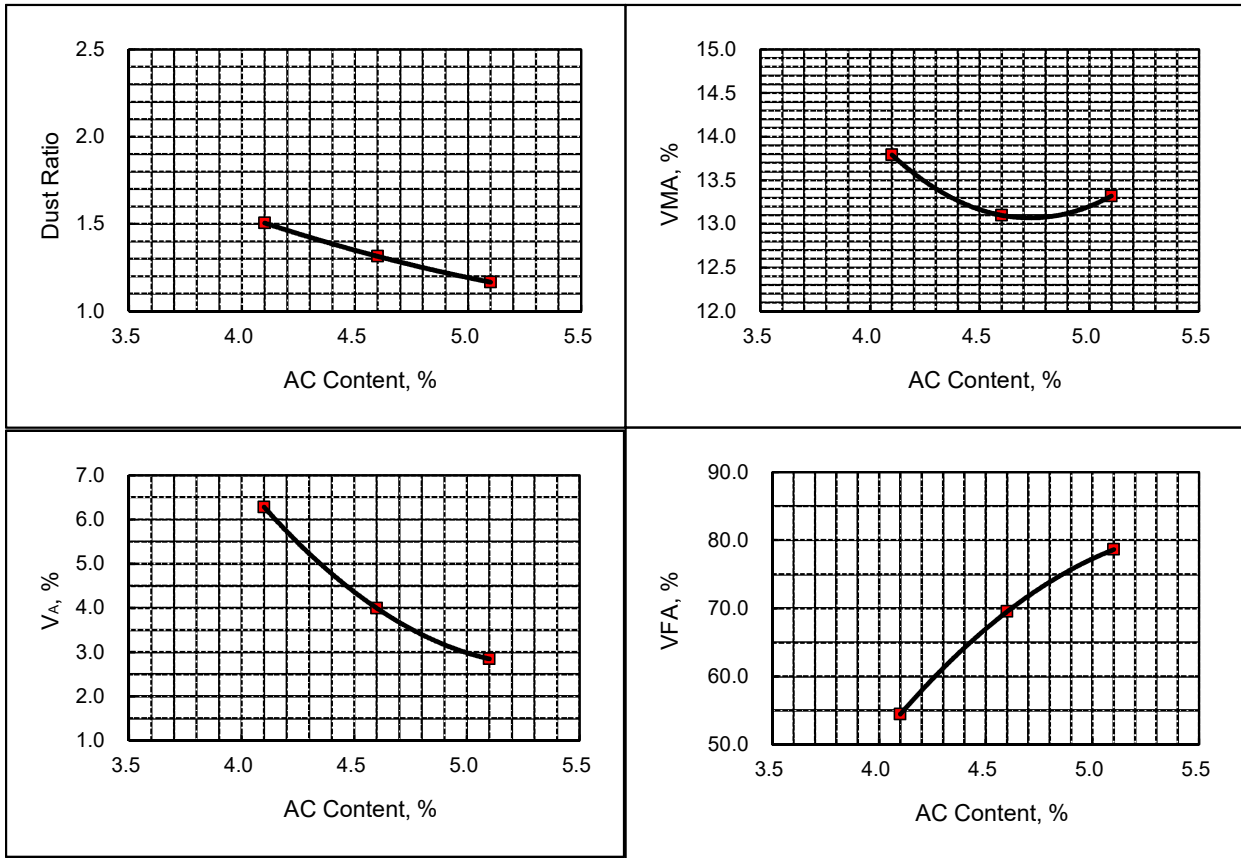


0.45 Power Chart

HOT MIXED ASPHALT PROPERTY CURVES

Mix Type: Type 5-01

Project: Various



AC Content (%)	Dust Ratio	Stability (lb)	Flow (0.01 in.)	VMA (%)	VFA (%)	V _A (%)
4.1	1.5			13.8	54.5	6.3
4.6	1.3			13.1	69.5	4.0
5.1	1.2			13.3	78.6	2.8



Design Summary

Mix Type: RC Type 5-01

Date: March 14, 2020

Project: Various

Mix Design No.: K0503G

Material Description	Percent	Source			
Greenwood 3/4" (#754)	19.0	Greenwood, MO			
Greenwood Dry 3/8" (#932)	11.0	Greenwood, MO			
Greenwood MS (#952)	20.0	Greenwood, MO			
Bingham Drag Sand	5.0	Picher, OK			
Holliday Nat Sand	15.0	Randolph, MO			
Baghouse Fines	(Designed w/ 0.5%)	Asphalt Plant			
KC Fine RAP	25.0	Ideker Asphalt Plant			
KC Coarse RAP	5.0	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")	89.8			±5	
9.5 mm (3/8")	82.0			±5	
4.75 mm (#4)	62.6			±5	
2.36 mm (#8)	38.9	28.0		±4	
1.18 mm (#16)	25.3			±4	
600 mm (#30)	15.9			±4	
300 mm (#50)	11.4			±4	
150 mm (#100)	6.9				
75 um (#200)	5.0	2.0	6.0	±2	
Mixture Property		Design Value		Spec. Min.	Spec. Max.
Optimum Binder Content, %		4.6		-----	-----
Air Voids (V _A), %		3.8		3	5
Voids in Mineral Aggregate (VMA), %		14.0		13	-----
Virgin AC Added %		3.03		-----	-----
AC From RAP		1.57		-----	-----
AC From Shingles				-----	-----
Voids Filled with Asphalt (VFA), %		73.0		65	75
Stability (pounds)				-----	-----
Flow (in.)				-----	-----
Dust Proportion (Based on Effective Binder Content)		1.0		0.6	1.2
%G _{mm} @ N _{ini}		87.6%		-----	90.5
%G _{mm} @ N _{max}		97.2%		-----	98.0
TSR		82.5		75.0	-----
Fractured Faces (% with 1 face / % with 2 faces)		100 / 96		85 /	-----
Flat & Elongated (F&E) (5:1), %		2		-----	20.0
Unit Weight, pcf		148.3			
Mixing Temperature, °F		300 - 315			
Compaction Temperature, °F		282 - 292			
Combined Bulk Specific Gravity of Aggregate, G _{sb}		2.636			
Combined Apparent Specific Gravity of Aggregate, G _{sa}		2.712			
Effective Specific Gravity of Aggregate, G _{se}		2.648			
Binder Specific Gravity (@ 77 °F), G _b		1.030			



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Project Information

Mix Type:	RC Type 5-01	Date:	April 18, 2020
Project No:	Various	County:	Various
Route:	Various	Mix Design No:	K0503G
Compaction Type:	Superpave Gyratory	Number of Gyration:	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	1.6	0	-----	2.597	2.713	0.1	24	Na - 7	
Greenwood Dry 3/8" (#932)	----	Greenwood, MO	BF 1-4	1.8	0	-----	2.591	2.717	0.1	24	Na - 7	
Greenwood MS (#952)	----	Greenwood, MO	BF 1-4	1.8	0	1	2.562	2.689	0.1	24	Na - 7	0.01
Bingham Drag Sand	----	Picher, OK	Chat	1.5	0	-----	2.543	2.647				0.05
Holliday Nat Sand	----	Randolph, MO	Sand	0.7	0	-----	2.623	2.670				0.10
Baghouse Fines	----	Asphalt Plant	----		0	-----	2.550	2.550				

Recycled Materials

Description	Material ID	Producer	Source	AC Content	Gmm	Gse
KC Fine RAP	----	Ideker Asphalt Plant	MoDot Projects	5.5	2.526	2.757
KC Coarse RAP	----	Ideker Asphalt Plant	MoDot Projects	4.1	2.584	2.761

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)	Bingham Drag Sand	Holliday Nat Sand		Baghouse Fines	KC Fine RAP	KC Coarse RAP		Cold Feed	Blend	JMF
	19.0	11.0	20.0	5.0	15.0		(Designed w/ 0.5%)	25.0	5.0		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		70.0	100.0	
25.0 mm (1")	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		70.0	100.0	95 100
12.5 mm (1/2")	58.0	100.0	100.0	100.0	100.0		100.0	91.0	100.0		62.0	89.8	
9.5 mm (3/8")	40.0	99.0	100.0	100.0	100.0		100.0	74.0	99.0		58.5	81.9	
4.75 mm (#4)	15.0	65.0	94.0	98.0	99.0		100.0	38.0	88.0		48.6	62.5	
2.36 mm (#8)	4.0	15.0	42.0	69.0	85.0		100.0	35.0	57.0		27.0	38.6	28
1.18 mm (#16)	4.0	8.0	24.0	41.0	51.0		100.0	26.0	45.0		16.1	24.9	
600 mm (#30)	3.0	7.0	11.0	24.0	28.0		100.0	20.0	31.0		8.9	15.5	
300 mm (#50)	3.0	6.0	7.0	16.0	16.0		97.0	15.0	28.0		5.8	11.0	
150 mm (#100)	3.0	5.0	5.0	7.4	4.0		95.0	10.0	18.0		3.1	6.5	
75 um (#200)	2.4	4.2	4.2	3.2	0.7		93.0	7.5	12.9		2.0	4.5	2 6
Gsb	2.597	2.591	2.562	2.543	2.623		2.550	2.757	2.761			2.636	
Gsa	2.713	2.717	2.689	2.647	2.670		2.550	2.757	2.761			2.712	
Pb								5.47	4.08				

Gradation with Bag House Fines

Sieve Size	Greenwood 3/4" (#754)	Greenwood Dry 3/8" (#932)	Greenwood MS (#952)	Bingham Drag Sand	Holliday Nat Sand		Baghouse Fines	KC Fine RAP	KC Coarse RAP		Cold Feed	Blend	JMF
	18.9	10.9	19.9	4.9	14.9		0.5	25.0	5.0		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		70.0	100.0	
25.0 mm (1")	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		70.0	100.0	95 100
12.5 mm (1/2")	58.0	100.0	100.0	100.0	100.0		100.0	91.0	100.0		62.1	89.8	
9.5 mm (3/8")	40.0	99.0	100.0	100.0	100.0		100.0	74.0	99.0		58.6	82.0	
4.75 mm (#4)	15.0	65.0	94.0	98.0	99.0		100.0	38.0	88.0		48.7	62.6	
2.36 mm (#8)	4.0	15.0	42.0	69.0	85.0		100.0	35.0	57.0		27.3	38.9	28
1.18 mm (#16)	4.0	8.0	24.0	41.0	51.0		100.0	26.0	45.0		16.5	25.3	
600 mm (#30)	3.0	7.0	11.0	24.0	28.0		100.0	20.0	31.0		9.4	15.9	
300 mm (#50)	3.0	6.0	7.0	16.0	16.0		97.0	15.0	28.0		6.3	11.4	
150 mm (#100)	3.0	5.0	5.0	7.4	4.0		95.0	10.0	18.0		3.5	6.9	
75 um (#200)	2.4	4.2	4.2	3.2	0.7		93.0	7.5	12.9		2.5	5.0	2 6
Gsb	2.597	2.591	2.562	2.543	2.623		2.550	2.757	2.761			2.636	
Gsa	2.713	2.717	2.689	2.647	2.670		2.550	2.757	2.761			2.711	
Pb								5.47	4.08				

HOT MIXED ASPHALT PROPERTIES

Location: Mosby, MO AC Specific Gravity (G_c)= 1.030

Compaction: Superpave Gyratory Effective Specific Gravity of Aggregate (G_{se})= 2.648

Grade AC: Phillips 66 PG58-28 Number of Gyration: 75 Gyros (N_{max}) Bulk Specific Gravity of Aggregate (G_{sb})= 2.636

General			Weights			Mix Volume	Specific Gravities		Volumes		Unit Weight	Voids			Marshall Info							
Specimen Number	Asphalt Content (%)	Average Height (in.)	In Air (g)	In Water (g)	SSD (g)	Volume (cc)	Bulk Gmb	TMD Gmm	Aggregate Volume (cc)	AC by Volume (%)	Unit Weight (pcf)	VA (%)	VMA (%)	VFA (%)	Measured (lb)	Flow (in.)	Ht @ Nini (mm)	Ht @ Nmax (mm)	%Gmm @ Nini (%)	%Gmm @ Nmax (%)		
1A	4.1	115.40	4703.0	2726.7	4720.3	1993.6	2.359				147.2						126.6	113.8	85.8%	95.5%		
1B	4.1	115.30	4703.4	2723.6	4721.7	1998.1	2.354				146.9								126.5	113.8	85.8%	95.4%
1C	4.1																					
Average							2.356	2.503	85.7	9.4	147.0	5.8	14.3	59.1								
2A	4.6	114.10	4701.6	2733.8	4711.2	1977.4	2.378				148.4						125.3	112.9	87.6%	97.2%		
2B	4.6	114.00	4700.1	2731.5	4710.8	1979.3	2.375				148.2								125.2	112.8	87.6%	97.2%
2C	4.6																					
Average							2.376	2.470	86.0	10.6	148.3	3.8	14.0	73.0					87.6%	97.2%		
3A	5.1	112.80	4701.8	2736.5	4706.3	1969.8	2.387				148.9						124.4	111.1	88.4%	99.0%		
3B	5.1	112.60	4697.5	2741.1	4702.0	1960.9	2.396				149.5								124.1	110.9	88.5%	99.0%
3C	5.1																					
Average							2.391	2.452	86.1	11.8	149.2	2.5	13.9	82.1								
4A	5.6																					
4B	5.6																					
4C	5.6																					
Average																						

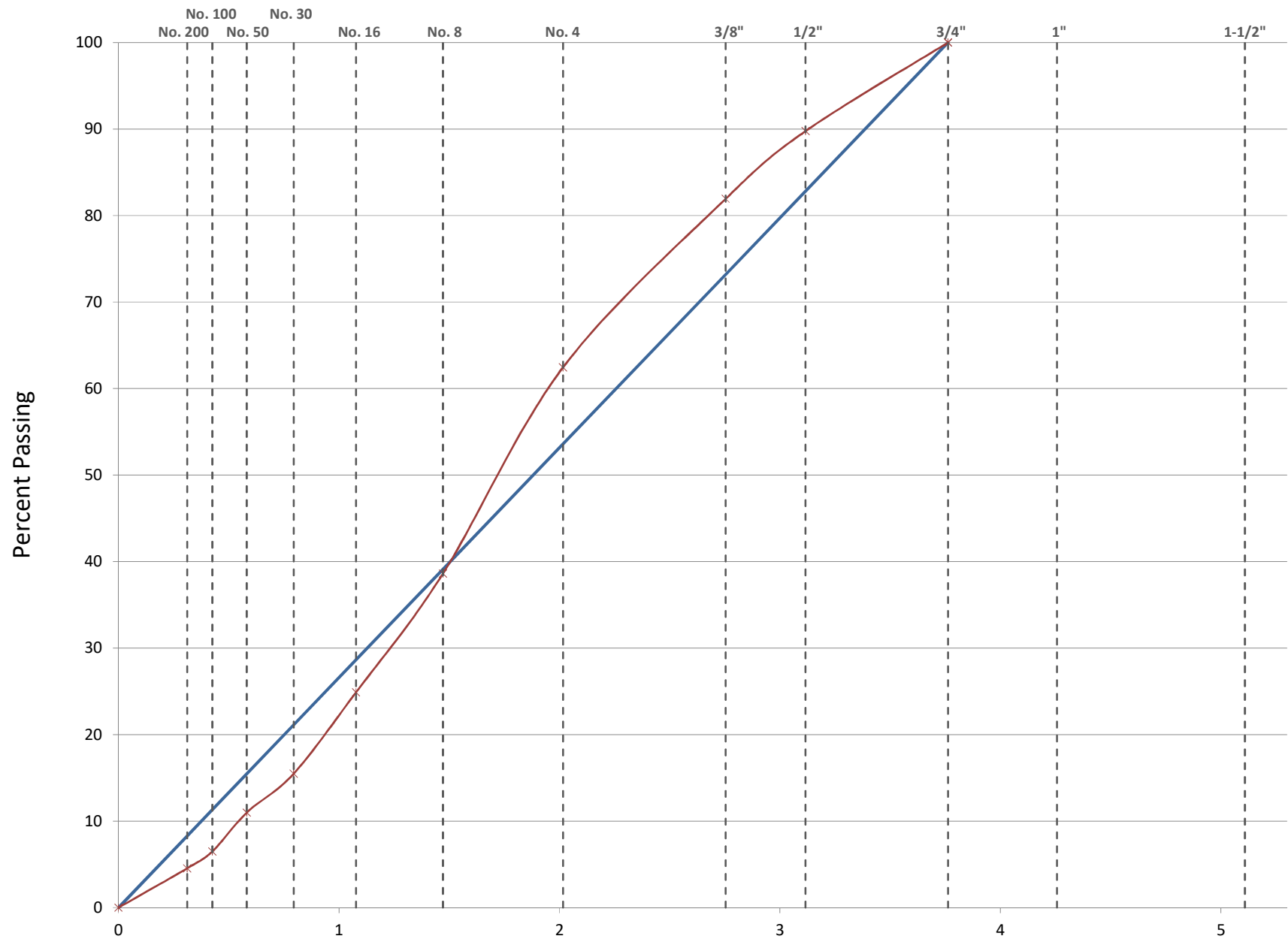
Binder Content, %	Effective Binder, %	Dust Proportion
4.1	3.9	1.2
4.6	4.4	1.0
5.1	4.9	0.9
5.6	5.4	0.8

Mix Type: RC Type 5-01

Date: 03/14/20

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	1563.2		1709.9		1682.4			
Weight of Sample (dry back)	1563.2		1709.9		1682.4			
Weight of flask (Calibration)	1347.8		1347.8		1347.8			
Weight of flask filled with water and sample	2286.4		2365.3		2344.2			
G _{mm}	2.503		2.470		2.452			
Average G_{mm}	2.503		2.470		2.452			
G _{mm} (dry back)	2.503		2.470		2.452			
Average G_{mm} (dry back)	2.503		2.470		2.452			



--- Max Density Line

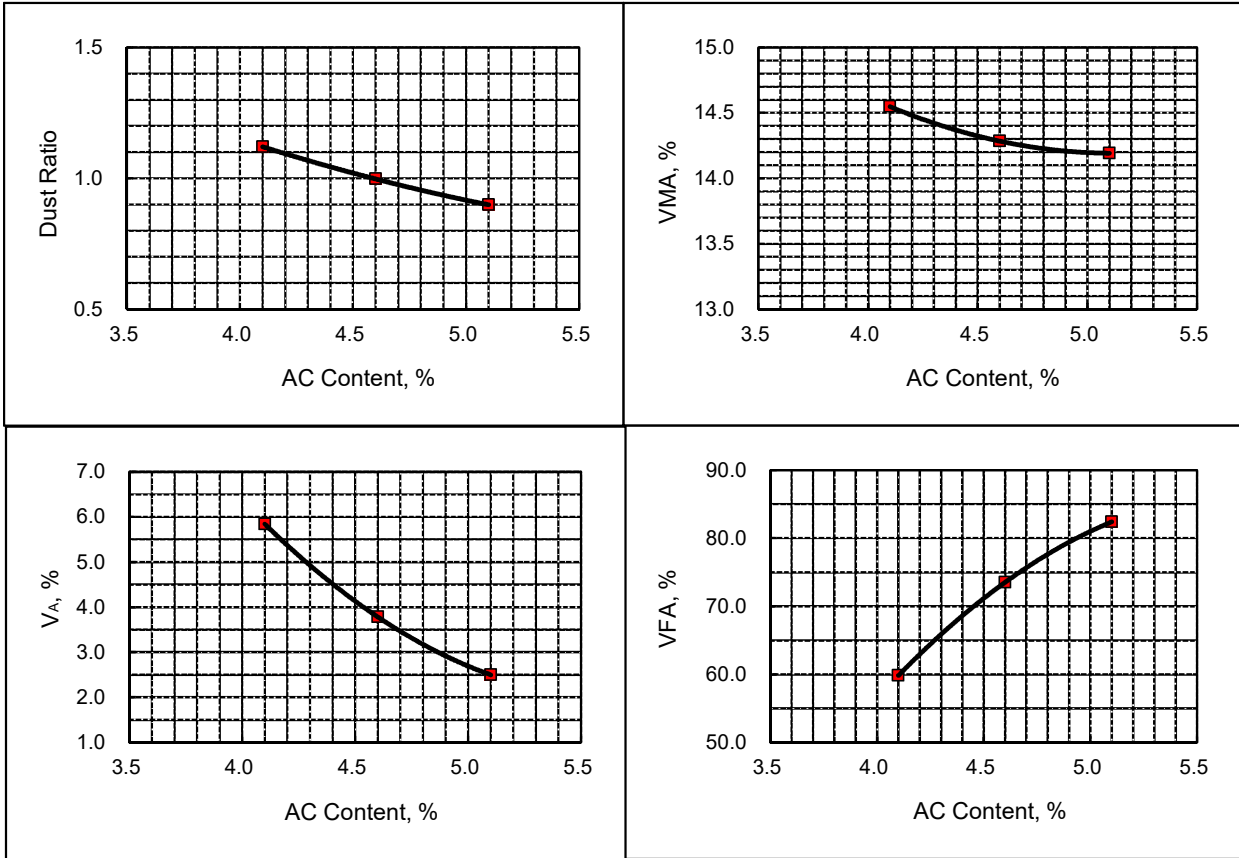
0.45 Power Chart

--x-- Gradation

HOT MIXED ASPHALT PROPERTY CURVES

Mix Type: RC Type 5-01

Project: Various



AC Content (%)	Dust Ratio	Stability (lb)	Flow (0.01 in.)	VMA (%)	VFA (%)	V _A
4.1	1.1			14.5	59.8	5.8
4.6	1.0			14.3	73.5	3.8
5.1	0.9			14.2	82.4	2.5