Denver Approved 2014 Asphalt Mix Designs for Paving, list expires July1, 2015.

Denver Public Works Engineering - Right Of Way Services, Construction Engineering: 303-446-3421, alternate: 720-913-8834

Mix design optimum values shown for Target %AC, %VTM, % VMA with tolerances to derive the Job Mix or Allowable Mix Production Range (AMPR) limits. Hveem Stability at optimum shown for information only: minimum specification shown in footer. Rice (Max Theoritical) density shown as a default basis for field compaction tests - use more current average production values if available.

Last updated per date approved

Mix Supplier Date Approved	Supplier's Product Code, Mix Number or ID (year) Lab Mix Design Number or Mix Info	Mix Design dated	Asphalt Supplier Virgin or RAP	Asphalt PG Binder Grade	Rice SpGr# at design optimum % AC	Rice pcf (62.24) at design optimum % AC	Target % Asphalt Content tolerance is: virgin= +/- 0.3%, RAP= +/- 0.4%	Target % Air Voids (VTM), tolerance is: +/-1.2%	Target % VMA Voids in Mineral Agg, tolerance is: +/-1.2%	composite aggregate Gsb used for VMA	Hveem Stability	Mix Design Notes
AGGI	**Aggregate Industries**											
	Mix Grading - N design ==>>		***S - 75***									
08/06/14	AggInd_2014_Mix# 28_(SAP #800081) (2014-Denver) SAP #800081 (Mix #28 (Denver))	AGGI	20% Rap	Agg Industries PG 64-22	2.471	153.8	5.0%	4.4%	15.3%	2.649	47	Use Mix SAP #80081 when PG 58-28 is required (for local streets)
	Mix Grading - N design ==>>		***S-100***									
01/23/15	AggInd_Mix #38_(SAP #800084) (2014-Denver) SAP #800084 (Mix #38 (Denver))	AGGI	20% Rap	Agg Industries PG 64-22	2.471	153.8	5.0%	3.7%	14.7%	2.649	47	
	Mix Grading - N design ==>>		***S-75***									
09/24/14	AggInd_Mix # 8_(SAP #800073) (2014-Denver) SAP #800073 (Mix #8 (Denver))	AGGI	20% Rap	Agg Industries PG 64-22	2.456	152.9	5.0%	4.5%	16.0%	2.654	50	Use Mix SAP #801493 when PG 58-28 is required (for local streets)
	Mix Grading - N design ==>>		***Sx -75***									
06/03/14	AggInd_Mix #13_(SAP #800074) (2014-Denver) SAP #800074 (Mix #13 (Denver))	AGGI	20% Rap	Agg Industries PG 64-22	2.451	152.6	5.3%	4.5%	16.2%	2.645	45	Use Mix SAP #801493 when PG 58-28 is required (for local streets)
	Mix Grading - N design ==>>		***Sx-100***									
01/23/15	AggInd_Mix #23_(SAP #800079) (2014-Denver) SAP #800079 (Mix #23 (Denver))	AGGI	20% Rap	Agg Industries PG 64-22	2.462	153.2	5.0%	4.5%	15.6%	2.645	44	

Usage:

Normal Lift Position ::	Size Grading-Traffic (#) ::	:: Aggregate Nom Max size	:: Lift Thickness Range (*)
Top Lift (residential + low collectors)	*Sx - ###* ::	*1/2"* ::	*less than 2.5"*
Middle or Bottom Lift(s)	*S - ###* ::	*3/4"* ::	*2.5" to 3.5"*
Middle or Bottom Lift(s)	*SG - ###* ::	*1.0"* ::	*3.0" to 4.5" (*)*

(*) thickness must not exceed ability of compaction equipment, number of rollers and size, and speed vs temperatures.

(###)Traffic -75 (75 gyrations in lab) is for residential + low collector traffic (<3 milllion ESALs). Use PG 58-28 AC binder on residential streets Use PG 64-22 on collectors. Hveem minimum=28.

(###)Traffic -100 (100 gyrations in lab) is for high collector + arterial traffic, (>3 million ESALs). Use PG 64-22 AC binder on arterials. PG 76-28 polymer AC binder is required on new arterial street top lift only, or if replacing polymer on existing surface. Hveem minimum=30.

printed on: ***Friday, March 20, 2015***

Mix Supplier Date Approved	Supplier's Product Code, Mix Number or ID (year) / Lab Mix Design Number or Mix Info	Mix Design dated	Virgin or RAP	Asphalt Supplier	Asphalt PG Binder Grade	Rice SpGr# at design optimum % AC	Rice pcf (62.24) at design optimum % AC	Target % Asphalt Content tolerance is: virgin= +/- 0.3%, RAP= +/- 0.4%	Target % Air Voids (VTM), tolerance is: +/-1.2%	Target % VMA Voids in Mineral Agg, tolerance is: +/-1.2%	composite aggregate Gsb used for VMA	Hveem Stability	Mix Design Notes
ASCI	**Asphalt Specialties Co. Inc.**												
	Mix Grading - N design ==>>	***S-75***											
03/10/15	ASCI-14_mix#_H_3_BN20-14		ASCI	20% RAP	Suncor	PG 64-22	2.524	157.1	5.0%	4.0%	14.1%	2.679	48
	143049 by Cesare_14.102B								RAP [7% coarse, 13% fine]				
	Mix Grading - N design ==>>	***Sx-75***											
03/10/15	ASCI-14_mix#_H_5_BN20-14		ASCI	20% RAP	Suncor	PG 64-22	2.497	155.4	5.5%	4.1%	15.1%	2.666	45
	143054 by Cesare_14.102								RAP [7% coarse, 13% fine]				
Bran	**Brannan Sand and Gravel**												
	Mix Grading - N design ==>>	***S -100***											
05/16/14	Bran# 40005-14		Bran	25% RAP	Suncor	PG 64-22	2.505	155.9	4.6%	3.7%	13.7%		42
	BSG_40005-14												
04/05/14	Bran# 40003-14		Bran	20% Rap	Suncor	PG 64-22	2.508	156.1	4.6%	3.8%	13.8%	2.670	41
	BSG_40003-14												
	Mix Grading - N design ==>>	***S -75***											
05/15/14	Bran# 40016-14		Bran	25% Rap	Suncor	PG 58-28	2.506	156.0	4.9%	3.7%	14.2%	2.673	42
	BSG_40013-14												
05/15/14	Bran# 40013-14		Bran	20% Rap	Suncor	PG 64-22	2.504	155.8	4.9%	3.8%	14.2%	2.671	42
	BSG_40013-14												
09/02/14	Bran# 40014-14		Bran	20% Rap	Suncor	PG 58-28	2.504	155.8	4.9%	3.8%	14.2%	2.671	42
	BSG_40014-14												
	Mix Grading - N design ==>>	***SG-100***											
05/26/14	Bran# 40089-14		Bran	20% Rap	Suncor	PG 64-22	2.539	158.0	4.4%	3.5%	13.0%	2.691	n/a
	BSG_mix# _40089-14												
	Mix Grading - N design ==>>	***SG-75***											

Usage:

Normal Lift Position ::	Size Grading-Traffic (#) ::	:: Aggregate Nom Max size	:: Lift Thickness Range (*)
Top Lift (residential + low collectors)	*Sx - ###* ::	*1/2"* ::	*less than 2.5"*
Middle or Bottom Lift(s)	*S - ###* ::	*3/4"* ::	*2.5" to 3.5"*
Middle or Bottom Lift(s)	*SG - ###* ::	*1.0"* ::	*3.0" to 4.5" (*)*

(*) thickness must not exceed ability of compaction equipment, number of rollers and size, and speed vs temperatures.

(###)Traffic -75 (75 gyrations in lab) is for residential + low collector traffic (<3 milllion ESALs). Use PG 58-28 AC binder on residential streets Use PG 64-22 on collectors. Hveem minimum=28.

(###)Traffic -100 (100 gyrations in lab) is for high collector + arterial traffic, (>3 million ESALs). Use PG 64-22 AC binder on arterials. PG 76-28 polymer AC binder is required on new arterial street top lift only, or if replacing polymer on existing surface. Hveem minimum=30.

Mix Supplier Date Approved	Supplier's Product Code, Mix Number or ID (year) / Lab Mix Design Number or Mix Info	Mix Design dated	Asphalt Supplier: Virgin or RAP	Asphalt Supplier: Asphalt PG Binder Grade		Rice SpGr# at design optimum % AC	Rice pcf (62.24) at design optimum % AC	Target % Asphalt Content tolerance is: virgin= +/- 0.3%, RAP= +/- 0.4%	Target % Air Voids (VTM), tolerance is: +/-1.2%	Target % VMA Voids in Mineral Agg, tolerance is: +/-1.2%	composite aggregate Gsb used for VMA	Hveem Stability / Mix Design Notes
05/26/14	Bran# 40085-14	Bran	20% Rap	Suncor	PG 64-22	2.535	157.8	4.4%	3.5%	13.4%	2.700	n/a
	BSG_40085-14											
	Mix Grading - N design ==>>	***SMA-100 (1/2") see note***										
05/26/14	Bran# 40175-14	Bran	20% Rap	Suncor	PG 76-28	2.516	156.6	6.3%	3.4%	17.0%	2.744	n/a
	BSG_40017585-14					has 2.5% limestone dust + 0.2% mineral filler						
	Mix Grading - N design ==>>	***Sx -100***										
05/09/14	Bran# 40143-14	Bran	20% Rap	Suncor	PG 76-28	2.492	155.1	5.1%	3.8%	14.9%	2.673	40
	BSG_40143-14					RAP mix and polymer binder OK as less than 30% binder replacement						
05/09/14	Bran# 40043-14	Bran	20% Rap	Suncor	PG 64-22	2.493	155.2	5.1%	3.7%	14.8%	2.674	41
	BSG_40043-14 (same as 45-14)											
05/09/14	Bran# 40045-14	Bran	20% Rap	Suncor	PG 64-22	2.493	155.2	5.1%	3.7%	14.8%	2.674	41
	BSG_40045-14											
	Mix Grading - N design ==>>	***Sx -75***										
05/22/14	Bran# 40054-14	Bran	20% Rap	Suncor	PG 58-28	2.492	155.1	5.3%	3.9%	15.5%	2.687	40
	BSG_40054-14											
05/22/14	Bran# 40053-14	Bran	20% Rap	Suncor	PG 58-28	2.492	155.1	5.3%	3.8%	15.5%	2.687	40
	BSG_40053-14 (binder check of 54-14)											
	Mix Grading - N design ==>>	***WMA***										
03/13/15	Evotherm is approved additive for Warm Mix Asphalt [WMA] technology.	Bran										
	same numbers as mixes without WMA additive.					Brannan can provide when approved Evotherm additive is used in any mix. No relaxing of any temperature or any end result field or mix specification.						

CASI **Colorado Asphalt Services Inc.**

Mix Grading - N design ==>> ***Sx-75***

Usage:

Normal Lift Position ::	Size Grading-Traffic (#) ::	:: Aggregate Nom Max size	:: Lift Thickness Range (*)
Top Lift (residential + low collectors)	*Sx - ###*	*1/2"*	*less than 2.5"*
Middle or Bottom Lift(s)	*S - ###*	*3/4"*	*2.5" to 3.5"*
Middle or Bottom Lift(s)	*SG - ###*	*1.0"*	*3.0" to 4.5" (*)*

(*) thickness must not exceed ability of compaction equipment, number of rollers and size, and speed vs temperatures.

(###)Traffic -75 (75 gyrations in lab) is for residential + low collector traffic (<3 milllion ESALs). Use PG 58-28 AC binder on residential streets Use PG 64-22 on collectors. Hveem minimum=28.

(###)Traffic -100 (100 gyrations in lab) is for high collector + arterial traffic, (>3 million ESALs). Use PG 64-22 AC binder on arterials. PG 76-28 polymer AC binder is required on new arterial street top lift only, or if replacing polymer on existing surface. Hveem minimum=30.

Mix Supplier Date Approved	Supplier's Product Code, Mix Number or ID (year) / Lab Mix Design Number or Mix Info	Mix Design dated	Virgin or RAP	Asphalt Supplier	Asphalt PG Binder Grade	Rice SpGr# at design optimum % AC	Rice pcf (62.24) at design optimum % AC	Target % Asphalt Content tolerance is: virgin= +/- 0.3%, RAP= +/- 0.4%	Target % Air Voids (VTM), tolerance is: +/-1.2%	Target % VMA Voids in Mineral Agg, tolerance is: +/-1.2%	composite aggregate Gsb used for VMA	Hveem Stability / Mix Design Notes
12/26/14	CASI Mix #13 (2014)	CASI	20% Rap	Suncor	PG 64-22	2.487	154.8	5.4%	4.0%	14.9%	2.653	42
	Mix #13_(CASI)_(1/2)SP75(64-22)20%							may be similar to MMM mix, its their agg and m/d				
MMM	**Martin Marietta Materials**											
	Mix Grading - N design ==>> ***S-100***											
	MMM_#_5586_(2014)	MMM	20% RAP	HollyFrontier	PG 64-22	2.503	155.8	4.9%	3.9%	14.1%	2.663	44
	MMM_5586_(3/4)SP100(64-22)20%											
	Mix Grading - N design ==>> ***S-75***											
02/13/15	MMM_#_5493_(2014)	MMM	20% RAP	HollyFrontier	PG 64-22	2.499	155.5	5.0%	4.0%	13.2%	2.628	44
	MMM_2243_(3/4)SP75(64-22)20%											
12/04/14	MMM_#_5492_(2014)	MMM	20% RAP	HollyFrontier	PG 58-28	2.499	155.5	5.0%	4.0%	14.5%	2.663	40
	MMM_2223_(3/4)SP75(58-28)20%											
	Mix Grading - N design ==>> ***SG-75***											
01/08/15	MMM_#_5517_(2014)	MMM	20% RAP	HollyFrontier	PG 58-28	2.531	157.5	4.2%	4.0%	12.7%	2.666	n/a
	MMM_3223_(1)SP75(58-28)20%											
02/13/15	MMM_#_5518_(2014)	MMM	20% Rap	HollyFrontier	PG 64-22	2.531	157.5	4.1%	4.1%	12.7%	2.666	n/a
	MMM_3243_(1)SP75(64-22)20%											
	Mix Grading - N design ==>> ***SMA(1/2")***											
05/26/14	MMM_#_5521_(2014)	MMM	Virgin	Suncor	PG 76-28	2.480	154.4	6.2%	3.8%	17.7%	2.718	34
	MMM_5370_(1/2)SMA100(76-28)								Virgin-SMA			
	Mix Grading - N design ==>> ***Sx-100***											
01/23/15	MMM_#_5584_(2014)	MMM	20% RAP	HollyFrontier	PG 64-22	2.488	154.9	5.3%	3.7%	14.6%	2.657	43
	MMM_5584_(1/2)SP100(64-22)20%											
	Mix Grading - N design ==>> ***Sx-75***											

Usage:

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Top Lift (residential + low collectors)	*Sx - ###* ::	*1/2"* ::	*less than 2.5"*
Middle or Bottom Lift(s)	*S - ###* ::	*3/4"* ::	*2.5" to 3.5"*
Middle or Bottom Lift(s)	*SG - ###* ::	*1.0"* ::	*3.0" to 4.5" (*)*

(*) thickness must not exceed ability of compaction equipment, number of rollers and size, and speed vs temperatures.

(###)Traffic -75 (75 gyrations in lab) is for residential + low collector traffic (<3 milllion ESALs). Use PG 58-28 AC binder on residential streets Use PG 64-22 on collectors. Hveem minimum=28.

(###)Traffic -100 (100 gyrations in lab) is for high collector + arterial traffic, (>3 million ESALs). Use PG 64-22 AC binder on arterials. PG 76-28 polymer AC binder is required on new arterial street top lift only, or if replacing polymer on existing surface. Hveem minimum=30.

Mix Supplier Date Approved	Supplier's Product Code, Mix Number or ID (year) / Lab Mix Design Number or Mix Info	Mix Design dated	Virgin or RAP	Asphalt Supplier	Asphalt PG Binder Grade	Rice SpGr# at design optimum % AC	Rice pcf (62.24) at design optimum % AC	Target % Asphalt Content tolerance is: virgin= +/- 0.3%, RAP= +/- 0.4%	Target % Air Voids (VTM), tolerance is: +/-1.2%	Target % VMA Voids in Mineral Agg, tolerance is: +/-1.2%	composite aggregate Gsb used for VMA	Hveem Stability / Mix Design Notes
12/04/14	MMM_#_5461_(2014) / MMM_(1223)_(1/2)SP75(58-28)20%	MMM	20% RAP	HollyFrontier	PG 58-28	2.486	154.7	5.4%	4.1%	15.1%	2.657	41
02/14/15	MMM_#_5462_(2014) / MMM_1243_(1/2)SP75(64-22)20%	MMM	20% RAP	HollyFrontier	PG 64-22	2.484	154.6	5.4%	3.9%	15.0%	2.657	41

Mix Grading - N design ==>> ***WMA***

12/04/14	Evotherm is approved additive for Warm Mix Asphalt [WMA] technology. / same numbers as mixes without WMA additive.	MMM

MMM can provide when approved Evotherm additive is used in any mix. No relaxing of any temperature or any end result field or mix specification.

Usage:

Normal Lift Position ::	Size Grading-Traffic (#) ::	:: Aggregate Nom Max size	:: Lift Thickness Range (*)
Top Lift (residential + low collectors)	*Sx - ###* ::	*1/2"* ::	*less than 2.5"*
Middle or Bottom Lift(s)	*S - ###* ::	*3/4"* ::	*2.5" to 3.5"*
Middle or Bottom Lift(s)	*SG - ###* ::	*1.0"* ::	*3.0" to 4.5" (*)*

(*) thickness must not exceed ability of compaction equipment, number of rollers and size, and speed vs temperatures.

(###)Traffic -75 (75 gyrations in lab) is for residential + low collector traffic (<3 milllion ESALs). Use PG 58-28 AC binder on residential streets Use PG 64-22 on collectors. Hveem minimum=28.

(###)Traffic -100 (100 gyrations in lab) is for high collector + arterial traffic, (>3 million ESALs). Use PG 64-22 AC binder on arterials. PG 76-28 polymer AC binder is required on new arterial street top lift only, or if replacing polymer on existing surface. Hveem minimum=30.