

District	Seal Coat Use in 2010			Other Aggregate Grades Used in Recent Years	Reason for Use of Only One Aggregate Grade	Criteria for Aggregate Grade Selection When More than One Aggregate Grade is Being Used	District Has Experience Using Modified (Single Size) Grades	Comments About Use of Modified (Single Size) Aggregate Grades
	Aggregate Grade	Mineralogy	Asphalt Options Allowed on the Plans in 2010					
Abilene	3 and 4	Crushed Limestone	AC-20-5TR, A-R Binder Type II	Grade 5 has been used for strip and spot seals by maintenance and occasionally on very low volume roads or shoulders.	Not applicable.	Grade 3 is favored on higher traffic volume roadways, including interstates, to keep the traffic out of the asphalt. It is favored on any roadway with moderate flushing for the same reason.	No	Not applicable.
Amarillo	4 and 4S	Crushed Siliceous Gravel	AC-10-2TR, AC-10	Grade 5 modified was used on shoulders about four years ago.	Not applicable.	Grade 4 is used on low volume roadways. Precoated Grade 4 is used on roadways in the 500-1500 ADT range, and Grade 4s is being used this year for the first time on the main lanes of I-40 and other roadways in the 3000+ ADT range. If Grade 3 was not economically prohibitive, Grade 3 aggregate is a better choice to cover up bleeding as it can reduce the amount of bleeding that returns. But the Grade 3 seals are also louder and you get more broken windshields. So he doesn't want to put them on a roadway with over 500 ADT.	Yes	2010 is the first year to try it. It will be used on their priority roadways.
Atlanta	4	Crushed Sandstone	AC-20-5TR, AC-10-2TR, AC-15P, AC-15XP	They have used a lot of lightweight over the past four or five years. Grade 3 was used back around 2003 and 2004. They had unspecified trouble with it. Grade 5 has been used by maintenance forces for spot, edge, and strip seals.	Grade 4 rides better and it isn't as noisy. Grade 4 is more economical. Using only a single grade lessens the learning curve for inspectors. When they used Grade 3, they were afraid to shoot enough asphalt, concerned about bleeding. Then they would lose the aggregate in the winter.	Not applicable.	No	Use of single size grades is too costly.
Austin	Primarily 4	Wide Variety, Mostly Crushed Limestone	Maintenance forces use emulsions exclusively.	Grade 4S has been used in the past, as well as some Grade 3. Grade 5 has been used some for strip seals.	Grade 4S is too expensive, and Grade 3 presents windshield breakage complaints as well as being more expensive than Grade 4.	Not applicable.	Yes	Have a definite preference for Grade 4S, but it's just more expensive and not used for that reason.
Beaumont	4	Lightweight and Crushed Limestone	CRS-2P, AC-20-5TR	Grade 3 and Grade 4 have been used in the past.	Eliminated use of Grade 3 beginning in 2010 to stretch their maintenance dollars. Stated that Grade 3 is probably the better long term product, but they are giving it up to instead cover as much road area as possible with the given budget.	In the past when specifying two aggregate grades in the plans, they specified Grade 3 on their lower volume roads. In their opinion the higher asphalt used on these roads gives them "more bang for their buck."	No	Not applicable.
Brownwood	4	Crushed Limestone	AC-20XP, AC-15P, AC-10-2TR, AC-10, ORAC-20-XP, CRS-2P, CRS-2H	Grade 3 and Grade 4 have been used in the past.	Eliminated use of Grade 3 to save money, knowing the quality could go down.	They consider a host of factors with determining whether a Grade 3 or a Grade 4 is more appropriate for a given roadway.	Yes, in the past.	Believe they get better performance with the single size aggregate.
Bryan	4	Lightweight	AC-20-5TR, AC-20XP, AC-15P, AC-10-2TR	Grade 3S on a single roadway.	Grade 4 works fine for as long as they plan to have them serve.	Not applicable.	Yes, in 2005.	They tried Grade 3S in 2005 on a single roadway where they were fixing a bleeding problem caused by gravel pit traffic.
Childress	4 and 4 Mod.	Crushed Siliceous Gravel	AC-20-5TR	Grade 4 lightweight had been allowed in the past. Grade 5 is used by maintenance forces for strip seals and spot seals.	Grade 3 breaks lots of windshields. Grade 4 lightweight costs them a lot more.	They have considered trying Grade 5 seal coats just to stretch the number of miles they can cover within their budget. But they would rather have the additional asphalt on the road with Grade 4.	No	Not applicable.
Corpus Christi	3, 3S, 4, 4S	Crushed Limestone	AC-20-5TR, AC-15P, AC-10-2TR, A-R Binder (Type III)	Have used Grade 5 trap rock for paved shoulders used by cyclists.	Not applicable.	Use Grade 3 on rural roadways, usually AADT under 500. Will not use Grade 3 in urban areas because of noise.	Yes	They only have a single producer making it so far.
Dallas	3 and 4	Lightweight and Crushed Sandstone	AC-20-5TR, AC-15P, AC-10-2TR	Only use Grade 5 to rack in a seal if it starts to flush or the rock starts to roll on a hot day.	Not applicable.	They use lightweight for lower traffic and lower truck percentages. It can be abraded or crushed under heavy loads. Two things pushing toward using a Grade 4 are noise, and the road needs to be in pretty good condition. An overlay that has been crack sealed for the first time in a residential setting is an ideal location for Grade 4. A rutted pavement is where he will use Grade 3 so the rut doesn't get swallowed up.	Yes	Really like the single size but they can be difficult to get from producers who have customers closer to their pits. One of the best single size seals they have was a Grade 3S limestone rock asphalt on US 80, but it is still very loud. You have better control over construction and getting the desired embedment, thereby avoiding losing aggregate or getting flushing.
El Paso	None in 2010	None in 2010	None in 2010	Usually use Grade 3 and asphalt rubber.	Category 1 funds were cut so drastically that they didn't have a seal coat program last year and may not have one next year either. They use only Grade 3 for two reasons: better skid results and putting down more asphalt should pay off in longer performance if funding runs short in future years.	Not applicable.	Yes	Tried a Grade 4S several years ago. It worked OK once they got the rates figured out.
Fort Worth	3 and 4	Crushed Limestone	AC-20-5TR, AC-20XP, AC-15P, AC-10-2TR	Have used Grade 5 on shoulders.	Not applicable.	They like to use Grade 3 to get more asphalt on the road and because you have more room for error in setting the asphalt rate and lastly because you have a better chance of overcoming flushing on the existing road surface. But, when they get into urban areas they usually switch to Grade 4 to lower noise.	No	Not applicable.
Houston	Little use	Little use	Little use	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Laredo	3, 3S, 4, 4S	Crushed Limestone	AC-20-5TR, AC-15P	Have used a Grade 5 a few times for special purposes. Maintenance forces use Grade 5 for strip and spot seals.	Not applicable.	Grade 3 is used when ADT is less than 750, when there is moderate to heavy flushing regardless of traffic level, and when there is high truck traffic regardless of traffic level. Grade 4 is used in other situations.	Yes.	Decided to allow it in efforts to increase competition and keep cost down. Believe that performance is better with single size.
Lubbock	4	Crushed Limestone	AC-20-5TR, AC-10-2TR, CRS-1P	Used to use the single size Grade 4. They liked it because the average rock size was larger and they could shoot a little more asphalt. They use Grade 4 and Grade 5 for full seal coats done by maintenance forces. Have used Grade 5 for bicyclists on shoulders also. They have used Grade 3 just at feed yard turnouts and similar high stress locations in the past.	Economics and simplicity are the reasons for specifying just one grade of aggregate. Better constructability is part of the simplicity aspect.	Not applicable.	Yes.	Quit using it when they had a bunch of broken windshields a year or two back. But they also said the loss of rock might not have been due to the rock being single sized.

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	Aggregate Grade	Mineralogy	Asphalt Options Allowed on the Plans in 2010					
Lufkin	3, 4, 5	Lightweight and Crushed Limestone	AC-20-STR, AC-15P, AC-10-2TR, CHFRS-2P, CRS-2P	Not applicable.	Use mostly Grade 4 because of economics.	Use a hard rock on roadways over 20,000 ADT. Use Grade 3 where ever they believe there is a need for higher asphalt, such as a location with higher cracking. This is often on higher volume roads. They typically use Grade 4 everywhere else, regardless of ADT. They use Grade 5 usually on hot mix pavements with skid problems. They also find that Grade 5 works better than Grade 3 or Grade 4 to resist rolling where they have a lot of turning movements. They have put Grade 5 basalt on high volume urban roads with a lot of turning movements.	No	Don't specify it because the aggregates they are getting are reasonably graded where they already get some of the benefits. And, the cost of single size is higher.
Odessa	4	Crushed Limestone and Crushed Rhyolite Gravel	AC-20-STR, AC-10-2TR, AC-20XP, AC-15P	Plan to start using some Grade 3 in future on top of asphalt rubber seals. The Grade 4 doesn't seem to keep the asphalt rubber from seeping up under traffic as well as a Grade 3 should do.	Grade 4 is more economical, so use it pretty well exclusively.	Not applicable.	No	Would think a Grade 3 would perform better than a Grade 4.
Paris	3 and 4S	Crushed Sandstone	AC-20-STR, AC-20XP	They only use Grade 5 when sealing a base repair.	Not applicable.	Use Grade 3 when ADT is less than 1,000. Use Grade 4 when traffic is over 1,000.	Yes	None.
Pharr	4	Crushed Limestone and Crushed Siliceous Gravel	AC-20-STR, AC-15P	Grade 5 is used for strip seals on high ADT roadways.	Grade 3 is too noisy for some locations.	Not applicable.	No	They have been very pleased over the years with the performance of a Grade 4 modified using local materials.
San Angelo	3 and 4S	Crushed Limestone Rock Asphalt and Crushed Traprock	AC-20-STR, AC-10-2TR	About eight years ago they used a Grade 4. They do not use Grade 5.	Experience with the Grade 4 was that the aggregate seemed to break down a little bit, so they went to the Grade 3 to get a little larger aggregate.	They use only Grade 3 as their standard. They are currently trying a Grade 4s.	Yes	Trying Grade 4S at this time.
San Antonio	3, 4, 5	Crushed Limestone Rock Asphalt and Crushed Limestone and Crushed Traprock	AC-20XP, AC-15P, AC-10-2TR, CRS-2P, CHFRS-2P	None.	Not applicable.	Use Grade 3 with emulsion on ADT 0-500. Use Grade 3 with second level polymer modified asphalts on ADT 500-2000. Use Grade 3 most of the time with top level polymer modified asphalt on ADT 2000-8000. Use Grade 4 with top level polymer modified asphalts on ADT over 8000. As a rule of thumb, use Grade 5 on very low ADT, below 1,000 ADT. Use Grade 3 on a little higher ADT. And use Grade 4 on everything else.	Yes	Bought a little for maintenance use recently.
Tyler	3 and 4	Crushed Limestone	AC-20-STR, AC-20XP, AC-10-2TR	Typically only use Grade 5 for in-house spot seals. They have used it on shoulders a couple of times to accommodate bicyclists.	Not applicable.	Usually use Grade 3 when the ADT is 1,500 or lower. Otherwise they use Grade 4. But there are other factors. They will usually use Grade 4 in towns.	No	None.
Waco	3, 4, 5	Lightweight and Crushed Limestone	AC-20-STR, AC-20XP, AC-15P, AC-10-2TR, CRS-2P	A Grade 5 use is in intersections where they do a racked in seal. They extend that 250 feet in each direction from the intersection. 2010 is the first year. They will also use Grade 5 sometimes under NovaChip.	Not applicable.	They use more Grade 4 than anything else. They have cut off points for using the various grades but they weren't available at the time of the interview.	No	Thinking about trying it next year.
Wichita Falls	4 Mod.	Crushed Limestone	AC-20-STR, AC-20XP, AC-10-2TR, AC-10XP	Grade 3. Probably have used some Grade 5 with maintenance forces.	They got away from Grade 3 when they were using emulsions and were loosing a lot of rock and breaking windshields.	Not applicable.	No	None.
Yoakum	3 and 4	Crushed Limestone	AC-20-STR, AC-15P, AC-10-2TR	The only Grade 5 they use is for an inverted prime.	Not applicable.	They use Grade 4 everywhere except where they need the taller aggregate because of flushing or when the surface is very dry and there's a lot of trucks on the roadway. That's the only places they still use Grade 3 because Grade 3 cost is higher.	Yes	Tried Grade 4S several years ago. It worked very well.

District	Performance Expectations - Grade 3 versus Grade 4	Performance Expectations - Grade 4 versus Grade 5	Other Selection Comments	Cost and Application Rate Comments
Abilene	Grade 3 would be expected to last one or more years longer than Grade 4 on high traffic roadways and roadways with a fair number of cracks. The difference wouldn't be expected to be as much on lower volume roadways without a lot of cracking to keep under control.	Based on limited experience with Grade 5, Grade 4 would probably perform longer than Grade 5.	None.	None.
Amarillo	For lower traffic volumes (less than 500 ADT), roadways would be expected to last three or four years longer if Grade 3 was used in lieu of Grade 4 provided that the asphalt rate was increased appropriately.	A maximum of two years service life would be expected if a Grade 5 were put on a main lane. It would just get completely embedded.	Usually use straight AC on roadways below 500 ADT for economic reasons. Would like to use larger aggregate on lower volume roadways but economics won't allow it. 2010 is their first year to try Grade 4S. Would like to use Grade 3 but it is just cost prohibitive. Current economics has district in more of a damage control mode than a preventive maintenance mode, so Grade 3 isn't a viable option.	In the past they had used Grade 5 mod on shoulders at a spread rate of 125-130 SY/CY and with an asphalt rate of 0.15-0.18 gal/SY. The aggregate price difference alone saved them \$10 to \$12 per CY. They would get 6 or 7 years of service life on the shoulder. Grade 4S cost was \$15-20/CY higher than Grade 4.
Atlanta	Grade 3 and Grade 4 would be expected to serve about the same in areas of the district where they have lots of base shrinkage problems causing cracking. Neither Grade would stand up to it.	Not addressed.	None.	Use of single size grades is too costly.
Austin	Although don't have a lot of experience with Grade 3, it is thought that Grade 3 might be able to go an eight or nine year cycle instead of a seven or eight year cycle with Grade 4.	Grade 4 would be expected to provide an additional year of service when compared to a Grade 5, everything being equal.	Grade 3 is unpopular with the bicyclist community. But there are rural areas and some areas with a lot of cracking where Grade 3 and the additional asphalt it allows would be preferred.	Use of single size grades is too costly.
Beaumont	A Grade 3 would be expected to serve a year or two longer than a Grade 4 with the same degree of distress on low volume traffic. Wouldn't use Grade 3 on high traffic for fear of flushing.	Not much experience with Grade 5. Opportunity for success is much higher with Grade 4 than Grade 5.	None.	Grade 3 isn't being used because it costs more.
Brownwood	Grade 3 means placing more asphalt, but does that actually result in longer performance? That's a good question for research to answer.	Not much experience with Grade 5.	Generally, a larger rock is more forgiving. That is, you don't have to be as perfect with the asphalt application rate to get good performance.	None.
Bryan	Theoretically a Grade 3 should last a year or two longer all other things being equal.	Not much experience with Grade 5 but would think a Grade 4 would last longer than a Grade 5.	None.	When putting Grade 5 down for rehab prior to placement of a double surface treatment (Grade 3 and Grade 4), they shoot between 0.2 and 0.25 gal/SY. The Grade 5 is placed at about 135 SY/CY. Cost of AC-10-2TR is competitive with AC-15P.
Childress	Not discussed.	Grade 4 would probably serve longer than a Grade 5.	The Grade 4 Mod. they allow is a coarse Grade 4.	In Childress lightweight was running \$60/CY compared to \$30/CY for the other aggregate, so they no longer spec the lightweight.
Corpus Christi	Grade 3 should last longer only if the aggregate is tough enough to stand up to the traffic without wearing down. Softer aggregates might not give any extra life.			
Dallas	Definitely believe a Grade 3 would serve 15% to 20% longer.	Not much experience with Grade 5. They have occasionally used it on shoulders for bicyclists. But he prefers to shoot a fog seal on a hot mix shoulder if cyclists are using it instead of using a Grade 5. They have just started this in the last few years. They use TRMSS, tire rubber surface seal, shot at an ambient temperature.	He will always start out thinking Grade 3 because there is more aggregate and more asphalt. Then, he has to talk himself out of using Grade 3 before he will move to specify a Grade 4. Would always use a Grade 4 on a roadway in a residential area with curb and gutter and a good cross section. He believes noise is affected by the configuration of the voids between seal coat aggregates. The voids configuration is affected by spread rate, grade of rock, and percent embedment.	If a Grade 3 lasts 15% to 20% longer, the additional cost is probably well worth it since you also save construction expense over a lengthy period of time.
El Paso	If the Grade 3 and Grade 4 were both shot with asphalt rubber, a difference in longevity between them probably wouldn't show up with their low traffic situation.	Not discussed.	They has tried to get to an eight-year cycle prior to funding cuts. Now they hope to get to a ten-year cycle. Virtually all of their roadways are under 1,000 ADT.	An area engineer determined they could usually get 10 to 12 years service from an asphalt rubber seal coat.
Fort Worth	A Grade 3 would probably last longer than a Grade 4 on the same roadway. Holding out longer against bleeding returning is part of the reason.	Not discussed.	Grade 3 seal coats can be more difficult to get good retroreflectivity from the paint stripe, but they think they have figured it out. It will just cost a little more with the process they will use.	Comment was that he hadn't seen a lot of cost difference between Grade 3 and Grade 4. Would like to use Grade 5S on shoulders but it's too expensive. Grade 3S and 4S are a lot more expensive also.
Houston	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Laredo	Would estimate two years longer performance from a Grade 3 over a Grade 4, but the actual difference on a roadway would depend on ADT, truck percentage, and other factors on that roadway.	The difference would be similar to the difference between Grade 3 and Grade 4.	The grade specified on the majority of roadways is Grade 3, followed by Grade 4S, followed by Grade 3S.	None.
Lubbock	Would expect a little better performance but haven't had enough experience to know for sure.	Not discussed.	Their roadways are generally very oxidized by the time they are sealed, so they like to put more asphalt down whenever they can. Grade 4S are believed to be a lot louder than Grade 4 seal coats. And Grade 3 are louder than Grade 4S seal coats.	On low truck-volume roadways, a cheap Grade 5 might buy you 10 or 12 years sometimes.

District	Performance Expectations - Grade 3 versus Grade 4	Performance Expectations - Grade 4 versus Grade 5	Other Selection Comments	Cost and Application Rate Comments
Lufkin	Would expect a Grade 3 to last 2 or 3 years longer than a Grade 4.	Really don't know for sure. A Grade 5 put in front of the district office five years ago is still performing just fantastic. Cracks would probably come back a year or so quicker with a Grade 5 versus and Grade 4.	Would like to use a little more Grade 5 with basalt aggregate. Believes a Grade 3 crushed stone is a little louder than a Grade 3 lightweight. Believes there is a place for using all three grades of seal coat aggregate. The City of Austin uses a lot of Grade 5 trap rock or basalt seal coats. That's where Lufkin got the idea.	Grade 3 was costing about 25% more than Grade 4 when the Director of Maintenance came to Lufkin.
Odessa	Not discussed.	Do not use Grade 5 in any seal coats.	Have recently moved to specifying SAC B instead of SAC A.	They had been pretty successful maintaining their roads long term using a seven-year cycle. That will not be possible anymore with the cuts in funding. There is strong concern that roads are going to be lost which wouldn't have been lost if sealed sooner than will be possible under the current budget situation.
Paris	Not discussed.	Not discussed.	They seal paved shoulders only every other seal cycle unless within 150 feet of a paved intersection. Grade 3 seal coats are very noisy, much more so than the Grade 4s. It was also stated it is believed noise level is related to how sparse the aggregate are, i.e., how they are spaced after the application rate is selected; and it also depends on the embedment. Rock that isn't embedded as far will be noisier.	There is a lot of waste during production in making single size Grade 3S.
Pharr	Would think a Grade 3 would perform two or three years longer than a Grade 4.	Would think a Grade 4 would perform two or three years longer than a Grade 5.	They would like to consider using Grade 3 on lower ADT roadways and Grade 5 on higher ADT roadways. However, Grade 4 has performed well in all of their applications.	Grade 3 seal coats cost is higher because of the increased amount of asphalt used.
San Angelo	Not discussed.	Not discussed.	Grade 3 is noisy compared to Grade 4. They have tried to seal roadways on a seven-year cycle. They aren't as age sensitive now. They are looking at condition of the roadway.	Grade 4 is a little cheaper than Grade 3. Trap rock is a good bit more expensive than limestone rock asphalt.
San Antonio	Would expect a Grade 3 to last longer than a Grade 4, but hadn't been watching them long enough to be sure it happens.	Would expect a Grade 4 to perform a little longer than a Grade 5 seal coat.	None.	Grade 3 seal coats cost 10% to 15% higher than Grade 4 in the San Antonio district.
Tyler	They expect a Grade 3 to last a little longer than a Grade 4, maybe a couple of years. But the condition of the roadway is a factor in if it will perform longer, or how much longer.	Don't have enough experience with Grade 5 to know.	About three years back and further they had used only Grade 3, but the complaints from broken windshields and the noise got to be too much. They expect a Grade 3 hard rock to last longer than a Grade 3 lightweight.	None.
Waco	Thinks Grade 3 would last a little longer because of additional asphalt it brings. He thinks noise may be the reason that Grade 4 is used so frequently in Waco. But probably won't get seven years out of Grade 3 in the eastern part of the district because they will likely be leveling up the roadway because of expansion below before seven years.	Would not put a Grade 5 as a stand alone seal coat. They could stand the chance of flushing.	They are trying rack seals this year at intersections where they might have problems from the stop-and-go traffic causing some flushing and bleeding.	None.
Wichita Falls	A Grade 3 might possibly last longer than a Grade 4 since it uses more asphalt.	A Grade 4 might possibly last longer than a Grade 5 since it uses more asphalt.	Since the purpose of a seal coat is to put asphalt on the road, why use a small aggregate and put less asphalt out there? They use the modification of Grade 4 to make it coarser. It also matches the Oklahoma spec. So specifying this gradation modification allows some Oklahoma sources to compete with others in Texas.	None.
Yoakum	Grade 3 would probably last longer than a Grade 4. The heavier asphalt should keep the moisture out longer.	Grade 4 should last longer than Grade 5 because of the additional asphalt to help keep moisture from penetrating.	None.	Economics will force them to use less Grade 3 in the future. They will only use it where they have moderate to severe flushing.