Texas Department of Transportation

Construction & Materials Tips

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Sealing Change Orders

Signing, sealing and dating of engineering documents associated with a contract change order, and the approval of a contract change order, are separate issues.

All plans, specifications and reports associated with a change order must be signed, sealed and dated by the engineer directly responsible for the changes, in accordance with the Texas Engineering Practices Act (Vernon's Texas Civil Statutes, Title 52A, Article 3271a.) and Texas Administrative Code §131.166.

The recommendation for approval, or approval, of Change Orders is related to the dollar amount and not the signing and sealing requirements. Change Order approval is conducted in accordance with Chapter 2, Section 8. of the department's Contract Management Manual, which provides Area Engineers the authority to approve Construction Contract Change Orders valued up to $50,000, and District administrative personnel the authority to approve Change Orders valued up to $300,000.

Written notification to the original engineer is needed only once and should occur at the time the consultant's plans are delivered, usually prior to letting. Notifying the original engineer of changes made during construction, however, is a practice of good engineering and a professional courtesy.

For more information, contact the Construction Section of CST at (512) 416-2456.

Quality Control of Aggregates Using the Micro-Deval Abrasion Test

The Texas Department of Transportation (TxDOT) has been evaluating the potential of a new method to control the quality and consistency of aggregates. This method is an indicator of both a coarse aggregate's durability and its ability to resist degradation caused by traffic loading.

TxDOT has written a draft test procedure, Tex-461-A, "Degradation of Coarse Aggregate by Micro-Deval Abrasion" (Micro-Deval Abrasion). The procedure requires a 1500 gram sample of aggregate, graded in accordance with TxDOT's normalized gradations specified in Test Method Tex-411-A, "Soundness of Aggregate Using Sodium Sulfate or Magnesium Sulfate" (Magnesium Sulfate Soundness). The sample is placed in a stainless steel jar with 2.0 liters of water and an abrasive charge consisting of 5,000 grams of 3/8 inch diameter steel balls. The jar is rotated at a rate of 100 revolutions per minute for two hours. The sample is then washed, oven-dried, and sieved to determine the amount of loss.

The Soils and Aggregates Branch of CST has been performing the Micro-Deval abrasion test on coarse aggregate samples tested for the Department's Aggregate Quality Monitoring Program (AQMP). In addition, Texas Tech University has conducted an evaluation of the Micro-Deval abrasion test under research project 0-1771, "Comparative Analysis of the Micro-Deval and Magnesium Sulfate Soundness Tests." Evaluation of data collected from these two efforts indicates that the Micro-Deval abrasion test is a good indicator of variation in aggregate mineralogy during production operations.

It is a very good tool for aggregate producers to use as a quality control test to monitor their daily production. It has good repeatability, and can be completed in one day. In comparing the magnesium sulfate soundness test to the Micro-Deval abrasion test, it is evident that the degradation mechanism of the two tests are different, and as such, indicate different properties of the aggregate. However, the aggregate quality trends indicated by both tests correlate fairly well. This relationship gives the Micro-Deval abrasion

test the potential to serve as a screening tool to indicate when the magnesium sulfate soundness of the aggregate may be approaching unacceptable levels.

TxDOT has included the Micro-Deval abrasion test in the draft specifications for Stone-Filled Hot Mix Asphalt Concrete and Quality Control, Quality Assurance of Superpave Hot Mix Asphalt Concrete. The specifications require sampling of aggregate stockpiles at the hot mix plant a minimum of once per five days of production. If the loss by Micro-Deval abrasion exceeds 25 %, a sample must be tested to determine loss from the magnesium sulfate soundness test. If the sample fails to meet the specification requirements for magnesium sulfate soundness, the aggregate will be rejected.

These specification requirements will be refined during the next few months as TxDOT determines the best use for the Micro-Deval abrasion test. If you would like more information about this topic, contact Caroline Herrera, P. E., Director of the Soils and Aggregates Branch, at 512-465-7505.

Relative Hot Mix Rankings

There are several hot mix paving mixtures that can be used to build a successful flexible pavement. These mixtures all have different and somewhat unique characteristics. The following chart has been compiled to help designers determine which mixture is most appropriate for a given application. The rankings are on a 0 to 5 Scale, with 5 being "Best"

Mixture Characteristic	**SMA**	PFC	**Superpave (Coarse)**	**CMHB**	**Dense Graded (A, B, C, D, F)**	**Determining Factors**
Resistance to Rutting	4-5	4-5	3-5	3-5	2-5	Stone on stone contact & binder stiffness
Resistance to Segregation	4-5	5	3-4	3-4	1-4	Gradation uniformity and aggregate size
Resistance to Raveling	4-5	2-4	3-4	3-4	2-4	Toughness of mastic & resistance to segregation
Ability to resist high shear forces	4-5	2-4	3-4	3-4	2-4	Toughness of mastic and resistance to raveling
Resistance to Moisture Damage	4-5	3-5	3-4	3-4	2-4	Film thickness & potential adverse permeability
Resistance to Freeze/Thaw Damage	4-5	2-4	3-4	3-4	3-4	Film thickness & potential permeability
Potential Permeability	4-5	N/A	2-4	2-4	3-4	Ability to compact to a relatively high in-place density
Long Term Durability	4-5	3-4	3-4	3-4	2-3	Binder film thickness & toughness
Wet Weather Traction	3-4	4-5	3-4	3-4	2-4	Texture, permeability, & resistance to hydroplaning
Wet Weather Visibility	2-4	4-5	2-4	2-4	2-3	Texture & ability to quickly drain surface water
Noise Reduction (comfort)	3-4	4-5	3-4	3-4	3-4	Ability to buffer noise & surface texture
Aesthetically Pleasing	3-5	5	3-4	3-4	3-4	Texture, uniformity & resistance to segregation
Ease of Compaction	3-4	5	2-3	2-3	2-4	Volume of mastic, VMA, & toughness
Ability to "hand work"	2-3	2-3	2-4	2-4	3-5	Aggregate gradation & binder stiffness
Affordability (Initial Cost)	2-3	2-4	3-4	3-4	4-5	Aggregates, additives, & production rates

For more information, contact Dale A. Rand, P.E., of the Bituminous Branch, at 512.232.1903.