Item 341M Municipal Dense-Graded Hot-Mix Asphalt

Chuck Fuller, Larry Peirce, and Dennis Turner

Why Do We Need A Local Agency Specification?

Jurisdiction	Center-line miles	Lane-miles
TxDOT	80,997	
City/County	239,234	
Other	3,133	
Total	323,364	701,447

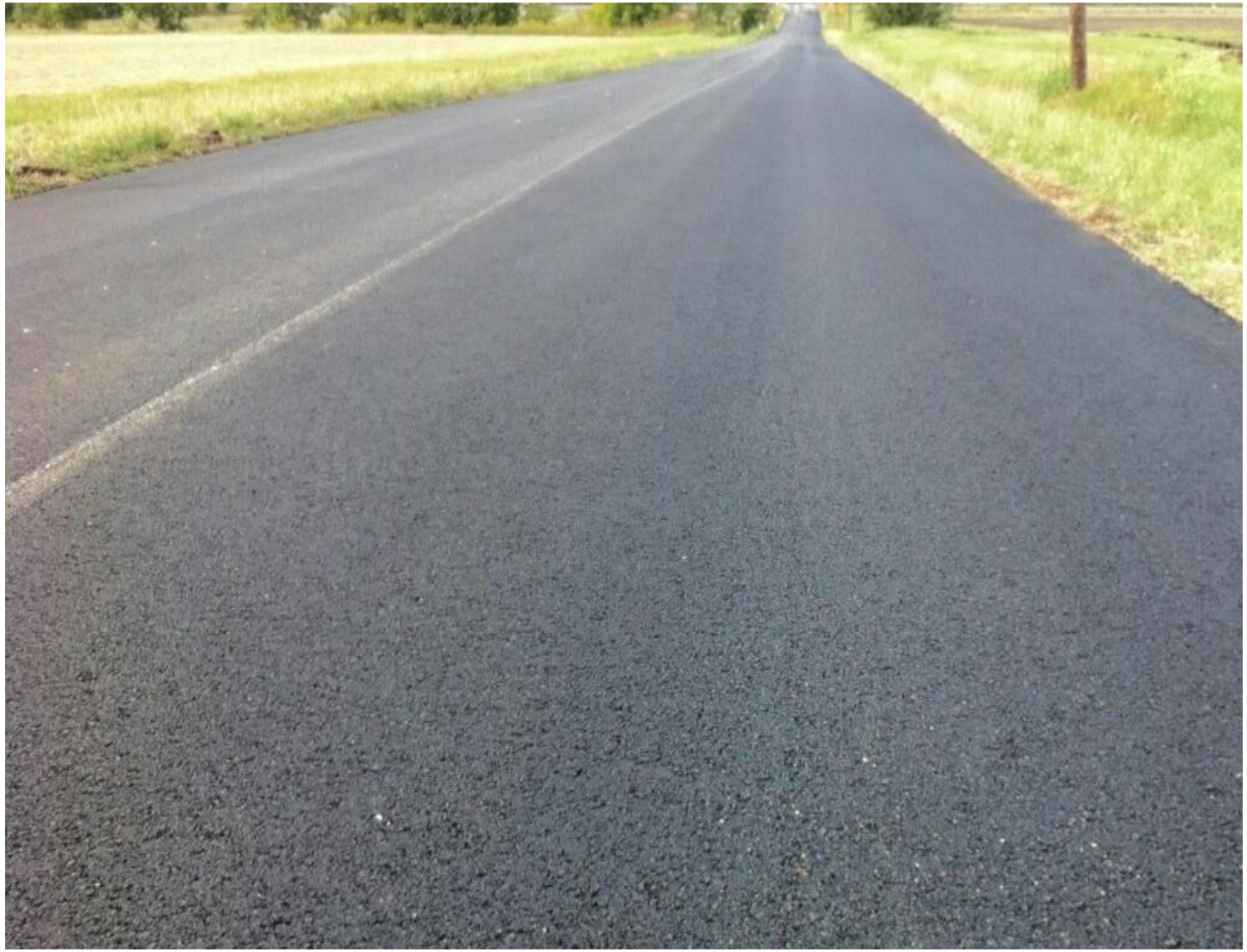
What's 341M?

- Based on 2024 TxDOT 341 Dense Graded Asphalt Mix Specification.
- Provides a uniform specification for Municipalities.
- Provides latest updates and enhancements.
- Allows substitution with TxDOT Spec 341 and 344 specs.
- Simplifies Testing and Acceptance Criteria.
- Enhances Sustainability by providing for RAP in the mix.
- Certified QC testing built into specification

Description

Construct a hot-mix asphalt (HMA) pavement layer composed of a compacted, dense-graded mixture of aggregate, asphalt binder, and additives mixed hot in a mixing plant.

Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications.



Materials

- Notify the Engineer of all material sources and before changing any material source or formulation.
- Allows Substitution: ***An TxDOT approved existing dense graded (341/3076) or Superpave (344/3077) mix design is considered an equal or better substitution and may be substituted for this item.***

Hyperlink

- Supply aggregates that meet the definitions in Tex-100-E

Click Hyperlink to go to TxDOT webpage.

Test Procedure for

SAMPLING SOILS AND FLEXIBLE BASE

TxDOT Designation: Tex-100-E

Effective Date: August 2023

1. SCOPE

1.1 Use this test procedure to sample soils that are used as embankment and non-select backfill materials. Use this procedure to sample flexible base from completed stockpiles and roadway windrows, and for the preparation of the samples for laboratory testing.

1.2 This procedure also provides information to develop a soil survey that may be used for the design, location, and construction of a highway.

1.3 *This test procedure does not claim to address the safety concerns associated with its use. It is the responsibility of the user of this test procedure to establish the appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations before use.*

2. APPARATUS

Quality Hot Mix

Table 1
Aggregate Quality Requirements

Property	Test Method	Requirement
Coarse Aggregate		
Surface Aggregate Classification SAC	Tex-499-A (AQMP)	As shown on the plans
Deleterious material, %, Max	Tex-217-F, Part I	1.5
Decantation, %, Max	Tex-217-F, Part II	1.5
Micro-Deval abrasion, %	Tex-461-A	Note [1]
Los Angeles abrasion, %, Max	Tex-410-A	40
Magnesium sulfate soundness, 5 cycles, %, Max	Tex-411-A	30
Crushed face count,[2] %, Min	Tex-460-A, Part I	85
Flat and elongated particles @ 5:1, %, Max	Tex-280-F	10
Fine Aggregate		
Linear shrinkage, %, Max	Tex-107-E	3
Sand equivalent, %, Min	Tex-203-F	45[3]
Organic impurities	Tex-408-A	Note [4]

1. Used to estimate the magnesium sulfate soundness loss in accordance with Section 341.2.1.1.2., "Micro-Deval Abrasion."
2. Only applies to crushed gravel.
3. The Engineer may perform Tex-252-F on fine aggregates not meeting this minimum requirement. Fine aggregates with a methylene blue value of 10.0 mg/g or less may be used.
4. Optional test.

Standardization of Binders

- Asphalt Binder. Furnish the type and grade of performance-graded (PG) asphalt binder shown on the plans that meets the requirements of Item 300, “Asphalts, Oils, and Emulsions.”

Item 300

Asphalts, Oils, and Emulsions

Texas Department of Transportation

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1. DESCRIPTION

Provide asphalt cements, cutback and emulsified asphalts, performance-graded asphalt binders, and other miscellaneous asphalt materials as specified on the plans.

Standardization of Tack Materials

- **Tack Coat**. Furnish CSS-1H, SS-1H, EBL, or a PG binder with a minimum high-temperature grade of PG 58 for tack coat binder in accordance with Item 300. Specialized tack coat materials on TxDOT's Material Producer List (MPL) for *Tracking Resistant Asphalt Interlayer* (TRAIL)

TRAIL Product	Product Type	Material Grade	SiteManager Material Code	Supplier	Typical Use
UltraFuse – Trackless Hot Applied	Hot asphalt	NT-HA	03TRAIL-HA	Blacklidge	Tack or seal
UltraTack – Trackless Tack (NTSS-1HM)	Emulsified asphalt	NT-HRE	03TRAIL-EH	Blacklidge	Tack
NTQS-1HH	Emulsified asphalt	NT-HRE	03TRAIL-EH	Asphalt Products Unlimited	Tack
Underseal	Hot asphalt	NT-HA	03TRAIL-HA	Jebro	Tack or seal
CBC-1H	Emulsified asphalt	NT-SRE	03TRAIL-ES	Ergon Asphalt and Emulsions	Tack
Zydex Nanotac[1]	Emulsified Asphalt	-	-	KLP	Tack
CATT-TR	Emulsified Asphalt	NT-RRE	03TRAIL-ER	Wright Asphalt Products Co	Tack
eTac-HB	Hot Asphalt	NT-HA	03TRAIL-HA	Ergon Asphalt and Emulsions	Tack or seal
Road Weld 250[2]	Hot Asphalt	-	-	Texas Materials Group	Tack or seal
BC-1HT	Emulsified asphalt	NT-HRE	03TRAIL-EH	Ergon Asphalt and Emulsions	Tack

1. This product is an additive used in conjunction with a standard emulsified asphalt. Follow manufacturer's recommendation for product use.
2. This product uses an additive in conjunction with a standard PG asphalt binder. Follow manufacturer's recommendations for proper PG grade selection and additive dosage rate.

Tracking Resistant Asphalt Interlayer (TRAIL)

Material Producer List

Materials and Tests Division – Flexible Pavements Section

Sustainable Asphalt

Warm-Mix Asphalt (WMA). WMA is defined as HMA that is produced within a target temperature discharge range of 215°F and 275°F using approved WMA additives or processes from the MPL.

- WMA is allowed for use on all projects and is required when shown on the plans. When WMA is required, the maximum placement or target discharge temperature for WMA will be set at a value at or below 275°F.

WMA Technology	Process Type	WMA Supplier
Accu-Shear	Foaming Process	Stansteel
Advera (Synthetic Zeolite)	Chemical Additive	PQ Corporation
ALmix WarmWare	Foaming Process	ALmix
ANOVA 1501	Chemical Additive	Cargill
Aspha-Min (Synthetic Zeolite)	Chemical Additive	Aspha-Min
Astech PER (Hydrogreen)	Chemical Additive	Meridian Technologies
Cecabase RT	Chemical Additive	Arkema, Inc.
Delta S	Chemical Additive	Collaborative Aggregates LLC
Double Barrel Green	Foaming Process	Astec Industries, Inc.
Evoflex	Chemical Additive	Ingevity
Evotherm	Chemical Additive	
FASTAC-R	Chemical Additive	Green Asphalt Technologies

WMA Technology	Process Type	WMA Supplier
HydroFoam IEQ	Foaming Process	East Texas Asphalt Co., Ltd.
Maxam	Foaming Process	Maxam Equipment
QPR QualiTherm	Chemical Additive	QPR Quality Pavement Repair
Rediset LQ	Chemical Additive	AkzoNobel Surface Chemistry
Rediset WMX	Chemical Additive	
Sasobit	Organic Additive	Sasol Wax Americas, Inc.
Terex	Foaming Process	Terex Roadbuilding
Ultrafoam GX	Foaming Process	Gencor Industries
ZycoTherm	Chemical Additive	Zydex Industries

Texas Department of Transportation

Warm-Mix Asphalt

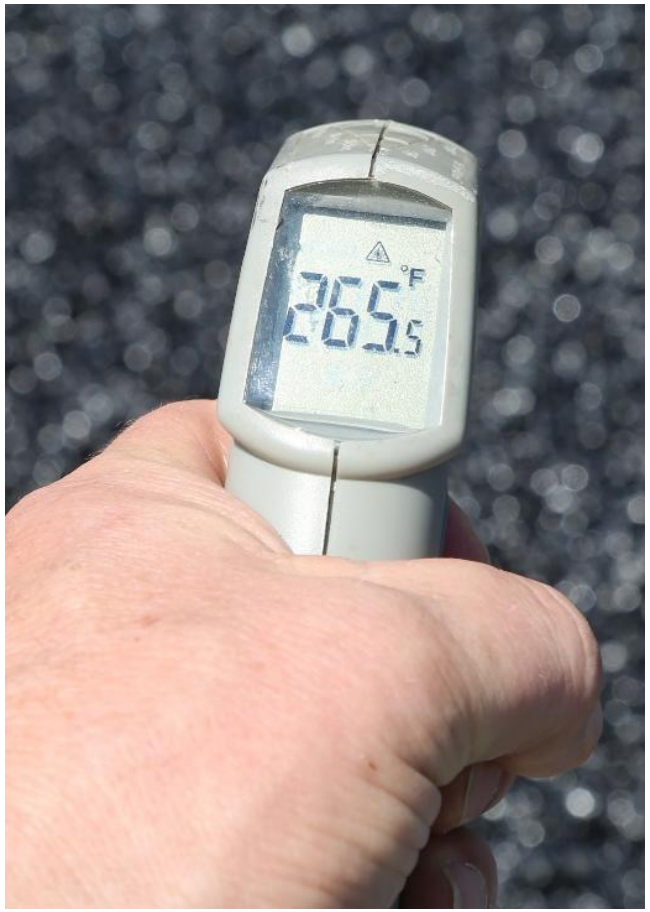
Material Producer List

Materials and Tests Division

Better Density = Better Performance!

Compaction Aid. Compaction aid is defined as an MPL-approved chemical warm-mix additive, denoted as “chemical additive” on the MPL, that is used to facilitate mixing and compaction of HMA at a discharge temperature greater than 275°F.

- ***Compaction aid is allowed for use on all projects***. Compaction aid is required when shown on the plans or as required in Section 341.4.7.1., “Weather Conditions.”



Proper Mix & Layer Selection

Surface, intermediate, and base mixes referenced in Table 4 and Table 5 are defined as follows, unless otherwise shown on the plans.

- **Surface**. The final HMA lift placed at the top of the pavement structure.
- **Intermediate**. Mixtures placed below an HMA surface mix and less than or equal to 8.0 in. below the riding surface.
- **Base**. Mixtures placed greater than 8.0 in. below the riding surface. Unless otherwise shown on the plans, mixtures used for bond breaker are defined as base mixtures.

Sustainable: Better Quality RAP

- **RAP.** RAP is salvaged, milled, pulverized, broken, or crushed asphalt pavement. Fractionated RAP is defined as a stockpile that contains ***RAP material with at least 95.0% passing the 1/2-in. sieve***, before burning in the ignition oven, unless otherwise approved. The Engineer may allow the Contractor to use an alternate to the 1/2-in. screen to fractionate the RAP.
- Do not use RAP contaminated with dirt or other objectionable materials***. Do not use RAP if the decantation value exceeds 5% and the plasticity index is greater than 8.*** Test the stockpiled RAP for decantation in accordance with Tex-406-A, Part I. Determine the plasticity index in accordance with Tex-106-E if the decantation value exceeds 5%

Table 4
Max Allowable Amounts of Fractionated RAP

Max Allowable Fractionated RAP (%)		
Surface	**Intermediate**	**Base**
20.0	30.0	35.0

Equipment: Right sized for the job

- **EQUIPMENT**
  - Provide required or necessary equipment in accordance with TxDOT Item 320, “Equipment for Asphalt Concrete Pavement.”

Item 320

Equipment for Asphalt Concrete Pavement

1. DESCRIPTION

Provide equipment to produce, haul, place, compact, and core asphalt concrete pavement.

2.3.1. **Asphalt Paver**. Furnish a paver that will produce a finished surface that meets longitudinal and transverse profile, typical section, and placement requirements. Ensure the paver does not support the weight of any portion of hauling equipment other than the connection. Provide loading equipment that does not transmit vibrations or other motions to the paver that adversely affect the finished pavement quality. Equip the paver with an automatic, dual, longitudinal-grade control system and an automatic, transverse-grade control system.

Certified Techs = Reliable Test Results

- Certification. ***Personnel certified by the TxDOT-approved HMA certification program (www.TXHMAC.org) must conduct all mixture designs, sampling, and testing*** in accordance with Table 6. Supply the Engineer with a list of certified personnel and copies of their current certificates before beginning production and when personnel changes are made. ***Provide a mixture design developed and signed by a Level 2-certified specialist.*** Provide Level 1A-certified specialists at the plant during production operations. ***Provide Level 1B-certified specialists to conduct placement tests***. Provide Level AGG101-certified specialists for aggregate testing.

Placement Testing				
Selecting placement random numbers	Tex-225-F, Part II		✓	1B
Trimming roadway cores	Tex-251-F, Part I and Part II	✓	✓	1A/1B
In-place air voids	Tex-207-F, Part I and Part VI	✓	✓	1A
In-place density (gauge method)	Tex-207-F, Part III	✓		1B
Establish rolling pattern	Tex-207-F, Part IV	✓		1B
Control charts	Tex-233-F	✓	✓	1A
Ride quality measurement	Tex-1001-S	✓	✓	Note[2]

1. Levels 1A, 1B, AGG101, and 2 are certification levels provided by the Hot Mix Asphalt Center certification program. www.TXHMAC.org
2. Profiler and operator are required to be certified at the Texas A&M Transportation Institute facility when surface test Type B is specified.

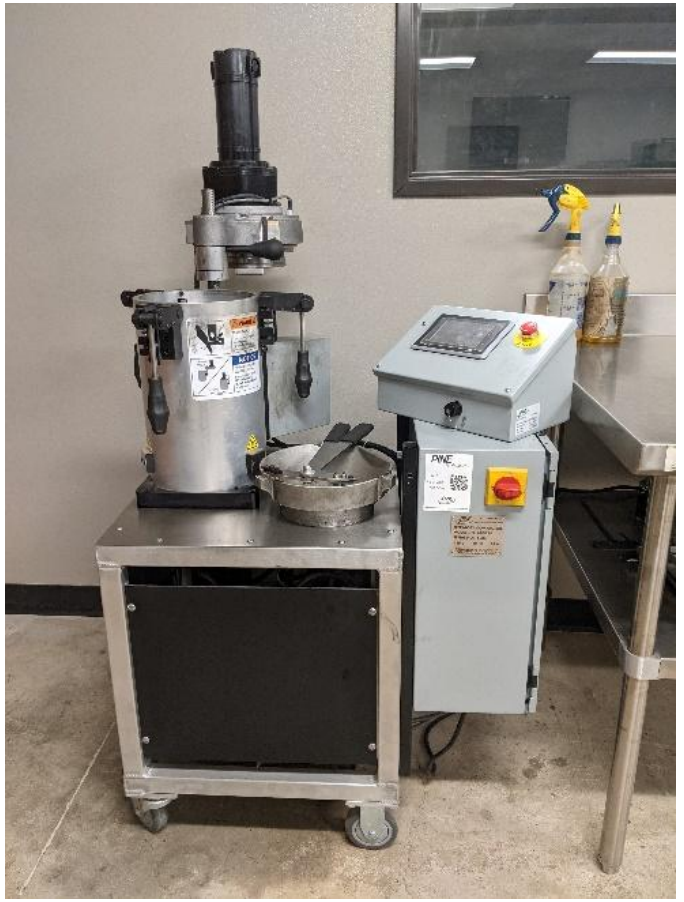
Quality Control starts with a Plan

Quality Control Plan (QCP). ***Develop and follow the QCP in detail.*** Obtain approval for changes to the QCP made during the project. ***The Engineer may suspend operations if the Contractor fails to comply with the QCP.***

Submit a written QCP before the mandatory pre-paving meeting. Receive approval of the QCP before beginning production. Include the following items in the QCP.

Latest Mix Design Equipment

- **Design Requirements. Use the dense-graded design procedure provided in Tex-204-F,** unless otherwise shown on the plans. Design the mixture to meet the requirements shown in Tables 1, 2, 3, 4, 5, 8, 9, and 10.
- ***Design the mixture using an SGC, and 50 gyrations as the design number of gyrations (Ndesign).*** Use a target laboratory-molded density of 96.0% to design the mixture; however, adjustments can be made to the Ndesign value as shown in Table 9. The Ndesign level may be reduced to at least 35 gyrations at the Contractor's discretion.
- **SGC = Superpave Gyratory Compactor**



Mix Design Options

Sieve Size	DG-B Fine Base	DG-C Coarse Surface	DG-D Fine Surface	DG-F Fine Mixture
2"	–	–	–	–
1-1/2"	100.0[1]	–	–	–
1"	98.0–100.0	100.0[1]	–	–
3/4"	84.0–98.0	95.0–100.0	100.0[1]	–
1/2"	–	–	98.0–100.0	100.0[1]
3/8"	60.0–80.0	70.0–85.0	85.0–100.0	98.0–100.0
#4	40.0–60.0	43.0–63.0	50.0–70.0	70.0–90.0
#8	29.0–43.0	32.0–44.0	35.0–46.0	38.0–48.0
#30	13.0–28.0	14.0–28.0	15.0–29.0	12.0–27.0
#50	6.0–20.0	7.0–21.0	7.0–20.0	6.0–19.0
#200	2.0–7.0	2.0–7.0	2.0–7.0	2.0–7.0
Design VMA), % Min				
–	13.0	14.0	15.0	16.0
Production (Plant-Produced) VMA), % Min				
–	12.5	13.5	14.5	15.5

1. Defined as Max sieve size. No tolerance allowed.

Performance Testing

- Rut Resistance protection and performance improvement options depending on traffic.

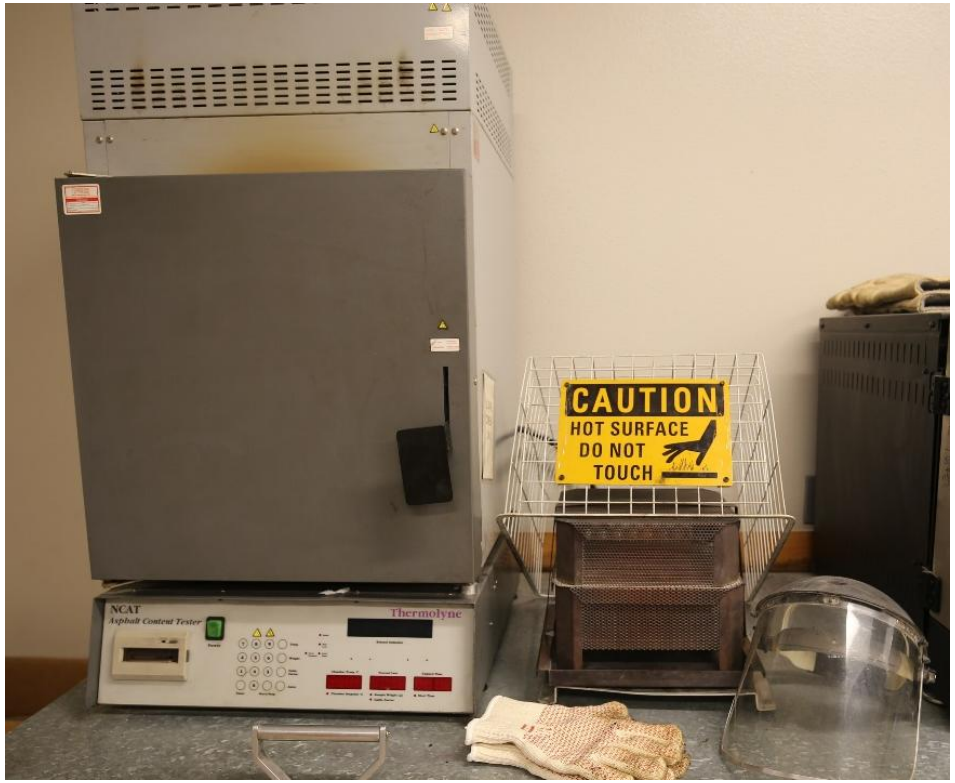
Table 10
Hamburg Wheel Test Requirements

High-Temperature Binder Grade	Test Method	Min # of Passes at 12.5-mm[1,2] Rut Depth, Tested at 50°C
PG 64 or lower	Tex-242-F	5,000
PG 70		10,000
PG 76 or higher		20,000

1. The Hamburg wheel test will have a minimum rut depth of 2.5 mm.
2. The Engineer may elect to use the Contractor's Hamburg Test Results

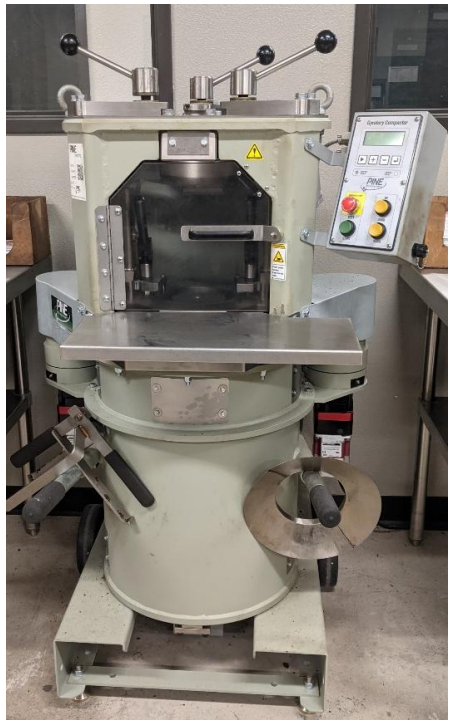
Correlation between Contractor and Agency

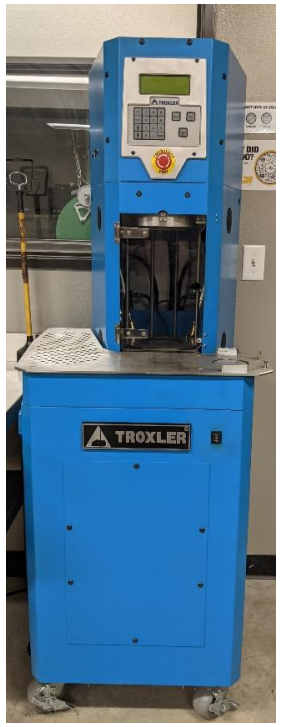
- **Gyratory Compactor Correlation Factors.** Use Tex-206-F, Part II, to perform a gyratory compactor correlation ***when the Engineer uses a different SGC***. Apply the correlation factor to all subsequent production test results.
- **Ignition Oven Correction Factors.** Notify the Engineer before performing Tex-236-F, Part II. Allow the Engineer to witness the mixing of ignition oven correction factor sample. Determine the aggregate and asphalt correction factors from the ignition oven in accordance with Tex-236-F, Part II.

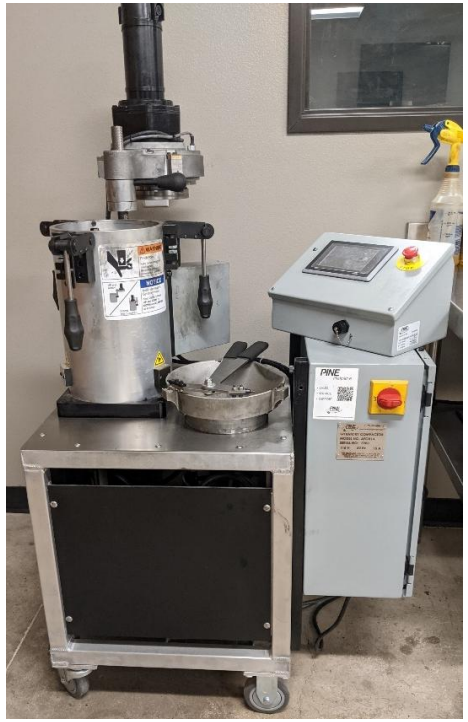


Agency Access to Contractor Lab

- Superpave Gyratory Compactor. The Engineer will use a SGC, calibrated in accordance with Tex-241-F, to mold samples for laboratory mixture design verification. ***For molding trial batch and production specimens, the Engineer will use the Contractor-provided SGC at the field laboratory or provide and use a SGC at an alternate location***.







Mixture Temperature Controls

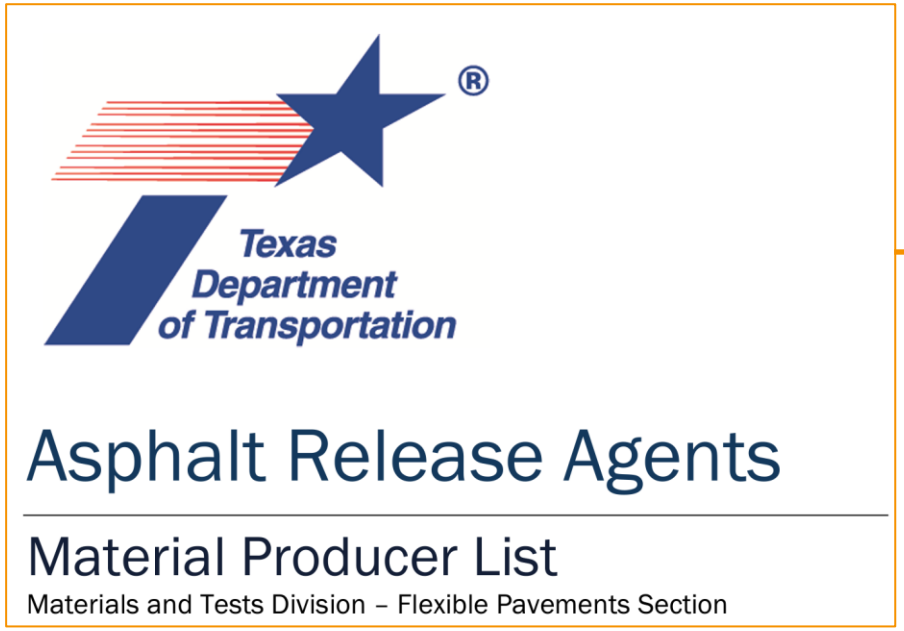
Table 12
Max Production Temperature

High-Temperature Binder Grade[1]	Max Production Temperature (°F)
PG 64	325[2]
PG 70	335[2]
PG 76	345[2]

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.
2. The Maximum production temperature of WMA is 275°F. The contractor may elect to run the first few loads warmer than the maximum WMA temp to pre-heat construction equipment.

Trucking Control

- Hauling Operations. Use belly dump, live-bottom, or end dump trucks to haul and transfer mixture. Use other hauling equipment only when allowed.
- ***Clean all truck beds before use*** to ensure that mixture is not contaminated. ***Use a release agent listed on the TxDOT Materials Producer List MPL to coat the inside bed of the truck*** when necessary. Do not use diesel or any release agent not listed on the MPL. ***Use a solid tarp of watertight construction***.



Manufacturer	Product Name	Approved for Truck Beds	Approved for Other Paving Equipment	Dilution Rates	Expiration
Arrow Magnolia International	Super Slick Asphalt Release Agent	YES	YES	10:1	1/8/2023
BG Chemical, LP	Black Magic	YES	NO	10:1	5/2/2022
	GreenGuard	YES	YES	10:1	5/2/2022
	Loose Juice	YES	YES	10:1	1/24/2026
Brody Chemical	First Choice Asphalt Release	YES	YES	20:1	5/3/2020
	First Choice Plus Asphalt Release	YES	YES	10:1	5/3/2020
	First Choice Concentrate Asphalt Release	YES	YES	40:1	6/5/2020
Cesco Solutions, Inc.	AR-400VT	YES	YES	9:1	5/3/2020
Chemtech, Inc.	CT 6550 Asphalt Release Agent	YES	YES	5:1	4/19/2020
Chemtek, Inc.	357 (Tradenames PavePro Blue & No Trax)	YES	YES	Full Strength	3/27/2022
	BA30	YES	YES	Full Strength	11/7/2025
Chem Station	44169	YES	NO	4:1	1/10/2023
	8277	YES	NO	4:1	1/10/2023
	8442	YES	NO	4:1	9/19/2022
	22169	YES	NO	5:1	10/24/2020
	20331	YES	YES	4:1	5/9/2022
	40019	YES	YES	30:1	9/27/2019
	40019D	YES	YES	4:1	4/5/2022
	No. 1 Release Agent	YES	YES	5:1	9/7/2019

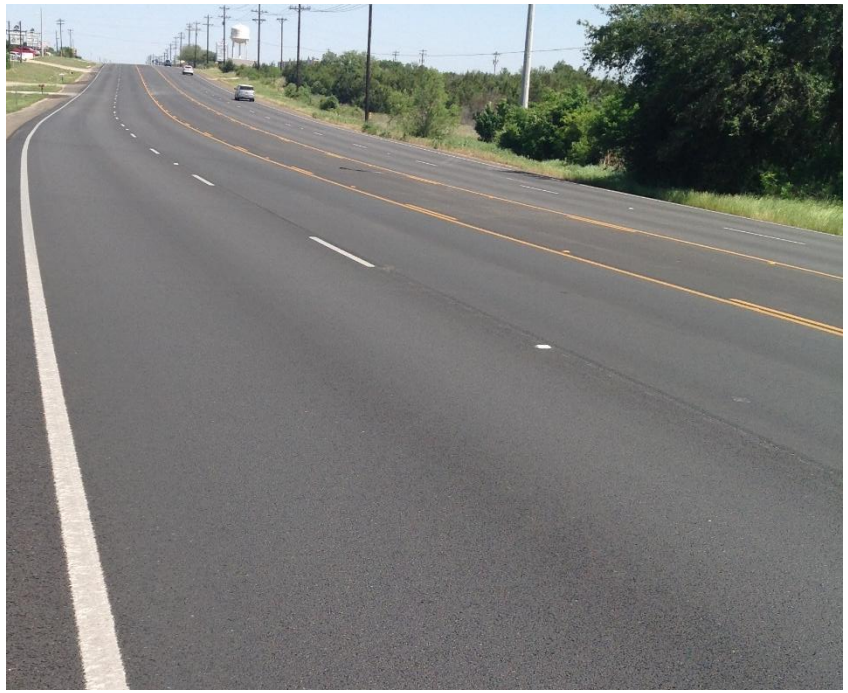
Manufacturer	Product Name	Approved for Truck Beds	Approved for Other Paving Equipment	Dilution Rates	Expiration
Compound Technologies	BMF Asphalt Release Agent	YES	YES	5:1	11/21/2022
	SPX-7 Asphalt Release Agent	YES	YES	5:1	9/9/2019
GS Asphalt Solutions	TA-200	YES	YES	Full Strength	9/30/2018
Industrial Oils Unlimited	Asphalt Release Agent PR	YES	YES	50:1	12/8/2017
	Asphalt Release Green S	YES	YES	2:1	9/19/2025
KT Chemicals	ClearRelease (also AR-50)	YES	YES	Full Strength	12/9/2017
	Popcorn Buster	YES	NO	Full Strength	12/2/2019
KO Manufacturing	Polymeric Release Agent	YES	YES	32:1	3/29/2019
Lubrication Technologies, Inc.	Lube-Tech Endurance HD Asphalt Release Agent	YES	YES	10:1	8/19/2025
Meyer Lab	Avalanche (was AR-101)	YES	NO	n/a	5/9/2022
	Super Slider	YES	YES	Ready to Use	5/24/24
	Ultra Slider	YES	NO	n/a	4/07/2023
Miller Chemical	BTR720	YES	YES	Full Strength	6/17/2018
Power Kleen	Soap Asphalt Release PK-8596	YES	YES	35:1	10/4/2016
Rhomar Industries	Enviro-Slide Ultra	YES	YES	5:1	4/1/2016
RoMix	Slid EZ AR-4	YES	NO	4:1	4/1/2016
SoChem Solutions	ARA-1	YES	YES	15:1	2/23/2019
SoySolv Biosolvents LLC.	TackSolv	YES	YES	30:1	5/03/2024
Tec-Team Ind., Inc.	Tec-Shield RTU	YES	NO	5:1	3/5/2022
Troxler Electronic Laboratories	Bindoff-RA	YES	NO	4:1	12/31/2017
ZEP Manufacturing	Pinnacle	YES	YES	1:5	4/1/2016

Field QC - Temperature

- Placement Operations. ***Collect haul tickets from each load*** of mixture delivered to the project and provide the Agency's copy to the Engineer approximately every hour, or as directed. ***Use a handheld thermal camera or infrared thermometer, or probe-type thermometer to measure and record the internal temperature*** of the mixture as discharged from the truck or material transfer device (MTD) before or as the mix enters the paver. ***To obtain windrow internal temperature, remove surface asphalt to a depth of at least 6 inches.*** Measure the mixture temperature ***at a minimum frequency of one per ten trucks, or as approved***. Include an approximate station number or Global Positioning System coordinates of the location where the temperature was taken on each ticket. ***Ensure the mixture meets the temperature requirements shown in Table 12. Calculate the daily yield and cumulative yield for the specified lift and provide to the Engineer at the end of paving operations for each day unless otherwise directed.*** The Engineer may suspend production if the Contractor fails to produce and provide haul tickets and yield calculations by the end of paving operations for each day.

Look good to perform great.

- Place the mixture to meet the typical section requirements and ***produce a smooth, finished surface with a uniform appearance and texture***. ***Offset longitudinal joints*** of successive courses of hot mix ***by at least 6 in***. ***Place mixture so that longitudinal joints on the surface course coincide within 6 in. of lane lines, are not placed in the wheel path***, ***or will not be covered with pavement markings***, or as directed.



Lift Thickness Matters.

- Proper lift thickness to aggregate size ensures better performance.

Table 13
Compacted Lift Thickness and Required Core Height

Mixture Type	Compacted Lift Thickness Guidelines		Min Untrimmed Core Height Eligible for Testing (in.)
	Min (in.)	Max (in.)	
DG-B	2.50	5.00	1.75
DG-C	2.00	4.00	1.50
DG-D	1.50	3.00	1.25
DG-F	1.25	2.50	1.25

Surface Temp Matters

- Pavement Surface. ***Place mixture when the roadway surface is dry and the roadway surface temperature is at or above the temperatures shown in Table 14*** unless otherwise approved or as shown on the plans. Place mixtures only when weather conditions and moisture conditions of the roadway surface are suitable as determined by the Engineer. ***The Contractor may pave at temperatures 10°F lower than these values*** when a chemical WMA additive is used as a compaction aid in the mixture, when using WMA, or when using a paving process with equipment that eliminates thermal segregation

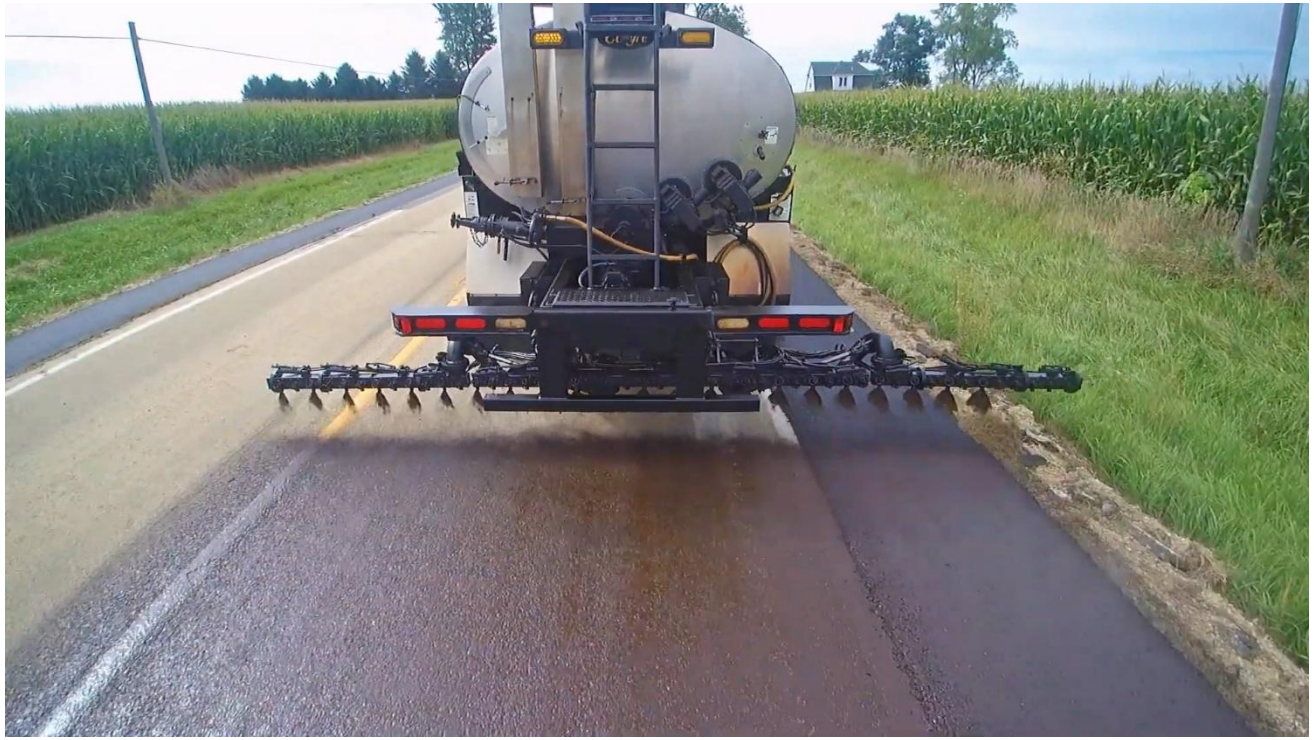
Table 14
Minimum Pavement Surface Temperatures

High-Temperature Binder Grade[1]	Min Pavement Surface Temperatures (°F)	
	Subsurface Layers	Surface Layers
PG 64	45	50
PG 70	55	60
PG 76	60	60

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.

Tack Coat matters.

- **Application.** Clean the surface before placing the tack coat. The Engineer will set the rate ***between 0.04 and 0.10 gal. of residual asphalt per square yard*** of surface area. ***Apply a uniform tack coat at the specified rate*** unless otherwise directed.



Paving at the correct temperature.

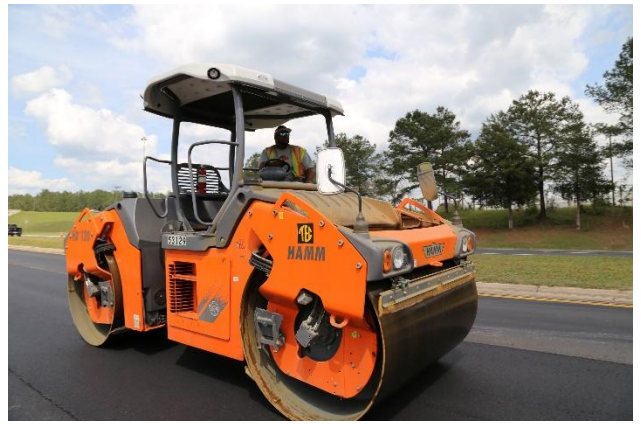
Table 15
Min. Mixture Placement Temperature

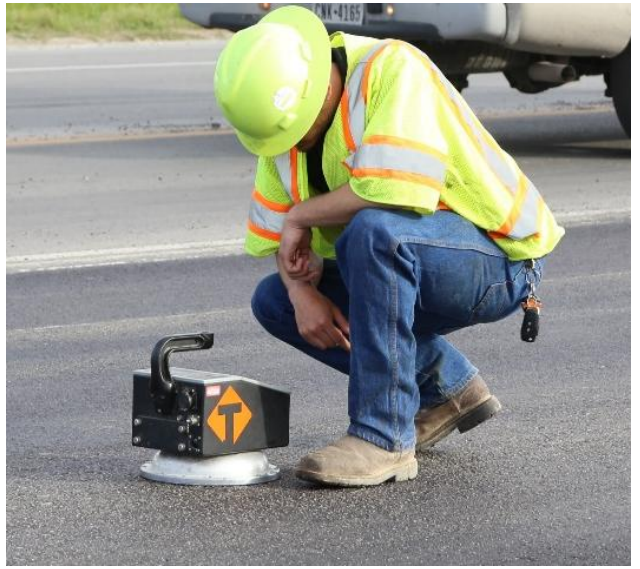
High-Temperature Binder Grade[1]	Min Placement Temperature[2,3,4] (°F)
PG 64	260
PG 70	270
PG 76	280

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.
2. The mixture temperature must be measured using a handheld thermal camera or infrared thermometer immediately before entering MTD or paver.
3. Min placement temperatures may be reduced 20°F if using a chemical WMA additive as a compaction aid, MTD with remixing capabilities, or paver hopper insert with remixing capabilities.
4. When using WMA, the minimum placement temperature is 215°F.

Compaction = Density = Performance

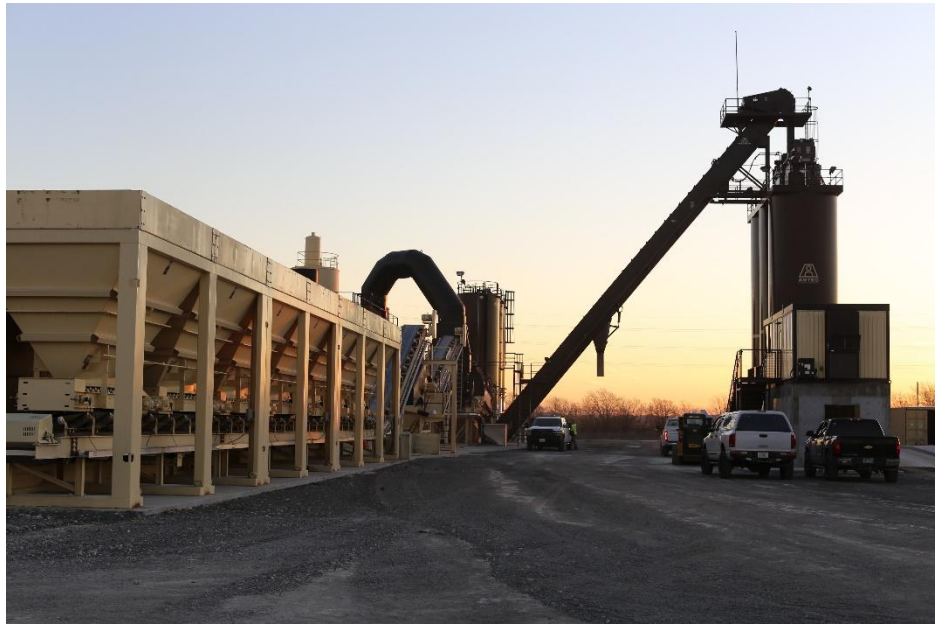
- Compaction. ***Compact the pavement uniformly to contain between 3.8% and 8.5% in-place air voids.*** Take immediate corrective action to bring the operation within 3.8% and 8.5% when the in-place air voids exceed the range of these tolerances. If the in-place air voids are less 2.7% or more than 9.9%, the Engineer may suspend operations or require removal and replacement. The Engineer will allow paving to resume when the proposed corrective action is likely to yield between 3.8% and 8.5% in-place air voids.
- ***In lieu of cores, a calibrated and correlated density gauge may be used to measure in place air voids. Take one density core per day to correlate to the gauge reading.***





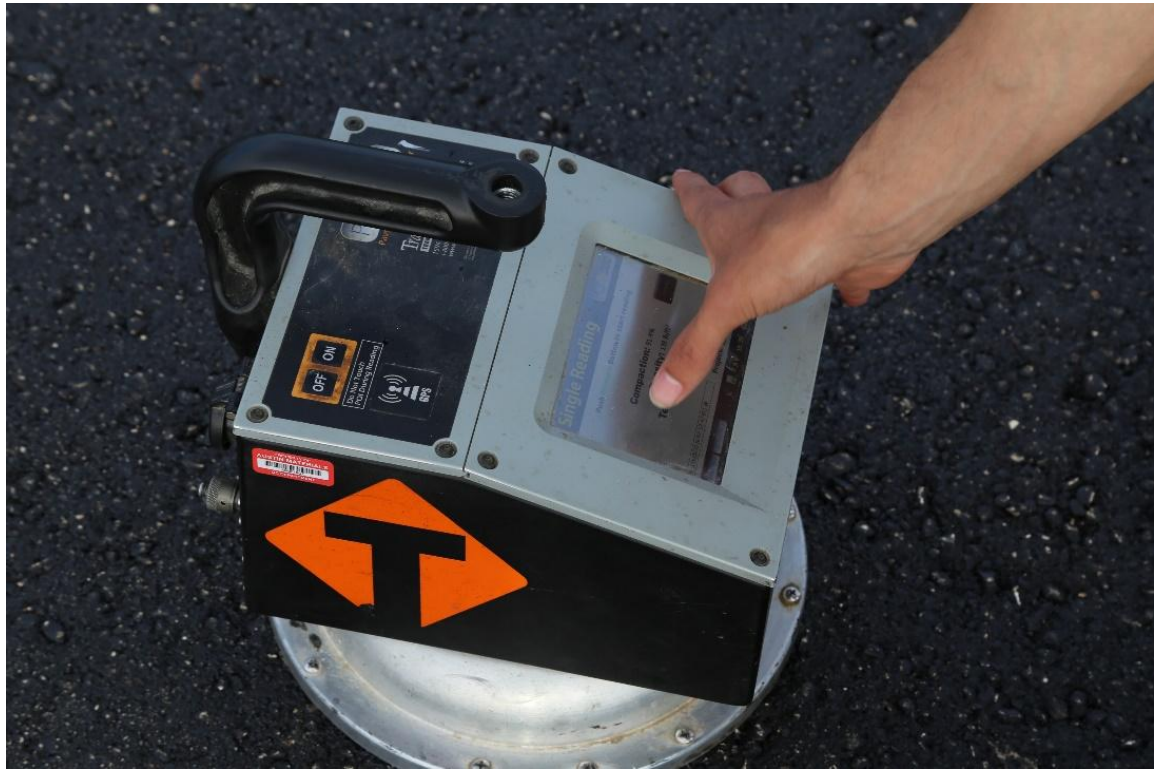
Acceptance: Production + Placement

- Production Lot: ***Production lot is a minimum of one test per 500 tons.***
- Production Testing. ***The Contractor will perform production tests on each lot*** as shown in Table 16. ***Determine compliance with operational tolerances shown in Table 11*** for all lots. ***The Engineer may use the Contractor's test results as acceptance tests, in lieu or performing tests***. ***No testing is required when less than 100 tons per day is produced.***



Acceptance: Production + Placement

- Placement Lot. ***A Placement Lot is defined as a minimum of one density core per 250 tons*** or as approved by the Engineer. ***If a density gauge is used, a minimum of one density test is required per 500 feet of paving.***

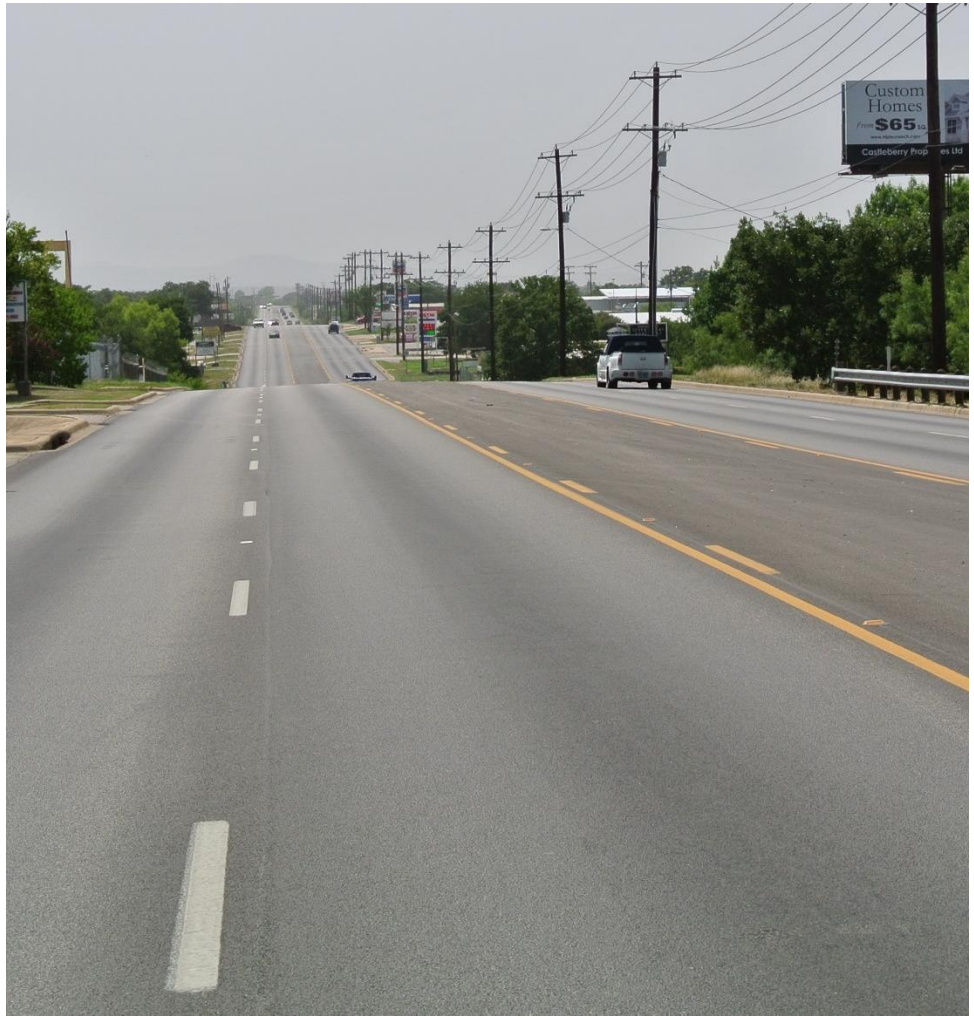


Measurement

- Dense-Graded HMA. ***Hot mix will be measured by the ton of composite hot mix,*** which includes asphalt, aggregate, and additives. Measure the weight on scales in accordance with TxDOT Item 520, “Weighing and Measuring Equipment.”
- Tack Coat*. Tack coat will be measured at the applied temperature* by strapping the tank before and after road application *and determining the net volume in gallons* from the calibrated distributor. The Engineer will witness all strapping operations for volume determination. ***All tack, including emulsions, will be measured by the gallon applied.*** The Engineer may allow the use of a metering device to determine asphalt volume used and application rate if the device is accurate within 1.5% of the strapped volume.

Why 341M?

- Quality.
- Availability.
- Economy ($).
- “SOP” for all.
- Confidence in results.
- Fewer conflicts due to standardization.
- Latest technical advances.



TXAPA

QUESTIONS?

MATERIALS
& ASPHALT
PAVEMENT
SOLUTIONS