



**I-59/I-20 HiMA (Highly Modified Asphalt)
Black Warrior River Basin – Industry Perspective**

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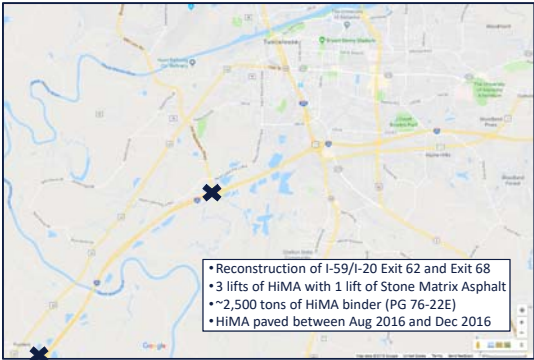


Acknowledgements





Special thanks to Lyndi Blackburn (ALDOT) and Terry Cummings (ST Bunn).

ALDOT Special Project ACIM49357F-IMF-I059

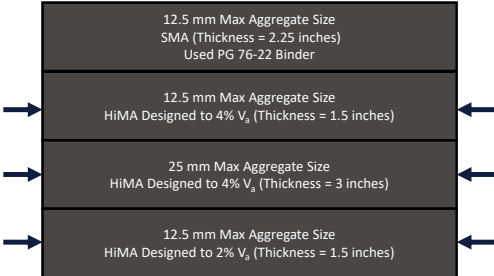


- Reconstruction of I-59/I-20 Exit 62 and Exit 68
- 3 lifts of HiMA with 1 lift of Stone Matrix Asphalt
- ~2,500 tons of HiMA binder (PG 76-22E)
- HiMA paved between Aug 2016 and Dec 2016

Special Project ACIM49357F-IMF-I059



Pavement Layers



- 12.5 mm Max Aggregate Size SMA (Thickness = 2.25 inches)
Used PG 76-22 Binder
- 12.5 mm Max Aggregate Size HiMA Designed to 4% V_v (Thickness = 1.5 inches)
- 25 mm Max Aggregate Size HiMA Designed to 4% V_v (Thickness = 3 inches)
- 12.5 mm Max Aggregate Size HiMA Designed to 2% V_v (Thickness = 1.5 inches)

ALDOT PG 76-22 ALDOT Section 804

| ASPHALT MATERIALS TABLE NO. 4 SPECIFICATIONS FOR PERFORMANCE GRADED ASPHALT BINDER Grade PG 76-22 | | |
|---|----------------------------|---------------------------|
| Property | Specification | Test Method |
| <i>Original Binder</i> | | |
| Flash Point Temperature | Minimum 230 °C | AASHTO T 48 |
| Rotational Viscosity | Maximum 3 Pa·s @ 135 °C | AASHTO T 316 |
| Dynamic Shear, G^* /sin δ | Minimum 1.00 kPa @ 76 °C | AASHTO T 315 |
| <i>Rolling Thin Film Oven Residue (AASHTO T 240)</i> | | |
| Mass Loss (RTFO) | Maximum 1.00 % | AASHTO T 240 |
| Dynamic Shear, G^* /sin δ | Minimum 2.20 kPa @ 76 °C | AASHTO T 315 |
| Elastic Recovery | Minimum 50 % @ 10 °C | AASHTO T 301 ¹ |
| <i>Pressure Aging Vessel Residue (AASHTO R 28)</i> | | |
| Dynamic Shear, G^* /sin δ | Maximum 5000 kPa @ 26.5 °C | AASHTO T 315 |
| Creep Stiffness, S | Maximum 300 MPa @ -12 °C | AASHTO T 313 |
| m-value | Minimum 0.300 @ -12 °C | AASHTO T 313 |

**Typically
Modified with ~2.5% SBS Polymer**

PG 76-22E – ALDOT Special Provision No. 12-1383

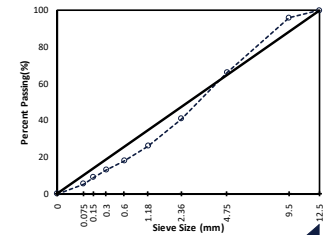
| ASPHALT MATERIALS TABLE NO. 4A SPECIFICATIONS FOR PERFORMANCE GRADED ASPHALT BINDER | | |
|--|--|--------------|
| Grade PG 76-22E | | |
| Property | Specification | Test Method |
| | <i>Original Binder</i> | |
| Flash Point Temperature | Minimum 230 °C | AASHTO T 48 |
| Rotational Viscosity | Maximum 8 Pa·s @ 135 °C | AASHTO T 316 |
| Dynamic Shear, G' sin δ | Minimum 1.00 kPa @ 76 °C | AASHTO T 315 |
| | <i>Rolling Thin Film Oven Residue (AASHTO T 240)</i> | |
| Mass Loss (RTFO) | Maximum 1.00 % | AASHTO T 240 |
| Non-recoverable Creep Compliance, J _{creep} | Maximum 0.5kPa ⁻¹ @ 76 °C | AASHTO T 350 |
| Non-recoverable Creep Compliance, J _{creep} | 75% | AASHTO T 350 |
| Recovery | Minimum 90% for J _{creep} | AASHTO T 350 |
| | <i>Pressure Aging Vessel Residue (AASHTO R 28)</i> | |
| Dynamic Shear, G' sin δ | Maximum 6000 kPa @ 25 °C | AASHTO T 315 |
| Creep Stiffness, S | Maximum 300 MPa @ -12 °C | AASHTO T 313 |
| m-value | Minimum 0.300 @ -12 °C | AASHTO T 313 |

Typically
Modified with ~7.5% SBS Polymer

Mix Design – Bottom Layer

Binder: PG 76-22E
Pb: 6.0%
Design Gyration: 60
Design V_a: 2%
VMA: 15.6%

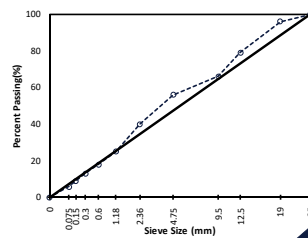
Limestone: 89%
Sandstone: 10%
Baghouse Fines: 1%



Mix Design – Middle HiMA Layer

Binder: PG 76-22E
Pb: 4.7%
Design Gyration: 60
Design V_a: 4%
VMA: 14.1%

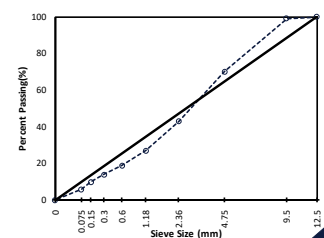
Slag: 15%
Limestone: 57%
Sandstone: 27%
Baghouse Fines: 1%



Mix Design – Top HiMA Layer

Binder: PG 76-22E
Pb: 5.8%
Design Gyration: 60
Design V_a: 4%
VMA: 15.7%

Limestone: 99%
Baghouse Fines: 1%



Contractor Feedback

For I-59/I-20 HiMA Black Warrior River Basin Project

- Like traditional paving, but with a few exceptions
- Slower rate (~25 feet per minute)
- Started compaction quickly
 - Can be difficult to reach density
- Used vibrating screed
- Used three rollers
 - Two breakdown rollers in tandem
 - One finish roller
- Recommend working closely with binder supplier to plan availability of materials

Photographs



Pre Construction (June 2016)



Construction (Fall/Winter 2016)



2 Years After Construction (Fall 2018)

Photographs



Pre-Construction (June 2016)

2 Years After Construction
(Fall 2018)

Hunt's Progression Since I-59/I-20

Lessons Learned:

1. Communication is key
2. HiMA requires longer cure times and has shorter shelf life
3. Asphalt tank temperature is vital to shelf life

2018 Status for HiMA at Hunt:

1. Two HiMA Terminals – Bainbridge, GA and Panama City, FL
 - a. Panama City, FL terminal damaged during Hurricane Michael
2. Ask customers to provide 2 weeks notice before pickup
3. Made on an as-needed basis
4. Supplied ~3,500 tons of HiMA binder in 2018

Questions?

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