Caltrans – HMA Type C

High Stability Intersection Desert

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Presentation Overview

- Terms
- Specs
- Design
- Applications
- Resources

Terms

- HMA Type C – mix that has a higher Stability value than that of a conventional HMA
- High Stability – Modified compacted effort used to provide values to a rut resistant mix and measured by its stability value
- Modified tamps – initial compaction with CA Kneading Compactor… and additional "tamps" with same

Terms

- NMAS
  - Nominal Maximum Aggregate Size
- JMF – the "recipe"
  - Job Mix Formula – Mix Design
  - Aggregate gradation & binder content

100
100
90
72
65
48
36
22
15
9
4

Aggregate Size Definitions

- *Nominal Maximum* Aggregate Size
  - one size larger than the first sieve to retain more than 10%
- *Maximum* Aggregate Size
  - one size larger than nominal maximum size

100
99
89
72
65
48
36
22
15
9
4

Specs
CTM 379 or 382

Nearly the same as a conventional HMA with the following changes

- Tighter tolerance on binder content
  - Type A & B = ± 0.45%
  - Type C = ± 0.40%

Specs
CTM 304

- Modified Compaction
  - Normal Compaction
    - 150 tamps @ 230°F
  - Modified Compaction
    - 500 ADDITIONAL tamps @ 140°F

Specs
CTM 366

- Stabilometer Values – Type C
  - Normal compaction = 37 Minimum S-Value
  - Modified compaction = 35 Minimum S-Value

Specs
CTM 205

- Crushed Particles
  - One Fractured Face (Fine Aggregate) ≥ 90%
  - Two Fractured Faces (Coarse Aggregate) ≥ 95%

Specs
CTM 375

- Theoretical Maximum Density (TMD)
  - Percent of RICE determined by design air void percentage
    - 4.0% air voids = 92-97% of TMD
    - 5.0% air voids = 91-96% of TMD

Specs
LP-2

- Voids in Mineral Aggregate (VMA) based on
  - Nominal Maximum Aggregate Size
  - Design air void content (4% or 5%)

Minimum VMA (%)

	4.0%	5.0%
½-inch	14	15
¾-inch	13	14
1-inch		
with NMAS = 1-inch	12	13
with NMAS = ¾-inch	13	14

Specs
LP-3

- Voids Filled with Asphalt (VFA) based on:
  - Nominal Maximum Aggregate Size
  - Design air void content (4% or 5%)
  - Voids filled with asphalt (%)

	4.0%	5.0%
½-inch	65-75	60-70
¾-inch	65-75	60-70
1-inch	65-75	60-70

Specs
LP-4

- Dust Proportion - same for both 4% and 5% air void content designs:

4.0%	5.0%
0.6 - 1.3	0.6 - 1.3

Design Considerations

- Air Void Content for Binder Selection
- Binder
- Aggregate Size
- Crushed Particles

Binder

- Usually "harder" liquid binders are used
- Grade "bump" up
- Bay Area - PG 70-10
- Typically higher stability values with harder binder

Aggregate

- Size and Gradation
  - Usually based on traffic level & aesthetics
  - 3 Type C mixes to choose from
    - 1-inch
    - ¾-inch
    - ½-inch
  - Crushed Particles
    - 90% fine fraction can be hard to meet in certain regions
    - Fine Aggregate Angularity (FAA – AASHTO T-304) not required for mixes with <10% natural sand, so theoretically this should not be problematic

Air Void Content & VMA

- Can be difficult to meet
- RAP influence on gradation & VMA
- Wide aggregate gradation band specs provide flexibility

HMA Comparison

¾-inch	Type A & B	Type C
1-inch	100	100
¾-inch	90-100	90-95
½-inch	70-90	60-75
No. 4	45-55	35-52
No. 8	32-40	22-36
No. 30	12-21	8-18
No. 200	2-7	3-7

HMA Comparison

½-inch	Type A & B	Type C
¾-inch	100	100
½-inch	95-99	90-98
⅜-inch	75-95	64-86
No. 4	55-66	42-57
No. 8	38-49	29-39
No. 30	15-27	13-19
No. 200	2-8	3-7

Stability

- S-Value tested twice on specimens
  - 3 specimens @ 150 tamp
  - 3 specimens @ 500 tamps
    - Same specimens have been used since maximum pressure placed on specimens during stability test is 6,000 lb
    - Maximum pressure used for "leveling load" is 12,600 lb; [stability test (max 6,000 lb) should not affect specimen for high stability test]
    - If high stability test fails, prepare two separate sets of specimens (similar to the bulk specific gravity/stability language in CTM 308)

Application

- Intersections
- Bus Stops
- Toll Facilities
- Haul Roads
- Landfills
- Airports
- High Traffic Roadways
- Ticket Booths
  - ✓ Ready-Mix Plants
  - ✓ HMA Plants
  - ✓ Quarries
  - ✓ Recycle Yards

Slow moving or Standing Loads

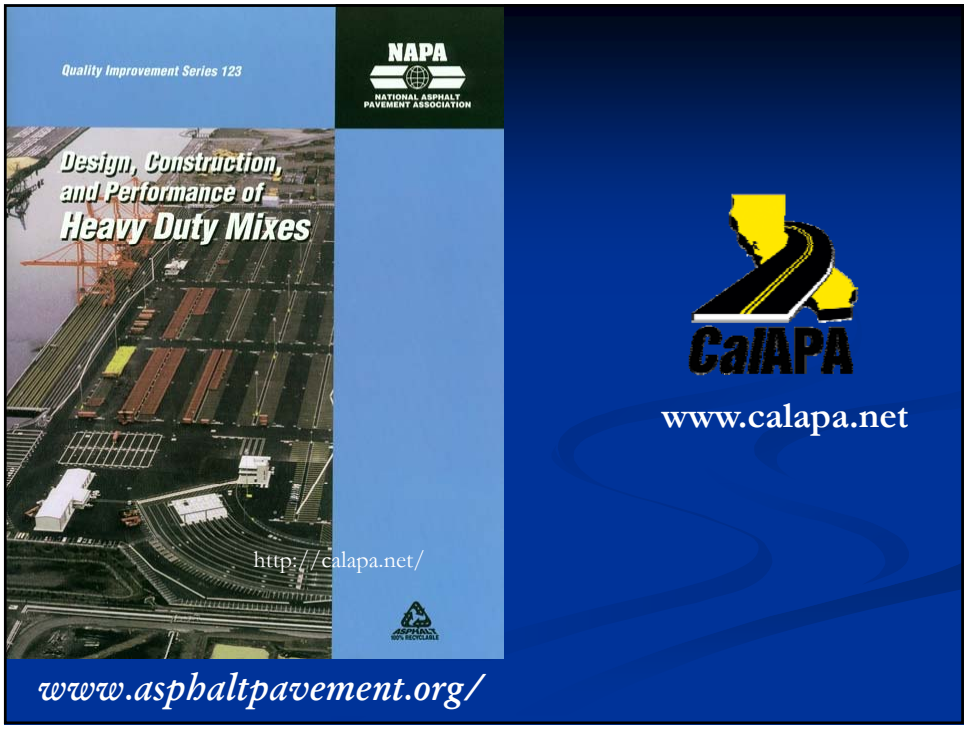
Examples

- Landfills - Newby Island, Warm Springs
- Airports
  - SFO (San Francisco)
  - SMF (Sac)
- Caltrans I-80 (West El Camino off-ramp)
- Local Agencies
  - Sac County & City
  - Roseville
  - Elk Grove
  - West Sac

New Construction
Remove & Replace
Overlay

Resources


AMERICA RIDES ON US
Asphalt.
HIGH-PERFORMANCE
INTERSECTIONS
Asphalt Pavement Alliance
www.asphaltroads.org


Quality Improvement Series 123
NAPA
NATIONAL ASPHALT PAVEMENT ASSOCIATION
Design, Construction, and Performance of
Heavy Duty Mixes
http://calapa.net/
www.asphaltpavement.org/
CalAPA
www.calapa.net

QUESTIONS?