

# Nebraska Mix Design Parameters for High RAP Blends

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➤ Gsb

➤ VMA

➤ Dust to Asphalt

➤ Binder Grading

➤ Type SPR



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➤ VMA

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## ➤ Gsb

- Largely affected by Ignition oven
- Artificially Lowers VMA
- Slightly lowers FAA
  - FAA is - #8 to + #100
- Both used for acceptance and pay factors



➤ Gsb

➤ VMA & FAA

➤ Dust to Asphalt

➤ Binder Grading

➤ Type SPR



## ➤ VMA & FAA

- VMA no longer used for acceptance or pay factor
- VMA is calculated using 2.585 for information only
- FAA is still used for acceptance and pay factor



➤ Gsb

➤ VMA

➤ Dust to Asphalt

➤ Binder Grading

➤ Type SPR



## ➤ Dust to Asphalt

- Gyrotory mixes initially produced low dust to asphalt ratios and lower binder
- Now we see D/A ratios of 1.0 to 1.2
- Richer Denser mixes
- Better compaction
- Better Joint Density
- Less joint raveling



➤ Gsb

➤ VMA

➤ Dust to Asphalt

➤ Binder Grading

➤ Type SPR



## ➤ Binder Grading

- Binder Grade Blending with RAP ?????
- Much Lab Testing....
- What do you really get ?????
- Went to all PG minus 34 Grade Crudes
- 70-34 Interstate
- 64-34 All others, 90% of our system
- 52-34 Shoulder mixes



➤ Gsb

➤ VMA

➤ Dust to Asphalt

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## ➤ Type SPR Asphalt

- VMA of 12 now eliminated
- Minimum AC of 5.0%
- Air voids incentive and disincentive
- PG 64-34
- 6 to 7 % Minus 200
- Tighter grading band than Superpave



## ➤ Type SPR Asphalt

- Higher strength modulus \*\*\*
- Stiffness of the RAP
- Polymer Modified PG 64-34
- Higher Dust to Asphalt
- 2.5% to 3.5 % Air Void Content
- Good Angularity



## ➤ Type SPR Asphalt

- MODULUS ?
- 25% by High Temp Binder Grade
- 5% by VMA
- 5% by NMAS
- 5% by higher in place Density
- 1.5% by increased dust to asphalt



## ➤ Type SPR Asphalt

- MODULUS ?
- ➔ • 25% by High Temp Binder Grade
- 5% by VMA
- 5% by NMAS
- 5% by higher in place Density
- 1.5% by increased dust to asphalt



## ➤ Type SPR Asphalt

- MODULUS ?
- ➔ • 25% by High Temp Binder Grade
  - Stiffness of RAP
  - Polymer modified PG 64-34
  - Low Temp covered by -34



## ➤ Type SPR Asphalt

- MODULUS ?

- ➔ • 25% by High Temp Binder Grade

- ➔ • 5% by VMA

- 5% by NMAS

- 5% by higher in place Density

- 1.5% by increased dust to asphalt



## ➤ Type SPR Asphalt

- MODULUS ?
- • 25% by High Temp Binder Grade
- • 5% by VMA
  - Slightly lower VMA
  - Graded more near Max Density Line



## ➤ Type SPR Asphalt

- MODULUS ?
- ➔ • 25% by High Temp Binder Grade
- ➔ • 5% by VMA
- ➔ • 5% by NMAS
- 5% by higher in place Density
- 1.5% by increased dust to asphalt



## ➤ Type SPR Asphalt

- MODULUS ?
- ➔ • 25% by High Temp Binder Grade
- ➔ • 5% by VMA
- ➔ • 5% by NMAS
  - ½ inch NMAS, can make 3/8 or ¾ also



## ➤ Type SPR Asphalt

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## ➤ Type SPR Asphalt

- MODULUS ?
- ➔ • 25% by High Temp Binder Grade
- ➔ • 5% by VMA
- ➔ • 5% by NMAS
- ➔ • 5% by higher in place Density
  - 93 to 95% In place Density
  - Not having to break aggregate to get it



## ➤ Type SPR Asphalt

- MODULUS ?
- ➔ • 25% by High Temp Binder Grade
- ➔ • 5% by VMA
- ➔ • 5% by NMAS
- ➔ • 5% by higher in place Density
- ➔ • 1.5% by increased dust to asphalt
  - 6 to 7% Dust, where we need it !

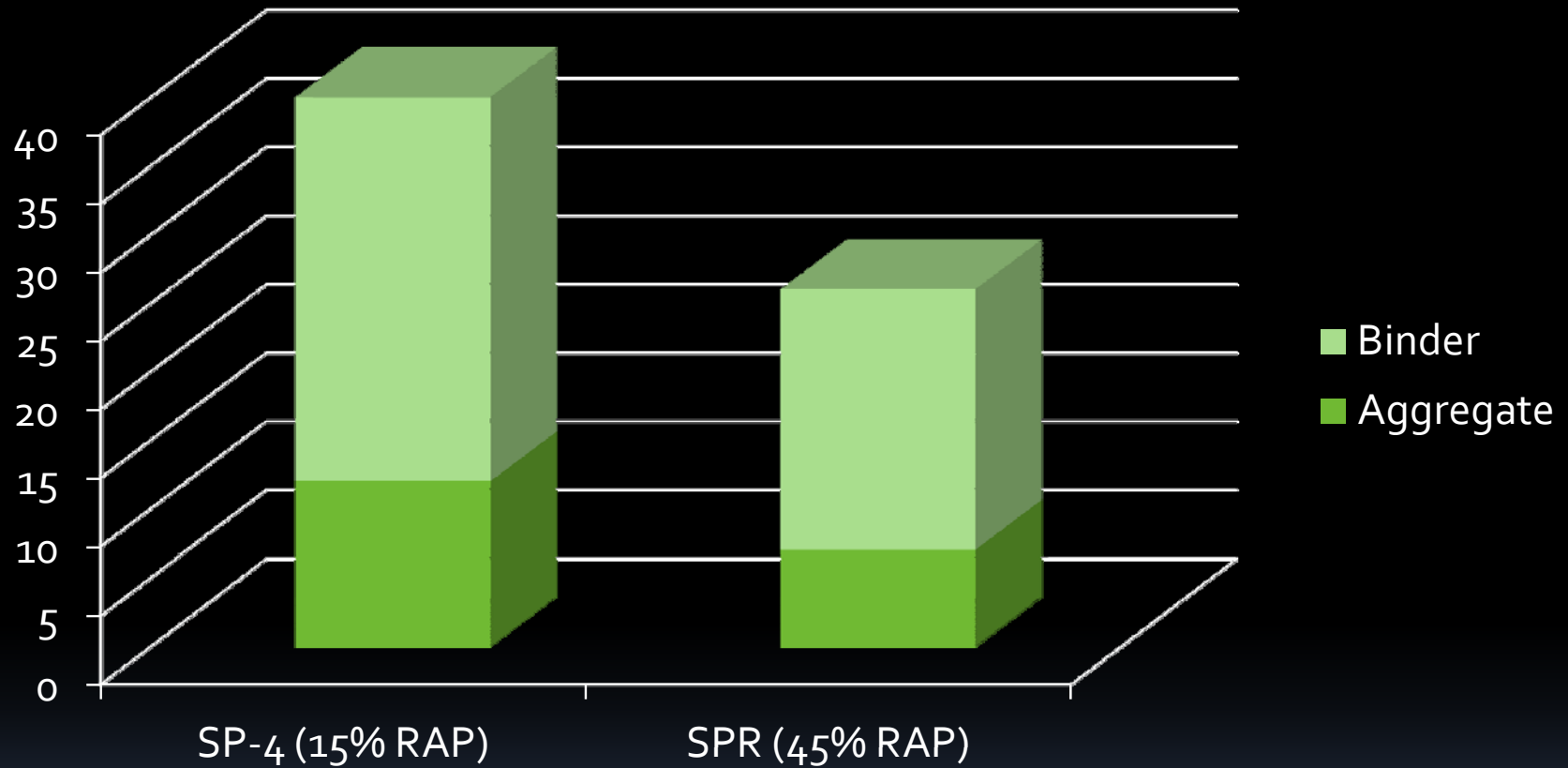


## ➤ Type SPR Asphalt

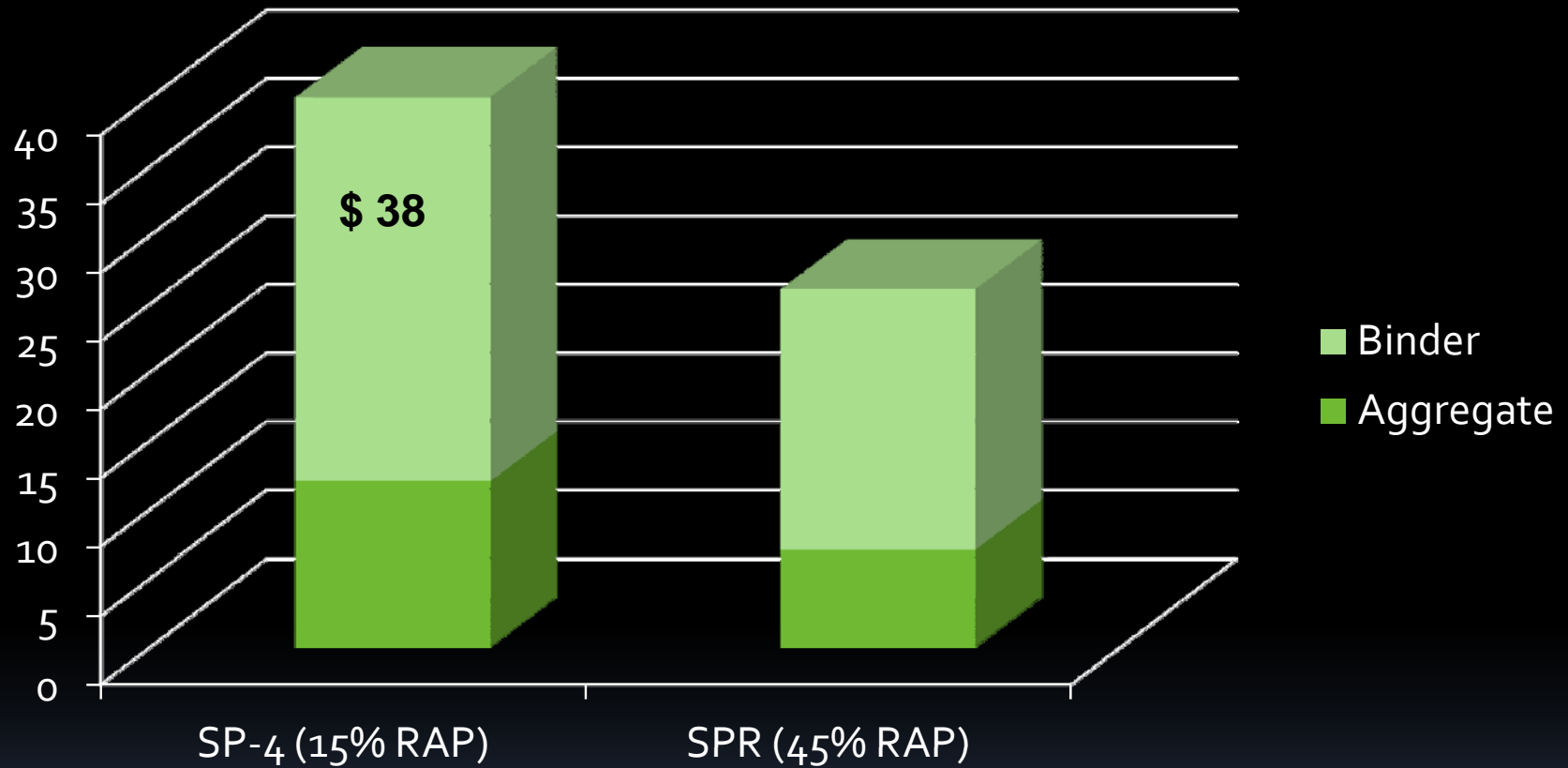
- Gyration 7 – 65 – 100 (75 Marshall)
  - Over 3 Million ESALS
- FAA 43 minimum
- CAA 83 minimum
- 5 % Binder minimum
- 50% RAP max
- Typical d/a of 1.0 to 1.2



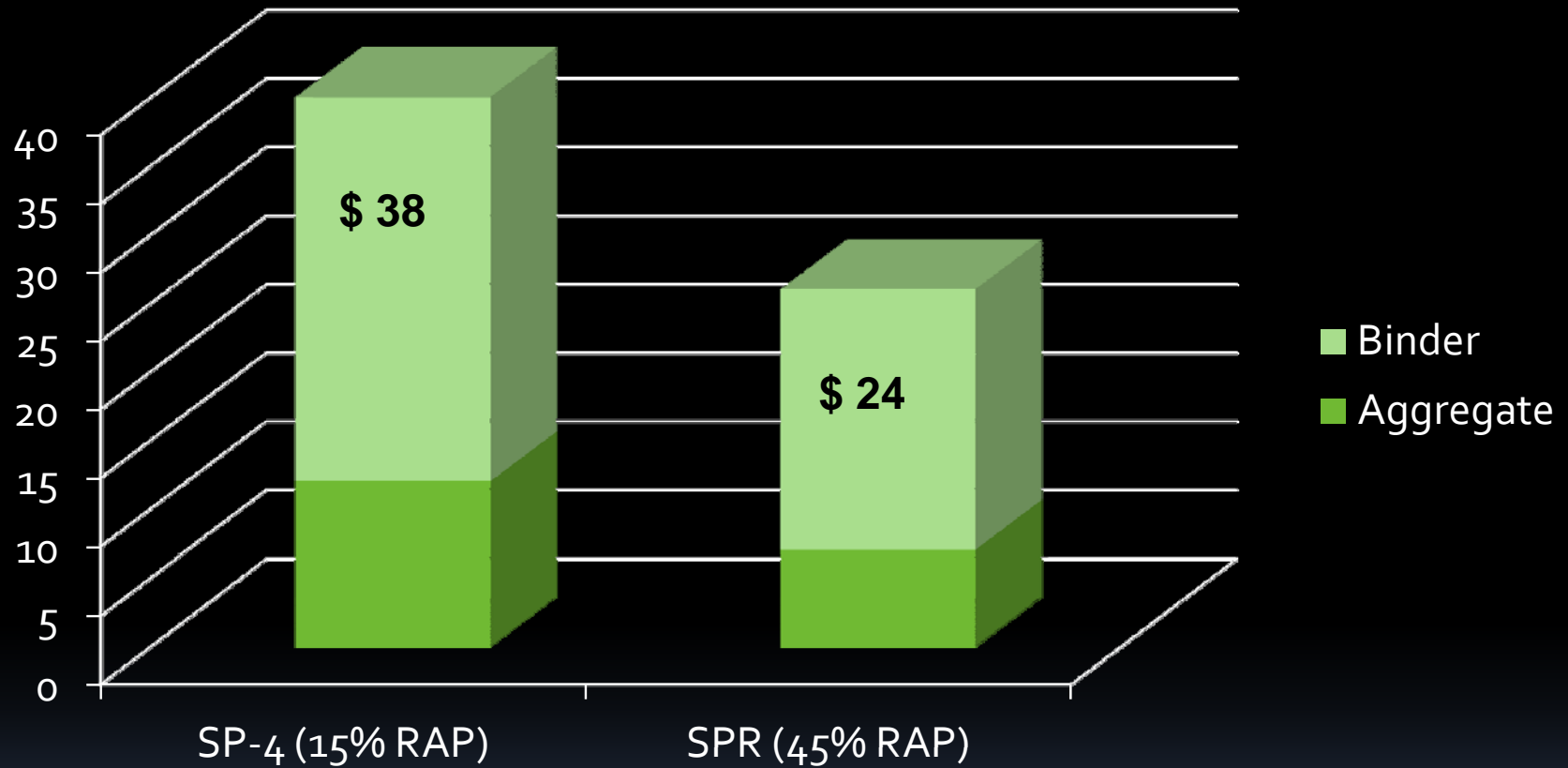
# ➤ Type SPR Asphalt



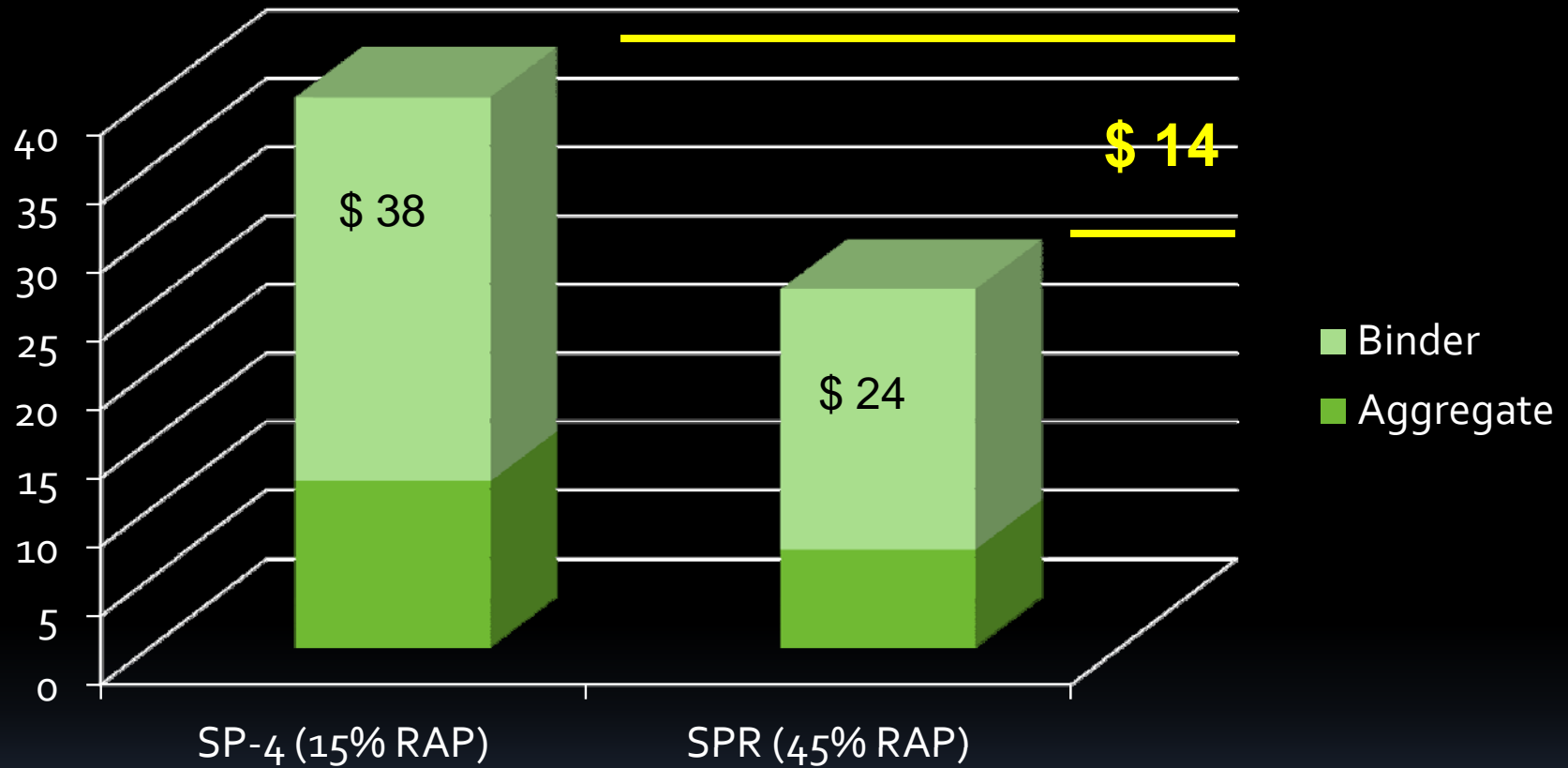
# ➤ Type SPR Asphalt



# ➤ Type SPR Asphalt



# ➤ Type SPR Asphalt



➤ SPR with PG 64-34 is 20 to 25% lower material cost





Thank You!