

CPD 13-5, Reclaimed Asphalt Pavement (RAP)
Sample Backup Calculations to Support Agreed Unit Price Credit to the State

Sample Backup Calculations are based on the following as planned Hot Mix Asphalt:

Aggregate 7.00 \$/ton

Asphalt Binder 603.00 \$/ton

HMA with Reclaimed Asphalt Pavement percentage of 15%

Reclaimed Asphalt Pavement (RAP) 6% Binder Content

6% Asphalt Content w/15% RAP binder replacement 0.9% virgin binder adjusted to 5.1%

Remaining HMA tons on project 30,000

Force Account Markup 15%

Material Cost Savings

Aggregate, \$/ton, Delivered to Hot Plant:

| Material | Trucking | Net | Markup 15% | Total |
|----------|----------|---------|---------------|---------|
| \$7.00 | \$3.00 | \$10.00 | \$1.50 | \$11.50 |

Aggregate Cost Savings

As Changed (HMA included 15% RAP now 25% RAP), \$/ton

Aggregate Costs

Aggregate Material Saved

10% Savings

\$11.50 X 10% = **(\$1.15) per ton**

Asphalt Binder, \$/ton, Delivered to Hot Plant:

| Material | Trucking | Net | Markup 15% | Total |
|----------|----------|----------|---------------|----------|
| \$603.00 | \$18.00 | \$621.00 | \$93.15 | \$714.15 |

Asphalt Binder, \$/ton of HMA with 5.1% Asphalt Binder Content:

(6% OBC w/15% RAP binder replacement 0.9% virgin binder adjusted to 5.1%)

\$714.15 X 0.051 = \$36.42 per ton

Asphalt Binder, \$/ton of HMA w/ RAP and 4.5% Asphalt Binder Content

(With 25% RAP asphalt binder replacement from RAP = 1.5% (RAP Binder Content of 6.0%)
 virgin binder adjusted to 6.0% - 1.5% = 4.5%)

\$714.15 X 0.045 = \$32.14 per ton

Asphalt Binder Cost Savings

Difference (15%RAP versus 25% RAP) =Asphalt Binder Savings, \$/ton

\$36.42 - \$32.14 = **(\$4.28) per ton**

Total Materials Cost Savings w/ 25% RAP

Sum = Aggregate Cost Savings plus Asphalt Binder Savings, \$/ton

(\$1.15) + **(\$4.28)** = **(\$5.43) per ton**

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Additional Costs

RAP Fractionation Increased Cost, \$2.00 per ton, 25% RAP

$$\$2.00 \quad \times \quad 0.25 \quad = \quad \$0.50 \text{ per ton}$$

HMA Increased Costs for new Mix Design, \$/ton

$$\frac{\$3,000.00 \text{ cost per mix design}}{30,000 \text{ tons/job}} = \$0.10 \text{ per ton}$$

HMA Increased Costs for Quality Control Testing, \$/ton
(HMA California Test 371 and AASHTO 324 (modified) every 10,000 tons)

$$\frac{\$3,000.00 \text{ cost per test set}}{10,000 \text{ tons}} = \$0.30 \text{ per ton}$$

Credit Per Ton of HMA

| Credit = Net Materials Savings for 25% RAP minus the additional costs | | | | | Credit to State |
|---|------------|------------|------------|--|-----------------|
| Material | RAP Fract. | Mix Design | QC Testing | | \$/ton |
| (\$5.43) | \$0.50 | \$0.10 | \$0.30 | | (\$4.53) |

Note: These values are for example only, and are meant only to show the types of costs to consider for the adjustment calculation. Actual costs will vary from project to project, depending on mix design, asphalt binder content, trucking distances, asphalt and aggregate costs and additional quality control requirements.