

# **I-70 Two Lift Construction**

**Exposed Aggregate Surface**

**Preliminary Work**

**June 28, 2007**

## **Aggregate Specifications**

### **Top Lift**

<b>Polished Stone Value</b>	<b>&gt;50</b>
<b>Acid Insoluble Residue</b>	<b>min 90</b>
<b>LA Wear</b>	<b>&lt;20</b>

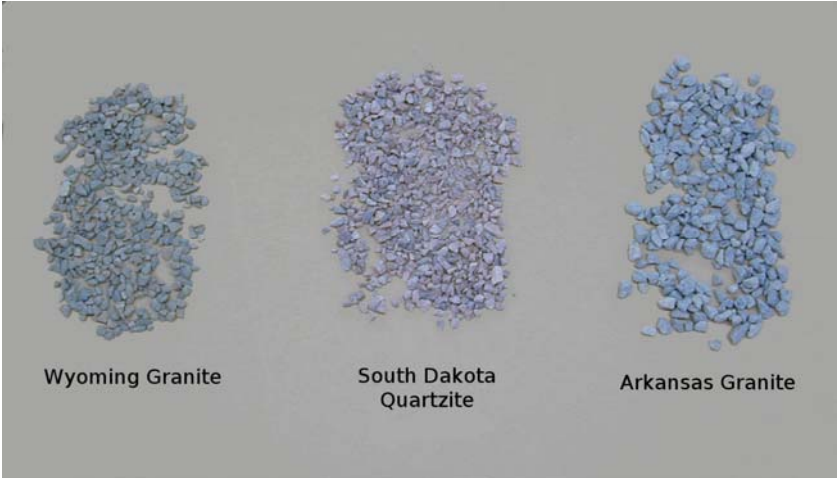
# Aggregate Specifications

Top Lift	Coarse Aggregate	Mortar Sand
<b>SIEVES</b>		
3/4" (19 mm)	0	
1/2" (12.5 mm)	10% + 11mm max	
3/8" (9.5 mm)		
#4 (4.75 mm)	85 % +4 mm min	
#8 (2.36 mm)		
#16 (1.18 mm)		15% + 2mm max
#30 (600 um)		
#50 (300 um)		
#100 (150 um)		
#200 (75 um)	98.5% + #230 min	90% + #230 min

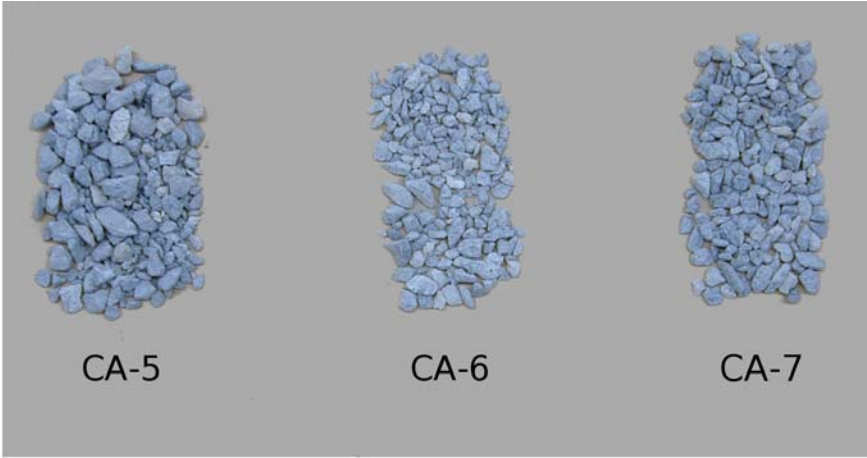
## Gradation

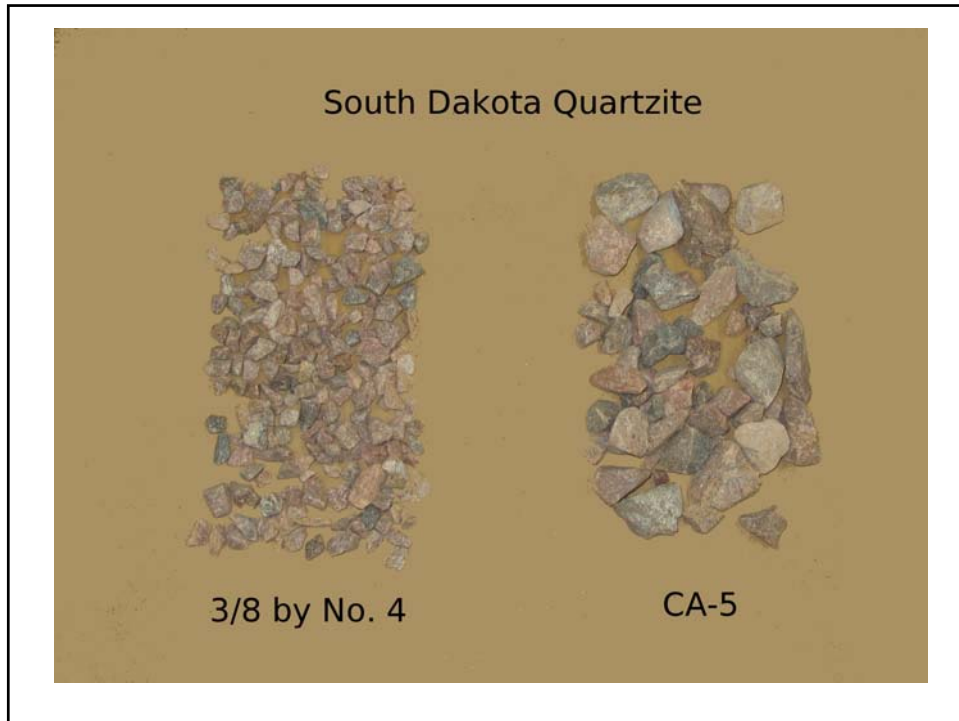
MATERIAL		CA-7	1/2"x #4	3/8"	Spec	Sand	Spec
		Ark	Quart	Wyo			
<b>SIEVES</b>							
3/4"	19 mm	0	0	0	0		
1/2"	12.5 mm	2	0	0	10% + 11mm max		
3/8"	9.5 mm	32	16	6			
#4	4.75 mm	95	90	94	85 % +4 mm min		
#8	2.36 mm	97	96	98		0	15% + 2mm max
#16	1.18 mm	98	97	98		16	
#30	600 um	98	97	98		49	
#50	300 um	98	98	98		83	
#100	150 um	99	98	99		97	
#200	75 um	99	99	99	98.5% + #230 min	99.6	90% + #230 min

# Choice of Aggregates

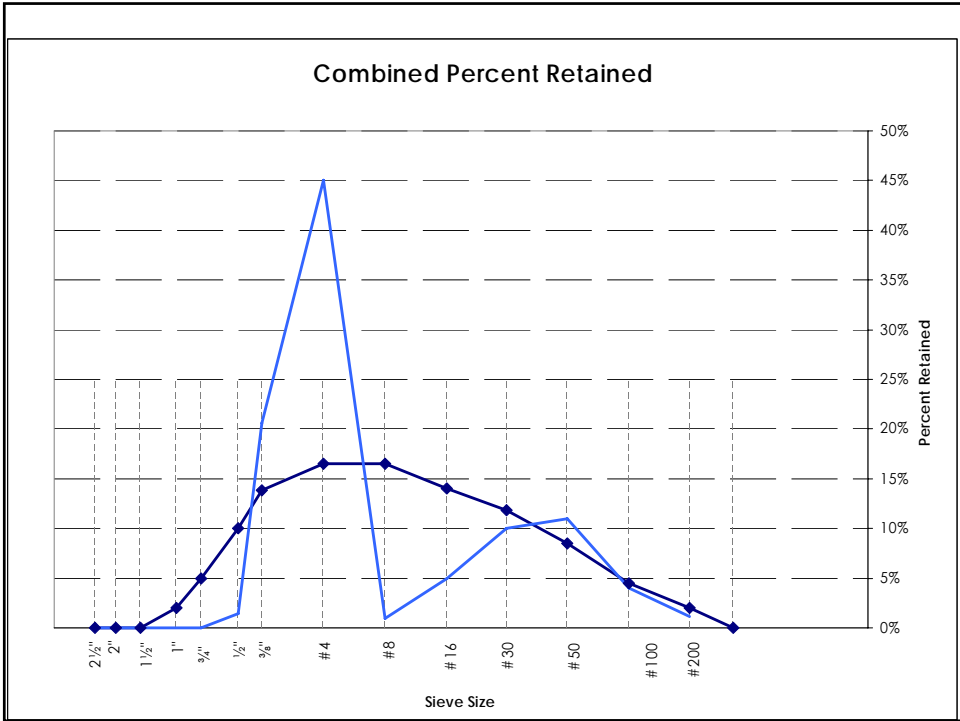


# Arkansas Granite





<u>Top Lift</u>	<u>Mix Design</u>
<b>Coarse Aggregate</b>	<b>70%</b>
<b>Sand</b>	<b>30%</b>
<b>Cementitious lbs/cuyd</b>	<b>752</b>
<b>w/c Ratio</b>	<b>0.38</b>
<b>Design Air Content</b>	<b>6.50%</b>



**Two Lift Construction I-70 Saline County, KS**

	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
	Ark	Ark	Wyo	Wyo	SD	SD
Aggregate	Gran	Gran	Gran	Gran	Quart	Quart
<b>Cementitious</b>	<b>658</b>	<b>752</b>	<b>658</b>	<b>752</b>	<b>658</b>	<b>752</b>
			25%	25%	30%	30%
			F-Ash	F-Ash	Slag	Slag
<b>Slump</b>	<b>2.50</b>	<b>4.00</b>	<b>1.50</b>	<b>2.25</b>	<b>3.00</b>	<b>3.00</b>
	<b>144.3</b>					
<b>Unit Wt.</b>	<b>6</b>	<b>142.6</b>	<b>150.86</b>	<b>149.65</b>	<b>143.96</b>	<b>143.08</b>
<b>% Air</b>	<b>4.5</b>	<b>5.0</b>	<b>2.8</b>	<b>3.0</b>	<b>4.5</b>	<b>4.9</b>
<b>28 Day Boil</b>	<b>12.6</b>	<b>14.2</b>	<b>13.5</b>	<b>14.2</b>		
<b>28 Day RC Perm</b>	<b>4235</b>	<b>4214</b>	<b>4301</b>	<b>4775</b>	<b>3077</b>	<b>3487</b>
<b>28 Day Strength</b>	<b>5560</b>	<b>5300</b>	<b>4940</b>	<b>4870</b>	<b>5330</b>	<b>5620</b>
<b>C-457 S. F.</b>	<b>0.154</b>	<b>0.123</b>	<b>0.234</b>	<b>0.244</b>	<b>0.163</b>	<b>N/A</b>
<b>AVA S. F.</b>	<b>0.228</b>	<b>0.172</b>	<b>0.647</b>	<b>0.612</b>	<b>0.247</b>	<b>0.201</b>

**Two Lift Construction I-70 Saline County, KS**

	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
	Ark	Ark	Wyo	Wyo	SD	SD
Aggregate	Gran	Gran	Gran	Gran	Quart	Quart
<b>Cementitious</b>	<b>658</b>	<b>752</b>	<b>658</b>	<b>752</b>	<b>658</b>	<b>752</b>
			25%	25%	30%	30%
			F-Ash	F-Ash	Slag	Slag
<b>Slump</b>	<b>2.50</b>	<b>4.00</b>	<b>1.50</b>	<b>2.25</b>	<b>3.00</b>	<b>3.00</b>
<b>Unit Wt.</b>	<b>144.3</b>	<b>142.6</b>	<b>150.8</b>	<b>149.6</b>	<b>143.9</b>	<b>143.1</b>
<b>% Air</b>	<b>4.5</b>	<b>5.0</b>	<b>2.8</b>	<b>3.0</b>	<b>4.5</b>	<b>4.9</b>
<b>28 Day Boil</b>	<b>12.6</b>	<b>14.2</b>	<b>13.5</b>	<b>14.2</b>	<b>13.0</b>	<b>13.1</b>
<b>28 Day RC Perm</b>	<b>4235</b>	<b>4214</b>	<b>4301</b>	<b>4775</b>	<b>3077</b>	<b>3487</b>
<b>28 Day Strength</b>	<b>5560</b>	<b>5300</b>	<b>4940</b>	<b>4870</b>	<b>5330</b>	<b>5620</b>
<b>C-457 S. F.</b>	<b>0.154</b>	<b>0.123</b>	<b>0.234</b>	<b>0.244</b>	<b>0.163</b>	<b>N/A</b>
<b>AVA S. F.</b>	<b>0.228</b>	<b>0.172</b>	<b>0.647</b>	<b>0.612</b>	<b>0.247</b>	<b>0.201</b>

# Test Results Comparisons

## CYLINDER DATA

	Mix 2	Silica Fume	I-435	PCCP
Aggregate	Ark Gran.	Ark Gran	Ark Gran	Limestone
Cementitious	752	625	564	602
		7% Silica Fume	25% F- Ash	
28 Day Boil	14.2	8.7	10.2	11.5
28 Day Rapid Chloride	4214	646	938	2700
28 Day Comp. Strength	5300	5870	6830	5030

## Mix Testing In Progress

Modulus of Elasticity

Coefficient of Thermal Expansion

Percent Expansion

Durability Factor

Resistance to ASR C-1567

Wet on Wet Bond

## Previous Attempts 2-Lift



## Bottom Lift

	<u>Mix Design</u>
Coarse Aggregate	55%
Sand	45%
Total Cementitious lbs/cuyd	520 - 547
w/c Ratio	0.42
Design Air Content	6.50%
<ul style="list-style-type: none"><li>• Viscosity Modifying Admixture</li><li>• Possible Recycle PCCP &amp; HMA 2008</li></ul>	



## **Possible Test Section**

- **Exposed Aggregate**
- **Grind Surface**
- **Longitudinal Tining**
- **Burlap Drag**
  
- **Optimized Surface Coarse**