

Appendix J. Durability Test Data – Rock Borrow Areas

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SOUNDNESS OF AGGREGATE BY SODIUM SULFATE AASHTO C 88

Project No.: 160023-02

H&K Project Name:

Project Name: 2016 Laboratory Testing

H&K Project No.: 4438-01

Client: Holdrege & Kull - Nevada City

Lab No.: L162206

Sampled By / Date: Client

Tested By / Date: N. Trease / 9-8-2016

Material: 1-1/2" Processed Core Samples - North

CYCLES					
Time	1	2	3	4	5
In	20:00	19:00	20:00	18:00	16:00
out	13:00	13:00	14:00	11:00	9:00

LOSS GRADATION

Sieve Size		Starting	Mass Retained	Percent	Sieve Percent
U.S.	Metric	Mass	After Cycles	Loss	Of Sample
1 1/2" - 3/4"	37.5mm - 19mm	1502.1		4.4%	100%
5/16"	16 mm		1435.4		

Sodium Sulfate Soundness (% Loss) 4.4%

Percent Loss = $\frac{W_0 - W_F}{W_0} \times 100$

Craig Long

 Craig W. Long
 Laboratory Operations Manager

SOUNDNESS OF AGGREGATE BY SODIUM SULFATE
AASHTO C 88

Project No.: 160023-02

H&K Project Name:

Project Name: 2016 Laboratory Testing

H&K Project No.: 4438-01

Client: Holdrege & Kull - Nevada City

Lab No.: L162206

Sampled By / Date: Client

Tested By / Date: N. Trease / 9-8-2016

Material: 1-1/2" Processed Core Samples - South

CYCLES					
Time	1	2	3	4	5
In	20:00	19:00	20:00	18:00	16:00
out	13:00	13:00	14:00	11:00	9:00

LOSS GRADATION

Sieve Size	Starting Mass	Mass Retained After Cycles	Percent Loss	Sieve Percent Of Sample
U.S. Metric				
1 1/2" - 3/4"	37.5mm - 19mm	1501.8	1.7%	100%
5/16"	16 mm	1476.0		

Sodium Sulfate Soundness (% Loss) 1.7%

$$\text{Percent Loss} = \frac{W_0 - W_F}{W_0} \times 100$$

Craig Long

Craig W. Long
 Laboratory Operations Manager

Abraison Resistance by the Los Angeles Rattler
 ASTM C 131 / AASHTO T 96

Project No.: 160023-02
 Project Name: 2016 Laboratory Testing
 Client: Holdrege & Kull
 Material: North Bedrock Cores
 Lab No.: L162206

Date Sampled:
 Sampled By: Client
 Date Tested: 9-7-2016
 Tested By: Z. Thompson
 H&K Project No.: 4438-01
 H&K Sample No.: 1 & 2

Grading	Number of Spheres	Mass of Charge, g
A	12	5000 ± 25
B	11	4584 ± 25
C	8	3330 ± 20
D	6	2500 ± 15

Sieve Size		Mass of Indicated Sizes, g			
Passing	Retained on	Grading			
		A	B	C	D
37.5 mm	25.0 mm	1250 ± 25			
25.0 mm	19.0 mm	1250 ± 25			
19.0 mm	12.5 mm	1250 ± 10	2500 ± 10		
12.5 mm	9.5 mm	1250 ± 10	2500 ± 10		
9.5 mm	6.3 mm			2500 ± 10	
6.3 mm	4.75 mm			2500 ± 10	
4.75 mm	2.36 mm				5000 ± 10
Total		5000 ± 10	5000 ± 10	5000 ± 10	5000 ± 10

After 100 Revolutions

Beginning Weight	5001
#4 Sieve Retained	4497
#12 Sieve Retained	4726

After 500 Revolutions

Beginning Weight	5001
#4 Sieve Retained	3469
#12 Sieve Retained	3999

Percent Loss₁₀₀: 5.5

Percent Loss₅₀₀: 20.0

Percent Loss = $[(M_i - M_f) / M_i] \times 100$

Abraison Resistance by the Los Angeles Rattler
 ASTM C 131 / AASHTO T 96

Project No.: 160023-02
 Project Name: 2016 Laboratory Testing
 Client: Holdrege & Kull
 Material: South Bedrock Cores
 Lab No.: L162206

Date Sampled:
 Sampled By: Client
 Date Tested: 9-7-2016
 Tested By: Z. Thompson
 H&K Project No.: 4438-01
 H&K Sample No.: 1 & 2

Grading	Number of Spheres	Mass of Charge, g
A	12	5000 ± 25
B	11	4584 ± 25
C	8	3330 ± 20
D	6	2500 ± 15

Sieve Size		Mass of Indicated Sizes, g			
Passing	Retained on	Grading			
		A	B	C	D
37.5 mm	25.0 mm	1250 ± 25			
25.0 mm	19.0 mm	1250 ± 25			
19.0 mm	12.5 mm	1250 ± 10	2500 ± 10		
12.5 mm	9.5 mm	1250 ± 10	2500 ± 10		
9.5 mm	6.3 mm			2500 ± 10	
6.3 mm	4.75 mm			2500 ± 10	
4.75 mm	2.36 mm				5000 ± 10
Total		5000 ± 10	5000 ± 10	5000 ± 10	5000 ± 10

After 100 Revolutions

Beginning Weight	4999
#4 Sieve Retained	4520
#12 Sieve Retained	4734

After 500 Revolutions

Beginning Weight	4999
#4 Sieve Retained	3540
#12 Sieve Retained	4031

Percent Loss₁₀₀: 5.3

Percent Loss₅₀₀: 19.4

Percent Loss = $[(M_i - M_f) / M_i] \times 100$

Summary Report

Project No.: 4438-01	Project Name: NID Water Storage Project	Date: 9/9/16
Sample No.: North	Boring/Trench: - Depth, ft.: -	Tested By: MLH
Description: NID Water Storage Project		Checked By: MLH
Sample Location		Lab. No.: 15-16-423

TEST	METHOD	RESULTS	SPECIFICATIONS
Sieve Analyses		Percent Passing	
Sieve Size Designation:			
U.S. Standard	Millimeters		
3.0 inch	75	-	
2.5 inch	63	-	
2.0 inch	50.0	-	
1.5 inch	37.5	-	
1.0 Inch	25.0	-	
3/4 Inch	19.0	-	
1/2 Inch	12.5	-	
3/8 Inch	9.5	-	
#4	4.75	-	
#8	2.36	-	
#16	1.18	-	
#30	0.600	-	
#50	0.300	-	
#60	0.250	-	
#100	0.150	-	
#200	0.075	-	
Resistance Value	CTM 301	-	
Sand Equivalent	CTM 217	-	
Durability, fine	CTM 229	-	
Durability, course	CDOT-229	-	

ADDITIONAL INFORMATION / RESULTS

TEST	METHOD	RESULTS	SPECIFICATIONS
			Operating Contract Range Compliance
Unit Weight of Aggregate (pcf):	ASTM C-29	-	
Maximum Dry Density (pcf):	ASTM D-1557	-	
Optimum Moisture (%):	ASTM D-1557	-	
Clay Lumps & Friable Particles:	ASTM C-142	-	
Clay Lumps & Friable Particles:	ASTM C-142	-	
Cleanliness of Course Aggregate	CTM 227	-	
Percent Crushed Particles (%):	CDOT-205	-	
Percent of Crushed Particles			
Bulk Specific Gravity of Fine Aggregate:	ASTM C-128	-	
Absorption (%):	ASTM C-127	0.780	
Coefficient of Uniformity (Cu):	ASTM D-2487	-	
Coefficient of Curvature (Cc):	ASTM D-2487	-	
Fineness Modulus (FM):	ASTM C-136	-	
Bulk specific gravity	ASTM C-127	2.746	
Bulk specific gravity SSD	ASTM C-127	2.767	
Apparent specific gravity	ASTM C-127	2.806	
Density	ASTM C-127	171.32	

Summary Report

Project No.: 4438-01	Project Name: NID Water Storage Project	Date: 9/9/16
Sample No.: South	Boring/Trench: -	Depth, ft.: -
Description: NID Water Storage Project		Tested By: MLH
Sample Location:		Checked By: MLH
		Lab. No.: 15-16-423

TEST	METHOD	RESULTS	SPECIFICATIONS
Sieve Analyses		Percent	
Sieve Size Designation:		Passing	
U.S. Standard	Millimeters		
3.0 inch	75	-	
2.5 inch	63	-	
2.0 inch	50.0	-	
1.5 inch	37.5	-	
1.0 Inch	25.0	-	
3/4 Inch	19.0	-	
1/2 Inch	12.5	-	
3/8 Inch	9.5	-	
#4	4.75	-	
#8	2.36	-	
#16	1.18	-	
#30	0.600	-	
#50	0.300	-	
#60	0.250	-	
#100	0.150	-	
#200	0.075	-	
	CTM 202		
Resistance Value	CTM 301	-	
Sand Equivalent	CTM 217	-	
Durability, fine	CTM 229	-	
Durability, course	CDOT-229	-	

ADDITIONAL INFORMATION / RESULTS

TEST	METHOD	RESULTS	SPECIFICATIONS
			Operating Range Contract Compliance
Unit Weight of Aggregate (pcf):	ASTM C-29	-	
Maximum Dry Density (pcf):	ASTM D-1557	-	
Optimum Moisture (%):	ASTM D-1557	-	
Clay Lumps & Friable Particles:	ASTM C-142	-	
Clay Lumps & Friable Particles:	ASTM C-142	-	
Cleanness of Course Aggregate	CTM 227	-	
Percent Crushed Particles (%):	CDOT-205	-	
Percent of Crushed Particles		-	
Bulk Specific Gravity of Fine Aggregate:	ASTM C-128	-	
Absorption (%):	ASTM C-127	0.210	
Coefficient of Uniformity (Cu):	ASTM D-2487	-	
Coefficient of Curvature (Cc):	ASTM D-2487	-	
Fineness Modulus (FM):	ASTM C-136	-	
Bulk specific gravity	ASTM C-127	2.803	
Bulk specific gravity SSD	ASTM C-127	2.809	
Apparent specific gravity	ASTM C-127	2.819	
Density	ASTM C-127	174.89	

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