

March 14, 2025  
(Revised April 9, 2025)

Holcim-Utelite  
P.O. Box 387  
Coalville, Utah 84017

Attention: Mr. Kenneth Nunley

Subject: Physical Properties Testing  
Holcim-Utelite ½" Lightweight Coarse Aggregate (19.0 mm – 4.75 mm)  
Project No. CT17,698.000-400-L1

Dear Mr. Nunley:

This report presents results of laboratory testing performed to determine chemical and physical properties of lightweight aggregate delivered to our laboratory on January 22, 2025. Testing was performed in general conformance with ASTM C330, *Standard Specification for Lightweight Aggregates for Structural Concrete*. The following tests were performed:

#### **CHEMICAL COMPOSITION**

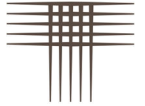
Staining Test (ASTM C641)  
Loss on Ignition (ASTM C114)

#### **PHYSICAL PROPERTIES OF AGGREGATES**

Gradation Analysis (ASTM C136)  
Passing No. 200 Sieve (ASTM C117)  
Clay Lumps and Friable Particles (ASTM C142)  
Loose Bulk Density (ASTM C29)  
Relative Density (ASTM C127)  
Sodium Sulfate (ASTM C88)  
Magnesium Sulfate (ASTM C88)

#### **CONCRETE PROPERTIES**

Compressive Strength (ASTM C39)  
Splitting Tensile Strength (ASTM C496)  
Measured Equilibrium Density (ASTM C567) – In Progress  
Measured Oven-Dry Density (ASTM C567)  
Calculated Equilibrium Density (ASTM C567)  
Drying Shrinkage (ASTM C157)  
Popouts (ASTM C151)  
Freezing and Thawing (ASTM C666) – In Progress



A summary of test results is presented in Table 1. Detailed results are presented in Appendix A for the lightweight aggregate properties and Appendix B for the concrete properties and results. Test results indicate the lightweight aggregate meets the ASTM C330 requirements for the properties reported.

If we may be of further assistance, please call or email.

Respectfully submitted,

CTL | THOMPSON, INC.

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Reviewed by:

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Attachments:

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## Aggregate Qualification Summary - ASTM Specifications (ASTM C330)

Holcim Utelite Lightweight - 19.0mm - 4.75 mm

Project No. CT17,698.000

Report Date: April 09, 2025

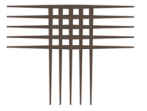
Sieve Analysis (ASTM C136 & C117)		
Sieve Size	Passing (%)	Specification (%)
1 inch (25 mm)	100	100
3/4 inch (19 mm)	100	90-100
1/2 inch (12.5 mm)	76	-
3/8 inch (9.5 mm)	37	10-50
No. 4 (4.75 mm)	3	0-15
No. 8 (2.36 mm)	1	-
No. 200 (75 µm)	0.1	0-10

Test	Results	Specification
Specific Gravity (ASTM C128)	1.86	-
Absorption (ASTM C128)	15.3%	-
Clay Lumps and Friable Particles (ASTM C142)	0.2% Weighted Particles	2.0% Max
Sodium Sulfate Soundness (ASTM C 88)	19% Weighted Loss	-
Magnesium Sulfate Soundness (ASTM C 88)	1% Weighted Loss	-
Loose Unit	Unit Weight	55 pcf
Weight & Voids (ASTM C29)	Percent Voids	45%
	Tons per cubic yard	0.74 tons/cu. yd.
Loss on Ignition (ASTM C114)	0.09%	5% Wt. Max
Fe in Solution (ASTM C641)	0.1	1.5 mg Fe <sub>2</sub> O <sub>3</sub> /200G Max

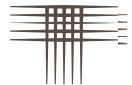
Concrete Properties		
	Results	Specifications
Plastic Unit Weight (lb/ft <sup>3</sup> )	116	-
Air Content	6.8%	6+1%
Slump (in)	3.0	2in. to 4in.
Concrete Temperature (°F)	61	-
Average 7-Day Compressive Strength (ASTM C39)	3820 psi	-
Average 28-Day Compressive Strength (ASTM C39)	4630 psi	3000 psi
Oven-Dry Density (ASTM C567)	103.5 pcf	-
Calculated Equalibrium Density (ASTM C567)	106.5 pcf	110 pcf Max
Splitting Tensile (ASTM C496)	315 psi	310 psi
Dry Shrinkage Average 28-Day (ASTM C157)	-0.027%	-0.070% Max
Popouts (ASTM C151)	No Popouts	No Popouts

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Zachariah J. Ballard, MCE, P.E.



APPENDIX A  
LIGHTWEIGHT AGGREGATE TEST RESULTS



**Company Name:** Holcim- Utelite  
**Material Source:** Utelite 1/2" Coarse Aggregate  
**Material Type:** 19.0mm to 4.75 mm

**Received Date:** January 22, 2025  
**Project No.** CT17698.000  
**Report Date:** April 9, 2025

**PHYSICAL PROPERTIES OF AGGREGATES**

**Sieve Analysis of Coarse Aggregate**

(ASTM C136)

Sieve Size	Percent Passing 19.0mm to 4.75 mm	Percent Passing (ASTM C330)
1 inch (25 mm)	100	100
3/4 inch (19 mm)	100	90-100
1/2 inch (12.5 mm)	76	-
3/8 inch (9.5 mm)	37	10-50
No. 4 (4.75 mm)	3	0-15
No. 8 (2.36 mm)	1	-

**Material Finer Than No. 200 Sieve by Washing**

ASTM C117) Procedure A

Initial Dry Weight (g)	Final Dry Weight (g)	Material Finer Than No. 200 Sieve (%)	Percent Passing (ASTM C330)
5403.0	5395.7	0.1	0-10

**Specific Gravity and Absorption of Coarse Aggregate**

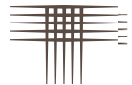
(ASTM C127)

Oven Dry Weight (g)	SSD in Air Weight (g)	Submerged Weight (g)	Bulk Volume	Bulk (SSD) Specific Gravity	Absorption (%)
4180.4	4819.6	2226.6	2593.0	1.86	15.3

**Clay Lumps and Friable Particles in Aggregate**

(ASTM C142)

Sieve Size		Percent Grading of Sample	Weight Before (g)	Weight After (g)	Percent Loss	Weighted Percent Loss
Passing	Retained					
1-1/2 inch	3/4 inch	0	-	-	-	-
3/4 inch	3/8 inch	63	2096.2	2091.5	0.2	0.1
3/8 inch	No. 4	34	1018	1015.4	0.3	0.1
Less Than No. 4		3	-	-	0.3	0.0
Total Percent Grading		100	Total Weighted Loss		0.2	



**Company Name:** Holcim- Utelite  
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**Material Type:** 19.0mm to 4.75 mm

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**Soundness of Coarse Aggregates by Use of Sodium Sulfate**

(ASTM C 88)

Sieve Size		Percent Grading of Sample	Weight Before(g)	Weight After (g)	Weighted % Loss
Passing	Retained				
1 inch	3/4 inch	0	-	-	-
3/4 inch	1/2 inch	24	671.1	552.9	4.2
1/2 inch	3/8 inch	39	330.7	251.4	9.4
3/8 inch	No. 4	34	300.6	257.7	4.9
Less Than No. 4		3	-	-	-

Total Percent Grading: 100 19

**Soundness of Coarse Aggregates by Use of Magnesium Sulfate**

(ASTM C 88)

Sieve Size		Percent Grading of Sample	Weight Before(g)	Weight After (g)	Weighted % Loss
Passing	Retained				
1 inch	3/4 inch	0	-	-	-
3/4 inch	1/2 inch	24	670.5	670.5	0.0
1/2 inch	3/8 inch	39	330.8	330.8	0.0
3/8 inch	No. 4	34	300.3	294.4	0.7
Less Than No. 4		3	-	-	-

Total Percent Grading: 100 1

**Bulk Density (Unit Weight) and Voids in Aggregates (Loose Method)**

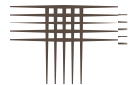
(ASTM C29)

Sample Weight (lbs)	Bucket Volume (ft <sup>3</sup> )	Unit Weight (pcf)
27.42	0.4981	55.1
27.31	0.4981	54.8
27.34	0.4981	54.9

Average Unit Weight: 55 pcf

Bulk Specific Gravity (OD) = 1.61

Voids in Aggregate Compacted by Rodding = 45%



**Company Name:** Holcim- Utelite  
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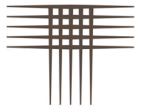
**Received Date:** January 22, 2025  
**Project No.** CT17698.000  
**Report Date:** April 9, 2025

**Iron Staining Materials**  
(ASTM C641)

Parameters	Results	Units
Fe in Solution	0.1	mg Fe <sub>2</sub> O <sub>3</sub> /200G
Visual Determination	0	Photographic Stain Index

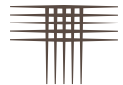
**Loss on Ignition**  
(ASTM C114)

Results	Units
0.09%	wt%



APPENDIX B  
LIGHTWEIGHT CONCRETE TEST RESULTS





**Company Name:** Holcim- Utelite  
**Material Source:** Utelite 1/2" Coarse Aggregate  
**Material Type:** 19.0mm to 4.75 mm

**Received Date:** January 22, 2025  
**Project No.** CT17698.000  
**Report Date:** April 9, 2025

**CONCRETE PROPERTIES**

**Compressive Strength  
(ASTM C39)**

7 Day (psi)	28 Day (psi)
3790	4530
3750	4710
3930	4650
Average (psi)	
3820	4630

**Popouts  
(ASTM C 151)**

Results
No Popouts



**TABLE 1**  
**Splitting Tensile Strength of Cylindrical Concrete Specimens**  
**ASTM C496**

**Client:** Holcim Utah  
**Project No.:** CT17698.000

**Date Cast:** February 5, 2025  
**Break Date:** March 5, 2025

Mix ID	Sample ID	Age of Sample	Sample Cured	Diameter inches 0.00	Length inches 0.00	Total Load (lbs)	Tensile Splitting Strength (psi)	Percent Coarse Aggregate Fractured	Type of Fracture
<b>Mix 1</b>  <b>1/2"</b>	1	28	50% RH	6.04	12.03	36,358	320	98	Split
	2	28	50% RH	6.01	12.01	29,141	260	98	Split
	3	28	50% RH	6.02	12.02	38,237	340	98	Split/Wedge
	4	28	50% RH	6.01	12.03	41,596	370	98	Split/Wedge
	5	28	50% RH	6.04	12.02	38,495	340	98	Split
	6	28	50% RH	6.03	12.01	31,258	270	98	Split/Wedge
	7	28	50% RH	6.03	12.02	33,762	300	98	Split
	8	28	50% RH	6.04	12.02	37,337	330	98	Split



## Length Change of Hardened Hydraulic Cement Mortar and Concrete (ASTM C157)

**Client Name:** Holcim Utah

**Project Name:** Holcim Utelight Lightweight C330

**Project No.** CT17698.000

**Report Date:** April 9, 2025

**Mix ID:** 1/2" Coarse Aggregate

**Cast Date:** February 5, 2025

**Type of Specimen:** Concrete

**Fine Aggregate:** Fountain Pit, WCS

**Coarse Aggregate:** 1/2" Utelite

**Admixtures:** None

**Cement Source/Type:** Holcim Type II

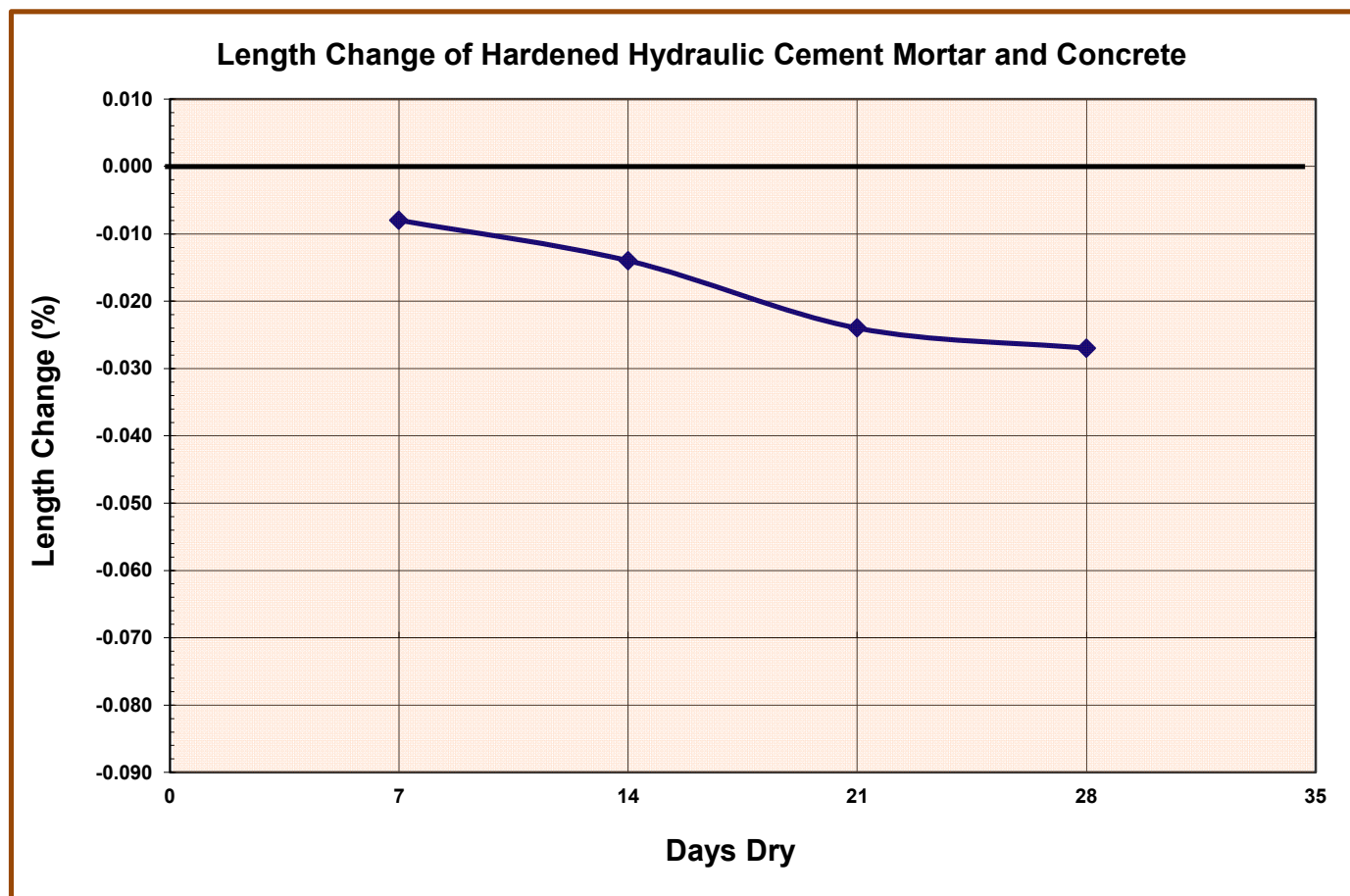
**Fly Ash Source/Class:** None

**Consolidation Method:** Rodding

**Initial Curing Environment:** Lab

**Storage Schedule:** 7 day Moist Room, 28 day 100°F / 32% RH

Sample I.D.	7 Day Soak	7 Day Dry	Length Change (%)	14 Day Dry	Length Change (%)	21 Day Dry	Length Change (%)	28 Day Dry	Length Change (%)
Actual Age	7	14		21		28		35	
Date	02/12/25	02/19/25		02/26/25		03/05/25		03/12/25	
1	0.0027	0.0019	-0.008	0.0013	-0.014	0.0000	-0.027	-0.0002	-0.029
2	0.0047	0.0039	-0.008	0.0033	-0.014	0.0024	-0.023	0.0021	-0.026
3	-0.0014	-0.0022	-0.008	-0.0027	-0.013	-0.0037	-0.023	-0.0040	-0.026
<b>Average</b>			<b>-0.008</b>		<b>-0.014</b>		<b>-0.024</b>		<b>-0.027</b>





## WORKSHEET OF DRY UNIT WEIGHTS FOR STRUCTURAL LIGHTWEIGHT CONCRETE

ASTM C567, Standard Test Method for Density of Structural Lightweight Concrete, Oven-Dry Method

Project: Holcim Utah Utelite Plant

Cast Date: February 5, 2025

Job No.: CT17698.000

Sample I.D.: ½ Coarse Aggregate

DATE OF WEIGHTS:		2/6/25	2/6/25	2/10/25	2/10/25	2/11/25	2/11/25
Ticket Number	Date Cast	24-32 hrs from cast Weight Suspended-Immersed (lbs)	Weight in Air (lbs)	72 hours Oven Dry (lbs)	72 hours Oven-Dry Density	96 hours Oven Dry (lbs)	96 hours Oven-Dry Density
Mix 1 #1	2/5/25	11.1350	23.4600	20.5650	104.0	20.5034	103.6
Mix 1 #2	2/5/25	11.0950	23.3900	20.4888	103.8	20.4340	103.5
Mix 1 #3	2/5/25	11.1200	23.3950	20.5032	104.1	20.4534	103.8
<b>Average:</b>	-	11.1167	23.4150	20.4150	104.0	20.4636	103.5