

# ICC-ES Evaluation Report

ESR-4206

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This report also contains:

- CBC Supplement

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<p><b>DIVISION: 32 00 00— EXTERIOR IMPROVEMENTS</b></p> <p><b>Section: 32 32 00— Retaining Walls</b></p> <p><b>Section: 32 32 23— Segmental Retaining Walls</b></p>	<p><b>REPORT HOLDER: ALLAN BLOCK CORPORATION</b></p>	<p><b>EVALUATION SUBJECT: ALLAN BLOCK RETAINING WALL SYSTEM</b></p>	
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## 1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)

Property evaluated:

- Physical properties

## 2.0 USES

The Allan Block Retaining Wall System (Allan Block SRWs) consists of modular concrete units for the construction of conventional gravity retaining walls and geogrid-reinforced-soil retaining walls with a mass of reinforced soils, stabilized by horizontal layers of geosynthetic reinforcement materials or a reinforced masonry retaining wall system.

## 3.0 DESCRIPTION

### 3.1 AB Units:

Allan Block concrete units are available in eight configurations: AB Stones, AB Classic, AB Vertical, AB Rocks, AB Fieldstone 812 with Short Anchoring Unit, AB Fieldstone 812 with Long Anchoring Unit, AB Fieldstone 824 with Short Anchoring Unit, and AB Fieldstone 824 with Long Anchoring Unit. The dimensions and weights are shown in [Figure 1A](#) and [Figure 1B](#). Optional capstones can be used with the Allan Block concrete units as show in [Figure 2A](#). Aesthetic finishing options exist such as tumble (AB Europa) and Non-split (AB Aztec, AB Metro), and are part of the AB Classic or 6 degree system.

All units are made with normal-weight aggregates, and comply with ASTM C1372, including having a minimum 28-day compressive strength of 3,000 psi (21 MPA) on the net area. In areas where repeated freezing and thawing under saturated conditions occur, evidence of compliance with freeze-thaw durability requirements of ASTM C1372 must be submitted to the code official for approval prior to construction.

### 3.2 Geogrid:

The geogrid materials listed in [Table 2](#) are proprietary materials used to increase the height of the Allan Block Retaining Wall Systems above the height at which the wall is stable under its self-weight as a gravity system.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

**4.1.1 General:** Structural calculations must be submitted to the code official for each wall system installation. The system must depend on the weight and geometry of the concrete units and soil to resist lateral earth pressures and other lateral forces. For masonry retaining wall systems, refer to Section 4.1.5 of this report. Lateral earth pressures are determined using either Coulomb or Rankine earth pressure theory. The design must include evaluation of both external and internal stability of the structure and include consideration of external loads such as surcharges and seismic forces, as applicable.

External stability analysis must be similar to that required for conventional retaining walls, and must consider base (lateral) sliding, overturning, bearing capacity (and excessive settlement), and overall (deep-seated) slope stability. Internal stability analysis of SRWs without geogrid-reinforced soil must consider movement between courses. Internal stability analysis of the SRWs with geogrid-reinforced soil must consider the maximum allowable reinforcement tension, pull-out resistance of reinforcement behind the active failure zone (excessive movement of geosynthetic material through the reinforced soil zone), and the connection strength of geosynthetic reinforcement material to the SRW concrete units or blocks, and movement between courses.

Minimum safety factors used in design (for external stability check) for SRWs, with and without a geogrid-reinforced soil mass, must be 1.5 for deep-seated (global) stability and 2.0 for bearing capacity. The minimum safety factors must be 1.5 for lateral sliding and 2.0 for overturning for SRWs with a geogrid-reinforced soil mass. The minimum safety factors against lateral sliding and overturning must be 1.5 (IBC Section 1807.2.3, as applicable), for SRWs without a reinforced soil mass. Minimum safety factors used in design (for internal stability) must be 1.5 for peak connection strength between the geosynthetic material and SRW units, and for peak shear strength between SRW units with or without geosynthetic material. Seismic safety factors for all limit states related to SRW design may be 75 percent of the corresponding minimum allowable static safety factors.

A site-specific soils investigation report in accordance with IBC Section 1803, is required. The soils investigation report shall specify the ultimate tensile strength, long-term design strength and allowable tensile strength of the geosynthetic reinforcement material, and the soil-reinforcement and interaction coefficients, including the coefficient of interaction for pullout and coefficient of direct sliding. The soils investigation report shall also specify safety factors for tensile rupture and pullout of the geosynthetic reinforcement. Where the wall is assigned to Seismic Design Category (SDC) C, D, E or F, the site-specific soils report must include the information as required by IBC Section 1803.5.11. Where the wall is assigned to Seismic Design Category (SDC) D, E or F, the site-specific soils report must include the information as required by IBC Section 1803.5.12.

The design of the Allan Block wall is based on accepted geotechnical principles for gravity and soil-reinforced structures. Specifics of design recommended by the manufacturer are found in the Allan Block Engineering Manual for "Allan Block Retaining Wall Systems" (AB Doc #R0904-0610); and the National Concrete Masonry Association report, "Design Manual for Segmental Retaining Walls", NCMA Report No. TR 127A/ISBN 1-881384-07-1, dated 2009.

**4.1.2 Conventional Gravity Retaining Walls:** The gravity wall system depends on its weight and geometry to counteract the lateral earth pressures and other lateral forces. Gravity wall design shall be based on standard engineering principles. Maximum wall heights are shown in [Table 1A-1E](#).

### 4.1.3 Geogrid-reinforced Retaining Walls:

**4.1.3.1 General:** The geogrid reinforced soil system relies on the weight and geometry of the Allan Block units and the reinforced soil mass to act as a coherent gravity mass to resist lateral earth pressures. The design of a reinforced soil structure is specific to the Allan Block unit selected, soil reinforcement strength and soil interaction, soil strength properties, and structure geometry. Inter-unit shear capacity equations are provided in [Table 4](#). Grid-to-block pullout resistance values/equations are provided in [Tables 3A](#), [3B](#), [3C](#) and [3D](#). The maximum practical height above the wall base is approximately 50 feet (15 m). [Figures 1A](#) and [1B](#) shows typical component details.

**4.1.3.2 Structural Analysis:** Structural analysis must be based on accepted engineering principles, and the IBC. The analysis must include all items noted in Sections 4.1.1, 4.1.3.2.1 and 4.1.3.2.2 of this report. All contact surfaces of the units must be maintained in compression.

#### 4.1.3.2.1 External Stability Analysis:

1. The minimum length of the reinforced mass is 0.6 times the height of the wall (as measured from the top of the leveling pad to the top of the wall) or as required to satisfy a safety factor of 1.5 on sliding at the base, whichever is greater.
2. The minimum safety factor for overturning the reinforced mass is 2.0, considering the mass as a rigid body rotating about the toe of the wall.
3. Global stability analysis must be provided for walls with slopes below the toe of the wall, walls on soft foundations, walls that will be designed for submerged conditions, or tiered walls.
4. After completion of the internal stability analysis and geogrid layout, sliding along each respective geogrid layer must be checked, including shearing through the connection at the wall face.

#### 4.1.3.2.2 Internal Stability Analysis:

1. Geogrid spacing must be based on local stability of the Allan Block units during construction. Vertical spacing is typically limited to 2 times the depth of the unit.
2. Tension calculations for each respective layer of reinforcing must be provided. Tension is based on the earth pressure and surcharge load calculated from halfway to the layer below to halfway to the layer above. Calculated tensions must not exceed the allowable geogrid strength.
3. Connection capacity must be checked for each geogrid-to-Allan Block connection (see [Table 3A](#) – [Table 3D](#)). The calculated connection capacity must be equal to or greater than the calculated tension for each layer.
4. A calculation check must be made on pullout of the upper layers of geogrid from the soil zone beyond the theoretical Coulomb or Rankine failure plane. The pullout capacity must be equal to or greater than the calculated tension after applying the applicable geogrid interaction and sliding coefficient adjustment factors.

**4.1.4 Backfill and Drainage:** Backfill material placed behind the Allan Block concrete units as a reinforced soil mass must consist of approved suitable fine grain or coarse grain materials as specified by the soils registered design professional. Provisions for drainage shall also be determined by the soils registered design professional.

**4.1.5 Reinforced Masonry Retaining Walls:** The design of reinforced masonry retaining wall systems must comply with Section 1807.2 and Chapter 21 of the IBC.

#### 4.2 Installation General:

The angle of wall inclination is approximately 3 to 12 degrees from vertical towards the backfill as determined by the setback per course provided by the block lip and notch. The block foundation is either leveled sub-grade material consisting of at least 6-inches (152 mm) of granular fill compacted to at least 95 percent of the maximum dry density determined by ASTM D698 or unreinforced concrete complying with Section 1909 of the IBC. Specific foundation requirements for each site shall be determined by the soils engineer based on a geotechnical investigation. Typical details are illustrated in [Figures 2A](#) and [2B](#) of this report.

Details in this report are limited to areas beyond groundwater. Footings in groundwater are contingent on appropriate soil and engineering analysis reports being submitted to the building official for approval.

Backfill used in the reinforced fill mass shall consist of material approved by the soils registered design professional, and placed in compacted lifts. The backfill soil properties, lift thickness, degree of compaction and width behind the block are determined by the soils engineer. If the retained soil or backfill has poor drainage qualities, granular drainage layers and/or perforated drains must be installed to prevent buildup of hydrostatic pressures behind the wall. Provisions for drainage must be determined by the licensed professional soils engineer.

Blocks are stacked and aligned using the vertical lip. The top units are set back approximately  $\frac{3}{8}$  to  $1\frac{1}{2}$  inches (9 to 38 mm) from the lower unit, and are guided by the lip. A minimum offset of 3 inches (76 mm), horizontally, is maintained between the head joints of adjacent courses of block. The completed wall is built with alignment tolerances of  $\frac{3}{4}$  inch in 10 feet (19 mm in 3048 mm) in both the horizontal and vertical directions.

Blocks also may be assembled with and inside or outside curved layout. The minimum inside curve radius is 4 feet (1219 mm), and the minimum outside curve radius is 4 feet (1219 mm).

**Special Inspections:** Special inspection must be provided in accordance with 2018, 2015 and 2012 IBC Sections 1705.1.1, 1705.4 and 1705.6. The inspector's responsibilities include verifying the following:

1. The modular concrete unit type and dimensions.
2. Allan Block unit identification compliance with ASTM C1372, including compressive strength and water absorption, as described in Section 3.1 of this report.

3. Product identification, including evaluation report number (ESR-4206).
4. Foundation preparation.
5. Allan Block unit placement, including proper alignment and inclination.
6. Geosynthetic reinforcement type (manufacturer and model number), location and placement.
7. Backfill placement and compaction.
8. Drainage provisions and water management.

## 5.0 CONDITIONS OF USE

The Allan Block Retaining Wall System described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The systems are designed and installed in accordance with this report; the manufacturer's published installation instructions; and accepted engineering principles. If there is a conflict between this report and the manufacturer's published installation instructions, this report governs.
- 5.2 The wall design calculations are submitted to, and approved by, the code official. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.3 A site-specific soils investigation in accordance with IBC Section 1803, as noted in Section 4.1.1 of this report, must be provided for each project site.
- 5.4 In areas where repeated freezing and thawing under saturated conditions occur, evidence of compliance with freeze-thaw durability requirements of ASTM C1372 must be furnished to the code official for approval prior to construction.
- 5.5 Special inspection must be provided for backfill placement and compaction, geogrid placement (when applicable), and block installation, in accordance with Section 4.3 of this report.
- 5.6 Details in this report are limited to areas outside of groundwater. For applications where free-flowing groundwater is encountered, or where wall systems are submerged, the installation and design of systems must comply with the recommendations of the soils engineer and the appropriate sections of the NCMA Design Manual for Segmental Retaining Walls, and must be approved by the code official.
- 5.7 Under the 2018 and 2015 IBC, project specifications for soil and water conditions that include sulfate concentrations identified in ACI 318-14 Table 19.3.1.1 as severe (S2) or very severe (S3), must include mix designs for the concrete, masonry and grout that comply with the intent of ACI 318-14 Table 19.3.1.1. See 2015 IBC Section 1904.
- 5.8 Under the 2012 IBC, project specifications for soil and water conditions that include sulfate concentrations identified in ACI 318-11 Table 4.2.1 as severe (S2) or very severe (S3), must include mix designs for the concrete, masonry and grout that comply with the intent of ACI 318-11 Table 4.3.1. See 2012 IBC Section 1904.
- 5.9 As to the geogrid reinforcement material, this report evaluates only the connection strength of the geogrid material when attached to the concrete units. Physical properties of the geogrid material or its interaction with the soil have not been evaluated.

## 6.0 EVIDENCE SUBMITTED

Data in accordance with [the ICC-ES Acceptance Criteria for Segmental Retaining Walls \(AC276\)](#), dated October 2004 (editorially revised January 2018).

## 7.0 IDENTIFICATION

- 7.1 Each pallet of concrete units is identified with the manufacturer's name and address, the name of the product, the unit type, and the evaluation report number (ESR-4206).
- 7.2 The report holder's contact information is the following:

**ALLAN BLOCK CORPORATION**  
**7424 WEST 78th STREET**  
**EDINA, MINNESOTA 55439**  
**(952) 835-5309**  
[www.allanblock.com](http://www.allanblock.com)

**TABLE 1A—12 DEGREE MAXIMUM WALL HEIGHTS (IN FEET) FOR UNREINFORCED ALLAN BLOCK WALLS<sup>1</sup>**

Soil Type	Angle of Friction	Conditions Above Retaining Wall						
		Level Slope	5-to-1 Slope	4-to-1 Slope	3-to-1 Slope	2-to-1 Slope	100 psf Surcharge	250 psf Surcharge
Firm Clay	26 degrees	3.0	2.5	2.4	2.2	1.3	1.4	1.3
Silty Clay	28 degrees	3.7	3.2	3.0	2.8	1.9	1.8	1.4
Mixed Silts	30 degrees	4.6	4.0	3.8	3.5	2.7	2.7	1.4
Silty Sand	32 degrees	5.5	5.0	4.8	4.4	3.6	3.7	1.4
Clean Sand	34 degrees	6.0	5.6	5.4	5.2	4.7	4.3	1.9

For SI: 1 psf = 47.9 Pa, 1 foot = 305 mm.

**TABLE 1B—6 DEGREE MAXIMUM WALL HEIGHTS (IN FEET) FOR UNREINFORCED ALLAN BLOCK WALLS**

Soil Type	Angle of Friction	Conditions Above Retaining Wall						
		Level Slope	5-to-1 Slope	4-to-1 Slope	3-to-1 Slope	2-to-1 Slope	100 psf Surcharge	250 psf Surcharge
Firm Clay	26 degrees	2.7	2.3	2.1	1.9	1.1	0.8	NA
Silty Clay	28 degrees	3.3	2.8	2.7	2.4	1.7	1.4	NA
Mixed Silts	30 degrees	4.0	3.5	3.3	3.0	2.3	2.1	0.8
Silty Sand	32 degrees	4.3	4.0	3.9	3.8	3.0	2.9	0.8
Clean Sand	34 degrees	4.6	4.3	4.2	4.1	3.7	3.2	1.1
Clean Sand	34 degrees	6.0	5.6	5.4	5.2	4.7	4.3	1.9

For SI: 1 psf = 47.9 Pa, 1 foot = 305 mm.

**TABLE 1C—3 DEGREE MAXIMUM WALL HEIGHTS (IN FEET) FOR UNREINFORCED ALLAN BLOCK WALLS**

Soil Type	Angle of Friction	Conditions Above Retaining Wall						
		Level Slope	5-to-1 Slope	4-to-1 Slope	3-to-1 Slope	2-to-1 Slope	100 psf Surcharge	250 psf Surcharge
Firm Clay	26 degrees	2.5	2.1	2.0	1.8	1.1	0.6	NA
Silty Clay	28 degrees	3.0	2.6	2.4	2.2	1.5	1.1	NA
Mixed Silts	30 degrees	3.5	3.1	3.0	2.7	2.1	1.7	NA
Silty Sand	32 degrees	3.7	3.5	3.4	3.3	2.7	2.4	0.9
Clean Sand	34 degrees	3.9	3.7	3.6	3.5	3.2	2.6	0.9

For SI: 1 psf = 47.9 Pa, 1 foot = 305 mm.

**TABLE 1D—AB FIELDSTONE SAU – 6 DEGREE MAXIMUM WALL HEIGHTS (IN FEET) FOR UNREINFORCED ALLAN BLOCK WALLS**

Soil Type	Angle of Friction	Conditions Above Retaining Wall						
		Level Slope	5-to-1 Slope	4-to-1 Slope	3-to-1 Slope	2-to-1 Slope	100 psf Surcharge	250 psf Surcharge
Firm Clay	26 degrees	2.9	2.5	2.4	2.1	1.3	1.1	NA
Silty Clay	28 degrees	3.6	3.1	2.9	2.7	1.9	1.7	NA
Mixed Silts	30 degrees	4.4	3.8	3.6	3.3	2.6	2.5	0.6
Silty Sand	32 degrees	4.7	4.4	4.3	4.1	3.3	3.3	0.8
Clean Sand	34 degrees	5.0	4.7	4.6	4.4	4.0	3.6	1.5

For SI: 1 psf = 47.9 Pa, 1 foot = 305 mm.

**TABLE 1E—AB FIELDSTONE LAU – 6 DEGREE MAXIMUM WALL HEIGHTS (IN FEET) FOR UNREINFORCED ALLAN BLOCK WALLS**

Soil Type	Angle of Friction	Conditions Above Retaining Wall						
		Level Slope	5-to-1 Slope	4-to-1 Slope	3-to-1 Slope	2-to-1 Slope	100 psf Surcharge	250 psf Surcharge
Firm Clay	26 degrees	5.1	4.3	4.1	3.9	2.2	3.3	1.0
Silty Clay	28 degrees	6.3	5.4	5.1	4.7	3.3	4.4	1.5
Mixed Silts	30 degrees	7.7	6.7	6.4	5.8	4.4	5.8	2.9
Silty Sand	32 degrees	8.2	7.7	7.5	7.2	5.8	6.7	4.5
Clean Sand	34 degrees	8.8	8.2	8.0	7.7	7.0	7.2	5.4

For SI: 1 psf = 47.9 Pa, 1 foot = 305 mm.

<sup>1</sup> Notes for Table 1A-1E:

<sup>1</sup> SEISMIC RESTRICTIONS NOT INCLUDED.

<sup>2</sup> Degree value represents angle of wall inclination measured from vertical toward backfill.

**TABLE 2—GEOGRILD MATERIAL GRADES<sup>1,2</sup>**

Light Grade	Medium Grade	Heavy Grade
Miragrid 3XT	Miragrid 5XT	Miragrid 8 XT
---	Miragrid 7XT	Miragrid 10XT
Strata 200	Strata 350	---

**TABLE 3A—FACING CONNECTION CAPACITIES FOR AB FIELDSTONE**

GEOGRID TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
<b>Strata Systems Inc. – 380 Dahlonega Road – Cumming, Georgia 30040 – (800) 680-7750</b>				
Strata 200	$T_u = 1327.5 \text{ lb/ft} + N \tan(10.6^\circ)$	1813	$T_{s1} = 850.64 \text{ lb/ft} + N \tan(5.4^\circ)$	1140
Strata 350	$T_u = 1722.9 \text{ lb/ft} + N \tan(10.2^\circ)$	2413	$T_{s1} = 983.45 \text{ lb/ft} + N \tan(3.4^\circ)$	1225

For SI: 1 lb/linear ft = 14.6 N/m.

<sup>1</sup> Where N = superimposed normal (applied) load (lb/linear foot of geogrid measured along the wall length direction).

<sup>2</sup> The serviceability connection strength is based on a maximum 3/4 inch (19mm) of geogrid displacement.

**TABLE 3B—FACING CONNECTION CAPACITIES FOR AB THREE (AB VERTICAL)<sup>1,2</sup>**

GEOGRID TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
<b>Tencate Nicolon – 365 South Holland Drive – Pendergrass, Georgia 30567 – (888) 795-0808</b>				
MIRAGRID 5XT	$T_{u1}=1157.3\text{lb/ft}+N\tan(14.3^\circ)$	1781.6	$T_{s1}=936\text{lb/ft}+N\tan(5.94^\circ)$	1199.1
MIRAGRID 7XT	$T_{u1}=1049.8\text{lb/ft}+N\tan(28.2^\circ)$	2569.6	$T_{s1}=864.7\text{lb/ft}+N\tan(18.4^\circ)$	1918.6
MIRAGRID 8XT	$T_{u1}=1013.4\text{lb/ft}+N\tan(35.2^\circ)$	3494.6	$T_{s1}=838\text{lb/ft}+N\tan(24.85^\circ)$	2398.3
MIRAGRID 10XT	$T_{u1}=935.3\text{lb/ft}+N\tan(20.8^\circ)$	2850.5	$T_{s1}=921.6\text{lb/ft}+N\tan(16^\circ)$	2137.9

For SI: 1 lb/linear ft = 14.6 N/m.

<sup>1</sup>Where N = superimposed normal (applied) load (lb/linear foot of geogrid measured along the wall length direction).

<sup>2</sup>The serviceability connection strength is based on a maximum 3/4 inch (19mm) of geogrid displacement.

**TABLE 3C—FACING CONNECTION CAPACITIES FOR AB CLASSICS AND AB ROCKS 1,2**

GEOGRID TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
<b>Strata Systems Inc. – 380 Dahlonega Road – Cumming, Georgia 30040 – (800) 680-7750</b>				
Strata 200	$T_u=1382.6\text{lb/ft}+N\tan(17.8^\circ)$	2087	$T_{s1}=715.5\text{lb/ft}+N\tan(1.6^\circ)$	802
Strata 350	$T_u=1256.9\text{lb/ft}+N\tan(12.2^\circ)$	1979	$T_{s1}=785.4\text{lb/ft}+N\tan(7.1^\circ)$	1178

For SI: 1 lb/linear ft = 14.6 N/m.

<sup>1</sup>Where N = superimposed normal (applied) load (lb/linear foot of geogrid measured along the wall length direction).

<sup>2</sup>The serviceability connection strength is based on a maximum 3/4 inch (19mm) of geogrid displacement.

TABLE 3D—FACING CONNECTION CAPACITIES FOR AB STONES 1,2

GEOGRID TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
<b>Tencate Nicolon – 365 South Holland Drive – Pendergrass, Georgia 30567 – (888) 795-0808</b>				
MIRAGRID 3XT	$T_{u1}=859.2\text{lb/ft}+N\tan(23.4^\circ)$	1892	$T_{s1}=592.3\text{lb/ft}+N\tan(14.1^\circ)$	1148
MIRAGRID 5XT	$T_{u1}=1188.9\text{lb/ft}+N\tan(18^\circ)$	1898.1	$T_{s1}=751.7\text{lb/ft}+N\tan(12.1^\circ)$	1236.8
MIRAGRID 7XT	$T_{u1}=1063.5\text{lb/ft}+N\tan(25.6^\circ)$	2565.5	$T_{s1}=644.8\text{lb/ft}+N\tan(19.3^\circ)$	1815.8

For SI: 1 lb/linear ft = 14.6 N/m.

<sup>1</sup>Where N = superimposed normal (applied) load (lb/linear foot of geogrid measured along the wall length direction).

<sup>2</sup>The serviceability connection strength is based on a maximum 3/4 inch (19mm) of geogrid displacement.

TABLE 4—SHEAR INTERACTION BETWEEN ALLAN BLOCK UNITS WITHOUT GEOSYNTHETIC REINFORCEMENT 1,2

BLOCK TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>1</sup>		PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft <sup>2</sup>	
	Segment 1:	Maximum	Segment 1:	Maximum
<b>AB Collection - Nominal 2 inch Leading Lip</b>				
AB Stones AB Classics AB Rocks	$V_u=2614\text{ lb/ft} + N\tan(42^\circ)$	5620	$V_u=379.5\text{ lb/ft} + N\tan(6.8^\circ)$	2215
<b>AB Collection - Nominal 1.5 inch Leading Lip</b>				
AB Three (AB Vertical)	$V_u=1381.6\text{ lb/ft} + N\tan(32.2^\circ)$	3497	$V_u=350.5\text{ lb/ft} + N\tan(29.2^\circ)$	2314
<b>AB Fieldstone Collection</b>				
812 with SAU & LAU 824 with SAU & LAU	$V_u=1697.3\text{ lb/ft} + N\tan(54.1^\circ)$	5830	$V_u=569.3\text{ lb/ft} + N\tan(32.6^\circ)$	3590





For SI: 1 lb/linear ft = 14.6 N/m.

<sup>1</sup>Where N = superimposed normal (applied) load (lb/linear foot of geogrid measured along the wall length direction).

<sup>2</sup>The serviceability connection strength is based on a maximum 3/4 inch (19mm) of geogrid displacement.





TABLE 4 NOTE: For conservative design purposes the interaction between the Allan Block units is using the same test results with the geosynthetic reinforcement between the unit



Block Type	Dimensions (H x D x W) Unit Weight*	Lip Depth	Notch Depth
<b>AB STONES</b>  	8.0 x 12.0 x 18.0 70 +/- 5 lbs	2.0	0.625
<b>AB CLASSIC</b>  	8.0 x 12.0 x 18.0 70 +/- 5 lbs	2.0	0.94
<b>AB THREE</b>  	8.0 x 12.0 x 18.0 70 +/- 5 lbs	1.5	0.94
<b>AB ROCKS</b>  	8.0 x 12.0 x 18.0 70 +/- 5 lbs	2.58	1.94

\*Nominal Dimensions are listed – exact block dimension vary based on plant location

**FIGURE 1A—ALLAN BLOCK RETAINING WALL DETAILS**  
**(ALL DIMENSIONS ARE IN INCHES UNLESS STATED OTHERWISE)**

Block Type	Dimensions (H x D x W) Unit Weight	Lip Depth	Notch Depth
<p>AB Fieldstone 812 w/ SAU*</p> 	<p>8.0 x 12.75 x 12.0 60 +/- 5 lbs</p>	<p>1.568</p>	<p>0.883</p>
<p>AB Fieldstone 812 w/ LAU**</p> 	<p>8.0 x 23.676 x 12.0 90 +/- 5 lbs</p>	<p>1.568</p>	<p>0.883</p>
<p>AB Fieldstone 824 w/ SAU*</p> 	<p>8.0 x 12.75 x 24.0 125 +/- 5 lbs</p>	<p>1.568</p>	<p>0.883</p>
<p>AB Fieldstone 824 w/ LAU**</p> 	<p>8.0 x 23.676 x 24.0 185 +/- 5 lbs</p>	<p>1.568</p>	<p>0.883</p>

\* SHORT ANCHORING UNIT

\*\* LONG ANCHORING UNIT

**FIGURE 1B—ALLAN BLOCK RETAINING WALL DETAILS**  
**(ALL DIMENSIONS ARE IN INCHES UNLESS STATED OTHERWISE)**

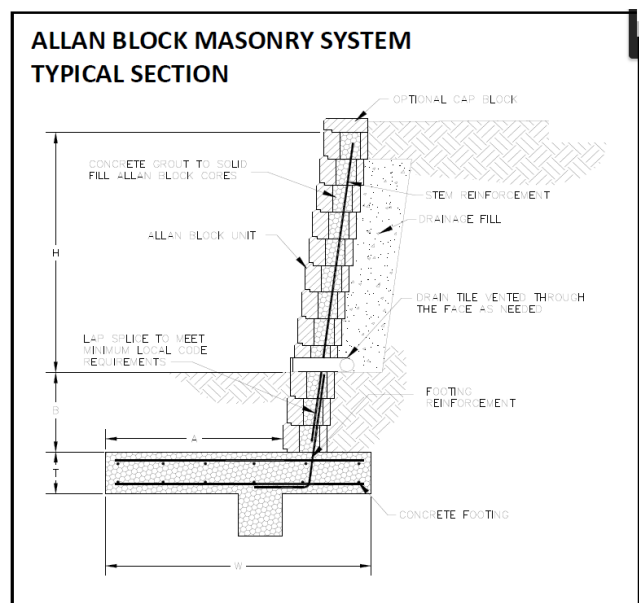
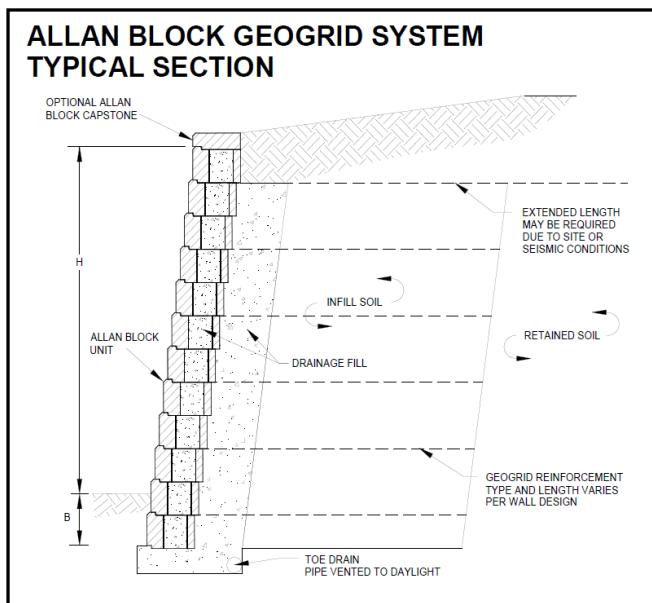
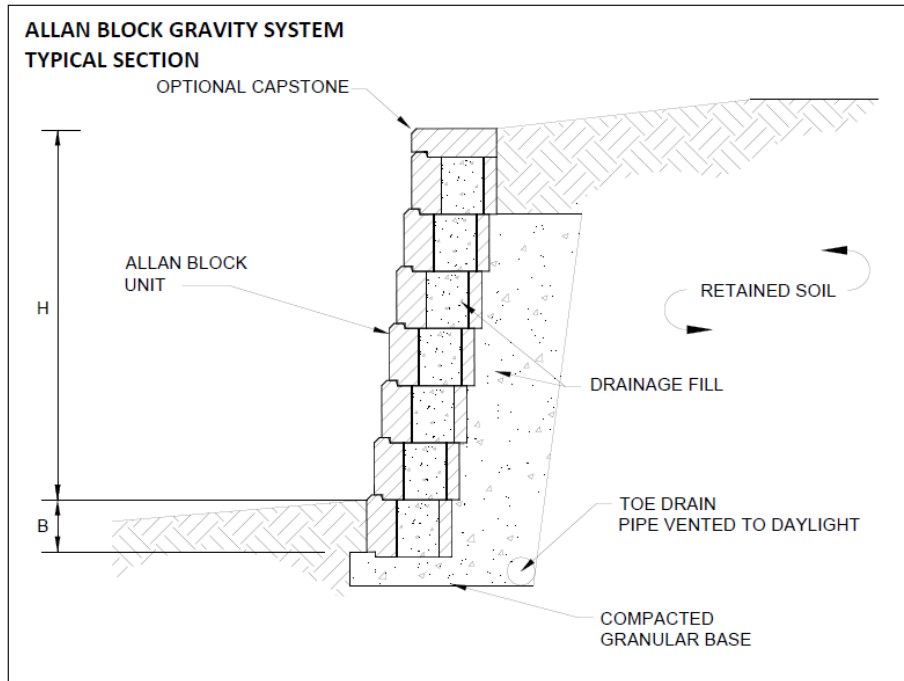


FIGURE 2A—TYPICAL SECTIONS

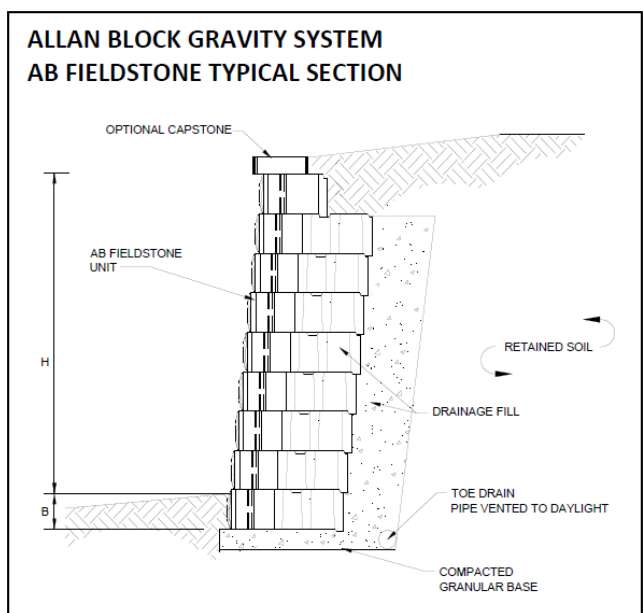
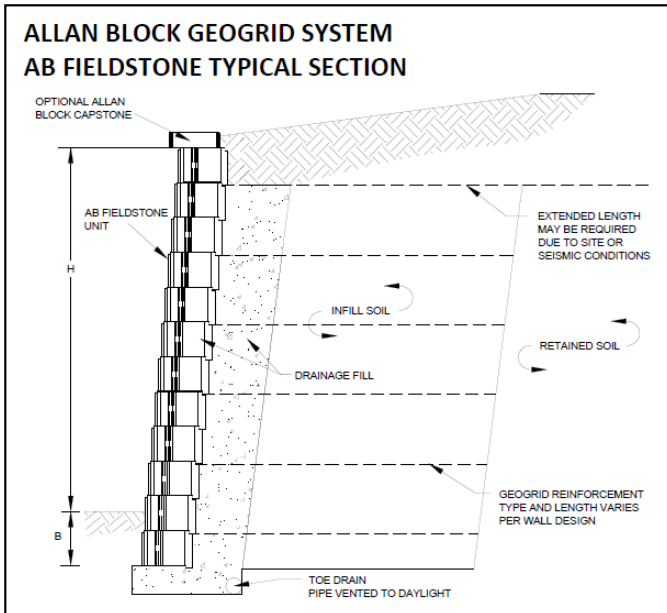
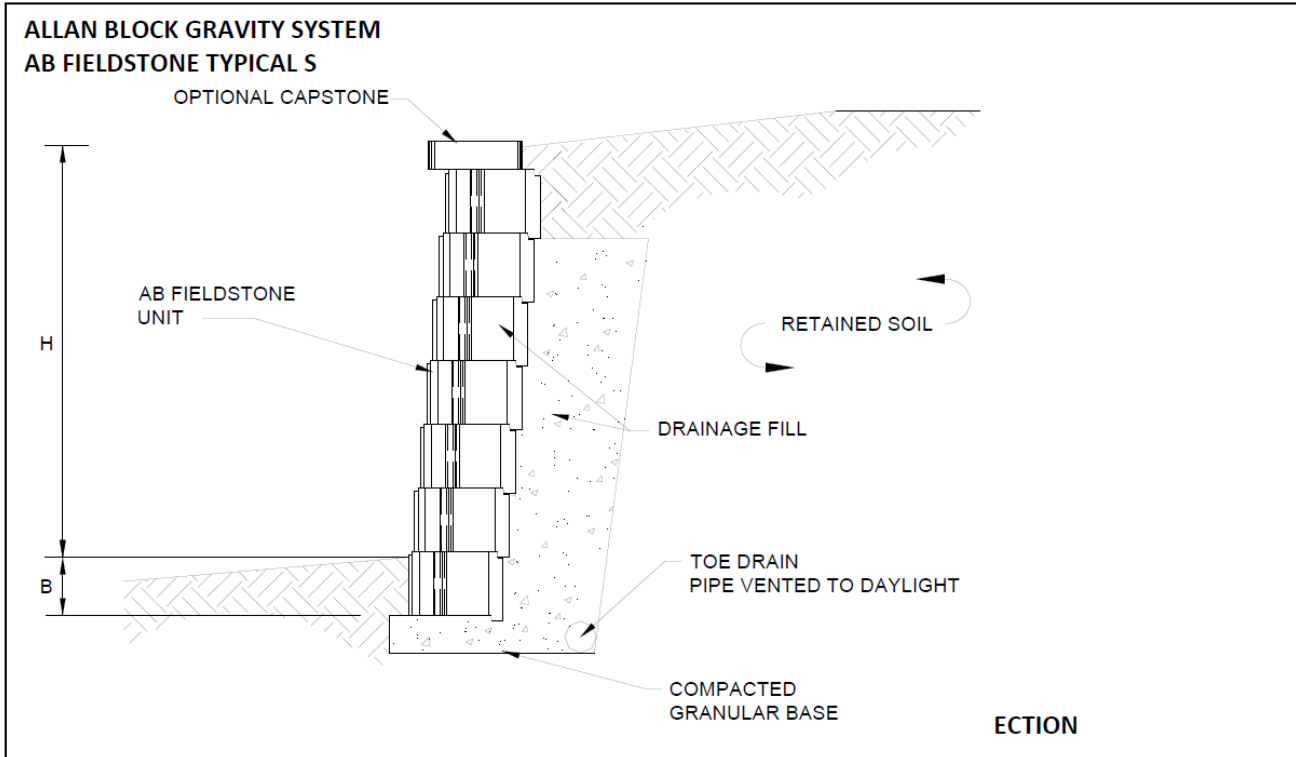


FIGURE 2B—TYPICAL SECTIONS AB FIELDSTONE

**DIVISION: 32 00 00—EXTERIOR IMPROVEMENTS****Section: 32 32 00—Retaining Walls****Section: 32 32 23—Segmental Retaining Walls****REPORT HOLDER:****ALLAN BLOCK CORPORATION****EVALUATION SUBJECT:****ALLAN BLOCK RETAINING WALL SYSTEM****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that the Allan Block Retaining Wall System, described in ICC-ES evaluation report ESR-4206, has also been evaluated for compliance with the code noted below.

**Applicable code edition:**

2016 *California Building Code*® (CBC)

**2.0 CONCLUSIONS**

The Allan Block Retaining Wall System, described in Sections 2.0 through 7.0 of the evaluation report ESR-4206, complies with CBC Chapters 18 and 18A, provided the design and installation are in accordance with the 2015 *International Building Code*® (2015 IBC) provisions noted in the evaluation report and the additional requirements of the CBC Chapters 16, 16A, 17, 17A, 21 and 21A Section 1807.2 and Section 1807A.2, as applicable.

This supplement expires concurrently with the evaluation report, reissued November 2023.