ALLAN BLOCK CORPORATION

ALLAN BLOCK RETAINING WALL SYSTEMS

CSI Section:
32 32 00 Retaining Walls

1.0 RECOGNITION

Allan Block Retaining Wall System recognized in this report has been evaluated for use as reinforced, soil retaining wall system. The structural properties of the Allan Block Retaining Wall System were evaluated for compliance with the following codes:

- 2012 International Building Code® (IBC)

2.0 LIMITATIONS

Use of the Allan Block Retaining Wall System recognized in this report is subject to the following limitations:

2.1 The system is designed and installed in accordance with this report; accepted geotechnical principles in compliance with IBC Section 1803; the Commercial Installation Manual for Allan Block Retaining Walls; the National Concrete Masonry Association report, "Design Manual for Segmental Retaining Walls," dated 2009; manufacturer's instructions and accepted engineering principles. In the event of a conflict, the more restrictive governs.

2.2 Calculations and plans justifying the design shall be submitted to the building official for approval on each wall system. The calculations and details shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. The analysis shall be based on accepted engineering principles, the Allan Block Retaining Engineering Manual and the IBC, as applicable. The analysis shall include all items under Section 3.2.1 of this report and follow the design methodology of the Allan Block Engineering Manual (AB Doc #R0904-0610).

2.3 Copies of the Commercial Installation Manual for Allan Block Retaining Walls shall be furnished to the building official.

2.4 This installation shall require a site-specific Geotechnical investigation in accordance with IBC or CBC Section 1803 for each project site. The geotechnical 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 and effects of earthquake ground motions. The geotechnical investigation report shall also specify safety factors for tensile rupture and pullout of the geosynthetic reinforcement.

2.5 Special inspection shall be provided in accordance with IBC Section 1705.4, as applicable. The special inspector shall verify the following:

- The dimensions of the Allan Block unit.
- Allan Block unit identification compliance with ASTM C1372, including compressive strength and water adsorption, as described in Section 4.2 of this report.
- Procedure for foundation preparation.
- Procedure for Allan Block unit placement, including alignment and inclination.
- Procedure for geogrid reinforcement type (manufacturer and model number) and placement.
- Procedure for backfill and compaction.
- Procedure for water management and drainage provisions.

2.6 This report evaluates the connection strength and the geogrid material when attached to the Allan Block units only. The physical properties of the geogrid and its interaction with the soil are not evaluated under this report.

3.0 PRODUCT USE

3.1 General: The Allan Block Retaining Wall System encompasses materials and methods for constructing gravity retaining walls, reinforced masonry retaining walls, and geogrid-reinforced (reinforced soil) retaining walls in accordance with IBC Sections 1610, 1807, 2107, and 2108.

3.2 Design:

3.2.1 General: Allan Block Retaining Wall System is designed as a reinforced, soil retaining wall system that depends upon the weight and geometry of the reinforced soil mass to resist the lateral earth pressures and other lateral forces. Design provisions in IBC Section 1610 shall be observed except loads shall be determined by a geotechnical investigation and the lateral soil loads in Table 1601.1 of the IBC shall not apply. The geotechnical investigation shall comply with requirements in IBC Section 1803. Lateral earth pressures are determined using either the Coulomb theory or the Rankine theory. The design shall include evaluation of both internal and external stability and shall also include consideration of external loads such as surcharges and seismic activity. External stability analysis is similar to those required of conventional gravity retaining walls, and shall consider base sliding, overturning, bearing capacity, and overall slope stability. In accordance with IBC Section 1807.2.3, the minimum external stability safety factors are 1.5 for base sliding, deep-seated (global) stability, and overturning. The load combinations of IBC Section 1605

shall not apply to this requirement and the provisions in IBC Section 1807.2.3 shall be observed. The minimum safety factor is 2.0 for the bearing capacity. Internal stability analysis shall consider allowable reinforcement tension, pullout resistance of the reinforcement behind the active failure zone and the strength of reinforcement connections at the facing and movement between courses. The minimum internal stability safety factors are 1.5 for peak shear connection strength (between the geosynthetic material and the SRW units) and shear strength between the SRW units. Seismic safety factors are permitted to be 75 percent of the minimum allowable internal and external static safety factors.

The design method is based primarily on accepted geotechnical principles. Details are 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," dated 2009, NCMA Report No. TR 127A/ISBN 1-881384-07-1.

3.2.2 Gravity Retaining Walls: Gravity wall design shall be based on standard engineering principles and Section 1807.2 of the IBC. Maximum wall heights are shown in Table 1 of this report.

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

3.2.4 Geogrid-reinforced Retaining Walls: The design shall include evaluation of both external and internal stability. External stability analyses are similar to those required for conventional gravity retaining walls. Internal stability analysis shall consider allowable geogrid reinforcement tension, pullout resistance of the geogrid reinforcement behind the active failure zone and the strength of the geogrid reinforcement connections at the block facing.

3.2.5 Exposure: Project specifications or soil and water conditions that have sulfate concentrations identified in ACI 318-11 Table 4.2.1 as very severe (S3) or severe (S2), shall include mix designs for the concrete masonry and grout that comply with the content of ACI 318-11 Table 4.3.1.

3.2.6 Seismic Design Categories C through F: The geotechnical investigation shall consider dynamic seismic lateral earth pressures and effects of liquefaction, settlement, displacement, and soil strength loss on retaining walls, in accordance with IBC Sections 1803.5.11 and 1803.5.12.

3.3 Installation:

3.3.1 Installation General: The products covered in the scope of this report shall be installed as followed:

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. 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 shall be installed to prevent buildup of hydrostatic pressures behind the wall. Provisions for drainage shall be determined by the soils registered design professional.

Blocks are stacked and aligned using the vertical lip. The top units are set back approximately 3/8 to 1 ½ 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 and adjacent courses of block. The completed wall is built with alignment tolerances of ¾ 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).

When used, geogrid reinforcement is placed at the elevations specified in the design. The backfill surface shall be placed and compacted to a level approximately 1 inch (25 mm) below the top of block elevation where geogrid placement is required. The grid is installed by placing it over the block and pulling it tight. The roll or warp direction is the direction of main reinforcement. After unrolling, the geogrid shall be tensioned by hand until taut, free of wrinkles and flat. Adjacent rolls are overlapped a minimum of 4 inches (102 mm). The geogrid is embedded a minimum of 8 inches (203 mm) in toe block units. The geogrid layers shall be pulled taut and, if required, anchored to the compacted backfill prior to backfilling over the geogrid to prevent any folds from occurring.

4.0 PRODUCT DESCRIPTION

4.1 General: The gravity retaining wall system depends on its geometry and weight to counteract lateral forces. The geogrid-reinforced retaining wall system is a reinforced soil-

retaining wall system that depends on the geometry and weight of the reinforced soil mass to resist lateral forces. The reinforced masonry retaining wall system is a steel-reinforced wall that depends on traditional reinforced masonry to resist lateral earth pressures and other lateral forces.

4.2 Product information

Typical sections of Allan Block Retaining Wall Systems are shown in Figures 2A and 2B of this report.

Eight Allan Block types are recognized in this report. AB Stones, AB Classics, AB Three (AB Vertical), AB Rocks block dimensions and weights are shown in Figure 1A of this report. AB Fieldstone 812, AB Fieldstone 824, AB Fieldstone Short Anchoring Unit and the AB Fieldstone Long Anchoring Unit block dimensions and weights are shown in Figure 1B of this report.

4.3 Materials

4.3.1 Allan Block Retaining Wall Units: All units comply with ASTM C1372 having a minimum 28-day compressive strength of 3,000 psi\ (1.2 MPa). In areas where repeated freezing and thawing under saturated conditions occur, evidence of compliance with freeze-thaw durability requirements of ASTM C1372 shall be furnished to the building official for approval prior to construction.

4.3.2 Geogrid Reinforcement: To increase the performance of the Allan Block Retaining Wall System, Miragrid and Strata geosynthetic materials are available. To aid in the selection of the grid material, Sections 4.3.2 and 4.3.3.1 and Tables 2 and 3 of this report provide information needed for design and installation.

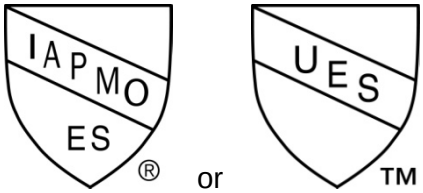
4.3.3.1 Miragrid: Miragrid geogrid grades are 3XT, 5XT, 7XT, 8XT and 10XT produced by Mirafi Inc., are compatible with the Allan Block Retaining Wall System. The grid consists of polyester yarn with acrylic latex coating, formed with a grid-shaped opening. Prolonged exposure of the grid to sunlight shall be avoided. Applicable design properties are indicated in Tables 3B and 3D of this report. Pullout resistance (P), in lb/ft (N/m), is a function of normal load (N), in lb/ft (N/m), due to the weight of the superimposed units. Miragrid geogrid shall be stored at temperatures above -10°F (-23°C) and contact with mud, wet cement, epoxy or other adhesive materials shall be avoided.

4.3.3.2 Strata: Strata geogrid grades are 200 and 350, produced by Strata Systems, Inc., are compatible with the Allan Block Retaining Wall System. The grid consists of polyester yarns woven into an interlocking pattern and coated with PVC. Applicable design properties are indicated in Tables 3A and 3C of this report. Pullout resistance (P), in lb/ft (N/m), is a function of normal load (N), in lb/ft (N/m), due to the weight of the superimposed units. Miragrid geogrid shall be stored at temperatures above -10°F (-23°C) and contact with mud, wet cement, epoxy or other adhesive materials shall be avoided. Prolonged exposure of the grid to sunlight shall be avoided

5.0 IDENTIFICATION

Each pallet of blocks is identified with the manufacturer's name and address, product name, type of unit and the IAPMO Uniform ES Marks of Conformity and Evaluation Report Number 198.

The geogrids are identified by a certificate of compliance with the geogrid manufacturer's name and address, the name of the product, and the product designation, with the certificate accompanying each shipment.



IAPMO ER-198

6.0 SUBSTANTIATING DATA

Testing, engineering calculations and analysis data is in conformance with Acceptance Criteria for Segmental Retaining Walls (AC276) approved October 2004 and editorially revised May 2014. Test results are from laboratories in compliance with ISO/IEC 17025.

7.0 CONTACT INFORMATION

Allan Block Retaining Wall System
Allan Block Corporation
5300 Edina Industrial Boulevard, Suite 100
Edina, Minnesota 55439
(952) 835-5309
www.allanblock.com

8.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on Allan Block Retaining Wall System to assess conformance to the codes shown in Section 1.0 of this report, and serves as documentation of the product certification.

Brian Gerber, P.E., S.E.
Vice President, Technical Operations
Uniform Evaluation Service

Richard Beck, PE, CBO, MCP
Vice President, Uniform Evaluation Service

GP Russ Chaney
CEO, The IAPMO Group

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org

TABLE 1A – 12 DEGREE MAXIMUM WALL HEIGHTS (IN FEET) FOR UNREINFORCED ALLAN BLOCK WALLS[1]

Soil Type	Phi Angle	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	Phi Angle	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	Phi Angle	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 WITH SAU – 6 DEGREE MAXIMUM WALL HEIGHTS (IN FEET) FOR UNREINFORCED ALLAN BLOCK WALLS

Soil Type	Phi Angle	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 WITH LAU – 6 DEGREE MAXIMUM WALL HEIGHTS (IN FEET) FOR UNREINFORCED ALLAN BLOCK WALLS

Soil Type	Phi Angle	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

[1]Seismic restrictions not included

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

TABLE 2 – GEOGRID MATERIAL GRADES

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 [1]		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft [1]	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
Strata Systems Inc. - 380 Dahlonega Road - Cumming, Georgia 30040 - (800) 680-7750				
Strata 200	T_u=1327.5lb/ft+Ntan(10.6º)	1813	Ts_1=850.64lb/ft+Ntan(5.4º)	1140
Strata 350	T_u=1722.9lb/ft+Ntan(10.2º)	2413	Ts_1=983.45lb/ft+Ntan(3.4º)	1225

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

[1]N represents the normal or applied load in lb/linear ft.

TABLE 3B - FACING CONNECTION CAPACITIES FOR AB THREE (AB VERTICAL)

GEOGRID TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft [1]		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft [1]	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
Tencate Nicolon - 365 South Holland Drive - Pendergrass, Georgia 30567 - (888) 795-0808				
MIRAGRID 5XT	T_{u1}=1157.3lb/ft+Ntan(14.3º)	1781.6	Ts_1=936lb/ft+Ntan(5.94º)	1199.1
MIRAGRID 7XT	T_{u1}=1049.8lb/ft+Ntan(28.2º)	2569.6	Ts_1=864.7lb/ft+Ntan(18.4º)	1918.6
MIRAGRID 8XT	T_{u1}=1013.4lb/ft+Ntan(35.2º)	3494.6	Ts_1=838lb/ft+Ntan(24.85º)	2398.3
MIRAGRID 10XT	T_{u1}=935.3lb/ft+Ntan(20.8º)	2850.5	Ts_1=921.6lb/ft+Ntan(16º)	2137.9

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

[1]N represents the normal or applied load in lb/linear ft (N/m).

TABLE 3C - FACING CONNECTION CAPACITIES FOR AB CLASSICS AND AB ROCKS

GEOGRID TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft [1]		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft [1]	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
Strata Systems Inc. - 380 Dahlonega Road - Cumming, Georga 30040 - (800) 680-7750				
Strata 200	T_u=1382.6lb/ft+Ntan(17.8º)	2087	Ts_1=715.5lb/ft+Ntan(1.6º)	802
Strata 350	T_u=1256.9lb/ft+Ntan(12.2º)	1979	Ts_1=785.4lb/ft+Ntan(7.1º)	1178

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

[1]N represents the normal or applied load in lb/linear ft (N/m).

TABLE 3D - FACING CONNECTION CAPACITIES FOR AB STONES

GEOGRID TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft [1]		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft [1]	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
Tencate Nicolon - 365 South Holland Drive - Pendergrass, Georgia 30567 - (888) 795-0808				
MIRAGRID 3XT	T_u=859.2lb/ft+Ntan(23.4º)	1892	Ts_1=592.3lb/ft+Ntan(14.1º)	1148
MIRAGRID 5XT	T_{u1}=1188.9lb/ft+Ntan(18º)	1918.6	Ts_1=751.7lb/ft+Ntan(12.1º)	1233.4
MIRAGRID 7XT	Tu1=1063.5lb/ft+Ntan(25.6º)	2603.8	Ts_1=644.8lb/ft+Ntan(19.3º)	1815.8

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

[1]N represents the normal or applied load in lb/linear ft (N/m).

TABLE 4 – SHEAR INTERACTION BETWEEN ALLAN BLOCK UNITS WITH GEOSYNTHETIC REINFORCMENT

BLOCK TYPE	PEAK CONNECTION STRENGTH EQUATIONS, P, lb/ft (kN/m)		SERVICEABILITY CONNECTION STRENGTH EQUATIONS, P, lb/ft (kN/m)	
	Segment 1:	MAXIMUM	Segment 1:	MAXIMUM
AB Collection - Nominal 2 inch Leading Lip				
AB Stones AB Classics AB Rocks	V_u=2614lb/ft+Ntan(42^o)	5620.0	V'_u=379.5lb/ft+Ntan(28.4^o)	3270.0
AB Collection - Nominal 1.5 inch Leading Lip				
AB Three (AB Vertical)	V_u=1381.6lb/ft+Ntan(32.2^o)	3497.0	V'_u=350.5lb/ft+Ntan(29.2^o)	3390.0
AB Fieldstone Collection				
812 with SUA & LAU 824 with SAU & LAU	V_u=1697.3lb/ft+Ntan(54.1^o)	5838.1	V'_u=569.3lb/ft+Ntan(32.6^o)	3590.0

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

Note 1 - For conservative design purposes the interaction between the Allan Block units is using these same test results with the geosythetic between the units.

All dimensions are in inches unless otherwise noted.

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

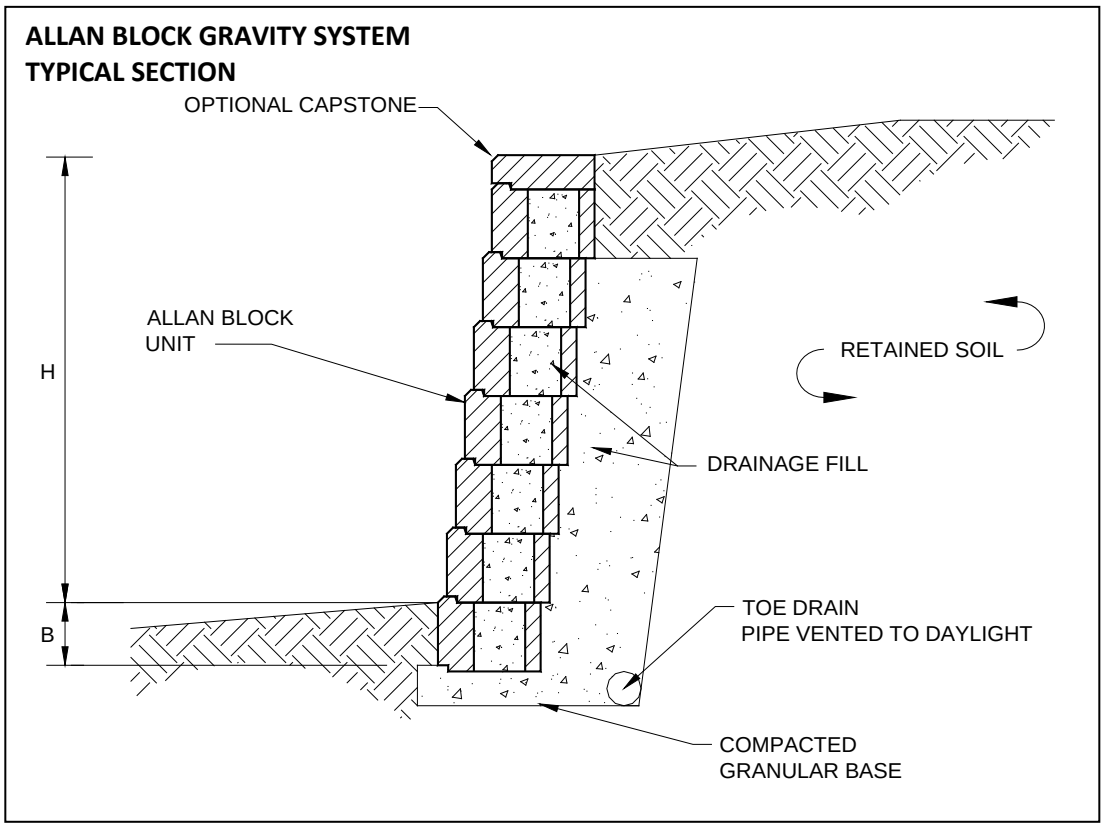
FIGURE 1A – ALLAN BLOCK RETAINING WALL DETAILS

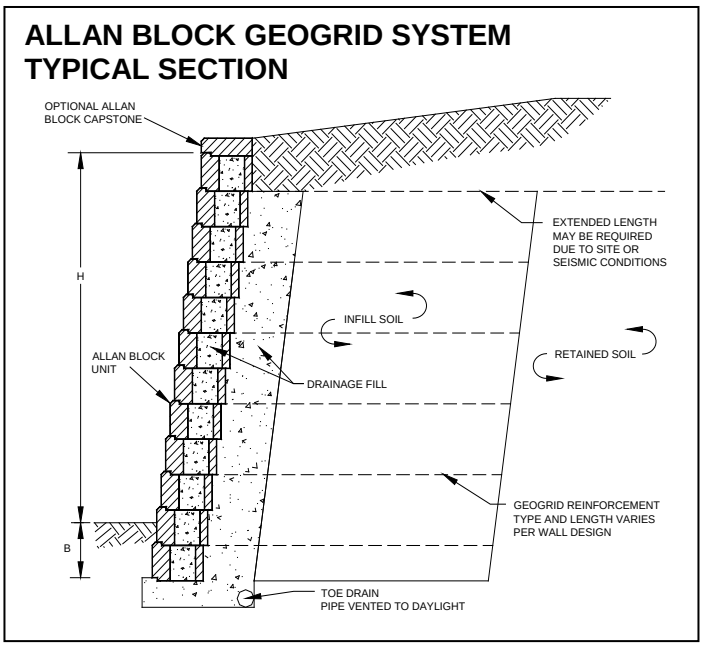
All dimensions are in inches unless otherwise noted.

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

* Short Anchoring Unit
** Long Anchoring Unit

FIGURE 1B – AB FIELDSTONE RETAINING WALL DETAILS





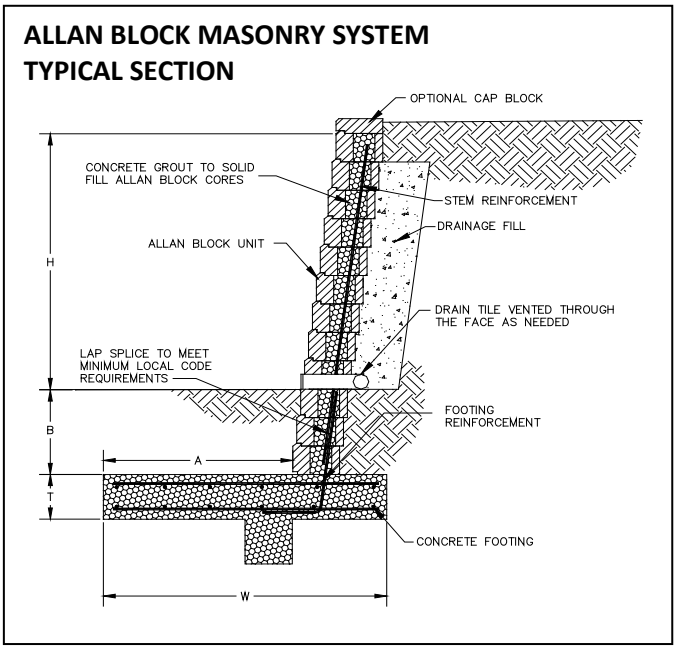
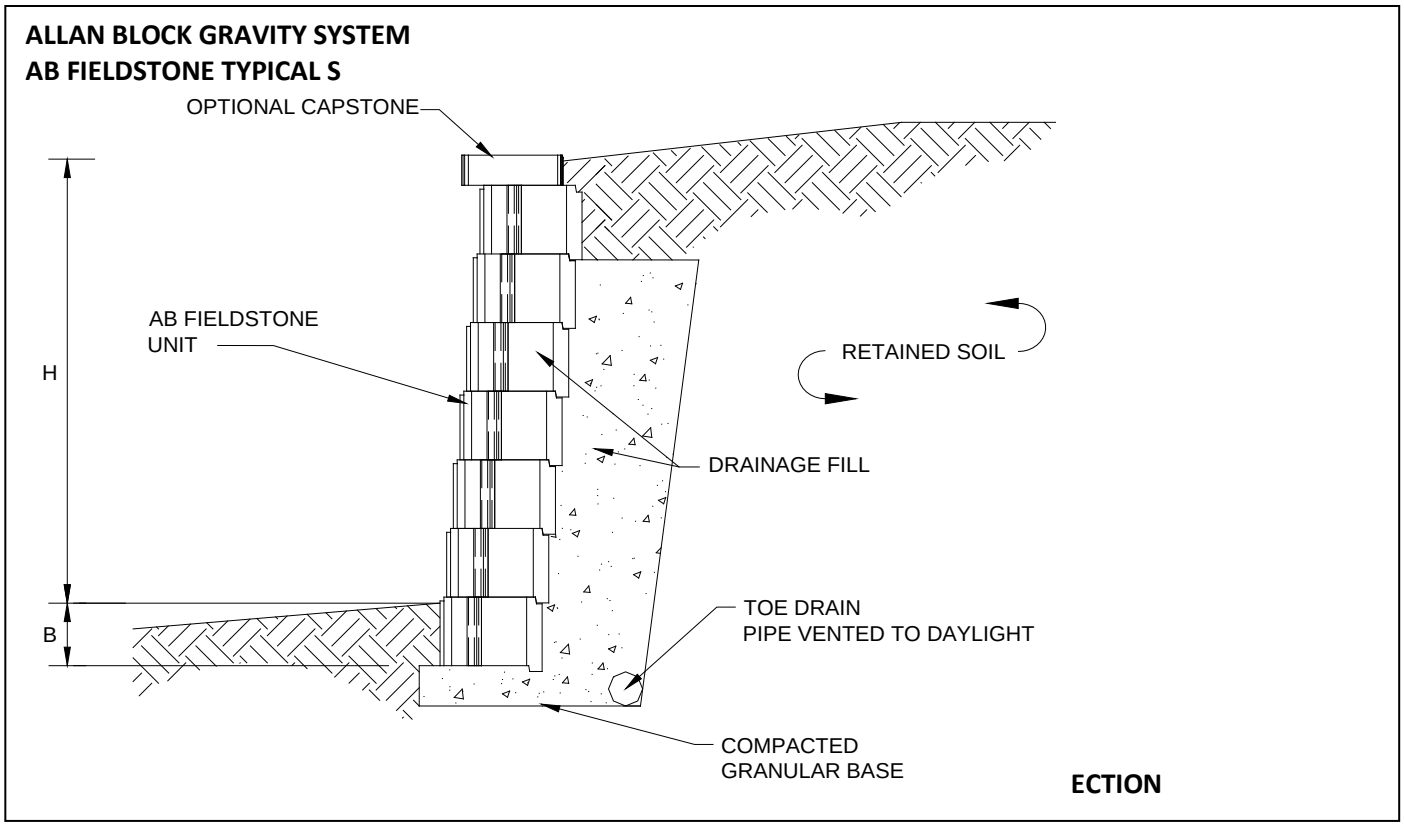
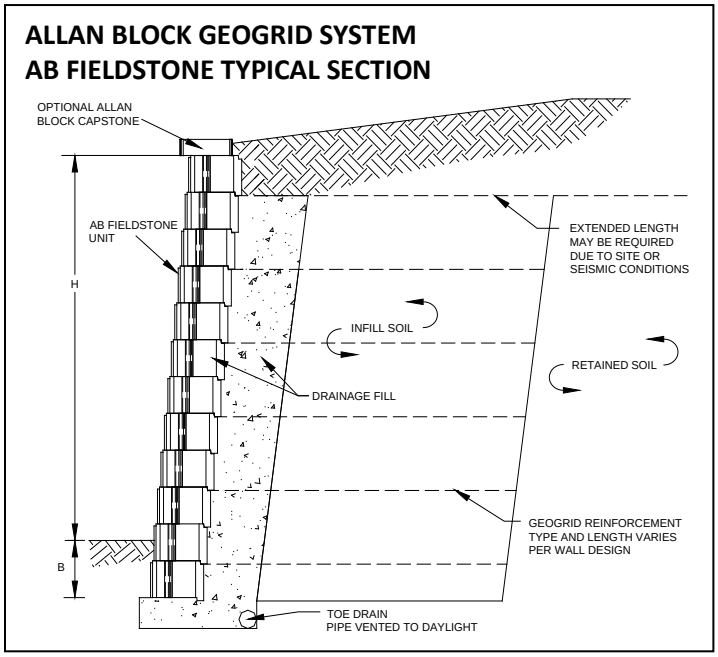


FIGURE 2A – TYPICAL SECTIONS





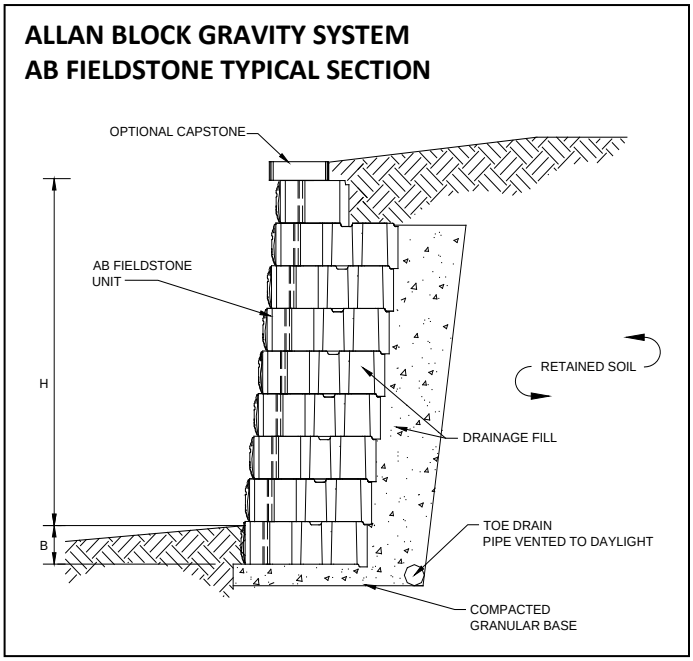


FIGURE 2B – TYPICAL SECTIONS AB FIELDSTONE

CALIFORNIA SUPPLEMENT

ALLAN BLOCK CORPORATION

ALLAN BLOCK RETAINING WALL SYSTEMS

CSI Section:
32 32 00 Retaining Walls

1.0 SCOPE OF EVALUATION

1.1 Compliance to the Following Codes and Regulations
- 2013 California Building Code® (CBC)

1.2 Evaluated in Accordance With
- ICC-ES AC 276 approved October 2004, editorially revised May 2011

1.3 Property evaluated
- Structural

ADDITIONAL REQUIREMENTS:

2.0 USES

The Allan Block Retaining Wall System encompasses materials and methods for constructing gravity retaining walls, reinforced masonry retaining walls, and geogrid-reinforced (reinforced soil) retaining walls in accordance with CBC Sections 1610, 1807, 2107, and 2108.

3.0 DESIGN AND INSTALLATION

Replace the first paragraph of Section 3.2.1 of ER-0198 with the following:

3.1.1 General: Allan Block Retaining Wall System is designed as a reinforced, soil retaining wall system that depends upon the weight and geometry of the reinforced soil mass to resist the lateral earth pressures and other lateral forces. Design provisions in CBC Section 1610 shall be be observed except loads shall be determined by a geotechnical investigation and the lateral soil loads in Table 1601.1 of the CBC shall not apply. The geotechnical investigation shall comply with requirements in CBC Section 1803. Lateral earth pressures are determined using either the Coulomb theory or the Rankine theory. The design shall include evaluation of both internal and external stability and shall also include consideration of external loads such as surcharges and seismic activity. External stability analysis is similar to those required of conventional gravity retaining walls, and shall consider base sliding, overturning, bearing capacity, and overall slope stability. In accordance with CBC Section 1807.2.3, the minimum external stability safety factors are 1.5 for base sliding, deep-seated (global) stability, and overturning. The load combinations of CBC Section 1605 shall not apply to this requirement and the provisions in CBC Section 1807.2.3 shall be observed. The minimum safety factor is 2.0 for the bearing capacity. Internal stability analysis shall consider allowable reinforcement tension, pullout resistance of the reinforcement behind the active failure zone and the strength of reinforcement connections at the facing and movement between courses. The minimum internal stability safety factors are 1.5 for peak shear connection strength (between the geosynthetic material and the SRW units) and shear strength between the SRW units. Seismic safety factors are permitted to be 75 percent of the minimum allowable internal and external static safety factors.

4.0 LIMITATIONS

The Allan Block Retaining Wall System described in this report complies, or is a suitable alternative to what is specified in, the codes listed in Section 1.0 of this report, subject to the following conditions:

4.1 The system is designed and installed in accordance with this report; accepted geotechnical principles in compliance with CBC Section 1803; the Commercial Installation Manual for Allan Block Retaining Walls; the National Concrete Masonry Association report, "Design Manual for Segmental Retaining Walls," dated 2009; manufacturer's instructions and accepted engineering principles. In the event of a conflict, the more restrictive governs.

4.2 Calculations and plans justifying the design shall be submitted to the building official for approval on each wall system. The calculations and details shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. The analysis shall be based on accepted engineering principles, the Allan Block Retaining Engineering Manual and the CBC, as applicable. The analysis shall include all items under Section 3.2.1 of this report and follow the design methodology of the Allan Block Engineering Manual (AB Doc #R0904-0610).

4.3 Copies of the Commercial Installation Manual for Allan Block Retaining Walls shall be furnished to the building official.

4.4 This installation shall require a site-specific Geotechnical investigation in accordance with CBC Section 1803 for each project site. The geotechnical 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 and effects of earthquake ground motions. The geotechnical investigation report shall also specify safety factors for tensile rupture and pullout of the geosynthetic reinforcement.

4.5 Special inspection shall be provided in accordance with CBC Section 1705.4, as applicable. The special inspector shall verify the following:

- The dimensions of the Allan Block unit.
- Allan Block unit identification compliance with ASTM C1372, including compressive strength and water adsorption, as described in Section 4.2 of this report.
- Procedure for foundation preparation.
- Procedure for Allan Block unit placement, including alignment and inclination.
- Procedure for geogrid reinforcement type (manufacturer and model number) and placement.
- Procedure for backfill and compaction.
- Procedure for water management and drainage provisions.

4.6 This report evaluates the connection strength and the geogrid material when attached to the Allan Block units only. The physical properties of the geogrid and its interaction with the soil are not evaluated under this report.

5.0 SUBSTANTIATING DATA

Testing, engineering calculations and analysis data is in conformance with Acceptance Criteria for Segmental Retaining Walls (AC276) approved October 2004 and editorially revised May 2011. Test results are from laboratories in compliance with ISO/IEC 17025.

6.0 IDENTIFICATION

Each pallet of blocks is identified with the manufacturer's name and address, product name, type of unit and the IAPMO Uniform ES Marks of Conformity and Evaluation Report Number 198.

7.0 CONTACT INFORMATION

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