BuildBlock
BUILDING SYSTEMS

MOST COMMON BELOW GRADE ENGINEERING CASES: TABLES & DETAILS

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FLAT WALL ENGINEERING

BELOW & ABOVE GRADE ICF WALL & SAFE ROOM DESIGN

RESIDENTIAL | COMMERCIAL | MULTIFAMILY | INDUSTRIAL | INSTITUTIONAL

REVISED JANUARY 2026

THIS DOCUMENT IS AN EXCERPT FROM
THE BUILDBLOCK FLAT WALL & SAFE
ROOM ENGINEERING
MANUAL JANUARY 2026 REVISION

BUILDBLOCK ENGINEERING MANUAL

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August 22, 2023

BuildBlock Building Systems
9705 Broadway Extension
Suite 150
Oklahoma City, Oklahoma 73114

Re: Engineering Certification

Dear Sir:

We have reviewed the contents of this BuildBlock ICF Products and Safe Room Engineering Manual and its referenced documents. Based on the scope and limitations, and disclaimers described therein, the information contained in this engineering manual meets the structural requirements of the 2021 International Residential Code (IRC) and the 2021 International Building Code (IBC).

Based on the scope and limitations, and disclaimers described therein, the BuildBlock Safe Room Engineering information meets the structural requirements of *ICC 500-2020, ICC/NSSA Standard for the Design and Construction of Storm Shelters* and *FEMA 361 Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms.*

Sincerely,

8/22/23

Robert F. Oleck, Ph.D., PE
FL PE # 52514

1.0 INTRODUCTION

OVERVIEW

This engineering manual is intended to provide prescriptive requirements for the design of BuildBlock Building Systems ICF flat wall and Global Block wall systems for limited scope and applications. A prescriptive specification is one that includes clauses for means and methods of construction and composition of the concrete mix rather than defining performance requirements. In this manual the requirements only apply to residential structures of 1 and 2 stories with a basement within load and dimensional limits specified in Table 1.1 and must comply with local building department requirements and the referenced building codes stated within this manual.

1.1 PRESCRIPTIVE APPROACH

The prescriptive requirements of this document are based primarily on the Prescriptive Method for Insulating Concrete Forms in Residential Construction [1], Building Code Requirements for Structural Concrete [2], and the Structural Design of Insulating Concrete Form Walls in Residential Construction [3] for member strength and reinforcement requirements, and is intended to be consistent with the provisions in the International Residential Code (IRC 2012) [9]. The design loading requirements are based on Minimum Design Loads for Buildings and Other Structures [4].

1.2 SCOPE & LIMITATIONS

These provisions apply to the construction of detached one and two-family homes, townhouses, and other attached single-family dwellings in accordance with the general limitations of Table 1.1. The limitations are intended to define the appropriate use of this document for most one and two-family dwellings including townhouses. An engineered design shall be required for houses built along the immediate, hurricane-prone coastline subjected to storm surge (i.e., beach front property) and in high seismic areas. Intermixing of the present provisions with other construction materials in a single structure shall be in accordance with the applicable building code requirements for that material, the general limitations set forth in Table 1.1, and relevant provisions of this document. An engineered design shall be required for applications that do not meet the limitations of Table 1.1.

These tables DO NOT take into account the required horizontal shear force resistance for lateral wind or seismic loads. Refer to references [1] & [3] for the required length of shear wall required for horizontal loads and minimum shear wall length between openings.

1.3 DEFINITION OF TERMS

Accepted Engineering Practice: An engineering approach that conforms with accepted principles, tests, technical standards, and sound judgment.

Anchor Bolt: A headed bolt, or threaded rod with nut embedded in the concrete, used to connect a structural member of different material to a concrete member.

Approved: Acceptable to the building official or other authority having jurisdiction.

Attic: The unfinished space between the ceiling joists of the top story and the roof rafters.

Authority Having Jurisdiction: The organization, political subdivision, office, or individual charged with the responsibility of administering and enforcing the provisions of applicable building codes.

Backfill: The soil that is placed adjacent to completed portions of a structure (e.g., basement wall, stem wall) with suitable compaction and allowance for settlement.

Basement: That portion of a building that is partly or completely below grade. See "story above grade plane."

Basic Wind Speed: In accordance with ASCE 7 ref[4]

Construction Joint: The surface where two successive placements of concrete meet, across which it may be desirable to achieve bond and through which reinforcement may be continuous.

Crawlspace Wall: A perimeter foundation wall 5 feet (1.5 m) or less in height that creates an under floor space which is not habitable.

Dead Load: Forces resulting from the weight of walls, partitions, framing, floors, ceilings, roofs, and all other permanent construction entering into, and becoming part of, a building.

Deflection: Elastic movement of a loaded structural member or assembly (i.e., beam or wall).

Design Lateral Soil Load: The force per unit area produced by the soil on an adjacent structure such as a basement wall.

Enclosure Classifications: Used for the purpose of determining internal wind pressure. Buildings are classified as partially enclosed or enclosed as defined in the applicable building code, or if there is no code as follows:

Enclosed Building: A building not complying with the requirements for a partially enclosed building.

Partially Enclosed Building: A building that complies with both of the following:

- The total area of openings in a wall that receives positive external pressure exceeds the sum of the area of openings in the balance of the building envelope (walls and roof) by more than 10%, and
- The total area of openings in a wall that receives positive external pressure exceeds 4 sq. ft. (0.37 m2) or 1% of the area of the wall, whichever is smaller, and the percentage of openings in the balance of the building envelope (walls and roof) does not exceed 20%.

Endwall: The exterior walls of the building that are perpendicular to the roof ridge. The length of an endwall is designated by W. See "sidewall."

Exposure Categories: Reflects the effect of the ground surface roughness on wind loads in accordance with ASCE 7.

Exposure Category B: includes urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.

Exposure Category C: includes open terrain with scattered obstructions having heights generally less than 30 ft (9.1 m).

Exposure Category D: includes flat, unobstructed areas and water surfaces.

Flame-Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84.

Flat Wall: A solid concrete wall of uniform thickness. Refers to BuildBlock and BuildLock ICF Forms.

Floor Joist: A horizontal structural framing member that supports floor loads.

Footing: A below-grade foundation component that transmits loads directly to the underlying soil or rock.

Form Tie: A mechanical connection in tension used to prevent concrete forms from spreading due to the fluid pressure of fresh concrete, and which remains permanently embedded in the concrete.

Foundation: The structural elements through which the dead load of a structure and the loads and forces imposed on it are transmitted to the footing, or directly to the soil or rock.

Foundation Wall: The structural element of a foundation that resists lateral soil loads, if any, and transmits the dead load of a structure and the loads and forces imposed on it to the footing, or directly to the soil or rock; includes basement, stem, and crawlspace walls.

Grade: The finished ground level adjoining the building at all exterior walls.

Grade Plane: A reference plane representing the average of the finished ground level adjoining the building at all exterior walls.

Ground Snow Load: Measured load on the ground due to snow accumulation developed from a statistical analysis of weather records expected to be exceeded once every 50 years at a given site.

Interpolation: A mathematical process used to compute an intermediate value of a quantity between two given values assuming a linear relationship.

Lap Splice: A connection of reinforcing steel made by lapping the ends of bars.

Lateral Load: A horizontal force, created by soil, wind, or earthquake, acting on a structure or its components.

Lateral Support: A horizontal member or assembly providing stability to a wall in the direction perpendicular to the plane of the wall.

Ledger: A horizontal structural member fastened to the side of a wall to serve as a connection point for other structural members, typically floor joists.

Light-Framed Construction: Construction where walls, floors and roofs are primarily formed by a system of repetitive wood or cold-formed steel framing members.

Lintel: A horizontal structural element of reinforced concrete located above an opening in a wall to support the construction and superimposed loads from above.

Live Load: Any gravity vertical load other than dead load,or environmental loads, such as from wind, snow, rain, earthquake, or flood. Includes furniture, people, and personal effects.

Load-Bearing Value of Soil: The allowable load per surface area of soil. It is usually expressed in pounds per square foot (psf) or kilonewtons per square meter (kN/m2).

Multiple Dwelling: A building with three or more attached single-family dwelling units, including townhouses, where means of egress from each dwelling unit are independent.

Roof Snow Load: Uniform load on the roof due to snow accumulation; typically 70 to 80 percent of the ground snow load in accordance with ASCE 7.

Screen-Grid Wall: A perforated concrete wall with closely spaced vertical and horizontal concrete members (cores) with voids in the concrete between the members created by the stay-in-place form. Refers to GlobalBlock.

Seismic Force: The force exerted on a structure or portion thereof resulting from seismic (earthquake) ground motions.

Sidewall: The exterior walls of the building that are parallel to the roof ridge. The length of a sidewall is designated by L. See “endwall.”

Slab-on-Ground (Grade): A concrete slab, which is continuously supported by, and rests on, the soil directly below.

Slump: A measure of consistency of freshly mixed concrete equal to the subsidence of the molded specimen measured immediately after the removal of the slump cone.

Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84.

Span: The clear horizontal distance between supports.

Specified Compressive Strength of Concrete: The compressive strength of concrete, f’c, used in design and evaluated in accordance with Chapter 5 of ACI 318.

Stay-in-Place Concrete Forms: A concrete forming system using stay-in-place forms of foam plastic insulation, a composite of cement and foam insulation, a composite of cement and wood chips, or other insulating material for constructing cast-in-place concrete walls.

Stem Wall: A foundation wall supported directly by the soil or rock, or on a footing that supports an above-grade concrete wall and retains unbalanced backfill beneath the slab-on-ground of the first story above grade plane.

Stirrup: Steel bars, wires, or welded wire reinforcement generally oriented perpendicular to longitudinal reinforcement, properly anchored, and extending across the depth of concrete beams, lintels, or similar members to resist shear and diagonal tension stresses in excess of those permitted to be carried by the concrete alone.

Story: That portion of the building included between the upper surface of any floor and the upper surface of the floor next above, except that the top-most story shall be from the upper surface of the top-most floor to the top of the ceiling joists, or where there is no ceiling, to the top of the roof rafters.

Story Above Grade Plane: Any story with its finished floor surface entirely above grade plane except that a basement shall be considered as a story above grade plane where the finished surface of the floor above the basement is (a) more than 6 feet (1.8 m) above the grade plane, or (b) more than 12 feet (3.7 m) above the finished ground level at any point.

Unbalanced Backfill Height: The difference between the interior and exterior finish ground level. Where an interior concrete slab-on-ground is provided, the unbalanced backfill height is the difference in height between the exterior finish ground level and the top of the slab. For a stem wall, the difference in height between the exterior finish ground level and the underside of the slab-on-ground.

Unsupported Wall Height: Within a basement or crawlspace, the maximum clear vertical distance between the exterior finish ground level, or interior finish ground level or top of finished floor, whichever is lower, and the finished ceiling or sill plate. In other stories, the maximum clear vertical distance from the top of the finished floor to the finished ceiling or sill plate.

Vapor Retarder: A layer of material used to retard the transmission of water vapor through a building wall or floor.

Waffle-Grid Wall: A solid concrete wall with closely spaced vertical and horizontal concrete members (cores) with a concrete web between the members created by the stay-in-place form. The thicker vertical and horizontal concrete cores and the thinner concrete webs create the appearance of a breakfast waffle. It is also called an uninterrupted-grid wall in other publications. BuildBlock does not produce a waffle-grid product.

Wall, Loadbearing: A concrete wall that supports more than 200 pounds per linear foot (2.92 kN/m) of vertical load in addition to its own weight. The weight of the wall includes any exterior and interior finishes attached to the wall, unless indicated otherwise.

Wall, Non-Loadbearing: A concrete wall that is not a loadbearing wall.

Web: A concrete wall segment, a minimum of 2 inches (51 mm) thick, that connects the vertical and horizontal concrete members (cores) of a waffle-grid stay-in-place wall or lintel member.

Wind Force: The force or pressure exerted on a building structure and its components resulting from wind. Wind forces are typically expressed in pounds per square foot (psf) or kilonewtons per square meter (kN/m)

1.4 DISCLAIMERS

This manual was designed to be used as a reference guide only. This manual is not intended to be used as a replacement or substitute for the actual training by an experienced and properly trained BuildBlock Building System professional. Before starting any project BuildBlock recommends that you receive proper training. BuildBlock also recommends that you consult with design professionals familiar with the type and scope of project to be built. Training is available by contacting BuildBlock Building Systems LLC at buildblock.com or 866-222-2575.

BuildBlock Building Systems, LLC, believes the information contained herein to be accurate at the time of writing and preparation. The information has been compiled using sources believed to be reliable. Neither BuildBlock Building Systems, LLC, nor its employees or representatives make any representation or warranty, either expressed or implied, whether arising by statute, operation of law, custom of trade or otherwise, with respect to the accuracy or completeness of information contained in this document or its fitness for any particular purpose, nor do they assume any liability for damages or injury resulting from the application of such information.

BuildBlock Building Systems, LLC, assumes no responsibility regarding the use of its products or any other third party products referred to in this document. It is the full responsibility of the user to comply with all applicable regulations and building code requirements concerning the use of these products and any other products outlined in this product manual. It is further the responsibility of the user to research and understand safe methods of use and handling of these products. To properly comply with the building codes in your area, contact your local distributor, dealer, or building code inspector.

TABLE 1.1 APPLICABILITY LIMITS

GENERAL	
Number of Stories	2 stories above grade plus basement
Design Wind Speed	150 mph (241 km/hr) 3-second gust (130 mph (209 km/hr) fastest mile)
Ground Snow Load	70 psf (3.4 kPa)
Seismic Design Category	Not Included in This Manual - Requires Structural Engineer

FOUNDATIONS	
Max Wall Height	12ft
Max Unbalanced Backfill Height	1ft below wall height
Equivalent Fluid Density of Soil	75 pcf (1201 kg/m3)
Presumptive Soil Bearing Value	2,000 psf (96 kPa)

WALLS	
Unit Weight of Concrete	150 pcf (23.6kN/m3)
Wall Height (Unsupported)	20ft Max. Varies by core thickness.

FLOORS	
Floor Dead Load	15 psf (0.72 kPa)
First Floor Live Load	40 psf (1.9 kPa)
Second Floor Live Load	30 psf (1.4 kPa)
Floor Clear Span (Unsupported)	32 feet (9.8m)

ROOFS	
Maximum Roof Slope	12:12
Roof and Ceiling Dead Load	15 psf (0.72 kPa)
Roof Live Load (Ground Snow Load)	70 psf (3.4 kPa)
Attic Live Load	20 psf (0.96 kPa)
Roof Clear Span (Unsupported)	40 feet (12m)

2.0 MATERIALS

2.1 CONCRETE

2.1.1 Walls formed with BuildBlock Building Systems forms shall have a minimum concrete thickness of 6 inches (159 mm) for basement walls and 4 inches (102 mm) for above-grade walls and crawl space walls, except in Seismic Design Categories (SDC) D1 and D2 where a wall thickness of 8 inches (159 mm) is required.

2.1.2 Ready-mixed concrete for BuildBlock Building Systems walls shall meet the requirements of ASTM C 94 [6, 10]. Slump shall be determined in accordance with ASTM C 143. Maximum slump and aggregate size requirements shall be in accordance with BuildBlock Building Systems Installation recommendations and meet the concrete compressive strength requirements herein. A suitable concrete mix design and placement methodology shall be selected for each project to ensure that concrete is properly consolidated in BuildBlock walls. Mix designs with a slump greater than 6 inches (152 mm) are not permissible.

2.1.3 The minimum compressive strength of concrete (f'c) shall be 3,000 psi at 28 days as determined in accordance with ASTM C 31 [5].

2.2 REINFORCING STEEL

2.2.1 Reinforcing steel used in BuildBlock Building Systems walls shall meet the requirements of ASTM A 615 [7], The minimum yield strength of the reinforcing steel shall be Grade 60 (420 MPa). Steel reinforcement shall have a minimum concrete cover in accordance with ACI 318.

2.2.2 Horizontal wall reinforcement shall not vary outside of the middle third of beams, columns, lintels, horizontal and vertical cores, and walls for all wall thicknesses, except as noted below.

2.2.2(a) Exception: Horizontal wall reinforcement in foundation walls is permitted to be placed closer to the inside face of the wall (Tension Side), provided that it does not conflict with the minimum required cover.

2.2.3 Vertical wall reinforcement in above-grade BuildBlock and GlobalBlock walls shall be placed in the center of the wall. Vertical wall reinforcement in below-grade (i.e., basement and crawlspace) BuildBlock and GlobalBlock walls shall be placed in accordance with BuildBlock Building System below grade wall tables in this manual.

2.2.4 Steel reinforcement in amounts and sizes required by these provisions shall be installed in accordance with the following requirements:

Vertical Reinforcement. Vertical reinforcement in above grade walls shall extend continuously to each story above and below.

Horizontal Reinforcement. Horizontal reinforcement shall be continuous around corners. Bent bars meeting a minimum required lap splice with the horizontal reinforcement shall be permissible at corners.

Splicing of Reinforcement. The longest practicable continuous length of horizontal or vertical rebar shall be used. When a splice is required in continuous reinforcement, rebar shall overlap a minimum of 40db with a separation between bars of not greater than 8db.

Bar Size (Diameter in Eighths)	Lap Splice Length (Inches)
#3	15
#4	20
#5	25
#6	30
#7	35
#8	40

2.3 FORM MATERIALS

Expanded Polystyrene (EPS) & Polypropylene Plastic Web Ties
The physical properties of the Expanded Polystyrene (EPS) should comply with ASTM C578, latest edition. The plastic ties shall have sufficient strength to resist at least 8 feet of wet concrete which can be calculated in accordance with ACI 347-04 or latest edition.

3.0 TYPES OF STRUCTURAL MEMBERS

3.1 BEAMS, WALLS, LINTELS

The structural elements addressed in this document consist of walls, below and above grade, and lintels which are primarily beams in bending. The wall elements are analyzed as structural members in combined compression and bending. Lintel elements are analyzed as flexural members or reinforced concrete beams in bending. ACI 318 chapters 10 and 11 are the primary references for flexural and shear requirements that apply to reinforced concrete beams.

Concrete walls constructed with ICF systems in accordance with this document shall comply with the shapes and minimum concrete cross-sectional dimensions required in ref. [11]. Under the current ACI 318 code (ACI 318-19), chapters 10 and 14 contain most of the requirements for reinforced concrete walls, whether below grade or above grade. In some cases, wall elements can be analyzed and designed as unreinforced, or structural plain concrete walls provided they meet the provisions of chapter 14 of ACI 318.

4.0 STRUCTURAL BUILDING TYPES & CONFIGURATIONS

4.1 LOAD CASES 1, 2, 3 & 4

Refer to Table 1.1 of ref. [11] for design criteria used for the wall and basement configurations that the following tables are based. (See wall diagrams) These 4 load cases comprise the limitations on loads and structural configuration used to build the tables for both the below grade and above grade wall tables. Each table lists the required reinforcing for the worst case load combinations from these 4 load cases show in the wall diagrams.

The design criteria assumed for each of these four construction cases are shown in this section. The below grade wall tables reflect the reinforcement required for the governing case for each loading condition. In other words, the table reflects the reinforcement required for whichever of the four cases is the most restrictive. The tables do not apply to construction cases not covered by these assumed conditions, and such cases should receive special design consideration. For cases that fall in between the assumptions, the more conservative or restrictive case should be assumed and interpolation should not be used. Shaded cells indicate the capacity of the wall is exceeded for the assumed design criteria. Specific project information and design criteria should be used to properly design the wall. Reinforcement requirements may be reduced and/or a design may be achieved with the specific project information and design criteria. Consult a design professional.

5.0 BELOW GRADE WALLS

5.1 BELOW GRADE WALL REINFORCEMENT FOR BUILDBLOCK

The information in the below grade wall tables has been determined using four different construction cases for below grade walls which were intended to cover the range of residential construction conditions typically used. The design criteria used for these four different configurations is based on Table 1.1 ref [11]. **The highlighted sections indicate typical use cases.** The construction load cases are summarized as follows (See wall diagrams):

5.2 HOW TO USE THE BELOW GRADE WALL REINFORCEMENT TABLES

1. Determine appropriate below grade wall reinforcement table.
   - Table 5a – Flat Panel ICF Basement Walls
   - Table 5b-6: 6" GlobalBlock Basement Wall
   - Table 5b-8- 8" GlobalBlock Basement Wall
2. Determine the equivalent fluid density category of soil. (30, 45, 60 or 75 pcf) Consult a professional Geotechnical Engineer for help in determining these values or use the following as an approximation that should be verified:

SOIL TYPE	SAND	SILT	CLAY	WET SILT OR CLAY	FAT CLAY
Equivalent Fluid Pressure (pcf)	30	45	60	75	90

3. Determine the unsupported wall height. See Figures 5.4A and 5.4B for Typical Below Grade BuildBlock Wall
4. Determine the maximum backfill height on the below grade wall. See Figure 5.1
5. Determine the reinforcement required from the applicable table.

5.3 BELOW GRADE BUILDBLOCK WALL REINFORCEMENT TABLE NOTES

Minimum vertical reinforcement required for temperature and shrinkage:

- 4" BuildBlock / BuildLock wall: #4 @ 48" o.c.
- 6" BuildBlock / BuildLock wall: #4 @ 48" o.c.
- 8" BuildBlock / BuildLock wall: #5 @ 48" o.c. or #4 @ 30" o.c.
- 10" BuildBlock wall #5 @ 48" o.c. or #4 @ 30" o.c.
- 12" BuildBlock wall #5 @ 48" o.c. or #4 @ 30" o.c.
- Minimum horizontal reinforcement required for temperature and shrinkage: One #4 rebar in the top and bottom course of the wall. A total of 2 #4 horizontal rebars and #3@ 32"o.c. to fill between top and bottom courses.
- Deflection meets L/240.
- Additional reinforcement is required around openings, corners, and discontinuities.
- Place the vertical reinforcement at center or toward the inside face as indicated in the applicable basement wall tables.
- The wall must be braced against sway at the top and bottom.
- One #6 rebar may be substituted with two #5 rebars. The two #5 rebars must be spaced no closer than 1" apart and each #5 rebar must have its own lap splice.
- Shaded cells indicate the capacity of the wall is exceeded for the assumed design criteria.
- A vertical rebar shall be placed at each corner.

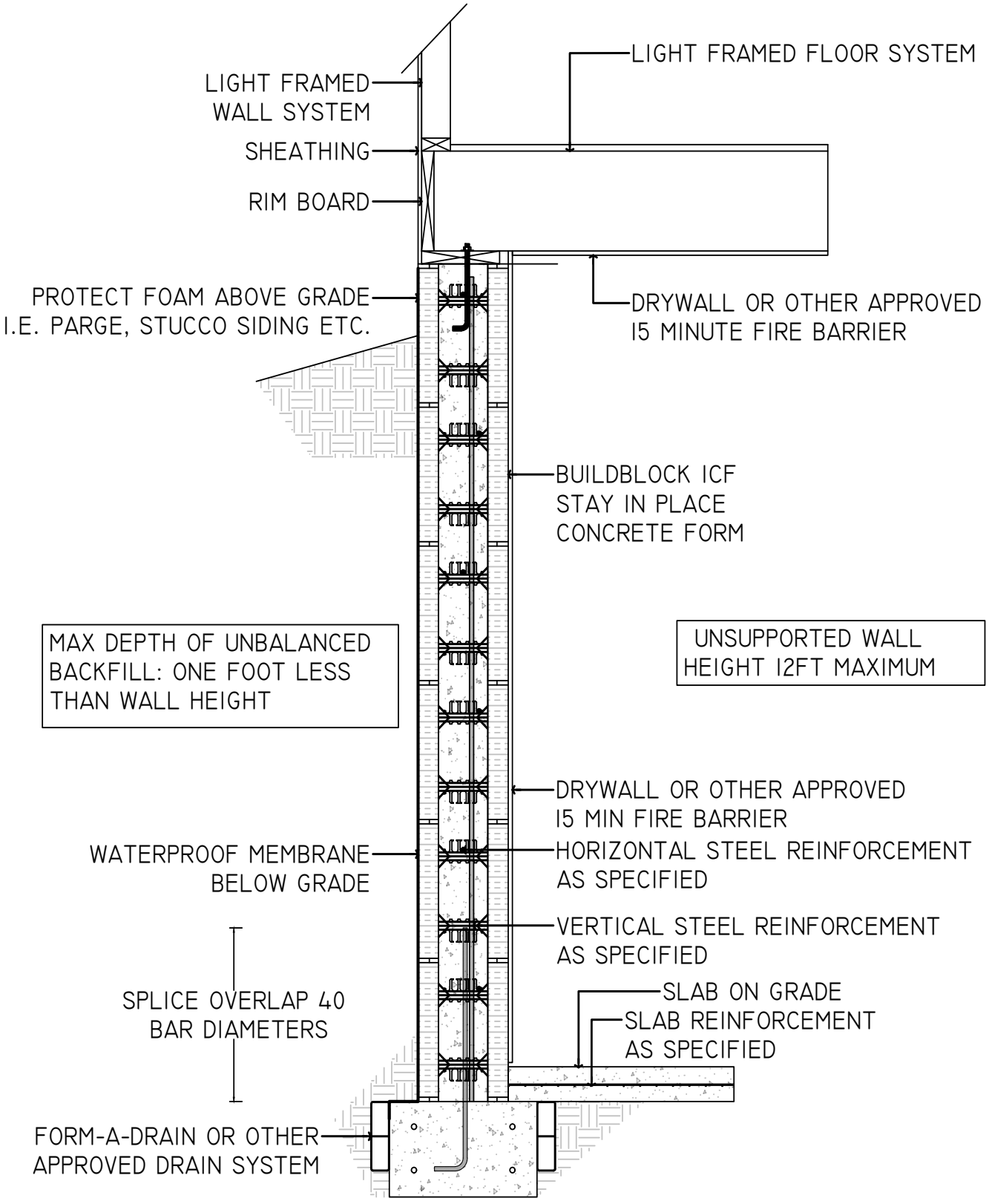


FIGURE 5.4A TYPICAL BELOW GRADE BUILDBLOCK WALL SECTION CUT THROUGH FLAT WALL OR VERTICAL CORE OF SCREEN GRID WALL. SUPPORTING LIGHT FRAMED WALL.

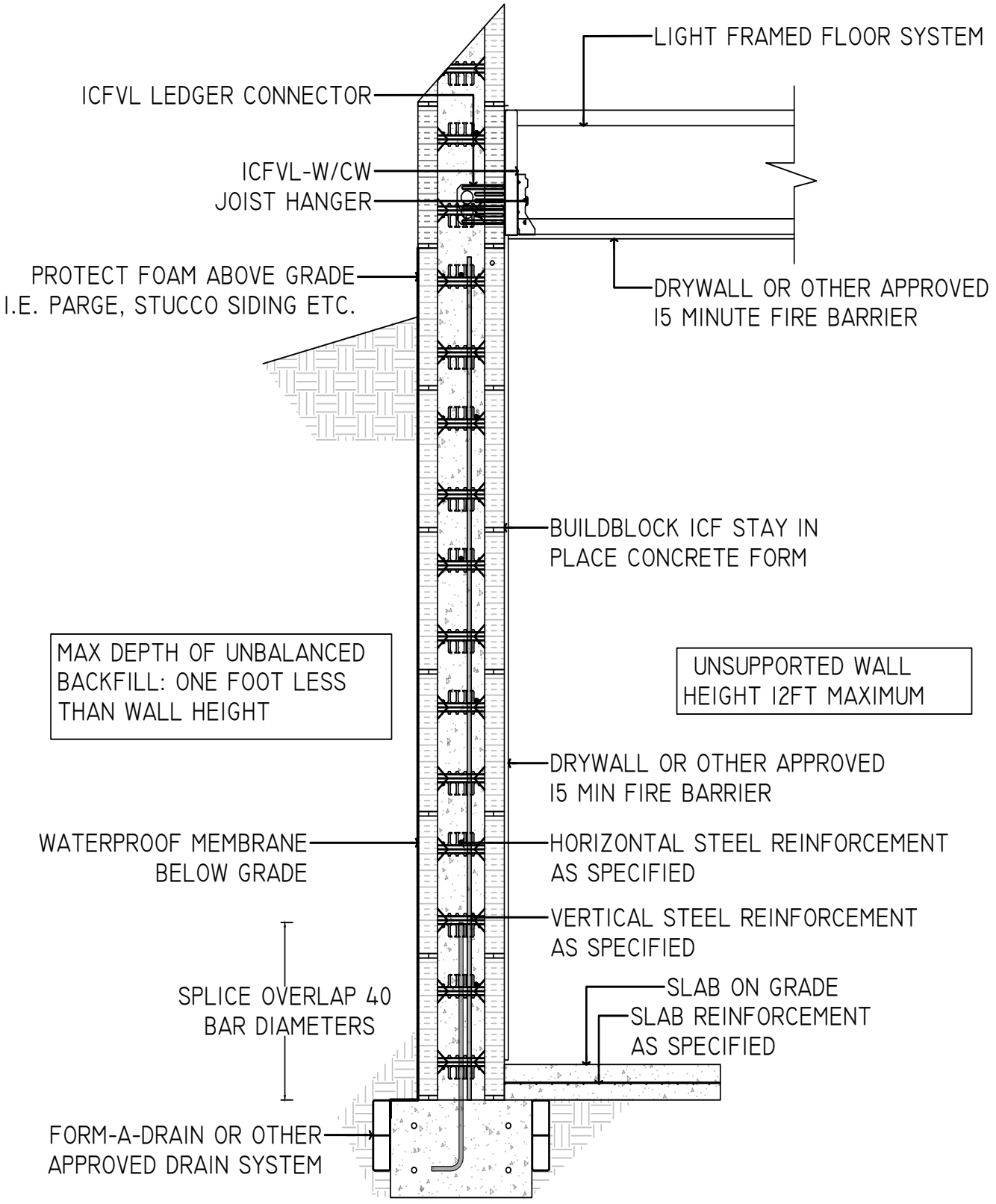
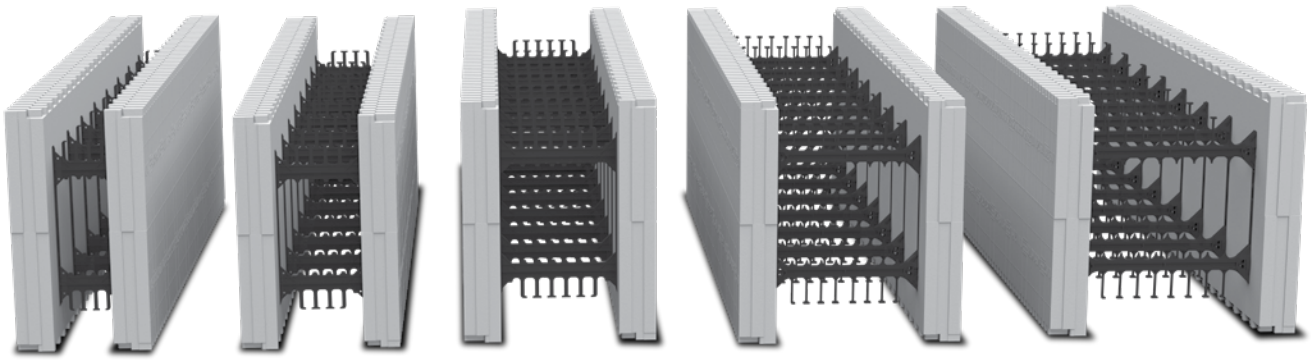


FIGURE 5.4B TYPICAL BELOW GRADE BUILDBLOCK WALL SECTION CUT THROUGH FLAT WALL OR VERTICAL CORE OF SCREEN GRID WALL. SUPPORTING CONCRETE WALL

[Flat Wall]

A solid concrete wall of uniform thickness. Refers to BuildBlock and BuildLock ICF Forms.



TYPICAL BELOW GRADE BUILDBLOCK FLAT WALL REINFORCEMENT FOR BUILDBLOCK AND BUILDLOCK KNOCKDOWN ICFS

TYPICAL BUILDBLOCK AND BUILDLOCK KNOCKDOWN ICF FLAT WALL

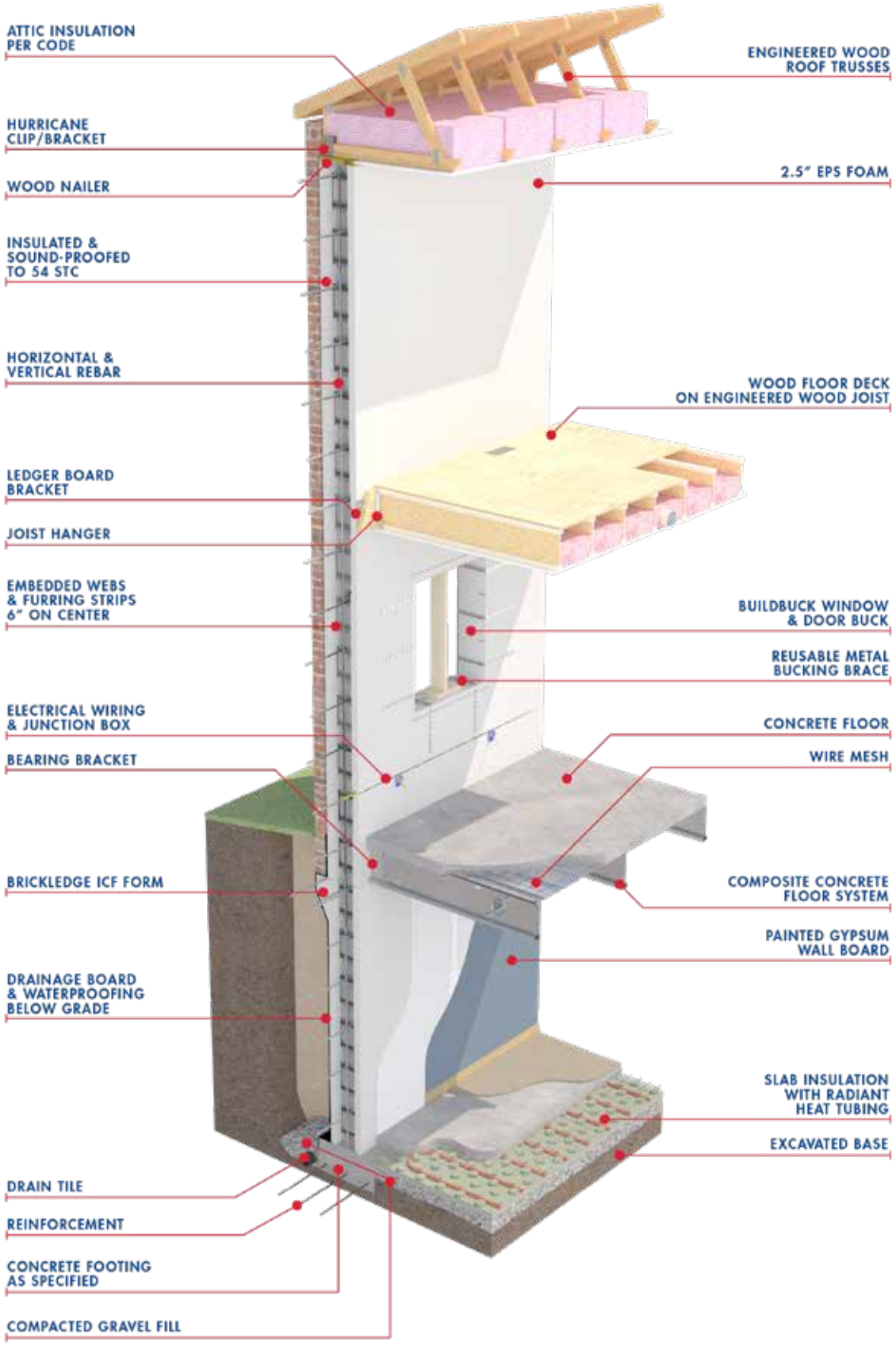


TABLE 5A VERTICAL REBAR SPACING (INCHES)*
BUILDBLOCK FLAT PANEL BASEMENT WALLS

Equivalent Fluid Density (pcf)	Max. Wall Height (ft.) Per Floor	Vertical Rebar Spacing (inches)*															
		Buildblock Flat Panel Wall thickness (inches)															
		6"				8"				10"				12"			
		#3	#4	#5	#6	#3	#4	#5	#6	#3	#4	#5	#6	#3	#4	#5	#6
30	8	6	18	30	42	6	24	36	48	24	30	48	48	24	48	48	48
	9	6	12	18	24	6	18	24	30	18	30	48	48	18	30	48	48
	10	6	6	12	24	6	18	24	30	12	24	30	42	12	24	30	42
	11		6	12	18	6	12	18	24	6	18	24	30	6	18	24	30
	12						6	12	18	6	12	18	24	6	18	24	30
	13														6	12	18
	14															12	18
45	8	6	12	18	24	6	18	24	36	12	24	36	48	18	30	42	48
	9		6	12	18	6	12	18	30	6	18	24	36	12	18	30	42
	10			6	12		6	12	18	6	12	18	24	6	12	24	30
	11				6			6	12		6	12	18	6	12	18	24
	12							6	6			6	12		6	12	18
	13															6	12
	14															6	12
60	8	6	6	12	18	6	12	24	30	6	18	30	36	12	24	36	48
	9		6	6	12	6	6	12	18	6	12	18	24	6	12	24	36
	10							6	12		6	12	18	6	12	18	24
	11								6			6	12		6	12	18
	12												6		6	6	12
	13																6
	14																

1. See notes regarding equivalent fluid density.
2. Refer to the design criteria limits in Table 1.1 and the Load Case diagrams for this table.
3. Vertical rebar is to be placed in the center of the form/wall.
4. The wall must be braced against sidesway at top of wall prior to pouring concrete and before soil backfilling.
5. Refer to Below-Grade Notes and Procedure (i.e.: no surcharge assumed)
6. Minimum horizontal reinforcing shall be 1 #4 bar in the top and bottom course, and #3 or #4@ 32" o.c. for remainder of wall.
7. Not less than two No. 5 bars shall be provided around all window and door openings. Such bars shall extend at least 24 in. beyond the corners of openings.
8. Chapter 14 of ACI318 for Plain concrete Basement walls only applicable to 8" & greater wall thickness
9. Per ACI 10.5.3: The requirements of 10.5.1 and 10.5.2 need not be applied if, at every section, As provided is at least one-third greater than that required by analysis.