

Product Information Bulletin

BULLETIN NO.	203
ISSUED:	February 25, 2008
REPLACES:	December 11, 2007

ICC-ES Evaluation Report ESR-1578

ICC Evaluation Service, Inc. (ICC-ES) is a national evaluation body in the United States that does technical evaluations of building products, components, methods, and materials for compliance with code.

The use of insulating concrete form (ICF) systems for constructing residential walls is recognized in the International Residential Code 2007. However, ICF construction is not specifically recognized in the International Building Code.

For this reason, an ICC-ES evaluation report provides a convenient means of demonstrating compliance with the intent of both the IRC and the IBC. Evaluation reports issued as a result of the ICC-ES evaluation process are made available to code officials, contractors, specifiers, architects, engineers, and anyone else with an interest in the building industry and construction.

Attached is a copy of ICC-ES Evaluation Report ESR-1578 for the Advantage ICF System updated as of December 2007. ESR-1578 provides evidence that the Advantage ICF System is a suitable alternative to methods of construction described in the codes noted below, subject to the conditions detailed in section 5.0 of the evaluation report.

- 2006 International Building Code®
- 2006 International Residential Code®
- The 1997 Uniform Building Code™

Refer to the attached report for additional detail.

ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

DIVISION: 03—CONCRETE
Section: 03130—Permanent Forms

REPORT HOLDER:

PLASTI-FAB, LTD.
270, 3015—5th AVENUE NE
CALGARY, ALBERTA T2A 6T8
CANADA
(888) 446-5377
www.plastifab.com

EVALUATION SUBJECT:

ADVANTAGE INSULATING CONCRETE FORMING (ICF) SYSTEM—STAY-IN-PLACE EPS FORMWORK FOR CONCRETE CONSTRUCTION

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)
- 1997 *Uniform Building Code*™ (UBC)

Properties evaluated:

- Structural
- Surface-burning characteristics
- Crawl space fire evaluation
- Fire resistance

2.0 USES

The Advantage Insulating Concrete Forming System is used as permanent formwork for reinforced concrete load-bearing and nonload-bearing exterior and interior walls; beams and lintels; and foundation and retaining walls. The forms are limited to buildings of combustible construction. The forms remain in place after placement and curing of concrete and must be protected by an approved interior and exterior finish material as described in Sections 4.2.2 and 4.2.3 of this report. The forms are limited to use in buildings of combustible Type V-B construction under the IBC, Type V construction under the UBC, and dwellings under the IRC.

3.0 DESCRIPTION

3.1 General:

The Advantage ICF System is a flat ICF system allowing for a solid concrete wall of uniform thickness. Advantage ICF System blocks consist of two expanded polystyrene (EPS) foam plastic boards separated by polypropylene cross-ties

molded into the EPS boards. The EPS boards are 2⁵/₈ inches (66.7 mm) thick. See Figure 1 for an illustration of the forms.

3.2 Materials:

3.2.1 Foam Plastic: The Advantage ICF System EPS foam plastic boards have a nominal density 1.4 pcf (22.4 kg/m³), and a maximum flame-spread index of 25 and a maximum smoke-developed index of 450 when tested in accordance with ASTM E 84 (UBC Standard 8-1). The foam plastic insulation complies as a Type II rigid cellular polystyrene in accordance with ASTM C 578.

3.2.2 Concrete: The concrete must be normal-weight concrete, complying with the applicable code, with a maximum 3/4-inch (19 mm) aggregate size. Concrete must have a minimum compressive strength of 2500 psi (17.24 MPa) at 28 days. If construction of the ICF wall system is based on the IRC, the concrete must comply with Sections R404.4.5 and R611.6.1.

3.2.3 Cross-ties: The polypropylene cross-ties, spaced 8 inches (203 mm) on center for 6-inch-wide (152 mm) walls, and at 6 inches (152 mm) on center for 8-inch-wide (203 mm) walls, have openings to permit concrete to pass through, and have slots to support horizontal steel reinforcing bars. The cross-ties have flanges (fastening strips) located 1/4 inch (6.4 mm) below the EPS surface that are used for attaching interior and exterior wall coverings. The flanges are 1⁵/₈ inches wide (41.2 mm) by 3/16 inch (4.8 mm) thick.

3.2.4 Reinforcement: Deformed steel reinforcement bars must have a minimum yield stress of either 40 ksi (275 kPa) or 60 ksi (413 MPa), depending on the structural design, and must comply with Section 1903 of either the UBC or the IBC. If construction of the Advantage ICF System is based on the IRC, reinforcement must comply with Sections R404.4.6 and R611.6.2 of the IRC.

3.2.5 Other Components: When required by the code official, wood members in contact with concrete for plates or windows and door framing, must be preservative-treated in accordance with the applicable code, and must be attached with hot-dipped galvanized steel fasteners complying with IBC Section 2304.9.5, IRC Section R319.3 or UBC Section 2304.3, as applicable. Materials other than wood, such as vinyl, are permitted for window and door framing if approved by the code official.

3.2.6 Standard and Accessory Forms: Four Advantage ICF System blocks are recognized: the standard block, half (top/bottom) block, 90-degree corner block, and 45-degree corner block. Two forms are recognized for solid concrete walls having a thickness of 6 inches (152 mm) or 8 inches (203 mm). The standard block is 48 inches (1219 mm) long, 16¹/₂ inches (419 mm) high, and 11¹/₄ inches (286 mm) wide for 6-inch (152 mm) walls, and 48 inches (1219 mm) long,

*Corrected December 2007

ES REPORTS™ are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, Inc., express or implied, as to any finding or other matter in this report, or as to any product covered by the report.



16½ inches (419 mm) high and 13¼ inches (337 mm) wide for 8-inch (203 mm) walls. Refer to Figure 1 for details.

4.0 DESIGN AND INSTALLATION

4.1 DESIGN:

4.1.1 IBC or UBC Method: Structural analysis and design of the concrete must be prepared in accordance with Chapter 19 of the IBC or UBC and ACI 318, assuming a monolithic concrete wall of uniform thickness. Design loads must comply with Chapter 16 of the IBC or UBC.

Design calculations and details for specific applications must be furnished to the code official to verify compliance with this report and the applicable code.

4.1.2 Alternate UBC Design Method: In lieu of calculations required by Section 4.1.1 of this report, the structural design of reinforced concrete formed by the Advantage ICF wall system for residential construction is permitted to comply with the *Prescriptive Method for Insulating Concrete Forms in Residential Construction* (publication No. EB118), dated May 1998, published by the Portland Cement Association (PCA), subject to all applicability and use limits for a flat ICF wall system specified in Table 1.1 of that document. The PCA document must be made available to the building official upon request. Buildings constructed with the Advantage ICF wall system and designed in accordance with this section (Section 4.1.2) must not exceed a height of two stories plus a basement, where the maximum unsupported wall height is 10 feet (3048 mm).

4.1.3 IRC Method: Insulating concrete walls constructed with the Advantage ICF wall system must be designed and constructed in accordance with Sections R404.4 and R611 of the IRC.

When the flat ICF forms are installed on buildings that do not conform to the applicability limits of Sections R404.4.1 and R611.2 of the IRC, the structural analysis and design of the concrete must be prepared in accordance with ACI 318, and Chapter 19 of the IBC as applicable.

4.2 Installation:

4.2.1 General: The Advantage ICF wall system must be installed in accordance with the manufacturer's published installation instructions and this report. The manufacturer's instructions and this report must be strictly adhered to and a copy of these instructions must be available on the jobsite at all times during installation.

The Advantage ICF System must be supported on concrete footings complying with Chapter 18 of the IBC or UBC, or Chapter 4 of the IRC, as applicable. Vertical rebars, embedded in the footing, must extend into the base of the wall system the minimum development length necessary for compliance with Chapter 12 of ACI 318-05 (IBC and IRC) or UBC Section 1912 as applicable.

Advantage ICF System units must be stacked in a running bond pattern, such that the polypropylene cross-ties align vertically, enabling the modified tongue-and-groove joints on the top and bottom surfaces of the Advantage blocks to be connected together. Vertical and horizontal reinforcement bars must be placed as required by the design, the approved plans and the applicable code. All horizontal and vertical reinforcement bars must have minimum concrete cover in accordance with the IBC or UBC, as applicable. Concrete quality, mixing, placing and curing must comply with Chapter 19 of the IBC or UBC, or IRC Section R611.6, as applicable.

Wood ledgers, when used, must be attached to the concrete wall by removal of the face shell of the form units, with the height of the removed portion equal to the depth of the wood ledger. Alternatively, subject to acceptance by the

designer and approval by the code official, wood ledgers are permitted to be attached by the cutting of 3-inch-square (76.2 mm) holes into the side of the foam block, before placement of concrete. Code-complying anchor bolts used to connect the wood ledgers or plates to the concrete must be cast-in-place, with the bolts sized and spaced as required by design or code requirements, whichever governs. The spacing, edge distance, and embedment depth of anchor bolts must comply with the design or code requirement, whichever governs. A dam must be used to center the anchor-bolts in the hole and hold them in place during the concrete pour. When concrete is poured into the wall system, the concrete-filled holes that are provided for the J-bolts form a solid-concrete connection from the ledger board to the concrete wall. Refer to Figures 2 and 3 for typical details.

4.2.2 Interior Finish: Advantage ICF system blocks must be finished on the interior with an approved 15-minute thermal barrier, such as minimum ½-inch-thick (12.7 mm) regular gypsum wallboard complying with ASTM C 36. The gypsum wallboard must be installed either vertically or horizontally, and must be attached to the polypropylene cross-tie fastener strips with minimum 0.136-inch-diameter-by-1½-inch-long (3.5 mm by 41.3 mm), Type S, fine-thread gypsum wallboard screws spaced 12 inches (305 mm) on center vertically and a maximum of 16 inches (406 mm) on center horizontally in the field. Gypsum wallboard joints and screw heads must be taped and filled with joint compound.

4.2.3 Exterior Finish:

4.2.3.1 Above Grade: The Advantage ICF wall system must be covered on the exterior with an approved wall covering in accordance with the applicable code or a current evaluation report. When regulated by the IRC, the walls must be flashed in accordance with IRC Section R703.8.

The exterior wall covering must be designed and installed in accordance with the applicable code or a current evaluation report. When the wall covering is required to be attached to structural members, the wall covering must be attached to the flanges of the polypropylene cross-ties with either No. 6, Type W, coarse-thread drywall screws or No. 6, Type S, fine-thread drywall screws. The screws must be corrosion-resistant and have sufficient length to protrude through the flanges a minimum of ¼ inch (6.4 mm). The screws have an allowable pullout capacity of 40 pounds (178 N), and an allowable lateral load capacity of 77 pounds (343 N). The maximum spacing of the screws must be designed to support the gravity loads of the wall covering and to resist the negative wind pressures. Negative wind pressure capacity of the exterior finish material must be the same as that recognized in the applicable code for generic materials or in a current evaluation report for proprietary materials.

4.2.3.2 Below Grade: Wall surfaces must be dampproofed and, when required by the code official, waterproofed in accordance with Section 1807 of the IBC, Section R404.4.11 of the IRC, or Appendix Chapter 18 of the UBC, as applicable. Dampproofing and waterproofing materials must be approved by Plasti-Fab, Ltd., and the code official, and must be free of solvents that will adversely affect the EPS foam panels.

4.2.4 Foundation Walls: The Advantage ICF System may be used as a foundation stem wall when supporting wood-framed construction and when the structure is supported on concrete footings complying with the applicable code. Compliance with UBC Table 18-I-C is mandatory in jurisdictions adopting the UBC. When regulation is by the IBC or IRC, design and installation of the Advantage ICF System as foundation walls must comply with IBC Section 1805.5 and IRC Section R404.4.

4.2.5 Retaining Walls: The wall system may be used as a retaining wall when reinforcement is designed in accordance

with accepted engineering principles and Section 4.1.1 of this report.

4.2.6 Crawl Spaces: The Advantage ICF System located in underfloor crawl spaces may be exposed to the crawl space with no covering applied to the crawl space side of the foam plastic, provided all the following conditions are met:

1. Entry to the crawl space is only to service utilities, and heat-producing appliances are not permitted.
2. There are no interconnected basement areas.
3. Air in the crawl space is not circulated to other parts of the building.
4. Underfloor ventilation complies with the applicable code.

4.2.7 Protection Against Termites: Where the probability of termite infection is defined as "very heavy" by the code official, the foam plastic must be installed in accordance with IBC Section 2603.8 or IRC Section R320.5 as applicable. Areas of very heavy termite infection must be determined in accordance with IBC Figure 2603.8 or IRC Figure R301.2(6) as applicable.

4.3 Fire-resistive Construction (UBC Only):

Concrete walls constructed with the Advantage ICF System may be used in nonload-bearing, one-, two-, and three-hour-rated, fire-resistance-rated construction. Concrete wall thickness must comply with Item 7.1.1 of UBC Table 7-B.

4.4 Special Inspection:

4.4.1 IBC: Special inspection is required in accordance with IBC Section 1704 for placement of reinforcing steel and concrete, and for concrete cylinder testing. Special inspection in accordance with IBC Sections 1704.1 and 1704.12 is required when an EIFS wall covering is applied. Duties of the special inspector include verifying field preparation of materials, expiration dates, installation of components, curing of components, and installation of joints and sealants.

4.4.2 IRC: For walls designed in accordance with Section 4.4.1, special inspection is not required.

4.4.3 UBC: Special inspection is required in accordance with UBC Section 1701 for placement of reinforcing steel and concrete, and for concrete cylinder testing. When approved by the code official, special inspection may be waived when all the following conditions are met:

1. Walls are a maximum of 8 feet (2.4 m) high, and are limited to use in single-story construction of Group R, Division 3, or Group U, Division 1, Occupancies.
2. Maximum height of a concrete pour is 48 inches (1219 mm). Succeeding lifts must be placed in accordance with UBC Section 1905.10.5.
3. Installation is by installers acceptable to Plasti-Fab Ltd.
4. Design of the wall uses half the allowable stresses or loads permitted by the UBC.
5. Installation instructions indicate methods used to verify proper placement of concrete.

5.0 CONDITIONS OF USE

The Advantage Insulating Concrete Forming (ICF) System described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

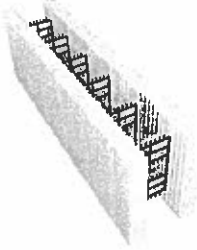
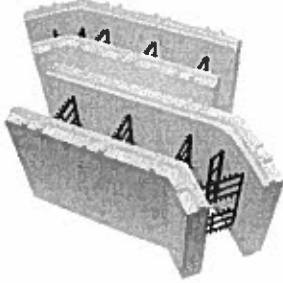
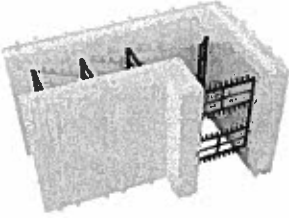
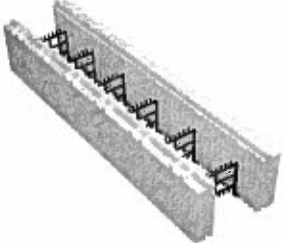
- 5.1 The ICF units must be manufactured, identified and installed in accordance with this report and the manufacturer's installation instructions. If there is a conflict between the manufacturer's instructions and this report, this report must govern.
- 5.2 Walls constructed with the Advantage ICF System must be limited to Type VB construction under the IBC, Type V construction under the UBC and dwellings under the IRC.
- 5.3 When required by the code official, calculations showing compliance with the general design requirements of Chapter 16 of the IBC or UBC must be submitted to the code official for approval, except calculations are not required when the building design is based on Section 4.1.2 or Section 4.1.3 of this evaluation report. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4 The foam plastic insulation must be separated from the building interior with an approved 15-minute thermal barrier, such as minimum 1/2-inch-thick (12.7 mm) regular gypsum wallboard installed as specified in this report, except as described in Section 4.2.6. Other thermal barriers are acceptable, provided they are recognized in a current evaluation report.
- 5.5 Special inspection must be provided in accordance with Section 4.4 of this report.
- 5.6 Concrete quality, mixing and placement must comply with IBC Section 1905, IRC Section R611.61 or UBC Section 1905 as applicable.
- 5.7 As described in Section 4.2.7 of this report, protection from termites must be provided as required by IBC Section 2603.8 or IRC Section R320.5, as applicable.
- 5.8 Advantage ICF system units are manufactured by Plasti-Fab, Ltd., at their facilities located in Crossfield, Alberta, Canada, or Kitchener, Ontario, Canada; and are produced under a quality control program with inspections conducted by Intertek Testing Services NA Ltd.—Warnock Hersey (AA-688).

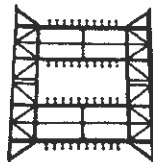
6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the applicable sections of the ICC-ES Acceptance Criteria for Concrete Floor, Roof and Wall Systems and Concrete Masonry Wall Systems (AC15), dated June 2007.
- 6.2 Data in accordance with the applicable sections of the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated February 2007; including reports of testing performed in accordance with ASTM C 578 showing compliance with the requirements for flexural strength, compressive strength, and density testing.

7.0 IDENTIFICATION

Each package of forms must bear a label that includes the name or trademark of the report holder (Plasti-Fab, Ltd.); the evaluation report number (ESR-1578); and the name or logo of the inspection agency (Intertek Testing Services NA Ltd.).

Advantage ICF Block Type	Advantage Block Dimensions			Concrete Wall thickness	
	Height	Width	Length		
	Standard Block				
	16 1/2"	11 1/4"	48"		6"
	16 1/2"	13 1/4"	48"		8"
	45° Corner Block				
	16 1/2"	11 1/4"	25 3/8" x 9 1/2"		6"
	16 1/2"	13 1/4"	21 1/4" x 9 1/4"		8"
	90° Corner Block				
	16 1/2"	11 1/4"	32" x 16"		6"
	16 1/2"	13 1/4"	29" x 17"		8"
	Half Block				
	7 1/2"	11 1/4"	48"		6"
	7 1/2"	13 1/4"	48"		8"



Advantage ICF System
Web Connector

FIGURE 1—ADVANTAGE ICF SYSTEM

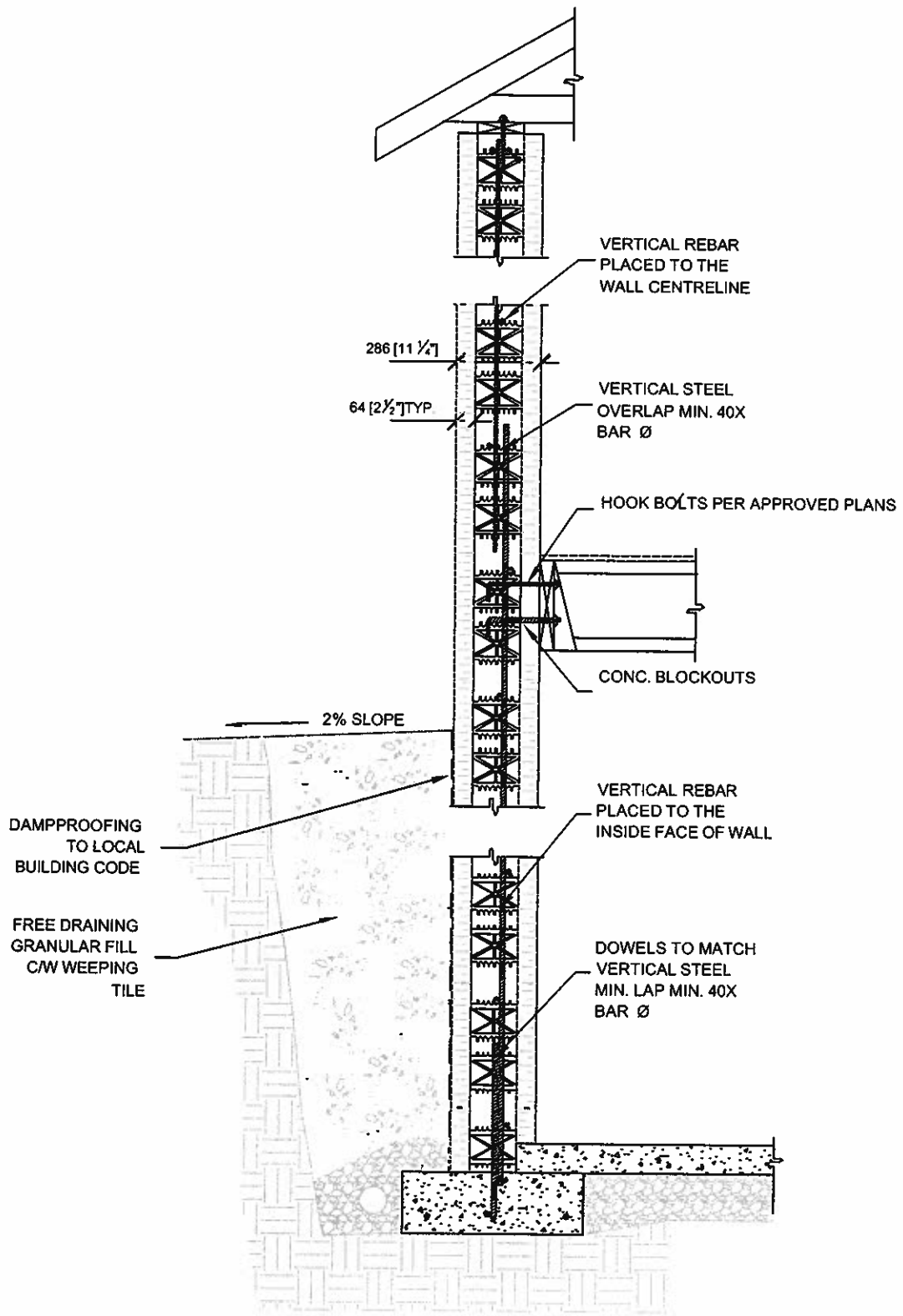


FIGURE 2—TYPICAL WALL SECTION, ADVANTAGE ICF SYSTEM, FOUNDATION AND ABOVE GRADE

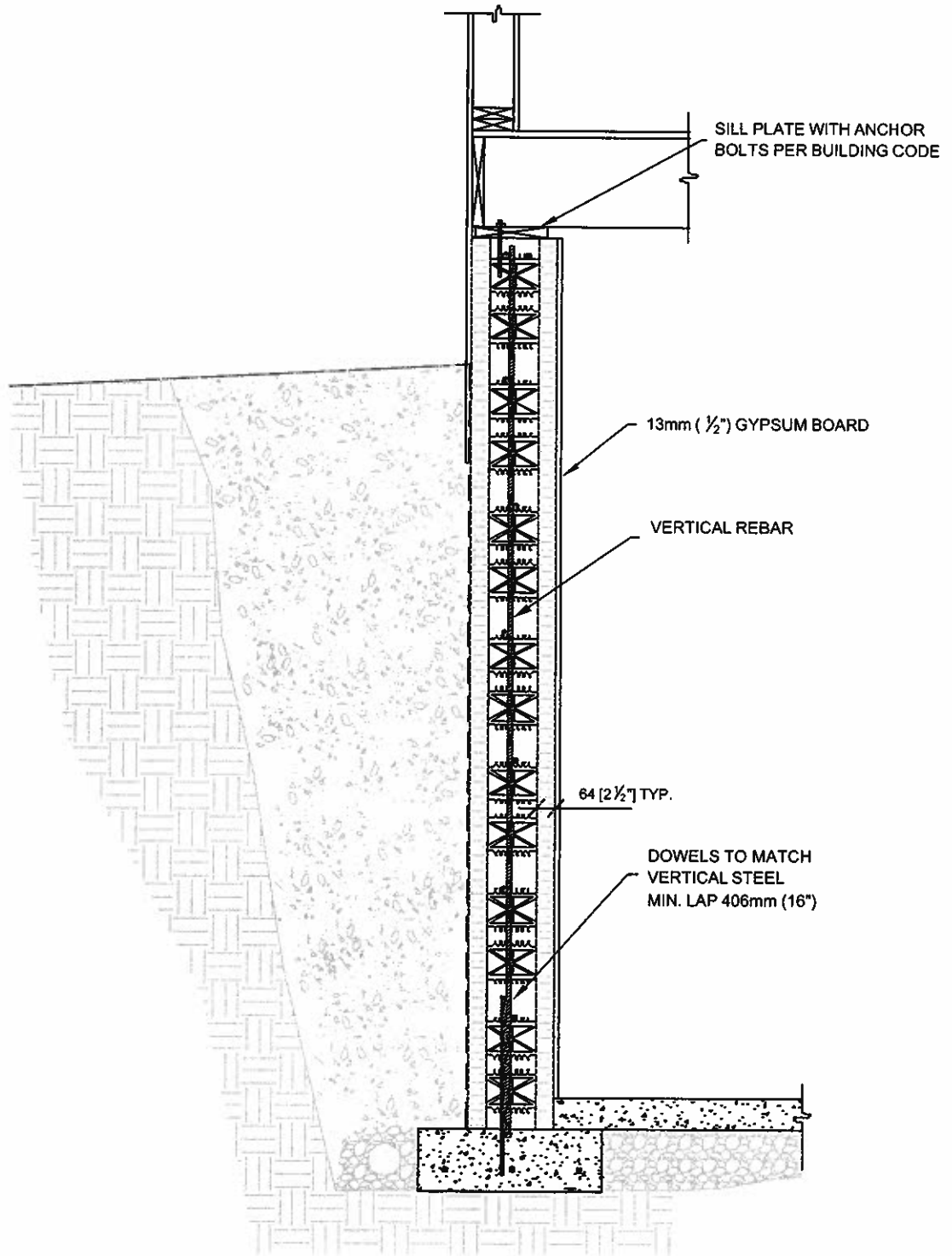


FIGURE 3—TYPICAL WALL SECTION, ADVANTAGE ICF SYSTEM, FOUNDATION AND WOOD STUD ABOVE GRADE