



ICC-ES Equivalency Evaluation Report (IRC) EER-3949

Issued July 2023

This report is subject to renewal July 2024.

CSI: DIVISION: 03 00 00—CONCRETE
Section: 03 31 00—Structural Concrete

Use of the Equivalency Evaluation Report:

The use of the ICC-ES equivalency evaluation report (IRC) applies to the construction of single-family houses, two-family houses (duplexes) and buildings consisting of three or more townhouse units, limited to three stories above grade plane, in accordance with the *International Residential Code*®. The ICC-ES equivalency evaluation report (IRC) evaluates designs of schematic plans, details and tables, of building products described in an ICC-ES evaluation report, to meet the prescriptive requirements of the *International Residential Code*®.

Report Holder: HELIX® STEEL

Equivalency Evaluation Subject:

Plain Concrete Walls and Concrete Foundations with HELIX® Micro Rebar as Reinforcement

Referenced ICC-ES Evaluation Report:

ESR-3949: HELIX® 5-25 MICRO REBAR™ & HELIX® 5-25U MICRO REBAR™ REINFORCEMENTS

Product Description: Helix® Micro Rebar™ reinforcements are made from minimum 240 ksi (1650 MPa), 0.020 in +/-0.007 in (0.51 mm +/- 0.02 mm) cold drawn steel wire. Each Helix® Micro Rebar™ has a minimum of one 360-degree twist. Helix® Micro Rebar™ reinforcement is used in dosage as described in Figure 2 and Tables A and B. Helix® 5-25 is electroplated with zinc; whereas, Helix® 5-25U is uncoated.

Evaluated to the following IRC Sections:

- 2018 *International Residential Code*® (IRC)
Applicable Sections: R301.2.2.5, R403, R404 and R608

Findings of Schematic Plans, Details and Tables:

The schematic plans, details and tables are in conformance with the prescriptive requirements of the IRC based on the submitted design calculations and the referenced ICC-ES Evaluation Report. The schematic plans, details and tables were evaluated to the following design parameter:

Design Criteria:

- Maximum Plan Dimension: 60 feet (18,288 mm)
- Maximum Story Height: 10 feet (3,048 mm)
- Above Grade Concrete Wall Thicknesses: 6, 8 and 10 inches (152.4, 203.2 and 254 mm)
- Number of Stories Above Grade: 2
- Roof Slope: 12:12 (max)
- Risk Category: II
- Seismic Load: Seismic Design Categories A and B

Design Loads:

Wind Load:

- a) Maximum Design Wind Speed of 160 mph (72 m/s), Exposure B
- b) Maximum First Floor Wind Pressure : 63 psf (3.02 kN/m²)
- c) Maximum Second Floor Wind Pressure : 44 psf (2.11 kN/m²)

Dead Loads:

- a) Concrete Self-weight: 145 pcf (2323 kg/m³)
- b) Floor/Ceiling Dead Load: 10 psf (0.48 kN/m²)
- c) Roof/Ceiling Dead Load: 15 psf (0.72 kN/m²)

Live Loads:

- a) Floor Live Load: 40 psf (1.92 kN/m²)
- b) Attic Live Load: 20 psf (0.96 kN/m²)

Snow Loads:

- a) Ground Snow Load: 50 psf (2.39 kN/m²)
- b) Flat Roof Snow Load: 42 psf (2.01 kN/m²)
- c) Sloped Roof Snow Load: 42 psf (2.01 kN/m²)

Earth Pressure Load:

Maximum Design Lateral Soil Load of 60 psf/ft per IRC Tables R404.1.2(3) and R404.1.2(4).

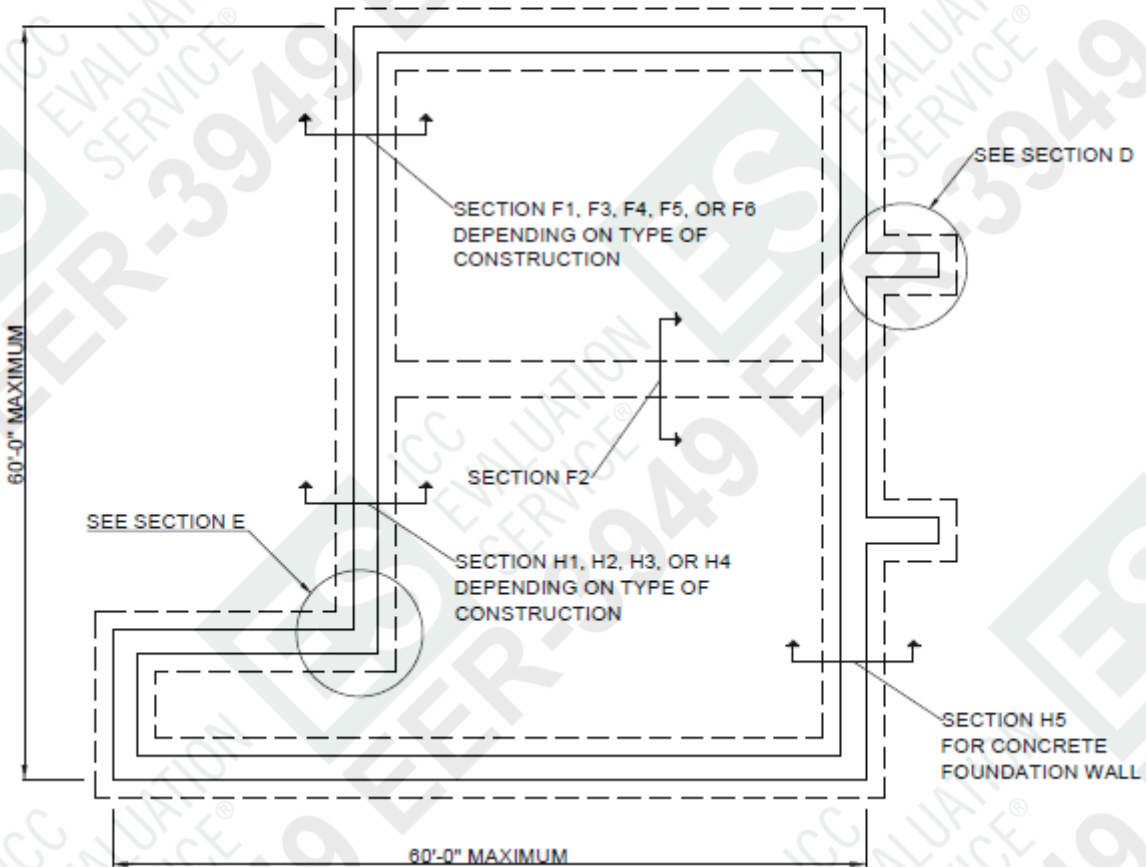
Identification:

1. The identification shall only be used on schematic plans, details and tables evaluated in this report and each page of the schematic plans, details and tables evaluated in this report shall be identified with watermark of the ICC-ES logo and the equivalency evaluation report (IRC) number (EER-3949).
2. The report holder's contact information is the following:

HELIX® STEEL
2300 WASHTENAW AVENUE, SUITE 201
ANN ARBOR, MICHIGAN 48104
(734) 322-2114
www.helixsteel.com

Conditions of Use:

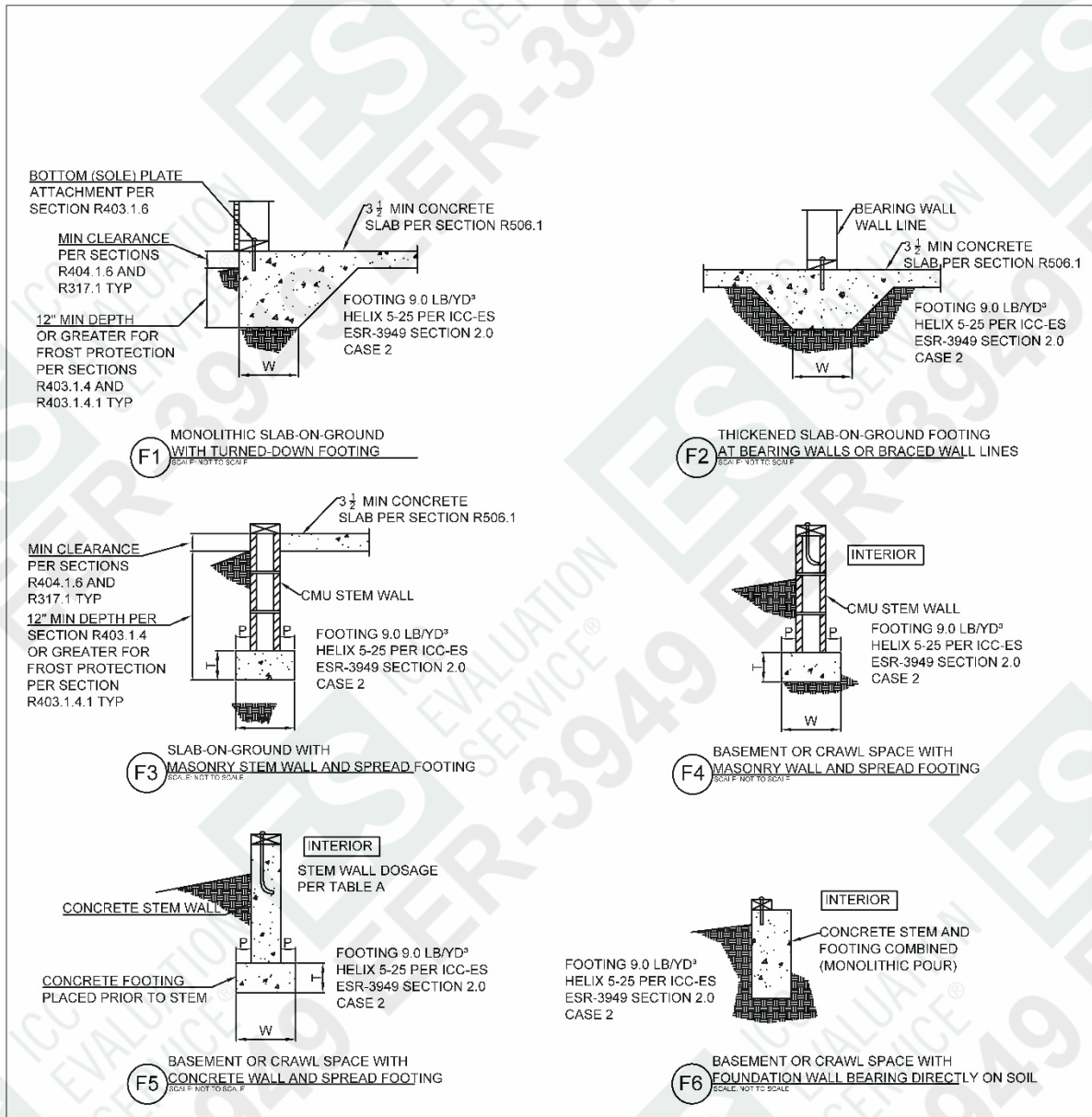
1. The ICC-ES equivalency evaluation report (IRC) addresses only conformance with the IRC sections noted above.
2. The end use application of the schematic plans, details and tables in this report must be submitted to the code official for approval.
3. The exemptions for requirement to stamp the schematic plans, details and tables by a registered design professional must comply with the state license laws in which the project is to be constructed.
4. This report applies only to the design parameters submitted for review by ICC-ES.
5. The design shall comply with the applicability limits noted in IRC Section R608.2.
6. Reinforcement around wall openings must be provided in accordance with Sections R404.1.3.3.7.3 and R608.8, in below and above grade walls, as applicable.
7. Evaluation for compliance with IRC Table R608.6(4) is outside the scope of this report.



TYPICAL CONCRETE FOUNDATION AND ABOVE GRADE WALL PLAN

<p>HELIX</p> <p>HELIX STEEL 2300 Washtenaw Avenue, Suite 201 Ann Arbor, MI 48104</p>	Drawn	JK	Date	01.23.23	Potential No.	8480
	Checked	JL			Drawing No.	8480-8
					Sheet	1 of 1

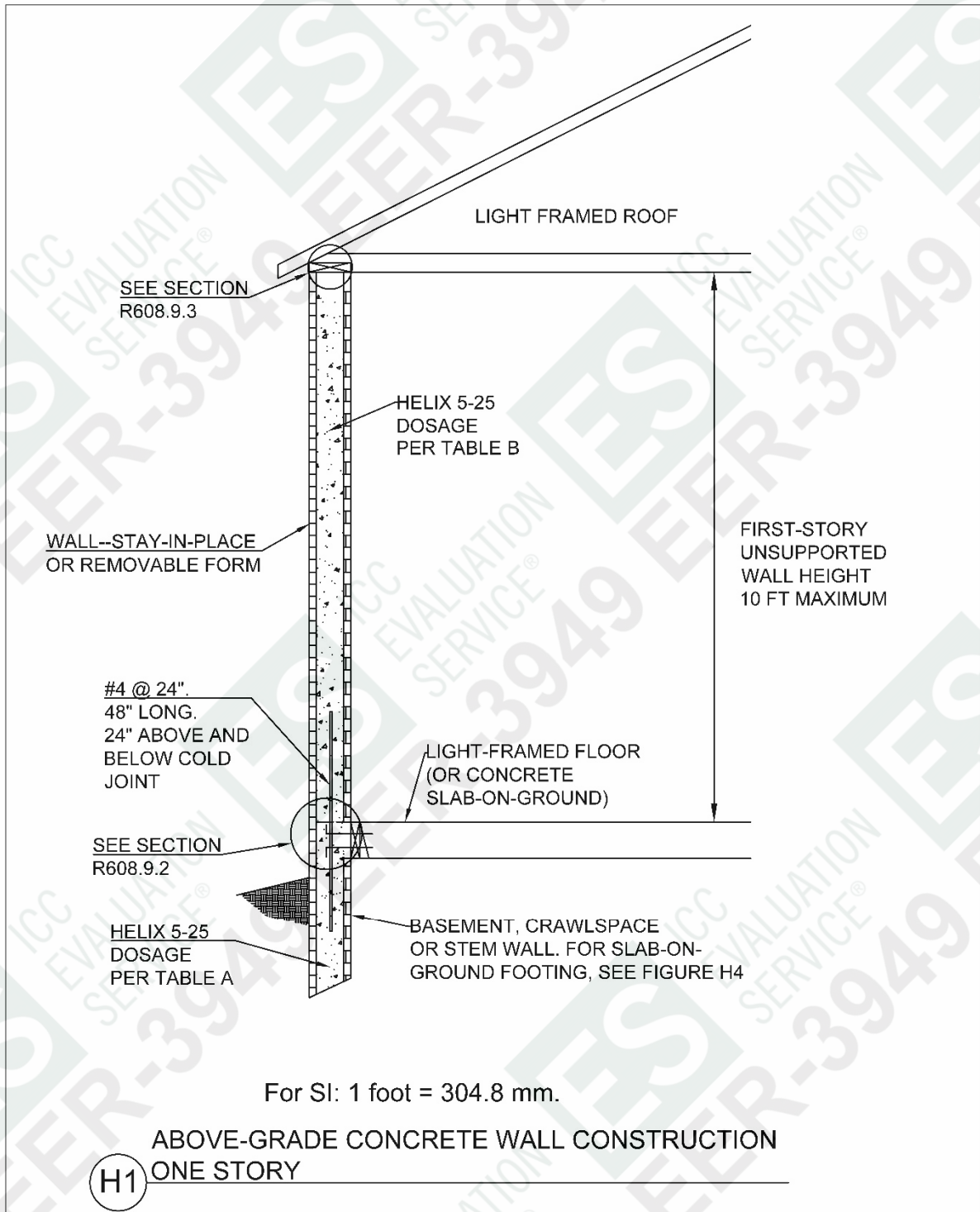
FIGURE 1: PLAN DIAGRAM



For Sl: 1 inch = 25.4 mm. W = Width of footing, T = Thickness of footing, and P = Projection per Section R403.1.1

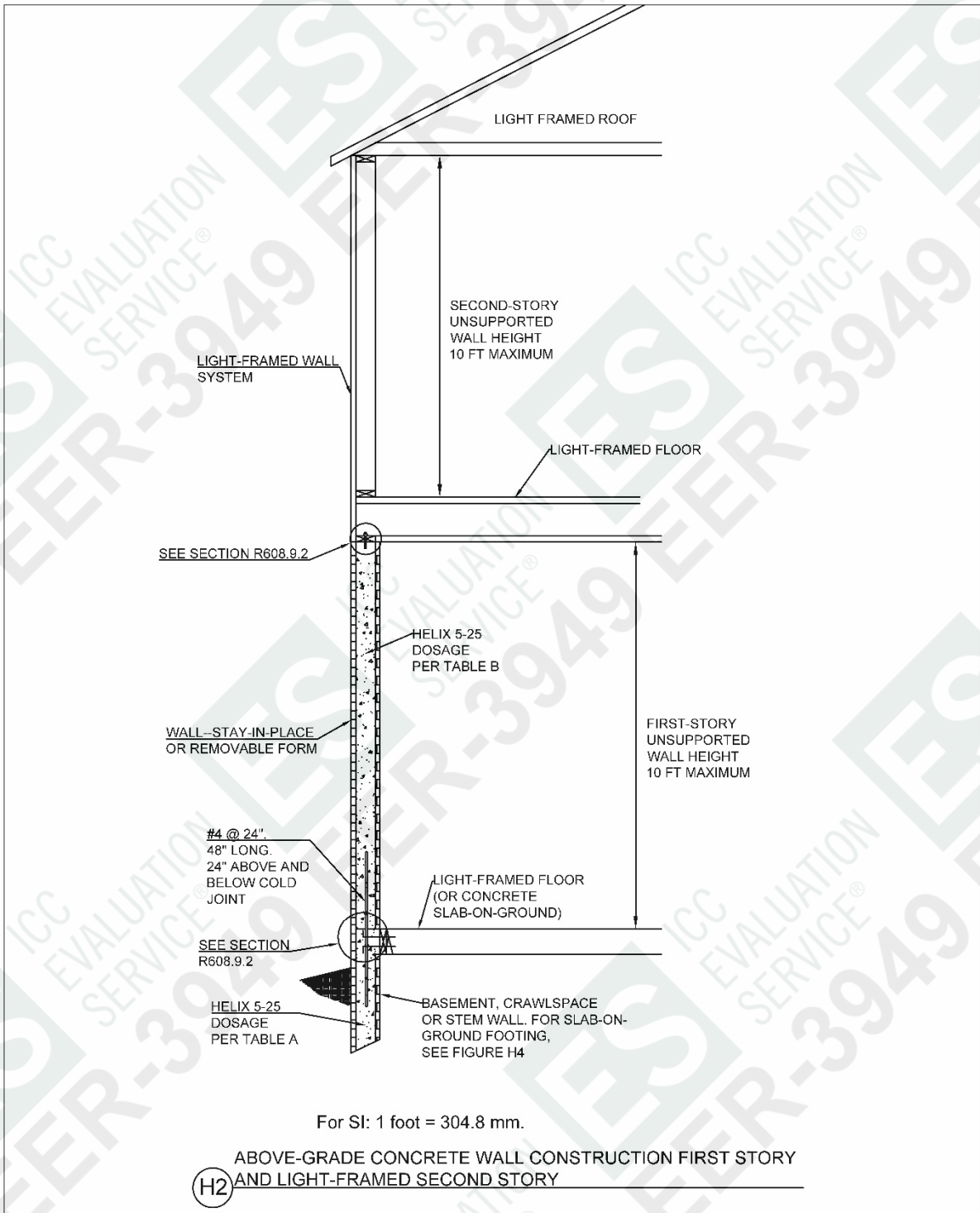
<h1>HELIX</h1> <p>HELIX STEEL 2300 Washtenaw Avenue, Suite 201 Ann Arbor, MI 48104</p>	Drawn <u>JK</u>	Date 05.25.2022	Potential No. 8480
	Checked <u>JL</u>	Drawing No. 8480 -1	
	Sheet 1 of 1		
	Date		

FIGURE 2: SECTION DETAILS



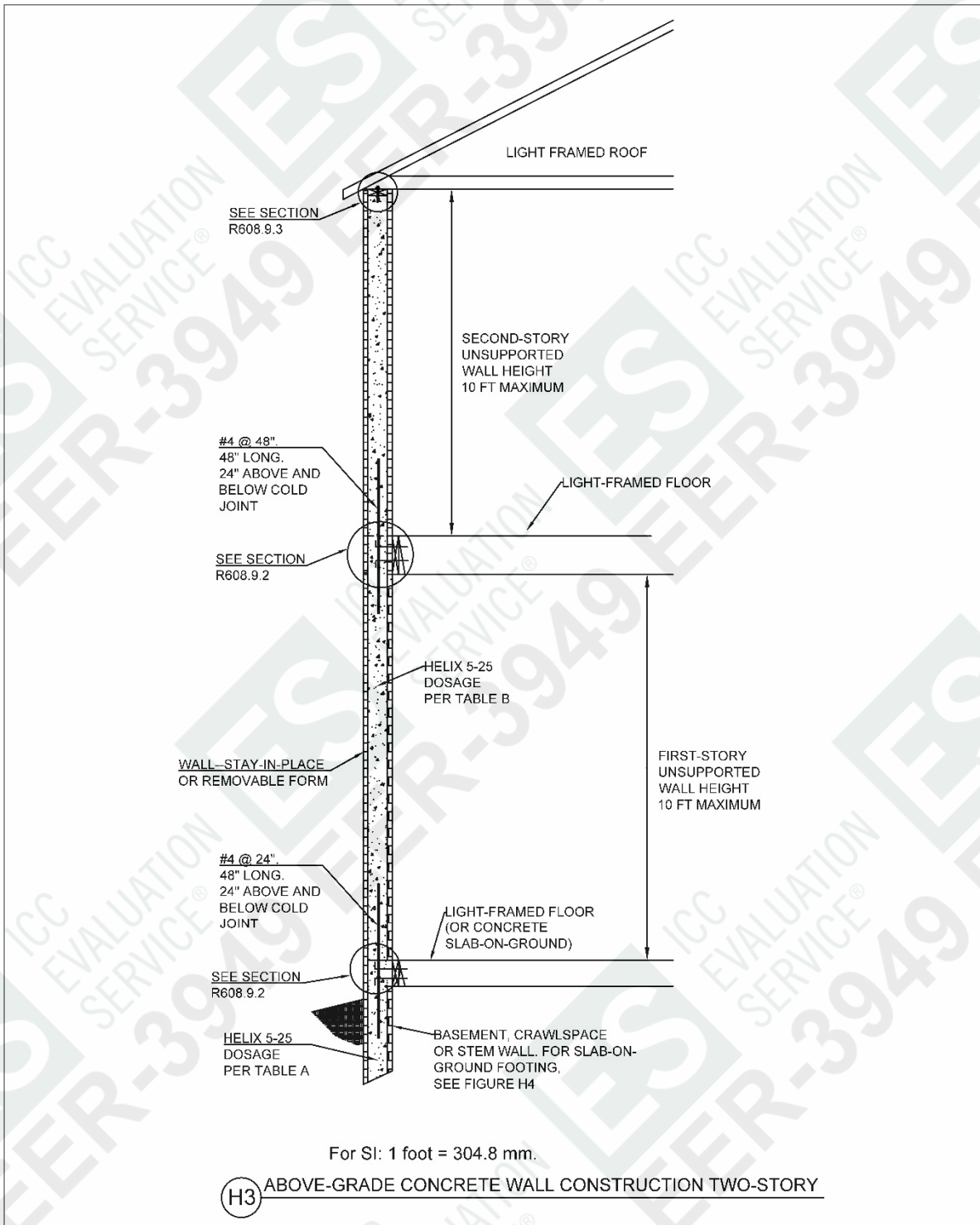
<p>HELIX</p> <p>HELIX STEEL 2300 Washtenaw Avenue, Suite 201 Ann Arbor, MI 48104</p>	<p>Drawn JK</p>	<p>Date 05.25.2022</p>	<p>Potential No. 8480</p>
	<p>Checked JL</p>	<p>Drawing No. 8480 -2</p>	
	<p>Sheet 1 of 1</p>		

FIGURE 2: SECTION DETAILS (Continued)



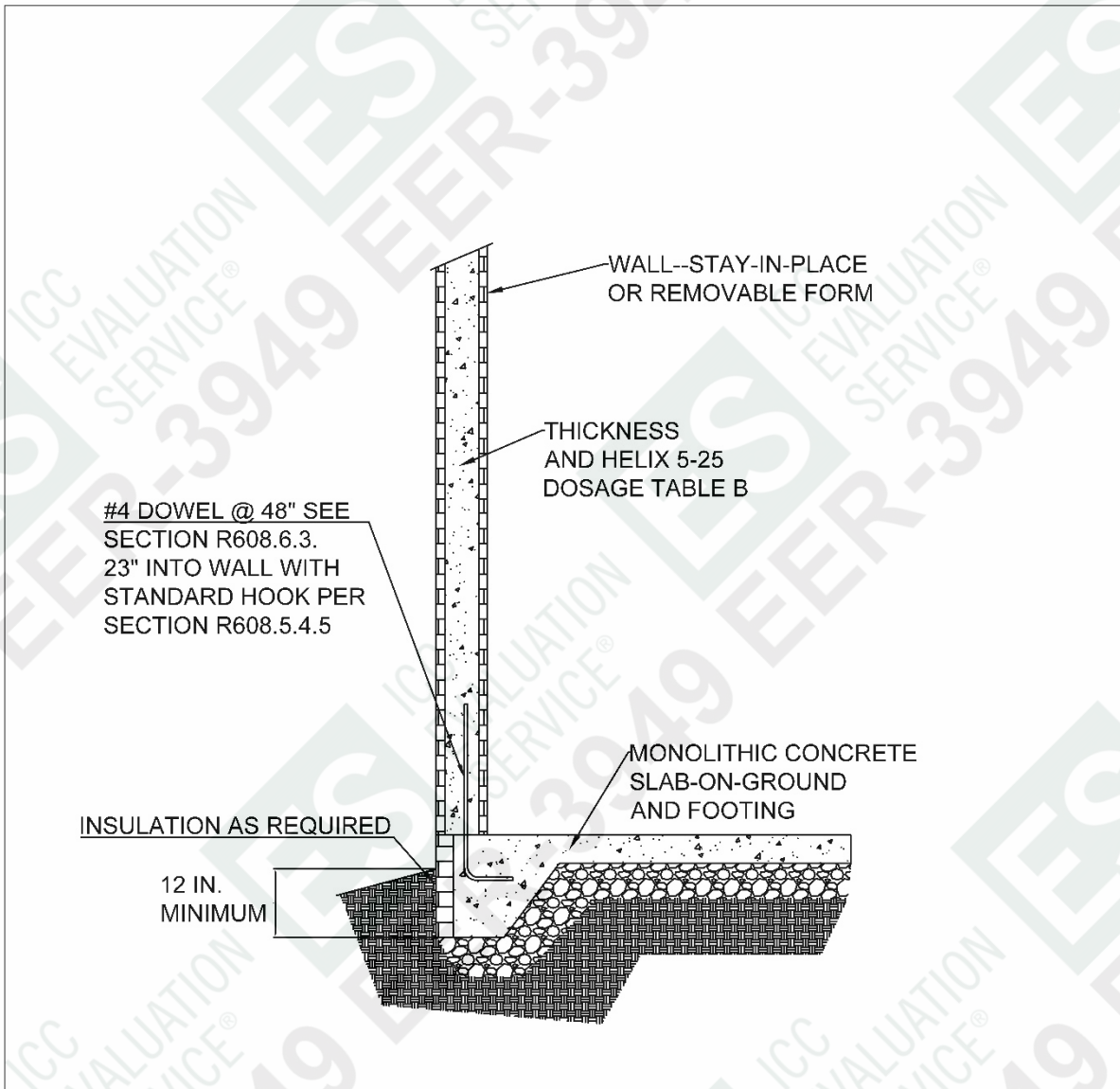
<p>HELIX</p> <p>HELIX STEEL 2300 Washtenaw Avenue, Suite 201 Ann Arbor, MI 48104</p>	Drawn <u>JK</u>	Date 05.25.2022	Potential No. 8480
	Checked <u>JL</u>	Drawing No. 8480 -3	
	Sheet 1 of 1		
	Date		

FIGURE 2: SECTION DETAILS (Continued)



<p>HELIX</p> <p>HELIX STEEL 2300 Washtenaw Avenue, Suite 201 Ann Arbor, MI 48104</p>	<p>Drawn JK</p>	<p>Date 05.25.2022</p>	<p>Potential No. 8480</p>
	<p>Checked JL</p>		<p>Drawing No. 8480-4</p>
			<p>Sheet 1 of 1</p>

FIGURE 2: SECTION DETAILS (Continued)



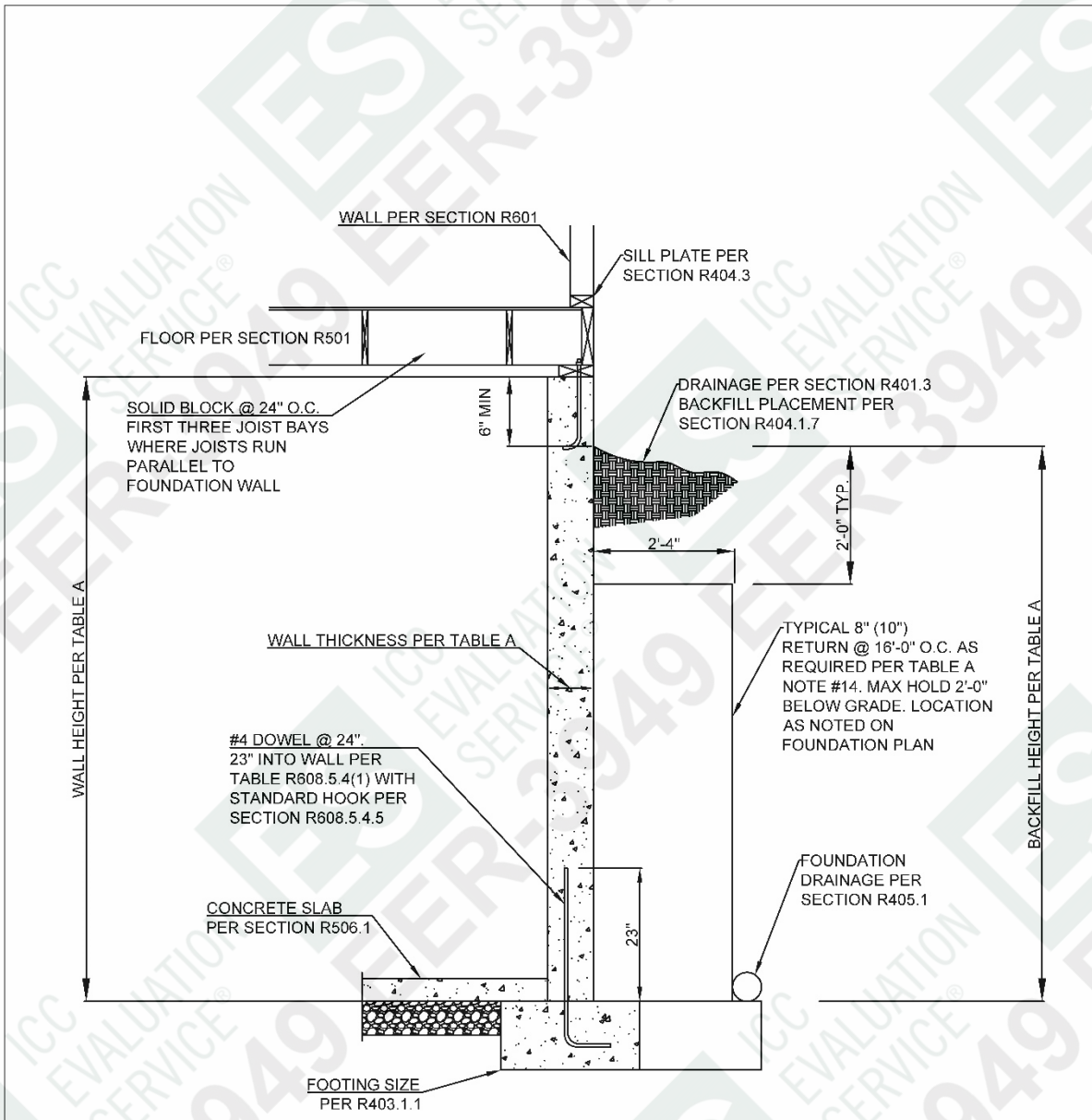
For SI: 1 inch = 25.4 mm.

ABOVE-GRADE CONCRETE WALL SUPPORTED
ON MONOLITHIC SLAB-ON-GROUND FOOTING

H4

<p>HELIX</p> <p>HELIX STEEL 2300 Washtenaw Avenue, Suite 201 Ann Arbor, MI 48104</p>	<p>Drawn JK</p>	<p>Date 05.25.2022</p>	<p>Potential No. 8480</p>
	<p>Checked JL</p>		<p>Drawing No. 8480 -5</p>
			<p>Sheet 1 of 1</p>

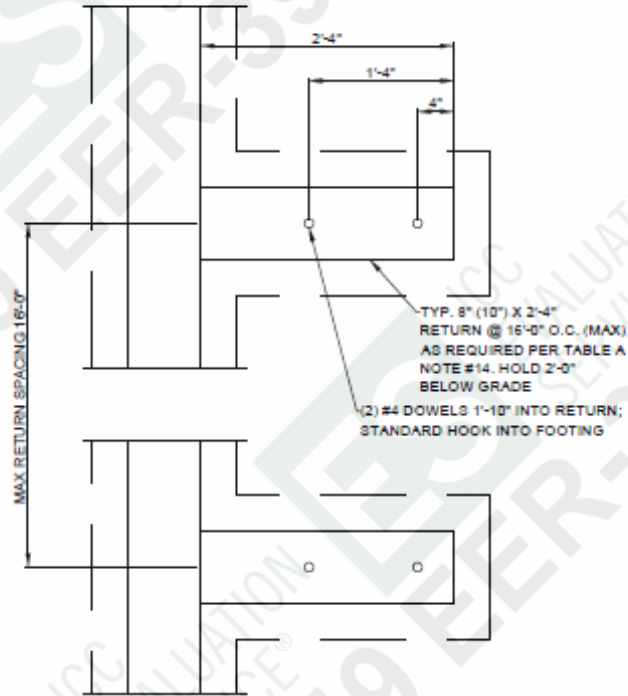
FIGURE 2: SECTION DETAILS (Continued)



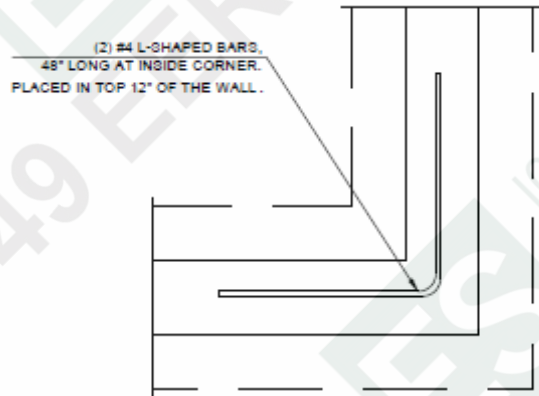
(H5) TYPICAL FOUNDATION WALL DETAIL

<p>HELIX</p> <p>HELIX STEEL 2300 Washtenaw Avenue, Suite 201 Ann Arbor, MI 48104</p>	<p>Drawn JK</p>	<p>Date 05.25.2022</p>	<p>Potential No. 8480</p>
	<p>Checked JL</p>		<p>Drawing No. 8480-6</p>
			<p>Sheet 1 of 1</p>

FIGURE 2: SECTION DETAILS (Continued)



D TYPICAL RETURN SECTION
N.T.S.



E ADDITIONAL INSIDE CORNER REINFORCEMENT
N.T.S.

HELIX
 HELIX STEEL
 2300 Washtenaw Avenue, Suite 201
 Ann Arbor, MI 48104

Drawn	JK	Date	01.30.23	Potential No.	8685
Checked	JL			Drawing No.	8685 -3
				Sheet	1 of 1

FIGURE 2: SECTION DETAILS (Continued)

Table A: Helix® 5-25 Micro Rebar™ for Concrete Foundation Walls 1, 2, 3, 4, 5, 9, 10, 11, 15

Wall Height (feet) ¹³	Backfill Height ⁶ (feet)	Helix 5-25 Dosage (lb/yd ³) ¹²			
		Soil classes ⁷ and design lateral soil load (psf per foot of depth)			
		GM, GC, SM, SM-SC and ML 45 psf/ft		SC, ML-CL and inorganic CL 60 psf/ft	
		Nominal ⁸ Wall Thickness (in)		Nominal ⁸ Wall Thickness (in)	
		8	10	8	10
6'	4'	9	9	9	9
	5'	9	9	9	9
7'	4'	9	9	9	9
	5'	9	9	9	9
	6'	9	9	9	9
8'	4'	9	9	9	9
	5'	9	9	9	9
	6'	9	9	9	9
	7'	9	9	13.5	9
9'	4'	9	9	9	9
	5'	9	9	9	9
	6'	9	9	9	9
	7'	9	9	13.5	9
	8'	13.5 †	9	13.5@f _c 4000 †	9

For SI: 1 inch = 25.4mm; 1 foot = 304.8mm; 1 psf/ft = 0.1571 kPa/m; 1 psi = 6.895 kPa; 1 lb/yd³ = 0.593 kg/m³

- Applies to both cast-in-place walls with removable forms and flat ICF walls. Design and installation of Helix® 5-25 Micro-Rebar™ reinforced concrete must be in accordance with ICC-ES, ESR-3949. Designs given in above table are Design "Type S", and walls must conform to all restrictions of ESR-3949.
- The same applicability limits of IRC R404.1.3 apply to this table.
- Minimum specified compressive strength is 3000 psi unless compressive strength, f_c is denoted on the table (in psi).
- Deflection criteria: L/240, where L is the height of the basement wall in inches. No soil surcharge allowed. Vertical bearing load is neglected and/or assumed to act at centerline of wall.
- Interpolation is not permitted.
- Backfill height is the difference in height between the exterior ground level and the top of the concrete footing that supports the foundation wall. The Helix designs assume a 4" thick slab above the top of footing. Walls must be laterally supported at top and bottom of wall before backfilling.
- Soil classes are in accordance with the Unified Soil Classification System. Refer to 2018 IRC Table R405.1.
- See 2018 IRC Table R608.3 for tolerance from nominal thickness permitted for flat walls.
- The table is limited to SDC A & B – an engineered design is required for higher seismic categories.
- Reinforcement around wall openings must be provided in accordance with IRC R404.1.3.3.7.3
- Dowels connecting footing to wall must be provided in accordance with IRC R404.1.3.3.7.8.
- The listed Helix® 5-25 dosage rate replaces minimum horizontal reinforcement as permitted by ESR 3949 Section 2.0.
- The unsupported wall height is the wall height minus the interior floor slab thickness, assumed to be 4" thick.
- † denotes an alternative dosage of 9 lb/yd³ with 3000 psi concrete may be used when returns. Returns shall be equal in thickness to the wall, extend minimum 2'-4" length perpendicular to the wall from the footing to 24" below grade.
- The table is limited to buildings with maximum aspect ratio (length to width) of 3.6.

Table B: Helix® 5-25 Micro Rebar™ Reinforcement for Above Grade Walls¹⁻¹²

Maximum Wind Speed (mph)			Maximum Unsupported Wall Height per Story (feet)	Helix Dosage (lb/yd ³) ⁸					
				Nominal ⁹ Wall Thickness (inches)					
Exposure Category				6		8		10	
B	C	D	Top ¹⁰	Side ¹⁰	Top ¹⁰	Side ¹⁰	Top ¹⁰	Side ¹⁰	
115	-	-	10	9	9	9	9	9	9
120	-	-	10	9	9	9	9	9	9
130	110	-	10	9	9	9	9	9	9
140	119	110	10	9	9	9	9	9	9
150	127	117	10	9	9	9	9	9	9
160	136	125	10	9	13.5	9	9	9	9

For Sl: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 mile per hour = 0.447 m/s; 1 pound per square inch = 1.895 kPa; 1 square foot = 0.0929 m²; 1 lb/yd³ = 0.593 kg/m³

- Applies to both cast-in-place walls with removable forms and flat ICF walls. Design and installation of Helix® 5-25 Micro-Rebar™ reinforced concrete must be in accordance with ICC-ES, ESR-3949. Designs given in above table are Design "Type S", and walls must conform to all restrictions of ESR-3949.
- Minimum specified compressive strength is 3000 psi
- Deflection criterion is L/240, where L is the unsupported height of the wall in inches.
- Interpolation is not permitted.
- Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet, topographic factor, K_z, equal to 1.0, and Risk Category II. Load conditions are outlined in IRC Chapter 3 and Chapter 6 (included are: 40 psf LL (Table R301.5), 10 psf DL (R608.2) and 32' floor span (R608.2)).
- Walls are subject to the requirements of R608.2 (applicability limits), R608.3.1 (Flat Walls) or R608.4 (Stay in Place Forms), R608.7 (Solid Walls for Resistance to Lateral Forces), R608.8 (Requirements for Lintel and Reinforcement around openings), R608.9 (Connections), and R608.10 (Diaphragms).
- Reinforcement shall be provided in accordance with R608.5.5 at construction joints and R608.6.3 to provide continuity between stories.
- The listed Helix 5-25 dosage rate is adequate to replace the minimum horizontal reinforcement required in R608.6.2.
- See 2018 IRC Table R608.3 for tolerance from nominal thickness permitted for flat walls.
- "Top" means gravity load from roof or floor construction bears on top of wall. "Side" means gravity load from floor construction is transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. For non load-bearing walls where floor framing members span parallel to the wall, use of the "Top" bearing condition is permitted.
- This table assumes that the building envelope aspect ratio does not exceed 3:1 and a minimum of 1/3 of all wall lengths are made of up of solid wall segments. Solid wall segments are defined as flat concrete walls extending the full height of the story without openings or penetrations.
- This table complies with the IRC.