



## ICC-ES Equivalency Evaluation Report (IRC) EER-4593

Reissued June 2024

This report is subject to renewal March 2025.

**CSI:**                    **DIVISION: 03 00 00—CONCRETE**  
                              **Section: 03 20 00—Concrete Reinforcing**  
                              **Section: 03 21 00— Reinforcement Bars**

### 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:** Owens Corning Infrastructure Solutions

### Equivalency Evaluation Subject:

Flat Concrete Walls, Lintels and Concrete Foundations with OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR as Reinforcement

### Referenced ICC-ES Evaluation Report:

ESR-4593: OCIS PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR STRUCTURAL FRP REINFORCING BARS

Product Description: OWENS CORNING PINKBAR®+ and MATEENBAR™ FIBERGLAS™ REBAR is a Glass Fiber Reinforced Polymer reinforcing bar (OCIS GFRP bar) meeting the requirements of ASTM D7957. OCIS GFRP bar is available in sizes #3#4, and #5 (10, 13 and 16 mm), has a guaranteed modulus of elasticity of 6800 ksi and a guaranteed bond strength of 1.1 ksi.

### Evaluated to the following IRC Sections:

- 2021 and 2018 *International Residential Code*® (IRC)  
Applicable Sections: R403, R404, R506, 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.

- For above grade wall designs with OCIS GFRP bars, see Table 2 and Figures 7 and 8.
- For below grade wall designs with OCIS GFRP bars, see Table 1 and Figures 6.
- For lintel designs with OCIS GFRP bars, see Tables 3 and 4.
- For plan diagram, typical foundation and slab details, see Figures 1 through 5.

The schematic plans, details, and tables were evaluated to the following design parameters:

### Design Criteria:

Maximum Plan Dimension: 60 feet (18,288 mm)  
Maximum Story Height: 10 feet (3,048 mm)

Concrete Wall Thicknesses: 4 (above grade), 6, 8, 10, and 12 inches (101.6, 152.4, 203.2, 254, 304.8 mm)  
Number of Stories Above Grade: 2  
Roof Slope: 12:12 (max)  
Risk Category: II  
Seismic Load: Seismic Design Categories A, B, and C (SDC C for below grade foundation elements only)

**Design Loads and Analysis:**

## 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/m<sup>2</sup>)
- c) Maximum Second Floor Wind Pressure: 44 psf (2.11 kN/m<sup>2</sup>)

## Dead Loads:

- a) Concrete Self-weight: 145 pcf (2323 kg/m<sup>3</sup>)
- b) Floor/Ceiling Dead Load: 10 psf (0.48 kN/m<sup>2</sup>)
- c) Roof/Ceiling Dead Load: 15 psf (0.72 kN/m<sup>2</sup>)

## Live Loads:

- a) Floor Live Load: 40 psf (1.92 kN/m<sup>2</sup>)
- b) Attic Live Load: 20 psf (0.96 kN/m<sup>2</sup>)

## Snow Loads:

- a) As required by Table R608.8(1)

## Earth Pressure Load:

Maximum Design Lateral Soil Load of 60 psf/ft per IRC Tables R404.1.2(8)

**Analysis Method:**

Walls were analyzed as vertical unit strips, ignoring all horizontal bar for sectional capacity.

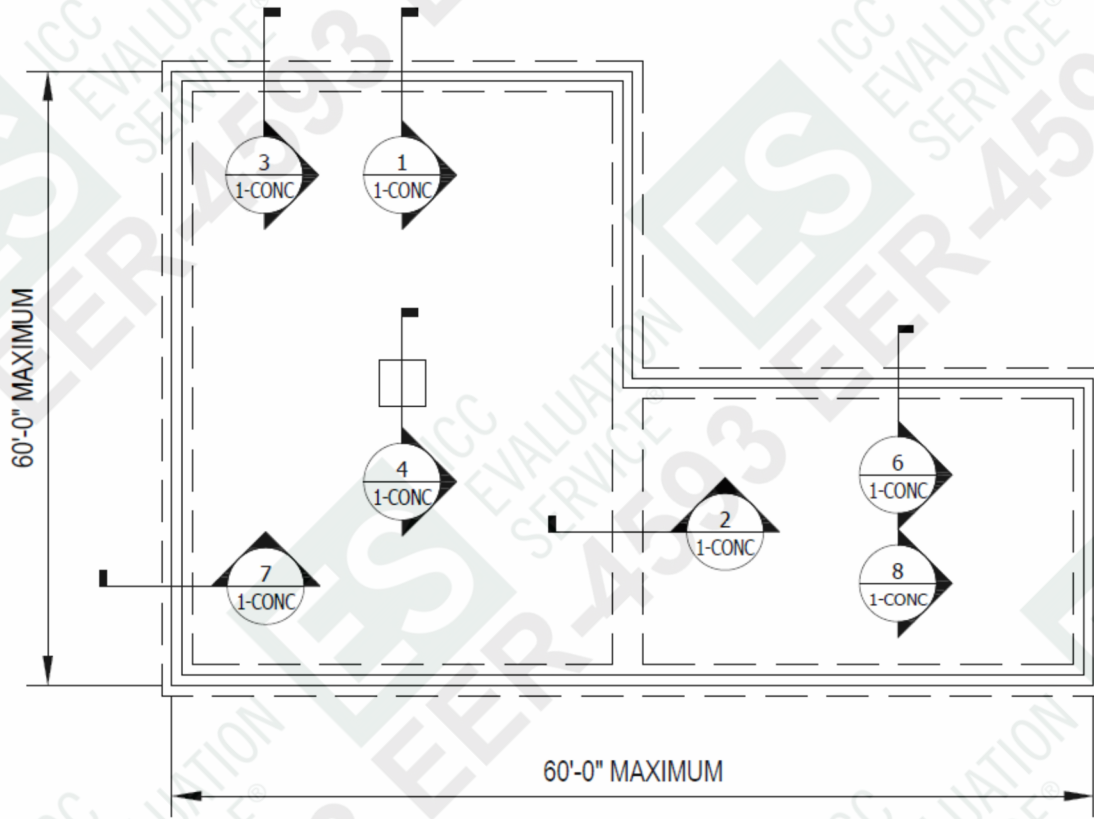
**Identification:**

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-4593).
2. The report holder's contact information is the following:

**OWENS CORNING INFRASTRUCTURE SOLUTIONS**  
**1 OWENS CORNING PARKWAY**  
**TOLEDO, OHIO 43659**  
**(419) 248-8000**  
[www.owenscorning.com](http://www.owenscorning.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. Evaluation for compliance with IRC Table R608.6(4) is outside the scope of this report.



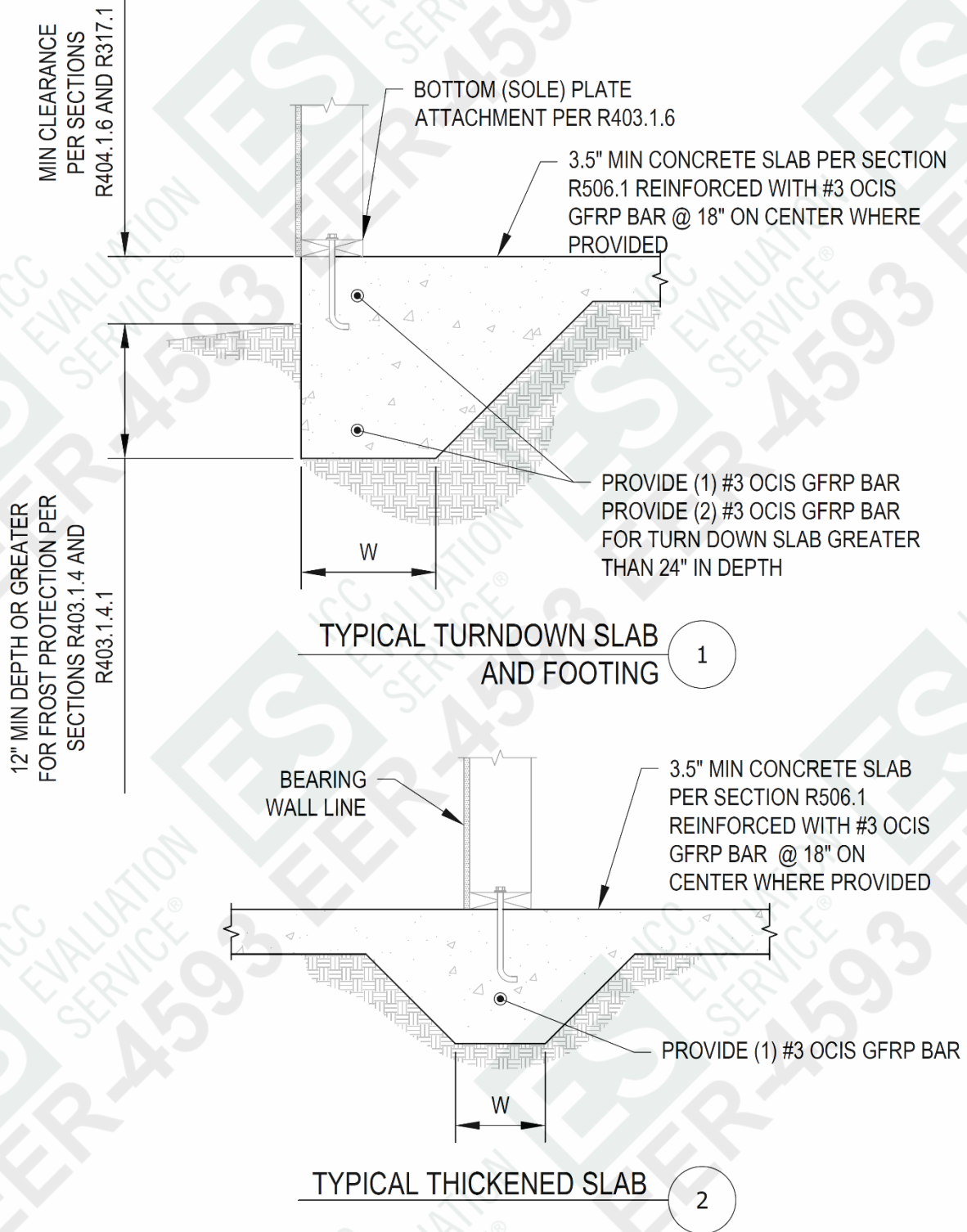
EXAMPLE CONCRETE AND MASONRY  
FOUNDATION AND ABOVE GRADE WALL PLAN



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FIGURE 1: PLAN DIAGRAM




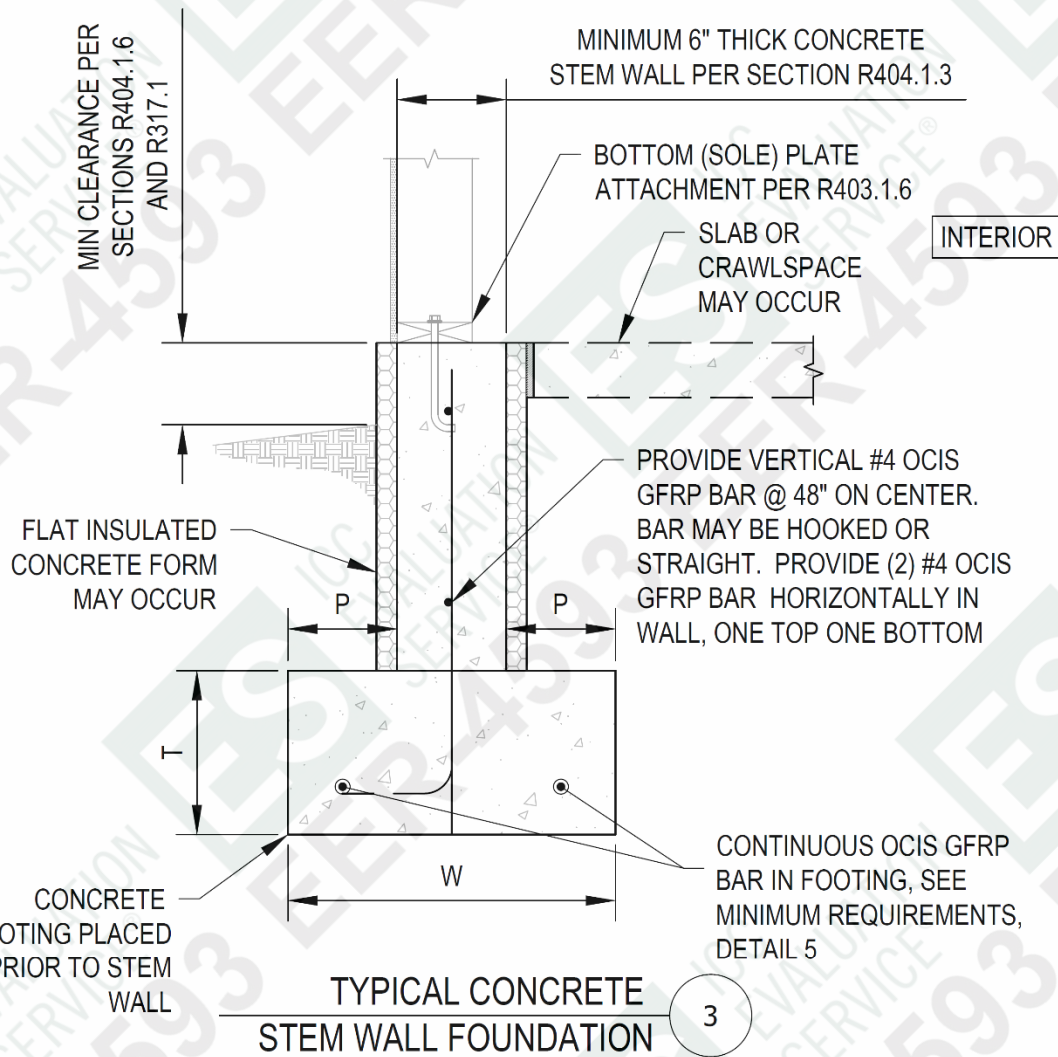
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FIGURE 2 – SECTION DETAILS




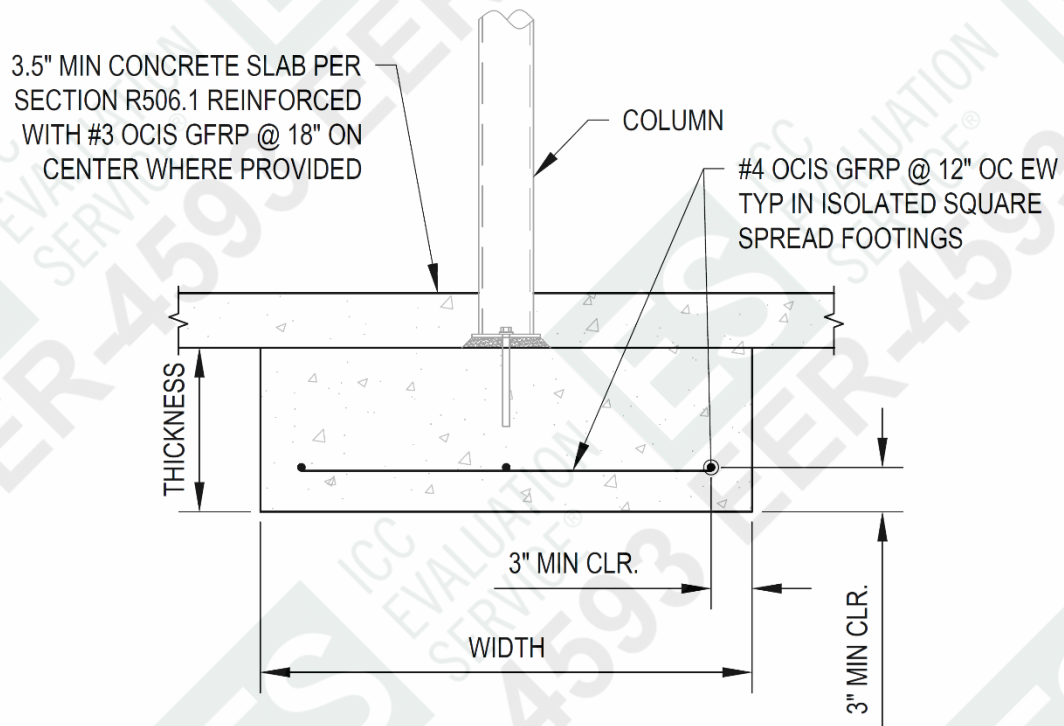
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	<p align="center">ICC EER 4593 GFRP REBAR DRAWINGS</p>				

FIGURE 3 – SECTION DETAILS



**TYPICAL SQUARE ISOLATED SPREAD FOOTING** 4

**CONSIDERATIONS:**

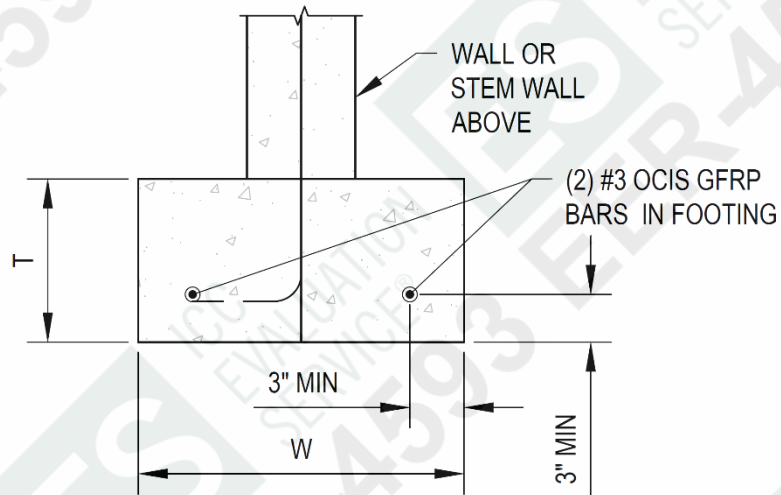
1. MINIMUM ALLOWABLE BEARING PRESSURE OF 1500PSF REQUIRED
2. MINIMUM COLUMN BASE PLATE DIMENSIONS OF 4 INCHES X 4 INCHES
3. MINIMUM FOOTING THICKNESS OF 12 INCHES
4. MINIMUM SQUARE FOOTING DIMENSIONS OF 28 INCHES X 28 INCHES
5. MAXIMUM SQUARE FOOTING DIMENSIONS OF 60 INCHES X 60 INCHES
6. MINIMUM CONCRETE STRENGTH OF 2500PSI
7. MAXIMUM TOTAL UNFACTORED AXIAL LOAD ON COLUMN OF 8000 LBS



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**FIGURE 4 – SECTION DETAILS**



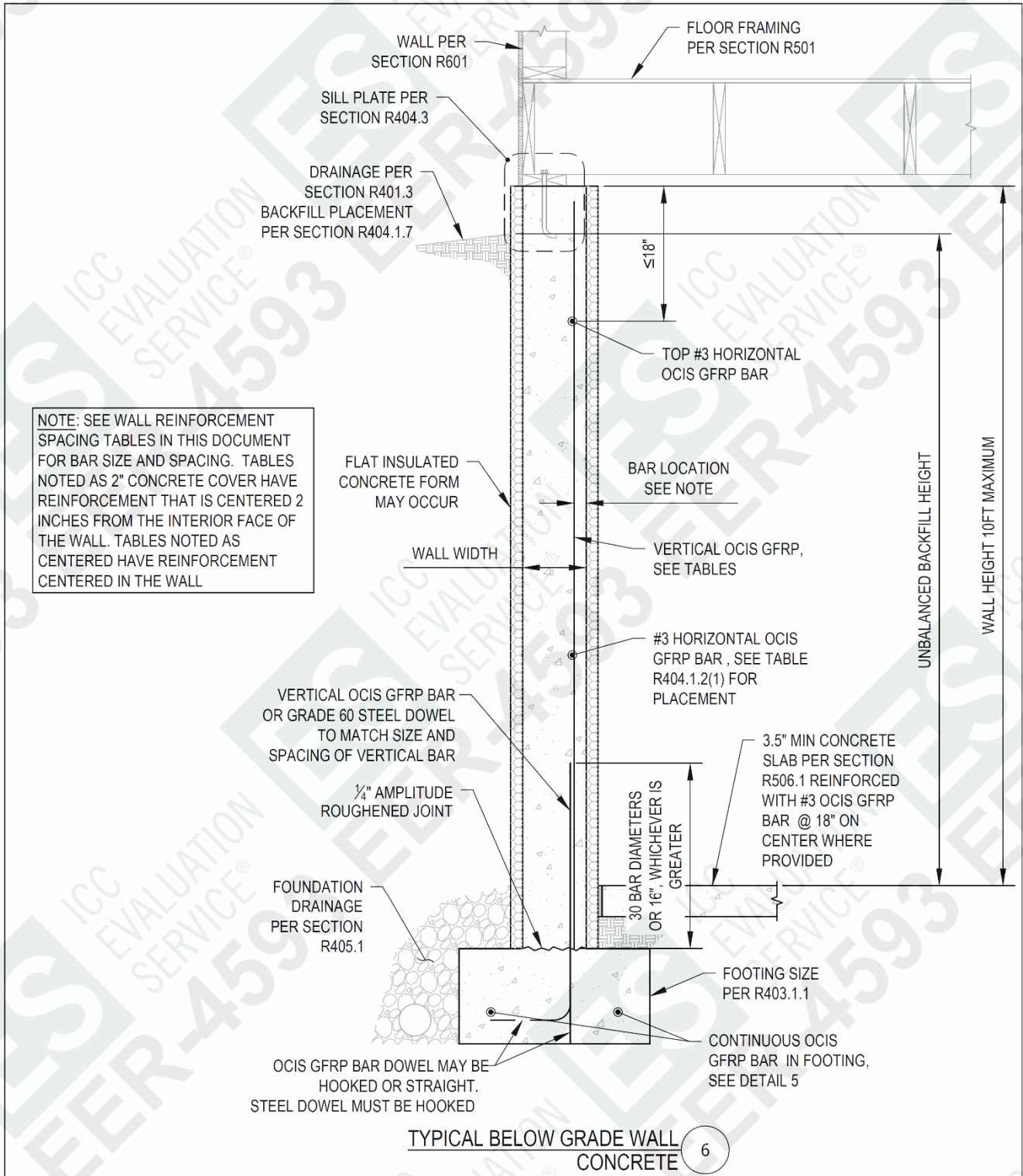
**MINIMUM CONTINUOUS WALL FOOTING REINFORCING** (5)

**CONSIDERATIONS:**

1. MINIMUM ALLOWABLE BEARING PRESSURE OF 1500PSF REQUIRED
2. DOWELS MAY BE INSTALLED INTO WET CONCRETE PROVIDED THEY PENETRATE THE FULL DEPTH OF THE FOOTING

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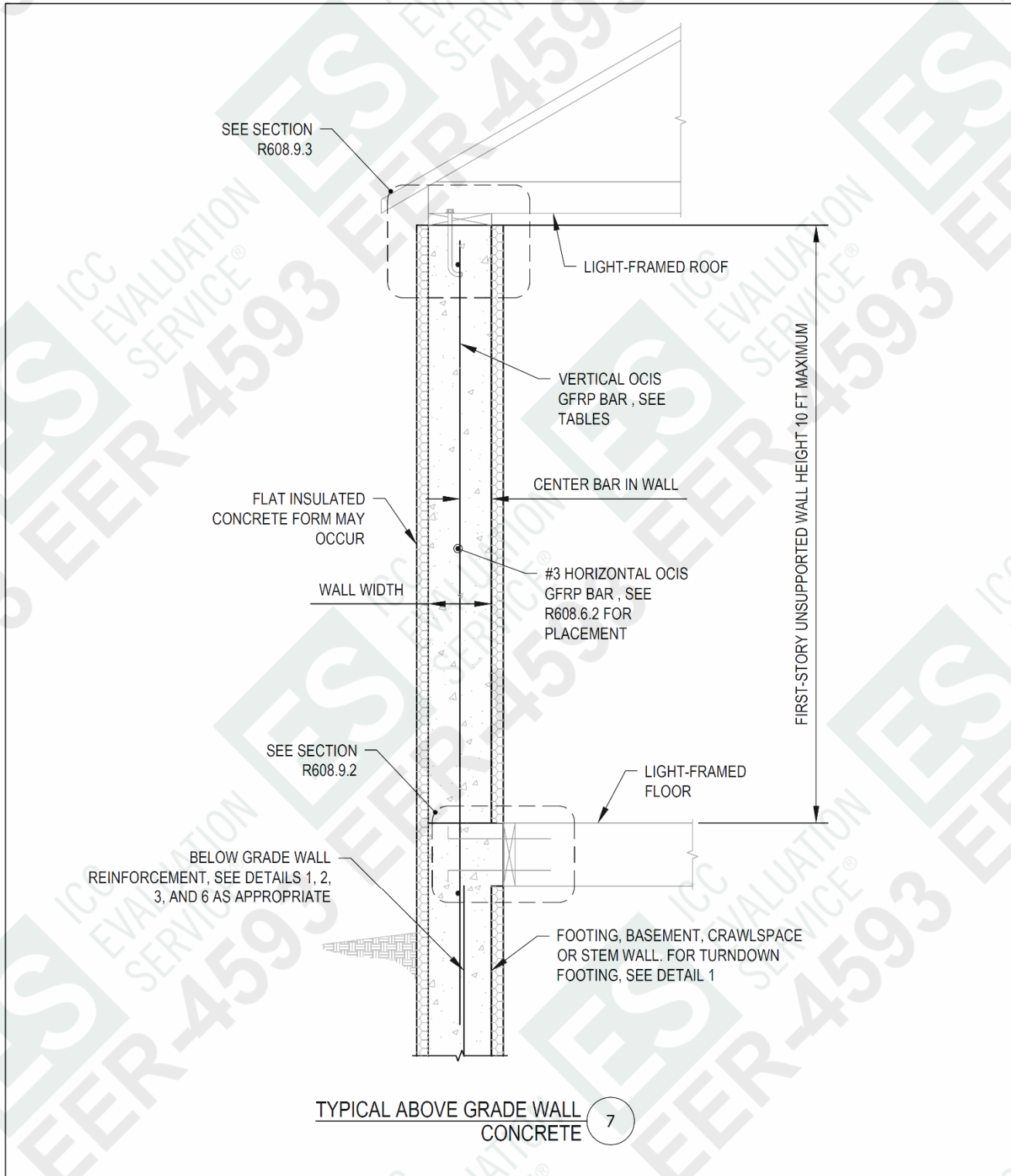
**FIGURE 5 – SECTION DETAILS**



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FIGURE 6 – SECTION DETAILS






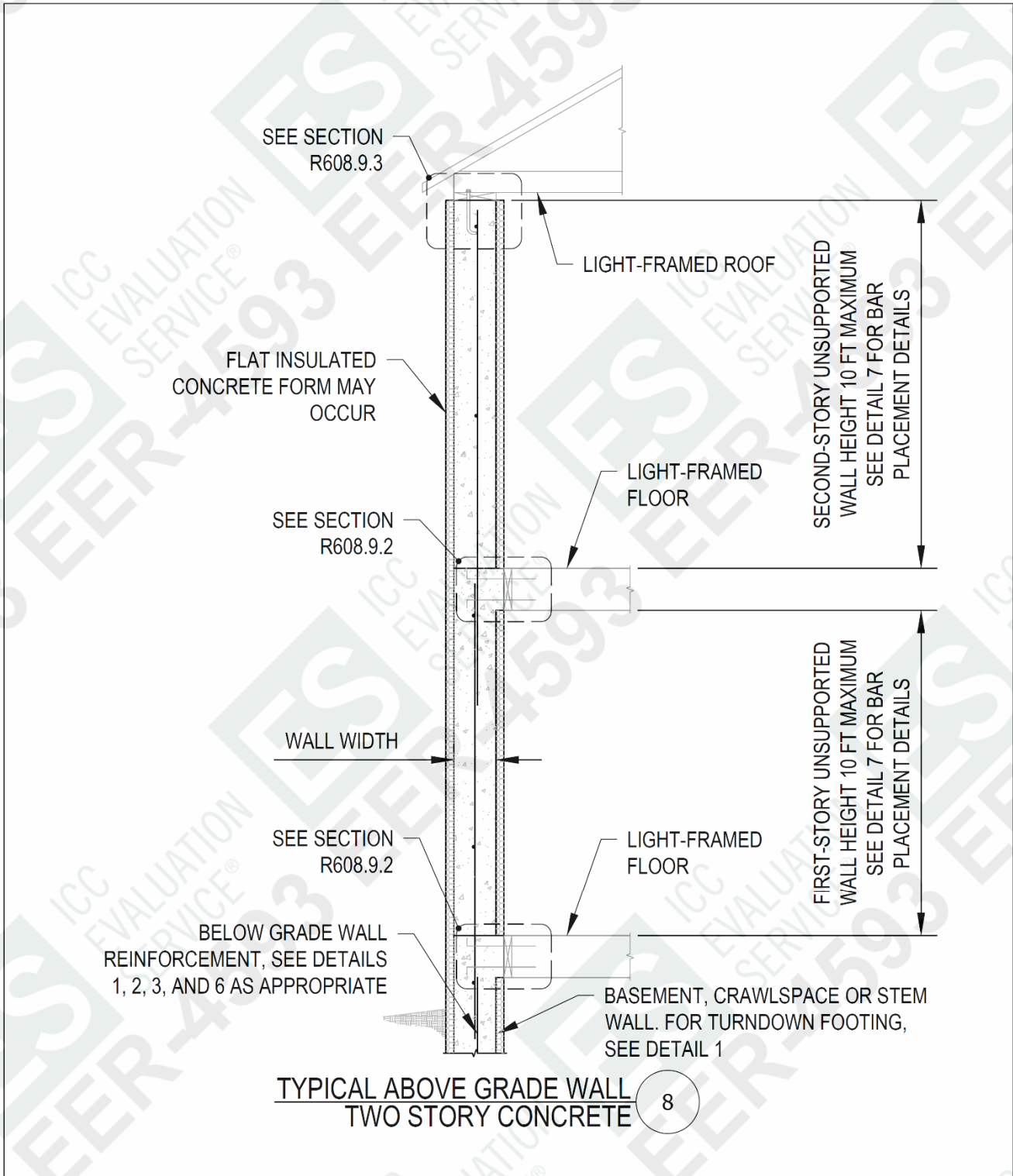

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FIGURE 7 – SECTION DETAILS



**TYPICAL ABOVE GRADE WALL  
TWO STORY CONCRETE** 8

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**FIGURE 8 – SECTION DETAILS**

TABLE 1 – BELOW GRADE CONCRETE WALL FOUNDATIONS VERTICAL REBAR SPACING (in)\*

2500psi Concrete 2" Concrete Cover			Design Lateral Soil Load (psf/ft)												
Wall Height (ft)	Backfill (ft)	Bar Size	30				45				60				
			Wall Thickness (in)				Wall Thickness (in)				Wall Thickness (in)				
			6	8	10	12	6	8	10	12	6	8	10	12	
7	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	15	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	25	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	41	PC	PC	PC	
	8	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
			4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
			5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
5		3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
6		3	PC	PC	PC	PC	PC	PC	PC	PC	13	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	22	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	36	PC	PC	PC	
7		3	PC	PC	PC	PC	13	PC	PC	PC	9	14	PC	PC	
		4	PC	PC	PC	PC	21	PC	PC	PC	16	24	PC	PC	
		5	PC	PC	PC	PC	35	PC	PC	PC	26	39	PC	PC	
9	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	16	PC	PC	PC	12	PC	PC	PC	
		4	PC	PC	PC	PC	27	PC	PC	PC	20	PC	PC	PC	
		5	PC	PC	PC	PC	45	PC	PC	PC	33	PC	PC	PC	
	7	3	PC	PC	PC	PC	11	PC	PC	PC	8	13	PC	PC	
		4	PC	PC	PC	PC	19	PC	PC	PC	14	22	PC	PC	
		5	PC	PC	PC	PC	31	PC	PC	PC	23	35	PC	PC	
8	3	13	PC	PC	PC	8	13	PC	PC	DR	10	PC	PC		
	4	22	PC	PC	PC	14	22	PC	PC	10	16	PC	PC		
	5	35	PC	PC	PC	23	36	PC	PC	16	26	PC	PC		
10	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	15	PC	PC	PC	11	PC	PC	PC	
		4	PC	PC	PC	PC	26	PC	PC	PC	19	PC	PC	PC	
		5	PC	PC	PC	PC	42	PC	PC	PC	31	PC	PC	PC	
	7	3	16	PC	PC	PC	10	PC	PC	PC	8	12	PC	PC	
		4	27	PC	PC	PC	18	PC	PC	PC	13	20	PC	PC	
		5	44	PC	PC	PC	29	PC	PC	PC	21	33	PC	PC	
8	3	12	PC	PC	PC	8	12	PC	PC	DR	9	12	PC		
	4	20	PC	PC	PC	13	20	PC	PC	8	15	20	PC		
	5	32	PC	PC	PC	21	32	PC	PC	12	24	32	PC		
9	3	9	14	PC	PC	DR	9	PC	PC	DR	7	9	PC		
	4	15	23	PC	PC	9	15	PC	PC	DR	11	15	PC		
	5	25	38	PC	PC	14	25	PC	PC	6	19	25	PC		

TABLE 1 – BELOW GRADE CONCRETE WALL FOUNDATIONS VERTICAL REBAR SPACING (in)\* (continued)

2500psi Concrete			Design Lateral Soil Load (psf/ft)												
Centered Bar			30				45				60				
Wall Height (ft)	Backfill (ft)	Bar Size	Wall Thickness (in)				Wall Thickness (in)				Wall Thickness (in)				
			6	8	10	12	6	8	10	12	6	8	10	12	
7	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	11	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	18	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	30	PC	PC	PC
8	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	10	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	16	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	27	PC	PC	PC
7	3	PC	PC	PC	PC	9	PC	PC	PC	PC	DR	9	PC	PC	
	4	PC	PC	PC	PC	16	PC	PC	PC	PC	8	16	PC	PC	
	5	PC	PC	PC	PC	26	PC	PC	PC	PC	13	26	PC	PC	
9	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	12	PC	PC	PC	PC	8	PC	PC	PC
		4	PC	PC	PC	PC	20	PC	PC	PC	PC	15	PC	PC	PC
		5	PC	PC	PC	PC	33	PC	PC	PC	PC	25	PC	PC	PC
7	3	PC	PC	PC	PC	7	PC	PC	PC	PC	DR	8	PC	PC	
	4	PC	PC	PC	PC	13	PC	PC	PC	PC	6	14	PC	PC	
	5	PC	PC	PC	PC	21	PC	PC	PC	PC	10	23	PC	PC	
8	3	9	PC	PC	PC	DR	8	PC	PC	PC	DR	DR	PC	PC	
	4	16	PC	PC	PC	6	14	PC	PC	PC	DR	10	PC	PC	
	5	26	PC	PC	PC	10	23	PC	PC	PC	DR	16	PC	PC	
10	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
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		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
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	6	3	PC	PC	PC	PC	11	PC	PC	PC	PC	7	PC	PC	PC
		4	PC	PC	PC	PC	19	PC	PC	PC	PC	13	PC	PC	PC
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7	3	12	PC	PC	PC	6	PC	PC	PC	PC	DR	8	PC	PC	
	4	20	PC	PC	PC	11	PC	PC	PC	PC	DR	13	PC	PC	
	5	32	PC	PC	PC	17	PC	PC	PC	PC	8	21	PC	PC	
8	3	8	PC	PC	PC	DR	8	PC	PC	PC	DR	DR	7	PC	
	4	14	PC	PC	PC	DR	13	PC	PC	PC	DR	8	12	PC	
	5	22	PC	PC	PC	7	21	PC	PC	PC	DR	12	20	PC	
9	3	DR	9	PC	PC	DR	DR	PC	PC	PC	DR	DR	DR	PC	
	4	7	15	PC	PC	DR	9	PC	PC	PC	DR	DR	9	PC	
	5	12	25	PC	PC	DR	14	PC	PC	PC	DR	6	15	PC	

**TABLE 1 – BELOW GRADE CONCRETE WALL FOUNDATIONS VERTICAL REBAR SPACING (in)\* (continued)**

3000psi Concrete			Design Lateral Soil Load (psf/ft)												
2" Concrete Cover			30				45				60				
Wall Height (ft)	Backfill (ft)	Bar Size	Wall Thickness (in)				Wall Thickness (in)				Wall Thickness (in)				
			6	8	10	12	6	8	10	12	6	8	10	12	
7	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
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	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	15	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	25	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	41	PC	PC	PC
8	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	13	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	22	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	36	PC	PC	PC
7	3	PC	PC	PC	PC	13	PC	PC	PC	PC	9	PC	PC	PC	
	4	PC	PC	PC	PC	21	PC	PC	PC	PC	16	PC	PC	PC	
	5	PC	PC	PC	PC	35	PC	PC	PC	PC	26	PC	PC	PC	
9	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	12	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	20	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	33	PC	PC	PC
	7	3	PC	PC	PC	PC	11	PC	PC	PC	PC	8	13	PC	PC
		4	PC	PC	PC	PC	19	PC	PC	PC	PC	14	22	PC	PC
		5	PC	PC	PC	PC	31	PC	PC	PC	PC	23	36	PC	PC
8	3	13	PC	PC	PC	8	13	PC	PC	PC	6	10	PC	PC	
	4	22	PC	PC	PC	14	22	PC	PC	PC	10	16	PC	PC	
	5	35	PC	PC	PC	23	36	PC	PC	PC	17	26	PC	PC	
10	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	15	PC	PC	PC	PC	11	PC	PC	PC
		4	PC	PC	PC	PC	26	PC	PC	PC	PC	19	PC	PC	PC
		5	PC	PC	PC	PC	42	PC	PC	PC	PC	31	PC	PC	PC
	7	3	PC	PC	PC	PC	10	PC	PC	PC	PC	8	12	PC	PC
		4	PC	PC	PC	PC	18	PC	PC	PC	PC	13	20	PC	PC
		5	PC	PC	PC	PC	29	PC	PC	PC	PC	21	33	PC	PC
	8	3	12	PC	PC	PC	8	12	PC	PC	PC	DR	9	PC	PC
		4	20	PC	PC	PC	13	20	PC	PC	PC	9	15	PC	PC
		5	32	PC	PC	PC	21	32	PC	PC	PC	16	24	PC	PC
9	3	9	PC	PC	PC	6	9	PC	PC	PC	DR	7	9	PC	
	4	15	PC	PC	PC	10	15	PC	PC	PC	DR	11	15	PC	
	5	25	PC	PC	PC	16	25	PC	PC	PC	8	19	25	PC	

TABLE 1 – BELOW GRADE CONCRETE WALL FOUNDATIONS VERTICAL REBAR SPACING (in)\* (continued)

3000psi Concrete			Design Lateral Soil Load (psf/ft)											
Centered Bar			30				45				60			
Wall Height (ft)	Backfill (ft)	Bar Size	Wall Thickness (in)				Wall Thickness (in)				Wall Thickness (in)			
			6	8	10	12	6	8	10	12	6	8	10	12
7	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	11	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	18	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	30	PC	PC	PC
8	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	10	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	16	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	27	PC	PC	PC
7	3	PC	PC	PC	PC	9	PC	PC	PC	6	PC	PC	PC	
	4	PC	PC	PC	PC	16	PC	PC	PC	11	PC	PC	PC	
	5	PC	PC	PC	PC	26	PC	PC	PC	17	PC	PC	PC	
9	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	9	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	15	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	25	PC	PC	PC
7	3	PC	PC	PC	PC	8	PC	PC	PC	DR	8	PC	PC	
	4	PC	PC	PC	PC	14	PC	PC	PC	8	14	PC	PC	
	5	PC	PC	PC	PC	23	PC	PC	PC	13	23	PC	PC	
8	3	9	PC	PC	PC	DR	8	PC	PC	DR	6	PC	PC	
	4	16	PC	PC	PC	8	14	PC	PC	DR	10	PC	PC	
	5	26	PC	PC	PC	13	23	PC	PC	6	17	PC	PC	
10	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	11	PC	PC	PC	8	PC	PC	PC
		4	PC	PC	PC	PC	19	PC	PC	PC	14	PC	PC	PC
		5	PC	PC	PC	PC	31	PC	PC	PC	23	PC	PC	PC
	7	3	PC	PC	PC	PC	8	PC	PC	PC	DR	8	PC	PC
		4	PC	PC	PC	PC	13	PC	PC	PC	7	13	PC	PC
		5	PC	PC	PC	PC	21	PC	PC	PC	11	21	PC	PC
	8	3	9	PC	PC	PC	DR	8	PC	PC	DR	DR	PC	PC
		4	14	PC	PC	PC	6	13	PC	PC	DR	9	PC	PC
		5	24	PC	PC	PC	10	21	PC	PC	DR	16	PC	PC
	9	3	DR	PC	PC	PC	DR	6	PC	PC	DR	DR	DR	PC
		4	10	PC	PC	PC	DR	10	PC	PC	DR	DR	9	PC
		5	16	PC	PC	PC	DR	16	PC	PC	DR	8	15	PC

TABLE 1 – BELOW GRADE CONCRETE WALL FOUNDATIONS VERTICAL REBAR SPACING (in)\* (continued)

3500psi Concrete			Design Lateral Soil Load (psf/ft)											
2" Concrete Cover			30				45				60			
Wall Height (ft)	Backfill (ft)	Bar Size	Wall Thickness (in)				Wall Thickness (in)				Wall Thickness (in)			
			6	8	10	12	6	8	10	12	6	8	10	12
7	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
8	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	13	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	22	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	36	PC	PC	PC
7	3	PC	PC	PC	PC	13	PC	PC	PC	9	PC	PC	PC	
	4	PC	PC	PC	PC	21	PC	PC	PC	16	PC	PC	PC	
	5	PC	PC	PC	PC	35	PC	PC	PC	26	PC	PC	PC	
9	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	12	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	20	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	33	PC	PC	PC
7	3	PC	PC	PC	PC	11	PC	PC	PC	8	PC	PC	PC	
	4	PC	PC	PC	PC	19	PC	PC	PC	14	PC	PC	PC	
	5	PC	PC	PC	PC	31	PC	PC	PC	23	PC	PC	PC	
8	3	13	PC	PC	PC	8	PC	PC	PC	6	10	PC	PC	
	4	22	PC	PC	PC	14	PC	PC	PC	10	16	PC	PC	
	5	35	PC	PC	PC	23	PC	PC	PC	17	26	PC	PC	
10	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	11	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	19	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	31	PC	PC	PC
7	3	PC	PC	PC	PC	11	PC	PC	PC	8	12	PC	PC	
	4	PC	PC	PC	PC	18	PC	PC	PC	13	20	PC	PC	
	5	PC	PC	PC	PC	29	PC	PC	PC	21	33	PC	PC	
8	3	12	PC	PC	PC	8	12	PC	PC	6	9	PC	PC	
	4	20	PC	PC	PC	13	20	PC	PC	9	15	PC	PC	
	5	32	PC	PC	PC	21	32	PC	PC	16	24	PC	PC	
9	3	9	PC	PC	PC	6	9	PC	PC	DR	7	9	PC	
	4	15	PC	PC	PC	10	15	PC	PC	7	11	15	PC	
	5	25	PC	PC	PC	16	25	PC	PC	11	19	25	PC	

TABLE 1 – BELOW GRADE CONCRETE WALL FOUNDATIONS VERTICAL REBAR SPACING (in)\* (continued)

3500psi Concrete			Design Lateral Soil Load (psf/ft)												
Centered Bar			30				45				60				
Wall Height (ft)	Backfill (ft)	Bar Size	Wall Thickness (in)				Wall Thickness (in)				Wall Thickness (in)				
			6	8	10	12	6	8	10	12	6	8	10	12	
7	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
8	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	10	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	16	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	27	PC	PC	PC
7	3	PC	PC	PC	PC	9	PC	PC	PC	7	PC	PC	PC	PC	
	4	PC	PC	PC	PC	16	PC	PC	PC	11	PC	PC	PC	PC	
	5	PC	PC	PC	PC	26	PC	PC	PC	19	PC	PC	PC	PC	
9	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	9	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	15	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	25	PC	PC	PC	PC
7	3	PC	PC	PC	PC	8	PC	PC	PC	6	PC	PC	PC	PC	
	4	PC	PC	PC	PC	14	PC	PC	PC	10	PC	PC	PC	PC	
	5	PC	PC	PC	PC	23	PC	PC	PC	17	PC	PC	PC	PC	
8	3	9	PC	PC	PC	6	PC	PC	PC	DR	6	PC	PC	PC	
	4	16	PC	PC	PC	10	PC	PC	PC	DR	10	PC	PC	PC	
	5	26	PC	PC	PC	17	PC	PC	PC	8	17	PC	PC	PC	
10	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	8	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	14	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	23	PC	PC	PC	PC
7	3	PC	PC	PC	PC	8	PC	PC	PC	DR	8	PC	PC	PC	
	4	PC	PC	PC	PC	13	PC	PC	PC	9	13	PC	PC	PC	
	5	PC	PC	PC	PC	21	PC	PC	PC	14	21	PC	PC	PC	
8	3	9	PC	PC	PC	DR	8	PC	PC	DR	6	PC	PC	PC	
	4	14	PC	PC	PC	8	13	PC	PC	DR	9	PC	PC	PC	
	5	24	PC	PC	PC	13	21	PC	PC	6	16	PC	PC	PC	
9	3	7	PC	PC	PC	DR	6	PC	PC	DR	DR	DR	PC	PC	
	4	11	PC	PC	PC	DR	10	PC	PC	DR	7	9	PC	PC	
	5	18	PC	PC	PC	7	16	PC	PC	DR	11	15	PC	PC	



TABLE 1 – BELOW GRADE CONCRETE WALL FOUNDATIONS VERTICAL REBAR SPACING (in)\* (continued)

4000psi Concrete 2" Concrete Cover			Design Lateral Soil Load (psf/ft)												
Wall Height (ft)	Backfill (ft)	Bar Size	30				45				60				
			Wall Thickness (in)				Wall Thickness (in)				Wall Thickness (in)				
			6	8	10	12	6	8	10	12	6	8	10	12	
7	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
8	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	13	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	22	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	36	PC	PC	PC
7	3	PC	PC	PC	PC	13	PC	PC	PC	9	PC	PC	PC	PC	
	4	PC	PC	PC	PC	21	PC	PC	PC	16	PC	PC	PC	PC	
	5	PC	PC	PC	PC	35	PC	PC	PC	26	PC	PC	PC	PC	
9	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	12	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	20	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	34	PC	PC	PC
7	3	PC	PC	PC	PC	11	PC	PC	PC	8	PC	PC	PC	PC	
	4	PC	PC	PC	PC	19	PC	PC	PC	14	PC	PC	PC	PC	
	5	PC	PC	PC	PC	31	PC	PC	PC	23	PC	PC	PC	PC	
8	3	13	PC	PC	PC	8	PC	PC	PC	6	10	PC	PC	PC	
	4	22	PC	PC	PC	14	PC	PC	PC	10	16	PC	PC	PC	
	5	35	PC	PC	PC	23	PC	PC	PC	17	27	PC	PC	PC	
10	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	11	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	19	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	31	PC	PC	PC
7	3	PC	PC	PC	PC	11	PC	PC	PC	8	PC	PC	PC	PC	
	4	PC	PC	PC	PC	18	PC	PC	PC	13	PC	PC	PC	PC	
	5	PC	PC	PC	PC	29	PC	PC	PC	21	PC	PC	PC	PC	
8	3	12	PC	PC	PC	8	PC	PC	PC	6	9	PC	PC	PC	
	4	20	PC	PC	PC	13	PC	PC	PC	9	15	PC	PC	PC	
	5	32	PC	PC	PC	21	PC	PC	PC	16	24	PC	PC	PC	
9	3	9	PC	PC	PC	6	9	PC	PC	DR	7	9	PC	PC	
	4	15	PC	PC	PC	10	15	PC	PC	7	11	15	PC	PC	
	5	25	PC	PC	PC	16	25	PC	PC	12	19	25	PC	PC	

**TABLE 1 – BELOW GRADE CONCRETE WALL FOUNDATIONS VERTICAL REBAR SPACING (in)\* (continued)**

4000psi Concrete			Design Lateral Soil Load (psf/ft)											
Centered Bar			30				45				60			
Wall Height (ft)	Backfill (ft)	Bar Size	Wall Thickness (in)				Wall Thickness (in)				Wall Thickness (in)			
			6	8	10	12	6	8	10	12	6	8	10	12
7	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
8	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	10	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	16	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	27	PC	PC	PC
7	3	PC	PC	PC	PC	9	PC	PC	PC	7	PC	PC	PC	
	4	PC	PC	PC	PC	16	PC	PC	PC	12	PC	PC	PC	
	5	PC	PC	PC	PC	26	PC	PC	PC	19	PC	PC	PC	
9	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	9	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	15	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	25	PC	PC	PC
7	3	PC	PC	PC	PC	8	PC	PC	PC	6	PC	PC	PC	
	4	PC	PC	PC	PC	14	PC	PC	PC	10	PC	PC	PC	
	5	PC	PC	PC	PC	23	PC	PC	PC	17	PC	PC	PC	
8	3	10	PC	PC	PC	6	PC	PC	PC	DR	6	PC	PC	
	4	16	PC	PC	PC	10	PC	PC	PC	6	10	PC	PC	
	5	26	PC	PC	PC	17	PC	PC	PC	10	17	PC	PC	
10	4	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	5	3	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
	6	3	PC	PC	PC	PC	PC	PC	PC	PC	8	PC	PC	PC
		4	PC	PC	PC	PC	PC	PC	PC	PC	14	PC	PC	PC
		5	PC	PC	PC	PC	PC	PC	PC	PC	23	PC	PC	PC
7	3	PC	PC	PC	PC	8	PC	PC	PC	6	PC	PC	PC	
	4	PC	PC	PC	PC	13	PC	PC	PC	10	PC	PC	PC	
	5	PC	PC	PC	PC	21	PC	PC	PC	16	PC	PC	PC	
8	3	9	PC	PC	PC	DR	PC	PC	PC	DR	6	PC	PC	
	4	14	PC	PC	PC	9	PC	PC	PC	DR	9	PC	PC	
	5	24	PC	PC	PC	16	PC	PC	PC	8	16	PC	PC	
9	3	7	PC	PC	PC	DR	6	PC	PC	DR	DR	DR	PC	
	4	11	PC	PC	PC	DR	10	PC	PC	DR	7	9	PC	
	5	18	PC	PC	PC	8	16	PC	PC	DR	12	15	PC	

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 psf/ft = 0.1571 kPa/m; 1 psi = 6.895 kPa.  
 PC = Plain Concrete  
 DR = Design Required  
 Shaded cells highlight conditions not governed by Plain Concrete.

## \*Footnotes:

1. Soil Classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1. Design Lateral Soil Loads are as follows:
  - a. 30psf/ft = GW, GP, SW, SP
  - b. 45psf/ft = GM, GC, SM, SM-SC, and ML
  - c. 60psf/ft = SC, ML-CL, and Inorganic CL
2. Table values are only applicable for OCIS GFRP bar with a specified concrete strength,  $f'_c$ , as specified in each table at 28 days.
3. Flat panel insulated concrete forms may be used so long as the manufacturer does not require special reinforcing outside of the IRC minimum requirements for steel as described in IRC Chapter 4.
4. PC indicates vertical wall reinforcement is not required. However, as a minimum, a vertical #4 OCIS GFRP bar @ 48 inches on center or #3 OCIS GFRP bar @ 24 inches on center must be used.
5. Allowable deflection criterion is  $L/240$ , where L is the unsupported height of the basement wall in inches.
6. Interpolation is not permitted.
7. Where walls retain 4 feet or more of unbalanced backfill, walls must be laterally supported at the top and bottom before backfill is placed.
8. Vertical reinforcing must be located in the wall as described in the Table above. Tables denoted with "Centered" reinforcing must have the bar placed at the center of the cross section. Tables denoted with "Edge" reinforcing must have the center line of the bar placed 2 inches from the inside face of the wall.
9. Concrete cover of the bar must not be less than 2x the diameter of the bar.
10. DR indicates design is required in accordance with the applicable building code, or in the absence of a code, in accordance with ACI 440.11.
11. Horizontal reinforcement located at mid height must be placed in accordance with Table R404.1.2(1) of the IRC, except #3 OCIS GFRP bar may be used in lieu of the #4 steel reinforcing bars. #3 OCIS GFRP bar may be lapped either 20 bar diameters or 12 inches, whichever is greater.
12. Top of wall horizontal reinforcement must be placed according to Detail 6 in the attached sketches.
13. Backfill to be a minimum of 6 inches below the top of the wall.
14. Wood sill plates to be installed in accordance with Section R403.1.6 and R608.9.
15. Vertical bars must be lapped a minimum of 30 bar diameters or 16 inches, whichever is greater.
16. Below grade walls reinforced with OCIS GFRP bar in Seismic Design Categories D, E, or F are outside the scope of this report but may be designed by a Registered Design Professional.

TABLE 2 – ABOVE GRADE CONCRETE WALLS VERTICAL REBAR SPACING (in)\*

2500psi Concrete - Above Grade Walls												
Center Bar in Wall												
Max Wind Speed (mph)			Wall Height (ft)	Bar Size	Wall Thickness (in)							
Exposure					4	6	8	10	12			
B	C	D										
115			8	3	PC	PC	PC	PC	PC			
				4	PC	PC	PC	PC	PC			
				5	PC	PC	PC	PC	PC			
			9	3	18	PC	PC	PC	PC			
				4	29	PC	PC	PC	PC			
				5	48	PC	PC	PC	PC			
			10	3	16	PC	PC	PC	PC			
				4	27	PC	PC	PC	PC			
				5	43	PC	PC	PC	PC			
			120			8	3	19	PC	PC	PC	PC
							4	31	PC	PC	PC	PC
							5	48	PC	PC	PC	PC
9	3	17				PC	PC	PC	PC			
	4	28				PC	PC	PC	PC			
	5	46				PC	PC	PC	PC			
10	3	15				PC	PC	PC	PC			
	4	25				PC	PC	PC	PC			
	5	42				PC	PC	PC	PC			
130	110					8	3	18	PC	PC	PC	PC
							4	29	PC	PC	PC	PC
							5	48	PC	PC	PC	PC
			9	3	16	PC	PC	PC	PC			
				4	26	PC	PC	PC	PC			
				5	43	PC	PC	PC	PC			
			10	3	14	PC	PC	PC	PC			
				4	23	PC	PC	PC	PC			
				5	38	PC	PC	PC	PC			
			140	119	110	8	3	16	PC	PC	PC	PC
							4	27	PC	PC	PC	PC
							5	45	PC	PC	PC	PC
9	3	15				PC	PC	PC	PC			
	4	24				PC	PC	PC	PC			
	5	40				PC	PC	PC	PC			
10	3	11				PC	PC	PC	PC			
	4	21				PC	PC	PC	PC			
	5	33				PC	PC	PC	PC			
150	127	117				8	3	15	PC	PC	PC	PC
							4	25	PC	PC	PC	PC
							5	42	PC	PC	PC	PC
			9	3	13	PC	PC	PC	PC			
				4	22	PC	PC	PC	PC			
				5	36	PC	PC	PC	PC			
			10	3	9	PC	PC	PC	PC			
				4	17	PC	PC	PC	PC			
				5	27	PC	PC	PC	PC			
			160	136	125	8	3	14	PC	PC	PC	PC
							4	24	PC	PC	PC	PC
							5	39	PC	PC	PC	PC
9	3	10				PC	PC	PC	PC			
	4	19				PC	PC	PC	PC			
	5	30				PC	PC	PC	PC			
10	3	7				PC	PC	PC	PC			
	4	14				PC	PC	PC	PC			
	5	21				PC	PC	PC	PC			

**TABLE 2 – ABOVE GRADE CONCRETE WALLS VERTICAL REBAR SPACING (in)\* (continued)**

3000psi Concrete - Above Grade Walls									
Center Bar in Wall									
Max Wind Speed (mph)			Wall Height (ft)	Bar Size	Wall Thickness (in)				
Exposure					4	6	8	10	12
B	C	D							
115			8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			10	3	16	PC	PC	PC	PC
				4	27	PC	PC	PC	PC
				5	44	PC	PC	PC	PC
120			8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	17	PC	PC	PC	PC
				4	28	PC	PC	PC	PC
				5	46	PC	PC	PC	PC
			10	3	15	PC	PC	PC	PC
				4	26	PC	PC	PC	PC
				5	42	PC	PC	PC	PC
130	110		8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	16	PC	PC	PC	PC
				4	26	PC	PC	PC	PC
				5	43	PC	PC	PC	PC
			10	3	14	PC	PC	PC	PC
				4	23	PC	PC	PC	PC
				5	38	PC	PC	PC	PC
140	119	110	8	3	16	PC	PC	PC	PC
				4	27	PC	PC	PC	PC
				5	45	PC	PC	PC	PC
			9	3	15	PC	PC	PC	PC
				4	24	PC	PC	PC	PC
				5	40	PC	PC	PC	PC
			10	3	13	PC	PC	PC	PC
				4	22	PC	PC	PC	PC
				5	35	PC	PC	PC	PC
150	127	117	8	3	15	PC	PC	PC	PC
				4	26	PC	PC	PC	PC
				5	42	PC	PC	PC	PC
			9	3	13	PC	PC	PC	PC
				4	22	PC	PC	PC	PC
				5	37	PC	PC	PC	PC
			10	3	12	PC	PC	PC	PC
				4	20	PC	PC	PC	PC
				5	33	PC	PC	PC	PC
160	136	125	8	3	14	PC	PC	PC	PC
				4	24	PC	PC	PC	PC
				5	39	PC	PC	PC	PC
			9	3	12	PC	PC	PC	PC
				4	21	PC	PC	PC	PC
				5	34	PC	PC	PC	PC
			10	3	10	PC	PC	PC	PC
				4	18	PC	PC	PC	PC
				5	29	PC	PC	PC	PC

TABLE 2 – ABOVE GRADE CONCRETE WALLS VERTICAL REBAR SPACING (in)\* (continued)

3500psi Concrete - Above Grade Walls									
Center Bar in Wall									
Max Wind Speed (mph)			Wall Height (ft)	Bar Size	Wall Thickness (in)				
Exposure					4	6	8	10	12
B	C	D							
115			8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			10	3	16	PC	PC	PC	PC
				4	27	PC	PC	PC	PC
				5	44	PC	PC	PC	PC
120			8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			10	3	15	PC	PC	PC	PC
				4	26	PC	PC	PC	PC
				5	42	PC	PC	PC	PC
130	110		8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	16	PC	PC	PC	PC
				4	26	PC	PC	PC	PC
				5	43	PC	PC	PC	PC
			10	3	14	PC	PC	PC	PC
				4	23	PC	PC	PC	PC
				5	38	PC	PC	PC	PC
140	119	110	8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	15	PC	PC	PC	PC
				4	24	PC	PC	PC	PC
				5	40	PC	PC	PC	PC
			10	3	13	PC	PC	PC	PC
				4	22	PC	PC	PC	PC
				5	35	PC	PC	PC	PC
150	127	117	8	3	15	PC	PC	PC	PC
				4	26	PC	PC	PC	PC
				5	42	PC	PC	PC	PC
			9	3	14	PC	PC	PC	PC
				4	23	PC	PC	PC	PC
				5	37	PC	PC	PC	PC
			10	3	12	PC	PC	PC	PC
				4	20	PC	PC	PC	PC
				5	33	PC	PC	PC	PC
160	136	125	8	3	14	PC	PC	PC	PC
				4	24	PC	PC	PC	PC
				5	39	PC	PC	PC	PC
			9	3	12	PC	PC	PC	PC
				4	21	PC	PC	PC	PC
				5	34	PC	PC	PC	PC
			10	3	11	PC	PC	PC	PC
				4	18	PC	PC	PC	PC
				5	30	PC	PC	PC	PC

TABLE 2 – ABOVE GRADE CONCRETE WALLS VERTICAL REBAR SPACING (in)\* (continued)

4000psi Concrete - Above Grade Walls									
Center Bar in Wall									
Max Wind Speed (mph)			Wall Height (ft)	Bar Size	Wall Thickness (in)				
Exposure					4	6	8	10	12
B	C	D							
115			8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			10	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
120			8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			10	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
130	110		8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			10	3	14	PC	PC	PC	PC
				4	24	PC	PC	PC	PC
				5	39	PC	PC	PC	PC
140	119	110	8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	15	PC	PC	PC	PC
				4	24	PC	PC	PC	PC
				5	40	PC	PC	PC	PC
			10	3	13	PC	PC	PC	PC
				4	22	PC	PC	PC	PC
				5	35	PC	PC	PC	PC
150	127	117	8	3	PC	PC	PC	PC	PC
				4	PC	PC	PC	PC	PC
				5	PC	PC	PC	PC	PC
			9	3	14	PC	PC	PC	PC
				4	23	PC	PC	PC	PC
				5	37	PC	PC	PC	PC
			10	3	12	PC	PC	PC	PC
				4	20	PC	PC	PC	PC
				5	33	PC	PC	PC	PC
160	136	125	8	3	14	PC	PC	PC	PC
				4	24	PC	PC	PC	PC
				5	39	PC	PC	PC	PC
			9	3	13	PC	PC	PC	PC
				4	21	PC	PC	PC	PC
				5	34	PC	PC	PC	PC
			10	3	11	PC	PC	PC	PC
				4	18	PC	PC	PC	PC
				5	30	PC	PC	PC	PC

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 psf/ft = 0.1571 kPa/m; 1 psi = 6.895 kPa.

PC = Plain Concrete

Shaded cells highlight conditions not governed by Plain Concrete.

\*Footnotes:

1. 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 number 4, an effective wind area of 10 square feet, topographic factor,  $K_{zt}$ , equal to 1.0, and Risk Category II.
2. Table is based on side loading for all walls, where gravity load from floor construction is transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall.
3. Table values are only applicable for OCIS GFRP bar, with a specified concrete strength,  $f'_c$ , as specified in each Table at 28 days.
4. Flat panel insulated concrete forms may be used provided the manufacturer does not require special reinforcing outside of the IRC minimum requirements for steel as described in IRC Chapter 6.
5. PC indicates vertical wall reinforcement is not required. However, as a minimum, a vertical #4 OCIS GFRP bar @ 48 inches on center or #3 OCIS GFRP bar @ 24 inches on center must be used.
6. Allowable deflection criterion is  $L/240$ , where L is the unsupported height of the wall in inches.
7. Interpolation is not permitted.
8. Vertical and horizontal reinforcing must be placed at the center of the cross section.
9. DR means design is required in accordance with the applicable building code, or in the absence of a code, in accordance with ACI 440.11.
10. Horizontal reinforcement must be placed in accordance with Section R608.6.2 of the IRC, except #3 OCIS GFRP bar may be used in lieu of the #4 steel reinforcing bars. #3 OCIS GFRP bar may be lapped either 20 bar diameters or 12 inches, whichever is greater.
11. See Table R608.3 for tolerances on nominal thicknesses.
12. Wood sill plates and other connections to the wall to be installed in accordance with Section R608.9.
17. Vertical bar must be lapped a minimum of 30 bar diameters or 16 inches, whichever is greater.
13. Walls are subject to the requirements of Section 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). Reduction factor for design strength,  $R_3$ , for walls must consider no horizontal and vertical shear reinforcement per requirements in Table R608.7.1.1(6) for the 2021 IRC or Table R608.7(4) for the 2018 IRC.
14. Reinforcing around openings can be OCIS GFRP bar in accordance with the Lintel section of this EER.
15. Table assumes that the building plan aspect ratio does not exceed 3:1 and a minimum of 1/3 of all wall lengths are made 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.
16. Above grade walls reinforced with OCIS GFRP bar are not permitted in Seismic Design Categories C, D, E or F.

**TABLE 3 – LOAD BEARING CONCRETE WALL LINTELS WITHOUT STIRRUPS\***

Load Bearing Lintel Span Table Reinforced with (1) #4 OCIS GFRP bar (in)											
Wall Thickness (in)	Lintel Depth (in)	Design Loading Condition per Table R608.8(1)									
		1		2		3		4		5	
		Maximum Ground Snow Load (psf)									
		30	70	30	70	30	70	30	70	30	70
4	8	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
	12	DR	DR	25	DR	DR	DR	DR	DR	DR	DR
	16	27	27	31	DR	DR	DR	DR	DR	DR	DR
	20	32	32	37	DR	DR	DR	DR	DR	DR	DR
	24	36	36	42	DR	DR	DR	DR	DR	DR	DR
6	8	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
	12	31	31	36	DR	DR	DR	DR	DR	DR	DR
	16	39	39	46	25	DR	DR	DR	DR	DR	DR
	20	46	46	53	30	DR	DR	DR	DR	DR	DR
	24	52	52	60	34	DR	DR	DR	DR	DR	DR
8	8	26	26	31	DR	DR	DR	DR	DR	DR	DR
	12	41	41	47	26	DR	DR	DR	DR	DR	DR
	16	51	51	59	33	DR	DR	DR	DR	DR	DR
	20	59	59	68	39	24	DR	DR	DR	DR	DR
	24	66	66	76	44	27	DR	DR	DR	DR	DR
10	8	32	32	38	DR	DR	DR	DR	DR	DR	DR
	12	50	50	58	33	DR	DR	DR	DR	DR	DR
	16	62	62	71	41	25	DR	DR	DR	DR	DR
	20	72	72	82	48	29	DR	DR	DR	DR	DR
	24	80	80	91	54	33	27	26	DR	26	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 psf = 47.88 Pa.

DR = Design Required



\*Footnotes:

1. Table is based on loading as defined in Table R608.8(1).
2. All lintel designs are considered as controlled by the shear capacity of the plain concrete.
3. All reinforcement must extend at least 12 in. beyond the end of the opening.
4. See Table R608.3 for tolerances permitted from nominal thickness.
5. Table values are based on concrete with a minimum specified compressive strength of 2500 psi. Where concrete with a minimum specified compressive strength of 3000 psi is used, span values may be permitted to be multiplied by 1.05.
6. Tabulated values are based on uniform loading.
7. Deflection criterion is  $L/240$ , where L is the clear span of the lintel in inches, or  $\frac{1}{2}$  inch, whichever is less.
8. Linear interpolation is permitted between ground snow loads and between lintel depths.
9. DR indicates design required in accordance with the applicable building code, or in the absence of a code, in accordance with ACI 440.11.
10. Lintel depth, D, may include the available height of wall located directly above the lintel, provided that the increased lintel depth spans the entire length of the lintel.
11. The maximum clear opening width between two solid wall segments must be 18 feet (216 in.). See Section R608.7.2.1.

**TABLE 4 – NON-LOAD BEARING CONCRETE WALL LINTELS WITHOUT STIRRUPS\***

Non-Load Bearing Lintel Span Table Reinforced with (1) #4 OCIS GFRP bar (in)								
Lintel Depth (in)	Wall Thickness (in)							
	4		6		8		10	
	Lintel Supporting							
	Light Framed Gable	Concrete Wall	Light Framed Gable	Concrete Wall	Light Framed Gable	Concrete Wall	Light Framed Gable	Concrete Wall
8	216	195	216	173	216	173	216	173
12	216	216	216	216	216	216	216	216
16	216	216	216	216	216	216	216	216
20	216	216	216	216	216	216	216	216
24	216	216	216	216	216	216	216	216

**For SI:** 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 psf = 47.88 Pa.

\*Footnotes:

1. Table is based on loading as defined in Table R608.8(1).
2. All lintels are presumed to not have stirrups and are controlled by the shear capacity of the plain concrete.
3. All reinforcement must extend at least 12 in. beyond the end of the opening.
4. See Table R608.3 for tolerances permitted from nominal thickness.
5. Table values are based on concrete with a minimum specified compressive strength of 2500 psi. Where concrete with a minimum specified compressive strength of 3000 psi, span values may be permitted to be multiplied by 1.05.
6. Tabulated values are based on uniform loading.
7. Deflection criterion is  $L/240$ , where L is the clear span of the lintel in inches, or  $\frac{1}{2}$  inch, whichever is less.
8. Lintel depth, D, is permitted to include the available height of wall located directly above the lintel, provided that the increased lintel depth spans the entire length of the lintel.
9. The maximum clear opening width between two solid wall segments must be 18 feet. See Section R608.7.2.1.