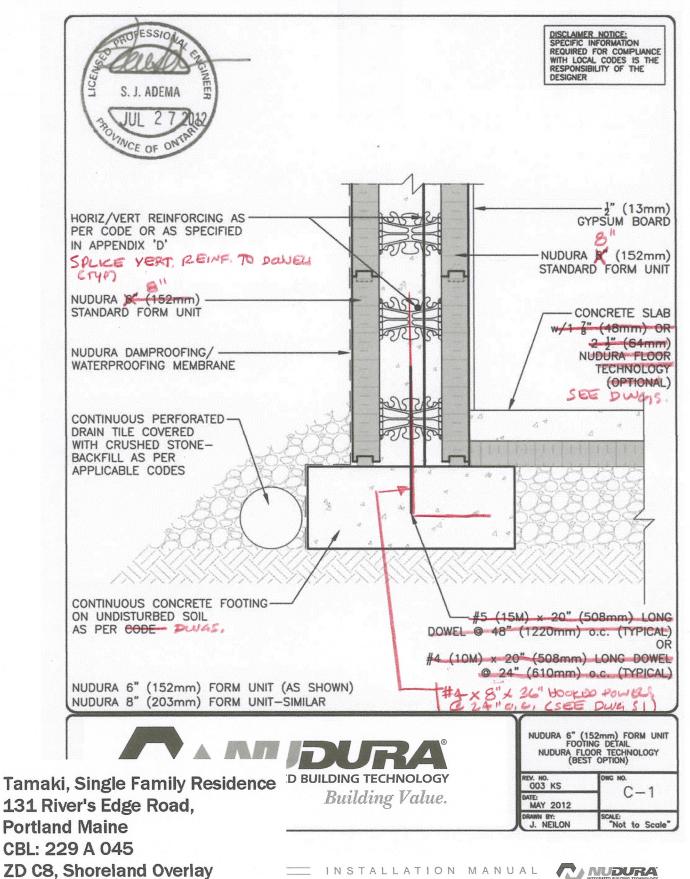
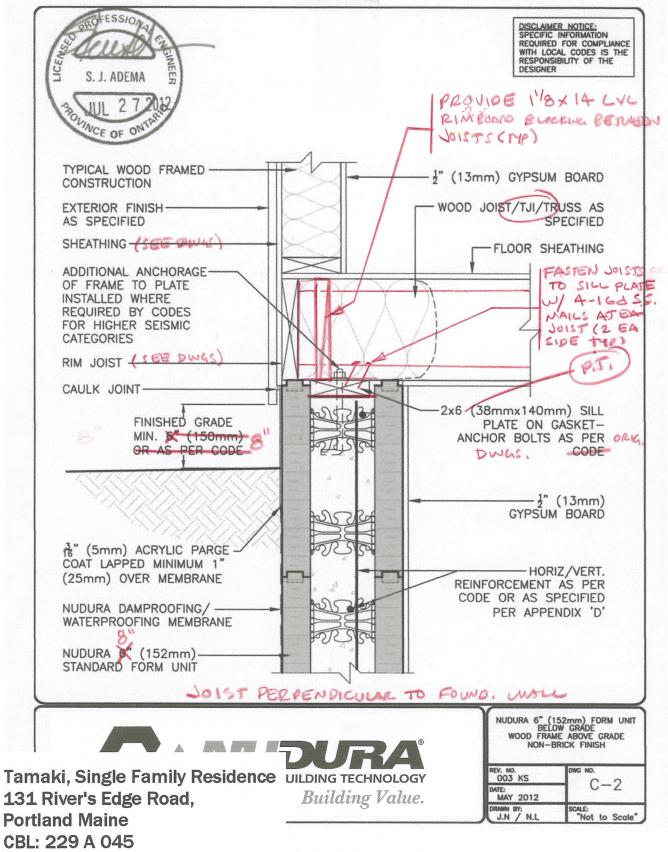
TYPICAL DETAILS C-1



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TYPICAL DETAILS C-2

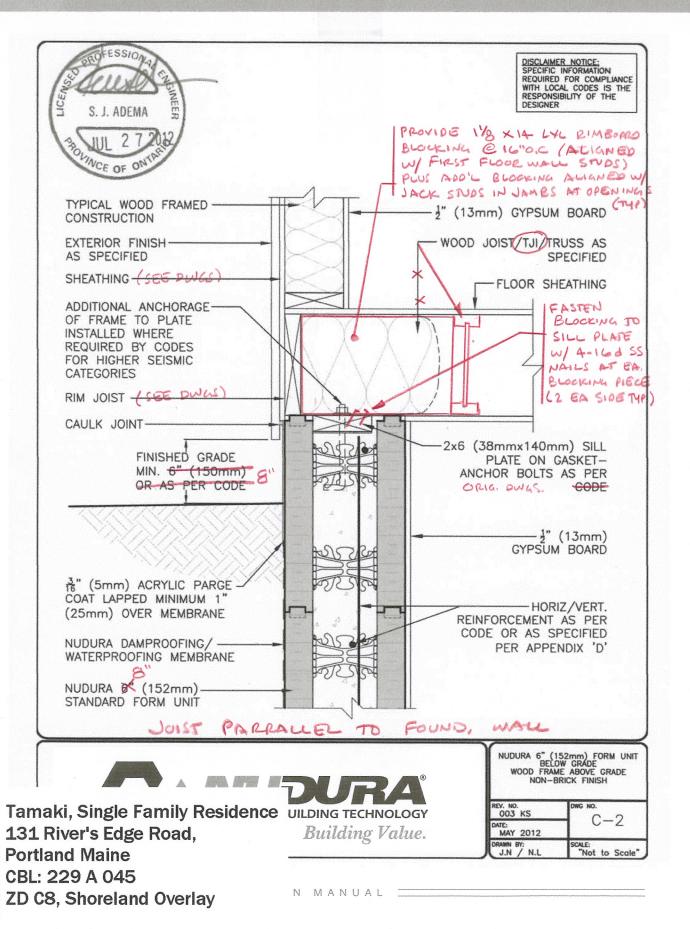


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ZD C8, Shoreland Overlay

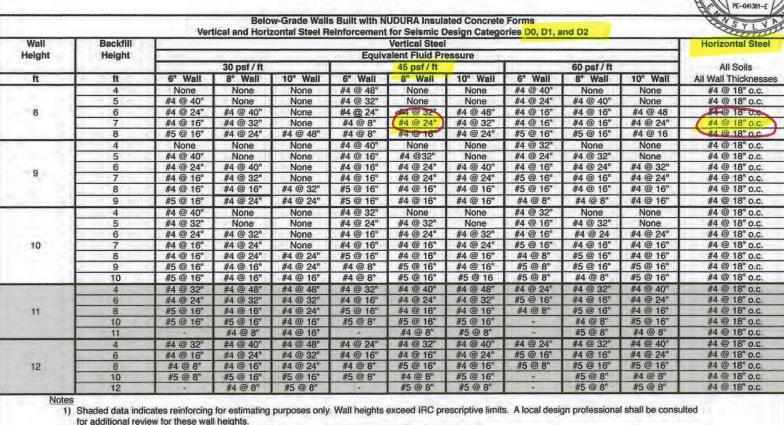
TYPICAL DETAILS C-2



RECOMMENDED WITH BACKFILL PER GENERAL FOUNDATION NOTE Nº 12 SHEET SI, DRAWINGS

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2) This table is to be used in conjunction with the "Design Limitations" prepared by The Kachele Group.

Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, design loads, additional wall reinforcing requirements 3) around openings, minimum wall length, and additional design and installation requirements.

5) Substitutions: #4 @ 32 = #5 @ 48, #4 @ 24 = #5 @ 32, #4 @ 16 = #5 @ 24, and #4 @ 8 = #6 @ 16.

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Design Limitations and Tables for Above and Below Grade Walls

INSTALLATION MANUAL





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Design Limitations

Introduction

The structural wall reinforcing and lintel design tables contained within the Appendix of NUDURA's Installation Manual have been prepared consistent with the design principals and practices that have been applied throughout the United States ICF industry for prescriptive design of insulated concrete form walls. The intent of these specific tables is to enable design and building reviewing professionals to competently determine reinforcement requirements for walls specifically constructed using the NUDURA Integrated Building Technology Insulated Concrete Form System[™]. For this reason, reinforcement specifications may vary slightly from prescriptive reinforcement configurations that may be specified within the 2006, 2009 and 2012 International Residential Codes (IRC) or referenced documents therein, as the design reflects the specific geometry and reinforcement capabilities that are unique to the NUDURA Wall System.

<u> Design – General</u>

- 1. These tables apply to one and two family residential structures that conform to the requirements of the 2006, 2009 or 2012 IRC and referenced design guides. All construction shall comply with the appropriate local building Codes.
- It is the responsibility of the parties involved, including the builder and subcontractors, to review the applicability of these tables and notes to the project specific conditions. The Kachele Group and NUDURA assume no responsibility with regard to the misinterpretation or misuse of the attached tables.
- 3. If the proposed construction does not meet the design or applicability parameters noted herein, a local design professional shall be retained to prepare the design in accordance with applicable standards and design Codes.
- 4. These tables have been designed to resist gravity, wind, and earthquake forces, as specifically noted, in accordance with the International Residential Code, along with the design loads and factors that are indicated in Notes 5 & 6 and within the structural tables contained in this appendix.



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- 5. The following maximum <u>UNFACTORED</u> loads were assumed in the design of the structural tables featured in this appendix:
 - A) Roof Snow Load (Live) = 49 psf (70 psf ground snow load)
 - B) Occupancy Load (Live) = 40 psf
 - C) Roof and Floor Load (Dead) = 15 psf
 - D) Soil Equivalent Fluid Pressure = 30, 45, and 60 psf / ft
 - E) Concrete Density (Dead) = 150 lb/ft^3
 - F) Seismic Design Categories A, B, C, D₀, D₁, and D₂
- 6. Design assumes that ALL walls are laterally supported at the top and bottom by building foundation, roof and floor systems, and associated diaphragms, designed by others.
- 7. Design limits concrete deflection to L/480.
- 8. Foundation walls are not designed for either hydrostatic pressure or additional lateral soil pressure associated with surcharge loading. These loading conditions require additional review.
- 9. Design assumes that the minimum 28 day compressive strength of concrete used in the installation shall be 3,000 psi. Actual design of the concrete mix is the responsibility of the ready mix supplier.
- 10.Design assumes that the reinforcing steel will be deformed rebar, placed in accordance with standard industry practice and ACI placement requirements and shall be supplied at the following yield strength:
 - ASTM A615 Grade 60 (fy = 60 ksi)
 - Grade 40 reinforcement may be substituted at 1.5 times the number of bars noted, or similarly 2/3 the spacing listed for requirements specified as 'on center spacing'
- 11.All wall reinforcement shall be proportionally and evenly distributed in both the transverse and longitudinal directions of the building.



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Design Limitations

12. The following maximum building dimensions are permitted for use:

- A) Building Width = 60 ft
- B) Floor Span = 32 ft
- C) Roof Span = 40 ft
- 13.Design is limited to one floor below grade and a maximum of two stories above grade, as well as a maximum mean roof height of 35 feet.
- 14.Maximum height of above grade walls = 10 ft. Reinforcement and wall information provided beyond this height as indicated by tan shaded section on each design table is for estimating purposes only. A local design professional is to be contacted for a site specific design at these locations.
- 15.Maximum height of foundation walls = 10 ft. Reinforcement and wall information provided beyond this height as indicated by tan shaded section on each design table is for estimating purposes only. A local design professional is to be contacted for a site specific design at these locations.
- 16.It is the responsibility of the roof or floor designer to ensure that adequate bearing for all framing members is provided on the concrete walls.

<u>Use of Design Tables</u> Specific Notes Regarding Vertical & Horizontal Steel Specifications

General

- 17.Height of foundation wall is defined as "the distance from the top of the basement floor slab to the point of bearing for the floor system".
- 18.Backfill height is defined as "the distance from the top of the basement floor slab to the finished exterior grade level".

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- 19.Except as otherwise indicated in Details C-12 through C-16, C-17 and C-19, all below grade wall vertical reinforcing shall be placed with the center axis of the bar being located 1 1/2" from the interior face of the concrete in the ICF forms (on the tension side of the wall).
- 20.Interpolation between backfill heights and soil equivalent fluid density is not permitted.
- 21.For walls above grade, vertical reinforcing shall be placed at the middle (or center axis) of the wall.
- 22.Horizontal reinforcing shall consist of #4 continuous bars at 36" on center, which includes (1) #4 continuous bar within 12" from the top of the wall and at floor levels, unless noted within the wall tables.

Rules for Reinforcement at Openings

- 23.In addition to the wall reinforcing indicated with the design tables of this appendix, a minimum of (2) #4 bars shall be installed at both sides of all openings in concrete, maintaining a minimum cover of 1½". Bars shall extend vertically for the full height of the wall pour, as shown in drawing L1 located within the "Lintel Design Limitations" document for concrete lintels. Vertical bars shall be installed with adequate splices at construction joints. (2) #4 bars shall also be installed at the base of the opening, again extending bars a minimum of 24" beyond both sides of the opening.
- 24.For foundation walls, the length of solid wall between two openings should be equal to the average width of the openings and shall be no less than a minimum of 4'-0''.
- 25.Openings in a foundation wall shall not exceed a maximum width of 6'-0". Egress walls outside of the foundation shall be self supporting and shall not be designed or constructed to induce additional lateral loading on the ICF foundation.
- 26.Each foundation wall shall not have a total width of openings in the wall constituting more than 25% of the length of the wall.



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27.For sections of wall between openings conforming to the above notes, the spacing of the vertical reinforcing must be decreased in these walls by a factor as calculated within the following formula:

width of wall between openings . (width of wall between openings + average width of the two openings)

28.If the spacing of the wall vertical reinforcing required between or on each side of openings is determined by the above calculation to be less than 4", a local design professional shall be retained to prepare the design in accordance with applicable standards.

Shear Walls

- 29.Shear walls and lateral resisting elements are to be in accordance with the 2006, 2009 or 2012 IRC. Refer to the additional referenced PCA 100 design guide where required by these Codes, including Seismic Design Category D, and wind speeds exceeding 130 mph, 110 mph, and 100 mph for exposure categories B, C, and D respectively.
- 30.Reinforcement tables are not to be used for structures classified as irregular in Seismic Design Categories C and D.
- 31.Reinforcement tables are not to be used for structures located where topographic factors may induce additional lateral loading.

Point Loads

- 32.All point loads, such as concentrated loads created by girder trusses, columns and beams, shall bear directly on top of the concrete wall, and shall not be hung or in any other manner create an eccentric loading on the concrete wall.
- 33.The minimum horizontal length of solid wall without openings directly below point loads, such as concentrated loads created by girder trusses, columns and beams, shall be 6'-0". In addition to the wall reinforcing required within the structural tables of this appendix, two additional #5 vertical bars shall be installed directly below the point load.



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Reinforcement at Corners

34.Two full height vertical bars, equal to the vertical reinforcing within the wall system, are to be installed at all corners.

Installation

General

35. The design and construction of all work on site shall conform to the latest editions of the applicable building codes for the region where installation is taking place, including local applicable code regulations and bylaws as well as all applicable health and safety regulations.

Footing Reinforcement

- 36.Strip footings are to be fitted with dowels to provide connection between the footing and the wall cavity. Dowels shall be installed along the center axis of the strip footings and shall be installed as per the details shown in this appendix.
- 37.Where footings or frost walls are not a requirement, when the footing is incorporated as part of a slab on grade foundation, dowels shall be embedded in the slab at equal size and spacing as the vertical reinforcement. Minimum embedment into both the slab and wall cavity shall be consistent with bar development and lapping requirements.

General Reinforcement Installation

- 38.Reinforcement placement must be in accordance with the specified design as per these notes and drawings produced in accordance with the NUDURA Structural Tables contained in Appendix C.
- 39. Minimum bar lap length shall be 40 bar diameters.



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Concrete Placement

- 40.Concrete work shall conform to the latest editions of ACI and ASTM standards for materials, placement, and workmanship:
- 41.Construction joints shall be made and located so as not to impair the strength of the structure. All specified reinforcing bars shall have minimum lap lengths across all construction joints.
- 42.Placement of concrete including adequate vibration is the responsibility of the contractor.
- 43.Concrete pours shall be terminated at locations of lateral support, such as provided by roof and floor systems.

Protection of Structure During Installation

- 44.Adequate frost protection shall be provided for all foundation walls and footings both during construction and in the final installation.
- 45.The contractor shall make adequate provision to protect concrete from exposure to freezing temperatures and precipitation for at least seven days after concrete placement.
- 46.Backfill shall be drained in accordance with IRC requirements
- 47.Walls shall be laterally supported at top and bottom prior to backfilling.
- 48.Surface grading around the foundation shall be sloped away from building to allow surface runoff to drain away. Provide a minimum slope of 6" over the first 10 feet or adequate drainage swales.
- 49. The contractor shall make adequate provision for construction loads and temporary bracing to keep structure plumb and in true alignment at all phases of construction.

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50.All work shall conform to the latest editions of ANY of the following codes and standards that are deemed applicable for your region including but not limited to:

- 2006, 2009 or 2012 International Residential Code.
- Document PCA 100 as referenced in the 2009 and 2012 IRC.
- Local building codes, local regulations, and laws
- Occupational Safety and Health Association Regulations.

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tor additional review for these wall heights. 2) This table is to be used in conjunction with the "Design Limitations" prepared by The Kachele Group.		3) Refer to	o the "Desig	Refer to the "Design Limitations" for information on Codes, construction methods, material s	or information	on Codes, con	istruction meth	ods, material :	specifications,	design loads,	additional wall	Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, design loads, additional wall reinforcing requirements	lirements





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ANTHONY L. MOSCOLLIC ROFESSIONA

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#4 @ 24" o.c. #4 @ 40" o.c. #4 @ 48" o.c. #4 @ 24" o.c. #4 @ 40" o.c. #4 @ 48" o.c. #4 @ 32" o.c. #4 @ 40" o.c. #4 @ 48" o.c. #4 @ 24" o.c. #4 @ 32" o.c. #4 @ 32" o.c. #4 @ 24" o.c. #4 @ 24" o.c. #4 @ 24" o.c.	#4 @ 24" o.c. #4 @ 40" o.c. #4 @ 48" o.c. http://www.mailingtonecomment #4 @ 32" o.c. #4 @ 48" o.c. http://www.mailingtonecomment #4 @ 32" o.c. #4 @ 32" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 32" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @ 24" o.c. http://www.mailingtonecomment #4 @ 24" o.c. #4 @		#4 @ 32" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
#4 @ 32" o.c. #4 @ 40" o.c. #4 @ 48" o.c. #4 @ 24" o.c. #4 @ 32" o.c. #4 @ 32" o.c. #4 @ 16" o.c. #4 @ 24" o.c. #4 @ 24" o.c.	#4 @ 32" o.c. #4 @ 40" o.c. #4 @ 48" o.c. #4 @ 24" o.c. #4 @ 24" o.c. #4 @ 32" o.c. Motes #4 @ 24" o.c. #4 @ 32" o.c. 1) Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits local design professional shall be consulted for additional review for these wall heights. #4 @ 24" o.c. 1) Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits local design professional shall be consulted for additional review for these wall heights. #4 @ 24" o.c. 2) This table is to be used in conjunction with the "Design Limitations" prepared by The Kachele Group. 3) Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, distribution wall reinforcing requirements around openings, minimum wall length, and additional design installation requirements.	0	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
#4 @ 24" 0.C. #4 @ 32" 0.C. #4 @ 32" 0.C. #4 @ 22" 0.C. #4 @ 16" 0.C. #4 @ 24" 0.C.	#4 @ 24" o.c. #4 @ 32" o.c. #4 @ 32" o.c. Motes #4 @ 16" o.c. #4 @ 24" o.c. #4 @ 24" o.c. I) Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits local design professional shall be consulted for additional review for these wall heights. #4 @ 24" o.c. I) Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits local design professional shall be consulted for additional review for these wall heights. #4 @ 24" o.c. 2) This table is to be used in conjunction with the "Design Limitations" prepared by The Kachele Group. 3) Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, d loads, additional wall reinforcing requirements around openings, minimum wall length, and additional design installation requirements.	2		#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
- #4 @ 16" o.c. #4 @ 24" o.c. #4 @ 24" o.c. #4 @	#4 @ 16" o.c. #4 @ 24" o.c. #4 @ 24" o.c. #4 @ 24" o.c. #4 @ 24" o.c. Notes 1) Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits. A local design professional shall be consulted for additional review for these wall heights. 2) This table is to be used in conjunction with the "Design Limitations" prepared by The Kachele Group. 3) Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, design limitalition requirements.	4		#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 32" o.c.	#4 @ 36" o.c.
		9			#4 @ 24" o.c.	#4 @ 24" o.c.	0
SUDV	_,	1		einforcing for estimating p	ourposes only. Wall height	s exceed IRC prescriptive	limits. A
Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits.				I shall be consulted for ac	dditional review for these	vall heights.	
Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits. local design professional shall be consulted for additional review for these wall heights.		3		n conjunction with the "D	esign Limitations" prepare	ed by The Kachele Group.	
		ŝ	_	itations" for information c	on Codes, construction me	thods, material specificat	ons, design
			loads, additional wall reli	ntorcing requirements are	ound openings, minimum	vall lengtn, and additional	design and
			Installation requirements				

INSTALLATION MANUAL

REINFORCING TABLES D-3

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Wall		Vertic	Vertical Steel	4	Horizontal Steel
Height	120	120 mph Basic Wind Speed (3 second gust) Exposure B	(3 second gust) Expos	ure B	AI
		Seismic Design C	Seismic Design Category A, B, or C		Scenarios
ō	One Story Concrete Stri	ete Structure or Top Floor of 2 Story Concrete Structure Supporting Wood Frame Roof	Story Concrete Structu	re Supporting Wood Fra	ame Roof
ft	4" Wall	6" Wall	8" Wall	10" Wall	
8	#4 @ 32" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
6	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
10	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
12		#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 36" o.c.
14		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 24" o.c.	#4 @ 36" o.c.
16		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 36" o.c.
	Lower Floor of 2 Story	2 Story Concrete Structure Supporting 2nd Story Wood Framed Walls, Floor,	pporting 2nd Story Woo		& Roof
H H	4" Wall	6" Wall	8" Wall	10" Wall	
8	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
6	#4 @ 16" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
10	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
12		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 36" o.c.
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 36" o.c.
16		#5 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 36" o.c.
Lower	Lower Floor of 2 Story Concrete	crete Structure Supporti	Structure Supporting 2nd Story Concrete Walls and Wood Frame Floor & Roof	Walls and Wood Frame	Floor & Roof
tt t	4" Wall	6" Wall	8" Wall	10" Wall	
8	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
6	#4 @ 16" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
10	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
12		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 36" o.c.
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 36" o.c.
16		#5 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 36" o.c.
Notes 1) S	shaded data indicates re	Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IBC prescriptive limits. A	urposes only. Wall height	s exceed IBC prescriptive	e limits. A
	ocal design professiona	This table is the most in and most in the	dditional review for these	wall heights.	
- H () () ()	Refer to the "Design Lim	Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, design code additional well sciencing contribution around accine and information and	on Codes, construction me	ethods, material specifica	tions, design
1.5	installation requirements.	r waii remorcing requirements around operings, minimum waii rengur, and audional uesign and rements.	חוות האבוווואיייייייייייייייייייייייייייייייי	אמון וכוואווי מווח מטמווטווס	ו תפאולוו מווח
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Wall		Vertica	vertical steel		HORIZONIAI SIEE
Height	150	150 mph Basic Wind Speed (3 second gust) Exposure B	(3 second gust) Exposi	ure B	All
		Seismic Design C	Seismic Design Category A, B, or C		Scenarios
	One Story Concrete Str	ucture or Top Floor of 2	Story Concrete Structu	e Structure or Top Floor of 2 Story Concrete Structure Supporting Wood Frame Roof	me Roof
ų	4" Wall	6" Wall	8" Wall	10" Wall	
8	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
6	#4 @ 16" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
10	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 36" o.c.
12		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 24" o.c.	#4 @ 36" o.c.
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 36" o.c.
16		#4 @ 8" 0.C.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 36" o.c.
	Lower Floor of 2 Story	/ Concrete Structure Su	pporting 2nd Story Woo	Story Concrete Structure Supporting 2nd Story Wood Framed Walls, Floor, & Roof	& Roof
ft	4" Wall	6" Wall	8" Wall	10" Wall	
8	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
6	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 36" o.c.
10	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 36" o.c.
12	-	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 36" o.c.
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 36" o.c.
16	•	#4 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 36" o.c.
Low	Lower Floor of 2 Story Cond	crete Structure Supporti	ng 2nd Story Concrete	Concrete Structure Supporting 2nd Story Concrete Walls and Wood Frame Floor & Roof	Floor & Roof
ft	4" Wall	6" Wall	8" Wall	10" Wall	
8	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 36" o.c.
6	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 36" o.c.
10	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 36" o.c.
12		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 36" o.c.
14	÷	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 36" o.c.
16	•	#4 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 36" o.c.
Notes 1) 2) 3)		Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IR local design professional shall be consulted for additional review for these wall heights. This table is to be used in conjunction with the "Design Limitations" prepared by The Ka Refer to the "Design Limitations" for information on Codes, construction methods, mate loads, additional wall reinforcing requirements around openings, minimum wall length, installation requirements.	urposes only. Wall height Iditional review for these v esign Limitations" prepare n Codes, construction me ound openings, minimum	Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits. A local design professional shall be consulted for additional review for these wall heights. This table is to be used in conjunction with the "Design Limitations" prepared by The Kachele Group. Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, design loads, additional wall reinforcing requirements around openings, minimum wall length, and additional design and installation requirements.	ug pa
4)		For 150 mph Exposure C conditions, consult with a local design professional	a local design profession	al.	

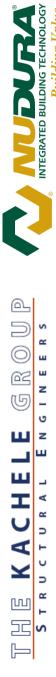
REINFORCING TABLES D-5

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		Vertic	Vertical Steel		Horizontal Steel
Height	90 m	mph Basic Wind Speed	Iph Basic Wind Speed (3 second gust) Exposure B	e B	AII
		Seismic Desi	Seismic Design Category D		Scenarios
	One Story Concrete Stru	ructure or Top Floor of 2	cture or Top Floor of 2 Story Concrete Structure Supporting Wood Frame Roof	e Supporting Wood Fra	me Roof
ft	4" Wall	6" Wall	8" Wall	10" Wall	
8		#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 18" 0.C.
6		#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 18" o.c.
10		#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 18" 0.C.
12		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 24" o.c.	#4 @ 18" o.c.
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" o.c.
16		#4 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" o.c.
	Lower Floor of 2 Story		Concrete Structure Supporting 2nd Story Wood Framed Walls, Floor, & Roof	d Framed Walls, Floor,	& Roof
ft	4" Wall	6" Wall	8" Wall	10" Wall	
80		#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 18" o.c.
6	3	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 18" o.c.
10		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 18" o.c.
12		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 18" o.c.
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" o.c.
16		#5 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" o.c.
Lov	Lower Floor of 2 Story Conc	rete	Structure Supporting 2nd Story Concrete Walls and Wood Frame Floor & Roof	Valls and Wood Frame	Floor & Roof
+	4" Wall	6" Wall	8" Wall	10" Wall	
8	•	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 18" o.c.
6		#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 18" o.c.
10		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 18" o.c.
12	3	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 18" o.c.
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" o.c.
16		#4 @ 8" o.c.	#5 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 18" o.c.
N	And the second sec	Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive local design professional shall be consulted for additional review for these wall heights. This table is to be used in conjunction with the "Design Limitations" prepared by The Kachele Group. Refer to the "Design Limitations" for information on Codes, construction methods, material specificational installation requirements.	inforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits. A shall be consulted for additional review for these wall heights. A conjunction with the "Design Limitations" prepared by The Kachele Group. tations" for information on Codes, construction methods, material specifications, design forcing requirements around openings, minimum wall length, and additional design and	a contract of the second line of the second line of the second line of the second of the second of the second second of the second second of the second seco	limits. ons, de design





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Wall		Vertica	vertical Steel		
Height	120	120 mph Basic Wind Speed (3 second gust) Exposure B	(3 second gust) Exposi	ure B	AII
		Seismic Desig	Seismic Design Category D		Scenarios
0	One Story Concrete Sti	crete Structure or Top Floor of 2 Story Concrete Structure Supporting Wood Frame Roof	Story Concrete Structu	re Supporting Wood Fra	Ime Roof
ft.	4" Wall	6" Wall	8" Wall	10" Wall	
8		#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 48" o.c.	#4 @ 18" o.c.
6		#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 18" o.c.
10		#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 18" o.c.
12		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 24" o.c.	#4 @ 18" o.c
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" o.c.
16		#4 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" o.c.
	Lower Floor of 2 Stor	of 2 Story Concrete Structure Supporting 2nd Story Wood Framed Walls, Floor, & Roof	pporting 2nd Story Woo	od Framed Walls, Floor,	& Roof
Ħ	4" Wall	6" Wall	8" Wall	10" Wall	
8	1 A A	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 18" o.c.
6		#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 18" o.c.
10		#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 18" o.c
12	-	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 18" o.c.
14	-	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" 0.C.
16		#4 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" 0.C.
Low	Lower Floor of 2 Story Con	ory Concrete Structure Supporting 2nd Story Concrete Walls and Wood Frame Floor & Roof	ng 2nd Story Concrete	Walls and Wood Frame	Floor & Roof
ft ft	4" Wall	6" Wall	8" Wall	10" Wall	
8	10 million	#4 @ 24" o.c.	#4 @ 40" o.c.	#4 @ 48" o.c.	#4 @ 18" 0.C
6		#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 40" o.c.	#4 @ 18" o.c
10	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 32" o.c.	#4 @ 18" o.c.
12		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 24" o.c.	#4 @ 18" o.c.
14		#5 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 16" o.c.	#4 @ 18" o.c
16	44	#4 @ 8" o.c.	#5 @ 8" o.c.	#5 @ 16" o.c.	#4 @ 18" o.c
1) 1) 2)	ting the second second	Shaded data indicates reinforcing for estimating purposes only. Wall heights exceed IRC prescriptive limits. A local design professional shall be consulted for additional review for these wall heights. This table is to be used in conjunction with the "Design Limitations" prepared by The Kachele Group.	urposes only. Wall height Iditional review for these esign Limitations" prepare	s exceed IRC prescriptive wall heights. ed by The Kachele Group	e limits. A
3)		Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, design	n Codes, construction me	ethods, material specificat	ions, design

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For Exposure C conditions with a 120 mph Basic Wind Speed, use the 150 mph tables. Substitutions: #4 @ 32 = #5 @ 48, #4 @ 24 = #5 @ 32, and #4 @ 16 = #5 @ 24

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eed (3 second gust) Exposure B Design Category D of 2 Story Concrete Structure Sur 8" Wall #4 @ 48" o.c. #4 @ 49" o.c. #4 @ 24" o.c. #4 @ 24" o.c. #4 @ 24" o.c. #6 @ 16" o.c. #5 @ 16" o.c. #5 @ 16" o.c. #6 @ 16" o.c. #7 @ 16" o.c. #6 @ 16" o.c. #7 @ 16" o.c. #6 @ 16" o.c. #6 @ 16" o.c. #7 @ 16" o.c. #6 @ 16" o.c. #6 @ 16" o.c. #7 @ 16" o.c.	All Scenarios Scenarios Scenarios C. #4 @ 18" 0.c. C. #4 @ 18" 0.c. Floor, & Roof C. #4 @ 18" 0.c. C. #4 @ 18" 0.c. Floor, A Roof C. #4 @ 18" 0.c. C. #4 @ 18" 0.c. Floor, A Roof C. #4 @ 18" 0.c. C. #4 @ 18" 0.c. Floor, A Roof C. #4 @ 18" 0.c. C. #4 @ 18" 0.c. C. #4 @ 18" 0.c. Floor, A Roof C. #4 @ 18" 0.c. C. #4 @ 0.c. C. #4 @ 18" 0.c. C. #4 @ 0.8 @ 0.8 @ 0.c. C. #4 @ 0.8 @ 0.8 @ 0.c. C. #4 @ 0.8 @ 0.6 @
One Story Conc 4" Wal	Scenari (@ 18" (@ 18" (@ 18" (@ 18" (@ 18" (@ 18" (@ 18")
One Story Conc 4" Wal	(0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18"
4" Wal	(0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18" (0) 18"
Lower Floor of	#4 @ 18" #4 @ 18"
Lower Floor of	#4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18"
Lower Floor of	#4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18"
Lower Floor of 4" Wall	#4 0 18" #4 0 18" #4 0 18" #4 0 18" #4 0 18" #4 0 18" #4 0 18" #4 0 18" #4 0 18"
Lower Floor of 4" Wall	#4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18"
Lower Floor of 4" Wall	#4 @ 18" #4 @ 18" #4 @ 18" #4 @ 18"
Lower Floor of 4" Wall	Floor, & Roof .c. #4 @ 18" o.0 .c. #4 @ 18" o.0 .c. #4 @ 18" o.0
4" Wall	.c. #4 @ 18" o.0 .c. #4 @ 18" o.0 .c. #4 @ 18" o.0 .c. #4 @ 18" o.0
- #4 @ 24" o.C. #4 @ 40" o.C.	
12 #4 @ 16" o.c. #4 @ 16" o.c. #4 @ 0.c. #4 @ 24" o.c.	.c. #4 @ 18" o.c.
14 #4@16" o.c. #4@16" o.c. #4@16" o.c. #4@16" o.c.	
16 - #4 @ 8" o.c. #5 @ 16" o.c. #4 @ 16" o.c.	.c. #4 @ 18" o.c.
Lower Floor of 2 Story Concrete Structure Supporting 2nd Story Concrete Walls and Wood Frame Floor & Roof	Frame Floor & Roof
ft 4" Wall 6" Wall 8" Wall 10" Wall	
8 - #4 @ 24" o.c. #4 @ 40" o.c. #4 @ 48" o.c.	.c. #4 @ 18" o.c.
9 - #4 @ 24" o.c. #4 @ 32" o.c. #4 @ 40" o.c.	
#4	
12 #4 @ 16" o.c. #4 @ 16" o.c. #4 @ 24" o.c.	.c. #4 @ 18" o.c.
#4	.c. #4 @ 18" o.c.
16 - #4 @ 8" o.c. #5 @ 8" o.c. #5 @ 16" o.c.	

Refer to the "Design Limitations" for information on Codes, construction methods, material specifications, design loads, additional wall reinforcing requirements around openings, minimum wall length, and additional design and installation requirements. 3

For 150 mph Exposure C conditions, consult with a local design professional. Substitutions: #4 @ 32 = #5 @ 48, #4 @ 24 = #5 @ 32, and #4 @ 16 = #5 @ 242 4

