

DISCLAIMER

By using the LOGIX Design Manual, in part or in whole, the user accepts the following terms and conditions.

The LOGIX Design Manual shall be used for the sole purpose of estimating, design or construction of LOGIX Insulated Concrete Forms used in residential, commercial or industrial structures.

The information represented herein is to be used as a reference guide only. The user shall check to ensure the information provided in this manual, including updates and amendments, meets local building codes and construction practices by consulting local building officials, construction and design professionals, including any additional requirements.

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The user shall check to ensure that any construction projects utilizing the LOGIX Design Manual includes the latest updates/amendments (related to the version of the LOGIX Design Manual being used at the time of the construction project). Updates/amendments to the LOGIX Design Manual are available for download in the "Technical Library" under "Addenda" at www.logixicf.com.

6.1 – U.S. ENGINEERING ANALYSIS REPORT

INTRODUCTION

LOGIX walls are intended to be used both above and below grade, and can carry large vertical as well as lateral loads. They are particularly effective for residential, commercial and industrial buildings; providing excellent insulation as well as thermal mass and structural strength. They can be easily adapted to accommodate concrete floors and other “non-standard” building systems.

Construction must be in conformance with the LOGIX Design Manual, including assembly of formwork, bracing, accurate rebar positioning, concrete mix design & placement, and details for interconnection with the other building components.

STRUCTURAL DESIGN AND PERFORMANCE

The LOGIX Building System can be used for an infinite variety of building situations with proper engineering. This report, with its load tables and diagrams, is intended to assist with the structural design of buildings using the LOGIX system for the basement only, or continuing to two stories above-grade and/or roof. Where unusual conditions are encountered, it is recommended that the user consult a designer who can evaluate the loadings to the various components and who can appreciate the limitations of “prescriptive” design under unusual conditions. Connection details have generally been excluded from this report because of the great variety of floor and roof systems that can be used with the Logix wall system. The designer should refer to the Logix Design Manual and the literature for the various proprietary products that are available for connections, which are an important part of the total design.

REINFORCEMENT TABLES

Above- and below-grade walls and lintel reinforcement tables are provided in this report. The tables were developed using the applicable sections of Chapter 16 of the International Building Code 2012, Sections 404 and 611 of the International Residential Code 2012, and ACI 318 Building Code Requirements for Structural Concrete.

Table 1 makes use of plain concrete foundation walls adapted from the IRC 2012, Table 404.1.2(8), for LOGIX used below-grade. For walls that fall outside the scope of Table 1, Tables 2A, 2B, 2C and 2D are provided, which cover wall reinforcement for larger walls and larger loading conditions.

Tables 3A and 3B provides reinforcement tables for LOGIX walls used above-grade.

HELIX TSMR TABLES - ALTERNATIVE TO REBAR REINFORCEMENT TABLES

Where applicable, Helix TSMR (Twisted Steel Micro Rebar) Tables 2A-H to 2D-H, and Tables 3.1A-H to 3.6A-H, and 3.1B-H to 3.6B-H, may be used in lieu of the reinforcement requirements in Tables 2A to 2D, and Tables 3A and 3B. Helix is steel fibre reinforcement that can significantly reduce the amount of horizontal and vertical reinforcement in above- and below-grade concrete walls, with exception of lintel and shear wall reinforcement. (For lintel and shear wall reinforcement see Tables 4A to 4E, 5A to 5E and 6A, 6B)

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LIMITATIONS

The limitations of Reinforcement Tables 2A to 2D, and Tabs 3A and 3B, also apply to Helix alternative reinforcement Tables 3.1A-H to 3.6A-H, and 3.1B-H to 3.6B-H.

Building limitations used to develop above- and below-grade tables include:

Building perimeter = 80 ft max x 40 ft max
Roof clear span = 40 ft max
Floor clear span = 32 ft max
Number of stories above grade = 2 max
Number of stories below grade = 1

Tables 4A to 4E and Tables 5A to 5E provide lintel tables for factored uniform and concentrated loading conditions, respectively.

More specific design assumptions and limitations are located with the corresponding reinforcement tables.

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BELOW-GRADE WALL REINFORCEMENT TABLES

NOTES FOR TABLE 1 - BELOW-GRADE TABLE ADAPTED FROM IRC 2012

Table 1 was developed adapting Table 404.1.2(8), Minimum Vertical Reinforcement For 6-, 8-, 10-Inch And 12-Inch Nominal Flat Basement Walls, of IRC 2012. Table 1 allows the use of foundation walls without reinforcement (in lieu of Tables 2A to 2D) provided the walls meet the following criteria:

1. Minimum 28day compressive strength of concrete = 2500 psi
2. Concrete foundation walls with corbels (ie, brick ledge), brackets or other projections built into the wall for support of masonry veneer or other purposes are not within the scope of the tables in this section
3. Where vertical rebar is not required (NR), provide minimum horizontal rebar as follows (Table 404.1.2(1)):
 - Maximum unsupported height of basement wall is LESS than or equal to 8 ft - One No. 4 bar within 12 inches of the top of the wall story and one No. 4 bar near mid-height of the wall story
 - Maximum unsupported height of basement wall is GREATER than 8 ft - One No. 4 bar within 12 inches of the top of the wall story and one No. 4 bar near third points in the wall story
4. Walls are not subject to hydrostatic pressure from ground water
5. Walls must be laterally supported at top and bottom of wall before backfilling
6. Interpolation is not permitted
7. Maximum 60 feet in plan dimensions, floors not more than 32 feet or roofs not more than 40 feet in clear span. Buildings shall not exceed 2 stories above-grade with each story not more than 10 feet high. Maximum ground snow load of 70 psf, and located in Seismic Design Categories A, B or C. For Seismic Design Categories D0, D1, or D2 see Items 7 to 9.
8. In Seismic Design Category D0, D1, and D2, concrete foundation walls supporting above grade concrete or LOGIX walls shall comply with above and below-grade tables in this manual, ACI 318, ACI 332 or PCA 100
9. In Seismic Design Category D0, D1, and D2, where Table 1 permits plain concrete, and supporting light-frame walls shall comply with the following:
 - Wall height shall not exceed 8 feet
 - Unbalanced backfill height shall not exceed 4 feet
 - Minimum thickness for plain concrete foundation walls shall be 7.5 inches except that 6 inches is permitted where the maximum wall height is 4 feet, 6 inches
 - Minimum reinforcement shall consist of one #4 horizontal bar within the top 12 inches of the wall
10. Backfill shall not be placed against the wall until the wall has sufficient strength and has been anchored to the floor above, or has been sufficiently braced to prevent damage by the back fill.
11. For walls that fall outside the scope Table 1 see "Notes for Tables 2A to 2D - LOGIX Below-grade Tables."

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TABLE 1 - LOGIX BELOW-GRADE WALLS MINIMUM VERTICAL REINFORCEMENT - IRC2012

NOTE: LOGIX recommends builders, owners and/or designers using these tables confirm that on-site building conditions are w/in the scope of the tables being used.

Height of Basement Wall, ft	Max. Unbalanced Backfill Height, ft	6.25" LOGIX			8" LOGIX			10" LOGIX			12" LOGIX		
		Design Lateral Soil Load (psf per foot of depth)			Design Lateral Soil Load (psf per foot of depth)			Design Lateral Soil Load (psf per foot of depth)			Design Lateral Soil Load (psf per foot of depth)		
		30	45	60	30	45	60	30	45	60	30	45	60
5	5	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	4	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	6	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
7	4	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	6	RR	RR	RR	NR	NR	RR	NR	NR	NR	NR	NR	NR
	7	RR	RR	RR	NR	RR	RR	NR	NR	NR	NR	NR	NR
8	4	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	6	RR	RR	RR	NR	NR	RR	NR	NR	NR	NR	NR	NR
	7	RR	RR	RR	NR	RR	RR	NR	NR	NR	NR	NR	NR
	8	RR	RR	RR	RR	RR	RR	NR	NR	RR	NR	NR	NR
9	4	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	6	RR	RR	RR	NR	NR	RR	NR	NR	NR	NR	NR	NR
	7	RR	RR	RR	NR	RR	RR	NR	NR	RR	NR	NR	NR
	8	RR	RR	RR	RR	RR	RR	NR	RR	RR	NR	NR	RR
10	4	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	RR	RR	RR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	6	RR	RR	RR	NR	NR	RR	NR	NR	NR	NR	NR	NR
	7	RR	RR	RR	NR	RR	RR	NR	NR	RR	NR	NR	NR
	8	RR	RR	RR	RR	RR	RR	NR	RR	RR	NR	NR	RR
	9	RR	RR	RR	RR	RR	RR	RR	RR	RR	NR	RR	RR
10	RR	RR	RR	RR	RR	RR	RR	RR	RR	NR	RR	RR	

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NOTES:

1. "NR" denotes plain concrete or no reinforcement required, except 6.25" LOGIX will requires #4@32" on center.
2. "RR" denotes reinforcement required. Refer to Tables 2A to 2D for LOGIX Below-grade tables.
3. Table 1 shall be read in conjunction with "Notes for Table 1 - Below-grade Table Adapted from IRC 2012".



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NOTES FOR TABLES 2A to 2D - LOGIX BELOW-GRADE TABLES

Tables 2A to 2D are recommended for use when larger walls and/or loading conditions fall outside the scope of Table 1. Alternatively, and where applicable, Helix dosage Tables 2A-H to 2D-H may be used in lieu of Logix reinforcement Tables 2A to 2D.

Tables 2A to 2D, and 2A-H to 2D-H, and shall be used in conjunction with corresponding Figures 2A to 2D, the notes listed below, and the building limitations noted in the "Reinforcement Tables" section, which form the basis of these tables.

1. Vertical rebar spacing shown in the tables provide simple placement between ICF ties.
2. Steel yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi
3. Rebar spacing is based on 40 ksi reinforcing steel. For spacing based on 60 ksi reinforcing steel multiply spacings by 1.5.
4. Deflection criteria = $L/240$
5. Snow load = 70 psf
6. Assumed eccentricity = 3" (to account for loads on LOGIX Brick Ledge).
7. The basement walls must be supported at the top and bottom of the wall.
8. For light vehicles parked or travelling near the wall use reinforcement corresponding to 1 feet higher backfill.
9. Where spaces have been left blank, the corresponding bar size is presumed to be less economical and/or practical than that shown. Consult a local licensed engineer to determine proper design.
10. For walls with over 50% of height exposed to wind, also check rebar requirements for above-grade walls.
11. Except as noted for seismic design, horizontal rebar shall be #4 at 32 inches on center. At least one rebar shall be placed at the bottom course and top course.
12. In Seismic Design Categories D0, D1, and D2, the reinforcing steel shall meet the requirements of ASTM A 706 for low-alloy steel with a minimum yield strength of 60 ksi.
13. For townhouses in Seismic Category C, the minimum vertical reinforcement shall be one #5 at 24 inches on center or one #4 bar at 16 inches on center, and the minimum horizontal reinforcement shall be one #4 bar at 16 inches on center.
14. For all buildings in Seismic Design Categories D0, D1 and D2, the minimum vertical reinforcement shall be one #5 at 18 inches on center or one #4 bar at 12 inches on center, and the minimum horizontal reinforcement shall be one #5 bar at 16 inches on center.
15. Horizontal reinforcement shall be continuous around building corners using corner bars or by bending the bars. The minimum lap splice shall be 24 inches. For townhouses in Seismic Design Categories D0, D1, and D2, each end of all horizontal reinforcement shall terminate with a standard hook or lap splice.
16. Carefully consider floor/wall connection details for lateral loads, especially with higher backfills, walkout basements, and active seismic areas.
17. Soil density is often referred to as "equivalent fluid density" or design fluid pressure.
18. Where applicable alternative Helix dosage Tables 2A-H to 2D-H may be used in lieu of Logix reinforcement Tables 2A to 2D.

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NOTES FOR TABLES 2A to 2D - LOGIX BELOW-GRADE TABLES Cont'd

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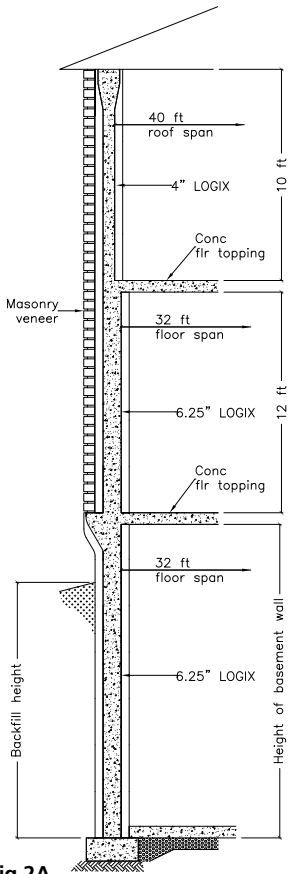


Fig 2A
Assumed typical flooring, wall & roof for **Table 2A**. Height & thickness of above-grade walls, floor & roof spans, including materials (i.e., wood frame, concrete, and cladding) can vary provided the total factored load on basement wall does not exceed 6.7 kips/ft.

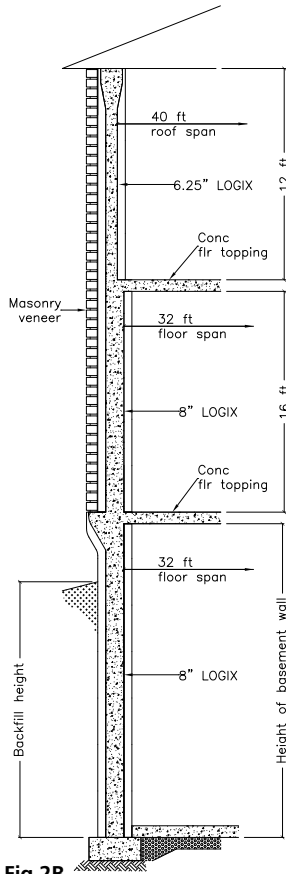


Fig 2B
Assumed typical flooring, wall & roof for **Table 2B**. Height & thickness of above-grade walls, floor & roof spans, including materials (i.e., wood frame, concrete, and cladding) can vary provided the total factored load on basement wall does not exceed 8 kips/ft.

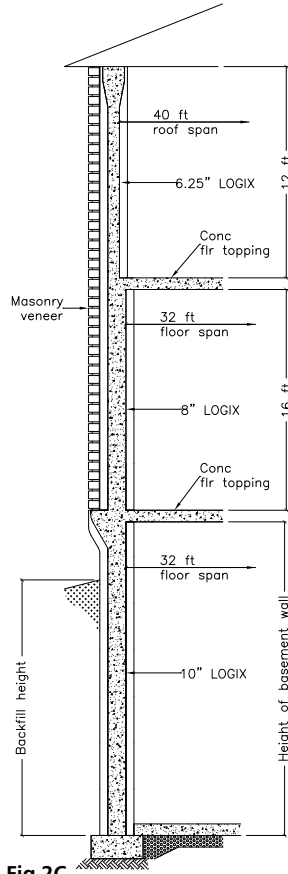


Fig 2C
Assumed typical flooring, wall & roof for **Table 2C**. Height & thickness of above-grade walls, floor & roof spans, including materials (i.e., wood frame, concrete, and cladding) can vary provided the total factored load on basement wall does not exceed 8 kips/ft.

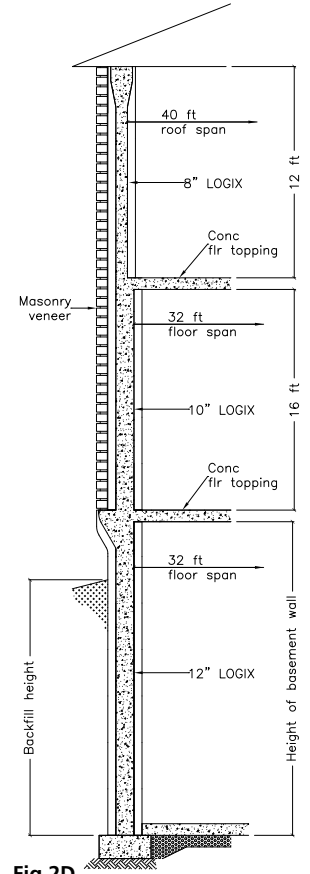


Fig 2D
Assumed typical flooring, wall & roof for **Table 2D**. Height & thickness of above-grade walls, floor & roof spans, including materials (i.e., wood frame, concrete, and cladding) can vary provided the total factored load on basement wall does not exceed 9 kips/ft.

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TABLE 2A - LOGIX 6.25" BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT

NOTE: LOGIX recommends builders, owners and/or designers using these tables confirm that on-site building conditions are w/in the scope of the tables being used.

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Bar Spacing, in.																								
		Maximum Equivalent Density 30pcf					Maximum Equivalent Density 45pcf					Maximum Equivalent Density 60pcf					Maximum Equivalent Density 75pcf									
		#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8					
8	4	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	5	48	48	48	48	48	48	48	48	48	48	24	40	48	48	48	16	24	40	48	48	16	24	40	48	48
	6	48	48	48	48	48	24	32	48	48	48	12	16	24	40	48	8	12	16	24	32	8	12	16	24	32
	7	24	40	48	48	48	12	16	24	32	48	8	12	16	24	32	6	8	12	16	24	6	8	12	16	24
	8	16	24	32	48	48	8	12	16	24	32	6	8	12	16	16	-	6	8	12	16	-	6	8	12	16
9	4	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	5	48	48	48	48	48	40	48	48	48	48	24	32	48	48	48	16	24	32	40	48	16	24	32	40	48
	6	40	48	48	48	48	16	24	32	48	48	12	16	24	32	40	8	12	16	24	32	8	12	16	24	32
	7	16	32	40	48	48	8	16	16	24	32	6	8	12	16	24	-	8	8	12	16	-	8	8	12	16
	8	12	16	24	32	48	6	8	12	16	24	-	6	8	12	16	-	6	8	12	16	-	-	8	6	12
10	4	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	40	48	48	48	48	40	48	48	48	48
	5	48	48	48	48	48	32	48	48	48	48	16	24	40	48	48	12	16	24	32	48	12	16	24	32	48
	6	32	48	48	48	48	12	16	32	40	48	8	12	16	24	32	6	8	12	16	24	6	8	12	16	24
	7	16	24	32	40	48	8	12	16	24	32	6	8	12	16	16	-	6	8	12	16	-	6	8	12	16
	8	8	12	16	24	32	6	8	12	16	16	-	6	8	12	12	-	-	6	6	6	-	-	6	6	6
	9	6	8	16	16	24	-	6	8	12	16	-	-	6	6	6	-	-	6	6	6	-	-	-	6	6
11	4	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	32	48	48	48	48	32	48	48	48	48
	5	48	48	48	48	48	24	40	48	48	48	16	24	32	48	48	8	16	24	32	40	8	16	24	32	40
	6	24	32	48	48	48	12	16	24	32	40	8	12	16	24	24	6	8	12	16	16	6	8	12	16	16
	7	12	16	24	32	48	6	8	16	16	24	-	8	8	12	16	-	6	8	12	16	-	6	8	6	6
	8	8	12	16	24	32	-	6	8	12	16	-	-	6	6	6	-	-	-	6	6	-	-	-	6	6
	9	6	8	12	16	16	-	-	6	6	6	-	-	-	6	6	-	-	-	6	6	-	-	-	-	6
	10	-	6	8	12	16	-	-	-	6	6	-	-	-	-	6	-	-	-	-	6	-	-	-	-	-
12	4	48	48	48	48	48	48	48	48	48	48	32	48	48	48	48	24	32	48	48	48	24	32	48	48	48
	5	40	48	48	48	48	16	32	40	48	48	12	16	24	32	48	8	12	16	24	32	8	12	16	24	32
	6	16	24	40	48	48	8	16	16	24	32	6	8	12	16	24	-	8	8	12	16	-	8	8	12	16
	7	8	16	16	24	40	6	8	12	16	16	-	6	8	12	16	-	-	6	6	6	-	-	6	6	6
	8	6	8	12	16	24	-	6	8	12	6	-	-	6	6	6	-	-	-	6	6	-	-	-	6	6
	9	-	6	8	12	16	-	-	6	6	6	-	-	-	-	6	-	-	-	-	6	-	-	-	-	-
	10	-	-	8	6	6	-	-	-	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	6	6	6	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

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NOTES:

1. Reinforcement to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 4.375"
2. Table 2A shall be read in conjunction with Fig 2A, and section "Notes for Tables 2A to 2D - LOGIX Below-grade Tables."
3. Steel yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi.
4. Where cells show "-" engineering is required.
5. Unless cell is shaded, Helix dosage Table 2A-H may be used in lieu of Table 2A.

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TABLE 2A-H - LOGIX 6.25" BELOW-GRADE WALL, HELIX 5-25 ALTERNATIVE REINFORCEMENT

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Helix Dosage and Hybrid Vertical Rebar Requirement			
		Maximum Equivalent Density 30 pcf	Maximum Equivalent Density 45 pcf	Maximum Equivalent Density 60 pcf	Maximum Equivalent Density 75 pcf
8	4	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³	20 lb/yd ³
	7	9 lb/yd ³	17 lb/yd ³	22 lb/yd ³	23 lb/yd ³
	8	9 lb/yd ³	22 lb/yd ³	23 lb/yd ³	27 lb/yd ³
9	4	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³	22 lb/yd ³
	7	9 lb/yd ³	19 lb/yd ³	23 lb/yd ³	23 lb/yd ³
	8	17 lb/yd ³	23 lb/yd ³	24 lb/yd ³	30 lb/yd ³
	9	21 lb/yd ³	23 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 18"
10	4	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	19 lb/yd ³	23 lb/yd ³
	7	9 lb/yd ³	20 lb/yd ³	23 lb/yd ³	25 lb/yd ³
	8	18 lb/yd ³	23 lb/yd ³	27 lb/yd ³	30 lb/yd ³ + #4 @ 48"
	9	23 lb/yd ³	26 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"
	10	23 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #5 @ 12"
11	4	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	20 lb/yd ³	23 lb/yd ³
	7	9 lb/yd ³	21 lb/yd ³	23 lb/yd ³	26 lb/yd ³
	8	19 lb/yd ³	23 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 30"
	9	23 lb/yd ³	28 lb/yd ³	30 lb/yd ³ + #4 @ 24"	30 lb/yd ³ + #5 @ 12"
	10	23 lb/yd ³	30 lb/yd ³ + #4 @ 42"	30 lb/yd ³ + #5 @ 12"	30 lb/yd ³ + #6 @ 12"
	11	28 lb/yd ³	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"	-
12	4	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³
	6	9 lb/yd ³	16 lb/yd ³	20 lb/yd ³	23 lb/yd ³
	7	15 lb/yd ³	22 lb/yd ³	23 lb/yd ³	28 lb/yd ³
	8	21 lb/yd ³	23 lb/yd ³	30 lb/yd ³	30 lb/yd ³ + #4 @ 24"
	9	23 lb/yd ³	30 lb/yd ³	30 lb/yd ³ + #4 @ 18"	30 lb/yd ³ + #5 @ 12"
	10	25 lb/yd ³	30 lb/yd ³ + #4 @ 24"	30 lb/yd ³ + #5 @ 12"	-
	11	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	30 lb/yd ³ + #6 @ 12"	-
	12	30 lb/yd ³ + #4 @ 30"	30 lb/yd ³ + #6 @ 12"	-	-

Notes:

- Design and installation of Helix 5-25 Micro-Rebar reinforced concrete must be in accordance with Uniform Evaluation Service, ER-279. Designs given in above table are Helix Design Class B, and walls must conform to all restrictions of Section 4.3.5 of ER-279.
- Conventional reinforcement (as required) to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 4.375"
- Table shall be read in conjunction with Fig 2A, and section "Notes for Tables 2A to 2D - LOGIX Below-Grade Tables."
- Conventional rebar yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi.
- For rebar spacing based on 60 ksi yield strength, multiply above Helix 5-25 Alternative Design rebar spacing by 1.5. Final spacing shall not exceed 48".
- Modulus of rupture of Helix reinforced concrete with 9 lb/yd³ Helix 5-25 = 7.5 √(3000 psi) = 410 psi.
- Walls must be laterally supported at top and bottom of wall before backfilling.
- Except as noted for seismic design, the listed Helix 5-25 dosage rate is adequate to replace the required horizontal #4 bars at 32 inches.
- Minimum Helix 5-25 dosage rate of 13.5 lb/yd³ for townhouses in Seismic Design Category C. This dosage replaces the required horizontal #4 bars at 16 inches.
- Minimum Helix 5-25 dosage rate of 27 lb/yd³ for all buildings in Seismic Design Categories D0, D1 and D2. This dosage replaces the required horizontal #5 bars at 16 inches.
- For more information contact your local Logix rep.

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TABLE 2B - LOGIX 8" BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT

NOTE: LOGIX recommends builders, owners and/or designers using these tables confirm that on-site building conditions are w/in the scope of the tables being used.

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Bar Spacing, in.																				
		Maximum Equivalent Density 30pcf				Maximum Equivalent Density 45pcf				Maximum Equivalent Density 60pcf				Maximum Equivalent Density 75pcf								
		#4	#5	#6	#8	#4	#5	#6	#8	#4	#5	#6	#8	#4	#5	#6	#8					
8	4-5	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48			
	6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	24	40	48	48	48		
	7	48	48	48	48	48	40	48	48	48	48	16	32	40	48	48	12	16	24	40	48	
	8	48	48	48	48	48	16	32	48	48	48	12	16	24	32	48	8	12	16	24	32	
9	4-5	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
	6	48	48	48	48	48	48	48	48	48	48	32	48	48	48	48	16	32	48	48	48	
	7	48	48	48	48	48	32	48	48	48	48	16	24	32	48	48	8	16	24	32	40	
	8	40	48	48	48	48	16	24	32	48	48	8	16	16	24	40	6	8	16	16	24	
	9	24	32	48	48	48	8	16	24	32	40	6	8	16	16	24	-	8	8	16	16	
10	4-5	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
	6	48	48	48	48	48	48	48	48	48	24	40	48	48	48	16	24	40	48	48	48	
	7	48	48	48	48	48	24	32	48	48	48	12	16	24	40	48	8	12	16	24	32	
	8	32	48	48	48	48	12	16	24	40	48	8	12	16	24	32	6	8	12	16	24	
	9	16	24	40	48	48	8	12	16	24	32	6	8	12	16	16	-	6	8	12	16	
	10	12	16	24	32	48	6	8	12	16	24	-	6	8	12	16	-	-	6	8	12	
11	4-5	48	48	48	48	48	48	48	48	48	48	48	48	48	48	40	48	48	48	48	48	
	6	48	48	48	48	48	48	48	48	48	24	32	48	48	48	16	24	32	40	48	48	
	7	48	48	48	48	48	16	24	40	48	48	12	16	24	32	40	8	12	16	24	32	
	8	24	32	48	48	48	8	16	24	32	40	6	8	16	16	24	-	8	12	16	16	
	9	12	16	32	40	48	6	12	16	16	24	-	8	8	12	16	-	6	8	8	12	
	10	8	16	16	24	32	-	8	12	16	16	-	6	8	8	12	-	-	6	8	6	
	11	6	12	16	16	24	-	6	8	12	16	-	-	6	8	6	-	-	-	6	6	
12	4-5	48	48	48	48	48	48	48	48	48	48	48	48	48	48	32	48	48	48	48	48	
	6	48	48	48	48	48	40	48	48	48	48	16	32	40	48	48	12	16	24	40	48	
	7	40	48	48	48	48	16	24	32	48	48	8	16	16	24	40	6	12	16	16	24	
	8	16	32	40	48	48	8	12	16	24	32	6	8	12	16	24	-	6	8	12	16	
	9	12	16	24	32	40	6	8	12	16	24	-	6	8	12	16	-	-	6	8	12	
	10	8	12	16	24	32	-	6	8	12	16	-	-	6	8	12	-	-	-	6	6	
	11	6	8	12	16	24	-	6	8	8	12	-	-	-	6	6	-	-	-	-	6	
	12	-	8	8	12	16	-	-	6	8	6	-	-	-	6	6	-	-	-	-	6	
14	4	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
	5	48	48	48	48	48	48	48	48	48	48	48	48	48	48	24	40	48	48	48	48	
	6	48	48	48	48	48	24	40	48	48	48	16	24	32	40	48	8	16	24	32	40	
	7	24	40	48	48	48	12	16	24	32	48	8	12	16	24	32	6	8	12	16	24	
	8	12	16	32	40	48	8	12	16	16	24	-	8	8	12	16	-	6	8	8	12	
	9	8	12	16	24	32	-	8	8	12	16	-	-	8	8	12	-	-	6	8	6	
	10	6	8	12	16	24	-	6	8	8	12	-	-	-	8	6	-	-	-	6	6	
	11	-	6	8	12	16	-	-	6	8	6	-	-	-	6	6	-	-	-	-	-	
	12	-	6	8	8	12	-	-	-	6	6	-	-	-	-	6	-	-	-	-	-	
	13	-	-	6	8	12	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	
	14	-	-	-	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	15	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8

- NOTES:**
1. Reinforcement to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 6"
 2. Table 2B shall be read in conjunction with Fig 2B, and section "Notes for Tables 2A to 2D - LOGIX Below-grade Tables."
 3. Steel yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi.
 4. Where cells show "-" engineering is required.
 5. Unless cell is shaded, Helix dosage Table 2B-H may be used in lieu of Table 2B.

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TABLE 2B-H - LOGIX 8" BELOW-GRADE WALL, HELIX 5-25 ALTERNATIVE REINFORCEMENT

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Helix Dosage and Hybrid Vertical Rebar Requirement			
		Maximum Equivalent Density 30 pcf	Maximum Equivalent Density 45 pcf	Maximum Equivalent Density 60 pcf	Maximum Equivalent Density 75 pcf
8	4-5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	17 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³	22 lb/yd ³
9	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	15 lb/yd ³	19 lb/yd ³
	8	9 lb/yd ³	15 lb/yd ³	20 lb/yd ³	25 lb/yd ³
	9	9 lb/yd ³	19 lb/yd ³	25 lb/yd ³	26 lb/yd ³
10	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	17 lb/yd ³	20 lb/yd ³
	8	9 lb/yd ³	17 lb/yd ³	22 lb/yd ³	26 lb/yd ³
	9	9 lb/yd ³	21 lb/yd ³	26 lb/yd ³	26 lb/yd ³
11	4-5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	15 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	17 lb/yd ³	22 lb/yd ³
	8	9 lb/yd ³	18 lb/yd ³	23 lb/yd ³	26 lb/yd ³
	9	16 lb/yd ³	23 lb/yd ³	26 lb/yd ³	28 lb/yd ³
	10	19 lb/yd ³	26 lb/yd ³	28 lb/yd ³	30 lb/yd ³ + #4 @ 30"
	11	23 lb/yd ³	26 lb/yd ³	30 lb/yd ³ + #4 @ 42"	30 lb/yd ³ + #4 @ 12"
12	4-5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³	23 lb/yd ³
	8	9 lb/yd ³	19 lb/yd ³	25 lb/yd ³	26 lb/yd ³
	9	17 lb/yd ³	24 lb/yd ³	26 lb/yd ³	30 lb/yd ³
	10	21 lb/yd ³	26 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 18"
	11	25 lb/yd ³	28 lb/yd ³	30 lb/yd ³ + #4 @ 18"	30 lb/yd ³ + #5 @ 12"
	12	26 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	30 lb/yd ³ + #6 @ 12"
14	4	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	17 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	20 lb/yd ³	24 lb/yd ³
	8	9 lb/yd ³	21 lb/yd ³	26 lb/yd ³	26 lb/yd ³
	9	18 lb/yd ³	26 lb/yd ³	27 lb/yd ³	30 lb/yd ³ + #4 @ 42"
	10	23 lb/yd ³	26 lb/yd ³	30 lb/yd ³ + #4 @ 36"	30 lb/yd ³ + #4 @ 12"
	11	26 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"
	12	26 lb/yd ³	30 lb/yd ³ + #4 @ 18"	30 lb/yd ³ + #6 @ 12"	-
	13	30 lb/yd ³	30 lb/yd ³ + #5 @ 12"	-	-
	14	30 lb/yd ³ + #4 @ 30"	30 lb/yd ³ + #6 @ 12"	-	-

NOTES:
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TABLE 2B-H - LOGIX 8" BELOW-GRADE WALL, HELIX 5-25 ALTERNATIVE REINF. Cont'd

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Helix Dosage and Hybrid Vertical Rebar Requirement			
		Maximum Equivalent Density 30 pcf	Maximum Equivalent Density 45 pcf	Maximum Equivalent Density 60 pcf	Maximum Equivalent Density 75 pcf
16	4	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	5	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³
	7	9 lb/yd ³	16 lb/yd ³	21 lb/yd ³	26 lb/yd ³
	8	9 lb/yd ³	22 lb/yd ³	26 lb/yd ³	27 lb/yd ³
	9	20 lb/yd ³	26 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 24"
	10	25 lb/yd ³	28 lb/yd ³	30 lb/yd ³ + #4 @ 18"	30 lb/yd ³ + #5 @ 12"
	11	26 lb/yd ³	30 lb/yd ³ + #4 @ 30"	30 lb/yd ³ + #5 @ 12"	-
	12	29 lb/yd ³	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"	-
	13	30 lb/yd ³ + #4 @ 36"	30 lb/yd ³ + #6 @ 12"	-	-
	14	30 lb/yd ³ + #4 @ 12"	-	-	-
	15	30 lb/yd ³ + #5 @ 12"	-	-	-

Notes:

- Design and installation of Helix 5-25 Micro-Rebar reinforced concrete must be in accordance with Uniform Evaluation Service, ER-279. Designs given in above table are Helix Design Class B, and walls must conform to all restrictions of Section 4.3.5 of ER-279.
- Conventional reinforcement (as required) to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 6"
- Table shall be read in conjunction with **Fig 2B**, and section "Notes for Tables 2A to 2D - LOGIX Below-Grade Tables."
- Conventional rebar yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi.
- For rebar spacing based on 60 ksi yield strength, multiply above Helix 5-25 Alternative Design rebar spacing by 1.5. Final spacing shall not exceed 48".
- Modulus of rupture of Helix reinforced concrete with 9 lb/yd³ Helix 5-25 = 7.5 √(3000 psi) = 410 psi.
- Walls must be laterally supported at top and bottom of wall before backfilling.
- Except as noted for seismic design, the listed Helix 5-25 dosage rate is adequate to replace the required horizontal #4 bars at 32 inches.
- Minimum Helix 5-25 dosage rate of 13.5 lb/yd³ for townhouses in Seismic Design Category C. This dosage replaces the required horizontal #4 bars at 16 inches.
- Minimum Helix 5-25 dosage rate of 22.5 lb/yd³ for all buildings in Seismic Design Categories D0, D1 and D2. This dosage replaces the required horizontal #5 bars at 16 inches.
- For more information contact your local Logix rep.

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TABLE 2C - LOGIX 10" BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT

NOTE: LOGIX recommends builders, owners and/or designers using these tables confirm that on-site building conditions are w/in the scope of the tables being used.

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Bar Spacing, in.																			
		Maximum Equivalent Density 30pcf					Maximum Equivalent Density 45pcf					Maximum Equivalent Density 60pcf					Maximum Equivalent Density 75pcf				
8	4-8	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
9	4-7	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	8	48	48	48	48	48	40	48	48	48	48	16	32	40	48	48	12	16	24	40	48
	9	48	48	48	48	48	16	32	48	48	48	12	16	24	32	48	8	12	16	24	32
10	4-7	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	8	48	48	48	48	48	32	48	48	48	48	16	24	32	48	48	8	16	24	32	40
	9	48	48	48	48	48	16	24	40	48	48	8	16	24	32	40	8	12	16	16	24
	10	24	40	48	48	48	12	16	24	32	48	8	12	16	24	24	-	8	12	16	16
11	4-7	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	8	48	48	48	48	48	24	40	48	48	48	12	16	32	40	48	8	16	16	24	32
	9	40	48	48	48	48	12	24	32	40	48	8	12	16	24	32	6	8	12	16	24
	10	16	32	48	48	48	8	16	16	24	40	6	8	12	16	24	-	8	8	12	16
	11	12	24	32	40	48	8	12	16	16	24	-	8	8	12	16	-	6	8	8	12
12	4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	7	48	48	48	48	48	48	48	48	48	48	24	32	48	48	48	16	24	32	40	48
	8	48	48	48	48	48	16	32	48	48	48	12	16	24	32	48	8	12	16	24	32
	9	32	48	48	48	48	12	16	24	40	48	8	12	16	24	32	6	8	12	16	24
	10	16	24	40	48	48	8	12	16	24	32	6	8	12	16	16	-	6	8	12	16
	11	12	16	24	32	48	6	8	12	16	24	-	6	8	12	16	-	-	6	8	12
	12	8	12	16	24	32	-	8	12	16	16	-	-	8	8	12	-	-	6	8	8
14	4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	7	48	48	48	48	48	40	48	48	48	48	16	32	40	48	48	12	16	24	40	48
	8	48	48	48	48	48	16	24	40	48	48	8	16	24	32	40	8	12	16	16	24
	9	24	32	48	48	48	8	16	24	32	40	6	8	12	16	24	-	8	8	12	16
	10	12	16	32	40	48	6	12	16	16	24	-	8	8	12	16	-	-	8	8	12
	11	8	16	16	24	32	-	8	12	16	16	-	6	8	8	12	-	-	6	8	8
	12	6	12	16	16	24	-	6	8	12	16	-	-	6	8	8	-	-	-	6	8
	13	6	8	12	16	16	-	-	6	8	12	-	-	-	6	8	-	-	-	-	6
	14	-	6	8	12	16	-	-	6	8	8	-	-	-	6	6	-	-	-	-	6
16	4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	7	48	48	48	48	48	32	48	48	48	48	16	24	32	48	48	12	16	24	32	40
	8	40	48	48	48	48	16	24	32	40	48	8	12	16	24	32	6	8	12	16	24
	9	16	24	40	48	48	8	12	16	24	32	6	8	12	16	24	-	6	8	12	16
	10	12	16	24	32	40	6	8	12	16	24	-	6	8	12	16	-	-	6	8	12
	11	8	12	16	24	32	-	6	8	12	16	-	-	6	8	12	-	-	-	6	8
	12	6	8	12	16	24	-	-	8	8	12	-	-	-	6	8	-	-	-	-	6
	13	-	6	8	12	16	-	-	6	8	8	-	-	-	6	6	-	-	-	-	6
	14	-	6	8	12	12	-	-	-	6	8	-	-	-	-	6	-	-	-	-	-
	15	-	-	6	8	12	-	-	-	6	6	-	-	-	-	-	-	-	-	-	-
	16	-	-	6	8	8	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-

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TABLE 2C - LOGIX 10" BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT Cont'd

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Bar Spacing, in.																								
		Maximum Equivalent Density 30pcf					Maximum Equivalent Density 45pcf					Maximum Equivalent Density 60pcf					Maximum Equivalent Density 75pcf									
18	4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	7	48	48	48	48	48	24	40	48	48	48	12	24	32	40	48	8	16	16	24	40	8	16	16	24	40
	8	32	48	48	48	48	12	16	24	40	48	8	12	16	24	32	6	8	12	16	24	6	8	12	16	24
	9	16	24	32	48	48	8	12	16	24	32	-	8	12	16	16	-	6	8	12	16	-	6	8	12	16
	10	8	16	16	24	40	-	8	12	16	16	-	6	8	8	12	-	-	6	8	8	-	-	6	8	8
	11	6	8	16	16	24	-	6	8	12	16	-	-	6	8	8	-	-	-	6	8	-	-	-	6	8
	12	-	8	12	16	16	-	-	6	8	12	-	-	-	6	8	-	-	-	-	6	-	-	-	-	6
	13	-	6	8	12	16	-	-	-	6	8	-	-	-	-	6	-	-	-	-	6	-	-	-	-	6
	14	-	-	6	8	12	-	-	-	6	6	-	-	-	-	6	-	-	-	-	6	-	-	-	-	6
	15	-	-	6	8	8	-	-	-	-	6	-	-	-	-	6	-	-	-	-	6	-	-	-	-	6
	16	-	-	-	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
18	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20	4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
	7	48	48	48	48	48	24	32	48	48	48	12	16	24	40	48	8	12	16	24	32	8	12	16	24	32
	8	24	40	48	48	48	12	16	24	32	40	6	8	16	16	24	-	8	12	16	16	-	8	12	16	16
	9	12	16	24	40	48	6	8	16	16	24	-	6	8	12	16	-	-	8	8	12	-	-	8	8	12
	10	8	12	16	24	32	-	6	8	12	16	-	-	6	8	12	-	-	-	6	8	-	-	-	6	8
	11	6	8	12	16	24	-	-	8	8	12	-	-	-	6	8	-	-	-	-	6	-	-	-	-	6
	12	-	6	8	12	16	-	-	6	8	8	-	-	-	-	6	-	-	-	-	6	-	-	-	-	6
	13	-	-	8	8	12	-	-	-	6	6	-	-	-	-	6	-	-	-	-	6	-	-	-	-	6
	14	-	-	6	8	8	-	-	-	-	6	-	-	-	-	6	-	-	-	-	6	-	-	-	-	6
	15	-	-	-	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8

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NOTES:

1. Reinforcement to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 8"
2. **Table 2C** shall be read in conjunction with **Fig 2C**, and section "Notes for Tables 2A to 2D - LOGIX Below-grade Tables."
3. Steel yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi.
4. Where cells show "-" engineering is required.
5. Unless cell is shaded, Helix dosage **Table 2C-H** may be used in lieu of **Table 2C**.

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TABLE 2C-H - LOGIX 10" BELOW-GRADE WALL, HELIX 5-25 ALTERNATIVE REINFORCEMENT

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Helix Dosage and Hybrid Vertical Rebar Requirement			
		Maximum Equivalent Density 30 pcf	Maximum Equivalent Density 45 pcf	Maximum Equivalent Density 60 pcf	Maximum Equivalent Density 75 pcf
8	4-8	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
9	4-7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³
	9	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³	20 lb/yd ³
10	4-7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³
	9	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³	22 lb/yd ³
	10	9 lb/yd ³	17 lb/yd ³	22 lb/yd ³	27 lb/yd ³
11	4-7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	15 lb/yd ³	19 lb/yd ³
	9	9 lb/yd ³	9 lb/yd ³	20 lb/yd ³	24 lb/yd ³
	10	9 lb/yd ³	18 lb/yd ³	24 lb/yd ³	29 lb/yd ³
	11	9 lb/yd ³	22 lb/yd ³	29 lb/yd ³	29 lb/yd ³
12	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³	20 lb/yd ³
	9	9 lb/yd ³	16 lb/yd ³	21 lb/yd ³	26 lb/yd ³
	10	9 lb/yd ³	20 lb/yd ³	26 lb/yd ³	29 lb/yd ³
	11	16 lb/yd ³	24 lb/yd ³	29 lb/yd ³	30 lb/yd ³
	12	19 lb/yd ³	28 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 24"
14	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³	22 lb/yd ³
	9	9 lb/yd ³	18 lb/yd ³	23 lb/yd ³	29 lb/yd ³
	10	15 lb/yd ³	22 lb/yd ³	29 lb/yd ³	29 lb/yd ³
	11	19 lb/yd ³	27 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 30"
	12	22 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"
	13	26 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"
16	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	17 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	19 lb/yd ³	23 lb/yd ³
	9	9 lb/yd ³	19 lb/yd ³	25 lb/yd ³	29 lb/yd ³
	10	17 lb/yd ³	24 lb/yd ³	29 lb/yd ³	30 lb/yd ³
	11	20 lb/yd ³	29 lb/yd ³	30 lb/yd ³	30 lb/yd ³ + #4 @ 18"
	12	25 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 18"	30 lb/yd ³ + #5 @ 12"
	13	29 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	-
	14	29 lb/yd ³	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"	-
	15	30 lb/yd ³	30 lb/yd ³ + #5 @ 12"	-	-
	16	30 lb/yd ³ + #4 @ 42"	30 lb/yd ³ + #6 @ 12"	-	-

NOTES:
See next page.

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TABLE 2C-H - LOGIX 10" BELOW-GRADE WALL, HELIX 5-25 ALTERNATIVE REINF. Cont'd

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Helix Dosage and Hybrid Vertical Rebar Requirement			
		Maximum Equivalent Density 30 pcf	Maximum Equivalent Density 45 pcf	Maximum Equivalent Density 60 pcf	Maximum Equivalent Density 75 pcf
18	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³
	8	9 lb/yd ³	15 lb/yd ³	20 lb/yd ³	24 lb/yd ³
	9	9 lb/yd ³	20 lb/yd ³	26 lb/yd ³	29 lb/yd ³
	10	18 lb/yd ³	26 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 48"
	11	22 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"
	12	27 lb/yd ³	30 lb/yd ³	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"
	13	29 lb/yd ³	30 lb/yd ³ + #4 @ 18"	30 lb/yd ³ + #6 @ 12"	-
	14	29 lb/yd ³	30 lb/yd ³ + #5 @ 12"	-	-
	15	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #6 @ 12"	-	-
	16	30 lb/yd ³ + #4 @ 18"	-	-	-
20	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³
	8	9 lb/yd ³	16 lb/yd ³	21 lb/yd ³	25 lb/yd ³
	9	9 lb/yd ³	21 lb/yd ³	28 lb/yd ³	29 lb/yd ³
	10	18 lb/yd ³	27 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 36"
	11	23 lb/yd ³	29 lb/yd ³	30 lb/yd ³ + #4 @ 30"	30 lb/yd ³ + #5 @ 12"
	12	28 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	30 lb/yd ³ + #6 @ 12"
	13	29 lb/yd ³	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"	-
	14	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	-	-
	15	30 lb/yd ³ + #4 @ 24"	30 lb/yd ³ + #6 @ 12"	-	-
	16	30 lb/yd ³ + #5 @ 18"	-	-	-
17	30 lb/yd ³ + #5 @ 12"	-	-	-	

Notes:

- Design and installation of Helix 5-25 Micro-Rebar reinforced concrete must be in accordance with Uniform Evaluation Service, ER-279. Designs given in above table are Helix Design Class B, and walls must conform to all restrictions of Section 4.3.5 of ER-279.
- Conventional reinforcement (as required) to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 8"
- Table shall be read in conjunction with Fig 2C, and section "Notes for Tables 2A to 2D - LOGIX Below-Grade Tables."
- Conventional rebar yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi.
- For rebar spacing based on 60 ksi yield strength, multiply above Helix 5-25 Alternative Design rebar spacing by 1.5. Final spacing shall not exceed 48".
- Modulus of rupture of Helix reinforced concrete with 9 lb/yd³ Helix 5-25 = 7.5 √(3000 psi) = 410 psi.
- Walls must be laterally supported at top and bottom of wall before backfilling.
- Except as noted for seismic design, the listed Helix 5-25 dosage rate is adequate to replace the required horizontal #4 bars at 32 inches.
- Minimum Helix 5-25 dosage rate of 10 lb/yd³ for townhouses in Seismic Design Category C. This dosage replaces the required horizontal #4 bars at 16 inches.
- Minimum Helix 5-25 dosage rate of 20 lb/yd³ for all buildings in Seismic Design Categories D0, D1 and D2. This dosage replaces the required horizontal #5 bars at 16 inches.
- For more information contact your local Logix rep.

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TABLE 2D - LOGIX 12" BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT

NOTE: LOGIX recommends builders, owners and/or designers using these tables confirm that on-site building conditions are w/in the scope of the tables being used.

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Bar Spacing, in.																			
		Maximum Equivalent Density 30pcf				Maximum Equivalent Density 45pcf				Maximum Equivalent Density 60pcf				Maximum Equivalent Density 75pcf							
14	4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
	7	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
	8	48	48	48	48	48	48	48	48	48	16	32	40	48	48	12	16	24	32	48	
	9	48	48	48	48	48	16	32	40	48	48	8	16	24	32	40	8	12	16	24	
	10	32	48	48	48	48	12	16	24	32	48	6	12	16	16	24	-	8	12	16	
	11	16	24	40	48	48	8	12	16	24	32	-	8	12	16	16	-	6	8	12	
	12	12	16	24	32	48	6	8	12	16	24	-	6	8	12	16	-	-	6	8	
	13	8	12	16	24	32	-	8	8	12	16	-	-	6	8	12	-	-	-	8	
	14	6	8	16	16	24	-	6	8	12	16	-	-	6	8	8	-	-	-	6	
	16	4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
		7	48	48	48	48	48	48	48	48	48	40	48	48	48	48	16	32	48	48	48
		8	48	48	48	48	48	32	48	48	48	16	24	32	48	48	8	16	24	32	40
		9	48	48	48	48	48	16	24	32	48	48	8	12	16	24	32	6	8	12	16
		10	24	32	48	48	48	8	16	16	24	40	6	8	12	16	24	-	6	8	12
11		12	16	32	40	48	6	8	16	16	24	-	6	8	12	16	-	-	8	8	
12		8	16	16	24	40	-	8	12	16	16	-	-	8	8	12	-	-	6	8	
13		6	12	16	16	24	-	6	8	12	16	-	-	6	8	8	-	-	-	6	
14		6	8	12	16	24	-	-	6	8	12	-	-	-	6	8	-	-	-	6	
15		-	6	8	12	16	-	-	6	8	8	-	-	-	6	8	-	-	-	6	
16		-	6	8	12	16	-	-	-	6	8	-	-	-	-	6	-	-	-	-	
18		4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
		7	48	48	48	48	48	48	48	48	48	32	48	48	48	48	16	24	40	48	48
		8	48	48	48	48	48	24	48	48	48	12	24	32	40	48	8	16	16	24	40
	9	40	48	48	48	48	12	16	32	40	48	8	12	16	24	32	6	8	12	16	
	10	16	24	40	48	48	8	12	16	24	32	6	8	12	16	16	-	6	8	12	
	11	12	16	24	32	48	6	8	12	16	24	-	6	8	12	16	-	-	6	8	
	12	8	12	16	24	32	-	6	8	12	16	-	-	6	8	12	-	-	-	6	
	13	6	8	12	16	24	-	-	8	8	12	-	-	-	6	8	-	-	-	6	
	14	-	8	8	12	16	-	-	6	8	12	-	-	-	6	8	-	-	-	6	
	15	-	6	8	12	16	-	-	-	6	8	-	-	-	-	6	-	-	-	-	
	16	-	-	6	8	12	-	-	-	6	8	-	-	-	-	-	-	-	-	-	
	17	-	-	6	8	8	-	-	-	-	6	-	-	-	-	-	-	-	-	-	
	18	-	-	-	6	8	-	-	-	-	6	-	-	-	-	-	-	-	-	-	
	20	4-6	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
7		48	48	48	48	48	48	48	48	48	32	48	48	48	48	16	24	40	48	48	
8		48	48	48	48	48	24	40	48	48	12	16	24	40	48	8	12	16	24	32	
9		32	48	48	48	48	12	16	24	40	48	8	12	16	24	32	6	8	12	16	
10		16	24	32	48	48	8	12	16	24	32	-	8	12	16	16	-	6	8	12	
11		8	16	24	32	40	6	8	12	16	16	-	6	8	8	12	-	-	6	8	
12		6	12	16	16	24	-	6	8	12	16	-	-	6	8	8	-	-	-	6	
13		6	8	12	16	16	-	-	6	8	12	-	-	-	6	8	-	-	-	6	
14		-	6	8	12	16	-	-	6	8	8	-	-	-	-	6	-	-	-	-	
15		-	-	8	8	12	-	-	-	6	8	-	-	-	-	6	-	-	-	-	
16		-	-	6	8	12	-	-	-	-	6	-	-	-	-	-	-	-	-	-	
17		-	-	-	6	8	-	-	-	-	6	-	-	-	-	-	-	-	-	-	
18		-	-	-	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
19		-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8	#4	#5	#6	#7	#8

- NOTES:**
- Effective depth (out face of concrete to center of vertical rebar) = 10"
 - Provide additional mat of rebar near exterior face of concrete surface:
- Horizontal = #4 @ 32" o/c.
- Vertical = #4 to match vertical rebar spacing
 - Table 2D shall be read in conjunction with Fig 2D, and section "Notes for Tables 2A to 2D - LOGIX Below-grade Tables."
 - Steel yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi.
 - Where cells show "-" engineering is required.
 - Unless cell is shaded, Helix dosage Table 2D-H may be used in lieu of Table 2D.

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TABLE 2D-H - LOGIX 12" BELOW-GRADE WALL, HELIX 5-25 ALTERNATIVE REINFORCEMENT

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Helix Dosage and Hybrid Vertical Rebar Requirement			
		Maximum Equivalent Density 30 pcf	Maximum Equivalent Density 45 pcf	Maximum Equivalent Density 60 pcf	Maximum Equivalent Density 75 pcf
14	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³
	9	9 lb/yd ³	9 lb/yd ³	16 lb/yd ³	20 lb/yd ³
	10	9 lb/yd ³	16 lb/yd ³	21 lb/yd ³	26 lb/yd ³
	11	9 lb/yd ³	19 lb/yd ³	25 lb/yd ³	30 lb/yd ³ + #4 @ 48"
	12	16 lb/yd ³	23 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 48"
	13	18 lb/yd ³	27 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 30"
	14	21 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"
16	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	17 lb/yd ³
	9	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³	22 lb/yd ³
	10	9 lb/yd ³	17 lb/yd ³	22 lb/yd ³	28 lb/yd ³
	11	9 lb/yd ³	21 lb/yd ³	28 lb/yd ³	30 lb/yd ³ + #4 @ 48"
	12	17 lb/yd ³	26 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 48"
	13	21 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"
	14	24 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 18"	30 lb/yd ³ + #5 @ 12"
	15	27 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	-
	16	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 24"	30 lb/yd ³ + #6 @ 12"	-
18	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	17 lb/yd ³
	9	9 lb/yd ³	9 lb/yd ³	19 lb/yd ³	23 lb/yd ³
	10	9 lb/yd ³	18 lb/yd ³	24 lb/yd ³	30 lb/yd ³
	11	16 lb/yd ³	23 lb/yd ³	30 lb/yd ³	30 lb/yd ³ + #4 @ 48"
	12	19 lb/yd ³	28 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 24"
	13	22 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 36"	30 lb/yd ³ + #5 @ 12"
	14	26 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"
	15	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 24"	30 lb/yd ³ + #6 @ 12"	-
	16	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"	-	-
	17	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	-	-
	18	30 lb/yd ³ + #4 @ 42"	30 lb/yd ³ + #6 @ 12"	-	-

NOTES:
See next page.

E N G I N E E R I N G

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TABLE 2D-H - LOGIX 12" BELOW-GRADE WALL, HELIX 5-25 ALTERNATIVE REINF. Cont'd

Maximum Height of Basement Wall, ft	Maximum Unbalanced Backfill Height, ft	Helix Dosage and Hybrid Vertical Rebar Requirement			
		Maximum Equivalent Density 30 pcf	Maximum Equivalent Density 45 pcf	Maximum Equivalent Density 60 pcf	Maximum Equivalent Density 75 pcf
20	4-6	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	7	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³
	8	9 lb/yd ³	9 lb/yd ³	9 lb/yd ³	18 lb/yd ³
	9	9 lb/yd ³	9 lb/yd ³	19 lb/yd ³	24 lb/yd ³
	10	9 lb/yd ³	19 lb/yd ³	25 lb/yd ³	30 lb/yd ³ + #4 @ 48"
	11	16 lb/yd ³	24 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 48"
	12	20 lb/yd ³	30 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"
	13	24 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 18"	30 lb/yd ³ + #5 @ 12"
	14	28 lb/yd ³	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	-
	15	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #4 @ 12"	30 lb/yd ³ + #6 @ 12"	-
	16	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #5 @ 12"	-	-
	17	30 lb/yd ³ + #4 @ 48"	30 lb/yd ³ + #6 @ 12"	-	-
	18	30 lb/yd ³ + #4 @ 12"	-	-	-
	19	30 lb/yd ³ + #5 @ 12"	-	-	-
	20	30 lb/yd ³ + #6 @ 12"	-	-	-

Notes:

- Design and installation of Helix 5-25 Micro-Rebar reinforced concrete must be in accordance with Uniform Evaluation Service, ER-279. Designs given in above table are Helix Design Class B, and walls must conform to all restrictions of Section 4.3.5 of ER-279.
- Conventional reinforcement (as required) to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 10"
- Table shall be read in conjunction with Fig 2D, and section "Notes for Tables 2A to 2D - LOGIX Below-Grade Tables."
- Conventional rebar yield strength = 40 ksi, 28 day concrete compressive strength = 3 ksi.
- For rebar spacing based on 60 ksi yield strength, multiply above Helix 5-25 Alternative Design rebar spacing by 1.5. Final spacing shall not exceed 48".
- Modulus of rupture of Helix reinforced concrete with 9 lb/yd³ Helix 5-25 = 7.5 √(3000 psi) = 410 psi.
- Walls must be laterally supported at top and bottom of wall before backfilling.
- Except as noted for seismic design, the listed Helix 5-25 dosage rate is adequate to replace the required horizontal #4 bars at 32 inches.
- Minimum Helix 5-25 dosage rate of 9 lb/yd³ for townhouses in Seismic Design Category C. This dosage replaces the required horizontal #4 bars at 16 inches.
- Minimum Helix 5-25 dosage rate of 18 lb/yd³ for all buildings in Seismic Design Categories D0, D1 and D2. This dosage replaces the required horizontal #5 bars at 16 inches.
- For more information contact your local Logix rep.

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