Builder Guideline Booklet™

Superior Walls®

BUILD ON A SUPERIOR FOUNDATION™

MAN 42-9000 (JUN 2018)

How the Crushed Stone Footing Works

The physics of the crushed stone footing:

1. The purpose of any wall footing is to distribute the wall's load over a sufficient area of soil so that the weight-bearing capacity of the soil is not exceeded.
2. The load of the building is carried by the Superior Walls panel and is transferred to the 1/2" clean crushed stone.
3. The load distribution path through the crushed stone is at an angle approximately 60 degrees from the horizontal.
4. As the depth of the crushed stone layer increases, the effective bearing width on the underlying soil also increases. (See Figure 1.)
5. The tables in this booklet identify the required depth of the crushed stone footing for various wall loads and soil bearing capacities.

Code Reference:
2018 IRC Section: R403.4

R403.4 Footings for precast concrete foundations. Footings for precast concrete foundations shall comply with Section R403.4. (See Section R403.4.1 Crushed stone footings.)

Crushed Stone Footing / Effective Bearing Width Chart

Crushed Stone Footing Depth (inches)	Effective Bearing Width (inches)
4	14-7/8
5	16
6	17-3/16
7	18-5/16
8	19-1/2
9	20-5/8
10	21-13/16
11	22-15/16
12	24-1/8
13	25-1/4
14	26-7/16
15	27-9/16
16	28-3/4
17	29-7/8
18	31-1/16
19	32-3/16
20	33-3/8
21	34-1/2
22	35-5/8

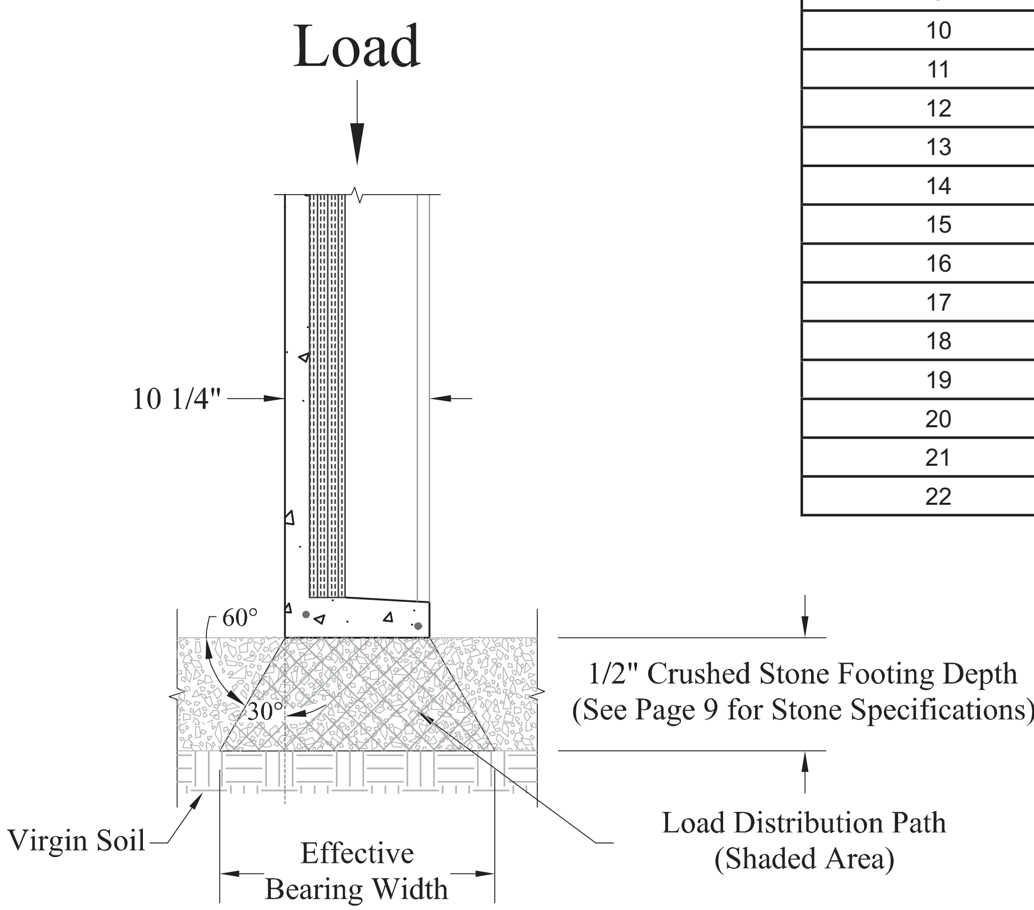

Figure 1

Site Preparation

Soils Verification

1. Determine your soil type from Table 1 on this page and stone depth requirements from Table 2 on page 6. Superior Walls panels may be used on virtually any type of soil that has a bearing capacity of 1,500 PSF or better. For assistance identifying your soil type consult with:
   - Building Department
   - County Agricultural Extension Service
   - County Conservation District Officer
   - Soils Technician
   - Web Soil Survey website (http://websoilsurvey.nrcs.usda.gov)
   - Excavator
2. Determine allowable Load-Bearing Pressure and Drainage Characteristics. (See Table 1.) This will affect the required depth of the 1/2" clean crushed stone footing.
3. Establish combined footing load per linear foot. (Consider dead load, live load, snow and wind load.) Acquire loading information from building designer or engineer.
4. Determine required depth of the 1/2" clean crushed stone footing. (From Table 2. Remember to allow for this depth when determining excavation depth.)

Table 1

Properties of Soils Classified According to the Unified Soil Classification System

Table reference: 2018 IRC Table R405.1

Soil Group	Unified Soil Classification System		Soil Description	Drainage Characteristics (a)	Frost Heave Potential	Volume Change Potential Expansion (b)	Presumptive Load-Bearing Pressure (PSF) (d)
	Soil Classes	Lateral Soil Load (PCF) (f)					
Group I Excellent	GW	30	Well graded gravel, gravel-sand mixtures, little or no fines	Good	Low	Low	3000
	GP	30	Poorly graded gravels or gravel sand mixtures, little or no fines	Good	Low	Low	3000
	SW	30	Well-graded sands, gravelly sands, little or no fines	Good	Low	Low	2000
	SP	30	Poorly graded sands or gravelly sands, little or no fines	Good	Low	Low	2000
	GM	45	Silty gravels, gravel-sand-silt mixtures	Good	Medium	Low	2000
	SM	45	Silty sand, sand-silt mixtures	Good	Medium	Low	2000
Group II Fair to Good	GC	45	Clayey gravels, gravel-sand-clay mixtures	Medium	Medium	Low	2000
	SC	60	Clayey sands, sand-clay mixture	Medium	Medium	Low	2000
	ML	45	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Medium	High	Low	1500(c)
	CL	60	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Medium	Medium	Medium to Low	1500(c)
Group III Poor (e)	CH	(e)	Inorganic clays of high plasticity, fat clays	Poor	Medium	High	1500(c)
	MH	(e)	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Poor	High	High	1500(c)
Group IV Unsatisfactory (e)	OL	(e)	Organic silts and organic silty clays of low plasticity	Poor	Medium	Medium	By Test
	OH	(e)	Organic clays of medium to high plasticity, organic silts.	Unsatisfactory	Medium	High	By Test
	PT	(e)	Peat and other highly organic soils	Unsatisfactory	Medium	High	By Test

(a) The percolation rate for good drainage is over 4 inches per hour, medium drainage is 2 inches to 4 inches per hour, and poor is less than 2 inches per hour.
(b) Soils with a low potential expansion typically have a plasticity index (PI) of 0 to 15, soils with a medium potential expansion have a PI of 10 to 35 and soils with a high potential expansion have a PI greater than 20.
(c) Where the building official determines that in-place soils with an allowable bearing capacity of less than 1,500 psf are likely to be present at the site, the allowable bearing capacity shall be determined by a soils investigation. 2018 IRC Table R401.4.1.
(d) Presumptive Load-Bearing Values of Foundation Materials data from 2018 IRC Table R401.4.1.
(e) CH, MH, OL, OH, and PT are unsuitable as backfill material.
(f) Lateral soil load (PCF) from 2018 IRC tables in section R404.1.

Table 2 Minimum Depth of 1/2” Clean Crushed Stone Footing (Inches)							
Construction Type		**Soil Type & Load Bearing Capacity (PSF)**					
Number of Stories	**(Assumed Uniform Wall Load) (f)**	1500 MH, CH, CL, ML	2000 SC, GC, SM, GM, SP, SW	2500	3000 GP, GW	3500	4000
Conventional light-frame construction							
1 – Story	(1100 pounds per linear foot) (e)	4”	4”	4”	4”	4”	4”
2 – Story	(1800 pounds per linear foot) (e)	7”	4”	4”	4”	4”	4”
3 – Story	(2900 pounds per linear foot) (e)	14” (a)	9” (a)	5”	4”	4”	4”
Masonry veneer over light-frame construction							
1 – Story	(1500 pounds per linear foot) (e)	5”	4”	4”	4”	4”	4”
2 – Story	(2700 pounds per linear foot) (e)	13” (a)	8”	4”	4”	4”	4”
3 – Story	(4000 pounds per linear foot) (e)	22” (a)	14” (a)	10” (a)	7”	5”	4”

(a) Crushed stone must be consolidated in 8” lifts with a plate vibrator.
(b) Table allows for 378 pounds per linear foot for self weight of 10’ Xi Plus foundation wall and 10-1/4 in. wall width.
(c) See Page 9 for Stone Specifications.
(d) Consult your Superior Walls drawing for the required depth of the crushed stone footing for your project.
(e) Assumed Wall Loading (pounds per linear foot) per 2018 IRC Table R403.4.
(f) The Assumed Uniform Wall Load shown in pounds per linear foot (plf) is the assumed load of the structure that is supported by the foundation wall and does not include the weight of foundation wall.

Typical Crushed Stone Footing Detail

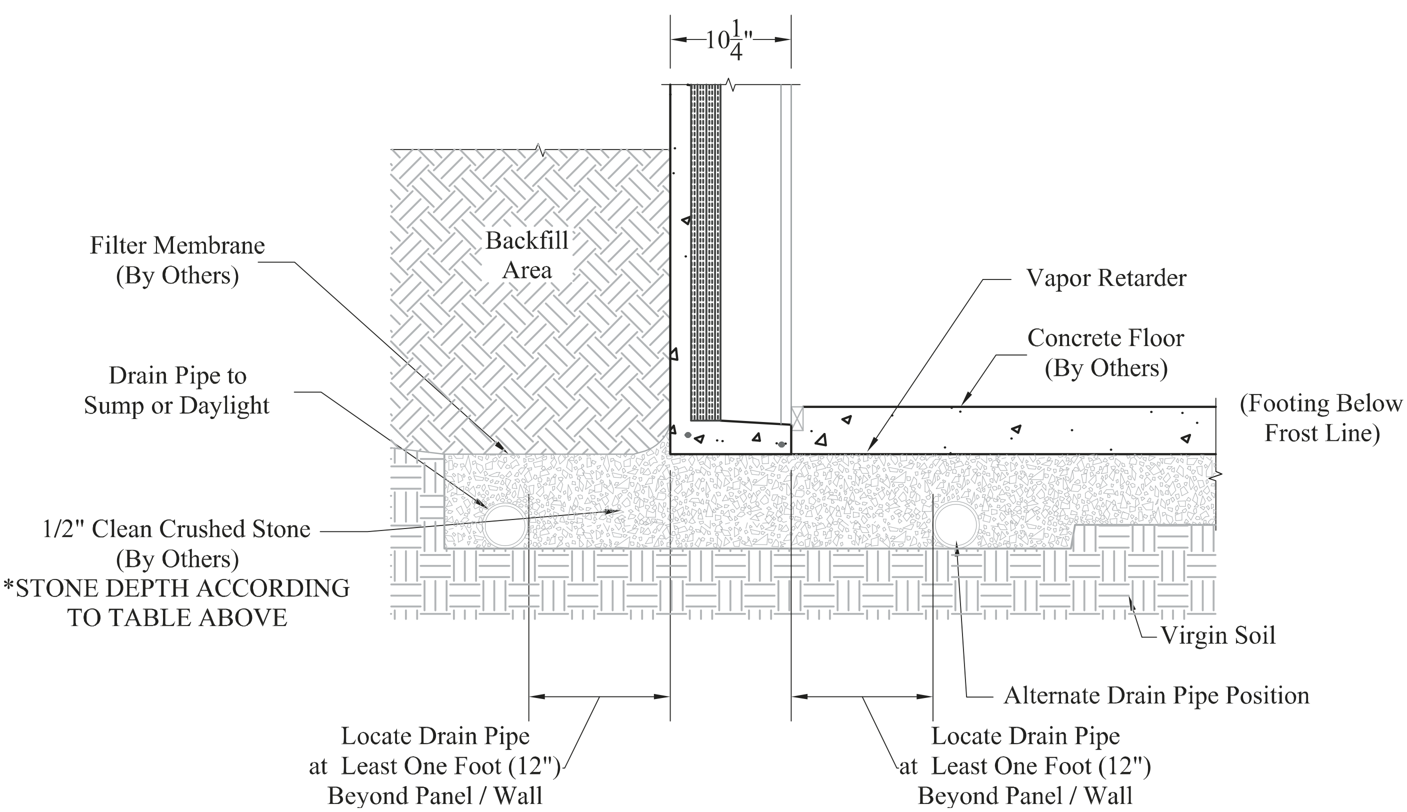

Figure 2