



**CONCRETE SLABS**  
**City of Grand Rapids**  
**Building Safety Division**  
**218-326-7601**

[www.cityofgrandrapidsmn.com](http://www.cityofgrandrapidsmn.com)



This handout is intended only as a guide and is based in part on the 2015 Minnesota State Building Code, Grand Rapids City ordinances, and good building practice. While every attempt has been made to insure the correctness of this handout, no guarantees are made to its accuracy or completeness. Responsibility for compliance with applicable codes and ordinances falls on the owner or contractor. For specific questions regarding code requirements, refer to the applicable codes or contact your local Building Safety Division.

### SITE AND SOILS

The area around any building must be sloped a minimum of 6 inches in the first ten feet for drainage (R401.3).

For residential and garage construction, the following rules for soil bearing shall apply:

- Capacity of 2,000 pounds per sq. ft. shall be assumed except where clay, sandy clay, clayey silt, silt, or sandy silt occurs.
- Where clay, sandy clay, clayey silt, silt, or sandy silt occurs 1500 pounds shall be used.
- Bearing capacities higher than 2000 pounds may be used based on soil tests or site observation.
- Soil tests are required in areas likely to have expansive, compressive, shifting or other unknown soil characteristics.

### FOUNDATION DEPTH FOR FROST PROTECTION

- The bottom of foundations must extend a **minimum of 60 inches below finished grade**
- All exterior footings must extend **12 inches below undisturbed ground**
- Detached garages, sheds and other detached accessory buildings may be constructed on a slab

## MINIMUM SPECIFIED COMPRESSIVE STRENGTH OF CONCRETE FOR SEVERE WEATHERING POTENTIAL

Table R402.2

TYPE OR LOCATIONS OF CONCRETE CONSTRUCTION	MINIMUM SPECIFIED COMPRESSIVE STRENGTH <sup>a</sup> (f' <sub>c</sub> )
Basement slabs and interior slabs on grade, except garage floor slabs	2,500 <sup>b</sup>
Porches, carport slabs, and steps exposed to the weather, and garage floor slabs	3,500 <sup>c, d</sup>

<sup>a</sup> At 28 days psi.

<sup>b</sup> Concrete in these locations that may be subject to freezing and thawing during construction shall be air-entrained concrete. Total air content (percent by volume of concrete) shall not be less than 5 percent or more than 7 percent.

<sup>c</sup> Concrete shall be air entrained. Total air content (percent by volume of concrete) shall not be less than 5 percent or more than 7 percent.

<sup>d</sup> The maximum weight of fly ash, other pozzolans, silica fume, or slag that is included in concrete mixtures for garage floor slabs and for exterior porches, carport slabs, and steps that will be exposed to deicing chemicals shall not exceed the percentages of the total weight of cement content.

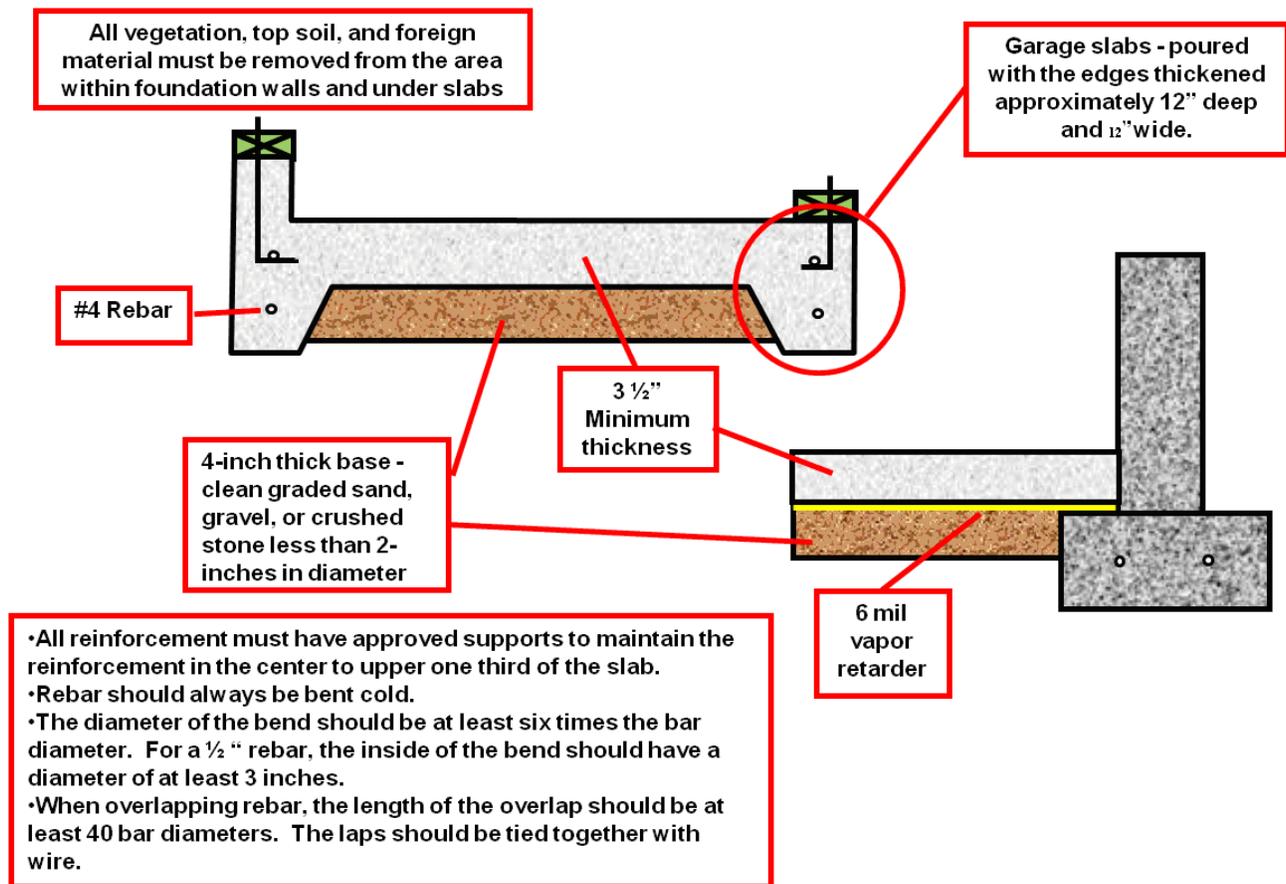
## SLABS ON OR ADJOINING SLOPES

Special care must be exercised whenever building foundations are placed on or adjacent to slopes steeper than 1 unit vertical to 3 units horizontal. When these conditions exist, a qualified engineer may be required to prepare foundation plans. For this reason, it is recommended that applicants for building permits contact the Building Safety Division early in the building planning process if these conditions exist.

APPROXIMATE RATIO OF BAGS OF CEMENT TO COMPRESSIVE STRENGTH	
2,500 – 3000 #psi	5 bag mix
3,000 – 3500 #psi	5 ½ bag mix
3,500 – 4000 #psi	6 bag mix

Strength is a variable that also depends on the variations of water/cement, sand/cement, admixtures, etc. When ordering ready-mix concrete, it is best to explain the type of project to the ready-mix producer and specify the strength you desire or what is required by code and they will provide a mix to meet your needs.

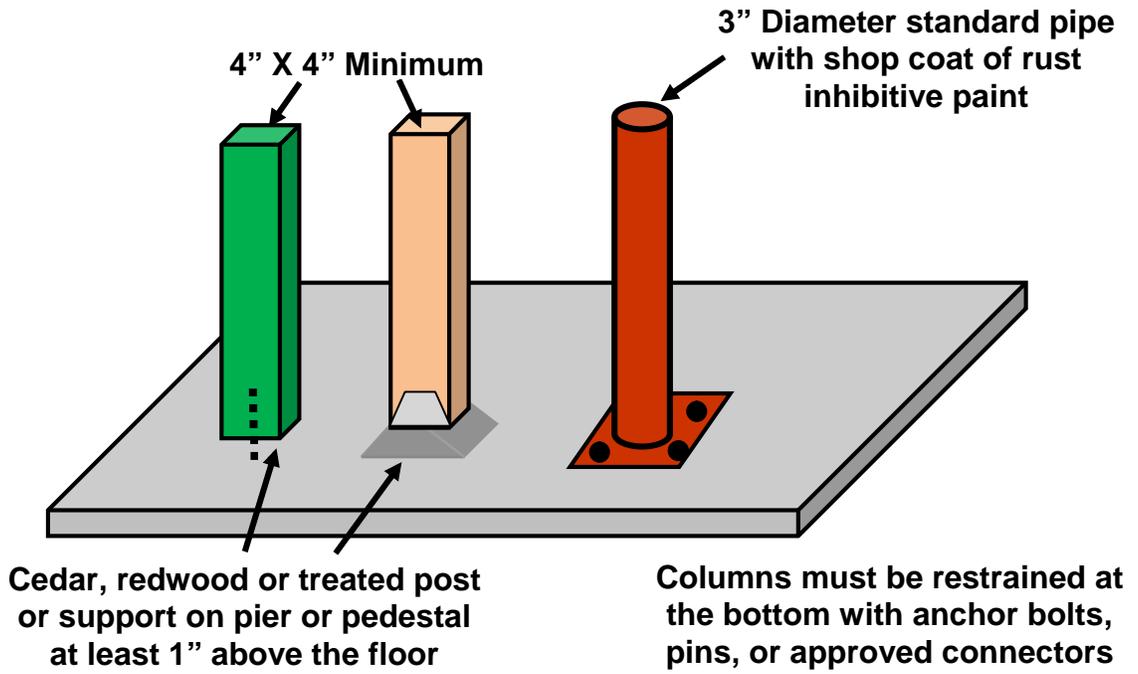
## CONCRETE SLAB FLOORS – GARAGES AND BASEMENTS



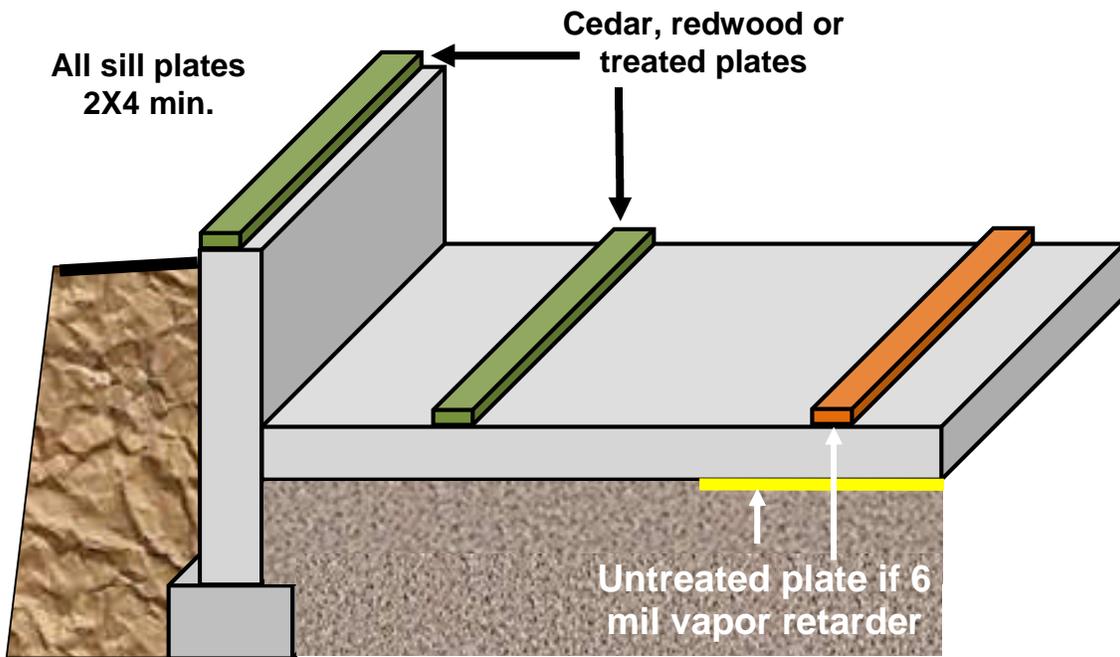
## FOUNDATION ANCHORAGE

The wood sole plate for all exterior walls on monolithic slabs must be anchored with bolts spaced a maximum of 6 feet apart and within 12 inches of each end. Bolts must be at least 1/2" diameter and extend at least 7 inches into the slab. Plates must be tightened to the bolt with a nut and washer. Where anchor straps are used, they must be designed and installed in a manner equivalent to anchor bolts. (R403.1.6).

# WOOD AND STEEL COLUMNS AND CONCRETE



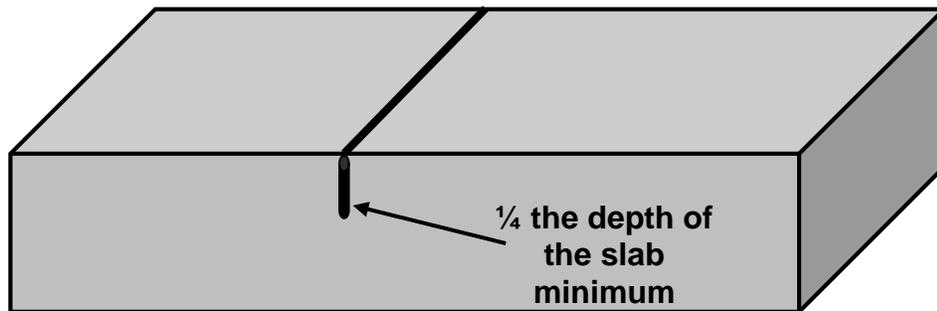
# WOOD SILL PLATES



## ISOLATION OR CONTRACTION JOINTS

Control joints are grooved, formed, or sawed into sidewalks, driveways, pavements, floors, and walls so that cracking will occur in these joints rather than in a random manner.

Maximum Recommended Spacing of Contraction Joints in Feet			
Slab thickness, inches	Slump 4 inches to 6 inches		Slump less than 4-inches
	Maximum-size when is aggregate less than $\frac{3}{4}$ inch	Maximum-size when is aggregate $\frac{3}{4}$ inch and larger	
4	8	10	12
5	10	13	15
6	12	15	18



## HOT AND COLD WEATHER ISSUES

### Hot Weather

Hot weather can result in accelerated setting of the concrete that will reduce workability and finishing time. To avoid this problem, pouring of concrete should be planned to avoid warm days if possible. Proper curing methods are also more important during warmer weather than when temperatures are more moderate.

### Cold Weather

Concrete can safely be poured in temperatures above freezing. Any snow or ice must be removed before concrete is poured and concrete should never be poured on frozen ground. Once poured, concrete should be protected from freezing for at least two to three days, by using insulating blankets, enclosures, or other means. Concrete that is frozen before proper curing will suffer strength reductions and will not be as resistant to weathering or watertight as concrete that has not been frozen. Use of air-entrained concrete is more important for concrete that has the potential to be frozen, as it will improve the strength characteristics of the concrete.