



CITY PLANNING & DEVELOPMENT

Standard Garage Slab and Foundation Wall Details One and Two- Family Dwellings

Kcmo.gov/planning

Information Bulletin 114

As a customer service initiative, the Kansas City, Missouri, City Planning and Development Department/Development Services, in cooperation with the Greater Kansas City Home Builders Association, has developed the attached standard foundation and structural slab details for use in all one- and two-family dwellings permitted under the 2018 International Residential Code (IRC). These standard details will be accepted by CPD-DS for slabs and foundations meeting the dimensions and design parameters specified herein. The standard slab details address suspended slabs and slabs on non-engineered fill. The standard foundation wall details address foundation walls subject to unbalanced fill conditions.

Please note that these are standard details and all customers may exercise the option of following the prescriptive requirements of the 2018 IRC or may provide a design prepared by a licensed professional engineer.

See the IRC for additional information. See CPD-DS Information Bulletin 100 for Requirements for 1 & 2 Family Dwelling plan submittals

SOILS

This standard is based on undisturbed soil conditions, with assumed soil values of 2000 psf load bearing capacity and 60 pcf (60 psf/ft) equivalent fluid pressure. Construction on fill materials or the use of alternative soil values is acceptable where based on a site-specific geotechnical evaluation performed by a licensed professional engineer. Other unusual site conditions may also require geotechnical evaluation. [IRC Chapter 4]

CONCRETE

Concrete strength shall comply with the following minimum strength requirements at 28 days [IRC R402.2]:

- 2,500 psi for basements floor slabs on undisturbed grade.
- 3,000 psi for footings, foundation walls, and other vertical concrete.
- 3,500 psi for carport and garage floor slabs on undisturbed grade.
- 3,500 psi for structural floor slabs.

Concrete shall be 6% (+/- 1%) air-entrained for garage slabs and for all locations footings, walls or flatwork where exposed to weather. Rebar shall be minimum 40 ksi unless noted otherwise.

Minimum concrete cover for reinforcement (per ACI 318):

Cast against earth	Exposed to weather	Not exposed to weather
3"	#5 or smaller 1 1/2"	Slabs 3/4" (u.n.o.)

FOOTINGS

Exterior walls, bearing walls, columns and piers shall be supported on continuous solid masonry or concrete footings, or other approved structural system to safely support the imposed loads and shall be sized and reinforced in accordance with this standard or shall be engineered designed. Footings under foundation walls shall be continuous around the structure and from one level to the next. The continuous transitions between footings at different levels enclosing usable space shall be made by approved solid jumps or support systems to provide safe support of the structure. See "Typical Footing/Foundation Wall/Standard Slab at Maximum 4-foot Over-dig" and "Footing Jump" diagrams for more detail.

The bottom of all footings shall extend not less than 36" below grade for frost protection. Footings for freestanding accessory structures with an area of 600 square feet or less and an eave height of 10 feet or less shall extend below grade a minimum of 12". [IRC R403.1.4]

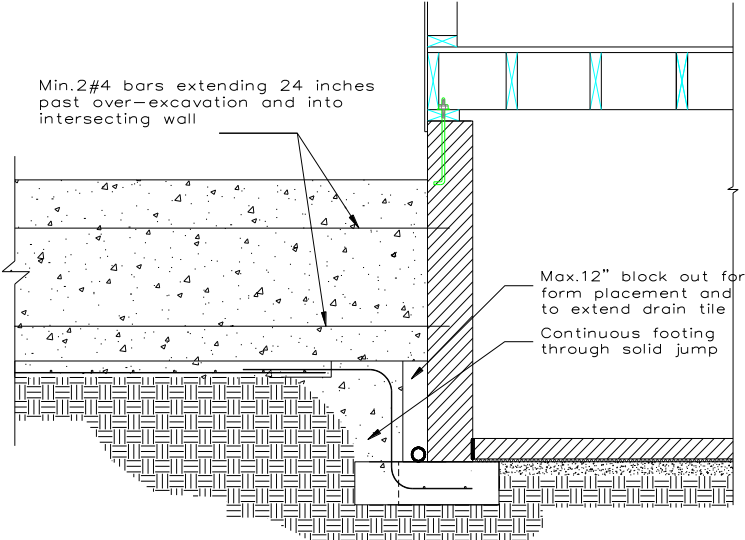
REQUIRED FOOTING:

BUILDING HEIGHT	MINIMUM FOOTING SIZE	HORIZONTAL REBAR	LOCATION OF REBAR
2 Stories or less	8" t x 16" w	2-#4	3" from bottom
3 Stories	8" t x 24" w	2-#4	3" from bottom
Accessory Structure	8" t x 12" w	2-#4	3" from bottom

MINIMUM REINFORCEMENT FOR ISOLATED FOOTING/COLUMN PADS (pad size determined based on actual load supported)

PAD SIZE	36"x36"x12"	42"x42"x14"	48"x48"x16"	60"x60"x18"
REINFORCING	6-#4 each way	7-#4 each way	8-#4 each way	9-#4 each way

FOOTING JUMP DETAIL:



FOUNDATION WALLS

Foundation wall reinforcement shall be installed as indicated below. See “Typical Footing/Foundation Wall/Standard Slab at Maximum 4’ Over-dig” diagram for details.

VERTICAL REINFORCEMENT

	VERTICAL REBAR/SPACING _{a,b,c,d}			
	GRADE 60 (60 ksi) STEEL		GRADE 40 (40 ksi) STEEL	
WALL THICKNESS:	7.5"	9.5"	7.5"	9.5"
WALL HEIGHT (FEET):				
6' or less	#4 @ 36" O.C.	#4 @ 36" O.C.	#4 @ 36" O.C.	#4 @ 36" O.C.
7'	#4 @ 32" O.C.	#4 @ 36" O.C.	#4 @ 21" O.C.	#4 @ 36" O.C.
8'	#4 @ 24" O.C.	#4 @ 36" O.C.	#4 @ 16" O.C.	#4 @ 36" O.C.
9'	#4 @ 16" O.C.	#4 @ 20" O.C.	#4 @ 12" O.C.	#4 @ 16" O.C.
10'	#4 @ 12" O.C.	#4 @ 16" O.C.	#4 @ 8" O.C.	#4 @ 12" O.C.
> 10'	DESIGN REQUIRED			

- a. Minimum requirement for vertical rebar in plain concrete walls is #4 @ 36" on center (ACI 332).
- b. Vertical bars shall be continued up to within 8" of the top of the wall.
- c. Rebar shall be positioned at the tension face of the wall (2" from the inside face).
- d. Reinforcement shall lap a minimum of 24 inches at ends, splices, and around corners.

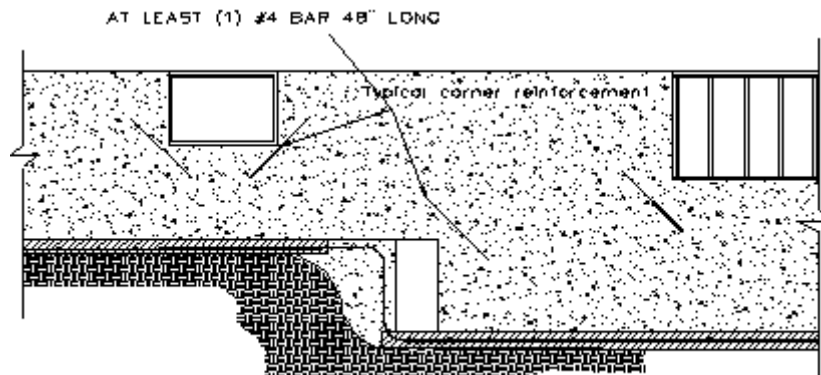
HORIZONTAL REINFORCEMENT

Foundation wall horizontal reinforcement shall be installed as follows:

- #4 bars at 24" on center.
- #4 bar within 12" of top and bottom of wall.
- Minimum Grade 40 (40 ksi) steel (per ACI 332).
- Horizontal reinforcement shall be installed on the compression side (soil side) of the vertical reinforcement.

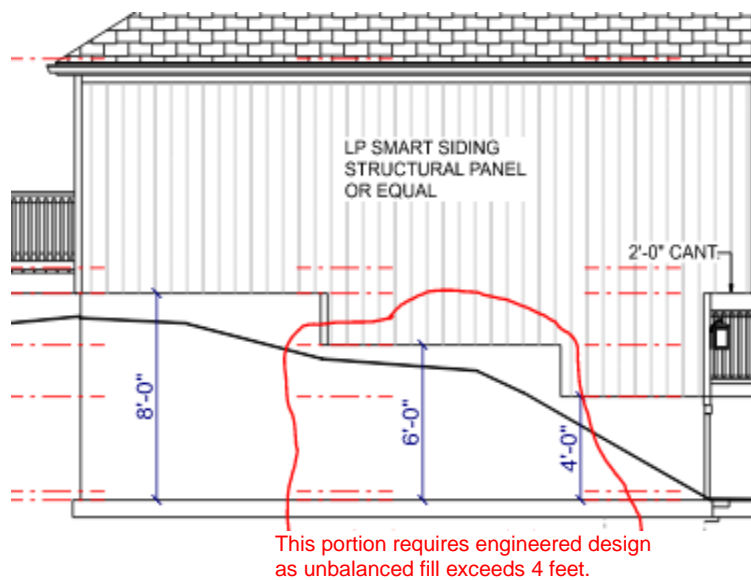
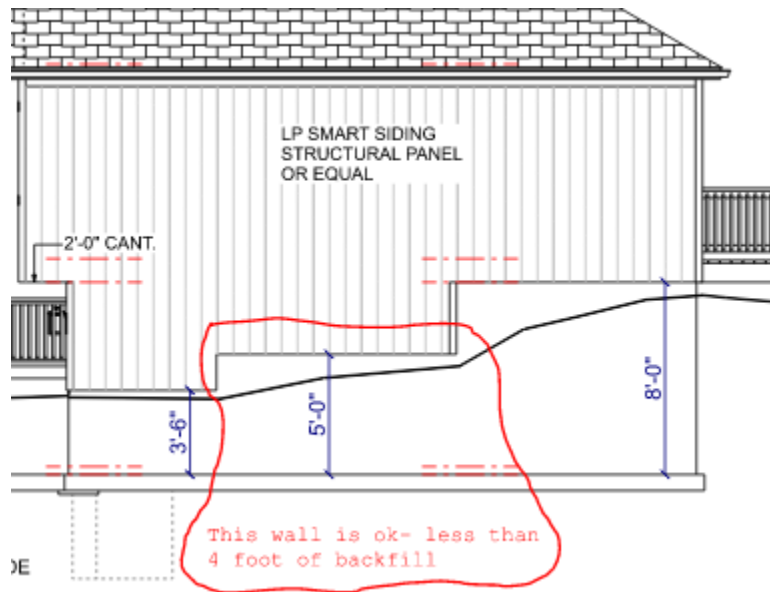
SUPPLEMENTAL REINFORCEMENT

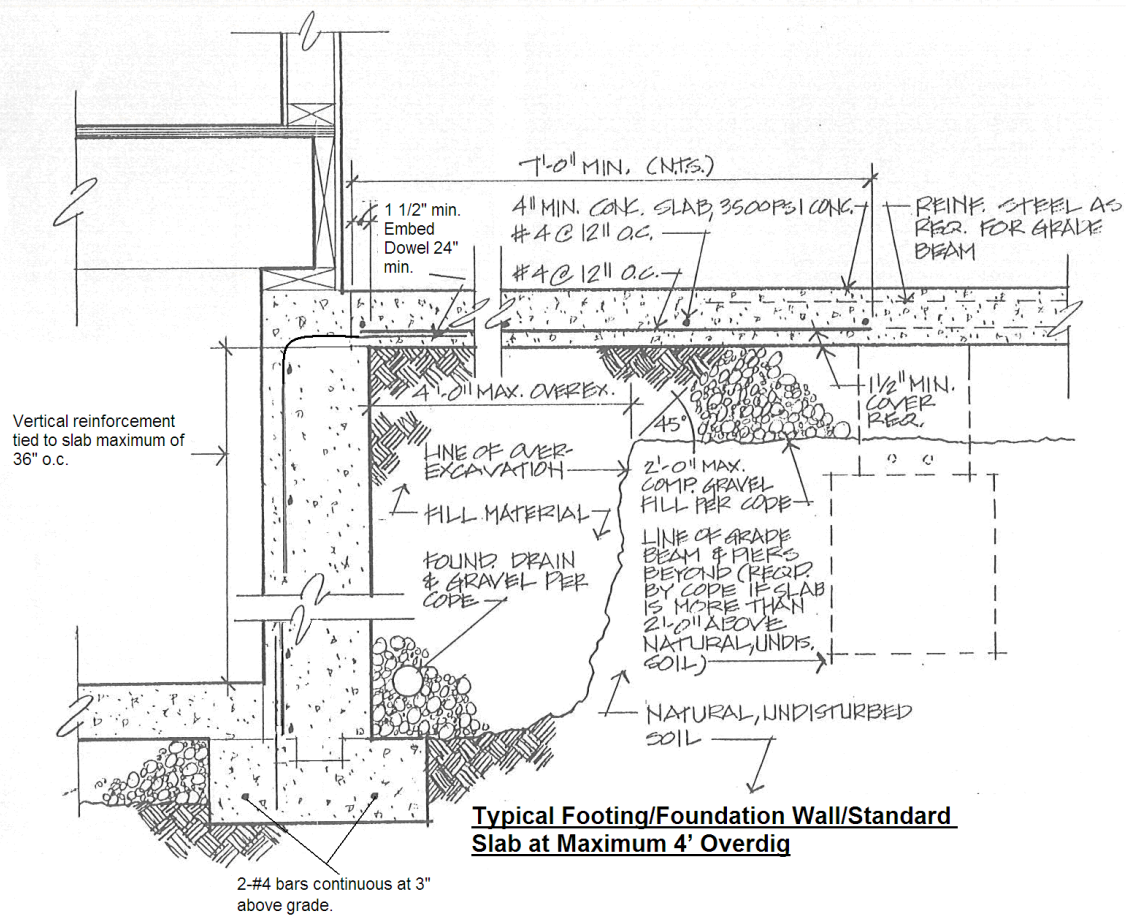
Supplemental reinforcement at corners requires 1#4 bar 48 inches long at a 45-degree angle at corners per figure below. Place reinforcement within 6" of the edge of inside corners.



Foundation wall not connected to floor framing at top of wall

When a wall has more than 4 feet of unbalanced backfill and is not directly attached to the floor system at top of wall, then an engineered design is required. This design will be similar to a retaining wall. (IRC section 404.1.1) See figures below.





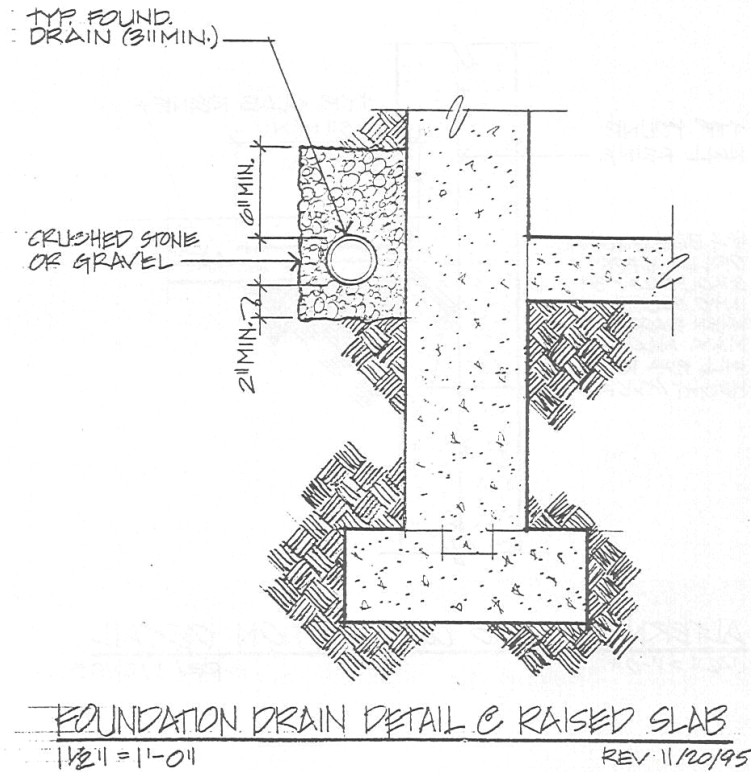
DAMPPROOFING

One coat (minimum) of damp proofing or equivalent foundation membrane shall be applied to exterior wall surfaces below grade [IRC R406.1]. Waterproofing in accordance with IRC section 406.2 is not required unless a ground water investigation indicates that excessive hydrostatic pressure, a high-water table, or other severe soil-water conditions are known to exist.

FOUNDATION DRAINAGE

Installation of a continuous foundation drain is required where habitable or usable space for any portion of the structure is located below grade. The foundation drain shall be at or below the area being protected. Drainage tile shall be placed with positive or neutral slope to minimize the accumulation of deposits in the drainage pipe. Placement of drain tile directly on top of the footing is acceptable. [IRC R405]

See “Typical Footing/Foundation Wall/Standard Slab at Maximum 4’ Over-dig” and “Foundation Drain Detail at Raised Slab” diagrams for details.



FOUNDATION ANCHORAGE

Sill plates shall be bolted to the foundation wall with a minimum ½” diameter anchor bolts embedded at least 7 inches into the concrete. Bolts shall be spaced no greater than 6 feet on center. There shall be a minimum of two bolts per plate section, with a bolt placed within 12 inches, and not closer than 7 bolt diameters, of the end of each plate section. The bolts shall be located in the middle third of the width of the plate. A properly sized nut and washer shall be tightened on each bolt to the plate. (NOTE: 7” embedment + 1 ½” sill plate + ¾” for nut and washer exceeds a 9” long bolt.) [IRC R403.1.6]

Please note that wall bracing methods per IRC R602 may require additional anchorage.

VAPOR RETARDER (VAPOR BARRIER)

A 6-mil polyethylene or approved vapor retarder with joints lapped a minimum of 6” is required between the concrete floor slab and the base course or prepared subgrade. (Not required for garage slabs or detached accessory buildings.) [IRC R506.2.3]

FOUNDATION AND LOT GRADING

Grades shall be sloped away from the foundation a minimum of 6 inches in the first 10 feet. Alternate approaches may be approved if the alternate design is equivalent in effectiveness and performance and provides for positive site drainage. [IRC R401.3]

STRUCTURAL SLABS

This section applies to concrete slabs placed on fill material which exceeds 24 inches of compacted granulated material (sand or gravel) or 8 inches of earth. This may occur at garage floor fills, or over excavated areas under floor slabs. The design and installation details in this document (where applicable based on size and spacing limitations) may be used in lieu of providing a separate design. Structural slabs exceeding the spans and conditions of the approved details shall be designed by a Missouri registered design professional.

SLABS AT MAXIMUM 4' OVERDIG ADJACENT TO FOUNDATION WALL

Where the soil is excavated for a maximum dimension of 4' horizontally adjacent to a foundation wall, the Standard Over-dig Detail may be used in lieu of a complete structural slab. See "Typical Footing/Foundation Wall/Standard Slab at Maximum 4' Over-dig" diagram for details.

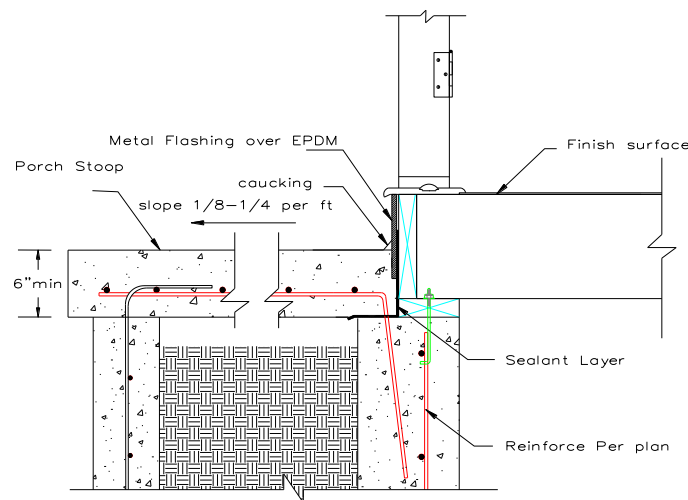
PORCH SLABS

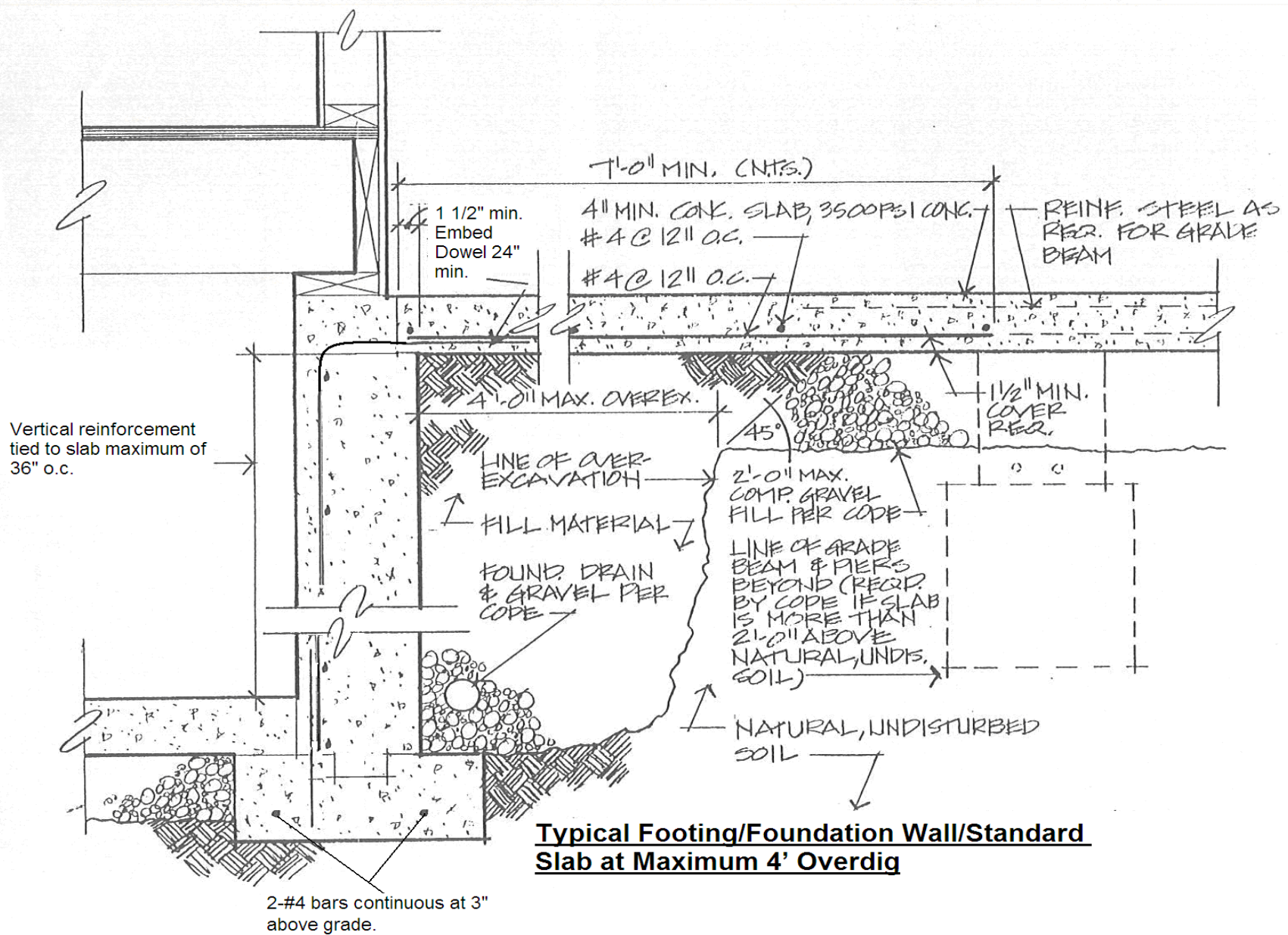
Elevated porch slabs spanning 6'0" or less in any one direction can be constructed as follows. See "Standard Porch Slab" diagram for details.

- Maximum span = 6'.
- Minimum 6" thickness.
- #4 bars at 12" on center each way.
- Minimum 1-1/2" of continuous bearing at the edges of the slab.

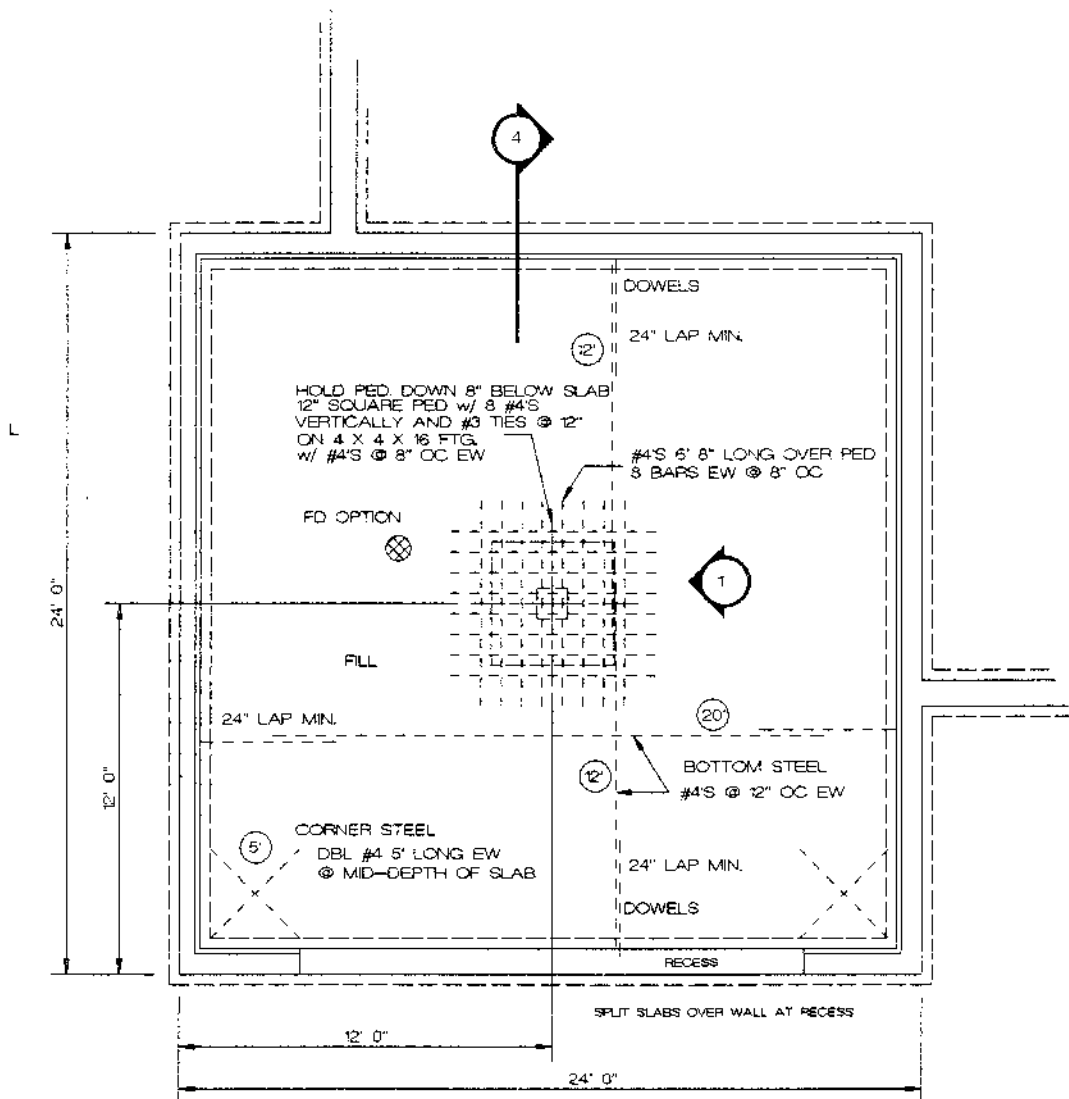
Elevated porch slabs spanning greater than 6'0" shall be treated as an elevated garage slab.

STANDARD PORCH SLAB



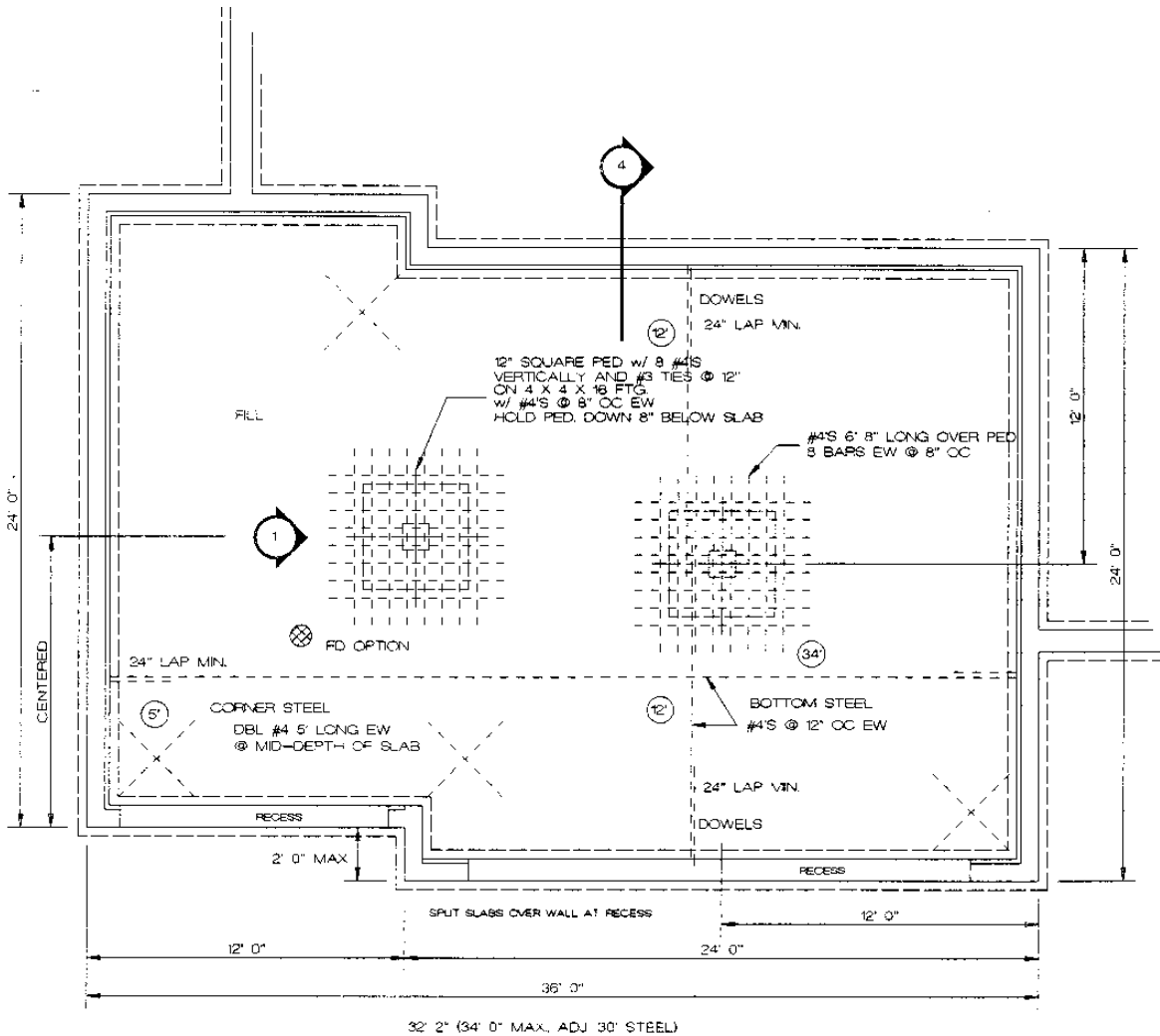


Typical Footing/Foundation Wall/Standard Slab at Maximum 4' Overdig



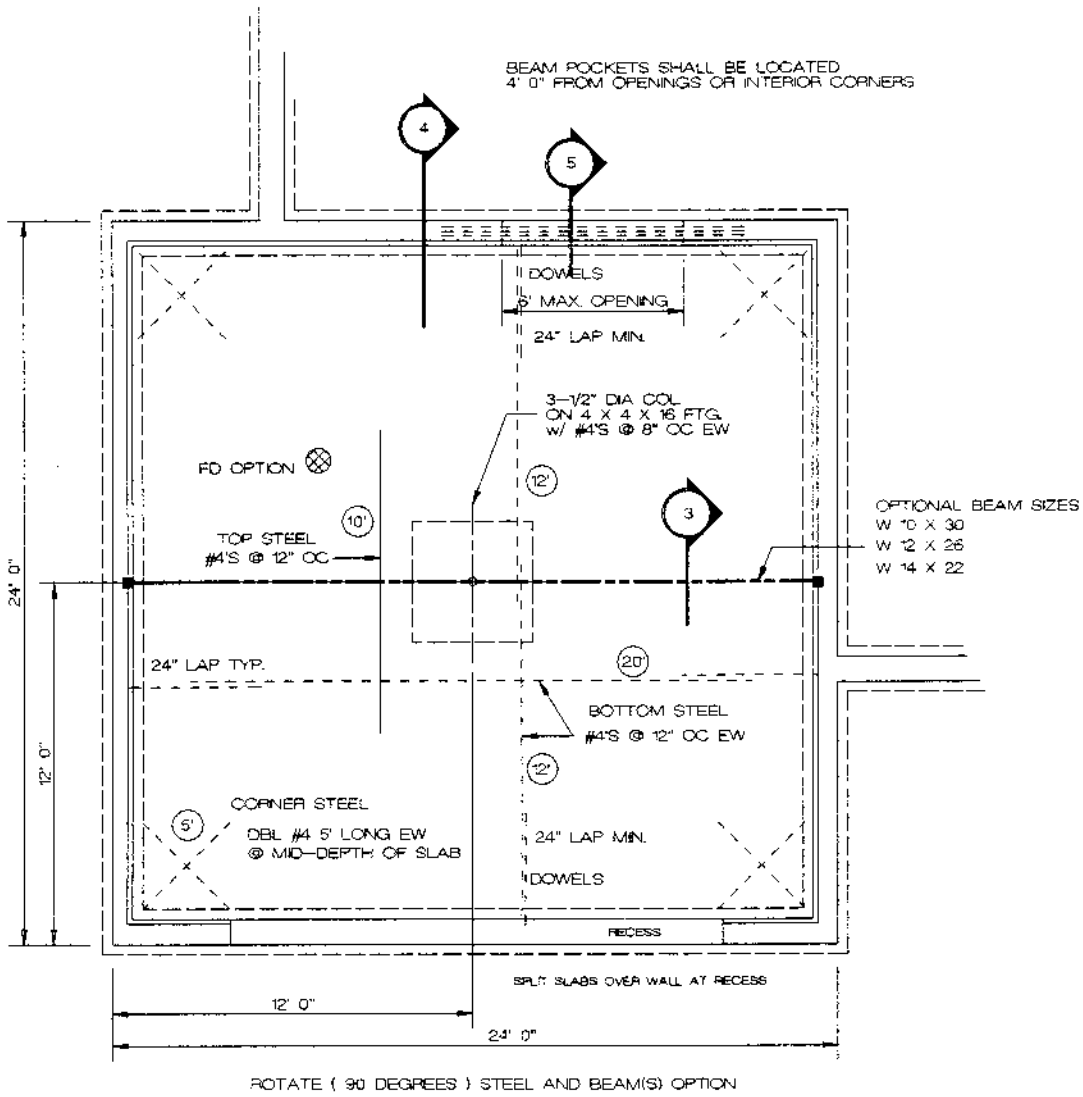
GARAGE SLAB ON FILL

NOT TO SCALE

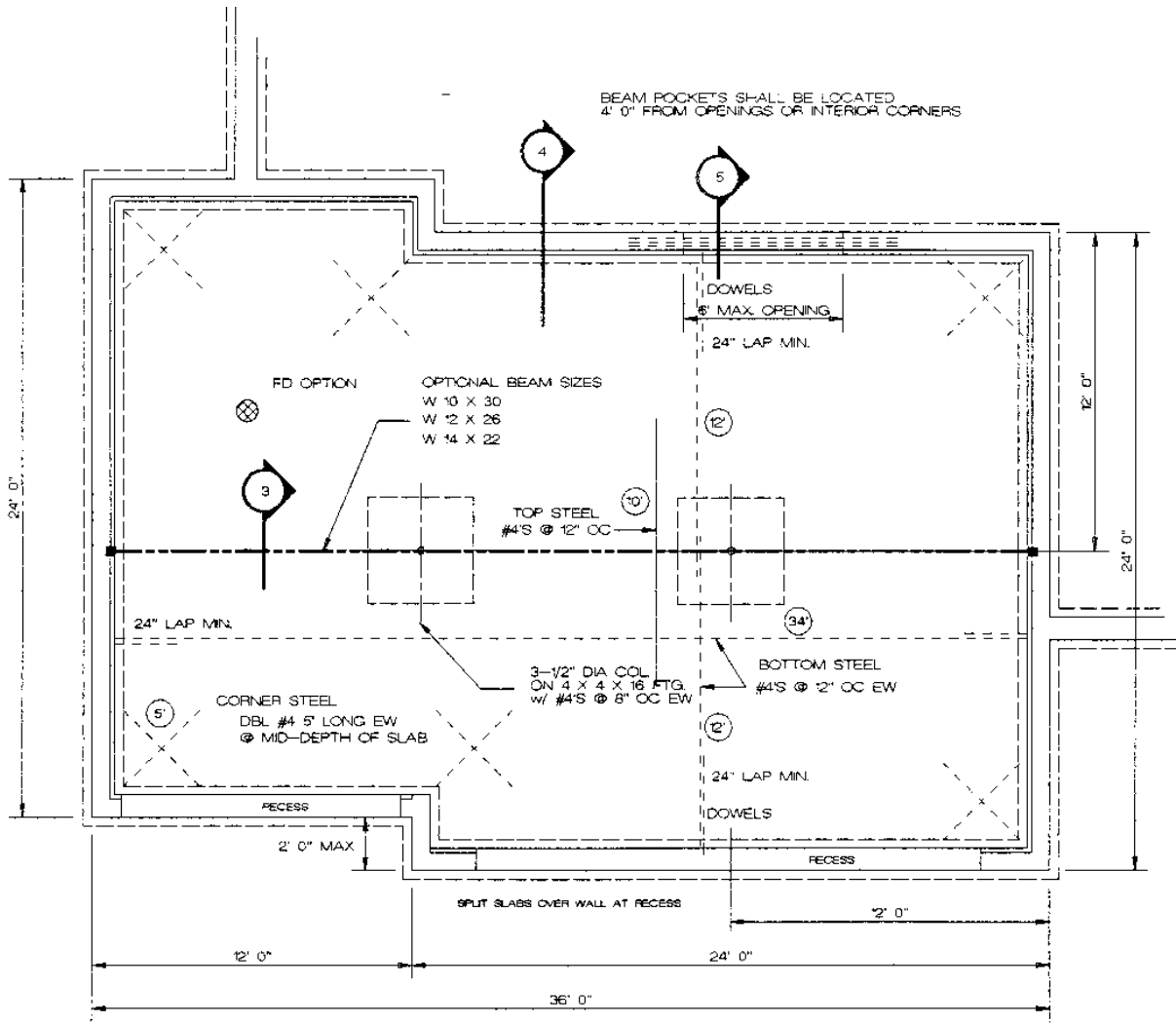


GARAGE SLAB ON FILL

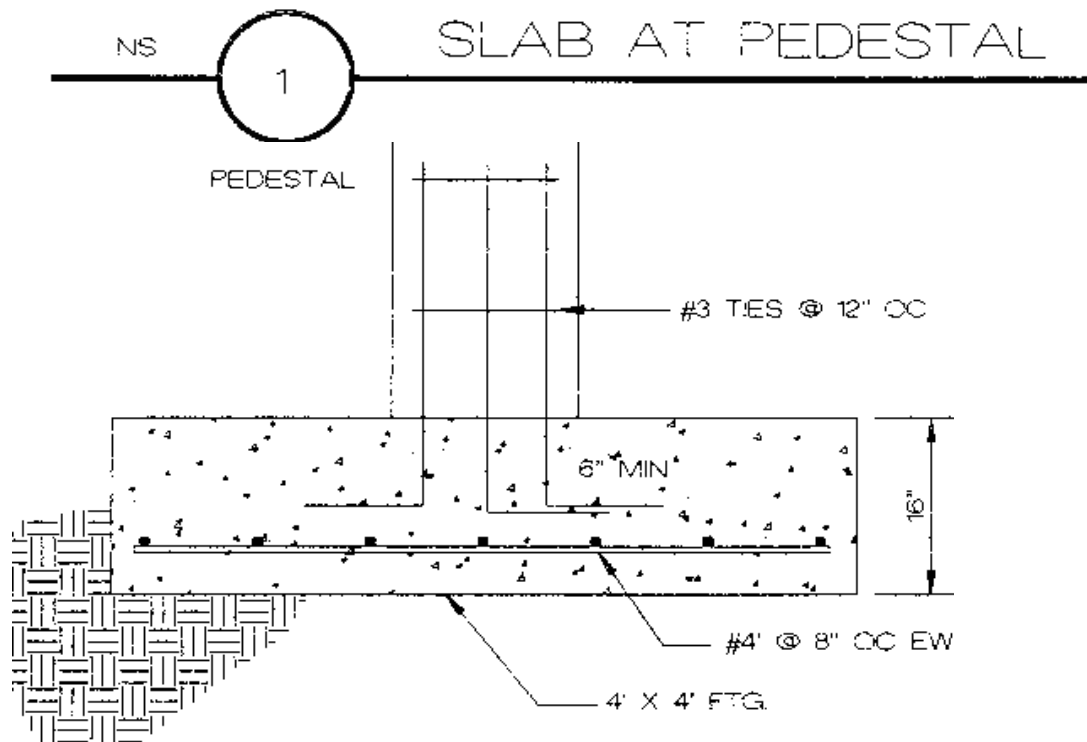
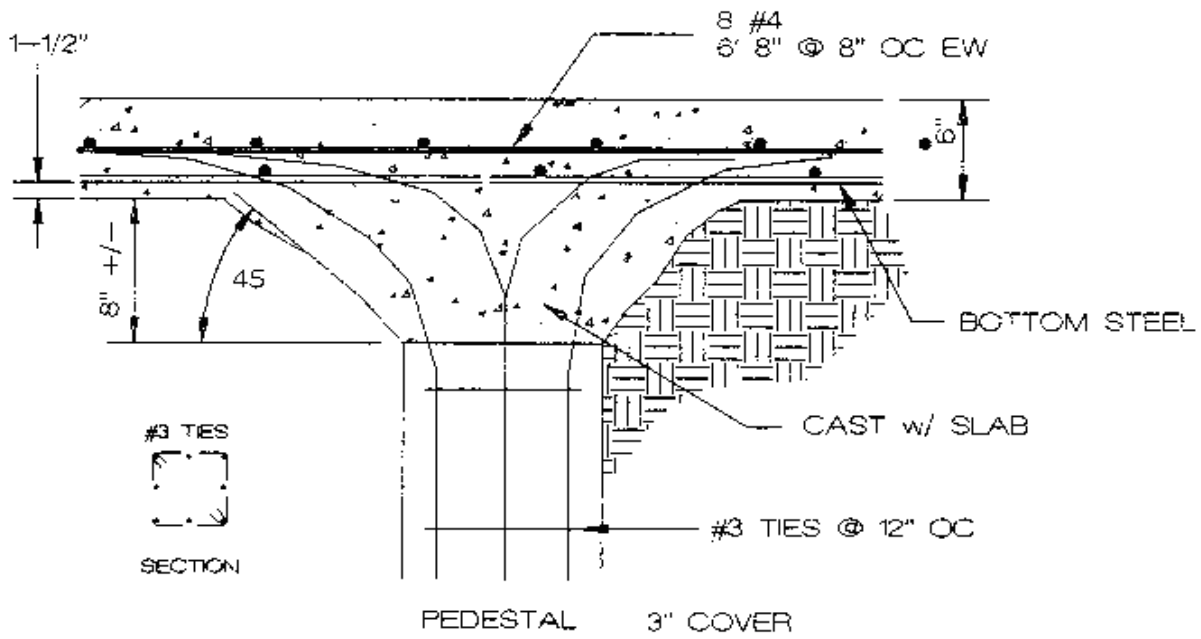
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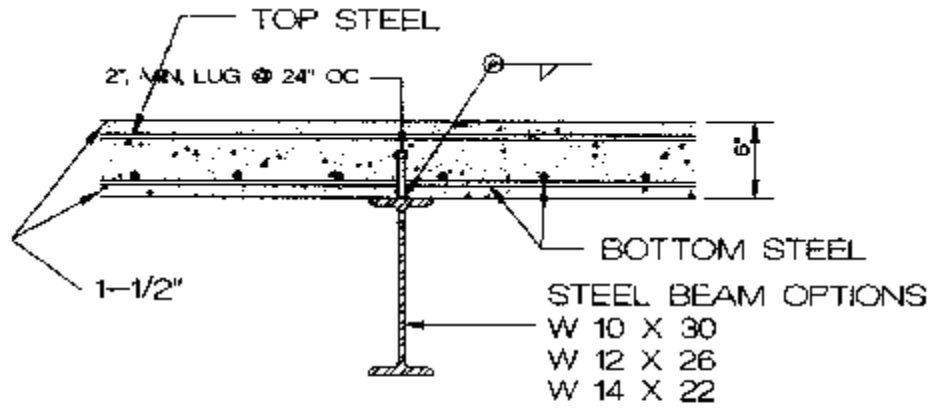


GARAGE SLAB w/ BSMT UNDER
NOT TO SCALE

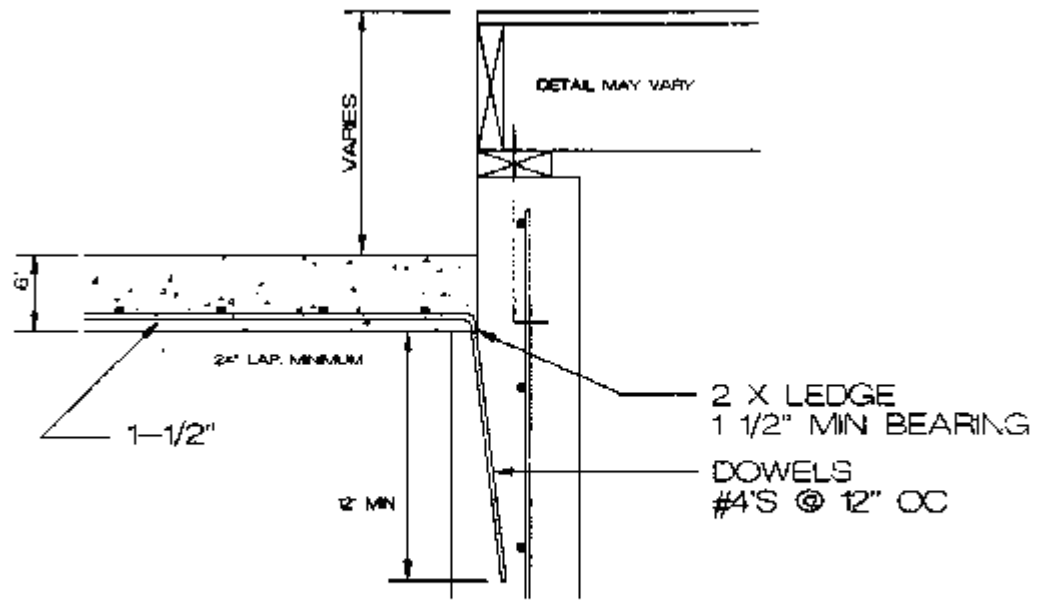


GARAGE SLAB w/ BSMT UNDER
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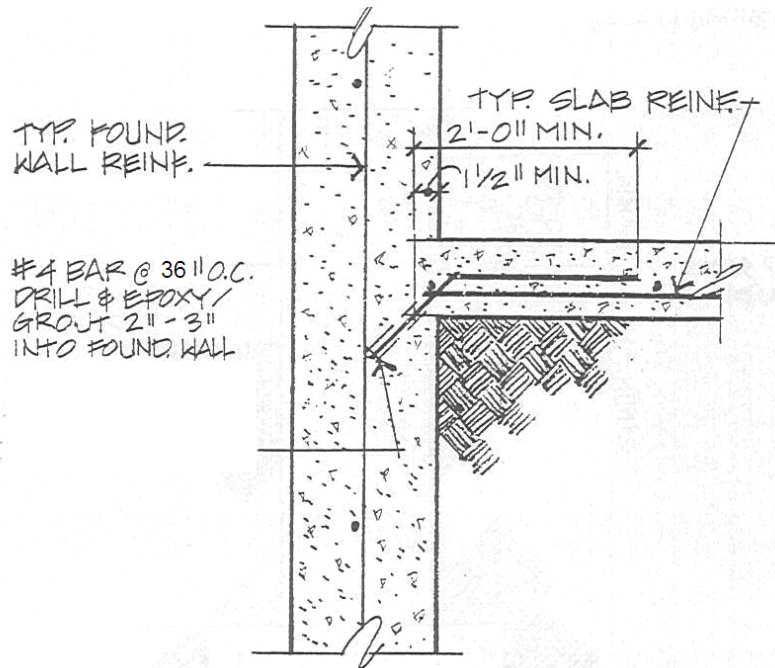




VS (3) SLAB OVER BEAM



VS (4) SLAB AT WALL



ALTERNATE SLAB CONNECTION DETAIL

1 1/2" = 1'-0"

REV 11/20/95

