	<p><b>BUILDING PERMIT REQUIREMENTS FOR:</b></p> <p><b>RETAINING WALLS</b></p> <p><b>Level or Sloping Backfill</b></p>	<p><b>INFORMATION GUIDELINE</b></p> <p><b>2</b></p> <p><b>March 2011</b></p>
<p>CITY OF ESCONDIDO • BUILDING DIVISION • 201 N. BROADWAY, ESCONDIDO, CA 92025 • (760) 839-4647</p>		

Job Address \_\_\_\_\_ Owner \_\_\_\_\_

Wall Type (circle one) I • II Wall Height \_\_\_\_\_ Wall Length \_\_\_\_\_

Upon permit issuance, this Guideline serves as the approved plan. Permit Validation \_\_\_\_\_

Construction of retaining walls, except those lower than three feet high and not supporting surcharge, requires a permit and is regulated by City of Escondido building codes. To obtain a permit, complete the above information and provide three (3) copies of a Plot Plan showing location of proposed wall (see Guideline #16). For inspection requests, call 839-4646 (24-hour inspection request recorder).

**I. INSPECTIONS**

Inspections must be performed during several phases of construction. The permit and plans must be available for the inspector. Please call for inspection at the following times:

1. When the footing has been dug, with the steel tied securely in its final position and is ready for the concrete to be placed, a footing inspection is required. For stepped footings, see requirement on page 7.
2. A masonry pre-grout inspection is required when the block has been laid and the steel is in place, but before the grout has been placed.
  - a. If cleanout holes *are* used, block may be laid to the full height at the grout pour before calling for the pregrout inspection. Grout shall be placed in a continuous pour in grout lifts not exceeding 6 feet.
  - b. If cleanout holes *are not* used, a masonry pregrout inspection is required prior to each grout pour. Block cannot be laid higher than the grout pour. Note that cleanouts are required for all grout pours over 5 feet in height.
3. After grouting is completed and after rock or rubble wall drains are in place, but before earth backfill is placed, call for a backfill/drainage inspection.
4. When all work has been completed, call for a final inspection.

*Example:* Wall height of 5 feet, slope of retained earth 3 horizontal to 1 vertical.

*From Table A*

- T=Type B wall
- R=Group 5 reinforcing steel
- K=Type E key
- W=2 feet, 9 inches

*From Table B*

Type B wall is Type I (see sketch Page 3), 8-inch concrete block. Group 5 reinforcing steel is #4 bars @ 16 inches on-center. Type E key is 8 inches wide by 8 inches deep.

**IV. MIX REQUIREMENTS**

*Note that use of plastic cement is not permitted in retaining walls located in Seismic Design Category C, D or E.*

- A. The concrete mix for footing must meet a compressive strength of 2,000 psi minimum, or the following proportions by volume:
  - 1 part Portland cement
  - 2-1/2 parts sand
  - 3-1/2 parts 3/4 inch maximum-size gravel
  - 7 gallons of water maximum per sack of cement
- B. The mortar mix must have a compressive strength of 1,800 psi minimum. One possible mix contains the following proportions by volume:
  - 1 part Portland cement
  - 3-1/2 parts sand
  - 1/4 part hydrated lime or lime putty
- C. Grout must have a compressive strength of 2,000 psi minimum. One possible mix contains the following proportions by volume:
  - 1 part Portland cement
  - 3 parts sand
  - 2 parts pea gravel (3/8-inch aggregate)

**II. WALL HEIGHT**

Wall height is measured from the top of the footing to the top of the wall. Walls not shown in the tables in this guideline must be designed specifically for the existing condition. The walls shown here are designed to retain earth banks from level to a slope of 1 horizontal to 1 vertical (sloping surcharge). No building foundation, retaining wall, driveway, parking, fence or other loading source on the upper level is allowed within a distance equal to the height of the wall.

**III. USE OF TABLES**

Determine height of wall to be constructed as described above, slope of retained earth and type of wall desired. For wall types I and II use Table A for T, R, K and W designations.

Water added to pouring consistency without segregation of the grout constituents.

*Note: All cells must be filled solid with grout. Rod of vibrate immediately. Re-rod or re-vibrate grout about 10 minutes after pouring to ensure solid consolidation. Stop grout 2 inches from top of masonry units when grouting of second lift is to be continued at another time.*

**V. MORTAR KEY**

To insure proper bonding between the footing and the first course of block, a mortar key must be formed by embedding a flat 2x4 flush with and at the top of the freshly poured footing. It should be removed after the concrete has started to harden (about 1 hour). A mortar key may be omitted if the first course of block is set into fresh concrete when the footing is poured and a good bond is obtained.

**VI. HORIZONTAL STEEL**

Two #4 bars must be placed longitudinally in the footing as shown. One #4 reinforcing bar must be placed longitudinally within the wall in a bond beam block every 16 inches as the blocks are laid up.

**VII. WALL DRAINS**

Wall drains, four inches in diameter, must be placed at 6-foot intervals along the length of the wall and located at the level of the bottom course of block. The drains must be formed by

placing a block on its side at 6-foot intervals or by leaving out the mortar in the vertical spaces between all the blocks (head joint) in the first course. Backfill behind wall drains or open head joints must be loose rubble or gravel. A min. 4" perforated pipe in a 12" gravel bed is recommended for the entire length of the wall. Wall drainage shall be controlled on the subject property/lot.

**VIII. SOIL**

All footings must extend at least 12 inches into undisturbed natural soil or compacted fill which has been compacted to at least 90 percent density. Soil should be dampened prior to placing concrete in footings. A soils report, compiled by a licensed engineer, may be required.

**IX. REINFORCING STEEL**

Reinforcing steel must be deformed and comply with ASTM specification A615, Grade 40. When one continuous bar cannot be used, a lap or splice of 40-bar diameters is required.

**X. ANTI-GRAFFITI COATING**

An approved Anti-Graffiti coating should be applied to all exterior wall surfaces. Contact Engineering Dept. 839-4651 for a list of approved coating materials.

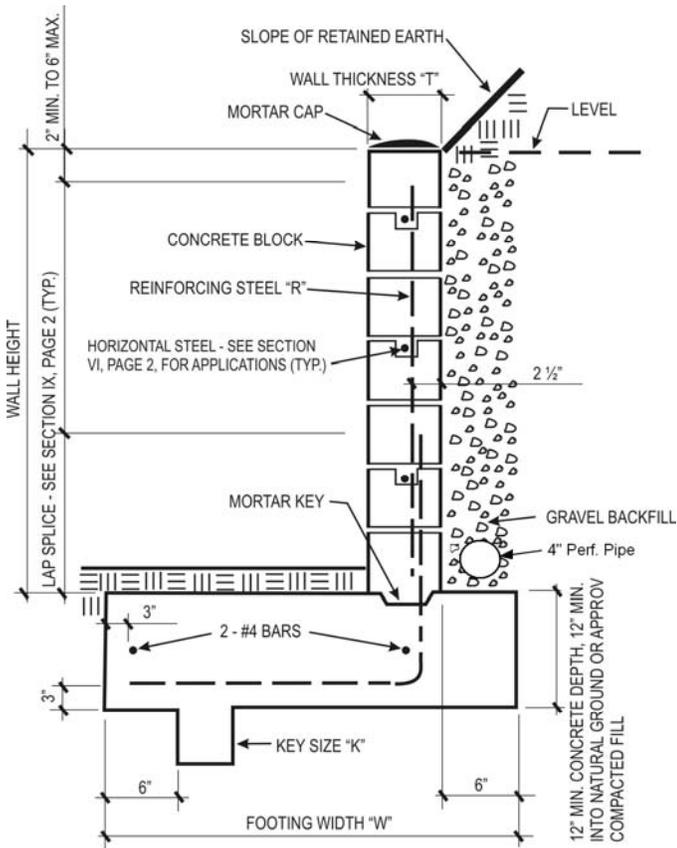
**Table A: Slope of Retained Earth/Horizontal Run to Vertical Rise 4**

Wall Ht.	Level				5 to 1				4 to 1				3 to 1				2 to 1				1 ½ to 1				1 to 1																							
	T	R	K	W	T	R	K	W	T	R	K	W	T	R	K	W	T	R	K	W	T	R	K	W	T	R	K	W	T	R	K	W																
1'-6"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	N	1'-6"	A	1	N	1'-6"	A	1	D	1'-7"	A	1	D	1'-7"												
2'-0"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	N	1'-4"	A	1	D	1'-8"	A	1	D	1'-8"	A	1	D	1'-10"	A	1	D	1'-10"								
2'-8"	A	1	N	1'-7"	A	1	N	1'-7"	A	1	N	1'-7"	A	1	N	1'-7"	A	1	N	1'-7"	A	1	N	1'-7"	A	1	D	1'-10"	A	1	D	1'-10"	A	1	E	2'-2"	A	1	E	2'-2"								
3'-0"	A	1	N	2'-0"	A	1	N	2'-0"	A	1	N	2'-0"	A	1	N	2'-0"	A	1	N	2'-0"	A	1	D	2'-0"	A	1	D	2'-0"	A	1	E	2'-2"	A	1	E	2'-2"	B	1	F	2'-5"	B	1	F	2'-5"				
3'-4"	A	1	N	2'-1"	A	1	N	2'-1"	A	1	N	2'-1"	A	1	N	2'-1"	A	3	D	2'-1"	A	3	D	2'-1"	A	3	D	2'-1"	A	3	D	2'-1"	B	1	E	2'-4"	B	1	E	2'-4"	B	4	F	2'-4"	B	4	F	2'-4"
4'-0"	B	1	N	2'-4"	B	1	N	2'-3"	B	1	N	2'-3"	B	1	N	2'-3"	B	1	D	2'-3"	B	1	D	2'-3"	B	1	D	2'-4"	B	1	D	2'-4"	B	4	F	2'-5"	B	4	F	2'-5"	B	6	G	3'-4"	B	6	G	3'-4"
4'-6"	B	1	N	2'-6"	B	2	D	2'-6"	B	2	D	2'-6"	B	4	E	2'-6"	B	4	E	2'-6"	B	6	F	3'-1"	B	6	F	3'-1"	C	5	G	3'-9"	C	5	G	3'-9"												
5'-0"	B	4	D	2'-9"	B	4	D	2'-9"	B	4	D	2'-9"	B	5	E	2'-9"	B	5	E	2'-9"	B	5	E	2'-9"	B	5	E	2'-9"	B	6	F	2'-9"	B	6	F	2'-9"	C	5	G	3'-5"	C	5	G	3'-5"				
5'-6"	B	5	D	3'-0"	B	6	D	3'-0"	B	6	D	3'-0"	B	6	E	3'-0"	B	6	E	3'-0"	B	6	E	3'-0"	B	6	E	3'-0"	C	5	F	3'-2"	C	5	F	3'-2"	C	5	G	3'-9"	C	5	G	3'-9"				
6'-0"	C	5	E	3'-3"	C	5	E	3'-3"	C	5	E	3'-3"	C	5	E	3'-4"	C	5	E	3'-4"	C	5	E	3'-4"	C	5	E	3'-4"	C	5	F	3'-6"	C	5	F	3'-6"	C	6	G	4'-2"	C	6	G	4'-2"				

**Table B 1,2,3**

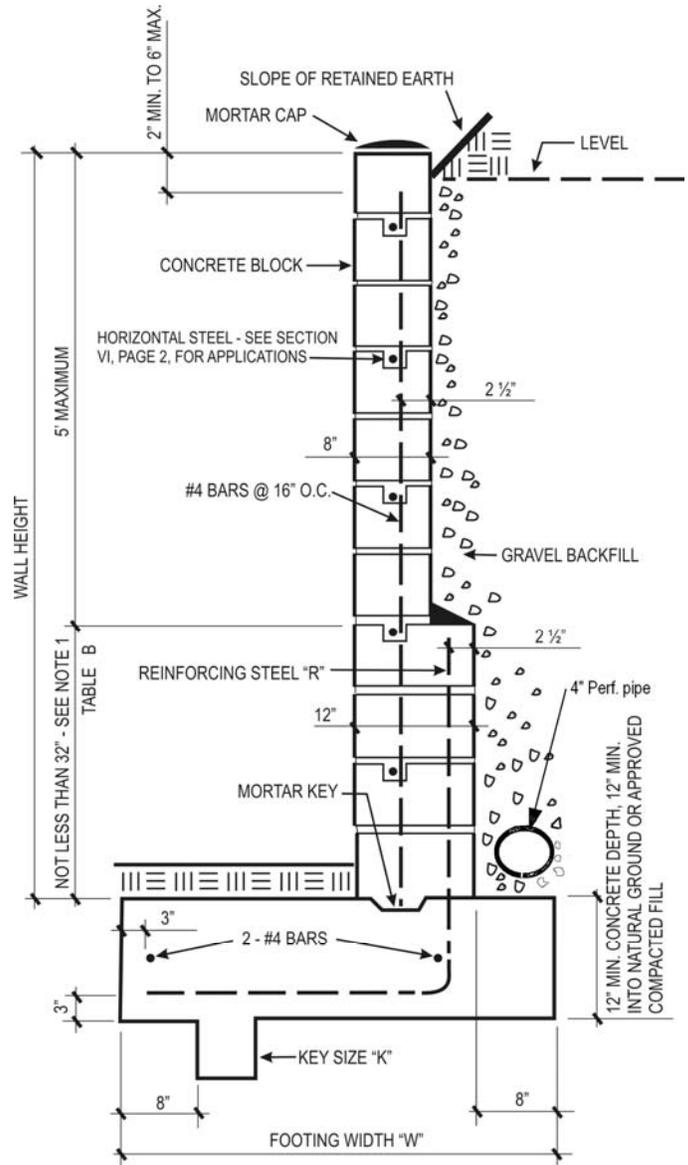
Wall types and thickness, T	Reinforcing Steel "R"	Key size "K" Width-by-depth
A - Type 1, 6" block	1 - #3 bars @ 24" o.c.	D - 6" X 6"
B - Type 1, 8" block	2 - #4 bars @ 32" o.c.	E - 8" X 8"
C - Type II, see note <sup>1</sup> below	3 - #3 bars @ 16" o.c.	F - 12"X12"
	4 - #4 bars @ 24" o.c.	G - 12"X18"
	5 - #4 bars @ 16" o.c.	N - None
	6 - #5 bars @ 16" o.c.	

1. When wall Type II is required, the first 32 inches of block, regardless of wall height, must be 12-inch wide masonry units.
2. All block must be grade "N" grouted solid with an -f'<sub>m</sub> = 1,500 PSI
3. All construction must comply with the specifications shown in the guideline.
4. Footing sizes are based on a soil bearing value of 1,000 psf. Walls not shown in the tables above must be designed specifically for the existing condition.



### TYPE I WALL

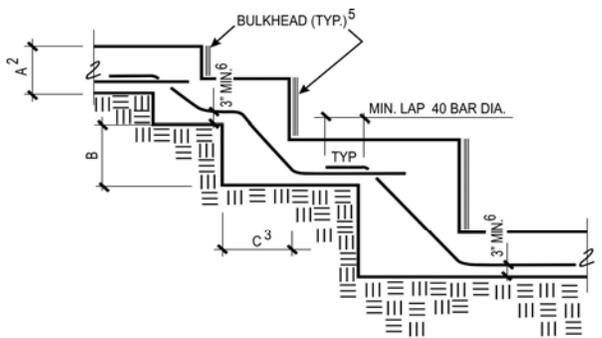
Note: A minimum of 7 feet must be provided horizontally from the leading edge of the footing to daylight where the ground slopes away from the base of the wall.



### TYPE II WALL

#### NOTES:

1. Where the surface of the ground slopes more than one foot in ten feet, the bottom of the footing shall be level and stepped as illustrated.
2. Footing thickness "A" shall be 12" minimum into natural grade or approved compacted fill.
3. Dimension "C" shall not be less than dimensions "A" or "B", whichever is larger.
4. At the time of inspection, the top of footing grade shall be clearly defined at intervals not exceeding 8 feet.
5. All bulkheads shall be plumb and adequately braced.
6. All reinforcement shall be supported with approved material and braced to resist displacement. A minimum of 3" clearance to earth shall be maintained.
7. The minimum reinforcement lap shall be 40 bar diameters.



### STEPPED FOOTING ELEVATION N.T.S.