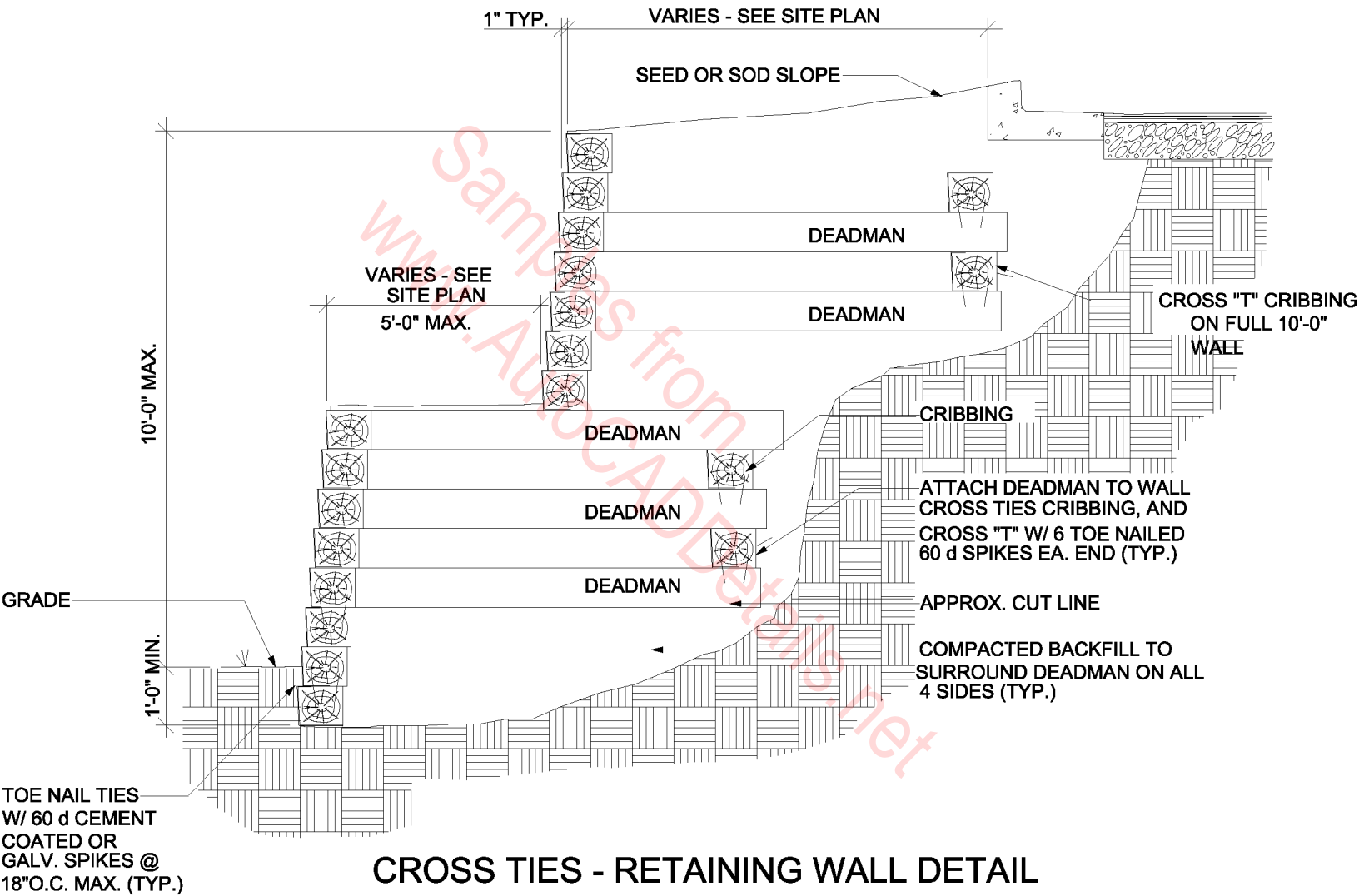
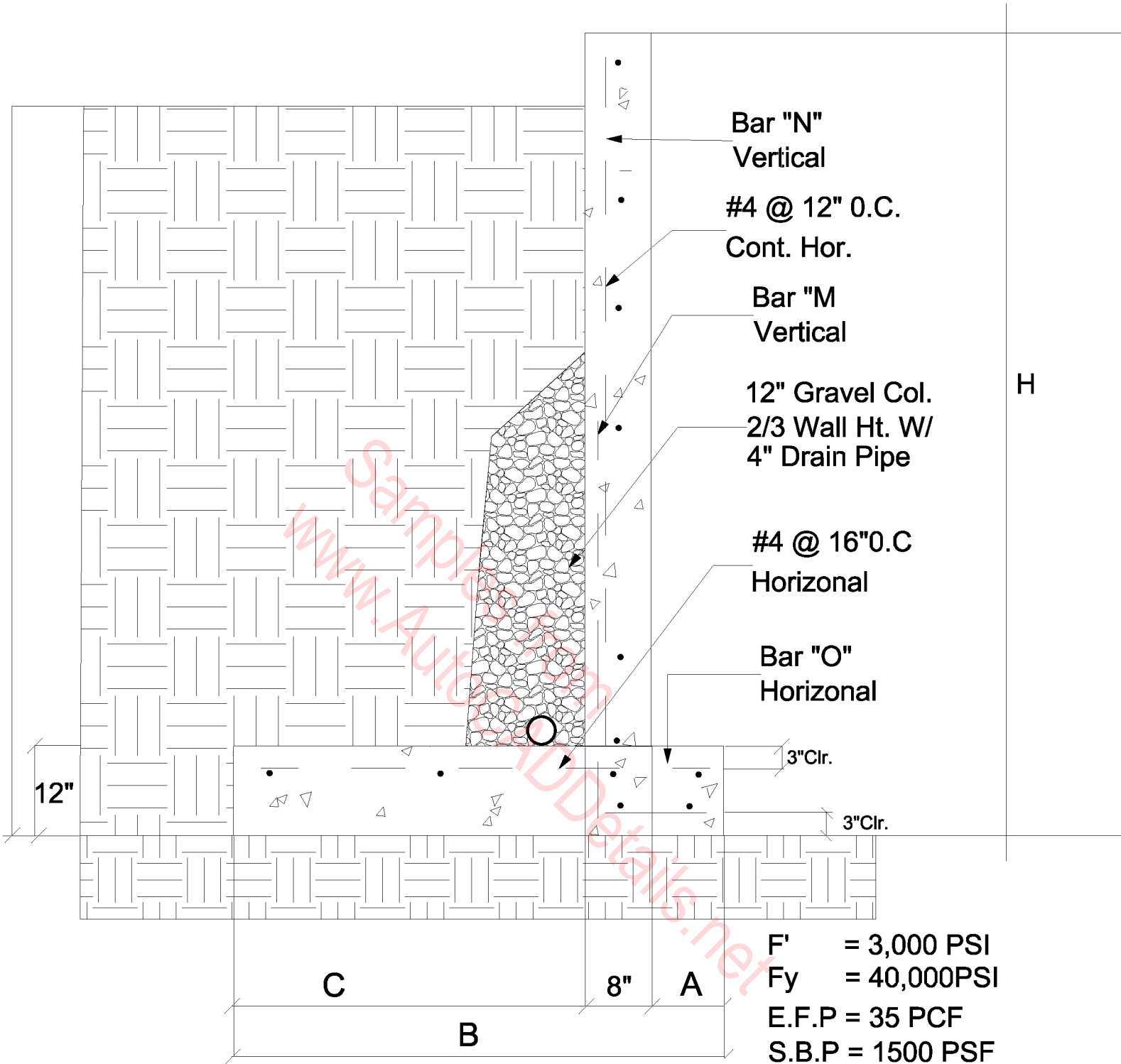


**CONCRETE RETAINING WALL**

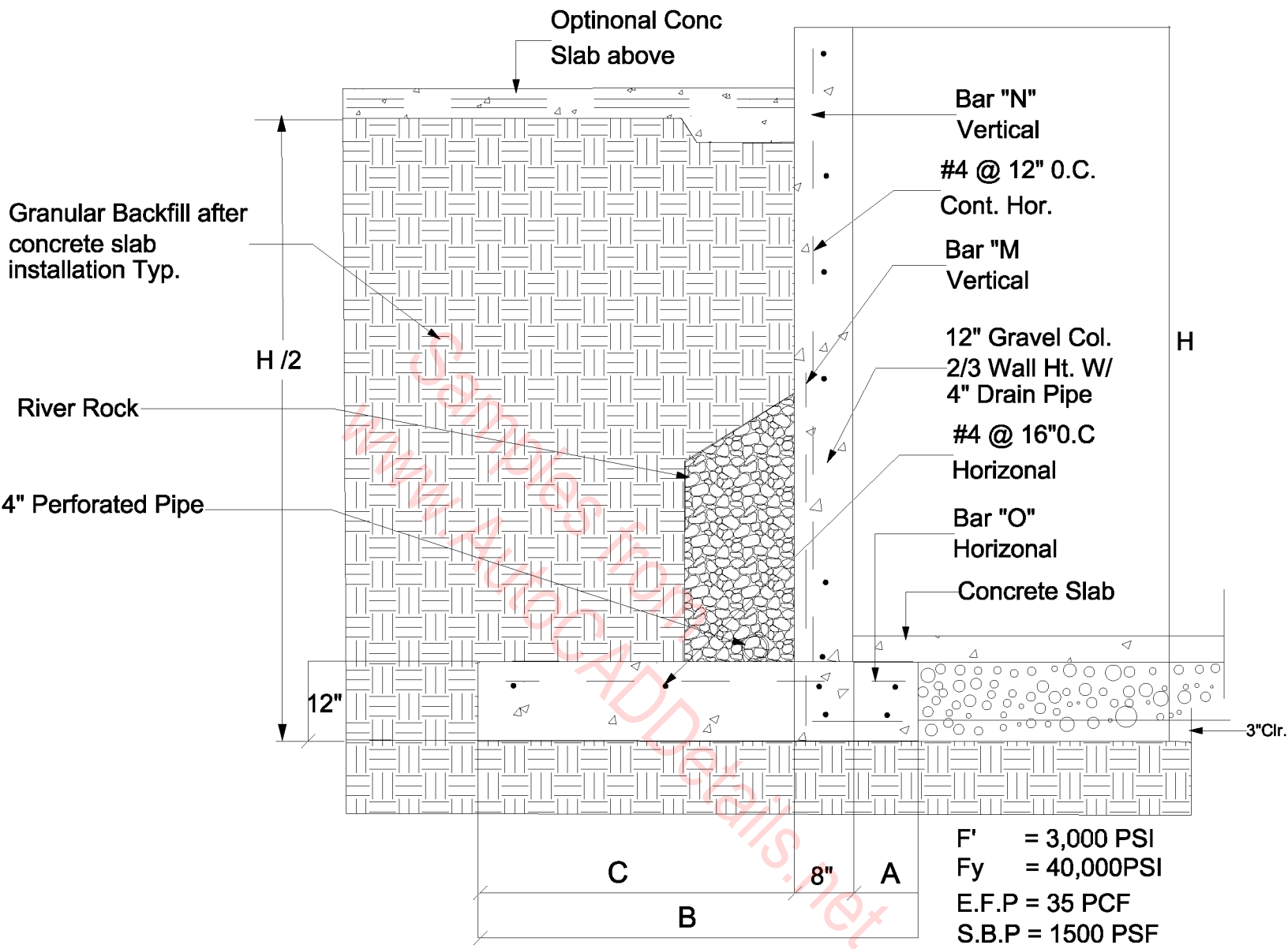


H/2



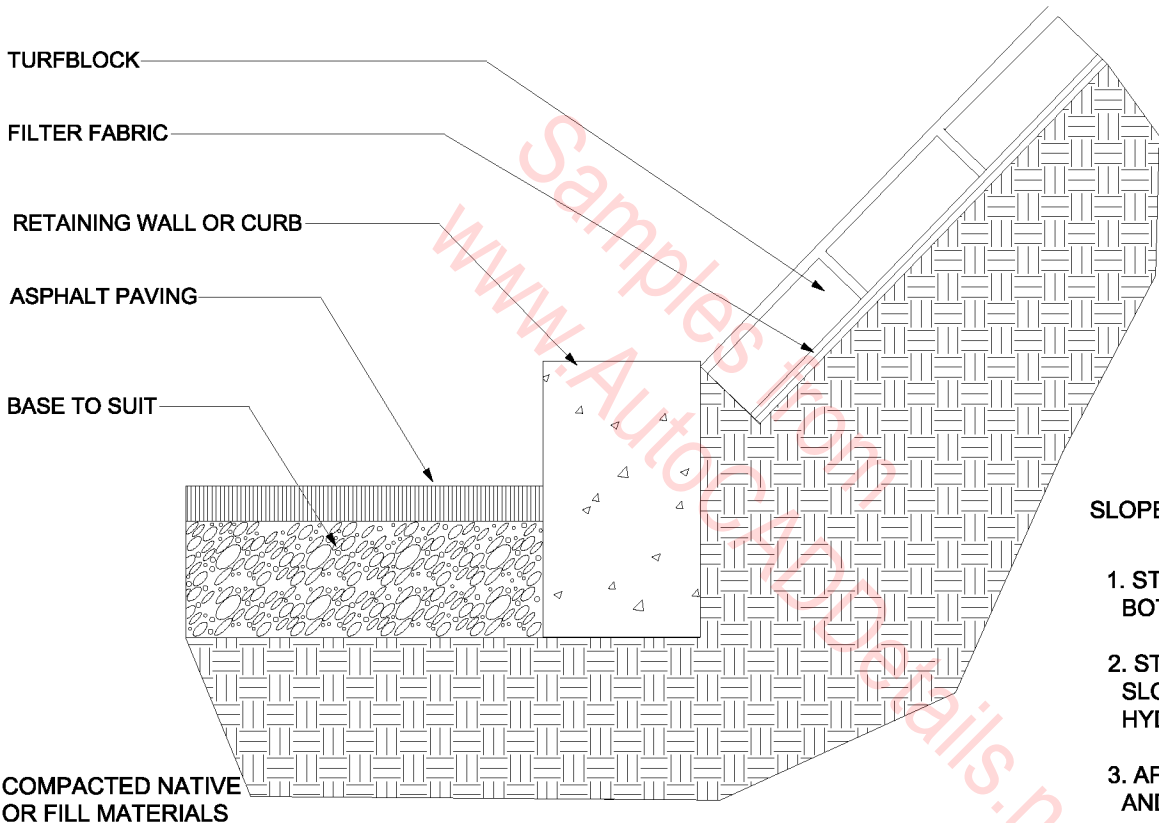
H	A	B	C	BAR "M"	BAR "N"	BAR "O"
4'-0"	8"	2'8"	1'4"	#4's @ 18" O.C.	#4's @ 18" O.C.	#4's @ 18" O.C.
6'-0"	8"	4'2"	2'10"	#4's @ 18" O.C.	#4's @ 18" O.C.	#4's @ 16" O.C.
8'-0"	8"	5'6"	4'2"	#4's @ 8" O.C.	#4's @ 16" O.C.	#5's @ 10" O.C.
10'-0"	12"	7'2"	5'6"	#5's @ 8" O.C.	#4's @ 16" O.C.	#6's @ 8" O.C.

# RETAINING WALL



H	A	B	C	BAR "M"	BAR "N"	BAR "O"
5'-4"	10"	10"	2'-4"	#4's @ 18" O.C.	#4's @ 18" O.C.	#4's @ 18" O.C.
7'-4"	1'-2"	1'-2"	3'-0"	#5's @ 18" O.C.	#4's @ 18" O.C.	#4's @ 18" O.C.
9'-4"	1'-8"	1'-8"	4'-0"	#5's @ 9" O.C.	#4's @ 18" O.C.	#4's @ 18" O.C.
10'4"	2'-0"	2'-0"	4'-8"	#6's @ 9" O.C.	#4's @ 18" O.C.	#4's @ 16" O.C.

## RETAINING WALL W/Slab

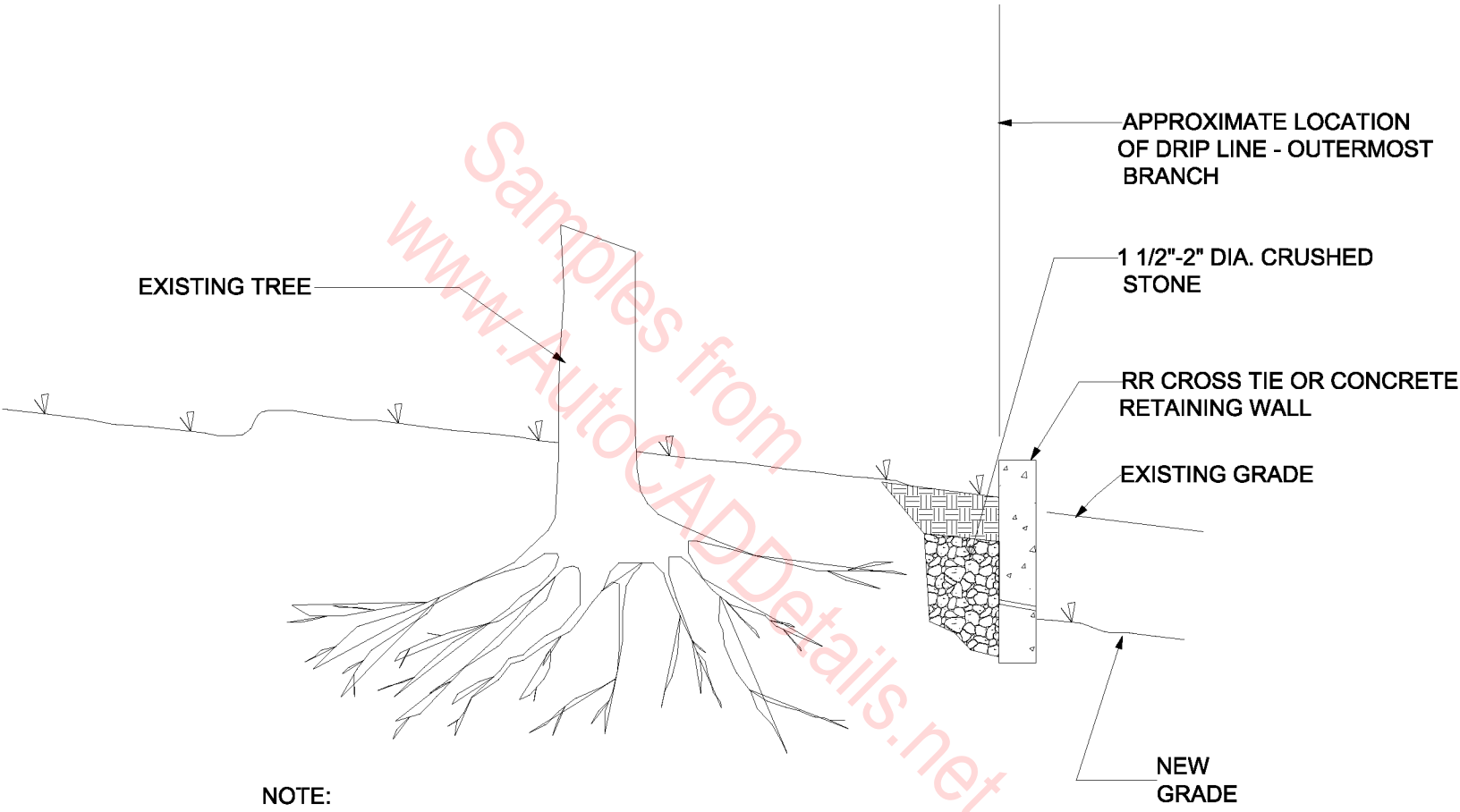


**SLOPE PROTECTION USING TURFBLOCK:**

1. STONE SHOULD ALWAYS BE LAID FROM BOTTOM UP.
2. STAKING OR PINNING MAY BE USED ON SLOPES STEEPER THAN 1 TO 1 OR WHERE HYDRAULIC FORCES ARE MORE INTENSE.
3. APERTURES MAY BE FILLED WITH TOPSOIL AND PLANTED OR FILLED WITH GRAVEL.
4. THE TOP OF THE SLOPE SHOULD BE PROTECTED AGAINST UNDERMINING.

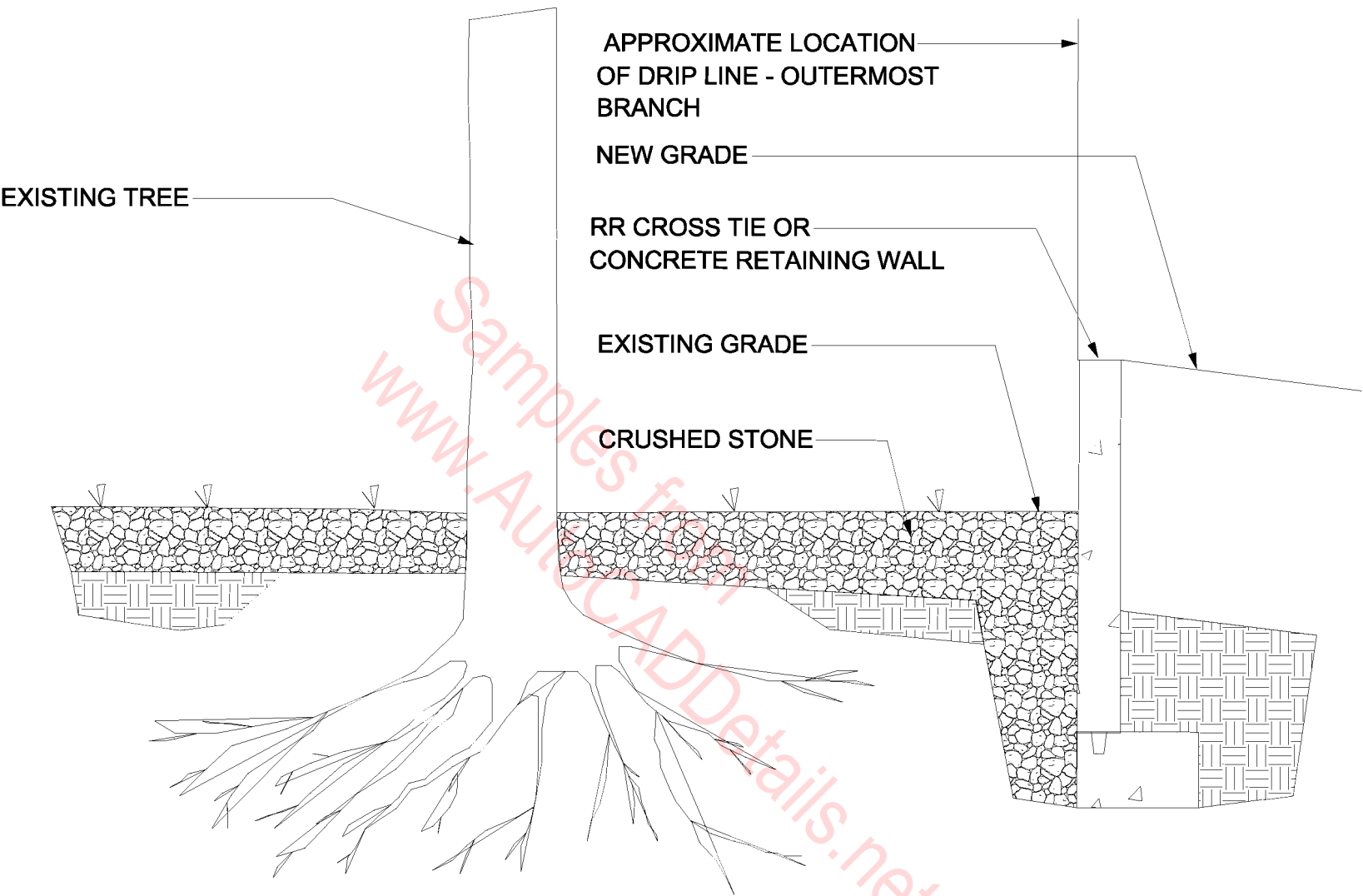
**SLOPE PROTECTION DETAIL**

---



NOTE:  
 CONCRETE WALLS SHALL HAVE  
 WEEP HOLES @ 3'-0" O.C.

## TREE PROTECTION AT CUT SLOPE



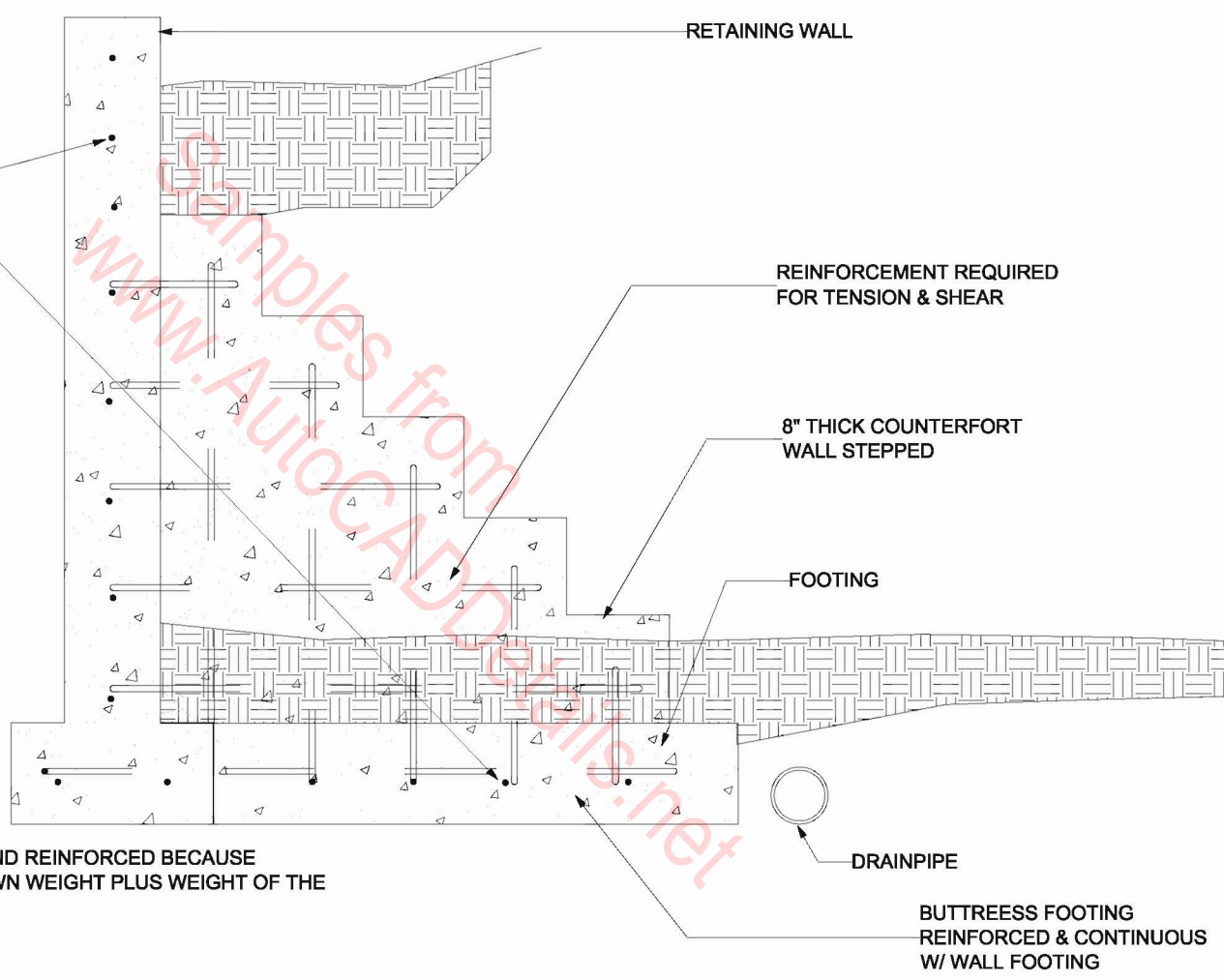
**NOTE:**  
**CONCRETE WALLS SHALL HAVE**  
**WEEP HOLES @ 3'-0" O.C.**

## TREE PROTECTION AT RETAINING WALL

---

NOTE: COUNTERFORT MUST BE PROFESSIONALLY ENGINEERED.

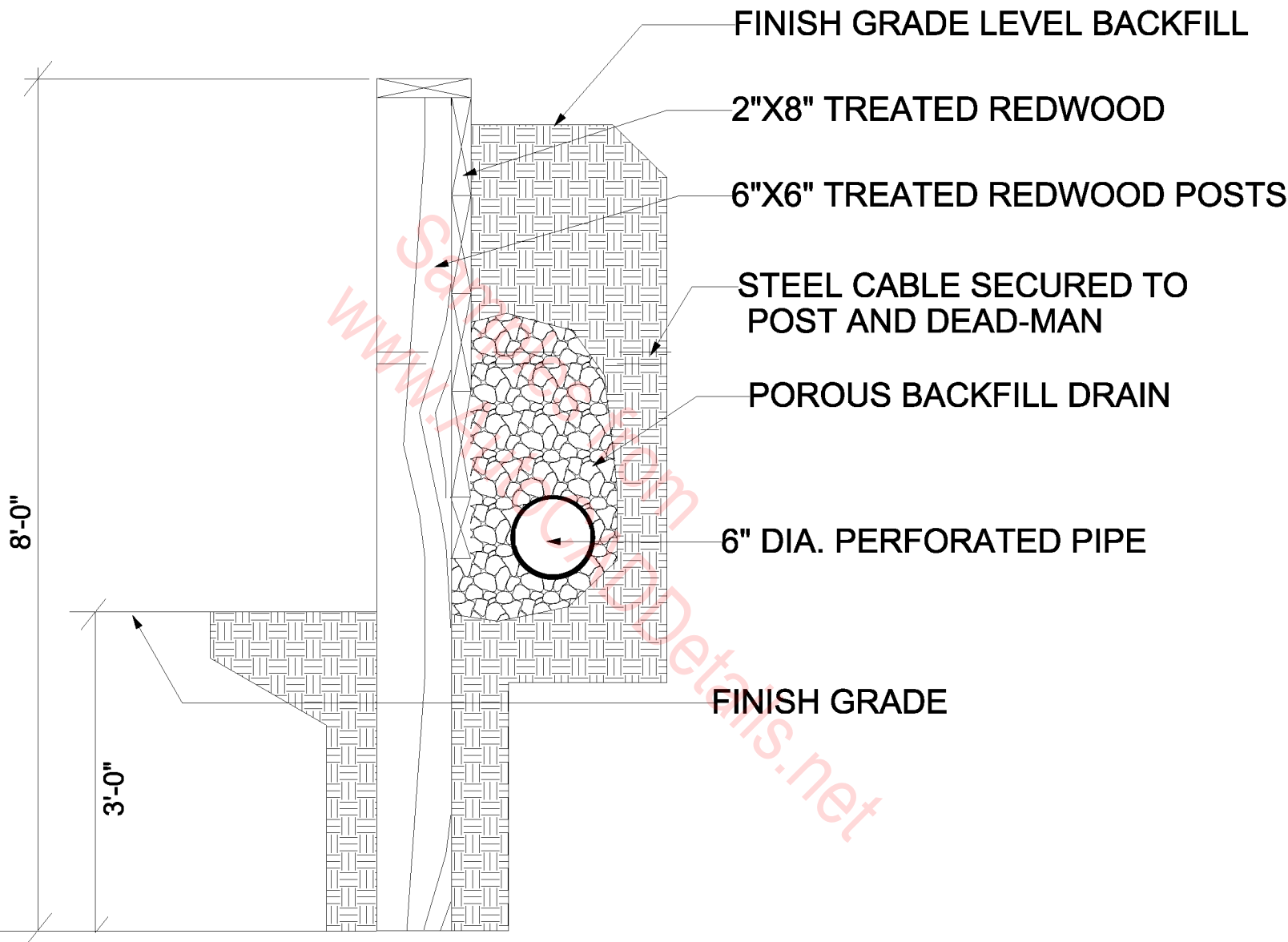
COUNTERFORT REBAR TIED TO RETAINING WALL & FOOTING



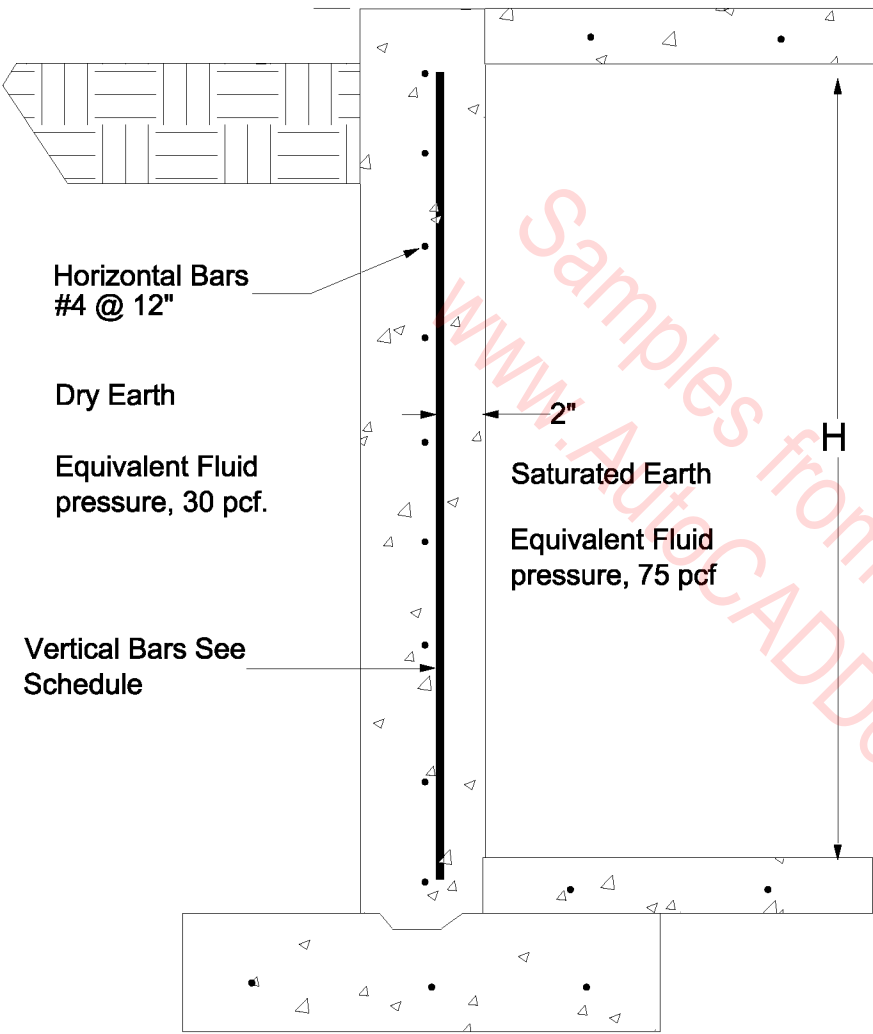
NOTE: FOOTING IS LARGE AND REINFORCED BECAUSE COUNTERFORT USES ITS OWN WEIGHT PLUS WEIGHT OF THE SOIL

# BUTTRESS





**WOOD RETAINING WALL**



H	12" Wall	16" Wall	20" Wall
<b>Grade 40 Reinforcement</b>			
8'-0"	#4 @ 12	#4 @ 12	#4 @ 12
9'-0"	#4 @ 12	#4 @ 12	#4 @ 12
10'-0"	#4 @ 12	#4 @ 12	#4 @ 12
11'-0"	#5 @ 12	#4 @ 10 1/2	#4 @ 12
12'-0"	#6 @ 12	#5 @ 12	#4 @ 10 1/2
13'-0"	#6 @ 10	#6 @ 9 1/2	#5 @ 9 1/2
14'-0"	#7 @ 10	#6 @ 11	#5 @ 10
15'-0"	#8 @ 10	#7 @ 12	#6 @ 11 1/2
16'-0"	#8 @ 9	#7 @ 10	#6 @ 9/12
17'-0"	#9 @ 9	#7 @ 8	#7 @ 10 1/2
18'-0"	#10 @ 9 1/2	#9 @ 11	#8 @ 11 1/2
19'-0"	#10 @ 8	#10 @ 12	#8 @ 10
20'-0"	#11 @ 8	#9 @ 8	#9 @ 10 1/2
<b>Grade 60 Reinforcement</b>			
8'-0"	#4 @ 12	#4 @ 12	#4 @ 12
9'-0"	#4 @ 12	#4 @ 12	#4 @ 12
10'-0"	#4 @ 12	#4 @ 12	#4 @ 12
11'-0"	#4 @ 12	#4 @ 12	#4 @ 12
12'-0"	#5 @ 12	#4 @ 12	#4 @ 12
13'-0"	#45 @ 10	#4 @ 12	#4 @ 12
14'-0"	#5 @ 12	#5 @ 11 1/2	#4 @ 12
15'-0"	#7 @ 12	#5 @ 9	#5 @ 12
16'-0"	#7 @ 10	#5 @ 11 1/2	#5 @ 9/12
17'-0"	#8 @ 11	#6 @ 9 1/2	#6 @ 12
18'-0"	#8 @ 9	#7 @ 10	#6 @ 10
19'-0"	#10 @ 12	#8 @ 11	#6 @ 8
20'-0"	#10 @ 12	#9 @ 12	#7 @ 9 1/2

**Basement Retaining Walls**

Type I

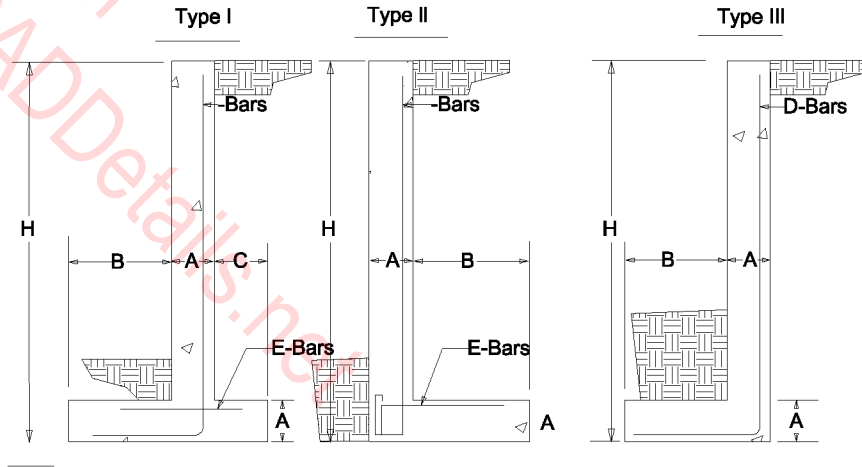
H	A	B	C	Toe Pressure psf	D bars	E bars
5'-0"	12"	1'-2"	6"	872	#4 @ 12	-----
6'-0"	12"	1'-5"	8"	924	#4 @ 12	-----
7'-0"	12"	1'-8"	10"	999	#4 @ 12	-----
8'-0"	12"	1'-11"	9"	1079	#4 @ 12	-----
9'-0"	12"	2'-2"	1'-0"	1207	#4 @ 12	#4 @ 12
10'-0"	12"	2'-5"	1'-2"	1352	#4 @ 12	#4 @ 12
11'-0"	12"	2'-8"	1'-5"	1452	#4 @ 12	#4 @ 12
12'-0"	12"	2'-11"	1'-8"	1551	#4 @ 9	#4 @ 12
13'-0"	12"	3'-2"	1'-11"	1649	#5 @ 11	#4 @ 12
14'-0"	12"	3'-5"	2'-2"	1746	#6 @ 12	#4 @ 12
15'-0"	14"	3'-8"	2'-3"	1873	#6 @ 12	#4 @ 12
16'-0"	15"	3'-11"	2'-4"	2017	#6 @ 11	#4 @ 12
17'-0"	16"	4'-2"	2'-6"	2128	#6 @ 10	#4 @ 12
18'-0"	17"	4'-4"	2'-7"	2341	#7 @ 12	#4 @ 12
20'-0"	19"	4'-10"	2'-11"	2562	#7 @ 10	#4 @ 12
22'-0"	21"	5'-4"	3'-3"	2787	#8 @ 11	#4 @ 11
24'-0"	24"	5'-10"	3'-5"	3059	#8 @ 10	#4 @ 10

Type III

H	A	B	Toe Pressure psf	D bars
5'-0"	12"	1'-8"	478	#4 @ 12
6'-0"	12"	2'-5"	457	#4 @ 12
7'-0"	12"	3'-3"	446	#4 @ 12
8'-0"	12"	3'-2"	711	#4 @ 12
9'-0"	12"	4'-1"	664	#4 @ 12
10'-0"	12"	5'-0"	646	#4 @ 12
11'-0"	12"	6'-0"	628	#4 @ 12
12'-0"	12"	7'-1"	611	#4 @ 9
13'-0"	12"	7'-9"	670	#5 @ 11
14'-0"	12"	9'-0"	642	#6 @ 12
15'-0"	14"	8'-10"	788	#6 @ 12
16'-0"	15"	9'-6"	826	#6 @ 11
17'-0"	16"	10'-3"	852	#6 @ 10
18'-0"	18"	10'-9"	896	#7 @ 12
20'-0"	20"	12'-2"	861	#7 @ 10
22'-0"	22"	13'-8"	1016	#7 @ 9
24'-0"	23"	14'-10"	1137	#9 @ 12

Type II

H	A	B	Toe Pressure psf	D bars	E bars
5'-0"	12"	2'-1"	1141	#4 @ 12	#4 @ 12
6'-0"	12"	2'-7"	1376	#4 @ 12	#4 @ 12
7'-0"	12"	3'-2"	1576	#4 @ 12	#4 @ 12
8'-0"	12"	3'-7"	1838	#4 @ 12	#4 @ 12
9'-0"	12"	4'-0"	2097	#4 @ 12	#4 @ 12
10'-0"	12"	4'-7"	2292	#4 @ 12	#4 @ 12
11'-0"	12"	5'-2"	2483	#4 @ 12	#4 @ 10
12'-0"	12"	5'-9"	2677	#4 @ 9	#5 @ 12
13'-0"	12"	6'-4"	2870	#5 @ 11	#5 @ 9
14'-0"	12"	6'-11"	3059	#6 @ 12	#6 @ 10
15'-0"	14"	7'-3"	3330	#6 @ 12	#6 @ 10
16'-0"	15"	7'-8"	3576	#6 @ 11	#7 @ 12
17'-0"	16"	8'-3"	3761	#6 @ 10	#7 @ 10
18'-0"	18"	8'-6"	4064	#7 @ 12	#7 @ 11
20'-0"	20"	9'-6"	4493	#7 @ 10	#7 @ 9
22'-0"	22"	10'-5"	4955	#7 @ 9	#8 @ 10
24'-0"	23"	11'-3"	5460	#9 @ 12	#9 @ 10



### TYPICAL RETAINING WALLS ENGINEERING

NOTE: Code Ultimate Strength design is 3000 PSI.

ASTM A-615 Grade 60 reinforcement. Soil weight 100lbs per ft(3)