

LAKE HAVASU CITY - DEVELOPMENT SERVICES DEPARTMENT
RESIDENTIAL MASONRY RETAINING WALL DESIGN

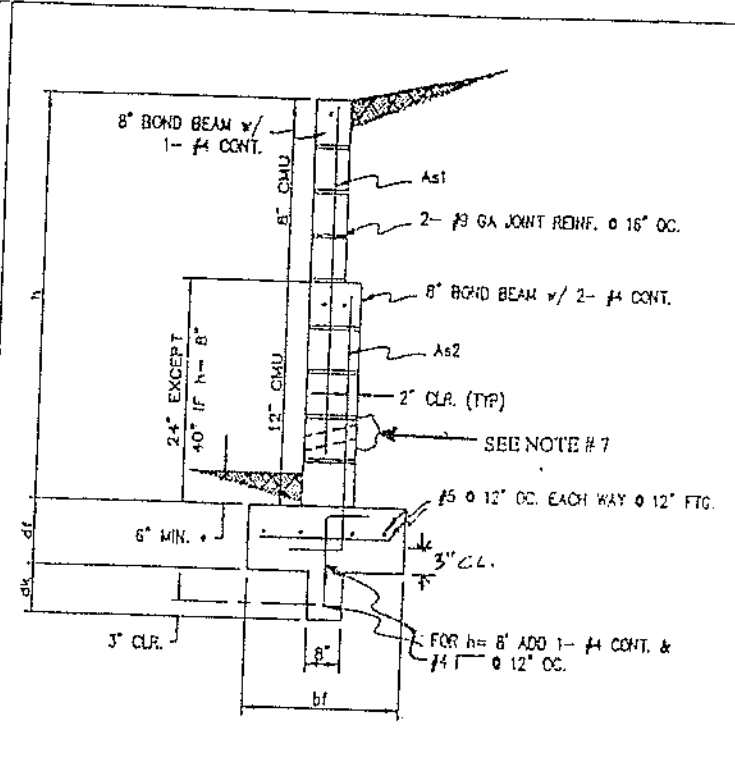
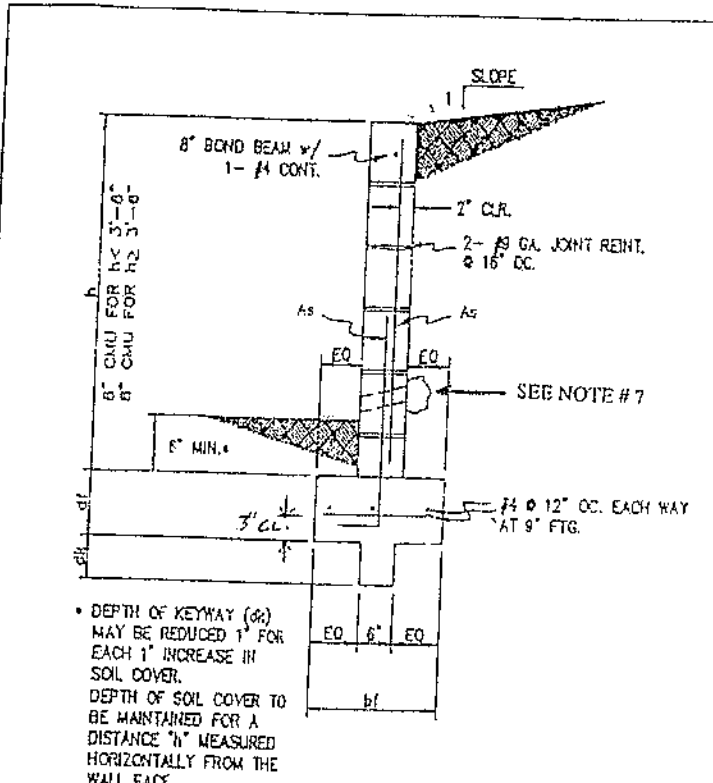
Applicant _____ Date _____

Address _____ Legal: Tract _____ Block _____ Lot _____

Retaining: Length _____ Height _____ Slope: None _____ 5:1 _____ 4:1 _____ 3:1 _____ 2:1 _____

Located in an Easement: No _____ Yes, Utility Approvals Attached _____

SUBMIT WITH A FULLY DIMENSIONED SITE PLAN AND UTILITY APPROVALS WHEN APPLICABLE



h	df	bf	SLOPE	HORIZ	5:1	4:1	3:1	2:1	h	df	bf	SLOPE	HORIZ	5:1	4:1	3:1	2:1						
1'-6"	8"	1'-0"	As	#4@48	#4@48	#4@48	#4@48	#4@48	6'-0"	12"	3'-0"	As2	NA	NA	NA	#4@24	#4@24						
			dk	NA	NA	NA	NA	NA				dk	NA	NA	NA	10"	1'-0"						
2'-0"	9"	1'-4"	As	#4@48	#4@48	#4@48	#4@48	#4@48	7'-0"	12"	3'-6"	As2	#4@16	#4@16	#4@16	#4@16	#4@16						
			dk	NA	NA	NA	NA	NA				dk	10"	11"	1'-0"	1'-0"	1'-3"						
2'-6"	9"	1'-4"	As	#4@48	#4@48	#4@48	#4@48	#4@48	8'-0"	12"	4'-0"	As2	#5@16	#5@8	#5@8	#5@8	#5@8						
			dk	NA	NA	NA	2"	5"				dk	1'-0"	1'-1"	1'-2"	1'-3"	1'-6"						
3'-0"	9"	1'-10"	As	#4@48	#4@48	#4@48	#4@48	#4@48	As1									#4@24	#4@24	#4@24	#4@24	#4@16	
			dk	NA	2"	2"	3"	4"															
3'-6"	9"	1'-10"	As	#4@48	#4@48	#4@48	#4@48	#4@40															
			dk	3"	4"	4"	4"	6"															
4'-0"	9"	1'-10"	As	#4@48	#4@48	#4@48	#4@48	#4@40															
			dk	6"	6"	6"	7"	8"															
4'-6"	9"	2'-0"	As	#4@40	#4@40	#4@40	#4@32	#4@32															
			dk	6"	7"	7"	8"	10"															
5'-0"	9"	2'-4"	As	#4@24	#4@24	#4@24	#4@24	#4@16															
			dk	7"	8"	8"	9"	11"															
5'-6"	9"	2'-6"	As	#5@24	#5@24	#5@24	#5@16	#5@8															
			dk	9"	10"	11"	11"	1'-1"															
6'-0"	12"	3'-0"	As	#4@8	#5@8	#5@8	NA	NA															
			dk	7"	8"	9"	NA	NA															

SYMBOL LEGEND

- h: TOP OF FOOTING TO TOP OF WALL HEIGHT
- df: DEPTH OF FOOTING
- dk: DEPTH OF KEYWAY
- bf: WIDTH OF FOOTING
- db: REINFORCING BAR DIAMETER
- As: VERTICAL WALL REINFORCING

NOTE: SEE REVERSE SIDE FOR MATERIAL STANDARDS AND CONSTRUCTION REQUIREMENTS.

NOTES

1. Concrete: Conform to ASTM C 94; Minimum compressive strength $f' c = 2500$ psi at 28 days.
2. Reinforcing: Conform to ASTM A 615, grade 40, deformed; Dowels to have standard hook, match and lap with vertical wall reinforcing; Vertical wall reinforcing to be secured in place prior to grouting by bar positioners spaced at 200 db o.c. max.; Lap splice length in concrete to be 32 db and 40 db in masonry; Wall horizontal joint reinforcing at 16 inches o.c., ladder or truss type, minimum yield strength $F_y = 60$ ksi, consisting of two deformed #9 ga. longitudinal wires with welded #9 ga. Cross wires.
3. Masonry: Specified compressive strength of masonry $f' m = 1500$ psi; Concrete block conforming to ASTM C 90, normal weight, type I, 1900 psi block unit compressive strength; Mortar conforming to ASTM C 270, type S, 28 day compressive strength $f' c = 1800$ psi; Grout conforming to ASTM C 476, compressive strength $f' c = 2000$ psi; constructed with running bond, all cells filled solid with grout; Quality, prior to or at the time of delivery to the job site, letters of certification from the block manufacture and grout supplier assuring the materials conform to these requirements shall be forwarded to Building Department.
4. Backfill Material: Clean, granular, non expansive fines; Brace wall prior to compaction backfill adjacent to wall.
5. Bearing Soil: Class 4, 2000 psf allowable foundation pressure.
6. No surface surcharge loads over backfill material; Wall extensions or support fences which extend above the retaining wall height are not permitted.
7. Drainage: 1 inch diameter PVC weep pipe at base, 48 inches o.c., screen with 1 cubic foot of 1 inch diameter rock.
8. Use retaining wall height plus $\frac{1}{2}$ privacy wall height for retaining wall design.
9. Privacy walls require #4 rebar at 4 ft. O.C. with 1-#4 at top of wall bond beam.
10. PUE/DE, wall/footing encroachments are not allowed without approvals from utility companies.
11. Wall/footing encroachments of adjacent properties are not allowed without common wall agreement.

**LAKE HAVASU CITY - DEVELOPMENT SERVICES DEPARTMENT
RESIDENTIAL CONCRETE RETAINING WALL DESIGN**

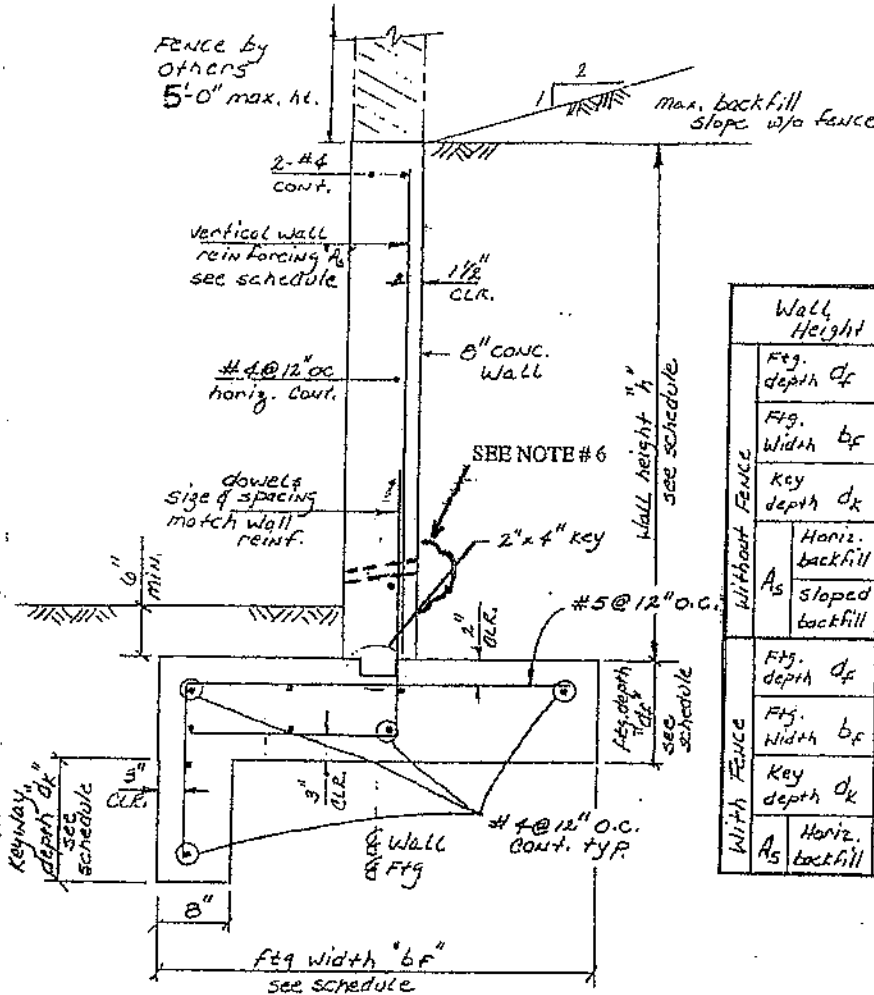
Applicant _____ Date _____

Address _____ Legal: Tract _____ Block _____ Lot _____

Retaining: Length _____ Height _____ Slope: None ___ 5:1 ___ 4:1 ___ 3:1 ___ 2:1 ___

Located in an Easement: No ___ Yes, Utility Approvals Attached ___ See the NOTES on sheet 2

SUBMIT WITH A FULLY DIMENSIONED SITE PLAN AND UTILITY APPROVALS WHEN APPLICABLE



8" Concrete Retaining Wall Schedule

Wall Height	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"
FTG. depth d_f	12"	12"	12"	9"	9"
FTG. Width b_f	4'-0"	3'-6"	3'-0"	2'-4"	1'-10"
Key depth d_k	13"	10"	8"	7"	6"
A_s	Horiz. backfill	#5@12	#5@12	#4@18	#4@18
	sloped backfill	#5@8	#5@12	#5@18	#4@18
FTG. depth d_f	12"	12"	12"	12"	12"
FTG. Width b_f	4'-6"	4'-0"	4'-0"	3'-6"	3'-6"
Key depth d_k	16"	14"	14"	6"	6"
A_s	Horiz. backfill	#5@12	#5@18	#4@12	#4@18

8" Concrete Retaining Wall

SYMBOL LEGEND

- h: TOP OF FOOTING TO TOP OF WALL HEIGHT
- A_s : SIZE AND SPACING OF WALL REINFORCING
- d_f : DEPTH OF FOOTING
- d_k : DEPTH OF FOOTING KEY
- b_f : WIDTH OF FOOTING

NOTE: SEE REVERSE SIDE FOR MATERIAL STANDARDS AND CONSTRUCTION REQUIREMENTS

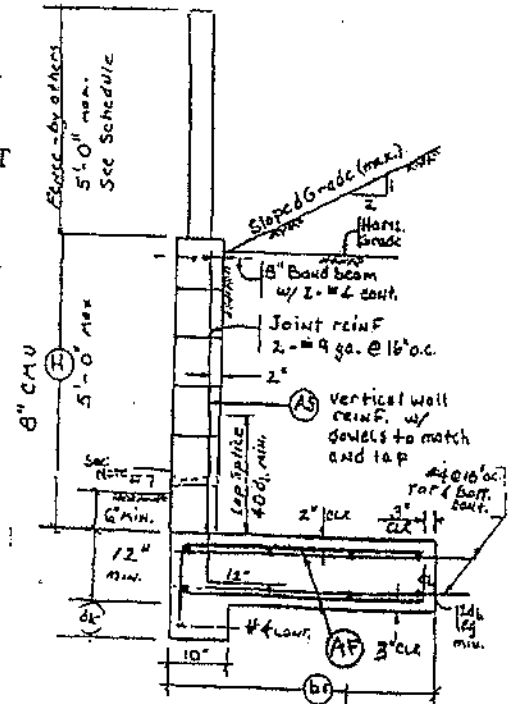
NOTES

1. Concrete: Conform to ASTM C 94; Minimum compressive strength $f'c = 2500$ psi at 28 days.
2. Reinforcing: Conform to ASTM A 615, grade 40, deformed; Dowels to have standard hook, match and lap with vertical wall reinforcing; Vertical wall reinforcing to be secured in place prior to concrete placement, lap splice length to be 32 bar diameters (db).
3. Backfill Material: Clean, granular, non-expansive fines; Brace wall prior to compacting backfill adjacent to wall.
4. Bearing Soil: Class 4, 2000 psf allowable foundation pressure.
5. No surcharge loads over backfill material; Wall extensions or support fences which extend above the wall height indicated, a maximum 5 ft. is permitted if used in conjunction with a horizontal backfill.
6. Drainage: 1 inch diameter PVC weep pipe at base, 48 inches o.c., screen with 1 cubic foot of 1 inch diameter rock.
7. Key depth "dk" may be reduced 1 inch for each 1 inch increase in soil cover over footing toe. Depth of soil fill to be maintained for a distance "h" measured horizontally from wall face.
8. Grade backfill to provide positive drainage without ponding.

LAKE HAVASU CITY - DEVELOPMENT SERVICES DEPARTMENT
RESIDENTIAL MASONRY RETAINING WALL DESIGN

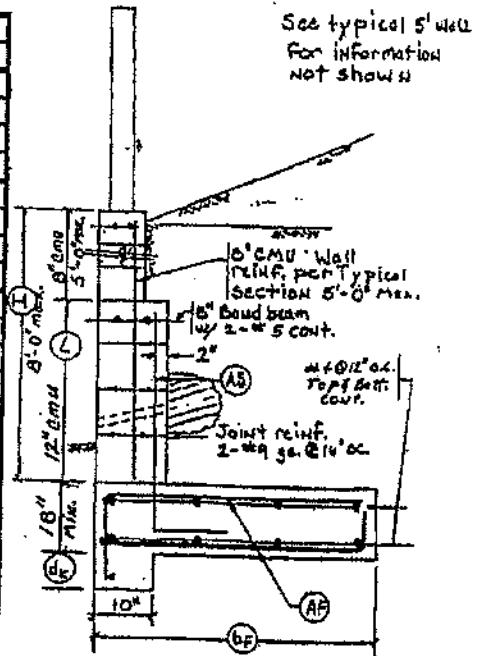
Applicant _____ Date _____
 Address _____
 Legal: Tract _____ Block _____ Lot _____
 Retaining Wall: Length _____ Height _____
 Slope: None _____ 5:1 _____ 4:1 _____ 3:1 _____ 2:1 _____
 Located in Easement: No _____ Yes, utility approvals attached _____

SUBMIT WITH A FULLY DIMENSIONED SITE PLAN AND UTILITY APPROVALS WHEN APPLICABLE



Typical Section 5'-0" Max.

H	L	Slope	< 5' Fence		< 3' Fence		No Fence	
			HORIZ.	≤ 2:1	HORIZ.	≤ 2:1	HORIZ.	≤ 2:1
8'	40"	As	#5 @ 8"	#8 @ 8"	#4 @ 8"	#5 @ 8"	#4 @ 8"	#8 @ 8"
		bf	6'-6"	8'-0"	6'-6"	8'-0"	6'-6"	8'-0"
		dk	0	2'-8"	0	2'-6"	0	2'-8"
		AF	#7 @ 12"	#7 @ 6"	#7 @ 12"	#7 @ 6"	#7 @ 12"	#7 @ 8"
7'	24"	As	#4 @ 16"	#4 @ 8"	#4 @ 16"	#4 @ 8"	#4 @ 16"	#4 @ 8"
		bf	5'-0"	7'-0"	5'-0"	7'-0"	5'-0"	7'-0"
		dk	0	2'-0"	0	2'-0"	0	2'-0"
		AF	#5 @ 10"	#7 @ 8"	#5 @ 10"	#7 @ 8"	#5 @ 10"	#7 @ 8"
6'	24"	As	#4 @ 16"	#4 @ 16"	#4 @ 24"	#4 @ 16"	#4 @ 24"	#4 @ 16"
		bf	4'-0"	5'-0"	4'-0"	5'-0"	4'-0"	5'-0"
		dk	0	1'-8"	0	1'-6"	0	1'-6"
		AF	#5 @ 12"	#5 @ 10"	#5 @ 12"	#5 @ 10"	#5 @ 12"	#5 @ 10"
5'	NA	As	#4 @ 16"	#4 @ 16"	#4 @ 16"	#4 @ 16"	#4 @ 24"	#4 @ 16"
		bf	3'-6"	4'-0"	3'-6"	4'-0"	3'-0"	4'-0"
		dk	6"	2'-0"	6"	1'-6"	6"	1'-6"
		AF	#4 @ 12"	#5 @ 8"	#4 @ 12"	#5 @ 8"	#4 @ 12"	#5 @ 8"
4'	NA	As	#4 @ 24"	#4 @ 24"	#4 @ 32"	#4 @ 32"	#4 @ 48"	#4 @ 48"
		bf	3'-0"	3'-0"	3'-0"	3'-0"	2'-6"	3'-0"
		dk	0	1'-6"	0	1'-0"	0	1'-0"
		AF	#4 @ 12"	#4 @ 12"	#4 @ 12"	#4 @ 12"	#4 @ 12"	#4 @ 12"
3'	NA	As	#4 @ 32"	#4 @ 32"	#4 @ 48"	#4 @ 48"	#4 @ 48"	#4 @ 48"
		bf	2'-6"	2'-6"	2'-6"	2'-6"	2'-0"	2'-0"
		dk	0	1'-0"	0	1'-0"	0	1'-0"
		AF	#4 @ 12"	#4 @ 12"	#4 @ 12"	#4 @ 12"	#4 @ 12"	#4 @ 12"



Typical Section over 5'-0"

SYMBOL LEGEND

- H: TOP OF FOOTING TO TOP OF WALL HEIGHT
- L: HEIGHT OF 12 INCH BLOCK ABOVE FOOTING
- As: SIZE AND SPACING OF WALL REINFORCING
- AF: SIZE AND SPACING OF FOOTING REINFORCING
- dk: DEPTH OF FOOTING KEY
- bf: WIDTH OF FOOTING

NOTE: SEE REVERSE SIDE FOR MATERIAL STANDARDS AND CONSTRUCTION REQUIREMENTS

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6. No surcharge loads over backfill material.
7. Drainage: 1 inch diameter PVC weep pipe at base, 48 inches o.c., screen with 1 cubic foot of 1 inch diameter rock.
8. Key depth "dk" may be reduced 1 inch for each 1 inch increase in soil cover over footing toe. Depth of soil fill to be maintained for a distance "H" measured horizontally from wall face.
9. Fence shall not obstruct drainage from sloped backfill. Grade backfill to provide positive drainage without ponding.