JK ENGINEERING

CIVIL ENGINEERING AND STRUCTURAL DESIGN
610 10TH ST. SUITE A, PASO ROBLES, CA. 93446
Ph. (805) 239-4151 Fax (805) 239-5853

REGISTERED PROFESSIONAL ENGINEER JOHN A. KUDLA No. 50652 Exp. 9-30-07 CIVIL STATE OF CALIFORNIA

APPROVED JUN 14 2005 ATASCADERO

RECEIVED MAY 18 2006 COMMUNITY DEVELOPMENT

RECEIVED OCT 13 2005 COMMUNITY DEVELOPMENT

August 16, 2005

Job #: 05028

CLIENT: MR. GLENN LEWIS / HOTEL PARK
PROJECT: STRUCTURAL ANALYSIS ON ELEVATOR TOWER AND RETAINING WALLS.
LOCATION: 5855 CAPISTRANO AVENUE, ATASCADERO, CA.

GENERAL NOTES AND SPECIFICATIONS

[SEE PAGES 2 THROUGH 5 FOR MORE SPECIFIC GENERAL NOTES AND SPECIFICATIONS PERTAINING TO THE ABOVE LISTED PROJECT / LOCATION.]

1) This Engineering applies only to the structure at the above listed PROJECT/LOCATION.
2) The Contractor or owner shall verify all dimensions and conditions on the job. Should any condition exist which is contrary to those on the plans, notify the engineer before proceeding with work.
3) ALL WORK shall comply with current 1997 U.B.C. and local and state ordinances.
4) SOIL: If no soils report is obtained at the time of engineering, Allowable bearing and skin friction per current U.B.C. minimums based on very low expansion index. Client/Owner/Contractor shall be responsible to obtain a soils reports prior to construction of foundation. J.K. Engineering shall not be responsible for assumed value.
5) CONCRETE: Use 2500 psi. Concrete strength & water/cement ratio of 0.55, with 28-day full cure. U.O.N. refer to current U.B.C. if no soils report is applicable, for design. Except for concentrated loads, all concrete designs shall meet or exceed U.B.C. Slab foundations shall be saw cut, within 24 hours from pour. Provide 3/4" deep cuts maximum 25 feet o.c.
6) REINFORCING STEEL: Use minimum ASTMA-615, GRADE 40 steel (U.O.N. ON PLANS). Steel shall be spliced with a minimum lap of 40 bar diameters in Masonry, 30 bar diameter lap in concrete. Lap all horizontal steel a minimum of 20" at all corners. Bends and Hooks shall conform to A.C.I. standard 318. Minimum cover of all steel within concrete shall conform with section 1907.7.1 in the current U.B.C.
7) MASONRY: Concrete blocks shall conform to grade N medium weight block and ASTM C-90 and U.B.C. chapter 21. All block walls shall be grouted solid with 2000 psi. Grout. Block shall be grouted in low lifts not to exceed 4 feet. Grout shall be terminated 1 1/2" below top lip of last course being grouted.
8) LUMBER: Use Douglas fir #2 or better. Plywood shall be rated Douglas fir CDX unless otherwise noted.
9) STEEL BOLTS shall be A307 or better with washers where bearing against wood. Use A-36 threaded rod when coupling anchor bolt to hold-down and when epoxy application is required on retrofit hold- downs.

JOB NAME: HOTEL PARK ELEV. TOWER **JOB #** 05028 **DATE** 4/05

REFERENCE LIST:

Governing Code:	1997 UBC (Uniform Building Code) Wind....70 MPH, Exposure C. Seismic.... Zone 4, R= 4.5, Na= 1.3
Design Charts and Tables:	
Lumber and timber	National Design Specifications (NDS) Wood Structural Data (NFPA)
Bolts and Nails	National Design Specifications (NDS)
Concrete	Reinforced Concrete Design Handbook (ACI) Ultimate Strength Design Handbook (ACI)
Masonry	Masonry Design Manual (MIA)
Steel	Manual of Steel Construction (AISC)
Hardware	Simpson Strong-tie

STRESSES AND MATERIALS: (MINIMUM REQUIREMENTS):

Lumber (sawn)	DF-L, WCLIB, Gr. Rule 16 #2 Jsts/Rftrs/Hdrs/Studs, #1 Brns/Psts
Glu-Lam Beams (GLB)	DF-L, Comb 24F-V4 (UON) Fb=2400 psi E=1800 ksi
Laminated Veneer Lumber (LVL, PSL)	DF-L, Fb=2600 psi, Fv=285 psi, E=1800 ksi
Plywood Sheathing	DFPA per PS 1-95
Structural Steel	ASTM A-36 (compact): Angles, Sections, Plates ASTM A-53; Pipes ASTM A-500 Grade "B": Tubes
Hot Dipped Galvanized (All hardware)	ASTM A-123 and ASTM A-153
Welding	AWS D1.1, E70xx Electrodes
Bolts	Anchor Bolts: ASTM A-36 or better Machine Bolts: ASTM A-307 or better
Reinforcing Steel	ASTM A-615 Grade 40: #4 bars and smaller Grade 60: #5 bars and larger
Epoxy (Rebar to Conc.)	ASTM C-881, Type 3, Grade 3
Non-Shrink Grout	MinWax Por-Rok or approved equal

GENERAL SPECIFICATIONS FOR SOILS:

1. It is recommended that on building sites exhibiting characteristics of instability, A soils investigation be performed (unless waived by the local building review agency). Any deviation from the design values shall be brought to the engineers attention.

2. Refer to soils report or foundation investigation for compaction, fill, backfilling, and site preparation requirements and procedures. Where said report is not required by local building officials, follow minimum UBC recommendations.

3. Allowable soil values and foundation design based upon:
   MINIMUM U.B.C. ALLOWABLES

4. Minimum required soil bearing (DL=LL) to be 1500 p.s.f.

5. Expansive index = MED (assumed* / from report)
   *verification may be required by building official

6. Actual soil conditions which deviate appreciably from that shown above shall be reported to the project engineer immediately.

GENERAL SPECIFICATIONS FOR FOUNDATIONS:

1. Minimum footing requirements for stud walls shall be per table 18-1-C of U.B.C., unless A soils investigation requires otherwise.

2. Foundations shall not be poured until all required formwork, reinforcing steel, holdowns, etc. have been properly placed and inspected by the local building official / inspector.

3. All required backfill at footings and retaining walls shall be compacted to at least 90% of maximum density unless otherwise noted on a soils report.

4. Carry all foundations to required depths into compacted fill or natural soil (per project soils report) or as required by expansion index (low=15", medium=21", high =27") whichever is deeper.

5. Excavate to required depths and dimensions, cut square and smooth with firm level bottoms, moisten several times just prior to pouring concrete.

6. Anchor bolts to be full diameter, cut thread made from ASTM A-36 steel by an American manufacturer and installed per "Lateral Requirements" on the following pages.

7. See "General Specifications for Concrete" for concrete requirements.

GENERAL SPECIFICATIONS FOR CONCRETE:

1. All concrete shall have 2500 psi minimum compressive strength at 28 days and shall be normal weight (U.O.N.).

2. All concrete work shall comply with UBC Chapter 19 and the ACI Building code (ACI 318-92).

3. The maximum concrete slump shall be: Slabs.....3" (plus or minus 1").
   All other work....4" (plus or minus 1").

4. The minimum cement content shall be 5 sacks per cu. yd and shall be Portland Cement, type I or II, low alkali, per ASTM C-150 and shall conform to UBC 1903.2.

5. Any water reducing agents added shall be used to reduce the water/cement ratio. Admixtures shall be approved by the Engineer.

6. Aggregate shall conform to ASTM C-33. Maximum aggregate size shall be 1" (U.O.N.) Use 3/4" aggregate for slabs on grade.

7. Concrete Placement:
   A. Concrete shall not free-fall more than five (5) feet. Use tremie, pump or other approved methods as required.
   B. Vibrate all concrete (including slabs) as it is placed with a mechanical vibrator operated by experienced personnel. Reinforcing and forms shall not be vibrated.

8. Curing: Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement (typically 7 days).

9. Unless specifically detailed or noted otherwise, construction and control joints shall be provided on all concrete slabs, and shall be located such that the area within joints does not exceed 400 sq. feet ., and is roughly square without interior corners.

GENERAL SPECIFICATIONS FOR REINFORCING:

1. Reinforcing steel shall be clean of rust, grease or other material likely to impair bond.

2. All reinforcing steel to be continuous and lapped (with staggered splices at adjacent bars) min 24" at splices, 20" at corners. Reinforcing bars shall have minimum bend radius of 6 times the bar diameter. Bars shall not be heated to facilitate bending. Once bent, steel shall not be straightened.

3. Reinforcing bars to be deformed bars conforming ASTM A-615
   #3, #4.....Grade 40 #5 & larger.....Grade 60

4. All reinforcing steel, anchor bolts and foundation hardware shall be located in the formwork and held firmly in place prior to and during concrete placement by means of wire supports.

5. Concrete cover is required as follows over reinforcing:
   3".....where concrete is exposed to and cast against earth.
   2".....where concrete is exposed to earth but cast against formwork.
   1 1/2.....where not exposed to earth or weather.

6. Reinforcing steel shall not be welded, unless specifically noted on the structural drawings. If allowed, welding shall conform to UBC 1903.5.2.

LATERAL NOTES AND REQUIREMENTS:

HORIZONTAL DIAPHRAGMS

Roof Sheathing (Tile).....Use 19/32" CDX Struct II (5-ply or better) with exterior glue and Panel ID # 24/0 with 10 d nails @ 6, 6, 12 (Boundary, Edge, Field).

Roof Sheathing (all others).....Use 15/32" CDX Struct II (5-ply or better) with exterior glue and Panel ID # 24/0 with 8 d nails @ 6, 6, 12 (Boundary, Edge, Field).

Floor Sheathing.....Use 3/4" CDX Struct II (5-ply or better) with exterior glue and Panel ID # 40/20 with 10d nails @ 6, 6, 10 (Boundary, Edge, Field).

Nail requirements.....All nails specified are common.
Where "air-gun" nailing is used, care shall be take to use TRUE common nail equivalents regarding diameter and length.

Blocking.....Use solid, full depth blocking with (3) 16d toe nails for 24" long and (2) 16d toe nails for 16" long blocks (typical each end).

Application....."Panels" shall be plywood (Group 1 or 2) APA performance rated panels conforming to UBC Standard No. 23-2 & 23-3.
Panels to be applied perpendicular to supports and shall be staggered.
Nail heads shall NOT be driven through outer laminant of panels.
Provide 2x blocking and min. 24" wide finish layout panel at all ridge lines.

VERTICAL DIAPHRAGMS (SHEARWALLS)

Material and Nailing.....Refer to Shearwall Schedule for material specifications and nail spacing.
All nails in plywood shearwalls to be common wire (16d "sinkers' are OK).
Box nails may be used if number increased by 33%
Where "air-gun nails" are used care should be taken to use TRUE common nail equivalents regarding diameter and length.

Blocking.....All edges of plywood shearwalls to be FULLY BLOCKED AND NAILED with full perimeter nails.
Plywood shall be edge nailed to end studs or posts and to any member attached to a holdown.

Application....."Panels" shall be plywood (Group 1 or 2) or APA performance rated panels.
Panels to be applied horizontally or vertically to studs spaced at 16" o/c max.
Nail heads shall NOT be driven through outer laminate of panel.
Where sheathing is applied to both sides of a wall, offset vertical joints by minimum one stud bay.
Do not penetrate shearwall plywood or plates with electrical panels, conduits, plumbing pipes or other such items.

Top Plates.....Use (15) 16d equally spaced per splice. Each plate to be of 2x material matching the wall width. All lap splices to be a min of 4'-0" in length.

Anchor Bolts (foundations).....See Shearwall schedule for proper bolt spacing. (Maximum spacing to be 5'-0")
Use 5/8" Dia. x 12" long (min) ASTM A-36 bolts with 2" hook and minimum 7" embedment into mono pour footing or 4" minimum embedment into bottom portion of 2-pour footings.
Provide min (2) bolts per sill plate and (1) bolt within 12" of splices and ends.
Holes in sill plates for A.B.'s shall be the bolt shank diameter + 1/16".
No over-sizing is allowed, use **plate washers** where bearing against wood, **plate washers** to be minimum 2"x2"x3/16" thk. A-36 steel.

Holdown Specifications.....All holdowns and straps to be "Simpson Strong Tie" or equal.
All holdown installations to be per manufacturers specifications.
Holdown bolts to be tied in place prior to foundation inspection and concrete installation, straps to be nailed at all holes.
All holdowns and straps to be bolted or nailed to 4x4 #1 (min) post at extreme ends of shearwalls, edge nail shearwall material to said post for its full height.

SHEAR WALL SCHEDULE (1)(2)

Mark	Shear (plf)	Material (1)(2)(7)	Nailing (3) E.N. - F.N.	Top Plate Connector (3)(6)	Sill Plate Nails O @ Subfloor (3)	5/8" ø A.B.'S W/2X SILL (4)(5)	5/8" ø A.B.'S W/3X SILL (4)(5)
1.	600 +	15/32" CDX (1D #24/0) (one side)	10d @ 3-12 +	A35 @ 9" o.c.	"SDS" @ 3 1/2" o.c.	16"	32"
2.	870 +	19/32" CDX (1D #24/0) (one side)	10d @ 2-12 +	A35 @ 6" o.c.	"SDS" @ 2 1/2" o.c.	———	24"
3.	260	15/32" CDX (1D #24/0) (One Side)	8d @ 6-12	A35 @ 24" o.c. or 16d @ 6" o.c.	16d @ 4" o.c.	36"	48"
4.	320	15/32" CDX (1D # 24/0) (One Side)	8d @ 4-12	A35 @ 16" o.c. or 16d @ 4" o.c.	16d @ 5 1/2" o.c.	32"	48"
5.	380 +	15/32" CDX (1D # 24/0) (One Side)	8d @ 4-12 +	A35 @ 12" o.c. or 16d @ 4" o.c.	16d @ 5" O.C.	24"	48"
6.	440 +	15/32" CDX (1D # 24/0) (One Side)	8d @ 3-12 +	A35 @ 9" o.c. or 16d @ 3" o.c.	"SDS" @ 4" o.c.	18"	42"
7.*	525 +	15/32" CDX (1D # 24/0) (Two Sides)	8d @ 6-12 +	A35 @ 9" o.c. or 16d @ 2 1/2" o.c.	"SDS" @ 4" o.c.	16"	36"
8.*	765 +	15/32" CDX (1D # 24/0) (Two Sides)	8d @ 4-12 +	A35 @ 6" o.c. or LTP4 @ 10" o.c.	"SDS" @ 3" o.c.	———	24"
9.*	980 +	15/32" CDX (1D # 24/0) (Two Sides)	8d @ 3-12 +	A35 @ 6" o.c. or LTP4 @ 8" o.c.	"SDS" @ 2" o.c.	———	18"
SW	———	SIMPSON "STRONGWALL" AS SPECIFIED	———	A35 @ 6" o.c. or LTP4 @ 10" o.c.	———	USE TEMPLATE	USE TEMPLATE

LEGEND:

* Stagger nails at opposite sides of wall.
O Use Simpson "SDS 1/4"x3 1/2" wood screws, pre-drill all holes to blocking below.
+ Studs shall be 3 x minimum @ adjoining (common) panel edges (see below)

NOTES:

1. All walls to be fully blocked.
2. Refer to "Vertical Diaphgram Notes" for material and application specifications.
3. All nails specified are common. Where "air - gun" nailing is used, care shall be taken to use true common nail equivelants regarding diameter and length. (8d common=.131"dia.x2.5"long/10d=.148 dia. x3"/16d=.162dia. x3.25). Toe nailing not allowed for shear transfer
4. Provide 3/16" THK.2"x2" square flat washers at all anchor bolts.
5. Use 5/8"ø anchor bolts @ 48" o.c. between shearwalls
6. For walls which bear trusses, or floor joist; one H-1 clip, from truss, or joist to top plate, may be used in place of one A35 top plate connector.
7. 15/32" OSB "APA approved sheathing" may be used in place of 15/32" CDX.

VERTICAL (FRAMING) NOTES AND REQUIREMENTS:

1. All framing lumber, timber and plywood to be grade stamped with a stamp of the association under whose grading rules it was produced.

2. Lumber to be of the following minimums (conforming to UBC Standard No. 23-I) with a maximum moisture content not to exceed 19%:
   roof rafters, ceiling joists, floor joist, brg studs and headers.....DF-L #2.
   non-brg studs, plates and blocking.....Standard grade DF.
   posts, beams.....DF-L #1.
   lumber in contact with concrete or masonry.....pressure treated DF-L #1.

3. Where Pre-Engineered roof trusses are specified on framing plans, the design, fastening, bracing, and other requirements related to the truss unit(s) are to be provided by an approved manufacturer and are not within the scope of these calculations. Prior to fabrication, contractor shall submit truss design, calculations and details (as provided by mfr.) to Engineer for his review, and to the local building department for their approval. Trusses shall be installed with all bearing plates, hardware, blocking, bracing, etc..., per mfrs. design package. The preceding items shall be installed prior to any truss loading.

4. "GT" refers to a girder truss by others, Trusses shall bear on "bearing walls" only (provide 'DTC' truss clips and minimum 1/2" gap atop interior, non-brg walls). Truss to truss hanger connections by supplier.

5. Manufactured lumber, Glue-Laminated (GLB) or Laminated-Veneer (LVL), shall be of the following minimums:

   GLB's (24F-V4 DF/DF)
   Fb=2400 psi Fv=165 psi
   E=1.8xE6 psi
   Camber: Standard (r=2000')

   LVL's (1.8E/DF)
   Fb=2600 psi Fv=285 psi
   E=1.8xE6 psi
   Camber: None

6. All posts shall be as wide as the beam which it supports unless a "Simpson" post cap is used. Posts not in walls to receive post bases and caps.

7. All top plates broken by a beam or header shall be strapped with an ST6236 centered on break.

8. All headers at bearing lines or shear lines to be 6x10#1 (U.O.N.).
   All interior, non-bearing headers not specifically sized shall be 4 x 6 #2.

9. Floor joists to be min. - N/A - @ 16" o/c (U.O.N.).
   Provide double floor joists under parallel walls and at all roof support posts.

10. Refer to UBC Table 23-II-B-1 for minimum nailing requirements.

11. 2 x solid blocking shall be placed between joists, rafters and trusses at both ends and all supports. Provide bridging or blocking at intervals of 8'-0"' at floor joists.

12. All double members to be nailed together with (2) rows of 16d nails @ 12" o/c, staggered (U.O.N.).

13. All metal framing connectors referenced in the calculations are "Simpson Strong Tie". Substitutions of equal (approved) connectors is acceptable with the written permission of the Engineer. Framing anchors shall be nailed or bolted to their full capacity (all holes to be filled) with fasteners specified by "Simpson".

14. All bolts shall conform to ASTM 307-68. Holes for bolts shall be bored with a bit 1/32" to 1/16" larger than the nominal bolt diameter. Cut washers shall be placed under heads and nuts of all bolts and under heads of lags. Double cut washers shall be used for bolts connecting wood ledgers to concrete or masonry walls. All bolts shall be re-tightened prior to application of plywood, plaster, etc.

15. Lag screws shall be screwed into pre-drilled holes the same diameter as the root of the thread.

16. No structural members (joists, plates, studs beams etc.) shall be notched, cut or drilled (except for those holes required for bolting) unless specifically noted.

17. Interior, non-bearing non-shear walls to be anchored with "Ramset" (ICBO#1147) or "Hilti" (ICBO#1290) shot pins @ 24" o/c max. for slabs or nailed w/ 16d @ 12" o/c max. for wood floors. Center shot pins or nails on plates.

JOB LATERAL ANALYSIS

SHEET NO. 8 OF

CALCULATED BY DARIN DATE 8/99

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SCALE STANDARD DERIVATION

- SEISMIC DESIGN PROCEDURE:

- REQUIREMENTS: 1997 UBC SECTION 1626.
- ASSUMED* DISTANCE TO SEISMIC SOURCE $\leq$ 2 KM.
- ASSUMED* SEISMIC SOURCE TYPE "B".

  * ASSUMED VALUES BASED ON LOCAL BUILDING OFFICIALS RECOMMENDATIONS.
- SOIL TYPE S_D (UBC 1629.3).
- NO STRUCTURAL DISCONTINUITY (UBC 1629.9.1)
- ALLOWABLE STRESS DESIGN TO BE USED

  SO... $.9D \pm \frac{E}{1.4}$ (UBC EQ'N 12-16-1)

  WHERE...

  $E = \rho E_H + E_V$ AND $E_V = 0$ (UBC EQ'N 30-1)

  ρ ← SEE BELOW.
- SELECTION OF LATERAL FORCE PROCEDURE (UBC 1629.8):

  USE "SIMPLIFIED DESIGN BASE SHEAR" PER UBC 1630.2.3 TO TAKE ADVANTAGE OF EXCLUSIONS LISTED IN SECTION 1630.2.3.4.

  USED....

  $$V = \frac{3.0\, C_a\, I}{R} W_{DL} \quad \text{(UBC EQ'N 30-11)}$$

  WHERE.... $C_a = .44 N_a \Rightarrow$ PER UBC T-16-Q, $N_a = 1.3$

  $I = 1.0$ $R = 5.5$ (PLYWOOD SHEARWALLS)

  $$V = \frac{3.0\left[.44(1.3)\right]}{5.5} W_{DL} = .312\, W_{DL}$$

  CONVERT TO 'ALLOWABLE STRESS' (SEE ABOVE)

  $$V' = \frac{E}{1.4} = \frac{V}{1.4} = \frac{.312}{1.4} W_{DL} \quad \therefore \text{ USE } V'_s = .223\, W_{DL}$$
- RELIABILITY / REDUNDANCY FACTOR: (UBC 1630.1.1)

  $$\rho = 2 - \frac{20}{r_{max}\sqrt{A_B}}$$

  WHERE.... $r_{max} = \frac{V_{LINE}\left(\frac{10}{L_W+}\right)}{\sqrt{\text{TOTAL STORY SHEAR}}}$ (PTAL) (SHEARWALLS)

  + NOTE... L_W IS IN "FT"

  $1.0_{(MIN)} \leq \rho \leq 1.5_{(MAX)}$

  A_B = AREA OF FLOOR LEVEL IN QUESTION.

$\rho = 1.0$ THIS PROJECT

END.

JOB VERTICAL LOADS

SHEET NO. 9 OF

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SCALE

• ROOF :

ROOFING (TILE)	10.0 #/ø
TRUSSES OR RAFTERS	3.0
PLYWOOD	1.5
GYP. BOARD	2.5
INSULATION	.5
MECH. / ELECT	1.0
MISC	1.5
	22.0 PSF
- ADJUSTED FOR SLOPE (5 : 12)	24.0 PSF
- LIVE LOAD PER U.B.C. 16-C	16.0 PSF

• FLOOR :

FLOOR JOISTS	4.0 #/ø
FLOORING	3.0
PLYWOOD	2.5
GYP. BOARD	2.5
INSULATION	.5
MECH. / ELECT	.5
MISC	1.0
	14.0 PSF
- LIVE LOAD PER U.B.C. 16-A	40.0 PSF

• WALLS :

	INTERIOR	EXTERIOR
SIDING (EXTERIOR), STUCCO	—	10.0 PSF
PLYWOOD (1 SIDE)	—	1.5
GYP. BOARD	4.0 #/ø	2.0
INSULATION	.5	.5
MECH. / ELECT.	.5	.5
STUDS	1.5	1.5
MISC	.5	—
	7.0 PSF	16.0 PSF

JOB LATERAL ANALYSIS

SHEET NO. 10 OF

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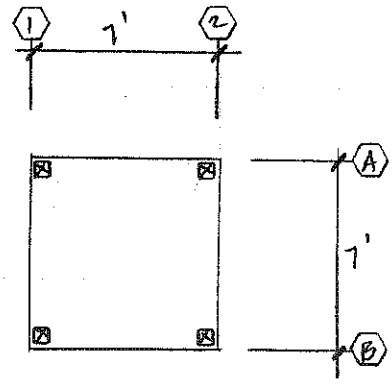
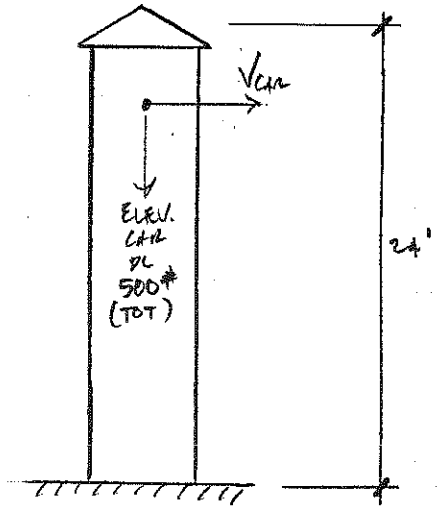
SCALE

• KEY PLAN:





• LATERAL LOADS:

– WIND:

$12.6^{PSF}(1.0)1.3(1.10) = 18.04^{PSF}$

Use $P_W = 18.0$ PSF

– SEISMIC:

(SEE PREVIOUS PAGE...)

Use $V_S = .272$ kips

ROOF W/S and E/W:	$24 + \left[(16)(2)\right]24/2\,(1/T)\,] =$	W_{DL}	V_S	Exp.
		78.9	21.5	13'

AND...

$V_C = 500(.272) = 136^{\#}$ say $V_{CAR} = 150^{\#} \rightarrow$

JOB LATERAL ANALYSIS

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SCALE

DIAPHRAGM (I) : RF FLR

N/S

18.0(13) = 234#/'

21.5(7) = 151#/'

+150# +150#

71'

VA 2/B

819 819

677 677

INCLUDE FLEV. D.L.

117#/'

117(7) = 819# ✓

$\frac{234(7)^2}{8(71)} = 205^{\#}$

WIND

SEISMIC

E/W

WIND

SEISMIC

v

STRUT

CHORD

COMB:

WIND

SEISMIC

v

STRUT

(SHEWALL (SCHED) & GRID LINE)	$v = P/L_{TOT}$	$M_{OT} = (\%\,WALL)\,P(HT)$	$M_{RES} = \frac{W_{PL} L_W^2}{2.4 \text{ SEISM.}} \leq \frac{}{3 \text{ WIND}}$	$P_{UP} = \frac{M_{OT} - M_{RES}}{L_W}$	HARDWARE
ALL	819#/WALL LINE	(SEE FOLLOW'G PGS...)			

JOB

SHEET NO. 12 OF

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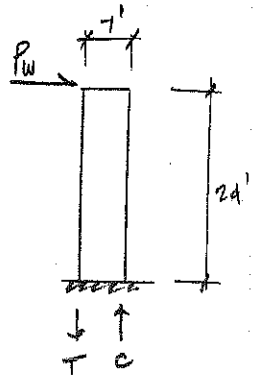
SCALE

• ✓ TOWER OVERTURNING : (WIND GOV'S)

$\frac{HT}{WIDTH} = \frac{24}{7} = 3.4 > 3.0$ ∴ TOWER WILL ACT AS TALL "TUBE" WITH T/C EACH LEG...

SO...



$T/C = \frac{819(24)}{7} = 2808\#/LEG$

USE T/C = 3000#/LEG

✓TENS: $A_{MIN} = \frac{T}{F_T} = \frac{2(3)}{21.6} = .3IN^2$ ∴ OK

TS 4x4x1/4 OK

✓COMP:

$\frac{KL}{r} = \frac{1.0(12)24}{1.54} = 187$

SO... $F_a = 4.27 KSI$

AND $A_{MIN} = \frac{2(3)}{4.27} = 1.4$ ∴ TS 4x4x1/4 OK

✓CONNECTIONS:

T/C = 3000# ∴ (2) 1/2" ϕ A.B.'s OK BY INSP'N ✓

JOB FRAMING ANALYSIS

SHEET NO. 13 OF

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SCALE

- ROOF RFTRS:

L = 4' MAX

W_{LL}^{DL} 48, 32 } 80#/'

TRIB 2'

$S_{REQ} = 1.9\ IN^3$

$I_{REQ} = 1.4\ IN^4$

R = 1600# ∴ BRG OK

USE 2x6#1 @ 24" O/C

- ROOF BEAMS:

L = 7'

W_{LL}^{DL} 352, 64 } 416#/'

TRIB 4'EF/16' MAX

$S_{REQ} = 30.6\ IN^3$

$I_{REQ} = 40.2\ IN^4$

R_C = 2912# ∴ BRG OK

USE 6x8#1 (MIN)

- DECK/WALKWAY JOISTS

L = 7'

W_{LL}^{DL} 19, 133 ← 100#/□' LL } 152#/'

TRIB 16"

$S_{REQ} = 11.2\ IN^3$

$I_{REQ} = 16.7\ IN^4$

R_C = 1064# ∴ BRG OK

USE 2x8#1 (MIN) @ 16" O/C

JOB

SHEET NO. 14 OF

CALCULATED BY DATE

CHECKED BY DATE

SCALE

• DECK / WALKWAY BEAMS:

L = 6'

W_{LL}^{DL} & 600 } 684#/'

TRIB 6'

$S_x = 30.9\ in^3$

$I_x = 41.6\ in^4$

$R_C = 2052\#$ ∴ 6x4 STD GRADE BM. FTG OK ✓

USE 6x8#/'

CANTILEVERED RETAINING WALL DESIGN

10' WALL

WALL & FOOTING DATA

Retained Height	=	10.00 ft
Wall Ht. above Soil	=	0.50 ft
Toe Width	=	3.33 ft
Heel Width	=	2.00 ft
Total Footing Width	=	5.33 ft
Footing Thickness	=	15.00 in
Key Depth	=	30.0 in
Key Width	=	12.0 in
Toe to Key Dist.	=	3.33 ft

SLIDING CHECK

Ftg/Soil Friction	=	0.35
Soil to Neglect	=	0.00 in
Lateral Pressure	=	2531 #
- Passive Pressure	=	2461 #
- Friction	=	1362 #
Add'l Force Required	=	0.0 #

SUMMARY

Pressure @ Toe	=	1902.1 psf
Pressure @ Heel	=	0.0 psf
Allowable Press.	=	2000 psf
Ecc. of resultant	=	15.61 in
Max. Shear @ Toe	=	27.99 psi
Max. Shear @ Heel	=	-3.50 psi
Allow. Ftg Shear	=	85.00 psi
Factors of Safety:		
Overturning	=	1.56 :1
Sliding	=	1.51 :1

VERTICAL LOADS

Axial DL on Stem	=	0 plf
Axial DL on Stem	=	0 plf
....Eccentricity	=	0.00 in
Surcharge over Toe	=	0.0 psf
Surcharge over Heel	=	0.0 psf

Note: Toe Surcharge Resists Overturning
Note: Heel Surcharge Resists Overturning

SOIL DATA

Allowable Bearing	=	2000 psf
Active Lateral	=	40.0 pcf
.....Max Press.	=	0.0 pcf
.....Slope Press.	=	0.0 pcf
Backfill Slope	=	0.0 :1
Passive Press.	=	350.0 pcf
Soil Density	=	110.0 pcf
Soil Ht over Toe	=	0.00 in

LATERAL LOADS

Lateral Load Acting on Stem Above Soil	=	0.00 psf
Add'l Lateral Load	=	0.00 plf
Dist to Load Start	=	0.00 ft
Dist to Load End	=	0.00 ft

ADJACENT FOOTING

Vertical Load	=	0.0 #
Load Eccentricity	=	0.00 in
Footing Width	=	0.00 ft
Ftg. CL to Wall	=	0.00 ft
Vert. Position of Ftg. ...Above/Below:[+/-]	=	0.0 ft
Spread Footing	?	No

FOOTING DESIGN

	Toe	Heel			
Soil Press. Mult. By ACI Eq 9-1	= 2663	0 psf	f'c	=	2500 psi
Mu-Upward	= 10759	0 ft-#	Fy	=	40000 psi
Mu-Downward	= 1455	1602 ft-#	Min. As Percent	=	0.0014
Mu-Design	= 9303	-1602 ft-#	Omit SP Under Heel	?	No
One-Way Shear:					
Actual	= 28.0	3.5 psi			
Allowable	= 85.0	85.0 psi			
Cover over Rebar	= 3.50	2.50 in			
'd'	= 11.50	12.50 in			
Ru = Mu/bd^2	= 78.2	11.4 psi			

	Toe	Heel
# 4 @	6.57	11.43 in o/c
# 5 @	10.18	17.71 in o/c
# 6 @	14.45	25.14 in o/c
# 7 @	19.70	34.29 in o/c
# 8 @	25.94	45.14 in o/c
# 9 @	32.83	48.00 in o/c

SUMMARY OF FORCES & MOMENTS

Origin of Force...	Overturning Moments #	ft	k-ft	Resisting Moments #	ft	k-ft
Active Soil Press.	= 2531.3	3.75	9492.2	0	0	0
Soil over Heel	= 0	0	0	1466.7	4.66	6839.6
Soil over Toe	= -31.3	0.42	-13.0	0.0	0.00	0.0
Sloped Soil @ Heel	= 0	0	0	0.0	0.00	0.0
Adjacent Ftg. Load	= 0.0	0.00	0.0	0.0	0.00	0.0
Surcharge Over Heel	= 0	0	0	0.0	0.00	0.0
Surcharge over Toe	= 0.0	0.00	0.0	0.0	0.00	0.0
Axial Load on Wall	= 0	0	0	0.0	0.00	0.0
Load @ Proj. Wall	= 0.0	0.00	0.0	0	0	0
Averaged Stem Wts.	= 0	0	0	1050.0	3.66	3846.5
Added Lateral Load	= 0.0	0.00	0.0	0	0	0
Footing Weight	= 0	0	0	999.4	2.67	2663.3
Key Weight	= 0	0	0	375.0	3.83	1436.2
Vertical Component of Active Pressure	= 0	0	0	0.0	0.00	0.0
Totals	= 2500.0 #		9479.2 k-ft	3891.0 #		14785.6 k-ft
Resisting Totals Used For Soil Pressure (Vert. Component of Active Pressure Removed)				3891.0 #		14785.6 k-ft

(continued on next page....

CANTILEVERED RETAINING WALL DESIGN

(.....,continued)

STEM SUMMARY

Top Stem: From 5.00 ft to Top of Wall
8.00in Concrete w/ # 4 @ 24.00in, d = 6.25in
f'c = 2500.0psi, Fy = 40000.0psi
Wall Wt. = 100.00psf, Bar Embed = 12.0in
Mu = 1416.7 <= Mn = 1851.4ft-#
Vu = 9.10 <= Vn = 85.00psi
Interaction Value = 0.765

Second Stem From 2.00ft to 5.00ft
8.00in Concrete w/ # 5 @ 16.00in, d = 6.19in
f'c = 2500.0psi, Fy = 60000.0psi
Wall Wt. = 100.00psf, Bar Embed = 21.0in
Mu = 5802.7 <= Mn = 6186.6ft-#
Vu = 25.65 <= Vn = 85.00psi
Interaction Value = 0.938

Third Stem From 0.00ft to 2.00ft
8.00in Concrete w/ # 5 @ 8.00in, d = 6.19in
f'c = 2500.0psi, Fy = 60000.0psi
Wall Wt. = 100.00psf, Bar Embed = 10.0in
Mu = 11333.3 <= Mn = 11799.2ft-#
Vu = 41.19 <= Vn = 85.00psi
Interaction Value = 0.961

CANTILEVERED RETAINING WALL DESIGN

8' WALL

WALL & FOOTING DATA			VERTICAL LOADS			LATERAL LOADS		
Retained Height	=	8.00 ft	Axial DL on Stem	=	0 plf	Lateral Load Acting on		
Wall Ht. above Soil	=	0.50 ft	Axial DL on Stem	=	0 plf	Stem Above Soil	=	0.00 psf
Toe Width	=	2.66 ft	....Eccentricity	=	0.00 in	Add'l Lateral Load	=	0.00 plf
Heel Width	=	1.67 ft	Surcharge over Toe	=	0.0 psf	Dist to Load Start	=	0.00 ft
Total Footing Width	=	4.33 ft	Surcharge over Heel	=	0.0 psf	Dist to Load End	=	0.00 ft
Footing Thickness	=	15.00 in	Note: Toe Surcharge Resists Overturning					
Key Depth	=	22.0 in	Note: Heel Surcharge Resists Overturning					
Key Width	=	12.0 in	**SOIL DATA**			**ADJACENT FOOTING**		
Toe to Key Dist.	=	2.67 ft	Allowable Bearing	=	1800 psf	Vertical Load	=	0.0 #
SLIDING CHECK			Active Lateral	=	40.0 pcf	Load Eccentricity	=	0.00 in
Ftg/Soil Friction	=	0.35	.....Max Press.	=	0.0 pcf	Footing Width	=	0.00 ft
Soil to Neglect	=	0.00 in	.....Slope Press.	=	0.0 pcf	Ftg. CL to Wall	=	0.00 ft
Lateral Pressure	=	1711 #	Backfill Slope	=	0.0 :1	Vert. Position of Ftg.		
- Passive Pressure	=	1664 #	Passive Press.	=	350.0 pcf	...Above/Below:[+/-]	=	0.0 ft
- Friction	=	987 #	Soil Density	=	110.0 pcf	Spread Footing	?	No
Add'l Force Required	=	0.0 #	Soil Ht over Toe	=	0.00 in			

SUMMARY			FOOTING DESIGN						
Pressure @ Toe	=	1610.9 psf	Soil Press. Mult.	Toe	Heel	f'c	=	2500 psi	
Pressure @ Heel	=	0.0 psf	By ACI Eq 9-1	= 2255	0 psf	Fy	=	40000 psi	
Allowable Press.	=	1800 psf	Mu-Upward	= 5958	1 ft-#	Min. As Percent	=	0.0014	
Ecc. of resultant	=	11.98 in	Mu-Downward	= 929	752 ft-#	Omit SP Under Heel	?	No	
Max. Shear @ Toe	=	17.81 psi	Mu-Design	= 5029	-752 ft-#		Toe	Heel	
Max. Shear @ Heel	=	0.00 psi	One-Way Shear:			# 4 @	12.25	11.43	in o/c
Allow. Ftg Shear	=	85.00 psi	Actual	= 17.8	0.0 psi	# 5 @	18.99	17.71	in o/c
Factors of Safety:			Allowable	= 85.0	85.0 psi	# 6 @	26.96	25.14	in o/c
Overturning	=	1.63 :1	Cover over Rebar	= 3.50	2.50 in	# 7 @	36.76	34.29	in o/c
Sliding	=	1.55 :1	'd'	= 11.50	12.50 in	# 8 @	48.00	45.14	in o/c
			Ru = Mu/bd^2	= 42.3	5.3 psi	# 9 @	48.00	48.00	in o/c

SUMMARY OF FORCES & MOMENTS

	Overturning Moments			Resisting Moments		
Origin of Force...	#	ft	k-ft	#	ft	k-ft
Active Soil Press. =	1711.3	3.08	5276.4	0	0	0
Soil over Heel =	0	0	0	882.9	3.83	3380.2
Soil over Toe =	-31.3	0.42	-13.0	0.0	0.00	0.0
Sloped Soil @ Heel =	0	0	0	0.0	0.00	0.0
Adjacent Ftg. Load =	0.0	0.00	0.0	0.0	0.00	0.0
Surcharge Over Heel =	0	0	0	0.0	0.00	0.0
Surcharge over Toe =	0.0	0.00	0.0	0.0	0.00	0.0
Axial Load on Wall =	0	0	0	0.0	0.00	0.0
Load @ Proj. Wall =	0.0	0.00	0.0	0	0	0
Averaged Stem Wts. =	0	0	0	850.0	2.99	2544.3
Added Lateral Load =	0.0	0.00	0.0	0	0	0
Footing Weight =	0	0	0	811.9	2.17	1757.7
Key Weight =	0	0	0	275.0	3.17	871.7
Vertical Component of Active Pressure =	0	0	0	0.0	0.00	0.0
Totals =	1680.0 #		5263.3 k-ft	2819.8 #		8553.9 k-ft
Resisting Totals Used For Soil Pressure (Vert. Component of Active Pressure Removed)				2819.8 #		8553.9 k-ft

(continued on next page....)

CANTILEVERED RETAINING WALL DESIGN

(.....continued)

STEM SUMMARY

Top Stem: From 4.00 ft to Top of Wall
8.00in Concrete w/ # 4 @ 24.00in, d= 6.25in
f'c= 2500.0psi, Fy= 40000.0psi
Wall Wt.= 100.00psf, Bar Embed= 12.0in
Mu = 725.3 <= Mn = 1851.4ft-#
Vu = 5.49 <= Vn = 85.00psi
Interaction Value = 0.392

Second Stem From 2.00ft to 4.00ft
8.00in Concrete w/ # 4 @ 16.00in, d= 6.25in
f'c= 2500.0psi, Fy= 40000.0psi
Wall Wt.= 100.00psf, Bar Embed= 12.0in
Mu = 2448.0 <= Mn = 2759.4ft-#
Vu = 13.61 <= Vn = 85.00psi
Interaction Value = 0.887

Third Stem From 0.00ft to 2.00ft
8.00in Concrete w/ # 5 @ 16.00in, d= 6.19in
f'c= 2500.0psi, Fy= 60000.0psi
Wall Wt.= 100.00psf, Bar Embed= 9.8in
Mu = 5802.7 <= Mn = 6186.6ft-#
Vu = 25.65 <= Vn = 85.00psi
Interaction Value = 0.938

CANTILEVERED RETAINING WALL DESIGN

6' WALL

WALL & FOOTING DATA

Retained Height	=	6.00 ft
Wall Ht. above Soil	=	0.50 ft
Toe Width	=	2.00 ft
Heel Width	=	1.33 ft
Total Footing Width	=	3.33 ft
Footing Thickness	=	15.00 in
Key Depth	=	13.0 in
Key Width	=	12.0 in
Toe to Key Dist.	=	2.67 ft

SLIDING CHECK

Ftg/Soil Friction	=	0.35
Soil to Neglect	=	0.00 in
Lateral Pressure	=	1051 #
- Passive Pressure	=	953 #
- Friction	=	656 #
Add'l Force Required	=	0.0 #

SUMMARY

Pressure @ Toe	=	1262.0 psf
Pressure @ Heel	=	0.0 psf
Allowable Press.	=	1800 psf
Ecc. of resultant	=	8.10 in
Max. Shear @ Toe	=	9.02 psi
Max. Shear @ Heel	=	0.00 psi
Allow. Ftg Shear	=	85.00 psi
Factors of Safety:		
Overturning	=	1.73 :1
Sliding	=	1.53 :1

VERTICAL LOADS

Axial DL on Stem	=	0 plf
Axial DL on Stem	=	0 plf
....Eccentricity	=	0.00 in
Surcharge over Toe	=	0.0 psf
Surcharge over Heel	=	0.0 psf

Note: Toe Surcharge Resists Overturning

Note: Heel Surcharge Resists Overturning

SOIL DATA

Allowable Bearing	=	1800 psf
Active Lateral	=	40.0 pcf
.....Max Press.	=	0.0 pcf
.....Slope Press.	=	0.0 pcf
Backfill Slope	=	0.0 :1
Passive Press.	=	350.0 pcf
Soil Density	=	110.0 pcf
Soil Ht over Toe	=	0.00 in

LATERAL LOADS

Lateral Load Acting on Stem Above Soil	=	0.00 psf
Add'l Lateral Load	=	0.00 plf
Dist to Load Start	=	0.00 ft
Dist to Load End	=	0.00 ft

ADJACENT FOOTING

Vertical Load	=	0.0 #
Load Eccentricity	=	0.00 in
Footing Width	=	0.00 ft
Ftg. CL to Wall	=	0.00 ft
Vert. Position of Ftg. ...Above/Below:[+/-]	=	0.0 ft
Spread Footing	?	No

FOOTING DESIGN

	Toe	Heel			
Soil Press. Mult. By ACI Eq 9-1	= 1767	0 psf	f'c	=	2500 psi
Mu-Upward	= 2741	3 ft-#	Fy	=	40000 psi
Mu-Downward	= 525	261 ft-#	Min. As Percent	=	0.0014
Mu-Design	= 2216	-258 ft-#	Omit SP Under Heel	?	No
One-Way Shear:					
Actual	= 9.0	0.0 psi	# 4 @	12.42	11.43 in o/c
Allowable	= 85.0	85.0 psi	# 5 @	19.25	17.71 in o/c
Cover over Rebar	= 3.50	2.50 in	# 6 @	27.33	25.14 in o/c
'd'	= 11.50	12.50 in	# 7 @	37.27	34.29 in o/c
Ru = Mu/bd^2	= 18.6	1.8 psi	# 8 @	48.00	45.14 in o/c
			# 9 @	48.00	48.00 in o/c

SUMMARY OF FORCES & MOMENTS

Origin of Force...	Overturning Moments #	ft	k-ft	Resisting Moments #	ft	k-ft
Active Soil Press.	= 1051.3	2.42	2540.5	0	0	0
Soil over Heel	= 0	0	0	437.8	3.00	1312.7
Soil over Toe	= -31.3	0.42	-13.0	0.0	0.00	0.0
Sloped Soil @ Heel	= 0	0	0	0.0	0.00	0.0
Adjacent Ftg. Load	= 0.0	0.00	0.0	0.0	0.00	0.0
Surcharge Over Heel	= 0	0	0	0.0	0.00	0.0
Surcharge over Toe	= 0.0	0.00	0.0	0.0	0.00	0.0
Axial Load on Wall	= 0	0	0	0.0	0.00	0.0
Load @ Proj. Wall	= 0.0	0.00	0.0	0	0	0
Averaged Stem Wts.	= 0	0	0	650.0	2.33	1516.7
Added Lateral Load	= 0.0	0.00	0.0	0	0	0
Footing Weight	= 0	0	0	624.4	1.67	1039.6
Key Weight	= 0	0	0	162.5	3.17	515.1
Vertical Component of Active Pressure	= 0	0	0	0.0	0.00	0.0
Totals	= 1020.0 #		2527.5 k-ft	1874.7 #		4384.0 k-ft
Resisting Totals Used For Soil Pressure (Vert. Component of Active Pressure Removed)				1874.7 #		4384.0 k-ft

(continued on next page....)

CANTILEVERED RETAINING WALL DESIGN

(.....continued)

STEM SUMMARY

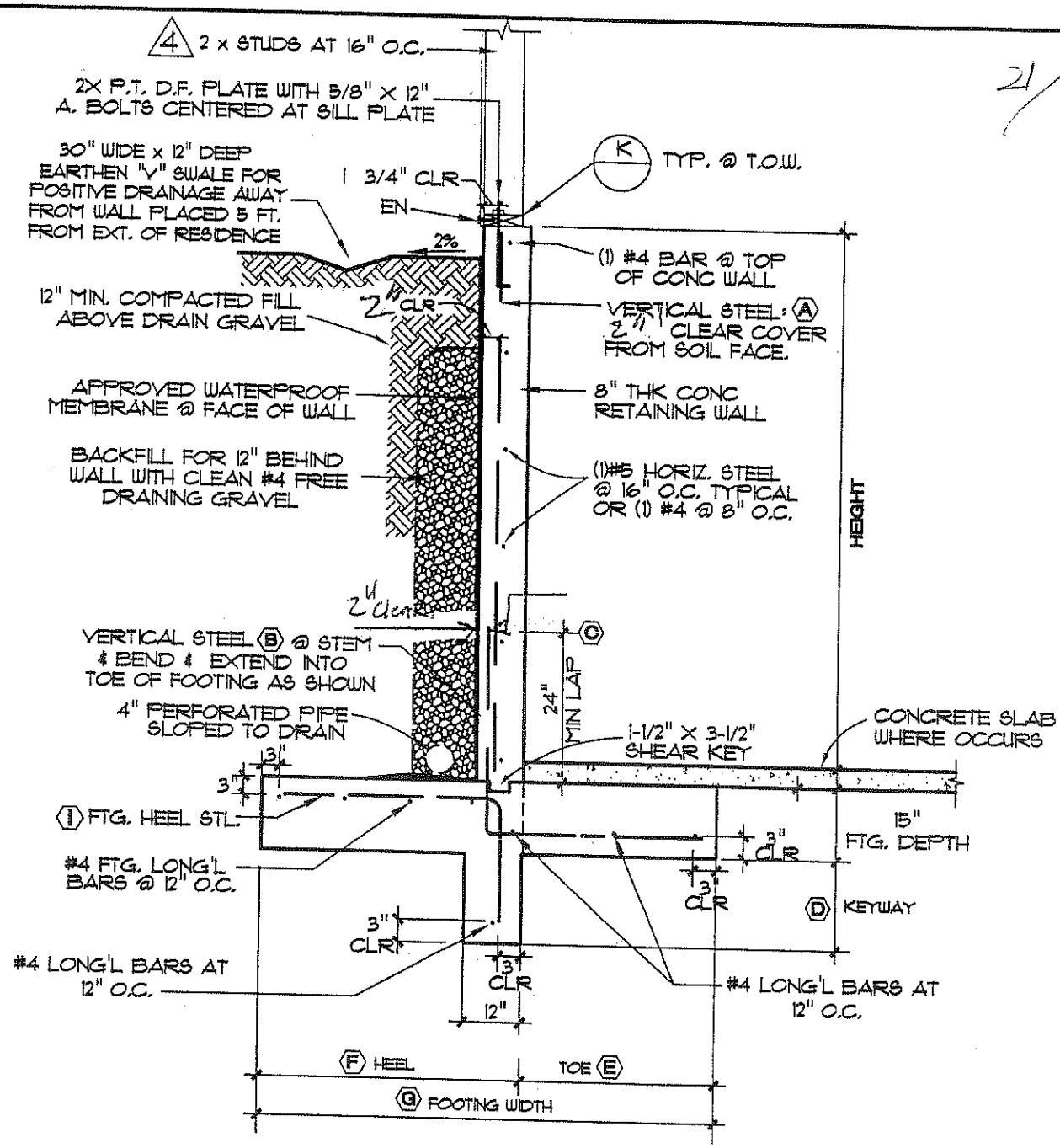
Top Stem: From 4.00 ft to Top of Wall
8.00in Concrete w/ # 4 @ 24.00in, d = 6.25in
f'c = 2500.0psi, Fy = 40000.0psi
Wall Wt. = 100.00psf, Bar Embed = 12.0in
Mu = 90.7 < = Mn = 1851.4ft-#
Vu = 0.99 < = Vn = 85.00psi
Interaction Value = 0.049

Second Stem From 2.00ft to 4.00ft
8.00in Concrete w/ # 4 @ 24.00in, d = 6.25in
f'c = 2500.0psi, Fy = 40000.0psi
Wall Wt. = 100.00psf, Bar Embed = 12.0in
Mu = 725.3 < = Mn = 1851.4ft-#
Vu = 5.49 < = Vn = 85.00psi
Interaction Value = 0.392

Third Stem From 0.00ft to 2.00ft
8.00in Concrete w/ # 5 @ 24.00in, d = 6.19in
f'c = 2500.0psi, Fy = 60000.0psi
Wall Wt. = 100.00psf, Bar Embed = 6.1in ✓
Mu = 2448.0 < = Mn = 4188.2ft-#
Vu = 13.77 < = Vn = 85.00psi
Interaction Value = 0.584

CKING

MAX



V CONC. RETAINING WALL

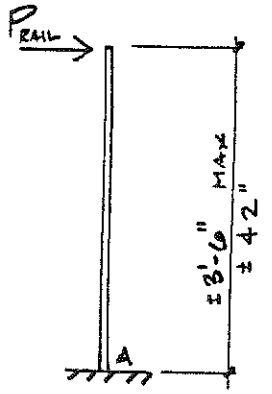
NO SCALE

HEIGHT	STEM	A	B	C	D	E	F	G	H	I
		VERTICAL STEEL AT TOP	VERTICAL STEEL AT LOWER-STEM	LOWER STEM HEIGHT	KEY DEPTH	TOE WIDTH	HEEL WIDTH	FOOTING WIDTH		HEEL STEEL
4'-0"	8" CONC	#4 @ 16"	#4 @ 16"	2'-3"	9"	1'-2"	1'-0"	2'-4"		#4 @ 12"
6'-0"	8" CONC	#4 @ 16"	#5 @ 16"	2'-6"	13"	2'-0"	1'-4"	3'-4"		#4 @ 12"
8'-0"	8" CONC	#4 @ 16"	#5 @ 16"	4'-0"	22"	2'-8"	1'-8"	4'-4"		#4 @ 12"
10'-0"	8" CONC	#5 @ 16"	#5 @ 8"	5'-0"	30"	3'-4"	2'-0"	5'-4"		#4 @ 12"

HANDRAIL DESIGN:

- PER UBC CH 16, T-16-B.9:

$W_{RAIL} = 20\#/l$ OR $W_{RAIL} = 50\#/l$



SO....

$$P_{RAIL} = W_{RAIL}(\text{SPACING}) = W_R S \geq 200\# \text{ (MIN)}$$

(UBC T-16-B.11 "HANDRAIL")

AND....

$$M_A = W_R S\left[3\tfrac{1}{2}'(12"/1)\right] = 42 W_R S \quad (\#\text{-IN})$$

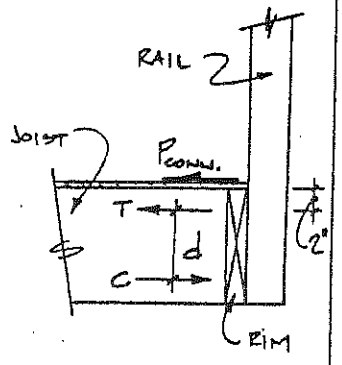
FOR DESIGN....

$$S_R = \frac{M}{F_B} = \frac{42 W_R S}{1250\ psi} = \frac{W_R S}{29.8} \quad (IN^3)$$

$$I_R = \frac{W_R S\,(3\tfrac{1}{2}(12"/1))^3}{3(1700000)\,\Delta_{MAX}} = \frac{W_R S}{14.5} \quad (IN^4)$$

(Δ_{MAX} = L/200 = .21")

✓ CONNECTION.....



LET $d = 6"$ (MIN) AND $P_{CPL} = T = C$

$$P_{CPL} = \frac{M_A}{d} = \frac{42 W_R S}{6"} = 7 W_R S \quad (LBS)$$

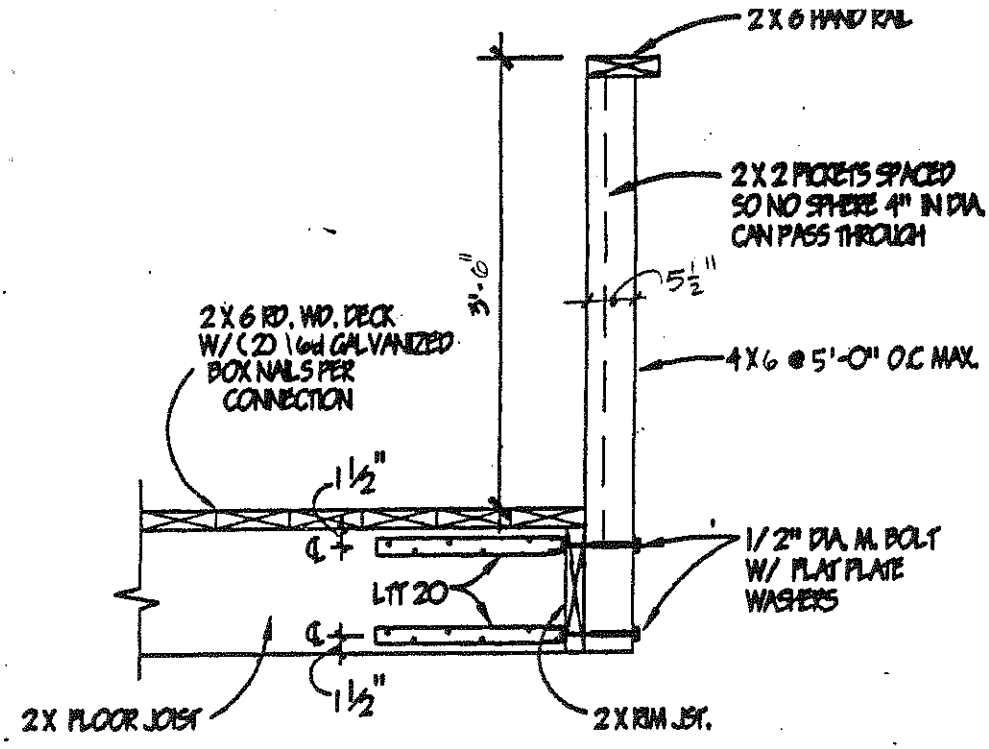
FINALLY, LET $T = P_{CONN}$ (CONSERV.) FOR RIM TO JOIST CONNECTION.

ALSO..... (1) 5/8"ϕ A307 BOLT G.F. 1760#/BOLT (DBL SHR)

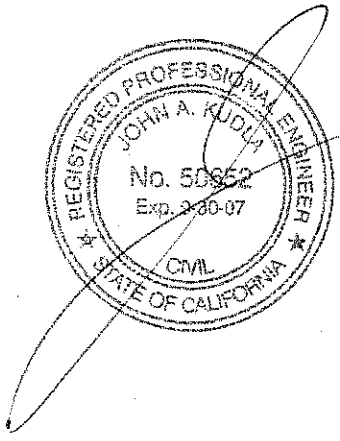
$F_{BEAM\ WSHR} = 625\ psi\,(2.30\ in^3) = 1438\#$/BOLT (TENSION)

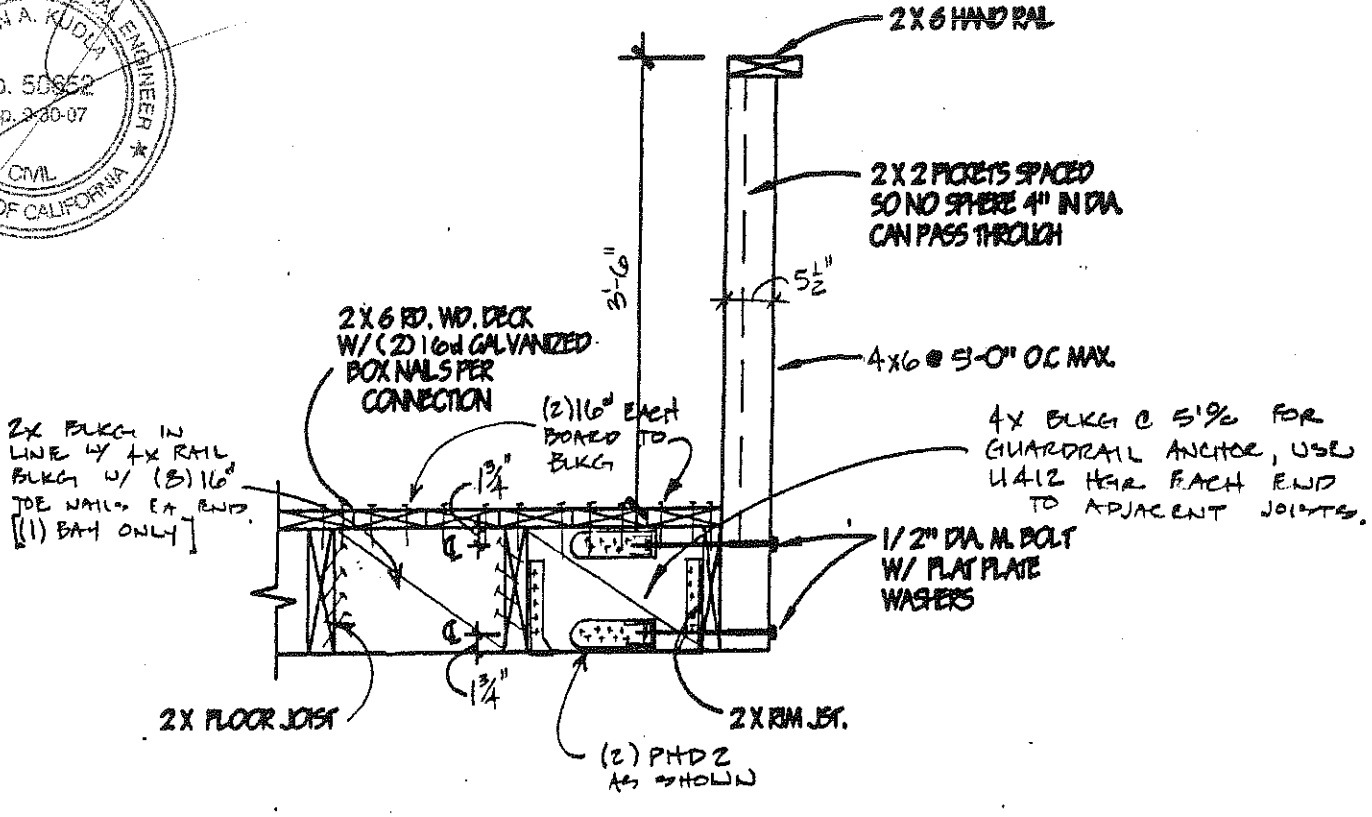
AND.... (1) LTT20B G.F. 1750#/FLA (TENS.)

W_{RAIL}	RAIL SPACING	P_{RAIL}	M_A	S_R	I_R	POST SIZE	$P_{CPL} = P_{CONN}$	POST TO JOIST/BLK	POST TO DBL JOIST
20#/l	6'-0"	120# ∴ USE 200#	8.4 K-FT	6.7	13.8	4x4#1	1400#	LTT20B	(2) 5/8"ϕ M.B. w/ d = 6" MIN
50#/l	5'-0"	250#	10.5 K-IN	8.4 IN^3	17.2 IN^4	4x6#2	1750#	LTT20B	(2) 5/8"ϕ M.B. w/ d = 6" MIN



GUARDRAIL DETAIL.





GUARDRAIL DETAIL.

Geotechnical Engineering Report

For

5855 Capistrano Avenue
Atascadero, California

February 11, 2004

B-043662

Prepared For

Glenn Lewis

By

Buena Geotechnical Services
3850 Ramada Drive, Suite A-2
Paso Robles, California

BUENA GEOTECHNICAL SERVICES, LLC
P.O. BOX 2857, ATASCADERO, CA 93423

February 11, 2004 B-043662

Glenn Lewis
5855 Capistrano Avenue
Atascadero, CA 93422

Project: 5855 Capistrano Avenue
Atascadero, California

Subject: Geotechnical Engineering Report

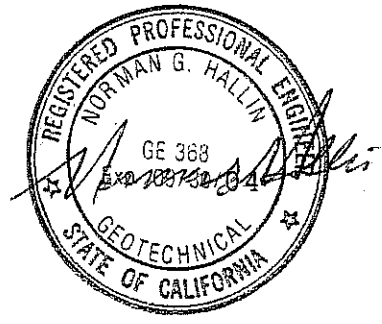
As authorized, we have performed a Geotechnical Study for the above referenced project. The accompanying Geotechnical Engineering Report presents the results of our subsurface exploration, laboratory-testing program and conclusions and recommendations for geotechnical engineering aspects of project design. Our services were performed using the standard of care ordinarily exercised in this locality at the time this report was prepared.

Based on our study, it is our opinion that the site is suitable for the proposed development from a geotechnical engineering standpoint provided the recommendations of this report are successfully implemented.

We have appreciated this opportunity to be of service to you on this project. Please call if you have any questions, or if we can be of further service.

Respectfully submitted,

Greg McKay
Project Manager



Norman G. Hallin
Geotechnical Engineer

Copies: 3-Lewis
1-File
1-KMN

805-434-9490 • 805-544-0333
FAX 805-434-9098 • 831-385-3170 (King City)

INTRODUCTION

A. Project Description

This report presents results of a Geotechnical Engineering Study performed for the proposed commercial building to be located in Atascadero, California.

1. We anticipate that the site will be developed by cutting and filling to create a level pad.
2. The proposed structure is assumed to be two (2) stories of wood framed construction.
3. Structural considerations for maximum wall loads of 2.0 kips per lineal foot were used as a basis for the recommendations of this report. If actual loads vary significantly from these assumed loads, Buena Geotechnical Services should be notified as re-evaluation of the recommendations contained herein may be required.

B. Purpose and Scope of Work

The purpose of the geotechnical investigation that led to this report was to evaluate the soil conditions of the site with respect to the proposed development. These conditions include surface and subsurface soil types, expansion potential, settlement potential, bearing capacity, and presence or absence of subsurface water. The scope of our work included:

1. Reconnaissance of the site.
2. Drilling, sampling and logging of three (3) borings to investigate soils and groundwater conditions.
3. Laboratory testing of soil samples obtained from subsurface exploration to determine their physical and engineering properties.
4. Geotechnical analysis of the data obtained.
5. Consultation with owner representatives and design professionals.
6. Preparation of this report.

Contained in the report are:

1. Discussions on local soil and groundwater conditions.
2. Results of laboratory and field tests.
3. Conclusions and recommendations pertaining to site grading and structural design.

C. Site Setting
1. The site of the proposed development is located in the City of Atascadero. See the Vicinity Map in Appendix A.
2. The site is sloping from the south to north.
3. The site contains scattered trees and uncertified fill.

SOIL CONDITIONS

A. Evaluation of the subsurface indicates that soils are generally silty clayey sand over clay and silt.
B. Soils encountered at approximate bearing depths are characterized by low in-place densities.
C. Expansion determination indicates that the bearing soils lie in the "Medium" range in accordance with the U.B.C.
D. Groundwater was not encountered to a maximum depth of fifteen (15) feet.

LIQUEFACTION

A. Earthquake-induced vibrations can be the cause of several significant phenomena, including liquefaction in fine sands and silty sands. Liquefaction results in a complete loss of strength and can cause structures to settle or even overturn if it occurs in the bearing zone. If liquefaction occurs beneath sloping ground, a phenomenon known as lateral spreading can occur. Liquefaction is typically limited to the upper 40 feet of the subsurface soils and to soils that have a relative density of less than 70%.
B. Based on the relative density of the in-place soils being over 70%. It is our opinion that the potential for liquefaction is low at this site.

CONCLUSIONS AND RECOMMENDATIONS

The site is suitable for the proposed development from a geotechnical engineering standpoint provided the recommendations contained herein are properly implemented into the project.

A. Grading
1. General Grading
a. Grading, at a minimum, should conform to Chapter 33 of the Uniform Building Code.
b. The existing ground surface should be initially prepared for grading by removing all vegetation, trees, large roots, debris, non-complying fill and all other organic material.

Voids created by removal of such material should not be backfilled unless the underlying soils have been observed by the Geotechnical Engineer.

c. The bottom of all excavations should be observed by a representative of this firm prior to processing or placing fill.
d. Fill and backfill placed at near optimum moisture in layers with loose thickness not greater than eight (8) inches should be compacted to a minimum of 90% of maximum dry density obtainable by the ASTM D 1557 Test Method.
e. Import soils used to raise site grade should be equal to or better than on-site soils in strength, expansion and compressibility characteristics. Import soils can be evaluated, but will not be pre-qualified by the Geotechnical Engineer. Final comments on the characteristics of the import soils will be offered after the material is at the project site.
f. Roof draining systems should be designed so that water is not discharged onto bearing soils or near structures.
g. Final site grade should be such that all water is diverted away from the structures and is not allowed to pond.
h. It is recommended that Buena Geotechnical Services be retained to provide intermittent geotechnical engineering services during site development, grading and foundation construction phases of the work to observe compliance with the design concepts, specifications and recommendations, and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.
i. Plans and specifications should be provided to Buena Geotechnical Services prior to grading. Plans should include the grading plans, foundation plans and foundation details. Structural loads should be shown on the foundation plans.
j. Should soils become unstable during grading due to excessive subsurface moisture, alternatives to correct instability may include aeration or the use of gravels and/or geotextiles as stabilizing measures. Recommendations for stabilization should be provided by this firm as needed during construction.

2. Site Grading/Development

   Grading Pads

   a. Due to the presence of low density soils and a cut/fill situation at the proposed bearing depth, overexcavation and recompaction of soils in the building area will be necessary to decrease the potential for differential settlement and to provide more uniform bearing conditions. Soils should be overexcavated to a depth of two (2) feet below the bottom of footings, four (4) feet below existing grade, or 75% of the deepest fill thickness, whichever is greater. The over-excavation should extend to a distance of five (5) feet beyond the building perimeter. The resulting surface should be scarified to a depth of one (1) foot, moisture conditioned and recompacted to a minimum of 90% of maximum dry density. The intent of these recommendations is to provide a minimum of two (2) feet of compacted soils below the bottom of all footings, and recompact the loose topsoil/fill.
   b. Areas outside the building area to receive fill, exterior slabs-on-grade, sidewalks and paving should be overexcavated to a depth of one (1) foot. The exposed surface should be scarified, moisture conditioned and recompacted.
   c. On-site soils may be used for fill once they are cleaned of all organic material, rock, debris and irreducible material larger than eight (8) inches.

3. Slope Construction

   a. All hillside grading and construction of fill slopes should conform to the minimum standards listed in Chapter 33 of the Uniform Building Code. It is recommended that the Geotechnical Engineer review the grading plans prior to grading and site development.
   b. Fill slopes should be keyed and benched into firm natural ground when the existing slope to receive fill is 10:1, horizontal to vertical, or steeper. The keys should be tilted into the slope, should be a minimum of one equipment width wide, and should extend a minimum of three (3) feet deep at the outside edge.
   c. Fill slopes should be overfilled, compacted and cut back to planned configurations. This will yield better compaction on the slope faces than other methods.
   d. Lined drainage swales and down drains should be provided at the tops of all cut and fill slopes to divert drainage away from the slope faces.

4. Utility Trenches
   a. Utility trench backfill should be governed by the provisions of this report relating to minimum compaction standards. In general, service lines inside of the property lines may be backfilled with native soils and compacted to a minimum of 90% of maximum dry density. Backfill of offsite service lines will be subject to the specifications of the jurisdictional agency or this report, whichever is more stringent.
   b. Geotechnical Engineer to monitor compliance with these recommendations.

B. Structural Design
   1. Foundations
      a. Conventional continuous footings may be used for support of the structures.
      b. Footings should bear entirely into firm recompacted soils.
      c. Conventional continuous footings may be designed based on an allowable bearing value of 2000 psf.
      d. Allowable bearing values are net (weight of footing and soils surcharge may be neglected) and are applicable for dead plus reasonable live loads.
      e. Bearing values may be increased by one-third when transient loads such as wind and/or seismicity are included.
      f. Lateral loads may be resisted by soils friction on floor slabs and foundations and by passive resistance of the soils acting on foundation stem walls. Lateral capacity is based on the assumption that any required backfill adjacent to foundations and grade beams is properly compacted.
      g. For structures to be constructed above slopes, the outside faces at the bottom of footings should provide a minimum horizontal distance of five (5) feet from the slope face.
      h. Conventional continuous footings for buildings where the ground surface slopes at 10:1, horizontal to vertical, or steeper should be stepped so that both top and bottom are level.
      i. Reinforcement of footings bottomed in soils in the "Medium" expansion range should be designed by the Project Structural Engineer. Soils should be presaturated to 130% of optimum moisture content to a depth of twenty-seven (27) inches below lowest adjacent grade.
      j. Foundation excavations should be observed by a representative of Buena Geotechnical Services after excavation, but prior to placing reinforcing steel or forms.

k. The soils profile type in UBC Table 16J should be Sd. The seismic zone factor (Z) in UBC Table 16I should be 0.40. The seismic source is the Rinconada Fault (Type B Fault) with a distance of less than 3 km.

2. Slabs-On-Grade
   a. Concrete slabs should be supported by compacted structural fill as recommended earlier in this report.
   b. It is recommended that perimeter slabs (walks, patios, etc.) be designed relatively independent of footing stems (i.e. free floating) so foundation adjustment will be less likely to cause cracking.
   c. Slabs should be underlain with a minimum of four (4) inches of clean and free draining sand. Areas where floor wetness would be undesirable should be underlain with a moisture barrier to reduce moisture transmission from the subgrade soils to the slab. The membrane should be placed at mid-height in the clean sand.
   d. Reinforcement and slab thickness should be determined by the Project Structural Engineer.
   e. Soils underlying slabs in the "Medium" expansion range should be presaturated to 130% of optimum moisture content to a depth of twenty-seven (27) inches below lowest adjacent grade.
3. Frictional and Lateral Coefficients
   a. Resistance to lateral loading may be provided by friction acting on the base of foundations. A coefficient of friction of 0.30 may be applied to dead load forces. This value does not include a factor of safety.
   b. Passive resistance acting on the sides of foundation stems equal to 275 pcf of equivalent fluid weight may be included for resistance to lateral load. This value does not include a factor of safety. However, when passive resistance is used in conjunction with friction, the coefficient of friction should be reduced by one-third in determining the total lateral resistance.
   c. A one-third increase in the quoted passive value may be used when considering transient loads such as wind and seismicity.
4. Settlement Considerations
   a. Maximum expected settlements of approximately 3/4 inches are anticipated for foundations and floor slabs designed as recommended.

b. Differential settlement between adjacent load bearing members should be less than one-half the total settlement.
c. The majority of settlement should occur during construction. Post construction settlement should be minimal.

5. Retaining Wall
   a. Conventional cantilever retaining walls bearing in soils prepared in accordance with Section A-2 of this report and backfilled with compacted on-site soils may be designed for the lateral pressures listed below:

Active Case	45	pcf
At Rest Case	75	pcf
Passive Case	275	pcf
Max. Toe Pressure	2000	psf
Coefficient of Sliding Friction	0.30	

   b. The pressures listed above were based on the assumption that backfilled soils will be compacted to 90% of maximum dry density as determined by ASTM D 1557 Test Method.
   c. The lateral earth pressure to be resisted by the retaining walls or similar structures should include the loads from any structures or temporary loads that influence the wall design.
   d. A back drain or an equivalent system of backfill drainage should be incorporated into the retaining wall design. Backfill immediately behind the retaining structure should be a free-draining granular material. Alternatively, the back of the wall could be lined with a geodrain system.
   e. Compaction on the uphill side of the wall within a horizontal distance equal to one wall height should be performed by hand-operated or other lightweight compaction equipment. This is intended to reduce potential "locked-in" lateral pressures caused by compaction with heavy grading equipment.
   f. Water should not be allowed to pond near the top of the wall. To accomplish this, the final backfill site grade should be such that all water is diverted away from the retaining wall.

ADDITIONAL SERVICES

This report is based on the assumption that an adequate program of monitoring and testing will be performed by Buena Geotechnical Services during construction to check compliance with the recommendations given in this report. The recommended tests and observations include, but are not necessarily limited to the following:

1. Review of the building and grading plans during the design phase of the project.
2. Observation and testing during site preparation, grading, placing of engineered fill, and foundation construction.
3. Consultation as required during construction.

LIMTATIONS AND UNIFORMITY OF CONDITIONS

The analysis and recommendations submitted in this report are based in part upon the data obtained from the borings drilled on site. The nature and extent of variations between and beyond the borings may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

The scope of our services did not include environmental assessment or geological study. The scope of services did not include investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater or air. Any statements in this report or on the soil boring logs regarding odors, unusual or suspicious items or conditions observed are strictly for the information of the client.

Findings of this report are valid as of this date, however, changes in a condition of a property can occur with passage of time whether they be due to natural processes or works of man on this or adjacent properties. In addition, changes in applicable or appropriate standard may occur whether they result from legislation or broadening knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one (1) year.

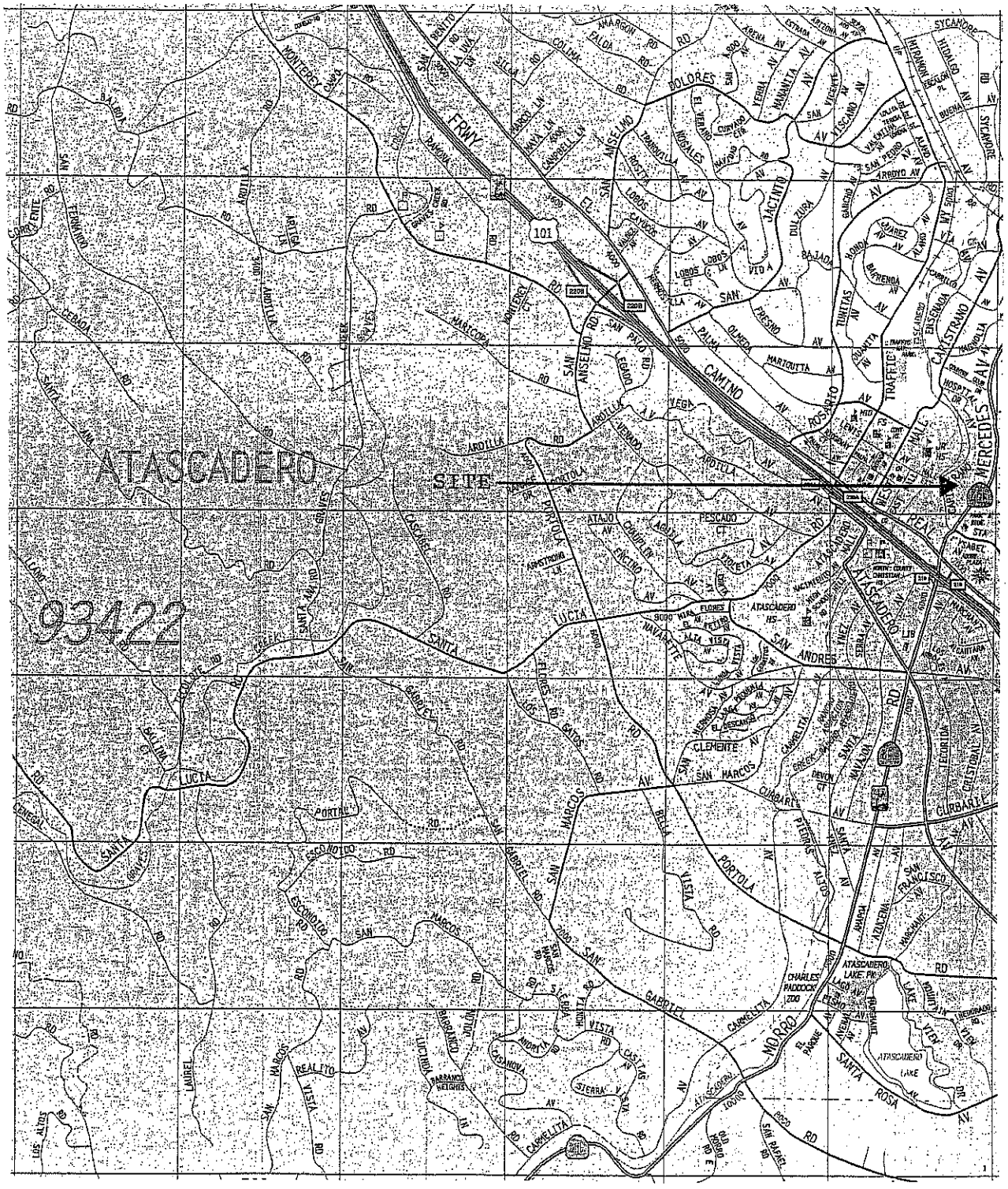
In the event that any changes in the nature, design, or location of the structure and other improvements are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

This report is issued with the understanding that it is the responsibility of the owner or his representatives to insure the information and recommendations offered herein are called to the attention of the project architect and engineers. It is also the responsibility of the owner or his representatives to insure the information and recommendations offered herein are incorporated into the project plans and specifications and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

Buena Geotechnical Services has prepared this report for the exclusive use of the client and authorized agents. This report has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are made as to the professional advice provided under the terms of this agreement.

It is recommended that Buena Geotechnical Services be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications. If Buena Geotechnical Services is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

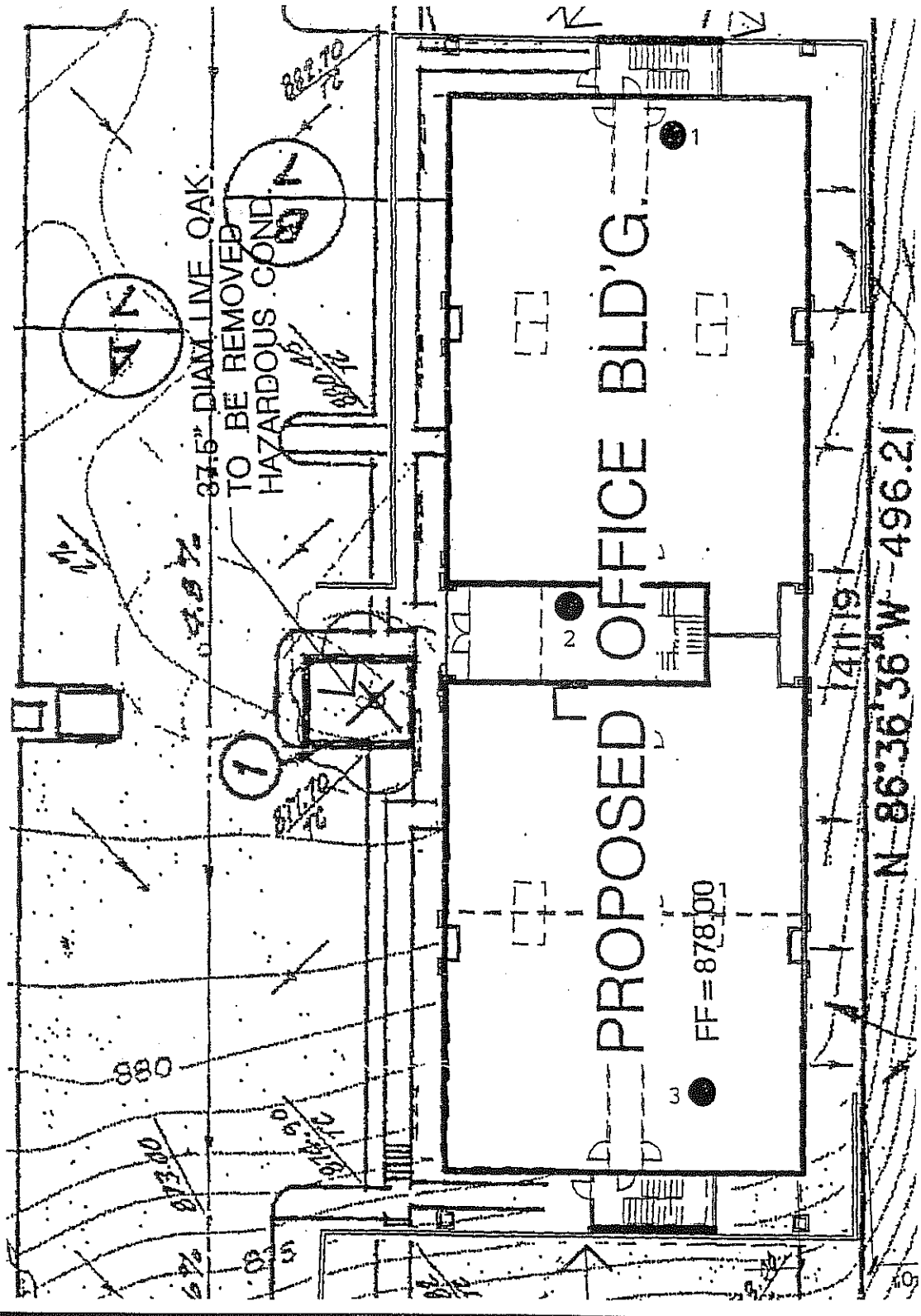
END OF TEXT
Appendices



PROJECT No. B-043662

BUENA GEOTECHNICAL SERVICES

VICINITY MAP



PROJECT No. B-043662

BUENA GEOTECHNICAL SERVICES

SITE MAP

A-1

FIELD INVESTIGATION

A. The borings were drilled to a maximum depth of fifteen (15) feet below the existing ground surface to observe the soil profile and to obtain samples for laboratory analysis. The borings were drilled on February 5, 2004 using a mobile drill rig and/or hand auguring equipment. The approximate locations of the borings were determined in the field by pacing and sighting, and are shown on the Site Plan in this Appendix.

B. Samples were obtained within the test borings with a Modified California (M.C.) Ring Sampler. The samples were obtained by driving the sampler with a 140 pound hammer dropping thirty (30) inches in accordance with ASTM D 1586.

C. Bulk samples of the soils encountered were gathered from the auger cuttings.

D. The final logs of borings represent our interpretation of the contents of the field logs and the results of laboratory testing performed on the samples obtained during the subsurface investigation. The final logs are included in this Appendix.

LOG OF BORING

for:

Site Location: Atascadero — 5855 Capistrano Avenue — Job No. B-043662

Driller/Helper:

Rig Type: — BORING NO. 1

Auger Diameter: 4"

Date: February 5, 2004

Depth (ft.)	Bag Sample	Blows per ft.	Drilling comments	Voids	Moisture	Description	USCS	Buena Soil ID
0						Dark brown silty clayey very fine to medium sand	SM-SC	A1
		8			14.1	with gravel		
		17			16.0	Brown silty very fine to medium sandy clay with	CL	C1
						gravel		
5		20			15.9			
						Tan very fine to medium sandy clayey silt	ML	B1
10		31			28.1			
15						Total Depth @ 15 Feet		
20								
25								
30								
35								
40								

GROUNDWATER

Time Depth

NE

SAMPLE TYPE

U=Undisturbed ring sample

S=Standard penetration tube

T=Shelby tube [ ] 3" [ ] Other:

LOG OF BORING

for:

Site Location: Atascadero — 5855 Capistrano Avenue — Job No. B-043662

Driller/Helper:

Rig Type: — BORING NO. 2

Auger Diameter: 4"

Date: February 5, 2004

Depth (ft.)	Bag Sample	Blows per ft.	Drilling comments	Voids	Moisture	Description	USCS	Buena Soil ID
0						Dark brown silty clayey very fine to medium sand	SM-SC	A1
		8			17.1	with gravel		
						Brown silty very fine to medium sandy clay with	CL	C1
		12			17.0	gravel		
5		20			14.9			
						Tan very fine to medium sandy clayey silt	ML	B1
10						Total Depth @ 10 Feet		
15								
20								
25								
30								
35								
40								

GROUNDWATER

Time Depth

NE

SAMPLE TYPE

U=Undisturbed ring sample

S=Standard penetration tube

T=Shelby tube [ ] 3" [ ] Other:

LOG OF BORING

for:

Site Location: Atascadero — 5855 Capistrano Avenue — Job No. B-043662

Driller/Helper:

Rig Type: — BORING NO. 3

Auger Diameter: 4"

Date: February 5, 2004

Depth (ft.)	Bag Sample	Blows per ft.	Drilling comments	Voids	Moisture	Description	USCS	Buena Soil ID
0						Dark brown silty clayey very fine to medium sand	SM-SC	A1
		15			16.5	with gravel		
						Brown silty very fine to medium sandy clay with	CL	C1
						gravel		
5		31			28.0	Tan very fine to medium sandy clayey silt	ML	B1
10						Total Depth @ 10 Feet		
15								
20								
25								
30								
35								
40								

GROUNDWATER

Time Depth

NE

SAMPLE TYPE

U=Undisturbed ring sample

S=Standard penetration tube

T=Shelby tube [ ] 3" [ ] Other:

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		G W	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE			G P	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		G M	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				G C	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		S W	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				S P	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SAND WITH FINES (APPRECIABLE AMOUNT OF FINES)		S M	SILTY SANDS, SAND-SILT MIXTURES
				S C	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		M L	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				C L	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				O L	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		M H	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				C H	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				O H	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				P T	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

APPENDIX B

Laboratory Testing
Test Results
In-Place Densities
Bench & Keyway Detail
Transition Lot Detail

B-1

LABORATORY TESTING

A. Samples were reviewed along with field logs to determine which would be analyzed further. Those chosen for laboratory analysis were considered representative of soils that would be exposed and/or used during grading, and those deemed to be within the influence of the proposed structure. Test results are presented in this Appendix.

B. In-situ Moisture Content and Unit Dry Weight for the ring samples were determined in general accordance with ASTM D 2947.

C. Expansion index test were performed on bulk soil samples in accordance with the U.B.C. The samples were surcharged under 144 pounds per square foot at moisture content of near 50% saturation. Samples were then submerged in water for 24 hours and the amount of expansion was recorded with a dial indicator.

D. Maximum density was performed to estimate the moisture-density relationship of typical soil materials. The tests were performed in accordance with ASTM designation D 1557-88.

B-2

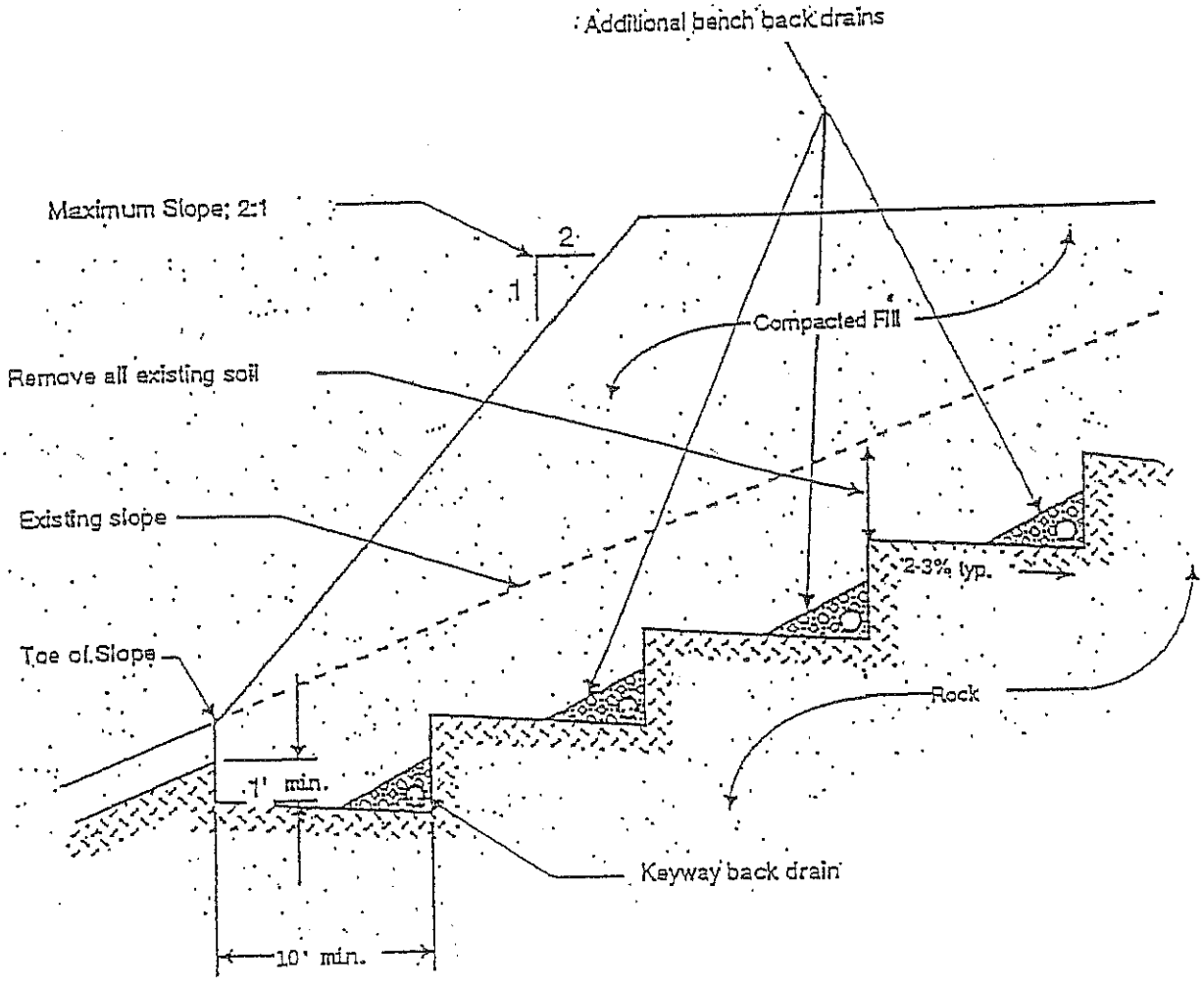
TEST RESULTS

Boring Depth	1@ 0'-3'	1@ 3'-6'	1@ 9'-12'
Soil Type	A1	C1	B1
USCS	SM-SC	CL	ML
Maximum Density (pcf)	116.9	109.9	82.7
Optimum Moisture (%)	12.7	16.8	30.9
Expansion Index	35	75	32
Plasticity Index	7	14	5

IN-PLACE DENSITIES

Boring Depth	Dry Density (pcf)	% Moisture
1@ 1'	98.0	14.1
1@ 3'	-----	16.0
1@ 5'	99.5	15.9
1@ 10'	-----	28.1
2@ 1'	96.1	17.1
2@ 3'	95.7	17.0
2@ 5'	101.7	14.9
3@ 1'	96.7	16.5
3@ 5'	77.1	28.0

Typical
NOT TO SCALE

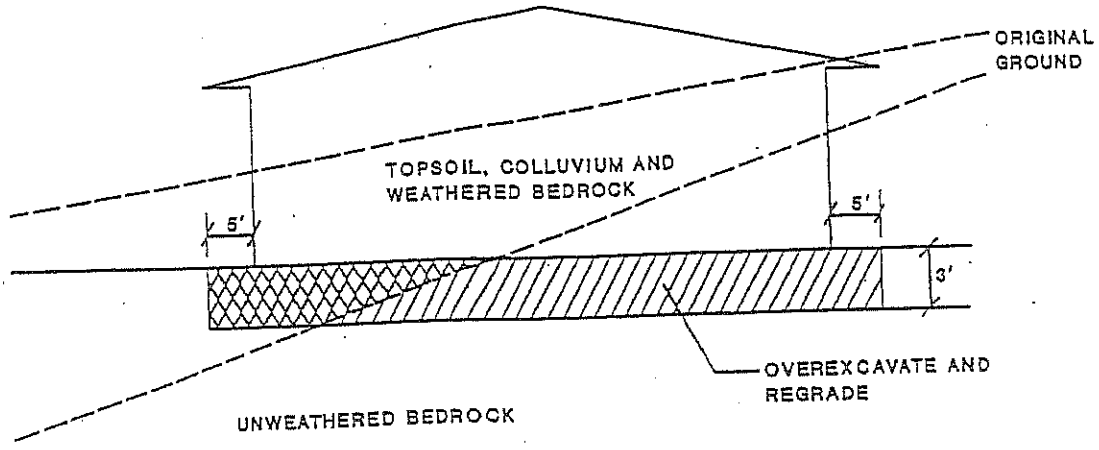


BUENA GEOTECHNICAL SERVICES

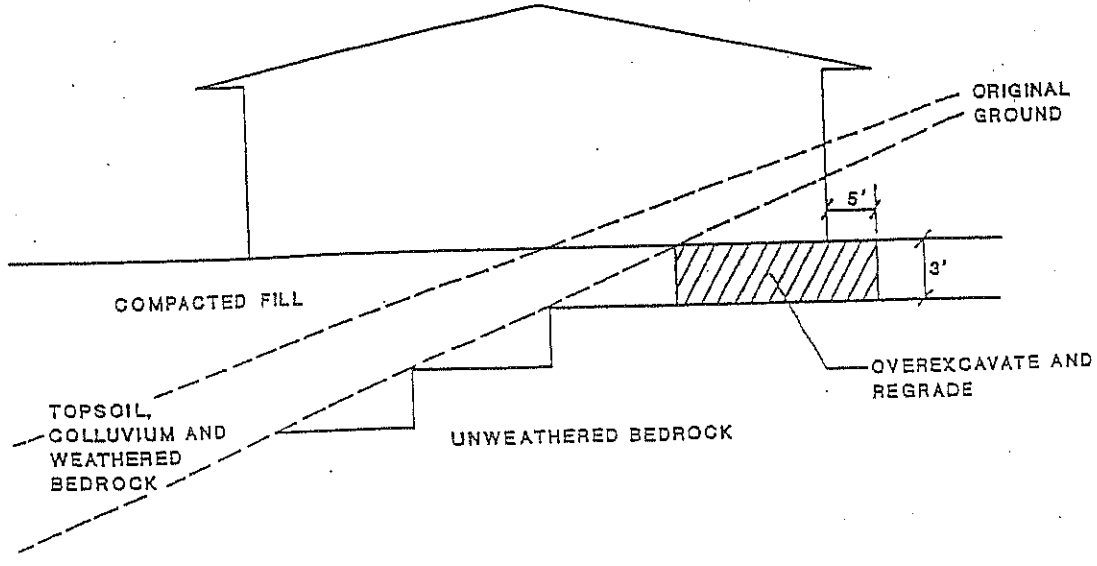
BENCH AND KEYWAY DETAIL

GENERAL GRADING RECOMMENDATIONS

CUT LOT



CUT/FILL LOT (TRANSITION)



BUENA GEOTECHNICAL SERVICES

TRANSITION LOT DETAIL