Sugimura & Associates
Architects

Architecture • Planning • Interiors
Landscape Architecture

Letter of Transmittal

Date: April 06, 2006 **Project Number:** 2506

To: **Terry Greene, A.I.A.**

Address: Public Works Dept
City of Cupertino
10300 Torre Avenue
Cupertino, CA 95014-3255

Attention:

Subject: T.I. & Seismic Project for the City Hall Building

Please find enclosed the following:

Date	Quantity	Description
April 6,'06	one page	"Recap" Cover Letter
~~11-6-05~~ 4.5.06	13 pages	Structural Calculations for Civic Center
Dec ~~6~~ 7, '05	one page	Research on what the CYGNA calculations show & what was assumed for loading, etc.
Nov ~~8~~ 10, '05	~~two~~ three pages	Report of Analysis of the existing building with reference to the current Code, the '01 CBC, and its shear protection.

Note: this is being provided in support of the current invoice submitted by our Structural Engineer, Ahern-Knox & Hyde, Inc.

For your: review and files

The above items are being submitted and delivered by G. Sugimura on 4/06/06.

By: G. M. Sugimura, A.I.A.
Senior Principal

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Campbell, CA 95008
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Principals
Gene M. Sugimura, AIA
Reed C. Grandy, ASIC
Christopher B. Clancy, AIA

Associates
Susan M. Landry, ASLA
Mirella Sion, Assoc. AIA

akh AHEARN, KNOX & HYDE, INC.
Structural Engineers

Dennis B. Ahearn, S.E.
William S. Knox, S.E.
Tim D. Hyde, S.E.

April 6, 2006

Sugimura & Associates Architects
2155 S. Bascom Avenue, Suite 200
Campbell, CA 95008

Att: Gene Sugimura
Ref: Cupertino City Civic Center Remodel

Dear Gene;

This is a recap of the work our office has performed on this project.

1. Preliminary analysis and framing scheme for the first design presented to us. This was the design that changed the shape of the existing roof to match the adjacent City Hall. This took considerable time for which we received no reimbursement.
2. Seismic analysis of the existing building for conformance to the 2001 California Building Code. After this analysis was completed we were informed that the facility is considered to be an Essential Facility due to the Emergency Operations Center being located in the building. This requirement increased the seismic forces that the structure is required to resist by 25% and our analysis had to be redone. In my letter to you of 11-8-05, I indicated several areas of overstress that would need to be addressed in the remodel to conform to the current code.
3. We were provided with a copy of the structural calculations that CYGNA compiled for the modifications to the building in 1986. We were asked to study these calculations to determine why CYGNA's conclusions differed from our analysis results. As indicated in my letter to you of 12-6-05, we found several errors in their analysis.
4. To date we have expended eighty-seven (87) hours on the above listed work. Although we feel that two weeks of time for the above analysis, meetings and presentation of our findings is entirely reasonable, I understand that there are limited funds available in your agreement with the City of Cupertino. I am therefore reducing our billing to a partial progress billing of forty (40) hours of time.

Please feel free to call me if you have any questions, or would like me to meet with you and the City.

Sincerely,

William S. Knox
Structural Engineer

Enclosures: Final structural analysis, previous letters referenced.

1505 Meridian Ave., Suite B, San Jose, CA 95125 • Phone (408) 978-1970 • Fax (408) 267-7919

Ahearn, Knox & Hyde, Inc.
Structural Engineers

1505 Meridian Avenue
San Jose, CA 95125
Phone (408) 978-1970
Fax (408) 267-7919

Structural Calculations
Cupertino City Civic Center

Project Number:	M05-036	Date:	11-6-05
Project Engineer:	Knox	Code:	2001 CBC
Seismic Zone:	4	Wind Zone:	70 mph
Checked By:		Date:	

Original Signature Required
To Be Valid Seal

STRUCTURAL LOADS

ROOF TYPE #1: Existing Tile Roof Slope, in/ft.: 4

Material	Decking	Purlins	Beams	Seismic
Tile Roofing	21.0	21.0	21.0	21.0
Plywood	1.5	1.5	1.5	1.5
3x Decking	8.0	8.0	8.0	8.0
Insulation	0.5	0.5	0.5	0.5
Fire Sprinklers		4.0	3.0	2.0
Ceiling		2.5	2.5	2.5
Purlins		4.0	4.0	4.0
Beams			1.0	1.0
Miscellaneous	5.0	4.0	4.0	2.0
Sub-Total:	36.0	45.5	45.5	42.5
Slope Factor	1.9	2.5	2.5	2.3
TOTAL DEAD LOAD:	37.9	48.0	48.0	44.8 psf

ROOF TYPE #2: Existing Built-up Slope, in/ft.: 0.25

Material	Decking	Joist	Beams	Seismic
Roofing	4.0	4.0	4.0	4.0
Plywood	1.5	1.5	1.5	1.5
Insulation	0.5	0.5	0.5	0.5
Fire Sprinklers		4.0	3.0	2.0
Joist		3.0	3.0	3.0
HVAC Equipment		5.0	5.0	5.0
Beams			2.0	2.0
Miscellaneous	5.0	5.0	4.0	2.0
Sub-Total:	11.0	23.0	23.0	20.0
Slope Factor	0.0	0.0	0.0	0.0
TOTAL DEAD LOAD:	11.0	23.0	23.0	20.0 psf

FLOOR TYPE #1:

Material	Slab	Joist	Beams	Seismic
Flooring	1.0	1.0	1.0	1.0
Concrete Slab, 3"	38.0	38.0	38.0	38.0
Fire Sprinklers		4.0	3.0	2.0
Ceiling		2.5	2.5	2.5
Joist, 6"x12" @ 36"		29.0	29.0	29.0
Beams			5.0	5.0
Miscellaneous	5.0	5.0	4.0	2.0
Sub-Total:	44.0	79.5	82.5	79.5
Partitions		20.0	20.0	20.0
TOTAL DEAD LOAD:	44.0	99.5	102.5	99.5 psf

WALL TYPE #1: Stud Wall w/ Gyp Board Each Side

Material	Weight
Studs @ 16" o.c.	1.5
Gypsum Board	5.0
Miscellaneous	1.5
TOTAL WEIGHT:	8.0 psf

WALL TYPE #2: Stud Wall w/ Gyp Board One Side & Plaster One Side

Material	Weight
Studs @ 16" o.c.	1.5

Gypsum Board	2.5	
Plywood	1.5	
Plaster	10.0	
Miscellaneous	1.5	
TOTAL WEIGHT:	17.0	psf

WALL TYPE #3: 6" Concrete 75 psf

LIVE LOADS: Floor

Office Areas	50	psf
Corridors & Lobbies	100	psf
Assembly, Open	100	psf

LIVE LOADS: Roof	0 - 200	201 - 600	> 600	sq. ft.
Slope <4:12	20	16	12	psf
Slope 4:12 to < 12:12	16	14	12	psf
Slope > 12:12	12	12	12	psf

SOILS DATA

Firm: Date:
Address:

Phone:

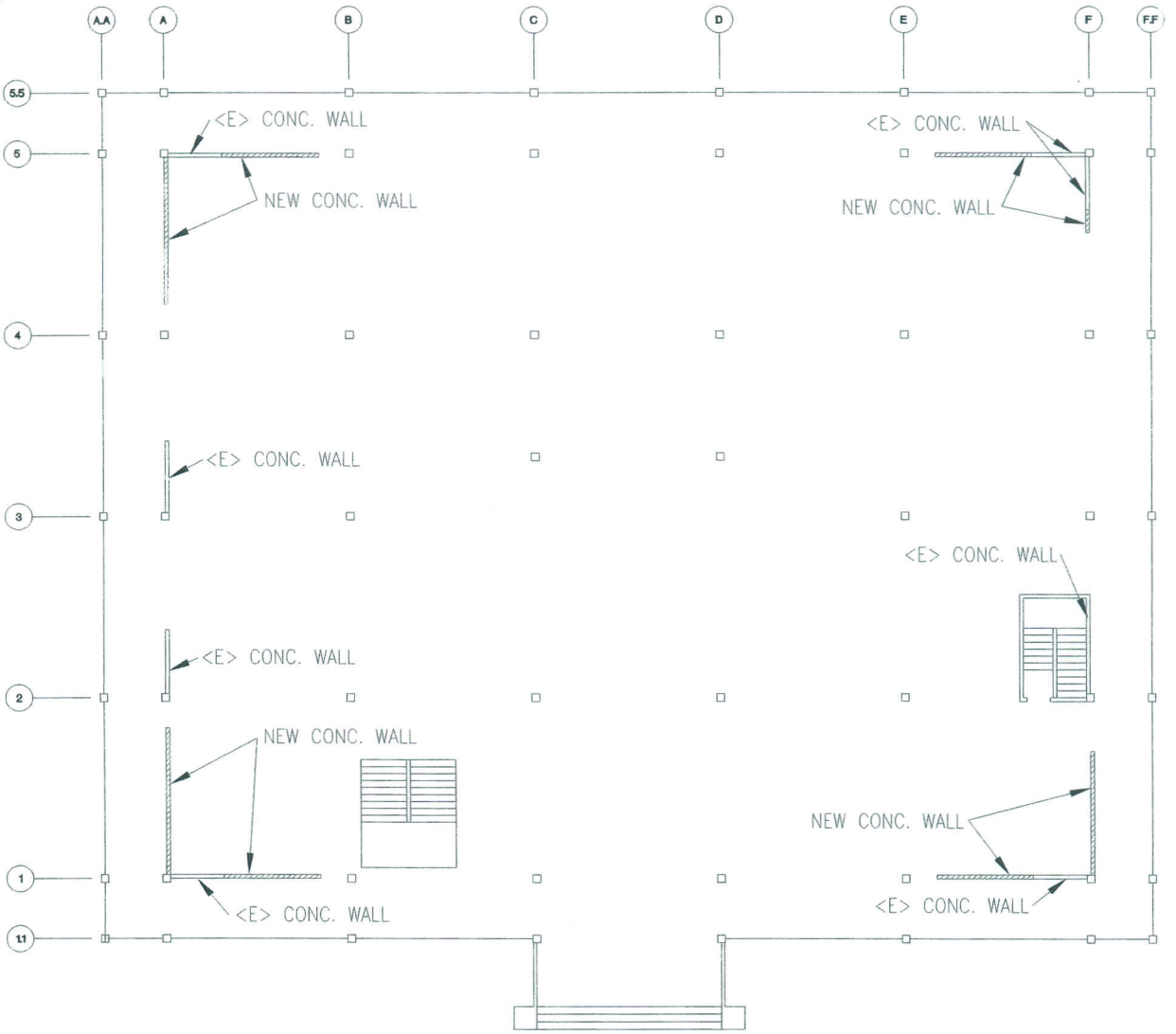
Recommendations:

Continuous & Spread Footings
- Minimum Depth:
- Minimum Width:
- Dead Load Bearing:
- Dead + Live Bearing:
- Total Bearing:
- Friction Coefficient:
- Passive Pressure:

Pier & Grade Beams
- Pier Friction:
- Dead End Bearing:
- Dead + Live Bearing:
- Total End Bearing:
- Disregard Top Depth:
- Active on Footings:
- Active of Piers:
- Passive Pressure:

Cantilevered Retaining Walls
- Active Pressure:
- Passive Pressure:
- Friction Coefficient:

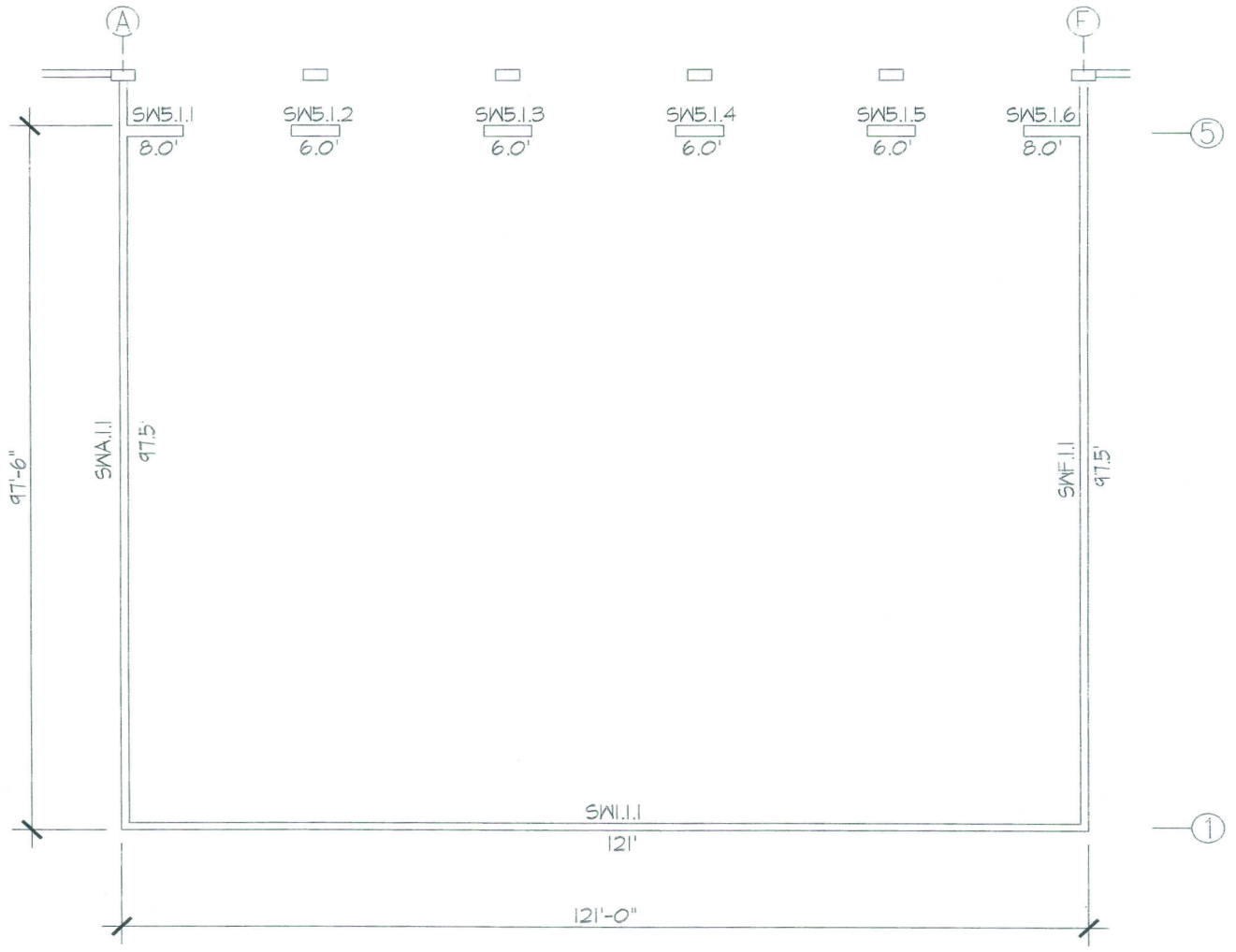
Restrained Retaining Walls
- Active Pressure:
- Passive Pressure:



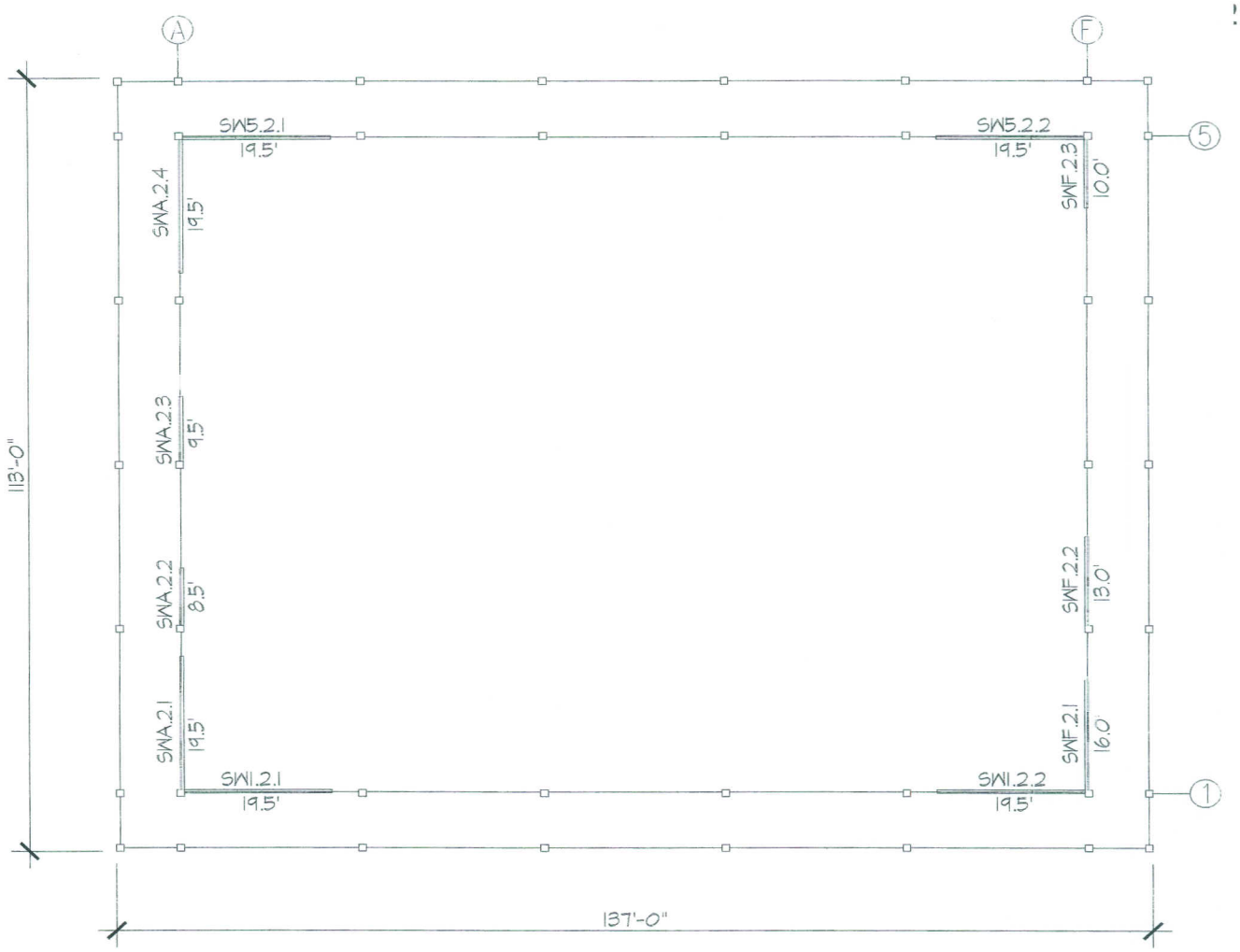
FLOOR PLAN – MAIN LEVEL

The upper level of the building lateral system consists of existing wood roof diaphragm and concrete shear walls. The lower level consists of a concrete joist floor system over concrete walls & columns. The lower portion was originally a full basement. In 1987 the North side of the building was excavated to the depth of the basement and the North basement wall opened up to a new patio. The building currently houses the City's Emergency Operations Center and is therefore an essential facility.

Earthquake Data:
Nearest fault is the Monte Vista - Shannon fault, 7 km. Distant. Type B fault



LOWER LEVEL PLAN



UPPER LEVEL PLAN

Building Mass:

Roof	Area	Unit Load	Mass	
High Roof:	3430	20	68600	
Tile Roof:	2810	44.8	125888	
Well Roof	6000	19	114000	
Mansard:	1450	30	43500	
Partitions	11340	5	56700	
		Total =	408688	lbs

Roof height = 18'

Floor	Area	Unit Load	Mass	
Floor	12705	100	1270500	
Ext. Walls	1140	100	114000	
Partitions	11340	10	113400	
		Total =	1497900	lbs

Floor height = 12'

Upper Level Seismic Loads:

Wood frame roof with plywood diaphragm. Concrete shear walls

Wall	Length	Rigidity	Relative R
SW1.2.1	19.5	7415	0.5
SW1.2.2	19.5	7415	0.5
		14830	
SW5.2.1	19.5	7415	0.5
SW5.2.2	19.5	7415	0.5
		14830	

Wall	Length	Rigidity	Relative R
SWA.2.1	19.5	7415	0.455
SWA.2.2	8.5	614	0.038
SWA.2.3	9.5	857	0.053
SWA.2.4	19.5	7415	0.455
		16301	
SWF.2.1	16	4096	0.562
SWF.2.2	13	2197	0.301
SWF.2.3	10	1000	0.137
		7293	

Program PL-09: Base Shear
Total Base shear = 73 kips
Load to each shear wall line = 36.5 kips

Wall	Shear
SW1.2.1	18.25
SW1.2.2	18.25
"1" Total:	36.50

Wall	Shear
SW5.2.1	18.25
SW5.2.2	18.25
"5" Total:	36.50

Wall	Shear
SWA.2.1	16.60
SWA.2.2	1.38
SWA.2.3	1.92
SWA.2.4	16.60
"A" Total:	36.50

Wall	Shear
SWF.2.1	20.50
SWF.2.2	11.00
SWF.2.3	5.00
"F" Total:	36.50

Reliability/Redundency factor = 1.0

Lower Level Seismic Loads:
Concrete floor slab. Concrete shear walls

Wall	Length	Rigidity	Relative R
SW1.1.1	121	1771561	1
SW5.1.1	8	512	0.271186
SW5.1.2	6	216	0.114407
SW5.1.3	6	216	0.114407
SW5.1.4	6	216	0.114407
SW5.1.5	6	216	0.114407
SW5.1.6	8	512	0.271186
		1888	

Wall	Length	Rigidity	Relative R
SWA.1.1	97.5	926859	1.000
SWF.2.1	97.5	926859	1.000

Program PL-09: Base Shear
Total Base shear = 327 kips from lower level mass only
Load to each wall line from upper level = 36.5*5.5/4.5 = 44.6 kips
Longitudinal seismic distribution, Program PL-08
Load to each shear wall line

Line	Shear	
1	1.1	kips
5	415.4	kips
A	224.7	kips
F	224.7	kips

Reliability/Redundency factor = 1.0

Roof Diaphragm

Load to Line A = 36.5 kips Diaphragm length = 97 ft.
Diaphragm shear = 376 plf
Existing diaphragm is 1/2" plywood w/ 10d @ 6" o.c. all edges, blocked
Allowable shear = 325 plf
Overstress = 15.8%

Chord stress = 2*36.5*121/8/97 = 11.4 kips
Existing chord is W16x31 w/ (3) 5/8" M.B. in 1/4" splice plate.
Allowable load = 3.1*3*1.33 = 12.4 kips

Maximum collector load = 36.5/121*41 = 12.4 kips
Allowable load = 3.1*3*1.33 = 12.4 kips

Shear Walls

Wall SW1.2.1
Wall length = 19.5 ft. Wall weight = 12*19.5*75 = 17.6 kips
Applied Lateral load = 18.25 kips Wall height = 12 ft.
Wall seismic weight = 0.179*17.6 = 3.1 kips
Program

Wall SW1.2.1
Wall length = 16 ft. Wall weight = 12*16*75 = 14.4 kips
Applied Lateral load = 20.5 kips Wall height = 12 ft.
Wall seismic weight = 0.179*14.4 = 2.6 kips
Program

Title: Upper Level

Program: PL-9,v2 SEISMIC BASE SHEAR 2001 CBC

Structural System Types

1. Bearing Wall - Light frame w/ plywood shear walls	11. Frame System - Masonry shear walls
2. Bearing Wall - Light frame w/ light shear walls	12. Frame System - Ordinary steel braced frame
3. Bearing Wall - Concrete shear walls	13. Frame System - Special steel braced frame
4. Bearing Wall - Masonry shear walls	14. Moment Frame - Special steel frame
5. Bearing Wall - Light frame w/ tension braces	15. Moment Frame - Special concrete frame
6. Bearing Wall - Steel braced frames	16. Moment Frame - Masonry frame
7. Frame System - Steel eccentric braced frame	17. Moment Frame - Ordinary steel frame
8. Frame System - Light frame w/ plywood shear walls	18. Moment Frame - Special truss steel frame
9. Frame System - Light frame w/ light shear walls	19. Cantilevered Column
10. Frame System - Concrete shear walls	**System Type Number:** 10

Roof Diaphragm Flexible/Rigid: F F/R | Floor Diaphragm Flexible/Rigid: R F/R

Irregularity Types (place an "X" next to all that apply)

	Soft Story, story stiffness < 70% of story above or < 80% of average of the three stories above.
	Mass, story mass > 150% of adjacent stories, except lighter roofs.
	Geometry, length of story resisting system > 130% of adjacent stories, except penthouses.
	Discontinuity, in-plane offset of system > length of system.
	Weak Story, story strength < 80% of story above.
	Torsional, end bay story drift > 1.2 of average story drift for both end bays, except flexible diaph.
	Re-entrant Corners, extension in each direction > 15% of plan dimension in respective direction.
	Diaphragm Discontinuity, openings > 50% or > 50% of stiffness of adjacent stories.
	Out-Of Plane, out-of-plane offset of vertical resisting elements.
	Nonparallel, vertical load frame not parallel to lateral resisting system.

Distance to nearest active fault:	7	km.
Fault Type	B	A, B or C
Soil type (SD if unknown):	SD	SA, SB, SC, SD or SE (UBC Table 16-J)
Occupancy category:	1	1 - 5 (UBC Tab. 16-K, Determines Importance Factor & Dynamic Req's)
Number of stories:	1	
Governing Code:	1	1 = CBC, 2 = DSA, 3 = OSHPD, 4 = BSC (State Buildings)

Limitation Notes: **None**

Building Mass

Level	Mass (kips)	Height (ft)
1	408.7	18
2		
3		
4		
Total	408.7	

STATIC DESIGN BASE SHEAR METHOD

Design Base Shear (UBC 30-4) =	0.932		R =	5.5
Max. Required (UBC 30-5) =	0.250		Ca =	0.440
Min. Required (UBC 30-6) =	0.061		Cv =	0.717
Min. Required (UBC 30-7) =	0.081		T =	0.175
Use: Base Shear Factor (Strength) =	**0.250**		Na =	1.000
Use: Base Shear Factor (ASD) =	**0.179**		Nv =	1.120
Base Shear = 102.18 kips, **Strength Design**			I =	1.25
Base Shear = 72.98 kips, **Allowable Stress Design**				

Dynamic Analysis Check: Dynamic Analysis Is Not Required

Total Base Shear = **102.18** kips, Strength Design

Total Base Shear = **72.98** kips, Allowable Stress Design

Base Shear Loads, See following page for design shear loads

	Final Loads - **Strength Design**			Final Loads - **Allowable Stress Design**			
Level	Load	Sum Load	Diaphragm Fpx	Load	Sum Load	Diaphragm Fpx	
1	102.18	102.18	140.49	72.98	72.98	100.35	kips
2	0.00	0.00	0.00	0.00	0.00	0.00	kips
3	0.00	0.00	0.00	0.00	0.00	0.00	kips
4	0.00	0.00	0.00	0.00	0.00	0.00	kips
FT	0.00			0.00			kips

Title: Lower Level

Program: PL-9,v2 SEISMIC BASE SHEAR 2001 CBC

Structural System Types

1. Bearing Wall - Light frame w/ plywood shear walls	11. Frame System - Masonry shear walls
2. Bearing Wall - Light frame w/ light shear walls	12. Frame System - Ordinary steel braced frame
3. Bearing Wall - Concrete shear walls	13. Frame System - Special steel braced frame
4. Bearing Wall - Masonry shear walls	14. Moment Frame - Special steel frame
5. Bearing Wall - Light frame w/ tension braces	15. Moment Frame - Special concrete frame
6. Bearing Wall - Steel braced frames	16. Moment Frame - Masonry frame
7. Frame System - Steel eccentric braced frame	17. Moment Frame - Ordinary steel frame
8. Frame System - Light frame w/ plywood shear walls	18. Moment Frame - Special truss steel frame
9. Frame System - Light frame w/ light shear walls	19. Cantilevered Column
10. Frame System - Concrete shear walls	**System Type Number:** 3

Roof Diaphragm Flexible/Rigid: R F/R

Floor Diaphragm Flexible/Rigid: R F/R

Irregularity Types (place an "X" next to all that apply)

	Soft Story, story stiffness < 70% of story above or < 80% of average of the three stories above.
	Mass, story mass > 150% of adjacent stories, except lighter roofs.
	Geometry, length of story resisting system > 130% of adjacent stories, except penthouses.
	Discontinuity, in-plane offset of system > length of system.
	Weak Story, story strength < 80% of story above.
	Torsional, end bay story drift > 1.2 of average story drift for both end bays, except flexible diaph.
	Re-entrant Corners, extension in each direction > 15% of plan dimension in respective direction.
	Diaphragm Discontinuity, openings > 50% or > 50% of stiffness of adjacent stories.
	Out-Of Plane, out-of-plane offset of vertical resisting elements.
	Nonparallel, vertical load frame not parallel to lateral resisting system.

Distance to nearest active fault:	7	km.
Fault Type	B	A, B or C
Soil type (SD if unknown):	SD	SA, SB, SC, SD or SE (UBC Table 16-J)
Occupancy category:	1	1 - 5 (UBC Tab. 16-K, Determines Importance Factor & Dynamic Req's)
Number of stories:	1	
Governing Code:	1	1 = CBC, 2 = DSA, 3 = OSHPD, 4 = BSC (State Buildings)

Limitation Notes: **None**

Building Mass

Level	Mass (kips)	Height (ft)
1	1498	12
2		
3		
4		
Total	1498	

STATIC DESIGN BASE SHEAR METHOD

Design Base Shear (UBC 30-4) =	1.544	R =	4.5
Max. Required (UBC 30-5) =	0.306	Ca =	0.440
Min. Required (UBC 30-6) =	0.061	Cv =	0.717
Min. Required (UBC 30-7) =	0.100	T =	0.129
Use: Base Shear Factor (Strength) =	**0.306**	Na =	1.000
Use: Base Shear Factor (ASD) =	**0.218**	Nv =	1.120
		I =	1.25

Base Shear = 457.72 kips, **Strength Design**

Base Shear = 326.94 kips, **Allowable Stress Design**

Dynamic Analysis Check: Dynamic Analysis Is Not Required

Total Base Shear = **457.72** kips, Strength Design

Total Base Shear = **326.94** kips, Allowable Stress Design

Base Shear Loads, See following page for design shear loads

	Final Loads - **Strength Design**			Final Loads - **Allowable Stress Design**			
Level	Load	Sum Load	Diaphragm Fpx	Load	Sum Load	Diaphragm Fpx	
1	457.72	457.72	457.72	326.94	326.94	326.94	kips
2	0.00	0.00	0.00	0.00	0.00	0.00	kips
3	0.00	0.00	0.00	0.00	0.00	0.00	kips
4	0.00	0.00	0.00	0.00	0.00	0.00	kips
FT	0.00			0.00			kips

Program: PC-03 CONCRETE SHEAR WALL

Designation: SW1.2.1 Existing

1998 CBC

Input Data:

Wall Length	7	ft.
Wall Thickness	6	in.
Unsupported Height	12	ft.
Horizontal Bars	4	(3-9)
Spacing	12	in.
Vertical Bars	4	(3-9)
Spacing	12	in.
Single or Double Curtain	S	S/D
Left End Bar Size	8	(3-9)
Number of Bars	2	
Right End Bar Size	8	(3-9)
Number of Bars	2	
Distance From End	4	in.
Boundary Tie Bars		(3-6) if required.
Concrete Strength, f'c	3	ksi
Reinforcing Yield, Fy	40	ksi

Vertical Loads, kips: (Special = assembly, > 100 psf or garage)

Distance measured from left end of wall, ft.

Load No.	Dead, kips	Live, kips	Distance	Special (Y/N)
1	6.3		3.5	
2				
3				
4				
5				

Lateral Loads

Load No.	Force, kips	Height, ft.
1	18.25	12
2	3.1	6
3		
4		
5		
6		

Note: Program does not calculate wall self weight!

Code Minimum Checks:

Minimum Wall Vertical Reinforcing Ratio:	0.0025	Actual:	0.0028	OK
Minimum Wall Horizontal Reinforcing Ratio:	0.0025	Actual:	0.0028	OK
Maximum Vertical Reinforing Spacing:	18	Actual:	12	OK
Maximum Horizontal Reinforing Spacing:	18	Actual:	12	OK

Double Curtain Reinforcing Check: Single Reinforcing Curtain Allowed

Hooked Shear Reinforcing Check: Hooked Shear Reinforcing IS Required

Maximum Axial Load Check: OK

Shear Check:

VU = 29.9 kips Phi*VN = 72.3 kips OK

Bending Check:

MU left = 332.6 ft-kips Phi*MN = 365.3 ft-kips OK

MU right = 332.6 ft-kips Phi*MN = 365.3 ft-kips OK

Boundary Member Check:

Boundary Member Required: YES

Minimum Boundary Member Length =	12.6	in.		
Minimum Boundary Member Thickness =	9.0	in.		
Minimum Boundary Member Steel =	0.6	sq.in.	Minimum Number Of Bars =	4
Actual Boundary Member Steel =	1.6	sq.in.	Supplied Number Of Bars =	2
Maximum Tie Spacing =	0.0	in.		

Length/Width Ratio Of Hoop Ties Shall Not Exceed 3

Cross Ties Or Hoops Shall Be Spaced 12 in. o.c. Maximum

Alternate Vertical Bars Shall Be Confined By Cross Tie Or Hoop Corner

Ties At Vertical Bar Splices Shall Be Spaced At 4 in. o.c. Maximum

Horizontal Wall Reinforcing Shall Be Hooked At Boundary Edge

Lap Splices Of Horizontal Reinforcing Not Allowed In Boundary Members

Program: PC-03 CONCRETE SHEAR WALL

Designation: SWF.2.1

1998 CBC

Input Data:

Wall Length	16	ft.
Wall Thickness	6	in.
Unsupported Height	12	ft.
Horizontal Bars	4	(3-9)
Spacing	12	in.
Vertical Bars	4	(3-9)
Spacing	12	in.
Single or Double Curtain	S	S/D
Left End Bar Size	8	(3-9)
Number of Bars	2	
Right End Bar Size	8	(3-9)
Number of Bars	2	
Distance From End	4	in.
Boundary Tie Bars		(3-6) if required.
Concrete Strength, f'c	3	ksi
Reinforcing Yield, Fy	40	ksi

Vertical Loads, kips: (Special = assembly, > 100 psf or garage)

Distance measured from left end of wall, ft.

Load No.	Dead, kips	Live, kips	Distance	Special (Y/N)
1	14.4		8	
2				
3				
4				
5				

Lateral Loads

Load No.	Force, kips	Height, ft.
1	20.5	12
2	2.6	6
3		
4		
5		
6		

Note: Program does not calculate wall self weight!

Code Minimum Checks:

Minimum Wall Vertical Reinforcing Ratio:	0.0012	Actual:	0.0028	OK
Minimum Wall Horizontal Reinforcing Ratio:	0.0020	Actual:	0.0028	OK
Maximum Vertical Reinforing Spacing:	18	Actual:	12	OK
Maximum Horizontal Reinforing Spacing:	18	Actual:	12	OK
Double Curtain Reinforcing Check:	Single Reinforcing Curtain Allowed			
Hooked Shear Reinforcing Check:	Hooked Shear Reinforcing Not Required			
Maximum Axial Load Check:	OK			

Shear Check:

VU =	32.3	kips	Phi*VN =	152.3	kips	OK

Bending Check:

MU left =	366.2	ft-kips	Phi*MN =	871.5	ft-kips	OK
MU right =	366.2	ft-kips	Phi*MN =	871.5	ft-kips	OK

Boundary Member Check:

Boundary Member Required: NO

Program: PC-03 CONCRETE SHEAR WALL

Designation: SW1.2.1 1998 CBC

Input Data:

Wall Length	19.5	ft.
Wall Thickness	6	in.
Unsupported Height	12	ft.
Horizontal Bars	4	(3-9)
Spacing	12	in.
Vertical Bars	4	(3-9)
Spacing	12	in.
Single or Double Curtain	S	S/D
Left End Bar Size	8	(3-9)
Number of Bars	2	
Right End Bar Size	8	(3-9)
Number of Bars	2	
Distance From End	4	in.
Boundary Tie Bars		(3-6) if required.
Concrete Strength, f'c	3	ksi
Reinforcing Yield, Fy	40	ksi

Vertical Loads, kips: (Special = assembly, > 100 psf or garage)

Distance measured from left end of wall, ft.

Load No.	Dead, kips	Live, kips	Distance	Special (Y/N)
1	17.6		9.75	
2				
3				
4				
5				

Lateral Loads

Load No.	Force, kips	Height, ft.
1	18.25	12
2	3.1	6
3		
4		
5		
6		

Note: Program does not calculate wall self weight!

Code Minimum Checks:

Minimum Wall Vertical Reinforcing Ratio:	0.0012	Actual:	0.0028	OK
Minimum Wall Horizontal Reinforcing Ratio:	0.0020	Actual:	0.0028	OK
Maximum Vertical Reinforing Spacing:	18	Actual:	12	OK
Maximum Horizontal Reinforing Spacing:	18	Actual:	12	OK
Double Curtain Reinforcing Check:	Single Reinforcing Curtain Allowed			
Hooked Shear Reinforcing Check:	Hooked Shear Reinforcing Not Required			
Maximum Axial Load Check:	OK			

Shear Check:

VU =	29.9	kips	Phi*VN =	185.6	kips OK

Bending Check:

MU left =	332.6	ft-kips	Phi*MN =	1068.4	ft-kips OK
MU right =	332.6	ft-kips	Phi*MN =	1068.4	ft-kips OK

Boundary Member Check:

Boundary Member Required: NO