FINAL REPORT
February 2002

# Seismic Rehabilitation Alternatives for the Ahwahnee Hotel Yosemite National Park, California

Indefinite Quantity Contract No. 1443CX2000-97-028
NPS Seismic Safety Program (2001-A250-405)


Prepared By:

URS

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San Francisco, CA 94105



Prepared For:

U.S. Department of the Interior
National Park Service
Denver Service Center
Denver, Colorado

# United States Department of the Interior

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P.O. BOX 25287
DENVER, COLORADO 80225-0287

In reply refer to:
D34 (DSC-FDC)
DSCP-A250

FEB 1 9 2002

Memorandum

To: Superintendent, Yosemite National Park

From: NPS Seismic Safety Program Manager, Facility Design Branch, Denver Service Center

Reference: Executive Order 12941, NPS Seismic Safety Program, Package A250

Subject: Seismic Evaluations of the Ahwahnee Hotel and the Rangers' Club

The National Park Service has completed the evaluation requirements of Executive Order (EO) 12941 on Seismic Safety of Existing Federally Owned or Leased Buildings. The NPS Seismic Safety Program has provided the project management, funding and engineering services to complete these studies; however, the work would not have been possible without the assistance from the park, specifically the efforts of Randy Fong and Bill Rust.

Attached are two copies each of the Seismic Evaluation Reports for the Ahwahnee Hotel and the Rangers' Club. The reports identify seismic structural deficiencies, provide rehabilitation solutions for life-safety and for greater than life-safety performance levels, and list the associated construction cost estimates for each alternative.

This information is being provided at the request of the park (refer to park memorandum H34 YOSE). The purpose of the evaluations was to determine any seismic deficiencies so that they could be incorporated into any future construction projects for the buildings and allow the park to make informed decisions concerning future work on these historic buildings. The draft reports were completed in 2001 and comments on the draft reports have been incorporated into the final report.

Please contact me at (303) 969-2552 or by e-mail if you have any questions.

Richard L. Silva

Attachments 2

cc:
YOSE-Randy Fong w/two copies of Rangers' Club Report
YOSE-Bill Rust w/two copies of Ahwahnee Hotel Report

bcc:
DSC-PDS-Warneke w/o copy
DSC-TIC w/copy of each report

FDC:RSilva

**URS**

February 4, 2002

Mr. Richard Silva, P.E.
NPS Seismic Safety Program Manager
National Park Service
12795 W. Alameda Pkwy.
Denver, CO 80225

Re: Seismic Rehabilitation Alternatives for the Ahwahnee Hotel in Yosemite National Park, California

Dear Richard:

URS is pleased to submit this final report on our study of the seismic rehabilitation alternatives for the Ahwahnee Hotel in Yosemite National Park, California.

Our study expands upon the work previously completed by Martin/Martin Consulting Engineers. URS investigated the existing building by judging its seismic performance against guidelines established by the Federal Emergency Management Agency (FEMA 273 and FEMA 274). In its current condition, the Ahwahnee Hotel does not comply with FEMA criteria for protection of human life safety and limitation of property damage during a seismic event.

The results of our study showed that the building has the following specific weaknesses:

1. Overstressed shear walls in the main six-story tower;
2. Inadequate lateral-load system for the Dining Room and Kitchen;
3. Non-structural falling hazards;
4. Soil liquefaction potential; and
5. Overstressed Porte Cochere and Entry Gallery connections.

For the above-mentioned weaknesses, URS proposes two rehabilitation alternatives for a Life Safety Performance Level, and one alternative for a Damage Control Performance Level. All three alternatives are discussed in detail in Section 4.0 of this report, and are shown in Structural Drawings in Appendix B.

In addition, a Class (C) Construction Cost Estimate for each of the three schemes is given in Appendix C. The total estimated cost for each of the three alternatives is listed below. These cost estimates assume that the building will not be occupied during construction, and take into account 2 years of escalation and a 20 percent contingency factor.

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San Francisco, CA 94105-1917
Tel: 415.896.5858
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| | Scheme & Performance Level | Cost |
|---|---|---|
| Scheme A.... | Life Safety (Wall Arrangement A/compaction grout) | [redacted] |
| Scheme B... | Life Safety (Wall Arrangement B/compaction grout) | [redacted] |
| Scheme C... | Limited Damage (Wall Arrangement C/jet grout) | [redacted] |

The three schemes are also discussed in the Historic Architectural Report in Appendix D.

It has been a pleasure for all of us here at URS to work on this exciting project. Please feel free to contact us concerning any item in the report.

Sincerely,

Joseph Baldelli

Joseph Baldelli
Project Manager

Job No.: 43-00066652-15
Client: National Park Service
Job Name: Seismic Rehabilitation Alternatives for the Ahwahnee Hotel, Yosemite National Park, CA

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## APPENDICES

# 1. Introduction

## 1.1 Purpose

The purpose of this report is twofold. The primary purpose is to evaluate the seismic performance of the Ahwahnee Hotel and conclude whether or not the building needs seismic retrofit. If retrofit is required, the additional purpose is to develop three alternate schemes for strengthening, and to prepare an estimate of the construction costs.

The criteria used for the seismic evaluation and retrofit design are those recommended by the U.S. Federal Emergency Management Agency; specifically, FEMA 273, *NEHRP Guidelines for the Seismic Rehabilitation of Buildings* (Second SC Draft Posted January 14, 2000) and FEMA 274 *Commentary* (Dated October 1997). The evaluation and retrofit designs were prepared with performance objectives in mind: protection of life safety, and the limiting of property damage during the studied seismic event.

## 1.2 Building Description

The Ahwahnee Hotel was constructed as a luxury hotel for Yosemite National Park between August 1926 and July 1927. The Yosemite Park & Curry Co. financed construction with approval of the National Park Service.

The building is a multi-story structure with a ground-floor surface area of approximately 40,000 square feet (SF). The structure is Y-shaped in plan, constructed of three wings, with the tallest six-story portion at the intersection of the three wings. The south wing, or Lounge Wing, is four stories high with a mezzanine; the east wing, or Lobby Wing, is three stories high; and the West Wing, or Dining Room/Kitchen Wing, is only one story. In addition to the Y-shaped footprint of the three wings, there are two northerly extensions, one of which is the one-story Kitchen attached to the Dining Room Wing, and the second the two-story shop/locker room attached to the Lobby Wing. Also connected to the shop/locker room extension and Lobby Wing is a one-story Entry Gallery. The Entry Gallery is a wood-framed structure with beam and column log construction. Connected at the northern end of the Entry Gallery is the Porte Cochere structure. Similar in roof construction to the Entry Gallery, the Porte Cochere is supported by corner stone columns and intermediate wood columns.

In this report, the building is divided into three separate structures based on building types. The three structures will be separated from each other by the addition of expansion joints, as recommended in this report. The three separate structures are the Main Building; the Dining Room and Kitchen Wing; and the Entry Gallery and Porte Cochere. Each of the three separate structures is described in detail in the following sections of this report. See Figure 1.1a for the location of each of the three structures

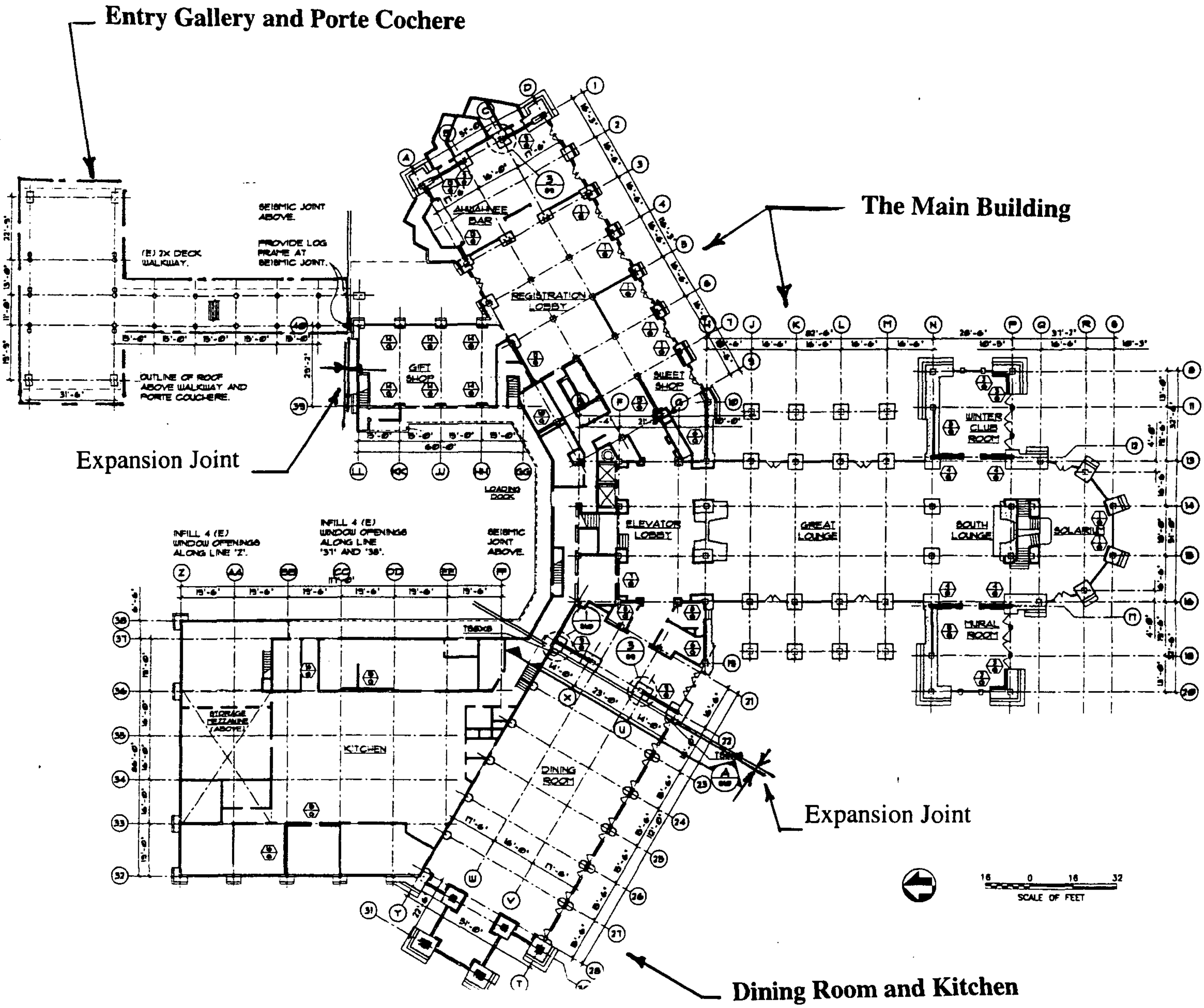



**Figure 1.1a Building First Floor Plan**

## 1.3 Vertical-Load-Resisting System

### 1.3.1 The Main Building

The Main Building, including the two-story gift shop/locker room structure, is a steel-frame structure with reinforced-concrete infill walls. Steel columns are supported on concrete piers at the first floor. The first floor is an 8-inch-thick reinforced-concrete suspended slab spanning approximately 16 feet between concrete piers. Beneath the first floor is a 3-foot-high crawl space. Concrete piers are supported on shallow spread footings, and similarly, perimeter walls are supported on shallow wall footings. There is a partial basement in the central core of the Main Building. Basement walls are cast-in-place concrete, and the floor is a concrete slab-on-grade.

Floor construction above the first floor consists of 3-inch-thick concrete slab over metal lath. The floor slab is supported on 10-inch-deep open-web steel joists spaced at approximately 2 feet on center. Metal lath is connected by wire ties to the steel joists, which span approximately 16 feet to steel floor beams supported by steel columns.

Roof construction over the Main Building consists of slate roofing on plywood supported by wood sleepers attached to a 2-inch-thick concrete roof slab. The concrete roof slab composition is similar to the floor construction of concrete fill over metal lath. The roof slab is supported on steel channel rafters spaced at 4 feet on center.

### 1.3.2 The Dining Room/Kitchen

The Dining Room and Kitchen are assumed as one structure, although each is constructed differently. The Dinning Room is a one-story wood structure, constructed of locally cut timber logs. The roof is supported on log scissors trusses at approximately 16 feet on center. The south and west exterior walls contain windows, while the north wall is a solid cast-in-place concrete wall common to both the Dining Room and Kitchen.

The Kitchen is a concrete bearing-wall structure with cast-in-place concrete walls on all four sides. The Kitchen floor plan is trapezoidal in shape, with the diagonal wall the common wall with the Dining Room. The three remaining perimeter walls are cast-in-place concrete bearing walls. Parallel to the east and west perimeter walls are two interior bearing walls. Steel trusses spaced at 17 feet, 6 inches on center span 64 feet between these walls and support the roof system. Windows are placed in these two walls between the high roof system of steel trusses and the lower shed roofs spanning between the interior walls and the parallel exterior walls. This line of windows forms a clerestory to allow sunlight to penetrate the interior of the Kitchen. Both the high roof and lower shed roofs are covered with slate shingles supported on 2-inch-thick concrete fill over metal lath spanning between channel purlins.

### 1.3.3 The Entry Gallery and Porte Cochere

The roof construction is similar for the Entry Gallery and Porte Cochere, with timber log construction supporting tongue-and-groove wood planking. The roof cover is slate, like the remainder of the building. The roof support system is slightly different for each: the Entry Gallery is supported by log columns, while the Porte Cochere is supported by both corner stone columns and three sets of double-timber columns on both the north and south sides.

## 1.4 Lateral-Load-Resisting System

### 1.4.1 The Main Building

The primary lateral-load-resisting system for the Main Building consists of the reinforced concrete infill walls, which engage the steel columns and the floor diaphragms, and subsequently act as shear walls. The secondary lateral-load-resisting system is the steel frame. Beam/column connections are limited moment connections constructed of top and bottom clip angles riveted to both beam flanges and column flanges. Moment capacity of this connection is limited to the capacity of rivets in either shear and tension, or the bending capacity of the clip angles. Shear connection plates are not present. The moment capacity is not large, and was not considered in determining the lateral-load capacity of the building.

### 1.4.2 The Dining Room/Kitchen

The lateral-load capacity of the Dining Room is difficult to evaluate. As stated in the Martin/Martin report, the two possible load paths are: roof diaphragm transferring roof shear forces into the two ends (massive stone columns at the west end and Main Building at the east end); and log scissors trusses carrying loads into the Kitchen roof diaphragm. Both systems have very limited lateral-load-resisting capacities, and were found later in the analysis to be only a small fraction of the lateral-load requirements of the FEMA 273 analysis.

### 1.4.3 Entry Gallery and Porte Cochere

The Entry Gallery structure can resist only a limited amount of lateral load through frame action made possible by the knee braces between the timber beams and columns. For the Porte Cochere structure, lateral-load capacity is developed in cantilever action of the four end massive stone columns. The lateral-force levels developed for the FEMA 273 earthquakes far exceed the capacities of both structures.

### 1.5 Existing Soil Conditions

Three exploratory borings were drilled in the vicinity of the site to obtain the subsurface soil conditions. The borings were drilled between 100 and 200 feet from the hotel footprint, between depths of 13 and 51.5 feet. A laboratory testing program was carried out to obtain soil properties, including soil classification, determination of grain size distribution, and dry unit weight. The field and laboratory testing programs indicate that the soil conditions consist of granular soil composed predominantly of poorly graded and silty loose sand and poorly graded loose gravel, with occasional cobbles in some locations. It is feasible that boulders are encountered in the vicinity of, or even underneath, the hotel footprint. Bedrock was not encountered down to terminal depth in the two 51.5-foot-deep borings. Groundwater was observed during drilling at a depth varying between 12.6 and 18.3 feet below existing ground surface.

Because of the loose condition of the sand deposit under the building, the occurrence of shallow groundwater table, and the relatively large ground motions predicted at the site, the potential for liquefaction is high. The consequences of liquefaction to the structure are serious, and may include excessive settlement, excessive differential settlement, excessive tilt, and rupture of utilities and conduits within the building footprint.

### 1.6 Sources of Information

Information for this report was gather from the following available documents:

1. FEMA 178/June 1992 Seismic Evaluation Report, *The Ahwahnee Hotel,* Final Report, August 1999, prepared by Martin/Martin Consulting Engineers, Wheat Ridge, Colorado.

2. Architectural drawings prepared by Gilbert Stanley Underwood and Company Architects and Engineers, Los Angeles, California. Set contains 27 architectural drawings of the original 1926 construction set. Structural drawings were not part of this set of drawings.

3. The Historic Structure Report for The Ahwahnee, prepared by Page & Turnbull Architects, San Francisco, California, dated November 1997.

4. Thirteen Drawings by Walter M. Sontheimer Architecture for the hotel exterior restoration, dated January 9, 1977.

5. Roof Systems Engineering drawings for the hotel re-roofing, dated September 1, 1987, and revised September 18, 1987.

6. Drawings for the reconstruction of the Porte Cochere dated December 12, 1987, and revised December 18, 1987, prepared by Roof Systems Engineering, Fresno, California.

7. Four drawings for reconstruction of the covered Entry Gallery, dated February 1, 1990, prepared by Roof Systems Engineering, Fresno, California.

8. Seven Architectural Drawings for the Indian Room Remodel, dated March 20, 1980, prepared by Vantress Design Associates.

9. Eight Architectural Drawings for a 1982 remodel of the Indian Room by Anco Engineering Inc.

10. Drawings for the Parlor Rooms remodel, dated October 30, 1990, prepared by Thompson Architectural Group and & Donald Lawrence & Associates.

11. Drawings for the HVAC & Plumbing Retrofit Project, dated September 15, 1989, prepared by Donald Lawrence & Associates.

12. In addition to the information obtained from the above drawings and reports, pertinent information was also developed during our field trip to the site on July 26 through July 28, 2000. The field trip was made by two structural engineers from URS, and a historical architect from Carey & Co, San Francisco. Field observations are documented in the Field Trip Report in Appendix E of this report.

### 1.7 Existing Material Properties and Hidden Conditions

Destructive testing to determine the material properties of the *in situ* building material (i.e., concrete strength, wall reinforcing, structural steel member sizes) was not included in this scope of work, and should be done in the next phase of design. However, the results of a future testing program could only reduce the components of the proposed strengthening program. In our analysis, we assumed minimum material properties given in FEMA 273/274, but the existing material properties could be higher; thus, the D/C ratios would be lower, and consequently less strengthening would be needed. Although this scenario is a possibility, based on professional experience, we have determined that the assumed member properties, albeit code minimum, are close to the existing member properties, and consequently, the proposed strengthening schemes are realistic.

## 1.8 Non-Structural Hazards

Several non-structural hazards were mentioned in the Martin/Martin report, and were also observed by URS personnel during the field trip. Our findings are as follows:

1. It is uncertain whether the masonry veneer on the exterior surface of the building is anchored into the concrete walls behind. We were able, with the use of a metal detector, to determine the presence of some metal in the mortar joints in the stone monumental columns at the west end of the Dining Room. However, since destructive testing was not allowed, it was not possible to verify that the metal detected was connectors, and if so, their capacity and extent. It was thus assumed that the metal connections, if any, are not adequate. Therefore, it is recommended that a network of new stainless-steel mortar fasteners be installed to pin the stones to the concrete wall.

2. Gypsum block partitions are free-standing and end at the ceiling level; these will need to be braced to prevent overturning, as well as reinforced with ribs to prevent collapse from out-of-plane forces.

3. Plaster ceilings are not braced for lateral movement. We recommend bracing the existing ceiling throughout the building to prevent collapse.

4. Existing clay tile walls surrounding the stairs and elevator cores should be replaced with reinforced concrete walls to prevent hazard to egress.

5. Mechanical and other service equipment that poses an overturning hazard should be anchored to prevent a falling hazard.

## 1.9 Photographs and Figures of the Existing Building

### List of Photographs



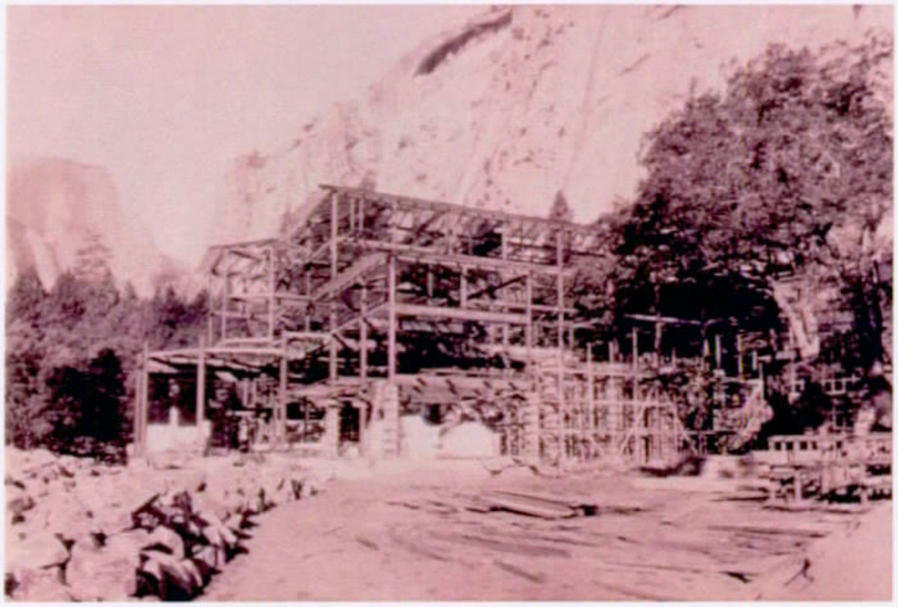
### List of Figures

**Photograph 1. South Elevation**

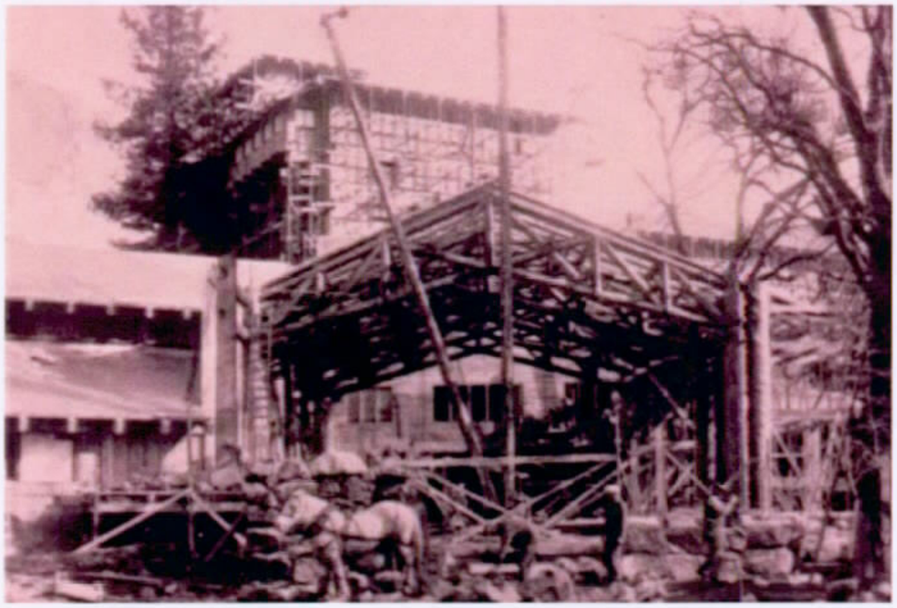
**Photograph 2. West End of Dining Room**

**Photograph 3. Southwest Elevation**

**Photograph 4. Porte Cochere West Elevation**

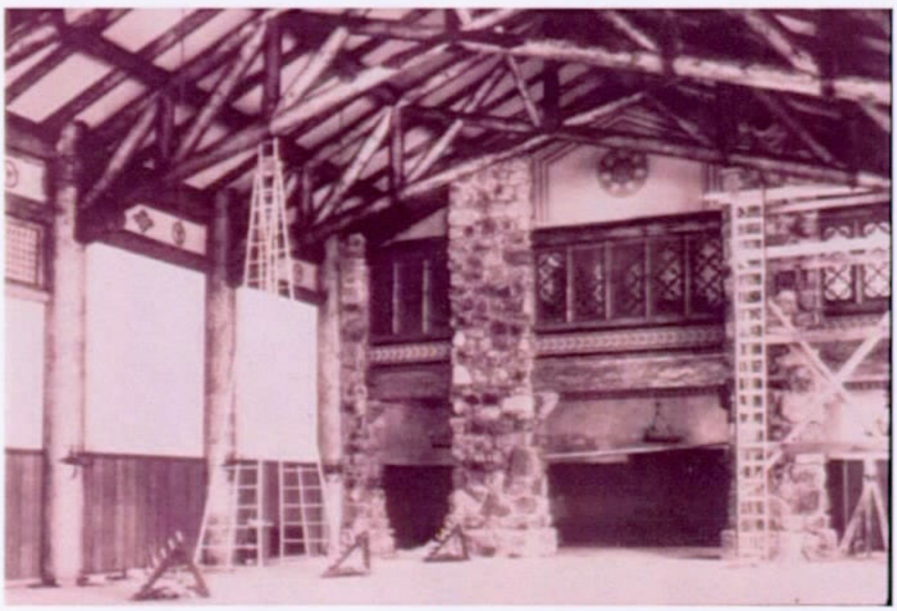


**Photograph 5. Southwest Elevation (during construction)**



**Photograph 6. Section through Dining Room (during construction)**

**Photograph 7. Dining Room**



**Photograph 8. Dining Room (during construction)**

**Photograph 9. Typical Wall Construction**

**Photograph 10. Typical Ceiling Support**

**Photograph 11. Typical Pier in Crawl Space**

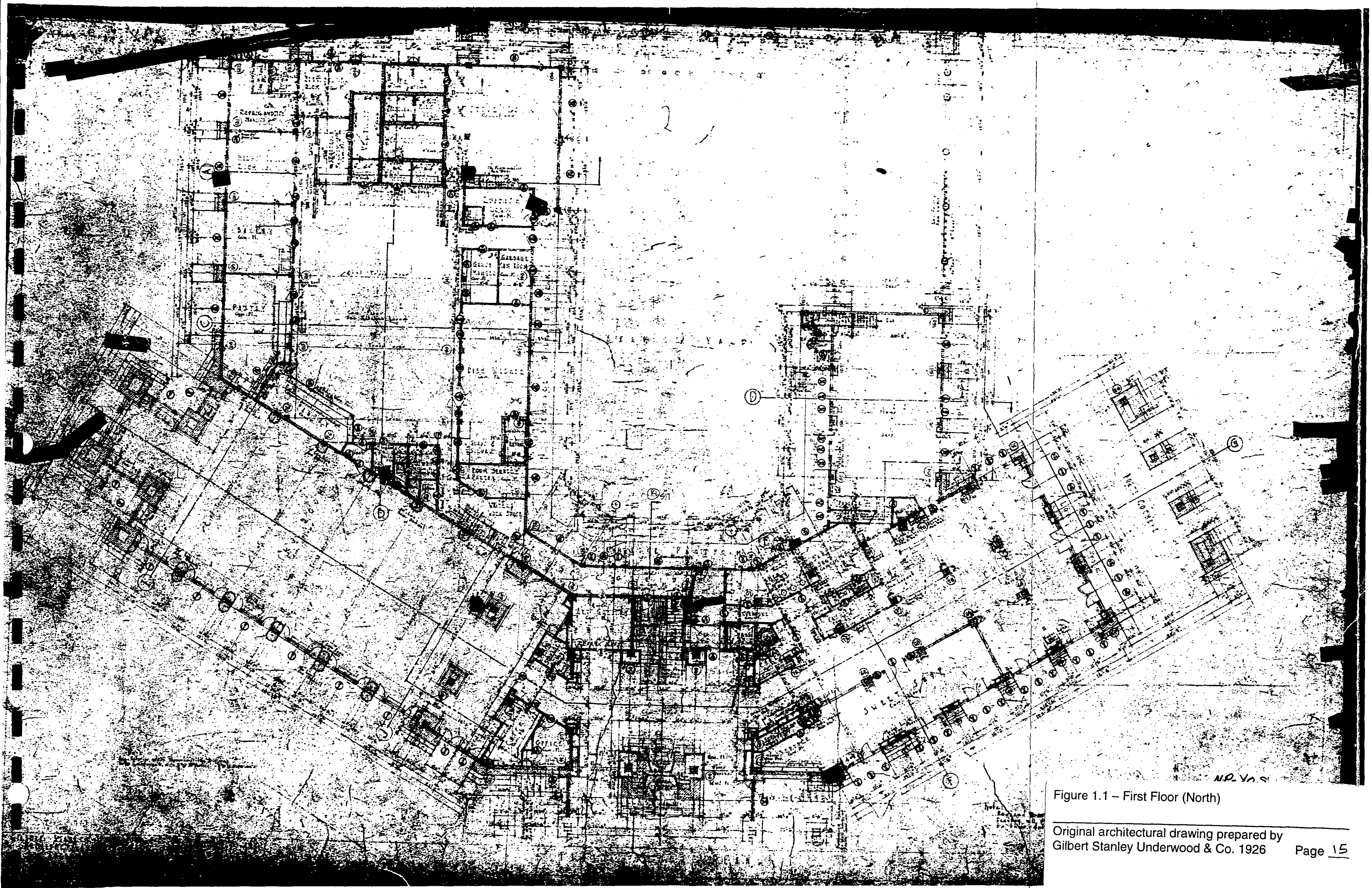


Figure 1.1 – First Floor (North)

Original architectural drawing prepared by Gilbert Stanley Underwood & Co. 1926

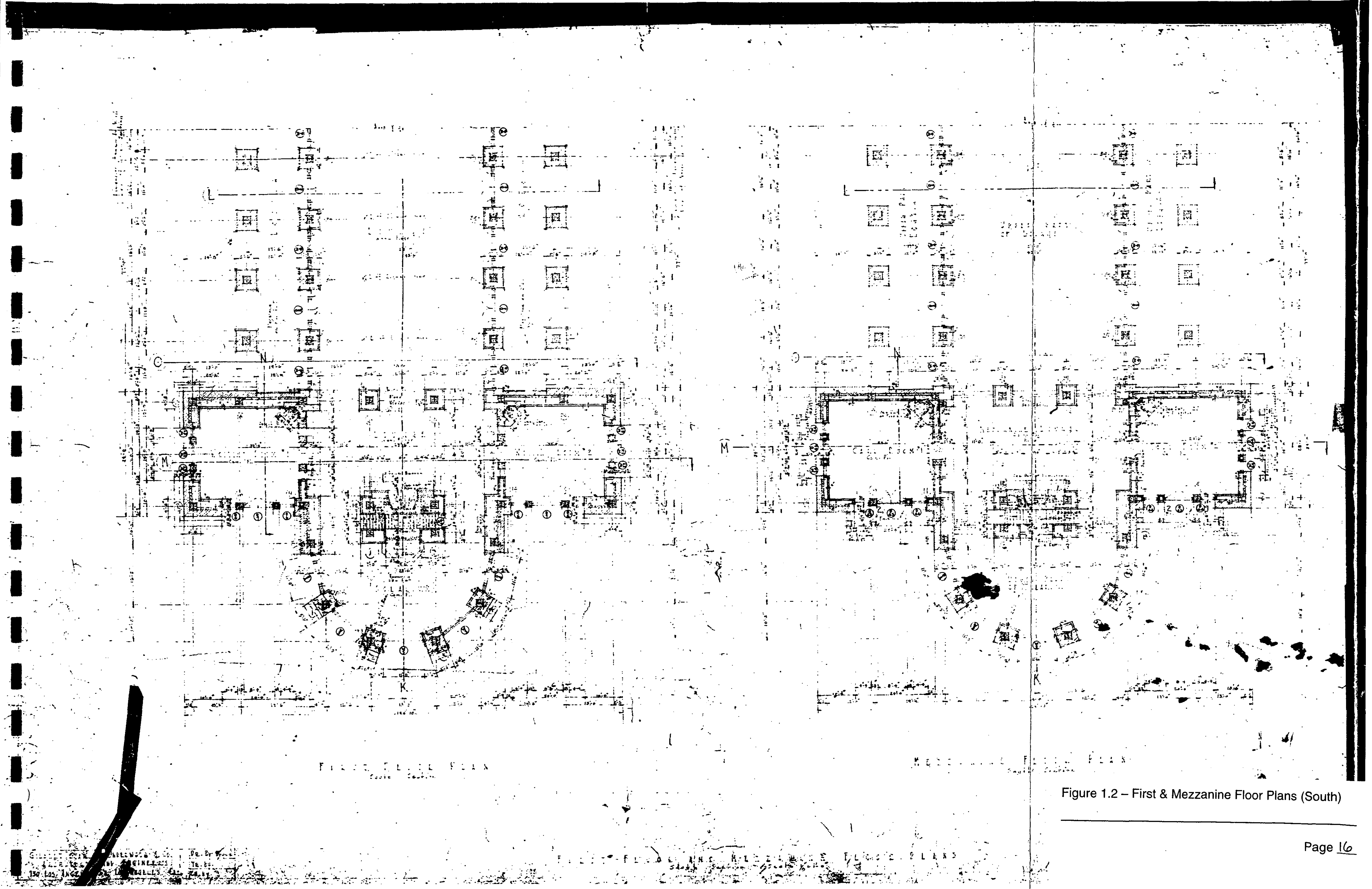


Figure 1.2 – First & Mezzanine Floor Plans (South)

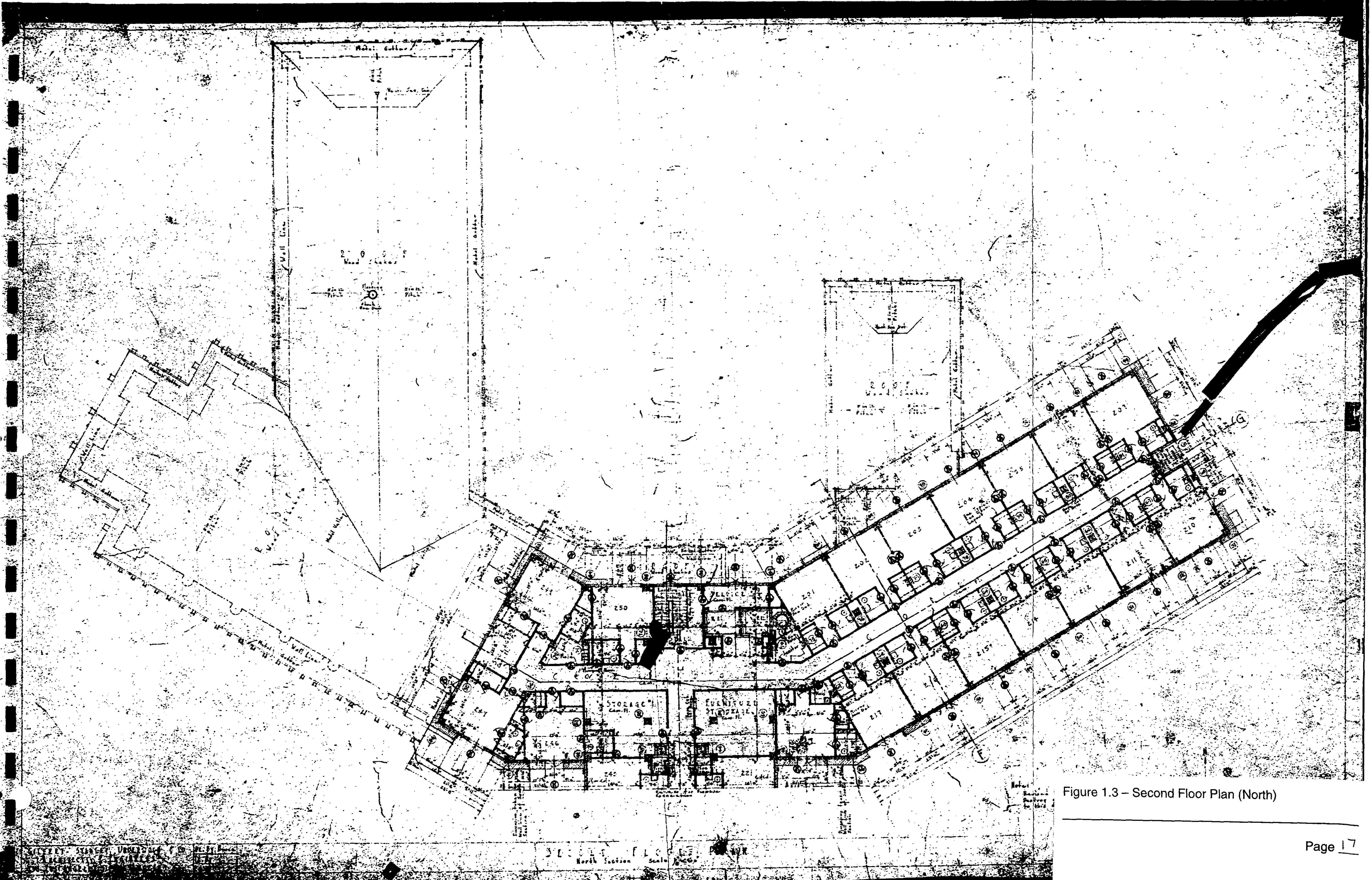


Figure 1.3 – Second Floor Plan (North)

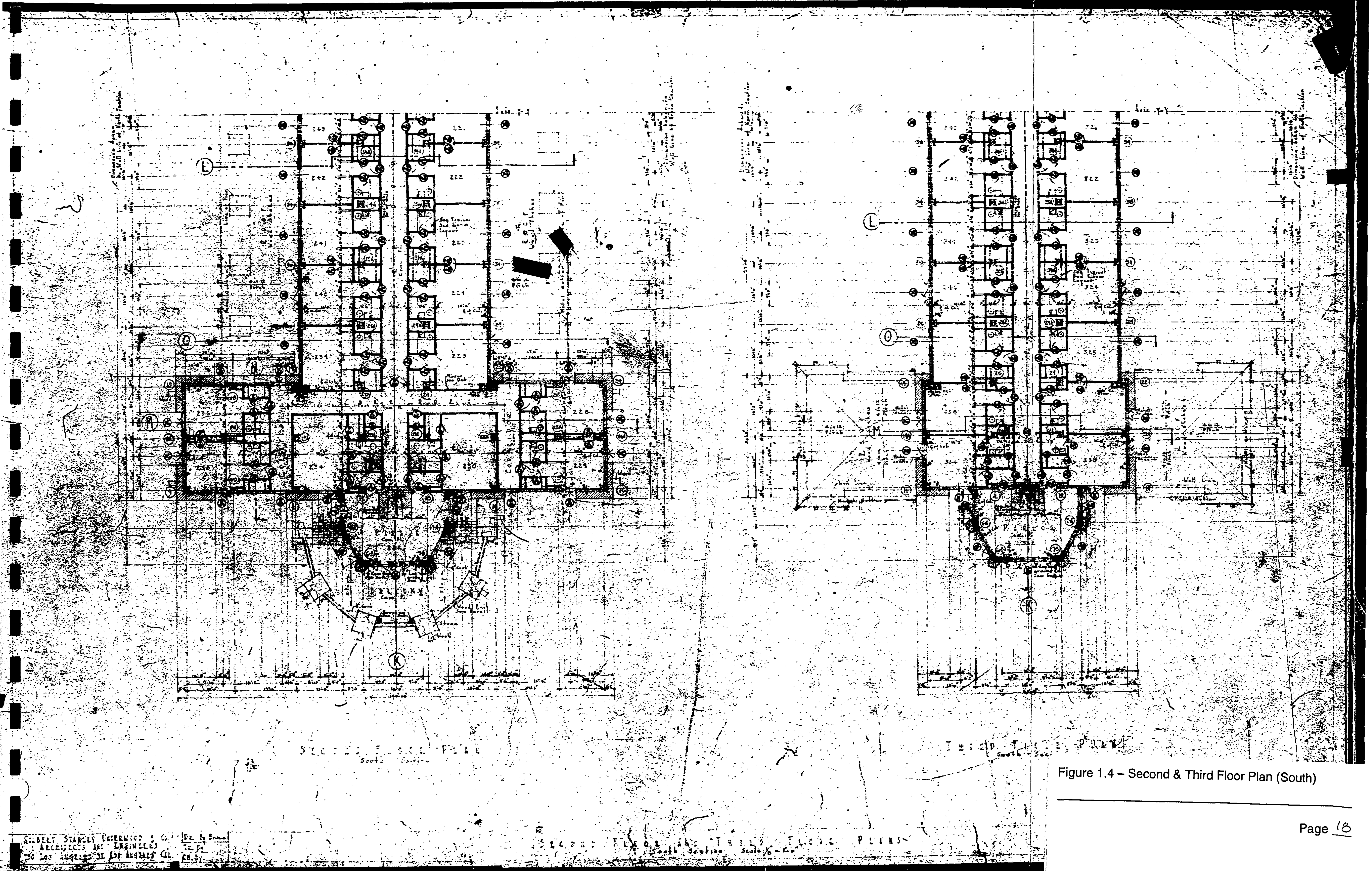


Figure 1.4 – Second & Third Floor Plan (South)

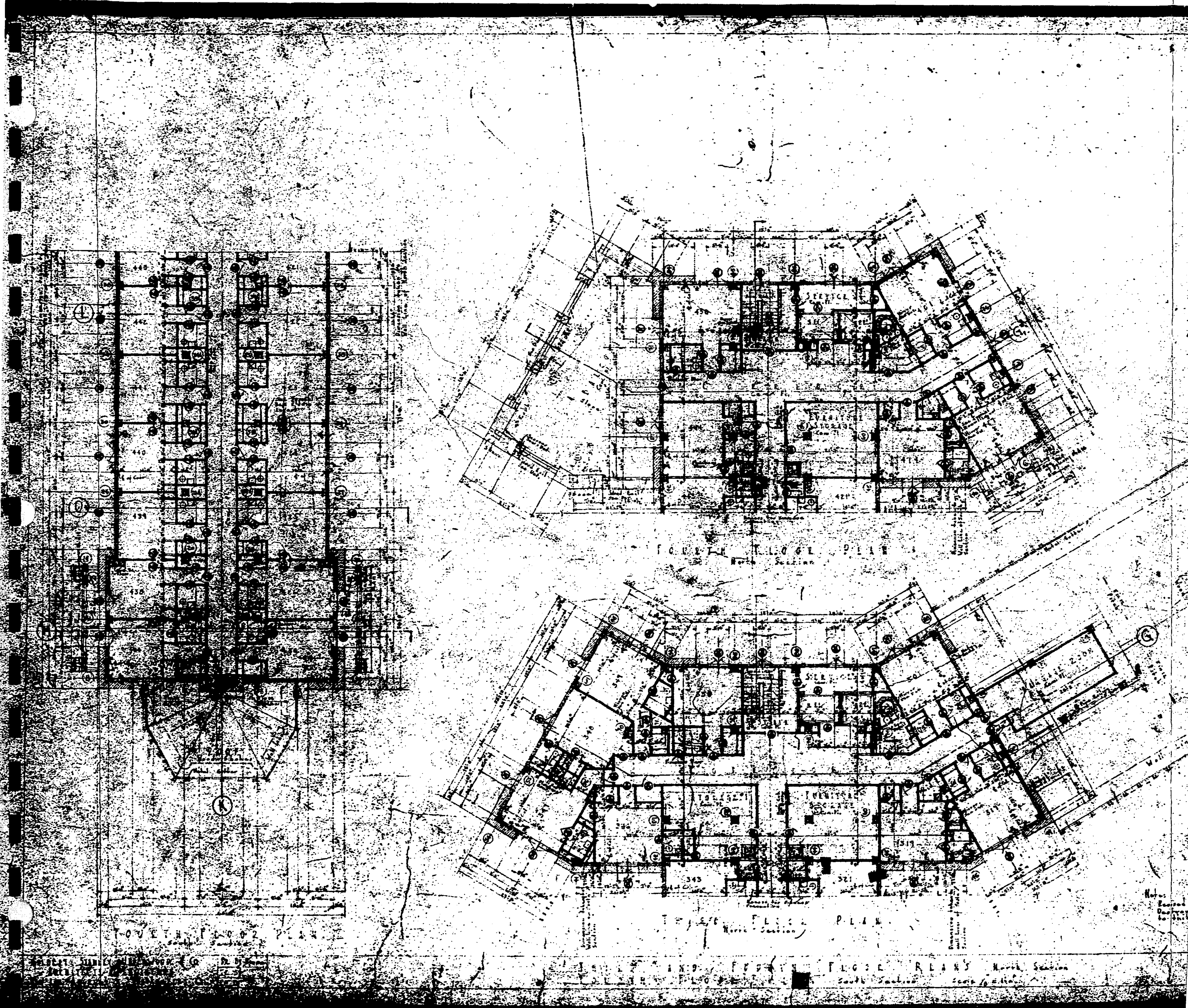


Figure 1.5 – Third & Fourth Floor Plan (North)

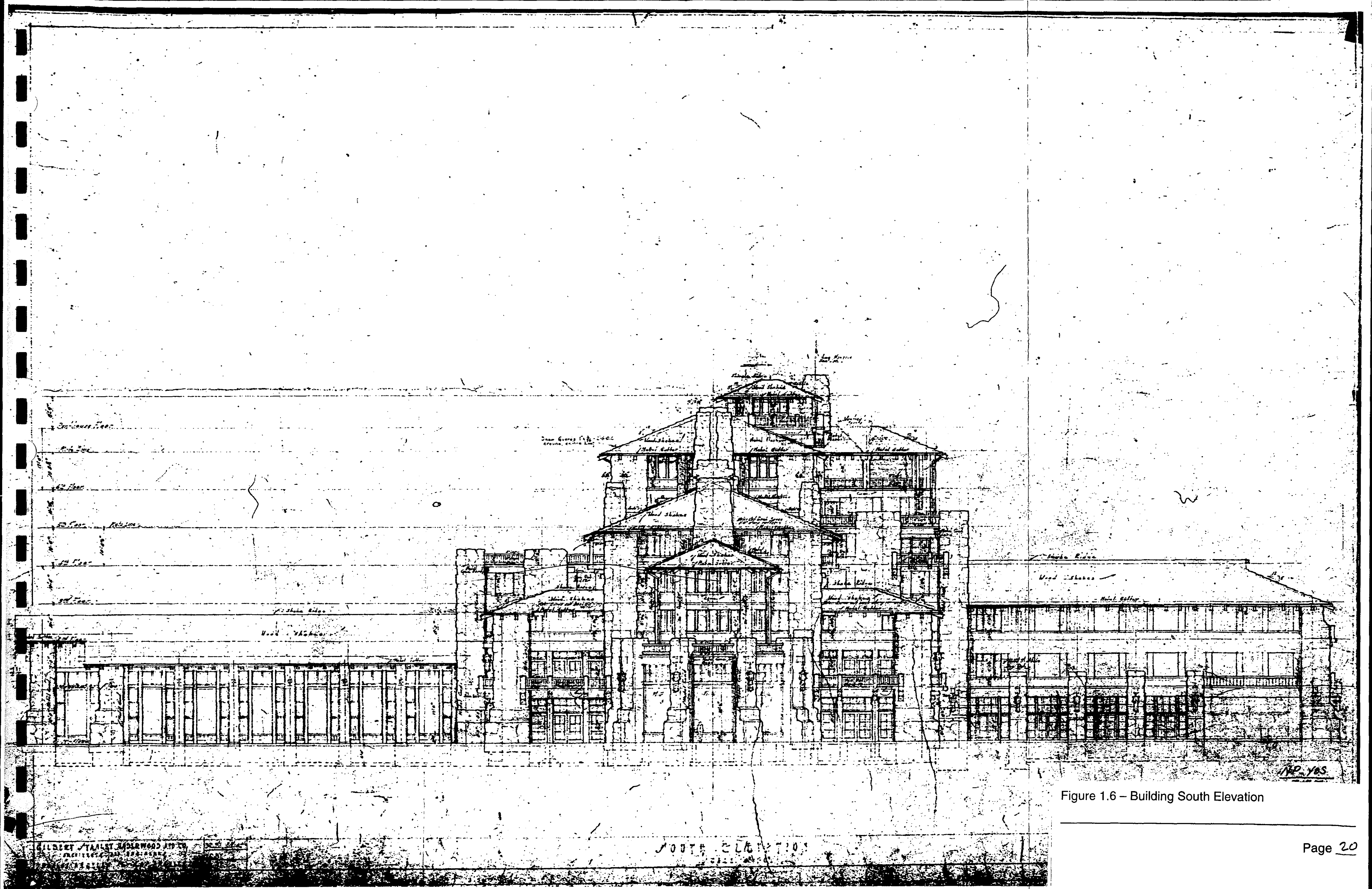


Figure 1.6 – Building South Elevation

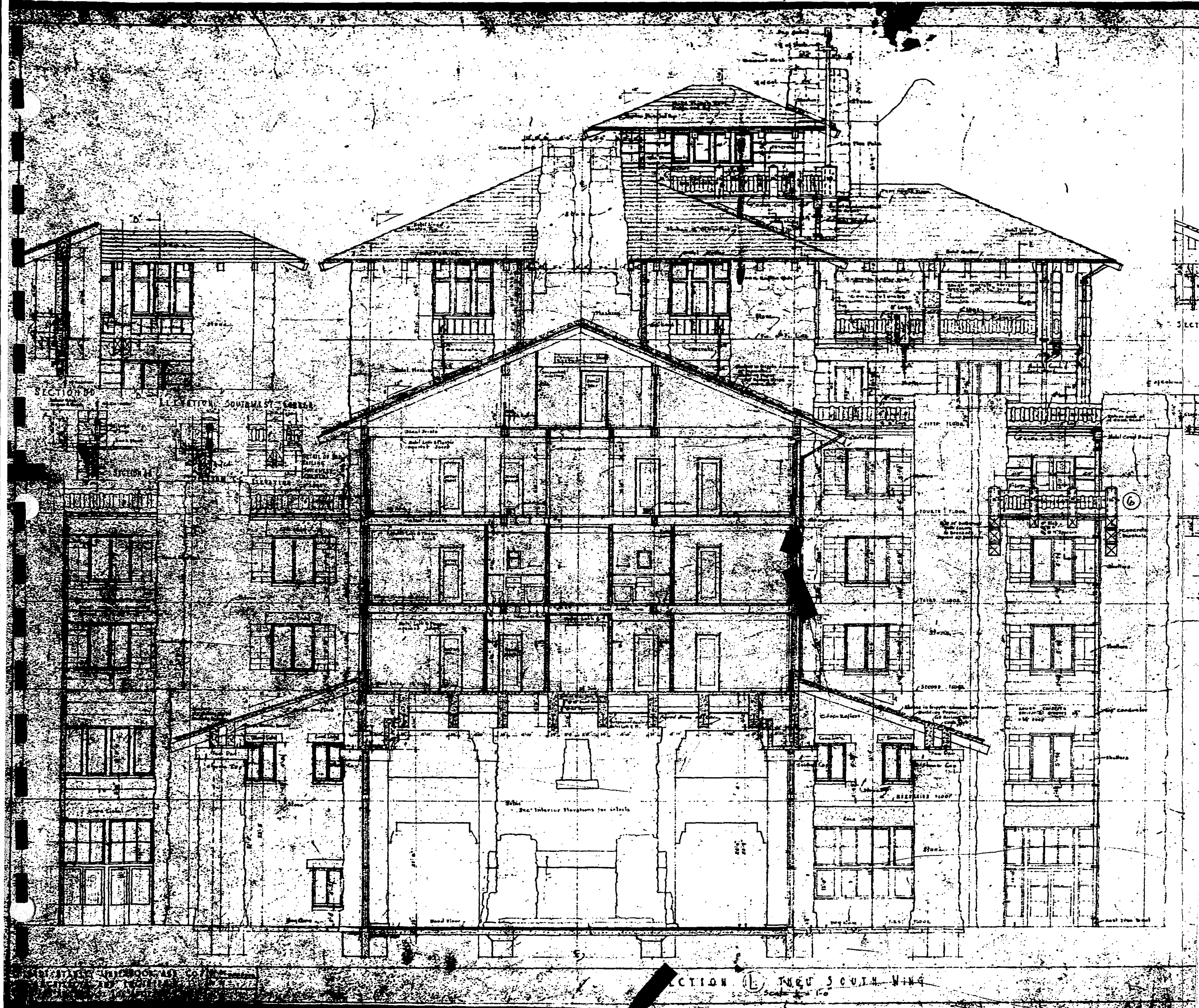



Figure 1.7 – Section through South Wing

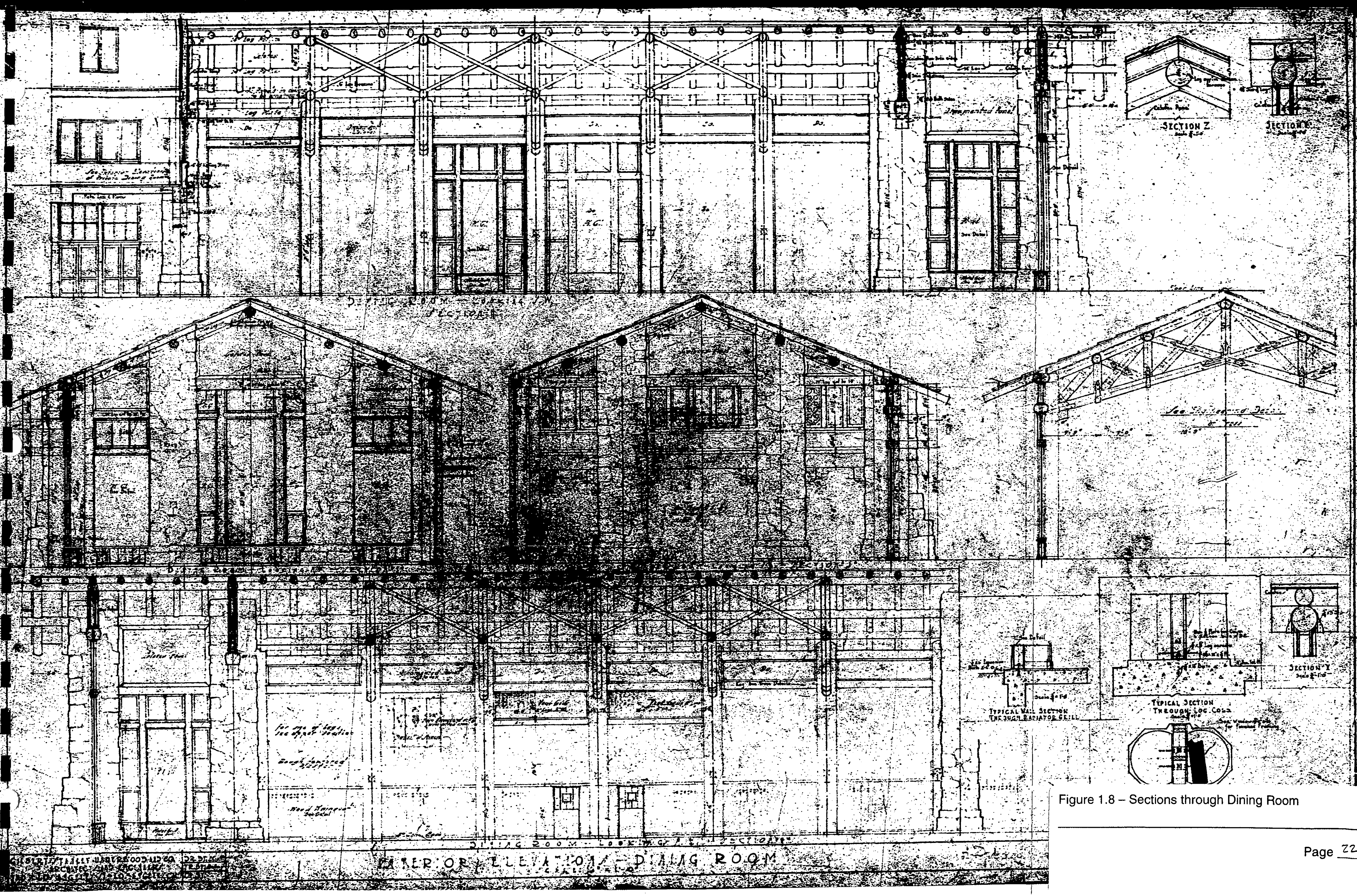



Figure 1.8 – Sections through Dining Room

# 2. Evaluation Procedures

## 2.1 Rehabilitation Objectives

The rehabilitation objectives for this project are the protection of life safety and limitation of property damage during the studied seismic events. A more specific description of these objectives is provided in Table 2.

**Table 2.1 FEMA 273 Rehabilitation Objectives**

| Objective | Earthquake Hazard Level | Allowable m-values (ductility) | Reference |
|---|---|---|---|
| Life Safety Performance Level (LSPL) | FEMA 273 BSE-1 (~10%/50yr) | LS | FEMA 273 Table C1-1(k) |
| | FEMA 273 BSE-2 (~2%/50yr) | CP | FEMA 273 Table C1-1(p) |
| | | | |
| Limited Damage Performance Level (LDPL) | FEMA 273 BSE-2 (~2%/50yr) | ½ (LS + IO) | FEMA 273 Table C1-1 |

### 2.1.1 Life Safety Performance Level

The Life Safety Performance Level (LSPL) is the same as the Basic Safety Objective (BSO) in FEMA 273. In order for a building to meet this objective, it must be capable of satisfying two conditions. The first condition considers an earthquake with a 10 percent probability of exceedance in 50 years (BSE-1 per FEMA 273). For this earthquake hazard level, a building is judged in compliance with the LSPL (first condition) if its response is within certain allowable *Life Safety* (LS)"m-values" specified in FEMA 273, Table C1-1(k). The "m" value is approximately the allowable ductility for a ductile component. Buildings that perform within these limits are judged to provide a reasonable level of Life Safety protection, thus satisfying the first condition of the LSPL.

The second condition of the LSPL considers a more severe and infrequent earthquake: one with a 2 percent probability of exceedance in 50 years (BSE-2 per FEMA 273). For this earthquake hazard level, a building is judged in compliance with the LSPL (second condition) if its response is within certain allowable *Collapse Prevention* (CP) "m-values" specified in FEMA 273, Table C1-1(p). The "m-values" for CP allows a building to undergo a more severe level of seismic response, and to suffer a greater extent of structural damage as compared to the response and damage implied by the *LS* "m-values." Buildings that perform within the CP limits are judged to provide a reasonable level of protection against collapse, thus satisfying the second condition of the LSPL.

### 2.1.2 Limited Damage Performance Level

The criteria for the Limited Damage Performance Level (LDPL) are not specified in FEMA 273, and were developed for this project. The LDPL requires satisfying only one condition for the BSE-2 earthquake hazard level. In order to ensure limited damage for this severe earthquake level, a building's response must be limited to a level that is less than that implied by the Life Safety Performance Level. FEMA 273 does not provide allowable "m-values" Limited Damage. FEMA 273 does provide allowable "m-values" for an Immediate Occupancy Performance Level (IOPL); however, these are considered to be too conservative since IOPL implies essentially no damage. Therefore, for the purpose of this study, the LDPL is judged using allowable "m-values" that are the average between the FEMA specified "m-values" for Life Safety and Immediate Occupancy.

## 2.2 Analysis Procedure

With the addition of expansion joints at Column Lines LL (Entry Gallery) and 22 (Dining Room), the Hotel was analyzed as three separate structures: Dining Room/Kitchen, Porte Cochere & Entry Gallery; and the Central Core. Two analysis procedures were used: the Linear Static Procedure (LSP), and the Linear Dynamic Procedure (LDP).

LSP was used for the structural analysis for both the Dining Room/ Kitchen and the Porte Cochere and Entry Gallery. The analysis was performed using hand calculations, and the members were evaluated with the acceptance criteria in FEMA 273, Section 3.4.

The LDP was used for the structural analysis of the Central Core (noted as the Main Building in Figure 1.1a). The analysis was performed using a computer model developed from the ETABS program. The input ground motion was characterized by a response spectrum as directed in FEMA 273, Chapter 1.6.1.5. Similar to the LSP, the calculated member stresses were evaluated with the acceptance criteria in FEMA 273, Section 3.4.

## 2.3 FEMA 273 Response Spectra

The ground-motion criteria for FEMA 273 are defined by the BSE-1 and BSE-2 earthquakes, which are events with a 10 percent probability of exceedance in 50 years (10%/50 yr), and a 2 percent probability of exceedance in 50 years (2%/50 yr), respectively. Five percent damped response spectra were constructed based on the following spectral response acceleration values, obtained for Soil Type E from the Geotechnical Report (See Appendix A). Detailed calculations for the development of the response spectra are provided in Appendix F.

| | | |
|---|---|---|
| BSE-1 (10%/50 yr) | Short-Period (0.2 sec) | $S_s = 0.456g$ |
| | 1-second | $S_1 = 0.1424g$ |
| BSE-2 (2%/50 yr) | Short-Period (0.2 sec) | $S_s = 1.0307g$ |
| | 1-second | $S_1 = 0.2823g$ |

Using the procedures in FEMA 273, Section 1.6.1.4, with adjustment for site Soil Type E, the following spectral acceleration values were obtained:

| | | |
|---|---|---|
| BSE-1 (10%/50yr) | Short-Period (0.2 sec) | $S_{xs} = F_a S_s = 1.84\ (0.456) = 0.839g$ |
| | 1-second | $S_{x1} = F_v S_1 = 3.37\ (0.1424) = 0.480g$ |
| BSE-2 (2%/50yr) | Short-Period (0.2 sec) | $S_{xs} = F_a S_s = 0.89\ (1.0307) = 0.921g$ |
| | 1-second | $S_{x1} = F_v S_1 = 2.87\ (0.2823) = 0.810g$ |

A plot of the spectra is given in Figure 2.1 for 5 percent critical damping.

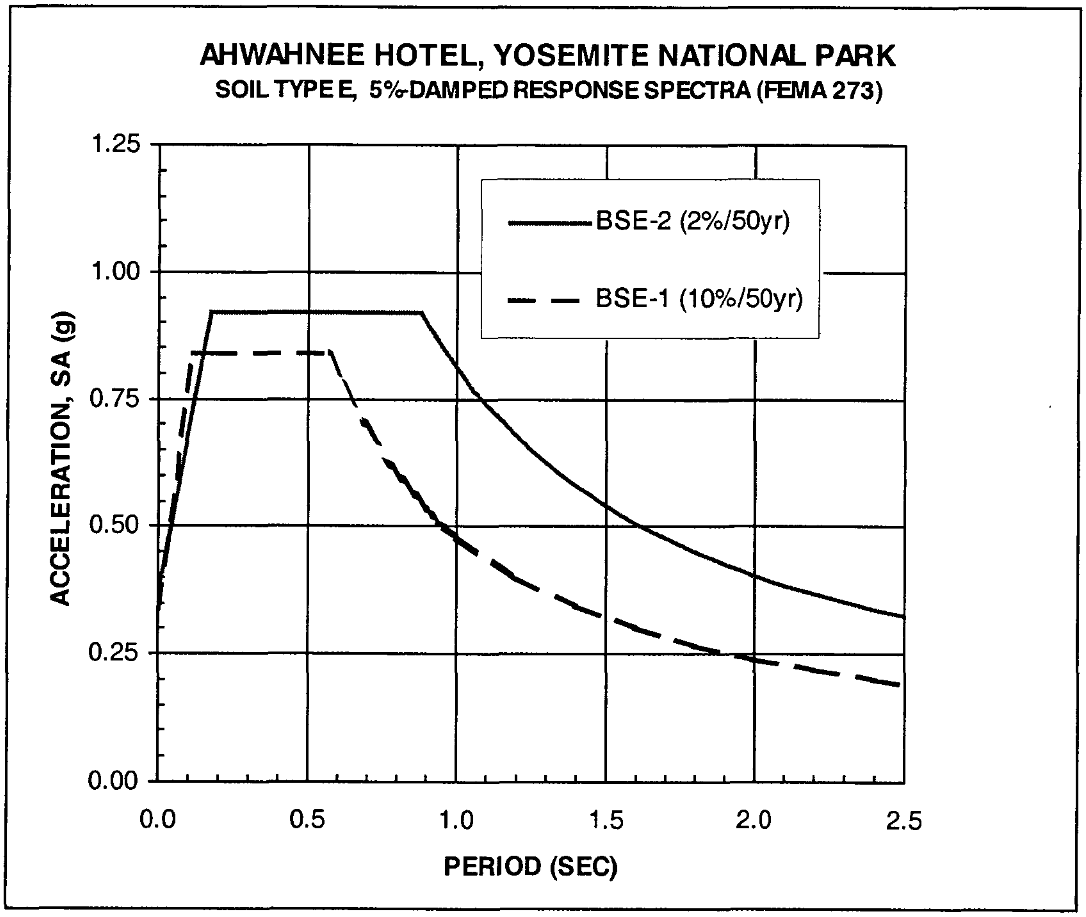



**Figure 2.1 FEMA 273 Response Spectra (BSE-1 & BSE-2)**

## 2.4 FEMA 273 Pseudo-Lateral Load

The linear static pseudo-lateral force was calculated for comparison with the base shear used for the linear dynamic procedure. The pseudo-lateral load represents the force required in a linear static analysis to impose maximum displacements expected in a design earthquake. Per FEMA 273, Section 3.3.1, Linear Static Procedure (LSP), the pseudo-lateral load was calculated from:

$V = C_1 C_2 C_3 C_m S_a W$
= 0.923g (Life Safety Performance Level; BSE-1, 10%/50yr earthquake hazard)
= 1.237g (Collapse Prevention Performance Level; BSE-2, 2%/50yr earthquake hazard)
= 1.237g (Limited Damage Performance Level; BSE-2, 2%/50yr earthquake hazard)

where:

$C_1$ = Modification Factor to relate expected maximum inelastic displacements to displacements calculated for linear elastic response.
= 1.0 (Life Safety Performance Level)
= 1.12 (Collapse Prevention Performance Level and Limited Damage Performance Level)

$C_2$ = Modification factor to represent the effect of stiffness degradation and strength deterioration on maximum displacement response.
= 1.10 (Life Safety Performance Level)
= 1.2 (Collapse Prevention Performance Level and Limited Damage Performance Level)

$C_3$ = Modification factor to represent increased displacements due to dynamic P-delta effects.
= 1.00 (All Performance Levels)

$C_m$ = Effective weight factor to account for higher mode mass participation effects.
$C_m = 1.0$

$S_a$ = Response spectrum acceleration at the fundamental building period, T, and 5% damping from Figure 2.1.
= 0.839g (BSE-1, Life Safety Performance Level)
= 0.921g (BSE-2, Collapse Prevention Performance Level)
= 0.921g (BSE-2, Limited Damage Performance Level)

T = Fundamental building period, calculated by hand or ETABS based on the structural properties and deformation characteristics of the building ($T < 0.6$ sec)

W = Seismic weight (total dead load and anticipated live load).

## 2.5 FEMA 273 Linear Dynamic Analysis

The peak member forces, displacements, story forces, story shears, and base reactions were determined by a linear-elastic, dynamic analysis with the response spectra presented in Figure 2.1 above, and modes combined by the complete quadratic combination (CQC) rule. All actions and deformations calculated from the response spectrum analysis were multiplied by the product of the modification factors $C_1$, $C_2$, and $C_3$, in accordance with FEMA 273, Section 3.3.2.3. Earthquake demand also considered the following:

Multidirectional (Orthogonal) Effects

Per FEMA 273, Section 3.2.7, the horizontal orthogonal effects were accounted for by applying the same response spectrum at each of the horizontal principal axes of the building and combining them using the square root of the sum of the squares (SRSS) method.

Horizontal Torsion

The effects of horizontal torsion were accounted for per FEMA 273, Section 3.2.2.2.

P-Delta Effects

P-Delta effects were not considered in this structure, since the worst-case stability coefficients for all floors were below a limiting value of 0.1, as given in FEMA 273, Section 3.2.5.

## 2.6 FEMA 273 Load Combinations

Design forces are categorized as actions that are either deformation-controlled or force-controlled per FEMA 273, Section 3.4.2.1, with load combinations as follows:

For deformation-controlled elements, design actions $Q_{UD}$ were calculated according to FEMA 273, Equation 3-18:

$$Q_{UD} = Q_G \pm Q_E$$

where:

$Q_G =$ Action due to gravity loads

=1.1 (DL+0.25LL) or 0.9DL;

where

DL = Dead load effect (action)

LL = Effective live load effect (action: 50 psf for the floor LL, and 20 psf LL for the roof.

$Q_E$ = Action due to earthquake loads from Linear Dynamic Analysis described above.

$=T \pm SRSS((S_x, S_y)$

where

T = horizontal torsion load, and

$SRSS(S_x,S_y)$=

Square-root-of-sum-of-the-squares of the response spectra loads in the x- and y-directions.

Four load combinations were then evaluated for each of the performance levels in accordance with Section 3.2.8 of FEMA 273:

Load Combinations for Deformation-Controlled Elements:

1. $1.1(DL+0.25LL)+T+SRSS(S_x, S_y)$
2. $1.1(DL+0.25LL)-T+SRSS(S_x, S_y)$
3. $0.9DL+T+SRSS(S_x, S_y)$
4. $0.9DL-T+SRSS(S_x, S_y)$.

For force-controlled elements, design actions $Q_{UF}$ were calculated according to FEMA 273, Equation 3-20:

$$Q_{UF} = Q_G \pm Q_E \; / \; C_1C_2C_3$$

where

$Q_G$ = action due to gravity loads

$=1.1\ (DL+0.25LL)$ or $0.9DL$;

where

DL = Dead load effect (action)

LL = Effective live load effect (action: 50 psf for the floor LL, and 20 psf LL for the roof.

$Q_E$ = Action due to earthquake loads from Linear Dynamic Analysis as described above.

$=T \pm SRSS((S_x, S_y)$

where

T = horizontal torsion load, and

$SRSS(S_x,S_y)$=

Square-root-of-sum-of-the-squares of the response spectra loads in the x- and y-directions.

$C_1, C_2\ C_3$ = factors as described above.

Four load combinations were then evaluated for each of the performance levels in accordance with Section 3.2.8 of FEMA 273:

Load Combinations for Force-Controlled Elements:

1. $1.1(DL+0.25LL)+T+SRSS(S_x, S_y)/(C_1C_2C_3)$
2. $1.1(DL+0.25LL)-T+SRSS(S_x, S_y)/(C_1C_2C_3)$
3. $0.9DL+T+SRSS(S_x, S_y)/(C_1C_2C_3)$
4. $0.9DL-T+SRSS(S_x, S_y)/(C_1C_2C_3)$.

## 2.7 FEMA 273 Acceptance Criteria

The acceptance criteria included modification factors to account for anticipated inelastic response of the structure. Elements were categorized as either deformation-controlled or force-controlled per FEMA 273, Section 3.4.2.2, with acceptance criteria as follows:

Deformation-controlled components include steel braces, beams, and columns under combined axial and bending stress. Deformation-Controlled Actions must satisfy FEMA 273, Equation 3-22:

$$mkQ_{CE} \geq Q_{UD}$$

$Q_{CE}$ = Expected strength of the component
$k$ = Knowledge factor = 1.0 was used for the analysis
$m$= component or element demand modifier to account for ductility.

For example, m-values for concrete structural walls are given below:

**Table 2.2 m-values for Concrete Structural Walls**

| | Life Safety | | Limited Damage |
|---|---|---|---|
| Seismic Demand | BSE-1 (LS) | BSE-2 (CP) | BSE-2 |
| Flexure (h/w > 3)* | 3 | 4 | 2.5 |
| Shear (h/w < or = 3)* | 2 | 3 | 2 |

*Walls with height-over-width (h/w) ratio greater than 3 are controlled by flexure; otherwise, they are controlled by shear.

Force-Controlled Actions must satisfy FEMA 273, Equation 3-23:

$$kQ_{CL} \geq Q_{UF}$$

$Q_{CL}$= Lower-bound strength of a component or element.
$k$ = Knowledge factor = 1.0 was used for the analysis.

## 2.8 Loads

### 2.8.1 Dead Loads

Dead loads are obtained from Martin/Martin's FEMA 178 seismic evaluations [Ref. 5]. A summary of the dead loads is given in Table 2.3.

**Table 2.3 Summary of Dead Loads**

| Level | Elevation | Story Height (ft) | Central Core | South Wing | East Wing | North Wing | Kitchen | Dining Room | Porte Cochere | Entry Gallery | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Penthouse Roof | 95'-10.5" | | 158 | | | | | | | | 158 |
| Penthouse Floor | 87'-1.5" | 8.75 | 784 | | | | | | | | 784 |
| Level 6 | 70'-1.5" | 17 | 856 | | | | | | | | 856 |
| Level 5 | 59'-6" | 10.63 | 728 | 1104 | | | | | | | 1832 |
| Level 4 | 49'-0" | 10.5 | 1129 | 1126 | | | | | | | 2255 |
| Level 3 | 38'-6" | 10.5 | 1088 | 1521 | 650 | | | | | | 3258 |
| Level 2 | 28'-0" | 10.5 | 1150 | 2846 | 692 | 253 | | | | | 4941 |
| Mezzanine | 15'-0" | 13 | 1255 | 750 | 912 | 411 | 1742 | 949 | 164 | 67 | 6250 |
| Level 1 | 0'-0" | 15 | | | | | | | | | |
| Total | | | 7148 | 7347 | 2253 | 664 | 1742 | 949 | 164 | 67 | 20334 |

Notes:
1. Level 1 dead loads are not included.
2. The Elevations of Kitchen, Dining Room, Porte Cochere and Entry Gallery are not at 15'-0"; they vary.

### 2.8.2 Live Loads

The floor and roof live loads are given below, and are used to combine with other loads in the load combinations. See Section 2.7.5.

Floor live loads 50 psf
Roof live loads 20 psf.

### 2.8.3 Seismic Loads

The short-period response acceleration parameter, $S_s$, and response acceleration parameter at a one-second period, $S_1$, for both BSE-1 and BSE-2 earthquake hazards were obtained from the National Seismic Hazard Mapping Project. See Appendix A for details.

**Table 2.4 Probabilistic Ground Motion Values (in % g)**

| | **BSE-1** | **BSE-2** |
|---|---|---|
| | (~10%/50yr) | (~2%/50yr) |
| $S_s$ (0.2 sec SA) | 45.60 | 103.07 |
| $S_1$ (1.0 sec SA) | 14.24 | 28.23 |

Using the above BSE-1 and BSE-2 ground motion values, the response spectra for the Ahwahnee Hotel were constructed using the FEMA 273, Section 1.6.1.5 procedure, with adjustment for soil type at the site. The soil type at the Ahwahnee Hotel is classified as Soil Type E by the geotechnical engineer.

2.8.4 Horizontal Torsion Loads

Per FEMA 273, the effects of horizontal torsion must be considered. The total torsional moment at a given floor level shall be set equal to the sum of the following two torsional moments:

1. The actual torsion
2. The 5% accidental torsion.

The torsion loads were added in the load combinations as shown in the next section.

2.8.5 Load Combinations

The load combinations used for structural analysis are:

1. $1.1(DL+0.25LL)+T+SRSS(S_x, S_y)$
2. $1.1(DL+0.25LL)-T+SRSS(S_x, S_y)$
3. $0.9DL+T+SRSS(S_x, S_y)$
4. $0.9DL-T+SRSS(S_x, S_y)$.

where:

DL = Dead loads
LL = Live Loads
T = Torsion loads
$SRSS(S_x, S_y)$ = Seismic loads for orthogonal effects.

## 2.9 Structural Computer Model (Existing Condition)

2.9.1 Description of Analysis

Using the existing plans (see Figure 2.2 for gridline system) of the Hotel, a three-dimensional ETABS model was created that include the following portions of hotel:

1. South Wing
2. Central Core
3. North Wing (Gift Shop)
4. West Wing (Dining Section up to Grid No. 22)
5. East Wing.

Four rigid diaphragms were used in the model as shown on Figure 2.3. Each of the above portions of the Hotel consists of a diaphragm that has infinite in-plane stiffness and no out-of-plane stiffness. Because the floor slabs are not quite rigid, with the rigid diaphragm system, ETABS will overestimate the loads to the outer walls, which is conservative. The concrete shear walls were modeled as a pier-spandrel system. A pier-spandrel system is simply a beam-column system in which the dimensions of the elements are large compared to the overall dimensions of the frame. This system captures the effects of window openings. The linear dynamic procedure was performed, as described in Section 2.4

### 2.9.2 ETABS Model Input Parameters

The ETABS model was created with the following input parameters and assumptions:

- Concrete modulus of elasticity, $E_c$ = 57,000*sqrt(f'c) = 3122 ksi, f'c=3,000 psi.
- Low value of f'c=3000 psi is to account for cracked section.
- Steel modulus of elasticity, $E_s$, of $29 \times 10^3$ ksi.
- Steel yield strength, fy=33 ksi.
- All columns, piers, and walls are modeled as "Fixed" at Level 1.
- P-delta effect option was included.
- Existing walls were assumed to be 12 inches thick.
- Members with steel section encased in concrete are computed as composite sections.
- Structural members with unclear dimensions were scaled to obtain approximate dimensions.
- Stone veneer/façade was included as dead loads, without any structural strength.
- Dead and live loads were included in the model as joint loads at the columns.

### 2.9.3 ETABS Model (See Figure 2.4 for graphic representation of model)

The completed ETABS model is described in Appendix F, which contains the following information data for the computer model: (1) the model plotted in color and 3-D; (2) input nodes located in each of the seven floor plans; (3) structural periods and mass participation factors for the first 45 modes; and (4) 3-D plots of the deformed building model for the first six modes.

UPDATED 9/20/2000

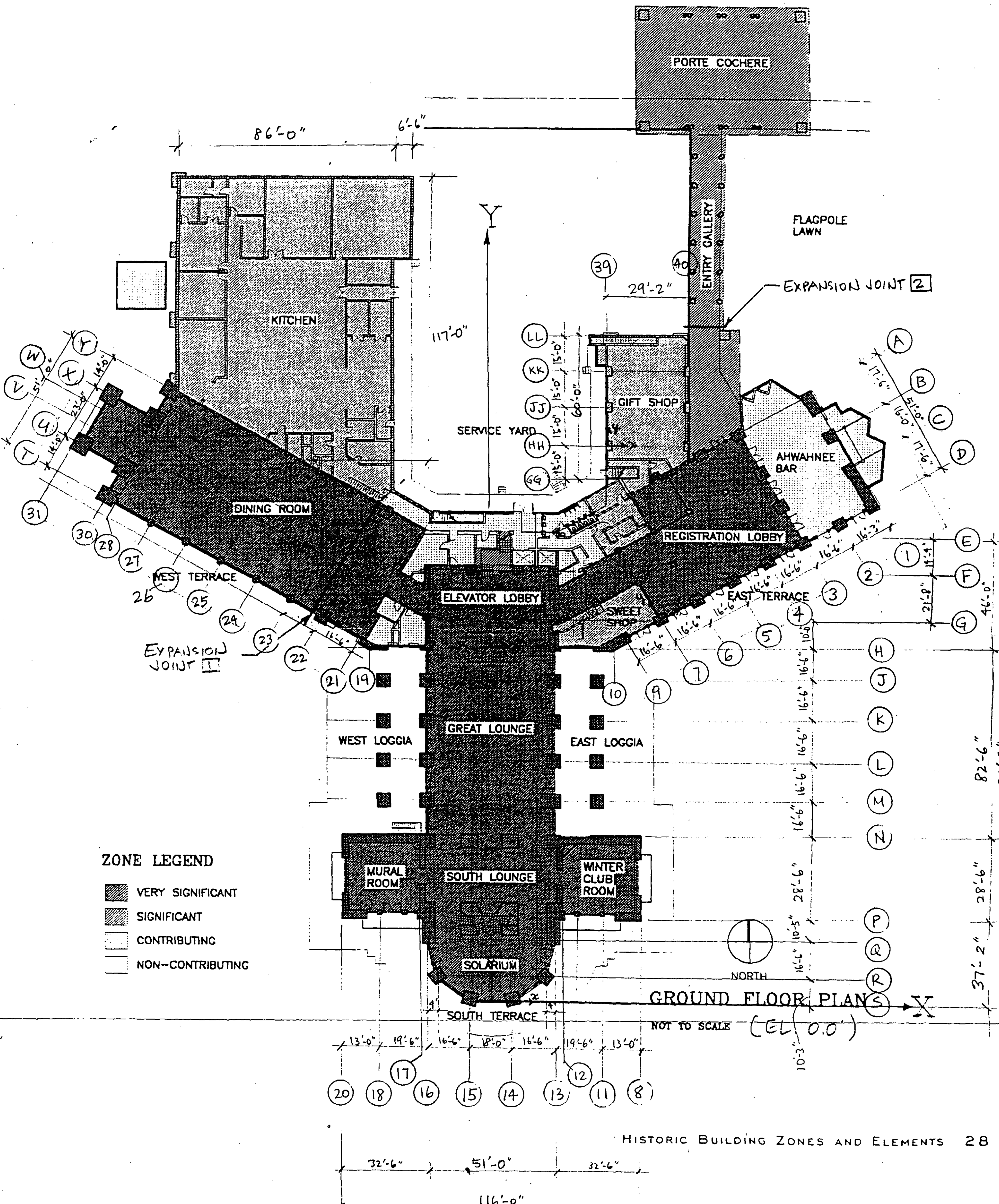





Figure 2.2 Grid Line System of the Awahnee Hotel

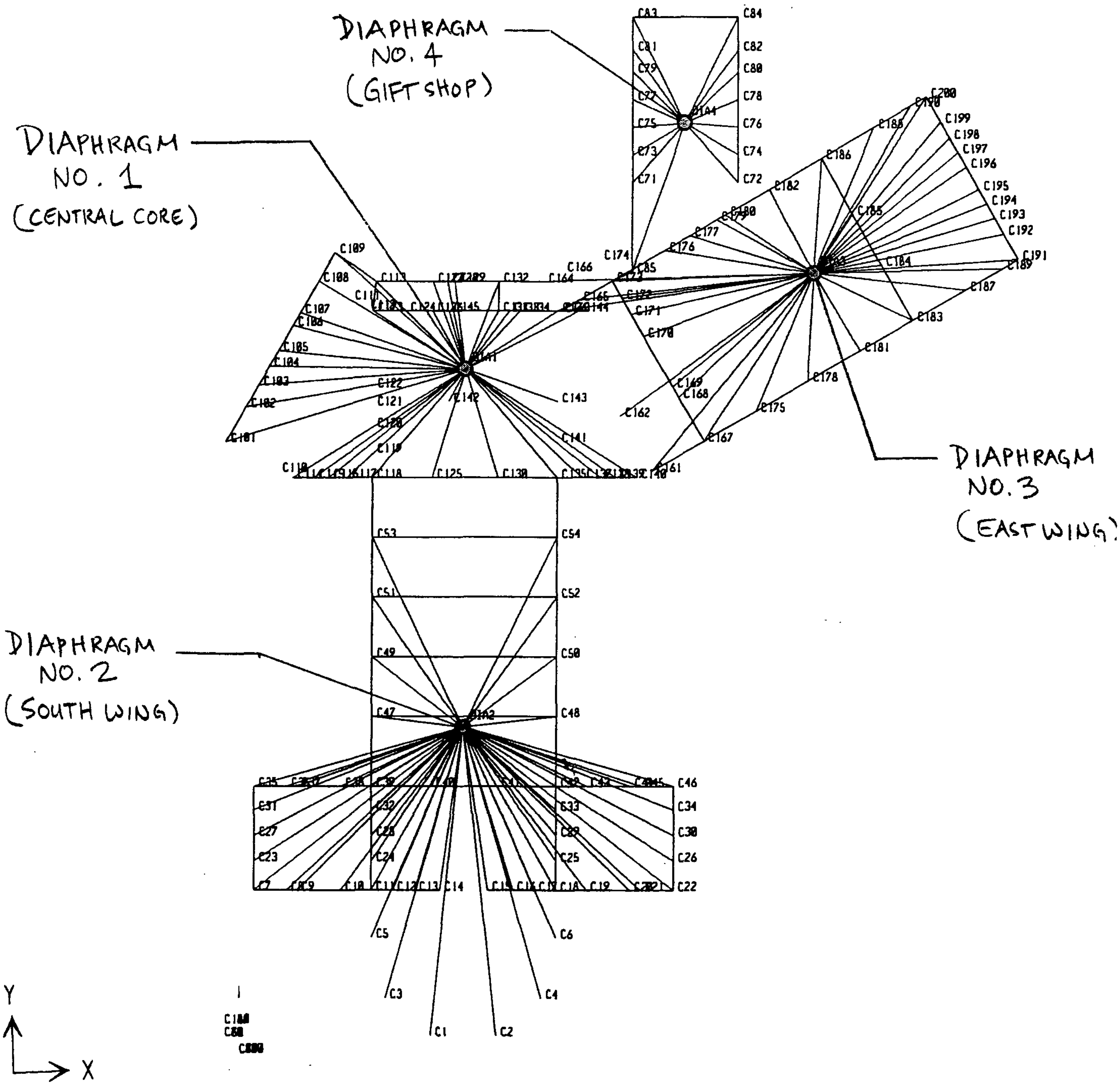



**Figure 2.3 Graphic Representation of Computer model of the Existing Main Building**

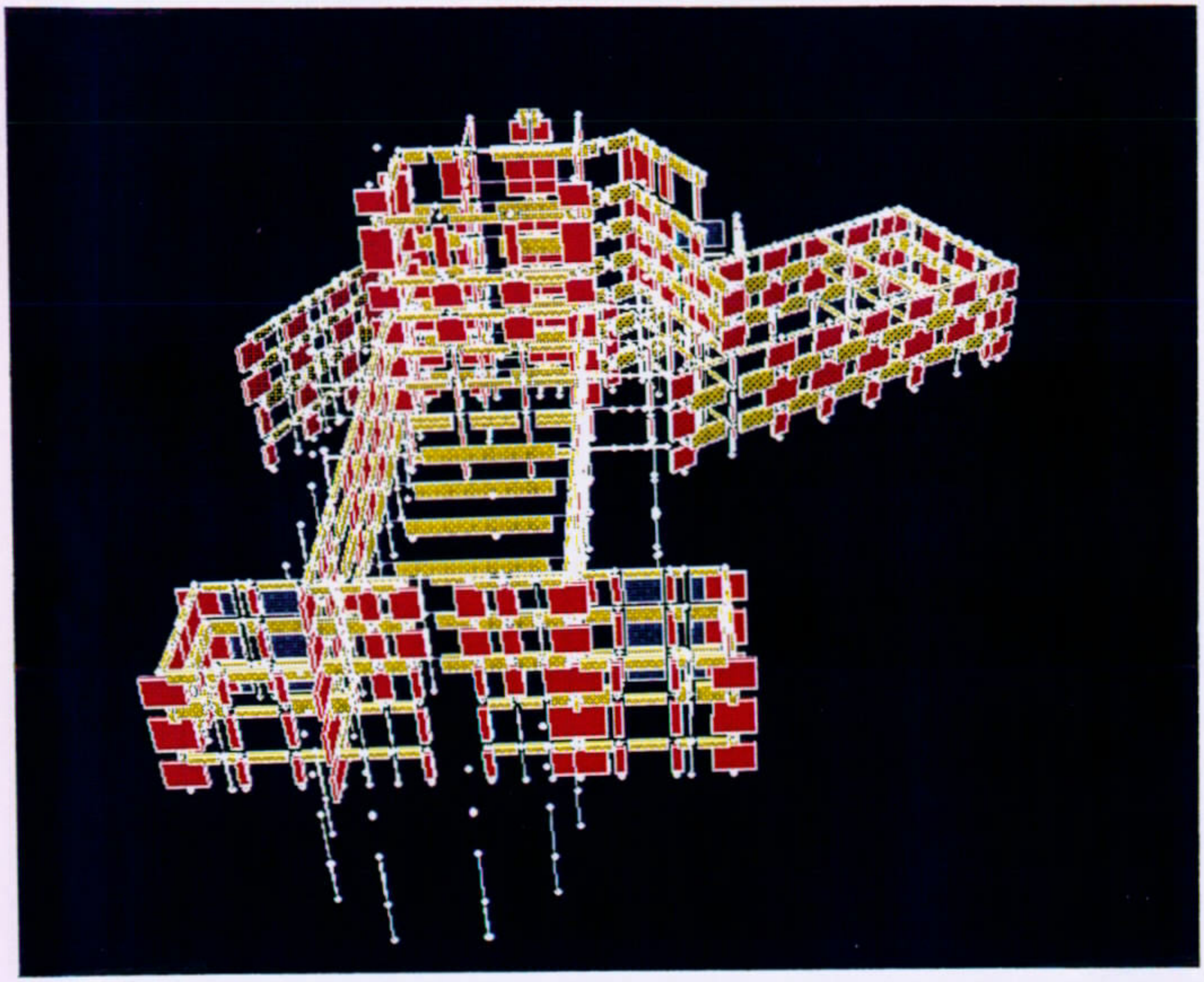


**Figure 2.4 Rigid Diaphragms in ETABS Computer Model**

# 3. Evaluation Results of the Existing Building

## 3.1 Evaluation of the Main Building

The seven-story Main Building was evaluated for both life safety and limited damage according to the procedure defined in the previous section of this report. The main structural elements reviewed were those that had the greatest impact on the structural integrity of the building during the studied earthquakes. The two main structural elements studied were: (1) the existing floor and roof diaphragms; and (2) the existing concrete shear walls. The existing floor and roof diaphragms were checked for their ability to transfer lateral forces into the existing concrete shear walls. The existing concrete shear walls were checked to for their ability to transfer the lateral seismic forces into the foundation system.

### 3.1.1 Existing Floor and Roof Diaphragm Evaluation

The capacity of the existing floor and roof diaphragm system is dependent on several elements. These elements are discussed below along with the calculated capacity for each as well as the demand on each element for both the Life Safety and the Limited Damage Performance Level.

1. *The floor and roof diaphragm composition, including connections to supporting members.*

   The existing floor diaphragm above the ground floor is a composite floor section of metal lath and approximately 2-inch concrete fill. The metal lath is connected to the supporting open web joists with metal ties. The roof diaphragm construction is similar to the floor construction.

   The ultimate capacity for the existing floor and roof construction was calculated to be approximately 6.7 kips per linear foot. This is the same for both the life safety and limited damage condition (both have the same "m-value" of 2.0).

   The shear demand on the floor and roof diaphragms varied for different locations. The highest demand for the Life Safety Performance Level (BSE 2 earthquake) was 33 kips per linear foot for the second floor diaphragm at column lines 1 and 7. The second floor diaphragm shears at column lines H and N were also high at 20 kips per linear foot. The shear demands tend to decrease in magnitude as one proceeds up the building but even at the roof level the shear demands are larger than the capacity (i.e., 6.7 kips per linear foot). The shear demands for the Limit Damage Performance Level are even larger than those calculated for the Life Safety (BSE-1 earthquake).

   From these results, it is concluded that the floor diaphragms in the Main Building, second floor through the roof, do not satisfy the Life Safety or Limited Damage Performance objectives.

2. *The floor and roof diaphragm connections to existing concrete shear walls*

   From our field observations, the floor to wall (and roof to wall) diaphragm connections appear to be a metal wire-tied connection joining the metal lath of the floor assembly to a floor beam. This floor beam is then embedded into a concrete shear wall. The metal wire tied connection is the same as the connection of floor assembly to the supporting open web joist.

   The ultimate capacity of this connection, which is the same for both the Life Safety and Limited Damage Performance Levels, was estimated to be 1 kip per linear foot of connection, based on the tear capacity of the embedded metal lath. Note that the 2-inch concrete fill is unreinforced and the only observed connection is the embedment of the metal lath into the concrete shear walls. The value of 1 kip per linear foot may even be unconservative.

   The shear demand for the Life Safety Performance Level (BSE 2 earthquake) varies from 3 kips per linear foot to as high as 8 kips per linear foot. The shear demand from the larger Limited Damage earthquake would be higher.

   From the above analysis, the existing wall/ diaphragm and roof/ wall connections do not satisfy the Life Safety or Limited Damage Performance objectives.

3. *Floor Collectors*

   A collector is a structural member (I-Beams in this building) that carry floor lateral loads to the nearest shear wall. There are five major collectors in the second floor of the Main Building. The collectors in the second floor are located in Figure 3.1 and are described the following:

   - <u>Collector on Column Line 7</u>: This collector carries the cumulative shear forces of 7 stories of shear wall above into an existing First Floor shear wall at column line B.
   - <u>Collectors on Column Lines 13 and 16</u>: The collectors on both these two column lines carry the cumulative shear forces of 3 stories of shear walls into existing First Floor and Mezzanine shear walls between column lines N and P.
   - <u>Collectors on Column Lines H and N</u>: The collectors are at each end of a large floor diaphragm (between column lines H and N) and transfer diaphragm shears into the mezzanine shear walls in column lines H and N.

The ultimate capacity of each of collector is limited to the weakest beam/column connection along the length of the collector. The ultimate capacity of the second floor collectors on Column lines 13 and 16 is approximately 80 kips based on the tensile capacity of the riveted beam/column connections. Similarly, the ultimate capacity for the second floor collectors on column line 7 as well as the collectors on column lines H and N is approximately 40 kips each. The ultimate capacity is the same for both the Life Safety and Limited Damage evaluations.

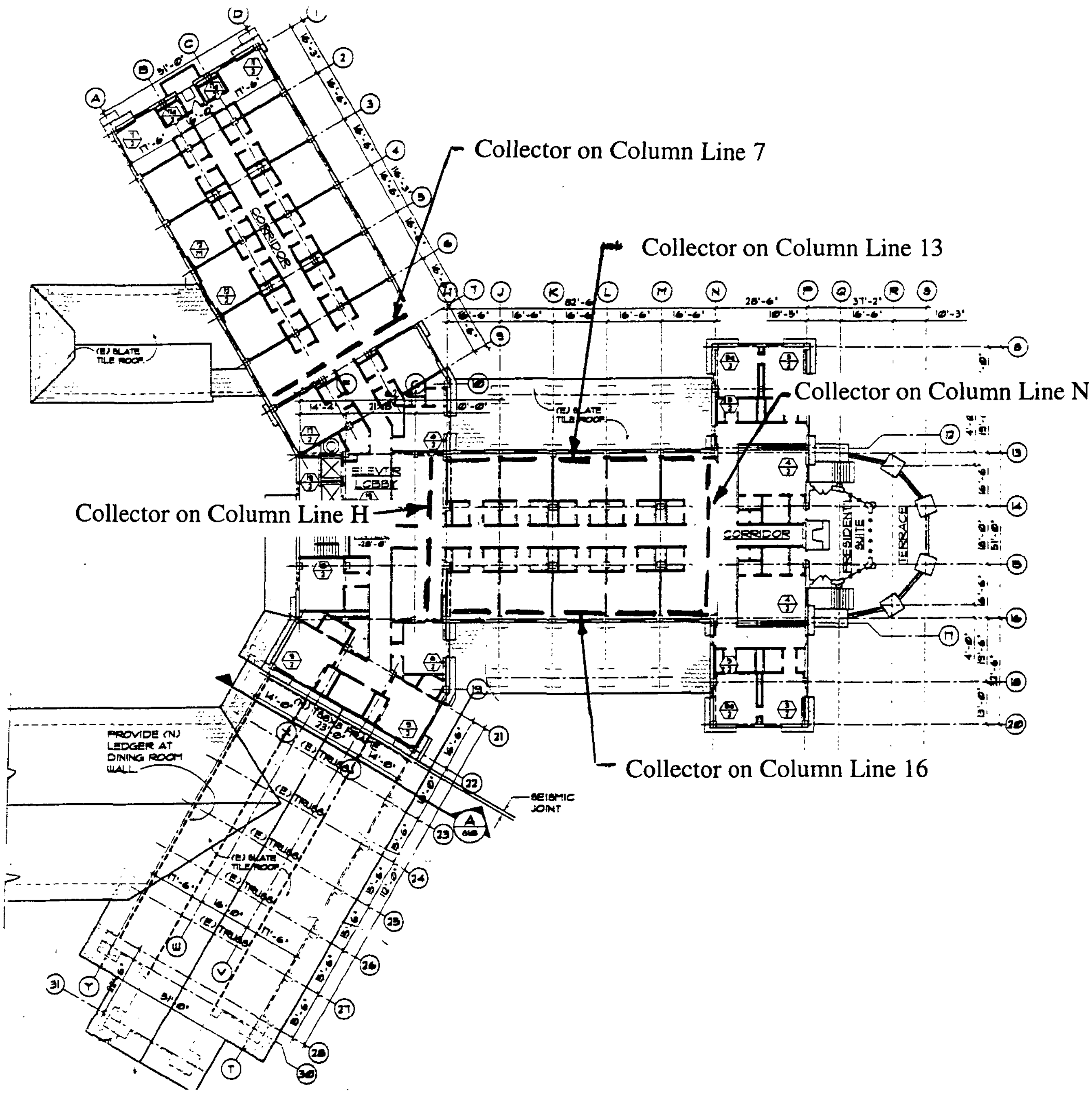



**Figure 3.1 Location of Second Floor Collectors**

The collector demands for the Life Safety Performance Level (BSE 1 earthquake) for the second floor collectors at each of the five locations are much larger than the capacity. For example, the calculated collector forces for both column lines 13 and 16 are 780 kips each and the collector force on column line 7 is 600 kips. The collector forces on Column lines H and N are 485 kips each For levels above the second floor, the collector forces decrease in magnitude, however, the demand forces are still larger than the collector capacity for both the Life Safety and Limited Damage Performance Levels.

As for the other elements of the floor diaphragm, the collectors in the second floor through the fourth floor, do not satisfy the Life Safety or Limited Damage Performance objectives.

### 3.1.2 Existing Concrete Shear Wall Evaluation

The Main Building was modeled using the ETABS program. The model is described in the Section 2 of this report. From the ETABS model, the existing wall shear forces were obtained for BSE-1 and BSE-2 earthquake hazard levels for each of the 314 wall elements that comprise the total shear wall elements for the Main Building. The shear forces were divided by the wall areas to obtain the average shear stress for each wall element. These shear stresses were then compared with the wall shear stress capacities.

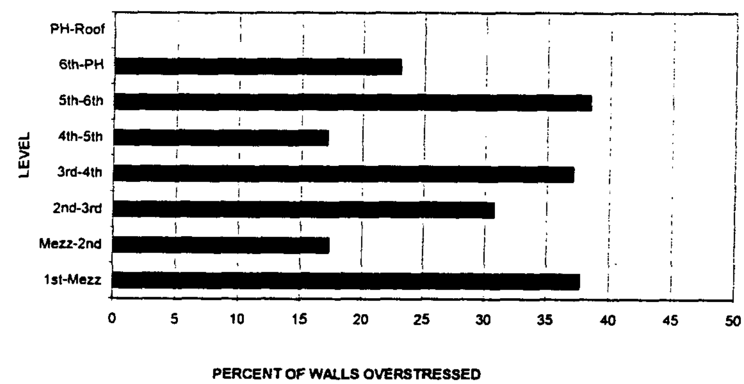
The shear stress capacity, $v_{capacity}$, was computed as follows:

$$
\begin{aligned}
v_{capacity} &= v_{concrete} + v_{reinforcement} \\
&= 2*\mathrm{sqrt}(f'c) + \rho *fy \\
&= 2*\mathrm{sqrt}(3000) + (0.002)*33000 \\
&= 176 \text{ psi.}
\end{aligned}
$$

The m-values for LS, CP, and LD were determined in accordance with FEMA 273, Tables 6-19 and 6-20, for shear and flexure control, respectively. In order to determine whether the wall or pier is controlled by flexure or shear, the wall height-to-width (h/w) ratio was computed for each wall. Walls with an h/w ratio greater than 3 were considered to be controlled by flexure, otherwise, they are shear controlled. Shear demand stresses were computed for the Life Safety Performance Level and the Limited Damage Performance Level. The wall shear demand to capacity, Demand/Capacity (D/C) ratios were calculated.

See Figures 3.2 and 3.3 for the results of the evaluation for both the Life Safety and Limited Damage Performance Levels.

## LIFE SAFETY FOR EXISTING MAIN BUILDING

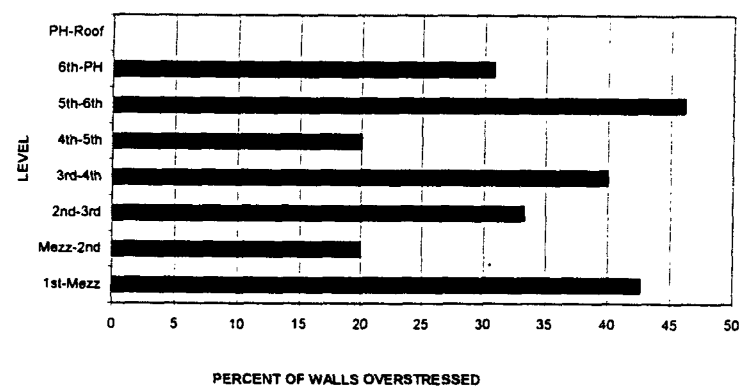



| | No. of Shear Wall Per Floor | No. of Shear Wall Overstressed Per Floor | Average* D/C Ratio Larger Than 1 |
|---|---|---|---|
| PH-Roof | 4 | 0 | - |
| 6th-PH | 13 | 3 | 1.11 |
| 5th-6th | 13 | 5 | 1.15 |
| 4th-5th | 35 | 6 | 1.32 |
| 3rd-4th | 35 | 13 | 1.37 |
| 2nd-3rd | 78 | 24 | 1.24 |
| Mezz-2nd | 75 | 13 | 1.60 |
| 1st-Mezz | 61 | 23 | 1.55 |

* Note: The average D/C ratio is based on the larger values from Life Safety Performance Level & the Collapse Prevention performance Level.

**FIGURE 3.2 LIFE SAFETY PERFORMANCE LEVEL
EVALUATION RESULTS OF SHEAR WALLS IN EXISTING MAIN BUILDING**

## LIMITED DAMAGE FOR EXISTING MAIN BUILDING




| | No. of Shear Wall Per Floor | No. of Shear Wall Overstressed Per Floor | Average D/C Ratio Larger Than 1 |
|---|---|---|---|
| PH-Roof | 4 | 0 | - |
| 6th-PH | 13 | 4 | 1.16 |
| 5th-6th | 13 | 6 | 1.24 |
| 4th-5th | 35 | 7 | 1.39 |
| 3rd-4th | 35 | 14 | 1.47 |
| 2nd-3rd | 78 | 26 | 1.34 |
| Mezz-2nd | 75 | 15 | 1.68 |
| 1st-Mezz | 61 | 26 | 1.63 |

**FIGURE 3.3 LIMITED DAMAGE PERFORMANCE LEVEL
EVALUATION RESULTS OF SHEAR WALLS IN EXISTING MAIN BUILDING**

For the Life Safety Performance Level, 87 of the 314 existing wall elements (28 percent) are over stressed, Demand/Capacity ratios vary from 1.55 at the first floor to 1.11 at the penthouse level. Similarly, for the Limited Damage condition 98 wall elements (31 percent) of the total wall elements were overstressed with Demand/Capacity Ratios varying from 1.63 at first floor to 1.16 at penthouse level.

Should the Ahwahnee Hotel (Main Building) be subject to an earthquake similar to those considered herein (BSE-1 or BSE-2), the building will experience significant structural and nonstructural damage. The damage will be most severe on the first floor. The structural walls and nonstructural partitions will be subject to extensive cracking, approaching the point of localized structural failure. This weakening of the lateral support in the first floor will affect the response of the upper stories. These first stories will undergo large lateral displacements, even greater than those predicted by this analysis. The inter-story displacement between the first and second floor will be excessive. The extensive damage that is expected will likely cause the building to be evacuated after such an earthquake. Because of the localized structural failures, there is the potential for loss of human lives.

## 3.2 Evaluation of the Kitchen and Dining Room

As stated in Section 1.2 of this report, it is proposed that the Kitchen and Dining Room sections be isolated from the Main Building by a seismic joint. Assuming that this seismic joint is in place, the Kitchen and Dining Room section have been evaluated as a separate one-story building for both the Life Safety and Limited Damage Performance Levels.

### 3.2.1 Dining Room

*1. The Dining Room Roof Diaphragm*

The existing Dining Room roof diaphragm consists of three-quarter inch plywood over wood sleepers, which in turn are placed over 2x straight sheathing. This diaphragm does not have adequate shear capacity to span between the monumental stone columns at the west end of the Dining Room, and a proposed steel gravity frame at the east end of the Dining Room.

The shear capacity of the existing diaphragm ($V_{capacity}$) was computed as follows:

Using: ¾" Struct.I plywood over 2x straight sheathing, with 10d @ 6", 6", & 12" o.c.
From Table 23-11-H; 1997 UBC: $V_{allowable} = 360$ plf.
From FEMA 273, Section 8.5.8.2 Strength Acceptance Criteria: $V_{cap} = 2 (V_{allow}) = 720$ plf

The m-values for LS and LD were determined in accordance with FEMA 273, Table 8-3; Wood structural panel overlay on sheathing, chorded. $m_{LS} = 2.5$, $m_{LD} = ½(1.5+2.5)= 2.0$
The shear demand on the existing roof diaphragm, assuming all of the shear is transferred to the adjoining Kitchen wall and the stone columns do not have the capacity to take lateral load.

LS: $mkQ_{CE} = 2.5(1)0.72$ klf = 1.8 klf < $Q_{UD}$ = 14 klf: D/C = 7.8
LD: $mkQ_{CE} = 2.0(1)0.72$ klf = 1.44 klf < $Q_{UD}$ = 18.9 klf: D/C = 13.1

2. *Stone columns*

The quality of concrete construction inside the monumental stone columns is unknown. It is assumed these columns are filled with unreinforced or lightly reinforced concrete and are considered to have inadequate shear and bending capacity to take the lateral seismic load. It is also unknown if the stones themselves are anchored into the concrete core of the monumental columns.

3. *Timber Trusses*

The vertical load carrying capacity of the roof trusses is adequate; however, the ability of the existing trusses as a lateral-load-resisting element is not adequate. The timber truss as a truss moment frame has limited capacity to serve as a shear resisting system to resist roof diaphragm shears.

3.2.2 Kitchen

*1. The existing lateral-load-resisting system*

The existing 1.5- to 2-inch-thick unreinforced concrete roof diaphragm does not have the shear capacity to span between the north wall and the diagonal wall adjoining the Dining Room.

The clerestory shear walls do not have adequate strength capacity to transfer roof diaphragm shears to lower shear walls.

## 3.3 Evaluation of the Entry Gallery and Porte Cochere

Similar to the Kitchen and Dining Room, the Entry Gallery and Porte Cochere are proposed to be separated from the Main Building by a seismic joint. Assuming this joint is in place, the Entry Gallery and Porte Cochere structure have been evaluated as a separate structure.

3.3.1 Porte Cochere

1. *The existing roof diaphragm*

The existing Porte Cochere roof diaphragm consists of three-quarter inch plywood over 2x straight sheathing with 6 penny nails at 6 inches. This diaphragm does not have the shear capacity to span between the monumental stone columns at the four corners. The shear capacity of the existing diaphragm was computed as follows:

Using: ¾" Struct.I plywood over 2x straight sheathing, with 6d @ 6", 6", & 12" o.c.
From Table 23-11-H; 1997 UBC: $V_{allowable} = 210$ plf.
From FEMA 273, Section 8.5.8.2 Strength Acceptance Criteria: $V_{cap} = 2\ (V_{allow}) = 420$ plf

$m_{LS} = 2.5$, $m_{LD} = 2.0$

LS: $mkQ_{CE} = 2.5(1)0.42$ klf $= 1.05$ klf $< Q_{UD} = 3.1$ klf: D/C = 2.9
LD: $mkQ_{CE} = 2.0(1)0.42$ klf $= 0.84$ klf $< Q_{UD} = 4.2$ klf: D/C = 5.0

2. *Corner columns*

The lateral-load-resisting elements for the Porte Cochere are the four corner stone columns. The existing connections of the wood trusses to the tops of the corner columns are not adequate to transfer the lateral loads into the corner stone columns. Also, the composition of the concrete inside the monumental stone columns, and if reinforced, is unknown.

From the drawings, the existing column footings are only 2 feet wider than the column width, and therefore do not have adequate overturning capacity.

3.3.2 Entry Gallery

The existing roof diaphragm was evaluated and found to have adequate shear capacity for both Life Safety and Limited Damage Performance Levels. Transverse lateral loads were resisted by frame action of the knee-braced frames; however, the knee braced connections at each frame were found to be overstressed for both the Life Safety and Limited Damage Performance Levels.

## 3.4 Results of the Evaluation of the Existing Foundation

A visual inspection was performed by the structural engineers during their field trip to determine the current condition of the foundation. There was no evidence of excessive yielding, buckling, or out-of-level conditions, which would be indicative of excessive settlement and/or differential settlement. Other than the fact that the underground space of the building is flooded regularly, in general, the foundation of the Ahwahnee Hotel has performed satisfactorily. An evaluation of sub-surface soil conditions revealed that the soils underlying the building may be subjected to earthquake-induced liquefaction. If this were to occur, the existing foundation would likely undergo excessive differential settlement. For this reason, it is judged that the existing foundation will not be able to tolerate the design seismic event.

A seismic retrofit of the foundation system is recommended for the Ahwahnee Hotel. The main concept behind feasible retrofit schemes is that the structure/foundation system should experience reduced and comparable settlements in order to minimize excessive relative settlement and intolerable tilt. One way of achieving this is to transfer the building's bearing surface, currently a few feet below the ground surface, to deeper layers where the effects of liquefaction settlements are substantially reduced and more uniform. Other remediation schemes should involve ground modification methods such as compaction grouting and jet grouting. See Appendix A for a discussion of both methods.

# 4. Recommended Rehabilitation Schemes

## 4.1 General Discussion

The intent of the rehabilitation design is to develop three separate rehabilitation schemes: two schemes for a Life Safety Performance level, and one for a Limited Damage Performance level. The three schemes chosen to meet these performance levels were developed based on several studies following our field trip, and discussions with the Historical Architect. During these studies and discussions, several possible solutions, used successfully on other large historic buildings, were studied. These solutions included base isolation, exterior buttresses, interior braced frames, and concrete shear walls. Each of these solutions had to meet with the approval of the Historic Architect, as well as accommodating the physical constraints and current foundation of the existing building.

The base isolation scheme was dropped because of the possibility of differential settlement due to the soil liquefaction potential. Even with foundation soil enhancement such as compaction grouting and jet grouting, differential settlement could not be reduced enough to make this a viable option.

It was determined that schemes consisting of using exterior buttresses or interior braced frames be eliminated, as these are not compatible with maintaining the historic fabric of the existing building. Either of these two solutions would add new structural elements that would be visible, and would significantly alter the appearance of the existing building.

The final and recommended solution is the addition of new concrete walls, at locations acceptable to both the Historic Architect and the National Park Service, and/or the replacement of existing walls and partitions with new concrete shear walls. The three selected schemes have a combination of new walls in three separate arrangements. These are referred to as Wall Arrangements A, B, and C, and will be discussed at greater length.

The addition of concrete shear walls are either new walls added to the building, at an acceptable location, or modification of existing concrete walls (i.e., increasing thickness with shotcrete). The proposed schemes add or modify walls in the Main Building at seven levels. For the Main Building, 67 new walls are proposed for both Life Safety Schemes A and B. Also for the same two schemes, 74 walls will be modified. For Scheme C, the Limited Damage Scheme, the number of new walls would increase to 75, with an additional 80 existing walls modified.

The seismic/structural impact of the addition of the new and modified walls for the Life Safety Scheme A (Scheme B results would be similar) is shown in Figure 4.1. Similarly, the results for the Limited Damage Scheme (Scheme C) are given in Figure 4.2. In both figures, the percent of existing walls that are overstressed (before rehabilitation) is shown as a solid bar, while the percent of all walls overstressed (after rehabilitation) are shown as an unshaded bar.

Figures 4.1 and 4.2 illustrate that the proposed modification schemes will substantially reduce, but not totally eliminate, overstressing in the shear walls. Further refinement of the proposed schemes will be accomplished as part of the final retrofit design, and this will result in additional reductions in overstressing. However, a scheme that totally eliminates overstressing is both impractical and not warranted from a seismic safety perspective. Such a scheme would be impractical because of prohibitive cost and conflicts with historic preservation objectives. Such a scheme would be unwarranted because the building is capable of meeting the Life Safety and Limited Damage Objectives with the degree of overstressing shown by the unshaded bars in Figures 4.1 and 4.2.

Besides the addition of new concrete shear walls, other improvements that are common to all three schemes include:

1. Reinforcing the Dining Room log scissors trusses with the addition of 1½-inch-diameter tie rods. See sheet S10 in Appendix B for details.

2. Adding a horizontal truss in the plane of the lower chord in the Kitchen Roof Truss. Details are provided in Appendix B, Sheet S10.

3. Adding a new network of tie beams in the crawl space. See the Foundation/Crawl Space drawing in S1 Appendix B.

4. Rebuilding the five monumental stone columns at the Dining Room's west end.

5. Rebuilding the existing Dining Room roof, which would include the removal and replacement of the existing slate roof, addition of a ¾-inch-thick plywood diaphragm, new blocking, and new tube steel collectors.

6. Closing several of the existing windows in the clerestory Kitchen walls.

7. Rebuilding the four monumental stone corner columns in the Porte Cochere, and roof improvements similar to the Dining Room. Also, the addition of new tie beams in the foundation.

8. Improving the existing connections to the joints of the log frames in the Entry Gallery.

9. Adding collector beams along lines 13, 16, 7, H & N; for four levels only.

10. Adding horizontal angle bracing needed to strengthen floors and roof concrete diaphragms, as indicated on the plans.

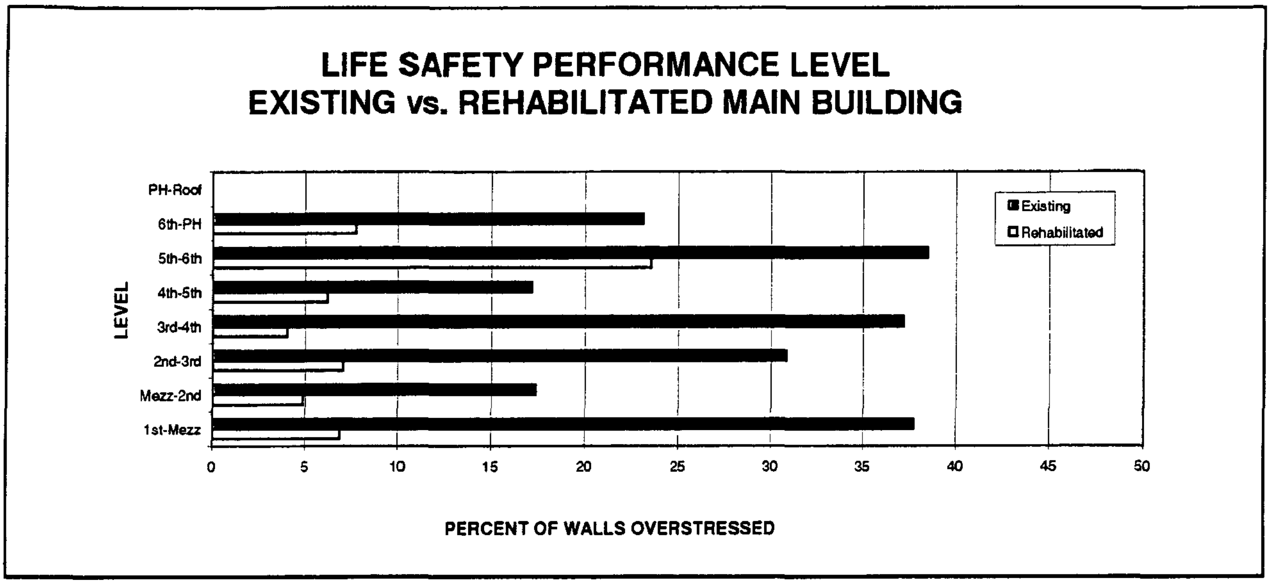



**FIGURE 4.1 LIFE SAFETY PERFORMANCE LEVEL- (EXISTING vs. REHABILITATED) EVALUATION RESULTS OF SHEAR WALLS IN MAIN BUILDING**

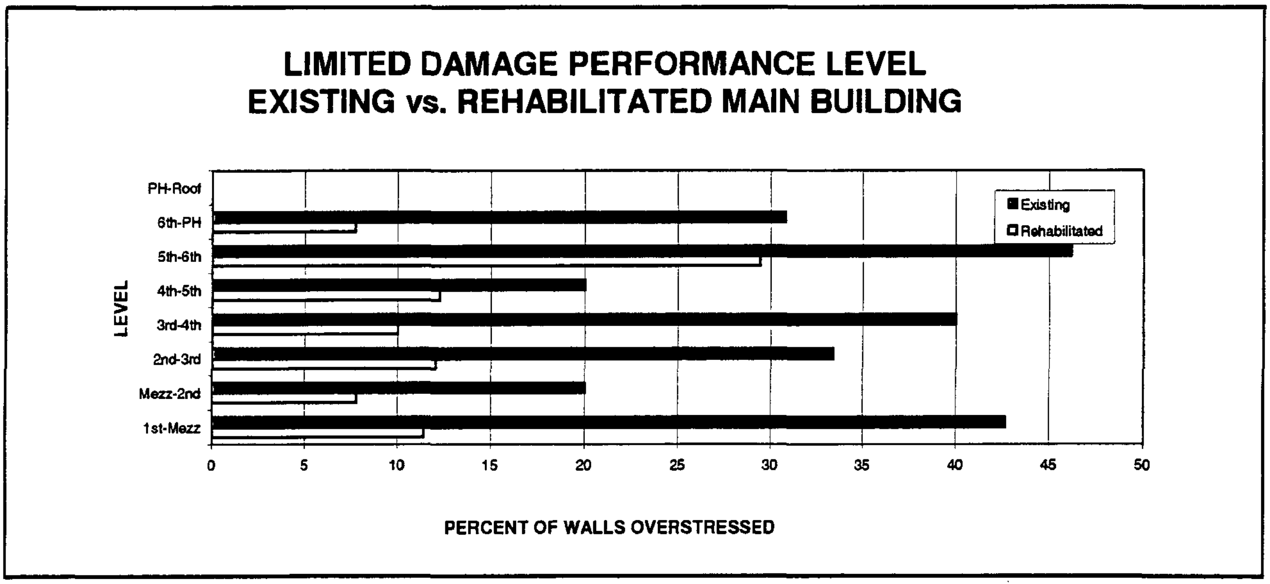



**FIGURE 4.2 LIMITED DAMAGE PERFORMANCE LEVEL- (EXISTING vs. REHABILITATED) EVALUATION RESULTS OF SHEAR WALLS IN MAIN BUILDING**

11. Adding continuous and intermittent angles to provide shear transfer between floor/roof diaphragms and walls.

12. Non-structural improvements common to all schemes are as follows:
    a. Anchoring the stone veneer around the perimeter of the building.
    b. Strengthening the existing tile room partitions.
    c. Bracing the existing plaster ceilings.
    d. Replacing the existing clay tile and brick walls around the stairs and elevator cores.
    e. Anchoring all mechanical and service equipment against overturning.

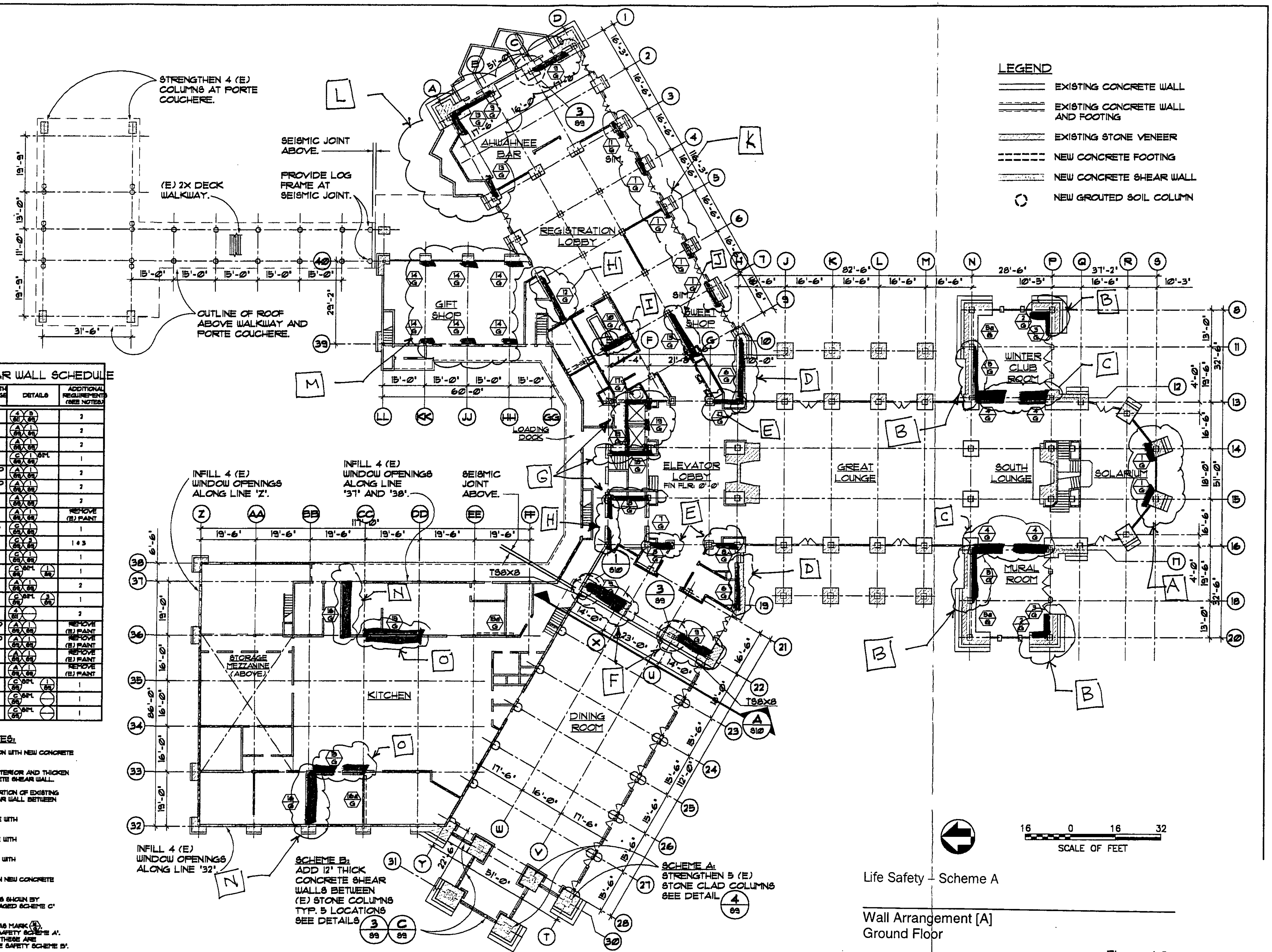
Besides the additions of the above items common to all three schemes, each of the three schemes will require foundation strengthening to prevent differential settlement following the two earthquakes studied in this report. The Geotechnical Engineer recommends the compaction-grouted method for stabilizing the existing soil beneath the building footings for the Life-Safety Performance Level, and the more intensive jet-grouted method for the Limit Damage Performance Level.

## 4.2 Scheme A – Life Safety with compacted grouted foundation

This first of the Life-Safety Schemes employs Wall Arrangement A, for new or modified concrete shear walls. See Figure 4.3 for the location of the new or modified walls for the ground floor level (highlighted in blue pen). See Appendix B for the location of new or modified walls for the remaining six floors, and the crawl-space below the ground floor. Also in Appendix B are the associated wall connection details and wall sizes.

The proposed new or modified concrete walls for wall arrangement (A) were placed to reduce the overstressed conditions on existing walls, as well as to minimize the impact to the historic fabric of the buildings.

The new or modified walls at ground floor level are located in Figure 4.3. The reasons for these walls are as follows:




## GROUND FLOOR SHEAR WALL SCHEDULE

| MARK | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/G | 8" | 5'-0" | 5'-0" | 4/S1, 5/S9 | 2 |
| 2/G | 12" | 6'-0" | 6'-0" | A/S9, 1/S9 | 2 |
| 3/G | 12" | 7'-0" | 7'-0" | A/S9, 1/S9 | 2 |
| 4/G | 18" | 9'-0" | 9'-0" | C/S9, 1/S9 SIM. | 1 |
| 5/G | 8" | 15'-0" | COMBINED 25'-0" | A/S9, 1/S9 | 2 |
| 5a/G | 8" | 10'-0" | COMBINED 25'-0" | A/S9, 1/S9 | 2 |
| 6/G | 12" | 26'-0" | 26'-0" | A/S9, 1/S9 | 2 |
| 7/G | 12" | 14'-0" | 28'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 8/G | 12" | 6'-0"+5'-0" | 6'-0"+5'-0" | C/S9, 1/S9 | 1 |
| 9/G | 12" | 12'-0" | 12'-0" | C/S9, 3/S9 | 1 & 3 |
| 10/G | 12" | 16'-0" | 24'-0" | C/S9, 1/S9 | 1 |
| 11/G | 12" | 14'-0" | 28'-0" | C/S9 SIM., 1/S9 | 1 |
| 12/G | 8" | 14'-0" | 14'-0" | A/S9, 1/S9 | 2 |
| 13/G | 8" | 6'-0" | 6'-0" | C/S9 SIM., 3/S9 | 1 |
| 14/G | 8" | 4'-0" | 4'-0" | 4/S1 | 2 |
| 15/G | 8" | 19'-6" | COMBINED 33'-6" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 15a/G | 8" | 14'-0" | COMBINED 33'-6" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 16/G | 8" | 19'-0" | 19'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 16a/G | 8" | 15'-0" | 15'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 17/G | 12" | LIMITED DAMAGE ONLY | 18'-0"+8'-0" | C/S9 SIM., 1/S9 | 1 |
| 18/G | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/G | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |

### SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE "LIMITED DAMAGED SCHEME C" WHERE INDICATED.
7. UNLESS OTHERWISE NOTED ON PLANS AS MARK 15/G, ALL WALL LOCATIONS ARE FOR 'LIFE SAFETY SCHEME A'. WHERE NOTED ON PLAN AS MARK 15/G, THESE ARE ALTERNATE WALL LOCATIONS FOR 'LIFE SAFETY SCHEME B'.

Life Safety – Scheme A

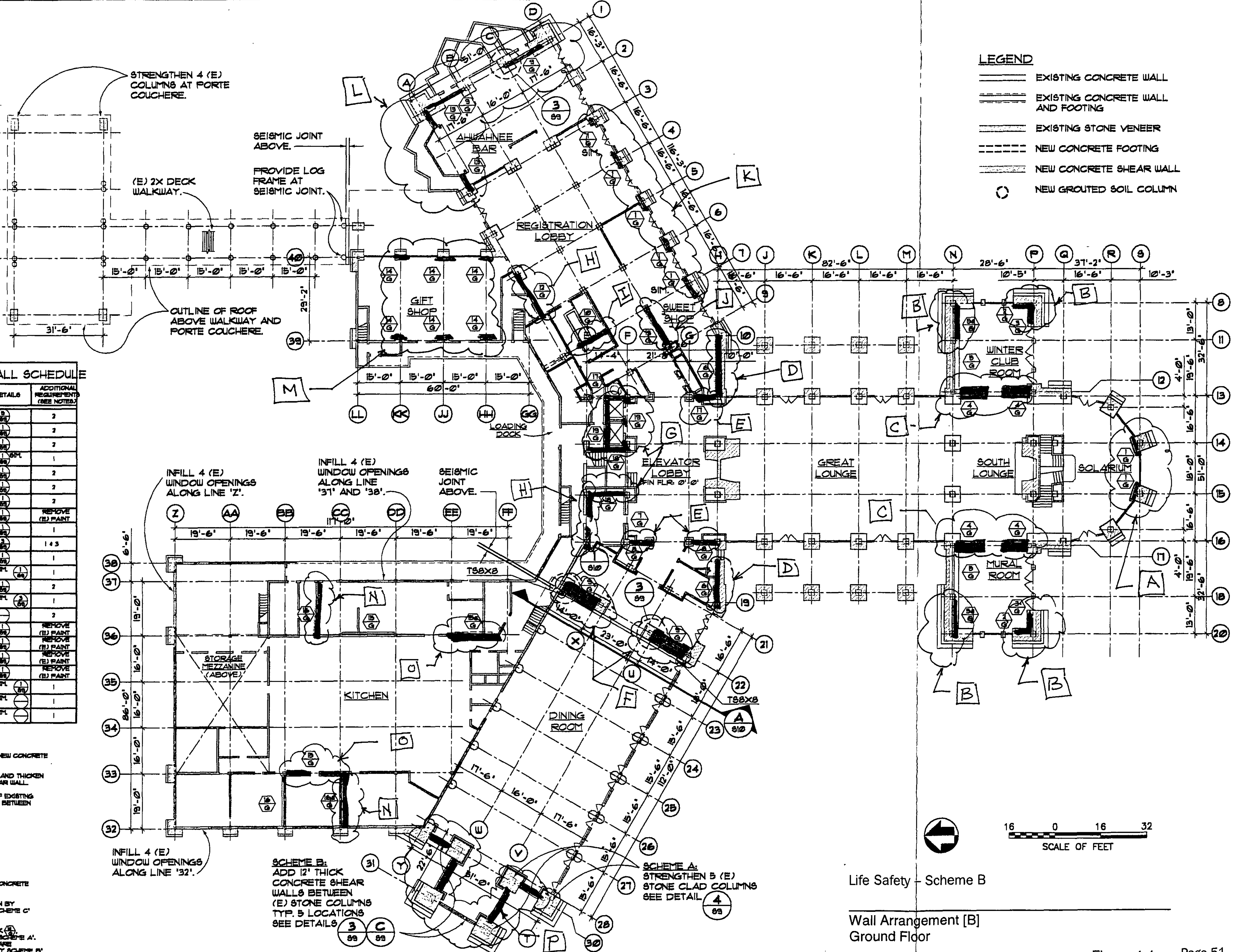
Wall Arrangement [A]
Ground Floor

Figure 4.3

| Arrangement (A) — New and Modified Walls | | |
|---|---|---|
| **Group Type** | **Wall Type (New or Modified)** | **Reason for Wall** |
| Group A | Modified | Existing four end columns were overstressed. Modify two of the existing columns by adding shotcrete. |
| B | Modified | Overstressed walls, increase thickness by the addition of shotcrete. |
| C | New | Existing wall overstressed. Replace the existing wall with new concrete shear wall. |
| D | Modified | Existing walls overstressed. Add thickness to existing wall with the addition of shotcrete. |
| E | New | Overstressed walls. Replace the existing walls with a new concrete shear wall. |
| F | New | Seven-story walls stop at mezzanine level, discontinuous shear wall and weak floor diaphragm. Overstressed masonry piers. |
| G | New | Stair and Elevator walls are constructed of clay tile, Hazard to egress. Replace with new concrete walls. |
| H | Modified | Overstressed concrete walls. Add shotcrete to inside surface of wall. |
| I | New | Seven-story walls end at second floor. New concrete shear walls needed plus a new collector along column line 7. |
| J | New | Replace partition with a new concrete shear wall. Adjacent walls are overstressed. |
| K | Modified | Thicken existing piers with shotcrete. |
| L | New | Existing walls are overstressed. Construct new concrete shear walls. |
| M | Modified | Thicken existing columns with shotcrete. |
| N | Modified | Increase thickness of existing wall with shotcrete. Adjacent walls are overstressed. |
| O | Modified | Increase thickness of existing wall with shotcrete. Adjacent walls are overstressed. |

### 4.3 Scheme B – Life Safety with compacted grouted foundation

The second of the Life-Safety Schemes employs Wall Arrangement B, for new or modified concrete shear walls. As shown in Figure 4.4, the location of the new or modified walls are similar in arrangement to the ones given in Scheme A. The only differences between the two wall arrangements are new or revised wall locations given in the table below:




## GROUND FLOOR SHEAR WALL SCHEDULE

| MARK | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/G | 8" | 5'-0" | 5'-0" | 4/S11, 5/S9 | 2 |
| 2/G | 12" | 6'-0" | 6'-0" | A/S9, 1/S9 | 2 |
| 3/G | 12" | 7'-0" | 7'-0" | A/S9, 1/S9 | 2 |
| 4/G | 18" | 9'-0" | 9'-0" | C/S9, 1/S9 SIM. | 1 |
| 5/G | 8" | 15'-0" | COMBINED 25'-0" | A/S9, 1/S9 | 2 |
| 5a/G | 8" | 10'-0" | COMBINED 25'-0" | A/S9, 1/S9 | 2 |
| 6/G | 12" | 20'-0" | 20'-0" | A/S9, 1/S9 | 2 |
| 7/G | 12" | 14'-0" | 20'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 8/G | 12" | 6'-0" & 5'-0" | 6'-0" & 5'-0" | C/S9, 1/S9 | 1 |
| 9/G | 12" | 12'-0" | 12'-0" | C/S9, 3/S9 | 1 & 3 |
| 10/G | 12" | 16'-0" | 24'-0" | C/S9, 1/S9 | 1 |
| 11/G | 12" | 14'-0" | 28'-0" | C/S9 SIM., 1/S9 | 1 |
| 12/G | 8" | 14'-0" | 14'-0" | A/S9, 1/S9 | 2 |
| 13/G | 8" | 6'-0" | 6'-0" | C/S9 SIM., 3/S9 | 1 |
| 14/G | 8" | 4'-0" | 4'-0" | 4/S11 | 2 |
| 15/G | 8" | 18'-6" | COMBINED 33'-6" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 15a/G | 8" | 14'-0" | COMBINED 33'-6" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 16/G | 8" | 18'-0" | 18'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 16a/G | 8" | 18'-0" | 18'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 17/G | 12" | LIMITED DAMAGE ONLY | 18'-0" & 8'-0" | C/S9 SIM., 1/S9 | 1 |
| 18/G | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/G | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |

### SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE 'LIMITED DAMAGED SCHEME C' WHERE INDICATED.
7. UNLESS OTHERWISE NOTED ON PLANS AS MARK 15/G, ALL WALL LOCATIONS ARE FOR 'LIFE SAFETY SCHEME A'. WHERE NOTED ON PLAN AS MARK 15/G, THESE ARE ALTERNATE WALL LOCATIONS FOR 'LIFE SAFETY SCHEME B'.

Life Safety - Scheme B

Wall Arrangement [B]
Ground Floor

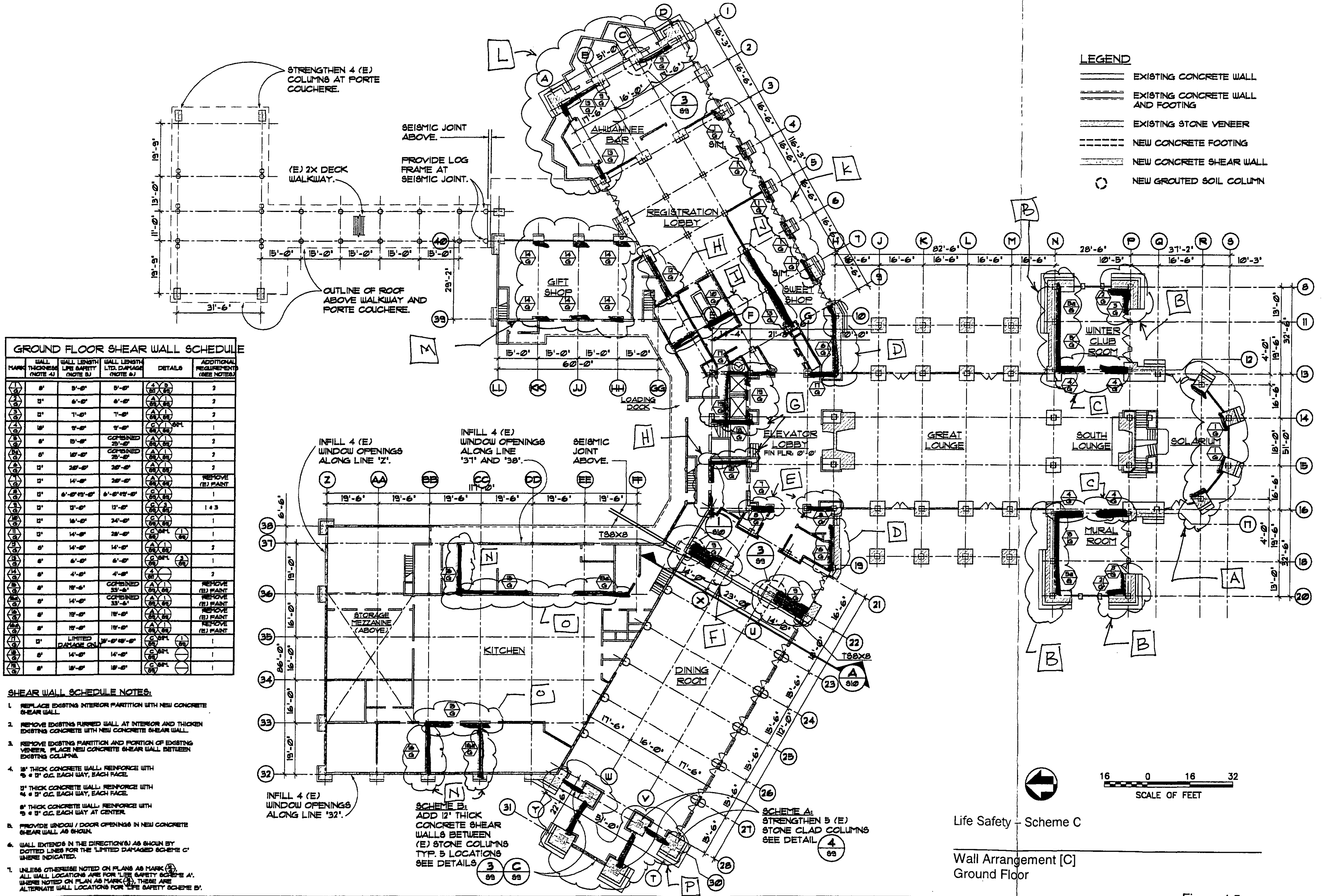
Figure 4.4

| Arrangement (B) — New and Modified Walls (Ground Floor only) | | |
|---|---|---|
| **Revised Wall Group Types** | **Wall Type (New or Modified)** | **Reason for Wall** |
| Group B | Modified | Overstressed walls, increase thickness of existing walls with the addition of shotcrete. New location of wall from what was shown in Wall Arrangement A. |
| N | Modified | Adjacent walls are overstressed. Add shotcrete to existing walls. Different wall location. |
| O | Modified | Similar condition to wall group N above. New location may work better for Kitchen operation. |
| P | New | Four new walls added to the west end of the Dining Room. This addition would save most of the proposed work (Scheme A), on the five monumental stone columns. |

## 4.4 Scheme C – Limited Damage with Jet Grouting

The third scheme, the Limited Damage Scheme, employs a combination of both Wall Arrangements A and B. The differences between Wall Arrangement A and C are listed in the table below and all new and modified walls are located in Figure 4.5. The reason for the following revisions was the larger force level and the need to reduce drift between floors to prevent damage. The jet grouting method was also recommended to stabilize the foundation system.

| Arrangement (C) — New and Modified Walls (Ground Floor only) | | |
|---|---|---|
| **Revised Wall Group Types** | **Wall Type (New or Modified)** | **Reason for Wall** |
| Group B | Modified | Overstressed walls, increase thickness of existing walls with shotcrete. New location of wall would be the combination of Wall Arrangements A and B. |
| N | Modified | Adjacent walls are overstressed. Add shotcrete to existing walls. New location is combination of Wall Arrangements A and B. |
| O | Modified | Similar condition to wall group N above. New location is combination of Wall Arrangements A and B. |
| P | New | Four new walls added to the west end of the Dining Room. This addition would save most of the proposed Scheme A work for the five monumental stone columns. |
| A | Modified | Modify the existing four end columns by adding shotcrete. Scheme A had only two columns to modified. |
| I | New | Increase length of new concrete shear wall in a northerly direction. |
| J | New | Increase length of new concrete shear wall proposed for Column Line C. |




## GROUND FLOOR SHEAR WALL SCHEDULE

| MARK | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/G | 8" | 5'-0" | 5'-0" | 4/S11, 5/S9 | 2 |
| 2/G | 12" | 6'-0" | 6'-0" | A/S9, 1/S9 | 2 |
| 3/G | 12" | 7'-0" | 7'-0" | A/S9, 1/S9 | 2 |
| 4/G | 18" | 9'-0" | 9'-0" | C/S9, 1/S9 SIM. | 1 |
| 5/G | 8" | 15'-0" | COMBINED 25'-0" | A/S9, 1/S9 | 2 |
| 5a/G | 8" | 10'-0" | COMBINED 25'-0" | A/S9, 1/S9 | 2 |
| 6/G | 12" | 28'-0" | 28'-0" | A/S9, 1/S9 | 2 |
| 7/G | 12" | 14'-0" | 28'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 8/G | 12" | 6'-0" & 5'-0" | 6'-0" & 5'-0" | C/S9, 1/S9 | 1 |
| 9/G | 12" | 12'-0" | 12'-0" | C/S9, 3/S9 | 1 & 3 |
| 10/G | 12" | 16'-0" | 24'-0" | C/S9, 1/S9 | 1 |
| 11/G | 12" | 14'-0" | 28'-0" | C/S9 SIM., 1/S9 | 1 |
| 12/G | 8" | 14'-0" | 14'-0" | A/S9, 1/S9 | 2 |
| 13/G | 6" | 6'-0" | 6'-0" | C/S9 SIM., 3/S9 | 1 |
| 14/G | 8" | 4'-0" | 4'-0" | 4/S11 | 2 |
| 15/G | 8" | 19'-6" | COMBINED 33'-6" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 15a/G | 8" | 14'-0" | COMBINED 33'-6" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 16/G | 8" | 19'-0" | 19'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 16a/G | 8" | 15'-0" | 15'-0" | A/S9, 1/S9 | REMOVE (E) PAINT |
| 17/G | 12" | LIMITED DAMAGE ONLY | 18'-0" & 18'-6" | C/S9 SIM., 1/S9 | 1 |
| 18/G | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/G | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |

### SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE 'LIMITED DAMAGED SCHEME C' WHERE INDICATED.
7. UNLESS OTHERWISE NOTED ON PLANS AS MARK 18/G, ALL WALL LOCATIONS ARE FOR 'LIFE SAFETY SCHEME A'. WHERE NOTED ON PLAN AS MARK 18/G, THESE ARE ALTERNATE WALL LOCATIONS FOR 'LIFE SAFETY SCHEME B'.

Life Safety - Scheme C

Wall Arrangement [C]
Ground Floor

Figure 4.5

## 5. References

1. FEMA 273, *NEHRP Guidelines for the Seismic Rehabilitation of Buildings,* Federal Emergency Management Agency, Prestandard, Second SC Draft, Posted January 14, 2000.

2. FEMA 274, *NEHRP Commentary on the Guidelines for the Seismic Rehabilitation of Buildings,* Federal Emergency Management Agency, October 1997.

3. FEMA 310, *Handbook for the Seismic Evaluation of Buildings — A Pre-standard,* Federal Emergency Management Agency, January 1998.

4. FEMA 172, *NEHRP Handbook for Seismic Rehabilitation of Existing Buildings,* Federal Emergency Management Agency, June 1992.

5. FEMA 178, June 1992, *Seismic Evaluation, the Ahwahnee Hotel,* Martin/Martin, Inc., Final Report, August 1999.

# APPENDIX A

# GEOTECHNICAL REPORT AND GEOLOGIC HAZARDS

REPORT

# EARTHQUAKE-RELATED GEOLOGICAL AND GEOTECHNICAL HAZARDS ASSESSMENT

# AHWAHNEE HOTEL

# YOSEMITE NATIONAL PARK, CALIFORNIA

*Prepared for*

National Park Service

October 13, 2000

URS

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500 12th Street, Suite 200
Oakland, CA 94607

43F0066652.15

# TABLE OF CONTENTS

## 1.0 INTRODUCTION

As part of the FEMA 310 evaluation for the Ahwahnee Hotel in Yosemite National Park, California, we present in this Appendix a Geotechnical Engineering and Geologic Hazards Report. We also completed a Foundations Checklist in accordance with the evaluation described in the FEMA 310 procedure (FEMA, 1998; ASCE, 2000). The following sections provide a description of the site, the building, and the soil subsurface conditions based on field exploratory and soil laboratory testing programs. The potential geologic hazards at the site, including the liquefaction potential, are evaluated. A Foundations Checklist is included in Appendix H. The report also presents a description of preliminary seismic retrofit methods for the foundation system.

## 2.0 SITE DESCRIPTION

The Ahwahnee Hotel is located in Yosemite National Park, California. The coordinates of the site are N 37.7462° and -119.5737°. The hotel is in Yosemite Valley in the Ahwahnee Meadow, about 2,200 feet east of the Yosemite Village. The site is bounded by an almost vertical cliff (approximately 1,600 feet to the north and adjacent to the North Dome), the Royal Arch Creek (about 600 feet to the east), the Merced River (on the south and east about 600 feet to the southeast at its closest point), and a more or less flat area (part of the Ahwahnee Meadow at approximate elevation 3737 feet). Approximately 150 feet to the east of the Ahwahnee Hotel is a creek that flows from north to south, more or less parallel to the Royal Arch Creek. A few bungalows, which are part of the hotel complex, are farther to the east. In addition, there is a small pond about 120 feet north of the hotel. The ground surface dips gently to the south toward the Merced River. Grass, landscaping, a parking lot, other minor structures, and access roads cover the site. [redacted]

## 3.0 BUILDING DESCRIPTION

The following building descriptions are based on observations made by URS structural engineers during their visit to the site. The Ahwahnee Hotel, which is a historic site, is a multi-story structure with an irregular footprint shaped approximately as a "Y" and with approximate maximum planar dimensions of 300 feet by 350 feet. The footprint consists of various wings. The south wing (great lounge, south lounge, and solarium on ground floor) is about 155 feet by 51 feet and expands into side areas (mural room and wing club room on the ground floor) near its end. The west wing (dining room on the ground floor) is about 110 feet by 51 feet and expands into the northwest wing (kitchen), which is approximately 117 feet by 86 feet. The east wing (registration lobby and bar on the ground floor) is about 116 feet by 51 feet and expands into the gift shop (about 60 feet by 29 feet) and the entry gallery. The wings converge to the core that accommodates the elevator lobby on the ground floor. The height of the structure varies. The core is seven stories high, while most of the south wing and part of the east and west wings are four stories high. The remaining of the south and east wings are two stories high. The rest of the building area, including exterior galleries, loggias, and terraces are one story high. A one-level basement occupies most of the core and the portion of the east wing that is immediately adjacent to the core.

The building is a steel framed, wooden and stone masonry structure built in the late 1920's. The building foundation consists of individual footings that are mostly square and with approximate maximum planar dimensions of 4.5 feet by 4.5 feet along the footing shaft, and 6.5 feet by 6.5 feet along the pedestal. The embedment depth of the footings has not been clearly established. Based on existing architectural drawings dated 1927, the bottom of the footings is about 6.5 feet below the ground floor level. The type, amount, and layout of reinforcement in the footings are unknown. At the ground floor level is a continuous 8-inch-thick reinforced concrete slab. Below this level, the footings are apparently not connected. Under the slab is a crawl space between 3.5 feet to 4 feet high that houses various pipelines and conduits.

## 4.0 SUBSURFACE CONDITIONS

The subsurface conditions in the adjacency of the site were obtained from field investigation and laboratory testing programs conducted in September of 2000. Three exploratory borings were drilled for the field investigation by Kleinfelder of Fresno, California. [redacted] Boring B-1 was drilled about 160 feet northeast of the hotel. In the first attempt the drilling encountered refusal at a depth of about 13 feet. In the second and third attempts, each offset approximately 20 feet from the first boring location, refusal occurred at a depth of about 3 feet. Boring B-2 was drilled about 100 feet southeast of the hotel footprint down to a depth of 51.5 feet. Boring B-3 was drilled approximately 200 feet northwest of the hotel footprint down to a depth of 51.5 feet. Attachment 1 contains a letter report from Kleinfelder summarizing the field investigation and also presents the logs of borings.

These borings indicate that the soil conditions consist of granular soil composed predominantly of poorly graded and silty loose sand and poorly graded gravel. In some locations, cobbles were encountered. The refusal in boring B-1 may indicate the presence of boulders in the area immediately adjacent to the hotel. At depths of about 20 to 25 feet and 50 feet, higher blow counts were recorded in B-2 and B-3. Bedrock was not encountered down to terminal depth. Groundwater was observed during drilling at a depth of 18.3 feet in B-2 and 12.6 feet in B-3. Because it appears that some consistency exists in the soil conditions encountered in borings B-2 and B-3, it is expected that for the purpose of this evaluation, which is preliminary in nature, the soil conditions underneath the hotel footprint are similar to those observed in the exploratory borings.

A soil laboratory testing program consisting of grain size distributions and dry unit weight were conducted on selected samples. Lab test results are also included in Attachment 1.

## 5.0 GEOLOGIC HAZARDS AND GEOTECHNICAL ISSUES AT THE SITE

### 5.1 Seismic Hazards

#### 5.1.1 Seismotectonic Setting

The modern tectonic setting of central California is dominated largely by the transform plate boundary contact between the Pacific and North American plates south of the Mendocino triple junction. The Pacific plate is sliding in a north-northwest direction (N35°W to N38°W) at a rate of about 46 to 47 mm/yr with respect to the North American plate (DeMets et al., 1994). Right-lateral strike-slip displacement along the major branches of the San Andreas fault system accommodates most of this plate motion, with the remainder generating Holocene tectonism and seismicity at the western continental margin and to the east in the Sierra Nevada and Basin and Range Provinces (Minster and Jordan 1987; Atwater. 1970). East of the Coast Ranges, the Great Valley and the adjacent Sierra Nevada form a relatively stable crustal block composed of Mesozoic crystalline basement that dips gently to the west (Hill et al., 1991). The eastern escarpment of the Sierra Nevada (and the western extent of the Basin and Range province) is marked by a series of eastward-dipping, range-front normal faults that reveal significant Holocene displacement. This region is also marked by Quaternary through recent volcanic centers (i.e. Long Valley, Mono-Inyo craters volcanic chain) that stretch for a distance of 25 km and have erupted both silicic and basaltic lava (Wallace, 1984; Vetter et al. 1983). The most recent eruptions occurred between 500 to 600 years ago from vents along the Mono-Inyo craters volcanic chain.

The Ahwahnee Hotel in Yosemite Valley lies in the central Sierra Nevada mountains. The Sierra Nevada is a 600-km-long by 150-km-wide composite batholith that developed over a period of nearly 100 million years (my), from approximately 180 to 80 million of years ago (Ma) (Bateman and Eaton, 1967). Uplift of the range to its present elevation occurred in late Cenozoic time around 10 to 3.5 Ma. In the vicinity of the central Sierra Nevada and Yosemite Valley, the fault activity map of California compiled by Jennings (1994) shows few faults that fall within a 70-km-long zone that extends northwest-southeast from Lake Tahoe to Owens Lake in the south. However, recent research by Wakabayashi and Sawyer (2000) suggests that "internal" faults may be distributed relatively evenly across the Sierra Nevada, and that cumulative late Cenozoic vertical separations on these faults systematically increase eastward towards the Frontal fault system along the eastern escarpment of the Sierra (from thousandths of a millimeters per year (mm/yr) to hundredths of a mm/yr). Only a few of these faults show latest Pleistocene or younger movement (Wakabayashi and Sawyer, 2000). Despite this recent finding, the majority of the faults that could wield potential seismic hazard for the Ahwahnee Hotel probably lie on the margins of the Sierra Nevada along range-bounding segments of the Frontal fault to the east or the Foothills fault system to the west.

## Sierra Nevada Frontal Fault System

The Sierra Nevada Frontal fault system forms part of the eastern escarpment of the Sierra Nevada, and is highly segmented along its 650-km length. Between Owens Valley and Lake Tahoe, the frontal fault system consists of a series of generally north-striking, left-stepping, en-echelon fault traces (Page et al., 1994; Jennings. 1994). Earthquakes on the larger fault traces in the Sierra Nevada Frontal zone may measure up to magnitude (M) 7.5. There is probably a strong correlation between faults of the Frontal fault system and volcanic centers in the vicinity of Mono Lake, Inyo craters, and Long Valley caldera. A swarm of earthquakes, perhaps associated with underlying magma movement, at Mammoth Lakes in the 1980s prompted scientists to take a closer look at the regional seismicity and tectonics. The region between Long Valley caldera, the northern end of Owens Valley, and the White Mountains has consistently produced more M 5 to 6 earthquakes since 1978 than any other part of the continental United States (Savage and Cockerham, 1997; Hill et al., 1985). Earthquake focal mechanisms show a mix of strike-slip and dip-slip faulting consistent with a tectonic regime influenced by both east-west extension of the Basin and Range Province and dextral shear of the San Andreas transform boundary (Zoback and Zoback, 1980). Although this region has produced numerous moderate-sized earthquakes, it remains a seismic gap with respect to major earthquakes that have ruptured the surface along the north-trending eastern California-central Nevada seismic belt in historical time (Hill et al., 1985; Wallace, 1981).

### Hartley Springs and Silver Lake Fault Zones

The Hartley Springs fault zone is a major Sierra Nevada range-front normal fault with a topographic relief of about 610 m across the fault escarpment (Bailey et al., 1976). It extends south into the Long Valley caldera and appears to displace Holocene pumice deposits (Jennings. 1994; Bailey and Koeppen, 1977). In addition, the earthquake swarms of 1980 may have resulted in surface rupture along segments of the Hartley Springs fault zone, although cracking may have been secondary and related to ground shaking (Taylor and Bryant, 1980). Slip rates range from 0.14 to 0.42 mm/yr along different segments of the fault zone. The Silver Lake fault is another Frontal fault that exhibits signs of displacing Holocene colluvium). Estimated slip rates for this fault range from 0.4 to 0.5 mm/yr (Bryant. 1984b; Clark et al. 1983). This fault zone is the closest significant seismic source to the Ahwahnee Hotel, which is located approximately 38 km east of the fault traces.

### Robinson Creek and Mono Lake Faults

Dohrenwend (1982) considered the Robinson Creek fault to be a major range-front fault exhibiting normal displacement that appears to offset late Pleistocene to Holocene alluvium. An estimated slip rate of 0.2 to 0.7 mm/yr (Bryant, 1984a; Clark et: al., 1983) indicates that there could be systematic movement along this fault. The Mono Lake fault bounds the western border of Mono Lake and is postulated by Gilbert et al. (1968) to have as much as 1830 m of vertical displacement. Late Pleistocene to Holocene talus and alluvium are offset along the trend of this fault (Jennings, 1994; Dohlenwend, 1982). The Mono Lake and Robinson Creek faults are located approximately 47 km and 57 km, respectively, northeast of the Ahwahnee Hotel.

### Hilton Creek Fault

The Hilton Creek fault, located approximately 60 km southwest of the Ahwahnee Hotel, has experienced historic rupture with two M 5.1 earthquakes on June 8 and July 14, 1998, as well as four M ≥ 6 earthquakes in 1980 (Bryant, 1981). This fault and associated fractures generally trend north-northwest and have normal displacement of almost 1100 m (Bailey et al., 1976). As mentioned before, earthquakes of M ≥ 5 constitute a diffuse belt of seismicity that extends along the eastern escarpment of the Sierra Nevada and the western edge of the Basin and Range province (Hill et al., 1991). Although the largest historic earthquake in this region was the 1872 M 8 Owens Valley event, it is unlikely that faults within the Frontal fault system can generate an earthquake event of that magnitude. More typical of this region are the four 1980 Mammoth Lakes earthquakes that all measured about M 6. As a conservative estimate, a maximum credible earthquake (MCE) of 7 to 7½ should be considered possible for faults in the Mono Lake-Long Valley caldera portion of the Frontal fault system.

**Foothills Fault System**

The Foothills fault system is a major zone of basement faults in the western Sierra Nevada. It is a complex zone of shear deformation that developed during the Mesozoic, extends south to the Merced River, which flows into Yosemite Valley (approximately 35-50 km to the northeast). Most researchers label the Bear Mountain fault zone as the western boundary and the Melones fault zone as part of the eastern boundary of the Foothills fault system (Jennings, 1994; Bryant. 1983). The results of previous geologic investigations on this fault system (which included over 100 trenches across more than 30 faults) indicate that some normal faulting has occurred during the Quaternary in the Sierra Nevada foothills as a result of late Tertiary to present east-west extension (Schwartz et al., 1977). Although some segments of the Foothills fault system have been reactivated in the late Quaternary (e.g., Negro Jack Point, Bowie Flat, Rawhide Flat East), the majority have not experienced slip since the Tertiary (Bryant, 1983; Alt et al., 1977).

Extremely low slip rates of about 0.003 to 0.006 mm/yr (Schwartz et al.. 1977) are characteristic of certain segments of the Foothills fault zone, and other segments have comparably low slip rates. A conservative estimate of the MCE in this region would be M 6½, which would result in little or no significant shaking in the vicinity of the Ahwahnee Hotel (at a distance of about 35 to 50 km).

### 5.1.2 Liquefaction

The subsurface conditions at the site consist predominantly of loose granular material. In addition, although the groundwater table was observed at depths of 18.3 feet and 12.6 feet in B-2 and B-3, respectively, it is known that groundwater in the area immediately adjacent to the hotel can be shallow, on the order of a few feet, during the rainy season. Furthermore, every season water accumulates in the basement and space under the building and must be pumped out. Based on these observations it can be inferred that shallow groundwater can occur during a large seismic event. We considered groundwater to occur at a depth of five feet during the design seismic event. Our analyses of liquefaction potential indicate that for the levels of ground motions selected for the project (see Section 7 "Site Response Acceleration Parameters") the potential for liquefaction is high. We conducted our liquefaction analyses following procedures described in Youd and Idriss (1997). A summary of this analysis is included in Attachment 2.

Based on the known subsurface conditions (only to a depth of about 50 feet) and the amplitude of the ground motions, we estimate the thickness of the liquefiable layer to be at least 35 to 45 feet. Using a procedure developed by Tokimatsu and Seed (1987), we estimated the liquefaction-induced free-field settlement to be between 10 to 13 inches. Because the site may be not horizontal but slightly sloping, the potential for lateral spreading may be also significant. At the time of the preparation of this report, the slope of the site is not known.

The consequences of liquefaction to the structure are serious and may include excessive settlement, excessive differential settlement, excessive tilt, rupture of utilities and conduits, etc.

## 7.0 SITE RESPONSE ACCELERATION PARAMETERS

As part of the procedure contained in Section 3.5.2.3.1 of FEMA 310, we calculated site response acceleration parameters.

By entering the site coordinates, we estimated the peak ground horizontal acceleration (PGA) (also described as $S_S$, the short-period response acceleration), and the spectral horizontal acceleration at a period of 1 second, $S_1$, from the National Seismic Hazard Mapping Project web site (address: http://geohazards.cr.usgs.gov) developed by the U.S. Geological Survey (USGS). Since the USGS site gives these parameters at the closest grid point to the site (the grid is spaced 0.1 degrees), we interpolated the response accelerations at the site. We obtained these ground motion parameters for the 2% of probability of exceedance in 50 years, which corresponds to the Basic Safety Earthquake level 2, designated as BSE-2, for an event with a return period of about 2,475 years. This level is also termed the Maximum Considered Earthquake (MCE).

The USGS maps were developed for a reference site condition at the boundary between the National Earthquake Hazard Reduction Program (NEHRP) site categories B and C. At this boundary, the average shear wave velocity in the top 100 feet is about 2,500 feet per second. Because the Ahwahnee Hotel is a soil site class F and categorized as class E for calculation purposes, the acceleration parameters obtained from the USGS site need to be corrected for the site conditions. Using tables 3-5 and 3-6 from FEMA 310 (1998), we corrected for a site E and obtained the following acceleration parameters at the site. The corrected values using these tables yield values are about two times the USGS site values. Based in our experience in site response analyses, we consider this adjustment to give too high values at the site. Comparisons of actual site responses at various site conditions and ground motion levels (e.g., Idriss, 1991) indicate that amplification at soil sites is considerably less than those obtained with the above tables. To obtain a more accurate estimate of ground motions at the site, we recommend that additional (deeper) site information be obtained and a site response analysis be conducted. In the interim, we use in our analyses the following acceleration values.

| | Acceleration (g) | | | |
|---|---|---|---|---|
| **Seismic Hazard Level** | **BSE-1** | | **BSE-2** | |
| **Acceleration Parameter** | **$S_S$** | **$S_1$** | **$S_S$** | **$S_1$** |
| **Site B** | 0.46 | 0.14 | 1.03 | 0.28 |
| **Site E** | 0.84 | 0.48 | 0.92 | 0.81 |

The values for Site E were calculated using the FEMA procedure as follows:

$$S_{X1} = F_v \times S_1$$
$$S_{XS} = F_a \times S_s$$

where:

$S_1 = 0.14g$ and $0.28g$ .................................. Spectral response acceleration at T=1.0 sec. for the BSE-1 and BSE-2 levels, respectively, and a damping ratio of 5% at Site B;

$S_s = 0.46g$, and $1.03g$ .................................. Short period response acceleration for the BSE-1 and BSE-2 levels, respectively, and a damping ratio of 5% at Site B;

$F_v = 3.37, 2.87$ .............................................. Interpolated site coefficient dependent on Site Class and the values of the response acceleration parameters BSE-1 and BSE-2 levels, respectively, (Table 3-6, Section 3.5.2.3.1, FEMA-310);

$F_a = 1.84, 0.894$ ............................................ Interpolated Site coefficient dependent on Site Class and the values of the short-period response acceleration BSE-1 and BSE-2 levels, respectively, (Table 3-5, Section 3.5.2.3.1, FEMA-310).

Therefore:

BSE-1: $S_{X1} = F_v \times S_1 = 3.37 \times 0.14 = 0.48g$
$S_{XS} = F_a \times S_s = 1.84 \times 0.46 = 0.84g$

BSE-2: $S_{X1} = F_v \times S_1 = 2.87 \times 0.28 = 0.81g$
$S_{XS} = F_a \times S_s = 0.89 \times 1.03 = 0.92g$

Using these values, the peak acceleration, $S_a$, can be calculated by the FEMA simplified procedure as follows:

$S_a = 0.4 * S_S$

BSE-1: $\mathbf{S_a = 0.34g.}$

BSE-2: $\mathbf{S_a = 0.37g.}$

## 8.0 RECOMMENDATION FOR IMPROVING GEOLOGICAL HAZARDS FOR THE BUILDING

The geologic hazard assessment conducted for this study and presented in this report shows that the potential for ground bearing failure under static conditions, fault surface rupture, and slope failure at the site are extremely low or nonexistent.

The potential for soil liquefaction at the site, however, is significant. We present in Attachment 3 preliminary schemes of foundation retrofit to mitigate liquefaction effects.

In addition, recent studies in the area suggest that the hazard of rock slope and related phenomena at the site might be sizeable. We recommend that the hazard of rock fall be assessed on a more site-specific basis, "design" events be defined, and their respective return periods be estimated.

For our calculations we obtained response acceleration parameters from the USGS Internet site. These values are adequate for this preliminary evaluation. However, because local sources may impact the seismic exposure at the site and the building sits on potentially liquefiable soils, we recommend that a site-specific probabilistic seismic hazard analyses be conducted if a seismic retrofit is deemed necessary.

There is no significant evidence indicating that the foundation of the Ahawhnee Hotel has not performed well in the past. However, as stated above, it is our professional opinion that major foundation improvements and retrofit are necessary to reduce and mitigate the potential damages associated with liquefaction under the building during the design seismic event.

## 9.0 LIMITATIONS

This report was prepared to provide support for the FEMA 310 evaluation of the Ahawhnee Hotel owned by the National Park Service (NPS). Because of the time constraint and limited access to the building and its adjacency, the three exploratory were drilled between 100 feet and 200 feet from the building footprint. The borings were drilled by Kleinfelder of Fresno. The recommendations presented in this report are based on the assumption that the soil and geologic conditions under the building do not deviate substantially from those encountered or extrapolated from the exploratory borings. Additional borings, immediately adjacent to the buildings, should be drilled for the design of retrofit measures. The presence of boulders under the buildings should be assessed.

Descriptions of the site and the structure are based on the observations made by URS structural engineers during their visit at the site. No URS geotechnical engineer participated in this visit.

In addition, the scope of the work called for a simplified determination of the response acceleration parameters using a USGS web site. We used this web site using coordinates of the building site measured during the visit by URS engineers. We recommend that a site-specific probabilistic seismic hazard analysis and a site response analysis be conducted in order to provide a more robust estimate of the seismic response at the site.

The elevations and building measurements used in this report are based on site observation made by URS structural engineers and a review of copies of architectural drawings dated 1927.

The environmental impacts of each retrofit scheme should be evaluated according to existing pertinent documents, e.g., National Environmental Policy Act (NEPA) guidelines drafted by the National Park Service (NPS, 1997). [redacted] Procedures to minimize impacts on cultural resources should be carefully developed. Environmental and cultural resources impact assessments are beyond the scope of this seismic evaluation. Although the preliminary retrofit schemes presented in this report may be feasible from the technical and economic viewpoints, it is not known at this time the impact environmental and archeological considerations will have on the proposed solutions.

The retrofit schemes presented in this report are preliminary. The diameter, depth, and number of columns may change as further engineering analyses and evaluations are conducted and demonstrate those changes are applicable. Therefore, the estimate cost derived from this evaluation will vary accordingly.

The recommendations presented in this report were developed with the standard of care commonly used as state of the practice in the profession. No other warranties are included, either express or implied, as to the professional advice included in this report.

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**Attachment 1**

**Logs of Exploratory Borings and**

**Soil Laboratory Test Results**

KLEINFELDER
An employee owned company

October 13, 2000
File No. 21-5286-01

Mr. Joe Baldelli
**URS CORPORATION**
100 California Street, Suite 500
San Francisco, California 94111

**SUBJECT:** **Geotechnical Engineering Services Letter**
**Geotechnical Drilling and Laboratory Services**
**Ahwahnee Hotel FEMA Evaluation**
**Yosemite, California**

Dear Mr. Baldelli:

As requested, this letter presents the results of our geotechnical drilling and laboratory testing services for the completion of a FEMA 310/273 evaluation of the Ahwahnee Hotel located in Yosemite, California. The purpose of our geotechnical services was to explore the subsurface conditions for use in a liquefaction analysis by URS Corporation of the subsurface soils at the site. The location of the project site is illustrated on Plate 1, "Vicinity Map".

Our scope of services consisted of a field exploration program, laboratory testing, and preparation of this written letter.

**Project Description**

We understand URS Corporation will perform a FEMA evaluation of the Ahwahnee Hotel in Yosemite, California and that the information contained in this letter will be used in the evaluation to assess the potential for liquefaction and dynamic settlement of subsurface soils at the project site.

**Field Exploration**

The field exploration was completed on September 5, 2000 and consisted of a site reconnaissance by our staff engineer and drilling five (5) test borings near the hotel. The test borings were drilled with a CME 85 truck-mounted drill rig using a combination of 8-inch diameter hollow stem flight auger and mud rotary drilling techniques to depths ranging from 13 to 51.5 feet below the existing ground surface. The locations of the test borings are indicated on

Plate 2, "Site Plan". Boring B-1 was terminated at a depth of 13 feet below the surrounding grade due to practical auger refusal on apparent bedrock or massive boulders. Two additional boring attempts were performed at distances of approximately 20 feet from the original location. These attempts resulted in practical auger refusal at a depth of 3 feet. Borings B-2 and B-3 were advanced to a depth of 51.5 feet below the surrounding grade.

The soils encountered in the test borings were visually classified in the field and a continuous log was recorded. In-place samples were collected from the test borings at selected depths by driving a 2.5 inch I.D. split barrel sampler containing three 6 inch long brass liners into the undisturbed soil. In addition, a 1.4 inch I.D. standard penetrometer was driven 18 inches in accordance with ASTM D1586 test procedures. The standard penetrometer was driven without liners. Resistance to sampler penetration was noted as the number of blows per foot over the last 12 inches of sampler penetration on the boring logs. Both samplers were driven with a 140 pound automatic hammer free falling a distance of 30 inches. The recorded sample penetration rates have not been corrected for sampler size, overburden, or hammer efficiency.

**Laboratory Tests**

Laboratory tests were performed on selected samples to aid in evaluation of physical characteristics of the soils encountered. As directed by you, the laboratory test program included performing the following tests:

- Unit weight (ASTM D-2937)
- Moisture content (ASTM D-2216)
- Sieve Analysis excluding Hydrometer (ASTM D-422)

Unit weight and moisture content test results are shown on the boring logs. The results of the sieve analyses are presented on Plates 6 through 10.

**Surface Conditions**

The Ahwahnee Hotel is located at the base of a southerly facing granitic rock face within the northern portion of the Yosemite Valley in Yosemite, California. Massive boulders and cobble were present on the ground surface north of the hotel (at the base of the rock face) that are associated with a prehistoric rock fall. The Merced River is located approximately 700 feet southeast of the hotel. The remaining features surrounding the hotel consist of cottages, maintenance facilities, mature trees, and drainage swales. The hotel is abutted on the north by existing asphalt-paved parking with the remainder of the hotel abutted by natural landscape and lawn areas.

### Earth Materials

The following description provides a general summary of the subsurface conditions encountered during our field exploration and further validated by the laboratory testing program. For a more thorough description of the actual conditions encountered at specific boring locations, refer to the boring logs presented (Plates 3 through 5). The data from our test borings indicate the subsurface soil at the project site generally consists of relatively clean sands with varying amounts of silt and gravel extending to the depth explored, 51.5 feet below surrounding grade.

### Groundwater Conditions

Groundwater was encountered at the boring locations between depths of 12 and 18 feet below the surrounding grade. Based on review of a Problem Assessment Report prepared for the Ahwahnee Hotel Underground Storage Tank Site by Kleinfelder (reference File No. 24-320012-E00/YSMTE-014-91-148, dated October 11, 1991), the depth to groundwater in July 1991 ranged from 6 to 10 feet below the surrounding grade. It is likely that groundwater conditions at the site fluctuate throughout the year due to variations in rainfall, snow melt, river flow, or other factors.

### Limitations

We have performed the field and laboratory testing in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No warranty is expressed or implied. Information contained in this letter is based on our field observations, subsurface explorations, and laboratory tests. It is possible that soil conditions could vary between or beyond the points explored.

This letter may be used only by URS Corporation and their client only for the purposes stated and within a reasonable time from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any other party who wishes to use this letter shall notify Kleinfelder of such intended use. Based on the intended use of the letter, Kleinfelder may require that additional work be performed and that an updated letter be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

Kleinfelder appreciates the opportunity to provide geotechnical engineering services to you during the design phase of this project. We trust this information meets your current needs. If you have any questions concerning the information presented in this letter, please contact the Fresno office at your convenience.

Respectfully submitted,

**KLEINFELDER, INC.**

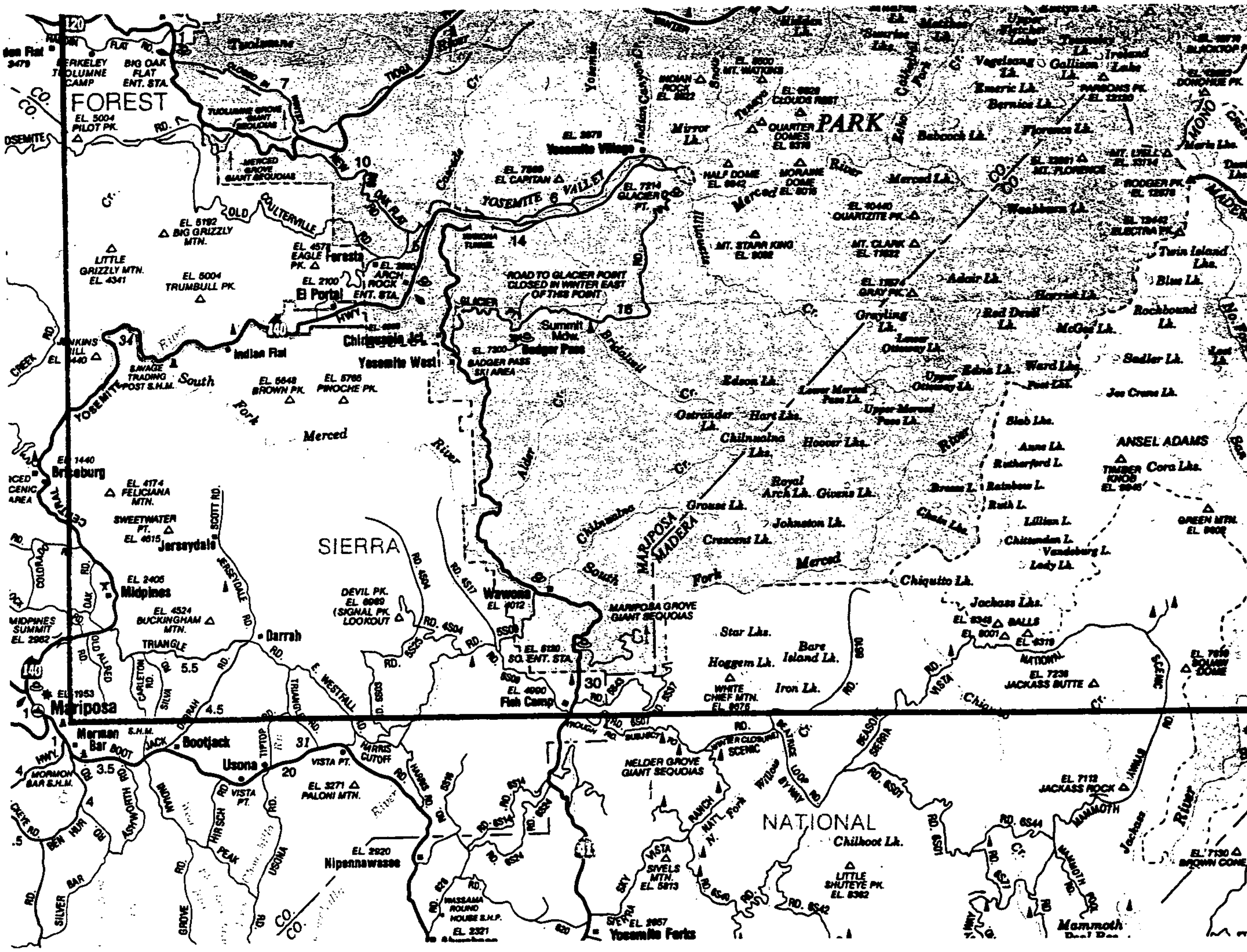
Stephen P. Plauson, E.I.T.
Project Engineer

David L. Pearson, P.E., G.E.
Senior Project Manager

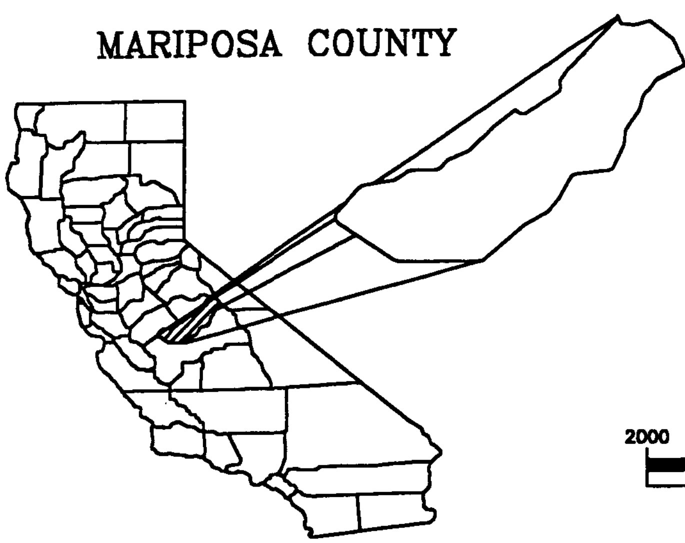
REGISTERED PROFESSIONAL ENGINEER
DAVID L. PEARSON
No. 674
Exp. 12/31/01
GEOTECHNICAL
STATE OF CALIFORNIA

SPP:DLP:tjg
Attachment

cc: URS Corporation, Carlos Lazarte (2 copies)



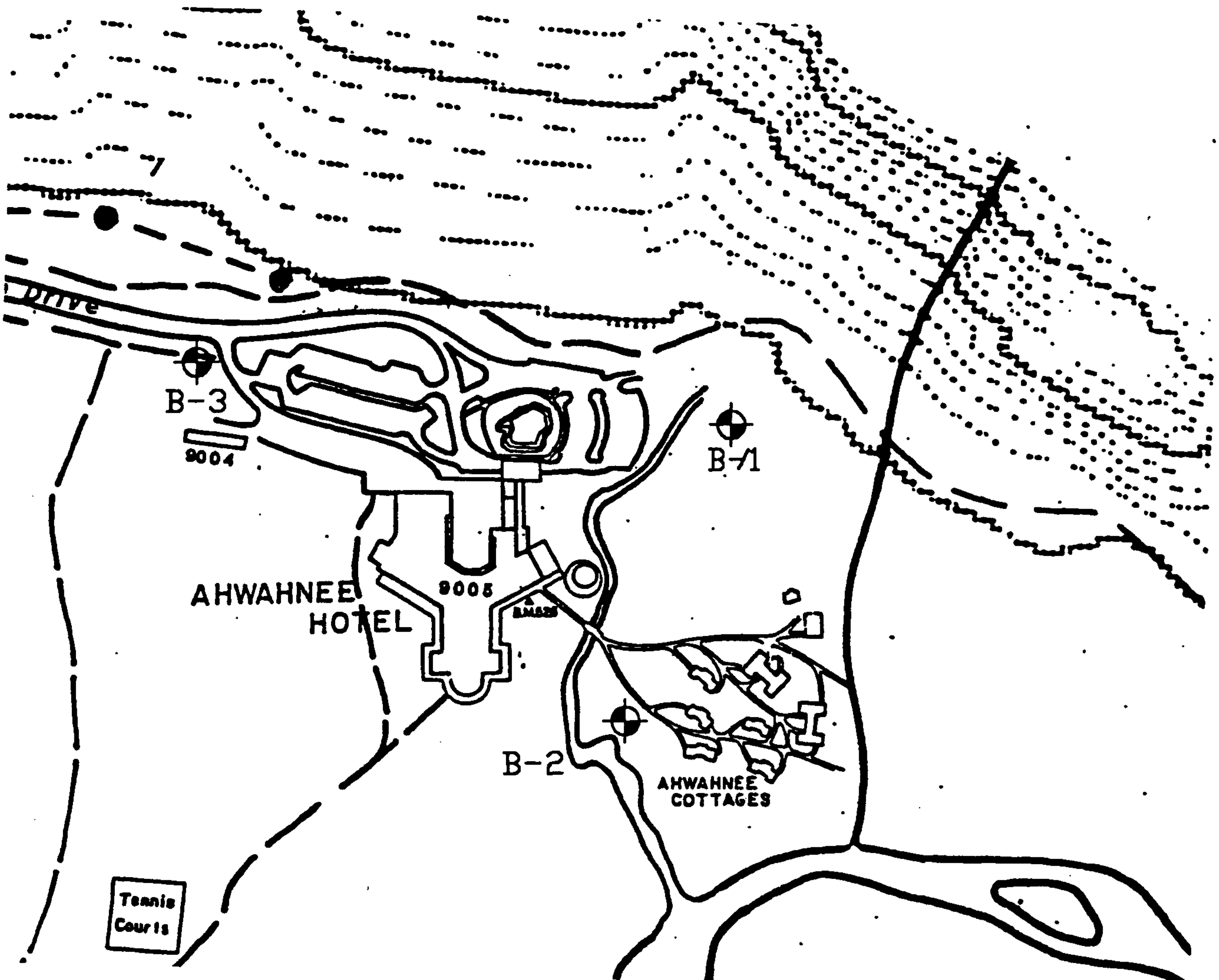

MARIPOSA COUNTY



2000 0 1000 2000 4000

*SCALE: 1 inch = 2000 ft.*

| KLEINFELDER | | SITE VICINITY<br>AHWAHNEE HOTEL FEMA EVALUATION<br>YOSEMITE VALLEY<br>YOSEMITE, CALIFORNIA | PLATE<br>1 |
|---|---|---|---|
| DRAWN BY: S. PLAUSON<br>PROJECT No. 21-5286-01 | DATE: 10-13-00<br>DWG No. site_vic | | |




EXPLANATION

B-1 Approximate boring location (typ.)

300 0 150 300 600

SCALE: 1 inch = 300 ft.

| KLEINFELDER | SITE PLAN<br>AHWAHNEE HOTEL FEMA EVALUATION<br>YOSEMITE VALLEY<br>YOSEMITE, CALIFORNIA | PLATE<br>2 |
|---|---|---|
| DRAWN BY: S. PLAUSON<br>PROJECT No. 21-5286-01 \| DATE: 10-13-00<br>DWG No. site_plan | | |

| | |
|---|---|
| Date Completed: 9/5/00 | Surface Conditions: FORRESTED AREA |
| Logged By: S. PLAUSON | Rig Type: CME 85 Auger Type: 5"DRAGBIT |
| Total Depth: 13.0 feet | Groundwater: NFGWE |

| Depth, ft | FIELD: Sample | FIELD: Blows/ft | LABORATORY: Dry Density pcf | LABORATORY: Moisture Content % | LABORATORY: Approx. Satura-tion % | LABORATORY: Approx. % Relative Compaction (ASTM 1557) | Pen, tsf | DESCRIPTION<br>Approximate Relative Surface Elevation (ft): |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | GRAVELLY SAND WITH SILT(SP-SM) - brown, moist, loose, fine to coarse grained sand, 1/4" to 3" diameter gravel |
| | | | | | | | | ... small cobbles |
| 5 | | 10 | 103.4 | 3.2 | | | | |
| 10 | | 9 | | | | | | ... decreasing gravel |
| | | | | | | | | ... practical auger refusal at 13 feet |
| 15 | | | | | | | | Notes:<br>1.) Bottom of boring at 13 feet.<br>2.) No free groundwater encountered.<br>3.) Boring backfilled with soil cuttings 9/5/00.<br>4.) Two additional borings were attempted within approximately 20 feet of boring B-1. Practical auger refusal was encountered at a depth of 3 feet in each additional boring. |
| 20 | | | | | | | | |

KLEINFELDER

PROJECT NO. 21-5286-01

LOG OF BORING B- 1
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

PLATE
1 of 1

Surface Conditions: FORRESTED AREA

Date Completed: 9/5/00

Logged By: S. PLAUSON

Total Depth: 51.5 feet

Rig Type: CME 85 Auger Type: 5"DRAGBIT

Groundwater: 18.3

| Depth, ft | FIELD Sample | FIELD Blows/ft | LABORATORY Dry Density pcf | LABORATORY Moisture Content % | LABORATORY Approx. Satura-tion % | LABORATORY Approx. % Relative Compaction (ASTM 1557) | Pen, tsf | DESCRIPTION — Approximate Relative Surface Elevation (ft): |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **GRAVELLY SAND WITH SILT(SP-SM)** - brown, moist, loose, fine to coarse grained sand, 1/4" to 3" diameter gravel |
| 5 | | 9 | 96.7 | 3.5 | | | | |
| | | | | | | | | **POORLY GRADED SAND (SP)** - gray, moist, loose, fine grained. |
| 10 | | 8 | | | | | | ...fine to coarse grained. |
| 15 | | 50/4" | | | | | | ... drove cobble |
| | | | | | | | | **SAND WITH SILT(SP-SM)** - gray, wet, medium dense, fine to coarse grained<br>... ground water measured at 18.3 feet. |
| 20 | | | | | | | | |

KLEINFELDER

PROJECT NO. 21-5286-01

LOG OF BORING B- 2
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

PLATE
1 of 3

| Depth, ft | FIELD Sample | FIELD Blows/ft | LABORATORY Dry Density pcf | LABORATORY Moisture Content % | LABORATORY Approx. Saturation % | LABORATORY Sample Number | Pen, tsf | DESCRIPTION (Continued from previous plate) |
|---|---|---|---|---|---|---|---|---|
| | | 25 | | | | | | ... wet, fine to coarse, grained, medium dense. |
| | | | | | | | | POORLY GRADED SAND (SP) - gray, moist , loose, fine grained. |
| 25 | | 5 | | | | | | ... fine grained, loose, convert to mud rotary. |
| | | | | | | | | SAND WITH SILT(SP-SM) - gray, wet, loose, fine |
| 30 | | 4 | | | | | | |
| | | | | | | | | POORLY GRADED SAND (SP) - gray, moist , medium dense, fine grained. |
| 35 | | 10 | | | | | | ... fine to coarse grained, medium dense. |
| 40 | | 5 | | | | | | ...loose, no recovery |

| Depth, ft | FIELD: Sample | FIELD: Blows/ft | LABORATORY: Dry Density pcf | LABORATORY: Moisture Content % | LABORATORY: Approx. Satura-tion % | LABORATORY: Sample Number | Pen, tsf | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *(Continued from previous plate)* |
| | | | | | | | | **POORL GRADED GRAVEL (GP)** - gary, wet, loose, 1/4"-1/2" diameter gravel. |
| 45 | ▲ | 9 | | | | | | **POORLY GRADED SAND (SP)** - gray, wet, loose, fine to medium graded. |
| 50 | ▲ | 25 | | | | | | |
| 55 | | | | | | | | **Notes:**<br>1.) Bottom of boring at 51.5 feet.<br>2.) Groundwater encountered at 18.3'.<br>3.) Boring backfilled with soil cuttings 9/5/00. |
| 60 | | | | | | | | |
| 65 | | | | | | | | |

KLEINFELDER

PROJECT NO. 21-5286-01

**LOG OF BORING B- 2**
**AHWAHNEE HOTEL FEMA EVALUATION**
**YOSEMITE VALLEY**
**YOSEMITE, CALIFORNIA**

**PLATE**
**3 of 3**

Date Completed: 9/5/00
Logged By: S. PLAUSON
Total Depth: 51.5 feet

Surface Conditions: FORRESTED AREA
Rig Type: CME 85 Auger Type: 5"DRAGBIT
Groundwater: 12.2

| Depth, ft | FIELD Sample | FIELD Blows/ft | LABORATORY Dry Density pcf | LABORATORY Moisture Content % | LABORATORY Approx. Saturation % | LABORATORY Approx. % Relative Compaction (ASTM 1557) | Pen, tsf | DESCRIPTION<br>Approximate Relative Surface Elevation (ft): |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **SILTY SAND (SM) - dark brown, moist, loose, fine to coarse grained (loam).** |
| 5 | | 10 | 100.2 | 7.9 | | | | ... brown |
| 10 | | 5 | | | | | | |
| | | | | | | | | ... convert to mud rotary, ground water measured at 12.2 feet. |
| | | | | | | | | **POORLY GRADED SAND (SP) - -gray, wet, loose, fine to coarse grained.** |
| 15 | | 3 | 94.0 | 23.2 | | | | |
| | | | | | | | | **GRAVEL WITH SILTY SAND (GM) - gray, wet , very dense, fine to coarse, 1/4 - 1" diameter gravel.** |
| 20 | | | | | | | | |

KLEINFELDER

PROJECT NO. 21-5286-01

LOG OF BORING B- 3
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

PLATE
1 of 3

| Depth, ft | Sample | Blows/ft | Dry Density pcf | Moisture Content % | Approx. Saturation % | Sample Number | Pen, tsf | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *(Continued from previous plate)* |
| | | 60 | | | | | | |
| 25 | | 15 | | | | | | ... no recovery. |
| 30 | | 7 | | | | | | ... drove cobble. |
| | | | | | | | | **POORLY GRATED SAND (SP)** - gray, wet, loose, fine to medium grated, trace fine gravel. |
| 35 | | 5 | | | | | | |
| 40 | | 19 | | | | | | |

KLEINFELDER

PROJECT NO. 21-5286-01

LOG OF BORING B- 3
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

| Depth, ft | FIELD Sample | FIELD Blows/ft | LABORATORY Dry Density pcf | LABORATORY Moisture Content % | LABORATORY Approx. Saturation % | LABORATORY Sample Number | Pen, tsf | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *(Continued from previous plate)* |
| 45 | | 9 | | | | | | |
| 50 | | 13 | | | | | | ... medium dense. |
| 55 | | | | | | | | |
| 60 | | | | | | | | |
| 65 | | | | | | | | |

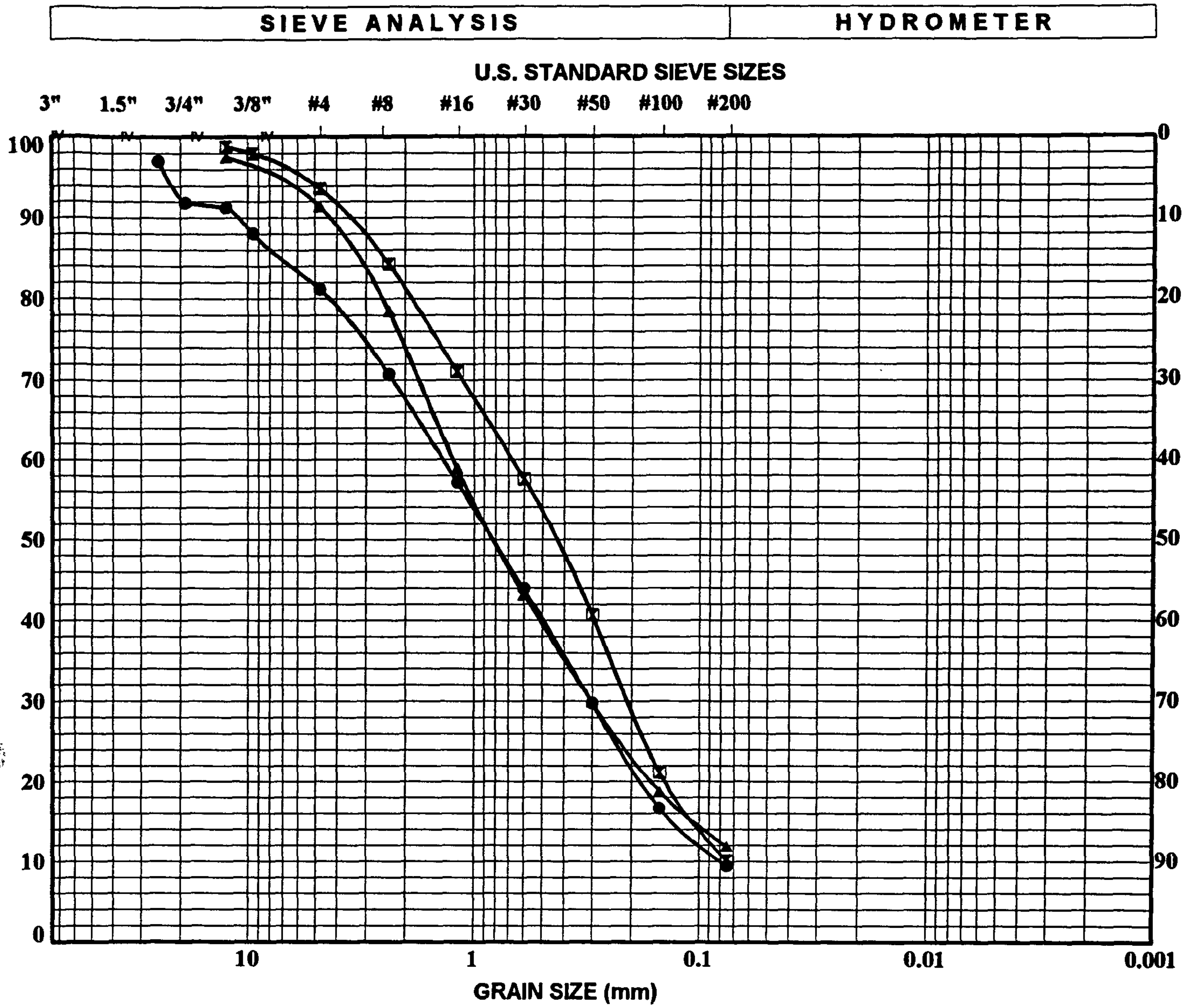
Notes:
1.) Bottom of boring at 51.5 feet.
2.) Groundwater encountered at 12.2'.
3.) Boring backfilled with soil cuttings 9/5/00.

KLEINFELDER

PROJECT NO. 21-5286-01

LOG OF BORING B- 3
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

PLATE
3 of 3




| GRAVEL | | SAND | | | SILT | CLAY |
|---|---|---|---|---|---|---|
| coarse | fine | coarse | medium | fine | | |

| Symbol | Sample | Depth (ft) | Description | Classification |
|---|---|---|---|---|
| ● | B-1 | 6.0 | Sand with Silt | SP-SM |
| ⊠ | B-1 | 10.0 | Sand with Silt | SP-SM |
| ▲ | B-2 | 6.0 | Sand with Silt | SP-SM |

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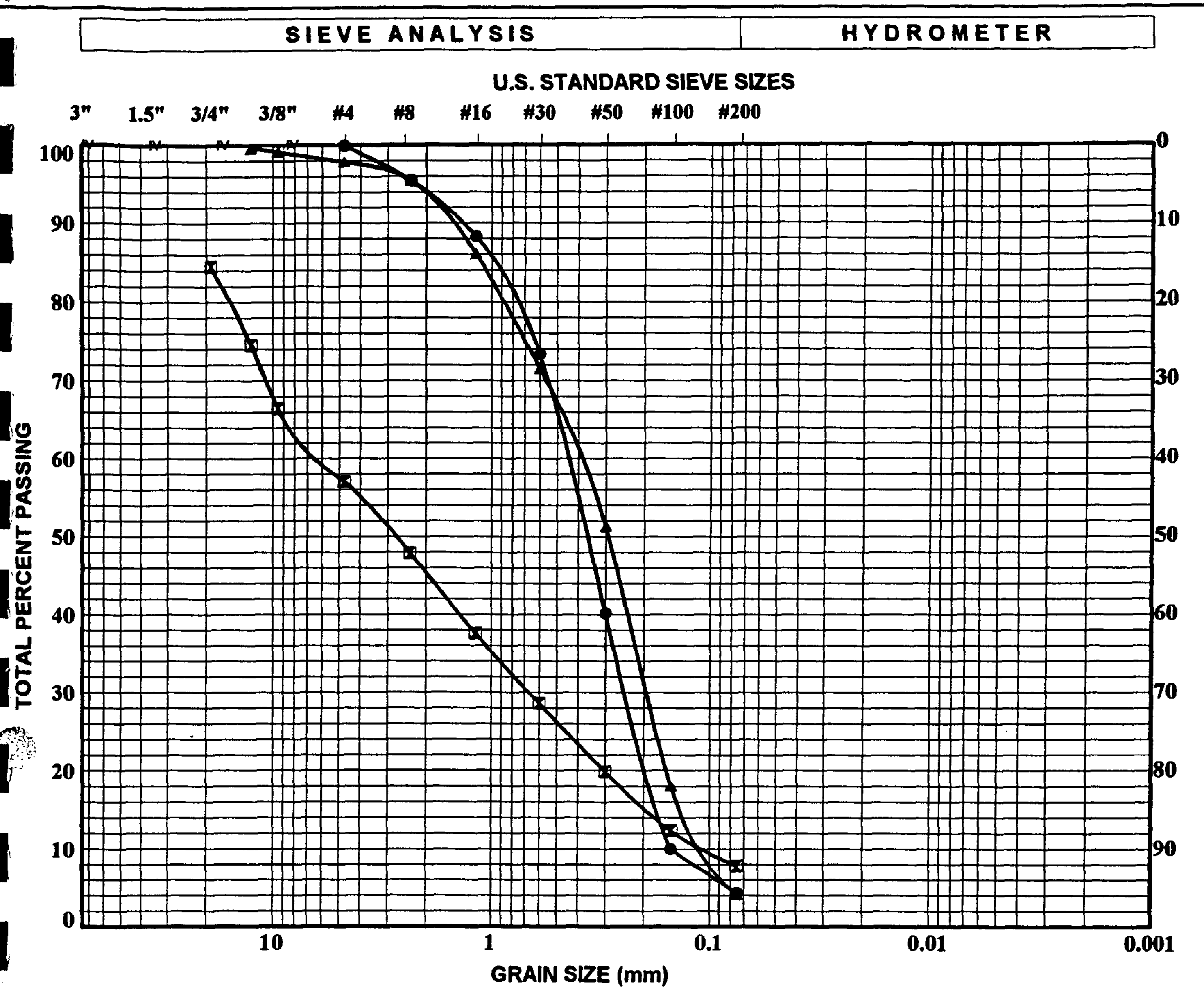
PROJECT NO. 21-5286-01

GRAIN SIZE DISTRIBUTION
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

PLATE 6




| GRAVEL | | SAND | | | SILT | CLAY |
|---|---|---|---|---|---|---|
| coarse | fine | coarse | medium | fine | | |

| Symbol | Sample | Depth (ft) | Description | Classification |
|---|---|---|---|---|
| ● | B- 2 | 10.0 | Poorly Graded Sand | SP |
| ⊠ | B- 2 | 20.0 | Sand with Silt | SP-SM |
| ▲ | B- 2 | 25.0 | Poorly Graded Sand | SP |

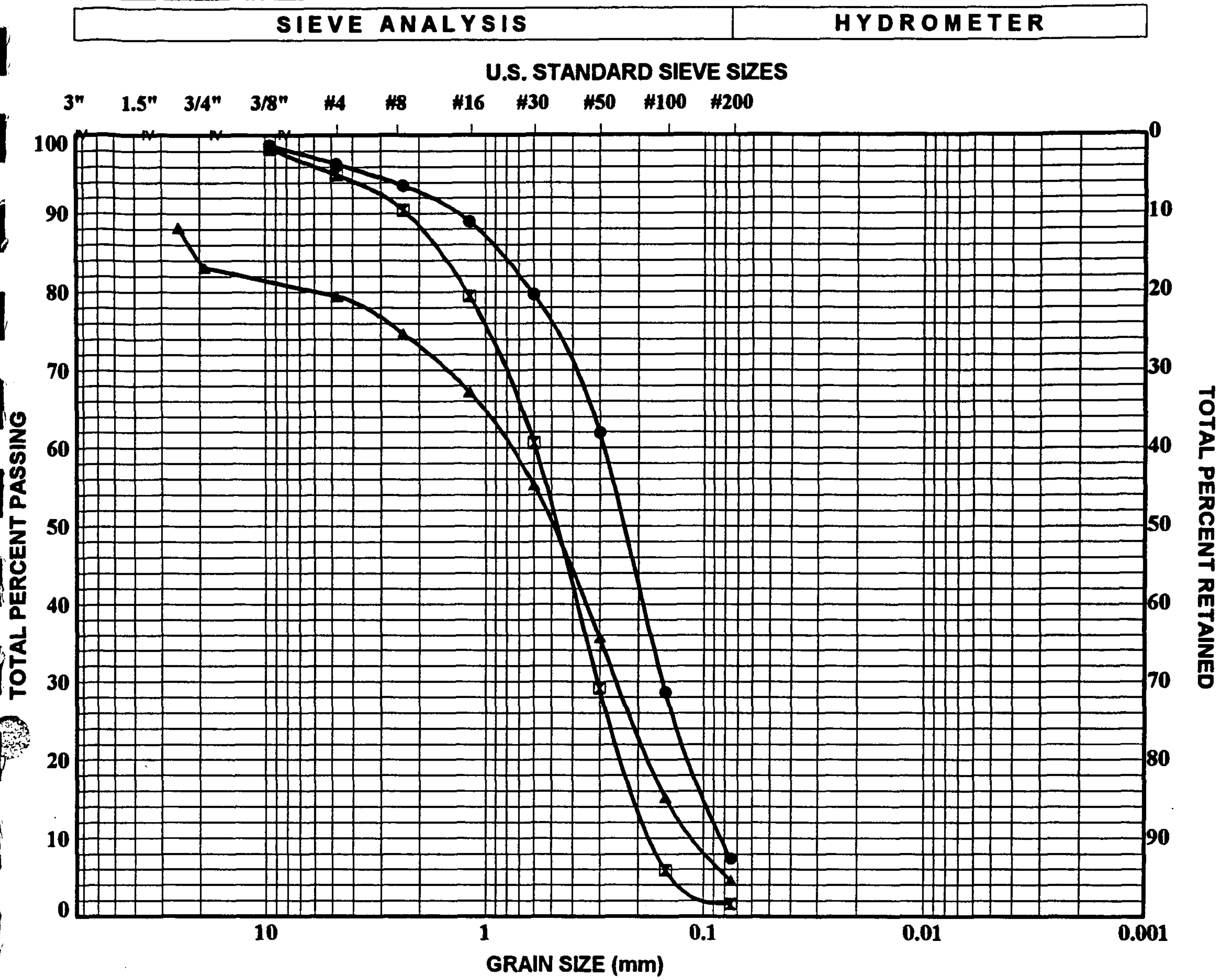
KLEINFELDER

PROJECT NO. 21-5286-01

GRAIN SIZE DISTRIBUTION
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

PLATE

7




| GRAVEL | | SAND | | | SILT | CLAY |
|---|---|---|---|---|---|---|
| coarse | fine | coarse | medium | fine | | |

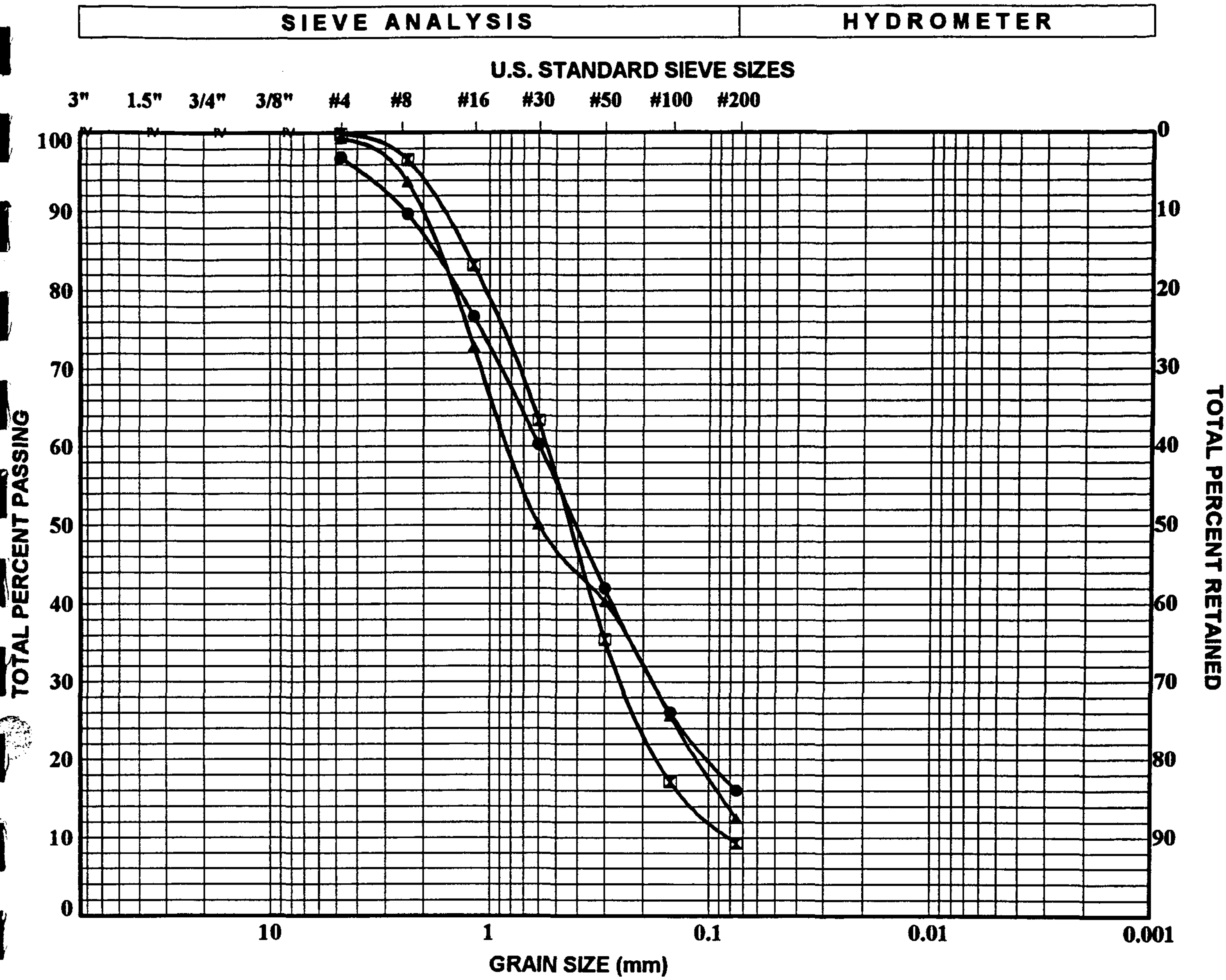
| Symbol | Sample | Depth (ft) | Description | Classification |
|---|---|---|---|---|
| ● | B- 2 | 30.0 | Sand with Silt | SP-SM |
| ⊠ | B- 2 | 35.0 | Poorly Graded Sand | SP |
| ▲ | B- 2 | 50.0 | Poorly Graded Sand | SP |

KLEINFELDER

PROJECT NO. 21-5286-01

GRAIN SIZE DISTRIBUTION
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

PLATE
8




| GRAVEL | | SAND | | | SILT | CLAY |
|---|---|---|---|---|---|---|
| coarse | fine | coarse | medium | fine | | |

| Symbol | Sample | Depth (ft) | Description | Classification |
|---|---|---|---|---|
| ● | B- 3 | 6.0 | Silty Sand | SM |
| ⊠ | B- 3 | 10.0 | Silty Sand | SM |
| ▲ | B- 3 | 16.0 | Silty Sand | SM |

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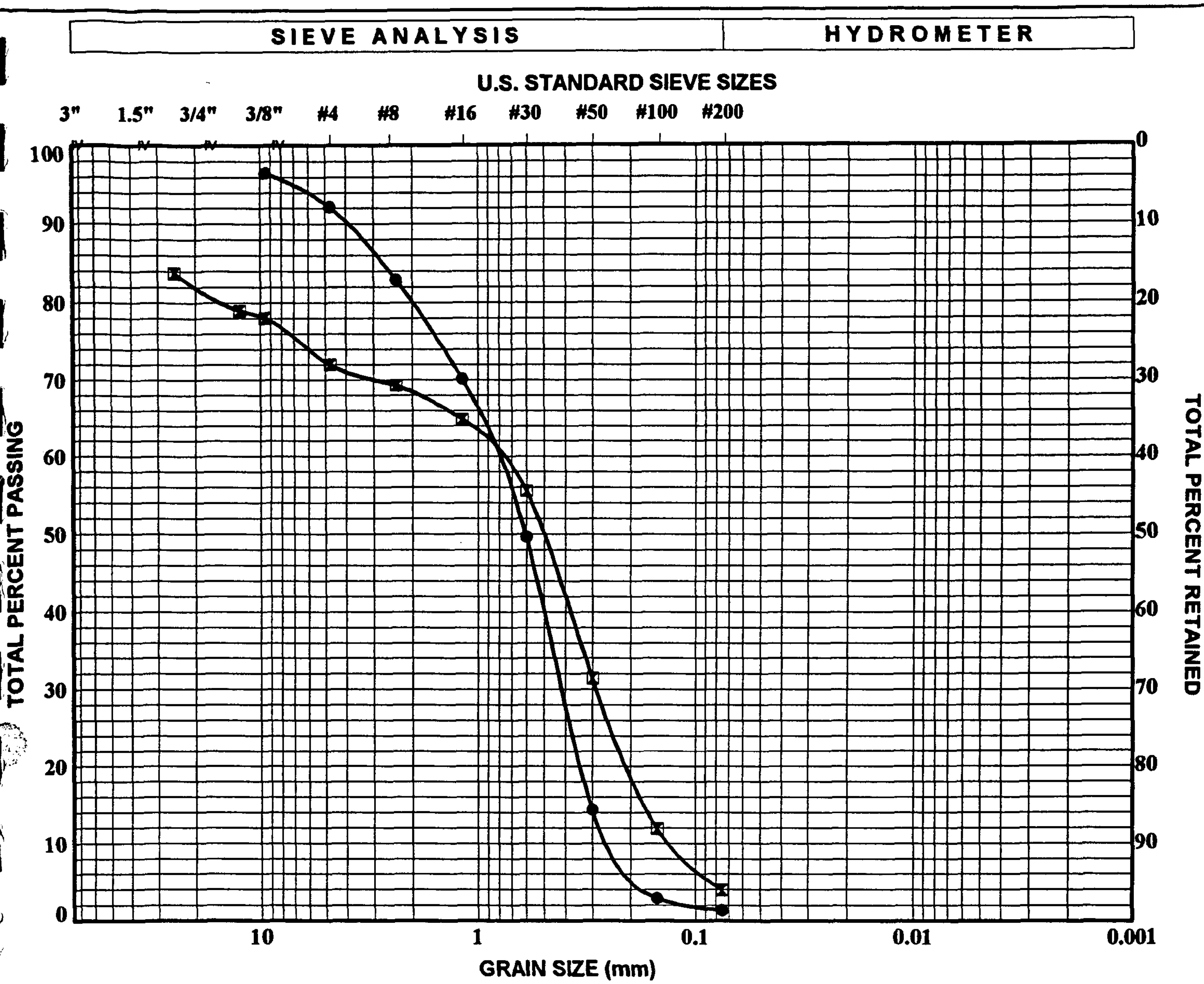
GRAIN SIZE DISTRIBUTION
AHWAHNEE HOTEL FEMA EVALUATION
YOSEMITE VALLEY
YOSEMITE, CALIFORNIA

PLATE 9



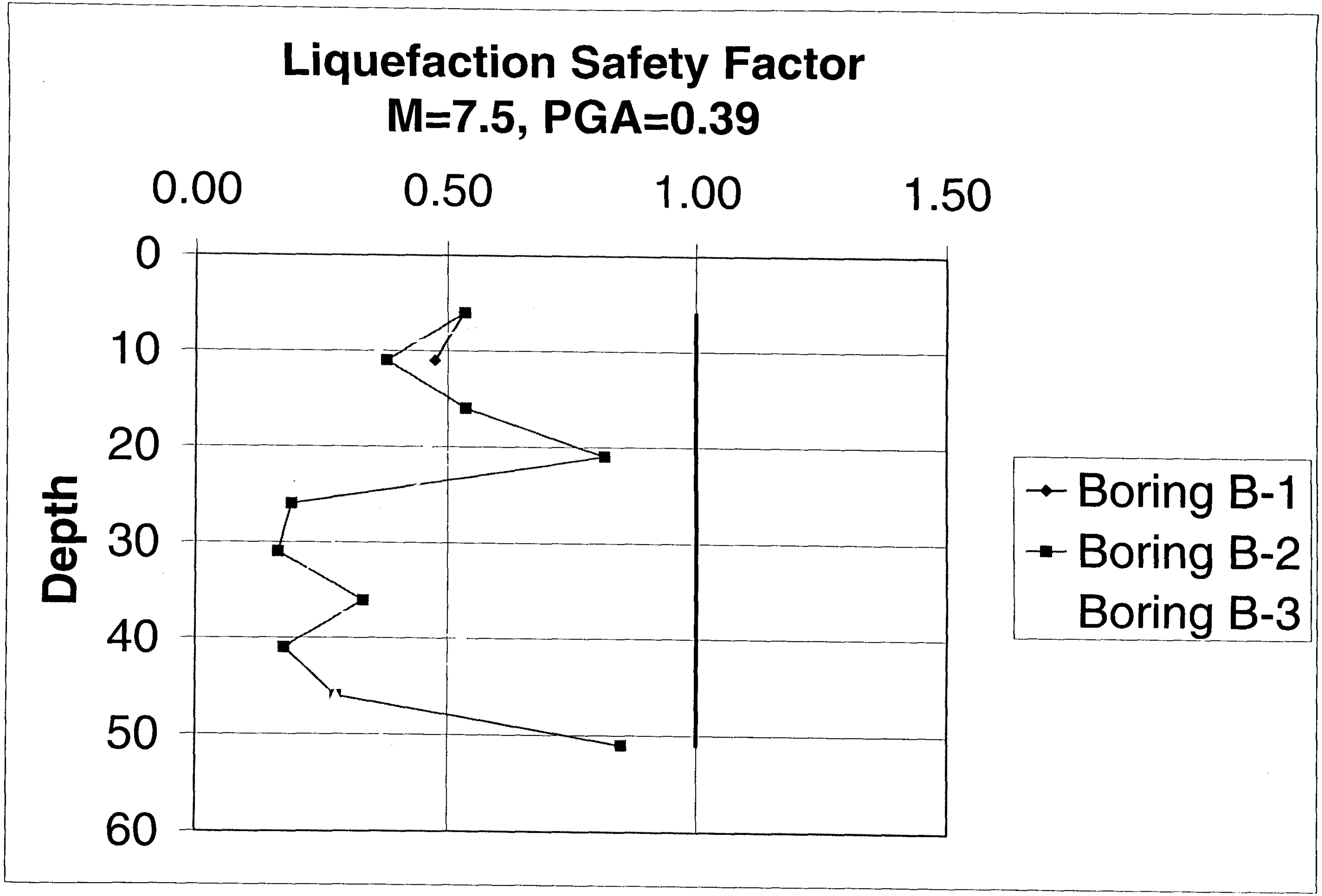

| GRAVEL | | SAND | | | SILT | CLAY |
|---|---|---|---|---|---|---|
| coarse | fine | coarse | medium | fine | | |

| Symbol | Sample | Depth (ft) | Description | Classification |
|---|---|---|---|---|
| ● | B-3 | 35.0 | Poorly Graded Sand | SP |
| ⊠ | B-3 | 45.0 | Poorly Graded Sand | SP |

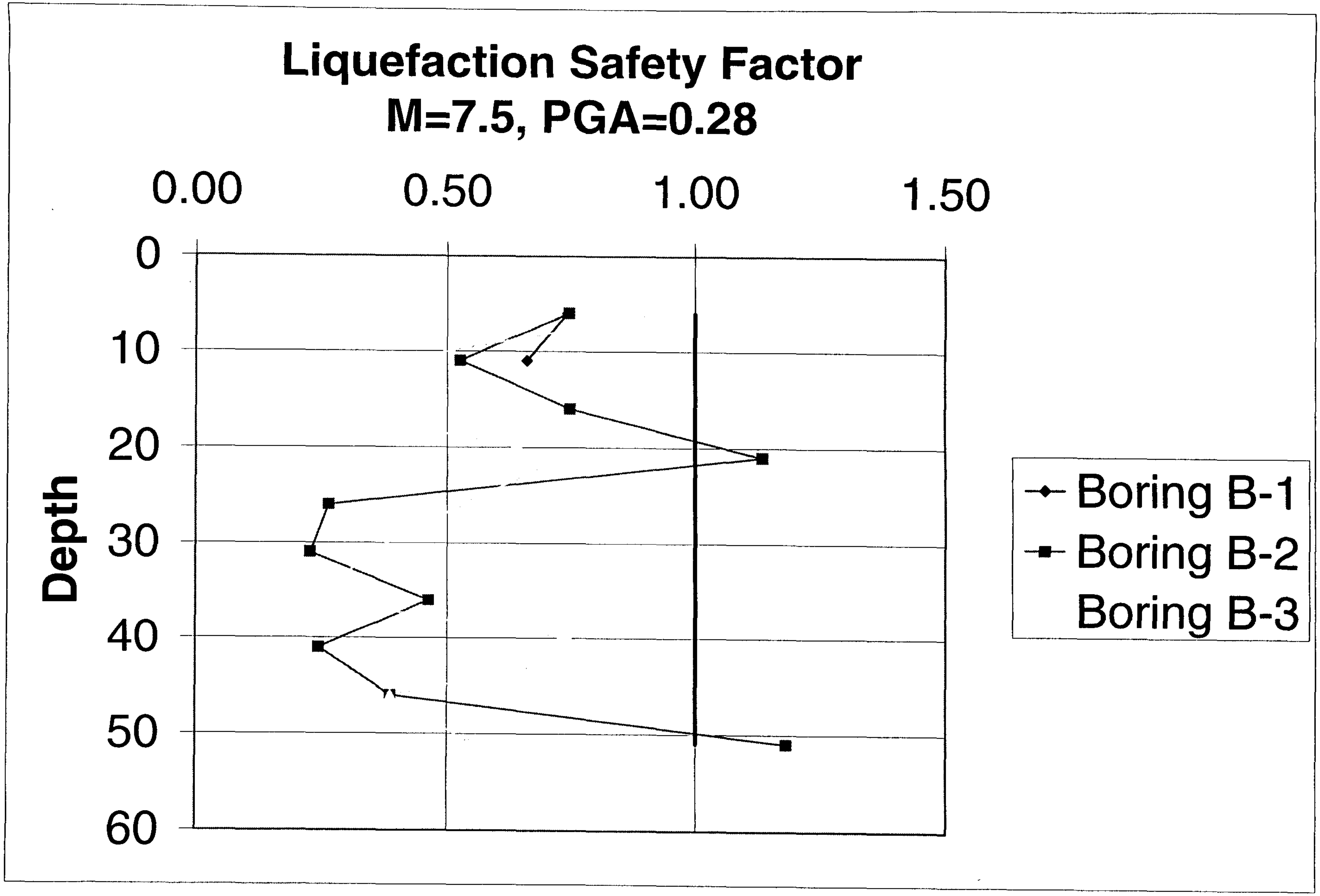
| | | |
|---|---|---|
| KLEINFELDER | GRAIN SIZE DISTRIBUTION<br>AHWAHNEE HOTEL FEMA EVALUATION<br>YOSEMITE VALLEY<br>YOSEMITE, CALIFORNIA | PLATE<br>10 |
| PROJECT NO. 21-5286-01 | | |

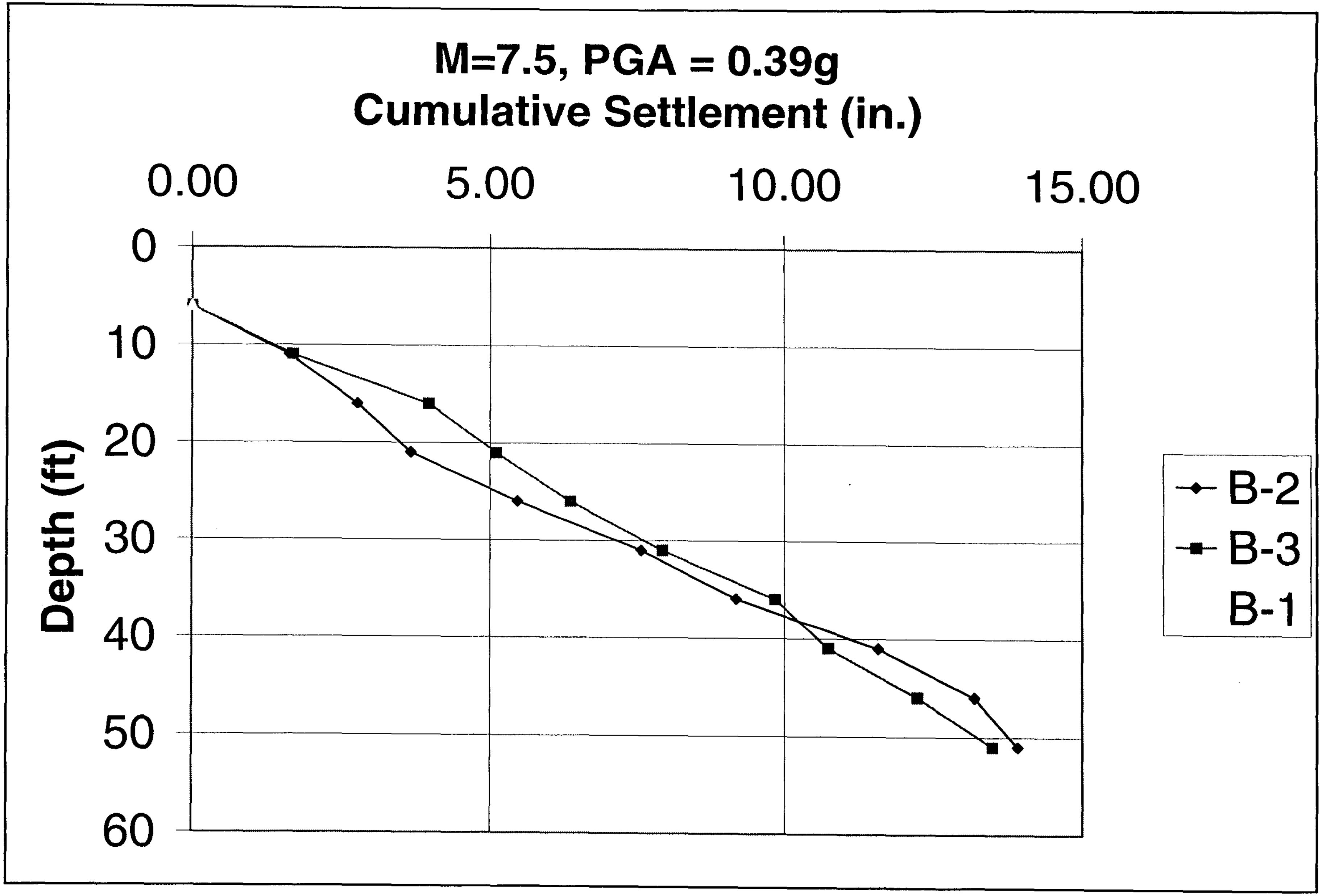
## Attachment 2

## Summary of Liquefaction Potential Analysis



Liquefaction Safety Factor
M=7.5, PGA=0.39
0.00
0.50
1.00
1.50
0
10
20
30
40
50
60
Depth
Boring B-1
Boring B-2
Boring B-3


Liquefaction Safety Factor
M=7.5, PGA=0.28
0.00
0.50
1.00
1.50
0
10
20
30
40
50
60
Depth
Boring B-1
Boring B-2
Boring B-3



M=7.5, PGA = 0.39g
Cumulative Settlement (in.)
0.00
5.00
10.00
15.00
0
10
20
30
40
50
60
Depth (ft)
B-2
B-3
B-1

# Attachment 3

## Preliminary Description of Foundation Seismic Retrofit

## Preliminary Description of Foundation Seismic Retrofit to mitigate Liquefaction Effects

### Introduction

This attachment presents preliminary conceptual retrofit schemes to mitigate liquefaction-induced damage during the design earthquake at the Ahwahnee Hotel. In developing these schemes, we considered liquefaction mitigation techniques that would be least invasive and be most compatible with [redacted] and historic nature of the building and its environ. This section describes the basic concepts of two selected retrofit schemes that were finally selected and presents a preliminary cost estimate of each of these techniques. In developing these preliminary concepts, we based our evaluation on our firm's experience in similar projects and on our conversations with specialty contractors in ground modification.

### Scope

The scope of this section includes:

- Identification of technically feasible and cost effective techniques to mitigate liquefaction;
- Evaluation of the constructibility of such techniques for the existing conditions of the building;
- Evaluation of the potential impacts of these techniques to the existing foundation and structure;
- Evaluation of the successful application of such techniques in the foundation remediation of historic buildings;
- Preliminary evaluation of effects of these techniques to the environment; and
- Preliminary cost estimate of each of the selected retrofit systems evaluated.

### Objectives of the liquefaction retrofit

The main objective of the remediation schemes is to minimize the total and relative settlement induced by liquefaction the structure is subjected to. Because the extent and depth of the liquefied volume is large, any scheme involving the modification of the whole liquefiable volume under the structure would be excessively expensive and require a more intrusive technique. Our concept involves the underpinning of individual footings with a continuous vertical support extending down to deeper layers. At the ground surface, it estimated that the design ground motions would produce settlements on the order of 14 inches. Differential settlements will probably be several inches. At a depth of about 40 to 45 feet, however, the cumulative liquefaction-induced total and differential settlement are estimated to be only 1.5 to 2 inches, and one inch, respectively. Because the bearing mechanism is transferred down to these deeper layers, the damaging effects at the surface are decoupled from the structure. As the ground adjacent to the building may liquefy and settle with respect to the structure, incoming pipelines and conduits, as well as on-grade slabs astride the structure and the adjacent ground may experience large deformations and breakage. However, it is anticipated that cost-effective solutions to these potential problems can be easily implemented or, alternatively, that the repair costs in the event of liquefaction-triggered failure may be acceptable. Another important objective of the foundation retrofit is to provide horizontal connection and restraint among footings at the foundation level.

## Techniques to Mitigate Liquefaction

Several techniques have been developed in the last few decades to mitigate the damaging effects of liquefaction. For the case of soil modification taking place before any construction is in place, some techniques include dynamic compaction, stone columns, vibro-flotation, vibro-replacement, variations of these techniques, and various types of soil grouting. For the case of soil remediation under and around existing facilities, successful techniques include jet grouting, chemical grouting, minipiles, compaction grout, permeation grout, etc. Various of these techniques have been utilized for a number of years in the rehabilitation and ground support of buildings, tunnels, etc. and also in the seismic retrofit of existing building and dams. The applicability of each of these techniques was controlled by numerous project variables including extent of retrofit, accessibility, conditions of existing facility, scheduling, and construction costs.

## Selected techniques

In order to meet the objectives of this retrofit described above, schemes that can reduce significantly or eliminate liquefaction effects underneath the foundation while they provide horizontal restrain are necessary. These techniques are heavily dependent on the existing conditions at the site. Some of the existing conditions at the Ahwahnee Hotel that affect the selection of liquefaction techniques are:

- The extent and depth (about 40 feet) of the liquefied volume is large;
- The large magnitude of the liquefaction-induced ground settlement at the site under the design earthquake, on the order of 14 inches;
- The foundation consists of multiple individual footings;
- Soil conditions;
- Groundwater conditions;
- The structure must remain in place;
- The nature of the structure must be preserved;
- Access to the underground is limited;
- Access inside the building is limited;
- Environmental and cultural impacts must be minimal.

The modification of the whole liquefiable volume would be excessively expensive. In addition, the modification of such a large volume may have a larger environmental impact, in particular, to the groundwater. As mentioned earlier, we resolved to a concept in which individual footings are underpinned with a continuous vertical support extending down to deeper layers to decouple the damaging effects at the surface from the structure. While some footings are located along the footprint of the structure, most are located in the interior of the building; therefore, much of the underpinning work will need to be conducted in the interior. Because of the limited space in the interior and the crawl space, only techniques that use small equipment are feasible. Therefore, techniques such as stone columns, vibro methods, and deep soil mixing, which utilize large equipment, may cause intolerable vibrations, and may present serious difficulties in spoil handling, were ruled out.

Importantly, the applicability of many of the liquefaction remediation techniques is heavily dependent of the soil conditions at the site. Because of the relatively open matrix of the granular materials with little fines content encountered at the site, most of the ground modification techniques typically employed in liquefaction mitigation are applicable in this case. However, the presence of erratic boulders under any footing may impede the successful application of any technique.

Based on the level of information available at the time of the preparation of this report of the structural, subsurface, environmental, accessibility conditions, the two techniques we find more feasible are:

a) Jet Grouting
b) Compaction Grout

These two techniques are briefly described below:

**Jet grouting:** Jet grouting is a ground improvement technique in which high pressure fluid jets are used to erode the in-situ soil and mix it with a neat cement grout. The result is an alteration of the mechanical characteristics of the jet-grouted material to a desired structural product. As the jet rotates, a continuous cylindrical shape of the jet-grouted material is commonly obtained. By controlling various parameters including jet pressure, rotation speed, probe withdrawal rate, grout and in-situ material characteristics, it is possible to vary the diameter of the jet-grouted material.

Typical sequential steps of a jet-grouted element are:

1) A small borehole (about 4 to 12 inches in diameter) is drilled to the limit depth of treatment;
2) A grout fluid, propelled by a high pressure pump, is introduced through one or more nozzles positioned at the end of the rod strings (located in the drilled hole); and
3) The rods are slowly rotated and extracted, forming a jet grouted column.

During the jetting process, excess material must be allowed to exit freely from the borehole. Otherwise, hydraulic fracturing could result and lead to heaving of the surrounding ground. The shape, size, composition and strength of the grout body depend on the physical characteristics of the in-situ soil as well as the jet grouting parameters employed. Typically, a 3- to 4-foot-diameter column of jet grouted soil can be achieved. Jet columns can be angled under existing structures. Because the technique involves the erosion and mixing of in-situ materials with grout, a large range of natural soils can be successfully treated with jet grouting. One advantage of jet grouting is that little or no vibration is induced to the structure and the noise level is low.

**Compaction Grout:** Compaction grouting consists in the injection of very thick (low-slump) grout through an injection pipe into the soil by using high pressure to expand a bulb in a controlled fashion. An injection pipe is drilled or driven into place with its tip located at the depths where soil treatment is desired. Because it is injected under high pressure, the grout expands as a bulb and compacts radially the surrounding soil. While the bulb is essentially non-liquefiable, the immediately adjacent soil is compacted and, if successfully applied, it can increases its ability to resist dynamic loads without liquefying. By injecting the grout at depths spaced every foot or so (stages), it is possible to achieve a more or less cylindrical, continuous column.

By controlling the injection rate and grout take, soil fracturing and, in particularly at shallow depths, is minimized and/or avoided. Typically, monitoring techniques including laser equipment is utilized to measure surface movement. The soils that are best suited to be treated with compaction grouting are granular with little fines contents, in such a way that they exhibit sufficiently high hydraulic conductivity (permeability) that facilitates excess water dissipation. The diameter of the treated volume is variable and mainly depends on the type of soil being treated. A primary injection hole pattern spaced 5 to 10 feet apart is commonly applied, which is followed by a secondary, in-between injection holes pattern. Some contractors have developed equipment and procedures that permit the installation of compaction grouting with limited access, in some cases with overhead limitations as little as six feet. Grout can be pumped long distances in excess of 150 feet. Because no spoils are produced, the compaction grouting can be typically done with little disturbance to the existing building. Compaction grouting also has the advantage that little or no vibration is induced to the structure and the noise level is low.

Attached are examples of the selected techniques used in the retrofit of historic buildings and sensitive structures.

We also evaluated underpinning of the structure with minipiles. Minipiles consist of relatively small diameter cast-in-place piles that are typically installed under existing structures. Several types of minipile types including steel pipe piles filled with concrete have been used in the past. While the installation of minipiles is typically unobtrusive, one major limitation they may have in this project is their vulnerability to be sheared off during large ground motions. In addition, for minipiles to efficiently support structures overlying liquefied ground, it is necessary they withstand the vertical load down largely as tip bearing resistance in deep competent layers as opposed to lateral frictional resistance, which can be greatly reduced during liquefaction. Based on the geologic information and the subsurface information gained from borings, a competent layer may be much deeper than 50 feet; this depth is at the limit of minipiles applicability. Based on these limitations, we ruled out this technique.

## Retrofit Description

**Jet Grouting:** In this scheme, four jet-grouted columns are installed under each footing. The columns are anticipated to extended about 35 to 40 feet beneath the bottom of existing footings and to have a diameter of up to 3 to 4 feet. The boreholes will be drilled from the existing interior ground and through the existing 8-inch-thick concrete slab. To avoid drilling the borehole through the existing footings, which would weaken this element substantially and have an impact on construction scheduling and costs, the boreholes can be drilled just outside the center of each footing side. Grade beams connecting individual footings will be constructed at an elevation coincident with the bottom of the footings. Therefore, the footprint of each jet grout column will be about half under the new grade beam and half under the existing footing. Special equipment adapted to work in reduced space is anticipated.

The main advantages of this solution are a good control over the shape and diameter of the column over the entire depth can be achieved. The relatively large diameters that can be attained assure an adequate bearing capacity at depth in the event the deposit liquefies. Because the jet grout columns would occupy a relatively small portion of the volume of soil underneath the hotel, it is estimated that the impact to the soil in-situ hydraulic conductivity and potential modification to the current groundwater flow will not be significant. It is anticipated that the spoils can be removed at the crawl space level.

The major issues that require further evaluation are the potential settlement during the setting of the jet grout column, and detailing the connection to the existing structure and new grade beam network. In addition, it is necessary to evaluate the acceptability of jet grout in view of environmental constraints; in particular, it is necessary to evaluate the impact of grout being transported into the ground water.

The scheme presented above is preliminary. The diameter, depth, and number of columns may decrease as further engineering analyses and evaluations are conducted. Therefore, the estimate cost will vary accordingly. The scheme presented above, however, is estimated to be a conservative scenario.

**Compaction Grout:** By introducing the grout at close stages, spaced at about one foot, continuous columns can be achieved. Four compaction grout columns will be installed under each footing. The columns are anticipated to extended about 35 to 40 feet beneath the bottom of existing footings and to have a diameter of up to 2 to 3 feet. As with jet grouting, the boreholes will be drilled from the existing interior ground and through the existing 8-inch-thick concrete slab. Again, to avoid drilling the borehole through the existing footings, which would weaken this element substantially and have an impact on construction scheduling and costs, the boreholes can be drilled just outside the center of each footing side. Alternatively, the boreholes can be drilled through the footing pedestal, which is approximately one foot thick. Grade beams connecting individual footings will be also constructed at an elevation coincident with the bottom of the footings. Therefore, most of the footprint of each compaction grout column will be under the existing footing and a portion will be under the new grade beam. By applying oblique injection, it is possible to inject secondary columns directly underneath the footing and in-between the four primary columns. Because of the reduced space, special equipment is necessary.

The main advantages of this solution are that the injection under high pressure not only produces a more or less continuous grout cylinder but also densify the soil in-between and outside columns. As a result, the liquefaction potential and the associated settlement can be significantly reduced. It anticipated that the relatively large diameters obtained with compaction grout, although smaller than those with jet grouting, would be adequate to provide bearing capacity at depth in the event the deposit liquefies. Because the compact grout columns would occupy a relatively small portion of the volume of soil underneath the hotel, it is estimated that the impact to the soil in-situ hydraulic conductivity and potential modification to the current groundwater flow will not be significant. It is estimated that the replacement volume of the treated area is about 10 to 15%. Spoils with this technique are minimal or nonexistent. Because the grout is a low-slump mixture with relatively low water content, it is expected that this material will not settle as much as jet grouting and will be more stable against groundwater flow.

Special requirements concerning the peak injection pressure and grout take will be necessary at shallow depths to prevent soil fracture and damage to the existing structure. Continuous structural monitoring will be necessary during grout injection. Pre construction tests are recommended to ensure that the continuity and good control over the achieved diameter of the column over the entire depth can be achieved.

The scheme presented above is preliminary. The diameter, depth, and number of columns may decrease as further engineering analyses and evaluations are conducted. Therefore, the estimate cost will vary accordingly. The scheme presented above, however, is estimated to be a conservative scenario.

## Archeological and Environmental Impacts

The environmental impacts of each retrofit scheme should be evaluated according to existing pertinent documents, e.g., National Environmental Policy Act (NEPA) guidelines drafted by the National Park Service (NPS, 1997).

[redacted] The assessment of the impact of the proposed retrofit schemes to historic resources must be performed following procedures in accordance with the National Historic Preservation Act, and other federal and state agencies including the Advisory Council on Historic Preservation (ACHP) and the California State Historic Preservation Officer (SHPO). [redacted] Procedures to minimize impacts on cultural resources should be carefully developed.

Environmental and cultural resources impact assessments are beyond the scope of this seismic evaluation. Although the retrofit schemes presented earlier may be feasible from the technical and economic viewpoints, it is not known at this time the impact environmental [redacted] considerations will have on the proposed solutions.

## Preliminary Cost Estimate for Soil Improvement

| Variable | Unit | Jet Grout | Compaction Grout |
|---|---|---|---|
| Number of columns per footing | Count | 4 | 4 |
| Number of footings | Count | 155 | 155 |
| Column diameter | feet | 4 | 3 |
| Column length | feet | 40 | 40 |
| Column volume | cy | 18.6 | 10.5 |
| Range of unit cost | 2000 $/cy | 84-340 | 270-320 |
| Unit cost per volume used | 2000 $/cy | 340(1) | 320(2) |
| Increase volume | % | 0 | 20% |
| Total volume | cy | 11542 | 7791 |
| Total basic cost | mil. $ | 3.9 | 2.5 |
| Mob-Demob | mil. $ | 0.2 | 0.2 |
| Total | mil. $ | 4.1 | 2.7 |
| Contingency | % | 20% | 20% |
| **Estimated cost** | mil. $ | **4.9** | **3.2** |

**Notes:** (1) Comparative cost chart - Hayward Baker - Ground Modification Seminar Notes, ca. 1997, corrected for 3% annual inflation.
(2) The Pressure Grout Company, Hayward, CA. 10/20/00.
(3) The above cost estimate does not include the construction cost of the connecting grade beams.

# Jet Grouting

# GKN Hayward Baker

# Jet Grouting Case Histories

Excavation Support
Underpinning
Soil Stabilization
Groundwater Control

## Borgess Medical Center
Kalamazoo, Michigan

Jet grouting is a valuable and versatile Ground Modification[sm] tool for today's construction market. This soil stabilization technique is appropriate for the widest range of soil types and thus can be used to solve a variety of problems. But since it is also an in situ stabilization technique, it is particularly suited to underpinning of sensitive structures, and could be described as tailor-made for those projects where the structure involved is also architecturally or historically significant.

Remodeling of the main entrance to the Borgess Medical Center involved the lowering of the site grade to beneath the foundation level of a porte-cochere entryway which extended from the building. This ornate, stone structure, built in 1929, was settlement sensitive and an elaborate conventional underpinning system using external footings and structural beams had been specified to enable reconstruction of the foundation piers for the remodeling work.

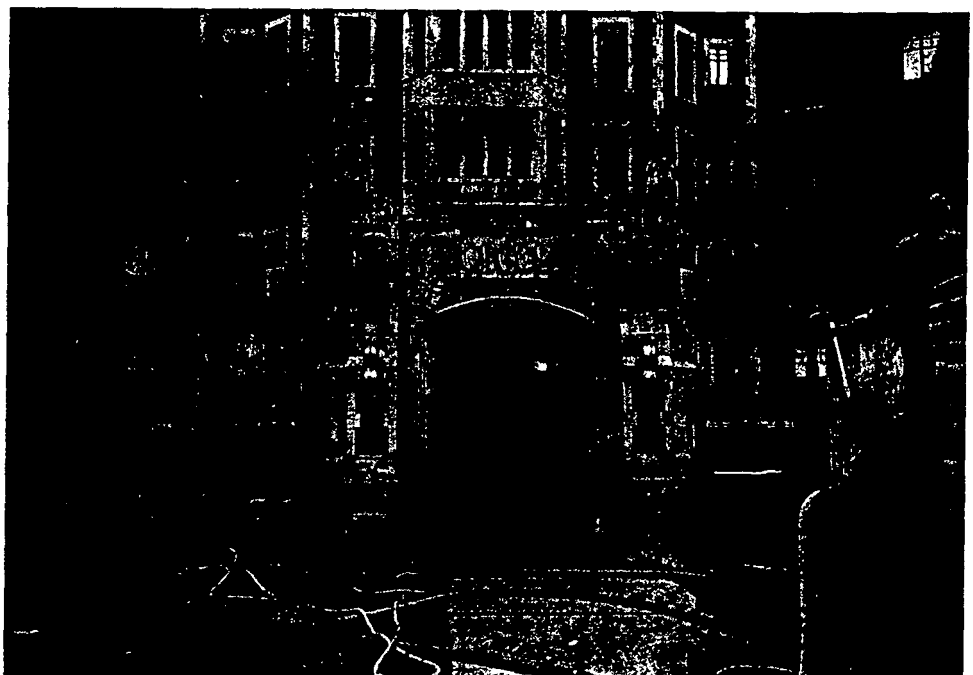
GKN Hayward Baker (GKN-HB), however, proposed a triple rod system jet grouting alternate to underpin and permanently support the existing column footings and the wall between the porte-cochere and the main hospital building. This technique, which would completely replace the design system, would provide a continuous Soilcrete[sm] support wall to readily meet design requirements and also offer a distinct cost and schedule advantage.

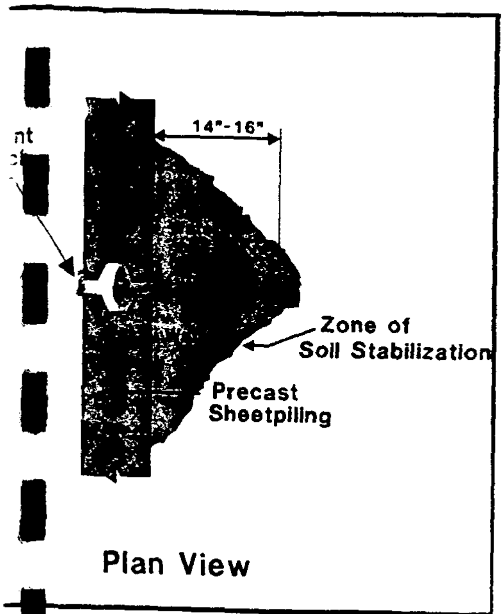
Prior to production work, a test section was installed to confirm that the jet grouting technique would provide the necessary strength requirements and the geometry proposed on the GKN-HB prepared construction drawings. Following acceptance of the test by geotechnical engineers Soil and Materials Engineers Inc., Battle Creek, MI, the Soilcrete wall and footing support was installed to depths of 6 ft, using a jet grouting drill and pumping station specially designed and built by our affiliate, GKN Keller, Germany.

Production grouting to design depths was then effected in a sequenced operation to maintain structural support at all times. A total of 2,100 cu ft of continuous Soilcrete underpinning was constructed. Monitoring and quality control were maintained throughout the project. Settlement gauges were installed on each column, and checkpoints for vertical and horizontal movement were established. Four waste samples per shift were retrieved for unconfined compressive strength testing. Core samples of the finished product were also retrieved and tested for strength.

Settlement of the underpinned porte-cochere did not exceed 0.38 in, which was well within the design maximum. The jet grouting program was completed in only six working days, weeks less than that anticipated for conventional underpinning, and because this technique involves no undermining of footings, the structural integrity of the building was completely maintained.

*Below: Triple rod system jet grouting provided continuous Soilcrete support beneath the medical center's ornate entryway to prevent settlement during remodeling.*






*Left: Jacksonville's intake flume erosion problems were solved by sealing each affected joint with a stable, impermeable jet grouted zone.*

*Above: The triangular grouted zone extended from six ft below the bottom of the flume channel to existing grade.*

manufactured drill head which was preprogrammed for the slow, smooth pulling speeds necessary to perform uniform, repeatable work. For the jet grouting operation, high pressure water was used to cut the soil and the designed slurry grout mix was tremied in place, forming a continuous, fully stabilized soil and grout zone. This zone was triangular in plan and extended from six ft below the bottom of the flume channel to existing grade outboard of the flume.

Jet grouting of the 570 affected joints was sequenced to permit sufficient curing before adjacent joints were completed, requiring a coordinated work plan to ensure efficient operations.

The complete remedial program was accomplished in an eight week time period.

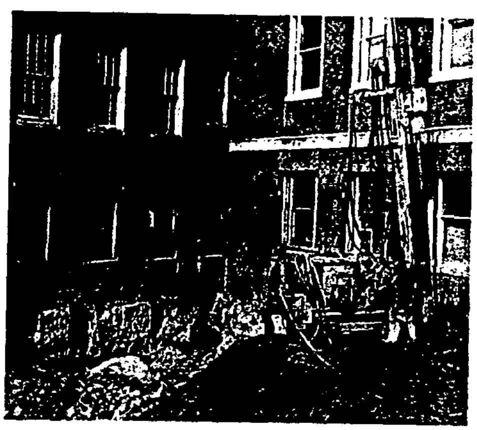
## Yale School of Medicine
### New Haven, Connecticut

At the Yale School of Medicine, additions to a four story Medical Library and Research Center required construction beneath and adjacent to existing footings. Specifications called for conventional underpinning by the pit method. However, the risk of building settlement due to the six ksf loads founded on "running sands," prompted general contractor Tomlinson-Hawley-Patterson to contact GKN-HB for a possible chemical grouting solution. GKN-HB offered a triple rod system jet grouting alternative to the underpinning project which would not only stabilize the sands but also replace conventional underpinning with a Soilcrete support wall. Through this approach, a time saving of as much as seven weeks on the construction schedule would be realized, along with similar economic savings.

Following acceptance of the jet grout proposal by Yale University and structural consultants Martin-Horton and Associates, GKN-HB constructed a test section. This confirmed that the technique would ensure the quality and size of jet grout mass designed. Six inch dia holes were then core drilled through existing reinforced concrete footings and jet grout columns constructed to three ft below the proposed construction excavation depth, providing a continuous Soilcrete wall and footing support to depths of up to 10 ft along the entire construction area. A total of 500 lf of underpinning was constructed, with four different column sizes applied, including half columns installed to reduce encroachment into the excavation.

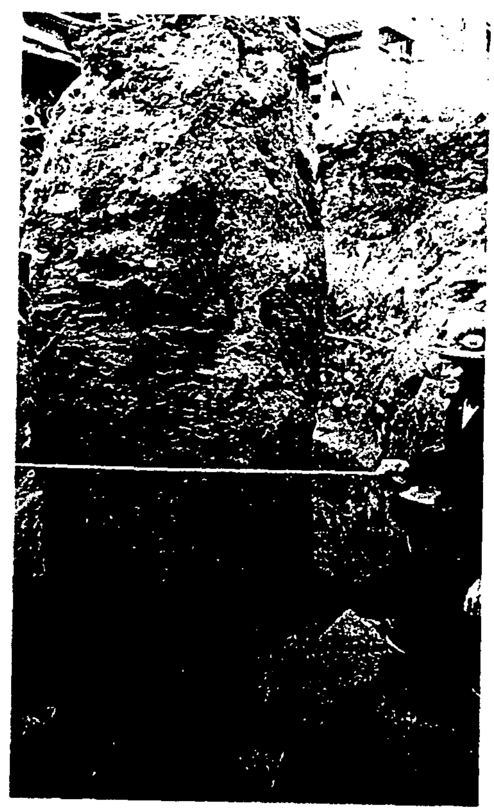
Resulting settlements of existing structures did not exceed 0.16 in, and averaged less than half of the maximum predicted by GKN-HB and geotechnical engineers GZA/Heller, Bridgeport, CT. Extensive testing and quality control was maintained throughout the project. Four Soilcrete samples per day were tested for unconfined compressive strength and specific gravity, and core samples were retrieved from the finished product and tested for strength.

The successful completion of this project represented the first North American application of jet grouting to produce excavation support combined with underpinning.



*Above: In the first U.S. application of its kind, jet grouting provided both underpinning and excavation support for the Yale project.*

*Right: Prior to production work at Yale, test sections were constructed to confirm the jet grouting design parameters.*



## O'Shaughnessey Library, St. Paul, Minnesota

The design for the expansion of the O'Shaughnessy Library required new foundation construction immediately adjacent to and up to 13 ft beneath the existing footings. Project engineers, concerned about settlement and distress to the existing building, initially assumed that chemical grouting combined with an inhibited sequence of excavation would counter the problem. Additional geotechnical investigation indicated that the soils were not groutable and another solution was needed. Hayward Baker suggested its Soilcrete System in a design/construct proposal to provide both the necessary underpinning and excavation support. After installing the Soilcrete, no internal bracing or anchorage was needed, assuring ease of continued construction and a significant schedule savings.

In addition to the underpinning, four new footings had to be constructed inside the library in an area with only 7.25 ft of headroom.

Hayward Baker used its mini-rig to construct a Soilcrete mass to transfer new column loads without impacting existing footings.

Core samples retrieved from the Soilcrete for unconfined compressive strength testing, yielded an average qc of greater than 1000 psi after 13 days.

| | |
|---|---|
| **Owner** | **St. Thomas College<br>St. Paul, MN** |
| **Architect/<br>Engineer/<br>Contractor** | **OPUS Corporation<br>Minnetonka, MN** |
| **Geotechnical<br>Consultant** | **Twin Cities Testing, Inc.<br>St. Paul, MN** |
| **Soilcrete Design<br>Engineer** | **American Engineering Testing Inc.<br>St. Paul, MN** |

*Above: Library foundation showing Soilcrete mass.*

*Left: Hayward Baker's mini-rig installs Soilcrete in limited headroom conditions.*

**HAYWARD BAKER**
A Keller Company

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515-276-5464

**Woodbine Division**

**Texas**
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Fort Worth, Texas 76106
817-625-4241

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**British Columbia**
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Vancouver, British Columbia
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604-294-4845

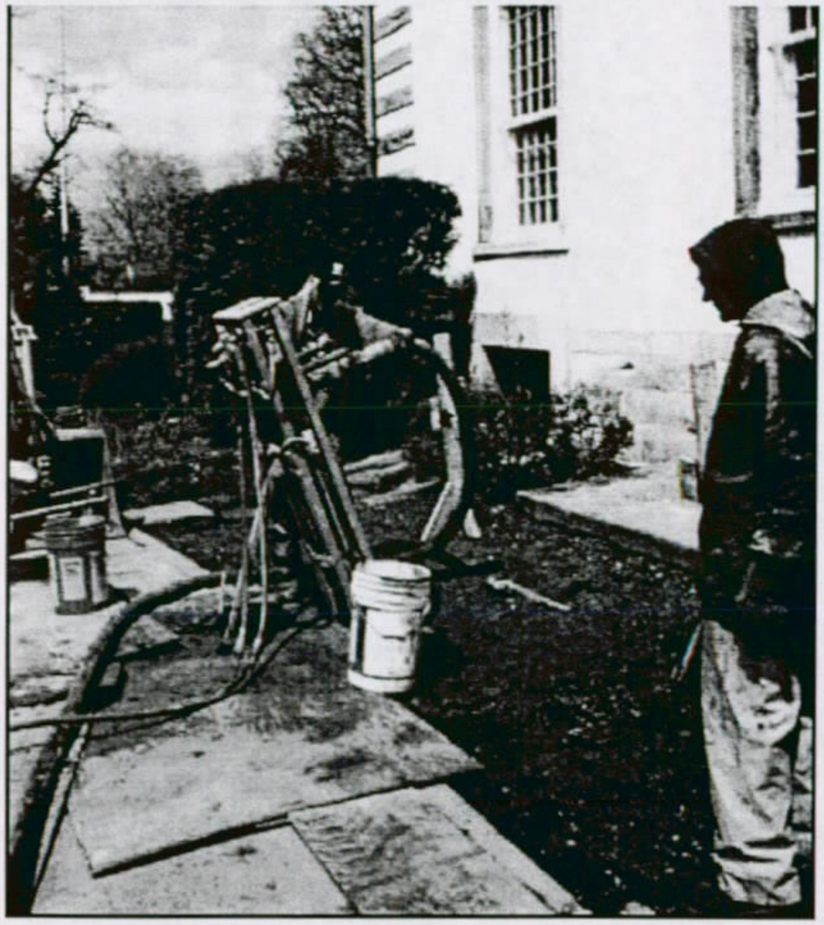


KELLER

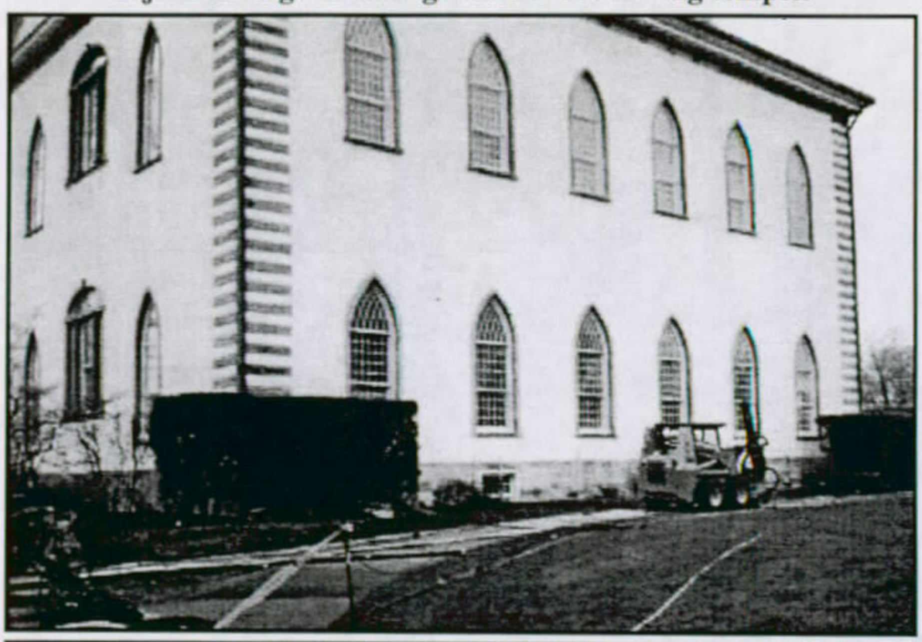
# Compaction Grout

# COMPACTION GROUTING

**Kirtland Temple** (near Cleveland, Ohio)
Kirtland Temple required installing 40 injection pipes with very low headroom in the basement. The outside work was completed with no damage to landscaping.



**Injection of grout into ground surrounding temple.**



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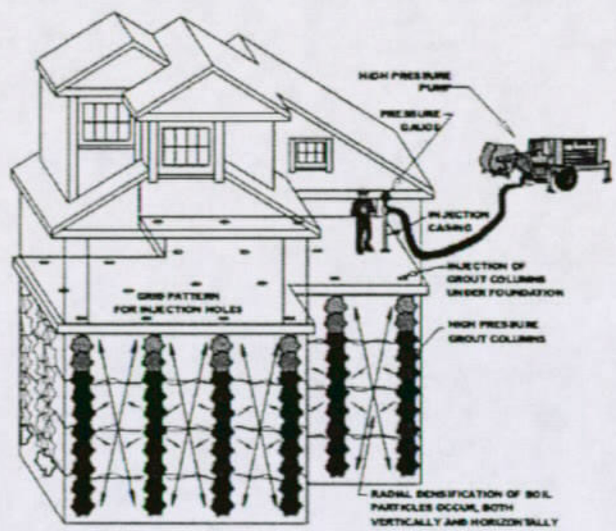
## Geotechnical Construction & Engineering

COMPACTION GROUTING is a cost effective technique for the re-compaction and stabilization of sub-soils to greater depths than economically feasible with traditional methods. Depths of 25 to 75 feet are not uncommon. Often, soil problems can be traced to poorly compacted fill, loose soils, infiltration of water, and failure to over excavate and re-compact a building site properly.

Compaction Grouting has been found to reduce the possible damage of liquefaction of soils during seismic events. This technique uses a clear low slump grout that can be pumped slowly under high pressure into the soils with predictable results that will densify and re-compact the soils. When required, our high pressure pumps can sustain pressures that will fracture the soils and lift up the land and structures that lie upon it.

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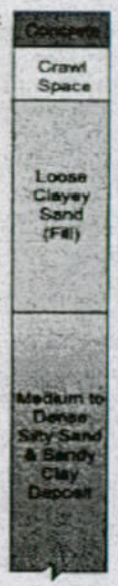
Last modified: July 20, 2000

ISSMFE-TC-17

## Poorly Placed Fill

*Provided sufficient overburden stress exists, a proper program of compaction grouting can fill material. This is often utilized when structure deformation alerts the owner to the proble approach to foundation restoration is needed.*



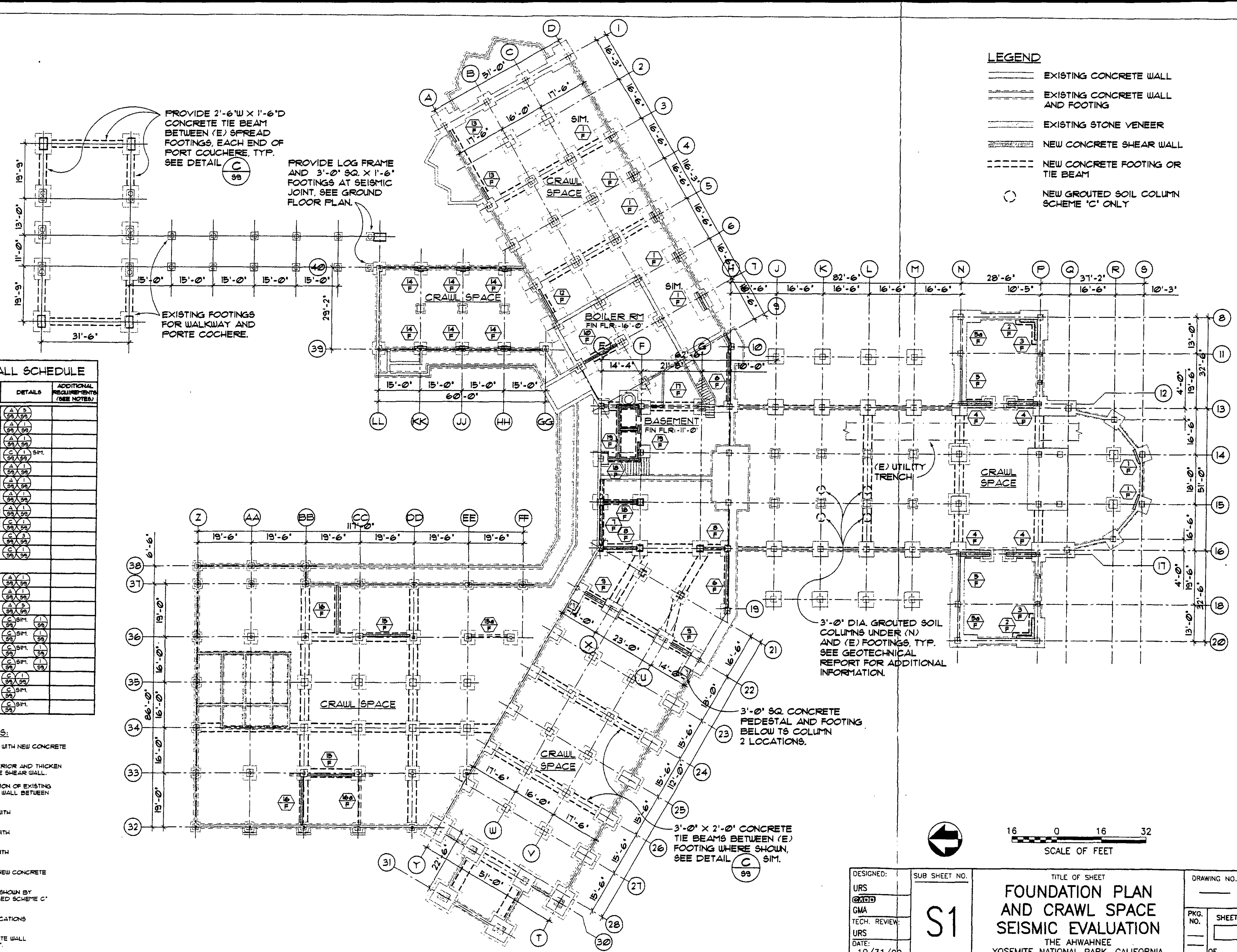

**WMATA Station Platforms**
**Rockville and Landover, Maryland**

Areas of poorly compacted granular fill beneath two Washington Metro Area Transportation Authority subway platforms had resulted in up to three inches of settlement. Consolidation of the fill was achieved through compaction grouting by the Denver System. Over 150 grout points were established for the 2 stations. Following coring through the concrete platforms, 2-inch ID casing was pneumatically driven in 3-ft, battered sections to between 9 and 17 ft. Low mobility grout was delivered via the specially designed, on-site mobile batching and pumping unit that typifies the Denver System. Limited station access dictated that this unit was located across the tracks from the platforms. Therefore, although casing installation was accomplished during station operating hours, grouting was limited to line shutdown hours of 1 to 4 a.m.

## APPENDIX B

## Rehabilitation Drawings for Schemes A, B, & C

**List of Structural Drawings**




## LEGEND

- EXISTING CONCRETE WALL
- EXISTING CONCRETE WALL AND FOOTING
- EXISTING STONE VENEER
- NEW CONCRETE SHEAR WALL
- NEW CONCRETE FOOTING OR TIE BEAM
- NEW GROUTED SOIL COLUMN SCHEME 'C' ONLY

## FOUNDATION SHEAR WALL SCHEDULE

| MARK (NOTE 7) | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/F | 8" | 5'-0" | 5'-0" | A/S9 5/S9 | |
| 2/F | 12" | 6'-0" | 6'-0" | A/S9 1/S9 | |
| 3/F | 12" | 7'-0" | 7'-0" | A/S9 1/S9 | |
| 4/F | 18" | 9'-0" | 9'-0" | C/S9 1/S9 SIM. | |
| 5/F | 8" | 15'-0" | COMBINED 25'-0" | A/S9 1/S9 | |
| 5a/F | 8" | 10'-0" | COMBINED 25'-0" | A/S9 1/S9 | |
| 6/F | 12" | 20'-0" | 20'-0" | A/S9 1/S9 | |
| 7/F | 12" | 14'-0" | 20'-0" | A/S9 1/S9 | |
| 8/F | 12" | 6'-0"/9'-0" | 6'-0"/9'-0" | C/S9 1/S9 | |
| 9/F | 12" | 12'-0" | 12'-0" | C/S9 3/S9 | |
| 10/F | 12" | 16'-0" | 16'-0" | C/S9 1/S9 | |
| 11/F | NOT USED | | | | |
| 12/F | 8" | 14'-0" | 14'-0" | A/S9 1/S9 | |
| 13/F | 8" | 6'-0" | 6'-0" | A/S9 1/S9 | |
| 14/F | 8" | 4'-0" | 4'-0" | A/S9 5/S9 | |
| 15/F | 8" | 19'-6" | COMBINED 33'-6" | C/S9 SIM. 1/S9 | |
| 15a/F | 8" | 14'-0" | COMBINED 33'-6" | C/S9 SIM. 1/S9 | |
| 16/F | 8" | 19'-0" | 19'-0" | C/S9 SIM. 1/S9 | |
| 16a/F | 8" | 19'-0" | 19'-0" | C/S9 SIM. 1/S9 | |
| 17/F | 12" | LIMITED DAMAGE ONLY | 32'-0" | C/S9 1/S9 | |
| 18/F | 8" | 14'-0" | 14'-0" | C/S9 SIM. | |
| 19/F | 8" | 18'-0" | 18'-0" | C/S9 SIM. | |

## SHEAR WALL SCHEDULE NOTES:

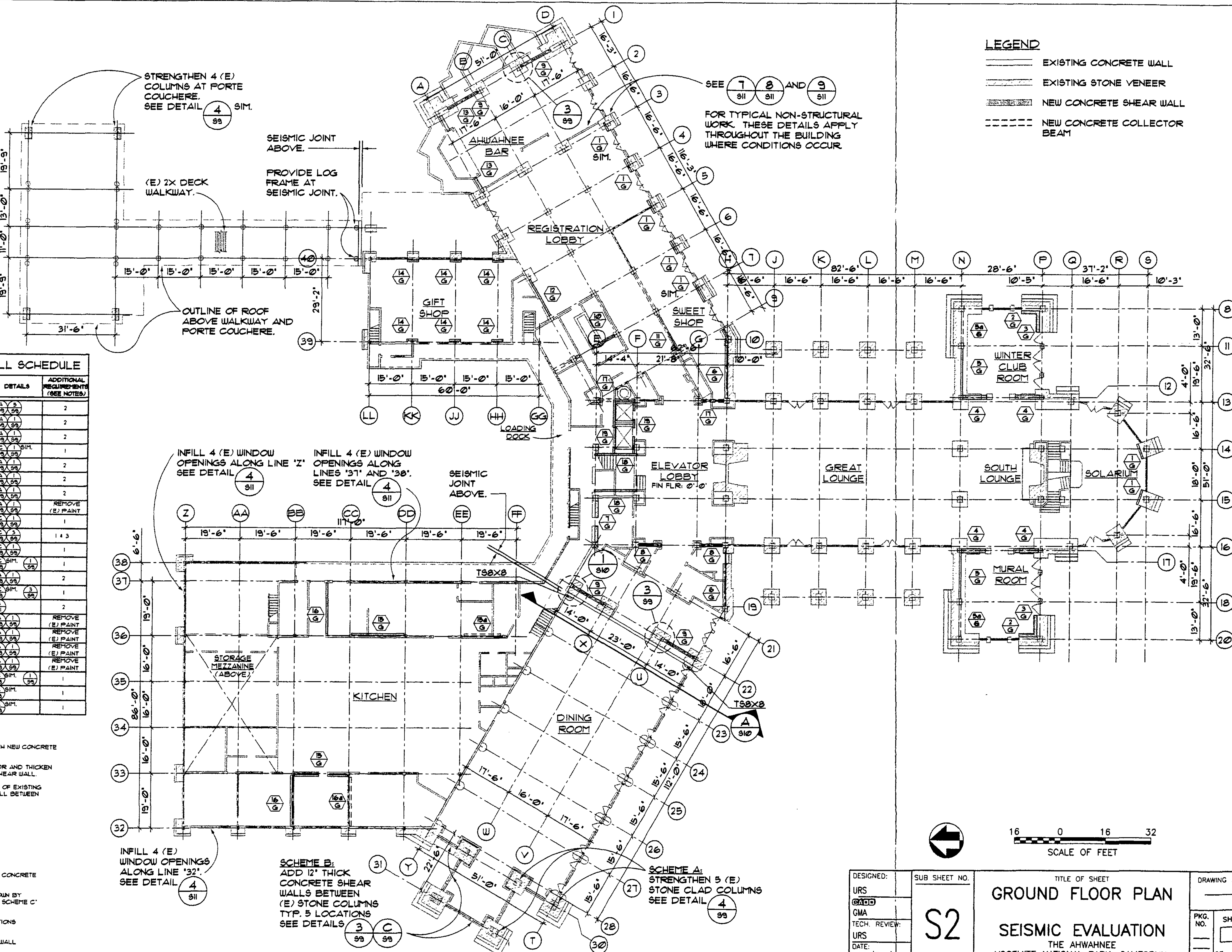
1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE "LIMITED DAMAGED SCHEME C" WHERE INDICATED.
7. MARKS INDICATED AS #/X ARE WALL LOCATIONS FOR "LIFE SAFETY SCHEME A".

   MARKS INDICATED AS #a/X ARE ALTERNATE WALL LOCATIONS FOR "LIFE SAFETY SCHEME B".

| DESIGNED: | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| URS | S1 | FOUNDATION PLAN AND CRAWL SPACE SEISMIC EVALUATION | |
| CADD: GMA | | THE AHWAHNEE | PKG. NO. / SHEET |
| TECH. REVIEW: URS | | YOSEMITE NATIONAL PARK, CALIFORNIA | OF |
| DATE: 10/31/00 | | | |




## LEGEND

- EXISTING CONCRETE WALL
- EXISTING STONE VENEER
- NEW CONCRETE SHEAR WALL
- NEW CONCRETE COLLECTOR BEAM

## GROUND FLR. SHEAR WALL SCHEDULE

| MARK (NOTE 7) | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/G | 8" | 5'-0" | 5'-0" | A/S9 5/S9 | 2 |
| 2/G | 12" | 6'-0" | 6'-0" | A/S9 1/S9 | 2 |
| 3/G | 12" | 7'-0" | 7'-0" | A/S9 1/S9 | 2 |
| 4/G | 18" | 9'-0" | 9'-0" | C/S9 1/S9 SIM. | 1 |
| 5/G | 8" | 15'-0" | COMBINED 25'-0" | A/S9 1/S9 | 2 |
| 5a/G | 8" | 10'-0" | COMBINED 25'-0" | A/S9 1/S9 | 2 |
| 6/G | 12" | 20'-0" | 20'-0" | A/S9 1/S9 | 2 |
| 7/G | 12" | 14'-0" | 20'-0" | A/S9 1/S9 | REMOVE (E) PAINT |
| 8/G | 12" | 6'-0"&9'-0" | 6'-0"&9'-0" | C/S9 1/S9 | 1 |
| 9/G | 12" | 12'-0" | 12'-0" | C/S9 3/S9 | 1 & 3 |
| 10/G | 12" | 16'-0" | 24'-0" | C/S9 1/S9 | 1 |
| 11/G | 12" | 14'-0" | 28'-0" | C/S9 SIM. 1/S9 | 1 |
| 12/G | 8" | 14'-0" | 14'-0" | A/S9 1/S9 | 2 |
| 13/G | 8" | 6'-0" | 6'-0" | C/S9 SIM. 3/S9 | 1 |
| 14/G | 8" | 4'-0" | 4'-0" | 4/S11 | 2 |
| 15/G | 8" | 19'-6" | COMBINED 33'-6" | A/S9 1/S9 | REMOVE (E) PAINT |
| 15a/G | 8" | 14'-0" | COMBINED 33'-6" | A/S9 1/S9 | REMOVE (E) PAINT |
| 16/G | 8" | 19'-0" | 19'-0" | A/S9 1/S9 | REMOVE (E) PAINT |
| 16a/G | 8" | 19'-0" | 19'-0" | A/S9 1/S9 | REMOVE (E) PAINT |
| 17/G | 12" | LIMITED DAMAGE ONLY | 18'-0"&8'-0" | C/S9 SIM. 1/S9 | 1 |
| 18/G | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/G | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |

## SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE "LIMITED DAMAGED SCHEME C" WHERE INDICATED.
7. MARKS INDICATED AS #/X ARE WALL LOCATIONS FOR "LIFE SAFETY SCHEME A".

   MARKS INDICATED AS #a/X ARE ALTERNATE WALL LOCATIONS FOR "LIFE SAFETY SCHEME B".

| | |
|---|---|
| DESIGNED: | URS |
| CADD | GMA |
| TECH. REVIEW: | URS |
| DATE: | 10/31/00 |
| SUB SHEET NO. | S2 |
| TITLE OF SHEET | GROUND FLOOR PLAN |
| | SEISMIC EVALUATION |
| | THE AHWAHNEE |
| | YOSEMITE NATIONAL PARK, CALIFORNIA |
| DRAWING NO. | |
| PKG. NO. | |
| SHEET | OF |

10/20/00 12:07 STATION4 R15 F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\S2-GFLR.DWG XREFS: F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\X-PLAN.DWG; F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\X-GRID.DWG
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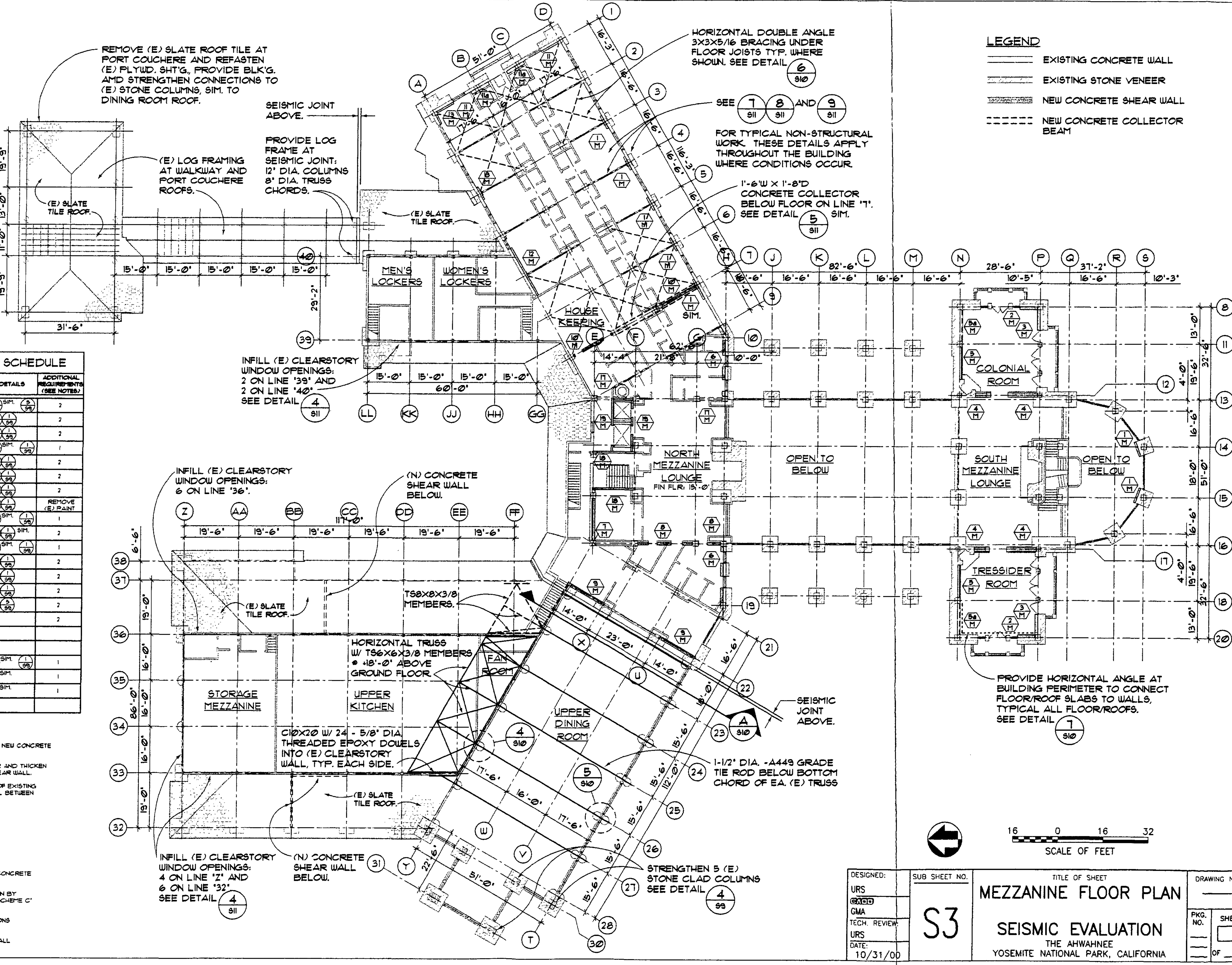



## MEZZANINE SHEAR WALL SCHEDULE

| MARK (NOTE 7) | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/M | 8" | 5'-0" | 5'-0" | B/S9 SIM. 5/S9 | 2 |
| 2/M | 12" | 6'-0" | 6'-0" | B/S9 1/S9 | 2 |
| 3/M | 12" | 7'-0" | 7'-0" | B/S9 1/S9 | 2 |
| 4/M | 18" | 4'-0"+9'-0" | 4'-0"+9'-0" | C/S9 SIM. 1/S9 | 1 |
| 5/M | 8" | 9'-0" | COMBINED 19'-0" | B/S9 1/S9 | 2 |
| 5a/G | 8" | 10'-0" | COMBINED 19'-0" | B/S9 1/S9 | 2 |
| 6/M | 12" | 20'-0" | 20'-0" | B/S9 1/S9 | 2 |
| 7/M | 12" | 14'-0" | 18'-0" | B/S9 1/S9 | REMOVE (E) PAINT |
| 8/M | 12" | 16'-0"+9'-0" | 16'-0"+9'-0" | C/S9 SIM. 1/S9 | 1 |
| 9/M | 12" | 18'-0" | 18'-0" | B/S9 1/S9 SIM. | 2 |
| 10/M | 12" | 16'-0" | 16'-0" | C/S9 SIM. 1/S9 | 1 |
| 11/M | 8" | 6'-0" | 6'-0" | B/S9 1/S9 | 2 |
| 11a/M | 8" | 7'-0" | 7'-0" | B/S9 1/S9 | 2 |
| 12/M | 8" | 26'-0" | 26'-0" | B/S9 1/S9 | 2 |
| 13/M | 8" | 6'-0"+4'-0" | 6'-0"+4'-0" | B/S9 5/S9 | 2 |
| 14/M | NOT USED | | | | 2 |
| 15/M | NOT USED | | | | |
| 16/M | NOT USED | | | | |
| 17/M | 12" | LIMITED DAMAGE ONLY | 14'-0"+8'-0" | C/S9 SIM. 1/S9 | 1 |
| 18/M | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/M | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |
| | | | | | |

## SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE "LIMITED DAMAGED SCHEME C" WHERE INDICATED.
7. MARKS INDICATED AS #/X ARE WALL LOCATIONS FOR "LIFE SAFETY SCHEME A".

   MARKS INDICATED AS #a/X ARE ALTERNATE WALL LOCATIONS FOR "LIFE SAFETY SCHEME B".

| DESIGNED: URS | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| CADD GMA | S3 | MEZZANINE FLOOR PLAN | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION | PKG. NO. / SHEET |
| DATE: 10/31/00 | | THE AHWAHNEE YOSEMITE NATIONAL PARK, CALIFORNIA | OF |

F:\20010 - Ahwahnee\Dwgs\03-SD\01-delta\S3-MFLR.dwg, S3-MPLN, 10/31/00 09:19:27 AM

10/20/00 12:07 STATION4 R15 F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\S3-MFLR.DWG XREFS: F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\X-PLAN.DWG; F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\X-GRID.DWG

| SECOND FLR. SHEAR WALL SCHEDULE | | | | | |
|---|---|---|---|---|---|
| MARK (NOTE 7) | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
| 1/2 | NOT USED | | | | |
| 2/2 | NOT USED | | | | |
| 3/2 | 12" | 7'-0" | 7'-0" | B/S9 I/S9 | 2 |
| 4/2 | 12" | 10'-0" | 21'-0" | C/S9 SIM. I/S9 | 1 |
| 5/2 | 8" | 16'-0" | COMBINED 16'-0" | B/S9 I/S9 | 2 |
| 5a/G | 8" | 10'-0" | COMBINED 16'-0" | B/S9 I/S9 | 2 |
| 6/2 | 12" | 20'-0" & 14'-0" | 20'-0" & 14'-0" | B/S9 C/S9 I/S9 | 1 & 2 |
| 7/2 | NOT USED | | | | |
| 8/2 | 12" | 14'-0" | 14'-0" | C/S9 SIM. I/S9 | 1 |
| 9/2 | 12" | 5'-0" | 5'-0" | B/S9 I/S9 | 2 |
| 10/2 | 12" | 16'-0" | 16'-0" | C/S9 SIM. I/S9 | 1 |
| 11/2 | 8" | 6'-0" | 6'-0" | B/S9 I/S9 | 2 |
| 11a/2 | 8" | 7'-0" | 7'-0" | B/S9 I/S9 | 2 |
| 12/2 | 8" | 5'-0" & 9'-0" | 5'-0" & 9'-0" | B/S9 I/S9 | 2 |
| 13/2 | NOT USED | | | | |
| 14/2 | NOT USED | | | | |
| 15/2 | NOT USED | | | | |
| 16/2 | NOT USED | | | | |
| 17/2 | 12" | LIMITED DAMAGE ONLY | 14'-0" & 8'-0" | C/S9 SIM. I/S9 | 1 |
| 18/2 | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/2 | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |
| | | | | | |

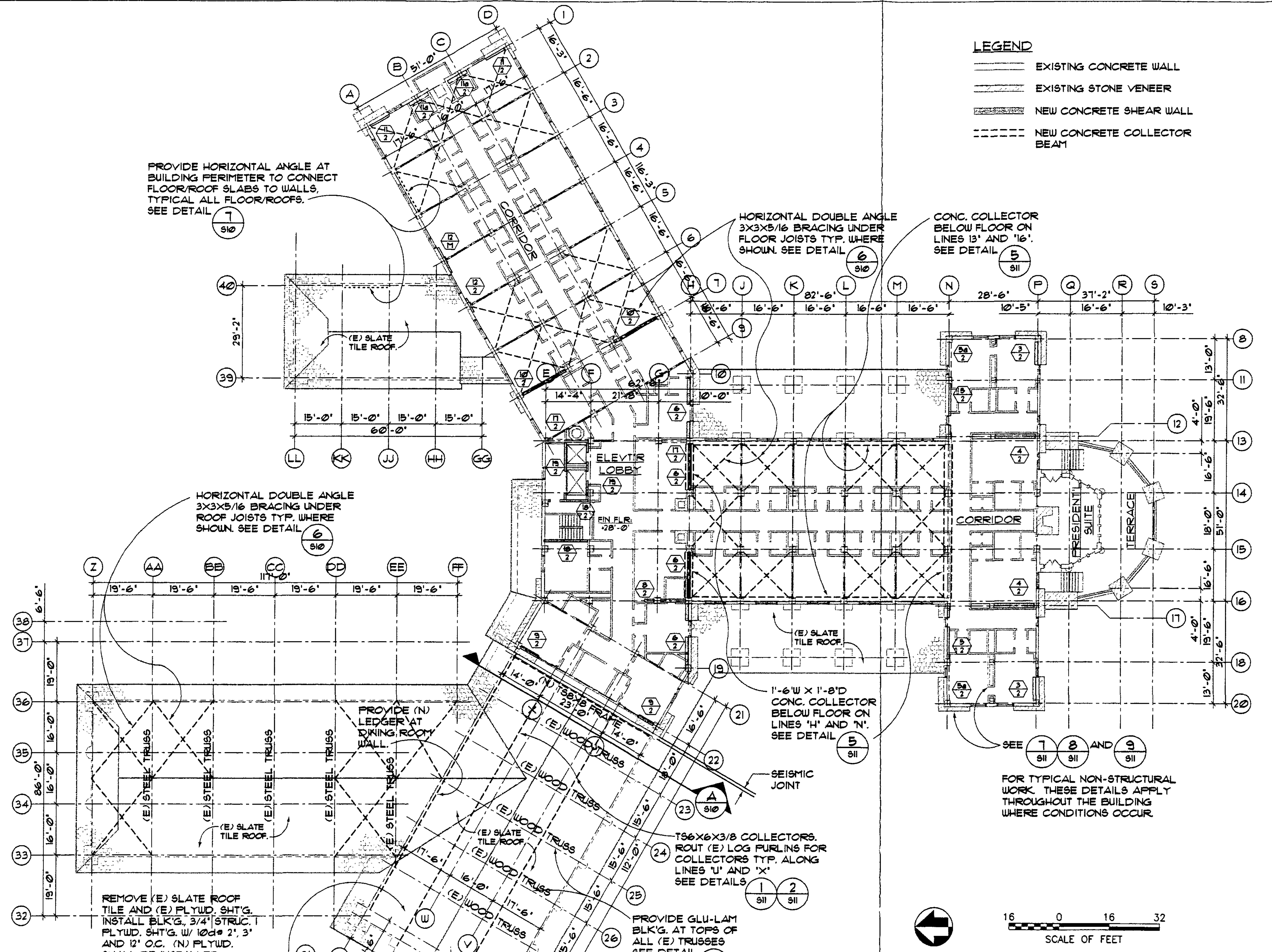
## SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE "LIMITED DAMAGED SCHEME C" WHERE INDICATED.
7. MARKS INDICATED AS #/X ARE WALL LOCATIONS FOR "LIFE SAFETY SCHEME A".

   MARKS INDICATED AS #a/X ARE ALTERNATE WALL LOCATIONS FOR "LIFE SAFETY SCHEME B".




| DESIGNED: URS | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| CADD: GMA | S4 | SECOND FLOOR PLAN | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION | PKG. NO. / SHEET |
| DATE: 10/31/00 | | THE AHWAHNEE<br>YOSEMITE NATIONAL PARK, CALIFORNIA | OF |

F:\20010 - Ahwahnee\Dwgs\03 SD\01-delta\S4-2FLR.dwg, S4-2PLN, 10/31/00 09:25:43 AM

10/20/00 12:07 STATION4 R15 F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\S4-2FLR.DWG XREFS: F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\X-PLAN.DWG; F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\X-GRID.DWG

## THIRD FLOOR SHEAR WALL SCHEDULE

| MARK (NOTE 7) | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 3) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/3 | NOT USED | | | | |
| 2/3 | NOT USED | | | | |
| 3/3 | NOT USED | | | | |
| 4/3 | 12" | 27'-0" | 27-0" | B/S9 1/S9 | 2 |
| 5/3 | NOT USED | | | | |
| 6/3 | 12" | 14'-0" | COMBINED 34'-0" | C/S9 SIM B/S9 1/S9 | 1 4 2 |
| 6a/3 | 12" | 20'-0" | COMBINED 34'-0" | C/S9 SIM B/S9 1/S9 | 1 4 2 |
| 7/3 | NOT USED | | | | |
| 8/3 | 12" | 14'-0" | 14'-0" | C/S9 SIM. 1/S9 | 1 |
| 9/3 | 12" | 5'-0" | 5'-0" | B/S9 1/S9 | 2 |
| 10/3 | 12" | 16'-0" | 16'-0" | B/S9 1/S9 | 2 |
| 11/3 | NOT USED | | | | |
| 12/3 | NOT USED | | | | |
| 13/3 | NOT USED | | | | |
| 14/3 | NOT USED | | | | |
| 15/3 | NOT USED | | | | |
| 16/3 | NOT USED | | | | |
| 17/3 | 12" | LIMITED DAMAGE ONLY | 14'-0"18'-0" | C/S9 SIM. 1/S9 | 1 |
| 18/3 | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/3 | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |
| | | | | | |
| | | | | | |

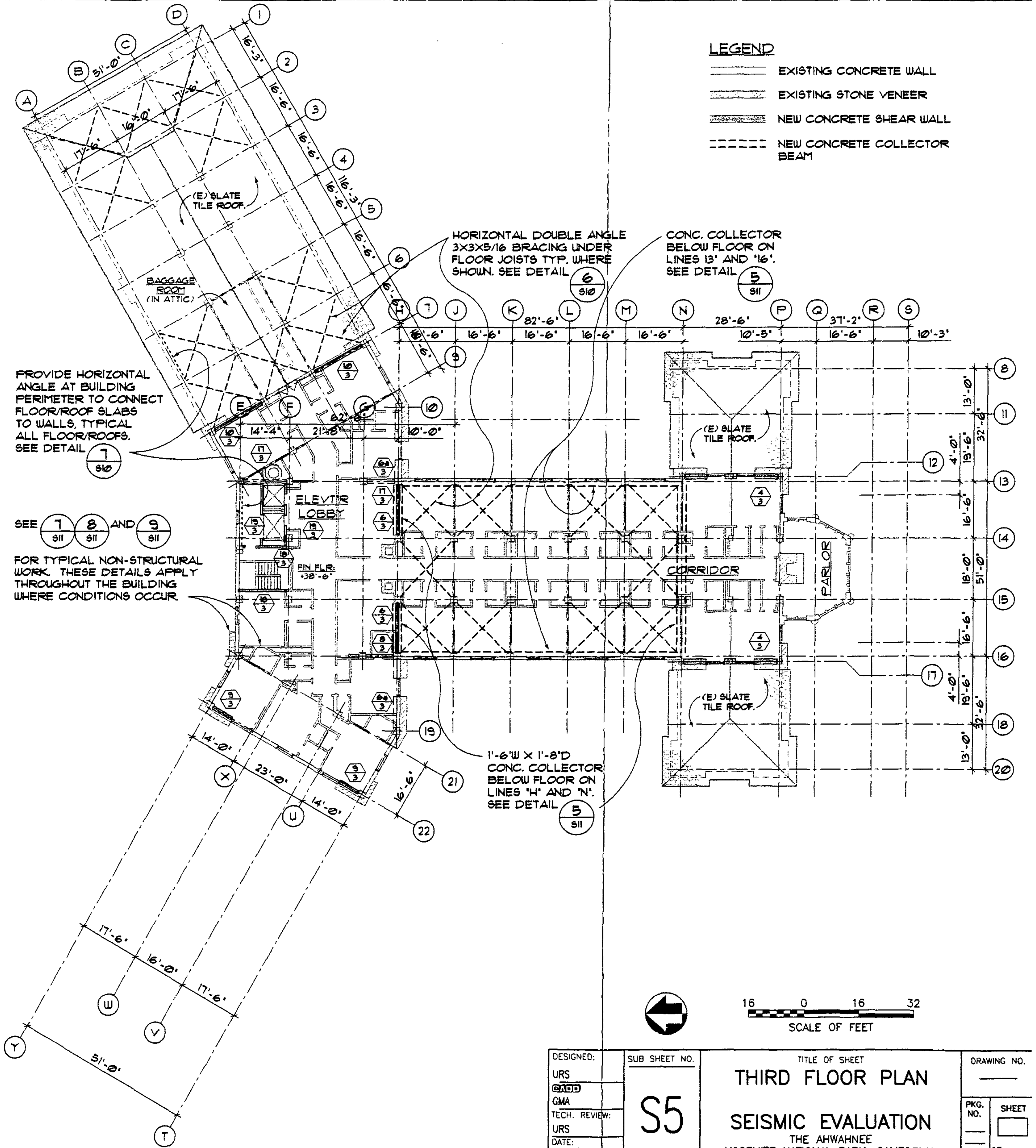
### SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE 'LIMITED DAMAGED SCHEME C' WHERE INDICATED.
7. MARKS INDICATED AS #/X ARE WALL LOCATIONS FOR 'LIFE SAFETY SCHEME A'.

   MARKS INDICATED AS #a/X ARE ALTERNATE WALL LOCATIONS FOR 'LIFE SAFETY SCHEME B'.




| | | | |
|---|---|---|---|
| DESIGNED: URS | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
| CADD GMA | S5 | THIRD FLOOR PLAN | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION | PKG. NO. / SHEET |
| DATE: 10/31/00 | | THE AHWAHNEE<br>YOSEMITE NATIONAL PARK, CALIFORNIA | OF |

# FOURTH FLR. SHEAR WALL SCHEDULE

| MARK (NOTE 7) | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/4 | NOT USED | | | | |
| 2/4 | NOT USED | | | | |
| 3/4 | NOT USED | | | | |
| 4/4 | 12" | 27'-0" | 27-0" | B/S9, 1/S9 | 2 |
| 5/4 | NOT USED | | | | |
| 6/4 | 12" | 14'-0" | 14'-0" | C/S9 SIM, B/S9, 1/S9 | 1 & 2 |
| 6a/4 | 12" | 20'-0" | COMBINED 34'-0" | C/S9 SIM, B/S9, 1/S9 | 1 & 2 |
| 7/4 | NOT USED | | | | |
| 8/4 | 12" | 8'-0" | 8'-0" | B/S9, 1/S9 | 2 |
| 9/4 | NOT USED | | | | |
| 10/4 | 12" | 16'-0" | 16'-0" | B/S9, 1/S9 | 2 |
| 11/4 | NOT USED | | | | |
| 12/4 | NOT USED | | | | |
| 13/4 | NOT USED | | | | |
| 14/4 | NOT USED | | | | |
| 15/4 | NOT USED | | | | |
| 16/4 | NOT USED | | | | |
| 17/4 | 12" | LIMITED DAMAGE ONLY | 14'-0"&8'-0" | C/S9 SIM., 1/S9 | 1 |
| 18/4 | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/4 | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |
| | | | | | |
| | | | | | |

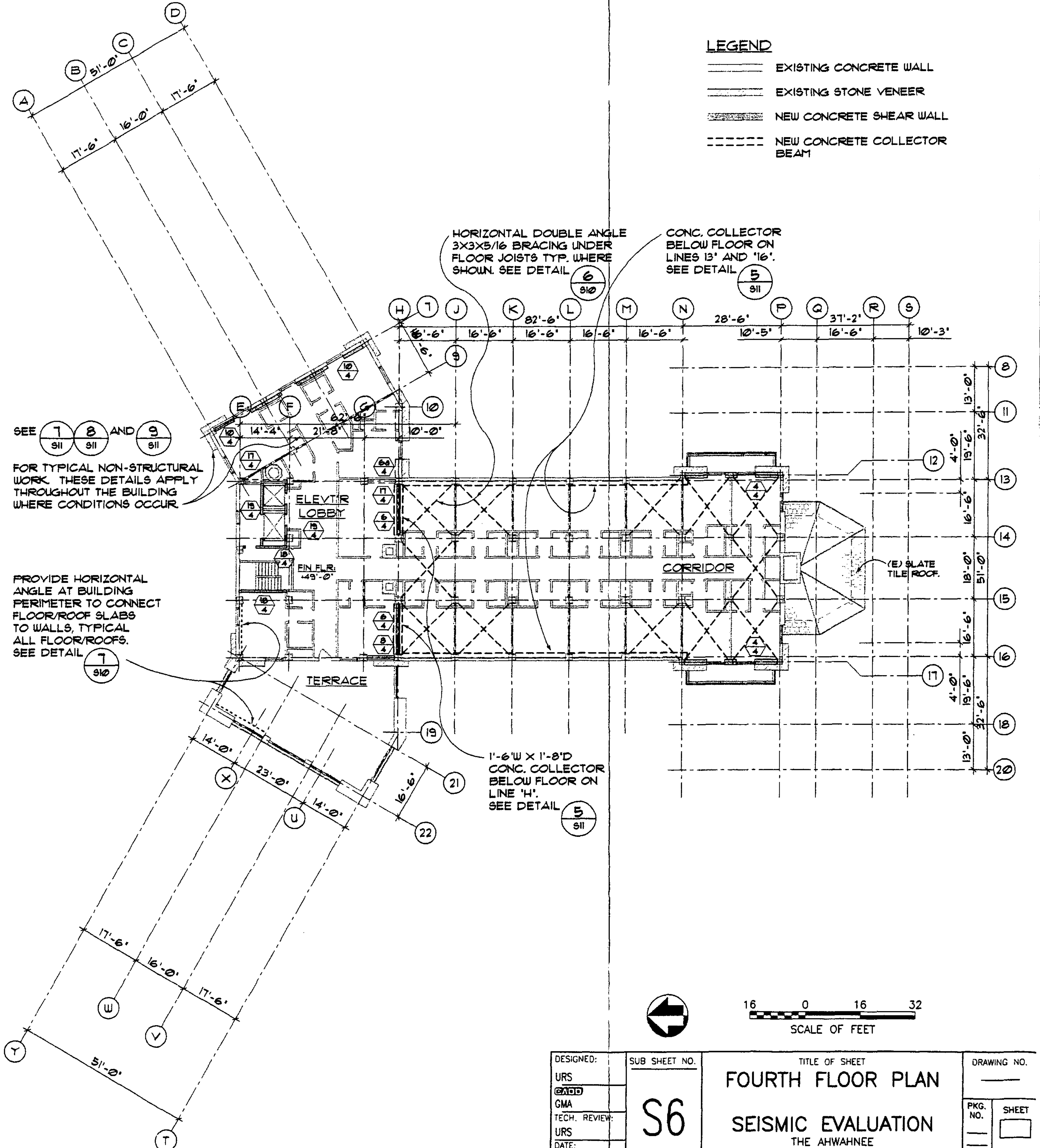
## SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE "LIMITED DAMAGED SCHEME C" WHERE INDICATED.
7. MARKS INDICATED AS #/X ARE WALL LOCATIONS FOR "LIFE SAFETY SCHEME A".

   MARKS INDICATED AS #a/X ARE ALTERNATE WALL LOCATIONS FOR "LIFE SAFETY SCHEME B".




| DESIGNED: URS | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| CADD GMA | S6 | FOURTH FLOOR PLAN | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION | PKG. NO. / SHEET |
| DATE: 10/31/00 | | THE AHWAHNEE<br>YOSEMITE NATIONAL PARK, CALIFORNIA | OF |

## FIFTH FLOOR SHEAR WALL SCHEDULE

| MARK (NOTE 7) | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/5 | NOT USED | | | | |
| 2/5 | NOT USED | | | | |
| 3/5 | NOT USED | | | | |
| 4/5 | NOT USED | | | | |
| 5/5 | NOT USED | | | | |
| 6/5 | 12" | 6'-0" | 6'-0" | B/S9 1/S9 | 2 |
| 7/5 | NOT USED | | | | |
| 8/5 | 12" | 6'-0" | 6'-0" | B/S9 1/S9 | 2 |
| 9/5 | NOT USED | | | | |
| 10/5 | 12" | 16'-0" | 16'-0" | B/S9 1/S9 | 2 |
| 11/5 | NOT USED | | | | |
| 12/5 | NOT USED | | | | |
| 13/5 | NOT USED | | | | |
| 14/5 | NOT USED | | | | |
| 15/5 | NOT USED | | | | |
| 16/5 | NOT USED | | | | |
| 17/5 | 12" | LIMITED DAMAGE ONLY | 14'-0" | C/S9 SIM. 1/S9 | 1 |
| 18/5 | 8" | 14'-0" | 14'-0" | C/S9 SIM. | 1 |
| 19/5 | 8" | 18'-0" | 18'-0" | C/S9 SIM. | 1 |
| | | | | | |
| | | | | | |
| | | | | | |

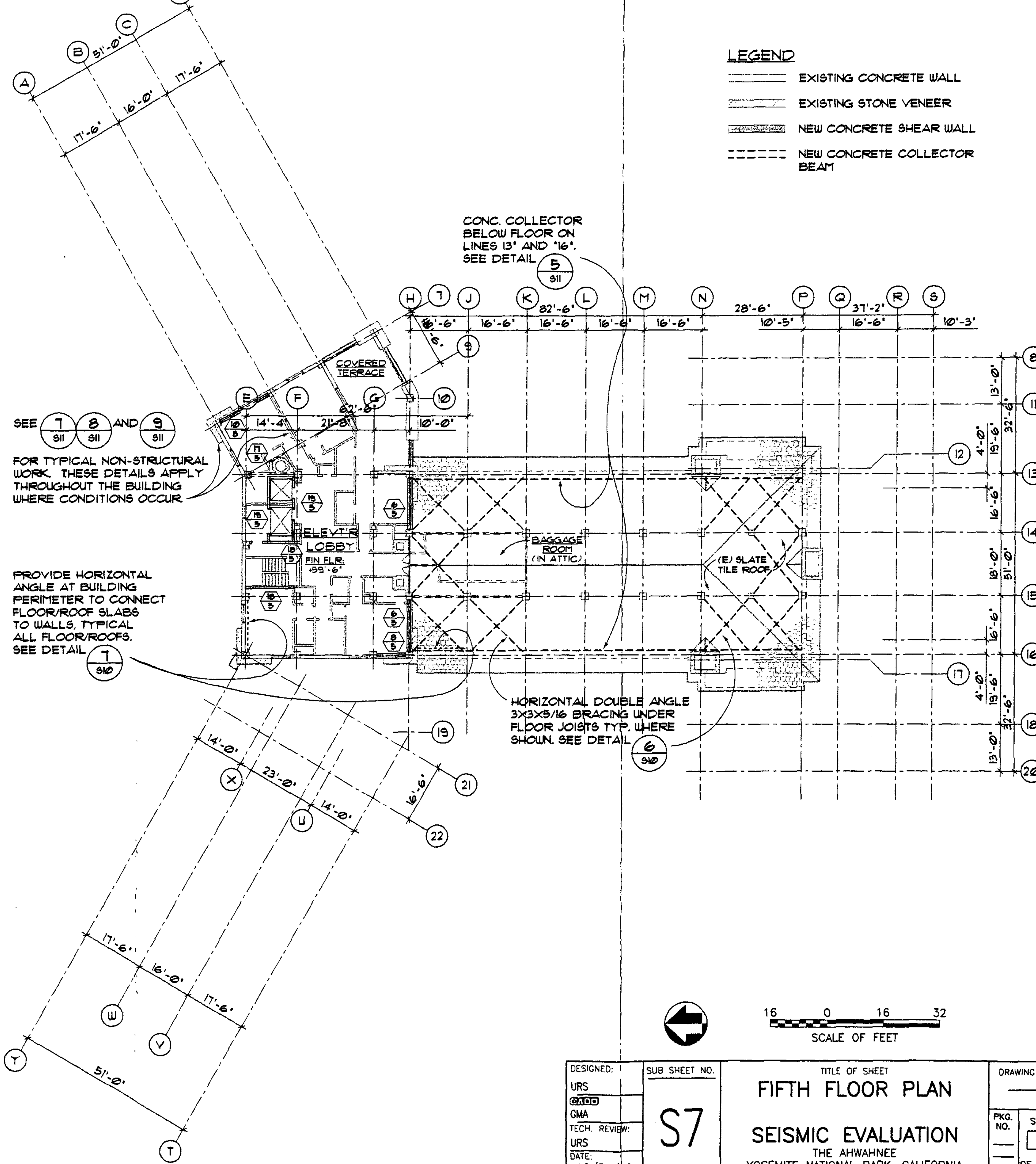
### SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE "LIMITED DAMAGED SCHEME C" WHERE INDICATED.
7. MARKS INDICATED AS #/X ARE WALL LOCATIONS FOR "LIFE SAFETY SCHEME A".

   MARKS INDICATED AS #a/X ARE ALTERNATE WALL LOCATIONS FOR "LIFE SAFETY SCHEME B".




| DESIGNED: URS | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| CADD: GMA | S7 | FIFTH FLOOR PLAN | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION<br>THE AHWAHNEE<br>YOSEMITE NATIONAL PARK, CALIFORNIA | PKG. NO. / SHEET |
| DATE: 10/31/00 | | | OF |

# SIXTH FLOOR SHEAR WALL SCHEDULE

| MARK (NOTE 7) | WALL THICKNESS (NOTE 4) | WALL LENGTH LIFE SAFETY (NOTE 5) | WALL LENGTH LTD. DAMAGE (NOTE 6) | DETAILS | ADDITIONAL REQUIREMENTS (SEE NOTES) |
|---|---|---|---|---|---|
| 1/6 | NOT USED | | | | |
| 2/6 | NOT USED | | | | |
| 3/6 | NOT USED | | | | |
| 4/6 | NOT USED | | | | |
| 5/6 | NOT USED | | | | |
| 6/6 | NOT USED | | | | |
| 7/6 | NOT USED | | | | |
| 8/6 | NOT USED | | | | |
| 9/6 | NOT USED | | | | |
| 10/6 | 12" | 16'-0" | 16'-0" | B/S9 1/S9 | 2 |
| 11/6 | NOT USED | | | | |
| 12/6 | NOT USED | | | | |
| 13/6 | NOT USED | | | | |
| 14/6 | NOT USED | | | | |
| 15/6 | NOT USED | | | | |
| 16/6 | NOT USED | | | | |
| 17/6 | 12" | LIMITED DAMAGE ONLY | 14'-0" | C/S9 SIM. 1/S9 | 1 |
| 18/6 | 8" | 14'-0" | 14'-0" | C/S9 | 1 |
| 19/6 | 8" | 18'-0" | 18'-0" | C/S9 | 1 |
| | | | | | |
| | | | | | |
| | | | | | |

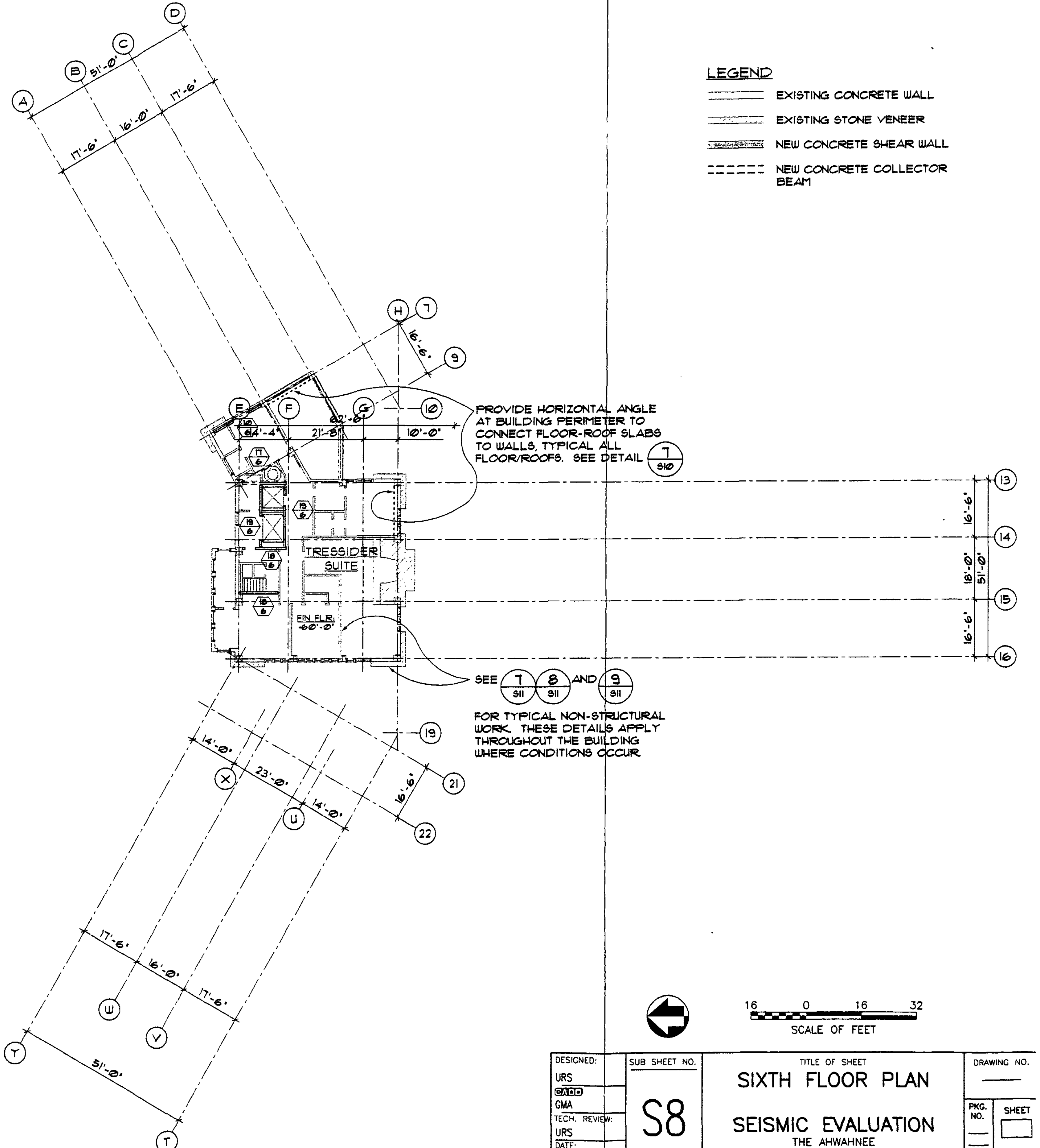
## SHEAR WALL SCHEDULE NOTES:

1. REPLACE EXISTING INTERIOR PARTITION WITH NEW CONCRETE SHEAR WALL.
2. REMOVE EXISTING FURRED WALL AT INTERIOR AND THICKEN EXISTING CONCRETE WITH NEW CONCRETE SHEAR WALL.
3. REMOVE EXISTING PARTITION AND PORTION OF EXISTING VENEER. PLACE NEW CONCRETE SHEAR WALL BETWEEN EXISTING COLUMNS.
4. 18" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY, EACH FACE.

   12" THICK CONCRETE WALL: REINFORCE WITH #4 @ 12" O.C. EACH WAY, EACH FACE.

   8" THICK CONCRETE WALL: REINFORCE WITH #5 @ 12" O.C. EACH WAY AT CENTER.
5. PROVIDE WINDOW / DOOR OPENINGS IN NEW CONCRETE SHEAR WALL AS SHOWN.
6. WALL EXTENDS IN THE DIRECTION(S) AS SHOWN BY DOTTED LINES FOR THE "LIMITED DAMAGED SCHEME C" WHERE INDICATED.
7. MARKS INDICATED AS #/X ARE WALL LOCATIONS FOR "LIFE SAFETY SCHEME A".

   MARKS INDICATED AS #a/X ARE ALTERNATE WALL LOCATIONS FOR "LIFE SAFETY SCHEME B".




PROVIDE HORIZONTAL ANGLE AT BUILDING PERIMETER TO CONNECT FLOOR-ROOF SLABS TO WALLS, TYPICAL ALL FLOOR/ROOFS. SEE DETAIL 7/S10

SEE 7/S11, 8/S11 AND 9/S11 FOR TYPICAL NON-STRUCTURAL WORK. THESE DETAILS APPLY THROUGHOUT THE BUILDING WHERE CONDITIONS OCCUR.

## LEGEND

- EXISTING CONCRETE WALL
- EXISTING STONE VENEER
- NEW CONCRETE SHEAR WALL
- NEW CONCRETE COLLECTOR BEAM

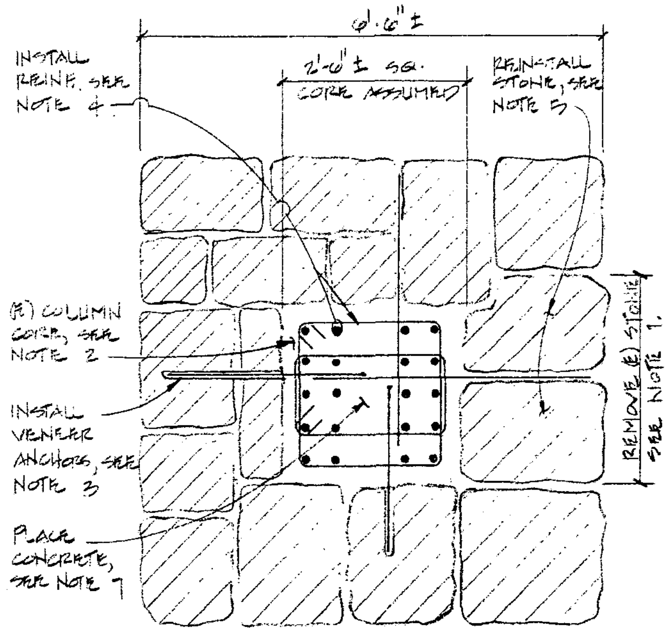
16 0 16 32
SCALE OF FEET

| DESIGNED: URS | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| CADD GMA | S8 | SIXTH FLOOR PLAN | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION | PKG. NO. / SHEET |
| DATE: 10/31/00 | | THE AHWAHNEE<br>YOSEMITE NATIONAL PARK, CALIFORNIA | OF |

XREFS: F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\X-PLAN.DWG; F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\X-GRID.DWG;

10/20/00 12:07 STATION4 R15 F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\S8-6FLR.DWG

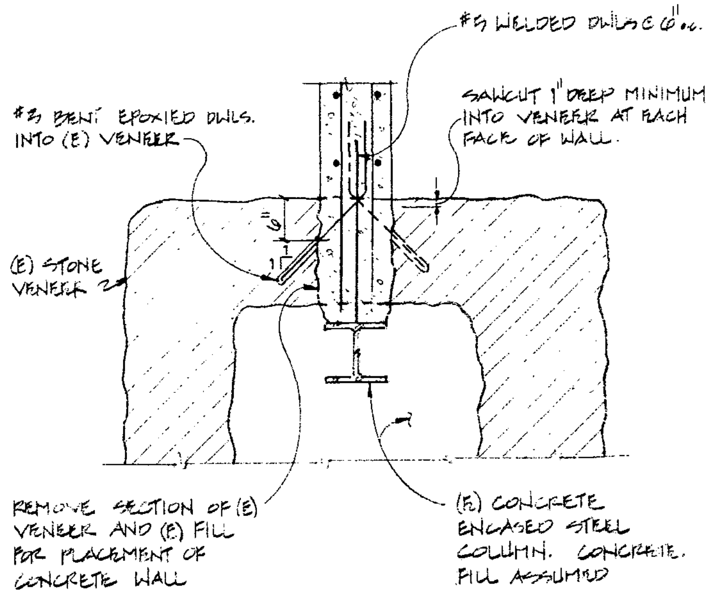
F:\20010 - Ahwahnee\Dwgs\03-SD\01-delta\S8-6FLR.dwg, S8-6PLN, 10/31/00 10:04:28 AM



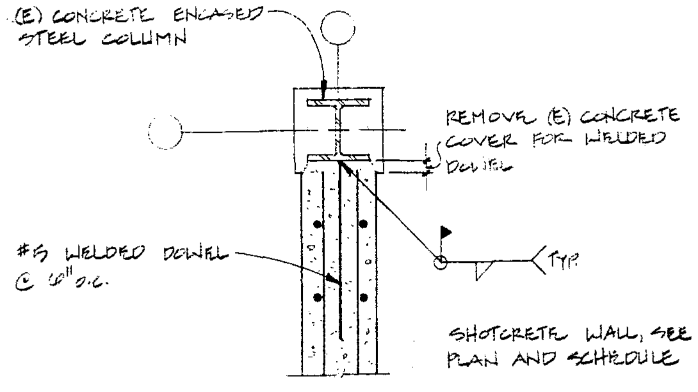

Notes:

1. REMOVE (E) STONE VENEER ON ONE FACE, FULL HEIGHT OF (E) COLUMN. MAP AND CATALOG STONES FOR REINSTALLATION.
2. CORE OF (E) STONE COLUMNS ASSUMED TO BE UNREINFORCED CONCRETE AND SHALL BE REMOVED.
3. INSTALL STONE VENEER ANCHORS, ONE ANCHOR PER TWO SQ. FT. OF EXTERIOR COLUMN SURFACE. ANCHORS MAY BE 1/4"φ STAINLESS STEEL THREADED RODS EPOXIED THROUGH (E) MORTAR JOINTS, OR #3 DOWELS EPOXIED INTO BACK OF STONES.
4. INSTALL 10-#11 ON TWO SIDES W/ 2-#4 TIE SETS @ 6" o.c.
5. REINSTALL STONE VENEER, MORTAR FULL THICKNESS.
6. INSTALL COLLECTOR CONNECTION AT ROOF.
7. REMOVE PORTION OF (E) ROOF OVER COLUMNS AND PLACE CONCRETE. REINSTALL ROOFING AFTER CONC. HAS CURED.

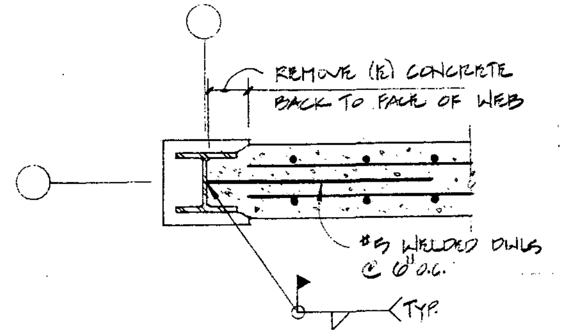
PLAN DETAIL 4/S9



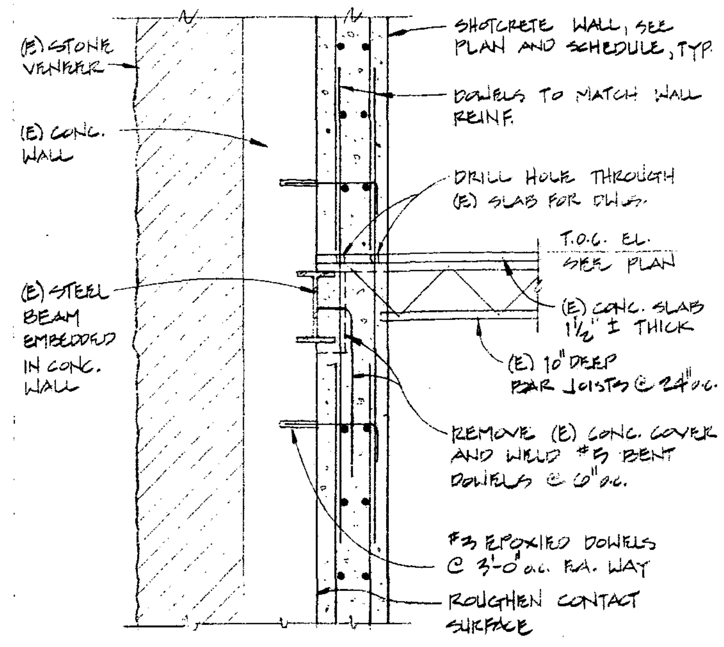

PLAN DETAIL 3/S9



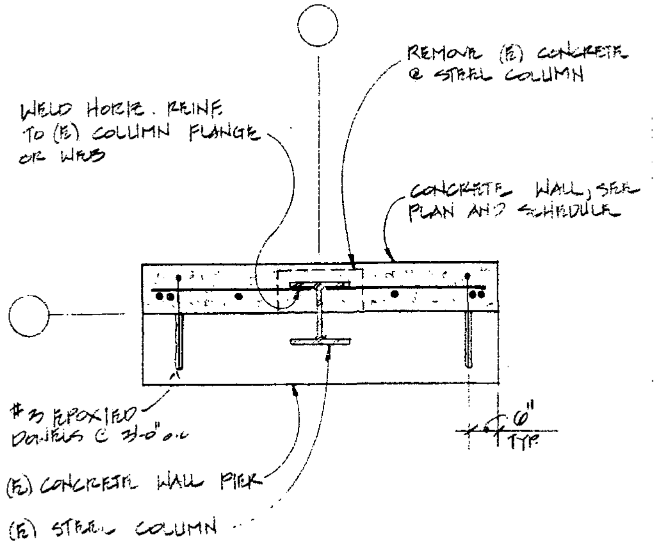

PLAN DETAIL 2/S9



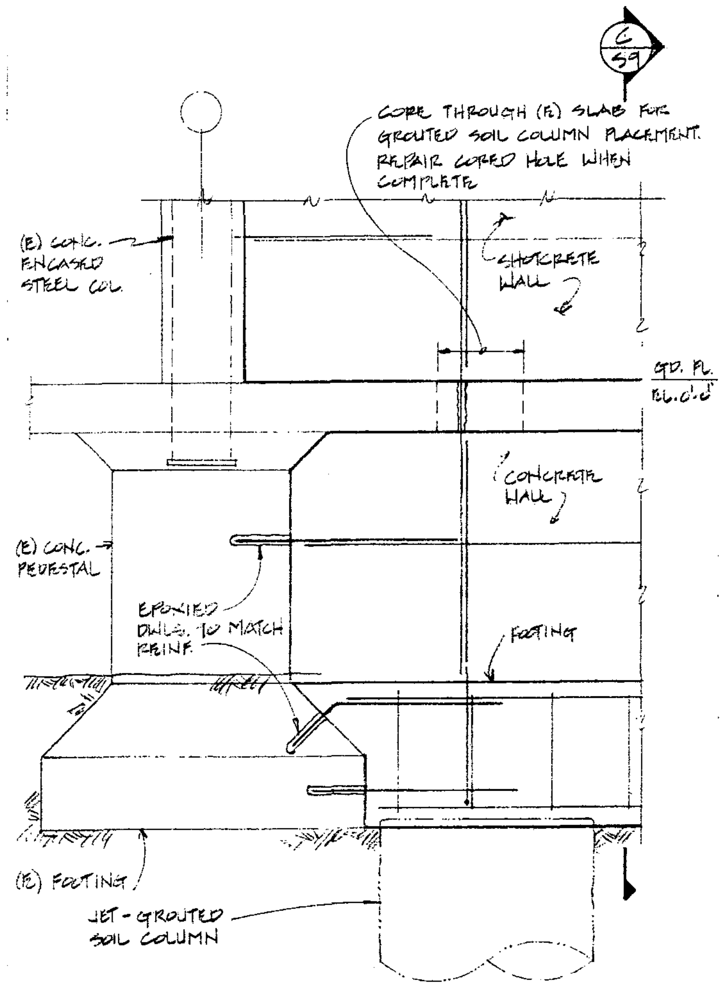

PLAN DETAIL 1/S9



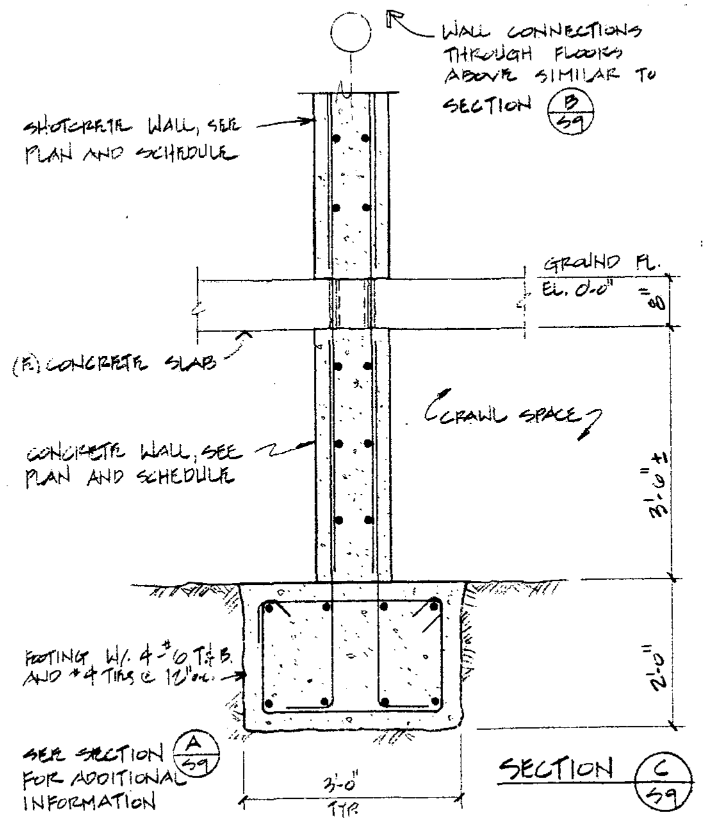

SECTION B/S9



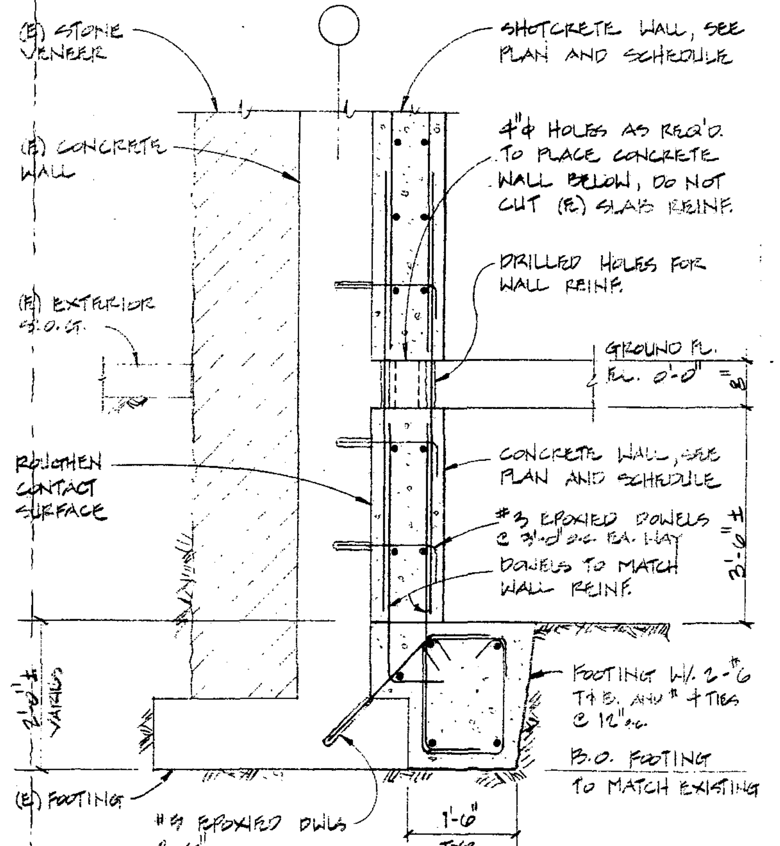

PLAN DETAIL 5/S9




SECTION D/S9




SECTION C/S9



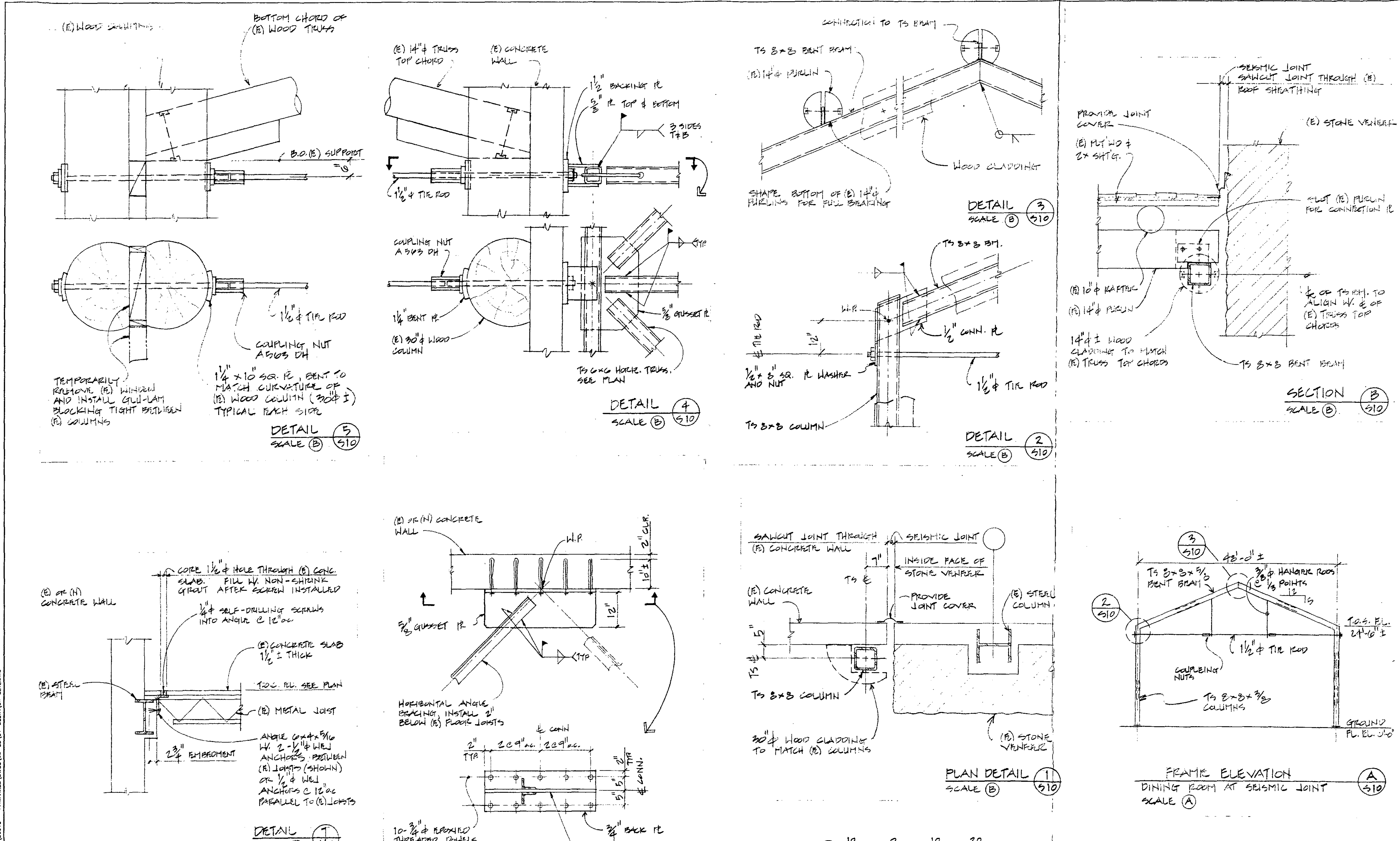

SECTION A/S9

1 0 1 2 3
SCALE OF FEET

| DESIGNED: LGM | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| CADD: KSB | S9 | DETAILS | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION | PKG. NO. / SHEET |
| DATE: 10/31/00 | | THE AHWAHNEE YOSEMITE NATIONAL PARK, CALIFORNIA | OF |

F:\20010 - Ahwahnee\Dwgs\03-SD\01-delta\SX-DETL.dwg, SX-DETL 10/05/00 04:03:19 PM

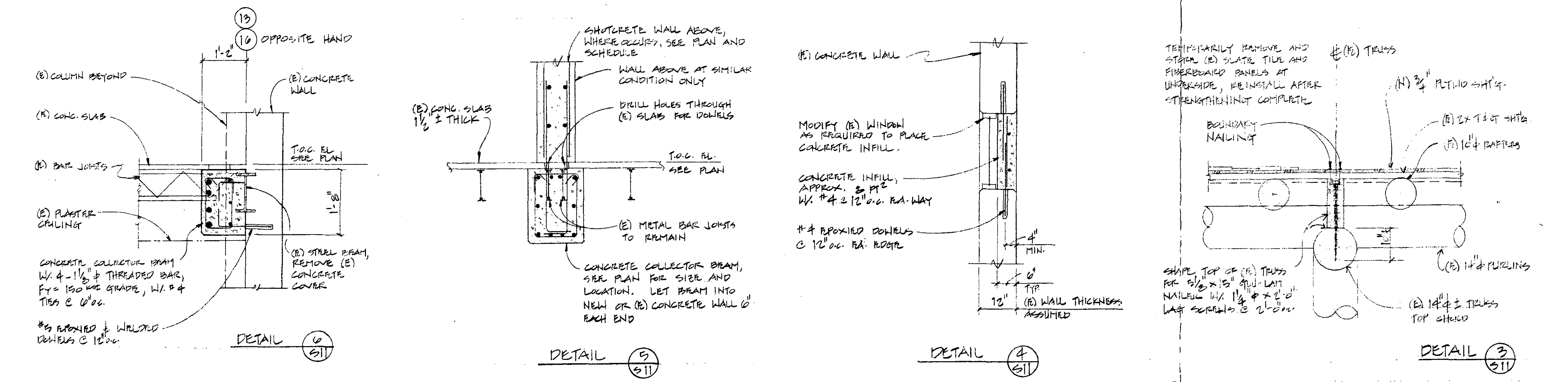
9/25/00 09:24 STATION4 R15 F:\20010 - AHWAHNEE\DWGS\03-SD\01-DELTA\SX-DETL.DWG

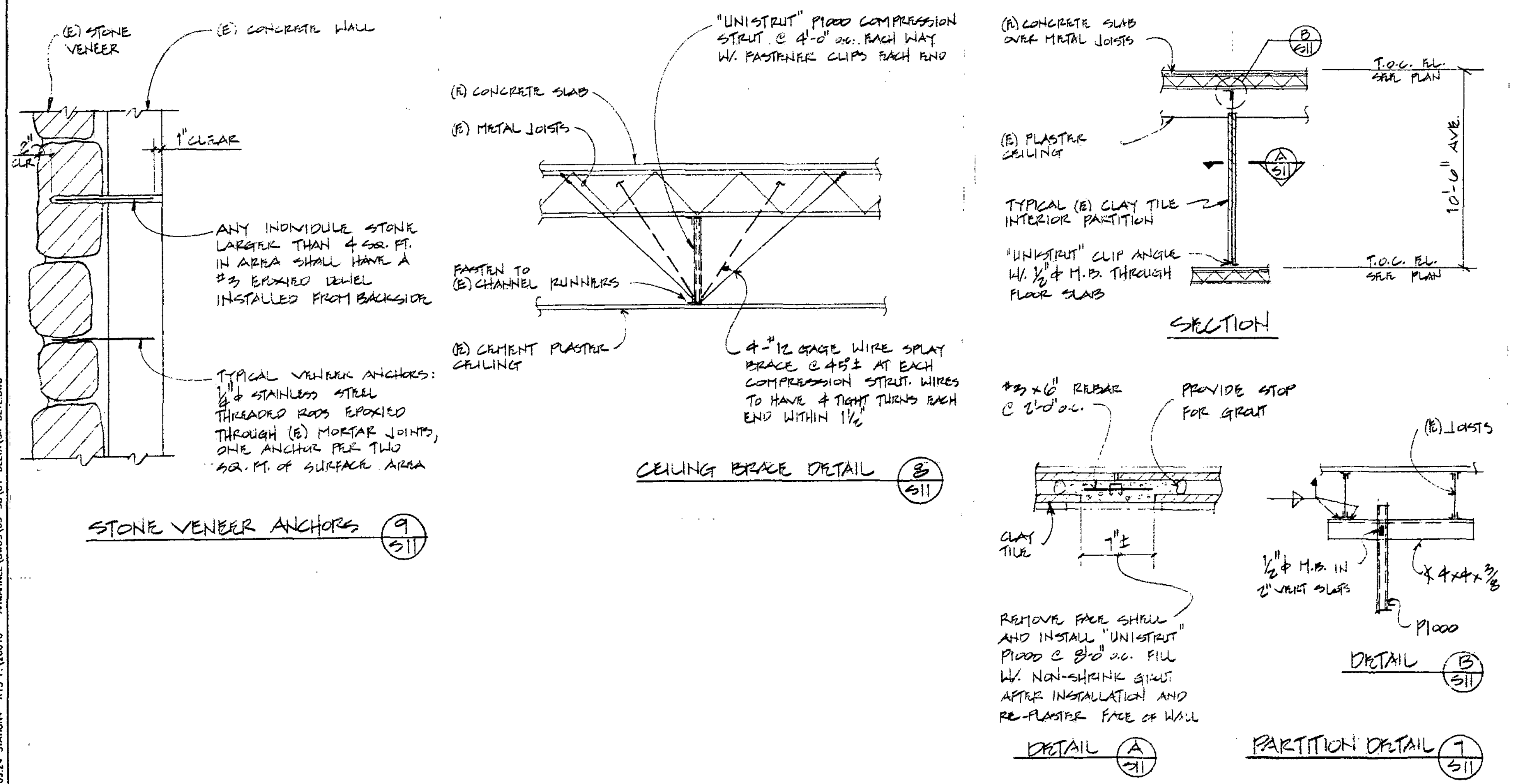


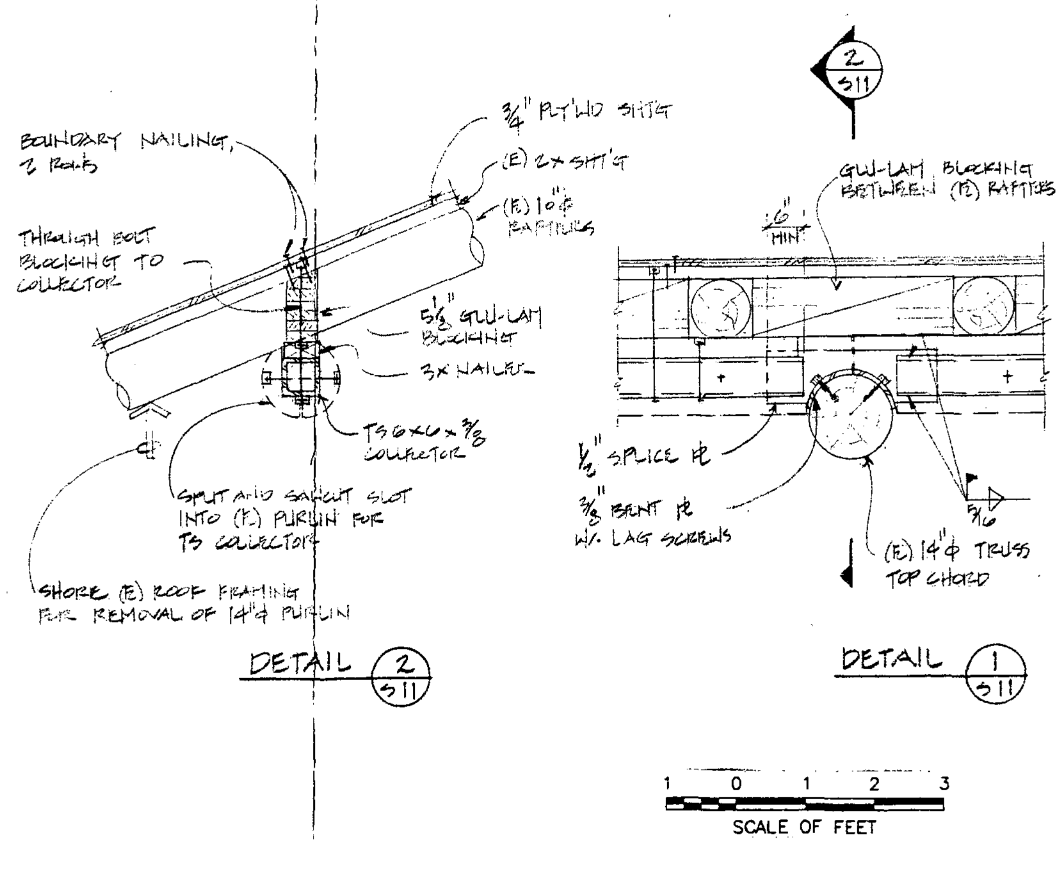

SCALE (A) 10 0 10 20 SCALE OF FEET

SCALE (B) 1 0 1 2 3 SCALE OF FEET

| DESIGNED: LGM | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| CADD: KSB | S10 | DETAILS | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION | PKG. NO. / SHEET |
| DATE: 10/31/00 | | THE AHWAHNEE<br>YOSEMITE NATIONAL PARK, CALIFORNIA | OF |




| DESIGNED: LGM | SUB SHEET NO. | TITLE OF SHEET | DRAWING NO. |
|---|---|---|---|
| CADD: KSB | S11 | DETAILS | |
| TECH. REVIEW: URS | | SEISMIC EVALUATION | PKG. NO. / SHEET |
| DATE: 10/31/00 | | THE AHWAHNEE<br>YOSEMITE NATIONAL PARK, CALIFORNIA | OF |

F:\20010 - Ahwahnee\Dwgs\03-SD\01-delta\SX-DETL.dwg, S1-BPLN, 10/05/00 03:52:33 PM

9/25/00 09:24 STATION4 R15 F:\20010 – AHWAHNEE\DWGS\03-SD\01-DELTA\SX-DETL.DWG

# APPENDIX C

## Construction Cost Estimate

Job No.: 43-00066652-15
Client: National Park Service
Job Name: Seismic Rehabilitation Alternatives for the Ahwahnee Hotel, Yosemite National Park, CA

## Summary of Schemes A, B & C Conceptual Cost Estimate

### Scheme A – Life Safety Conceptual Cost Estimate

| | | |
|---|---|---|
| Structural Cost | $ [redacted] | |
| Non-Structural Cost | $ [redacted] | |
| Total Estimated Cost | | $ [redacted] |

### Scheme B – Life Safety Conceptual Cost Estimate

| | | |
|---|---|---|
| Structural Cost | $ [redacted] | |
| Non-Structural Cost | $ [redacted] | |
| Total Estimate Cost | | $ [redacted] |

### Scheme C.-.Limited Damage Conceptual Cost Estimate

| | | |
|---|---|---|
| Structural Cost | $ [redacted] | |
| Non-Structural Cost | $ [redacted] | |
| Total Estimated Cost | | $ [redacted] |

**Scheme A – Life Safety Conceptual Cost Estimate**

SUMMARY

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME A LIFE SAFETY CONCEPTUAL ESTIMATE
SUMMARY

10/31/00

| NO. | DESCRIPTION | | TOTAL $ | COST/SF |
|---|---|---|---|---|
| 1 | DEMOLITION | | [redacted] | |
| 2 | SITEWORK | | [redacted] | |
| 3 | CONCRETE | | [redacted] | |
| 4 | MASONRY | | [redacted] | |
| 5 | METALS | | [redacted] | |
| 6 | WOOD & PLASTICS | | [redacted] | |
| 7 | THERMAL & MOISTURE | | [redacted] | |
| 8 | DOORS & GLAZING | | [redacted] | |
| 9 | FINISHES | | [redacted] | |
| 10 | SPECIALTIES | | [redacted] | |
| 11 | EQUIPMENT | | [redacted] | |
| 12 | FURNISHINGS | | [redacted] | |
| 13 | SPECIAL CONSTRUCTION | | [redacted] | |
| 14 | CONVEYANCES | | [redacted] | |
| 15 | MECHANICAL | | [redacted] | |
| 16 | ELECTRICAL | | [redacted] | |
| | DIRECT COST SUBTOTAL | | [redacted] | |
| | GENERAL CONDITIONS | [redacted] | [redacted] | |
| | G.C. MARK UP & BOND | [redacted] | [redacted] | |
| | ESTIMATE/DESIGN CONTINGENCY | [redacted] | [redacted] | |
| | TOTAL CONSTRUCTION COST | | [redacted] | |
| | ESCALATION TO 2003=2YRS@4% P.A. | [redacted] | [redacted] | |
| | TOTAL PROJECT COST | | $ [redacted] | |

**NATIONAL PARK SERVICE**
**SEISMIC SAFETY PROGRAM**
**SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL**
**YOSEMITE PARK, CALIFORNIA.**
**SCHEME A LIFE SAFETY CONCEPTUAL ESTIMATE**

**DATE: 10/31/00**

| NO. | DESCRIPTION | UANTIT | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| 5 | **METALS** | | | | |
| | #5 DOWELS, WELDED TO COLUMNS | [redacted] | [redacted] | [redacted] | [redacted] |
| | #5 DOWELS, DRILL & EPOXY | [redacted] | [redacted] | [redacted] | [redacted] |
| | #3 DOWELS, DRILL & EPOXY | [redacted] | [redacted] | [redacted] | [redacted] |
| | TS 8X8 COL | [redacted] | | | |
| | TS 8X8 TRUSS MEMBERS | | | | |
| | TS 8X8 MEMBERS, PER AS/10 | | | | |
| | TS 6X6 COLLECTORS AT DINING | | | | |
| | C10X20 | | | | |
| | 1 1/2" TIE RODS, 51'0" LONG | | | | |
| | 3/8" HANGER ROD, 10' LONG | | | | |
| | 5/8" ANCHORS, DRILL & EPOXY AT C10 | | | | |
| | 3X3X5/16 DOUBLE ANGLE, BOLTS & PLATES | | | | |
| | 3X3X5/16 SINGLE ANGLE, BOLTS & PLATES | | | | |
| | 6X4X5/16 ANGLE CONNECTIONS AT FLOORS/WALLS | | | | |
| | MISC METALS | | | | |
| | **SUB TOTAL** | | | | |
| 6 | **WOOD & PLASTICS** | | | | |
| | GLULAM BLOCKING | | | | |
| | 3/4" CDX PLY SHEATHING W/SHEAR NAIL, ROOF | | | | |
| | 3/4" CDX PLY SHEATHING W/SHEAR NAIL, KITCHEN ROOF | | | | |
| | SHEAR NAIL SHEATHING AY PORTE | | | | |
| | 3"X 4" BLOCKING | | | | |
| | LOG FRAME AT SEISMIC JOINT | | | | |
| | MISC. | | | | |
| | **SUB TOTAL** | | | | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEMES A & B
NON STRUCTURAL ITEMS CONCEPTUAL ESTIMATE
SUMMARY

10/31/00

| NO. | DESCRIPTION | | TOTAL $ | COST/SF |
|---|---|---|---|---|
| | SCHEMES A & B | | | |
| 1 | NON STRUCTURAL ITEMS | | [redacted] | |
| | DIRECT COST SUBTOTAL | | [redacted] | |
| | GENERAL CONDITIONS | [redacted] | [redacted] | |
| | G.C. MARK UP & BOND | [redacted] | [redacted] | |
| | ESTIMATE/DESIGN CONTINGENCY | [redacted] | [redacted] | |
| | TOTAL CONSTRUCTION COST | | [redacted] | |
| | ESCALATION TO 2003=2YRS@4% P.A. | [redacted] | [redacted] | |
| | TOTAL PROJECT COST | | [redacted] [redacted] | |

**NATIONAL PARK SERVICE**
**SEISMIC SAFETY PROGRAM**
**SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL**
**YOSEMITE PARK, CALIFORNIA.**
**SCHEMES A & B**
**NON STRUCTURAL ITEMS CONCEPTUAL ESTIMATE**

**DATE:** 10/31/00

| NO. | DESCRIPTION | QUANTITY | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| | **AHWAHNEE HOTEL** | | | | |
| | **NON STRUCTURAL ITEMS** | | | | |
| | **SCHEMES A & B** | | | | |
| | UNISTRUT, REBAR & GROUT AT CLAY PARTITIONS - 7/S11 | [redacted] | [redacted] | [redacted] | [redacted] |
| | CEILING BRACE, PER 8/S11 | [redacted] | | | |
| | STONE ANCHORS, STAINLESS | | | | |
| | STONE ANCHORS TO EA STONE <4 SF EA ALLOWANCE | | | | |
| | **TOTAL NON STRUCTURAL** | | | | |

## Scheme B – Life Safety Conceptual Cost Estimate

**NATIONAL PARK SERVICE**
**SEISMIC SAFETY PROGRAM**
**SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL**
**YOSEMITE PARK, CALIFORNIA.**
**SCHEME B LIFE SAFETY CONCEPTUAL ESTIMATE**
**SUMMARY** **10/31/00**

| NO. | DESCRIPTION | | [redacted] | COST/SF |
|---|---|---|---|---|
| 1 | DEMOLITION | | [redacted] | |
| 2 | SITEWORK | | [redacted] | |
| 3 | CONCRETE | | [redacted] | |
| 4 | MASONRY | | [redacted] | |
| 5 | METALS | | [redacted] | |
| 6 | WOOD & PLASTICS | | [redacted] | |
| 7 | THERMAL & MOISTURE | | [redacted] | |
| 8 | DOORS & GLAZING | | [redacted] | |
| 9 | FINISHES | | [redacted] | |
| 10 | SPECIALTIES | | [redacted] | |
| 11 | EQUIPMENT | | [redacted] | |
| 12 | FURNISHINGS | | [redacted] | |
| 13 | SPECIAL CONSTRUCTION | | [redacted] | |
| 14 | CONVEYANCES | | [redacted] | |
| 15 | MECHANICAL | | [redacted] | |
| 16 | ELECTRICAL | | [redacted] | |
| | DIRECT COST SUBTOTAL | | [redacted] | |
| | GENERAL CONDITIONS | [redacted] | [redacted] | |
| | G.C. MARK UP & BOND | [redacted] | [redacted] | |
| | ESTIMATE/DESIGN CONTINGENCY | [redacted] | [redacted] | |
| | TOTAL CONSTRUCTION COST | | [redacted] | |
| | ESCALATION TO 2003=2YRS@4% P.A. | [redacted] | [redacted] | |
| | TOTAL PROJECT COST | | [redacted] [redacted] | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME B LIFE SAFETY CONCEPTUAL ESTIMATE

DATE: 10/31/00

| NO. | DESCRIPTION | QUANTIT | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| | | | | | |
| | **AHWAHNEE HOTEL** | | | | |
| | | | | | |
| 1 | **DEMOLITION** | [redacted] | | | |
| | EXISTING PARTITIONS | | | | |
| | EXISTING SLATE ROOF & PLY | | | | |
| | EXISTING SLATE ROOF AT PORTE | | | | |
| | DEMO FOOTING | | | | |
| | DEMO FLOOR SLAB | | | | |
| | SCABBLE EXISTING | | | | |
| | | | | | |
| | CUT OUT CONC. COLUMN SURROUND | | | | |
| | DEMO EXIST. CEILINGS | | | | |
| | DEMO EXIST. CEILINGS FOR ANGLE BRACING | | | | |
| | MISC. DEMO | | | | |
| | | | | | |
| | **SUB TOTAL** | | | | |
| | | | | | |
| 2 | **SITE WORK** | | | | |
| | | | | | |
| | COMPACTION GROUT FOUNDATION | | | | |
| | SHORING GROUND FLOOR FOR EQUIPMENT, ALLOWANCE | | | | |
| | CORE DRILL FOR FOUNDATION WORK, ALLOWANCE | | | | |
| | | | | | |
| | EXCAV & DISPOSE GRADE BEAMS, HAND | | | | |
| | EXCAV & DISPOSE FOOTING, HAND | | | | |
| | | | | | |
| | | | | | |
| | **SUB TOTAL** | | | | |
| | | | | | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME B LIFE SAFETY CONCEPTUAL ESTIMATE

DATE: 10/31/00

| NO. | DESCRIPTION | QUANTITY | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| 3 | **CONCRETE** | | | | |
| | GRADE BEAMS, | [redacted] | | | |
| | PEDESTAL FOOTING | | | | |
| | FOOTING, FORM & REBAR | | | | |
| | 8" CONCRETE SHEAR WALL, CIP, FORM & REBAR | | | | |
| | 12" CONCRETE SHEAR WALL, CIP, FORM & REBAR | | | | |
| | 18" CONCRETE SHEAR WALL, CIP, FORM & REBAR | | | | |
| | 8" SHOTCRETE SHEAR WALL | | | | |
| | 12" SHOTCRETE SHEAR WALL | | | | |
| | 18" SHOTCRETE SHEAR WALL | | | | |
| | FORMWORK FOR SHOTCRETE | | | | |
| | COLLECTOR BEAM | | | | |
| | INFILL WINDOW OPENINGS, REINF. CONC. | | | | |
| | INFILL CLERESTORY WINDOWS | | | | |
| | REPLACE FLOOR SLAB | | | | |
| | PATCH CONCRETE CORE DRILL | | | | |
| | MISC. CONCRETE | | | | |
| | **SUB TOTAL** | | | | |
| 4 | **MASONRY** | | | | |
| | REINFORCE STONE COLS AT DINING, SCHEME A ONLY | | | | |
| | REINFORCE STONE COLS AT PORTE, | | | | |
| | KEY INTO COLS PER 3/S9 | | | | |
| | MISC. MASONRY | | | | |
| | **SUB TOTAL** | | | | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME B LIFE SAFETY CONCEPTUAL ESTIMATE

DATE: 10/31/00

| NO. | DESCRIPTION | QUANTITY | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| 7 | **THERMAL & MOISTURE** | | | | |
| | REINSTALL SLATE ROOF | [redacted] | | | |
| | CAULKING & SEALING | | | | |
| | **SUB TOTAL** | | | | |
| 9 | **FINISHES** | | | | |
| | LATH & PLASTER, CEILING | | | | |
| | LATH & PLASTER, CEILING | | | | |
| | FURR & PLASTER, | | | | |
| | PAINT WALLS | | | | |
| | PAINT INTERNAL, CEILING | | | | |
| | MISC FINISHES | | | | |
| | **SUB TOTAL** | | | | |
| 13 | **SPECIAL CONSTRUCTION** | | | | |
| | PROTECTION OF EXISTING FLOORS, WALLS CEILINGS, ETC ALLOWANCE | | | | |
| | **SUB TOTAL** | | | | |
| 15 | **MECHANICAL** | | | | |
| | REMOVE & REROUTE PLUMBING, ALLOWANCE | | | | |
| | REMOVE & REROUTE DUCTING, ALLOWANCE | | | | |
| | **SUB TOTAL** | | | | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME B LIFE SAFETY CONCEPTUAL ESTIMATE

DATE: 10/31/00

| NO. | DESCRIPTION | QUANTITY | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| | | | | | |
| 16 | **ELECTRICAL** | | | | |
| | REMOVE & REROUTE ELECTRICAL, ALLOWANCE | [redacted] | | | |
| | | | | | |
| | | | | | |
| | **SUB TOTAL** | | | | |
| | | | | | |
| | | | | | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEMES A & B
NON STRUCTURAL ITEMS CONCEPTUAL ESTIMATE
SUMMARY

10/31/00

| NO. | DESCRIPTION | | TOTAL $ | COST/SF |
|---|---|---|---|---|
| | SCHEMES A & B | | | |
| 1 | NON STRUCTURAL ITEMS | [redacted] | | |
| | DIRECT COST SUBTOTAL | | | |
| | GENERAL CONDITIONS | | | |
| | G.C. MARK UP & BOND | | | |
| | ESTIMATE/DESIGN CONTINGENCY | | | |
| | TOTAL CONSTRUCTION COST | | | |
| | ESCALATION TO 2003=2YRS@4% P.A. | | | |
| | TOTAL PROJECT COST | | | |

**NATIONAL PARK SERVICE**
**SEISMIC SAFETY PROGRAM**
**SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL**
**YOSEMITE PARK, CALIFORNIA.**
**SCHEMES A & B**
**NON STRUCTURAL ITEMS CONCEPTUAL ESTIMATE**

**DATE:** 10/31/00

| NO. | DESCRIPTION | QUANTITY | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| | **AHWAHNEE HOTEL** | | | | |
| | **NON STRUCTURAL ITEMS** | | | | |
| | **SCHEMES A & B** | | | | |
| | UNISTRUT, REBAR & GROUT AT CLAY PARTITIONS - 7/S11 | [redacted] | [redacted] | [redacted] | [redacted] |
| | CEILING BRACE, PER 8/S11 | [redacted] | [redacted] | [redacted] | [redacted] |
| | STONE ANCHORS, STAINLESS | [redacted] | [redacted] | [redacted] | [redacted] |
| | STONE ANCHORS TO EA STONE <4 SF EA ALLOWANCE | [redacted] | [redacted] | [redacted] | [redacted] |
| | **TOTAL NON STRUCTURAL** | [redacted] | [redacted] | [redacted] | [redacted] |
| | | | | | |

**Scheme C – Limited Damage Conceptual Cost Estimate**

**NATIONAL PARK SERVICE**
**SEISMIC SAFETY PROGRAM**
**SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL**
**YOSEMITE PARK, CALIFORNIA.**
**SCHEME C LIMITED DAMAGE CONCEPTUAL ESTIMATE**
**SUMMARY** 10/31/00

| NO. | DESCRIPTION | | TOTAL $ | COST/SF |
|---|---|---|---|---|
| 1 | DEMOLITION | [redacted] | [redacted] | |
| 2 | SITEWORK | [redacted] | [redacted] | |
| 3 | CONCRETE | [redacted] | [redacted] | |
| 4 | MASONRY | [redacted] | [redacted] | |
| 5 | METALS | [redacted] | [redacted] | |
| 6 | WOOD & PLASTICS | [redacted] | [redacted] | |
| 7 | THERMAL & MOISTURE | [redacted] | [redacted] | |
| 8 | DOORS & GLAZING | [redacted] | [redacted] | |
| 9 | FINISHES | [redacted] | [redacted] | |
| 10 | SPECIALTIES | [redacted] | [redacted] | |
| 11 | EQUIPMENT | [redacted] | [redacted] | |
| 12 | FURNISHINGS | [redacted] | [redacted] | |
| 13 | SPECIAL CONSTRUCTION | [redacted] | [redacted] | |
| 14 | CONVEYANCES | [redacted] | [redacted] | |
| 15 | MECHANICAL | [redacted] | [redacted] | |
| 16 | ELECTRICAL | [redacted] | [redacted] | |
| | DIRECT COST SUBTOTAL | [redacted] | [redacted] | |
| | GENERAL CONDITIONS | [redacted] | [redacted] | |
| | G.C. MARK UP & BOND | [redacted] | [redacted] | |
| | ESTIMATE/DESIGN CONTINGENCY | [redacted] | [redacted] | |
| | TOTAL CONSTRUCTION COST | [redacted] | [redacted] | |
| | ESCALATION TO 2003=2YRS@4% P.A. | [redacted] | [redacted] | |
| | TOTAL PROJECT COST | [redacted] | [redacted] | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME C LIMITED DAMAGE CONCEPTUAL ESTIMATE

DATE: 10/31/00

| NO. | DESCRIPTION | QUANTIT | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| | **AHWAHNEE HOTEL** | | | | |
| 1 | **DEMOLITION** | | | | |
| | EXISTING PARTITIONS | [redacted] | | | |
| | EXISTING SLATE ROOF & PLY | [redacted] | | | |
| | EXISTING SLATE ROOF AT PORTE | [redacted] | | | |
| | DEMO FOOTING | [redacted] | | | |
| | DEMO FLOOR SLAB | [redacted] | | | |
| | SCABBLE EXISTING | [redacted] | | | |
| | | [redacted] | | | |
| | CUT OUT CONC. COLUMN SURROUND | [redacted] | | | |
| | DEMO EXIST. CEILINGS | [redacted] | | | |
| | DEMO EXIST. CEILINGS FOR ANGLE BRACING | [redacted] | | | |
| | | [redacted] | | | |
| | MISC. DEMO | [redacted] | | | |
| | | [redacted] | | | |
| | **SUB TOTAL** | [redacted] | | | |
| | | [redacted] | | | |
| 2 | **SITE WORK** | [redacted] | | | |
| | | [redacted] | | | |
| | JET GROUT FOUNDATION | [redacted] | | | |
| | SHORING GROUND FLOOR FOR EQUIPMENT, ALLOWANCE | [redacted] | | | |
| | CORE DRILL FOR FOUNDATION WORK, ALLOWANCE | [redacted] | | | |
| | | [redacted] | | | |
| | EXCAV & DISPOSE GRADE BEAMS, HAND | [redacted] | | | |
| | EXCAV & DISPOSE FOOTING, HAND | [redacted] | | | |
| | | [redacted] | | | |
| | **SUB TOTAL** | [redacted] | | | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME C LIMITED DAMAGE CONCEPTUAL ESTIMATE

DATE: 10/31/00

| NO. | DESCRIPTION | QUANTIT | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| 3 | **CONCRETE** | | | | |
| | GRADE BEAMS, | [redacted] | | | |
| | PEDESTAL FOOTING | | | | |
| | FOOTING, FORM & REBAR | | | | |
| | 8" CONCRETE SHEAR WALL, CIP, FORM & REBAR | | | | |
| | 12" CONCRETE SHEAR WALL, CIP, FORM & REBAR | | | | |
| | 18" CONCRETE SHEAR WALL, CIP, FORM & REBAR | | | | |
| | 8" SHOTCRETE SHEAR WALL | | | | |
| | 12" SHOTCRETE SHEAR WALL | | | | |
| | 18" SHOTCRETE SHEAR WALL | | | | |
| | FORMWORK FOR SHOTCRETE | | | | |
| | COLLECTOR BEAMS | | | | |
| | INFILL WINDOW OPENINGS, REINF. CONC. | | | | |
| | INFILL CLERESTORY WINDOWS | | | | |
| | REPLACE FLOOR SLAB | | | | |
| | PATCH CONCRETE CORE DRILL | | | | |
| | MISC. CONCRETE | | | | |
| | **SUB TOTAL** | | | | |
| 4 | **MASONRY** | | | | |
| | REINFORCE STONE COLS AT DINING, SCHEME A ONLY | | | | |
| | REINFORCE STONE COLS AT PORTE, | | | | |
| | KEY INTO COLS PER 3/S9 | | | | |
| | MISC. MASONRY | | | | |
| | **SUB TOTAL** | | | | |

**NATIONAL PARK SERVICE**
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**SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL**
**YOSEMITE PARK, CALIFORNIA.**
**SCHEME C LIMITED DAMAGE CONCEPTUAL ESTIMATE**

**DATE: 10/31/00**

| NO. | DESCRIPTION | QUANTIT | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| | | | | | |
| 5 | **METALS** | | | | |
| | | | | | |
| | #5 DOWELS, WELDED TO COLUMNS | [redacted] | | | |
| | #5 DOWELS, DRILL & EPOXY | | | | |
| | #3 DOWELS, DRILL & EPOXY | | | | |
| | | | | | |
| | TS 8X8 COL | | | | |
| | TS 8X8 TRUSS MEMBERS | | | | |
| | TS 8X8 MEMBERS, PER AS/10 | | | | |
| | TS 6X6 COLLECTORS AT DINING | | | | |
| | C10X20 | | | | |
| | 1 1/2" TIE RODS, 51'0" LONG | | | | |
| | 3/8" HANGER ROD, 10' LONG | | | | |
| | 5/8" ANCHORS, DRILL & EPOXY AT C10 | | | | |
| | 3X3X5/16 DOUBLE ANGLE, BOLTS & PLATES | | | | |
| | 3X3X5/16 SINGLE ANGLE, BOLTS & PLATES | | | | |
| | 6X4X5/16 ANGLE CONNECTIONS AT FLOORS/WALLS | | | | |
| | | | | | |
| | MISC METALS | | | | |
| | | | | | |
| | **SUB TOTAL** | | | | |
| | | | | | |
| 6 | **WOOD & PLASTICS** | | | | |
| | | | | | |
| | GLULAM BLOCKING | | | | |
| | | | | | |
| | 3/4" CDX PLY SHEATHING W/SHEAR NAIL, ROOF | | | | |
| | 3/4" CDX PLY SHEATHING W/SHEAR NAIL, KITCHEN ROOF | | | | |
| | SHEAR NAIL SHEATHING AY PORTE | | | | |
| | 3"X 4" BLOCKING | | | | |
| | LOG FRAME AT SEISMIC JOINT | | | | |
| | MISC. | | | | |
| | | | | | |
| | **SUB TOTAL** | | | | |
| | | | | | |

**NATIONAL PARK SERVICE**
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**YOSEMITE PARK, CALIFORNIA.**
**SCHEME C LIMITED DAMAGE CONCEPTUAL ESTIMATE**

**DATE: 10/31/00**

| NO. | DESCRIPTION | QUANTIT | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| 7 | **THERMAL & MOISTURE** | | | | |
| | REINSTALL SLATE ROOF | [redacted] | | | |
| | CAULKING & SEALING | | | | |
| | **SUB TOTAL** | | | | |
| 9 | **FINISHES** | | | | |
| | LATH & PLASTER, CEILING | | | | |
| | LATH & PLASTER, CEILING | | | | |
| | FURR & PLASTER, | | | | |
| | PAINT WALLS | | | | |
| | PAINT INTERNAL, CEILING | | | | |
| | MISC FINISHES | | | | |
| | **SUB TOTAL** | | | | |
| 13 | **SPECIAL CONSTRUCTION** | | | | |
| | PROTECTION OF EXISTING FLOORS, WALLS CEILINGS, ETC ALLOWANCE | | | | |
| | **SUB TOTAL** | | | | |
| 15 | **MECHANICAL** | | | | |
| | REMOVE & REROUTE PLUMBING, ALLOWANCE | | | | |
| | REMOVE & REROUTE DUCTING, ALLOWANCE | | | | |
| | **SUB TOTAL** | | | | |

NATIONAL PARK SERVICE
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SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME C LIMITED DAMAGE CONCEPTUAL ESTIMATE

DATE: 10/31/00

| NO. | DESCRIPTION | QUANTIT | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| | | | | | |
| 16 | **ELECTRICAL** | | | | |
| | REMOVE & REROUTE ELECTRICAL, ALLOWANCE | [redacted] | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | **SUB TOTAL** | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME C
NON STRUCTURAL ITEMS CONCEPTUAL ESTIMATE
SUMMARY

10/31/00

| NO. | DESCRIPTION | | TOTAL $ | COST/SF |
|---|---|---|---|---|
| | SCHEME C | | | |
| 1 | NON STRUCTURAL ITEMS | [redacted] | | |
| | DIRECT COST SUBTOTAL | [redacted] | | |
| | GENERAL CONDITIONS | [redacted] | | |
| | G.C. MARK UP & BOND | [redacted] | | |
| | ESTIMATE/DESIGN CONTINGENCY | [redacted] | | |
| | TOTAL CONSTRUCTION COST | [redacted] | | |
| | ESCALATION TO 2003=2YRS@4% P.A. | [redacted] | | |
| | TOTAL PROJECT COST | [redacted] | | |

NATIONAL PARK SERVICE
SEISMIC SAFETY PROGRAM
SEISMIC REHABILITATION OF THE AHWAHNEE HOTEL
YOSEMITE PARK, CALIFORNIA.
SCHEME C
NON STRUCTURAL ITEMS CONCEPTUAL ESTIMATE

DATE: 10/31/00

| NO. | DESCRIPTION | QUANTITY | UNIT | RATE $ | AMOUNT $ |
|---|---|---|---|---|---|
| | **AHWAHNEE HOTEL** | | | | |
| | **NON STRUCTURAL ITEMS** | | | | |
| | **SCHEMES C** | | | | |
| | UNISTRUT, REBAR & GROUT AT CLAY PARTITIONS - 7/S11 | | | | |
| | 4'0" O.C. | [redacted] | | | |
| | CEILING BRACE, PER 8/S11 | | | | |
| | STONE ANCHORS, STAINLESS | | | | |
| | STONE ANCHORS TO EA STONE <4 SF EA ALLOWANCE | | | | |
| | **TOTAL NON STRUCTURAL** | | | | |

# APPENDIX D

## Historical Architectural Report

CAREY & CO. INC.
ARCHITECTURE

# TRANSMITTAL

DATE: December 6, 2000

VIA: Messenger

TO: Mr. Joe Baldelli
URS Corporation
100 California Street, Suite 500
San Francisco, CA 94111

RE: The Ahwahnee Hotel

ENCLOSURE: Hard copy of "Structural Upgrade Historical Evaluation" dated December 5

REMARKS: Joe

Here is hard copy of report, per your request.

Nancy Goldenberg
Carey & Co. Inc.

F:\2000\20164 Ahwahnee\20164t002.wpd

CAREY & CO. INC.
ARCHITECTURE

Ahwahnee Hotel
Yosemite National Park, California

# STRUCTURAL UPGRADE HISTORICAL EVALUATION

DRAFT

This Structural Upgrade Historical Evaluation is prepared as part of a Seismic Rehabilitation Alternatives study for the Ahwahnee Hotel at Yosemite National Park. Three structural upgrade schemes have been prepared by URS for inclusion in the study. This document reviews each scheme and provide comments, based upon compliance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties.* Written descriptions of architectural elements requiring repair, rehabilitation, replacement, or reconstruction resulting from structural upgrades are addressed.

This report consists of two parts. The first part reviews the three schemes for compliance with the Secretary of the Interior's Standards. The second part discusses impacts to specific materials, providing repair, rehabilitation, replacement or reconstruction protocols for historic features and finishes impacted by the schemes.

### Background

The Ahwahnee Hotel, designed by Gilbert Stanley Underwood, was constructed in 1926 and 1927. It is a National Historic Landmark, the nation's highest level of significance. The hotel has been the subject of several recent reports. These include a Historic Structure Report, by Page & Turnbull, dated November 1977; and a FEMA 178 Seismic Evaluation, by Martin/Martin, Inc. dated August 1999. Both reports were consulted prior to beginning this project.

Fieldwork for this Evaluation took place on July 26 and July 27, 2000.

## PART I - REVIEW OF SCHEMES

All three schemes proposed by URS rely upon the use of concrete shear walls, combined with foundation upgrades and soil compaction to counter liquefaction. The locations of the shear walls vary somewhat from scheme to scheme.

We have structured our review by area rather than by scheme. Since all schemes share common material disruptions and many common elements, we can more easily contrast the schemes area by area.

**Floors**

All schemes involve grouting to counter liquefaction; two types were proposed. Schemes A and B propose compaction grouting, while scheme C proposes jet grouting. The two types differ in their potential impact to the historic concrete floors at ground level. Compaction grouting will require fewer, smaller holes in the concrete, while jet grouting will require larger diameter, more frequent holes.

Both grouting procedures have the potential to greatly impact the ground floor slab. This slab forms the finish floor in many of the building's most significant spaces, including the registration lobby and the dining room. In these spaces, the slab is finished with decorative treatments including scoring, staining and patterned inlays of linoleum. Successful patching of these surfaces will be extremely difficult and costly. Therefore, pursue grouting that does not disturb these existing ornamental concrete floors. We are told that it is possible to do compaction grouting from the exterior without disturbing the slab.

If slab disturbance is unavoidable, compaction grouting appears preferable to jet grouting. With the smaller, less frequent holes required by the compaction grout procedures, successful patching may be possible. However, the more frequent, larger holes required by the other scheme would probably require either complete slab replacement; or surface grinding and covering the entire existing slab with a topping slab, replicating the existing surface treatments.

The grade beams proposed at foundation level may be installed without disturbing the existing floor slab.

**West Wing (Dining Room/Kitchen Wing)**

*The Dining Room*

The dining room retrofit for all schemes includes: a seismic separation joint; shear walls at column line 22, reinforcing the log scissors trusses with tie rods; and either strengthening the five stone clad columns at the northwest end of the dining room (scheme A), or adding four shear walls (schemes B and C). In addition, proposed work will involve the addition of concrete tie beams at the foundation level, and the installation of a new diaphragm at the roof.

1. Seismic separation joint. This feature runs along column line 22. The seismic joint will be concealed in new wood trim to match that used for other features in the Dining Room. This may be acceptable; however, it may be preferable to have the new feature distinct from, while compatible with, the original. Costs associated with these two trim options are not expected to differ markedly.

2. Shear wall along column line 22. These shear walls are infilling existing openings. They will be set back from existing materials. The lower portion should be treated with a simplified rendition of the wood wainscot found elsewhere in the room (a good detail to emulate exists in the bar area, I believe.) The concrete surfaces may be plastered and either simply painted or given an appropriate ornamental treatment.

3. Reinforcing the Dining Room log scissors trusses with 1 ½" diameter tie rods. While a visible alteration to a highly significant, character-defining feature, this proposal is an acceptable modification if, by proceeding with it, more intrusive measures (such as infilling window openings or providing exterior buttresses) are avoided. We recommend that, if possible, connections are hidden, i.e. countersunk.

4. The proposed retrofit will also add glu-lam blocking above the top chords of the trusses, and above the purlins. While these features are narrower than the members that they are positioned above, they may be somewhat visible above the existing structure, as they infill areas that are currently open. This will be a minimal visual change that may not be noticed by the casual visitor; however, mock-ups should be studied in place to determine the extent of the intrusion and whether various finishes will help to camouflage them.

5. Strengthening the five stone clad columns at the northwest end of the dining room (scheme A). The proposal here is to number and document, and then remove the stones from one face of these piers. The existing, presumably unreinforced core would then be removed and a new, reinforced core would be installed. At the same time, the stone veneers on all sides would be anchored to the core.

The proposed strengthening of the columns is acceptable, and preferable over infilling windows as proposed in schemes B and C (see item 5, below). However, we recommend the following:

a. Test core one of the columns prior to proceeding to determine existing condition.
b. Determine the feasibility of coring from the top in lieu of dismantling stones.

6. Adding shear walls at the northwest end (schemes B and C). The northwest end of the dining room is set apart from the remainder of the room spatially, forming a very special apse-like space. This proposal infills four windows here. In addition to removing historic fabric (significant windows), the infill would change the quality of light and block views. We strongly recommend strengthening the columns (as proposed in scheme A) over infilling the windows.

7. The proposed foundation work may require cutting and patching into portions of the concrete floor. Concrete should be saw cut along existing score lines. See material repairs section below, and section on "Floors," above.

8. The proposed roof work will involve salvaging existing slates, storing and then reinstalling them after the new diaphragm is in place. New slates to supplement existing slates that are damaged during removal will be required.

*Kitchen*

The kitchen space, rated contributing in the Page & Turnbull Historic Structure Report, is less historically sensitive than many other parts of the building. It has always been and continues to be an area of secondary importance, as a service rather than a public space. It is anticipated that the selection of upgrades to this area will be driven by functional, rather than historical or aesthetic considerations. The only features of the kitchen that retain significance are the original cooler doors, retained and reused on existing coolers. Schemes should avoid impacting these features, as all three proposed schemes appear to do. Clerestory windows are contributing features on the building exterior; shear walls proposed at column lines 33 and 36 would impact these windows; however, the window assemblies may remain intact so that the exterior appearance will remain unchanged.

Proposals include adding a horizontal truss in the plane of the lower chord in the Kitchen Roof Truss, and adding new shear walls. The proposed horizontal truss will have minimal historic fabric impacts. The shear wall configurations vary from scheme to scheme. Schemes A and B are roughly equal in the amount of clerestory window that will be impacted.

**South Wing (Lounge Wing)-**

The South Wing, or Lounge Wing, is four stories high with a mezzanine. If the building is considered a "Y" in plan, the South Wing forms the leg.

*Main Floor*

The main floor consists of the Great Lounge, South Lounge, Solarium, Winter Club Room, and Mural Room.

*Great Lounge and South Lounge*

1. The double angle bracing under the second floor joists are problematic for the Great Lounge Ceiling, unless the second floor diaphragm can be braced without disturbing the Great Lounge Ceiling. The ceiling features expressed concrete beams with polychrome stenciled designs. While, according to the Historic Structure Report, the designs are not original, they are unique, unique, character-defining features that should either be protected or replicated. The ceiling could be documented, removed, and then replicated; this would be very expensive and would also constitute a loss of historic fabric.

If the bracing can be applied from above, the ceiling should still be well documented and then braced and protected prior to commencing the work. The bracing and protection is to prevent or at least limit damage; the documentation will assure accurate re-creation should any damage occur.

2. Shear Walls. All three schemes are similar in their impact to the walls of the Great Lounge. The points of potential impact are the northeast and northwest corners, and the east and west walls of the South Lounge - along column lines 13 and 16. These are plain plaster walls, easily replicated.

*Mural Room*

The mural room features wood-paneled walls, a stone fireplace with a hammered copper cone-shaped hood in the northeast corner, and a painted mural on the upper half of the north wall.

Potential work to the mural room consistent with all three schemes includes shear walls at the southwest corner and at the east wall. The three schemes differ in their impacts to the north wall.

1. Work to the southwest corner: Carefully document, label and dismantle paneling. Remove enough material from the interior wall so that the wall thickness after retrofit will remain unchanged. Protect adjacent surfaces.

2. The north wall. This wall is problematic since it features the mural. Scheme A impacts the eastern end of the wall, scheme B the western end, while scheme C impacts the entire north wall. Obviously, schemes A or B are preferable to scheme C in terms of potential impacts to this particular room. If the mural is painted on canvas, it may be possible to remove, store and reinstall the existing mural. This should be done under the supervision of a fine arts painting conservator. However, if the mural is painted directly onto the wall, then it will not be possible to salvage. In that case, either the existing mural can be replicated, again by a painting conservator experienced in accurate copy painting; or an artist may be commissioned to create a new mural for this room.

3. Depending upon the selected scheme, the northeast corner fireplace will probably require dismantling, cataloging, and re-installation. Schemes A or C have the most potential for impacting the fireplace, since they affect both walls on which the fireplace stands. If the work to both walls may be done mostly from the opposite side, then the fireplace may simply be protected-in-place from vibration and impact-related damage.

*The Winter Club Room*

The Winter Club Room mirrors the Mural Room in plan; therefore the three retrofit options for the Winter Club Room mirror those for the Mural Room. However, finishes in the Winter Club Room are much simpler than those at the Mural Room, so the impacts to the space from the retrofit schemes would be less.

*Solarium*

All three schemes impact the solarium, but they vary in the extent of impact. Schemes A and B involve introducing shear walls into the column cavities at column-lines 14 and 15 only; scheme C involves introducing shear walls at all four columns cavities at the south end of the solarium. It is assumed that these shear walls can be concealed totally within existing wall cavities.

Shear wall retrofits would also most likely impact the concrete floor to an unknown degree. It may be possible to saw cut the existing concrete floor along score lines and patch in new concrete floor to match. The greater extent of impacted flooring in scheme C may render total Solarium floor replacement the most viable approach.

*South Wing - Mezzanine Level*

Mezzanine level impacts are similar to those on the ground floor, as shear walls beginning on the ground floor continue their ascent. Therefore, impacts to the Colonial Room are similar to those for the Winter Club Room, below; while impacts to the Tressider Room will be similar to those in the Mural Room.

**Elevator Lobby**

The elevator lobby is a trapezoidal space at the intersection of the three wings. Proposed upgrades here include reinforcing or replacing the walls around the elevator and stairs, and along the west wall, the wall forming the entrance to the Dining Room. Preservation issues here may involve replacing ornamental painting at the plaster walls, and patching the concrete floors. The other issue involves preservation of the niches in the west wall. These are not only architecturally significant - as they form a symmetrical composition with matching niches at the east wall - but are also used by the hotel for flowers and other seasonal and special occasion displays.

**East Wing - Lobby Wing**

*Registration Lobby/Sweet Shop*

Retrofits here, consistent for all three schemes, include the insertion of shear walls into the existing pier cavities along the south-eastern window walls. It is assumed that the reinforcing will fit within the existing cavities. Wood wainscot here will require cataloguing, removal and reinstallation. Plaster surfaces will have to be replaced. The ornamental, patterned concrete floors in the vicinity of these piers also may be disturbed by grouting.

Scheme C differs from schemes A and B in that it adds a new solid wall along column line C, between column lines 6 and 7. While the original Sweet Shop extended to column line 5, the existing shop ends at column line 7. In other words, the proposed shear wall extends into the lobby one bay further than the existing shear wall. The new shear wall proposed for scheme C would therefore be an unacceptable alteration to the lobby, unless at the same time the Sweet Shop were restored to its original configuration.

*Ahwahnee Bar*

The bar occupies the east end of the lobby wing. This was originally an open Porte Cochere, and was enclosed in the 1940s. The bar was installed here in 1951, and was substantially altered in the 1960s. Because this is a heavily altered and therefore non-contributing space, retrofits here do not raise any preservation issues for the building interior.

*The Gift Shop/Locker Rooms*

The Gift Shop occupies the first floor, and the Locker Rooms the mezzanine level of a small wing linking the Entry Gallery to the Registration Lobby. Proposed retrofits for all three schemes involve adding shear walls within existing piers at column lines 39 and 40. As these are assumed to fit within existing cavities; and since the space is altered and therefore of only minor significance to the building, impacts from this proposal are correspondingly light.

*Upper Levels*

The east wing ascends through the third floor. The most substantial impact proposed is for floor bracing at the second and third floors; as the lobby has a flat plaster ceiling, these proposed retrofits are not anticipated to pose a problem.

**Entry Gallery and Porte Cochere**

The entry gallery is a wood-framed structure with beam and column log construction. Connected at the northern end of the Entry Gallery, the Porte Cochere is similar in roof construction, but is supported by corner stone columns and intermediate wood columns.

*Entry Gallery*

Retrofit proposals here include improving existing connections to the joints of the log frames, and adding a new seismic joint between the entry gallery and gift shop. The wood-frame construction here is more easily dismantled and modified than the concrete and masonry construction elsewhere. If possible, countersink new connections.

*Port Cochere*

Work here includes rebuilding the four monumental stone corner columns in the Porte Cochere; roof improvements similar to the dining room; and new tie beams at the foundation. As with the Dining Room, consider coring the stone columns rather than dismantling.

**Work to Upper Floors**

Upper floors in general are more simply treated than the public spaces at the ground floor and mezzanine. These spaces will therefore be correspondingly easier to deal with in the retrofit. Both Corridor and Guest Room spaces, however, feature stenciled friezes at the tops of the plaster walls; these will require careful documentation and replication.

## PART 2 - MATERIAL REPAIRS

This section provides repair, rehabilitation, replacement or reconstruction protocols for historic features and finishes impacted by the schemes. Also see recommendations in the *Historic Structure Report* prepared by Page & Turnbull.

**Exterior Materials**

*Granite Boulder Cladding*

Description: Granite boulders clad vertical wall elements over much of the building. While original building specifications call for "all necessary wire and metallic anchors," it is uncertain how or even whether these were used.

Impacts: The report calls for anchoring the stone veneer around the entire building perimeter. Also, the granite piers at the end of the dining room, as well as at the Porte Cochere, are recommended to be rebuilt around new cores.

Repairs: The report is not specific about how the stones will re-anchored. We recommend an initial investigation to determine the existing anchorage, as well as the existing core condition at the piers. Depending upon the existing condition, the retrofit impacts may be lessened or even avoided. For the piers, consider coring from the top rather than dismantling and then reconstructing them.

*Slate Roofing*

Description: The existing slate roof dates from a 1992 re-roof of the building. The slate is Grade S1 Evergreen Slate from Vermont. It is multi-colored, and includes green, grey, red, purple and tan slates. At the time these slates were purchased, the Park made an agreement with the quarry to purchase more slates at some time in the future.

Impacts: Proposed upgrades call for the roofs over both the Dining Room and the Porte Cochere to be dismantled, strengthened, and then rebuilt. While careful salvage may permit many of the slates to be reinstalled, it is likely that many will require replacement. For budgeting purposes, it may be assumed that one-half of the slates will require replacement at that time.

Repairs: Salvage and reinstallation is recommended, although depending upon the quality of the slates and the skill of the roofer, anticipate 25% to 50% replacement.

**Interior Materials**

*Concrete Floors*

Description: Poured concrete with patterns created by scoring, staining, and inlaying with linoleum. This type of flooring occurs over much of the ground floor.

Impacts: Anticipated impacts from shear wall installation as well as foundation work.

Repairs: The score lines create natural break points for patching in new areas of flooring. . Existing concrete should be tested, and a new mix developed that matches the existing as closely as possible. This will not only involve testing, but also a fair amount of trial and error. While concrete matching can be problematical, the staining treatment may help in camouflaging new areas

*Wood Floors*

Description: Impacted wood flooring occurs in the Great Lounge and Mural Room. This floor is 2 ½" oak strip flooring. Flooring at the Great Lounge also includes mahogany strip inlays.

Impacts: These floors may be impacted by both adjacent shear wall work, and by work sub-floor grouting and foundation work.

Repair: Salvage and reinstall floor boards if possible. Replace as required with new oak flooring of size, species, cut and grade to match existing. Finish boards to match surrounding floor surfaces; or refinish entire floor with stain and varnish to match existing. However, as with all historic wood flooring, avoid excessive sanding.

*Plaster Wall and Ceiling surfaces*

Description: Plaster walls at the Ahwahnee are treated to convey a rustic appearance. On the Ground Floor, they have a troweled finish and glossy paint. Many of the flat plaster walls feature painted stenciled designs (see below).

Impacts: Plaster will require demolition at shear wall locations, and in the Guest Rooms where non-structural walls require reinforcement.

Repairs: Plaster surfaces should be well-documented prior to demolition. Replacement plaster should match the existing in composition and finish.

*Ornamental Painting/Stenciling*

Description: Stenciled wall patterns featuring Native American motifs occur throughout the building, in both public spaces and Guest Rooms. The ceiling in the Great Lounge is especially ornate, featuring painted concrete beams running in both directions, with the undersides of all beams stenciled with unique, brightly colored designs. According the Historic Structure Report, these designs are not original.

Impacts: Impacts are similar to those described for plaster, above. In addition, the Great Lounge ceiling is likely to be heavily impacted by reinforcing of the second floor.

Repairs: Samples should be taken of all finishes and stenciled designs so that they may be accurately reproduced. In addition, each design should be photo-documented. New stencils should be made from existing designs (these should be made and approved prior to demolition of the existing patterns). Stenciling should be reproduced in colors to match the existing.

*Gypsum Block Guest Room Demising Walls*

Description: Gypsum block partitions separate guestrooms. These walls are plastered, and have stenciled friezes at their tops. These walls stop at the ceilings.

Impacts: Since these walls stop at the ceilings, they present a collapse hazard. The proposed scheme buries unistrut stiffeners within the walls, and then uses these members to tie into the slab above.

Repairs: The proposed scheme is acceptable as it will not alter the existing wall configurations. However, there will be plaster patching, painting and re-stenciling required on those walls that are braced.

*Wood*

Description: Many of the public spaces feature wood wainscot or paneling.

Impacts: Some of the walls featuring paneling will require disassembly and reconstruction.

Repairs: Wood elements are generally easy to dismantle, store, and reassemble.

**Cost Estimate**

We reviewed the cost estimate and find that in most instances, sufficient allowances and contingencies are included to cover the specialized finishes at the Ahwahnee. However, money was not included in the estimate for salvaging and reinstalling the mural, or for recreating stenciling.

# APPENDIX E

## Field Trip Report

# Seismic Rehabilitation Alternatives for the Ahwahnee Hotel
# Yosemite National Park, CA

**Field Trip Report**
**July 26, 27, & 28, 2000**

**Prepared by:**


**URS**
**100 California Street**
**Suite 500**
**San Francisco, CA 94111**


**Contents of Report**



**Date: August 23, 2000**

## Section 1 Field Observation by URS Personnel

## 1.0 General Description

During the period from July 26 through 28, 2000, Myron Humeny and Joe Baldelli, Structural Engineers from URS, joined Nancy Goldenberg, Historical Architect from Carrey & Co., on a field trip to Yosemite National Park to visit the Ahwahnee Hotel. This report documents the findings of that field trip.

## 2.0 Building Subdivision

One of the first observations made was the complexity and size of the existing building. The building is a continuous structure, "Y" shaped in plan, and constructed of a collection of several different building types (i.e., steel frame and concrete shear walls, timber structure). Each building type also varied both in number of stories and story heights. The combination of different building types and story differences added to the uncertainty of how the building would perform in an earthquake. It would therefore be advisable to divide the existing building into several buildings, each constructed of the same building type, and with predictable behavior in an earthquake. Each new building would be separated by an expansion joint. This method of dividing a complex building into separate regular buildings is a standard practice for retrofiting existing buildings.

Retrofit design can be accomplished by dividing the building into three separate buildings, as shown on Figure No. 1. Concealed expansion joints could be added without affecting the historical fabric of the building. The three separate buildings would consist of: (1) the multistory main building (a steel-frame structure with concrete shear walls; see Photo No. 1)); (2) the one-story combined Dining Wing and Kitchen Wing (the Dining Room is a timber / concrete structure and the Kitchen is a steel frame / concrete structure); and (3) the combined one-story Porte Cochere and Entry Gallery Structure (wood frame structure; see Photo No. 2). The expansion joint between the main building and the dining room was also proposed in the Martin / Martin Report (FEMA 178 Seismic Evaluation – dated August 1999).

## 3.0 Building Eccentricity

Dividing the building into three separate structures as proposed above would also increase the building eccentricity, thus increasing the torsional shear forces at the ends of the building wings. It is expected that new shear walls would be needed at column lines 1, 20, 41, and 23, as shown in Figure No. 1. The existing concrete shear wall at column line 23 may need to be strengthened. New walls at column lines 1, 20, and 41 will be discussed later in this report.

## 4.0 New Foundation Walls

Except for the crawl space beneath the Dining Room and portions of the area under the Registration Lobby, we were able to access the remainder of the crawl space below the first floor. There are corridors of major piping runs and ducts and areas where utilities lie buried (see Photo No. 3). It would be appropriate to locate the new basement walls to avoid these areas. It would also be advisable to locate new walls so as not to close access to remote areas of the crawl space, or add new walls that would restrict future utility placement.

## 5.0 Floor Diaphragms

The first floor is a 10-inch-thick reinforced concrete suspended slab. This slab is a rigid diaphragm with apparent strength to distribute shear forces to the perimeter concrete walls. The floors above the first floor are not as rigid. The floors above are constructed of 2½-inch-thick concrete fill over metal lath. The concrete fill appears not to be reinforced. The concrete fill / metal-lath slab spans 2 feet between open-web joists (see Photo No. 4). The metal lath appears not to be welded or mechanically connected to the open-web joist. It appears to be secured in place with wire stays. There is some question as to whether the floor diaphragm a rigid or a flexible diaphragm: in out future analyses, we will study it as both.

## 6.0 Gypsum Block Partition Walls

Room partition walls are constructed of 2½-inch-thick unreinforced gypsum block stacked in a running bond configuration. A ¾-inch thickness of plaster was added to both sides. These walls do not go the floor above, but end at the ceiling. Pipe chases also constructed of gypsum blocks do go to the floor above (see Photo No. 5). This observation was made in an access hatch in the second floor laundry.

Our recommendation is to support the top of the partition walls to prevent collapse.

## 7.0 Plaster Ceilings

Except for the Dining Room, the ceilings are suspended metal laths with ¾-inch plaster. The ceiling is supported by wire at approximately 4 feet on center (see Photo No. 6). There were no diagonal wire supports to prevent lateral movement of the ceiling during an earthquake.

Our recommendation is to add diagonal wires at each support point.

## 8.0 Granite Walls Metallic Anchors

On page 53 of the Historic Structure Report, the original Building Specifications for anchorage of the granite clad exterior walls are referred to. The Report states "...the specification also indicates that the stone should be set with all necessary wire and metallic anchors." It goes on to say that "...no details were located indicating just what anchorages are present within stone assemblies."

We did not remove a block to ascertain if this was true; however, we did use a metal detector and got positive readings around the mortar joints of the blocks tested. This could indicate metal connectors anchoring the granite blocks to a concrete core.

It would be advisable to remove one or two of the smaller blocks from the exterior face of one of the dining room masonry columns, and also one or two small blocks from another masonry wall at the opposite end of the building. Also advisable is the removal of a small section of the roof above one of the corner-stone columns at the Dining Room to determine if the column core is filled with concrete or rubble (see Photo No. 7).

## 9.0 New Concrete Shear Walls at Ground Floor

The most historically sensitive building area effected by our work will be the ground-floor level. In particular, the Registration Lobby, Elevator Lobby, Great Lounge, Solarium and adjoining rooms, and the Dining Room, which will be discussed later in this report.

In the other areas of the ground floor, we made every effort to determine possible location of walls that would have a minimal effect on the historic fabric of the building. We tried first to find existing partitions that could be replaced with new concrete shear walls. Secondly, we found locations where a new wall could be added and look like it was part of the original floor plan. Since our calculations had not started at the time of the field trip, the exact number and final locations will be determined at a later time. We did use the wall locations recommended in the Martin/Martin Report, and from that report and our location study, we formulated a possible location plan for new walls. Again, it has to pass the "Acid Test of the FEMA 273 analysis," but we are confident that the final solution for both the Life Safety Solutions will include these walls at a minimum, and will probably not require any additional walls. The Limit Damage Solution will include all these walls plus others.

The walls proposed for the Registration and Elevator Lobbies and Gift Shop are located in Figure 2. They are as follows:

- Column strengthening on Column Line 4 — Four existing columns have a 12-inch-thick furring space in the interior of the building. This space could become a 10 inch-thick concrete panel anchored to and reinforcing the existing columns.

- New shear walls on Column Line A — Existing partition walls behind the bar to be replaced with new shear walls.

- New shear wall on Column Line D — Existing partition wall behind the registration desk to be replaced with a concrete shear wall.

| | |
|---|---|
| • New shear wall on Column Line B | Existing partition wall at the Sweet Shop to be replaced with a concrete shear wall. |
| • Strengthen an existing wall at Line 23 and replaced furred out column space | In store area, existing wall and furred out columns strengthened with concrete. |
| • New shear wall on Column Line 7 | Existing partition between the Cashier and the Men's Room to be replaced with a concrete shear wall. Also, the collector beam between Column Lines B & C will need to be strengthened. |
| • New shear wall on Column Line N | Existing partitions in the Lobby to be replaced with concrete shear walls. |
| • New shear wall on Column Line 41 | At this location, two new walls would be constructed. The new walls would tie existing columns together and go from the ground floor to the underside of existing construction at the second floor. Currently, there is a concrete wall at each location from the mezzanine to the second floor. These walls would be replaced with the new walls. |
| • New shear wall on Column Line 12 | Existing exterior concrete wall to be rebuilt into a shear wall. |

New concrete shear walls proposed for the Great Lounge and Solarium are located in Figure No. 3. They are as follows:

| | |
|---|---|
| • New shear walls on both Column Lines N & K | Existing partitions to be rebuilt into concrete shear walls. The new walls are two stories high: ground floor to mezzanine, mezzanine to second floor. |
| • Reinforce the four existing end columns | The existing four end columns are furred-out 12 inches toward the interior of the building. This furred-out space would be replaced with concrete to reinforce the existing columns. |

## 10.0 Basement Boiler Room

The boilers and other mechanical equipment are located in the basement, which is a room approximately 2,300 square feet directly below the Registration Desk. The room houses two boilers and several tanks.

There would be a need for a shear wall or a braced frame to resist the lateral forces from the seven-story shear wall above. Because of the congestion in the room, the possibly of using a chevron brace instead of a concrete shear wall will be studied.

## 11.0 Dining Room Timber Trusses

Assuming that the Kitchen and dining rooms can be cut free of the main building with the addition of the expansion joint at Column Line 41, it would be appropriate to join the two rooms together into one structure for the purpose of resisting lateral forces. A possible solution would be to distribute lateral forces with new bracing in the plane of the lower chord of the steel roof trusses as shown in Figure No. 4. Forces could then be transferred to new concrete shear walls in the Kitchen.

## 12.0 Geologic/Seismic Hazards Assessments

We recommend that the subsurface conditions at the Ahwahnee Hotel be investigated for potential liquefaction by drilling three 50-foot-deep borings at the locations shown in Figure No. 5. Each boring hole is referenced to zones that indicate where the borings would be located. The boring program is tentatively scheduled to start on September 6, 2000.

Section 5 of this Field Report contains the preliminary Seismic Hazards Assessment. This information will be augmented with the results of the soil boring and testing program.

## Section 2 Figures and Plans

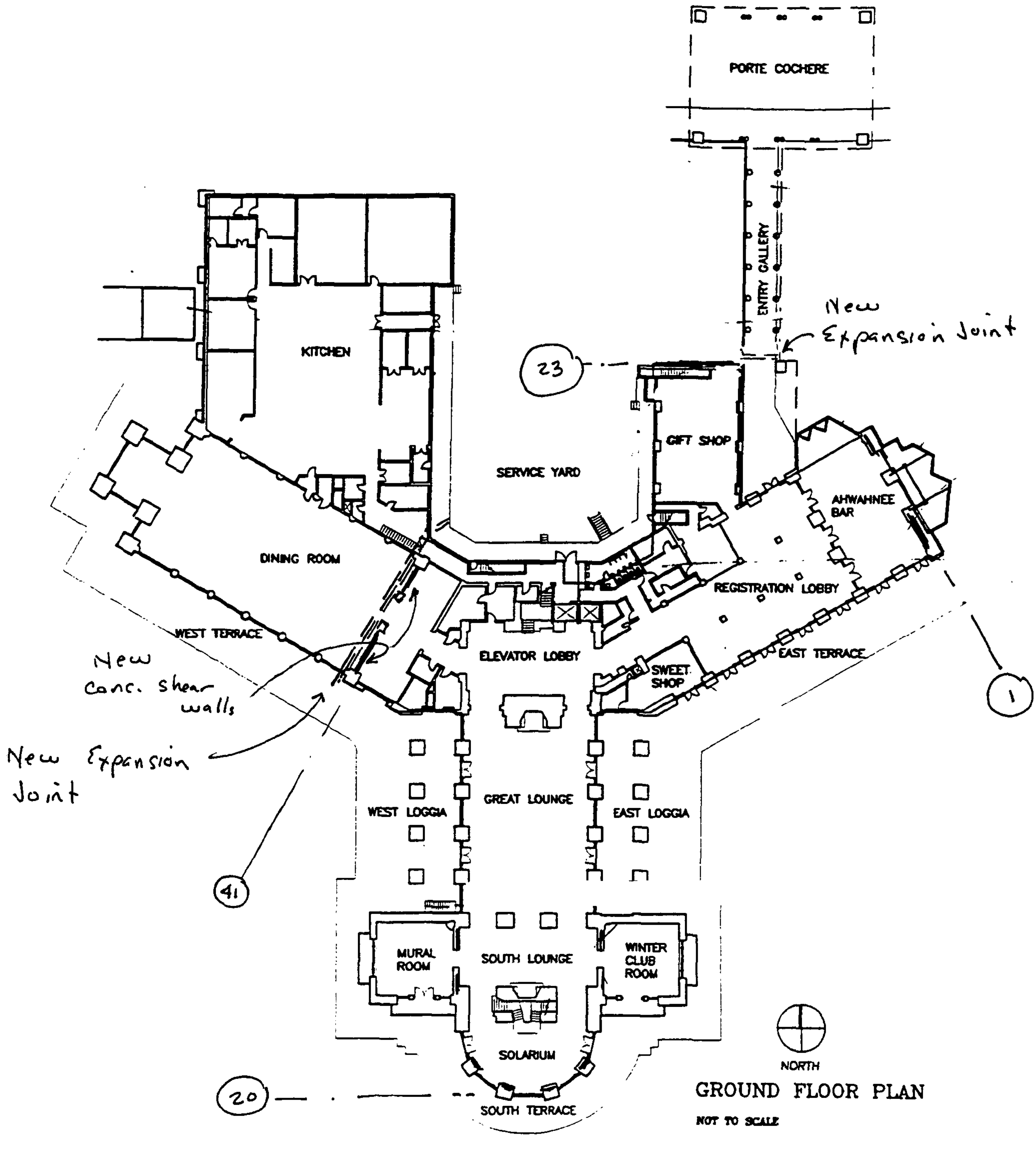

PORTE COCHERE
ENTRY GALLERY
New Expansion Joint
23
GIFT SHOP
KITCHEN
SERVICE YARD
AHWAHNEE BAR
DINING ROOM
REGISTRATION LOBBY
WEST TERRACE
ELEVATOR LOBBY
EAST TERRACE
New conc. shear walls
SWEET SHOP
1
New Expansion Joint
WEST LOGGIA
GREAT LOUNGE
EAST LOGGIA
41
MURAL ROOM
SOUTH LOUNGE
WINTER CLUB ROOM
SOLARIUM
NORTH
20
SOUTH TERRACE
GROUND FLOOR PLAN
NOT TO SCALE



Figure No. 1

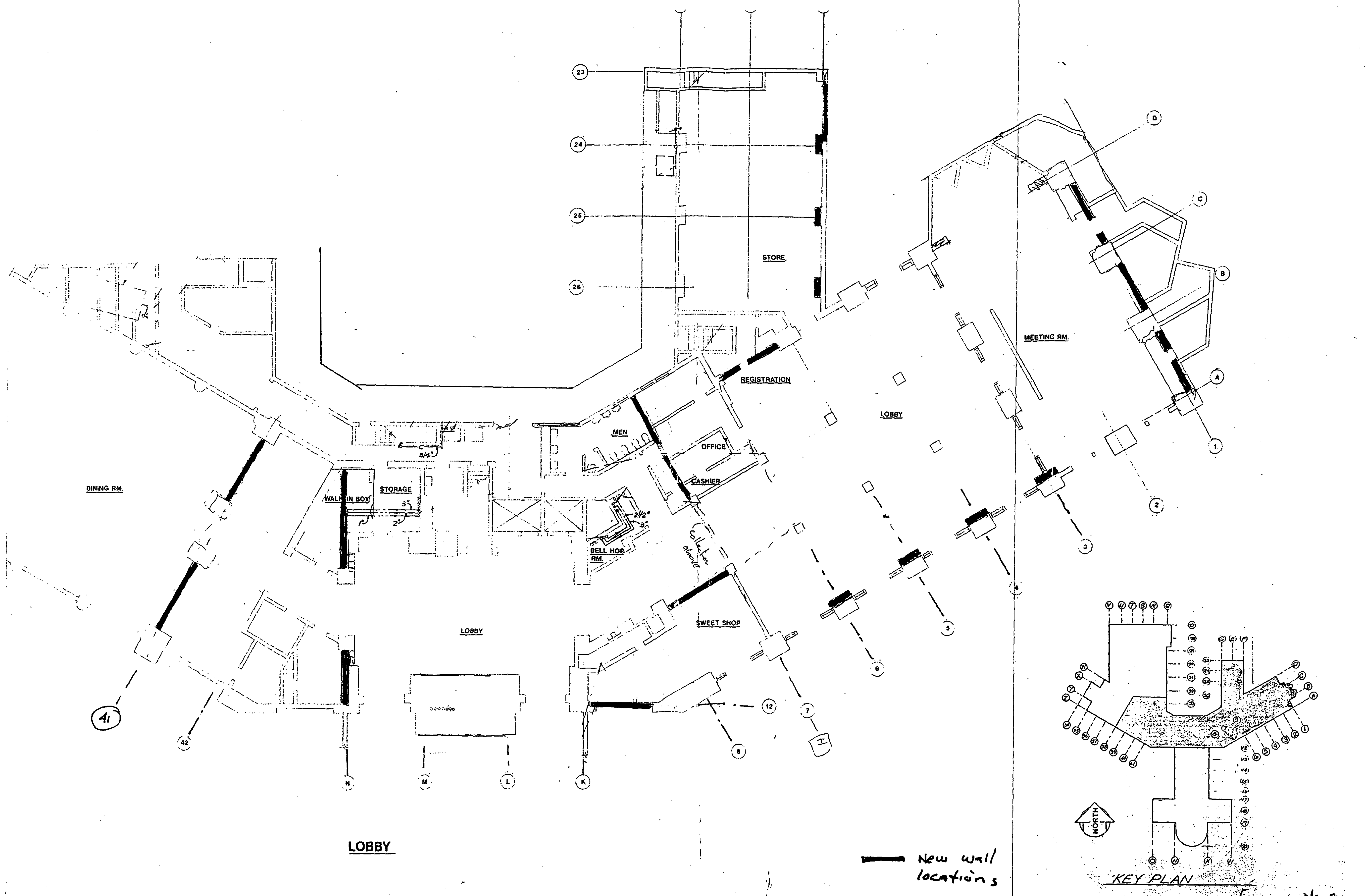
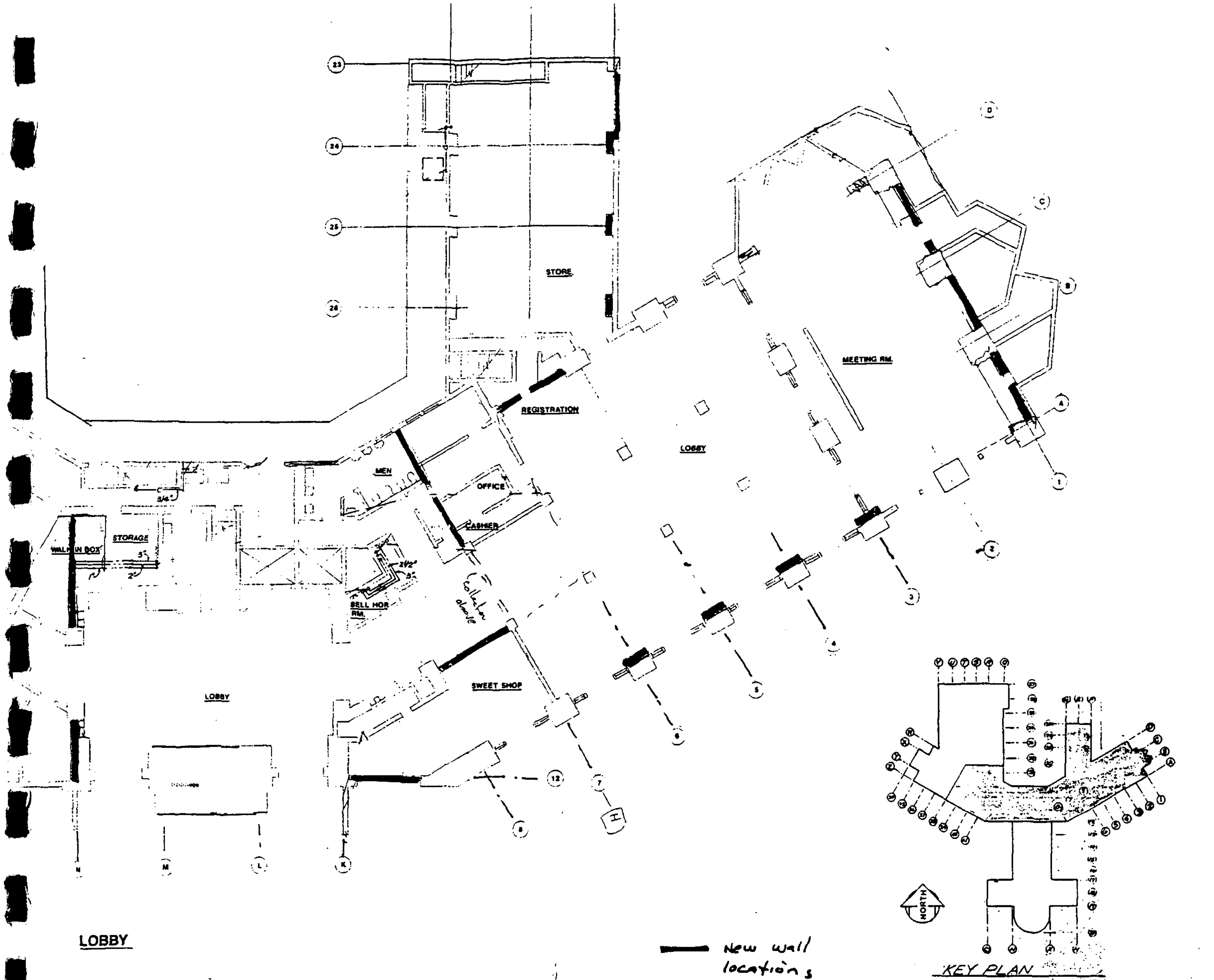

STORE
REGISTRATION
MEETING RM.
LOBBY
MEN
OFFICE
CASHIER
DINING RM.
WALK-IN BOX
STORAGE
BELL HOP RM.
SWEET SHOP
LOBBY
LOBBY
New wall locations
NORTH
KEY PLAN

Figure No. 2




LOBBY

Figure No. 2

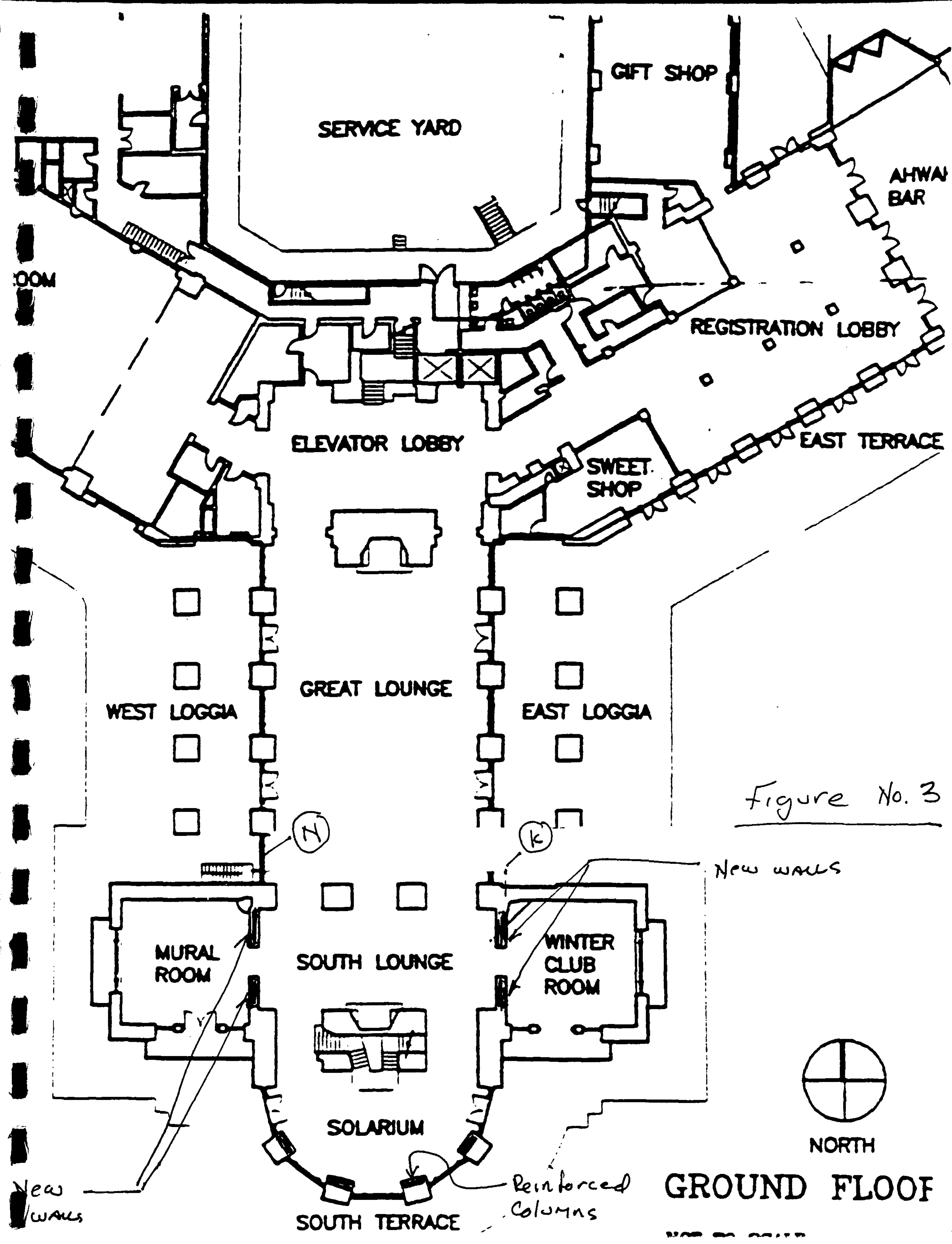
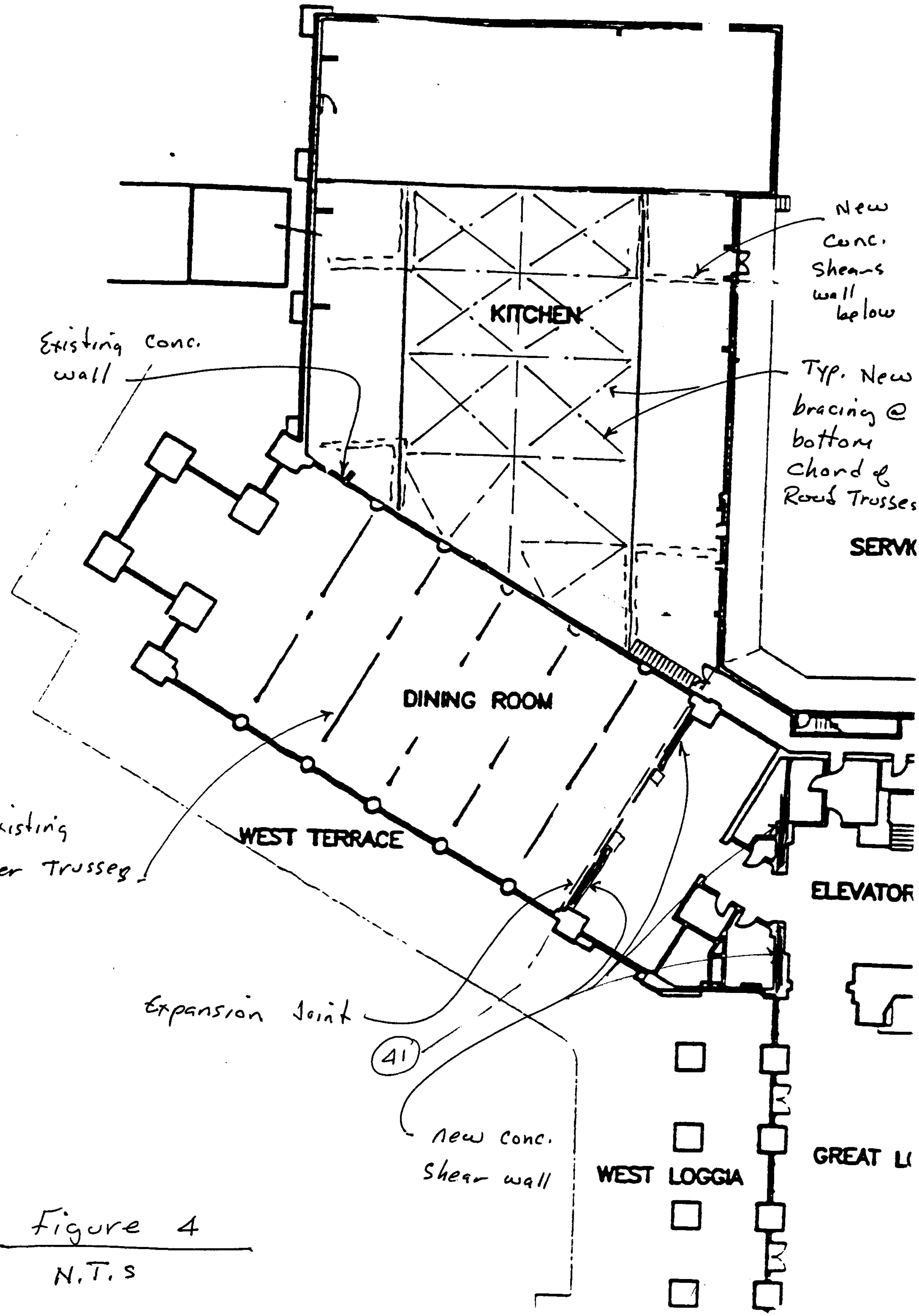



Figure No. 3

GROUND FLOOF



KITCHEN
New Conc. Shears wall below
Existing Conc. wall
Typ. New bracing @ bottom Chord of Roof Trusses
SERVI
DINING ROOM
WEST TERRACE
Existing Timber Trusses
ELEVATOR
Expansion Joint
41
New Conc. Shear wall
WEST LOGGIA
GREAT L


Figure 4

N.T.S

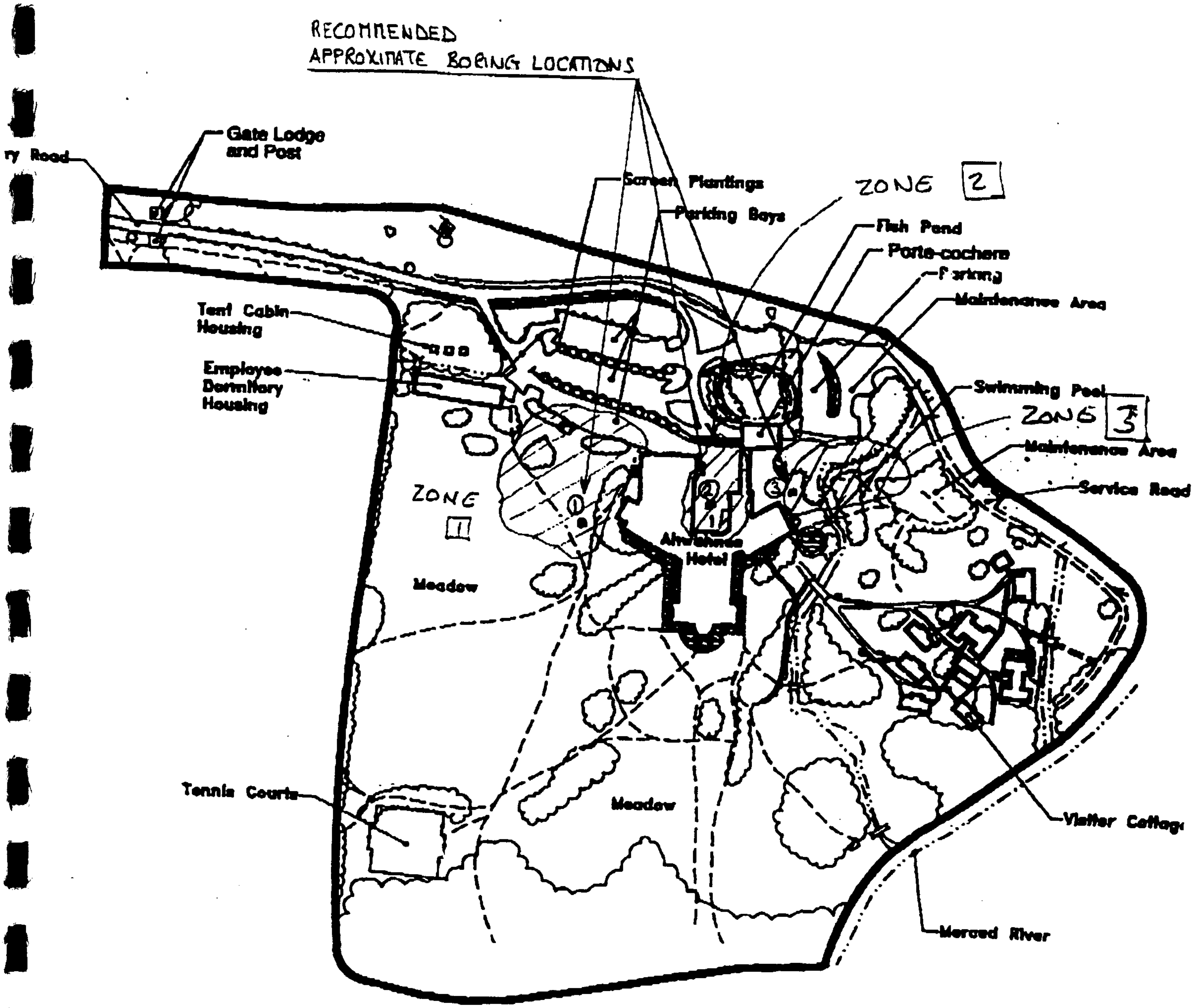



Figure No. 5

TOTAL P.03

## Section 3 Photographs

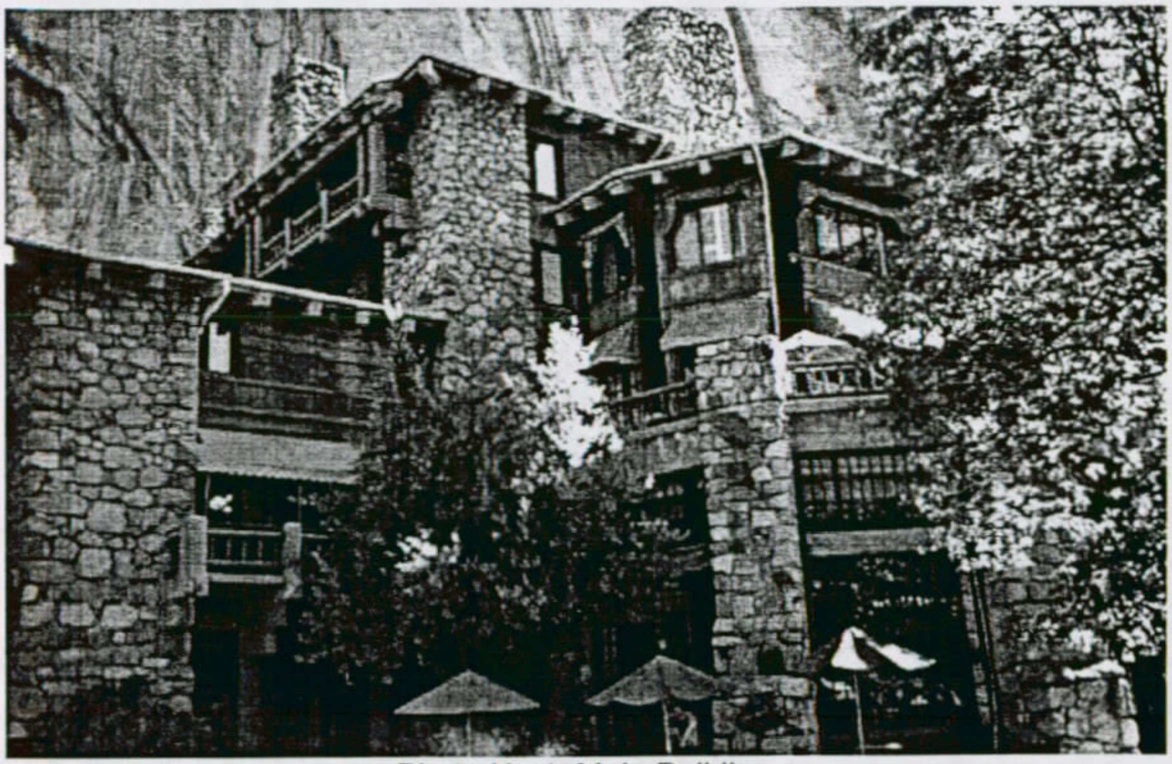


Photo No.1  Main Building


Photo No. 2  Entry Gallery Structure

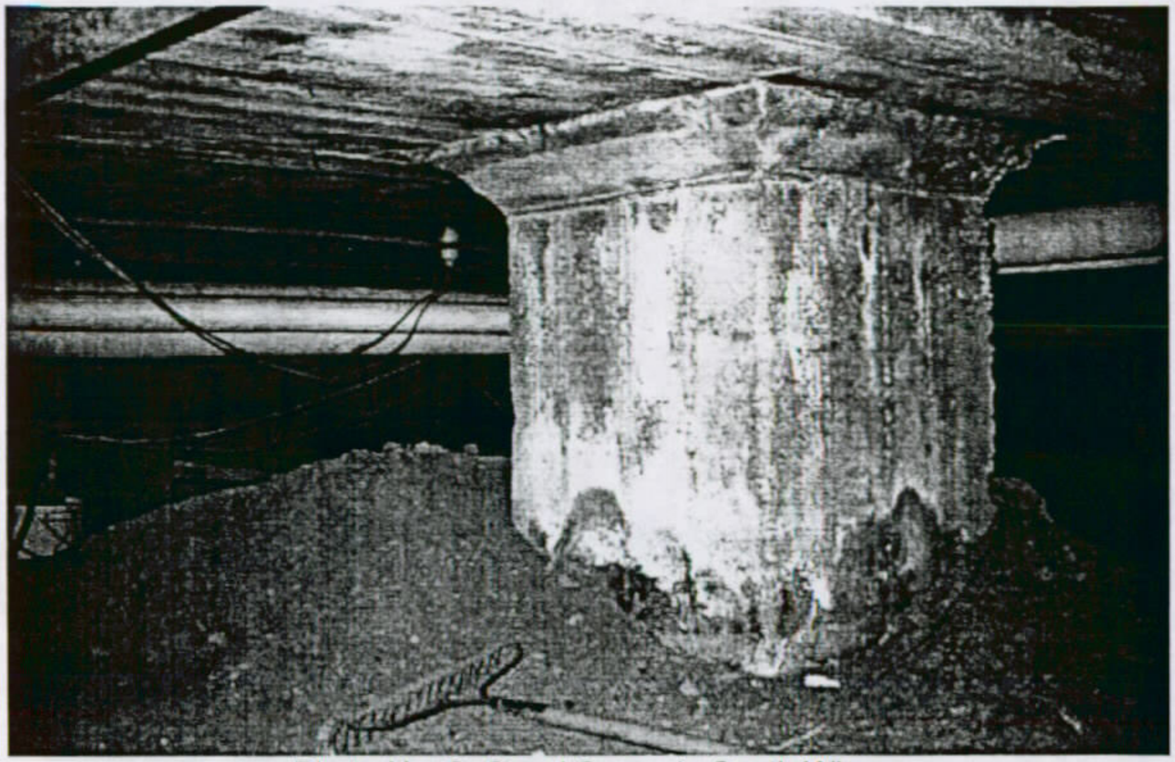


Photo No. 3  Crawl Space in South Wing

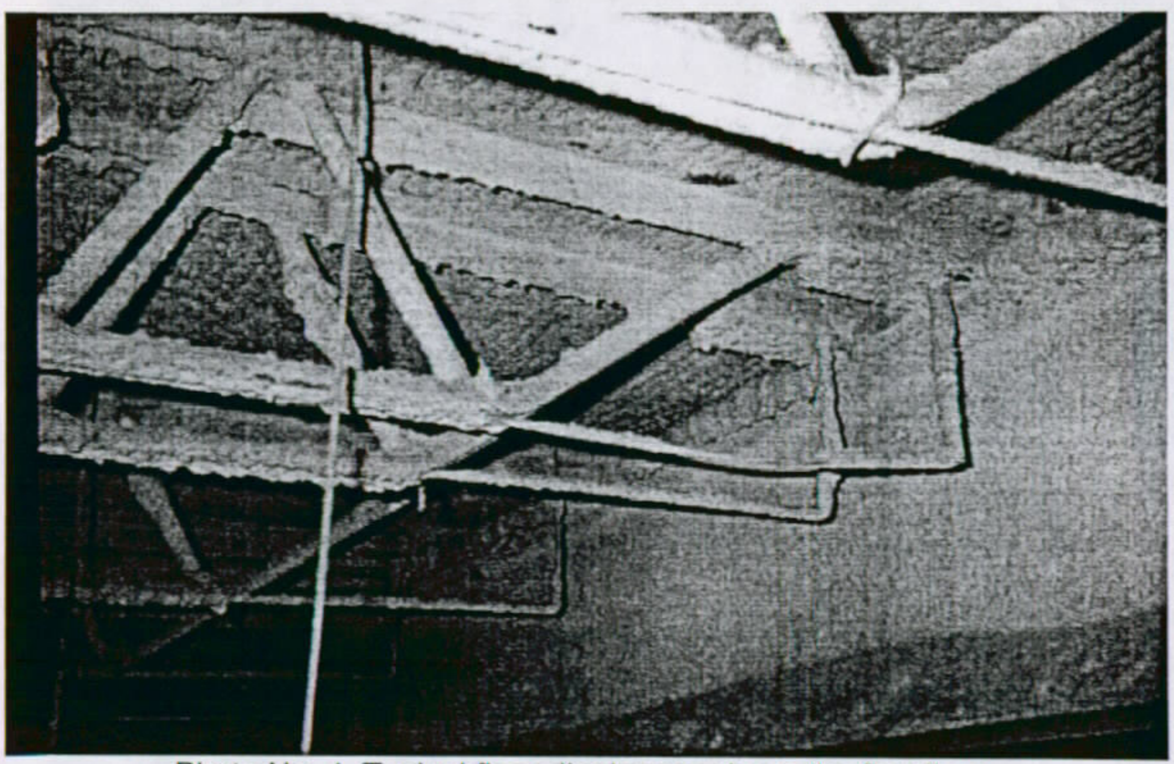


Photo No. 4  Typical floor diaphragm above the first floor.

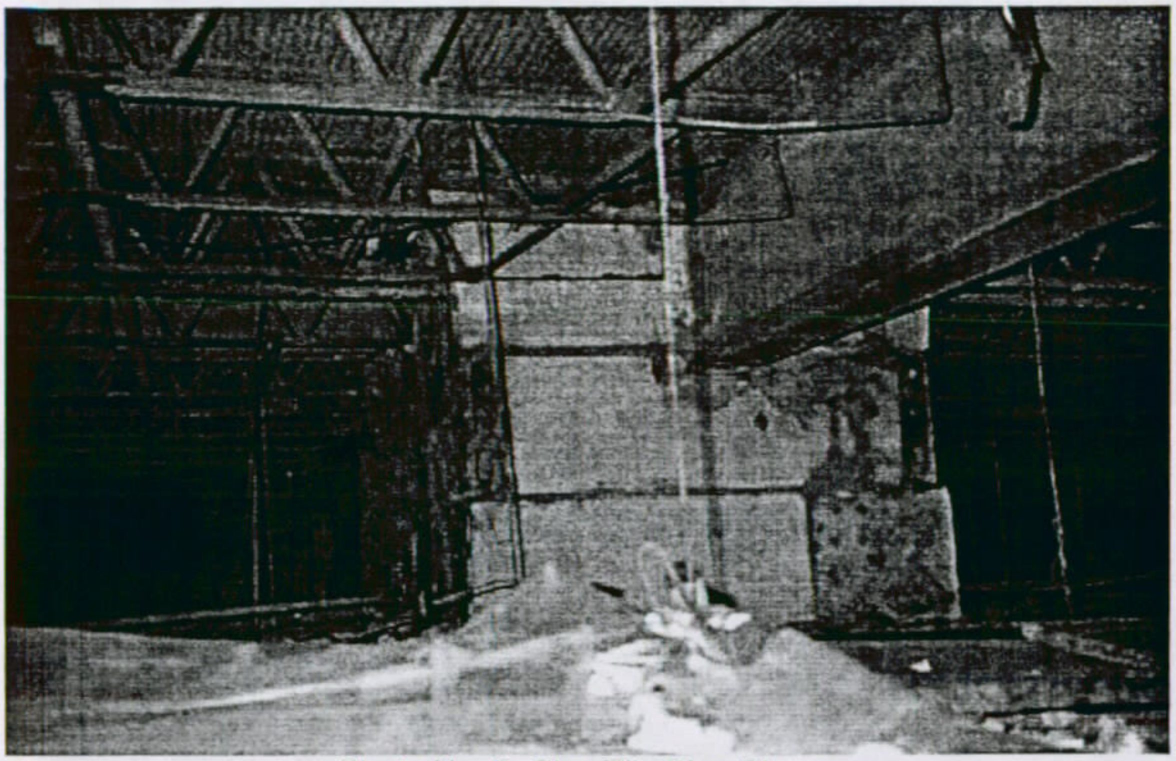


Photo No. 5  Clay Tile Pipe Chase

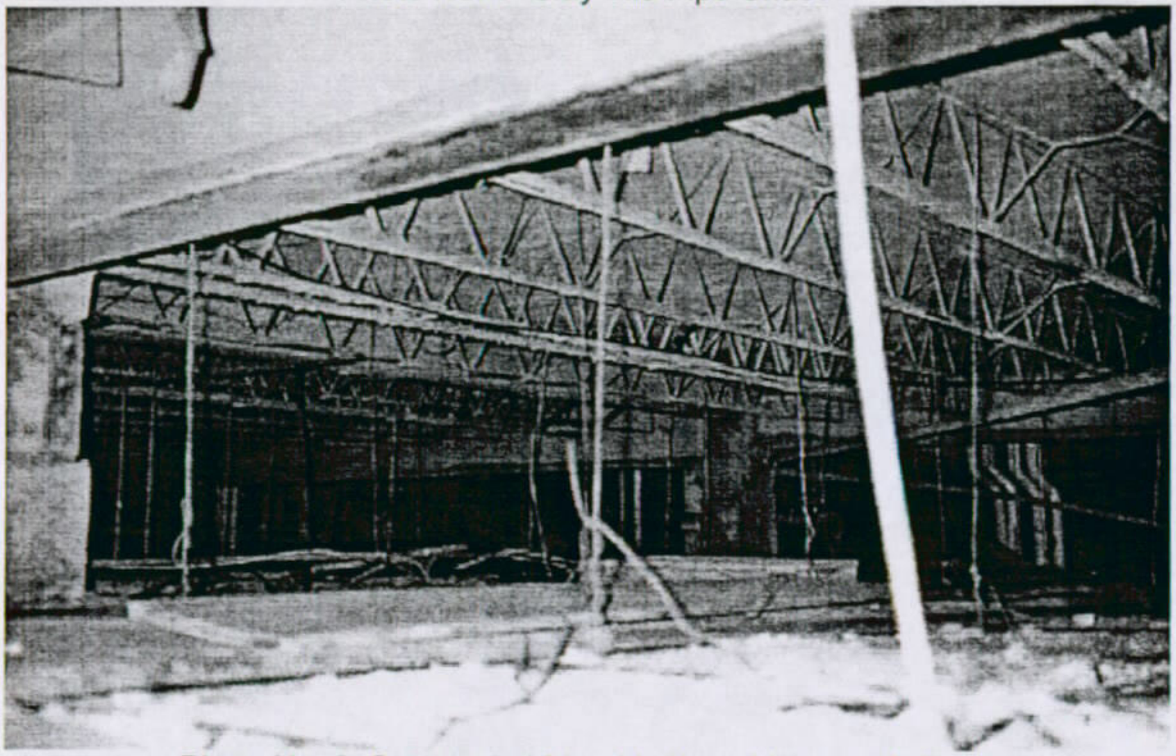


Photo No. 6  Suspended Metal Lath and Plaster Ceilings

Photo No. 7  Granite Veneer


Photo No. 8  Existing partition to be converted to concrete shear wall.

# Section 4 Field Notes by Historical Architect

CAREY & CO. INC.
ARCHITECTURE

# FAX TRANSMITTAL

DATE: August 2, 2000

TO: Joe Baldelli
URS

FAX: 398-1904

PAGES: 5 (including this one)

RE: Ahwahnee Hotel
Field Report

REMARKS: Joe,

Attached is my field report, with the Secretary of the Interior Standards for Restoration attached. I will also email this to you.

Nancy Goldenberg

Nancy Goldenberg
Carey & Co. Inc.

CAREY & CO. INC.
ARCHITECTURE

# MEMORANDUM

August 2, 2000

To: Joe Baldelli
URS
100 California Street, Suite 500
San Francisco, CA 94111

From: Nancy Goldenberg
Carey & Co., Inc.

Re: Ahwahnee Hotel
Field Report

Carey & Co. has been retained to assist the structural engineers, URS, in developing seismic rehabilitation schemes for the Ahwahnee Hotel. This initial field report summarizes our observations from the initial site visit, and is designed to act as a guide to the structural engineers on historic fabric and preservation issues. A future report will review and evaluate proposed schemes, using the *Secretary of the Interior's Standards for the Treatment of Historic Properties.*

**Methodology**

The initial field visit took place on July 26 and July 27, 2000. The field work consisted of a building walk-through, where preliminary structural retrofit ideas were discussed. The walk-through was followed by archival research. Present during the walk through were Donald Evans, YCS; Joe Baldelli, URS; Myron Humeny, URS; David Mark, Ahwahnee staff; and Nancy Goldenberg, Carey & Co. Archival research was conducted at the following Yosemite Valley archives: National Park Service Research Library (historic photos and original specifications); YCS Public Relations Library (historic photos and slides); and the Archive Room, YCS Maintenance and Facilities Services (drawings).

**Background**

The Ahwahnee Hotel, designed by Los Angeles architect Gilbert Stanley Underwood, was constructed in 1926 and 1927. It is a National Historic Landmark, which is the nation's highest level of significance. The hotel has been the subject of several recent reports. These include a Historic Structure Report, by Page & Turnbull, dated November 1977; and a FEMA 178 Seismic Evaluation, by Martin/Martin, Inc. dated August 1999. Both reports were studied prior to beginning field work.

**Building Description**

Detailed building descriptions are included in both the Page & Turnbull and Martin/Martin reports. Briefly, the building plan forms an irregular "Y." It rises to approximately 100 feet, and includes seven stories plus an elevator penthouse. While most of the building is constructed of steel and concrete, the Dining Room is primarily wood construction. Stylistically, the hotel is a hybrid of Rustic and Art Deco. The building retains a high degree of integrity.

**General Recommendations**

Prevailing Code: As with any historic building, especially one of this importance, the State Historic Building Code and the Uniform Code for Building Conservation should be used as the prevailing codes. They provide sensitive, performance-based means for achieving a safe, improved structure. In addition, *The Secretary of the Interior's Standards for Rehabilitation* (see attachment) should be used as guidelines for this project.

The following are general guidelines for structural improvements to historic buildings, relevant to the Ahwahnee Hotel.

- Locate structure to have he least impact on historic fabric.
- Locate structure within original wall and ceiling locations where possible, to conform to the original spatial design.
- Where structure cannot be accommodated within existing original walls, modify the wall profile on the side of least significance.
- Prepare as-built drawings documenting extent historically significant materials and components.
- Graphically document with archival quality photographs and/or measured drawings areas with character-defining features that will be demolished or impacted by the work.
- Coordinate the seismic work with other needed upgrades to minimize overall impacts to historic building fabric.
- Analyze the building so that the full value of the existing materials and assemblies may be utilized. Perform testing as required, using non-destructive techniques where possible.

**Findings**

Using the scheme proposed in the Martin/Martin report as a starting point, the team discussed retrofit options as we walked the building. Some general comments are as follows:

Main building areas (central core, east and south wings): this portion of the building is primarily steel and concrete construction. The proposed concrete shear wall additions appear to be acceptable. During the walk-through, we identified sensitive areas, such as the lobby, where shear walls that cannot fit into existing wall voids should be avoided. Where unacceptable shear wall locations were proposed in the Martin/Martin report, we found alternatives in less visible or non-public locations.

Dining Room: This area appears to be the most problematic. Issues discussed were 1) inserting a seismic separation joint, 2) inserting a shear wall at the east end, 3) strengthening the granite columns, and 4) creating a roof diaphragm and/or strengthening the trusses.

Seismic joint: this appears necessary. The proposed location happens at a juncture between wood and concrete finishes – it is also the location of a proposed new shear wall. The aesthetics of this feature cannot be addressed until details are produced, but since a new shear wall at this location (the east end of the Dining Room) appears inevitable, there will be opportunities for camouflage.

New shear wall at the east end: At this shear wall location, identified in the Martin/Martin report as the "E" line, the Dining Room space drops down to one story. A solid wall fills in the upper area, which at one time was an open balcony. Granite columns stand not only at the two side walls, but also at intermediate points to flank a center aisle. At the north side, a wainscot-high non-original wall separates the bar from the Dining Room. A folding screen stands at the south side. Spatially and well as functionally, the east end of the dining room is already distinct from the remainder of the room. If a solid shear wall must be created here, the infill portion should be treated in a period-neutral, compatible way, and set back from the original portions of the building.

Strengthening the granite columns: we discussed coring these elements from above, rather than disassembling and rebuilding. Prior to structural design, it is assumed that representative core samples will be taken at mortar joint locations to investigate the internal structure of these elements.

Creating a roof diaphragm and/or strengthening the trusses: Installation of a new roof diaphragm will involve salvaging and reinstalling the Vermont slate roof tiles. According to Don Evans, additional tiles are available from the Vermont quarry, so that replacing broken roof tiles will not pose a problem. In terms of the trusses, several retrofit ideas were discussed, and our comments will wait until specific fixes are recommended. However, at this time we have the following comments:

- Analyze the existing trusses so that their full structural value may be utilized.
- Avoid a visible solution if possible.
- If there are no other alternatives to a visible solution, one employing simple steel tie rods would probably be acceptable. These elements are relatively invisible, and are a common retrofit element on truss ceilings.

Nancy Goldenberg, Senior Vice President
Carey & Co., Inc.

# SECRETARY OF THE INTERIOR'S STANDARDS FOR THE TREATMENT OF HISTORIC PROPERTIES (REHABILITATION)

The *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Department of Interior Regulations, 36 CFR 67) pertain to historic buildings of all construction types, materials, sizes and occupancy, and encompass the exterior and the interior, related landscape features and the building's site and environment as well as attached, adjacent, or related new construction. The *Standards* are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility. Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.

2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.

3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.

4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.

6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.

10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

# Section 5 Preliminary Seismic Hazards Assessments

**Tiziano Grifoni**

08/17/00 11:29 AM

To: Joseph Baldelli/SanFrancisco/URSCorp@URSCORP
cc:
Subject: Ahwahnee Hotel

Joe:

Following is a brief preliminary seismic hazards assessment for the Ahwahnee Hotel in the Yosemite Valley.

1- Seismotectonic Setting, see attached document. Surface rupture potential is very small at the site.

faults and surface rupture.do

2- Site Class: Based on geology information the subsurface conditions at the site may consist of lake fill covered by colluvium and alluvium wash from the canyon slopes. For preliminary estimates the site class may be taken as D. However, site specific subsurface information from borings are required in order to define the Site Class at the site.

3- Site specific Ss and S1 values for BSE-2 and BSE-1, respectively are as follows:

| | Ss (0.2 sec) | S1 (1.0 sec) |
|---|---|---|
| BSE-2 | 0.78 g | 0.22 g |
| BSE-1 | 0.38 g | 0.13 g |

Regards
Tiziano

## SEISMOTECTONIC SETTING

The modern tectonic setting of central California is dominated largely by the transform plate boundary contact between the Pacific and North American plates south of the Mendocino triple junction. The Pacific plate is sliding in a north-northwest direction (N35°W to N38°W) at a rate of about 46 to 47 mm/yr with respect to the North American plate (DeMets et al., 1994). Right-lateral strike-slip displacement along the major branches of the San Andreas fault system accommodates most of this plate motion, with the remainder generating Holocene tectonism and seismicity at the western continental margin and to the east in the Sierra Nevada and Basin and Range Provinces (Minster and Jordan, 1987; Atwater, 1970). East of the Coast Ranges, the Great Valley and the adjacent Sierra Nevada form a relatively stable crustal block composed of Mesozoic crystalline basement that dips gently to the west (Hill et al., 1991). The eastern escarpment of the Sierra Nevada (and the western extent of the Basin and Range province) is marked by a series of eastward-dipping, range-front normal faults that reveal significant Holocene displacement. This region is also marked by Quaternary through recent volcanic centers (i.e. Long Valley, Mono-Inyo craters volcanic chain) that stretch for a distance of 25 km and have erupted both silicic and basaltic lavas (Wallace, 1984; Vetter et al., 1983). The most recent eruptions occurred between 500 to 600 years ago from vents along the Mono-Inyo craters volcanic chain.

The Ahwahnee Hotel in Yosemite Valley lies in the central Sierra Nevada mountains. The Sierra Nevada is a 600-km-long by 150-km-wide composite batholith that was emplaced over a period of nearly 100 m.y., from approximately 180 to 80 Ma (Bateman and Eaton. 1967). Uplift of the range to its present elevation occurred in late Cenozoic time around 10 to 3.5 Ma. In the vicinity of the central Sierra Nevada and Yosemite Valley, the fault activity map of California compiled by Jennings (1994) shows few faults that fall within a 70-km-long zone that extends northwest-southeast from Lake Tahoe to Owens Lake in the south. However, recent research by Wakabayashi and Sawyer (2000) suggests that "internal" faults may be distributed relatively evenly across the Sierra Nevada, and that cumulative late Cenozoic vertical separations on these faults systematically increase eastward towards the Frontal fault system along the eastern escarpment of the Sierra (from thousandths of a mm/yr to hundredths of a mm/yr). Only a few of these faults show latest Pleistocene or younger movement (Wakabayashi and Sawyer, 2000). In spite of this recent finding, the majority of the faults that could wield potential seismic hazard for the Ahwahnee Hotel probably lie on the margins of the Sierra Nevada along range-bounding segments of the Frontal fault to the east or the Foothills fault system to the west.

### Sierra Nevada Frontal Fault System

The Sierra Nevada Frontal fault system forms part of the eastern escarpment of the Sierra Nevada, and is highly segmented along its 650-km length. Between Owens Valley and Lake Tahoe, the frontal fault system consists of a series of generally north-striking, left-stepping en echelon fault traces (Page et al., 1994; Jennings. 1994). Earthquakes on the larger fault traces in the Sierra Nevada Frontal zone may measure up to magnitude (M) 7.5.

There is probably a strong correlation between faults of the Frontal fault system and volcanic centers in the vicinity of Mono Lake, Inyo craters, and Long Valley caldera. A swarm of earthquakes, perhaps associated with underlying magma movement, at Mammoth Lakes in the 1980s prompted scientists to take a closer look at the regional seismicity and tectonics. The region between Long Valley caldera, the northern end of Owens Valley, and the White Mountains has consistently produced more M 5 to 6 earthquakes since 1978 than any other part of the continental United States (Savage and Cockerham, 1987; Hill et al., 1985). Earthquake focal mechanisms show a mix of strike-slip and dip-slip faulting consistent with a tectonic regime influenced by both east-west extension of the Basin and Range Province and dextral shear of the San Andreas transform boundary (Zoback and Zoback, 1980). Although this region has produced numerous moderate-sized earthquakes, it remains a seismic gap with respect to major earthquakes that have ruptured the surface along the north-trending eastern California-central Nevada seismic belt in historical time (Hill et al., 1985; Wallace, 1981).

*Hartley Springs and Silver Lake Fault Zones*

The Hartley Springs fault zone is a major Sierra Nevada range-front normal fault with a topographic relief of about 610 m across the fault escarpment (Bailey et al., 1976). It extends south into the Long Valley caldera and appears to displace Holocene pumice deposits (Jennings, 1994; Bailey and Koeppen, 1977). In addition, the earthquake swarms of 1980 may have resulted in surface rupture along segments of the Hartley Springs fault zone, although cracking may have been secondary and related to ground shaking (Taylor and Bryant, 1980). Slip rates range from 0.14 to 0.42 mm/yr along different segments of the fault zone. The Silver Lake fault is another Frontal fault that exhibits signs of displacing Holocene colluvium). Estimated slip rates for this fault range from 0.4 to 0.5 mm/yr (Bryant, 1984b; Clark et al., 1983). This fault zone is the closest significant seismic source to the Ahwahnee Hotel, which is located approximately 38 km east of the fault traces.

*Robinson Creek and Mono Lake Faults*

Dohrenwend (1982) considered the Robinson Creek fault to be a major range-front fault exhibiting normal displacement that appears to offset late Pleistocene to Holocene alluvium. An estimated slip rate of 0.2 to 0.7 mm/yr (Bryant, 1984a; Clark et al., 1983) indicates that there could be systematic movement along this fault. The Mono Lake fault bounds the western border of Mono Lake and is postulated by Gilbert et al. (1968) to have as much as 1830 m of vertical displacement. Late Pleistocene to Holocene talus and alluvium are offset along the trend of this fault (Jennings, 1994; Dohrenwend, 1982). The Mono Lake and Robinson Creek faults are located approximately 47 km and 57 km, respectively, northeast of the Ahwahnee Hotel.

*Hilton Creek Fault*

The Hilton Creek fault, located approximately 60 km southwest of the Ahwahnee Hotel, has experienced historic rupture with two M 5.1 earthquakes on June 8 and July 14, 1998, as well as four M $\geq$ 6 earthquakes in 1980 (Bryant, 1981). This fault and associated fractures generally trend north-northwest and have normal displacement of almost 1100 m (Bailey et al., 1976).

As mentioned before, earthquakes of M $\geq$ 5 constitute a diffuse belt of seismicity that extends along the eastern escarpment of the Sierra Nevada and the western edge of the Basin and Range province (Hill et al., 1991). Although the largest historic earthquake in this region was the 1872 M 8 Owens Valley event, it is unlikely that faults within the Frontal fault system can generate an earthquake event of that magnitude. More typical of this region are the four 1980 Mammoth Lakes earthquakes that all measured about M 6. As a conservative estimate, a maximum credible earthquake (MCE) of 7 to 7½ should be considered possible for faults in the Mono Lake-Long Valley caldera portion of the Frontal fault system.

**Foothills Fault System**

The Foothills fault system is a major zone of basement faults in the western Sierra Nevada. It is a complex zone of shear deformation, developed during the Mesozoic, that extends south to the Merced River which flows into Yosemite Valley (approximately 35-50 km to the northeast). Most researchers label the Bear Mountain fault zone as the western boundary and the Melones fault zone as part of the eastern boundary of the Foothills fault system (Jennings, 1994; Bryant, 1983). The results of previous geologic investigations on this fault system (which included over 100 trenches across more than 30 faults) indicate that some normal faulting has occurred during the Quaternary in the Sierra Nevada foothills as a result of late Tertiary to present east-west extension (Schwartz et al., 1977). Although some segments of the Foothills fault system have been reactivated in the late Quaternary (e.g., Negro Jack Point, Bowie Flat, Rawhide Flat East), the majority have not experienced slip since the Tertiary (Bryant, 1983; Alt et al., 1977).

Extremely low slip rates of about 0.003 to 0.006 mm/yr (Schwartz et al., 1977) are characteristic of certain segments of the Foothills fault zone, and other segments have comparably low slip rates. A conservative estimate of the MCE in this region would be M 6½, which would result in little or no significant shaking in the vicinity of the Ahwahnee Hotel (at a distance of about 35 to 50 km).

**Surface Faulting Hazard**

Since the Ahwahnee Hotel is located in Yosemite Valley with no known or mapped active faults, the hazard represented by surface faulting is nonexistent at the site.

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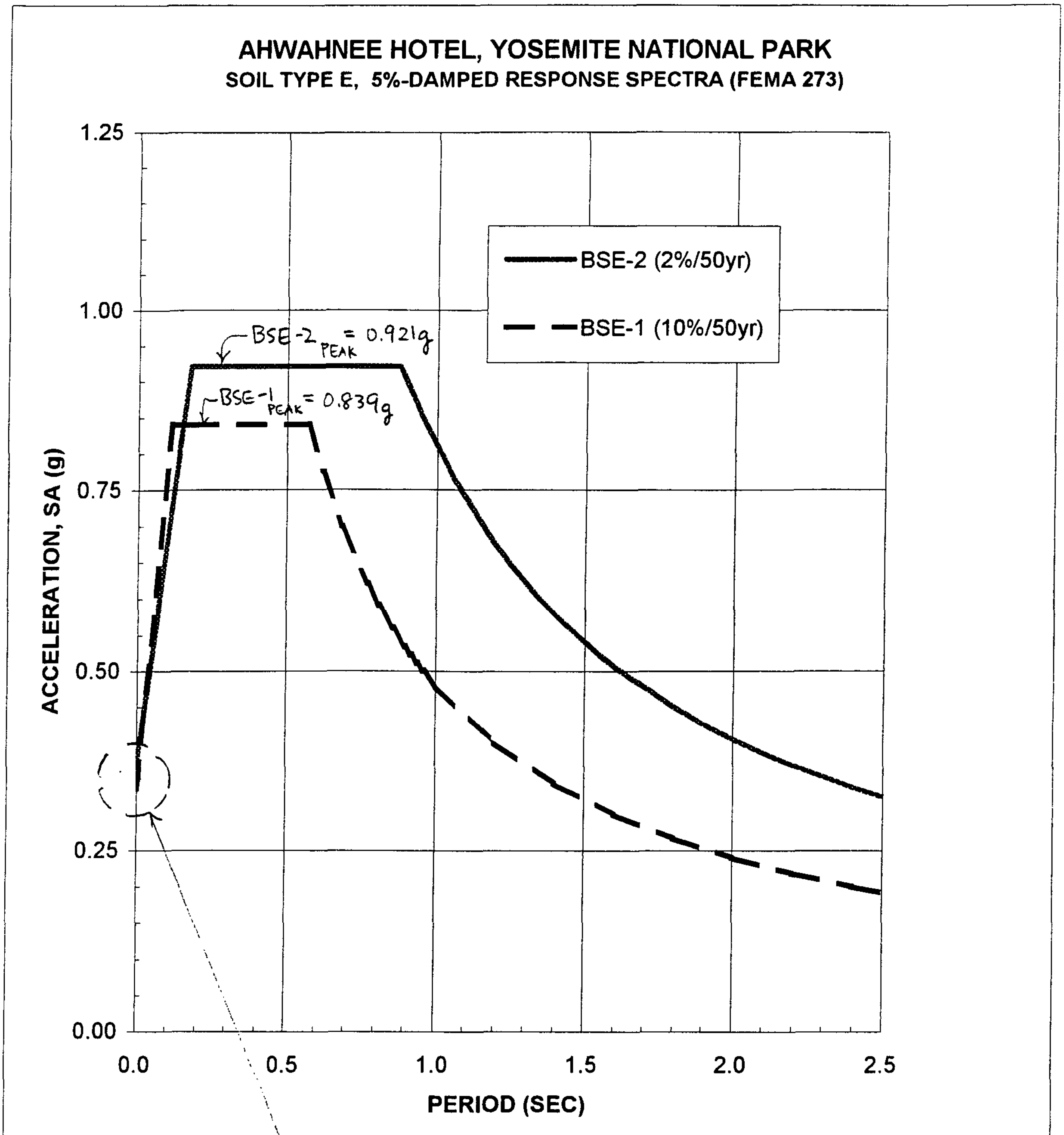
# APPENDIX F

## Summary of Structural Calculations

## List of Structural Calculations

# Detailed Calculations to Create Response Spectra




BSE-1 PGA = 0.336g
BSE-2 PGA = 0.369g

F-3



URS

Sheet No. ________

- Job No.: – 43-F0066652-15 — Job Name: — Ahwahee Hotel, Yosemite National Park
- Client.: – National Park Service — Subject: — Structural Analvsis Documentation

RESPONSE SPECTRA FOR AHWAHEE HOTEL YOSEMITE NATIONAL PARK, CA

CONSTRUCTED USING THE PROCEDURES OF FEMA 273, Section 1.6.1.5

From USGS Web site (based on Soil Type B), the following is obtained:

**For BSE-1 (10%/50yr):**

| | | | |
|---|---|---|---|
| Short-Per (0.2) spectra, Ss= | **0.4560** | g | Note: Enter **BOLD** data |
| 1-Second spectra, S1 = | **0.1424** | g | |

For Soil Type E (Ahwahnee Hotel, Yosemite), find Fa from FEMA 273 Tables 1-4:

| | | | | | |
|---|---|---|---|---|---|
| From Table 1-4: | Ss= | **0.25** g | Fa = | **2.50** | |
| | Ss= | **0.50** g | Fa = | **1.70** | |
| | Ss= | **0.4560** g | Fa = | 1.84 | (interpolation) |

For Soil Type E (Ahwahnee Hotel), find Fv from FEMA 273 Tables 1-5:

| | | | | | |
|---|---|---|---|---|---|
| From Table 1-5: | S1= | **0.10** g | Fv = | **3.50** | |
| | S1= | **0.20** g | Fv = | **3.20** | |
| | S1= | **0.1424** g | Fv = | 3.37 | (interpolation) |

From FEMA 273, Section 1.6.1.4, Equations 1-4 & 1-5

| | | | | |
|---|---|---|---|---|
| Eqn 1-4: | Sxs = | FaSs = | 0.839 | g |
| Eqn 1-5: | Sx1 = | FvS1 = | 0.480 | g |

From FEMA 273, Table 1-6 Obtain damping Coefficients Bs and B1 as a function of Effective Damping

| % of critical damping | Bs | B1 | $T_0$ | $0.2^*T_0$ |
|---|---|---|---|---|
| <2 | 0.8 | 0.8 | 0.572 | 0.114 |
| 5 | 1.0 | 1.0 | 0.572 | 0.114 |
| 10 | 1.3 | 1.2 | 0.620 | 0.124 |
| 20 | 1.8 | 1.5 | 0.687 | 0.137 |
| 30 | 2.3 | 1.7 | 0.774 | 0.155 |
| 40 | 2.7 | 1.9 | 0.813 | 0.163 |
| >50 | 3.0 | 2.0 | 0.858 | 0.172 |

where $T_0$ = (Sx1*Bs) / (Sxs*B1)

From FEMA 273, Section 1.6.1.5.1, Equations 1-8 and 1-9, construct Response Spectra

$S_a$ = (Sxs / Bs)*(0.4 + 3T / $T_0$) for 0 < T < or = 0.2 $T_0$)

$S_a$ = (Sx1 / (B1* T)) for T > $T_0$

Damping of % Critical:

| PERIOD | 2% | 5% | 10% | 20% | 30% | 40% | 50% |
|---|---|---|---|---|---|---|---|
| (SEC) | SA (G) | SA (G) | SA (G) | SA (G) | SA (G) | SA (G) | SA (G) |
| 0 | 0.420 | 0.336 | 0.258 | 0.187 | 0.146 | 0.124 | 0.112 |
| 0.114 | 1.049 | 0.839 | 0.616 | 0.420 | 0.308 | 0.256 | 0.224 |
| 0.114 | 1.049 | 0.839 | 0.616 | 0.420 | 0.308 | 0.256 | 0.224 |
| 0.124 | 1.049 | 0.839 | 0.646 | 0.439 | 0.321 | 0.267 | 0.233 |
| 0.137 | 1.049 | 0.839 | 0.646 | 0.466 | 0.340 | 0.282 | 0.246 |
| 0.155 | 1.049 | 0.839 | 0.646 | 0.466 | 0.365 | 0.302 | 0.263 |
| 0.163 | 1.049 | 0.839 | 0.646 | 0.466 | 0.365 | 0.311 | 0.271 |
| 0.172 | 1.049 | 0.839 | 0.646 | 0.466 | 0.365 | 0.311 | 0.280 |

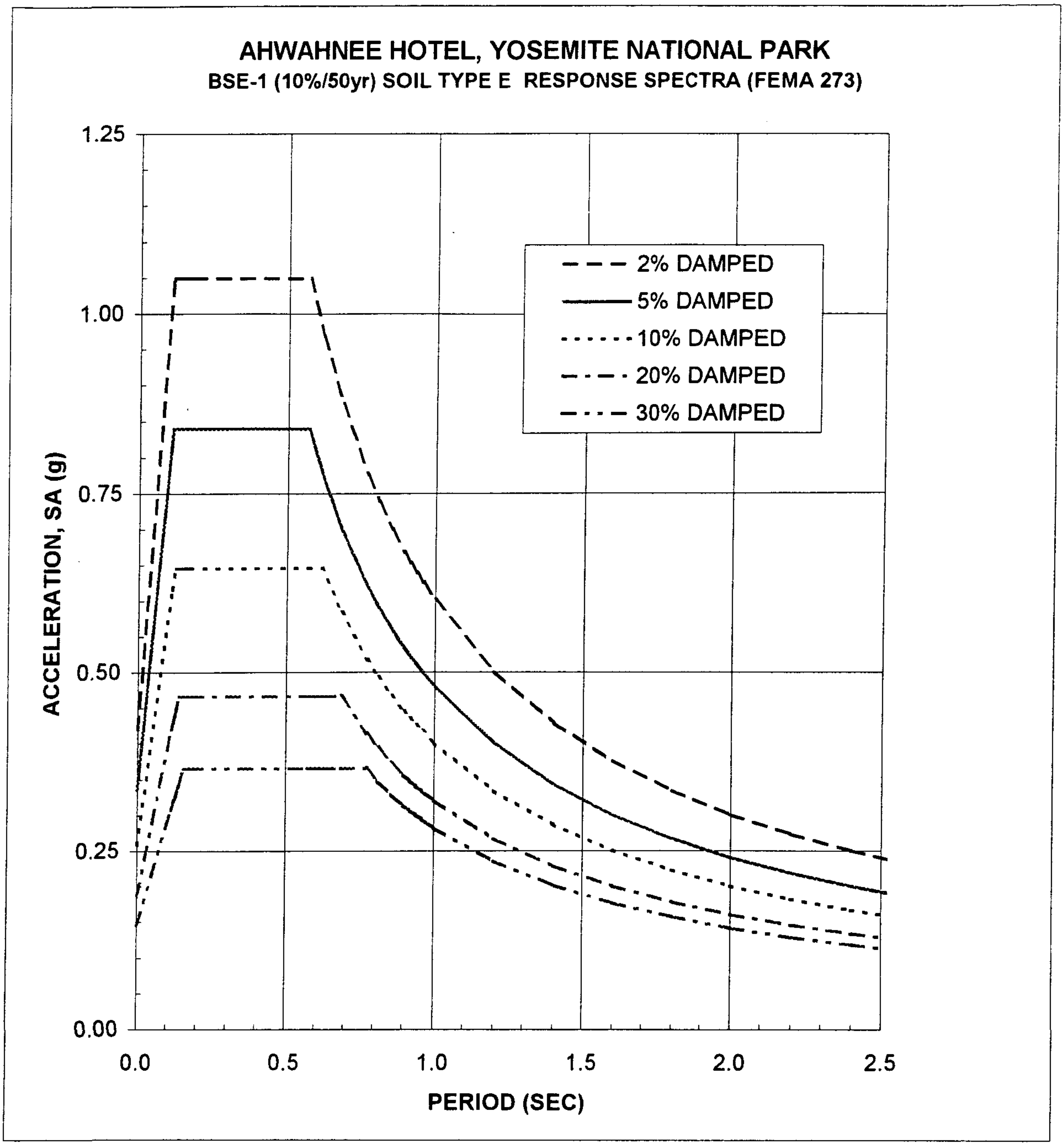
URS

Sheet No. ________

Job No.: 43-F0066652-15 — Job Name: Ahwahee Hotel, Yosemite National Park

Client.: National Park Service — Subject: Structural Analvsis Documentation

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.572 | 1.049 | 0.839 | 0.646 | 0.466 | 0.365 | 0.311 | 0.280 |
| 0.572 | 1.049 | 0.839 | 0.646 | 0.466 | 0.365 | 0.311 | 0.280 |
| 0.620 | 0.969 | 0.775 | 0.646 | 0.466 | 0.365 | 0.311 | 0.280 |
| 0.687 | 0.874 | 0.700 | 0.583 | 0.466 | 0.365 | 0.311 | 0.280 |
| 0.774 | 0.776 | 0.620 | 0.517 | 0.414 | 0.365 | 0.311 | 0.280 |
| 0.813 | 0.738 | 0.591 | 0.492 | 0.394 | 0.347 | 0.311 | 0.280 |
| 0.858 | 0.700 | 0.560 | 0.466 | 0.373 | 0.329 | 0.295 | 0.280 |
| 0.900 | 0.667 | 0.534 | 0.445 | 0.356 | 0.314 | 0.281 | 0.267 |
| 0.920 | 0.653 | 0.522 | 0.435 | 0.348 | 0.307 | 0.275 | 0.261 |
| 0.94 | 0.639 | 0.511 | 0.426 | 0.341 | 0.301 | 0.269 | 0.255 |
| 0.96 | 0.625 | 0.500 | 0.417 | 0.334 | 0.294 | 0.263 | 0.250 |
| 1 | 0.600 | 0.480 | 0.400 | 0.320 | 0.283 | 0.253 | 0.240 |
| 1.2 | 0.500 | 0.400 | 0.334 | 0.267 | 0.235 | 0.211 | 0.200 |
| 1.4 | 0.429 | 0.343 | 0.286 | 0.229 | 0.202 | 0.181 | 0.172 |
| 1.6 | 0.375 | 0.300 | 0.250 | 0.200 | 0.177 | 0.158 | 0.150 |
| 1.8 | 0.334 | 0.267 | 0.222 | 0.178 | 0.157 | 0.140 | 0.133 |
| 2 | 0.300 | 0.240 | 0.200 | 0.160 | 0.141 | 0.126 | 0.120 |
| 2.2 | 0.273 | 0.218 | 0.182 | 0.146 | 0.128 | 0.115 | 0.109 |
| 2.4 | 0.250 | 0.200 | 0.167 | 0.133 | 0.118 | 0.105 | 0.100 |
| 2.6 | 0.231 | 0.185 | 0.154 | 0.123 | 0.109 | 0.097 | 0.092 |
| 2.8 | 0.214 | 0.172 | 0.143 | 0.114 | 0.101 | 0.090 | 0.086 |
| 3 | 0.200 | 0.160 | 0.133 | 0.107 | 0.094 | 0.084 | 0.080 |


AHWAHNEE HOTEL, YOSEMITE NATIONAL PARK
BSE-1 (10%/50yr) SOIL TYPE E RESPONSE SPECTRA (FEMA 273)
ACCELERATION, SA (g)
PERIOD (SEC)
1.25
1.00
0.75
0.50
0.25
0.00
0.0
0.5
1.0
1.5
2.0
2.5
2% DAMPED
5% DAMPED
10% DAMPED
20% DAMPED
30% DAMPED

**URS**

Sheet No. ________

Job No.: 43-F0066652-15 Job Name: Ahwahee Hotel, Yosemite National Park
Client.: National Park Service Subject: Structural Analysis Documentation

RESPONSE SPECTRA FOR AHWAHNEE HOTEL, YOSEMITE NATIONAL PARK, CA
CONSTRUCTED USING THE PROCEDURES OF FEMA 273, Section 1.6.1.5
From USGS Web site (based on Soil Type B), the following is obtained:

**For BSE-2 (2%/50yr):**

| | | | |
|---|---|---|---|
| Short-Per (0.2) spectra, Ss= | **1.0307** | g | Note: Enter **BOLD** data |
| 1-Second spectra, S1 = | **0.2823** | g | |

For Soil Type E (Ahwahnee Hotel, Yosemite), find Fa from FEMA 273 Tables 1-4:

| | | | | | | |
|---|---|---|---|---|---|---|
| From Table 1-4: | Ss= | **1.00** | g | Fa = | **0.90** | |
| | Ss= | **1.25** | g | Fa = | **0.85** | (assumed) |
| | Ss= | **1.0307** | g | Fa = | 0.89 | (interpolation) |

For Soil Type E (Ahwahnee Hotel), find Fv from FEMA 273 Tables 1-5:

| | | | | | | |
|---|---|---|---|---|---|---|
| From Table 1-5: | S1= | **0.20** | g | Fv = | **3.20** | |
| | S1= | **0.30** | g | Fv = | **2.80** | |
| | S1= | **0.2823** | g | Fv = | 2.87 | (interpolation) |

From FEMA 273, Section 1.6.1.4, Equations 1-4 & 1-5

| | | | | |
|---|---|---|---|---|
| Eqn 1-4: | Sxs = | FaSs = | 0.921 | g |
| Eqn 1-5: | Sx1 = | FvS1 = | 0.810 | g |

From FEMA 273, Table 1-6 Obtain damping Coefficients Bs and B1 as a function of Effective Damping

| % of critical damping | Bs | B1 | $T_0$ | $0.2^*T_0$ |
|---|---|---|---|---|
| <2 | 0.8 | 0.8 | 0.880 | 0.176 |
| 5 | 1.0 | 1.0 | 0.880 | 0.176 |
| 10 | 1.3 | 1.2 | 0.953 | 0.191 |
| 20 | 1.8 | 1.5 | 1.056 | 0.211 |
| 30 | 2.3 | 1.7 | 1.190 | 0.238 |
| 40 | 2.7 | 1.9 | 1.250 | 0.250 |
| >50 | 3.0 | 2.0 | 1.319 | 0.264 |

where $T_0$ = (Sx1*Bs) / (Sxs*B1)

From FEMA 273, Section 1.6.1.5.1, Equations 1-8 and 1-9, construct Response Spectra

$S_a$ = (Sxs / Bs)*(0.4 + 3T / $T_0$) for 0 < T < or = 0.2 $T_0$)

$S_a$ = (Sx1 / (B1* T)) for T > $T_0$

| | Damping of % Critical: | | | | | | |
|---|---|---|---|---|---|---|---|
| PERIOD | 2% | 5% | 10% | 20% | 30% | 40% | 50% |
| (SEC) | SA (G) | SA (G) | SA (G) | SA (G) | SA (G) | SA (G) | SA (G) |
| 0 | 0.461 | 0.369 | 0.283 | 0.205 | 0.160 | 0.136 | 0.123 |
| 0.176 | 1.152 | 0.921 | 0.676 | 0.461 | 0.338 | 0.281 | 0.246 |
| 0.176 | 1.152 | 0.921 | 0.676 | 0.461 | 0.338 | 0.281 | 0.246 |
| 0.191 | 1.152 | 0.921 | 0.709 | 0.482 | 0.353 | 0.293 | 0.256 |
| 0.211 | 1.152 | 0.921 | 0.709 | 0.512 | 0.373 | 0.309 | 0.270 |
| 0.238 | 1.152 | 0.921 | 0.709 | 0.512 | 0.401 | 0.331 | 0.289 |
| 0.250 | 1.152 | 0.921 | 0.709 | 0.512 | 0.401 | 0.341 | 0.297 |

F-7

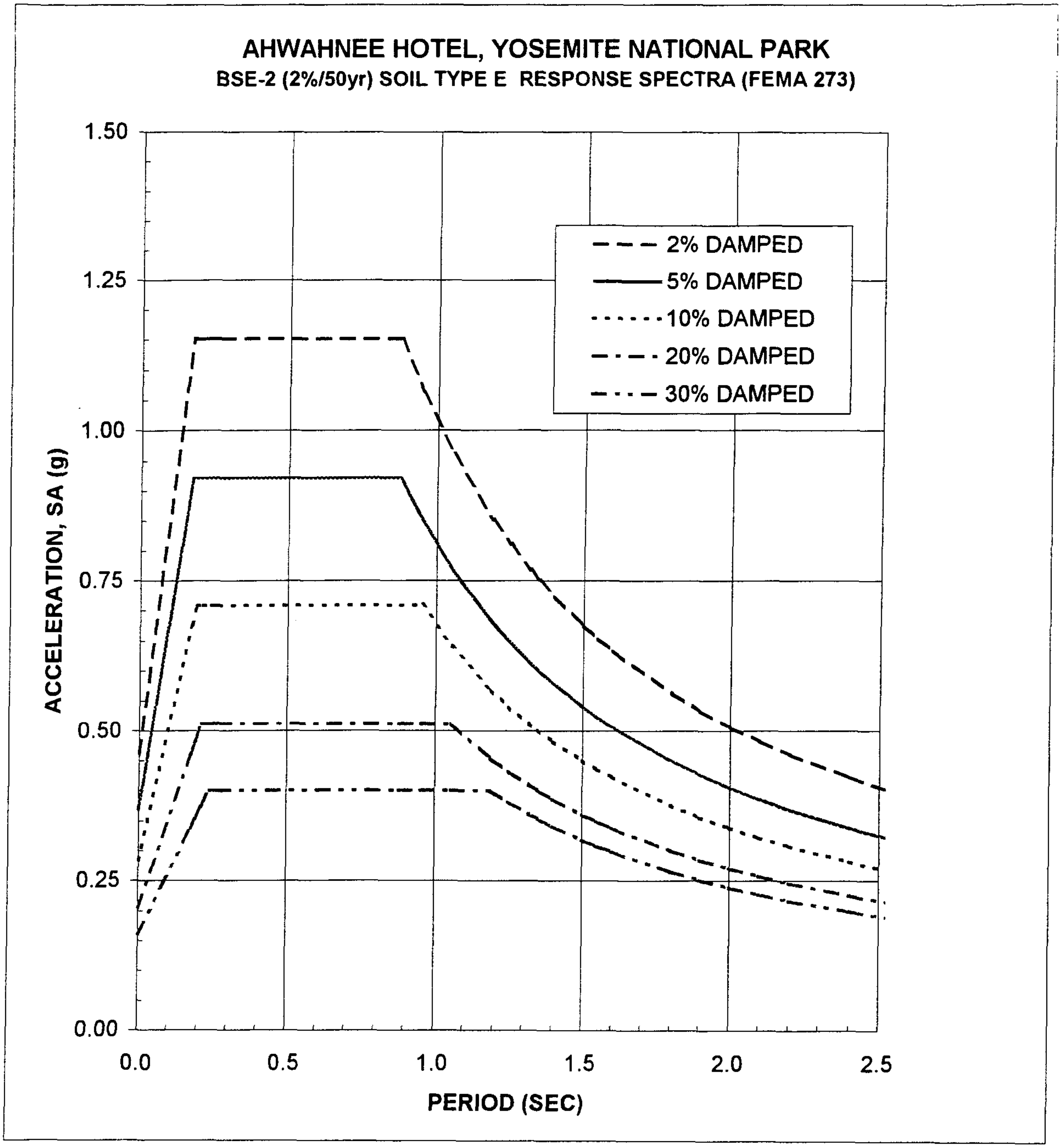


**URS**

Sheet No. ______

Job No.: 43-F0066652-15 Job Name: Ahwahee Hotel, Yosemite National Park
Client.: National Park Service Subject: Structural Analysis Documentation

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.264 | 1.152 | 0.921 | 0.709 | 0.512 | 0.401 | 0.341 | 0.307 | |
| 0.880 | 1.152 | 0.921 | 0.709 | 0.512 | 0.401 | 0.341 | 0.307 | |
| 0.880 | 1.152 | 0.921 | 0.709 | 0.512 | 0.401 | 0.341 | 0.307 | |
| 0.953 | 1.063 | 0.850 | 0.709 | 0.512 | 0.401 | 0.341 | 0.307 | |
| 1.056 | 0.960 | 0.768 | 0.640 | 0.512 | 0.401 | 0.341 | 0.307 | |
| 1.190 | 0.851 | 0.681 | 0.567 | 0.454 | 0.401 | 0.341 | 0.307 | |
| 1.250 | 0.810 | 0.648 | 0.540 | 0.432 | 0.381 | 0.341 | 0.307 | |
| 1.319 | 0.768 | 0.614 | 0.512 | 0.409 | 0.361 | 0.323 | 0.307 | |
| 1.320 | 0.767 | 0.614 | 0.512 | 0.409 | 0.361 | 0.323 | 0.307 | |
| 1.350 | 0.750 | 0.600 | 0.500 | 0.400 | 0.353 | 0.316 | 0.300 | |
| 1.4 | 0.724 | 0.579 | 0.482 | 0.386 | 0.341 | 0.305 | 0.289 | |
| 1.5 | 0.675 | 0.540 | 0.450 | 0.360 | 0.318 | 0.284 | 0.270 | |
| 1.55 | 0.654 | 0.523 | 0.436 | 0.349 | 0.308 | 0.275 | 0.261 | |
| 1.6 | 0.633 | 0.507 | 0.422 | 0.338 | 0.298 | 0.267 | 0.253 | |
| 1.8 | 0.563 | 0.450 | 0.375 | 0.300 | 0.265 | 0.237 | 0.225 | |
| 1.9 | 0.533 | 0.427 | 0.355 | 0.284 | 0.251 | 0.224 | 0.213 | |
| 2 | 0.507 | 0.405 | 0.338 | 0.270 | 0.238 | 0.213 | 0.203 | |
| 2.1 | 0.482 | 0.386 | 0.322 | 0.257 | 0.227 | 0.203 | 0.193 | |
| 2.2 | 0.460 | 0.368 | 0.307 | 0.246 | 0.217 | 0.194 | 0.184 | |
| 2.4 | 0.422 | 0.338 | 0.281 | 0.225 | 0.199 | 0.178 | 0.169 | |
| 2.6 | 0.390 | 0.312 | 0.260 | 0.208 | 0.183 | 0.164 | 0.156 | |
| 2.8 | 0.362 | 0.289 | 0.241 | 0.193 | 0.170 | 0.152 | 0.145 | |
| 3 | 0.338 | 0.270 | 0.225 | 0.180 | 0.159 | 0.142 | 0.135 | |


AHWAHNEE HOTEL, YOSEMITE NATIONAL PARK
BSE-2 (2%/50yr) SOIL TYPE E RESPONSE SPECTRA (FEMA 273)
2% DAMPED
5% DAMPED
10% DAMPED
20% DAMPED
30% DAMPED
ACCELERATION, SA (g)
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0.0
0.5
1.0
1.5
2.0
2.5
PERIOD (SEC)

**E-TABS 3-D Model of Existing Building**

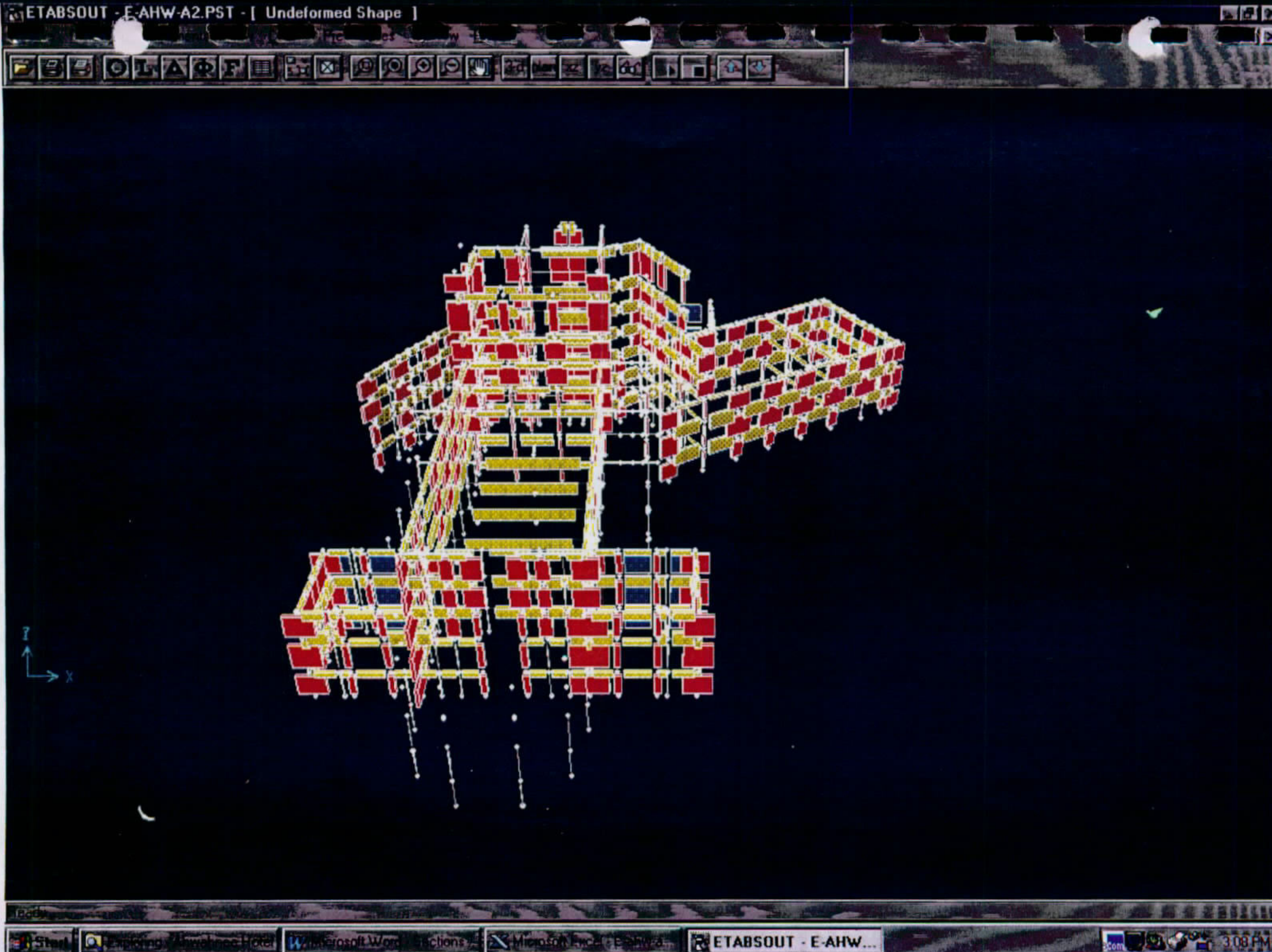
**Results of Computer Model of Existing Building**

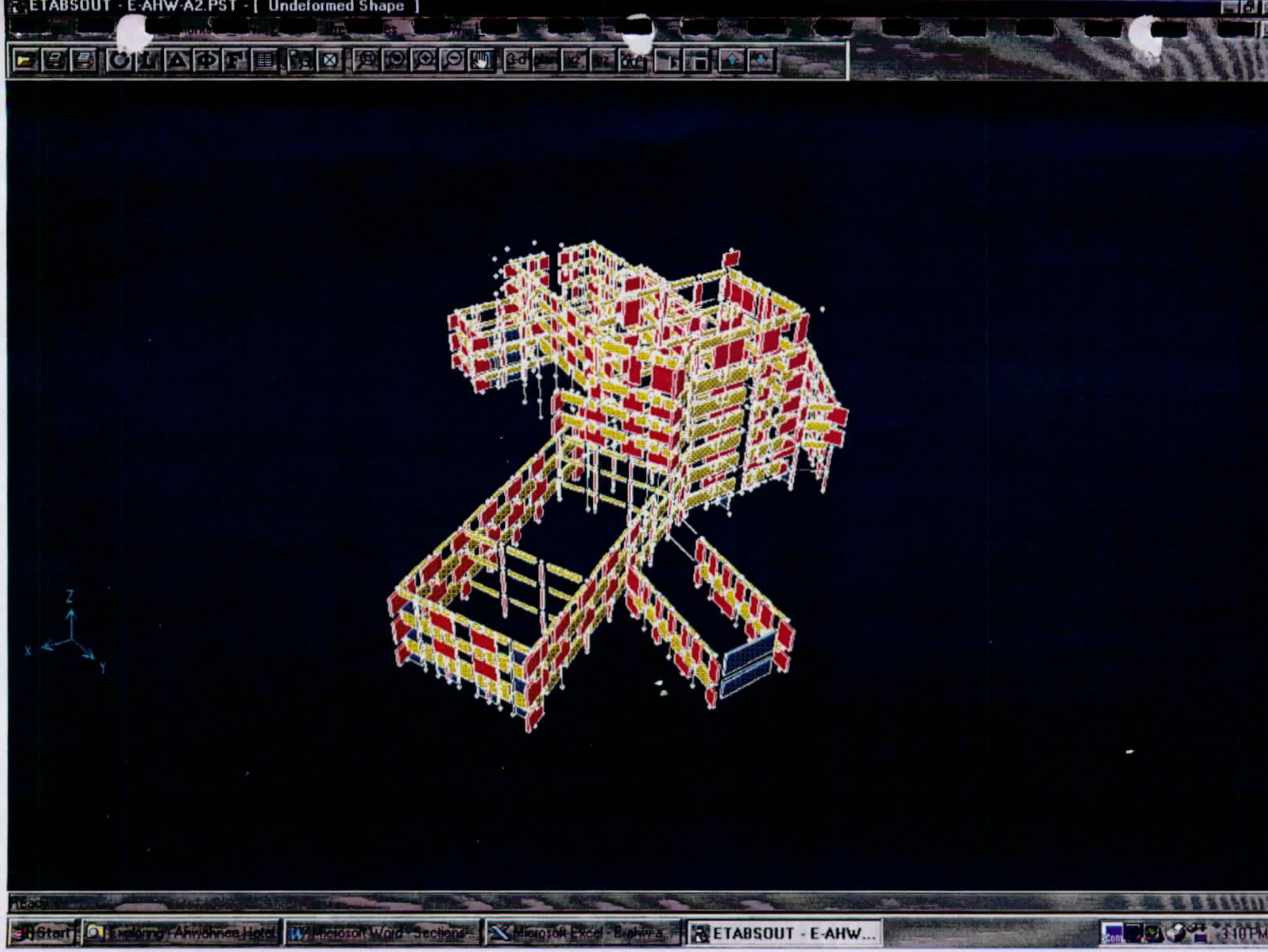
From the ETABS analysis, the existing wall shear stresses were obtained for BSE-1 and BSE-2 earthquake hazard levels. The shear demand stresses were compare to the shear capacity of the existing walls. The shear stress capacity , $v_{capacity}$, was computed as follows:

$$\begin{aligned} v_{capacity} &= v_{concrete} + v_{reinforcement} \\ &= 2*\mathrm{sqrt}(f'c) + \rho*fy \\ &= 2*\mathrm{sqrt}(3000) + (0.002)*33000 \\ &= 176 \text{ psi} \end{aligned}$$

The m-values for LS, CP and LD were determined in accordance with FEMA 273 Tables 6-19 and 6-20, for flexure and shear control, respectively. In order to determine whether the wall or pier is controlled by flexure or shear, the wall height-to-width (h/w) ratio was computed for each wall. For walls with h/w ratio greater than 3, they are flexure controlled; otherwise, they are shear controlled. Shear demand stresses were computed for the Life Safety Performance Level and the Limited Damage Performance Level. The wall shear demand over shear capacity (D/C) ratios were calculated.

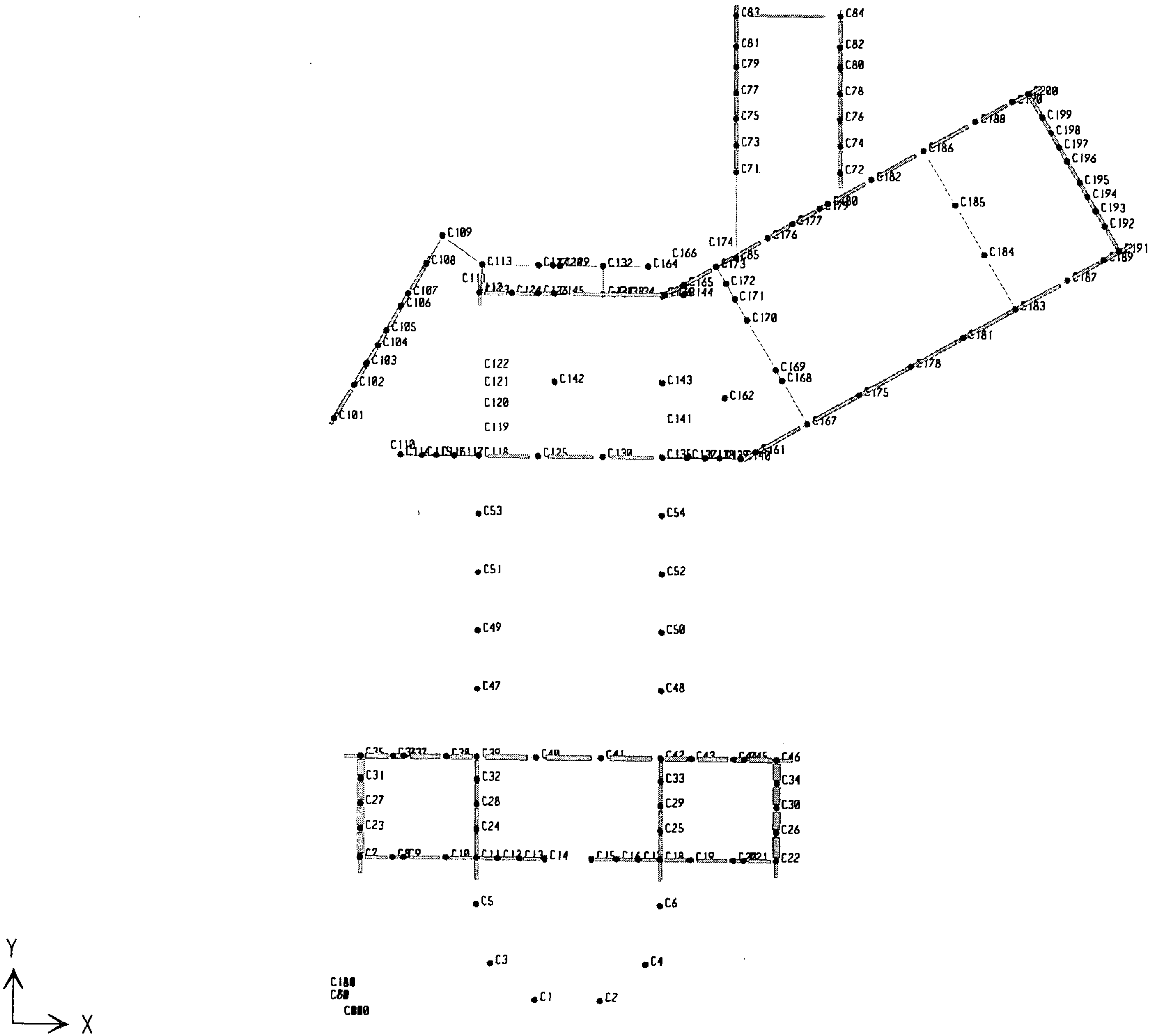
Table 3.1 tabulates the locations of the walls and piers, m-values, shear capacity, shear demand and D/C ratios.


ETABSOUT - E-AHW-A2.PST - [ Undeformed Shape ]
X
Start
ETABSOUT - E-AHW...
3:08 PM


ETABSOUT - E-AHW-A2.PST - [ Undeformed Shape ]
Z
X
Y
Ready
Start
Exploring - Ahwahnee Hotel
Microsoft Word - Sections...
Microsoft Excel - B-ahw-a...
ETABSOUT - E-AHW...
3:10 PM

F-12

MEZZ LEVEL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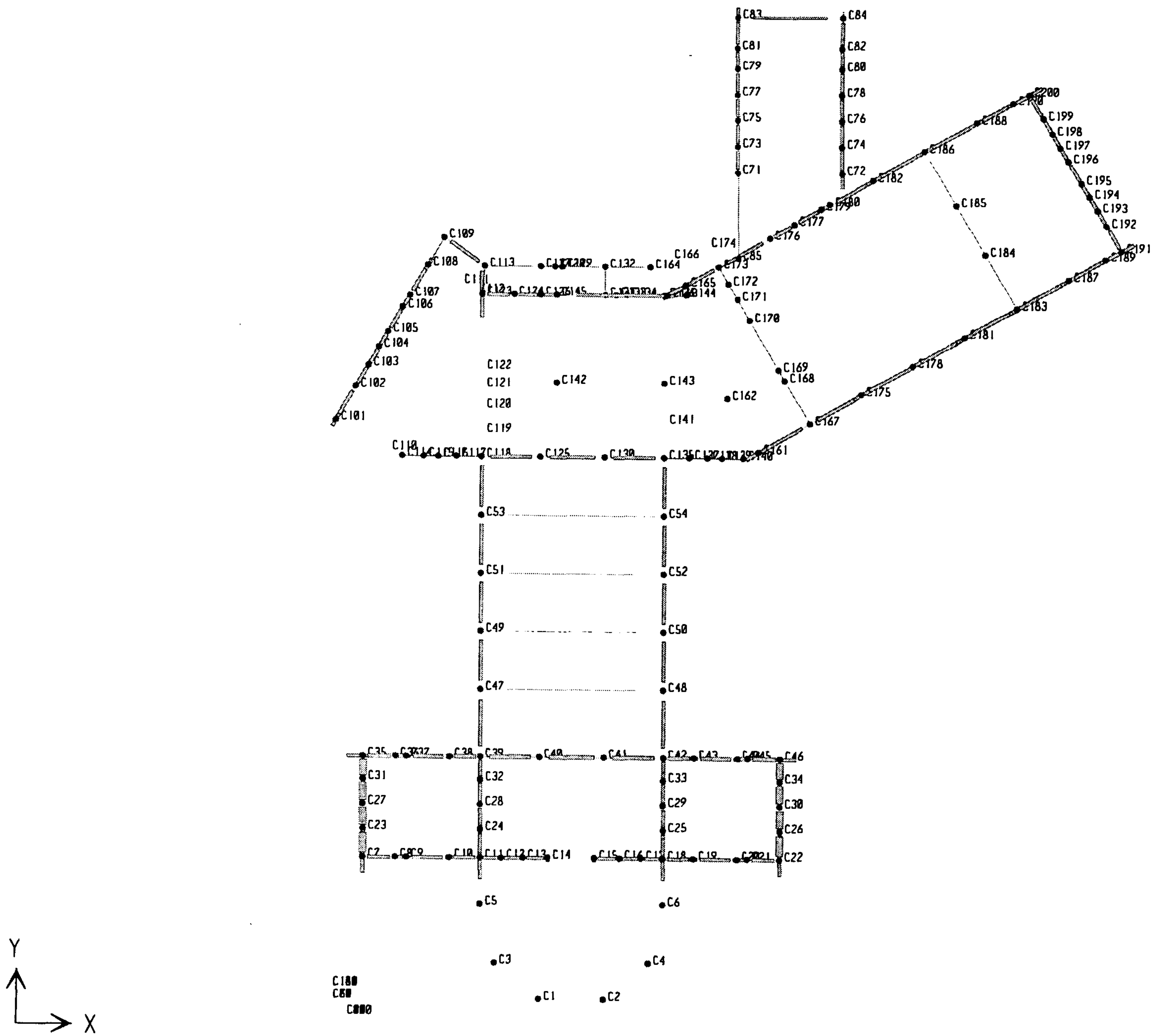
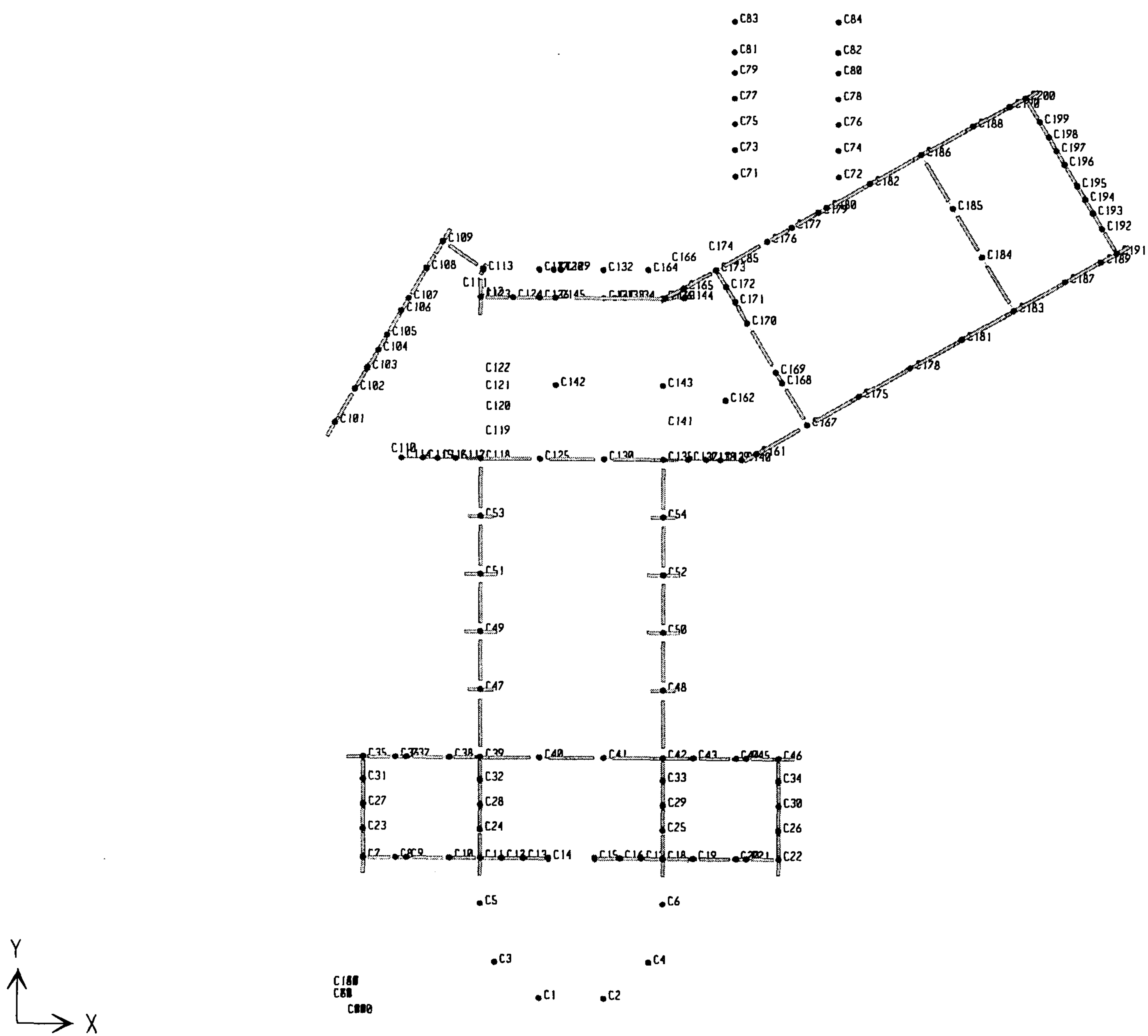
2nd LEVEL






F-14

3rd LEVEL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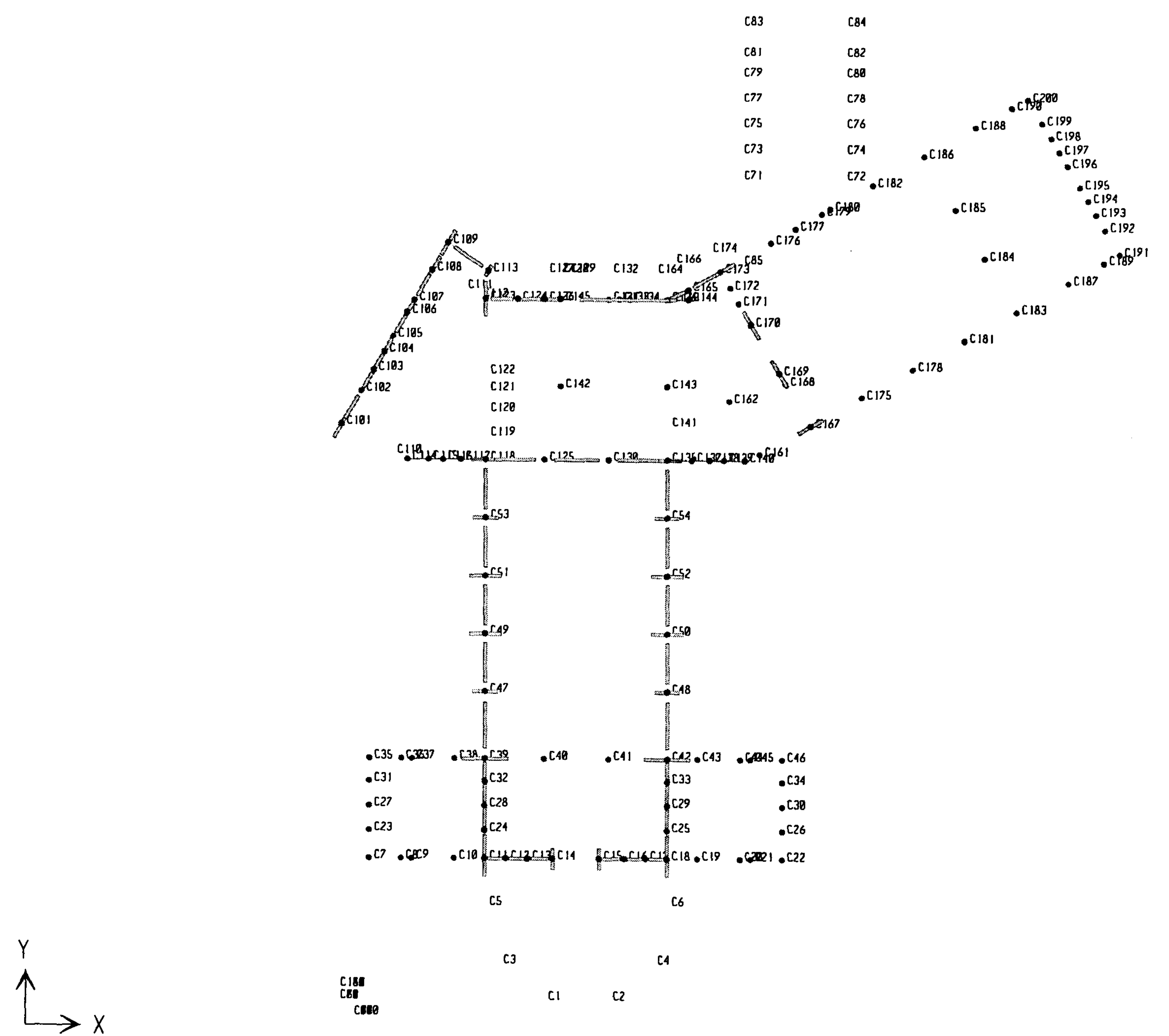
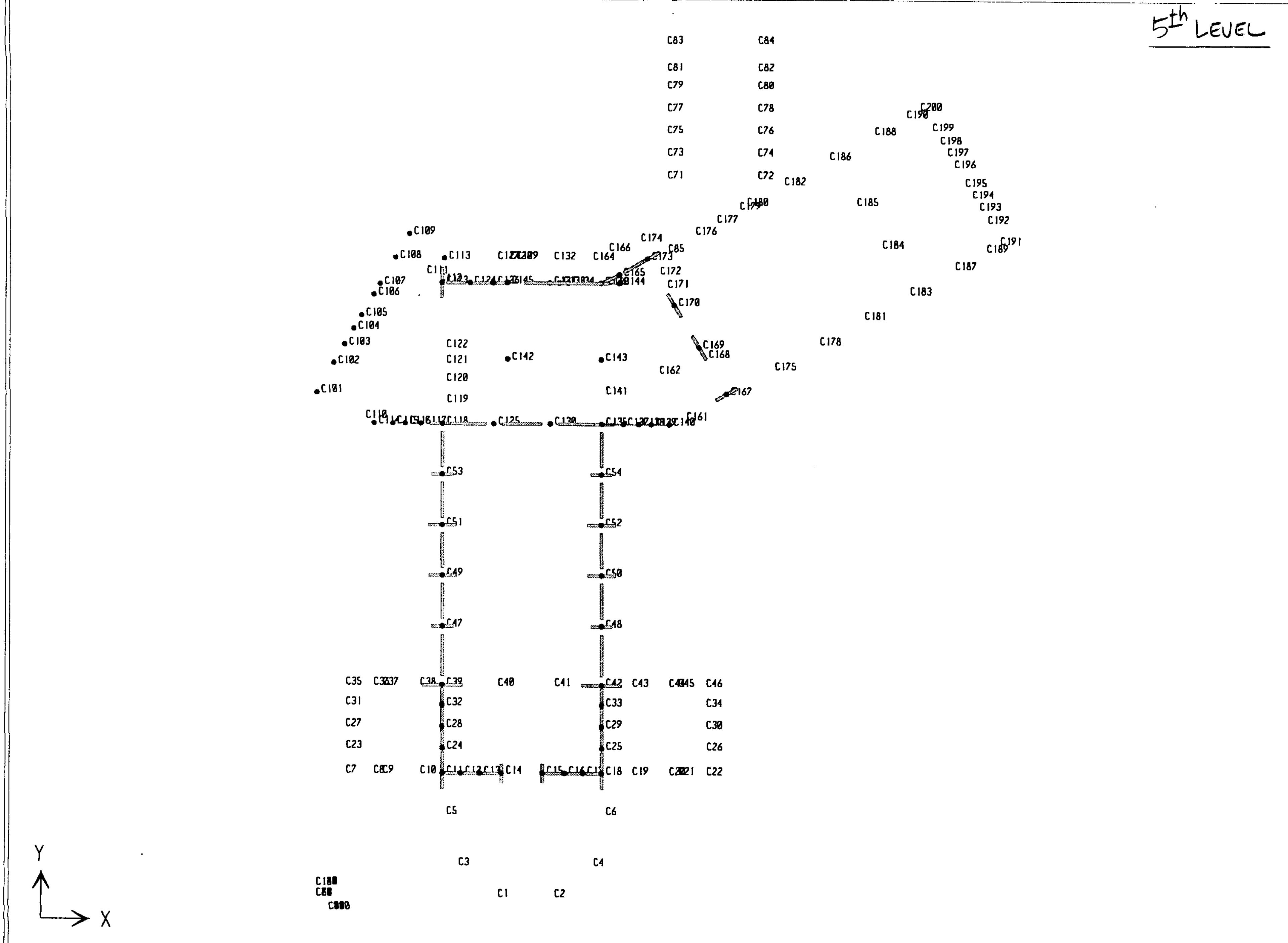
4th LEVEL



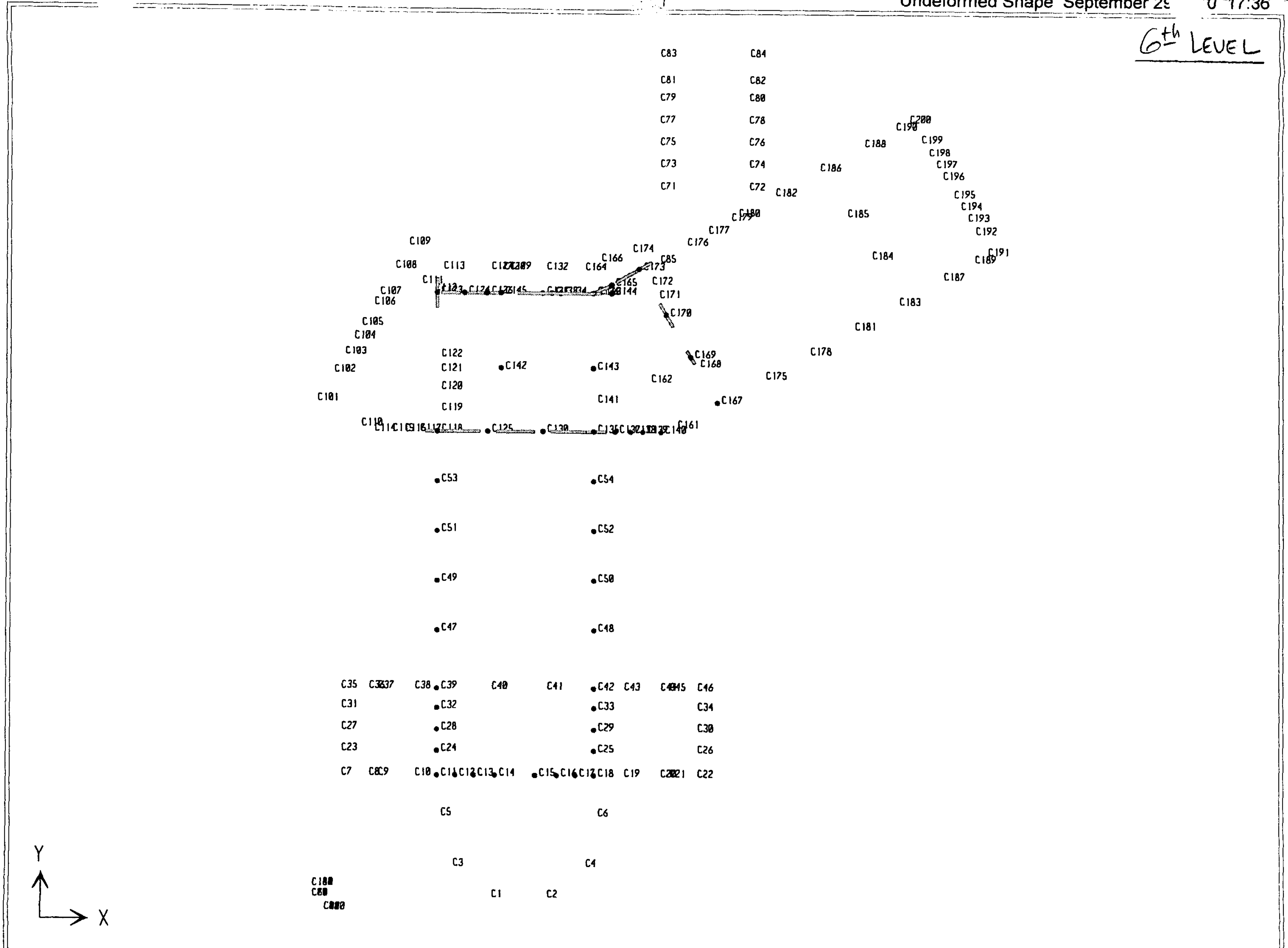



F-16

[redacted] Undeformed Shape September 2[redacted] 0 17:35



6th LEVEL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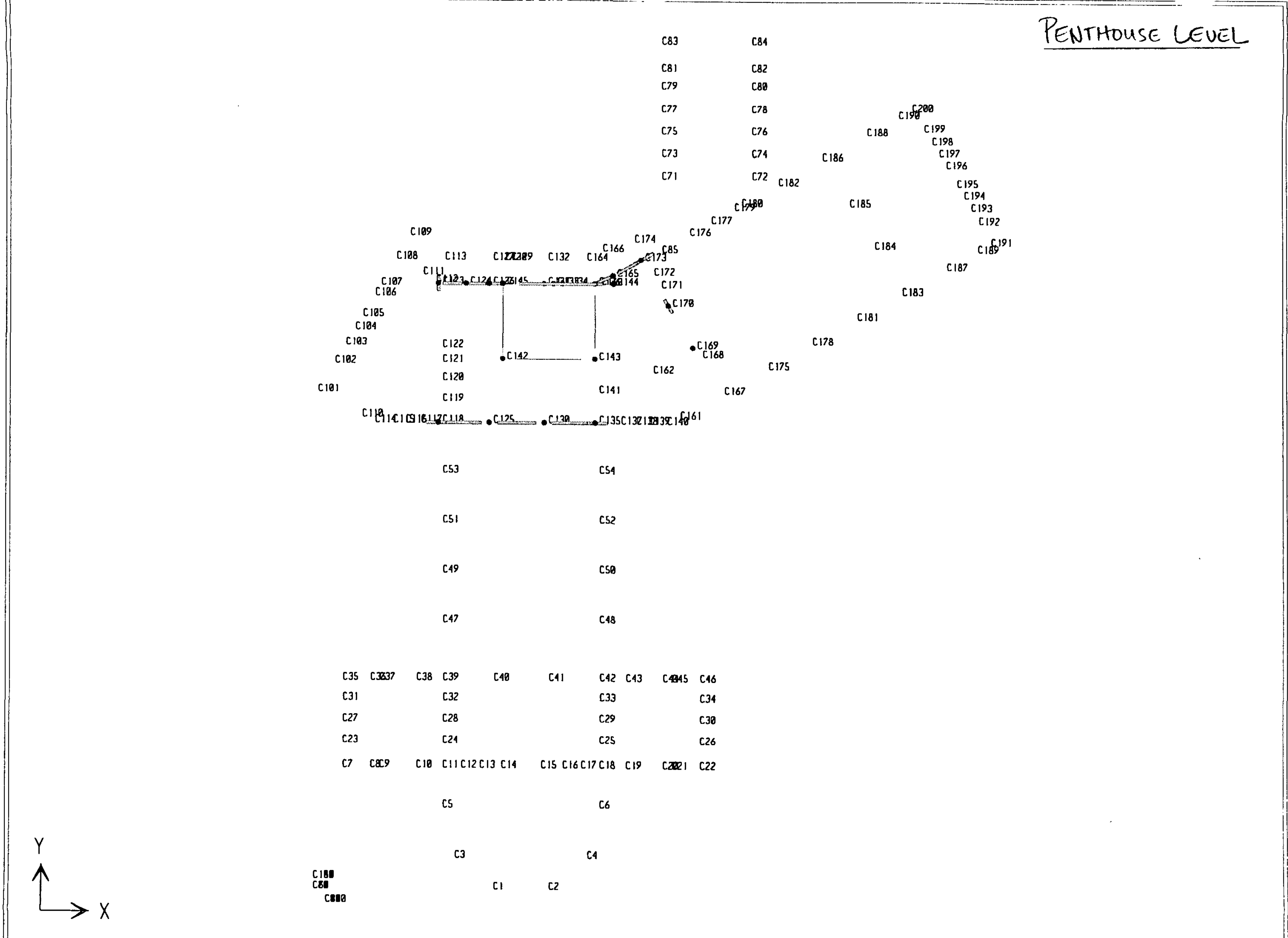
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# Structural Periods, Mass Participation Factors and Mode Shapes of the first 6 Modes (Existing Condition)

URS Greiner



PROGRAM:ETABS/FILE:\AHWAHN~1\E-AHW-A2.EIG

ETABS ANALYSIS OF AHWAHNEE HOTEL, YOSEMITE NATIONAL PARK

JOB NO. 43-F0066652-15 MODEL A = EXISTING CONDITION RUN ID = E-AHW-A2

STRUCTURAL TIME PERIODS AND FREQUENCIES

| MODE NUMBER | PERIOD (TIME) | FREQUENCY (CYCLES/UNIT TIME) | CIRCULAR/FREQ (RADIANS/UNIT TIME) |
|---|---|---|---|
| 1 | 0.45618 | 2.19213 | 13.77357 |
| 2 | 0.37114 | 2.69441 | 16.92945 |
| 3 | 0.31732 | 3.15144 | 19.80106 |
| 4 | 0.21992 | 4.54701 | 28.56973 |
| 5 | 0.21366 | 4.68043 | 29.40801 |
| 6 | 0.17792 | 5.62051 | 35.31468 |
| 7 | 0.15590 | 6.41450 | 40.30351 |
| 8 | 0.14396 | 6.94652 | 43.64630 |
| 9 | 0.11081 | 9.02424 | 56.70098 |
| 10 | 0.10545 | 9.48303 | 59.58362 |
| 11 | 0.09536 | 10.48634 | 65.88763 |
| 12 | 0.09301 | 10.75172 | 67.55505 |
| 13 | 0.08895 | 11.24262 | 70.63944 |
| 14 | 0.08049 | 12.42466 | 78.06641 |
| 15 | 0.07133 | 14.02007 | 88.09072 |
| 16 | 0.06678 | 14.97406 | 94.08481 |
| 17 | 0.06520 | 15.33645 | 96.36178 |
| 18 | 0.05988 | 16.69963 | 104.92689 |
| 19 | 0.05979 | 16.72402 | 105.08010 |
| 20 | 0.05468 | 18.28876 | 114.91169 |
| 21 | 0.05083 | 19.67502 | 123.62180 |
| 22 | 0.04841 | 20.65627 | 129.78718 |
| 23 | 0.04515 | 22.14649 | 139.15048 |
| 24 | 0.04027 | 24.83466 | 156.04076 |
| 25 | 0.03962 | 25.23851 | 158.57821 |
| 26 | 0.03706 | 26.98621 | 169.55934 |
| 27 | 0.03597 | 27.79980 | 174.67130 |
| 28 | 0.03489 | 28.66374 | 180.09956 |
| 29 | 0.03440 | 29.07112 | 182.65925 |
| 30 | 0.03189 | 31.36098 | 197.04683 |
| 31 | 0.03046 | 32.82765 | 206.26220 |
| 32 | 0.02937 | 34.05097 | 213.94854 |
| 33 | 0.02813 | 35.54615 | 223.34304 |
| 34 | 0.02753 | 36.32951 | 228.26503 |
| 35 | 0.02629 | 38.03858 | 239.00347 |
| 36 | 0.02587 | 38.65189 | 242.85696 |
| 37 | 0.02361 | 42.35483 | 266.12325 |
| 38 | 0.02281 | 43.83353 | 275.41422 |
| 39 | 0.02208 | 45.29168 | 284.57604 |
| 40 | 0.02101 | 47.59098 | 299.02296 |
| 41 | 0.01964 | 50.91334 | 319.89792 |
| 42 | 0.01937 | 51.62330 | 324.35875 |
| 43 | 0.01861 | 53.74548 | 337.69283 |
| 44 | 0.01859 | 53.80241 | 338.05051 |
| 45 | 0.01724 | 58.01563 | 364.52297 |

PROGRAM:ETABS/FILE:\AHWAHN~1\E-AHW-A2.EIG

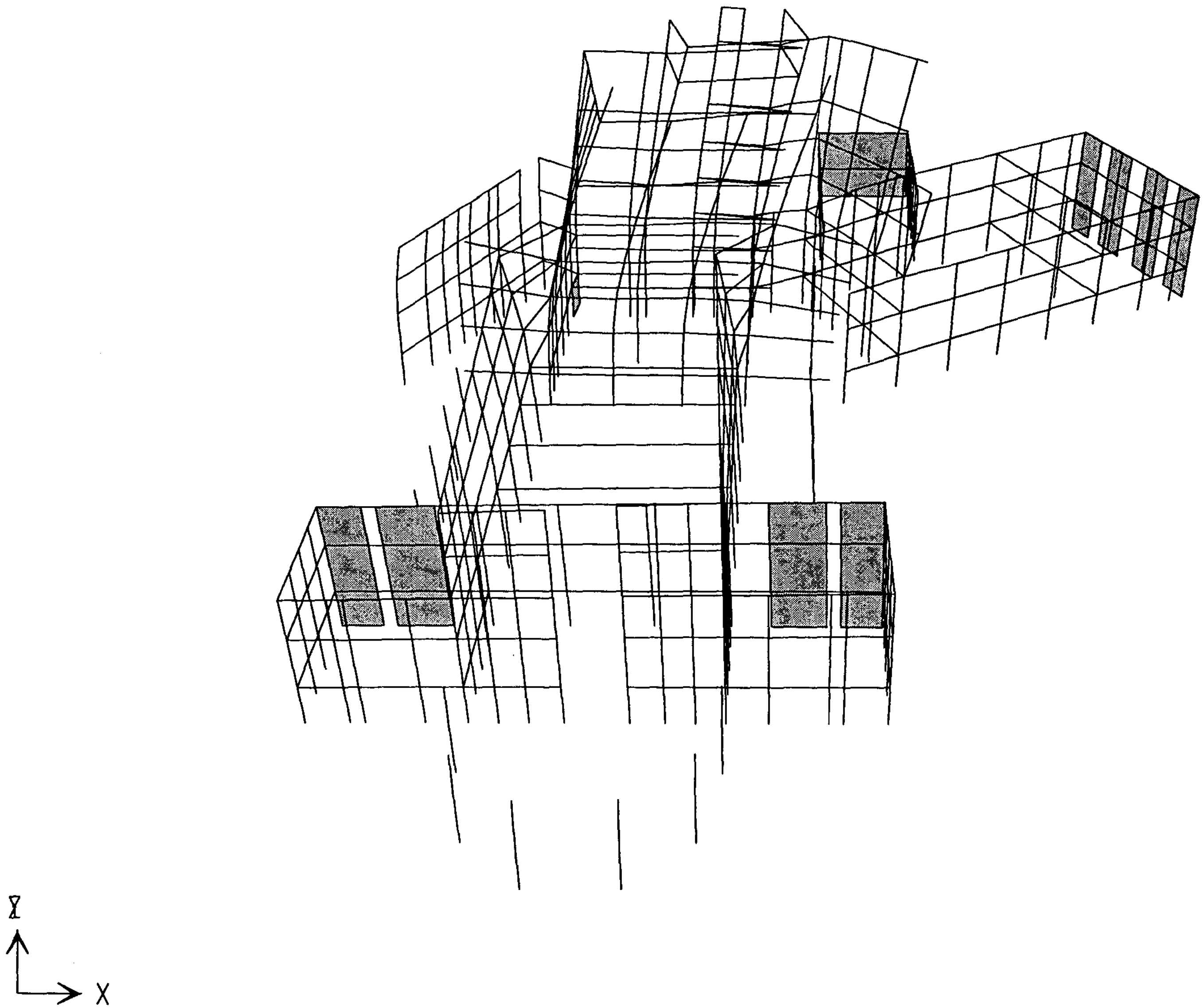
ETABS ANALYSIS OF AHWAHNEE HOTEL, YOSEMITE NATIONAL PARK
JOB NO. 43-F0066652-15 MODEL A = EXISTING CONDITION RUN ID = E-AHW-A2

EFFECTIVE MASS FACTORS

| MODE | /--X TRANSLATION--/ | | /--Y TRANSLATION--/ | | /----Z ROTATION----/ | |
|---|---|---|---|---|---|---|
| NUMBER | %-MASS | <%-SUM> | %-MASS | <%-SUM> | %-MASS | <%-SUM> |
| 1 | 16.80 | < 16.8> | 1.12 | < 1.1> | 3.45 | < 3.4> |
| 2 | 3.49 | < 20.3> | 53.41 | < 54.5> | 0.09 | < 3.5> |
| 3 | 25.91 | < 46.2> | 0.15 | < 54.7> | 0.49 | < 4.0> |
| 4 | 0.35 | < 46.6> | 19.32 | < 74.0> | 2.91 | < 6.9> |
| 5 | 0.81 | < 47.4> | 1.19 | < 75.2> | 58.58 | < 65.5> |
| 6 | 11.99 | < 59.4> | 0.05 | < 75.2> | 2.38 | < 67.9> |
| 7 | 1.60 | < 61.0> | 4.91 | < 80.2> | 0.00 | < 67.9> |
| 8 | 22.89 | < 83.8> | 0.15 | < 80.3> | 0.64 | < 68.5> |
| 9 | 0.05 | < 83.9> | 0.83 | < 81.1> | 3.12 | < 71.7> |
| 10 | 5.48 | < 89.4> | 0.29 | < 81.4> | 1.32 | < 73.0> |
| 11 | 0.50 | < 89.9> | 4.00 | < 85.4> | 0.59 | < 73.6> |
| 12 | 1.21 | < 91.1> | 0.17 | < 85.6> | 0.40 | < 74.0> |
| 13 | 0.02 | < 91.1> | 2.36 | < 88.0> | 0.43 | < 74.4> |
| 14 | 0.11 | < 91.2> | 0.00 | < 88.0> | 1.40 | < 75.8> |
| 15 | 0.32 | < 91.5> | 4.49 | < 92.4> | 0.01 | < 75.8> |
| 16 | 1.17 | < 92.7> | 0.01 | < 92.5> | 0.04 | < 75.9> |
| 17 | 0.01 | < 92.7> | 0.57 | < 93.0> | 0.19 | < 76.0> |
| 18 | 0.00 | < 92.7> | 0.08 | < 93.1> | 0.11 | < 76.2> |
| 19 | 0.55 | < 93.3> | 2.20 | < 95.3> | 0.15 | < 76.3> |
| 20 | 0.02 | < 93.3> | 0.33 | < 95.6> | 0.14 | < 76.5> |
| 21 | 0.50 | < 93.8> | 0.01 | < 95.6> | 1.91 | < 78.4> |
| 22 | 1.10 | < 94.9> | 0.35 | < 96.0> | 0.03 | < 78.4> |
| 23 | 0.07 | < 94.9> | 0.37 | < 96.4> | 0.24 | < 78.6> |
| 24 | 0.24 | < 95.2> | 0.11 | < 96.5> | 0.98 | < 79.6> |
| 25 | 0.01 | < 95.2> | 0.12 | < 96.6> | 0.18 | < 79.8> |
| 26 | 0.08 | < 95.3> | 0.08 | < 96.7> | 2.67 | < 82.5> |
| 27 | 0.14 | < 95.4> | 0.18 | < 96.9> | 0.00 | < 82.5> |
| 28 | 0.30 | < 95.7> | 0.40 | < 97.3> | 0.05 | < 82.5> |
| 29 | 0.74 | < 96.5> | 0.06 | < 97.3> | 2.16 | < 84.7> |
| 30 | 1.08 | < 97.5> | 0.66 | < 98.0> | 0.61 | < 85.3> |
| 31 | 0.41 | < 98.0> | 0.01 | < 98.0> | 0.91 | < 86.2> |
| 32 | 0.29 | < 98.2> | 0.45 | < 98.4> | 1.45 | < 87.6> |
| 33 | 0.00 | < 98.2> | 0.06 | < 98.5> | 0.38 | < 88.0> |
| 34 | 0.09 | < 98.3> | 0.28 | < 98.8> | 1.12 | < 89.1> |
| 35 | 0.00 | < 98.3> | 0.09 | < 98.9> | 0.37 | < 89.5> |
| 36 | 0.08 | < 98.4> | 0.79 | < 99.7> | 0.01 | < 89.5> |
| 37 | 0.01 | < 98.4> | 0.02 | < 99.7> | 0.17 | < 89.7> |
| 38 | 0.06 | < 98.5> | 0.13 | < 99.8> | 0.97 | < 90.6> |
| 39 | 0.00 | < 98.5> | 0.00 | < 99.8> | 0.85 | < 91.5> |
| 40 | 0.02 | < 98.5> | 0.08 | < 99.9> | 0.03 | < 91.5> |
| 41 | 0.01 | < 98.5> | 0.03 | < 99.9> | 0.00 | < 91.5> |
| 42 | 0.00 | < 98.5> | 0.00 | < 99.9> | 0.09 | < 91.6> |
| 43 | 0.00 | < 98.5> | 0.03 | < 99.9> | 0.26 | < 91.9> |
| 44 | 1.23 | < 99.7> | 0.00 | < 99.9> | 0.63 | < 92.5> |
| 45 | 0.01 | < 99.8> | 0.02 | <100.0> | 0.18 | < 92.7> |

ETAB.

Mode 1  Period 0.4562 seconds  October 13,2‌L  18:00

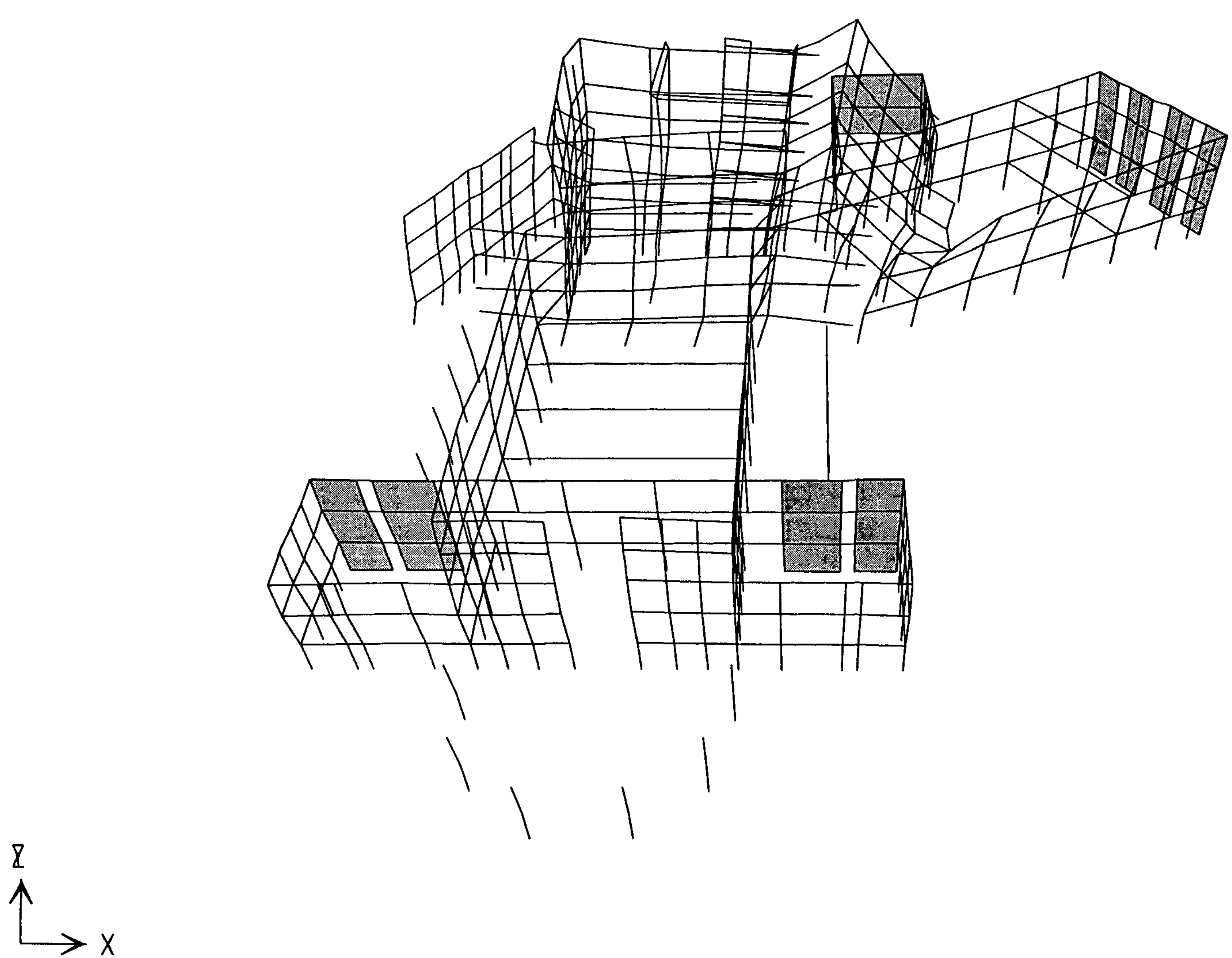



ETABS 6.20  File: E-AHW-A2.PST  Effective Mass:  Xtrans 16.8%  Ytrans 1.1%  Zrotn 3.4%

ETAB

Mode 2  Period 0.3711 seconds  October 13,2

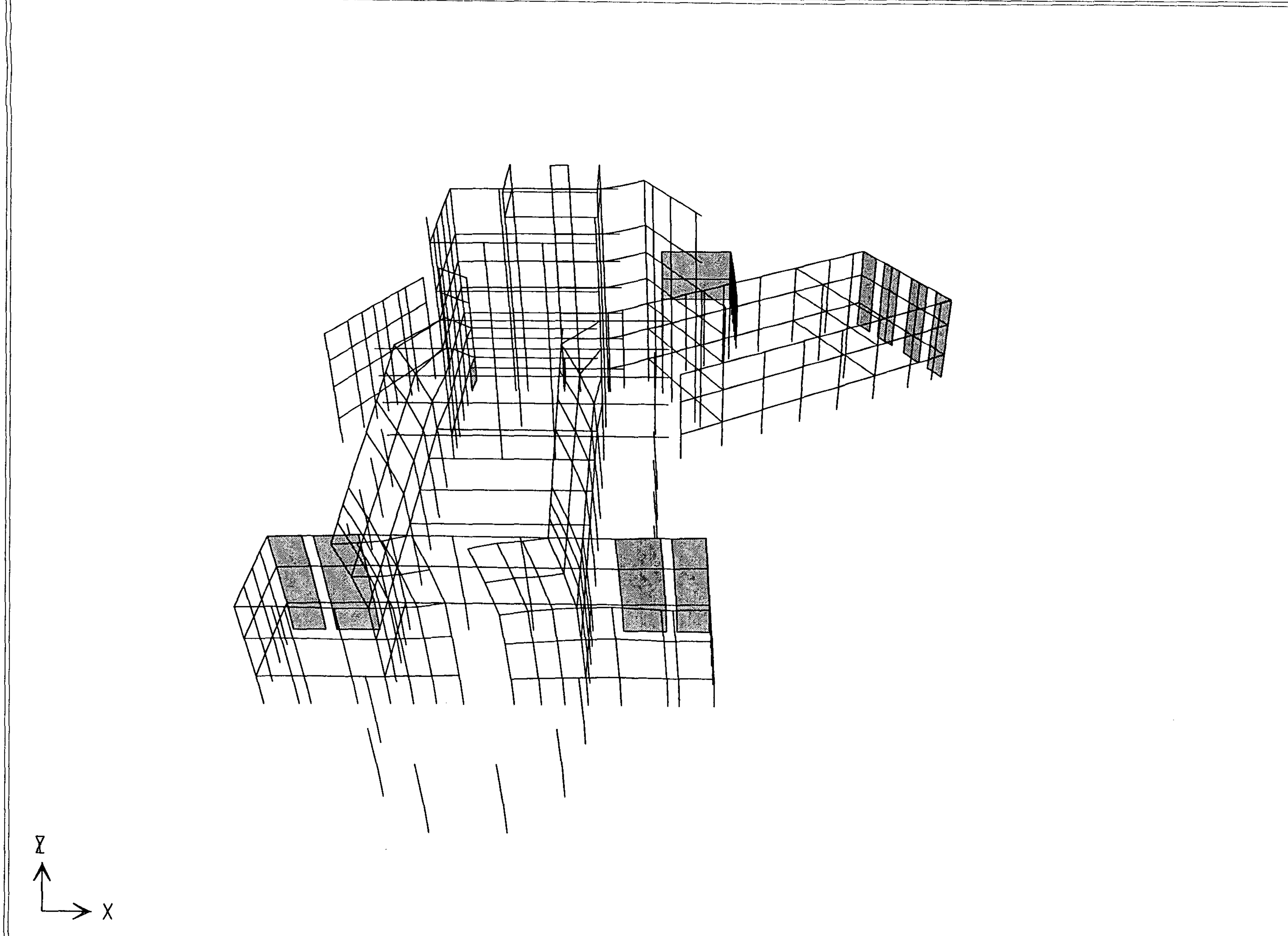
18:00




ETABS 6.20  File: E-AHW-A2.PST  Effective Mass:  Xtrans 3.5%  Ytrans 53.4%  Zrotn 0.1%

ETAE

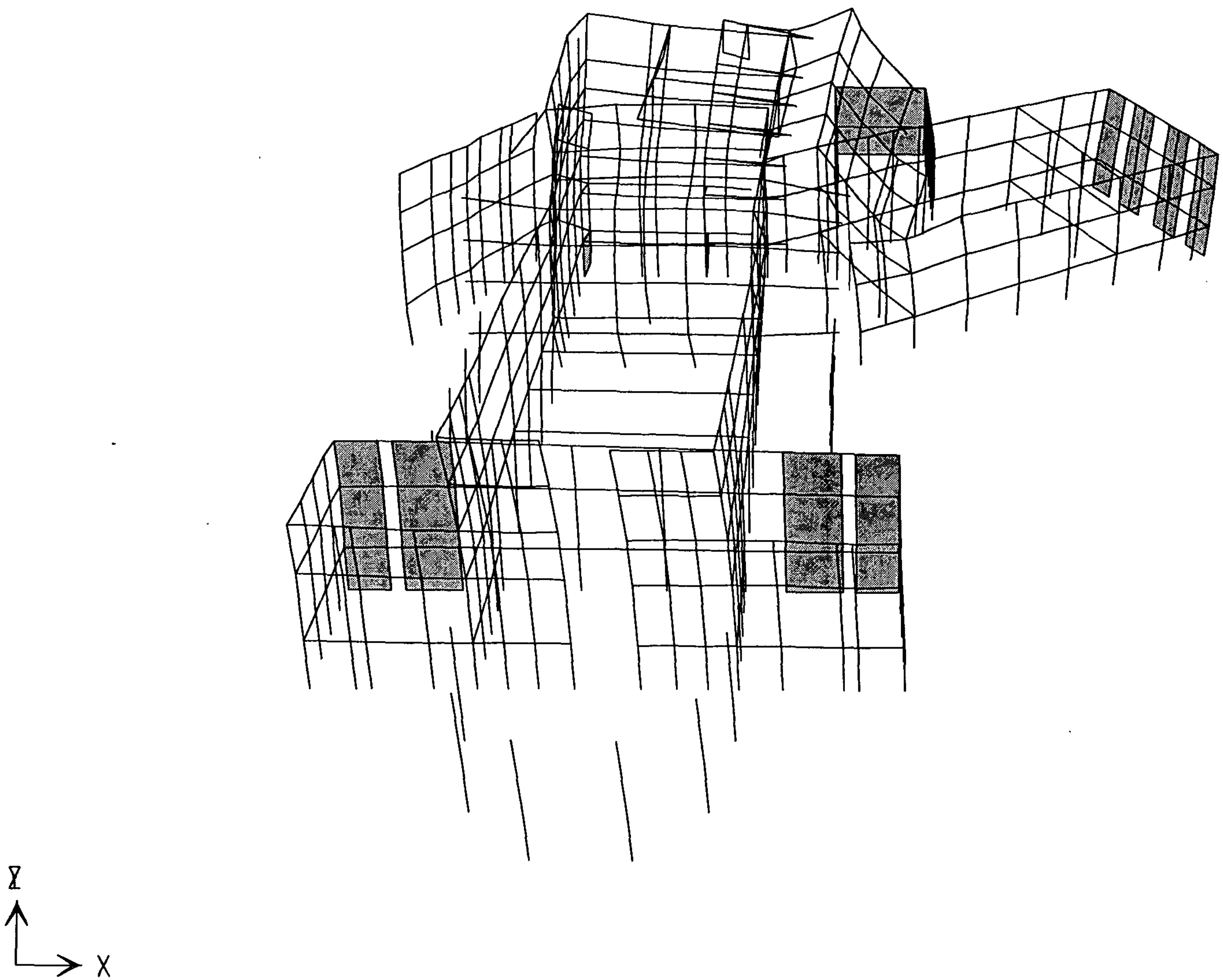
Mode 3 Period 0.3173 seconds October 13,2… 18:02




ETABS 6.20 File: E-AHW-A2.PST Effective Mass: Xtrans 25.9% Ytrans 0.1% Zrotn 0.5%

ETABS

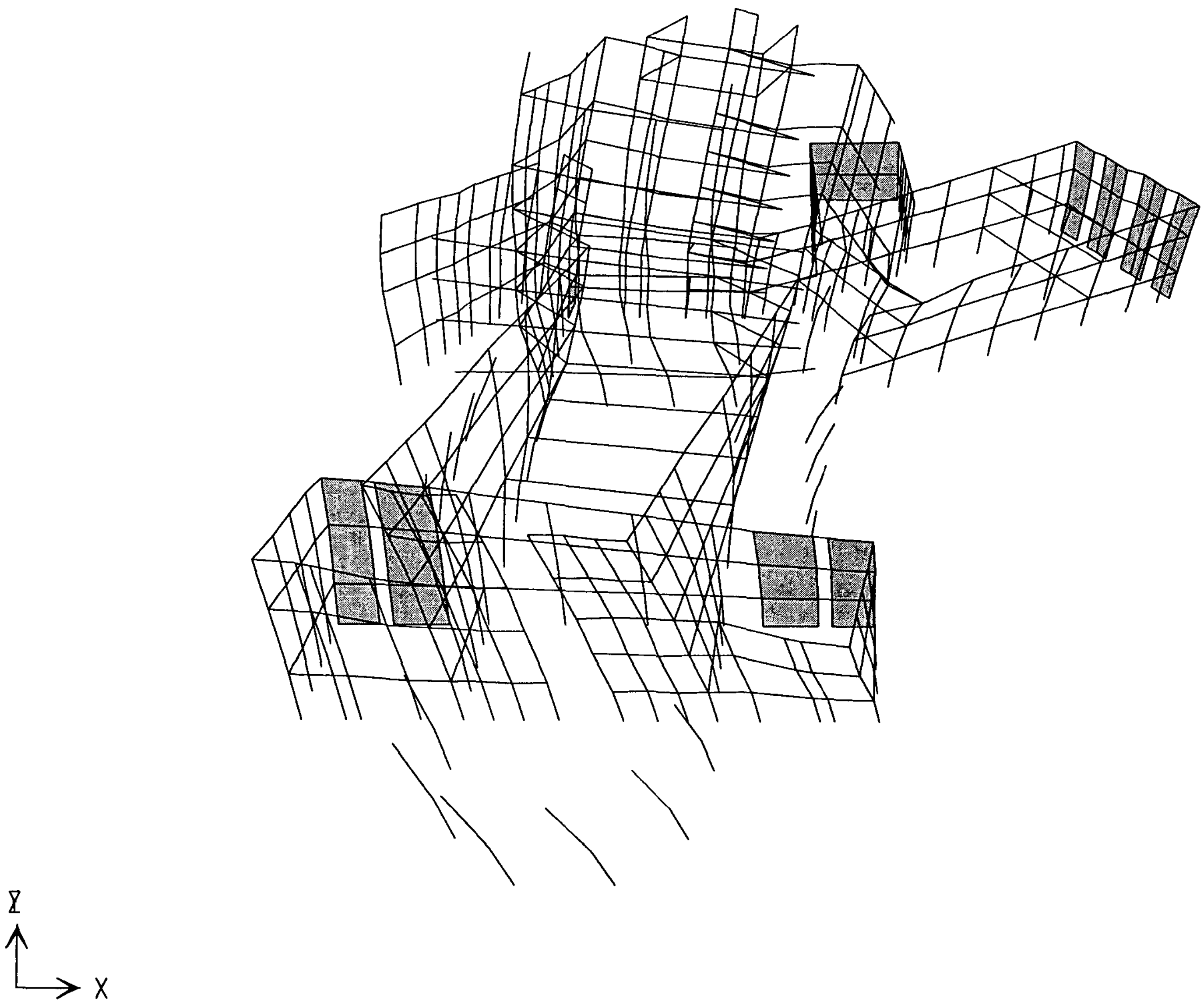
Mode 4 Period 0.2199 seconds October 13,20__ 18:02




ETABS 6.20 File: E-AHW-A2.PST Effective Mass: Xtrans 0.4% Ytrans 19.3% Zrotn 2.9%

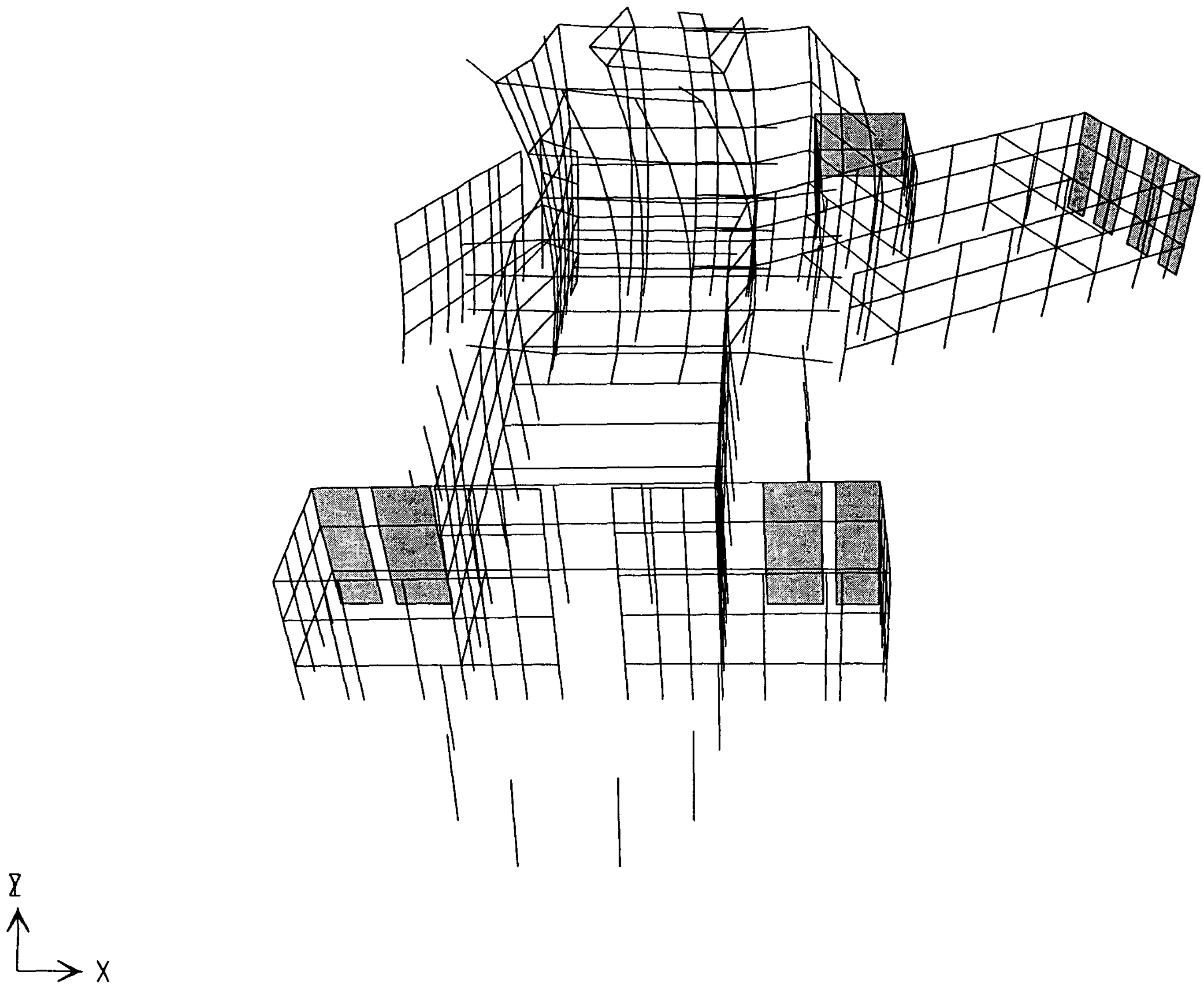
ETAB

Mode 5 Period 0.2137 seconds October 13,2ᴄ 18:03




ETABS 6.20 File: E-AHW-A2.PST Effective Mass: Xtrans 0.8% Ytrans 1.2% Zrotn 58.6%

E-37




ETABS 6.20 File: E-AHW-A2.PST Effective Mass: Xtrans 12.0% Ytrans 0.0% Zrotn 2.4%

**Summary of Wall or Pier Demand/ Capacity Ratios**
**(Existing Condition)**

**URS**

Job No.: 43-F0066652-15
Client.: National Park Service

Sheet No. ______
Job Name: Ahwahnee Hotel, Yosemite National Park
Subject: Structural Analysis for Seismic Rehabilitation

## Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| **South Wing:** | | | | | | | | | | | | | | | | | | | |
| 1 | S | 15 | | | | | | | | | | | | | | | | | |
| 2 | S | 14 | | | | | | | | | | | | | | | | | |
| 3 | R | 16 | | | | | | | | | | | | | | | | | |
| 4 | R | 13 | | | | | | | | | | | | | | | | | |
| 5 | Q | 16 | | | | | | | | | | | | | | | | | |
| 6 | Q | 13 | | | | | | | | | | | | | | | | | |
| 7 | P | 20 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 155 | 78 | 170 | 57 | 0.44 | 170 | 85 | 0.48 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 141 | 71 | 155 | 52 | 0.40 | 155 | 77 | 0.44 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 191 | 96 | 210 | 70 | 0.54 | 210 | 105 | 0.60 |
| 8 | P | 20-16 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 9 | P | 20-16 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 315 | 105 | 346 | 86 | 0.60 | 346 | 138 | 0.79 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 83 | 28 | 91 | 23 | 0.16 | 91 | 36 | 0.21 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 78 | 26 | 86 | 21 | 0.15 | 86 | 34 | 0.20 |
| 10 | P | 20-16 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 283 | 94 | 311 | 78 | 0.54 | 311 | 124 | 0.71 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 75 | 25 | 82 | 21 | 0.14 | 82 | 33 | 0.19 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 71 | 24 | 78 | 19 | 0.13 | 78 | 31 | 0.18 |
| 11 | P | 16 | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 124 | 62 | 136 | 45 | 0.35 | 136 | 68 | 0.39 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 243 | 122 | 267 | 89 | 0.69 | 267 | 133 | 0.76 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 256 | 128 | 281 | 94 | 0.73 | 281 | 141 | 0.80 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 574 | 287 | 630 | 210 | 1.63 | 630 | 315 | 1.79 |
| | | | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 176 | 657 | 329 | 721 | 240 | 1.87 | 721 | 361 | 2.05 |
| 12 | P | 16-13 | | | | | | | | | | | | | | | | | |
| 13 | P | 16-13 | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 282 | 141 | 310 | 103 | 0.80 | 310 | 155 | 0.88 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 396 | 198 | 435 | 145 | 1.13 | 435 | 217 | 1.24 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 141 | 71 | 155 | 52 | 0.40 | 155 | 77 | 0.44 |
| 14 | P | 16-13 | 4th-5th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 165 | 83 | 181 | 60 | 0.47 | 181 | 91 | 0.52 |
| | | | 3rd-4th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 165 | 83 | 181 | 60 | 0.47 | 181 | 91 | 0.52 |
| | | | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 95 | 32 | 104 | 26 | 0.18 | 104 | 42 | 0.24 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 33 | 11 | 36 | 9 | 0.06 | 36 | 14 | 0.08 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 33 | 11 | 36 | 9 | 0.06 | 36 | 14 | 0.08 |
| 15 | P | 16-13 | 4th-5th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 190 | 95 | 209 | 70 | 0.54 | 209 | 104 | 0.59 |
| | | | 3rd-4th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 219 | 110 | 240 | 80 | 0.62 | 240 | 120 | 0.68 |
| | | | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 67 | 22 | 74 | 18 | 0.13 | 74 | 29 | 0.17 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 38 | 13 | 42 | 10 | 0.07 | 42 | 17 | 0.10 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 29 | 10 | 32 | 8 | 0.06 | 32 | 13 | 0.07 |
| 16 | P | 16-13 | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 404 | 202 | 443 | 148 | 1.15 | 443 | 222 | 1.26 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 552 | 276 | 606 | 202 | 1.57 | 606 | 303 | 1.73 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 158 | 79 | 173 | 58 | 0.45 | 173 | 87 | 0.49 |

**URS**

Job No.: 43-F0066652-15
Client.: National Park Service

Sheet No. ____

Job Name: Ahwahnee Hotel, Yosemite National Park
Subject: Structural Analysis for Seismic Rehabilitation

## Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| 17 | P | 16-13 | | | | | | | | | | | | | | | | | |
| 18 | P | 13 | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 248 | 124 | 272 | 91 | 0.71 | 272 | 136 | 0.78 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 602 | 301 | 661 | 220 | 1.71 | 661 | 330 | 1.88 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 358 | 179 | 393 | 131 | 1.02 | 393 | 196 | 1.12 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 210 | 105 | 231 | 77 | 0.60 | 231 | 115 | 0.66 |
| | | | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 176 | 266 | 133 | 292 | 97 | 0.76 | 292 | 146 | 0.83 |
| 19 | P | 13-8 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 299 | 100 | 328 | 82 | 0.57 | 328 | 131 | 0.75 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 65 | 22 | 71 | 18 | 0.12 | 71 | 29 | 0.16 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 81 | 27 | 89 | 22 | 0.15 | 89 | 36 | 0.20 |
| 20 | P | 13-8 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 367 | 122 | 403 | 101 | 0.70 | 403 | 161 | 0.92 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 86 | 29 | 94 | 24 | 0.16 | 94 | 38 | 0.22 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 81 | 27 | 89 | 22 | 0.15 | 89 | 36 | 0.20 |
| 21 | P | 13-8 | | | | | | | | | | | | | | | | | |
| 22 | P | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 160 | 80 | 176 | 59 | 0.46 | 176 | 88 | 0.50 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 139 | 70 | 153 | 51 | 0.40 | 153 | 76 | 0.43 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 190 | 95 | 209 | 70 | 0.54 | 209 | 104 | 0.59 |
| 23 | P+8 | 20 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 156 | 78 | 171 | 57 | 0.44 | 171 | 86 | 0.49 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 635 | 318 | 697 | 232 | 1.81 | 697 | 349 | 1.99 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 611 | 306 | 671 | 224 | 1.74 | 671 | 335 | 1.91 |
| 24 | P+8 | 16 | Mezz-2nd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 243 | 81 | 267 | 67 | 0.46 | 267 | 107 | 0.61 |
| | | | 1st-Mezz | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 257 | 86 | 282 | 71 | 0.49 | 282 | 113 | 0.64 |
| 25 | P+8 | 13 | Mezz-2nd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 261 | 87 | 287 | 72 | 0.50 | 287 | 115 | 0.65 |
| | | | 1st-Mezz | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 236 | 79 | 259 | 65 | 0.45 | 259 | 104 | 0.59 |
| 26 | P+8 | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 239 | 120 | 262 | 87 | 0.68 | 262 | 131 | 0.75 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 852 | 426 | 935 | 312 | 2.43 | 935 | 468 | 2.66 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 865 | 433 | 950 | 317 | 2.46 | 950 | 475 | 2.70 |
| 27 | P+15 | 20 | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 176 | 365 | 183 | 401 | 134 | 1.04 | 401 | 200 | 1.14 |
| 28 | P+15 | 16 | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 291 | 146 | 319 | 106 | 0.83 | 319 | 160 | 0.91 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 297 | 149 | 326 | 109 | 0.85 | 326 | 163 | 0.93 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 422 | 211 | 463 | 154 | 1.20 | 463 | 232 | 1.32 |
| 29 | P+15 | 13 | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 454 | 227 | 498 | 166 | 1.29 | 498 | 249 | 1.42 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 451 | 226 | 495 | 165 | 1.28 | 495 | 248 | 1.41 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 437 | 219 | 480 | 160 | 1.24 | 480 | 240 | 1.37 |
| 30 | P+15 | 8 | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 176 | 365 | 183 | 401 | 134 | 1.04 | 401 | 200 | 1.14 |
| 31 | P+22 | 20 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 186 | 93 | 204 | 68 | 0.53 | 204 | 102 | 0.58 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 673 | 337 | 739 | 246 | 1.92 | 739 | 369 | 2.10 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 643 | 322 | 706 | 235 | 1.83 | 706 | 353 | 2.01 |
| 32 | P+22 | 16 | 4th-5th | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 276 | 92 | 303 | 76 | 0.52 | 303 | 121 | 0.69 |
| | | | 3rd-4th | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 326 | 109 | 358 | 89 | 0.62 | 358 | 143 | 0.82 |
| | | | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 301 | 100 | 330 | 83 | 0.57 | 330 | 132 | 0.75 |

**URS**

| | | | |
|---|---|---|---|
| Job No.: | 43-F0066652-15 | | Sheet No. ________ |
| Client.: | National Park Service | Job Name: | Ahwahnee Hotel, Yosemite National Park |
| | | Subject: | Structural Analysis for Seismic Rehabilitation |

**Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 280 | 93 | 307 | 77 | 0.53 | 307 | 123 | 0.70 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 237 | 79 | 260 | 65 | 0.45 | 260 | 104 | 0.59 |
| 33 | P+22 | 13 | 4th-5th | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 394 | 131 | 433 | 108 | 0.75 | 433 | 173 | 0.99 |
| | | | 3rd-4th | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 325 | 108 | 357 | 89 | 0.62 | 357 | 143 | 0.81 |
| | | | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 242 | 81 | 266 | 66 | 0.46 | 266 | 106 | 0.61 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 245 | 82 | 269 | 67 | 0.47 | 269 | 108 | 0.61 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 221 | 74 | 243 | 61 | 0.42 | 243 | 97 | 0.55 |
| 34 | P+22 | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 261 | 131 | 287 | 96 | 0.74 | 287 | 143 | 0.82 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 901 | 451 | 989 | 330 | 2.57 | 989 | 495 | 2.82 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 906 | 453 | 995 | 332 | 2.58 | 995 | 497 | 2.83 |
| 35 | N | 18 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 248 | 124 | 272 | 91 | 0.71 | 272 | 136 | 0.78 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 275 | 138 | 302 | 101 | 0.78 | 302 | 151 | 0.86 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 306 | 153 | 336 | 112 | 0.87 | 336 | 168 | 0.96 |
| 36 | N | 17-15 | | | | | | | | | | | | | | | | | |
| 37 | N | 17-15 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 91 | 30 | 100 | 25 | 0.17 | 100 | 40 | 0.23 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 70 | 23 | 77 | 19 | 0.13 | 77 | 31 | 0.18 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 85 | 28 | 93 | 23 | 0.16 | 93 | 37 | 0.21 |
| 38 | N | 17-15 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 95 | 32 | 104 | 26 | 0.18 | 104 | 42 | 0.24 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 68 | 23 | 75 | 19 | 0.13 | 75 | 30 | 0.17 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 80 | 27 | 88 | 22 | 0.15 | 88 | 35 | 0.20 |
| 39 | N | 16 | 4th-5th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 203 | 102 | 223 | 74 | 0.58 | 223 | 111 | 0.63 |
| | | | 3rd-4th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 281 | 141 | 308 | 103 | 0.80 | 308 | 154 | 0.88 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 372 | 186 | 408 | 136 | 1.06 | 408 | 204 | 1.16 |
| 40 | N | 15-12 | | | | | | | | | | | | | | | | | |
| 41 | N | 15-12 | | | | | | | | | | | | | | | | | |
| 42 | N | 13 | 4th-5th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 201 | 101 | 221 | 74 | 0.57 | 221 | 110 | 0.63 |
| | | | 3rd-4th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 270 | 135 | 296 | 99 | 0.77 | 296 | 148 | 0.84 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 458 | 229 | 503 | 168 | 1.30 | 503 | 251 | 1.43 |
| 43 | N | 12-9 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 93 | 31 | 102 | 26 | 0.18 | 102 | 41 | 0.23 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 69 | 23 | 76 | 19 | 0.13 | 76 | 30 | 0.17 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 81 | 27 | 89 | 22 | 0.15 | 89 | 36 | 0.20 |
| 44 | N | 12-9 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 89 | 30 | 98 | 24 | 0.17 | 98 | 39 | 0.22 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 70 | 23 | 77 | 19 | 0.13 | 77 | 31 | 0.18 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 86 | 29 | 94 | 24 | 0.16 | 94 | 38 | 0.22 |
| 45 | N | 12-9 | | | | | | | | | | | | | | | | | |
| 46 | N | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 240 | 120 | 263 | 88 | 0.68 | 263 | 132 | 0.75 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 286 | 143 | 314 | 105 | 0.81 | 314 | 157 | 0.89 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 315 | 158 | 346 | 115 | 0.90 | 346 | 173 | 0.98 |
| 47 | M | 16 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 218 | 109 | 239 | 80 | 0.62 | 239 | 120 | 0.68 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 275 | 138 | 302 | 101 | 0.78 | 302 | 151 | 0.86 |

URS

Job No.: 43-F0066652-15
Client.: National Park Service

Sheet No. ______

Job Name: Ahwahnee Hotel, Yosemite National Park
Subject: Structural Analysis for Seismic Rehabilitation

## Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | CP | LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 416 | 208 | 457 | 152 | 1.18 | 457 | 228 | 1.30 |
| 48 | M | 13 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 258 | 129 | 283 | 94 | 0.73 | 283 | 142 | 0.81 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 481 | 241 | 528 | 176 | 1.37 | 528 | 264 | 1.50 |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 468 | 234 | 514 | 171 | 1.33 | 514 | 257 | 1.46 |
| 49 | L | 16 | 4th-5th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 209 | 105 | 229 | 76 | 0.60 | 229 | 115 | 0.65 |
| | | | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 305 | 153 | 335 | 112 | 0.87 | 335 | 167 | 0.95 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 428 | 214 | 470 | 157 | 1.22 | 470 | 235 | 1.34 |
| 50 | L | 13 | 4th-5th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 269 | 135 | 295 | 98 | 0.77 | 295 | 148 | 0.84 |
| | | | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 529 | 265 | 581 | 194 | 1.51 | 581 | 290 | 1.65 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 438 | 219 | 481 | 160 | 1.25 | 481 | 240 | 1.37 |
| 51 | K | 16 | 4th-5th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 217 | 109 | 238 | 79 | 0.62 | 238 | 119 | 0.68 |
| | | | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 315 | 158 | 346 | 115 | 0.90 | 346 | 173 | 0.98 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 461 | 231 | 506 | 169 | 1.31 | 506 | 253 | 1.44 |
| 52 | K | 13 | 4th-5th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 258 | 129 | 283 | 94 | 0.73 | 283 | 142 | 0.81 |
| | | | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 514 | 257 | 564 | 188 | 1.46 | 564 | 282 | 1.61 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 435 | 218 | 478 | 159 | 1.24 | 478 | 239 | 1.36 |
| 53 | J | 16 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 252 | 126 | 277 | 92 | 0.72 | 277 | 138 | 0.79 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 332 | 166 | 364 | 121 | 0.95 | 364 | 182 | 1.04 |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 526 | 263 | 577 | 192 | 1.50 | 577 | 289 | 1.64 |
| 54 | J | 13 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 254 | 127 | 279 | 93 | 0.72 | 279 | 139 | 0.79 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 418 | 209 | 459 | 153 | 1.19 | 459 | 229 | 1.31 |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 377 | 189 | 414 | 138 | 1.07 | 414 | 207 | 1.18 |
| 55 | M | 18 | | | | | | | | | | | | | | | | | |
| 56 | M | 11 | | | | | | | | | | | | | | | | | |
| 57 | L | 18 | | | | | | | | | | | | | | | | | |
| 58 | L | 11 | | | | | | | | | | | | | | | | | |
| 59 | K | 18 | | | | | | | | | | | | | | | | | |
| 60 | K | 11 | | | | | | | | | | | | | | | | | |
| 61 | J | 18 | | | | | | | | | | | | | | | | | |
| 62 | J | 11 | | | | | | | | | | | | | | | | | |
| W1 | N | 20-18 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 374 | 187 | 411 | 137 | 1.07 | 411 | 205 | 1.17 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 396 | 198 | 435 | 145 | 1.13 | 435 | 217 | 1.24 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 408 | 204 | 448 | 149 | 1.16 | 448 | 224 | 1.28 |
| W2 | N | 18-17 | 2nd-3rd | 10.5 | 12 | 0.88 | Shear | 2 | 3 | 2 | 176 | 582 | 291 | 639 | 213 | 1.66 | 639 | 319 | 1.82 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 552 | 276 | 606 | 202 | 1.57 | 606 | 303 | 1.73 |
| | | | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 176 | 501 | 251 | 550 | 183 | 1.43 | 550 | 275 | 1.57 |
| W3 | N | 12-11 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 688 | 344 | 755 | 252 | 1.96 | 755 | 378 | 2.15 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 612 | 306 | 672 | 224 | 1.74 | 672 | 336 | 1.91 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 517 | 259 | 568 | 189 | 1.47 | 568 | 284 | 1.62 |
| W4 | N | 11-8 | 2nd-3rd | 10.5 | 12 | 0.88 | Shear | 2 | 3 | 2 | 176 | 395 | 198 | 434 | 145 | 1.13 | 434 | 217 | 1.24 |

**Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 414 | 207 | 454 | 151 | 1.18 | 454 | 227 | 1.29 |
| | | | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 176 | 421 | 211 | 462 | 154 | 1.20 | 462 | 231 | 1.32 |
| **Gift Shop Wing:** | | | | | | | | | | | | | | | | | | | |
| 71 | HH | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 677 | 226 | 743 | 186 | 1.29 | 743 | 297 | 1.69 |
| | | | 1st-Mezz | 15 | 3 | 5.00 | Flexure | 3 | 4 | 2.5 | 176 | 192 | 64 | 211 | 53 | 0.36 | 211 | 84 | 0.48 |
| 72 | HH | 40 | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 257 | 129 | 282 | 94 | 0.73 | 282 | 141 | 0.80 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 235 | 118 | 258 | 86 | 0.67 | 258 | 129 | 0.73 |
| 73 | HH/JJ | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 203 | 68 | 223 | 56 | 0.39 | 223 | 89 | 0.51 |
| 74 | HH/JJ | 40 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 142 | 47 | 156 | 39 | 0.27 | 156 | 62 | 0.36 |
| 75 | JJ | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 189 | 63 | 207 | 52 | 0.36 | 207 | 83 | 0.47 |
| | | | 1st-Mezz | 15 | 11 | 1.36 | Shear | 2 | 3 | 2 | 176 | 462 | 231 | 507 | 169 | 1.32 | 507 | 254 | 1.44 |
| 76 | JJ | 40 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 148 | 49 | 162 | 41 | 0.28 | 162 | 65 | 0.37 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 176 | 279 | 93 | 306 | 77 | 0.53 | 306 | 123 | 0.70 |
| 77 | JJ/KK | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 227 | 76 | 249 | 62 | 0.43 | 249 | 100 | 0.57 |
| 78 | JJ/KK | 40 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 143 | 48 | 157 | 39 | 0.27 | 157 | 63 | 0.36 |
| 79 | KK | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 233 | 78 | 256 | 64 | 0.44 | 256 | 102 | 0.58 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 342 | 171 | 375 | 125 | 0.97 | 375 | 188 | 1.07 |
| 80 | KK | 40 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 136 | 45 | 149 | 37 | 0.26 | 149 | 60 | 0.34 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 391 | 196 | 429 | 143 | 1.11 | 429 | 215 | 1.22 |
| 81 | KK/LL | 39 | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 176 | 285 | 143 | 313 | 104 | 0.81 | 313 | 156 | 0.89 |
| 82 | KK/LL | 40 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 181 | 60 | 199 | 50 | 0.34 | 199 | 79 | 0.45 |
| 83 | LL | 39 | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 176 | 232 | 116 | 255 | 85 | 0.66 | 255 | 127 | 0.73 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 176 | 236 | 118 | 259 | 86 | 0.67 | 259 | 130 | 0.74 |
| 84 | LL | 40 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 131 | 44 | 144 | 36 | 0.25 | 144 | 58 | 0.33 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 176 | 194 | 65 | 213 | 53 | 0.37 | 213 | 85 | 0.49 |
| 85 | A | 10 | | | | | | | | | | | | | | | | | |
| W5 | LL | 39-40 | Mezz-2nd | 13 | 29 | 0.45 | Shear | 2 | 3 | 2 | 176 | 84 | 42 | 92 | 31 | 0.24 | 92 | 46 | 0.26 |
| | | | 1st-Mezz | 15 | 29 | 0.52 | Shear | 2 | 3 | 2 | 176 | 113 | 57 | 124 | 41 | 0.32 | 124 | 62 | 0.35 |
| **Dining Wing:** | | | | | | | | | | | | | | | | | | | |
| 101 | T | 22 | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 164 | 82 | 180 | 60 | 0.47 | 180 | 90 | 0.51 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 187 | 94 | 205 | 68 | 0.53 | 205 | 103 | 0.58 |
| | | | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 288 | 96 | 316 | 79 | 0.55 | 316 | 126 | 0.72 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 176 | 174 | 58 | 191 | 48 | 0.33 | 191 | 76 | 0.44 |
| 102 | T-Y | 22 | | | | | | | | | | | | | | | | | |

**URS**

| | | | |
|---|---|---|---|
| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park |
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation |

Sheet No. ________

**Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| 103 | T-Y | 22 | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 283 | 142 | 311 | 104 | 0.81 | 311 | 155 | 0.88 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 251 | 126 | 276 | 92 | 0.71 | 276 | 138 | 0.78 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 454 | 227 | 498 | 166 | 1.29 | 498 | 249 | 1.42 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 176 | 276 | 138 | 303 | 101 | 0.79 | 303 | 151 | 0.86 |
| 104 | T-Y | 22 | | | | | | | | | | | | | | | | | |
| 105 | T-Y | 22 | | | | | | | | | | | | | | | | | |
| 106 | T-Y | 22 | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 276 | 138 | 303 | 101 | 0.79 | 303 | 151 | 0.86 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 210 | 105 | 231 | 77 | 0.60 | 231 | 115 | 0.66 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 437 | 219 | 480 | 160 | 1.24 | 480 | 240 | 1.37 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 176 | 262 | 131 | 288 | 96 | 0.75 | 288 | 144 | 0.82 |
| 107 | T-Y | 22 | | | | | | | | | | | | | | | | | |
| 108 | Y | 22 | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 179 | 90 | 196 | 65 | 0.51 | 196 | 98 | 0.56 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 259 | 130 | 284 | 95 | 0.74 | 284 | 142 | 0.81 |
| | | | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 347 | 116 | 381 | 95 | 0.66 | 381 | 152 | 0.87 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 176 | 380 | 127 | 417 | 104 | 0.72 | 417 | 167 | 0.95 |
| 109 | Y+9' | 22 | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 152 | 76 | 167 | 56 | 0.43 | 167 | 83 | 0.48 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 345 | 173 | 379 | 126 | 0.98 | 379 | 189 | 1.08 |
| 110 | T | 21 | | | | | | | | | | | | | | | | | |
| 111 | Y | 21-22 | | | | | | | | | | | | | | | | | |
| 112 | Y | 21-22 | | | | | | | | | | | | | | | | | |
| 113 | Y+9' | 21-22 | 3rd-4th | 10.5 | 3.5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 121 | 61 | 133 | 44 | 0.34 | 133 | 66 | 0.38 |
| | | | 2nd-3rd | 10.5 | 3.5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 209 | 105 | 229 | 76 | 0.60 | 229 | 115 | 0.65 |
| Central Core: | | | | | | | | | | | | | | | | | | | |
| 114 | H | 18-16 | | | | | | | | | | | | | | | | | |
| 115 | H | 18-16 | | | | | | | | | | | | | | | | | |
| 116 | H | 18-16 | | | | | | | | | | | | | | | | | |
| 117 | H | 18-16 | | | | | | | | | | | | | | | | | |
| 118 | H | 16 | PH-Roof | 8.75 | 8 | 1.09 | Shear | 2 | 3 | 2 | 176 | 113 | 57 | 124 | 41 | 0.32 | 124 | 62 | 0.35 |
| | | | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 129 | 65 | 142 | 47 | 0.37 | 142 | 71 | 0.40 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 124 | 62 | 136 | 45 | 0.35 | 136 | 68 | 0.39 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 267 | 134 | 293 | 98 | 0.76 | 293 | 147 | 0.83 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 374 | 187 | 411 | 137 | 1.07 | 411 | 205 | 1.17 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 311 | 156 | 341 | 114 | 0.89 | 341 | 171 | 0.97 |
| 119 | H/G | 16 | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 306 | 153 | 336 | 112 | 0.87 | 336 | 168 | 0.96 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 379 | 190 | 416 | 139 | 1.08 | 416 | 208 | 1.19 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 274 | 137 | 301 | 100 | 0.78 | 301 | 150 | 0.86 |
| 120 | H/G | 16 | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 323 | 162 | 355 | 118 | 0.92 | 355 | 177 | 1.01 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 389 | 195 | 427 | 142 | 1.11 | 427 | 214 | 1.22 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 236 | 118 | 259 | 86 | 0.67 | 259 | 130 | 0.74 |
| 121 | H/G | 16 | | | | | | | | | | | | | | | | | |

**URS**



## Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| 122 | G | 16 | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 386 | 193 | 424 | 141 | 1.10 | 424 | 212 | 1.21 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 502 | 251 | 551 | 184 | 1.43 | 551 | 276 | 1.57 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 314 | 157 | 345 | 115 | 0.89 | 345 | 172 | 0.98 |
| 123 | E | 16 | 6th-PH | 17 | 5 | 3.40 | Flexure | 3 | 4 | 2.5 | 176 | 144 | 48 | 158 | 40 | 0.27 | 158 | 63 | 0.36 |
| | | | 5th-6th | 10.63 | 10 | 1.06 | Shear | 2 | 3 | 2 | 176 | 148 | 74 | 162 | 54 | 0.42 | 162 | 81 | 0.46 |
| | | | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 279 | 140 | 306 | 102 | 0.79 | 306 | 153 | 0.87 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 245 | 123 | 269 | 90 | 0.70 | 269 | 134 | 0.77 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 214 | 107 | 235 | 78 | 0.61 | 235 | 117 | 0.67 |
| | | | Mezz-2nd | 13 | 13 | 1.00 | Shear | 2 | 3 | 2 | 176 | 164 | 82 | 180 | 60 | 0.47 | 180 | 90 | 0.51 |
| | | | 1st-Mezz | 15 | 7 | 2.14 | Shear | 2 | 3 | 2 | 176 | 691 | 346 | 759 | 253 | 1.97 | 759 | 379 | 2.16 |
| 124 | E | 16-15 | | | | | | | | | | | | | | | | | |
| 125 | H | 15 | 6th-PH | 17 | 3.5 | 4.86 | Flexure | 3 | 4 | 2.5 | 176 | 302 | 101 | 332 | 83 | 0.57 | 332 | 133 | 0.76 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 374 | 187 | 411 | 137 | 1.07 | 411 | 205 | 1.17 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 304 | 152 | 334 | 111 | 0.87 | 334 | 167 | 0.95 |
| 126 | E | 15 | 6th-PH | 17 | 10 | 1.70 | Shear | 2 | 3 | 2 | 176 | 164 | 82 | 180 | 60 | 0.47 | 180 | 90 | 0.51 |
| | | | 5th-6th | 10.63 | 6 | 1.77 | Shear | 2 | 3 | 2 | 176 | 277 | 139 | 304 | 101 | 0.79 | 304 | 152 | 0.87 |
| | | | 4th-5th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 540 | 270 | 593 | 198 | 1.54 | 593 | 296 | 1.69 |
| | | | 3rd-4th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 462 | 231 | 507 | 169 | 1.32 | 507 | 254 | 1.44 |
| | | | 2nd-3rd | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 294 | 147 | 323 | 108 | 0.84 | 323 | 161 | 0.92 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 176 | 189 | 95 | 207 | 69 | 0.54 | 207 | 104 | 0.59 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 176 | 627 | 314 | 688 | 229 | 1.79 | 688 | 344 | 1.96 |
| 127 | E+8' | 15 | | | | | | | | | | | | | | | | | |
| 128 | E+8' | 15-14 | | | | | | | | | | | | | | | | | |
| 129 | E+8' | 15-14 | | | | | | | | | | | | | | | | | |
| 130 | H | 14 | 6th-PH | 17 | 3.5 | 4.86 | Flexure | 3 | 4 | 2.5 | 176 | 310 | 103 | 340 | 85 | 0.59 | 340 | 136 | 0.78 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 380 | 190 | 417 | 139 | 1.08 | 417 | 209 | 1.19 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 320 | 160 | 351 | 117 | 0.91 | 351 | 176 | 1.00 |
| 131 | E | 14 | PH-Roof | 8.75 | 5 | 1.75 | Shear | 2 | 3 | 2 | 176 | 142 | 71 | 156 | 52 | 0.40 | 156 | 78 | 0.44 |
| | | | 6th-PH | 17 | 10 | 1.70 | Shear | 2 | 3 | 2 | 176 | 105 | 53 | 115 | 38 | 0.30 | 115 | 58 | 0.33 |
| | | | 5th-6th | 10.63 | 13 | 0.82 | Shear | 2 | 3 | 2 | 176 | 98 | 49 | 108 | 36 | 0.28 | 108 | 54 | 0.31 |
| | | | 4th-5th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 245 | 123 | 269 | 90 | 0.70 | 269 | 134 | 0.77 |
| | | | 3rd-4th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 238 | 119 | 261 | 87 | 0.68 | 261 | 131 | 0.74 |
| | | | 2nd-3rd | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 317 | 159 | 348 | 116 | 0.90 | 348 | 174 | 0.99 |
| | | | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 176 | 233 | 117 | 256 | 85 | 0.66 | 256 | 128 | 0.73 |
| 132 | E+8' | 14 | | | | | | | | | | | | | | | | | |
| 133 | E | 14-13 | | | | | | | | | | | | | | | | | |
| 134 | E | 14-13 | PH-Roof | 8.75 | 5 | 1.75 | Shear | 2 | 3 | 2 | 176 | 222 | 111 | 244 | 81 | 0.63 | 244 | 122 | 0.69 |
| | | | 6th-PH | 17 | 7 | 2.43 | Shear | 2 | 3 | 2 | 176 | 361 | 181 | 396 | 132 | 1.03 | 396 | 198 | 1.13 |
| | | | 5th-6th | 10.63 | 7 | 1.52 | Shear | 2 | 3 | 2 | 176 | 350 | 175 | 384 | 128 | 1.00 | 384 | 192 | 1.09 |
| | | | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 431 | 216 | 473 | 158 | 1.23 | 473 | 237 | 1.35 |

**URS**

Sheet No. ________

Job No.: 43-F0066652-15 Job Name: Ahwahnee Hotel, Yosemite National Park
Client.: National Park Service Subject: Structural Analysis for Seismic Rehabilitation

## Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 494 | 247 | 542 | 181 | 1.41 | 542 | 271 | 1.54 |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 372 | 186 | 408 | 136 | 1.06 | 408 | 204 | 1.16 |
| | | | Mezz-2nd | 13 | 7 | 1.86 | Shear | 2 | 3 | 2 | 176 | 272 | 136 | 299 | 100 | 0.77 | 299 | 149 | 0.85 |
| 135 | H | 13 | PH-Roof | 8.75 | 8 | 1.09 | Shear | 2 | 3 | 2 | 176 | 108 | 54 | 119 | 40 | 0.31 | 119 | 59 | 0.34 |
| | | | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 126 | 63 | 138 | 46 | 0.36 | 138 | 69 | 0.39 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 103 | 52 | 113 | 38 | 0.29 | 113 | 57 | 0.32 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 315 | 158 | 346 | 115 | 0.90 | 346 | 173 | 0.98 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 414 | 207 | 454 | 151 | 1.18 | 454 | 227 | 1.29 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 404 | 202 | 443 | 148 | 1.15 | 443 | 222 | 1.26 |
| 136 | E | 13 | | | | | | | | | | | | | | | | | |
| 137 | E | 13-11 | | | | | | | | | | | | | | | | | |
| 138 | E | 13-11 | | | | | | | | | | | | | | | | | |
| 139 | E | 13-11 | | | | | | | | | | | | | | | | | |
| 140 | E | 13-11 | | | | | | | | | | | | | | | | | |
| 141 | H+10' | 13 | | | | | | | | | | | | | | | | | |
| 142 | F | 15-14 | | | | | | | | | | | | | | | | | |
| 143 | F | 13 | | | | | | | | | | | | | | | | | |
| 144 | E | 13-14 | | | | | | | | | | | | | | | | | |
| 145 | E | 15 | | | | | | | | | | | | | | | | | |
| 146 | E-F | 16 | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 41 | 21 | 45 | 15 | 0.12 | 45 | 23 | 0.13 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 20 | 10 | 22 | 7 | 0.06 | 22 | 11 | 0.06 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 53 | 27 | 58 | 19 | 0.15 | 58 | 29 | 0.17 |
| W12 | E | 16 | 1st-Mezz | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 1096 | 548 | 1203 | 401 | 3.12 | 1203 | 602 | 3.43 |
| W13 | E | 14 | 1st-Mezz | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 436 | 218 | 479 | 160 | 1.24 | 479 | 239 | 1.36 |
| East Wing: | | | | | | | | | | | | | | | | | | | |
| 161 | D | 9 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 133 | 67 | 146 | 49 | 0.38 | 146 | 73 | 0.42 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 124 | 62 | 136 | 45 | 0.35 | 136 | 68 | 0.39 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 440 | 220 | 483 | 161 | 1.25 | 483 | 242 | 1.38 |
| 162 | C | 9 | | | | | | | | | | | | | | | | | |
| 163 | A | 9 | 2nd-3rd | 10.5 | 3 | 3.50 | Flexure | 3 | 4 | 2.5 | 176 | 69 | 23 | 76 | 19 | 0.13 | 76 | 30 | 0.17 |
| | | | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 124 | 41 | 136 | 34 | 0.24 | 136 | 54 | 0.31 |
| | | | 1st-Mezz | 15 | 3 | 5.00 | Flexure | 3 | 4 | 2.5 | 176 | 179 | 60 | 196 | 49 | 0.34 | 196 | 79 | 0.45 |
| 164 | A+9' | 9 | | | | | | | | | | | | | | | | | |
| 165 | A | 7-9 | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 176 | 559 | 280 | 614 | 205 | 1.59 | 614 | 307 | 1.75 |
| | | | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 176 | 242 | 121 | 266 | 89 | 0.69 | 266 | 133 | 0.76 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 334 | 167 | 367 | 122 | 0.95 | 367 | 183 | 1.04 |
| 166 | A+9' | 7-9 | | | | | | | | | | | | | | | | | |
| 167 | D | 7 | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 504 | 252 | 553 | 184 | 1.44 | 553 | 277 | 1.58 |

**Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | m-values | | | | | | | | | | | |
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | LS | CP | LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 570 | 285 | 626 | 209 | 1.62 | 626 | 313 | 1.78 |
| 168 | D-C | 7 | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 458 | 229 | 503 | 168 | 1.30 | 503 | 251 | 1.43 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 229 | 115 | 251 | 84 | 0.65 | 251 | 126 | 0.72 |
| 169 | C | 7 | | | | | | | | | | | | | | | | | |
| 170 | B | 7 | | | | | | | | | | | | | | | | | |
| 171 | B-A | 7 | | | | | | | | | | | | | | | | | |
| 172 | B-A | 7 | 6th-PH | 17 | 10 | 1.70 | Shear | 2 | 3 | 2 | 176 | 418 | 209 | 459 | 153 | 1.19 | 459 | 229 | 1.31 |
| | | | 5th-6th | 10.63 | 10 | 1.06 | Shear | 2 | 3 | 2 | 176 | 192 | 96 | 211 | 70 | 0.55 | 211 | 105 | 0.60 |
| | | | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 243 | 122 | 267 | 89 | 0.69 | 267 | 133 | 0.76 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 222 | 111 | 244 | 81 | 0.63 | 244 | 122 | 0.69 |
| 173 | A | 7 | | | | | | | | | | | | | | | | | |
| 174 | A+7' | 7 | | | | | | | | | | | | | | | | | |
| 175 | D | 6 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 217 | 109 | 238 | 79 | 0.62 | 238 | 119 | 0.68 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 288 | 144 | 316 | 105 | 0.82 | 316 | 158 | 0.90 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 383 | 192 | 420 | 140 | 1.09 | 420 | 210 | 1.20 |
| 176 | A | 6 | | | | | | | | | | | | | | | | | |
| 177 | A | 5-6 | | | | | | | | | | | | | | | | | |
| 178 | D | 5 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 207 | 104 | 227 | 76 | 0.59 | 227 | 114 | 0.65 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 319 | 160 | 350 | 117 | 0.91 | 350 | 175 | 1.00 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 404 | 202 | 443 | 148 | 1.15 | 443 | 222 | 1.26 |
| 179 | A | 5 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 277 | 139 | 304 | 101 | 0.79 | 304 | 152 | 0.87 |
| | | | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 176 | 188 | 94 | 206 | 69 | 0.54 | 206 | 103 | 0.59 |
| 180 | A | 4-5 | | | | | | | | | | | | | | | | | |
| 181 | D | 4 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 214 | 107 | 235 | 78 | 0.61 | 235 | 117 | 0.67 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 333 | 167 | 366 | 122 | 0.95 | 366 | 183 | 1.04 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 408 | 204 | 448 | 149 | 1.16 | 448 | 224 | 1.28 |
| 182 | A | 4 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 344 | 172 | 378 | 126 | 0.98 | 378 | 189 | 1.08 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 176 | 213 | 107 | 234 | 78 | 0.61 | 234 | 117 | 0.67 |
| 183 | D | 3 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 218 | 109 | 239 | 80 | 0.62 | 239 | 120 | 0.68 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 328 | 164 | 360 | 120 | 0.93 | 360 | 180 | 1.03 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 404 | 202 | 443 | 148 | 1.15 | 443 | 222 | 1.26 |
| 184 | C | 3 | | | | | | | | | | | | | | | | | |
| 185 | B | 3 | | | | | | | | | | | | | | | | | |
| 186 | A | 3 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 363 | 182 | 398 | 133 | 1.03 | 398 | 199 | 1.13 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 176 | 264 | 132 | 290 | 97 | 0.75 | 290 | 145 | 0.83 |
| 187 | D | 2 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 213 | 107 | 234 | 78 | 0.61 | 234 | 117 | 0.67 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 372 | 186 | 408 | 136 | 1.06 | 408 | 204 | 1.16 |
| 188 | A | 2 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 377 | 189 | 414 | 138 | 1.07 | 414 | 207 | 1.18 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 176 | 291 | 146 | 319 | 106 | 0.83 | 319 | 160 | 0.91 |
| 189 | D | 1-2 | 2nd-3rd | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 130 | 65 | 143 | 48 | 0.37 | 143 | 71 | 0.41 |

**URS**

Job No.: 43-F0066652-15
Client.: National Park Service

Sheet No. __________
Job Name: Ahwahnee Hotel, Yosemite National Park
Subject: Structural Analysis for Seismic Rehabilitation

**Table 3.1 Summary of Wall or Pier Demand/Capacity Ratios (Existing Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 176 | 281 | 141 | 308 | 103 | 0.80 | 308 | 154 | 0.88 |
| | | | 1st-Mezz | 15 | 3 | 5.00 | Flexure | 3 | 4 | 2.5 | 176 | 228 | 76 | 250 | 63 | 0.43 | 250 | 100 | 0.57 |
| 190 | A | 1-2 | 2nd-3rd | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 227 | 114 | 249 | 83 | 0.65 | 249 | 125 | 0.71 |
| | | | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 176 | 273 | 137 | 300 | 100 | 0.78 | 300 | 150 | 0.85 |
| 191 | D | 1 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 82 | 41 | 90 | 30 | 0.23 | 90 | 45 | 0.26 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 45 | 23 | 49 | 16 | 0.13 | 49 | 25 | 0.14 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 451 | 226 | 495 | 165 | 1.28 | 495 | 248 | 1.41 |
| 192 | D-C | 1 | | | | | | | | | | | | | | | | | |
| 193 | D-C | 1 | | | | | | | | | | | | | | | | | |
| 194 | C | 1 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 143 | 72 | 157 | 52 | 0.41 | 157 | 78 | 0.45 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 297 | 149 | 326 | 109 | 0.85 | 326 | 163 | 0.93 |
| 195 | C-B | 1 | | | | | | | | | | | | | | | | | |
| 196 | C-B | 1 | | | | | | | | | | | | | | | 0 | | |
| 197 | B | 1 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 150 | 75 | 165 | 55 | 0.43 | 165 | 82 | 0.47 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 312 | 156 | 342 | 114 | 0.89 | 342 | 171 | 0.98 |
| 198 | B-A | 1 | | | | | | | | | | | | | | | | | |
| 199 | B-A | 1 | | | | | | | | | | | | | | | | | |
| 200 | A | 1 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 190 | 95 | 209 | 70 | 0.54 | 209 | 104 | 0.59 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 65 | 33 | 71 | 24 | 0.19 | 71 | 36 | 0.20 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 422 | 211 | 463 | 154 | 1.20 | 463 | 232 | 1.32 |
| W6 | D | 1 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 176 | 88 | 193 | 64 | 0.50 | 193 | 97 | 0.55 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 224 | 112 | 246 | 82 | 0.64 | 246 | 123 | 0.70 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 348 | 174 | 382 | 127 | 0.99 | 382 | 191 | 1.09 |
| W7 | D-C | 1 | 2nd-3rd | 10.5 | 4.5 | 2.33 | Shear | 2 | 3 | 2 | 176 | 99 | 50 | 109 | 36 | 0.28 | 109 | 54 | 0.31 |
| | | | Mezz-2nd | 13 | 4.5 | 2.89 | Shear | 2 | 3 | 2 | 176 | 128 | 64 | 141 | 47 | 0.36 | 141 | 70 | 0.40 |
| | | | 1st-Mezz | 15 | 4.5 | 3.33 | Flexure | 3 | 4 | 2.5 | 176 | 220 | 73 | 242 | 60 | 0.42 | 242 | 97 | 0.55 |
| W8 | C-B | 1 | 2nd-3rd | 10.5 | 4.5 | 2.33 | Shear | 2 | 3 | 2 | 176 | 98 | 49 | 108 | 36 | 0.28 | 108 | 54 | 0.31 |
| | | | Mezz-2nd | 13 | 4.5 | 2.89 | Shear | 2 | 3 | 2 | 176 | 130 | 65 | 143 | 48 | 0.37 | 143 | 71 | 0.41 |
| | | | 1st-Mezz | 15 | 4.5 | 3.33 | Flexure | 3 | 4 | 2.5 | 176 | 225 | 75 | 247 | 62 | 0.43 | 247 | 99 | 0.56 |
| W9 | C-B | 1 | 2nd-3rd | 10.5 | 4.5 | 2.33 | Shear | 2 | 3 | 2 | 176 | 101 | 51 | 111 | 37 | 0.29 | 111 | 55 | 0.32 |
| | | | Mezz-2nd | 13 | 4.5 | 2.89 | Shear | 2 | 3 | 2 | 176 | 132 | 66 | 145 | 48 | 0.38 | 145 | 72 | 0.41 |
| | | | 1st-Mezz | 15 | 4.5 | 3.33 | Flexure | 3 | 4 | 2.5 | 176 | 226 | 75 | 248 | 62 | 0.43 | 248 | 99 | 0.57 |
| W6 | B-A | 1 | 2nd-3rd | 10.5 | 4.5 | 2.33 | Shear | 2 | 3 | 2 | 176 | 106 | 53 | 116 | 39 | 0.30 | 116 | 58 | 0.33 |
| | | | Mezz-2nd | 13 | 4.5 | 2.89 | Shear | 2 | 3 | 2 | 176 | 131 | 66 | 144 | 48 | 0.37 | 144 | 72 | 0.41 |
| | | | 1st-Mezz | 15 | 4.5 | 3.33 | Flexure | 3 | 4 | 2.5 | 176 | 223 | 74 | 245 | 61 | 0.42 | 245 | 98 | 0.56 |
| W6 | A | 1 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 204 | 102 | 224 | 75 | 0.58 | 224 | 112 | 0.64 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 265 | 133 | 291 | 97 | 0.75 | 291 | 145 | 0.83 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 371 | 186 | 407 | 136 | 1.06 | 407 | 204 | 1.16 |

**E-TABS 3-D Model of Modified Building**

## Structural Computer Model (Retrofitted Condition)

Description of Analysis

The computer model for the existing condition was modified to include potential new walls. The locations of the new walls were selected with the consideration of preserving the historical aspect of the hotel.

ETABS Model Input Parameters

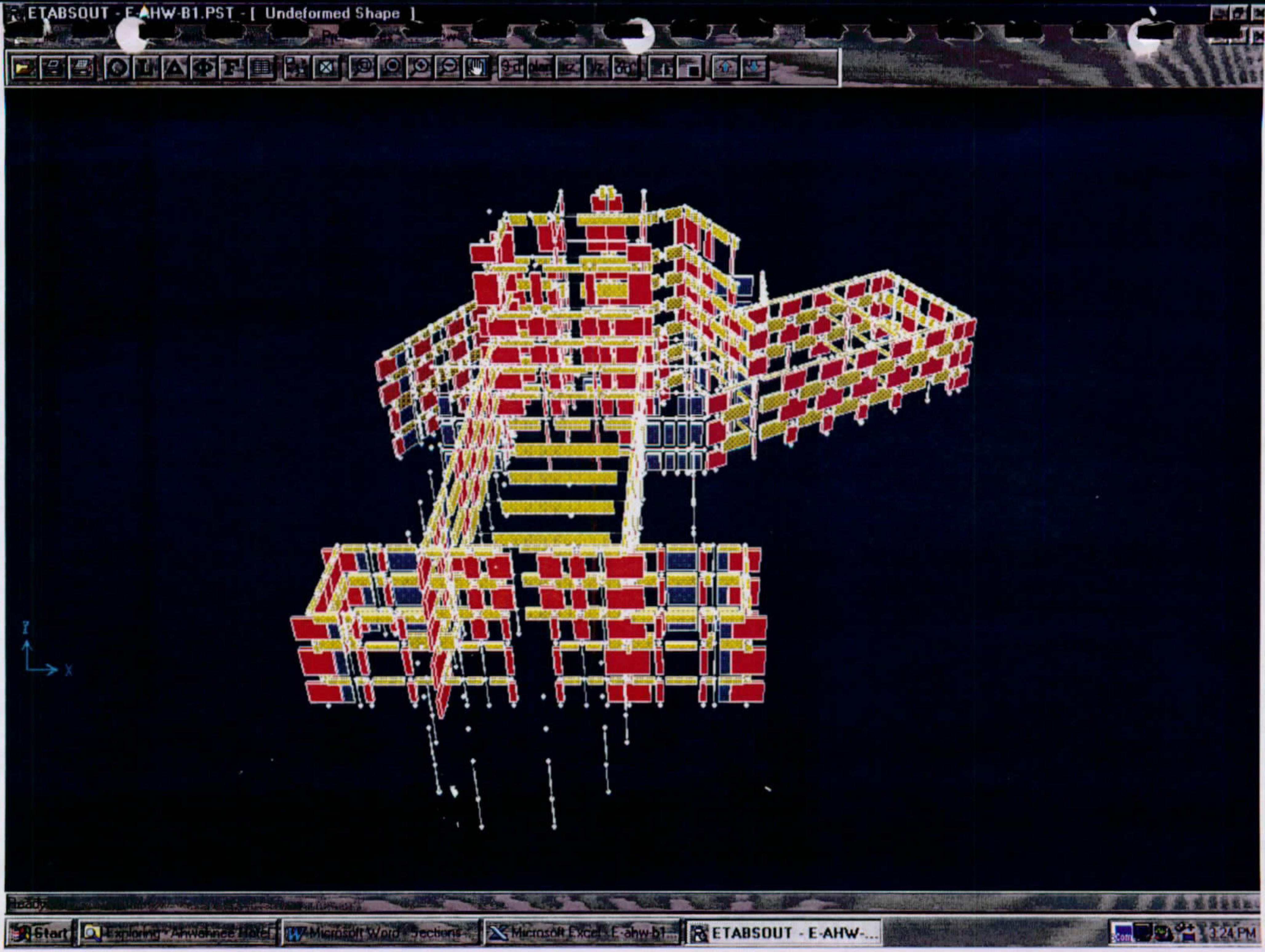
The input parameters for the retrofitted condition are given below:

- Concrete modulus of elasticity of the new walls, $E_c$ = 57,000*sqrt(f'c) = 4031 ksi, f'c=5,000 psi
- The new walls were assumed to be 12 inches thick.
- New walls were added to some of the existing columns. For simplicity, the old $E_c$ = 3122 ksi was used for the mixture of old and new concrete material. The material will be refined when the location of the walls are finalized.

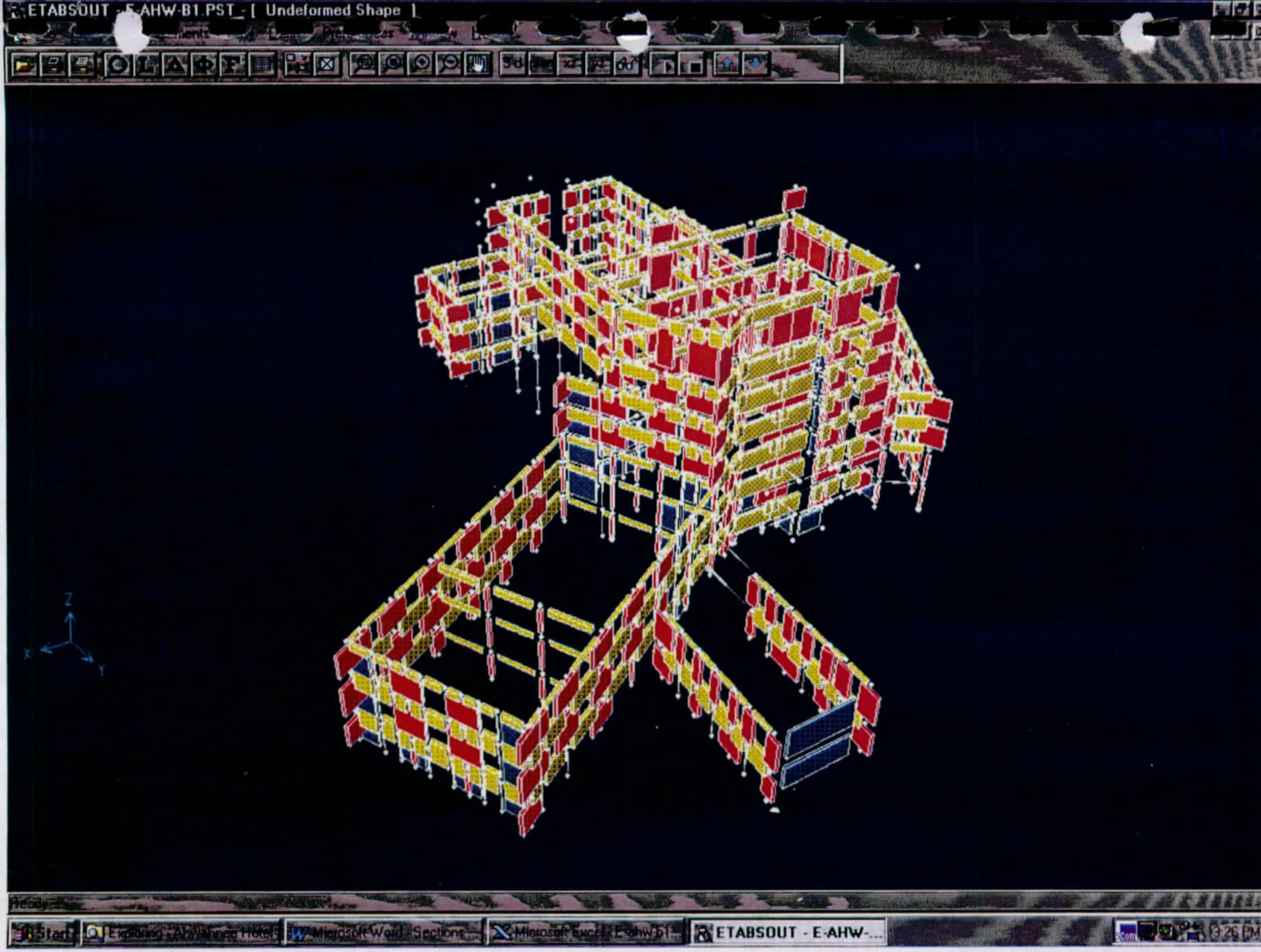
ETABS Model Sketches

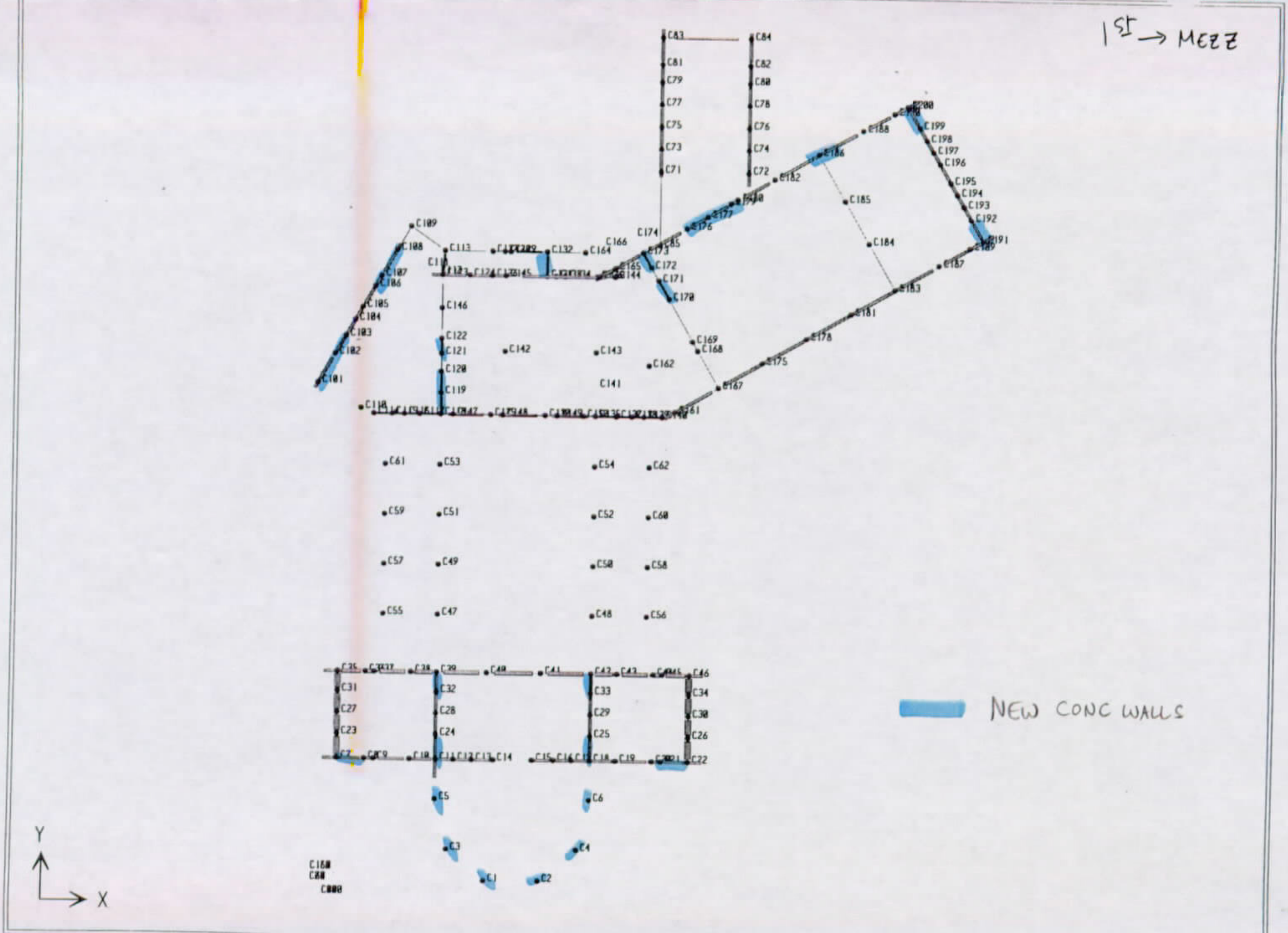
The following ETABS model sketches are given in Appendix F:

- 3-D view of the model (Retrofitted condition)
- Locations of the new walls are highlighted.

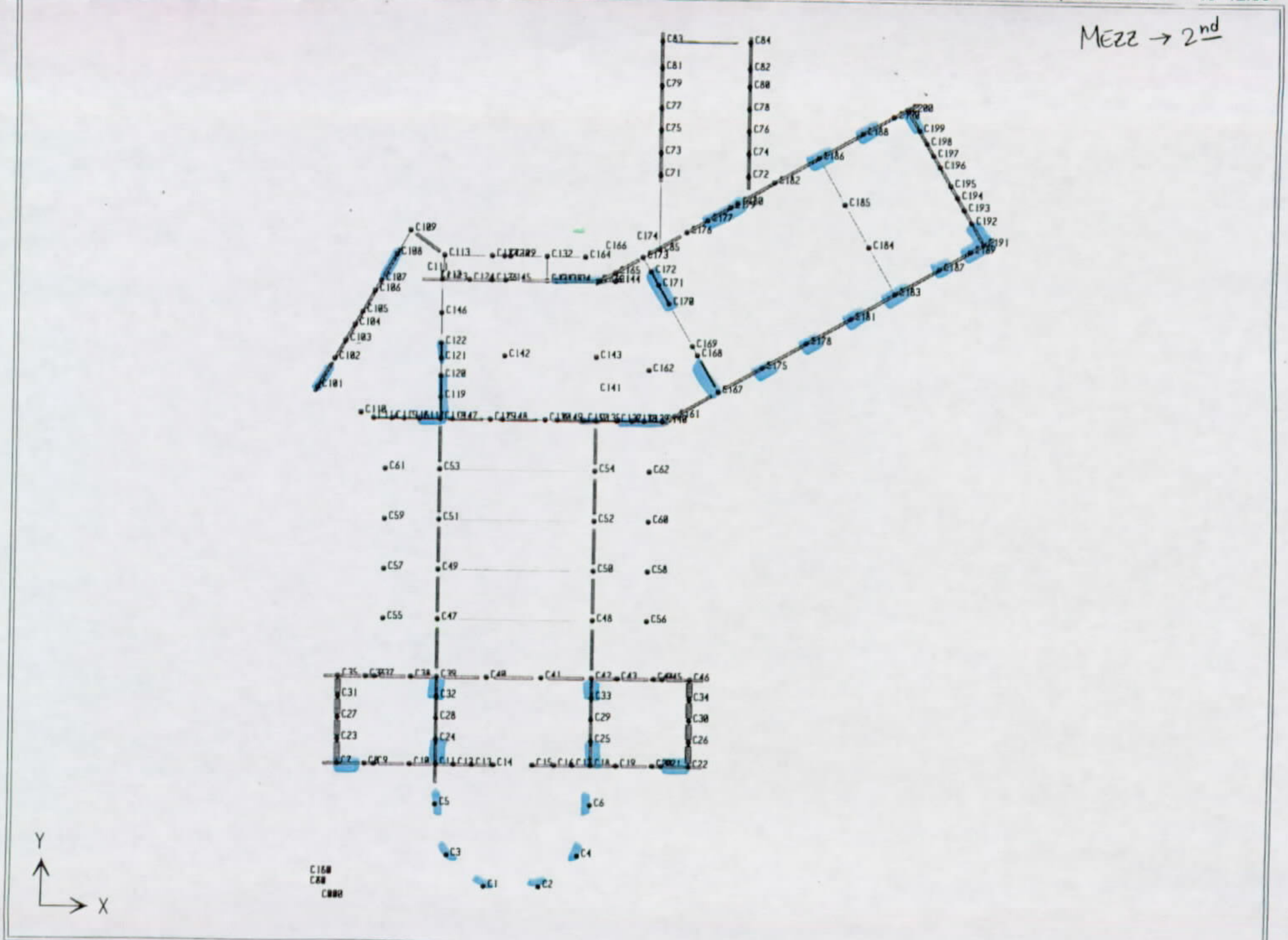

ETABSOUT - E-AHW-B1.PST - [ Undeformed Shape ]
Y
X
Ready
Start
Exploring - Ahwahnee Hotel
Microsoft Word - Sections
Microsoft Excel - E-ahw-b1
ETABSOUT - E-AHW-...
3:24 PM

F-42


ETABSOUT - E-AHW-B1.PST - [ Undeformed Shape ]
Z
X
Y
Ready
Start
ETABSOUT - E-AHW-...
3:26 PM

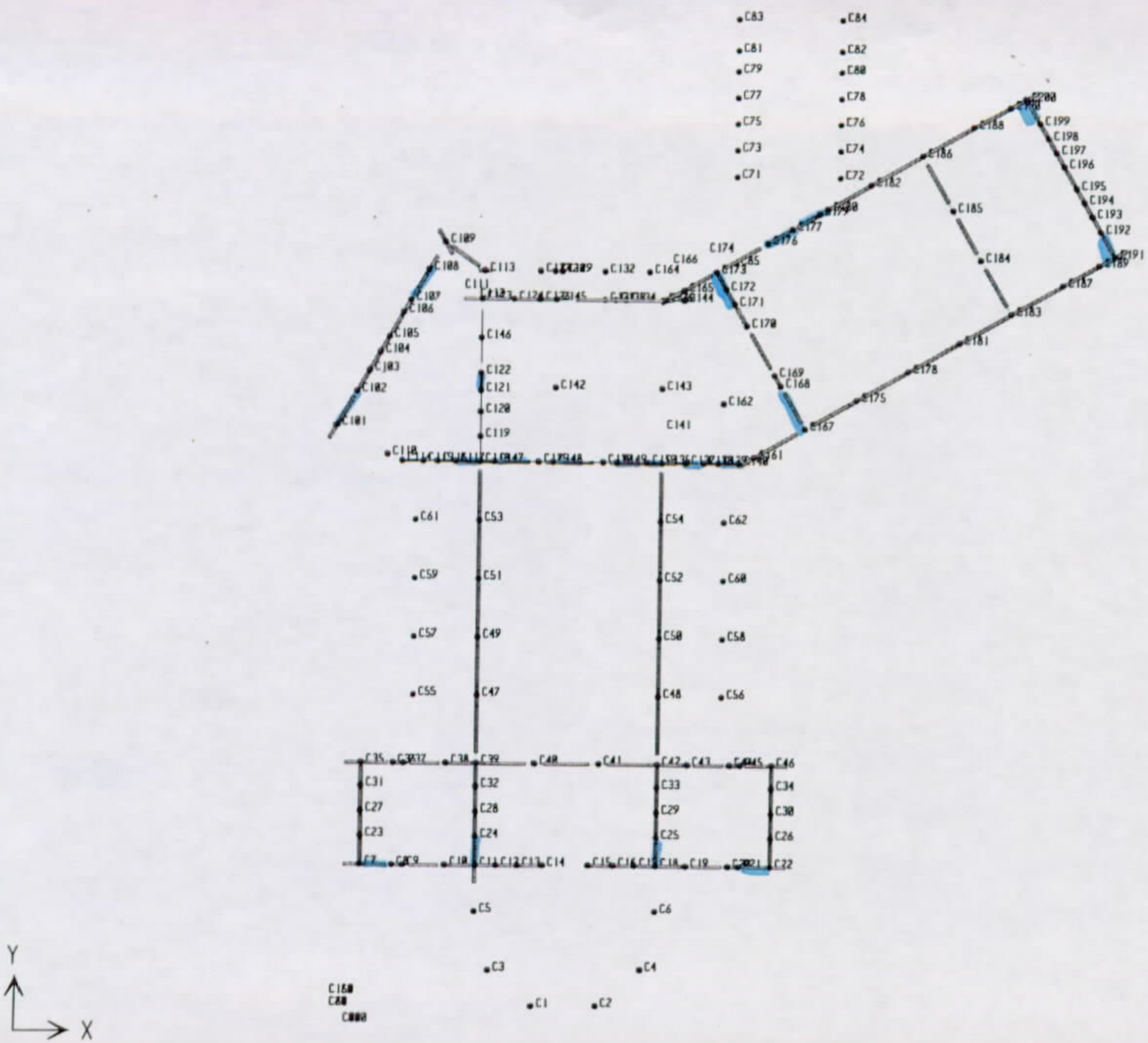

1ST → MEZZ
NEW CONC WALLS
Y
X

ETABS Undeformed Shape October 1 12:00




ETABS 6.20 File: E-AHW-B1.PST

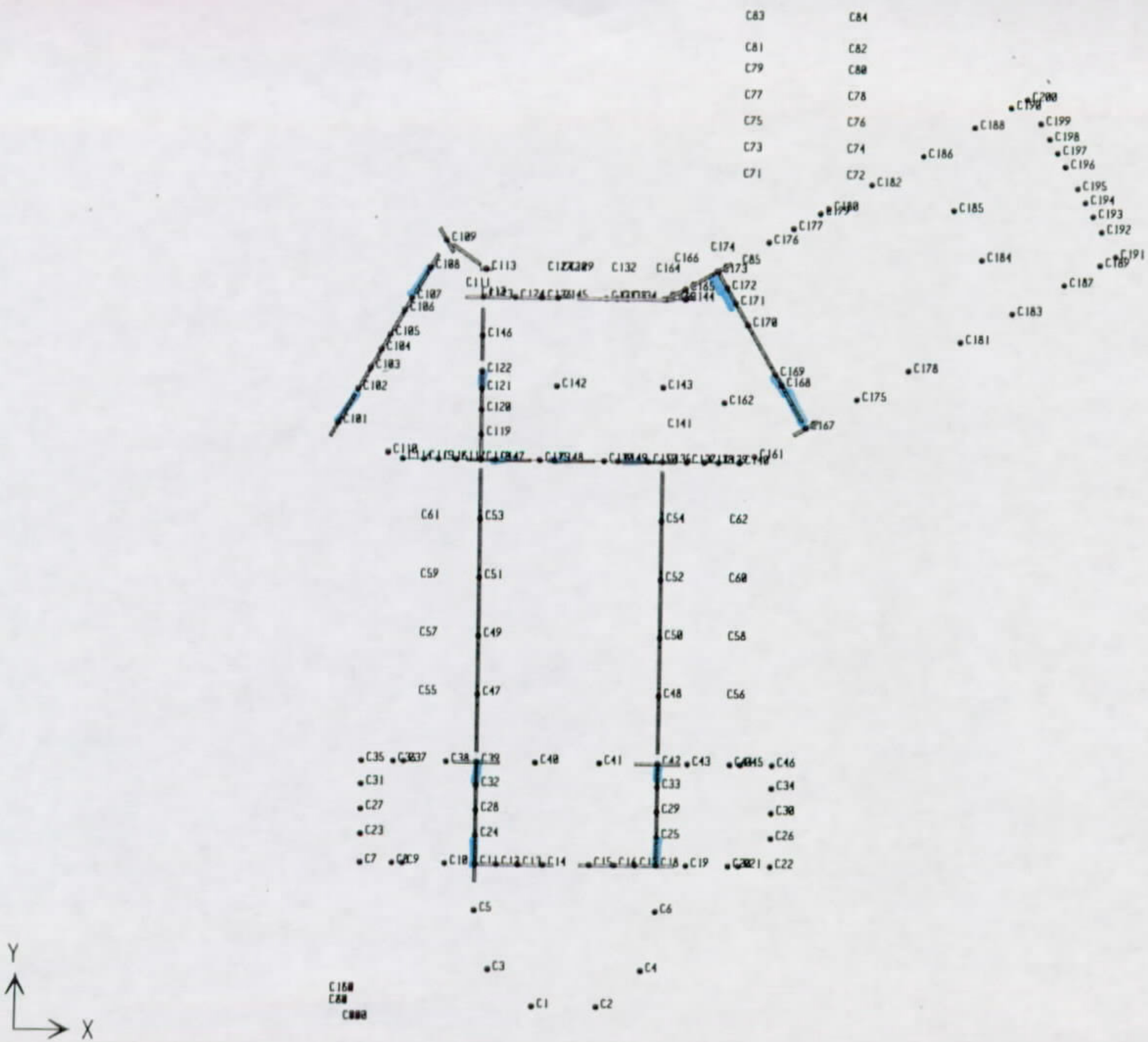
$2^{nd} \to 3^{rd}$



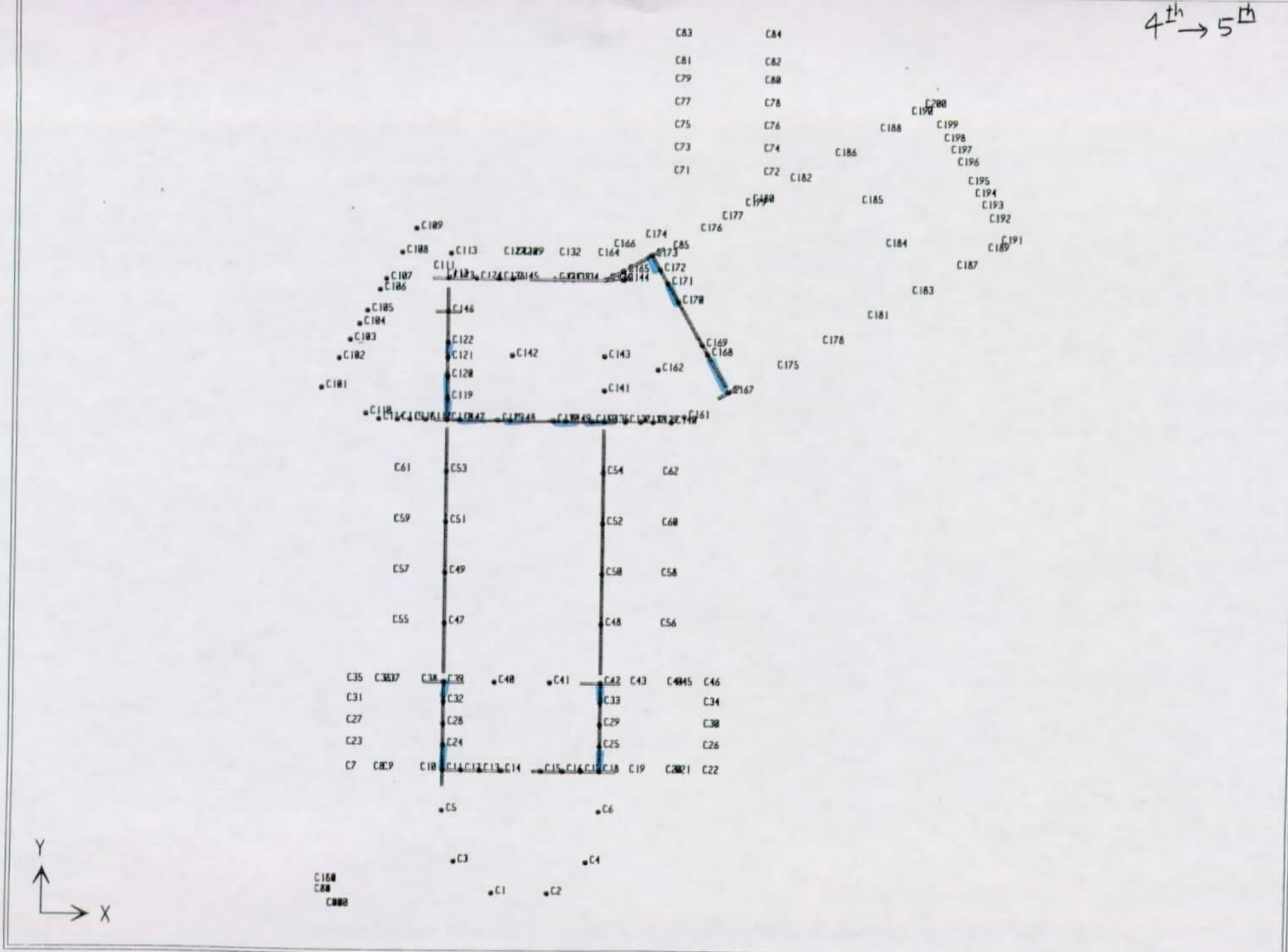



F. 46

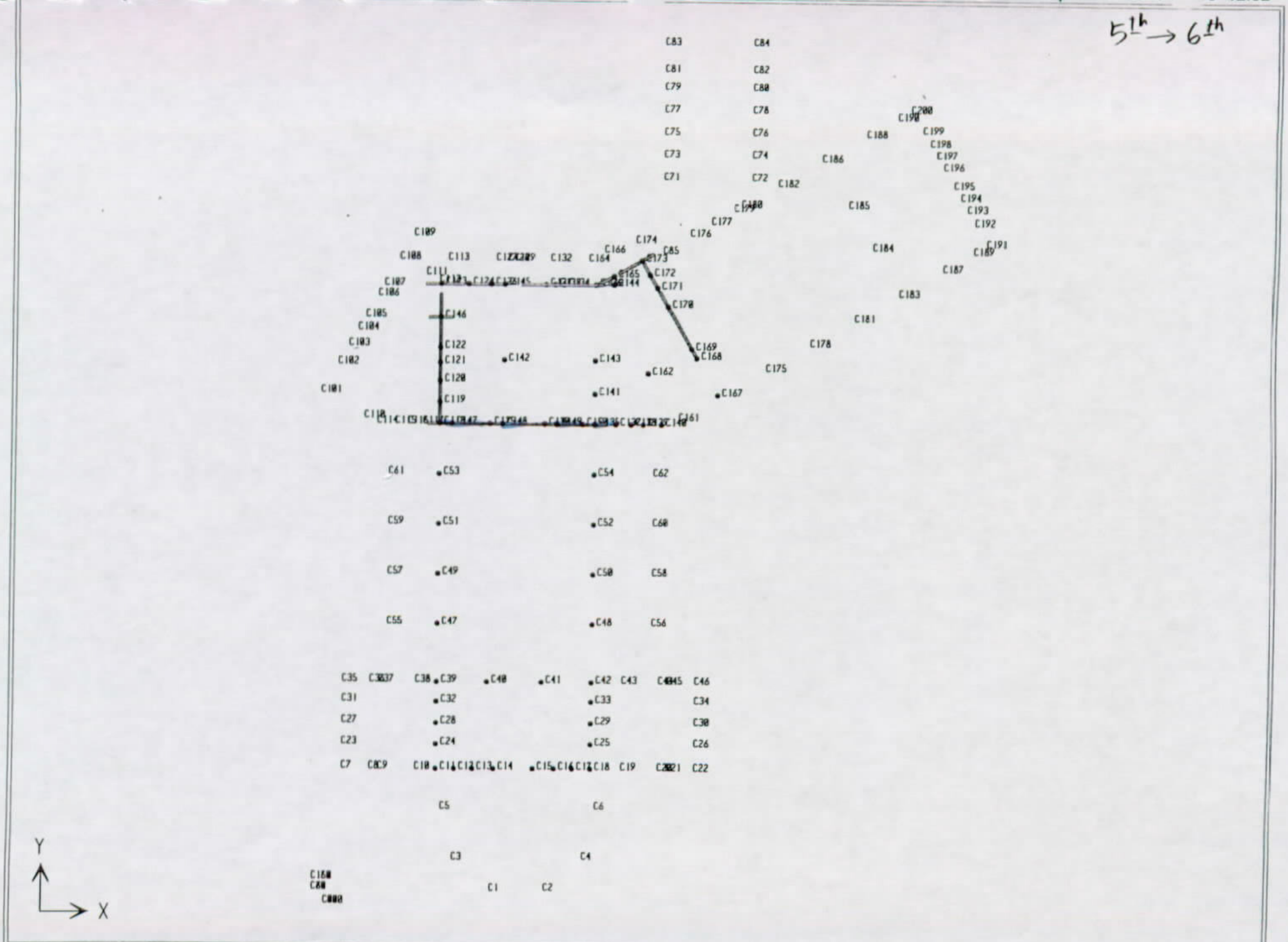
3rd → 4th



4th → 5th



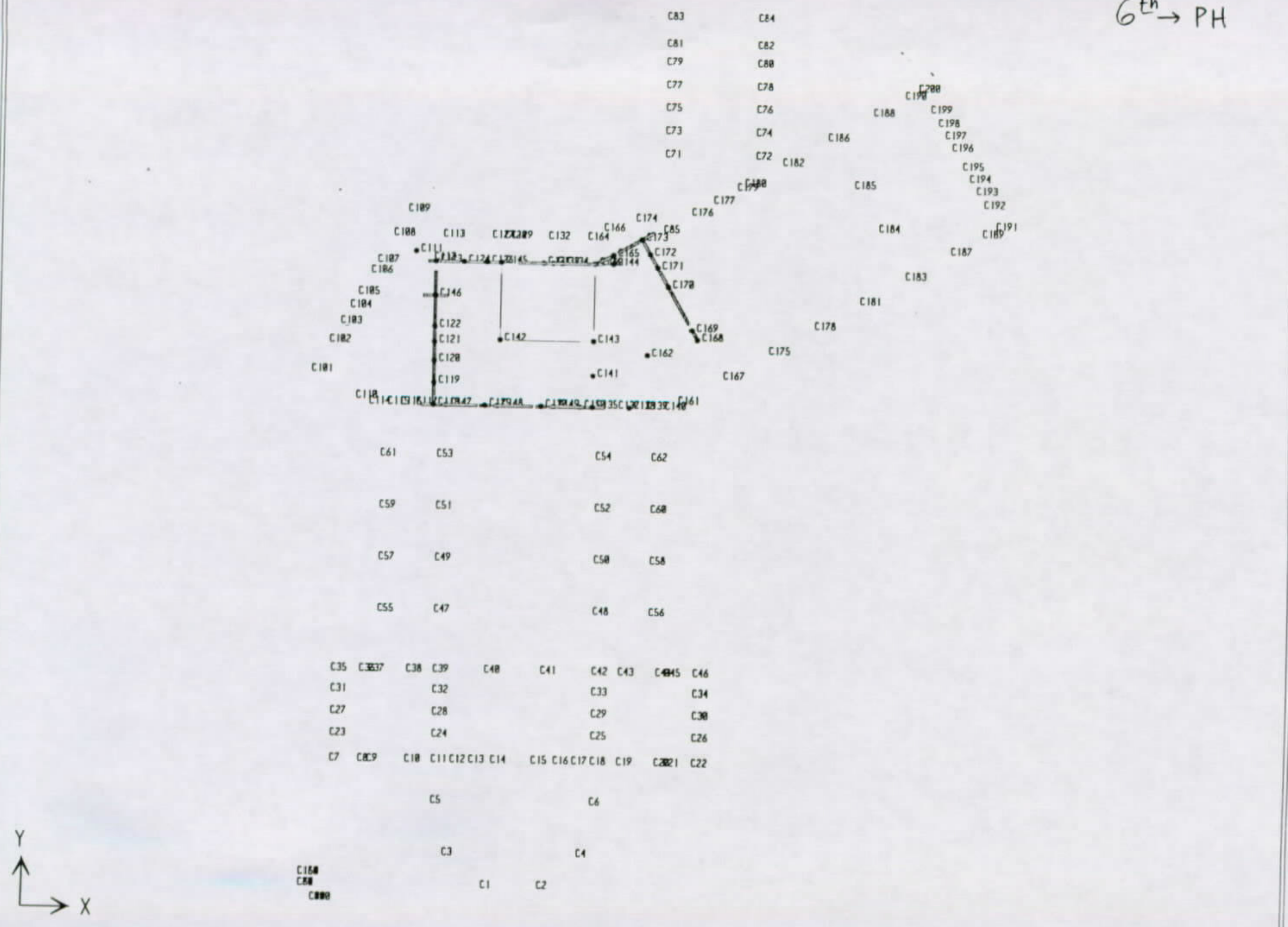
$5^{th} \rightarrow 6^{th}$



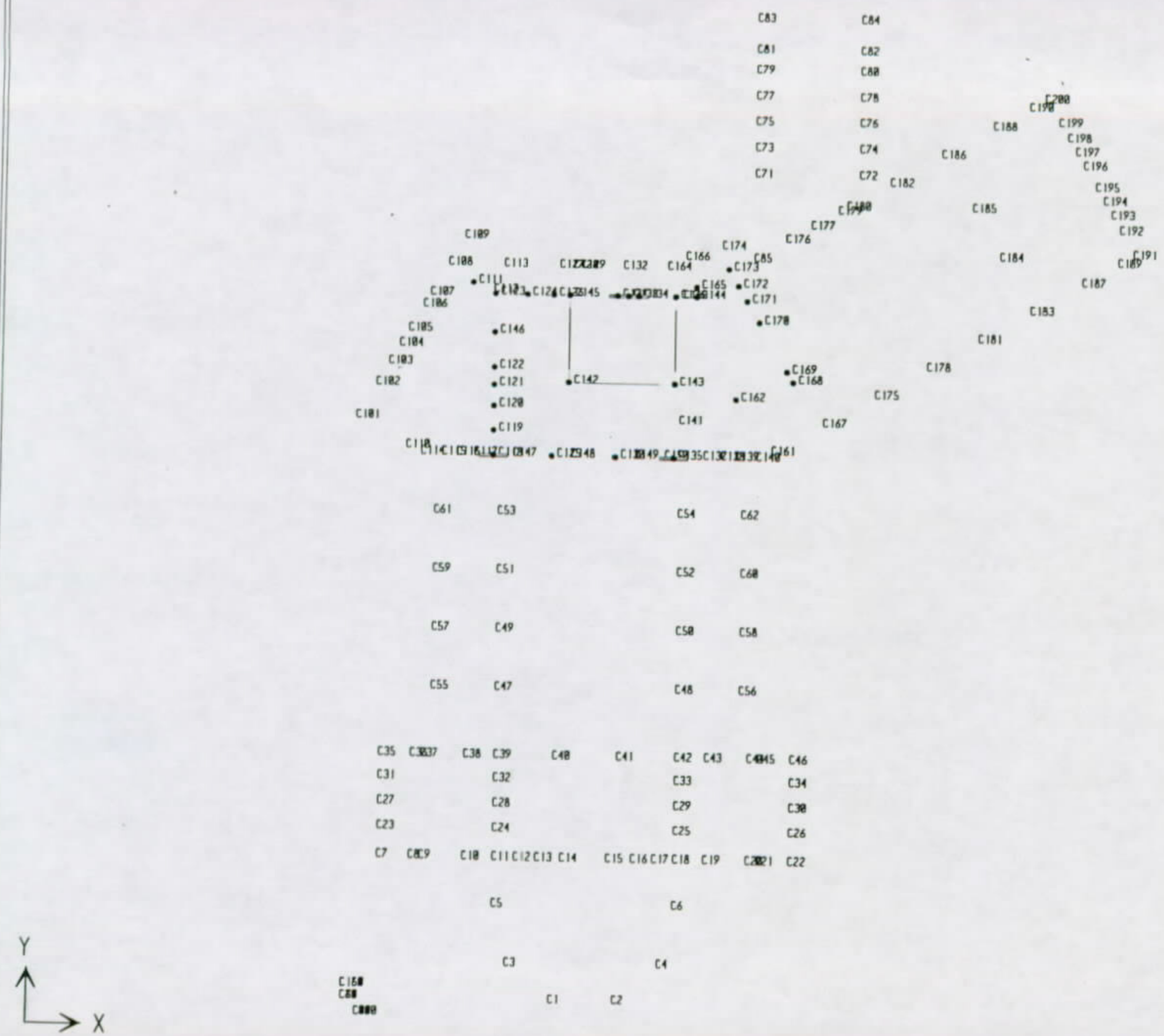
ETABS

Undeformed Shape October 1 )0 12:00

6th → PH



PH → PHRF


C83
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C197
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C195
C194
C193
C192
C187
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X

# Structural Periods, Mass Participation Factors and Mode Shapes of the first 6 Modes (Retrofitted Condition)

PROGRAM:ETABS/FILE:\AHWAHN~1\E-AHW-B1.EIG
ETABS ANALYSIS OF AHWAHNEE HOTEL, YOSEMITE NATIONAL PARK
JOB NO. 43-F0066652-15 MODEL B = RETROFITTED CONDITIORUN ID = E-AHW-B1

STRUCTURAL TIME PERIODS AND FREQUENCIES

| MODE NUMBER | PERIOD (TIME) | FREQUENCY (CYCLES/UNIT TIME) | CIRCULAR/FREQ (RADIANS/UNIT TIME) |
|---|---|---|---|
| 1 | 0.30098 | 3.32251 | 20.87596 |
| 2 | 0.29427 | 3.39819 | 21.35146 |
| 3 | 0.23881 | 4.18749 | 26.31077 |
| 4 | 0.18670 | 5.35605 | 33.65303 |
| 5 | 0.16794 | 5.95439 | 37.41252 |
| 6 | 0.13808 | 7.24207 | 45.50329 |
| 7 | 0.13242 | 7.55181 | 47.44944 |
| 8 | 0.12095 | 8.26798 | 51.94928 |
| 9 | 0.09386 | 10.65442 | 66.94371 |
| 10 | 0.08158 | 12.25779 | 77.01800 |
| 11 | 0.07662 | 13.05105 | 82.00218 |
| 12 | 0.07330 | 13.64170 | 85.71331 |
| 13 | 0.06797 | 14.71332 | 92.44650 |
| 14 | 0.06161 | 16.23143 | 101.98507 |
| 15 | 0.05938 | 16.84102 | 105.81526 |
| 16 | 0.05689 | 17.57718 | 110.44069 |
| 17 | 0.05039 | 19.84701 | 124.70243 |
| 18 | 0.04802 | 20.82618 | 130.85475 |
| 19 | 0.04109 | 24.33398 | 152.89490 |
| 20 | 0.03911 | 25.56924 | 160.65629 |
| 21 | 0.03665 | 27.28480 | 171.43548 |
| 22 | 0.03604 | 27.75001 | 174.35847 |
| 23 | 0.03552 | 28.15159 | 176.88166 |
| 24 | 0.03510 | 28.48735 | 178.99131 |
| 25 | 0.03159 | 31.65780 | 198.91181 |
| 26 | 0.03108 | 32.17598 | 202.16762 |
| 27 | 0.03067 | 32.60778 | 204.88072 |
| 28 | 0.03022 | 33.09168 | 207.92114 |
| 29 | 0.02879 | 34.73279 | 218.23254 |
| 30 | 0.02652 | 37.70869 | 236.93070 |
| 31 | 0.02479 | 40.33789 | 253.45044 |
| 32 | 0.02394 | 41.76840 | 262.43861 |
| 33 | 0.02260 | 44.24029 | 277.96996 |
| 34 | 0.02185 | 45.76749 | 287.56561 |
| 35 | 0.02164 | 46.21813 | 290.39707 |
| 36 | 0.02104 | 47.52038 | 298.57937 |
| 37 | 0.02023 | 49.42711 | 310.55968 |
| 38 | 0.01893 | 52.83159 | 331.95064 |
| 39 | 0.01828 | 54.70581 | 343.72673 |
| 40 | 0.01799 | 55.58815 | 349.27067 |
| 41 | 0.01722 | 58.06872 | 364.85653 |
| 42 | 0.01649 | 60.66100 | 381.14429 |
| 43 | 0.01535 | 65.15253 | 409.36543 |
| 44 | 0.01478 | 67.67140 | 425.19196 |
| 45 | 0.01474 | 67.85838 | 426.36675 |

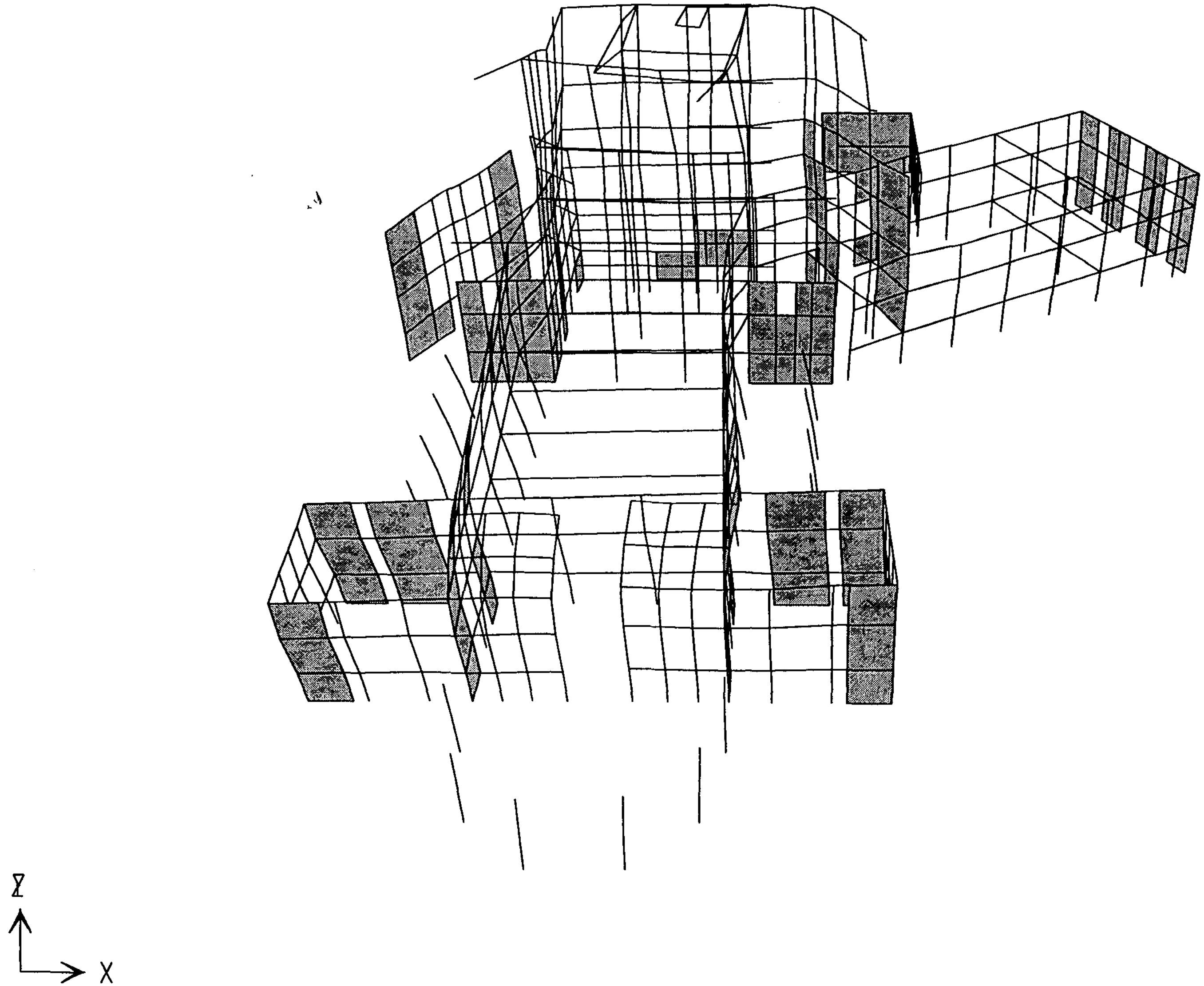
PROGRAM:ETABS/FILE:\AHWAHN~1\E-AHW-B1.EIG
ETABS ANALYSIS OF AHWAHNEE HOTEL, YOSEMITE NATIONAL PARK
JOB NO. 43-F0066652-15 MODEL B = RETROFITTED CONDITIORUN ID = E-AHW-B1

EFFECTIVE MASS FACTORS

| MODE | /--X TRANSLATION--/ | | /--Y TRANSLATION--/ | | /----Z ROTATION----/ | |
|---|---|---|---|---|---|---|
| NUMBER | %-MASS | <%-SUM> | %-MASS | <%-SUM> | %-MASS | <%-SUM> |
| 1 | 11.33 | < 11.3> | 12.40 | < 12.4> | 1.18 | < 1.2> |
| 2 | 10.81 | < 22.1> | 23.67 | < 36.1> | 0.03 | < 1.2> |
| 3 | 22.18 | < 44.3> | 7.44 | < 43.5> | 0.92 | < 2.1> |
| 4 | 0.75 | < 45.1> | 21.45 | < 65.0> | 0.94 | < 3.1> |
| 5 | 2.05 | < 47.1> | 0.02 | < 65.0> | 58.68 | < 61.8> |
| 6 | 0.17 | < 47.3> | 13.22 | < 78.2> | 3.21 | < 65.0> |
| 7 | 9.14 | < 56.4> | 0.33 | < 78.5> | 0.18 | < 65.1> |
| 8 | 23.31 | < 79.7> | 0.74 | < 79.3> | 1.70 | < 66.8> |
| 9 | 0.85 | < 80.6> | 0.03 | < 79.3> | 0.20 | < 67.0> |
| 10 | 0.10 | < 80.7> | 1.53 | < 80.8> | 4.08 | < 71.1> |
| 11 | 3.55 | < 84.2> | 3.84 | < 84.7> | 0.37 | < 71.5> |
| 12 | 0.30 | < 84.5> | 0.72 | < 85.4> | 0.23 | < 71.7> |
| 13 | 3.05 | < 87.6> | 4.28 | < 89.7> | 0.01 | < 71.7> |
| 14 | 0.18 | < 87.8> | 0.18 | < 89.8> | 0.48 | < 72.2> |
| 15 | 1.59 | < 89.4> | 0.08 | < 89.9> | 0.34 | < 72.6> |
| 16 | 0.60 | < 90.0> | 0.39 | < 90.3> | 0.26 | < 72.8> |
| 17 | 0.41 | < 90.4> | 1.38 | < 91.7> | 0.11 | < 72.9> |
| 18 | 0.03 | < 90.4> | 1.34 | < 93.0> | 0.41 | < 73.3> |
| 19 | 0.22 | < 90.6> | 0.11 | < 93.1> | 2.00 | < 75.3> |
| 20 | 1.10 | < 91.7> | 0.82 | < 94.0> | 0.80 | < 76.1> |
| 21 | 0.15 | < 91.9> | 0.01 | < 94.0> | 0.00 | < 76.1> |
| 22 | 0.00 | < 91.9> | 0.01 | < 94.0> | 1.03 | < 77.2> |
| 23 | 0.01 | < 91.9> | 1.27 | < 95.3> | 1.31 | < 78.5> |
| 24 | 0.68 | < 92.6> | 0.45 | < 95.7> | 0.23 | < 78.7> |
| 25 | 2.66 | < 95.2> | 0.00 | < 95.7> | 0.25 | < 79.0> |
| 26 | 0.03 | < 95.3> | 0.13 | < 95.8> | 1.90 | < 80.9> |
| 27 | 0.74 | < 96.0> | 0.12 | < 96.0> | 1.09 | < 81.9> |
| 28 | 0.62 | < 96.6> | 0.72 | < 96.7> | 1.49 | < 83.4> |
| 29 | 0.46 | < 97.1> | 0.06 | < 96.7> | 1.48 | < 84.9> |
| 30 | 0.72 | < 97.8> | 0.59 | < 97.3> | 0.21 | < 85.1> |
| 31 | 0.11 | < 97.9> | 0.37 | < 97.7> | 0.13 | < 85.3> |
| 32 | 0.05 | < 98.0> | 0.01 | < 97.7> | 1.75 | < 87.0> |
| 33 | 0.02 | < 98.0> | 0.60 | < 98.3> | 1.06 | < 88.1> |
| 34 | 0.20 | < 98.2> | 0.21 | < 98.5> | 1.07 | < 89.1> |
| 35 | 0.01 | < 98.2> | 0.09 | < 98.6> | 0.04 | < 89.2> |
| 36 | 0.13 | < 98.3> | 0.00 | < 98.6> | 0.01 | < 89.2> |
| 37 | 0.06 | < 98.4> | 1.08 | < 99.7> | 0.45 | < 89.6> |
| 38 | 0.03 | < 98.4> | 0.01 | < 99.7> | 0.02 | < 89.7> |
| 39 | 0.00 | < 98.4> | 0.00 | < 99.7> | 0.17 | < 89.8> |
| 40 | 0.07 | < 98.5> | 0.22 | < 99.9> | 0.06 | < 89.9> |
| 41 | 0.12 | < 98.6> | 0.04 | < 99.9> | 0.00 | < 89.9> |
| 42 | 1.13 | < 99.7> | 0.00 | <100.0> | 0.19 | < 90.1> |
| 43 | 0.04 | < 99.8> | 0.02 | <100.0> | 1.22 | < 91.3> |
| 44 | 0.11 | < 99.9> | 0.00 | <100.0> | 0.35 | < 91.6> |
| 45 | 0.02 | < 99.9> | 0.00 | <100.0> | 0.05 | < 91.7> |

ETAB

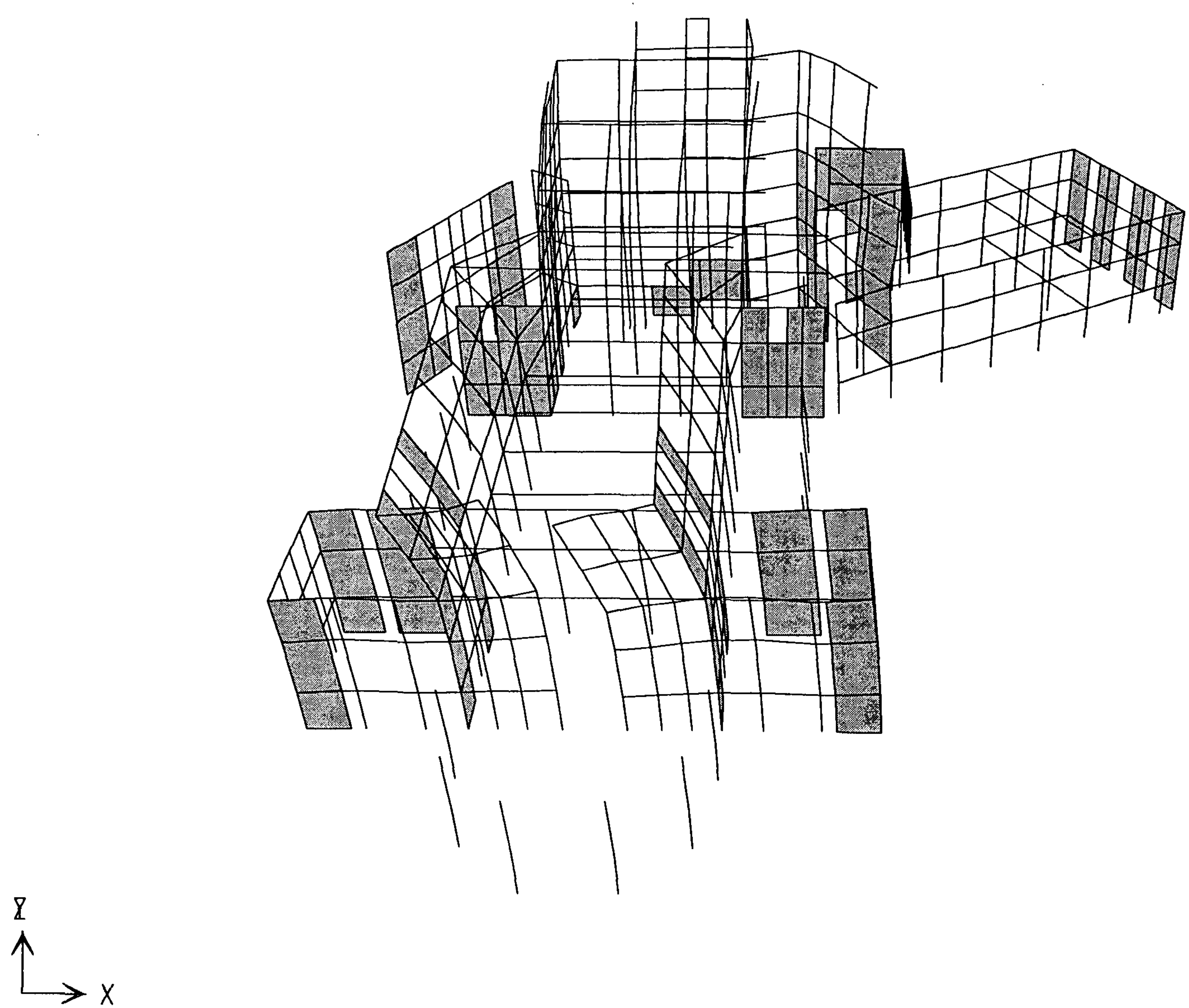
Mode 6 Period 0.1381 seconds October 13,2... 18:07




ETABS 6.20 File: E-AHW-B1.PST Effective Mass: Xtrans 0.2% Ytrans 13.2% Zrotn 3.2%

ETABS

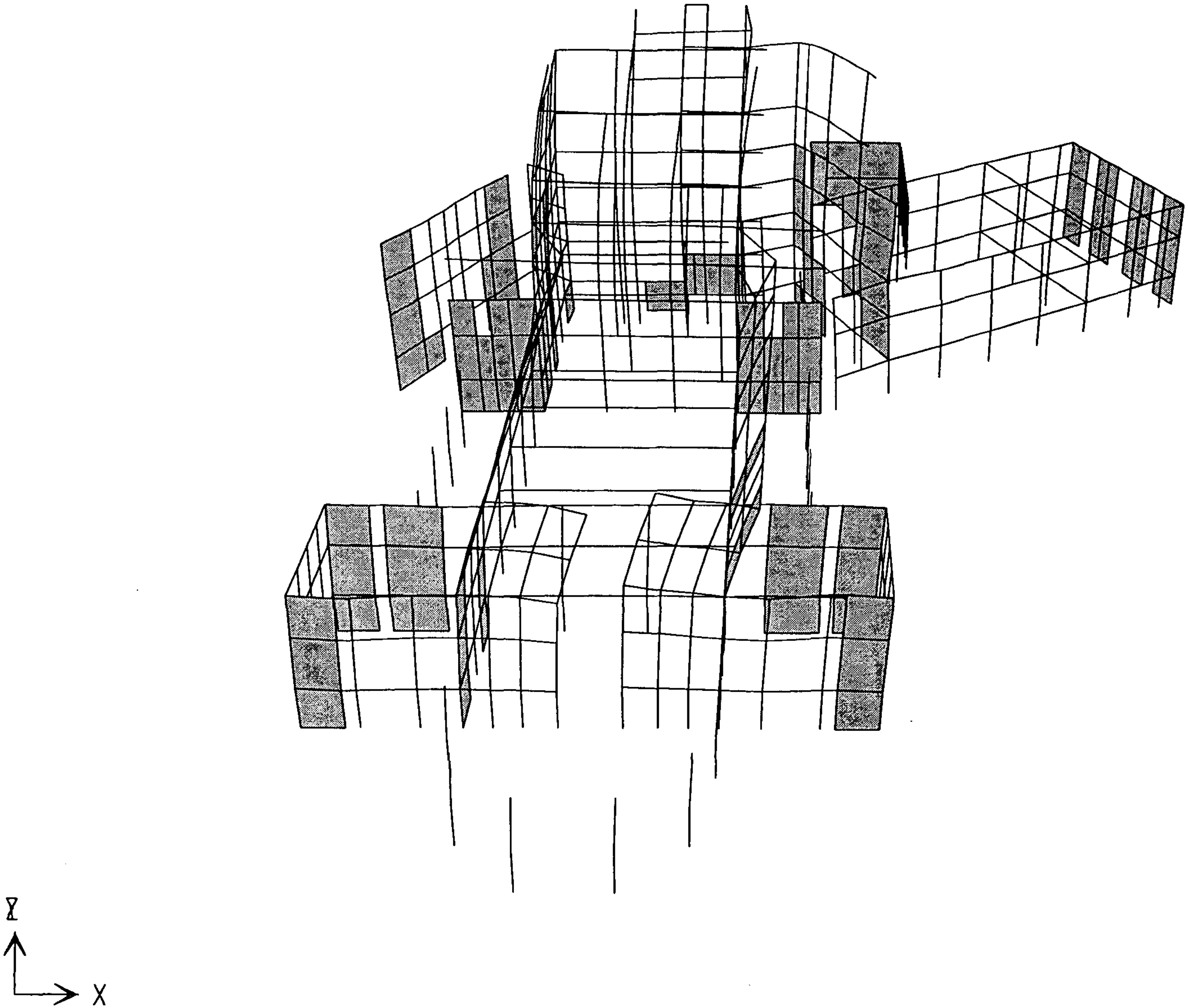
Mode 1 Period 0.3010 seconds October 13,20[illegible] 18:05




ETABS 6.20 File: E-AHW-B1.PST Effective Mass: Xtrans 11.3% Ytrans 12.4% Zrotn 1.2%

ETAB.

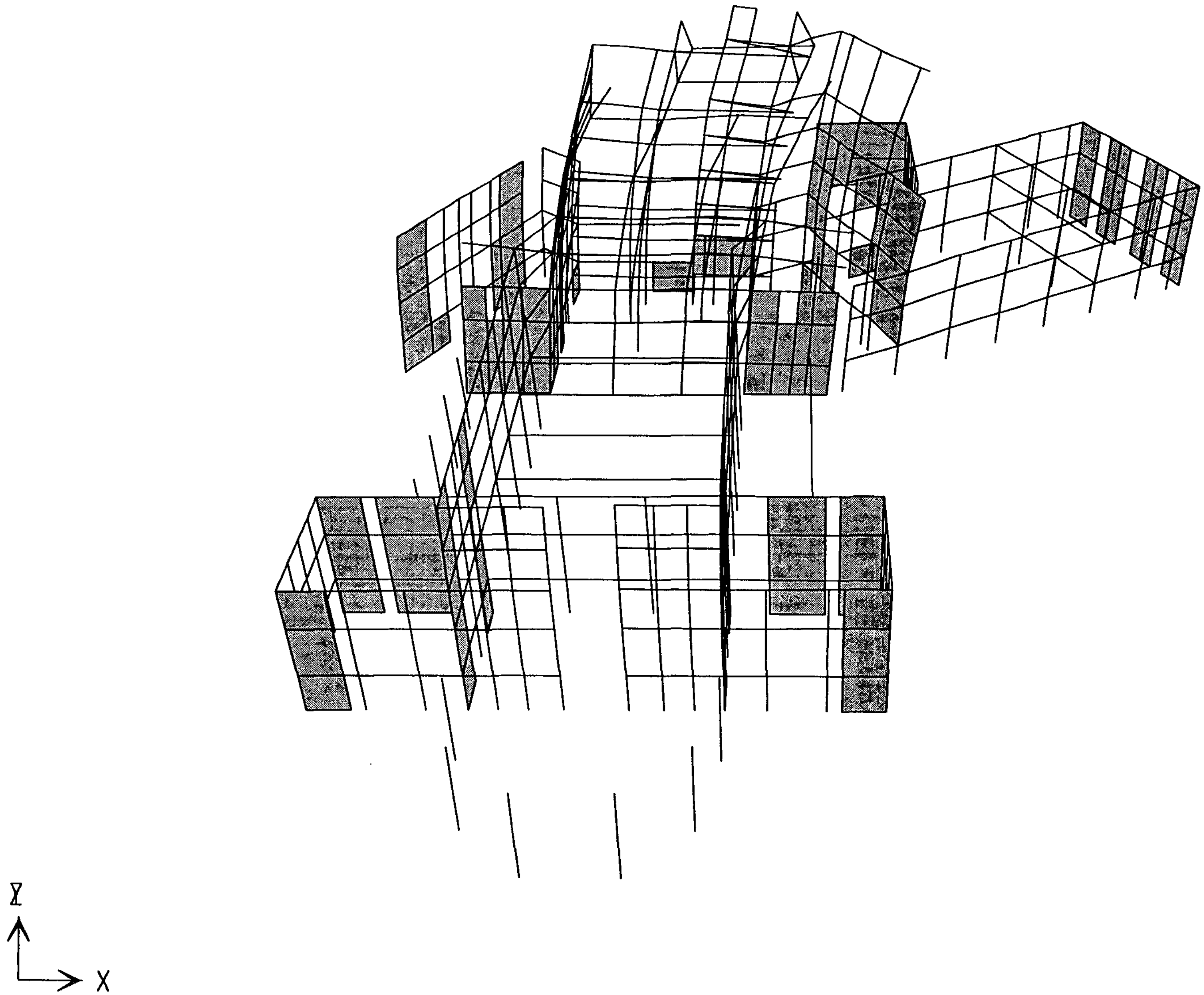
Mode 2 Period 0.2943 seconds October 13,20.. 18:05




ETABS 6.20 File: E-AHW-B1.PST Effective Mass: Xtrans 10.8% Ytrans 23.7% Zrotn 0.0%

ETAI

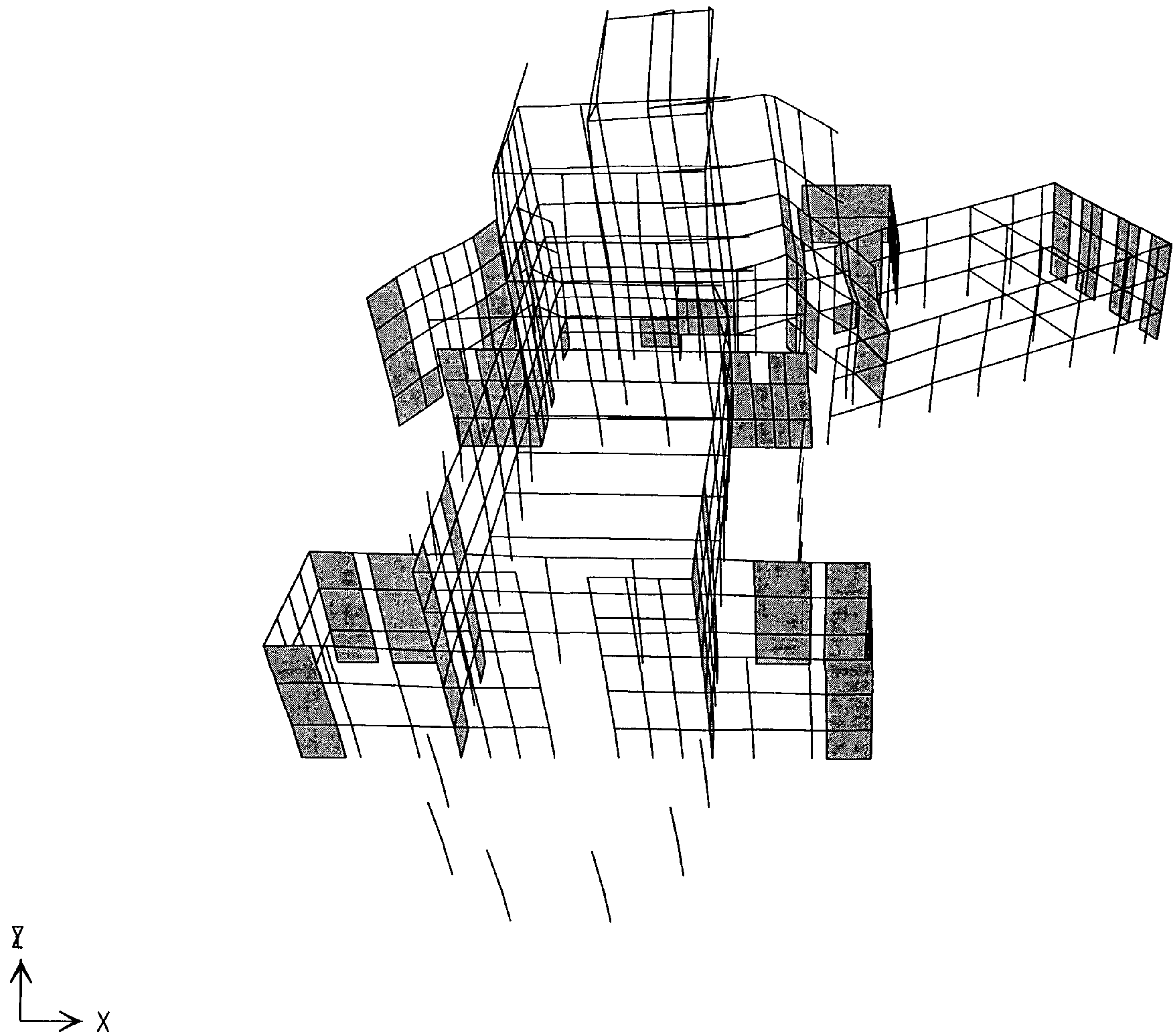
Mode 3 Period 0.2388 seconds October 13,2[illegible] 18:05




ETABS 6.20 File: E-AHW-B1.PST Effective Mass: Xtrans 22.2% Ytrans 7.4% Zrotn 0.9%

ETAB.

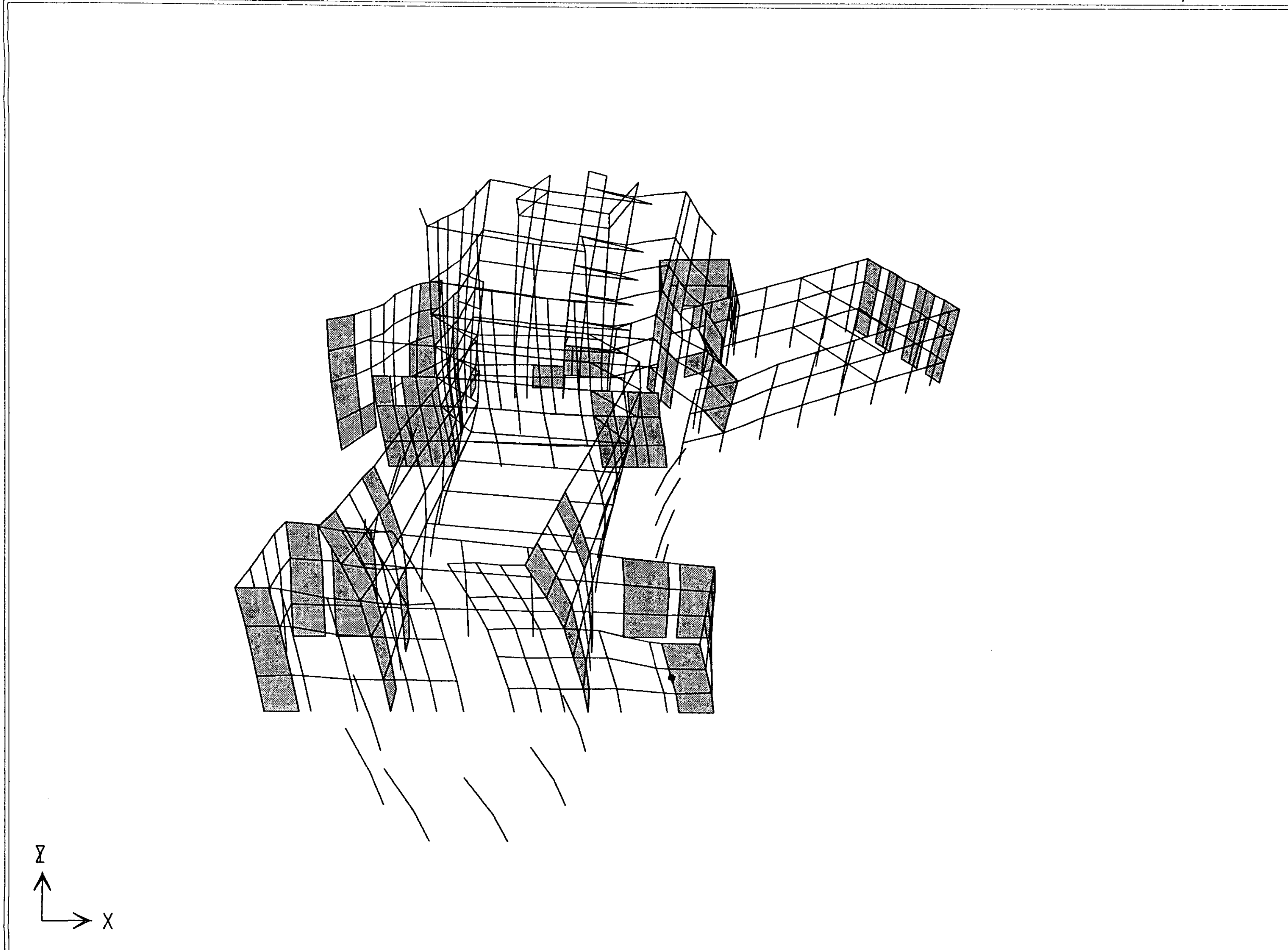
Mode 4 Period 0.1867 seconds October 13,2[illegible] 18:06




ETABS 6.20 File: E-AHW-B1.PST Effective Mass: Xtrans 0.7% Ytrans 21.5% Zrotn 0.9%

ETAE

Mode 5 Period 0.1679 seconds October 13,2 , 18:07




ETABS 6.20 File: E-AHW-B1.PST Effective Mass: Xtrans 2.0% Ytrans 0.0% Zrotn 58.7%

**Summary of Wall or Pier Demand/ Capacity Ratios**
**(Modified Condition)**

# URS

| | | | |
|---|---|---|---|
| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park |
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation |

Sheet No. __________

**Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| **South Wing:** | | | | | | | | | | | | | | | | | | | |
| 1 | S | 15 | | | | | | | | | | | | | | | | | |
| 2 | S | 14 | | | | | | | | | | | | | | | | | |
| 3 | R | 16 | | | | | | | | | | | | | | | | | |
| 4 | R | 13 | | | | | | | | | | | | | | | | | |
| 5 | Q | 16 | | | | | | | | | | | | | | | | | |
| 6 | Q | 13 | | | | | | | | | | | | | | | | | |
| 7 | P | 20 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 123 | 62 | 135 | 45 | 0.35 | 135 | 68 | 0.38 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 118 | 59 | 130 | 43 | 0.34 | 130 | 65 | 0.37 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 167 | 84 | 183 | 61 | 0.48 | 183 | 92 | 0.52 |
| 8 | P | 20-16 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 9 | P | 20-16 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 159 | 53 | 175 | 44 | 0.30 | 175 | 70 | 0.40 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 48 | 16 | 53 | 13 | 0.09 | 53 | 21 | 0.12 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 73 | 24 | 80 | 20 | 0.14 | 80 | 32 | 0.18 |
| 10 | P | 20-16 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 273 | 91 | 300 | 75 | 0.52 | 300 | 120 | 0.68 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 62 | 21 | 68 | 17 | 0.12 | 68 | 27 | 0.16 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 55 | 18 | 60 | 15 | 0.10 | 60 | 24 | 0.14 |
| 11 | P | 16 | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 69 | 35 | 76 | 25 | 0.20 | 76 | 38 | 0.22 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 108 | 54 | 119 | 40 | 0.31 | 119 | 59 | 0.34 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 91 | 46 | 100 | 33 | 0.26 | 100 | 50 | 0.28 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 268 | 134 | 294 | 98 | 0.76 | 294 | 147 | 0.84 |
| | | | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 176 | 298 | 149 | 327 | 109 | 0.85 | 327 | 164 | 0.93 |
| 12 | P | 16-13 | | | | | | | | | | | | | | | | | |
| 13 | P | 16-13 | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 324 | 162 | 356 | 119 | 0.92 | 356 | 178 | 1.01 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 343 | 172 | 377 | 126 | 0.98 | 377 | 188 | 1.07 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 149 | 75 | 164 | 55 | 0.42 | 164 | 82 | 0.47 |
| 14 | P | 16-13 | 4th-5th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 163 | 82 | 179 | 60 | 0.46 | 179 | 89 | 0.51 |
| | | | 3rd-4th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 149 | 75 | 164 | 55 | 0.42 | 164 | 82 | 0.47 |
| | | | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 96 | 32 | 105 | 26 | 0.18 | 105 | 42 | 0.24 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 27 | 9 | 30 | 7 | 0.05 | 30 | 12 | 0.07 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 25 | 8 | 27 | 7 | 0.05 | 27 | 11 | 0.06 |
| 15 | P | 16-13 | 4th-5th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 183 | 92 | 201 | 67 | 0.52 | 201 | 100 | 0.57 |
| | | | 3rd-4th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 196 | 98 | 215 | 72 | 0.56 | 215 | 108 | 0.61 |
| | | | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 74 | 25 | 81 | 20 | 0.14 | 81 | 32 | 0.19 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 31 | 10 | 34 | 9 | 0.06 | 34 | 14 | 0.08 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 22 | 7 | 24 | 6 | 0.04 | 24 | 10 | 0.06 |
| 16 | P | 16-13 | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 385 | 193 | 423 | 141 | 1.10 | 423 | 211 | 1.20 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 511 | 256 | 561 | 187 | 1.46 | 561 | 280 | 1.60 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 176 | 88 | 193 | 64 | 0.50 | 193 | 97 | 0.55 |

**URS**

Sheet No. __________

Job No.: 43-F0066652-15 Job Name: Ahwahnee Hotel, Yosemite National Park

Client.: National Park Service Subject: Structural Analysis for Seismic Rehabilitation

**Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| 17 | P | 16-13 | | | | | | | | | | | | | | | | | |
| 18 | P | 13 | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 242 | 121 | 266 | 89 | 0.69 | 266 | 133 | 0.76 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 568 | 284 | 624 | 208 | 1.62 | 624 | 312 | 1.78 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 377 | 189 | 414 | 138 | 1.07 | 414 | 207 | 1.18 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 165 | 83 | 181 | 60 | 0.47 | 181 | 91 | 0.52 |
| | | | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 176 | 194 | 97 | 213 | 71 | 0.55 | 213 | 106 | 0.61 |
| 19 | P | 13-8 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 266 | 89 | 292 | 73 | 0.51 | 292 | 117 | 0.67 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 53 | 18 | 58 | 15 | 0.10 | 58 | 23 | 0.13 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 63 | 21 | 69 | 17 | 0.12 | 69 | 28 | 0.16 |
| 20 | P | 13-8 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 184 | 61 | 202 | 50 | 0.35 | 202 | 81 | 0.46 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 52 | 17 | 57 | 14 | 0.10 | 57 | 23 | 0.13 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 77 | 26 | 85 | 21 | 0.15 | 85 | 34 | 0.19 |
| 21 | P | 13-8 | | | | | | | | | | | | | | | | | |
| 22 | P | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 123 | 62 | 135 | 45 | 0.35 | 135 | 68 | 0.38 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 123 | 62 | 135 | 45 | 0.35 | 135 | 68 | 0.38 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 168 | 84 | 184 | 61 | 0.48 | 184 | 92 | 0.53 |
| 23 | P+8 | 20 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 112 | 56 | 123 | 41 | 0.32 | 123 | 61 | 0.35 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 347 | 174 | 381 | 127 | 0.99 | 381 | 190 | 1.08 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 320 | 160 | 351 | 117 | 0.91 | 351 | 176 | 1.00 |
| 24 | P+8 | 16 | Mezz-2nd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 43 | 14 | 47 | 12 | 0.08 | 47 | 19 | 0.11 |
| | | | 1st-Mezz | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 49 | 16 | 54 | 13 | 0.09 | 54 | 22 | 0.12 |
| 25 | P+8 | 13 | Mezz-2nd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 61 | 20 | 67 | 17 | 0.12 | 67 | 27 | 0.15 |
| | | | 1st-Mezz | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 66 | 22 | 72 | 18 | 0.13 | 72 | 29 | 0.17 |
| 26 | P+8 | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 121 | 61 | 133 | 44 | 0.34 | 133 | 66 | 0.38 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 461 | 231 | 506 | 169 | 1.31 | 506 | 253 | 1.44 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 444 | 222 | 487 | 162 | 1.26 | 487 | 244 | 1.39 |
| 27 | P+15 | 20 | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 176 | 152 | 76 | 167 | 56 | 0.43 | 167 | 83 | 0.48 |
| 28 | P+15 | 16 | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 269 | 135 | 295 | 98 | 0.77 | 295 | 148 | 0.84 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 247 | 124 | 271 | 90 | 0.70 | 271 | 136 | 0.77 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 279 | 140 | 306 | 102 | 0.79 | 306 | 153 | 0.87 |
| 29 | P+15 | 13 | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 326 | 163 | 358 | 119 | 0.93 | 358 | 179 | 1.02 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 292 | 146 | 321 | 107 | 0.83 | 321 | 160 | 0.91 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 176 | 304 | 152 | 334 | 111 | 0.87 | 334 | 167 | 0.95 |
| 30 | P+15 | 8 | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 176 | 199 | 100 | 218 | 73 | 0.57 | 218 | 109 | 0.62 |
| 31 | P+22 | 20 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 123 | 62 | 135 | 45 | 0.35 | 135 | 68 | 0.38 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 364 | 182 | 400 | 133 | 1.04 | 400 | 200 | 1.14 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 340 | 170 | 373 | 124 | 0.97 | 373 | 187 | 1.06 |
| 32 | P+22 | 16 | 4th-5th | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 62 | 21 | 68 | 17 | 0.12 | 68 | 27 | 0.16 |
| | | | 3rd-4th | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 72 | 24 | 79 | 20 | 0.14 | 79 | 32 | 0.18 |
| | | | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 95 | 32 | 104 | 26 | 0.18 | 104 | 42 | 0.24 |

**URS**

| | | | |
|---|---|---|---|
| | | | Sheet No. ________ |
| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park |
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation |

**Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 74 | 25 | 81 | 20 | 0.14 | 81 | 32 | 0.19 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 44 | 15 | 48 | 12 | 0.08 | 48 | 19 | 0.11 |
| 33 | P+22 | 13 | 4th-5th | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 73 | 24 | 80 | 20 | 0.14 | 80 | 32 | 0.18 |
| | | | 3rd-4th | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 83 | 28 | 91 | 23 | 0.16 | 91 | 36 | 0.21 |
| | | | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 95 | 32 | 104 | 26 | 0.18 | 104 | 42 | 0.24 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 81 | 27 | 89 | 22 | 0.15 | 89 | 36 | 0.20 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 53 | 18 | 58 | 15 | 0.10 | 58 | 23 | 0.13 |
| 34 | P+22 | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 131 | 66 | 144 | 48 | 0.37 | 144 | 72 | 0.41 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 486 | 243 | 533 | 178 | 1.38 | 533 | 267 | 1.52 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 469 | 235 | 515 | 172 | 1.34 | 515 | 257 | 1.47 |
| 35 | N | 18 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 204 | 102 | 224 | 75 | 0.58 | 224 | 112 | 0.64 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 248 | 124 | 272 | 91 | 0.71 | 272 | 136 | 0.78 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 266 | 133 | 292 | 97 | 0.76 | 292 | 146 | 0.83 |
| 36 | N | 17-15 | | | | | | | | | | | | | | | | | |
| 37 | N | 17-15 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 79 | 26 | 87 | 22 | 0.15 | 87 | 35 | 0.20 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 61 | 20 | 67 | 17 | 0.12 | 67 | 27 | 0.15 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 70 | 23 | 77 | 19 | 0.13 | 77 | 31 | 0.18 |
| 38 | N | 17-15 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 83 | 28 | 91 | 23 | 0.16 | 91 | 36 | 0.21 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 60 | 20 | 66 | 16 | 0.11 | 66 | 26 | 0.15 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 67 | 22 | 74 | 18 | 0.13 | 74 | 29 | 0.17 |
| 39 | N | 16 | 4th-5th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 182 | 91 | 200 | 67 | 0.52 | 200 | 100 | 0.57 |
| | | | 3rd-4th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 253 | 127 | 278 | 93 | 0.72 | 278 | 139 | 0.79 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 347 | 174 | 381 | 127 | 0.99 | 381 | 190 | 1.08 |
| 40 | N | 15-12 | | | | | | | | | | | | | | | | | |
| 41 | N | 15-12 | | | | | | | | | | | | | | | | | |
| 42 | N | 13 | 4th-5th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 180 | 90 | 198 | 66 | 0.51 | 198 | 99 | 0.56 |
| | | | 3rd-4th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 244 | 122 | 268 | 89 | 0.69 | 268 | 134 | 0.76 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 404 | 202 | 443 | 148 | 1.15 | 443 | 222 | 1.26 |
| 43 | N | 12-9 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 81 | 27 | 89 | 22 | 0.15 | 89 | 36 | 0.20 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 59 | 20 | 65 | 16 | 0.11 | 65 | 26 | 0.15 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 66 | 22 | 72 | 18 | 0.13 | 72 | 29 | 0.17 |
| 44 | N | 12-9 | 2nd-3rd | 10.5 | 2 | 5.25 | Flexure | 3 | 4 | 2.5 | 176 | 77 | 26 | 85 | 21 | 0.15 | 85 | 34 | 0.19 |
| | | | Mezz-2nd | 13 | 2 | 6.50 | Flexure | 3 | 4 | 2.5 | 176 | 60 | 20 | 66 | 16 | 0.11 | 66 | 26 | 0.15 |
| | | | 1st-Mezz | 15 | 2 | 7.50 | Flexure | 3 | 4 | 2.5 | 176 | 70 | 23 | 77 | 19 | 0.13 | 77 | 31 | 0.18 |
| 45 | N | 12-9 | | | | | | | | | | | | | | | | | |
| 46 | N | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 202 | 101 | 222 | 74 | 0.58 | 222 | 111 | 0.63 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 252 | 126 | 277 | 92 | 0.72 | 277 | 138 | 0.79 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 274 | 137 | 301 | 100 | 0.78 | 301 | 150 | 0.86 |
| 47 | M | 16 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 125 | 63 | 137 | 46 | 0.36 | 137 | 69 | 0.39 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 217 | 109 | 238 | 79 | 0.62 | 238 | 119 | 0.68 |

**URS**

Sheet No. __________

| | | | |
|---|---|---|---|
| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park |
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation |

**Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 374 | 187 | 411 | 137 | 1.07 | 411 | 205 | 1.17 |
| 48 | M | 13 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 143 | 72 | 157 | 52 | 0.41 | 157 | 78 | 0.45 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 261 | 131 | 287 | 96 | 0.74 | 287 | 143 | 0.82 |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 337 | 169 | 370 | 123 | 0.96 | 370 | 185 | 1.05 |
| 49 | L | 16 | 4th-5th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 104 | 52 | 114 | 38 | 0.30 | 114 | 57 | 0.33 |
| | | | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 193 | 97 | 212 | 71 | 0.55 | 212 | 106 | 0.60 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 276 | 138 | 303 | 101 | 0.79 | 303 | 151 | 0.86 |
| 50 | L | 13 | 4th-5th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 119 | 60 | 131 | 44 | 0.34 | 131 | 65 | 0.37 |
| | | | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 237 | 119 | 260 | 87 | 0.68 | 260 | 130 | 0.74 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 265 | 133 | 291 | 97 | 0.75 | 291 | 145 | 0.83 |
| 51 | K | 16 | 4th-5th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 115 | 58 | 126 | 42 | 0.33 | 126 | 63 | 0.36 |
| | | | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 206 | 103 | 226 | 75 | 0.59 | 226 | 113 | 0.64 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 298 | 149 | 327 | 109 | 0.85 | 327 | 164 | 0.93 |
| 52 | K | 13 | 4th-5th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 121 | 61 | 133 | 44 | 0.34 | 133 | 66 | 0.38 |
| | | | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 241 | 121 | 265 | 88 | 0.69 | 265 | 132 | 0.75 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 290 | 145 | 318 | 106 | 0.83 | 318 | 159 | 0.91 |
| 53 | J | 16 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 157 | 79 | 172 | 57 | 0.45 | 172 | 86 | 0.49 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 251 | 126 | 276 | 92 | 0.71 | 276 | 138 | 0.78 |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 354 | 177 | 389 | 130 | 1.01 | 389 | 194 | 1.11 |
| 54 | J | 13 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 137 | 69 | 150 | 50 | 0.39 | 150 | 75 | 0.43 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 254 | 127 | 279 | 93 | 0.72 | 279 | 139 | 0.79 |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 379 | 190 | 416 | 139 | 1.08 | 416 | 208 | 1.19 |
| 55 | M | 18 | | | | | | | | | | | | | | | | | |
| 56 | M | 11 | | | | | | | | | | | | | | | | | |
| 57 | L | 18 | | | | | | | | | | | | | | | | | |
| 58 | L | 11 | | | | | | | | | | | | | | | | | |
| 59 | K | 18 | | | | | | | | | | | | | | | | | |
| 60 | K | 11 | | | | | | | | | | | | | | | | | |
| 61 | J | 18 | | | | | | | | | | | | | | | | | |
| 62 | J | 11 | | | | | | | | | | | | | | | | | |
| W1 | N | 20-18 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 315 | 158 | 346 | 115 | 0.90 | 346 | 173 | 0.98 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 317 | 159 | 348 | 116 | 0.90 | 348 | 174 | 0.99 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 315 | 158 | 346 | 115 | 0.90 | 346 | 173 | 0.98 |
| W2 | N | 18-17 | 2nd-3rd | 10.5 | 12 | 0.88 | Shear | 2 | 3 | 2 | 176 | 541 | 271 | 594 | 198 | 1.54 | 594 | 297 | 1.69 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 476 | 238 | 523 | 174 | 1.36 | 523 | 261 | 1.49 |
| | | | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 176 | 397 | 199 | 436 | 145 | 1.13 | 436 | 218 | 1.24 |
| W3 | N | 12-11 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 596 | 298 | 654 | 218 | 1.70 | 654 | 327 | 1.86 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 505 | 253 | 554 | 185 | 1.44 | 554 | 277 | 1.58 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 176 | 403 | 202 | 442 | 147 | 1.15 | 442 | 221 | 1.26 |
| W4 | N | 11-8 | 2nd-3rd | 10.5 | 12 | 0.88 | Shear | 2 | 3 | 2 | 176 | 333 | 167 | 366 | 122 | 0.95 | 366 | 183 | 1.04 |

**URS**

Sheet No. ________

| | | | |
|---|---|---|---|
| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park |
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation |

**Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 176 | 331 | 166 | 363 | 121 | 0.94 | 363 | 182 | 1.03 |
| | | | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 176 | 324 | 162 | 356 | 119 | 0.92 | 356 | 178 | 1.01 |
| W14 | P | 17 | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 291 | 106 | 53 | 116 | 39 | 0.18 | 116 | 58 | 0.20 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 291 | 147 | 74 | 161 | 54 | 0.25 | 161 | 81 | 0.28 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 291 | 115 | 58 | 126 | 42 | 0.20 | 126 | 63 | 0.22 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 291 | 292 | 146 | 321 | 107 | 0.50 | 321 | 160 | 0.55 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 291 | 387 | 194 | 425 | 142 | 0.66 | 425 | 212 | 0.73 |
| W15 | N | 17 | 4th-5th | 10.5 | 6.5 | 1.62 | Shear | 2 | 3 | 2 | 291 | 255 | 128 | 280 | 93 | 0.44 | 280 | 140 | 0.48 |
| | | | 3rd-4th | 10.5 | 6.5 | 1.62 | Shear | 2 | 3 | 2 | 291 | 355 | 178 | 390 | 130 | 0.61 | 390 | 195 | 0.67 |
| W16 | N | 17 | Mezz-2nd | 13 | 6.5 | 2.00 | Shear | 2 | 3 | 2 | 291 | 347 | 174 | 381 | 127 | 0.60 | 381 | 190 | 0.65 |
| | | | 1st-Mezz | 15 | 6.5 | 2.31 | Shear | 2 | 3 | 2 | 291 | 306 | 153 | 336 | 112 | 0.53 | 336 | 168 | 0.58 |
| W17 | P | 17 | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 291 | 195 | 98 | 214 | 71 | 0.33 | 214 | 107 | 0.37 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 291 | 261 | 131 | 287 | 96 | 0.45 | 287 | 143 | 0.49 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 291 | 176 | 88 | 193 | 64 | 0.30 | 193 | 97 | 0.33 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 291 | 431 | 216 | 473 | 158 | 0.74 | 473 | 237 | 0.81 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 291 | 513 | 257 | 563 | 188 | 0.88 | 563 | 282 | 0.97 |
| W18 | N | 13 | 4th-5th | 10.5 | 6.5 | 1.62 | Shear | 2 | 3 | 2 | 291 | 296 | 148 | 325 | 108 | 0.51 | 325 | 162 | 0.56 |
| | | | 3rd-4th | 10.5 | 6.5 | 1.62 | Shear | 2 | 3 | 2 | 291 | 374 | 187 | 411 | 137 | 0.64 | 411 | 205 | 0.70 |
| W19 | N | 13 | Mezz-2nd | 13 | 6.5 | 2.00 | Shear | 2 | 3 | 2 | 291 | 388 | 194 | 426 | 142 | 0.67 | 426 | 213 | 0.73 |
| | | | 1st-Mezz | 15 | 6.5 | 2.31 | Shear | 2 | 3 | 2 | 291 | 367 | 184 | 403 | 134 | 0.63 | 403 | 201 | 0.69 |
| W20 | P | 20 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 291 | 176 | 88 | 193 | 64 | 0.30 | 193 | 97 | 0.33 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 291 | 217 | 109 | 238 | 79 | 0.37 | 238 | 119 | 0.41 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 291 | 289 | 145 | 317 | 106 | 0.50 | 317 | 159 | 0.54 |
| W21 | P | 8 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 291 | 178 | 89 | 195 | 65 | 0.31 | 195 | 98 | 0.34 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 291 | 225 | 113 | 247 | 82 | 0.39 | 247 | 123 | 0.42 |
| | | | 1st-Mezz | 15 | 9 | 1.67 | Shear | 2 | 3 | 2 | 291 | 292 | 146 | 321 | 107 | 0.50 | 321 | 160 | 0.55 |
| North Wing (Gift Shop): | | | | | | | | | | | | | | | | | | | |
| 71 | HH | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 370 | 123 | 406 | 102 | 0.70 | 406 | 162 | 0.93 |
| | | | 1st-Mezz | 15 | 3 | 5.00 | Flexure | 3 | 4 | 2.5 | 176 | 119 | 40 | 131 | 33 | 0.23 | 131 | 52 | 0.30 |
| 72 | HH | 40 | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 120 | 60 | 132 | 44 | 0.34 | 132 | 66 | 0.38 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 120 | 60 | 132 | 44 | 0.34 | 132 | 66 | 0.38 |
| 73 | HH/JJ | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 111 | 37 | 122 | 30 | 0.21 | 122 | 49 | 0.28 |
| | | | | | | | | | | | | | | | | | | | |
| 74 | HH/JJ | 40 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 72 | 24 | 79 | 20 | 0.14 | 79 | 32 | 0.18 |
| | | | | | | | | | | | | | | | | | | | |
| 75 | JJ | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 95 | 32 | 104 | 26 | 0.18 | 104 | 42 | 0.24 |
| | | | 1st-Mezz | 15 | 11 | 1.36 | Shear | 2 | 3 | 2 | 176 | 289 | 145 | 317 | 106 | 0.82 | 317 | 159 | 0.90 |
| 76 | JJ | 40 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 76 | 25 | 83 | 21 | 0.14 | 83 | 33 | 0.19 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 176 | 170 | 57 | 187 | 47 | 0.32 | 187 | 75 | 0.43 |
| 77 | JJ/KK | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 116 | 39 | 127 | 32 | 0.22 | 127 | 51 | 0.29 |

F.6.8

**Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| 78 | JJ/KK | 40 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 75 | 25 | 82 | 21 | 0.14 | 82 | 33 | 0.19 |
| 79 | KK | 39 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 120 | 40 | 132 | 33 | 0.23 | 132 | 53 | 0.30 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 222 | 111 | 244 | 81 | 0.63 | 244 | 122 | 0.69 |
| 80 | KK | 40 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 70 | 23 | 77 | 19 | 0.13 | 77 | 31 | 0.18 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 234 | 117 | 257 | 86 | 0.67 | 257 | 128 | 0.73 |
| 81 | KK/LL | 39 | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 176 | 153 | 77 | 168 | 56 | 0.44 | 168 | 84 | 0.48 |
| 82 | KK/LL | 40 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 96 | 32 | 105 | 26 | 0.18 | 105 | 42 | 0.24 |
| 83 | LL | 39 | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 176 | 117 | 59 | 128 | 43 | 0.33 | 128 | 64 | 0.37 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 176 | 161 | 81 | 177 | 59 | 0.46 | 177 | 88 | 0.50 |
| 84 | LL | 40 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 67 | 22 | 74 | 18 | 0.13 | 74 | 29 | 0.17 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 176 | 114 | 38 | 125 | 31 | 0.22 | 125 | 50 | 0.29 |
| 85 | A | 10 | | | | | | | | | | | | | | | | | |
| W5 | LL | 39-40 | Mezz-2nd | 13 | 29 | 0.45 | Shear | 2 | 3 | 2 | 176 | 47 | 24 | 52 | 17 | 0.13 | 52 | 26 | 0.15 |
| | | | 1st-Mezz | 15 | 29 | 0.52 | Shear | 2 | 3 | 2 | 176 | 80 | 40 | 88 | 29 | 0.23 | 88 | 44 | 0.25 |
| **West Wing (Dining Area):** | | | | | | | | | | | | | | | | | | | |
| 101 | T | 22 | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 106 | 53 | 116 | 39 | 0.30 | 116 | 58 | 0.33 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 69 | 35 | 76 | 25 | 0.20 | 76 | 38 | 0.22 |
| | | | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 78 | 26 | 86 | 21 | 0.15 | 86 | 34 | 0.20 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 176 | 73 | 24 | 80 | 20 | 0.14 | 80 | 32 | 0.18 |
| 102 | T-Y | 22 | | | | | | | | | | | | | | | | | |
| 103 | T-Y | 22 | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 233 | 117 | 256 | 85 | 0.66 | 256 | 128 | 0.73 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 293 | 147 | 322 | 107 | 0.83 | 322 | 161 | 0.92 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 283 | 142 | 311 | 104 | 0.81 | 311 | 155 | 0.88 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 176 | 109 | 55 | 120 | 40 | 0.31 | 120 | 60 | 0.34 |
| 104 | T-Y | 22 | | | | | | | | | | | | | | | | | |
| 105 | T-Y | 22 | | | | | | | | | | | | | | | | | |
| 106 | T-Y | 22 | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 177 | 89 | 194 | 65 | 0.50 | 194 | 97 | 0.55 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 234 | 117 | 257 | 86 | 0.67 | 257 | 128 | 0.73 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 235 | 118 | 258 | 86 | 0.67 | 258 | 129 | 0.73 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 176 | 95 | 48 | 104 | 35 | 0.27 | 104 | 52 | 0.30 |
| 107 | T-Y | 22 | | | | | | | | | | | | | | | | | |
| 108 | Y | 22 | 3rd-4th | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 107 | 54 | 117 | 39 | 0.30 | 117 | 59 | 0.33 |
| | | | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 150 | 75 | 165 | 55 | 0.43 | 165 | 82 | 0.47 |
| | | | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 176 | 105 | 35 | 115 | 29 | 0.20 | 115 | 46 | 0.26 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 176 | 82 | 27 | 90 | 23 | 0.16 | 90 | 36 | 0.21 |
| 109 | Y+9' | 22 | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 64 | 32 | 70 | 23 | 0.18 | 70 | 35 | 0.20 |

**URS**

Sheet No. ________

| | | | |
|---|---|---|---|
| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park |
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation |

**Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 223 | 112 | 245 | 82 | 0.64 | 245 | 122 | 0.70 |
| 110 | T | 21 | | | | | | | | | | | | | | | | | |
| 111 | Y | 21-22 | | | | | | | | | | | | | | | | | |
| 112 | Y | 21-22 | | | | | | | | | | | | | | | | | |
| 113 | Y+9' | 21-22 | 3rd-4th | 10.5 | 3.5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 44 | 22 | 48 | 16 | 0.13 | 48 | 24 | 0.14 |
| | | | 2nd-3rd | 10.5 | 3.5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 126 | 63 | 138 | 46 | 0.36 | 138 | 69 | 0.39 |
| W50 | T | 22 | 3rd-4th | 10.5 | 11 | 0.95 | Shear | 2 | 3 | 2 | 291 | 200 | 100 | 220 | 73 | 0.34 | 220 | 110 | 0.38 |
| | | | 2nd-3rd | 10.5 | 11 | 0.95 | Shear | 2 | 3 | 2 | 291 | 134 | 67 | 147 | 49 | 0.23 | 147 | 74 | 0.25 |
| | | | Mezz-2nd | 13 | 11 | 1.18 | Shear | 2 | 3 | 2 | 291 | 282 | 141 | 310 | 103 | 0.48 | 310 | 155 | 0.53 |
| | | | 1st-Mezz | 15 | 11 | 1.36 | Shear | 2 | 3 | 2 | 291 | 288 | 144 | 316 | 105 | 0.49 | 316 | 158 | 0.54 |
| W51 | T-U | 22 | 1st-Mezz | 15 | 7 | 2.14 | Shear | 2 | 3 | 2 | 291 | 272 | 136 | 299 | 100 | 0.47 | 299 | 149 | 0.51 |
| W52 | X-Y | 22 | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 291 | 189 | 95 | 207 | 69 | 0.32 | 207 | 104 | 0.36 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 291 | 186 | 93 | 204 | 68 | 0.32 | 204 | 102 | 0.35 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 291 | 298 | 149 | 327 | 109 | 0.51 | 327 | 164 | 0.56 |
| | | | 1st-Mezz | 15 | 10 | 1.50 | Shear | 2 | 3 | 2 | 291 | 274 | 137 | 301 | 100 | 0.47 | 301 | 150 | 0.52 |
| W53 | X-Y | 22 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 291 | 119 | 40 | 131 | 33 | 0.14 | 131 | 52 | 0.18 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 291 | 107 | 36 | 117 | 29 | 0.12 | 117 | 47 | 0.16 |
| **Central Core:** | | | | | | | | | | | | | | | | | | | |
| 114 | H | 18-16 | | | | | | | | | | | | | | | | | |
| 115 | H | 18-16 | | | | | | | | | | | | | | | | | |
| 116 | H | 18-16 | | | | | | | | | | | | | | | | | |
| 117 | H | 18-16 | | | | | | | | | | | | | | | | | |
| 118 | H | 16 | PH-Roof | 8.75 | 8 | 1.09 | Shear | 2 | 3 | 2 | 176 | 166 | 83 | 182 | 61 | 0.47 | 182 | 91 | 0.52 |
| | | | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 238 | 119 | 261 | 87 | 0.68 | 261 | 131 | 0.74 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 155 | 78 | 170 | 57 | 0.44 | 170 | 85 | 0.48 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 233 | 117 | 256 | 85 | 0.66 | 256 | 128 | 0.73 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 351 | 176 | 385 | 128 | 1.00 | 385 | 193 | 1.10 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 251 | 126 | 276 | 92 | 0.71 | 276 | 138 | 0.78 |
| 119 | H/G | 16 | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 276 | 138 | 303 | 101 | 0.79 | 303 | 151 | 0.86 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 372 | 186 | 408 | 136 | 1.06 | 408 | 204 | 1.16 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 170 | 85 | 187 | 62 | 0.48 | 187 | 93 | 0.53 |
| 120 | H/G | 16 | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 299 | 150 | 328 | 109 | 0.85 | 328 | 164 | 0.93 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 403 | 202 | 442 | 147 | 1.15 | 442 | 221 | 1.26 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 168 | 84 | 184 | 61 | 0.48 | 184 | 92 | 0.53 |
| 121 | H/G | 16 | | | | | | | | | | | | | | | | | |
| 122 | G | 16 | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 319 | 160 | 350 | 117 | 0.91 | 350 | 175 | 1.00 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 418 | 209 | 459 | 153 | 1.19 | 459 | 229 | 1.31 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 118 | 59 | 130 | 43 | 0.34 | 130 | 65 | 0.37 |
| 123 | E | 16 | 6th-PH | 17 | 5 | 3.40 | Flexure | 3 | 4 | 2.5 | 176 | 145 | 48 | 159 | 40 | 0.28 | 159 | 64 | 0.36 |
| | | | 5th-6th | 10.63 | 10 | 1.06 | Shear | 2 | 3 | 2 | 176 | 90 | 45 | 99 | 33 | 0.26 | 99 | 49 | 0.28 |

### Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 151 | 76 | 166 | 55 | 0.43 | 166 | 83 | 0.47 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 113 | 57 | 124 | 41 | 0.32 | 124 | 62 | 0.35 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 121 | 61 | 133 | 44 | 0.34 | 133 | 66 | 0.38 |
| | | | Mezz-2nd | 13 | 13 | 1.00 | Shear | 2 | 3 | 2 | 176 | 110 | 55 | 121 | 40 | 0.31 | 121 | 60 | 0.34 |
| | | | 1st-Mezz | 15 | 7 | 2.14 | Shear | 2 | 3 | 2 | 176 | 198 | 99 | 217 | 72 | 0.56 | 217 | 109 | 0.62 |
| 124 | E | 16-15 | | | | | | | | | | | | | | | | | |
| 125 | H | 15 | 6th-PH | 17 | 3.5 | 4.86 | Flexure | 3 | 4 | 2.5 | 176 | 230 | 77 | 252 | 63 | 0.44 | 252 | 101 | 0.58 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 61 | 31 | 67 | 22 | 0.17 | 67 | 33 | 0.19 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 90 | 45 | 99 | 33 | 0.26 | 99 | 49 | 0.28 |
| 126 | E | 15 | 6th-PH | 17 | 10 | 1.70 | Shear | 2 | 3 | 2 | 176 | 169 | 85 | 186 | 62 | 0.48 | 186 | 93 | 0.53 |
| | | | 5th-6th | 10.63 | 6 | 1.77 | Shear | 2 | 3 | 2 | 176 | 144 | 72 | 158 | 53 | 0.41 | 158 | 79 | 0.45 |
| | | | 4th-5th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 264 | 132 | 290 | 97 | 0.75 | 290 | 145 | 0.83 |
| | | | 3rd-4th | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 171 | 86 | 188 | 63 | 0.49 | 188 | 94 | 0.53 |
| | | | 2nd-3rd | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 140 | 70 | 154 | 51 | 0.40 | 154 | 77 | 0.44 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 176 | 115 | 58 | 126 | 42 | 0.33 | 126 | 63 | 0.36 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 176 | 189 | 95 | 207 | 69 | 0.54 | 207 | 104 | 0.59 |
| 127 | E+8' | 15 | | | | | | | | | | | | | | | | | |
| 128 | E+8' | 15-14 | | | | | | | | | | | | | | | | | |
| 129 | E+8' | 15-14 | | | | | | | | | | | | | | | | | |
| 130 | H | 14 | 6th-PH | 17 | 3.5 | 4.86 | Flexure | 3 | 4 | 2.5 | 176 | 242 | 81 | 266 | 66 | 0.46 | 266 | 106 | 0.61 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 69 | 35 | 76 | 25 | 0.20 | 76 | 38 | 0.22 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 101 | 51 | 111 | 37 | 0.29 | 111 | 55 | 0.32 |
| 131 | E | 14 | PH-Roof | 8.75 | 5 | 1.75 | Shear | 2 | 3 | 2 | 176 | 159 | 80 | 175 | 58 | 0.45 | 175 | 87 | 0.50 |
| | | | 6th-PH | 17 | 10 | 1.70 | Shear | 2 | 3 | 2 | 176 | 171 | 86 | 188 | 63 | 0.49 | 188 | 94 | 0.53 |
| | | | 5th-6th | 10.63 | 13 | 0.82 | Shear | 2 | 3 | 2 | 176 | 86 | 43 | 94 | 31 | 0.24 | 94 | 47 | 0.27 |
| | | | 4th-5th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 123 | 62 | 135 | 45 | 0.35 | 135 | 68 | 0.38 |
| | | | 3rd-4th | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 136 | 68 | 149 | 50 | 0.39 | 149 | 75 | 0.43 |
| | | | 2nd-3rd | 10.5 | 13 | 0.81 | Shear | 2 | 3 | 2 | 176 | 167 | 84 | 183 | 61 | 0.48 | 183 | 92 | 0.52 |
| | | | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 176 | 119 | 60 | 131 | 44 | 0.34 | 131 | 65 | 0.37 |
| 132 | E+8' | 14 | | | | | | | | | | | | | | | | | |
| 133 | E | 14-13 | | | | | | | | | | | | | | | | | |
| 134 | E | 14-13 | PH-Roof | 8.75 | 5 | 1.75 | Shear | 2 | 3 | 2 | 176 | 234 | 117 | 257 | 86 | 0.67 | 257 | 128 | 0.73 |
| | | | 6th-PH | 17 | 7 | 2.43 | Shear | 2 | 3 | 2 | 176 | 271 | 136 | 297 | 99 | 0.77 | 297 | 149 | 0.85 |
| | | | 5th-6th | 10.63 | 7 | 1.52 | Shear | 2 | 3 | 2 | 176 | 277 | 139 | 304 | 101 | 0.79 | 304 | 152 | 0.87 |
| | | | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 287 | 144 | 315 | 105 | 0.82 | 315 | 158 | 0.90 |
| | | | 3rd-4th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 217 | 109 | 238 | 79 | 0.62 | 238 | 119 | 0.68 |
| | | | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 201 | 101 | 221 | 74 | 0.57 | 221 | 110 | 0.63 |
| | | | Mezz-2nd | 13 | 7 | 1.86 | Shear | 2 | 3 | 2 | 176 | 114 | 57 | 125 | 42 | 0.32 | 125 | 63 | 0.36 |
| 135 | H | 13 | PH-Roof | 8.75 | 8 | 1.09 | Shear | 2 | 3 | 2 | 176 | 162 | 81 | 178 | 59 | 0.46 | 178 | 89 | 0.51 |
| | | | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 237 | 119 | 260 | 87 | 0.68 | 260 | 130 | 0.74 |

**URS**

Sheet No. ________

Job No.: 43-F0066652-15 Job Name: Ahwahnee Hotel, Yosemite National Park
Client.: National Park Service Subject: Structural Analysis for Seismic Rehabilitation

## Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 176 | 132 | 66 | 145 | 48 | 0.38 | 145 | 72 | 0.41 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 258 | 129 | 283 | 94 | 0.73 | 283 | 142 | 0.81 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 302 | 151 | 332 | 111 | 0.86 | 332 | 166 | 0.94 |
| | | | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 293 | 147 | 322 | 107 | 0.83 | 322 | 161 | 0.92 |
| 136 | E | 13 | | | | | | | | | | | | | | | | | |
| 137 | E | 13-11 | | | | | | | | | | | | | | | | | |
| 138 | E | 13-11 | | | | | | | | | | | | | | | | | |
| 139 | E | 13-11 | | | | | | | | | | | | | | | | | |
| 140 | E | 13-11 | | | | | | | | | | | | | | | | | |
| 141 | H+10' | 13 | | | | | | | | | | | | | | | | | |
| 142 | F | 15-14 | | | | | | | | | | | | | | | | | |
| 143 | F | 13 | | | | | | | | | | | | | | | | | |
| 144 | E | 13-14 | | | | | | | | | | | | | | | | | |
| 145 | E | 15 | | | | | | | | | | | | | | | | | |
| 146 | E-F | 16 | 6th-PH | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 80 | 40 | 88 | 29 | 0.23 | 88 | 44 | 0.25 |
| | | | 5th-6th | 10.63 | 8 | 1.33 | Shear | 2 | 3 | 2 | 291 | 107 | 54 | 117 | 39 | 0.18 | 117 | 59 | 0.20 |
| | | | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 291 | 29 | 15 | 32 | 11 | 0.05 | 32 | 16 | 0.05 |
| 147 | H | 16-15 | 5th-6th | 10.63 | 10 | 1.06 | Shear | 2 | 3 | 2 | 291 | 539 | 270 | 592 | 197 | 0.92 | 592 | 296 | 1.02 |
| | | | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 291 | 469 | 235 | 515 | 172 | 0.80 | 515 | 257 | 0.88 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 291 | 499 | 250 | 548 | 183 | 0.86 | 548 | 274 | 0.94 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 291 | 324 | 162 | 356 | 119 | 0.56 | 356 | 178 | 0.61 |
| 148 | H | 16-15 | 5th-6th | 10.63 | 4 | 2.66 | Shear | 2 | 3 | 2 | 291 | 668 | 334 | 733 | 244 | 1.15 | 733 | 367 | 1.26 |
| | | | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 291 | 596 | 298 | 654 | 218 | 1.02 | 654 | 327 | 1.12 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 291 | 505 | 253 | 554 | 185 | 0.87 | 554 | 277 | 0.95 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 291 | 322 | 161 | 353 | 118 | 0.55 | 353 | 177 | 0.61 |
| 149 | H | 14-13 | 5th-6th | 10.63 | 4 | 2.66 | Shear | 2 | 3 | 2 | 291 | 435 | 218 | 478 | 159 | 0.75 | 478 | 239 | 0.82 |
| | | | 4th-5th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 291 | 398 | 199 | 437 | 146 | 0.68 | 437 | 218 | 0.75 |
| | | | 3rd-4th | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 291 | 362 | 181 | 397 | 132 | 0.62 | 397 | 199 | 0.68 |
| | | | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 291 | 222 | 111 | 244 | 81 | 0.38 | 244 | 122 | 0.42 |
| 150 | H | 14-13 | 5th-6th | 10.63 | 10 | 1.06 | Shear | 2 | 3 | 2 | 291 | 452 | 226 | 496 | 165 | 0.78 | 496 | 248 | 0.85 |
| | | | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 291 | 401 | 201 | 440 | 147 | 0.69 | 440 | 220 | 0.76 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 291 | 474 | 237 | 520 | 173 | 0.81 | 520 | 260 | 0.89 |
| | | | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 291 | 247 | 124 | 271 | 90 | 0.42 | 271 | 136 | 0.47 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 291 | 375 | 188 | 412 | 137 | 0.64 | 412 | 206 | 0.71 |
| W12 | E | 16 | 1st-Mezz | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 348 | 174 | 382 | 127 | 0.99 | 382 | 191 | 1.09 |
| W13 | E | 14 | 1st-Mezz | 17 | 8 | 2.13 | Shear | 2 | 3 | 2 | 176 | 288 | 144 | 316 | 105 | 0.82 | 316 | 158 | 0.90 |
| W33 | H | 12 | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 291 | 408 | 204 | 448 | 149 | 0.70 | 448 | 224 | 0.77 |
| | | | Mezz-2nd | 13 | 7 | 1.86 | Shear | 2 | 3 | 2 | 291 | 449 | 225 | 493 | 164 | 0.77 | 493 | 246 | 0.85 |
| | | | 1st-Mezz | 15 | 7 | 2.14 | Shear | 2 | 3 | 2 | 291 | 530 | 265 | 582 | 194 | 0.91 | 582 | 291 | 1.00 |
| W34 | H | 12 | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 291 | 296 | 148 | 325 | 108 | 0.51 | 325 | 162 | 0.56 |

F-70

**URS**

| | | | |
|---|---|---|---|
| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park |
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation |

Sheet No. ________

## Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 291 | 372 | 186 | 408 | 136 | 0.64 | 408 | 204 | 0.70 |
| W35 | H | 11 | 2nd-3rd | 10.5 | 4 | 2.63 | Shear | 2 | 3 | 2 | 291 | 241 | 121 | 265 | 88 | 0.41 | 265 | 132 | 0.45 |
| | | | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 291 | 188 | 63 | 206 | 52 | 0.22 | 206 | 83 | 0.28 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 291 | 265 | 88 | 291 | 73 | 0.30 | 291 | 116 | 0.40 |
| W36 | H | 10 | 2nd-3rd | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 291 | 333 | 167 | 366 | 122 | 0.57 | 366 | 183 | 0.63 |
| | | | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 291 | 282 | 141 | 310 | 103 | 0.48 | 310 | 155 | 0.53 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 291 | 399 | 200 | 438 | 146 | 0.68 | 438 | 219 | 0.75 |
| W37 | H | 12 | 2nd-3rd | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 291 | 279 | 140 | 306 | 102 | 0.48 | 306 | 153 | 0.53 |
| | | | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 291 | 279 | 140 | 306 | 102 | 0.48 | 306 | 153 | 0.53 |
| | | | 1st-Mezz | 15 | 6 | 2.50 | Shear | 2 | 3 | 2 | 291 | 377 | 189 | 414 | 138 | 0.65 | 414 | 207 | 0.71 |
| W38 | H | 11 | Mezz-2nd | 13 | 4 | 3.25 | Flexure | 3 | 4 | 2.5 | 291 | 186 | 62 | 204 | 51 | 0.21 | 204 | 82 | 0.28 |
| | | | 1st-Mezz | 15 | 4 | 3.75 | Flexure | 3 | 4 | 2.5 | 291 | 264 | 88 | 290 | 72 | 0.30 | 290 | 116 | 0.40 |
| W39 | H | 10 | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 291 | 306 | 153 | 336 | 112 | 0.53 | 336 | 168 | 0.58 |
| | | | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 291 | 283 | 142 | 311 | 104 | 0.49 | 311 | 155 | 0.53 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 291 | 363 | 182 | 398 | 133 | 0.62 | 398 | 199 | 0.68 |
| W40 | H | 10 | 2nd-3rd | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 291 | 335 | 168 | 368 | 123 | 0.57 | 368 | 184 | 0.63 |
| | | | Mezz-2nd | 13 | 7 | 1.86 | Shear | 2 | 3 | 2 | 291 | 444 | 222 | 487 | 162 | 0.76 | 487 | 244 | 0.84 |
| | | | 1st-Mezz | 15 | 7 | 2.14 | Shear | 2 | 3 | 2 | 291 | 471 | 236 | 517 | 172 | 0.81 | 517 | 259 | 0.89 |
| W41 | H | 16 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 291 | 341 | 171 | 374 | 125 | 0.59 | 374 | 187 | 0.64 |
| W42 | H | 16 | Mezz-2nd | 13 | 7 | 1.86 | Shear | 2 | 3 | 2 | 291 | 430 | 215 | 472 | 157 | 0.74 | 472 | 236 | 0.81 |
| | | | 1st-Mezz | 15 | 7 | 2.14 | Shear | 2 | 3 | 2 | 291 | 318 | 159 | 349 | 116 | 0.55 | 349 | 175 | 0.60 |
| W43 | G | 16 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 291 | 285 | 143 | 313 | 104 | 0.49 | 313 | 156 | 0.54 |
| W44 | G | 16 | Mezz-2nd | 13 | 7 | 1.86 | Shear | 2 | 3 | 2 | 291 | 415 | 208 | 456 | 152 | 0.71 | 456 | 228 | 0.78 |
| | | | 1st-Mezz | 15 | 7 | 2.14 | Shear | 2 | 3 | 2 | 291 | 349 | 175 | 383 | 128 | 0.60 | 383 | 192 | 0.66 |
| W45 | F | 16 | 4th-5th | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 291 | 157 | 79 | 172 | 57 | 0.27 | 172 | 86 | 0.30 |
| | | | 3rd-4th | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 291 | 255 | 128 | 280 | 93 | 0.44 | 280 | 140 | 0.48 |
| | | | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 291 | 411 | 206 | 451 | 150 | 0.71 | 451 | 226 | 0.77 |
| | | | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 291 | 370 | 185 | 406 | 135 | 0.63 | 406 | 203 | 0.70 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 291 | 314 | 157 | 345 | 115 | 0.54 | 345 | 172 | 0.59 |
| W46 | E+8' | 14 | 1st-Mezz | 15 | 12 | 1.25 | Shear | 2 | 3 | 2 | 291 | 399 | 200 | 438 | 146 | 0.68 | 438 | 219 | 0.75 |
| W47 | E+8' | 14-13 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 291 | 56 | 19 | 61 | 15 | 0.06 | 61 | 25 | 0.08 |
| W48 | E+8' | 14-13 | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 291 | 54 | 18 | 59 | 15 | 0.06 | 59 | 24 | 0.08 |
| W49 | E+8' | 14-13 | Mezz-2nd | 13 | 10.5 | 1.24 | Shear | 2 | 3 | 2 | 291 | 207 | 104 | 227 | 76 | 0.36 | 227 | 114 | 0.39 |
| **East Wing:** | | | | | | | | | | | | | | | | | | | |
| 161 | D | 9 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 81 | 41 | 89 | 30 | 0.23 | 89 | 44 | 0.25 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 177 | 89 | 194 | 65 | 0.50 | 194 | 97 | 0.55 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 169 | 85 | 186 | 62 | 0.48 | 186 | 93 | 0.53 |
| 162 | C | 9 | | | | | | | | | | | | | | | | | |
| 163 | A | 9 | 2nd-3rd | 10.5 | 3 | 3.50 | Flexure | 3 | 4 | 2.5 | 176 | 32 | 11 | 35 | 9 | 0.06 | 35 | 14 | 0.08 |
| | | | Mezz-2nd | 13 | 3 | 4.33 | Flexure | 3 | 4 | 2.5 | 176 | 73 | 24 | 80 | 20 | 0.14 | 80 | 32 | 0.18 |

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|---|---|---|---|---|
| | | | | Sheet No. __________ |
| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park | |
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation | |

**Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)**

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| | | | 1st-Mezz | 15 | 3 | 5.00 | Flexure | 3 | 4 | 2.5 | 176 | 64 | 21 | 70 | 18 | 0.12 | 70 | 28 | 0.16 |
| 164 | A+9' | 9 | | | | | | | | | | | | | | | | | |
| 165 | A | 7-9 | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 176 | 346 | 173 | 380 | 127 | 0.99 | 380 | 190 | 1.08 |
| | | | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 176 | 192 | 96 | 211 | 70 | 0.55 | 211 | 105 | 0.60 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 153 | 77 | 168 | 56 | 0.44 | 168 | 84 | 0.48 |
| 166 | A+9' | 7-9 | | | | | | | | | | | | | | | | | |
| 167 | D | 7 | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 304 | 152 | 334 | 111 | 0.87 | 334 | 167 | 0.95 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 334 | 167 | 367 | 122 | 0.95 | 367 | 183 | 1.04 |
| 168 | D-C | 7 | 4th-5th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 191 | 96 | 210 | 70 | 0.54 | 210 | 105 | 0.60 |
| | | | 3rd-4th | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 134 | 67 | 147 | 49 | 0.38 | 147 | 74 | 0.42 |
| 169 | C | 7 | | | | | | | | | | | | | | | | | |
| 170 | B | 7 | | | | | | | | | | | | | | | | | |
| 171 | B-A | 7 | | | | | | | | | | | | | | | | | |
| 172 | B-A | 7 | 6th-PH | 17 | 10 | 1.70 | Shear | 2 | 3 | 2 | 176 | 427 | 214 | 469 | 156 | 1.22 | 469 | 234 | 1.34 |
| | | | 5th-6th | 10.63 | 10 | 1.06 | Shear | 2 | 3 | 2 | 176 | 225 | 113 | 247 | 82 | 0.64 | 247 | 123 | 0.70 |
| | | | 4th-5th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 185 | 93 | 203 | 68 | 0.53 | 203 | 102 | 0.58 |
| | | | 3rd-4th | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 155 | 78 | 170 | 57 | 0.44 | 170 | 85 | 0.48 |
| 173 | A | 7 | | | | | | | | | | | | | | | | | |
| 174 | A+7' | 7 | | | | | | | | | | | | | | | | | |
| 175 | D | 6 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 123 | 62 | 135 | 45 | 0.35 | 135 | 68 | 0.38 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 291 | 295 | 148 | 324 | 108 | 0.51 | 324 | 162 | 0.56 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 160 | 80 | 176 | 59 | 0.46 | 176 | 88 | 0.50 |
| 176 | A | 6 | | | | | | | | | | | | | | | | | |
| 177 | A | 5-6 | | | | | | | | | | | | | | | | | |
| 178 | D | 5 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 85 | 43 | 93 | 31 | 0.24 | 93 | 47 | 0.27 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 291 | 181 | 91 | 199 | 66 | 0.31 | 199 | 99 | 0.34 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 145 | 73 | 159 | 53 | 0.41 | 159 | 80 | 0.45 |
| 179 | A | 5 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 119 | 60 | 131 | 44 | 0.34 | 131 | 65 | 0.37 |
| | | | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 176 | 101 | 51 | 111 | 37 | 0.29 | 111 | 55 | 0.32 |
| 180 | A | 4-5 | | | | | | | | | | | | | | | | | |
| 181 | D | 4 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 86 | 43 | 94 | 31 | 0.24 | 94 | 47 | 0.27 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 291 | 187 | 94 | 205 | 68 | 0.32 | 205 | 103 | 0.35 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 143 | 72 | 157 | 52 | 0.41 | 157 | 78 | 0.45 |
| 182 | A | 4 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 123 | 62 | 135 | 45 | 0.35 | 135 | 68 | 0.38 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 176 | 171 | 86 | 188 | 63 | 0.49 | 188 | 94 | 0.53 |
| 183 | D | 3 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 90 | 45 | 99 | 33 | 0.26 | 99 | 49 | 0.28 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 291 | 199 | 100 | 218 | 73 | 0.34 | 218 | 109 | 0.37 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 141 | 71 | 155 | 52 | 0.40 | 155 | 77 | 0.44 |
| 184 | C | 3 | | | | | | | | | | | | | | | | | |
| 185 | B | 3 | | | | | | | | | | | | | | | | | |

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| Job No.: | 43-F0066652-15 | Job Name: | Ahwahnee Hotel, Yosemite National Park | Sheet No. ______ |
|---|---|---|---|---|
| Client.: | National Park Service | Subject: | Structural Analysis for Seismic Rehabilitation | |

## Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| 186 | A | 3 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 118 | 59 | 130 | 43 | 0.34 | 130 | 65 | 0.37 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 291 | 163 | 82 | 179 | 60 | 0.28 | 179 | 89 | 0.31 |
| | | | 1st-Mezz | 15 | 5 | 3.00 | Shear | 2 | 3 | 2 | 291 | 229 | 115 | 251 | 84 | 0.39 | 251 | 126 | 0.43 |
| 187 | D | 2 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 81 | 41 | 89 | 30 | 0.23 | 89 | 44 | 0.25 |
| | | | Mezz-2nd | 13 | 12 | 1.08 | Shear | 2 | 3 | 2 | 291 | 181 | 91 | 199 | 66 | 0.31 | 199 | 99 | 0.34 |
| 188 | A | 2 | 2nd-3rd | 10.5 | 10 | 1.05 | Shear | 2 | 3 | 2 | 176 | 114 | 57 | 125 | 42 | 0.32 | 125 | 63 | 0.36 |
| | | | Mezz-2nd | 13 | 10 | 1.30 | Shear | 2 | 3 | 2 | 291 | 187 | 94 | 205 | 68 | 0.32 | 205 | 103 | 0.35 |
| 189 | D | 1-2 | 2nd-3rd | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 52 | 26 | 57 | 19 | 0.15 | 57 | 29 | 0.16 |
| | | | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 291 | 157 | 79 | 172 | 57 | 0.27 | 172 | 86 | 0.30 |
| | | | 1st-Mezz | 15 | 3 | 5.00 | Flexure | 3 | 4 | 2.5 | 176 | 86 | 29 | 94 | 24 | 0.16 | 94 | 38 | 0.22 |
| 190 | A | 1-2 | 2nd-3rd | 10.5 | 6 | 1.75 | Shear | 2 | 3 | 2 | 176 | 77 | 39 | 85 | 28 | 0.22 | 85 | 42 | 0.24 |
| | | | Mezz-2nd | 13 | 6 | 2.17 | Shear | 2 | 3 | 2 | 176 | 167 | 84 | 183 | 61 | 0.48 | 183 | 92 | 0.52 |
| 191 | D | 1 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 33 | 17 | 36 | 12 | 0.09 | 36 | 18 | 0.10 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 26 | 13 | 29 | 10 | 0.07 | 29 | 14 | 0.08 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 167 | 84 | 183 | 61 | 0.48 | 183 | 92 | 0.52 |
| 192 | D-C | 1 | | | | | | | | | | | | | | | | | |
| 193 | D-C | 1 | | | | | | | | | | | | | | | | | |
| 194 | C | 1 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 75 | 38 | 82 | 27 | 0.21 | 82 | 41 | 0.23 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 210 | 105 | 231 | 77 | 0.60 | 231 | 115 | 0.66 |
| 195 | C-B | 1 | | | | | | | | | | | | | | | | | |
| 196 | C-B | 1 | | | | | | | | | | | | | | | | | |
| 197 | B | 1 | 2nd-3rd | 10.5 | 9 | 1.17 | Shear | 2 | 3 | 2 | 176 | 79 | 40 | 87 | 29 | 0.23 | 87 | 43 | 0.25 |
| | | | Mezz-2nd | 13 | 9 | 1.44 | Shear | 2 | 3 | 2 | 176 | 219 | 110 | 240 | 80 | 0.62 | 240 | 120 | 0.68 |
| 198 | B-A | 1 | | | | | | | | | | | | | | | | | |
| 199 | B-A | 1 | | | | | | | | | | | | | | | | | |
| 200 | A | 1 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 53 | 27 | 58 | 19 | 0.15 | 58 | 29 | 0.17 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 58 | 29 | 64 | 21 | 0.17 | 64 | 32 | 0.18 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 127 | 64 | 139 | 46 | 0.36 | 139 | 70 | 0.40 |
| W6 | D | 1 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 107 | 54 | 117 | 39 | 0.30 | 117 | 59 | 0.33 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 180 | 90 | 198 | 66 | 0.51 | 198 | 99 | 0.56 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 265 | 133 | 291 | 97 | 0.75 | 291 | 145 | 0.83 |
| W7 | D-C | 1 | 2nd-3rd | 10.5 | 4.5 | 2.33 | Shear | 2 | 3 | 2 | 176 | 55 | 28 | 60 | 20 | 0.16 | 60 | 30 | 0.17 |
| | | | Mezz-2nd | 13 | 4.5 | 2.89 | Shear | 2 | 3 | 2 | 176 | 86 | 43 | 94 | 31 | 0.24 | 94 | 47 | 0.27 |
| | | | 1st-Mezz | 15 | 4.5 | 3.33 | Flexure | 3 | 4 | 2.5 | 176 | 133 | 44 | 146 | 36 | 0.25 | 146 | 58 | 0.33 |
| W8 | C-B | 1 | 2nd-3rd | 10.5 | 4.5 | 2.33 | Shear | 2 | 3 | 2 | 176 | 54 | 27 | 59 | 20 | 0.15 | 59 | 30 | 0.17 |
| | | | Mezz-2nd | 13 | 4.5 | 2.89 | Shear | 2 | 3 | 2 | 176 | 86 | 43 | 94 | 31 | 0.24 | 94 | 47 | 0.27 |
| | | | 1st-Mezz | 15 | 4.5 | 3.33 | Flexure | 3 | 4 | 2.5 | 176 | 133 | 44 | 146 | 36 | 0.25 | 146 | 58 | 0.33 |
| W9 | C-B | 1 | 2nd-3rd | 10.5 | 4.5 | 2.33 | Shear | 2 | 3 | 2 | 176 | 56 | 28 | 61 | 20 | 0.16 | 61 | 31 | 0.18 |
| | | | Mezz-2nd | 13 | 4.5 | 2.89 | Shear | 2 | 3 | 2 | 176 | 89 | 45 | 98 | 33 | 0.25 | 98 | 49 | 0.28 |
| | | | 1st-Mezz | 15 | 4.5 | 3.33 | Flexure | 3 | 4 | 2.5 | 176 | 133 | 44 | 146 | 36 | 0.25 | 146 | 58 | 0.33 |

**URS**

Sheet No. __________

Job No.: 43-F0066652-15 Job Name: Ahwahnee Hotel, Yosemite National Park
Client.: National Park Service Subject: Structural Analysis for Seismic Rehabilitation

## Table 3.2 Summary of Wall or Pier Demand/Capacity Ratios (Retrofitted Condition)

| Wall/Pier Location | | | | Wall/Pier Information | | | | | | | | Life Safety | | | | | Limited Damage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Etabs ID | Grid Line | Grid No. | Level | Height h (ft) | Width w (ft) | h/w Ratio | Controlled by | m-values LS | m-values CP | m-values LD | Shear Capacity (psi) | BSE-1 Shear Demand (psi) | Divided by LS m-value (psi) | BSE-2 Shear Demand (psi) | Divided by CP m-value (psi) | Max D/C Ratio | BSE-2 Shear Demand (psi) | Divided by LD m-value (psi) | Max D/C Ratio |
| W10 | B-A | 1 | 2nd-3rd | 10.5 | 4.5 | 2.33 | Shear | 2 | 3 | 2 | 176 | 58 | 29 | 64 | 21 | 0.17 | 64 | 32 | 0.18 |
| | | | Mezz-2nd | 13 | 4.5 | 2.89 | Shear | 2 | 3 | 2 | 176 | 90 | 45 | 99 | 33 | 0.26 | 99 | 49 | 0.28 |
| | | | 1st-Mezz | 15 | 4.5 | 3.33 | Flexure | 3 | 4 | 2.5 | 176 | 132 | 44 | 145 | 36 | 0.25 | 145 | 58 | 0.33 |
| W11 | A | 1 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 118 | 59 | 130 | 43 | 0.34 | 130 | 65 | 0.37 |
| | | | Mezz-2nd | 13 | 8 | 1.63 | Shear | 2 | 3 | 2 | 176 | 201 | 101 | 221 | 74 | 0.57 | 221 | 110 | 0.63 |
| | | | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 264 | 132 | 290 | 97 | 0.75 | 290 | 145 | 0.83 |
| W22 | B | 7 | 4th-5th | 10.5 | 7 | 1.50 | Shear | 2 | 3 | 2 | 176 | 343 | 172 | 377 | 126 | 0.98 | 377 | 188 | 1.07 |
| W23 | B | 7 | Mezz-2nd | 13 | 7 | 1.86 | Shear | 2 | 3 | 2 | 176 | 329 | 165 | 361 | 120 | 0.94 | 361 | 181 | 1.03 |
| W24 | B | 7 | 1st-Mezz | 15 | 7 | 2.14 | Shear | 2 | 3 | 2 | 176 | 370 | 185 | 406 | 135 | 1.05 | 406 | 203 | 1.16 |
| W25 | B-A | 7 | 3rd-4th | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 176 | 169 | 85 | 186 | 62 | 0.48 | 186 | 93 | 0.53 |
| | | | 2nd-3rd | 10.5 | 5 | 2.10 | Shear | 2 | 3 | 2 | 176 | 281 | 141 | 308 | 103 | 0.80 | 308 | 154 | 0.88 |
| | | | Mezz-2nd | 13 | 5 | 2.60 | Shear | 2 | 3 | 2 | 176 | 256 | 128 | 281 | 94 | 0.73 | 281 | 141 | 0.80 |
| W26 | A | 7 | 4th-5th | 10.5 | 5.5 | 1.91 | Shear | 2 | 3 | 2 | 176 | 127 | 64 | 139 | 46 | 0.36 | 139 | 70 | 0.40 |
| | | | 3rd-4th | 10.5 | 5.5 | 1.91 | Shear | 2 | 3 | 2 | 176 | 118 | 59 | 130 | 43 | 0.34 | 130 | 65 | 0.37 |
| | | | 2nd-3rd | 10.5 | 5.5 | 1.91 | Shear | 2 | 3 | 2 | 176 | 346 | 173 | 380 | 127 | 0.99 | 380 | 190 | 1.08 |
| W27 | A | 7 | 1st-Mezz | 15 | 5.5 | 2.73 | Shear | 2 | 3 | 2 | 176 | 416 | 208 | 457 | 152 | 1.18 | 457 | 228 | 1.30 |
| W28 | D | 7 | 4th-5th | 10.5 | 14 | 0.75 | Shear | 2 | 3 | 2 | 176 | 362 | 181 | 397 | 132 | 1.03 | 397 | 199 | 1.13 |
| | | | 3rd-4th | 10.5 | 14 | 0.75 | Shear | 2 | 3 | 2 | 176 | 221 | 111 | 243 | 81 | 0.63 | 243 | 121 | 0.69 |
| | | | 2nd-3rd | 10.5 | 14 | 0.75 | Shear | 2 | 3 | 2 | 176 | 313 | 157 | 344 | 115 | 0.89 | 344 | 172 | 0.98 |
| | | | Mezz-2nd | 10.5 | 14 | 0.75 | Shear | 2 | 3 | 2 | 176 | 207 | 104 | 227 | 76 | 0.59 | 227 | 114 | 0.65 |
| W29 | D-C | 7 | 3rd-4th | 10.5 | 3.5 | 3.00 | Shear | 2 | 3 | 2 | 176 | 121 | 61 | 133 | 44 | 0.34 | 133 | 66 | 0.38 |
| W30 | D | 6-5 | 2nd-3rd | 10.5 | 8 | 1.31 | Shear | 2 | 3 | 2 | 176 | 269 | 135 | 295 | 98 | 0.77 | 295 | 148 | 0.84 |
| W31 | D | 6-5 | 1st-Mezz | 15 | 8 | 1.88 | Shear | 2 | 3 | 2 | 176 | 279 | 140 | 306 | 102 | 0.79 | 306 | 153 | 0.87 |
| W32 | D | 6-5 | 2nd-3rd | 10.5 | 8.67 | 1.21 | Shear | 2 | 3 | 2 | 176 | 180 | 90 | 198 | 66 | 0.51 | 198 | 99 | 0.56 |
| | | | Mezz-2nd | 13 | 8.67 | 1.50 | Shear | 2 | 3 | 2 | 176 | 126 | 63 | 138 | 46 | 0.36 | 138 | 69 | 0.39 |
| | | | 1st-Mezz | 15 | 8.67 | 1.73 | Shear | 2 | 3 | 2 | 176 | 288 | 144 | 316 | 105 | 0.82 | 316 | 158 | 0.90 |