Disaster Resistant University

Preliminary Seismic Screening of University of Nevada, Reno Campus

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BJG ARCHITECTURE + ENGINEERING

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Executive Summary

As a part of the University of Nevada Reno's Disaster Resistant University Project, BJG was retained to perform seismic hazard screening and preliminary evaluation of the buildings on the University of Nevada Reno's campus. This screening, using a nationally recognized scoring process from the Federal Emergency Management Agency (FEMA), produced a ranking of each building's relative propensity to suffer damage due to an earthquake. The screening was a combination of visual review, review of construction drawings and application of general engineering principles.

A number of buildings on the campus scored poorly. This is not unexpected, as the University has a large inventory of older buildings with a few over 100 years old. Seismic resistance of structures has improved steadily over the years based in many cases on observed damage to buildings in earthquakes. The FEMA standard used as the basis for the scoring suggests that any building scoring less than two be subjected to review. This additional evaluation is more in-depth than a standard screening which would only involve visual screening of the buildings. Due to this additional level of review, a more appropriate cutoff for additional review is a score of 1.0 or less. The scoring system is not an absolute determination that low-scoring buildings are "dangerous". However, these buildings have structural systems and features that have performed very poorly in past earthquakes.

There are two structural systems in use on campus that are the most likely to suffer extensive damage in a large earthquake: Un-reinforced Masonry (URM) and Ordinary Concrete Frames with URM Infill Walls. Both of these systems have URM walls that carry earthquake loads. The difference is that URM buildings' walls carry vertical loads and in the second case there are concrete columns and beams to carry vertical loads. The term "ordinary" separates these frames from "ductile" frames that are designed for earthquake loads. The problem with both of these systems is a lack of reinforcing steel in the masonry – thus any crack that develops due to shaking will continue to grow. Eventually, this leads to partial or total collapse of the wall.

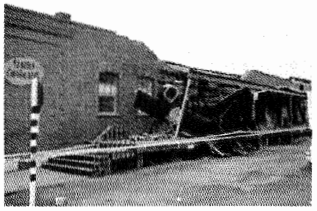
The damage that these type of buildings suffer is not only a hazard to their occupants, indeed many people have been injured or killed outside the buildings because of falling bricks from the walls. The damage is often so severe that the buildings are a total loss even if no one is injured. This level of damage presents a long term problem for the University in recovering from such an event.

The buildings that scored poorly are listed below, organized by their structural system with examples of damage to similar buildings in recent earthquakes. Only buildings that scored one or less on the FEMA scale are listed below.

Un-Reinforced Masonry (URM)
Issue: Potential partial or total collapse due to no reinforcing steel in the brick walls.

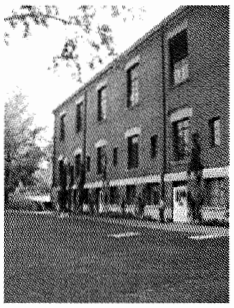
Previous Damage Example:
1933 Long Beach Earthquake

Previous Damage Example
Seattle Earthquake, 2001



Manzanita Hall
Built 1896

Clark Administration
Built 1926

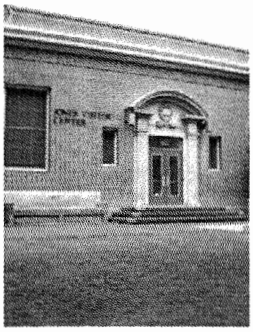


Facilities Service Building
Built 1907

Virginia Street Gym
Built 1943

Lincoln Hall
Built 1896

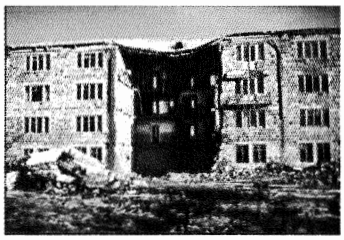
Morrill Hall Alumni Center
Built 1886, Remodeled
without significant upgrade



Jones Visitor Center
Built 1913

Thomson Building
Built 1920

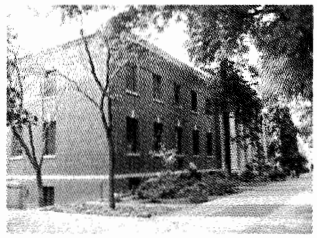
Ordinary Concrete Frame with Un-reinforced Concrete Infill Walls
Issue: Infill falls out between frame members during earthquake resulting in partial or total collapse.



Previous Damage Example:
Leninakan, Armenia,
December 1988

Palmer Engineering
Built 1941

Mackay Science
Built 1930



It is not the intent of this report to declare a crisis of dangerous buildings on the campus. Northern Nevada has had large earthquakes in the past. Large earthquakes in Northern Nevada are thought to occur on a time frame of several hundred to several thousand years. The location and dates of major earthquakes in the past are not precise so we may be "due" for another large earthquake. There *will* be another large earthquake; the timing is the only issue. The information in this report needs to be incorporated into capital projects for the next several cycles in order to mitigate the most significant hazards. This will most likely involve significant structural upgrades to the lowest-scoring buildings. It may turn out that structural modifications are so extensive and expensive that it makes better sense to replace a building rather than improve it. However, that determination can only be made after an upgrade program is defined and priced; seismic upgrades vary greatly in their complexity and costs.

The next step in this part of the Disaster Resistant University process is to create a seismic upgrade program for each building with a score of 1.0 or less or other buildings as directed by the University that may have other issues not considered within the scoring process. Each of these buildings would be analyzed in greater detail and a conceptual plan would be prepared for the upgrade of each building selected. Based on that information, a cost estimate to perform the upgrade can be prepared.

While a crisis need not be declared, complacency is also dangerous. Studies of Northern Nevada's geology and seismicity show that a large earthquake will occur eventually. The buildings that scored poorly will suffer damage – and it could be catastrophic. In beginning this process the University has the opportunity to mitigate the major safety issues before the next major earthquake.

Introduction

As a part of the University of Nevada Reno's Disaster Resistant University Project, BJG has evaluated the buildings on the University of Nevada, Reno campus for potential seismic hazard. BJG personnel reviewed all of the plans available in the university archive. Then, we visually screened buildings that did not have available plans and those that required further review. The information gathered through this two-part process was used to create a database of all the buildings. The database, located in Appendix A, outlines the basic structural characteristics of each building. We then scored each building using the structural characteristics, combined with an adjustment for the year they were built. The scoring procedure is based on the Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook (FEMA 154). The buildings were prioritized for rehabilitation using the FEMA scores and two project specific modifications. This list and the building characteristics provided in the database can be used to designate specific buildings for further evaluation. Additional investigation and detailed analysis is required before developing specific retrofitting plans and completing a cost analysis.

Northern Nevada has had large earthquakes in the past. Large earthquakes in Northern Nevada are thought to occur on a time frame of several hundred to several thousand years. As past earthquake history for location and time is not precise, we may be "due" for another large earthquake. There *will* be another large earthquake; the timing is the only issue. The Disaster Resistant University Program offers the opportunity to prepare for this eventuality and to mitigate the greatest dangers.

Data Collection

FEMA 154 is designed to allow screeners to use rapid visual screening to "identify, inventory, and rank buildings that are potentially seismically hazardous" (FEMA 154). The process of rapid visual screening involves a fifteen to thirty minute inspection of the exterior of the building and the building site. The screener gathers information on the lateral system and any building attributes that modify the lateral system. The data collection form that FEMA 154 supplies is located in Appendix C. BJG reviewed the plans for a large number of the buildings on campus, interviewed facility staff and collected data through visual screening. This enabled us to gather more information than FEMA 154 requires, resulting in a more complete screening. The review beyond the ordinary visual screening was very valuable for in many cases the lateral system for a building is difficult to determine without plans.

The main information a screener obtains using the FEMA 154 method is 1) the lateral system, 2) irregularities to the lateral system, 3) number of stories, and 4) date of construction. In addition to the information required by FEMA 154, we were also able to determine the building code date, floor system, roof system, vertical system, floor to floor height, and information about retrofits. This information was used to determine the potential seismic hazard of each building. Each structure has a building name, abbreviation, and number from the University's campus map. We used the building area to establish scale for both mass, occupancy, and potential damage. We identified the building date (the date on the construction documents), occupancy date (from University records when available) and the code date to establish potential building deficiencies. In some cases the dates were not available but could be estimated based on other information. We used the floor and roof system information to establish the building mass and the height

dimensions to establish scale and evaluate seismic performance. We identified the building use to evaluate potential hazards (i.e. chemical storage) and life safety risk (occupancy issues). We combined the collected data with photographs of each building to help illustrate the irregularities and provide building identification.

Building Scoring

The basic building score "reflects the estimated likelihood that building collapse or major structural damage will occur if the building is subjected to the maximum considered earthquake ground motions for the region" (FEMA 154). For the purpose of this document, collapse and likelihood of collapse are equivalent to building structural damage of 60% or greater. The basic scores included in FEMA 154 were computed through an analysis of how buildings of different lateral systems had performed in previous earthquakes from around the world. FEMA 155, the companion report to FEMA 154, outlines the process of data collection and mathematical modeling. The basic score is the average expected performance for each building type. The basic scores vary according to the level of seismicity of the region. We have used the high seismicity values to score the buildings because Reno, Nevada is located in an area of high seismicity.

FEMA 154 Modifiers

The basic scores are modified based on building characteristics. These modifiers include: height, irregularities, pre-code, post-benchmark, and soil type. These modifications do not imply that a building is poorly designed. The irregularity modifications account for characteristics that have consistently caused poor performance in past earthquakes. The modifiers vary depending upon the lateral system. The breakdown of each modifier and its effect on the basic score of each building type is listed in a table in Appendix C. The following paragraph outlines the specific modifiers in more detail.

Building Height

The height modifiers are broken into two categories: mid-rise and high-rise. Buildings between 4-7 stories are defined as mid-rise and the score is modified accordingly. Buildings over 7 stories are defined as a high-rise have a different modifier. No modification is made to the score for buildings 4 stories or less. The modifications "improve" taller building scores because taller buildings generally have responses that are less sensitive to earthquake motions. This is not true of all conditions, but it has been observed to be the case in most earthquakes.

Irregularities

FEMA 154 divides irregularities into two categories: vertical and plan. FEMA 154 lists the following as examples of vertical irregularities: buildings with setbacks, hillside buildings, and buildings with soft stories. A building is considered to have a setback if the building is irregularly shaped in elevation or if some of the walls are not vertical. A building is classified as a hillside building if it is built on a steep hill so that over the up-slope dimension of the building the hill rises at least one story height. A building is defined as having a

soft story if the stiffness of one story is dramatically less than that of most of the others. Visual examples of each of these are available in Appendix C. Buildings with any of these three vertical irregularities have the same vertical irregularity modifier. This modifier subtracts from the score because it has been observed that these features are related to observed performance problems in past earthquakes.

FEMA 154 lists the following as plan irregularities: buildings with re-entrant corners, buildings with good lateral-load resistance in one direction, but not in the other, and buildings with major stiffness eccentricities in the lateral-force-resisting system. FEMA 154 describes buildings with re-entrant corners as those with long wings that are E, L, T, U, or + shaped. Building with any of these plan irregularities have the same plan irregularity modifier.

Pre-Code Date

This modification reduces the scores of buildings designed prior to the initial adoption and enforcement of seismic codes. The default year of adoption of seismic codes is 1941 for all types of construction except tilt-up buildings (PC1), which have a default year of 1973. If any building was designed prior to 1941, its score is modified with the pre-code modifier. The default year is consistent with the code enforcement in our region. Essentially, the score improves with buildings that are more modern, a reflection of improvement in building design with building code guidance and requirements.

Post Benchmark Date

This modification increases the scores of buildings that were designed after "significantly improved seismic codes...were adopted and enforced by local jurisdiction" (FEMA 154, 41). These dates vary significantly depending on the type of construction as different types of structure design rules were changed at different times. This modifier improves the score of modern buildings assuming that they were designed in substantial compliance with the improved codes. Different types of buildings have different benchmark dates because the codes changed for these types of construction at different times.

Soil Type

The soil type modification accounts for the fact that buildings of similar design perform differently on different soils. A soil parameter of type D was used for all university buildings and the corresponding modifier is incorporated into the scores of the buildings. Measurements at the University indicate that this soil classification is accurate for most of the campus. This soil type is also the code default where soil information is incomplete. There are two classifications of soil that are associated with greater earthquake damage than soil type D.

Project Specific Modifiers

In addition to the FEMA score modifications, we have added two additional score modifications. The first is based upon ATC-21, the precursor document of FEMA 154 and 155. ATC-21 breaks vertical irregularities into two groups: soft story and vertical irregularity, and a modifier is

attributed to each. This allows for a more accurate evaluation of buildings when the vertical irregularity can be classified. The data collected to determine the scores suggests that a soft story has a much greater impact on the performance of a building in an earthquake than other vertical irregularities. This is particularly important for the University as many buildings have hill-side irregularities but not soft stories. Although FEMA 154 does not include this breakdown in their scoring, we have included it in the form of our own modifier. This modifier returns a portion of the points deducted for vertical irregularity by the FEMA 154 modifier if the vertical irregularity is not a soft story. The project specific vertical irregularity modification is to reduce the FEMA modifier by ½ if a building has a hillside condition. This modifier allows us to more accurately evaluate the effect of the vertical irregularities on the overall performance of the building.

The other score modification is designed to give priority to buildings based on occupancy. FEMA 154 includes a broad occupancy classification and occupancy load estimate in the collection form, but does not use it to calculate the final score. The occupancy modification is modeled after the 2003 International Building Code's Classification of Buildings and Other Structures for Importance Factors (Appendix C). This table classifies buildings into four categories based on the nature of their occupancy and assigns "Importance Factors" (I). The intent is to provide additional safety factors to buildings based on their hazard to human life and their importance in the relief after an earthquake.

The lowest categories, I and II are typical buildings without any special use or occupancy. Category I and II buildings include almost all ordinary construction. Category III buildings include buildings where more than 300 people congregate in one area, day care facilities with and occupant load greater than 250, buildings with an occupant load greater than 500 for colleges, power-generating stations, and any other occupancy with an occupant load greater than 5000. Category III buildings are designed for 125% (I = 1.25) of the "regular" lateral force due to earthquakes. Category IV buildings are essential facilities, such as designated emergency shelters, emergency services buildings, and any other building that is necessary to be in operation after an earthquake. Category IV buildings are designed for 150% (I=1.5) of the regular lateral force due to earthquakes. In order to apply this modifier, each building's occupancy was calculated using its area and the International Building Code occupancy requirements, the same as would be performed for new construction. After placing each building into a category, the final score with all other modifiers was divided by the importance factor from the IBC. Thus a classroom building with more than 500 students would be a Category III building and its score would be divided by 1.25 to get a final score. This final score is the score that is used to rank the priority of buildings for mitigation.

A final area of score modification concerned seismic upgrades. Only two buildings on campus have had comprehensive upgrades: The Mackay Schools of Mines Building and Fransden Humanities. FEMA 154 has no guidance on how to handle these types of structures. The Mackay School of Mines was upgraded and placed on base isolators, essentially placing the building on special springs to prevent the building from experiencing earthquake accelerations. We assigned this building a lateral system score as if it was a reinforced masonry building. This improved the score as to remove the building from the need for any further review, a reasonable conclusion. Fransden Humanities was upgraded per the Uniform Code for Building Conservation, a special building code to allow the use of archaic materials and special techniques not allowed under the regular building code. While this type of upgrade is not fully new code compliant, it increases the life safety of the building sufficiently to remove it from the list of critical buildings.

Score Interpretation

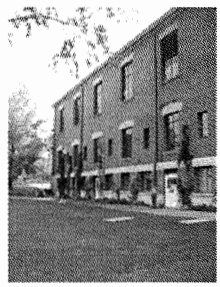
After the modifiers are applied to the basic score, the resulting final score is an indicator of the respective building's potential for seismic hazard. According to FEMA 154, final scores (raw scores) typically range from 0-7, with the higher values corresponding to better seismic performance. The scores are based on limited observed data and as a result the probability of collapse that the scores refer to is approximately 1 in 10 raised to the score power. Thus a score of 3.0 implies there is a chance of 1 in 1000 that the building will collapse if the design ground motion occurs. The final scores in this document are modified beyond the FEMA score, therefore these probabilities refer to the building's raw score before the project specific modifications.

These scores "imply" probabilities – these values are quite approximate and only useful for relative performance evaluations. There is no known technique of ascertaining exactly what damage will occur to any building for any earthquake. Poorly scoring buildings have characteristics that have not performed well in historical earthquakes and are therefore suspect. The damage level in any building will be highly dependent on the actual ground motion at the site and the details of the building's design and construction.

Results

A list of all the buildings in order of their final score is available in Appendix B. The ten buildings with scores less than or equal to 1.0 (the highest potential for seismic damage and the highest life safety concern) are Manzanita Hall, Clark Administration, Virginia Street Gym, Palmer Engineering, Mackay Science, Lincoln Hall, Facility Services Building, Jones Visitor Center, Morrill Hall Alumni Center, and the Thompson Building. The majority of these buildings rely on un-reinforced masonry for lateral and in most cases vertical support. Similar types of buildings have performed poorly in previous earthquakes and as a result the basic score for this type of construction is low. The individual explanation for the scoring of each of the ten lowest scoring buildings follows:

Manzanita Hall (Final score = **0.4**): Manzanita Hall was designed before its 1896 occupancy date and prior to the 1941 adoption and enforcement of seismic codes. It has bearing/shear walls of un-reinforced masonry, which has a basic score of 1.8. Manzanita Hall has a plan irregularity due to its U-shape plan, which accounts for a modification of -0.5. In addition, it has an code occupant load of greater than 500, qualifying it for an occupancy modification. These modifications result in a final score of 0.4.



Clark Administration (Final Score = **0.5**): The Clark Administration building was designed in 1926, before the 1941 adoption and enforcement of seismic codes. It is an un-reinforced masonry building, with a basic score of 1.8. In addition, it has a vertical irregularity because it is a hillside building. These modifications result in a final score of 0.5.

Palmer Engineering (Final Score = **0.5**): This building was designed in 1940, just prior to the adoption and enforcement of seismic codes. It has a concrete frame with an un-reinforced masonry infill lateral system, which has a basic score of 1.6. This building has a plan irregularity based on its L-shape. As a result of the basic score and modifications, Palmer Engineering has a final score of 0.5.

Virginia Street Gym (Final Score = **0.56**): The Virginia Street Gym was designed in 1941, most likely before the first code was adopted. It is an un-reinforced masonry building, with a basic score of 1.8. It has a vertical irregularity because it is a hillside building. In addition, it qualifies for the occupancy modification because more than 300 people congregate in one area. These modifications result in a final score of 0.56.

Lincoln Hall (Final Score = **0.8**): This building was occupied in 1896, prior to the 1941 adoption and enforcement of seismic codes. It was constructed with an un-reinforced masonry lateral system, which has a basic score of 1.8. Lincoln Hall has an occupancy load of greater than 500, which qualifies it for the occupancy modification. Based on these modifications, Lincoln Hall's final score is 0.8. The difference in score between Manzanita Hall and Lincoln Hall is due to the plan irregularity of Manzanita Hall.

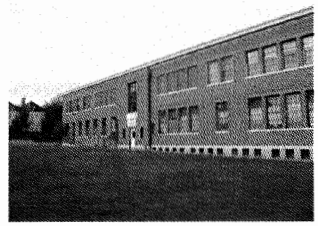
Mackay Science (Final Score = **1.0**): The Mackay Science building was designed in 1929, prior to the 1941 adoption and enforcement of seismic codes. Its lateral system is a concrete frame with un-reinforced masonry infill. This lateral system has a basic score of 1.6. Mackay Science has a final score of 1.0.

Facility Services (Final Score = **1.0**): This building was designed before its 1921 occupancy date and prior to the seismic codes, with an un-reinforced masonry lateral system. The basic score for un-reinforced masonry is 1.8, with a 0.2 deduction for pre-code. As a result of the type of construction and the modifications, the Facility Services building has a final score of 1.0.

Jones Visitor Center (Final Score = **1.0**): This building was occupied in 1913, prior to the 1941 adoption and enforcement of seismic codes. It was constructed using an un-reinforced masonry lateral system, which has a basic score of 1.8. As a result of the type of construction and the modifications, the final score for the Jones Visitor Center is 1.0.

Morrill Hall Alumni Center (Final Score = **1.0**): The Morrill Hall Alumni Center was occupied in 1886, prior to the adoption and enforcement of seismic codes. Its lateral system is un-reinforced masonry, which has a basic score of 1.8. Morrill Hall has a final score of 1.0, based on the basic score and modifications. Morrill Hall had minor connection upgrades between the floor and wall installed during its remodel, but the upgrades, as shown on the drawings available, do not appear to be sufficient for adjusting its score.

Thompson Building (Final Score = **1.0**): The Thompson building was designed in 1919, prior to the adoption and enforcement of seismic codes. Its lateral system is un-reinforced masonry, which has a basic score of 1.8. The Thompson Building has a final score of 1.0, based on its basic score and modifications.



There are several buildings just above the threshold of 1.0 for further study. These buildings by and large have engineered lateral force systems that, while not current code compliant, are at less risk of major damage than the URM buildings above. Their relatively low scores are mostly due to *potential* detailing issues that have caused similar buildings to have structural problems in other earthquakes. Concrete shear wall buildings that were designed prior to 1976 have potential problems with overturning connections, trim steel and "boundary" elements with shear walls and other potential detailing issues. Not all buildings have these issues and most concrete shear wall buildings are at less risk of damage than the URM buildings. Therefore, these buildings have lower priority for mitigation than buildings with URM or concrete frames with infill URM walls.

Recommendations and Conclusions

It is not the intent of this report to declare a crisis of dangerous buildings on the campus. Northern Nevada has had large earthquakes in the past. Large earthquakes in Northern Nevada are thought to occur on a time frame of several hundred to several thousand years. As we cannot say when the last large earthquake was on the faults that are near the University, we cannot predict when the next earthquake will occur. We can only surmise that another large earthquake will occur; the timing is the only issue.

The information we have gathered provides the preliminary analysis for improving disaster resistance at the University of Nevada, Reno. The ranking of the buildings provides a starting point for the rehabilitation efforts. From here, the buildings that pose the highest potential threat in the case of an earthquake should be evaluated in greater depth. In Stanford University's Seismic Engineering Guidelines, FEMA 356 is used as a reference for the rehabilitation of older buildings on their campus. FEMA 356 focuses primarily on target building performance level in determining a rehabilitation objective. Rehabilitation can be a minimum upgrade to provide an improvement of life safety, a major upgrade to bring the building to full modern code compliant

condition, or demolition and replacement. This decision tree provides a road map to mitigation method to be considered.

The next step in this part of the Disaster Resistant University process is to create a seismic upgrade program for each building with a score of 1.0 or less or other buildings as directed by the University that may have other issues not considered within the scoring process. Each of these buildings would be analyzed in greater detail and a conceptual plan would be prepared for the upgrade of each building selected. Based on that information, a cost estimate to perform the upgrade can be prepared.

While a crisis need not be declared, complacency is also dangerous. Studies of Northern Nevada's geology and seismicity show that large earthquakes have occurred and will occur again eventually. The buildings that scored poorly will suffer damage – and it could be catastrophic. In beginning this process the University has the opportunity to mitigate the major safety issues before the next major earthquake.

References

ASCE, 1998, *Handbook for the Seismic Evaluation of Buildings – A Pre-standard,* prepared by the American Society of Civil Engineers for the Federal Emergency Management Agency, FEMA 310 Report, Washington D.C.

ASCE, 2000, *Pre-standard and Commentary for the Seismic Rehabilitation of Buildings,* prepared by the American Society of Civil Engineers for the Federal Emergency Management Agency, FEMA 356 Report, Washington D.C.

ATC, 1988a, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook,* prepared by the Applied Technology Council for the Federal Emergency Management Agency, FEMA 154 Report, Washington D.C.

ATC, 1988b, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: Supporting Documentation,* prepared by the Applied Technology Council for the Federal Emergency Management Agency, FEMA 155 Report, Washington D.C.

ATC, 2002, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook (2nd Edition),* prepared by the Applied Technology Council for the Federal Emergency Management Agency, FEMA 154 Report, Washington D.C.

Ferrari Shields and Associates, *Structural Narrative for the Feasibility of the Conversion of the Getchell Library to Classrooms and Offices,* prepared by Ferrari Shields and Associates for the University of Nevada, Reno, Reno, Nevada.

ICC, 2003, *International Building Code,* International Code Council, Country Club Hills, Illinois.

NOAA, 1994, *Geologic Hazard Photos* [CD-ROM], prepared by the National Oceanic and Atmospheric Administration in association with the National Environmental Satellite, Data, and Information Service and the National Geophysical Data Center for the United States Department of Commerce, Boulder, Colorado.

SDPM, 2003, *Seismic Engineering Guidelines,* prepared by the Stanford University Department of Project Management, Palo Alto, California.

Web Pages

United States Geological Survey [online]. Available: http://neic.usgs.gov [2005, August 1].

Appendix A
Building Database

Agricultural Education

AE
173

Important Building Dates		
Construction	**Code**	**Occupancy**
1959	1958	1960
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
18,473	13,337	109

Are structural plans available? Yes

Location of Plans: Flat File 1

Structural Engineer: Jack A. Means

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU bearing walls; mezz: wood bearing walls	Wood	Main floor: 4" slab on grade; mezzanine floor: wood	Low roof area: max 12; high roof area: max 18.67; mezz: 9.5	Varies, max = 18'-8"	1 + mezza-nine level	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Building listed as Agricultural Mechanics Facility and Shop Building; open machinery storage not included in sq ft; gravity is steel columns and CMU bearing wall, roof is wood with overhang, dimensions are 64' x 28'

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:
Agricultural Education - Annex 2 (AN2, #91, Trailer); Annex 4 (AN4, #92, Trailer)

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Ansari Business Building

AB
063

Important Building Dates		
Construction	**Code**	**Occupancy**
1980	1979	1982
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
115,666	70,498	1,543

Are structural plans available? Yes

Location of Plans: Stick File 1

Structural Engineer: J. Clark Gribben

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns	Main building: 5" post tensioned concrete slab w/ conc beams	5" post tensioned concrete slab w/ conc beams	16/18/14/14/14/14/5 (parapet)	Total max = 95'	6 + small basement	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C1: Conc Moment Frame	C1: Conc Moment Frame
Basic Score	2.5	2.5
Height	0.4	0.4
Vertical Irregularity	-1.5	-1.5
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	1.4	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**2.16**	

Comments:

Floor - 18x30 beams (NS) and ~18x24 (EW); small basement (elevator pit); auditorium roof: 3" metal deck with 2 1/2" light weight concrete fill.

Vertical Irregularity:
Type 3: Built against a hill

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

NEVADA

Applied Research Facility

ARF
090

Important Building Dates		
Construction	**Code**	**Occupancy**
1955	1952?	1954
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
63,280	39,737	500

Are structural plans available? No

Location of Plans:

Structural Engineer: None Listed

Building Use: B: Office/Lab

Has there been a seismic upgrade?

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete walls and columns	Concrete slab (?)	Concrete slab (?)	11.08/11.08/11.08/11.08/13.42	57'-9"	3 + sub basement + basement	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:

***Information based on visual screening. Former US Bureau of Mines Research Center; no plans available (structural or other); information gathered from architectural plans for '96 mechanical upgrade.

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:
Applied Research Facility - Out # 1: 640 gsf, 1980; #2, 1680 gsf, 1980; and #3, 480 gsf, 1980; Applied Research Facility - Pilot Annex, 3456 gsf, 1980. No plans available for any of these annexes.

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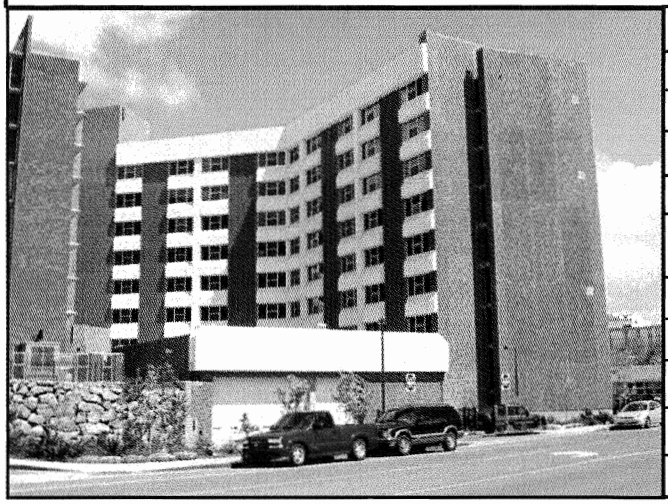
Argenta Hall (previously New Residence Hall)

AH
008



Important Building Dates		
Construction	**Code**	**Occupancy**
2000	1997	2000
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
107,767	62,453	1,519

Are structural plans available? Yes

Location of Plans: Flat File 101

Structural Engineer: Hyytinen Engineering

Building Use: R: Residential

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and bearing walls	7 1/2" concrete slab	Lobby: mild steel slab; dorm levels: 7 1/2" concrete slab	(11.17)/12.67/10.67/10.67/10.67/10.67/10.67/10.67/10.67	98'-6" to the top of the roof; 110'-6" to the top of the parapet	(future dining level - phase 2) + lobby + 7	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C1: Conc Moment Frame
Basic Score	2.8	2.5
Height	0.8	0.6
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	2.4	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**5.4**	**3.9**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**3.12**	

Comments:

Phase 1; Top of parapet is 12' from roof slab; brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Argenta Hall (Phase 2, second tower, same contract as the DCC)

AH
008

Important Building Dates		
Construction	**Code**	**Occupancy**
2002	1997	2003
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
53,727		1,075
Are structural plans available? Yes		
Location of Plans: Flat File 70		
Structural Engineer: Culp and Tanner		
Building Use: R: Residential		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
	Dorms: 7" post-tensioned concrete slab	7" post-tenioned con-crete slabs	12.67/10.67/10.67/10.67/10.67/10.67/10.67/10.67	97'-6"	8	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C1: Conc Moment Frame
Basic Score	2.8	2.5
Height	0.8	0.6
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	2.4	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**5.4**	**3.9**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**3.12**	

Comments:

This building is in the same contract as the Dining Conference Center, but the two sections are structurally separate.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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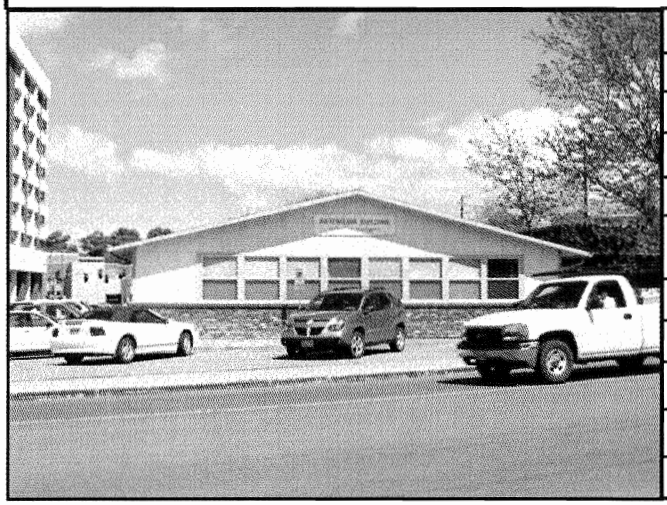
NEVADA Seismological Laboratory

NEVADA

Artemesia Building

ARTM
012



Important Building Dates		
Construction	**Code**	**Occupancy**
1951	1949?	1952
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
14,818	11,666	58

Are structural plans available? No

Location of Plans: Flat File 57, Old Campus

Structural Engineer: None Listed

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
	Wood	Wood	13.42	Max = ~16'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	W2: Light Wood Frame > 5000 sf	W2: Light Wood Frame > 5000 sf
Basic Score	3.8	3.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.8	-0.8
FEMA Score	**3**	**3**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**3**	

Comments:

Limited plans; formerly St. Albert's School; brick veneer; complete plans for original Artemesia Hall, destroyed in 1962 to build an addition to the JTSU; Vaughn Millwork Co was the only name listed on the plans; limited elevations with no dimensions.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:
Building section with no distinctions as to materials; foundation detail that shows 7' concrete footings; several sections that show the wood framing and the brick veneer

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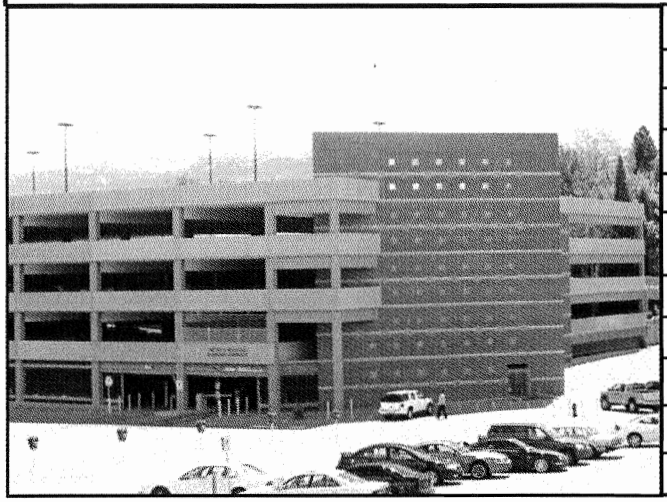
Brian J. Whalen Parking Complex

BWPC
083



Important Building Dates		
Construction	**Code**	**Occupancy**
1998	1991	1998
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
257,112	240,496	160

Are structural plans available? Yes

Location of Plans: Stick File 10

Structural Engineer: Blakely Johnson and Ghusn

Building Use: Parking

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and concrete bearing walls	6 1/2" post-tensioned concrete slab on post-tensioned beams	6 1/2" post-tensioned concrete slab on post-tensioned beams	11.25/11.25/11.25/11.25	Overall (to top level, not including elevator shaft) = 49'	5	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0.4	0.4
Vertical Irregularity	-1	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	2.4	2.4
Soil Type D	-0.6	-0.6
FEMA Score	**4**	**4**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**4.5**	

Comments:

Brick veneer; elevator shaft and stair tower: RM2

Vertical Irregularity:
Built against a hill

Plan Irregularity:
NA

Annexes and Outbuildings:

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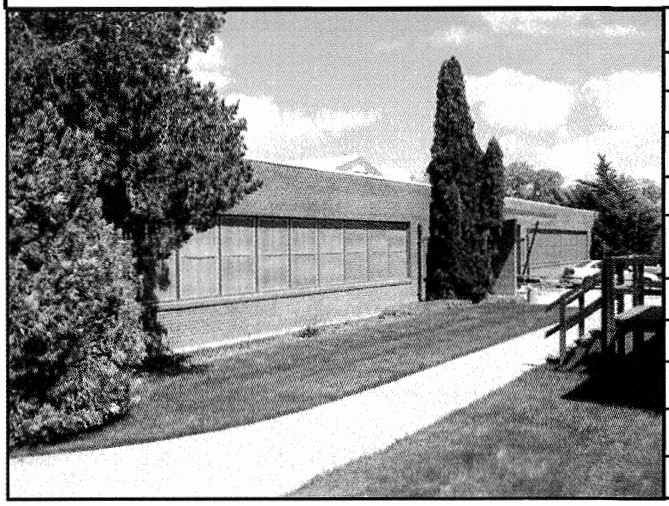
NEVADA Seismological Laboratory

NEVADA

Buildings and Grounds

BG
076



Important Building Dates		
Construction	**Code**	**Occupancy**
1945	1944?	1946
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
18,409	14,332	17

Are structural plans available? No

Location of Plans: No Plans

Structural Engineer: None Listed

Building Use: S: Storage

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel for the shops and brick bearing walls for the front portion	?	Concrete slab on grade	N/A	20' +/- max	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S2: Braced Steel Frame
Basic Score	2.8	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.4**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:
In both directions, the front portion is unreinforced masonry (URM)
***No plans available; information based on visual screen

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:
Buildings and Grounds Modular, Hazmat Building (BGM, #075, 800sqft, 1985, no plans available), Buildings and Grounds Storage (BGS, #068, 10,417sqft, 1990, no plans available)

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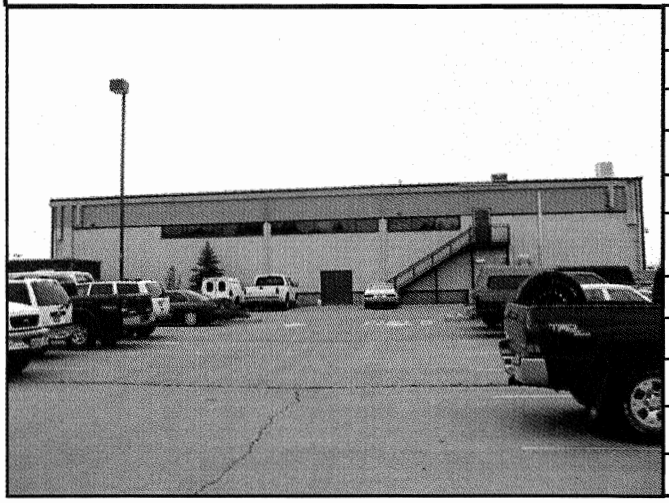
Buildings and Grounds Storage Building

SB
144



Important Building Dates		
Construction	**Code**	**Occupancy**
1989	1988	1989?
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
9,240	Not Available	31

Are structural plans available? Yes

Location of Plans:

Structural Engineer: Hyytinen Engineering

Building Use: S: Storage

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics						
Gravity System	**Roof System**	**Floor System**	**Floor to Floor (ft)**	**Total Height (ft)**	**No. of Stories**	**Irregularity (Vertical, Plan, Both)**
Steel	Metal roofing	6" slab concrete slab on grade; wood for second story floor	9, 16 or 25	25'	2	None

Basic Score, Modifiers, and Final Score (based on FEMA-154 Data Collection Form)		
	North—South	East—West
Lateral System	S1: Steel Moment Frame	S1: Steel Moment Frame
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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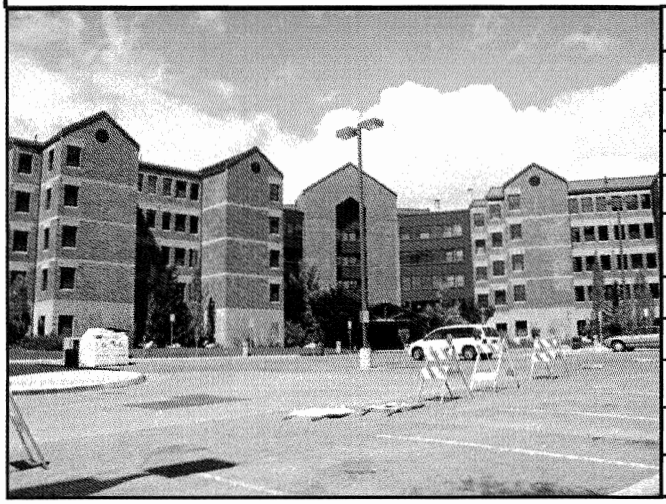
Canada Hall

CH
006



Important Building Dates		
Construction	**Code**	**Occupancy**
1991	1988	1993

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
76,585	48,522	1,503

Are structural plans available? Yes

Location of Plans: Stick File 1

Structural Engineer: Kirk N. Ellis and Associates

Building Use: R: Residential

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU walls	Metal deck	2-1/2" concrete on concrete precast planks; corridors - 3-1/4" concrete on 3" metal deck	10.67/9.33/9.33/9.33/8.46/11.5 (to ridge)	71'-4"	5	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0.4	0.4
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	2.6	2.6
Soil Type D	-0.6	-0.6
FEMA Score	**5.2**	**5.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**4.16**	

Comments:

Corridor Deck - W3KX18; gravity system: steel columns at corridor, low roof in core framing, and for the entry canopy; lobby and dorm towers are structurally separate connected with expansion joints

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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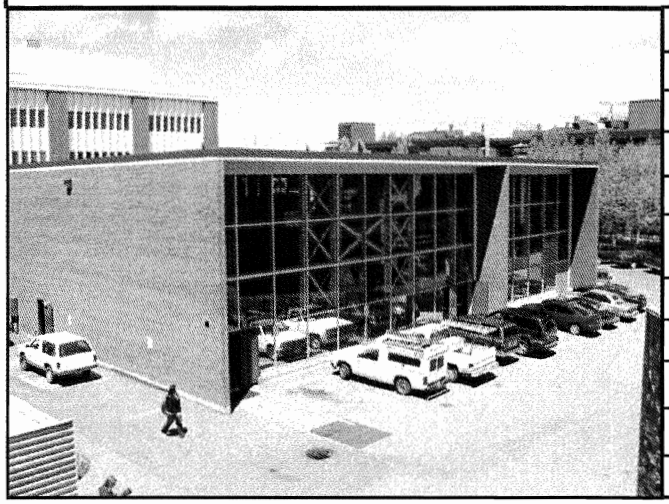
Central Heat Plant - Boiler Room

CHP
064



Important Building Dates		
Construction	**Code**	**Occupancy**
1960	1958?	1961

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
8,556	728	15

Are structural plans available? Yes

Location of Plans: Stick File 1

Structural Engineer: d'Auntremont-Helms

Building Use: F: Manufacturing/Plant

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	6" to 8" concrete slab	6" reinforced concrete slab on grade	26' high roof and 9.33' low roof	Max: 27'-1"	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	Combined, RM2 and S2
Basic Score	2.8	2.9
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.3**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.50	÷ 1.50
Final Score, S	**1.47**	

Comments:
Combined, RM2: Reinf Mas w/ Rigid Floor/Roof and S2: Braced Steel Frame in the EW direction Three trenches with depths varying from 6" to 6'-10"; steel columns embedded in shearwall; low roof section: RM2

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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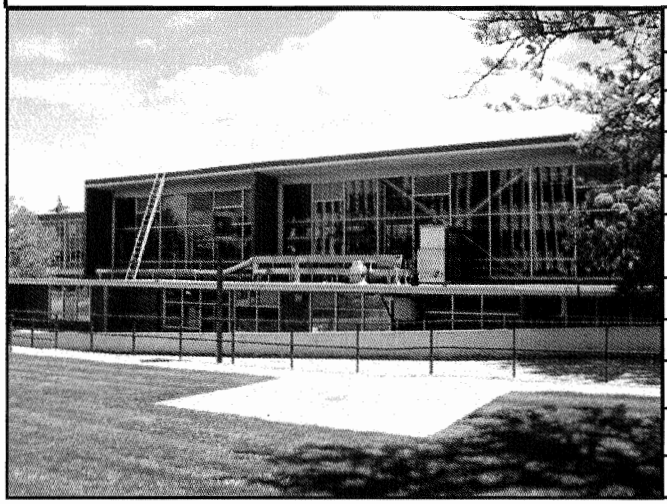
Central Heat Plant - Boiler Room Addition

CHP
064



Important Building Dates		
Construction	**Code**	**Occupancy**
1967	1964?	
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
2,760	Not Available	9
Are structural plans available? Yes		
Location of Plans: Stick File 1		
Structural Engineer: d'Auntremont-Helms		
Building Use: F: Manufacturing/Plant		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	4" to 9" concrete slab	6" reinforced concrete slab on grade	26' high roof and 9.33' low roof	Max: 27'-1"	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	Combined, RM2 and S2
Basic Score	2.8	2.9
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.3**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.50	÷ 1.50
Final Score, S	**1.47**	

Comments:
Combined, RM2: Reinf Mas w/ Rigid Floor/Roof and S2: Braced Steel Frame in the EW direction Steel columns embedded in shearwall; low roof section: RM2 in both directions; no brace frames added in x-direction, supported by existing braces

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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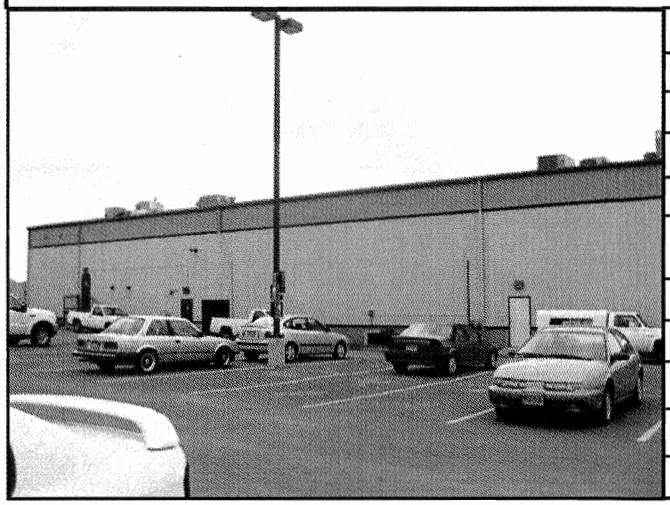
NEVADA Seismological Laboratory

NEVADA

Central Services - original building

CS
136



Important Building Dates		
Construction	**Code**	**Occupancy**
1988	1985	1989
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
8,100		81

Are structural plans available? Yes

Location of Plans: Stick File 1, Central Receiving

Structural Engineer: Hyytinen Engineering

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	Metal deck	Ranges between 4" and 6" concrete slab on grade; mezzanine floor is wood	12.83/12.17	25'	1 + mezzanine level	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S2: Braced Steel Frame
Basic Score	2.8	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.4**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Metal building by manufacturer; previously central receiving; plans did not include elevations; 1997 addition including a catwalk, level with the mezzanine level and tied to existing framing.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

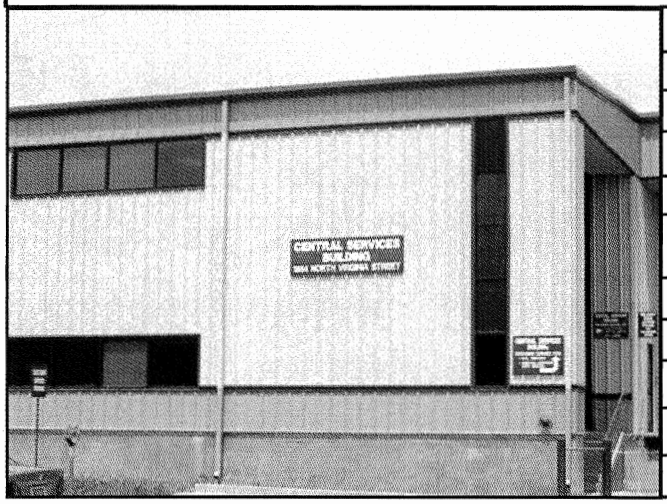
BJG ARCHITECTURE · ENGINEERING
Reno/Las Vegas
Bielsky, Johnson & Gruber Inc.
6005 Sierra Center Parkway Suite 200
Reno, Nevada 89511
775.827.1010
775.827.1663 (fax)
www.bjginc.com

NEVADA Seismological Laboratory

NEVADA

Central Services - copy center addition

CS
136



Important Building Dates		
Construction	**Code**	**Occupancy**
1994	1991	1989
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
4,881		49
Are structural plans available? Yes		
Location of Plans: Stick File 1, central receiving		
Structural Engineer: Hyytinen Engineering		
Building Use: B: Office/Lab		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics						
Gravity System	**Roof System**	**Floor System**	**Floor to Floor (ft)**	**Total Height (ft)**	**No. of Stories**	**Irregularity (Vertical, Plan, Both)**
Steel	Metal deck	Wood	12.83/12.17	25'	2	Plan

Basic Score, Modifiers, and Final Score (based on FEMA-154 Data Collection Form)		
	North—South	East—West
Lateral System	S1: Steel Moment Frame	S2: Braced Steel Frame
Basic Score	2.8	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**3.3**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:

Structurally separate; lateral system: some wood shear walls on first story; floor to floor heights are typical, portion of addition is only one story and has a height equal to the total height, 25'

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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Reno Las Vegas
Blakely, Johnson & Ghusn Inc.
6995 Sierra Center Parkway Suite 200
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775.827.1663 (fax)
www.bjginc.com

NEVADA Seismological Laboratory

NEVADA

Central Services - mail room addition

CS
136

Important Building Dates		
Construction	**Code**	**Occupancy**
1994	1991	1989
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
2,204		22

Are structural plans available? Yes

Location of Plans: Stick File 1, central receiving

Structural Engineer: Hyytinen Engineering

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	Metal deck	Wood	12.83/12.17	25'	2	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S2: Braced Steel Frame
Basic Score	2.8	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**3.8**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Structurally separate at the roof, but not at the mezzanine level.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

NEVADA

Chemistry Building

CB
071

Important Building Dates		
Construction	**Code**	**Occupancy**
1967	1964?	1970

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
75,599	47,939	951

Are structural plans available? Yes

Location of Plans: Stick File 3

Structural Engineer: John Webster Brown

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete	1" rigid insulation over concrete deck	12" concrete slab	12.5/13.5/13.5/13.5/ varies	69'-9"	3 + basement + penthouse	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.76**	

Comments:

Poor aspect ratio of shear wall in EW direction; vertical is flat slab- 2-way; brick veneer; lateral system: one direction ventilation shafts that are made of 12" concrete walls, with a 4' x 4' opening; other direction is concrete shear wall; architectural precast concrete panels in each direction; repairs done to roof and parapets in 2001 (code 1997)

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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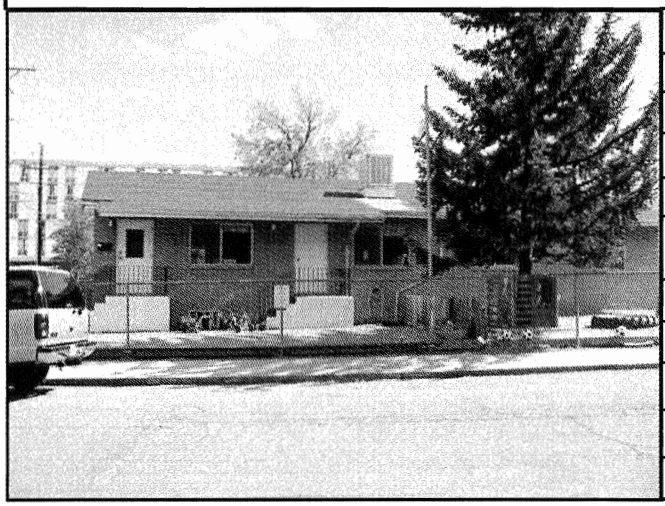
Reno Blakely, Johnson & Ghusn Inc.
Las Vegas 6995 Sierra Center Parkway Suite 200
Reno, Nevada 89511
775.827.1010
775.827.1663 (fax)
www.bjgnc.com

Child Care Center (off 11th street)

CCC
013



Important Building Dates		
Construction	**Code**	**Occupancy**
?	?	?
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
Not Available	Not Available	Not Available

Are structural plans available? No

Location of Plans: No Plans

Structural Engineer: None Listed

Building Use: I: Institutional/Childcare

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Bearing Walls	Wood Truss	Wood	+/- 9'	+/- 12'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	W2: Light Wood Frame > 5000 sf	W2: Light Wood Frame > 5000 sf
Basic Score	3.8	3.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.8	-0.8
FEMA Score	3	3
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	3	

Comments:

***No plans available; information based on visual screen

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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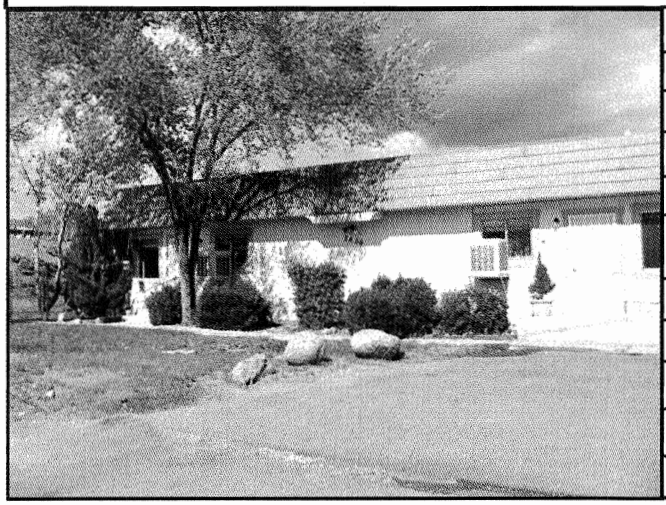
Reno Las Vegas
Bailey, Johnson & Ghosn Inc.
6995 Sierra Center Parkway Suite 200
Reno, Nevada 89511
775.827.1616
775.827.1663 (fax)
www.bjgnc.com

NEVADA Seismological Laboratory

NEVADA

Child Care Facility (north campus)

CCF
141



Important Building Dates		
Construction	**Code**	**Occupancy**
?	?	?
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
Not Available	Not Available	Not Available
Are structural plans available? No		
Location of Plans: No Plans		
Structural Engineer: None Listed		
Building Use: I: Institutional/Childcare		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Bearing Walls	Wood	Slab on grade	?	?	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	W2: Light Wood Frame > 5000 sf	W2: Light Wood Frame > 5000 sf
Basic Score	3.8	3.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.8	-0.8
FEMA Score	**3**	**3**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**3**	

Comments:

***No plans available; information based on visual screen

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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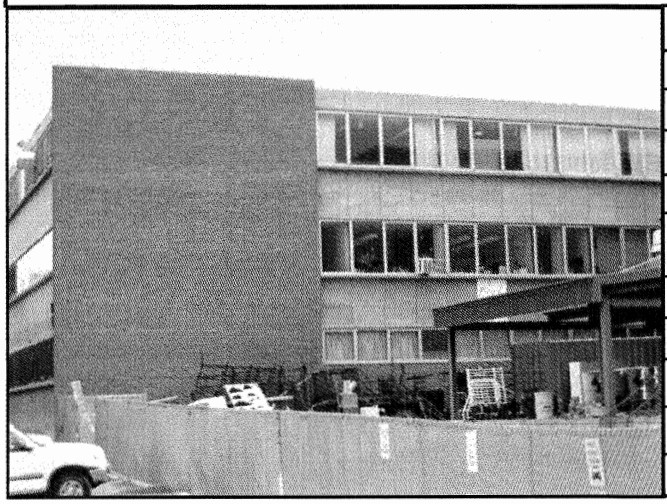
Reno Las Vegas
Blakely, Johnson & Ghusn Inc.
6995 Sierra Center Parkway Suite 200
Reno, Nevada 89511
775.827.1010
775.827.1663 (fax)
www.bgginc.com

NEVADA Seismological Laboratory

NEVADA

Church Fine Arts- Art and Speech

CFA
078



Important Building Dates		
Construction	**Code**	**Occupancy**
1958	1955?	
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
33,067		441

Are structural plans available? Yes

Location of Plans: Stick File 2

Structural Engineer: Parker Zehnder

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and brick and concrete bearing walls	Pan and joist system	3" concrete fill on metal joist pans	12.5/12.5/12.5 (small section with 8' height- one story)	37'-6"	3	Both

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	Combined, RM2 and S2
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	-1	-1
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**0.7**	**0.7**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.2**	

Comments:
Combined, RM2: Reinf Mas w/ Rigid Floor/Roof and C2: Conc Shearwall in the EW direction Structurally separate (2 1/2" gap), lateral: EW is a combined system, RM2 and C2; NS is only C2

Vertical Irregularity:
Vertical irregularity - different heights (ranges from 8' to 37'-6")

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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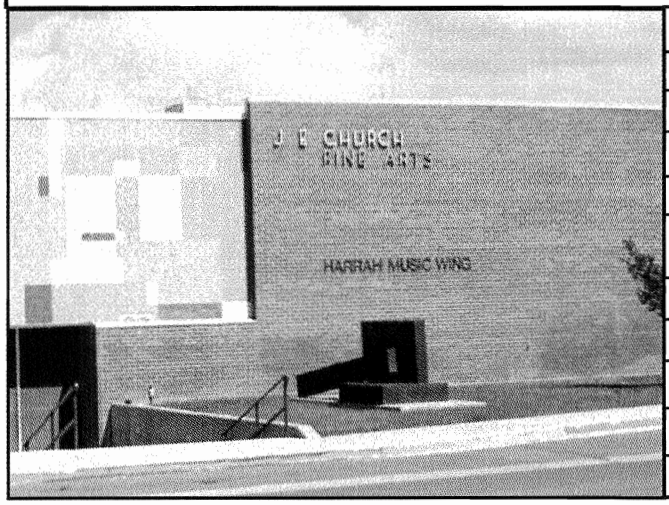
Reno Blakely, Johnson & Gibson Inc.
Las Vegas 6995 Sierra Center Parkway Suite 200
Reno, Nevada 89511
775.827.1010
775.827.1663 (fax)
www.bjgnc.com

Church Fine Arts- Music

CFA
078



Important Building Dates		
Construction	**Code**	**Occupancy**
1958	1955?	

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
12,397	12,397	165

Are structural plans available? Yes

Location of Plans: Stick File 2

Structural Engineer: Parker Zehnder

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and brick and concrete bearing walls	Steel frame with poured gypsum with 3/4" diameter rod bracing with some pan and joist	4" slab on grade	Varies: either 20' or 12.5'	Max = 20'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	Combined, RM2 and C2	Combined, RM2 and C2
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:
Combined, RM2: Reinf Mas w/ Rigid Floor/Roof and C2: Conc Shearwall in both directions Structurally separate (2 1/2" gap); lateral: RM2 and C2, combined system in both directions

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Reno, Nevada 89511
775.827.1010
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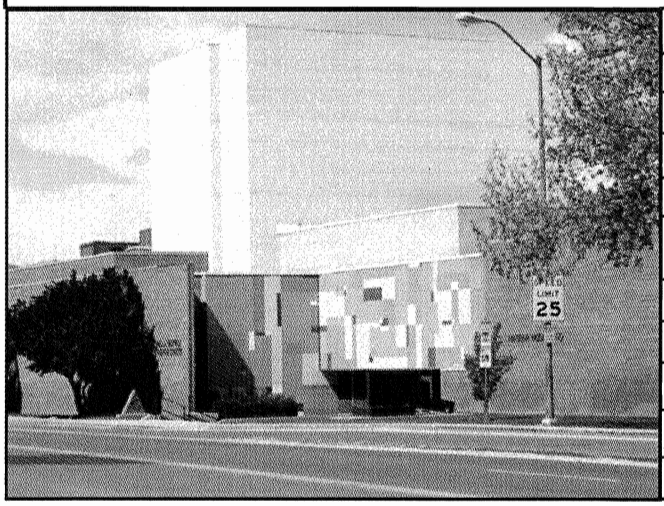
NEVADA Seismological Laboratory

NEVADA

Church Fine Arts- Drama

CFA
078



Important Building Dates		
Construction	**Code**	**Occupancy**
1958	1955?	

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
7,910	7,910	105

Are structural plans available? Yes

Location of Plans: Stick File 2

Structural Engineer: Parker Zehnder

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and brick and concrete bearing walls	Steel frame with poured gypsum with 3/4" diameter rod bracing	4" slab on grade	Varies from 20' to 60'	Max = 60'	1	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	Combined, RM2 and C2	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**1.2**
ATC-21 Correction	0	0.5
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:
Combined, RM2: Reinf Mas w/ Rigid Floor/Roof and C2: Conc Shearwall in the NS direction Structurally separate (2 1/2" gap), NS direction is a combined system RM2 and C2.

Vertical Irregularity:
Total height varies from 20' to 60'

Plan Irregularity:
NA

Annexes and Outbuildings:

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Blakely, Johnson & Giwson Inc.
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Reno, Nevada 89511
775.827.1010
775.827.1663 (fax)
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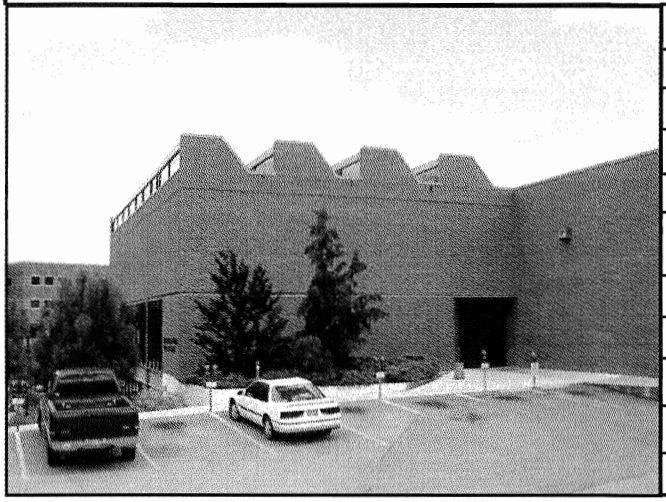
Church Fine Arts - addition phase 1 (Arts and Theater Addition)

CFA
078



Important Building Dates		
Construction	**Code**	**Occupancy**
1985	1982	

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
41,362		551

Are structural plans available? Yes

Location of Plans: Stick File 2

Structural Engineer: Clark Gribben

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	3" metal deck	2 1/2" concrete on 3" metal deck	2nd and 3rd floor heights vary; typical heights: 12.5/12.5/12.25	37'-3"	3	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S2: Braced Steel Frame
Basic Score	3	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.9**	**1.9**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.9**	

Comments:

Structurally separate (2" gap), roof pattern requires further inspection; 1st floor contains concrete shear wall and brace frames, upper floors are brace frames in both directions

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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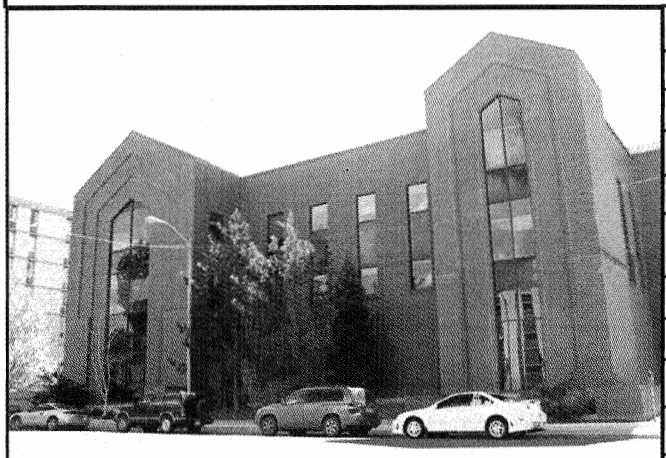
NEVADA Seismological Laboratory

NEVADA

Continuing Education Building (Formerly Midby-Byron Bldg)

CE
020



Important Building Dates		
Construction	**Code**	**Occupancy**
1989	1988?	1990
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
38,354	23,736	357

Are structural plans available? Yes

Location of Plans: Stick File 9

Structural Engineer: Ferrari-Howard

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Metal deck (designed with 5 1/2" concrete slab, left out in construction)	6" concrete slab on metal deck	10/14.5/13/13	43'-11" to top of walls (from finished grade)	3 + basement	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S2: Braced Steel Frame
Basic Score	3	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.9**	**1.9**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.9**	

Comments:

4" brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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Reno, Nevada 89511
775.827.1010
775.827.1663 (fax)
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NEVADA Seismological Laboratory

NEVADA

Dining Conference Center

DCC
009

Important Building Dates		
Construction	Code	Occupancy
2002	1997	2003

Building Areas/ Occupancy		
Gross (ft^2)	Assignable (ft^2)	No. Persons
42,811		856

Are structural plans available? Yes

Location of Plans: Flat File 70

Structural Engineer: Culp and Tanner

Building Use: R/A: Residential and Assembly

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and concrete bearing walls	Metal deck	4" concrete slab on grade	10.167	10'-2"	1	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	2.4	2.4
Soil Type D	-0.6	-0.6
FEMA Score	**4.1**	**4.1**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**3.28**	

Comments:

Brick veneer; triangular shape, with two sides concrete shear wall

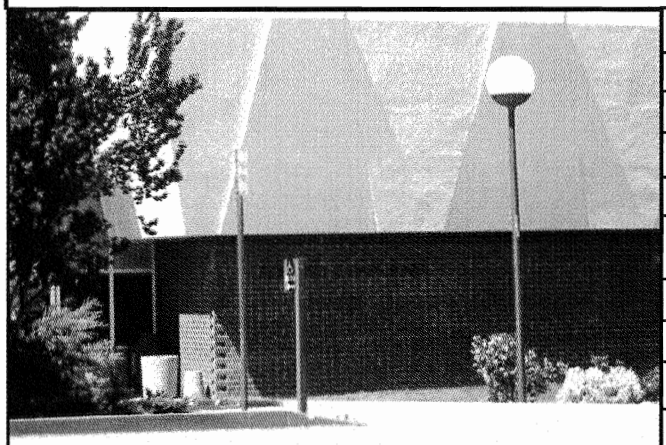
Vertical Irregularity:
NA

Plan Irregularity:
Type 1

Annexes and Outbuildings:

Edmund J. Cain Hall

EJCH
081



Important Building Dates		
Construction	**Code**	**Occupancy**
1971	1967?	1972
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
88,081	59,898	1,147

Are structural plans available? Yes

Location of Plans: Stick File 2

Structural Engineer: Engle and Engle

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? Yes

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Metal deck	5" reinforced concrete slab	16/14	Varies, max = 35'	2	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	-1	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.2**	**1.2**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.36**	

Comments:

No elevations in plans

Vertical Irregularity:
Built against a hill

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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Fleischmann Greenhouses

FG
045

Important Building Dates		
Construction	**Code**	**Occupancy**
1951	?	1957
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
17,019	15,606	57

Are structural plans available? No

Location of Plans: Flat File 17

Structural Engineer: None Listed

Building Use: U: Utility/Misc. Ag

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU bearing walls for head-house	Wood	5" concrete slab on grade; small second floor: wood flooring	11.6/8.04	Max height, where there are two stories = 19'-7 3/4"; where there is one story ~11'	2	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Architectural plans available - no structural plans; for greenhouses: designed by manufacturer (Lord and Burnham), roof: 1/2 glass and 1/2 aluminum over wood framing, light metal framing.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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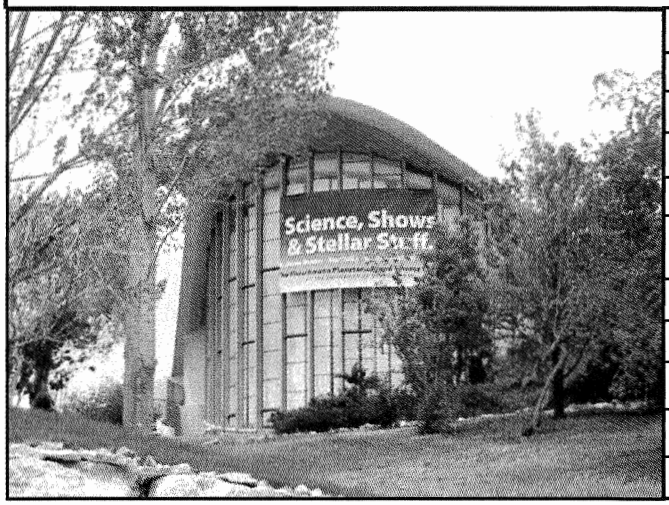
Fleischmann Planetarium

FP
105



Important Building Dates		
Construction	**Code**	**Occupancy**
1962	1958?	1963
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
13,144	7,045	183

Are structural plans available? Yes

Location of Plans: Stick File 4

Structural Engineer: H. V. Lamberti

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete walls	Concrete roof (hyperbolic shell)	6" reinforced concrete slab (4" and 8" in some locations)	8.67 (lower projection room)/12/(9 to 18)/9 (upper projection room)	44' (to the highest point)	3	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Hyperbolic Structure - Classified as C2, closest

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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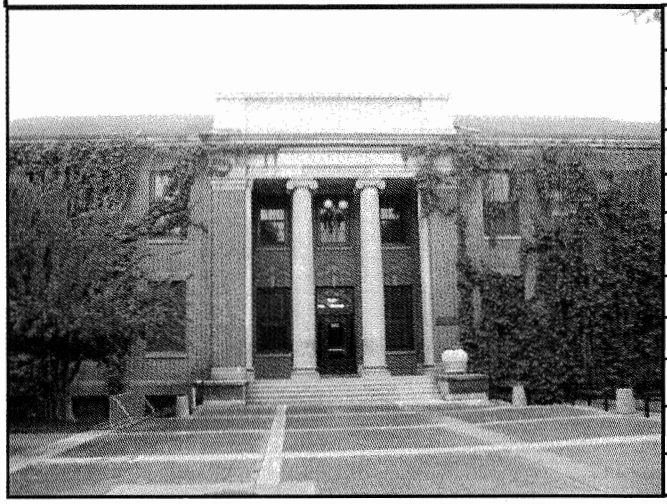
Frandsen Humanities

FH
042



Important Building Dates		
Construction	**Code**	**Occupancy**
1917	None	1917
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
31,332	19,204	418

Are structural plans available? No

Location of Plans: Stick File 4

Structural Engineer: N. B. Ellery

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? Yes

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Brick walls and wood bearing walls	Wood roof joist with 1x roof sheathing.	Wood	10/13/13	36'	3	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	URM: Unreinf Mas Bearing Wall	URM: Unreinf Mas Bearing Wall
Basic Score	1.8	1.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	-0.2	-0.2
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1**	**1**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2**	

Comments:

*** 1 point added to final score due to seismic upgrade. No structural plans available; brick shearwall; remodeled in 1999, checked original sheathing and replaced if necessary and provided a new plywood overlay, provided new framing for the 3rd floor (attic) and 2x blocking at plywood edges; added CMU shearwalls in the EW direction at ground level (new wood shear walls extend above); existing URM may contribute to NS lateral system.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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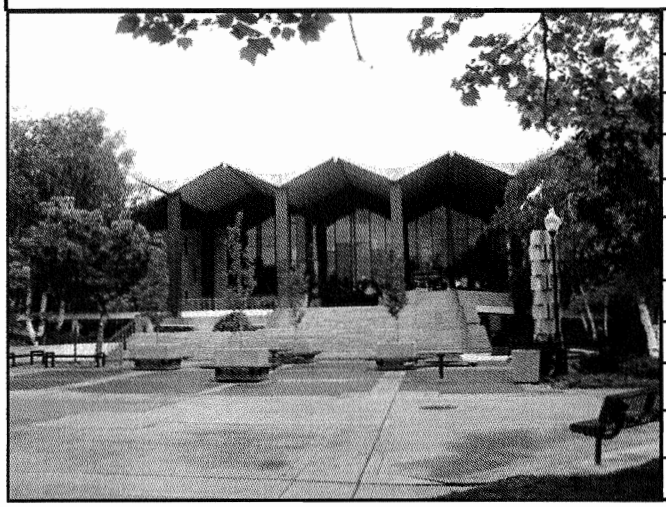
Getchell Library

GL
059



Important Building Dates		
Construction	**Code**	**Occupancy**
1959	1958?	1962
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
99,919	Not Available	1,998

Are structural plans available? Yes

Location of Plans: Stick File 4

Structural Engineer: Parker Zehnder

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete bearing walls and columns	Folded plate roof over main building with 4"-6" post-tensioned concrete slab	9" post-tensioned lift slab units (6) with mild steel reinforcing	12/12/9.125	33'-1.5"	3	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.36**	

Comments:

Brick veneer attached with dovetail anchors at 12" OC; 3 sided diaphragm, one of the walls in the x-direction is not shear wall.

Vertical Irregularity:
NA

Plan Irregularity:
3-sided diaphragm

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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Getchell Library - 1975 Addition

GL
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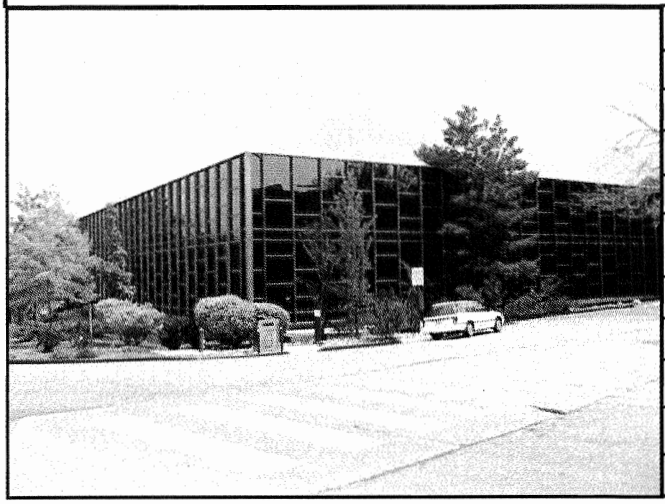

Important Building Dates		
Construction	**Code**	**Occupancy**
1975	1973	1962
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
64,997	Not Available	1,300

Are structural plans available? Yes

Location of Plans: Stick File 4

Structural Engineer: J. Clark Gribben

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete bearing walls and columns	7" post-tensioned concrete slab	8" post-tensioned concrete; 10" concrete slab in new concrete trench	17.75/12/11.06	49'-9"	3	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.76**	

Comments:

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Harry Reid Engineering Laboratory - part 1, High Bay Lab

HREL
065

Important Building Dates		
Construction	**Code**	**Occupancy**
1990	1988	1991
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
5,251	Not Available	53
Are structural plans available? Yes		
Location of Plans: Stick File 3		
Structural Engineer: Mike Blakely		
Building Use: B: Office/Lab		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Metal deck w/ 2-1/2" lt. weight concrete slab	Basement floor: 24" slab on grade; 36" suspended concrete slab	11/41.54	Max height (without basement)= 41'-6 1/2"	1 + basement	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S1: Steel Moment Frame
Basic Score	3	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.4**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Lab: Structurally separate from Parts 2 and 3 and 4; brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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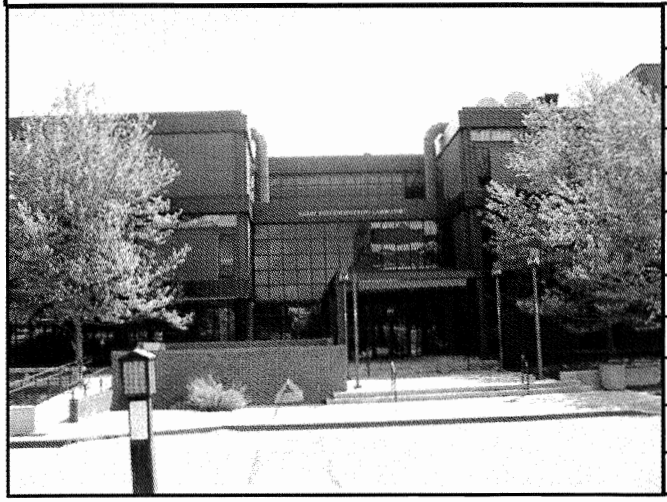
Harry Reid Engineering Laboratory - part 2, classrooms and small labs

HREL
065



Important Building Dates		
Construction	**Code**	**Occupancy**
1990	1988	1991
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
42,000	Not Available	560

Are structural plans available? Yes

Location of Plans: Stick File 3

Structural Engineer: Mike Blakely

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Metal deck w/ 2-1/2" light-weight concrete slab	4 1/2" reinforced stone concrete slab on metal deck	14/14/14	42'	3	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S2: Braced Steel Frame
Basic Score	3	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.9**	**1.9**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.52**	

Comments:

Class rooms: Seismically separate from parts 1 and 3 and 4; lateral system: S 1/2 on 3 sides and S 1 on 1 side; brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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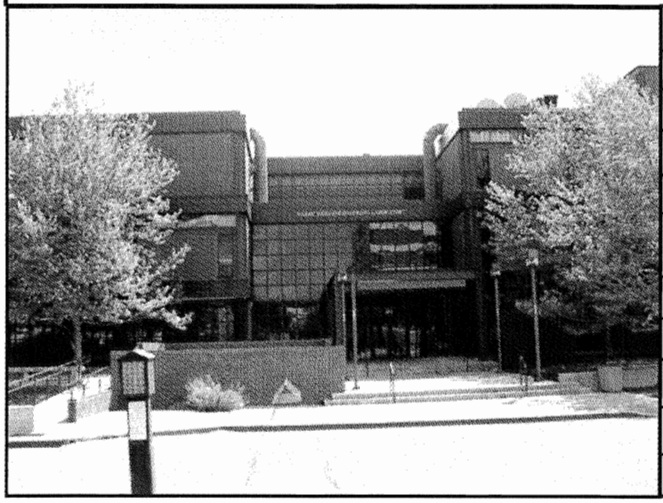
Harry Reid Engineering Laboratory - part 3, classrooms and small labs

HREL
 # 065



Important Building Dates		
Construction	**Code**	**Occupancy**
1990	1988	1991
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
42,000	Not Available	560

Are structural plans available? Yes

Location of Plans: Stick File 3

Structural Engineer: Mike Blakely

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Metal deck w/ 2-1/2" light-weight con-crete slab	4 1/2" rein-forced stone concrete slab on metal deck	14/14/14	42'	3	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S2: Braced Steel Frame
Basic Score	3	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.4**	**2.4**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.92**	

Comments:

Class rooms: Seismically separate from parts 1 and 2 and 4; lateral system: S 1/2 on 3 sides and S 1 on 1 side; brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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Harry Reid Engineering Laboratory - part 4, mechanical and electrical

HREL
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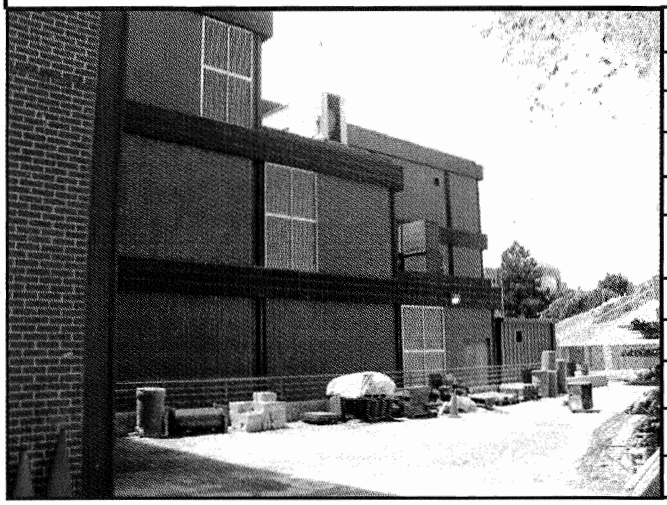

Important Building Dates		
Construction	**Code**	**Occupancy**
1990	1988	1991

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
3,000	Not Available	10

Are structural plans available? Yes

Location of Plans: Stick File 3

Structural Engineer: Mike Blakely

Building Use: F: Manufacturing/Plant

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	4 1/2" stone concrete	4 1/2" reinforced stone concrete slab on metal deck	14/14/14	42'	3	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S2: Braced Steel Frame
Basic Score	2.8	3
Height	0	0
Vertical Irregularity	-1	-1.5
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.2**	**0.9**
ATC-21 Correction	0.5	1
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:

Seismically separate from parts 1 and 2 and 3; brick veneer

Vertical Irregularity:
Description Required

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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Harry Reid Engineering Laboratory - part 1 addition

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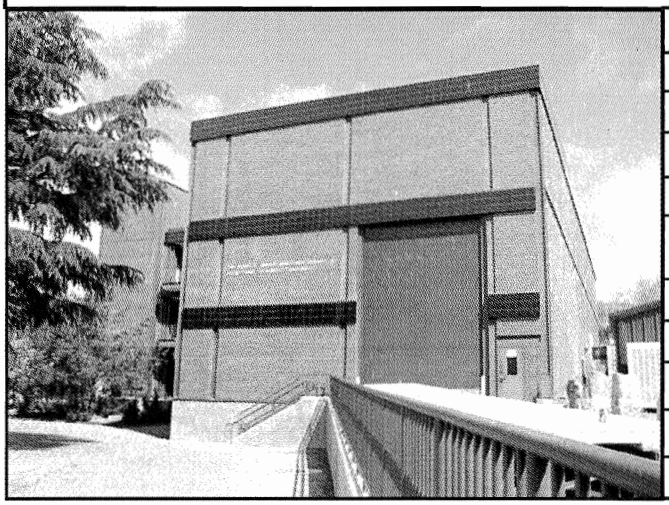

Important Building Dates		
Construction	**Code**	**Occupancy**
1998	1994	1991
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
2,796	Not Available	28
Are structural plans available? Yes		
Location of Plans: Stick File 3		
Structural Engineer: Blakely Johnson & Ghusn		
Building Use: B: Office/Lab		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics						
Gravity System	**Roof System**	**Floor System**	**Floor to Floor (ft)**	**Total Height (ft)**	**No. of Stories**	**Irregularity (Vertical, Plan, Both)**
Steel columns	Metal deck w/ 5-1/2" light-weight con-crete slab	Basement floor: 24" slab on grade; 36" suspended con-crete slab	11/41.54	Max height (without base-ment)= 41'-6 1/2"	1 + basement	None

Basic Score, Modifiers, and Final Score (based on FEMA-154 Data Collection Form)		
	North—South	East—West
Lateral System	S2: Braced Steel Frame	S1: Steel Moment Frame
Basic Score	3	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	1.4	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**3.8**	**3.6**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**3.6**	

Comments:

Structurally separate from parts 2 and 3; plans show the roof slabs lining up for Part 1 and the addition, but it specifies a 2 1/2" fill for Part 1 and a 5 1/2" fill for the addition; brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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Information Kiosk

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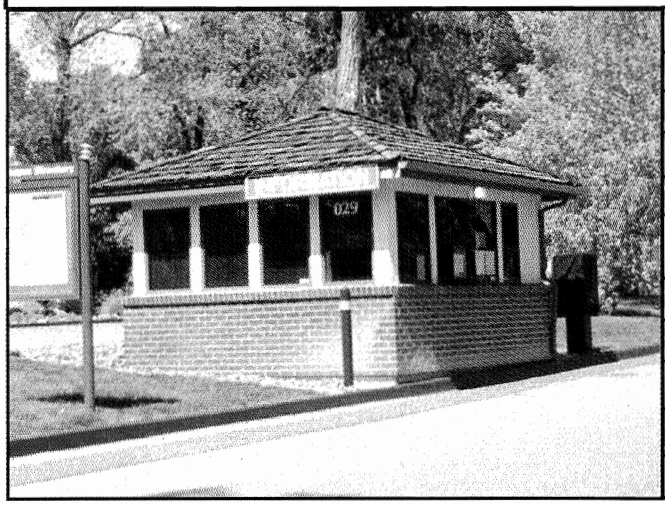

Important Building Dates		
Construction	**Code**	**Occupancy**
1994	1991?	1995
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
168	137	2

Are structural plans available? Yes

Location of Plans: In-house Plans

Structural Engineer: None Listed

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Wood bearing walls	Wood	4" concrete slab on grade	8.06	Max to ridge of the roof = 10'-8"	1	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	W1: Light Wood Frame < 5000 sf	W1: Light Wood Frame < 5000 sf
Basic Score	4.4	4.4
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	2.4	2.4
Soil Type D	0	0
FEMA Score	**6.3**	**6.3**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**6.3**	

Comments:

Partial plans; no structural; brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
Type 1

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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Jones Visitor Center

JV
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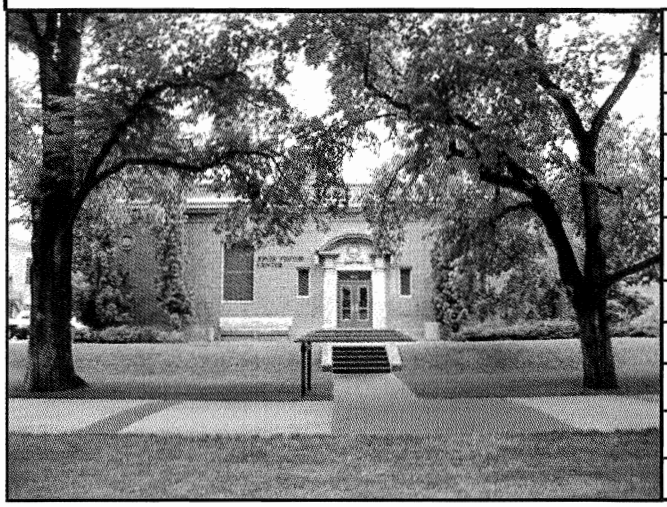

Important Building Dates		
Construction	**Code**	**Occupancy**
1912	none	1913
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
8,302	6,200	83

Are structural plans available? No

Location of Plans: Flat File 57, old campus

Structural Engineer: None Listed

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Brick	Wood	Wood	8.83/16	Max = 25'	1 + basement	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	URM: Unreinf Mas Bearing Wall	URM: Unreinf Mas Bearing Wall
Basic Score	1.8	1.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	-0.2	-0.2
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	1	1
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	1	

Comments:

No structural plans available

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Jot Travis Student Center - original building

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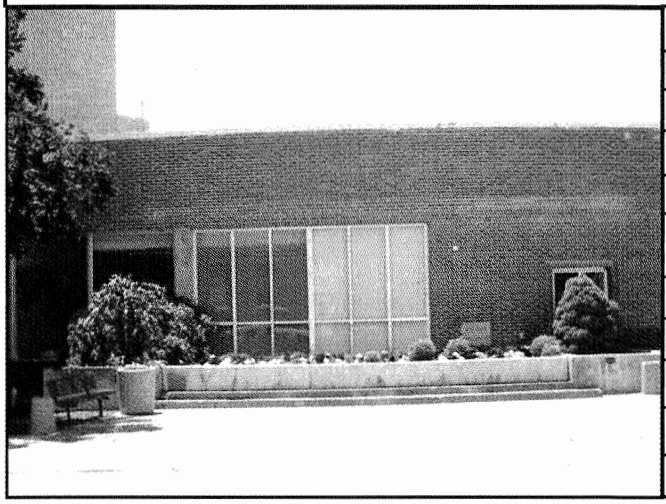

Important Building Dates		
Construction	**Code**	**Occupancy**
1954	1952?	1958
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
21,193	Not Available	424

Are structural plans available? Yes

Location of Plans: Stick File 5

Structural Engineer: H. M. Engle

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Wood	Wood	Auditorium: varies 12.33-15.38/23.5; other side: 9.25/13.38	Max = 38'-9 1/2"	2	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:

Lateral system: 3 sided diaphragm; plan for future 2nd story; parapet 2'-6"; Pyramid Lake Room was added in 1991, enclosure of a ground floor, with an existing second floor and no major structural alterations; 1995 remodel: mostly interior, information based on the addition of the mezz level of the pine lounge, elevator shaft and stairs were also added, lateral system is connected to the existing building.

Vertical Irregularity:
NA

Plan Irregularity:
Type 1

Annexes and Outbuildings:

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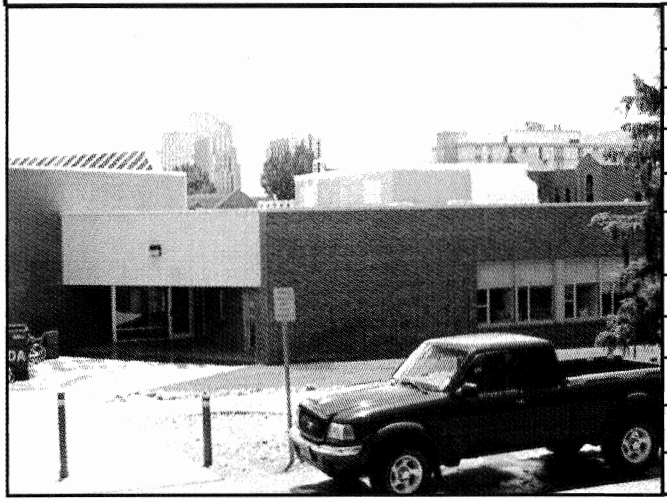

Important Building Dates		
Construction	**Code**	**Occupancy**
1962	1958	1958
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
21,241		425

Are structural plans available? Yes

Location of Plans: Stick File 5

Structural Engineer: H. V. Lamberti

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns for upper level; concrete columns and bearing wall for lower level	Wood	7 1/2" concrete slab; pent-house: wood	12.33/13.08/9.54	Max = 34'-11 1/2"	2 + pent-house	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Not structurally separate from original building; brick veneer; 3'-4" parapet

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Jot Travis Student Center - Addition phase 2

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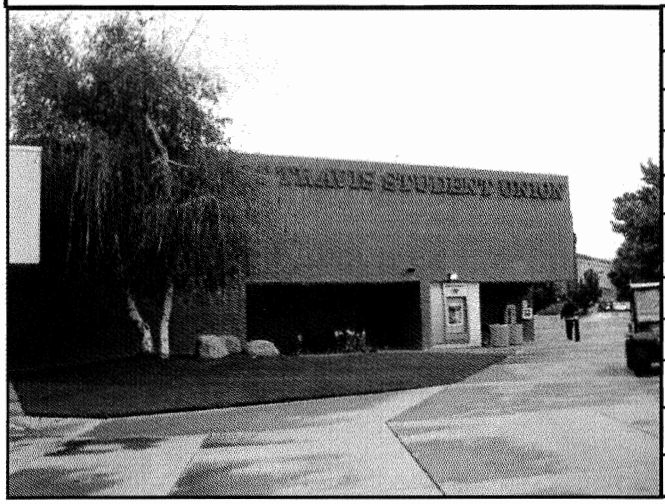

Important Building Dates		
Construction	**Code**	**Occupancy**
1977	1976	1958
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
14,124		282
Are structural plans available? Yes		
Location of Plans: Stick File 5		
Structural Engineer: John Webster Brown		
Building Use: A: Assembly/Classroom		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics						
Gravity System	**Roof System**	**Floor System**	**Floor to Floor (ft)**	**Total Height (ft)**	**No. of Stories**	**Irregularity (Vertical, Plan, Both)**
Concrete columns and bearing walls	1 1/2" metal deck	7 1/2" concrete slab	12.33/19.29	Max = 31'-9 1/4"	2	None

Basic Score, Modifiers, and Final Score (based on FEMA-154 Data Collection Form)		
	North—South	East—West
Lateral System	Combined, RM1/2 and C2	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:
Combined, RM1/2: Reinf Mas w/ Rigid Floor/ Flex Roof and C2: Conc Shearwall in the NS direction
Not structurally separate from phase 1 or the original building; north wall is half concrete shearwall; brick veneer on 3 walls

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Important Building Dates		
Construction	**Code**	**Occupancy**
1987	1985	1958
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
19,395		388

Are structural plans available? Yes

Location of Plans: Stick File 5

Structural Engineer: Clark Gribben

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and steel columns	1 1/2" metal deck with zondlite fill	1 1/2" metal deck with zondlite fill	9.08/14.25 (varies, some platform lower level floors)	Max = 23'-4"	2	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S1: Steel Moment Frame
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:
Combined, S1: Steel Moment Frame and C2: Conc Shearwall in both directions
Structurally separate from the existing building; lateral system is a combined system and also includes concrete shear walls.

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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Jot Travis Student Center - Dining Commons

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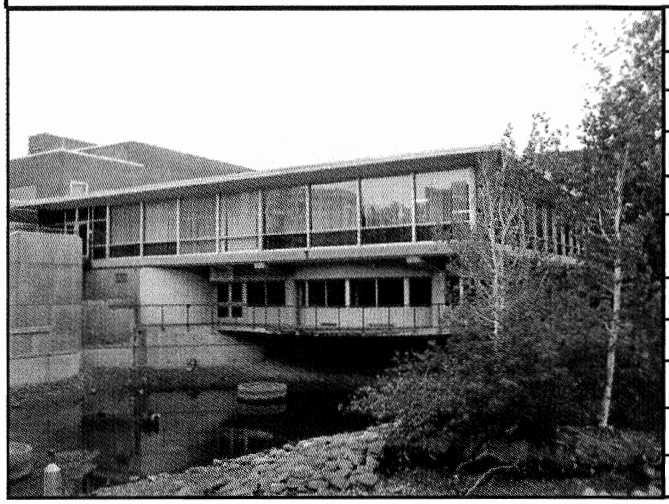

Important Building Dates		
Construction	**Code**	**Occupancy**
1958	1955?	1960
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
27,608	18,530	281

Are structural plans available? Yes

Location of Plans: Stick File 5

Structural Engineer: Edward S. Pankhurst

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns	6" reinforced concrete slab	Concrete slabs of varying thickness (4"-6")	10.17/13.25	23'-5"	1 + basement	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:

Not enough information to determine if this addition is structurally separate from the original building; lateral system: torsion irregularity with 3-sided support; 3750 sqft of basement was leveled, but left unfinished for future floor

Vertical Irregularity:
NA

Plan Irregularity:
Type 1

Annexes and Outbuildings:

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Jot Travis Student Center - Dining Commons addition

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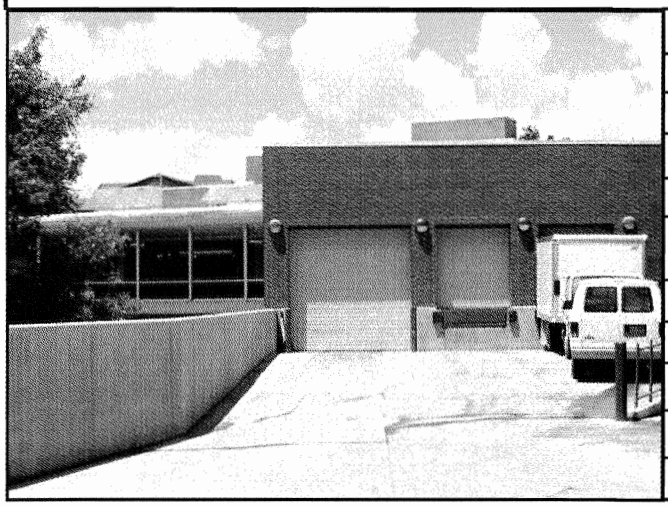

Important Building Dates		
Construction	**Code**	**Occupancy**
1999	None Listed	

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
4,571		91

Are structural plans available? Yes

Location of Plans: Stick File 5

Structural Engineer: Hyytinen Engineering

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns and CMU columns and bearing walls	1 1/2" metal deck	6" concrete slab on grade for area B; 3" metal deck with 3 1/4" light weight concrete ill	Area A: 10.17/10.75-16.25 Area B: 12.5-16	Varies, max ~ 27'	Area A :1 + basement; area B: 1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Area B gravity and lateral: CMU columns; brick veneer in both areas; stair addition is a concrete shear wall

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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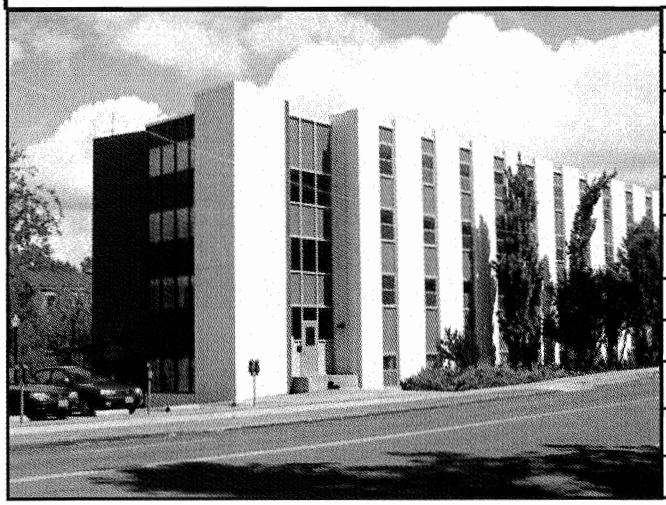

Important Building Dates		
Construction	**Code**	**Occupancy**
1961	1958?	1962
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
32,312	20,763	631

Are structural plans available? Yes

Location of Plans: Stick File 6

Structural Engineer: Jack A. Means

Building Use: R: Residential

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	7 1/2" reinforced concrete slab	7 1/2" reinforced concrete slab	11/9/9/9	47'	4	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0.4	0.4
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.6**	**2.6**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**2.08**	

Comments:
Combined, C2: Conc Shearwall and RM2: Reinf Mas w/ Rigid Floor/Roof Diaph in the EW direction
Lobby (south end): gravity: brick and concrete bearing walls; floor to floor heights vary. On the East side of the structure, in addition to the concrete shearwall, there is a 27.5' reinforced 10" brick shear wall; 1977 Remodel of ground floor, structural plans for new entrance.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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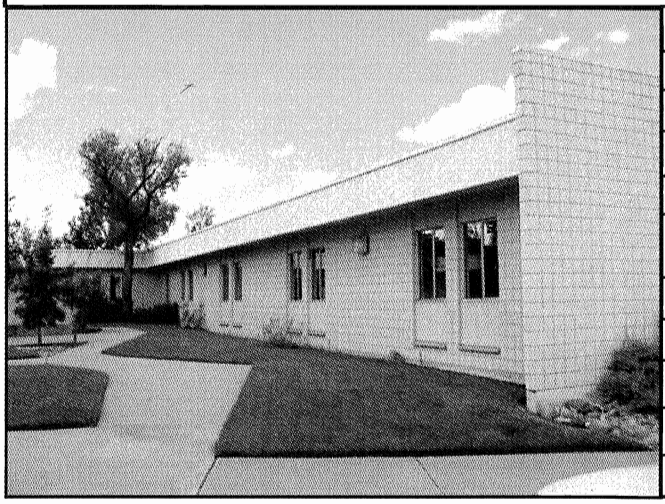

Important Building Dates		
Construction	**Code**	**Occupancy**
1977	1976	1967
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
21,650	15,696	285

Are structural plans available? Yes

Location of Plans: Flat File 28

Structural Engineer: Jack A. Means

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Wood	Wood	9	Max = 14'-8"	1	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:

Depressed boiler room (680sqft); Valley Road building

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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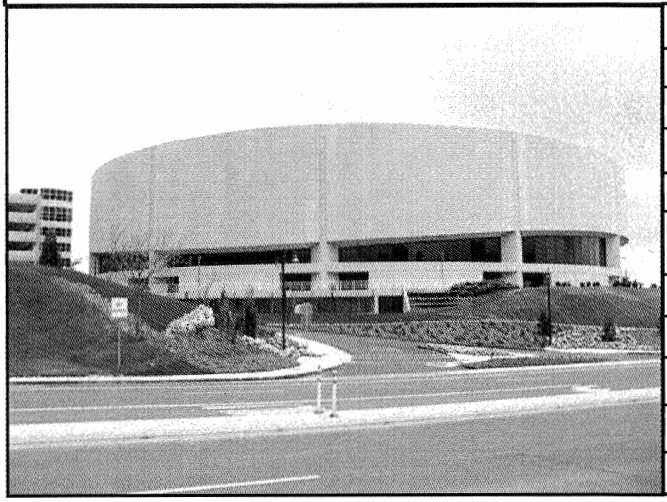

Important Building Dates		
Construction	**Code**	**Occupancy**
1981	1979	1983
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
213,127	125,775	42,625

Are structural plans available? Yes

Location of Plans: Stick File 6

Structural Engineer: Jack A. Means

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete and steel beams spanning toward the center	Dual steel truss system: radial trusses with tension ring, center clear span carrier truss	Main floor: 7 1/2" slab on grade; exterior main floor: 6" reinforced concrete slab	20.5/26.8/29.7	77' plus dome roof	3	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	2.4	2.4
Soil Type D	-0.6	-0.6
FEMA Score	**4.6**	**4.6**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**3.68**	

Comments:

Max occupancy: 19,634; concourse level floor: concrete slab on metal deck (-3/4" below finished floor);

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:
Lawlor Events Center - Annex

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Legacy Hall

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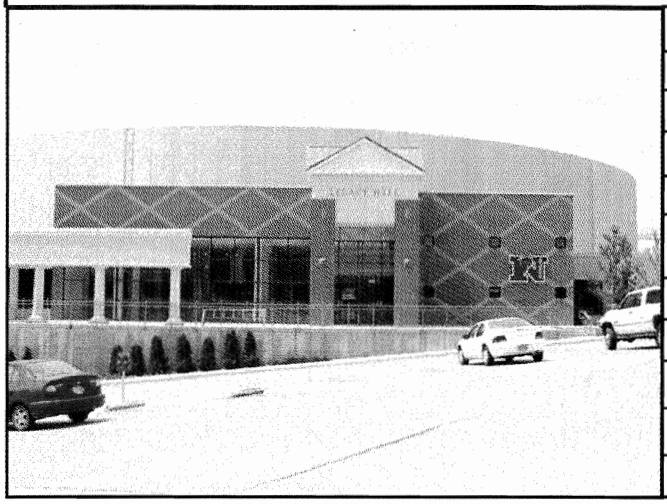

Important Building Dates		
Construction	**Code**	**Occupancy**
1998	1994	1999
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
24,152	18,154	309

Are structural plans available? Yes

Location of Plans: Stick File 7

Structural Engineer: Clark Gribben

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel Columns	1 1/2" metal deck	2" metal deck with 3-1/4" light weight concrete	11.56/12.73/7 (small attic)	31'- 3.5"+ clock tower	2 + small attic below high roof	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S1: Steel Moment Frame
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	-1	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	1.4	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**2.6**	**2.6**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**3.1**	

Comments:

Brick veneer; lateral: one brace frame at the main entrance, the rest are moment frames; on the Lawlor side, precast concrete piers were added to lower the bearing level

Vertical Irregularity:
Built on a slope; building is mostly two stories, with portions ranging from one story to two+ stories.

Plan Irregularity:
NA

Annexes and Outbuildings:

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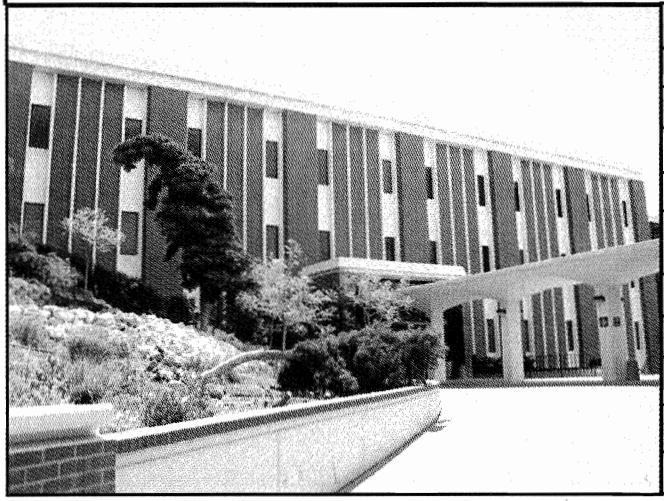

Important Building Dates		
Construction	**Code**	**Occupancy**
1969	1967?	1972
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
64,888	36,971	655

Are structural plans available? Yes

Location of Plans: Stick File 7

Structural Engineer: John Webster Brown

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete bearings walls and concrete columns	6" to 10" reinforced concrete slab.	6" to 10" concrete slabs (additional mechanical pads)	12 (sub bsmt)/12.5 (bsmt)/13.5/13.5/13.5/11.5	63'	3 + sub basement + basement + mechanical penthouse	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	-1	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.2**	**1.2**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.36**	

Comments:

Parapet (2'-4"); brick veneer connected with dovetail masonry anchors; penthouse roof: metal deck with insulated concrete fill, typical.

Vertical Irregularity:
Built against a hill

Plan Irregularity:
NA

Annexes and Outbuildings:

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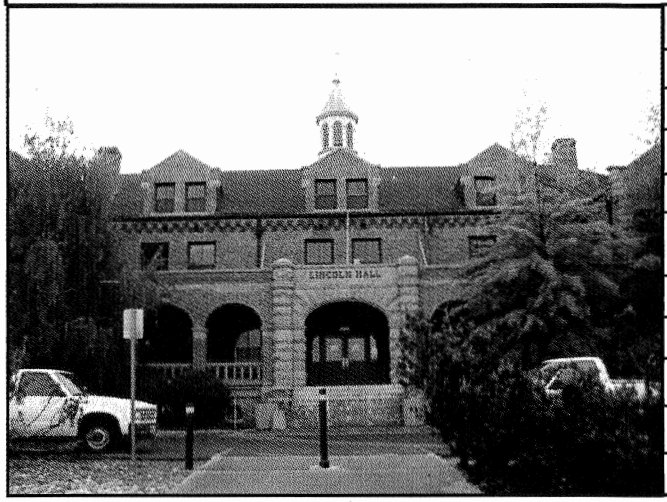
NEVADA Seismological Laboratory

NEVADA

Lincoln Hall

LH
060



Important Building Dates		
Construction	**Code**	**Occupancy**
1895		1896

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
28,298	15,764	545

Are structural plans available? No

Location of Plans: Stick File 7; Flat File 43

Structural Engineer: None Listed

Building Use: R: Residential

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Brick walls					3 + basement	

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	URM: Unreinf Mas Bearing Wall	URM: Unreinf Mas Bearing Wall
Basic Score	1.8	1.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	-0.2	-0.2
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1**	**1**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**0.8**	

Comments:

Limited plans for new stairs and interior alterations in 1952; E.G.W. listed as EOR on 1952 plans; no structural plans for 1989 remodel.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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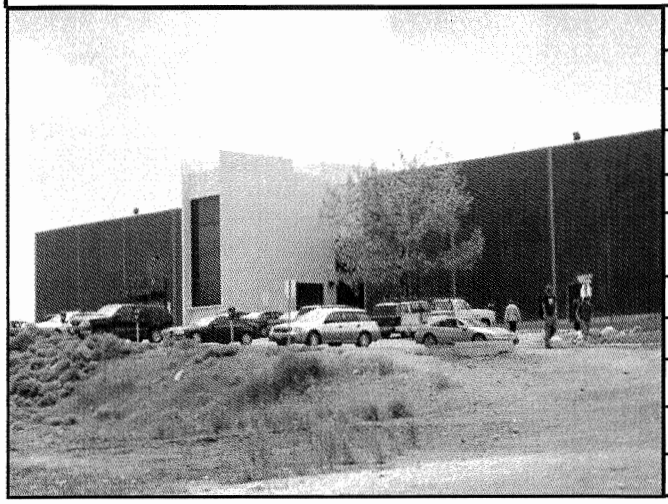
Lombardi Recreation Center

LRC
095



Important Building Dates		
Construction	**Code**	**Occupancy**
1973	1970	1974
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
109,622	81,182	2,481

Are structural plans available? Yes

Location of Plans: Stick File 7; Flat File 34

Structural Engineer: Jack A. Means

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel Columns	1 1/2" metal deck with 3 1/2" Vermiculite fill	3 1/4" light weight concrete over 1 1/2" metal deck	15/(10 to 16)/ (12.25 to 16.25)	22'-3" to 32'-7"	2 + small basement	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S2: Braced Steel Frame
Basic Score	3	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.9**	**1.9**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.52**	

Comments:

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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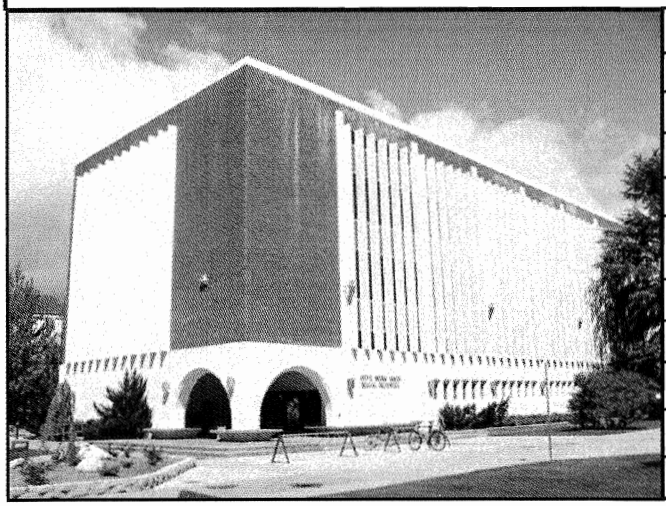
NEVADA Seismological Laboratory

NEVADA

Mack Social Science

MSS
072



Important Building Dates		
Construction	**Code**	**Occupancy**
1965	1964	1967
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
54,141	35,753	771

Are structural plans available? Yes

Location of Plans: Stick File 8

Structural Engineer: J. Clark Gribben

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete bearing walls and columns	14" pan joists, typ.	12" pans with 3" fill	13.67/13/13/13/13/6 (cooling tower)	65'-8"	4 + basement	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0.4	0.4
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.6**	**2.6**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**2.08**	

Comments:

Plans for a unit 'B', but they are not included in the architectural drawings nor final structure

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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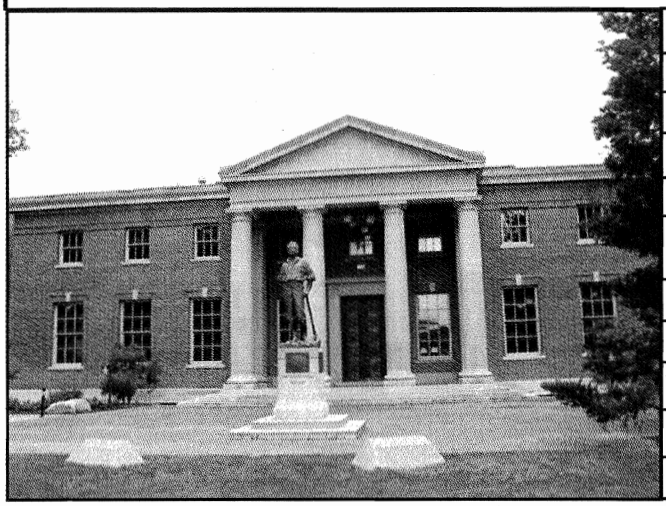
Mackay Mines - original building

MM
057



Important Building Dates		
Construction	**Code**	**Occupancy**
1926	None	1907
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
44,909	30,952	592

Are structural plans available? No

Location of Plans: Stick File 8

Structural Engineer: None Listed

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? Yes

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Brick walls	Wood	Wood	10/10/10/10	40'	3 + basement	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	1.4	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**3.6**	**3.6**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**2.88**	

Comments:

Scored based on the seismic upgrade; original building is URM; earliest plans available are dated 1926; part of building is only 3 stories, with floor to floor: 13.83/15/11.17; additional plans for library completion in 1996 (no structural); re-stored in1990, base isolation added as part of seismic retrofit, post tension concrete slab added as floor system, some original wood floors re-main.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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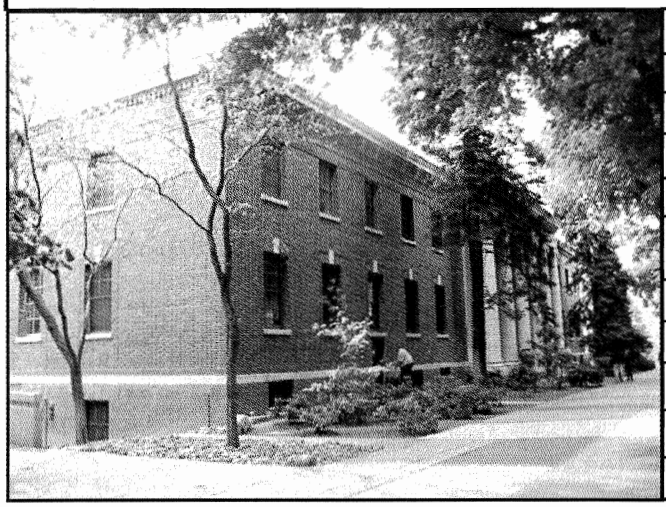
Mackay Science

MS
036



Important Building Dates		
Construction	**Code**	**Occupancy**
1929	None	1930
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
44,127	27,866	482
Are structural plans available? Yes		
Location of Plans: Stick File 8		
Structural Engineer: T. Ronneberg		
Building Use: A/B: Assembly/Classroom and Office/Lab		
Has there been a seismic upgrade? Yes		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and bearing walls	Wood	3 1/2" concrete slab	12/13.33/14/ varies	Varies: 39'-4"	2 + basement + attic	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C3: Conc Frame w/ Unreinf Mas Infill	C3: Conc Frame w/ Unreinf Mas Infill
Basic Score	1.6	1.6
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	-0.2	-0.2
Post-Benchmark	0	0
Soil Type D	-0.4	-0.4
FEMA Score	1	1
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	1	

Comments:

Roof plans had an option for a concrete truss support; file for remodel contains no structural plans and no plans at all dating after 1930.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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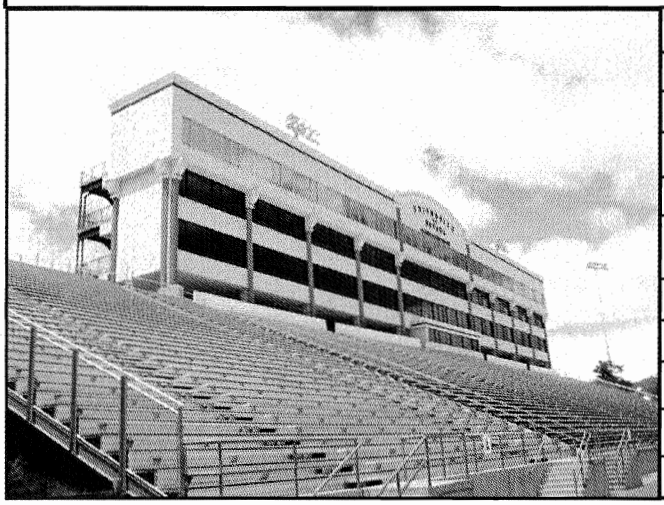
Mackay Stadium - 1995 Westside Box Addition

S
109



Important Building Dates		
Construction	**Code**	**Occupancy**
1995	1994	1989
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
89,280	18,791	181

Are structural plans available? Yes

Location of Plans: Stick File 8

Structural Engineer: Martin, Peltyn, & Early

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel on large concrete pillars	1 1/2" steel metal deck	3" metal deck with 7 1/2" light weight concrete fill	12/12/12/12	Max = 48'-4 1/2"	4	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S1/2: Steel Moment Frame w/ Braces
Basic Score	2.8	5.8
Height	0.2	0.6
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.4**	**5.8**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.4**	

Comments:

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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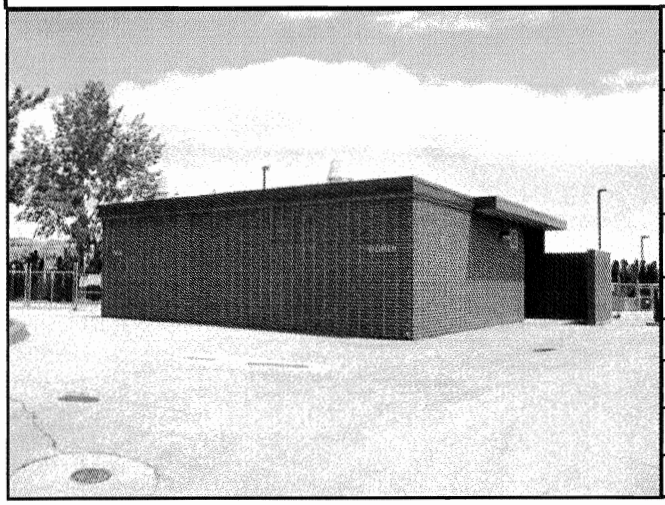
Mackay Stadium - Miscellaneous Small Buildings

S
109



Important Building Dates		
Construction	**Code**	**Occupancy**
1964	1961?	1989
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
89,280	18,791	#N/A

Are structural plans available? Yes

Location of Plans: Stick File 8

Structural Engineer: Varies

Building Use: #N/A

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU bearing walls	Wood	4" concrete slab	varies	varies	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Typical information for the small buildings that are a part of Mackay Stadium (mainly restroom buildings)

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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Mackay Stadium - Field House: original contract: Locker Room

CFH
102

Important Building Dates		
Construction	**Code**	**Occupancy**
1964	1961?	1965

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
5,459	Not Available	109

Are structural plans available? Yes

Location of Plans: Stick File 8

Structural Engineer: John Webster Brown

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and bearing walls	6" concrete roof slab	Main floor: 4" slab on grade; upper level: 7" reinforced concrete slab	14	Max height = 17'-7"	2	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

2004 renovation and addition, this phase removed the existing metal deck roof and replaced it with metal deck with fill, in preparation for a future second story; includes plans for the future second story roof.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Mackay Stadium - Field House: 1977 Additions: New Locker room

CFH
102

Important Building Dates		
Construction	**Code**	**Occupancy**
1977	1976?	1978?
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
3,550		71
Are structural plans available? Yes		
Location of Plans: Stick File 8		
Structural Engineer: John Webster Brown		
Building Use: A: Assembly/Classroom		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU walls	1 1/2" metal deck	4" concrete slab on grade	Ranges from 12- 14	12'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Built up to existing 8" concrete wall; 4" brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Mackay Stadium - Field House: 1988 Addition: second story football offices

CFH
102

Important Building Dates		
Construction	**Code**	**Occupancy**
1988	1985	1989?
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
2,969		30
Are structural plans available? Yes		
Location of Plans: Flat File 39		
Structural Engineer: Clark Gribben		
Building Use: B: Office/Lab		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	1 1/2" metal deck	1 1/2" metal deck with fill	10.67/8.08; area without atrium approx 11'	Max overall = 21'-6"	1 + atrium (addition is the second story)	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S2: Braced Steel Frame
Basic Score	3	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.4**	**2.4**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.4**	

Comments:

The heights are based on the top of the atrium and include only the addition; the first floor is approx 14'

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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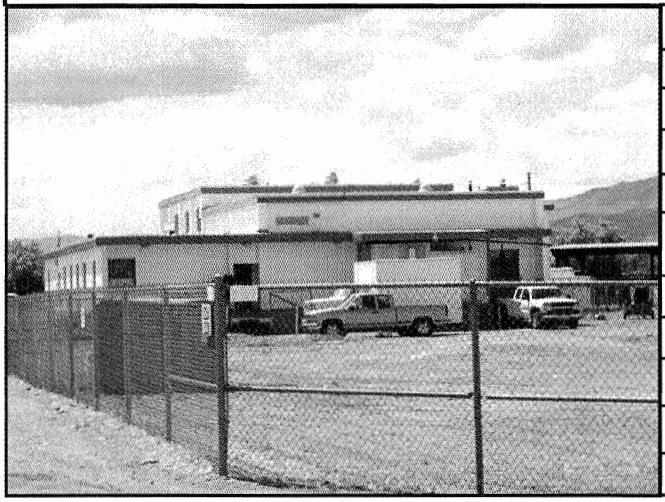
Main Station Farm (all)

#



Important Building Dates		
Construction	**Code**	**Occupancy**
1973	1967?	1970
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
56,443	47,546	188

Are structural plans available? No

Location of Plans: Stick File 8

Structural Engineer: None Listed

Building Use: U/B: Utility/Misc. Ag and Offices

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU bearing walls	Aluminum with wood decking	Concrete slab	Varies between 8 and 16	Max = 16'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Main Station Farm is a collection of small buildings located off McCarran near Mill st, including: Veterinary Medical Building, Veterinary Science Research Center and Addition, Sheep Barn; Animal Research Lab; limited plans available for these buildings; information reflects the typical structure.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

NEVADA

Manzanita Hall

MAH
040

Important Building Dates		
Construction	**Code**	**Occupancy**
1895	None	1896
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
29,968	20,198	504

Are structural plans available? No

Location of Plans: Stick File 8; Flat File 41

Structural Engineer: None Listed

Building Use: R: Residential

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Brick bearing walls	Wood	8" concrete slab	9.96/11.85/9.72/8.14	39'-8"	3 + basement	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	URM: Unreinf Mas Bearing Wall	URM: Unreinf Mas Bearing Wall
Basic Score	1.8	1.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	-0.2	-0.2
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**0.5**	**0.5**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**0.4**	

Comments:

Information based on plans for alterations done in 1957; no structural plans

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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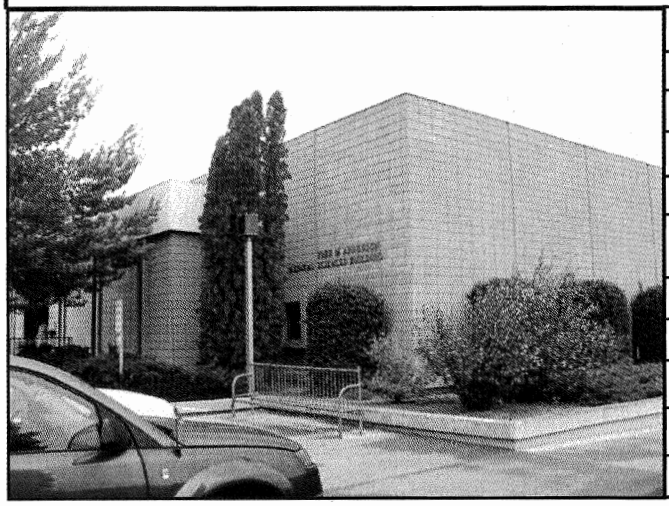
Medicine - Anderson Health Sciences

AHS
128



Important Building Dates		
Construction	**Code**	**Occupancy**
1970	1967?	1972

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
25,263	18,788	322

Are structural plans available? Yes

Location of Plans: Stick File 1

Structural Engineer: John Webster Brown

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU walls	1 1/2" metal deck with rigid insulation	4" concrete slab on grade	14.67	14.67	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Plans split into units 'A' and 'B'; portion of unit 'B' roof has concrete fill

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

NEVADA

Medicine - Brigham Family Medicine

FMC
123

Important Building Dates		
Construction	**Code**	**Occupancy**
1985	1982	1986
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
12,035	8,393	120
Are structural plans available? Yes		
Location of Plans: Stick File 1		
Structural Engineer: Hyytinen Engineering		
Building Use: B: Office/Lab		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU walls	Wood	4" concrete slab on grade	9.33/6 (to ridge)	15'4"	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Additional support on each side of mech. units and mech. roof top unit.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:
Family Medicine Storage (FMS, 118)

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NEVADA Seismological Laboratory

NEVADA

Medicine - Howard Medical Sciences

HMS
125

Important Building Dates		
Construction	**Code**	**Occupancy**
1981	1979?	1982

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
39,791	26,798	379

Are structural plans available? Yes

Location of Plans: Stick File 4

Structural Engineer: PMB Systems

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU walls + steel columns	Concrete fill on metal deck	Concrete fill on metal deck	14/ 17 (varies)	31' (varies)	2 (1 in a section of the Admin. Building)	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	2.6	2.6
Soil Type D	-0.6	-0.6
FEMA Score	**4.8**	**4.8**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**4.8**	

Comments:

2" structural gap between Admin and Lab portions of the building

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA

Medicine - Manville Health Science

MHS
126

Important Building Dates		
Construction	**Code**	**Occupancy**
1975	1973?	1975
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
21,958	16,732	283

Are structural plans available? Yes

Location of Plans: Stick File 9

Structural Engineer: John Webster Brown

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU walls	1 1/2" metal deck	4" concrete slab on grade	12 (unit B)/ 16.67 (unit A)/ 8.67 (penthouse)	12' to 20'-8" (varies)	1 + 2 mechanical penthouses	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Mechanical rooms have a combination of metal stud walls and CB walls; floor system: 4" concrete fill on 1 1/2" metal deck.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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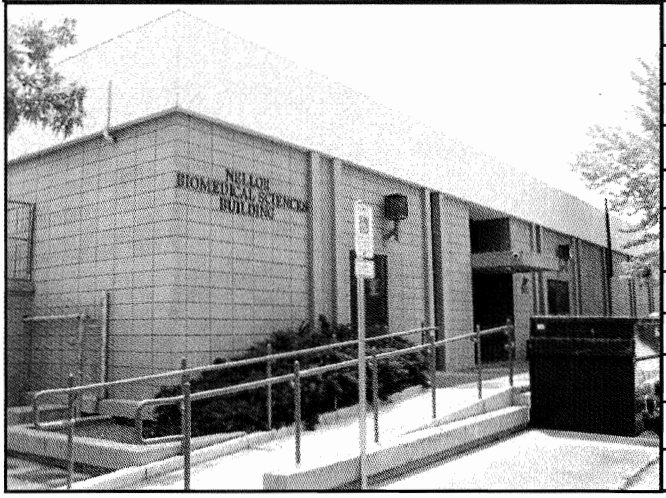
NEVADA Seismological Laboratory

NEVADA

Medicine - Nellor Biomedical Science

NBS
127



Important Building Dates		
Construction	**Code**	**Occupancy**
1989	1985	1990
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
14,852	5,950	140
Are structural plans available? Yes		
Location of Plans: Stick File 9		
Structural Engineer: Clark Gribben		
Building Use: A/B: Assembly/Classroom and Office/Lab		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU walls	Metal deck	5 1/2" light weight concrete fill on 3" metal deck	13/14 (varies)	Max total = 31'	2	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	-1	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.2**	**1.2**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:

2'-8" parapet; west side of building is built against a hill

Vertical Irregularity:
Built against a hill

Plan Irregularity:
NA

Annexes and Outbuildings:

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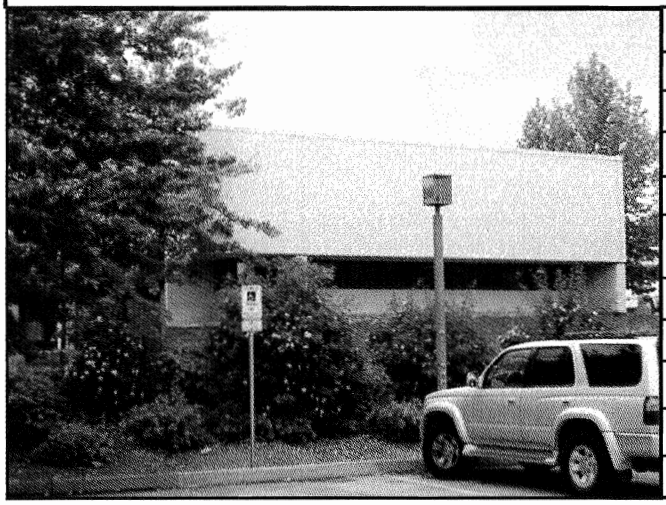
Medicine - Nev. Health Lab

NSHL
136



Important Building Dates		
Construction	**Code**	**Occupancy**
1976	1973	1985
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
9,530	Not Available	95

Are structural plans available? Yes

Location of Plans: Stick File 11

Structural Engineer: Jack A. Means

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete panels	Wood	4" concrete slab on grade	Ranges from 11.83 to 13.35	Max total = 14'-7 1/4"	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	PC1: Tilt-up	PC1: Tilt-up
Basic Score	2.6	2.6
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2**	**2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2**	

Comments:

Precast panels extend 4' out from main wall every 12'

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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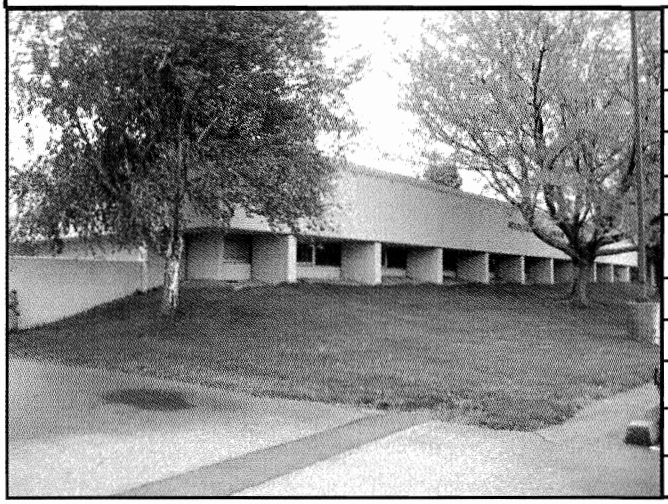
NEVADA Seismological Laboratory

NEVADA

Medicine - Nev. Health Lab addition

NSHL
138



Important Building Dates		
Construction	**Code**	**Occupancy**
1994	1991	Not Available
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
8,841	Not Available	88

Are structural plans available? Yes

Location of Plans: Flat File 21

Structural Engineer: Hyytinen Engineering

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete pan-els	Wood (sloped)	5" concrete slab on grade	16	16'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	PC1: Tilt-up	PC1: Tilt-up
Basic Score	2.6	2.6
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2**	**2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2**	

Comments:

Walls are precast concrete panels, varying in size

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

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Medicine - Pennington Med Educ

PMB
121

Important Building Dates		
Construction	**Code**	**Occupancy**
2000	1997	2001

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
72,258	46,386	811

Are structural plans available? Yes

Location of Plans: Flat File 96

Structural Engineer: Blakely Johnson & Ghusn

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	2" concrete on 3" metal deck; penthouse roof: 1 1/2" metal deck	3" concrete on 3" metal deck	14/14/14/15	Max = 60'	2 + basement + penthouse	Both

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	-1	-1
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	2.6	2.6
Soil Type D	-0.6	-0.6
FEMA Score	**3.3**	**3.3**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**3.04**	

Comments:

2'-9" parapet

Vertical Irregularity:
Built on a hill; grade elevation varies by 17'

Plan Irregularity:
Type 5

Annexes and Outbuildings:

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Medicine - Nell J. Redfield

NJR
122

Important Building Dates		
Construction	**Code**	**Occupancy**
1989	1988	1992

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
26,619	16,735	347

Are structural plans available? Yes

Location of Plans: Stick File 11

Structural Engineer: Sea Engineers

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns and CMU walls	Wood sheath-ing (sloped)	Wood	12.67/12.67	25'-4" (plus parapet)	2	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1.7**	

Comments:

Parapet; listed in archives as Speech Pathology and Student Health (located in the stick file with the purple cover)

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:
Student Health Storage (SHS,119)

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Medicine - Savitt Medical Science

SMS
124

Important Building Dates		
Construction	**Code**	**Occupancy**
1977	1976?	1979
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
17,761	11,730	213
Are structural plans available? Yes		
Location of Plans: Stick File 11		
Structural Engineer: John Webster Brown		
Building Use: A/B: Assembly/Classroom and Office/Lab		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns and CMU walls	1 1/2" metal deck	2 1/2" light weight concrete fill on 3" metal deck	12-15 (varies)/12'	24' to 27' (varies)	2 + mechanical penthouse	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

CMU blocks change from 10" to 12" above 2nd floor

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:
Medicine - Trailer # 2: 712 gross sf; 631, assignable sf, 1991; Trailer #3:719 gsf, 641 asf, 1991; Trailer #4: 1434 gsf; 1349 asf; 1997; Trailer #7: 1440 gsf, 1356 asf, 1997

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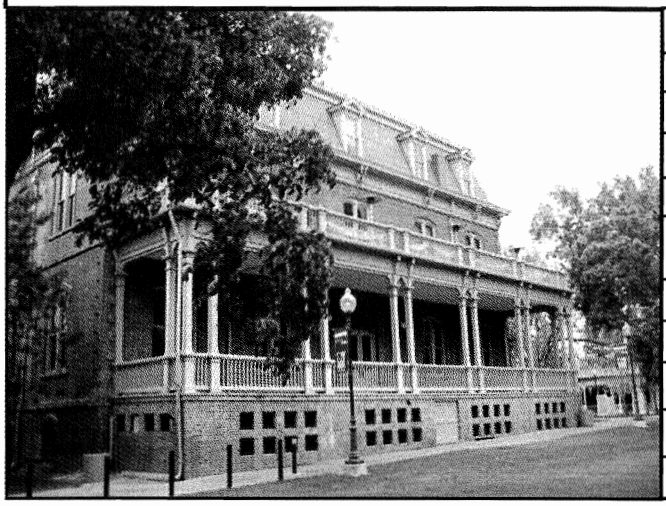
Morrill Hall Alumni Center

MH
034



Important Building Dates		
Construction	**Code**	**Occupancy**
1885	None	1886
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
15,384	9,078	172

Are structural plans available? No

Location of Plans: Stick File 8

Structural Engineer: None Listed

Building Use: B: Office/Lab

Has there been a seismic upgrade?

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Brick walls			10.5/17/17/12	56'-6"	3 + basement	

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	URM: Unreinf Mas Bearing Wall	URM: Unreinf Mas Bearing Wall
Basic Score	1.8	1.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	-0.2	-0.2
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1**	**1**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**1**	

Comments:

Plans for restoration of 1977, including wood floors and connection of floors to the walls; no structural plans: information listed is based on architectural plans; architect: Edward S. Parsons

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

NEVADA

Motor Pool - B&G

MP
145

Important Building Dates		
Construction	**Code**	**Occupancy**
1989	1988	1990

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
8,835	6,911	26

Are structural plans available? Yes

Location of Plans: Stick File 9 (under North Campus)

Structural Engineer: Hyytinen Engineering

Building Use: S: Storage

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Metal deck	Ranges from 4" to 6" concrete slab on grade; 3/4" plywood floor for mez. Level	8/8 or 16 where no mez.	Max height = 16'	1 + mezza-nine level	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S2: Braced Steel Frame
Basic Score	2.8	3
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.4**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Steel brace frame is covered with pre-manufactured metal panels; plans listed for relocation and addition to building in '89. Base building is a metal building with moment frames in the transverse direction; Mike Blakely, structural engineer for relocation and addition.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:
Motor Pool Storage - B&G (750sq ft)

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National Judicial College: original building

NJC
084

Important Building Dates		
Construction	**Code**	**Occupancy**
1970	1967	1971
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
27,383	Not Available	365

Are structural plans available? Yes

Location of Plans: Stick File 6

Structural Engineer: J. Clark Gribben

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns, concrete columns, and CMU bearing walls	1 1/2" metal deck	9 1/2" reinforced concrete slab	Admin: 10.875/13.5 (typical); library: varies 22-23.83	Admin max= 27'-5"; library max= 25'	1 + basement (admin wing), 1 (library/ classroom)	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.76**	

Comments:

The Trial Judges Building was added to the original building, but no plans are available for the addition; precast fins on admin portion of the building; there are some different heights, but not a whole story difference

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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NEVADA Seismological Laboratory

NEVADA

National Judicial College: Donald W. Reynolds National Center for the Courts and Media	NJC # 084

Important Building Dates		
Construction	**Code**	**Occupancy**
1998	1994	

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
33,307	Not Available	444

Are structural plans available? Yes

Location of Plans: Stick File 6

Structural Engineer: Martin, Peltyn, & Early

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	1 1/2" metal deck	4 1/2" concrete on 2" metal deck	16/16	Max height = 46'-8"	2 + mechanical penthouse	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.36**	

Comments:

Brick veneer; engineer: Allen K. Forbes

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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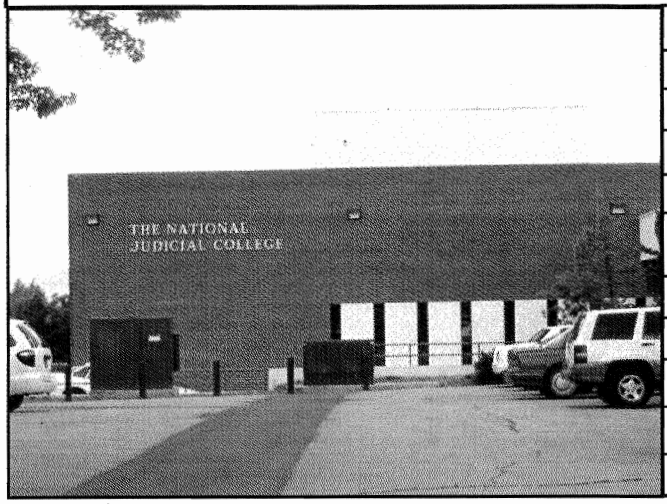
National Judicial College: Trial Judges Building

NJC
084



Important Building Dates		
Construction	**Code**	**Occupancy**
Not Available	Not Available	Not Available

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
Not Available	Not Available	Not Available

Are structural plans available? No

Location of Plans:

Structural Engineer: None Listed

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	Unable to determine	Unable to determine	?	?	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

***No plans available; information based on visual screen; located between the original building and the media center, structurally separate from both; brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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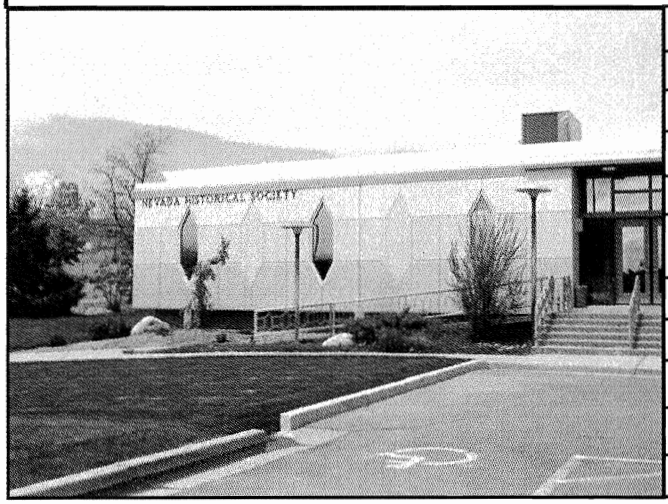
NEVADA Seismological Laboratory

NEVADA

Nevada Historical Society

NHS
134



Important Building Dates		
Construction	**Code**	**Occupancy**
1967	1964	Not Available
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
12,688	Not Available	127

Are structural plans available? Yes

Location of Plans: Stick File 9

Structural Engineer: Jack A. Means

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	Metal deck with 3" fill	4" concrete slab on grade	13.5	13'-6"	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	PC1: Tilt-up	PC1: Tilt-up
Basic Score	2.6	2.6
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2**	**2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2**	

Comments:

Vertical Irregularity:
NA

Plan Irregularity:
NA

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Nevada Historical Society: 1980 addition

NHS
134

Important Building Dates		
Construction	**Code**	**Occupancy**
1980	1979	Not Available

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
9,556	Not Available	96

Are structural plans available? Yes

Location of Plans:

Structural Engineer:

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	Wood	5" concrete slab	13.5/9.33	Max = 22'-10"	1 + pent-house	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	PC1: Tilt-up	PC1: Tilt-up
Basic Score	2.6	2.6
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2**	**2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2**	

Comments:

Added weight due to solar panels, supported by trusses; 1/2" plywood veneer; parapet: typ: 1.5', max: 6.5'

Vertical Irregularity:
NA

Plan Irregularity:
NA

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Nye Hall

NH
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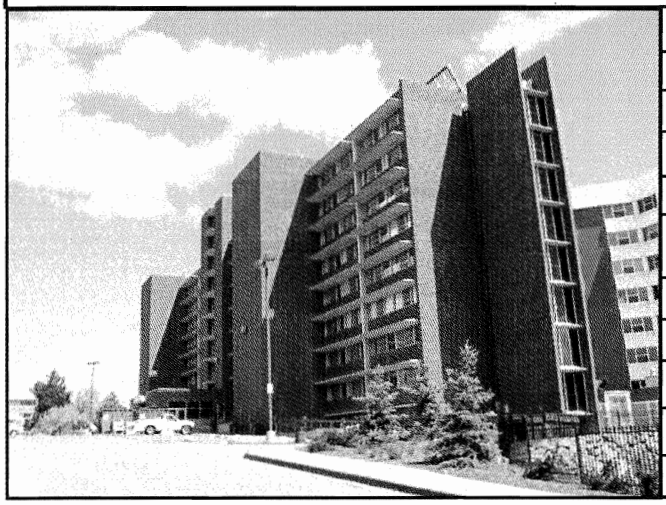

Important Building Dates		
Construction	**Code**	**Occupancy**
1964	1961?	1967
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
123,141	78,840	2,246

Are structural plans available? Yes

Location of Plans: Stick File 9

Structural Engineer: Robert Henderson

Building Use: R: Residential

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and CMU walls	5 1/2" concrete slab	5 1/2" concrete slab	Basement 12'4"/ 8'-8" (floors 1-8 and penthouse)	86'-8"	8 + 2 story mechanical penthouse + basement	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0.6	0.6
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.8**	**2.8**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**2.24**	

Comments:

Thickened floor slabs for mechanical; brick veneer

Vertical Irregularity:
NA

Plan Irregularity:
NA

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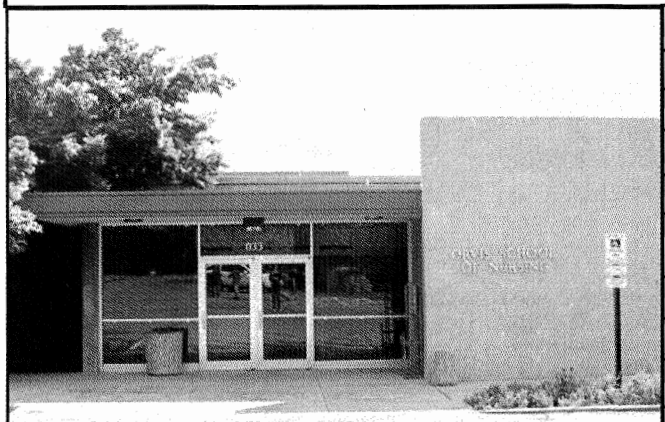
Orvis School of Nursing

OSN
033



Important Building Dates		
Construction	**Code**	**Occupancy**
1965	1961?	1966

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
22,227	13,678	334

Are structural plans available? Yes

Location of Plans: Stick File 10

Structural Engineer: H. V. Lamberti

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns and concrete bearing walls	4" concrete slab on 1 1/2" metal deck	4 1/2" structural slab	14/13	27'	2	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	Combined, C2 and RM2 in both directions	Combined, C2 and RM2 in both directions
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:
Combined, C2: Conc Shearwalls and RM2: Reinf Mas w/ Rigid Floor/Roof Diaph in both directions.
First floor lateral system: C2 in both directions; second floor combined R2 and C2 in one direction and R2 in the other

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Palmer Engineering

PE
050

Important Building Dates		
Construction	**Code**	**Occupancy**
1940	?	1941

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
33,272	24,300	427

Are structural plans available? Yes

Location of Plans: Stick File 10; Flat File 57 (old campus)

Structural Engineer: J. W. C.

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete	Wood	Pan Joist system	13/13/15.67	41'-8"	2 + basement	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C3: Conc Frame w/ Unreinf Mas Infill	C3: Conc Frame w/ Unreinf Mas Infill
Basic Score	1.6	1.6
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	-0.2	-0.2
Post-Benchmark	0	0
Soil Type D	-0.4	-0.4
FEMA Score	**0.5**	**0.5**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**0.5**	

Comments:

5" brick veneer; no structural engineer listed: architect listed: Russell Mills

Vertical Irregularity:
NA

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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Paul Laxalt Mineral Engineering

LME
046

Important Building Dates		
Construction	**Code**	**Occupancy**
1981	1979	1982
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
68,839	41,143	931

Are structural plans available? Yes

Location of Plans: Stick File 7

Structural Engineer: J. Clark Gribben

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel (first 2 floors: steel and CMU bearing walls)	1 1/2" metal deck	3 1/4" light weight concrete on 2" metal deck	13.33/13.33/13.33/12.65	Max = 52'-7 3/4"	Ranges from 2 to 4	Both

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S2: Braced Steel Frame
Basic Score	3	3
Height	0.4	0.4
Vertical Irregularity	-1.5	-1.5
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**0.8**	**0.8**
ATC-21 Correction	1	1
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.44**	

Comments:
C2: Conc Shearwalls on the first two floors and S2: on the 3rd and 4th floors
Lateral system: first two stories are C2 with some CMU shear walls; Vert: NE section: 1st 2 stories; NW section: 4 stories; SW section: top 2 stories; engineer on the project: Kirk N. Ellis.

Vertical Irregularity:
Vertical Irregularity: NE section: 1st 2 stories; NW section: 4 stories; SW section: top 2 stories; built against a hill

Plan Irregularity:
Type 2

Annexes and Outbuildings:

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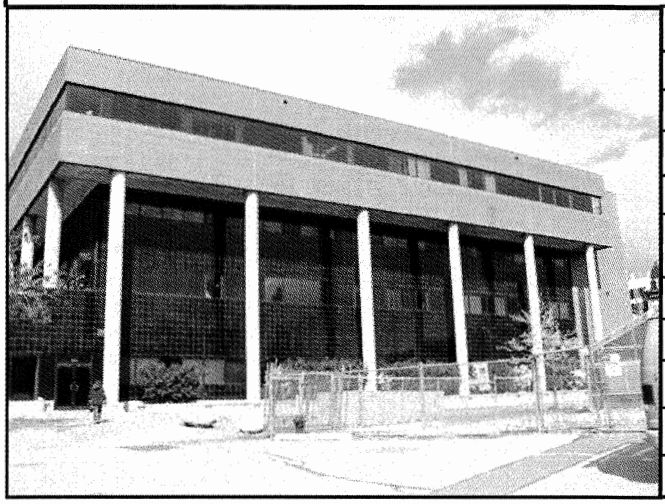
Paul Laxalt Mineral Research

LMR
044



Important Building Dates		
Construction	**Code**	**Occupancy**
1987	1985?	1989

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
83,831	50,754	710

Are structural plans available? Yes

Location of Plans: Stick File 7

Structural Engineer: Ferrari-Howard

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel, concrete columns	1 1/2" metal deck	6 1/2" concrete fill on 3" metal deck	10/15/13.375/ 13.33/13.875	65'-7"	4+ basement and mechanical level	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S2: Braced Steel Frame	S2: Braced Steel Frame
Basic Score	3	3
Height	0.4	0.4
Vertical Irregularity	-1.5	-1.5
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.3**	**1.3**
ATC-21 Correction	1	1
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.84**	

Comments:
C2: Conc Shearwalls on the first two floors and S2: on the 3rd and 4th floors
Lower floors have concrete shear wall; seismic pad in basement; full brick veneer; second floor: 3 sides are braced framed and 1 side is C2, third floor is braced frame on all sides; engineer on the plans: John E. Howard

Vertical Irregularity:
Vertical: built against a hill

Plan Irregularity:
NA

Annexes and Outbuildings:

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Renewable Resource Center

RRC
172

Important Building Dates		
Construction	**Code**	**Occupancy**
1966	1964	1979

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
7,849	5,302	80

Are structural plans available? Yes

Location of Plans: Stick File 6

Structural Engineer: Jack A. Means

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU bearing walls	Wood	Wood	Varies 10.42 to 12.42	16'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

Dates don't match; part of the Valley Road buildings

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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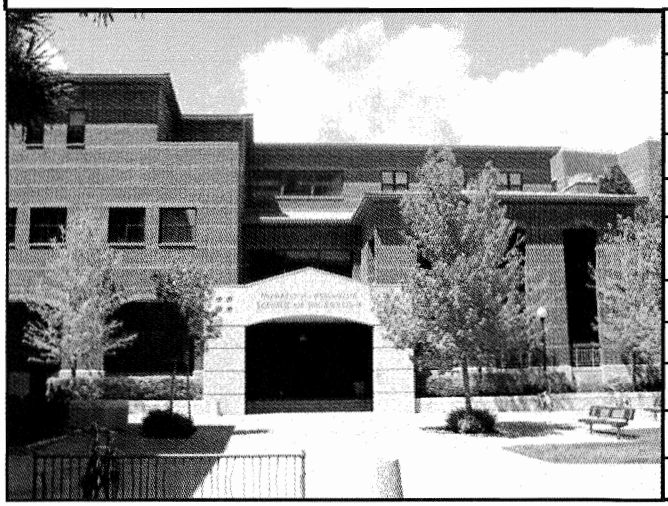
Reynolds School of Journalism

RSJ
077



Important Building Dates		
Construction	**Code**	**Occupancy**
1991	1988	1992
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
38,668	21,712	498

Are structural plans available? Yes

Location of Plans: Stick File 10

Structural Engineer: Martin, Peltyn, & Early

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU walls	Wood	3 1/2" concrete on metal deck	15/15/13	43'	3	Both

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	-1	-1
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	2.6	2.6
Soil Type D	-0.6	-0.6
FEMA Score	**3.3**	**3.3**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**3.04**	

Comments:

Vertical Irregularity:
Vertical: varying heights

Plan Irregularity:
Type 5

Annexes and Outbuildings:

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Ross Hall

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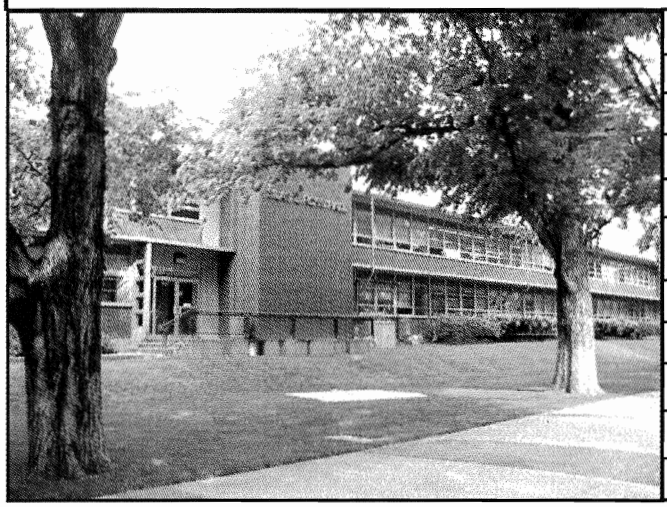

Important Building Dates		
Construction	**Code**	**Occupancy**
1956	1955?	1957

Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
24,132	15,633	238

Are structural plans available? Yes

Location of Plans: Stick File 10; Flat File 43

Structural Engineer: W. C.

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel, CMU bearing wall	Metal deck (Robertson long span Q-deck)	4 1/2" reinforced concrete slab	11-1/2/10-6	21'-6 1/2"	2	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof	RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:
Combined, RM1/2: Reinf Mas w/ Rigid Floor/ Flex Roof and S2: Braced Steel Frame in the EW direction (end walls only)
Remodeled in 1998 (UBC 97), no shear or bearing walls removed; No structural engineer listed (Howard Engle??), architect: Vhay and Grow

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Blakely, Johnson & Giesen Inc
6995 Sierra Center Parkway Suite 200
Reno, Nevada 89511
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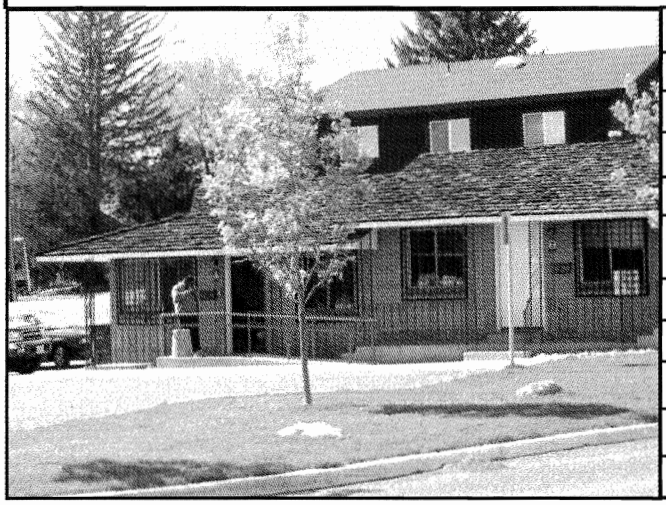
775.827.1663 (fax)
www.bjginc.com

NEVADA Seismological Laboratory

NEVADA

Sagebrush Newspaper Office

SNO
001



Important Building Dates		
Construction	**Code**	**Occupancy**
Not Available	Not Available	Not Available
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
Not Available	Not Available	Not Available

Are structural plans available? No

Location of Plans: No Plans

Structural Engineer: None Listed

Building Use: B: Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU bearing walls	Wood truss	Slab on grade	+/- 9'	+/- 12'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

***No plans available; information based on visual screening; could be poorly reinforced.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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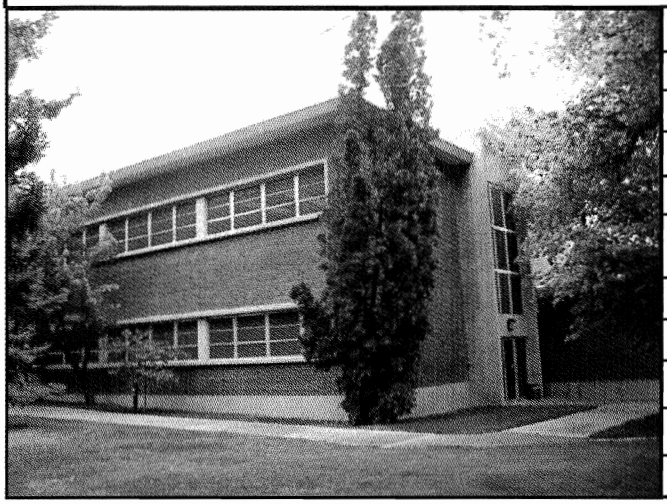
Sarah H. Fleischmann Building

SFB
031



Important Building Dates		
Construction	**Code**	**Occupancy**
1956	1955?	1957
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
42,446	23,012	500

Are structural plans available? Yes

Location of Plans: Stick File 11

Structural Engineer: John A. Boneli

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	Metal deck	2 1/2" light weight concrete on metal deck	11/12/12	35'	2 + basement	Plan

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	-0.5	-0.5
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.7**	**1.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.36**	

Comments:

Portions of the building are 3-sided diaphragms

Vertical Irregularity:
NA

Plan Irregularity:
Type 1

Annexes and Outbuildings:

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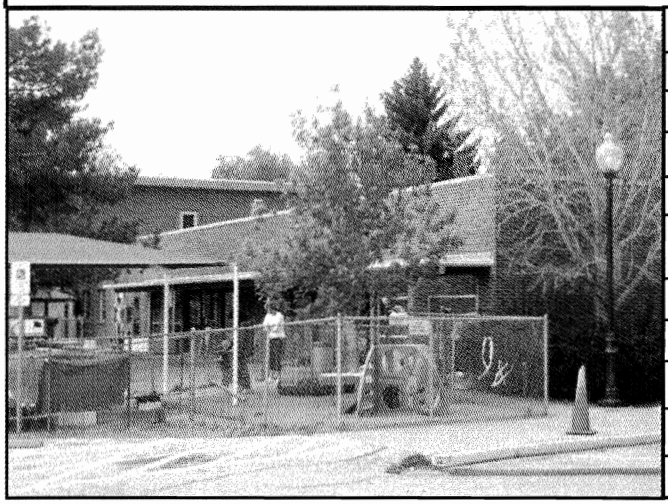
Sarah H. Fleischmann Building: Child Care Wing

SFB
031



Important Building Dates		
Construction	**Code**	**Occupancy**
1956	1955?	1957
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
Not Available	Not Available	Not Available
Are structural plans available? No		
Location of Plans: No Plans		
Structural Engineer: None Listed		
Building Use: I: Institutional/Childcare		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel	Unable to determine	Slab on grade	?	?	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S1: Steel Moment Frame
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

***Remodel in 1996-no structural; information based on visual screen; structurally separate from Sarah H. Fleischmann Building

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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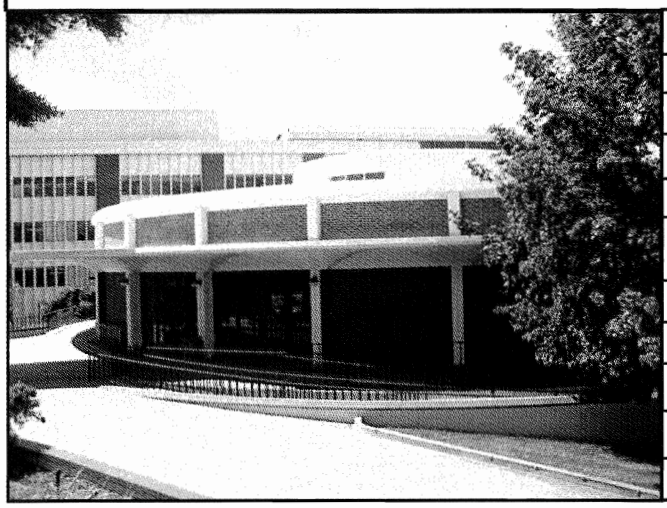
NEVADA

Schulich Lecture Hall

SLH
073



Important Building Dates		
Construction	**Code**	**Occupancy**
1967	1964?	1970
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
17,441	8,360	167

Are structural plans available? Yes

Location of Plans: Stick File 3

Structural Engineer: John Webster Brown

Building Use: A: Assembly/Classroom

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete bearing walls	main roof: 6" concrete slab on concrete beams, located 15.5' above the first floor	8" reinforced concrete slab	9.17/17.5/5.83	17'-6" (without basement or penthouse)	1 + basement + penthouse	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.76**	

Comments:

Same contract as Chemistry Building; brick veneer; roof details: varying concrete canopy (8"min), 9' above the first floor; penthouse roof: 3" metal deck with radial steel supports.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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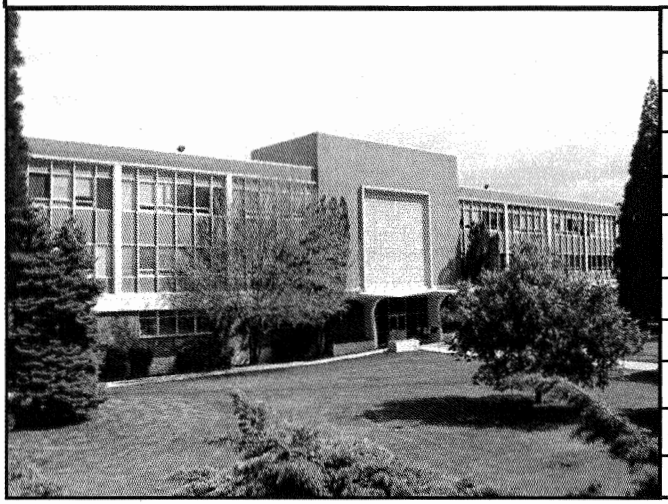
Scrugham Engineering/ Mines

SEM
056



Important Building Dates		
Construction	**Code**	**Occupancy**
1963	1961?	1963
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
130,365	89,797	1,573

Are structural plans available? Yes

Location of Plans: Stick File 11

Structural Engineer: Clark Gribben

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete bearing wall and columns	5" reinforced concrete slab	7 1/2" reinforced concrete slab; one way pan joists	11/12/12/12/12/9	Varies; max = 57'	4 + basement + two penthouses	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0.4	0.4
Vertical Irregularity	-1	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.6**	**1.6**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.68**	

Comments:

Vertical Irregularity:
Hillside (portion)

Plan Irregularity:
No-Expansion Joint

Annexes and Outbuildings:

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Sierra Street Parking Complex

SPC
005

Important Building Dates		
Construction	**Code**	**Occupancy**
2000	1997	2001
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
136,240	132,294	658

Are structural plans available? Yes

Location of Plans: Stick File 10

Structural Engineer: Culp and Tanner

Building Use: Parking

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and concrete bearing walls	5" post-tensioned concrete slab w/ post-tensioned concrete beams	5" post-tensioned concrete slab w/ post-tensioned concrete beams	11.33/10.17/10.17	31'-10 1/2"	3	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	C2: Conc Shearwall
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	2.4	2.4
Soil Type D	-0.6	-0.6
FEMA Score	**4.6**	**4.6**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**4.6**	

Comments:

Stairwell: 3" metal deck roof with steel frame, lateral system RM2

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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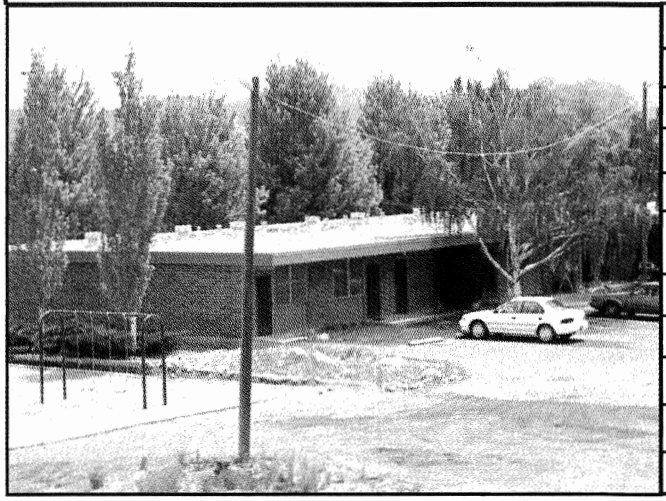
University Village

UV
097



Important Building Dates		
Construction	**Code**	**Occupancy**
1958	1955?	1960
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
23,382	20,436	466

Are structural plans available? No

Location of Plans: Stick File 12

Structural Engineer: None Listed

Building Use: R: Residential

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Brick bearing walls	Wood	Concrete slab on grade	8	8'	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

***No structural plans available; consists of 4 units, each containing 10 apartments; information is based on visual screen.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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Virginia Street Gym

VSG
062

Important Building Dates		
Construction	**Code**	**Occupancy**
1941	None	1943
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
51,494	36,801	562

Are structural plans available? No

Location of Plans: Stick File 10

Structural Engineer: None Listed

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
	?		12.5/28.06 or 12.5/8.17/19.90	40'-6"	1 + basement + balcony	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	URM: Unreinf Mas Bearing Wall	URM: Unreinf Mas Bearing Wall
Basic Score	1.8	1.8
Height	0	0
Vertical Irregularity	-1	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**0.2**	**0.2**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**0.56**	

Comments:

No structural plans available, information based on architectural plans

Vertical Irregularity:
Built against a hill

Plan Irregularity:
NA

Annexes and Outbuildings:

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Nevada Seismological Laboratory

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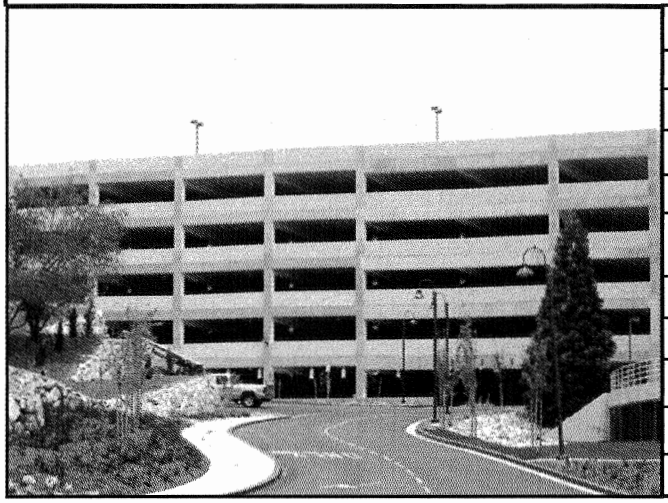
West Stadium Parking Complex

WSPC
107



Important Building Dates		
Construction	**Code**	**Occupancy**
2003	1997	2005
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
617,343	Not Available	3,087
Are structural plans available? Yes		
Location of Plans: Flat File 90		
Structural Engineer: Carl Walker		
Building Use: Parking		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and bearing walls and CMU walls	Post Tension Concrete slab on post-tensioned concrete beams	Post Tension Concrete slab on post-tensioned concrete beams	11.67/11.66/11.33/11.34/11.33/11.33	Max (to the top of the elevator shaft) = 83'-10"	6	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C1: Conc Moment Frame	C1: Conc Moment Frame
Basic Score	2.5	2.5
Height	0.4	0.4
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	1.4	1.4
Soil Type D	-0.6	-0.6
FEMA Score	**3.7**	**3.7**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**3.7**	

Comments:

Two floors are below grade and have C2 retaining walls; structure includes an elevator shaft that is separated with an expansion joint.

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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White Pine Hall

WPH
061

Important Building Dates		
Construction	**Code**	**Occupancy**
1958	1955?	1962
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
32,951	24,177	624

Are structural plans available? Yes

Location of Plans: Stick File 12

Structural Engineer: Edward S. Pankhurst

Building Use: R: Residential

Has there been a seismic upgrade? Yes

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Concrete columns and concrete bearing walls	9" reinforced concrete	4" to 5" reinforced concrete	11/9/9	29'	3	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	C2: Conc Shearwall	RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.76**	

Comments:

Brick Veneer

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

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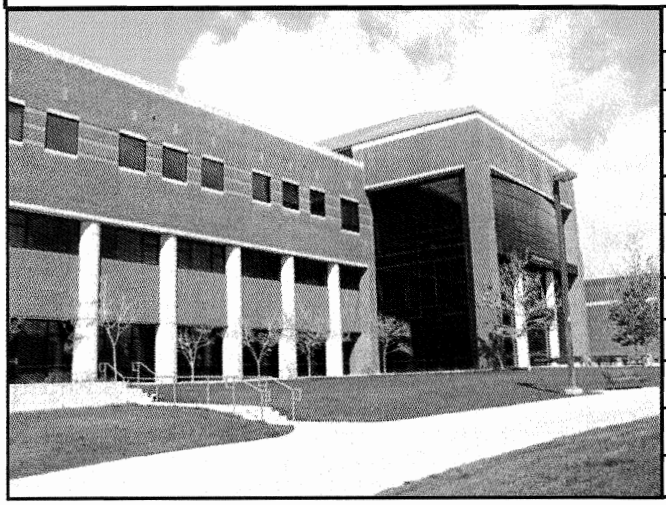
William J. Raggio Building, Education Building

WRB
080



Important Building Dates		
Construction	**Code**	**Occupancy**
1991	1988?	1997
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
117,854	75,020	1,571

Are structural plans available? Yes

Location of Plans: Stick File 2

Structural Engineer: Fricke Engineering

Building Use: A/B: Assembly/Classroom and Office/Lab

Has there been a seismic upgrade? No

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
Steel columns	1 1/2" metal deck	3-1/2" concrete on 3" metal deck	16/16/14.67/14.66/9.79 (pent)	71'-1 1/2" (with penthouse)	5 + mechanical penthouse	Vertical

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	S1: Steel Moment Frame	S1: Steel Moment Frame
Basic Score	2.8	2.8
Height	0.2	0.2
Vertical Irregularity	-1	-1
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**1.4**	**1.4**
ATC-21 Correction	0.5	0.5
Occupancy Correction	÷ 1.25	÷ 1.25
Final Score, S	**1.52**	

Comments:

Mechanical penthouse in south section (has a brace frame lateral system)

Vertical Irregularity:
Built against a hill

Plan Irregularity:
NA

Annexes and Outbuildings:

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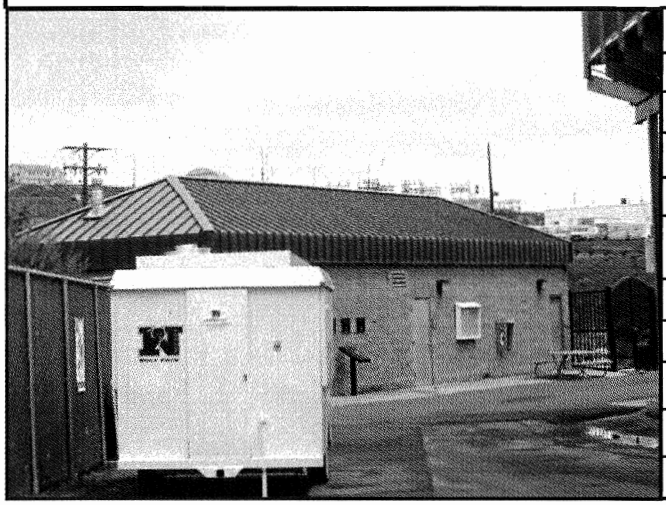
Williams Peccole Park - Restroom Addition

WPP
114



Important Building Dates		
Construction	**Code**	**Occupancy**
1994	1991?	1994
Building Areas/ Occupancy		
Gross (ft^2)	**Assignable (ft^2)**	**No. Persons**
6,068	858	#N/A
Are structural plans available? Yes		
Location of Plans: Hanging File 3		
Structural Engineer: None Listed		
Building Use: #N/A		
Has there been a seismic upgrade? No		

Structure Properties and Building Characteristics

Gravity System	Roof System	Floor System	Floor to Floor (ft)	Total Height (ft)	No. of Stories	Irregularity (Vertical, Plan, Both)
CMU Walls	Metal deck with pre-fabricated roof trusses	4" concrete slab on grade	10	Max height = 16'-8"	1	None

Basic Score, Modifiers, and Final Score
(based on FEMA-154 Data Collection Form)

	North—South	East—West
Lateral System	RM1: Reinf Mas w/ Flex Floor/Roof Diaph	RM1: Reinf Mas w/ Flex Floor/Roof Diaph
Basic Score	2.8	2.8
Height	0	0
Vertical Irregularity	0	0
Plan Irregularity	0	0
Pre-Code	0	0
Post-Benchmark	0	0
Soil Type D	-0.6	-0.6
FEMA Score	**2.2**	**2.2**
ATC-21 Correction	0	0
Occupancy Correction	÷ 1.00	÷ 1.00
Final Score, S	**2.2**	

Comments:

No structural plans available

Vertical Irregularity:
NA

Plan Irregularity:
NA

Annexes and Outbuildings:

BJG ARCHITECTURE - ENGINEERING
Reno/Las Vegas
Bailey, Johnson & Gholson Inc.
6995 Sierra Center Parkway Suite 200
Reno, Nevada 89511
775.827.1010
775.827.1663 (fax)
www.bjginc.com

NEVADA Seismological Laboratory

NEVADA

Appendix B
Building Lists:

By Score
By Lateral Force System
By Date of Construction

Buildings Listed By Score

Building Name	Final Modified Score
Manzanita Hall	0.4
Clark Administration - original building	0.5
Palmer Engineering	0.5
Virginia Street Gym	0.56
Lincoln Hall	0.8
Facility Services Building	1
Jones Visitor Center	1
Mackay Science	1
Morrill Hall Alumni Center	1
Thompson Building	1
Church Fine Arts- Art and Speech	1.2
Edmund J. Cain Hall	1.36
Fleischmann Agriculture	1.36
Getchell Library	1.36
Leifson Physics	1.36
National Judicial College: Donald W. Reynolds National Center for the Courts and Media	1.36
Sarah H. Fleischmann Building	1.36
Paul Laxalt Mineral Engineering	1.44
Central Heat Plant - Boiler Room	1.47
Central Heat Plant - Boiler Room Addition	1.47
Harry Reid Engineering Laboratory - part 2, classrooms and small labs	1.52

Buildings Listed By Score

Lombardi Recreation Center	1.52
William J Raggio Building, Education Building	1.52
Scrugham Engineering/ Mines	1.68
Applied Research Facility	1.7
Central Services - copy center addition	1.7
Church Fine Arts- Drama	1.7
Fleischmann Agriculture - 1961 addition of Life Science Wing	1.7
Harry Reid Engineering Laboratory - part 4, mechanical and electrical	1.7
Jot Travis Student Center - original building	1.7
Jot Travis Student Center - Addition phase 3	1.7
Jot Travis Student Center - Dining Commons	1.7
Knudtsen Resource Center	1.7
Medicine - Nellor Biomedical Science	1.7
Medicine - Nell J. Redfield	1.7
Sports Medicine Center	1.7
Chemistry Building	1.76
Claude Howard System Administration Building	1.76
Getchell Library - 1975 Addition	1.76
National Judicial College: original building	1.76
Schulich Lecture Hall	1.76
White Pine Hall	1.76
Paul Laxalt Mineral Research	1.84
Church Fine Arts - addition phase 1 (Arts and Theater Addition)	1.9

Buildings Listed By Score

Continuing Education Building (Formerly Midby-Byron Bldg)	1.9
Harry Reid Engineering Laboratory - part 3, classrooms and small labs	1.92
Frandsen Humanities	2
Medicine - Nev. Health Lab	2
Medicine - Nev. Health Lab addition	2
Nevada Historical Society	2
Nevada Historical Society: 1980 addition	2
Juniper Hall	2.08
Mack Social Science	2.08
University Inn	2.1
Ansari Business Building	2.16
Agricultural Education	2.2
Buildings and Grounds	2.2
Buildings and Grounds Storage Building	2.2
Central Services - original building	2.2
Central Services - mail room addition	2.2
Church Fine Arts- Music	2.2
Church Fine Arts - addition phase 1 (Music Addition)	2.2
Equestrian Center	2.2
Fleischmann Greenhouses	2.2
Fleischmann Planetarium	2.2
Harry Reid Engineering Laboratory - part 1, High Bay Lab	2.2
Jot Travis Student Center - Addition phase 1	2.2

Buildings Listed By Score

Jot Travis Student Center - Addition phase 2	2.2
Jot Travis Student Center - Dining Commons addition	2.2
Mackay Stadium - Miscellaneous Small Buildings	2.2
Mackay Stadium - Field House: original contract: Locker Room	2.2
Mackay Stadium - Field House: 1977 Additions: New Locker room	2.2
Main Station Farm (all)	2.2
Medicine - Anderson Health Sciences	2.2
Medicine - Brigham Family Medicine	2.2
Medicine - Manville Health Science	2.2
Medicine - Savitt Medical Science	2.2
Motor Pool - B&G	2.2
National Judicial College: Trial Judges Building	2.2
Orvis School of Nursing	2.2
Renewable Resource Center	2.2
Ross Hall	2.2
Sagebrush Newspaper Office	2.2
Sarah H Fleischmann Building: Child Care Wing	2.2
University Inn - Parking Garage	2.2
University Village	2.2
Williams Peccole Park - Restroom Addition	2.2
Nye Hall	2.24
Mackay Stadium - 1995 Westside Box Addition	2.4
Mackay Stadium - Field House: 1988 Addition: second story football offices	2.4

Buildings Listed By Score

Mackay Mines - original building	2.88
Student Services Building	2.88
Artemesia Building	3
Child Care Center (off 11th street)	3
Child Care Facility (north campus)	3
Computing Center - old water resources building	3
Medicine - Pennington Med Educ	3.04
Reynolds School of Journalism	3.04
Legacy Hall	3.1
Argenta Hall (previously New Residence Hall)	3.12
Argenta Hall (Phase 2, second tower, same contract as the DCC)	3.12
Dining Conference Center	3.28
Harry Reid Engineering Laboratory - part 1 addition	3.6
Lawlor Events Center	3.68
West Stadium Parking Complex	3.7
Canada Hall	4.16
Environmental Research Facility	4.4
Brian J. Whalen Parking Complex	4.5
Sierra Street Parking Complex	4.6
Church Fine Arts - addition phase 2 (Music Addition)	4.8
Medicine - Howard Medical Sciences	4.8
Information Kiosk	6.3

Buildings Listed by Lateral System

W1: Light Wood Frame < 5000 sf
- Environmental Research Facility
- Information Kiosk

W2: Light Wood Frame > 5000 sf
- Artemesia Building
- Child Care Center (off 11th street)
- Child Care Facility (north campus)
- Computing Center - old water resources building

S1: Steel Moment Frame
- Buildings and Grounds
- Buildings and Grounds Storage Building
- Central Services - original building
- Central Services - copy center addition
- Central Services - mail room addition
- Equestrian Center
- Harry Reid Engineering Laboratory - part 1 High Bay Lab
- Harry Reid Engineering Laboratory - part 4 mechanical and electrical
- Harry Reid Engineering Laboratory - part 1 addition
- Jot Travis Student Center - Addition phase 3
- Legacy Hall
- Mackay Stadium - 1995 Westside Box Addition
- Motor Pool - B&G
- Sarah H. Fleischmann Building: Child Care Wing
- William J. Raggio Building Education Building

S2: Braced Steel Frame
- Buildings and Grounds
- Central Services - original building
- Central Services - copy center addition
- Central Services - mail room addition
- Church Fine Arts - addition phase 1 (Arts and Theater Addition)
- Continuing Education Building (Formerly Midby-Byron Bldg)
- Equestrian Center
- Lombardi Recreation Center
- Mackay Stadium - Field House: 1988 Addition: second story football offices
- Motor Pool - B&G
- Paul Laxalt Mineral Engineering
- Paul Laxalt Mineral Research

S1/2: Steel Moment Frame w/ Braces
- Mackay Stadium - 1995 Westside Box Addition

S3: Light Metal
- None

S4: Steel Frame w/ Conc Shearwall
- None

S5: Steel Frame w/ Unreif Mas Infill
- None

C1: Conc Moment Frame
- Ansari Business Building
- Argenta Hall (previously New Residence Hall)
- Argenta Hall (Phase 2 second tower same contract as the DCC)
- West Stadium Parking Complex

C2: Conc Shearwall
- Applied Research Facility
- Argenta Hall (previously New Residence Hall)
- Argenta Hall (Phase 2, second tower same contract as the DCC)
- Brian J. Whalen Parking Complex
- Chemistry Building
- Church Fine Arts- Art and Speech
- Church Fine Arts- Drama
- Dining Conference Center
- Fleischmann Agriculture
- Fleischmann Agriculture - 1961 addition of Life Science Wing
- Fleischmann Planetarium
- Getchell Library
- Getchell Library - 1975 Addition
- Jot Travis Student Center - Dining Commons
- Juniper Hall
- Lawlor Events Center
- Leifson Physics
- Mack Social Science
- Mackay Stadium - Field House: original contract: Locker Room
- Sarah H Fleischmann Building
- Schulich Lecture Hall
- Scrugham Engineering/ Mines
- Sierra Street Parking Complex
- Student Services Building
- University Inn - Parking Garage
- White Pine Hall

Buildings Listed by Lateral System

C3: Conc Frame w/ Unreinf Mas Infill
- Mackay Science
- Palmer Engineering

PC1: Tilt-up
- Medicine - Nev. Health Lab
- Medicine - Nev. Health Lab addition
- Nevada Historical Society
- Nevada Historical Society: 1980 addition

PC2: Precast Conc Frame
- None

RM1: Reinf Mas w/ Flex Floor/Roof Diaph
- Agricultural Education
- Church Fine Arts - addition phase 1 (Music Addition)
- Claude Howard System Administration Building
- Fleischmann Greenhouses
- Jot Travis Student Center - original building
- Jot Travis Student Center - Dining Commons addition
- Knudtsen Resource Center
- Mackay Stadium - Miscellaneous Small Buildings
- Mackay Stadium - Field House: 1977 Additions: New Locker room
- Main Station Farm (all)
- Medicine - Brigham Family Medicine
- Medicine - Manville Health Science
- Medicine - Neil J. Redfield
- National Judicial College: original building
- National Judicial College: Trial Judges Building
- Renewable Resource Center
- Sagebrush Newspaper Office
- Sports Medicine Center
- Williams Peccole Park - Restroom Addition

RM2: Reinf Mas w/ Rigid Floor/Roof Diaph
- Canada Hall
- Central Heat Plant - Boiler Room
- Central Heat Plant - Boiler Room Addition
- Church Fine Arts - addition phase 2 (Music Addition)
- Mackay Mines - original building
- Medicine - Anderson Health Sciences
- Medicine - Howard Medical Sciences
- Medicine - Pennington Med Educ
- Nye Hall
- Reynolds School of Journalism
- University Inn
- University Village
- White Pine Hall

RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof
- Edmund J. Cain Hall
- Jot Travis Student Center - Addition phase 1
- Jot Travis Student Center - Addition phase 2
- Medicine - Nellor Biomedical Science
- Medicine - Savitt Medical Science
- National Judicial College: Donald W. Reynolds National Center for the Courts and Media
- Ross Hall

URM: Unreinf Mas Bearing Wall
- Clark Administration - original building
- Facility Services Building
- Frandsen Humanities
- Jones Visitor Center
- Lincoln Hall
- Manzanita Hall
- Morrill Hall Alumni Center
- Thompson Building
- Virginia Street Gym

Buildings Listed by Design Date

Date (design date if available)	Building Name
1885	Morrill Hall Alumni Center
1895	Lincoln Hall
1895	Manzanita Hall
1917	Frandsen Humanities
1919	Thompson Building
1921	Facility Services Building
1926	Clark Administration - original building
1926	Mackay Mines - original building
1929	Mackay Science
1940	Palmer Engineering
1941	Virginia Street Gym
1945	Buildings and Grounds
1951	Fleischmann Greenhouses
1954	Jot Travis Student Center - original building
1955	Applied Research Facility
1956	Fleischmann Agriculture
1956	Ross Hall
1956	Sarah H. Fleischmann Building
1956	Sarah H. Fleischmann Building: Child Care Wing
1958	Church Fine Arts- Art and Speech
1958	Church Fine Arts- Music
1958	Church Fine Arts- Drama
1958	Jot Travis Student Center - Dining Commons
1958	University Village
1958	White Pine Hall
1959	Agricultural Education
1959	Getchell Library
1960	Central Heat Plant - Boiler Room
1961	Fleischmann Agriculture - 1961 addition of Life Science Wing
1961	Juniper Hall
1962	Fleischmann Planetarium
1962	Jot Travis Student Center - Addition phase 1
1963	Scrugham Engineering/ Mines
1964	Mackay Stadium - Miscellaneous Small Buildings
1964	Mackay Stadium - Field House: original contract: Locker Room
1964	Nye Hall
1965	Mack Social Science
1965	Orvis School of Nursing
1966	Environmental Research Facility
1966	Renewable Resource Center
1966	Equestrian Center
1967	Central Heat Plant - Boiler Room Addition
1967	Chemistry Building
1967	Nevada Historical Society
1967	Schulich Lecture Hall
1969	Leifson Physics
1970	Medicine - Anderson Health Sciences
1970	National Judicial College: original building

Buildings Listed by Design Date

1971	Edmund J Cain Hall
1973	Lombardi Recreation Center
1973	Main Station Farm (all)
1975	Getchell Library - 1975 Addition
1975	Medicine - Manville Health Science
1976	Medicine - Nev Health Lab
1977	Jot Travis Student Center - Addition phase 2
1977	Knudtsen Resource Center
1977	Mackay Stadium - Field House: 1977 Additions: New Locker room
1977	Medicine - Savitt Medical Science
1978	Computing Center - old water resources building
1978	University Inn
1978	University Inn - Parking Garage
1980	Ansari Business Building
1980	Nevada Historical Society: 1980 addition
1981	Lawlor Events Center
1981	Medicine - Howard Medical Sciences
1981	Paul Laxalt Mineral Engineering
1985	Church Fine Arts - addition phase 1 (Arts and Theater Addition)
1985	Medicine - Brigham Family Medicine
1986	Church Fine Arts - addition phase 1 (Music Addition)
1986	Church Fine Arts - addition phase 2 (Music Addition)
1987	Claude Howard System Administration Building
1987	Jot Travis Student Center - Addition phase 3
1987	Paul Laxalt Mineral Research
1988	Central Services - original building
1988	Mackay Stadium - Field House: 1988 Addition: second story football offices
1989	Buildings and Grounds Storage Building
1989	Continuing Education Building (Formerly Midby-Byron Bldg)
1989	Medicine - Nellor Biomedical Science
1989	Medicine - Nell J. Redfield
1989	Motor Pool - B&G
1990	Harry Reid Engineering Laboratory - part 1, High Bay Lab
1990	Harry Reid Engineering Laboratory - part 2, classrooms and small labs
1990	Harry Reid Engineering Laboratory - part 3, classrooms and small labs
1990	Harry Reid Engineering Laboratory - part 4, mechanical and electrical
1991	Canada Hall
1991	Reynolds School of Journalism
1991	William J. Raggio Building, Education Building
1992	Sports Medicine Center
1994	Central Services - copy center addition
1994	Central Services - mail room addition
1994	Information Kiosk
1994	Medicine - Nev. Health Lab addition
1994	Williams Peccole Park - Restroom Addition
1995	Mackay Stadium - 1995 Westside Box Addition
1998	Brian J. Whalen Parking Complex
1998	Harry Reid Engineering Laboratory - part 1 addition
1998	Legacy Hall
1998	National Judicial College: Donald W. Reynolds National Center for the Courts and Media
1999	Jot Travis Student Center - Dining Commons addition

Buildings Listed by Design Date

1999	Student Services Building
2000	Argenta Hall (previously New Residence Hall)
2000	Medicine - Pennington Med Educ
2000	Sierra Street Parking Complex
2002	Argenta Hall (Phase 2, second tower, same contract as the DCC)
2002	Dining Conference Center
2003	West Stadium Parking Complex
Not Available	Child Care Center (off 11th street)
Not Available	Child Care Facility (north campus)
Not Available	Artemesia Building
Not Available	Jones Visitor Center
Not Available	National Judicial College: Trial Judges Building
Not Available	Sagebrush Newspaper Office

Appendix C

FEMA 154 Data Collection Form
Map of US Seismicity
Map of Nevada Seismicity
Pre-code and Post-benchmark Dates
FEMA Modifiers
Visual Examples of Irregularities
FEMA 136 Flow Chart for Rehabilitation

Rapid Visual Screening of Buildings for Potential Seismic Hazards

FEMA-154 Data Collection Form

HIGH Seismicity

Scale:

Address: _____

_____ Zip _____

Other Identifiers _____

No. Stories _____ Year Built _____

Screener _____ Date _____

Total Floor Area (sq. ft.) _____

Building Name _____

Use _____

PHOTOGRAPH

OCCUPANCY			SOIL		TYPE						FALLING HAZARDS			
Assembly	Govt	Office	Number of Persons		A	B	C	D	E	F	☐	☐	☐	☐
Commercial	Historic	Residential	0 – 10	11 – 100	Hard Rock	Avg. Rock	Dense Soil	Stiff Soil	Soft Soil	Poor Soil	Unreinforced Chimneys	Parapets	Cladding	Other:
Emer. Services	Industrial	School	101-1000	1000+										

BASIC SCORE, MODIFIERS, AND FINAL SCORE, *S*

BUILDING TYPE	W1	W2	S1 (MRF)	S2 (BR)	S3 (LM)	S4 (RC SW)	S5 (URM INF)	C1 (MRF)	C2 (SW)	C3 (URM INF)	PC1 (TU)	PC2	RM1 (FD)	RM2 (RD)	URM
Basic Score	4.4	3.8	2.8	3.0	3.2	2.8	2.0	2.5	2.8	1.6	2.6	2.4	2.8	2.8	1.8
Mid Rise (4 to 7 stories)	N/A	N/A	+0.2	+0.4	N/A	+0.4	+0.4	+0.4	+0.4	+0.2	N/A	+0.2	+0.4	+0.4	0.0
High Rise (> 7 stories)	N/A	N/A	+0.6	+0.8	N/A	+0.8	+0.8	+0.6	+0.8	+0.3	N/A	+0.4	N/A	+0.6	N/A
Vertical Irregularity	-2.5	-2.0	-1.0	-1.5	N/A	-1.0	-1.0	-1.5	-1.0	-1.0	N/A	-1.0	-1.0	-1.0	-1.0
Plan Irregularity	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Pre-Code	0.0	-1.0	-1.0	-0.8	-0.6	-0.8	-0.2	-1.2	-1.0	-0.2	-0.8	-0.8	-1.0	-0.8	-0.2
Post-Benchmark	+2.4	+2.4	+1.4	+1.4	N/A	+1.6	N/A	+1.4	+2.4	N/A	+2.4	N/A	+2.8	+2.6	N/A
Soil Type C	0.0	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Soil Type D	0.0	-0.8	-0.6	-0.6	-0.6	-0.6	-0.4	-0.6	-0.6	-0.4	-0.6	-0.6	-0.6	-0.6	-0.6
Soil Type E	0.0	-0.8	-1.2	-1.2	-1.0	-1.2	-0.8	-1.2	-0.8	-0.8	-0.4	-1.2	-0.4	-0.6	-0.8

FINAL SCORE, *S*

COMMENTS

Detailed Evaluation Required

YES NO

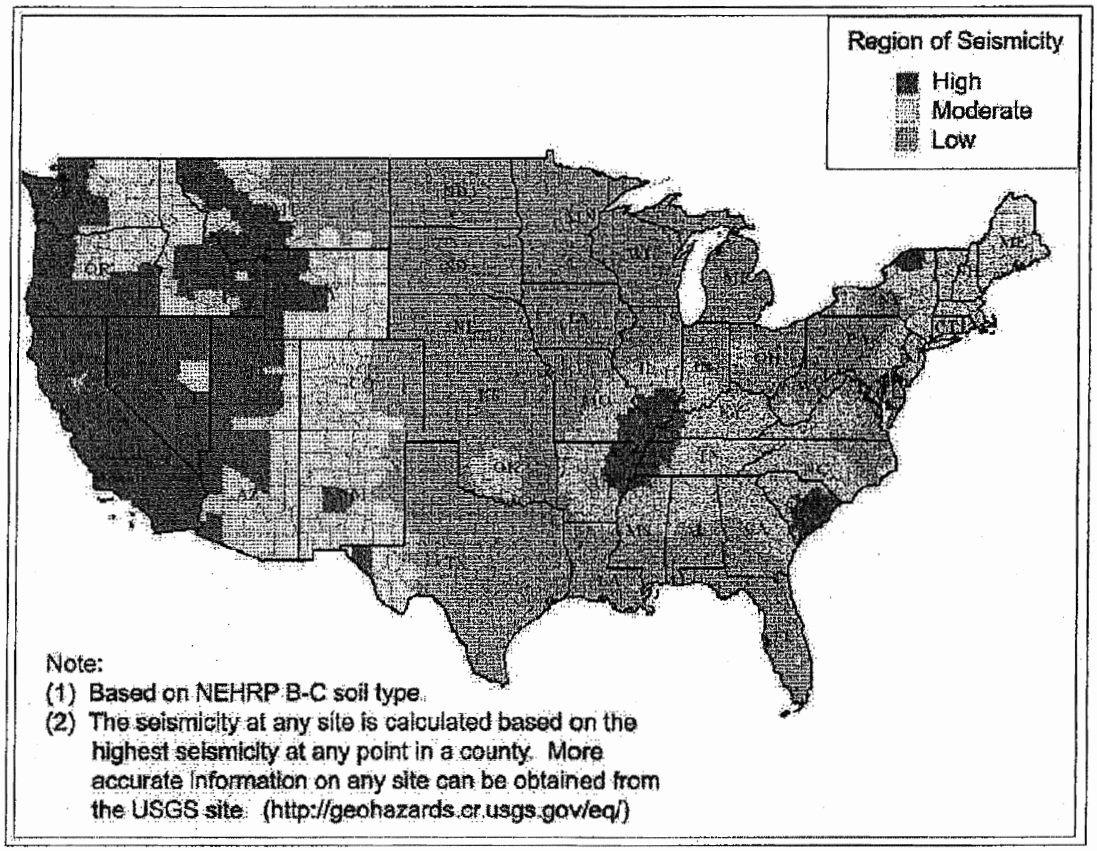
* = Estimated, subjective, or unreliable data
DNK = Do Not Know

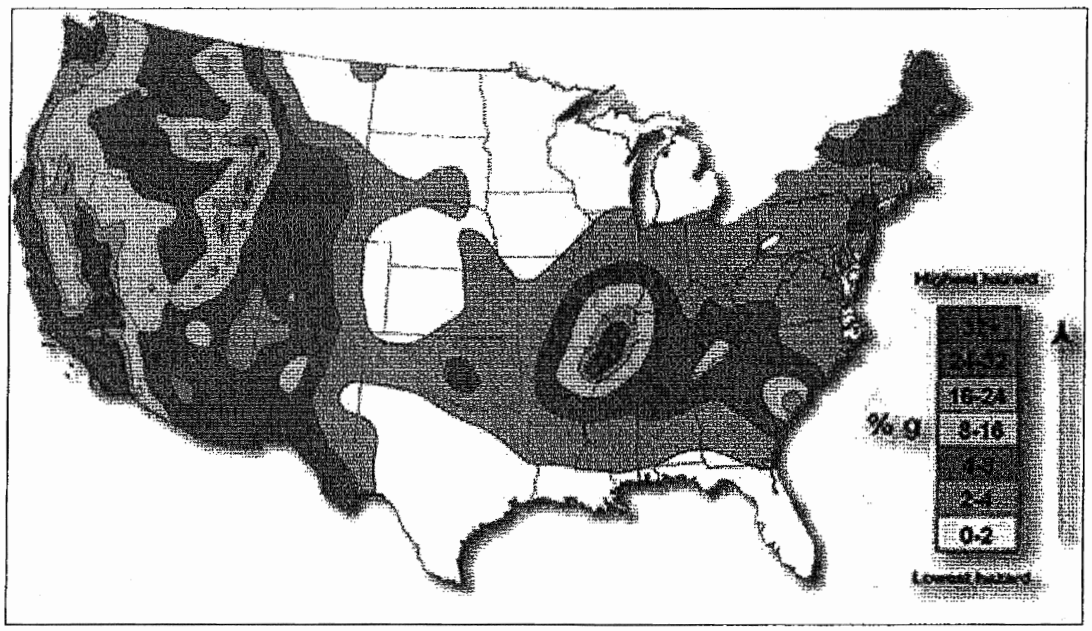
BR = Braced frame
FD = Flexible diaphragm
LM = Light metal

MRF = Moment-resisting frame
RC = Reinforced concrete
RD = Rigid diaphragm

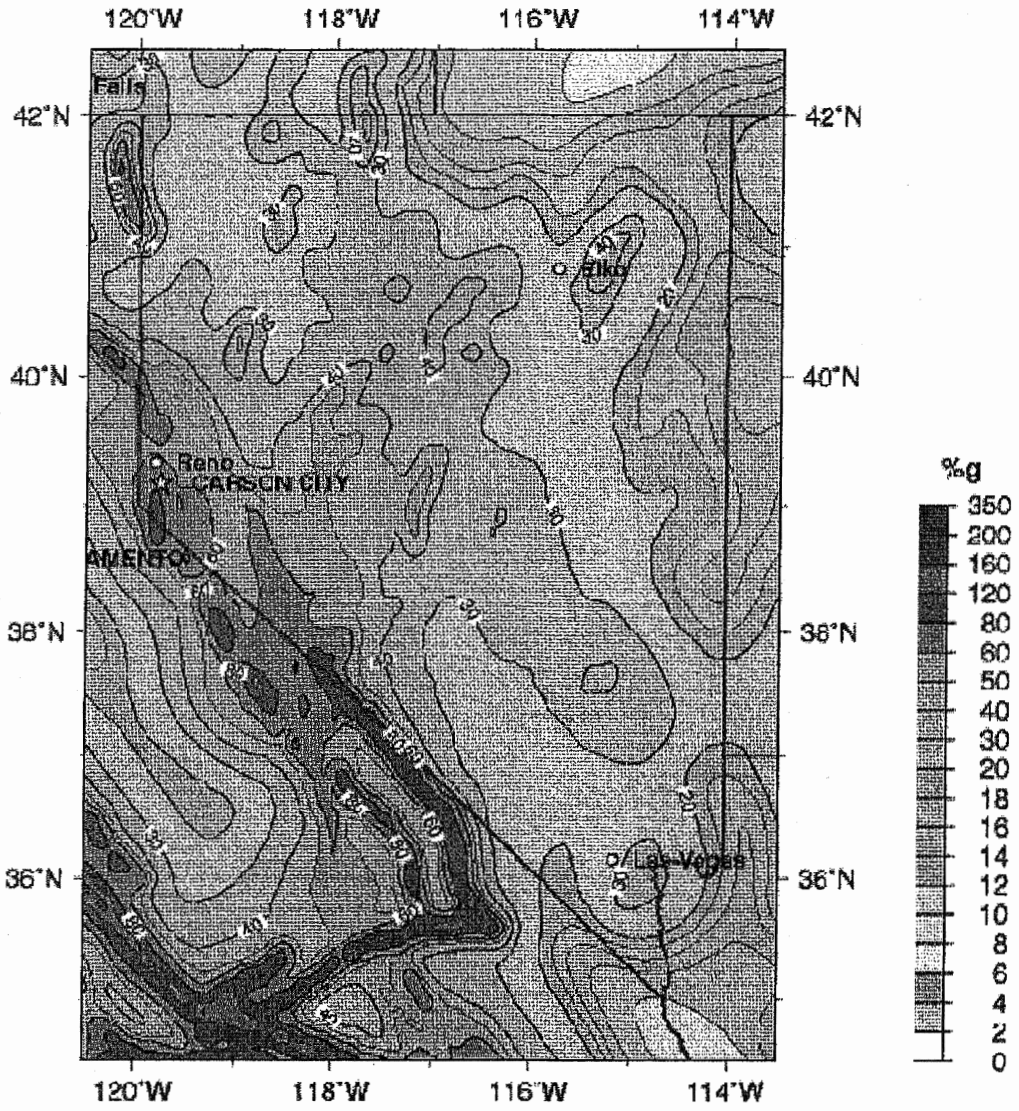
SW = Shear wall
TU = Tilt up
URM INF = Unreinforced masonry infill

Map of US Seismicity and Seismic Hazard





Map of Nevada's Seismicity



Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
site: NEHRP B-C boundary
National Seismic Hazard Mapping Project

Rapid Visual Screening of Buildings for Potential Seismic Hazards (FEMA 154)

Quick Reference Guide (for use with Data Collection Form)

1. Model Building Types and Critical Code Adoption and Enforcement Dates

Structural Types		Year Seismic Codes Initially Adopted and Enforced*	Benchmark Year when Codes Improved
W1	Light wood frame, residential or commercial, ≤ 5000 square feet	1941	1976
W2	Wood frame buildings, > 5000 square feet.	1941	1976
S1	Steel moment-resisting frame	1941	1994
S2	Steel braced frame	1941	1988
S3	Light metal frame	1941	*
S4	Steel frame with cast-in-place concrete shear walls	1941	1976
S5	Steel frame with unreinforced masonry infill	1941	*
C1	Concrete moment-resisting frame	1941	1976
C2	Concrete shear wall	1941	1976
C3	Concrete frame with unreinforced masonry infill	1941	*
PC1	Tilt-up construction	1941	1997
PC2	Precast concrete frame	1941	*
RM1	Reinforced masonry with flexible floor and roof diaphragms	1941	1997
RM2	Reinforced masonry with rigid diaphragms	1941	1976
URM	Unreinforced masonry bearing-wall buildings	1941	1991

*Not applicable in regions of low seismicity

2. Anchorage of Heavy Cladding

Year in which seismic anchorage requirements were adopted: 1976

3. Occupancy Loads

Use	Square Feet, Per Person	Use	Square Feet, Per Person
Assembly	varies, 10 minimum	Industrial	200-500
Commercial	50-200	Office	100-200
Emergency Services	100	Residential	100-300
Government	100-200	School	50-100

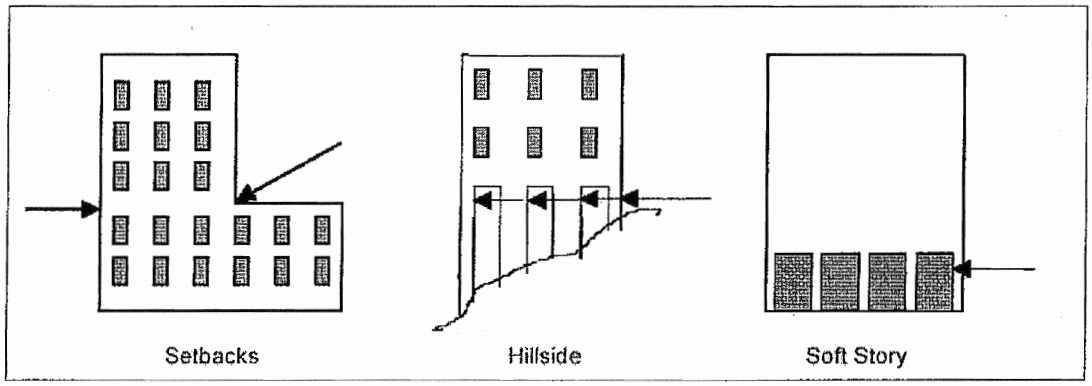
4. Score Modifier Definitions

Mid-Rise:	4 to 7 stories
High-Rise:	8 or more stories
Vertical Irregularity:	Steps in elevation view; inclined walls; building on hill; soft story (e g , house over garage); building with short columns; unbraced cripple walls.
Plan Irregularity	Buildings with re-entrant corners (L, T, U, E, + or other irregular building plan); buildings with good lateral resistance in one direction but not in the other direction; eccentric stiffness in plan, (e.g corner building, or wedge-shaped building, with one or two solid walls and all other walls open).
Pre-Code:	Building designed and constructed prior to the year in which seismic codes were first adopted and enforced in the jurisdiction; use years specified above in Item 1; default is 1941, except for PC1, which is 1973.
Post-Benchmark:	Building designed and constructed after significant improvements in seismic code requirements (e.g., ductile detailing) were adopted and enforced; the benchmark year when codes improved may be different for each building type and jurisdiction; use years specified above in Item 1 (see Table 2-2 of FEMA 154 *Handbook* for additional information)
Soil Type C:	Soft rock or very dense soil; S-wave velocity: 1200 – 2500 ft/s; blow count > 50; or undrained shear strength > 2000 psf.
Soil Type D:	Stiff soil; S-wave velocity: 600 – 1200 ft/s; blow count: 15 – 50; or undrained shear strength: 1000 – 2000 psf.
Soil Type E:	Soft soil; S-wave velocity < 600 ft/s; or more than 100 ft of soil with plasticity index > 20, water content > 40%, and undrained shear strength < 500 psf.

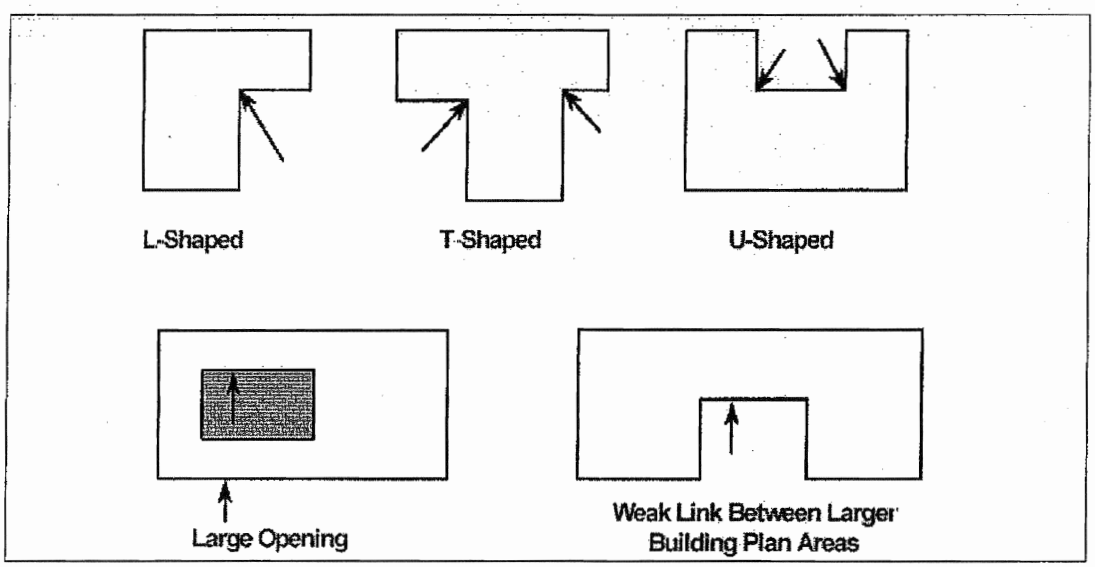
FEMA Modifiers and Their Values

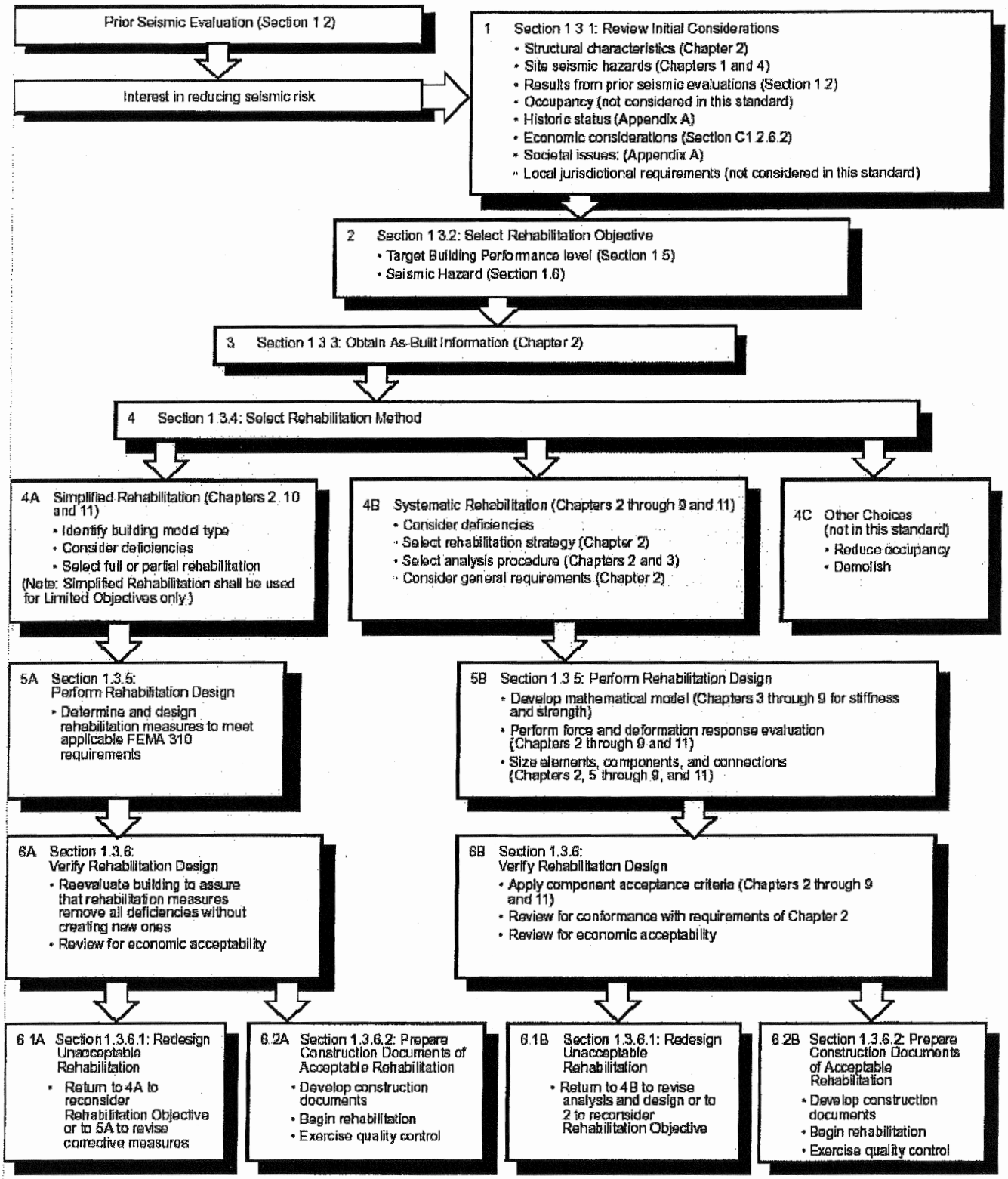
Lateral System	Basic Score	Mid Rise	High Rise	Vertical Irreg	Plan Irreg	Pre-code	Post-Benchmark	Soil Type D
W1: Light Wood Frame ≤ 5000 sf	4.4	NA	NA	-2.5	-0.5	0	2.4	0
W2: Light Wood Frame > 5000 sf	3.8	NA	NA	-2	-0.5	-1	2.4	-0.8
S1: Steel Moment Frame	2.8	0.2	0.6	-1	-0.5	-1	1.4	-0.6
S2: Braced Steel Frame	3	0.4	0.8	-1.5	-0.5	-0.8	1.4	-0.6
S1/2: Steel Moment Frame w/ Braces	5.8	0.6	1.4	-1	-0.5	-0.8	1.4	-0.6
S3: Light Metal	3.2	NA	NA	NA	-0.5	-0.6	NA	-0.6
S4: Steel Frame w/ Conc Shearwall	2.8	0.4	0.8	-1	-0.5	-0.8	1.6	-0.6
S5: Steel Frame w/ Unreif Mas Infill	2	0.4	0.8	-1	-0.5	-0.2	NA	-0.4
C1: Conc Moment Frame	2.5	0.4	0.6	-1.5	-0.5	-1.2	1.4	-0.6
C2: Conc Shearwall	2.8	0.4	0.8	-1	-0.5	-1	2.4	-0.6
C3: Conc Frame w/ Unreinf Mas Infill	1.6	0.2	0.3	-1	-0.5	-0.2	NA	-0.4
PC1: Tilt-up	2.6	NA	NA	NA	-0.5	-0.8	2.4	-0.6
PC2: Precast Conc Frame	2.4	0.2	0.4	-1	-0.5	-0.8	NA	-0.6
RM1: Reinf Mas w/ Flex Floor/Roof Diaph	2.8	0.4	NA	-1	-0.5	-1	2.8	-0.6
RM2: Reinf Mas w/ Rigid Floor/Roof Diaph	2.8	0.4	0.6	-1	-0.5	-0.8	2.6	-0.6
RM1/2: Reinf Mas w/ Rigid Floor/Flex Roof	2.8	0.4	0.6	-1	-0.5	-0.9	2.7	-0.6
URM: Unreinf Mas Bearing Wall	1.8	0	NA	-1	-0.5	-0.2	NA	-0.6

Visual Examples of Vertical Irregularities



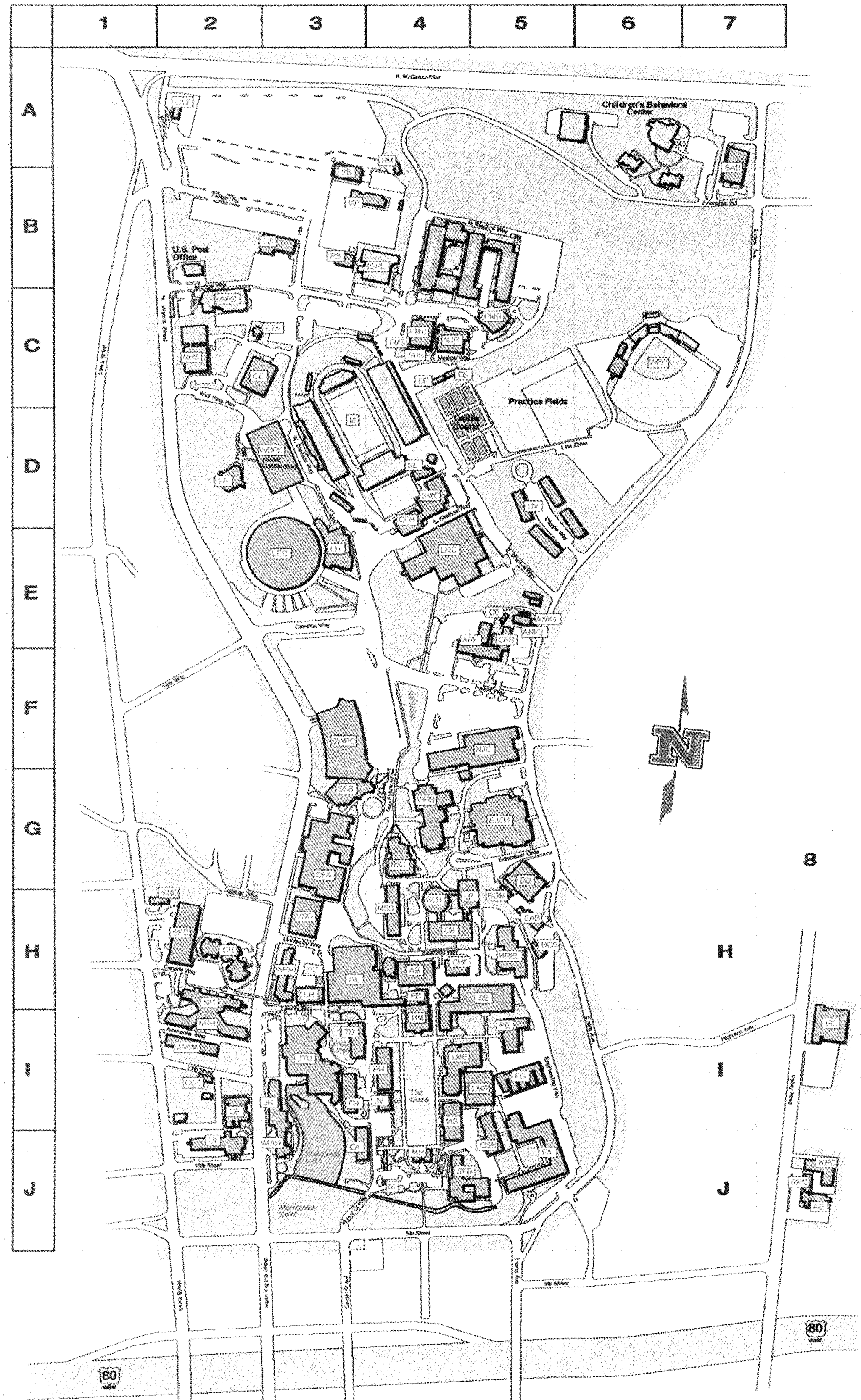
Visual Examples of Plan Irregularities




Prior Seismic Evaluation (Section 1.2)
Interest in reducing seismic risk
1 Section 1.3.1: Review Initial Considerations
• Structural characteristics (Chapter 2)
• Site seismic hazards (Chapters 1 and 4)
• Results from prior seismic evaluations (Section 1.2)
• Occupancy (not considered in this standard)
• Historic status (Appendix A)
• Economic considerations (Section C1.2.6.2)
• Societal issues: (Appendix A)
• Local jurisdictional requirements (not considered in this standard)
2 Section 1.3.2: Select Rehabilitation Objective
• Target Building Performance level (Section 1.5)
• Seismic Hazard (Section 1.6)
3 Section 1.3.3: Obtain As-Built Information (Chapter 2)
4 Section 1.3.4: Select Rehabilitation Method
4A Simplified Rehabilitation (Chapters 2, 10 and 11)
• Identify building model type
• Consider deficiencies
• Select full or partial rehabilitation
(Note: Simplified Rehabilitation shall be used for Limited Objectives only.)
4B Systematic Rehabilitation (Chapters 2 through 9 and 11)
• Consider deficiencies
• Select rehabilitation strategy (Chapter 2)
• Select analysis procedure (Chapters 2 and 3)
• Consider general requirements (Chapter 2)
4C Other Choices (not in this standard)
• Reduce occupancy
• Demolish
5A Section 1.3.5: Perform Rehabilitation Design
• Determine and design rehabilitation measures to meet applicable FEMA 310 requirements
5B Section 1.3.5: Perform Rehabilitation Design
• Develop mathematical model (Chapters 3 through 9 for stiffness and strength)
• Perform force and deformation response evaluation (Chapters 2 through 9 and 11)
• Size elements, components, and connections (Chapters 2, 5 through 9, and 11)
6A Section 1.3.6: Verify Rehabilitation Design
• Reevaluate building to assure that rehabilitation measures remove all deficiencies without creating new ones
• Review for economic acceptability
6B Section 1.3.6: Verify Rehabilitation Design
• Apply component acceptance criteria (Chapters 2 through 9 and 11)
• Review for conformance with requirements of Chapter 2
• Review for economic acceptability
6.1A Section 1.3.6.1: Redesign Unacceptable Rehabilitation
• Return to 4A to reconsider Rehabilitation Objective or to 5A to revise corrective measures
6.2A Section 1.3.6.2: Prepare Construction Documents of Acceptable Rehabilitation
• Develop construction documents
• Begin rehabilitation
• Exercise quality control
6.1B Section 1.3.6.1: Redesign Unacceptable Rehabilitation
• Return to 4B to revise analysis and design or to 2 to reconsider Rehabilitation Objective
6.2B Section 1.3.6.2: Prepare Construction Documents of Acceptable Rehabilitation
• Develop construction documents
• Begin rehabilitation
• Exercise quality control

Appendix D
Campus Map

UNIVERSITY OF NEVADA, RENO
CAMPUS MAP



University Buildings

Grid	Building Name	Abbrev.	Bldg No.
J3	Agricultural Education	AE	[illegible]
G4	Anderson Health Sciences	M	139
E5	Annex 2 (ARF)	[illegible]	991
E5	Annex 4 (ARF)	[illegible]	992
H4	Ansari Business Building	AB	080
E5	Applied Research Facility	ARF	990
I2	Artemesia Building	ARTM	012
F3	Brian J. Whalen Parking Complex	BJWPC	101
G5	Buildings & Grounds	BG	079
G5	Buildings & Grounds Modular	BGM	075
H5	Buildings & Grounds Storage	BGS	069
H2	Canada Hall	CH	009
[illegible]	Center For [illegible]	[illegible]	[illegible]
H4	Central Heat Plant	CHP	024
B3	Central Services	CS	138
H4	Chemistry Building	CB	071
I2	Child Care Center	CCC	013
A1	Child Care Facility	CCF	141
G3	Church Fine Arts	CFA	078
J3	Clark Administration	CA	035
A7	Claude Howard System Administration Building	SAB	154
E5	Clean Fuel Research Lab (ARF)	CFR	994
C2	Computing Center	CC	133
I2	Continuing Education Building (Formerly [illegible] Bldg)	CE	020
C4	Department of Pediatrics	DP	117
G5	Edmund J. Cain Hall	EJCH	081
C7	Environmental Research Facility	ERF	109
I2	Equestrian Center	EC	[illegible]
H5	Evans Avenue Building	EAB	093
H4	Facility Services Building	FS	058
C4	Family Medicine Center (Brigham Building)	FMC	173
C4	Family Medicine Storage	FMS	118
J5	Fleischmann Agriculture	FA	032
I5	Fleischmann Greenhouses	FG	046
D3	Fleischmann Planetarium	FP	105
C5	Football Practice Field / John Sala Intramural Field		113
I3	Frandsen Humanities	FH	002
H3	Getchell Library	GL	098
H5	Harry Reid Engineering Laboratory	HREL	065
G5	Howard Medical Sciences	HM	125
J4	Information Kiosk	IK	[illegible]
I4	Jones Visitor Center	JV	[illegible]
I3	Jot Travis Student Union	JTU	[illegible]
I3	Juniper Hall	JH	041
J3	Knudtsen Resource Center	KRC	171
E3	Lawlor Events Center	LEC	104
E3	Legacy Hall	LH	103
H4	Leifson Physics	LP	074
H3	Lincoln Hall	LH	060
E4	Lombardi Recreation Center	LRC	095
H4	Mack Social Science	MSS	072
I4	Mackay Mines	MM	057
I4	Mackay Science	MS	076
D3	Mackay Stadium	S	105
G4	Manville Health Science	M	126
J3	Manzanita Hall	MAH	040
J4	Morrill Hall Alumni Center	MH	034
B3	Motor Pool	MP	145
F4	National Judicial College	NJC	094
C4	Nell J. Redfield Building (Speech Pathology & Audiology, Student Health Center)	NJR	172
G4	[illegible] Biomedical Sciences	M	127
[illegible]	New Residence Hall	NRH	008
H2	Nye Hall	NH	007
E5	Ore Bins (ARF)	OB	993
I5	Orvis School of Nursing	OSN	033
I5	Palmer Engineering	PE	050
B3	Parking Services	PS	137
I4	Paul Laxalt Mineral Engineering	LME	048
I5	Paul Laxalt Mineral Research	LMR	044
C5	Pennington Medical Education Building	PMB	174
J3	Renewable Resource Center	RRC	[illegible]
A4	Renovation Modular	RM	149
G4	Reynolds School of Journalism	RSJ	077
D4	Robert Cashell Fieldhouse	CFH	102
I4	Ross Hall	RH	047
H1	Sagebrush Newspaper Office	SNO	[illegible]
J4	Sarah H. Fleischmann Building	SFB	031
B4	Savitt Medical Science	M	[illegible]
H4	Schulich Lecture Hall	SLH	073
H5	Scrugham Engineering/Mines	SEM	056
H2	Sierra Street Parking Complex	SPC	[illegible]
D4	Sports Medicine Center	SMC	101
D4	Stadium Visitors Locker Room	SL	110
B3	Storage Building	SB	146
C4	Student Health Storage	SHS	119
G3	Student Services Building	SSB	092
D4	Tennis Courts		112
I3	Thompson Building	TB	049
J3	University Inn	UI	[illegible]
D6	University Village	UV	[illegible]
H3	Virginia Street Gym (Formerly Old Gym)	VSG	[illegible]
G3	West Stadium Parking Complex (Under Construction)	WSPC	107
H3	White Pine Hall	WPH	[illegible]
C8	William Peccole Park	WPP	114
G4	William J. Raggio Building	WRB	[illegible]

Non-University Buildings

Grid	Building Name	Abbrev.	Bldg No.
C7	Nevada Historical Society		134
B8	Nevada State Health Laboratory		[illegible]
C2	Reno [illegible] Building		135
B2	U.S. Post Office		139

FACILITIES SERVICES DEPARTMENT/[illegible]
UNIVERSITY OF NEVADA, RENO
RENO, NEVADA 89557-[illegible]
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Revised [illegible]

Un-Reinforced Masonry (URM)

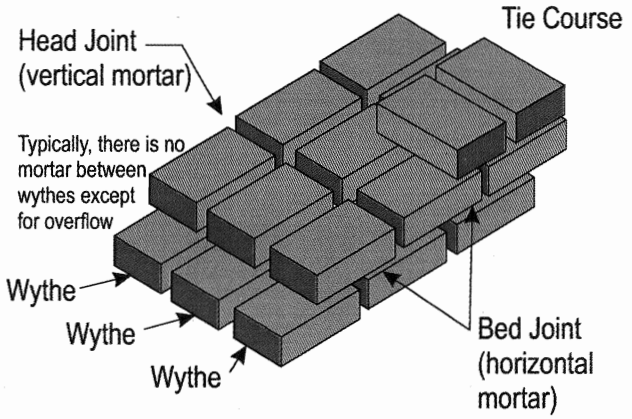
What is it?

What is it?

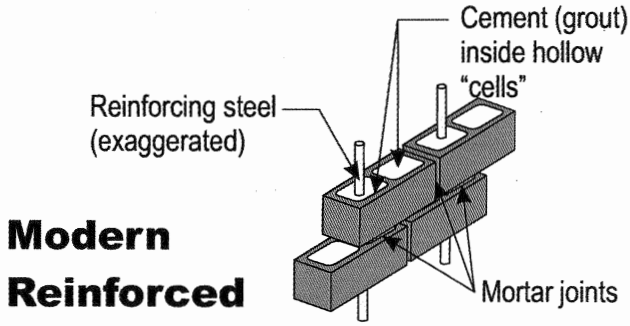
Un Reinforced Masonry (URM) generally refers to bricks that are set in mortar without reinforcing steel or other additional reinforcement. The mortar can be cement based or simply lime. To make taller walls, the bricks were set in wythes -" thicknesses" - or bricks with occasional bricks turned to tie the wythes togther. For many structures of up to three stories, a three-wythe wall is typical.

This type of construction was very common in the 1800's through about 1930 in the western US. It is still used in similar forms throughout the world.

By contrast, modern reinforced masonry construction uses steel reinforcing bars to provide tension load capacity between the units. Today's concrete masonry units (CMU) and structural brick have large holes or "cells" that allow installation of the steel. The cells are then filled with grout, or highly liquid concrete to bond the units and the steel togther. Mortar is still used between the surfaces of the units, but this mortar is higher strength than many older buildings. Lime-only mortar is no longer used.



URM Construction



Modern Reinforced Construction

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Un-Reinforced Masonry (URM)

Why is it a Problem?

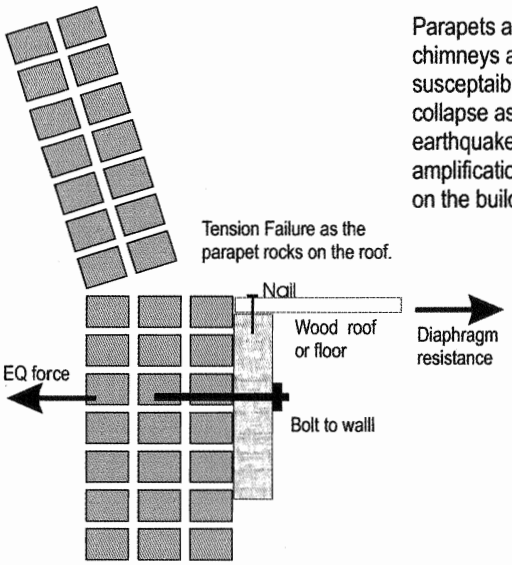
Un Reinforced Masonry (URM) has been shown to fare very poorly in earthquakes around the world, whether made of bricks or other masonry materials. The reason is that the mortar cannot carry tension loads. Under the back and forth (cyclic) loads, the mortar cracks and then falls apart, leading to partial or total collapse of the wall.

In part this is an intrinsic problem with the material. But exacerbating this tendency to crack and fail are details used in many of the buildings that do not restrain the motion of the walls. It has been shown that, with special attention to connections between floor and wall and roof and wall, a URM building can tolerate an amazing amount of shaking. These special details were incorporated into a code called the International Code for Building Conservation and allow URM buildings to be improved. The problem is that for most buildings, these connections are very poor or missing completely.

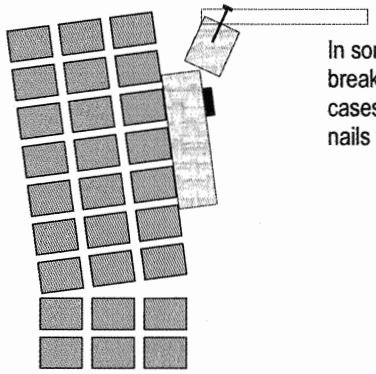
Collapse of School in 1933 Long Beach Earthquake

Damage to Library at Stanford University
San Francisco Earthquake on April 18, 1906

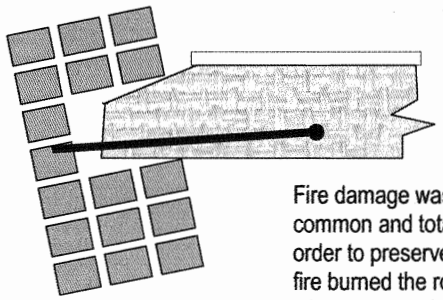
Why is it a problem?



Parapets above the roof and chimneys are particularly susceptaible to damage and collapse as this is where the earthquake acceleration amplification is generally greatest on the building.



In some case the ledgers fail by breaking as shown. In other cases, the bolts pull out or the nails fail.



Fire damage was once far more common and total than it is today. In order to preserve the wall when a fire burned the roof and/or floor, the joists were pocketed into the walls with a "fire cut" to allow the joist to tip free of the wall. Unfortunately, this detail has no connection to the wall for seismic forces. Later, after the 1906 San Francisco earthquake, a simple tie called a "Government Tie" was installed. However, this bent rod did not have significant anchorage in most cases and did little to improve the buildings.

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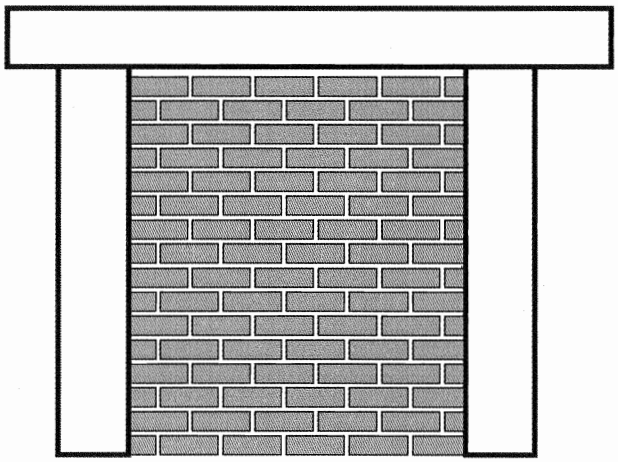
Un-Reinforced Masonry (URM)

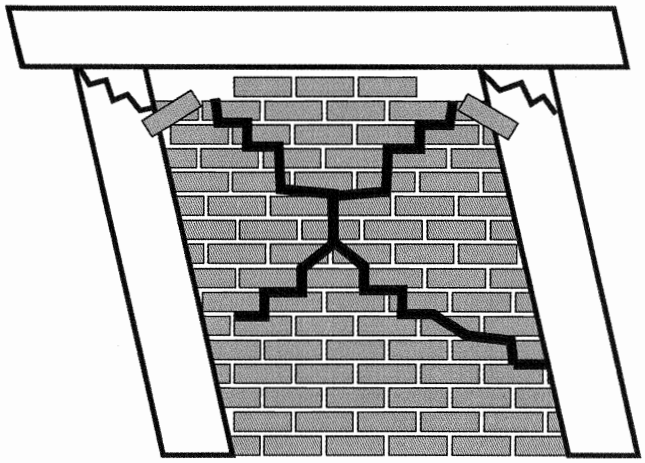
Why is it a problem? Continued

More Problems

URM walls are rigid, but not very strong. In other words, they will try to hold the building from moving by taking the earthquake forces in shear, that is, in the plane of the wall. However, they rarely have sufficient strength to carry all the forces that they attract.

In URM bearing wall buildings, the brick walls carry both the lateral forces and the vertical forces of the building. In another version of the system, a vertical concrete frame is used and the URM walls are fitted between the columns and beams. This system performs only marginally better than URM alone. Cracks once they start have nothing to impede their growth, ultimately leading to failure.





As earthquake forces make the wall rock back and forth, the wall brings to crack and if the racking is severe enough, bricks will break loose. The example here shows a concrete frame with infill wall. Once the wall begins to degrade, the columns start to break at the top and bottoms due to the earthquake motion that the brick was originally resisting. If the earthquake has enough power and duration, the columns will break completely leading to a collapse.

Damage to Concrete-Frame Building, Leninakan, Armenia, December 1988

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Un-Reinforced Masonry (URM)

How do you fix it?

There are two approaches to fix a URM or non-ductile (ordinary) concrete frame building with URM infill walls: Conservation or Full Upgrade.

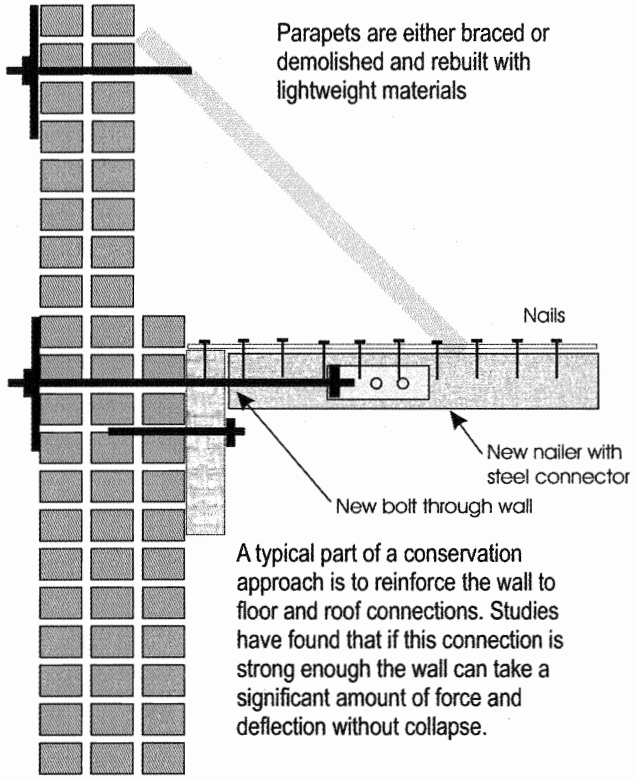
Conservation is governed by the International Existing Building Code, a document that contains specific design values and methods for these types of buildings. The provisions in this code were determined by testing of various materials and construction details often used in these buildings. The use of a conservation approach maintains most of the original materials and provides for improved life safety of the structure.

A Full Upgrade would involve abandoning the obsolete materials as structural members and replacing them with current-code-compliant structural members. In this way the building would be literally "good as new" in the sense that the life safety of the upgraded structure would be the same as a similar modern building.

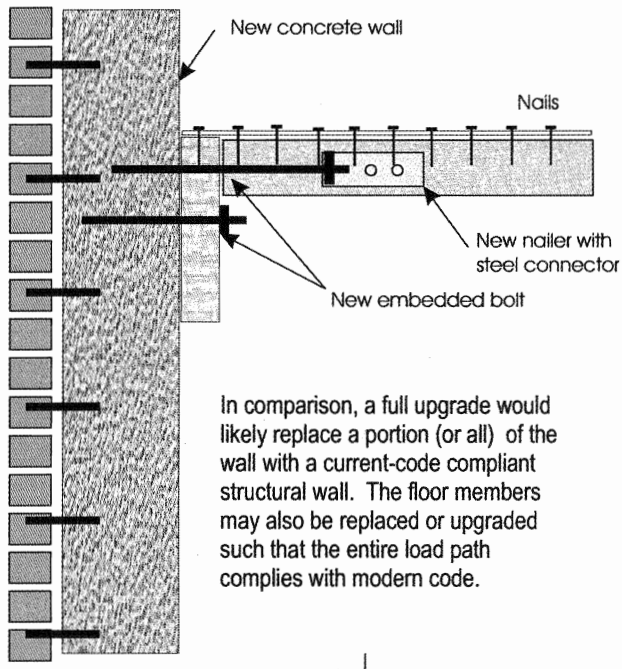
A version of both of these approaches is base isolation, in which the building is placed on springs (isolators) with dampers (shock absorbers) that reduce the earthquake forces the building experiences. An isolation system could be design under conservation or full upgrade criteria.

Both conservation and full upgrades are expensive because of the amount of labor required to work within the limitations of an existing building shell

How do you fix it?



A typical part of a conservation approach is to reinforce the wall to floor and roof connections. Studies have found that if this connection is strong enough the wall can take a significant amount of force and deflection without collapse.



In comparison, a full upgrade would likely replace a portion (or all) of the wall with a current-code compliant structural wall. The floor members may also be replaced or upgraded such that the entire load path complies with modern code.

Existing exterior wythe maintained for appearance with new connectors to new structural wall

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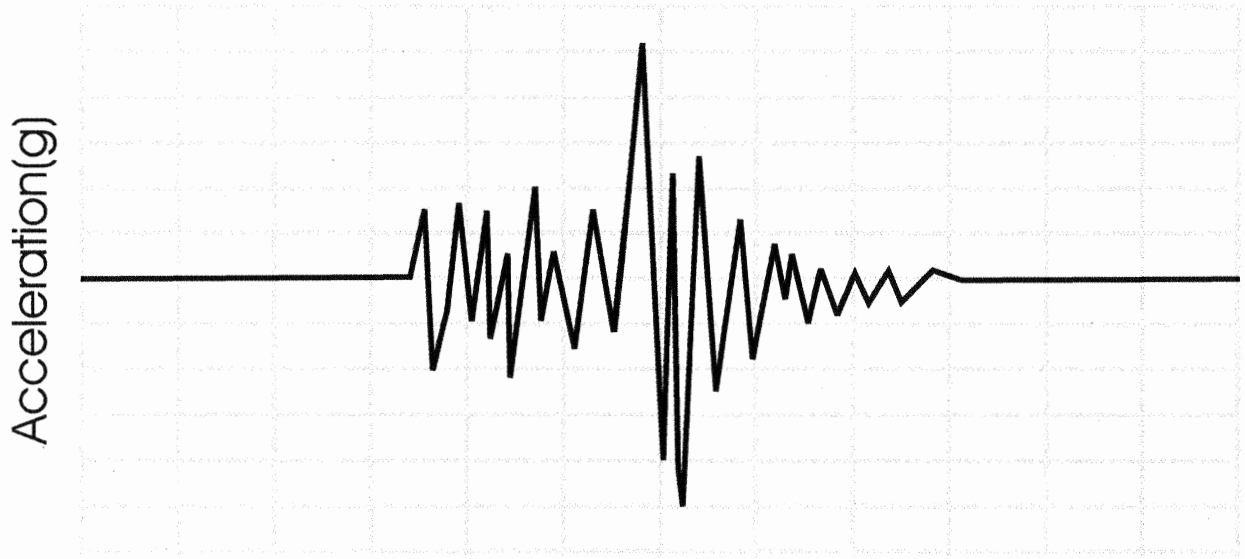
Glossary of Structural Seismic Terms



Earthquake Ground Motion

by
George Ghusn, Jr., S.E.
of

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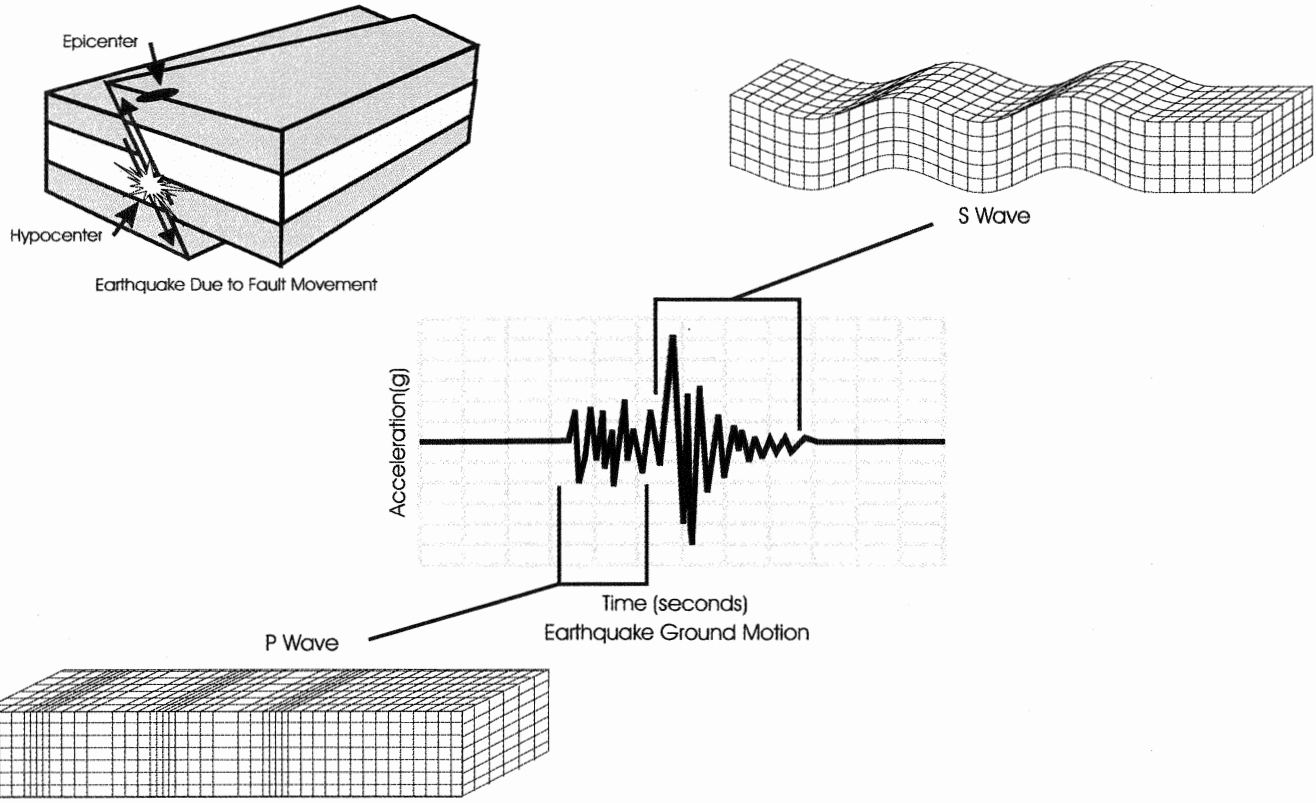
Earthquakes



Earthquakes are the result of sudden energy release along planes of movement in the earth called faults. Faults are described by their direction of movement. For example, the San Andreas Fault in California is a right lateral fault because the predominant movement is to the right if you stand on one side of the fault and look to the other side. Most faults in Nevada are vertical movement or dip-slip faults. These faults are caused by the earths crust being compressed or expanded. The basin and range in Nevada is an expansion feature. In California, the San Andreas system is shear dominated and moves side to side rather than vertical. California will not fall into the ocean, but someday Los Angeles and Oakland will be adjacent as parts of L.A. move slowly up the coast.

The earths crust moves very slowly, but because the mass is so great the movement produces huge amounts of energy which is stored as strain (or displacement) of the rocks along the fault, similar to a stretched rubber band. Eventually the rock breaks loose and slides along the fault, producing an earthquake.

The location of the fault break can be determined by measuring the arrival times of the earthquake waves at three or more locations. The hypocenter is the location of the actual break. The epicenter is the point on the surface directly above the hypocenter.

An earthquake produces several kinds of motions in the ground, each of which is associated with a type of wave. The compression or P wave is the fastest and arrives first at a given site. The S or secondary wave produces a vertical motion of the ground and is generally associated with the largest ground accelerations and damage in structures. In addition there are two surface waves that may form: Rayleigh (rolling motion of the ground) and Love (side to side shearing of the ground) waves. These waves arrive after the P and S waves and are associated with surface deformations.

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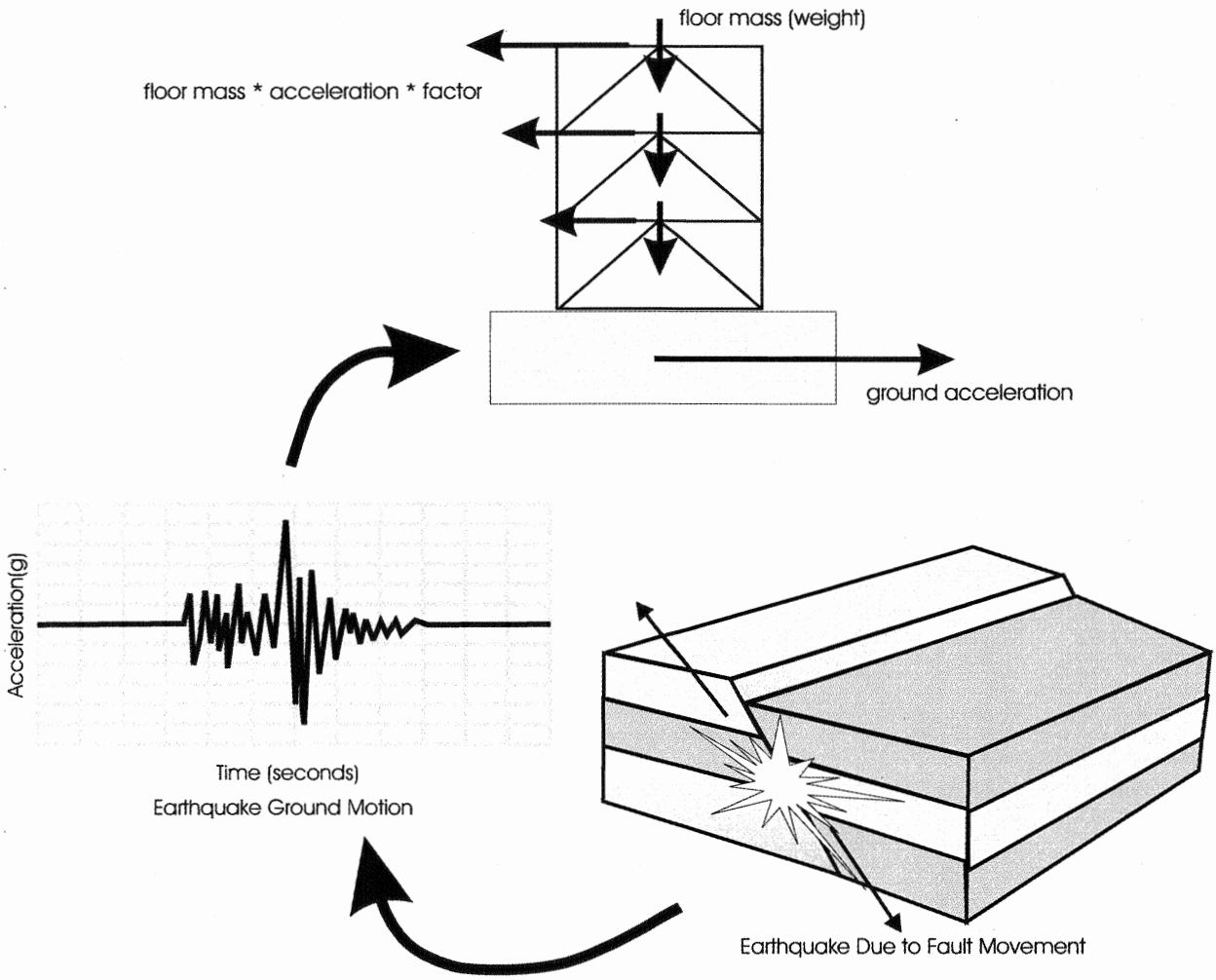
Earthquake Forces



Earthquake forces are caused by ground motion during an earthquake. As the ground moves, the building's mass (or weight) tries to keep the building in place. As a result, the building experiences forces (called inertial forces) due to the mass of building and the ground moving at different rates. The forces developed are proportional to the mass (or weight) of the structure.

A heavy structure will produce larger earthquake forces for a similar earthquake acceleration. Very lightweight structures are usually designed for wind loads because the wind loads are larger than the earthquake forces.

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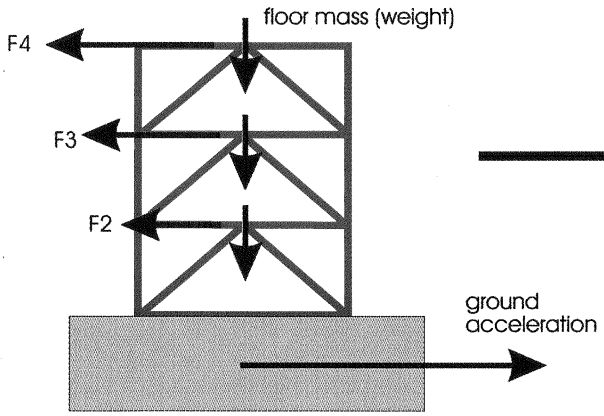
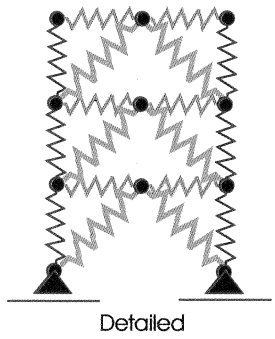
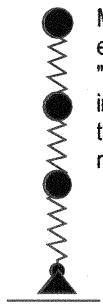
Structural Response





Detailed

Or



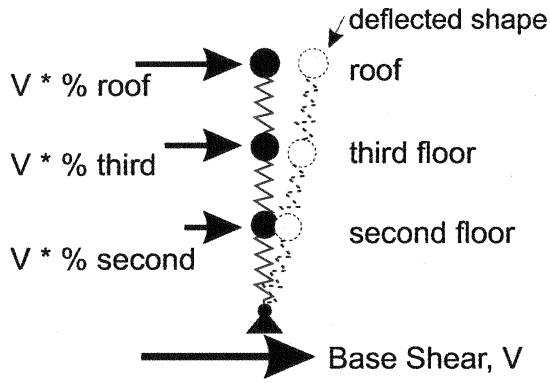
Mass or weight at each level is "condensed" into a "lump": the "lumped mass" model

Simplified - each spring represents several elements

F = floor mass * acceleration * factor

The motion of a building is determined by the frequency (cycles per second) and power (amplitude) of the ground motion and the structural properties of the system. Each building has a predominant, or fundamental, frequency of motions to which it is sensitive. If the earthquake frequency and the building's fundamental frequency are similar, then resonance can occur, effectively multiplying the motion that the building experiences by many times.

One way to model the response of a building to ground motions is to construct a representative mathematical model where each element (column, beam, wall..) or group of elements is represented by a spring stiffness based on the properties of that element. The model can then be subjected to typical earthquake ground motions and the response determined mathematically. This is called dynamic analysis because the applied accelerations are not constant with time. This type of analysis requires sophisticated modeling and detailed acceleration assumptions. This procedure is only used for unusual structures with properties defined as "irregular" by the International Building Code. Although this type of analysis is the most comprehensive, it is typically cost prohibitive for any but the largest and most complicated of structures.



The International Building Code approach for "regular" structures is to treat the dynamic effects as a maximum force on the structure that does not change with time. This is called static analysis and is determined using the simplified model shown above. Each floor in the building is lumped together as a single mass supported on the combined structural system for the floor. Based on the type of structural system, the earthquake expected peak acceleration, the soil conditions, and the building height, a total horizontal force for the entire structure is determined. Then, based on the height and weight of each floor, a portion of this total force (called base shear) is applied to each floor level. The structure is then analyzed for stresses and strains due to these forces using the same methods used for gravity loads. The distribution of these static forces is typically triangular as shown.

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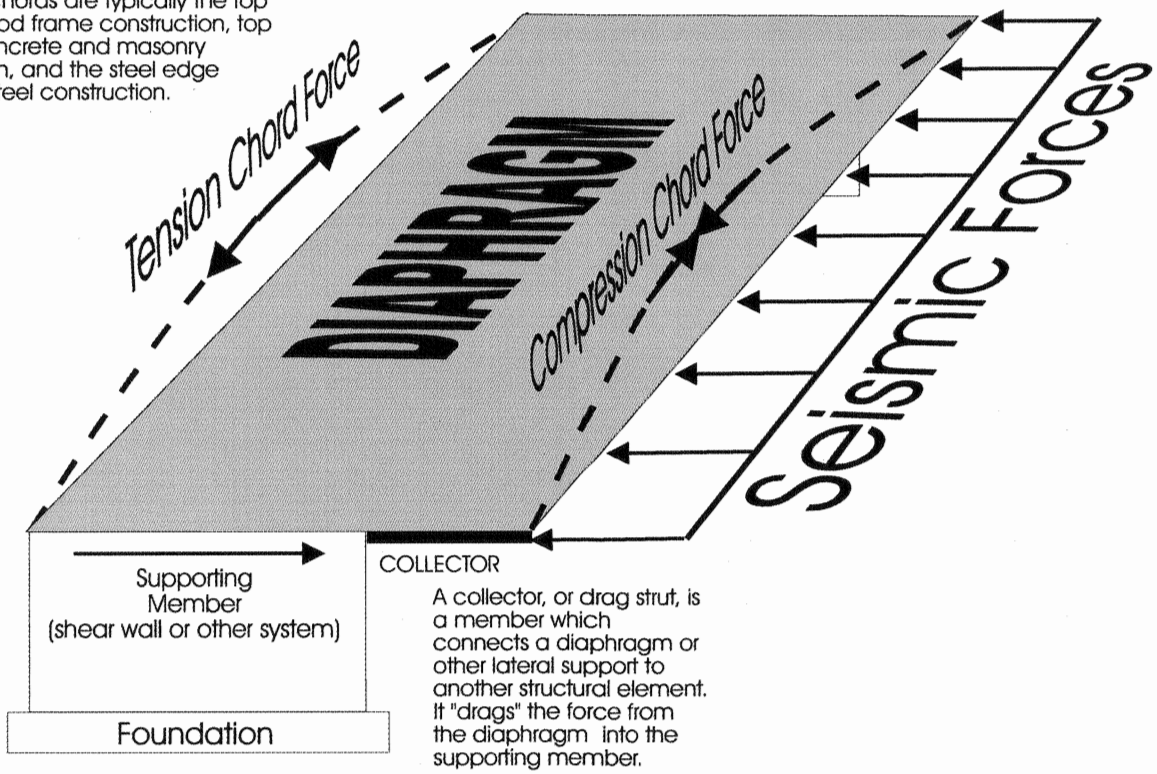
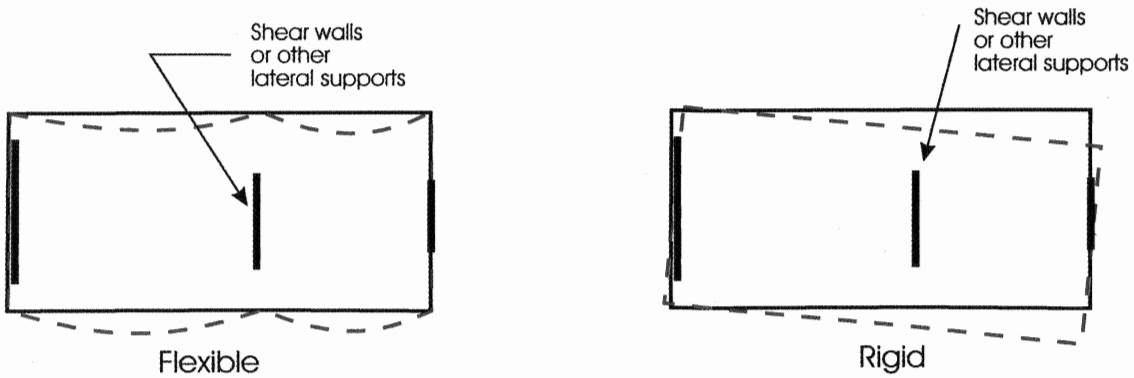
Diaphragms

A diaphragm is a wide, thin structural element loaded within its plane. A diaphragm may be horizontal, such as a floor; vertical, such as a shear wall; or inclined as in a roof. Diaphragms are classified as rigid or flexible, depending on their rigidity in comparison with their supporting members. A rigid diaphragm is more rigid than its supporting members. A concrete floor deck is generally considered rigid. A flexible diaphragm, such as plywood, is less rigid than its supporting members. Rigid diaphragms can transfer lateral forces by torsion, flexible diaphragms typically cannot.

A chord is a compression/tension member at the edge of a diaphragm that keeps the diaphragm from splitting. Chords are typically the top plate in wood frame construction, top rebar in concrete and masonry construction, and the steel edge beams in steel construction.



A collector, or drag strut, is a member which connects a diaphragm or other lateral support to another structural element. It "drags" the force from the diaphragm into the supporting member.



Comparison of the deflection of a flexible (left) and rigid (right) diaphragm. Note the the flexible diaphragm deflects much like a beam on multiple supports. The rigid diaphragm rotates about the "center of rigidity" determined by the stiffness and location of its supports.

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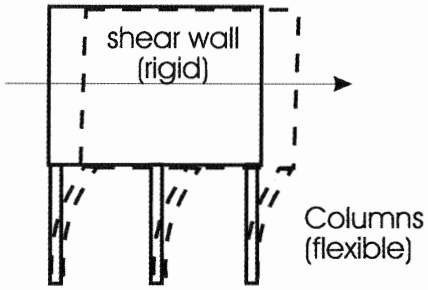
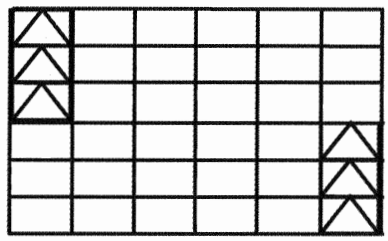
Structural Vertical Irregularities

Past earthquakes have revealed that certain vertical arrangements of structural members cause or exacerbate damaging deflections or stresses when subjected to earthquake forces. These configurations are called irregularities in the International Building Code (IBC). Irregularities are not banned, but special design considerations are required when irregularities are part of the system.

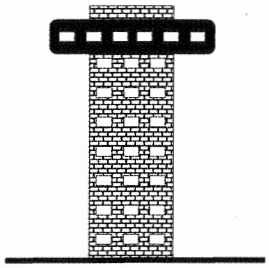
Depending on the size of the structure and the type of irregularity, the IBC may require greater strengths or deflection capability than regular structures. In addition, the IBC requires a three-dimensional dynamic analysis in some situations. A three-dimensional dynamic analysis is considerably more involved (and more expensive) than a conventional static analysis.



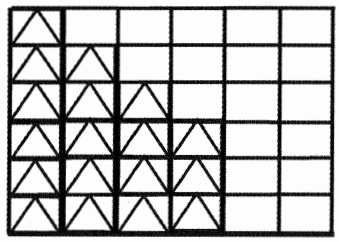
Stiffness Irregularity-Soft Story: This situation causes excessive forces and deflections in the softer story. This picture also illustrates A weak story situation - where the columns may be weaker than the wall above. Situations such as the one indicated above have lead to serious structural failures.



In-plane Discontinuity: When the lateral force elements are offset in their plane, large forces must be transferred at the level of the discontinuity.



Mass Irregularity: Where the mass of a floor is greater than 150% of the mass of the adjacent floor. Does not apply when the roof is lighter than the floor below. This situation may cause the assumptions inherent in the static analysis model to be non-conservative.



Vertical geometric irregularity: As shown above, this situation occurs when the lateral force system is of greatly different lengths on different floors. Note that the building as a whole is not irregular in this picture; only the lateral force braced bays are irregular. This situation may lead to large forces in the areas where the system is short

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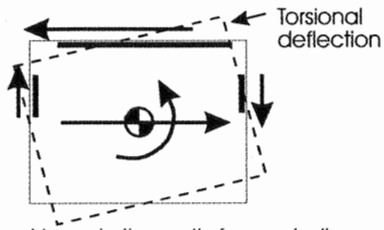
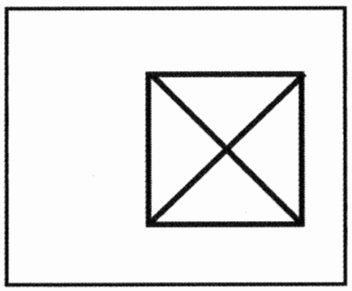
Structural Plan Irregularities

Past earthquakes have revealed that certain plan arrangements of structural members cause or exacerbate damaging deflections or stresses when subjected to earthquake forces. These configurations are called plan irregularities in the International Building Code(IBC). Plan irregularities are not banned for most structures, but special design considerations are required when irregularities are part of the system.

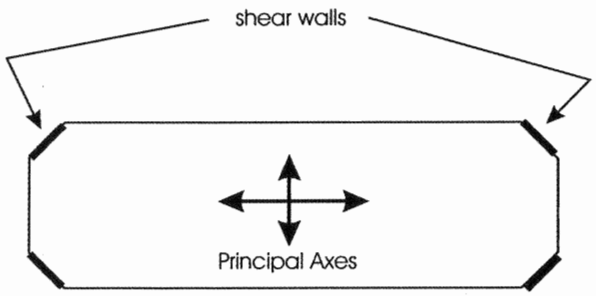
Depending on the size of the structure and the type of irregularity, the IBC may require greater strengths or deflection capability than regular structures. In addition, the IBC requires a three-dimensional dynamic analysis in some situations. Such an analysis is considerably more involved (and more expensive) than a conventional static analysis.



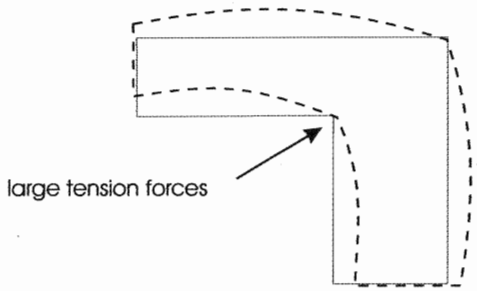
Torsional Irregularity results from misalignment between the center of mass and the center of resistance (or rigidity). This causes the building to twist in response to the offset between earthquake forces and structural resistance. The same torsion can result from heavy equipment or floors to one side of a building. Torsion can cause much higher loads in certain parts of the structural system due to the twisting motion.



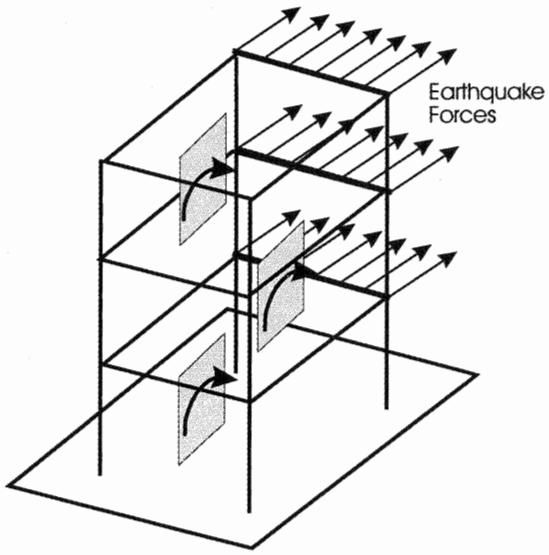
Diaphragm Discontinuity: Sudden variations in stiffness or large openings in diaphragms lead to stress concentrations. The forces may tear the corners or edges of the floor or roof away from its supports.



Non-Parallel systems: When the lateral force system does not align with the principal axes of the building, building performance during an earthquake may suffer.



Plan Irregularity: L-, U-, and T- shaped buildings have suffered extensive damage at the re-entrant corners due to incompatibility of displacements due to earthquake motions. In the picture above, as each wing moves away fron the intersection, the forces generated try to tear the wings apart.



Out-Of-Plane Offsets: These offsets cause large overturning (tipping) forces in the floors below the offset. In the picture above, each wall has tipping (overturning) forces that can cause structural problems for members below and lead to increased deflections of the building.

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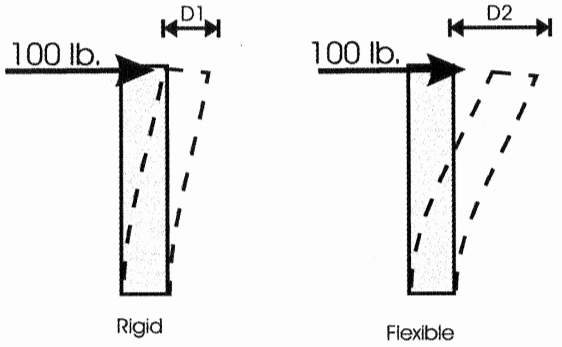
Rigidity, Strength, and Ductility

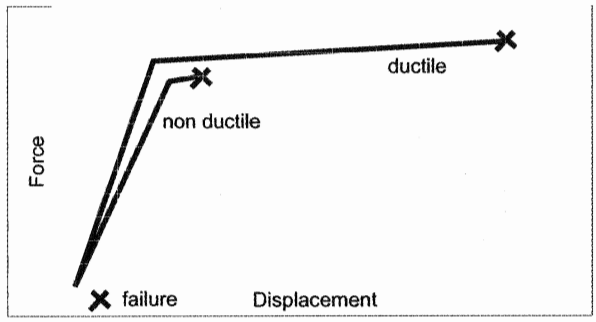
Rigidity (or stiffness) and Strength are two terms used frequently in structural engineering. Many people are confused because they think of these two terms as the same. However, rigidity concerns the amount of movement (or displacement) that will occur under a load. Strength refers to the capacity of a member to carry load without breaking.

Ductility is the ability of a structural element to survive beyond its yield point. Ductility is desirable because in a overload situation (such as an earthquake greater than the code design values) the structure will give, but not break and collapse. Note that the structure may be a total economic loss, but it will not collapse on its occupants.

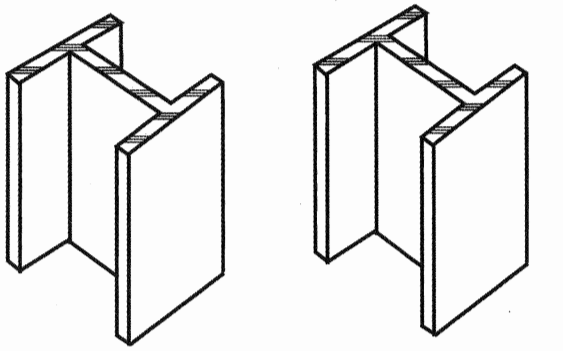
Rigidity is a critical parameter in earthquake-resistant design because it affects the natural frequency of the building, which determines how much energy the building "sees" from an earthquake. Rigidity also determines how much a building will move during an earthquake (or high wind). This movement is important because the finishes of the building (i.e. plaster or gypsum board walls, exterior glass (glazing), curtain walls, veneers, etc.) may crack, break or become separated from the structure.



Rigidity: These two columns are equally loaded, but they have different rigidities, so their displacements are different under the same loads. Rigidity is defined mathematically as the force/displacement. Therefore, if D2 is twice as large as D1, then the right column is one-half as rigid as the left column.



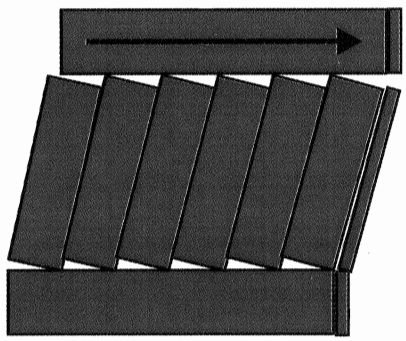
Ductility: A ductile member will yield , or lose strength, but not break or collapse. Ductility can be achieved through special detailing of connections, special criteria for reinforcement, and special performance criteria. Typically, concrete and masonry are made ductile by special reinforcement details; Steel is made ductile through special connection details. Wood is somewhat ductile by its nature, however, there are no special provisions for ductile wood structures.



W14X22
ASTM A36

W14X22
ASTM A572, Grade 50

These two steel sections are identical except for the grade of steel. The right section is stronger, because A572, grade 50 steel will yield at a higher stress level than A36. However, these two sections have the same rigidity. Why? Because modulus for steel is always 29,000 ksi, regardless of grade, and the modulus is what in part determines the rigidity of an element. Rigidity is determined by the geometry of the element and its modulus. Strength is a material property.



This picture illustrates why rigidity is important. Large deflections can cause compatibility problems; that is, the finishes must move with the structure. As you can see, a large deflection caused by low rigidity may result in prohibitively large joints in glazing or curtain walls or cause failure of the finishes if not accounted for in design.

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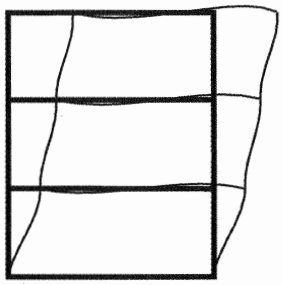
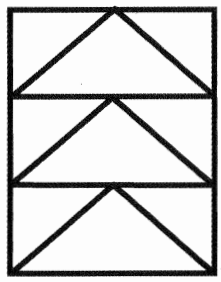
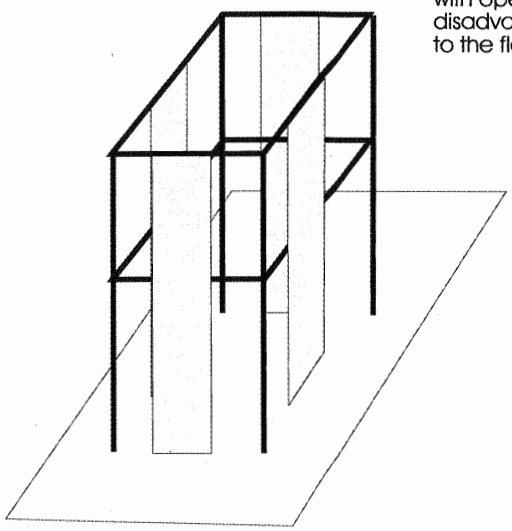
Structural Systems for Lateral Forces



Moment Frame: This system carries lateral forces as shear and bending in the columns and beams. It may be built of steel, concrete, or masonry. Moment frames require special detailing in high seismic areas to ensure ductile performance. The advantages of this system are primarily minimum disruption of interior space and exterior appearance. This system is less rigid than other systems, often resulting in compatibility problems with glazing and curtain walls.



Braced Frame: A braced frame has diagonal brace elements to carry the lateral forces axially in the braces. Braced frames of steel or heavy timber are allowed in high seismic areas. The configuration shown here is called a chevron brace. Other configurations are X-bracing and K-bracing (which is prohibited in high seismic areas). A braced frame is relatively rigid, between the rigidity of a moment frame and a shear wall system. The advantages of a braced frame are increased rigidity with openings allowed and ease of construction. The disadvantages of a braced system are the disruption to the floor plan and appearance of the braces.



Shear Walls: A shear wall system carries lateral load primarily in shear in the wall. There are two types of shear wall systems: bearing and non-bearing. A bearing wall carries vertical loads as well as the lateral forces. This is most rigid of all systems and can be constructed of wood, concrete or masonry. The primary disadvantage of shear walls is disruption to the floor plan, restrictions on windows and doors, and difficulties in remodeling.

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