

Summary Minutes

Nevada Earthquake Safety Council

16 February 2005

The Nevada Earthquake Safety Council (NESC) met from 9:00 a.m. to 2:50 p.m. at the Clark County Department of Building's Russell/Cameron Office in Las Vegas. These and previous minutes are posted on the NESC Web site (www.nbmg.unr.edu/nesc).

Ron Lynn chaired the meeting. Individuals attending the meeting are members of the Council:

John Anderson*, Nevada Seismological Laboratory
 Alex Balint, Las Vegas Academy
 Mike Blakely*, Blakely, Johnson, and Ghusn, who also held the proxy for
 Ian Buckle*, UNR Center for Civil Engineering Earthquake Research
 Wayne Carlson*, Nevada Public Agency Insurance Pool
 Press Clewe, who held the proxy for
 Bernie Anderson*, Nevada State Assemblyman
 Gaye Cote, UNLV Engineering Geophysics Lab
 Craig dePolo, Nevada Bureau of Mines and Geology, who held the proxy for
 Michael Lynch*, Builders Association of Northern Nevada
 Diane dePolo, Nevada Seismological Laboratory, who held the proxy for
 Jenelle Hopkins*, Clark County School District, Las Vegas
 Greg Flanigan*, Farmers Insurance
 Terri Garside, Nevada Bureau of Mines and Geology
 Marge Gunn Nutman*, Nevada Association of Counties & Lincoln County Office of Emergency
 Management
 Mark Harris, Nevada Public Utilities Commission
 Werner Hellmer, Clark County Department of Development Services, Building Department
 Bruce Hurley, National Nuclear Security Administration/Nevada State Office
 Eric Hubbard, Kleinfelder
 Gloria Leggio, Las Vegas Academy (Clark County School District)
 Ron Lynn*, Clark County Building Department
 Rick Martin, Nevada Division of Emergency Management
 Greg Moss*, The Moss Group, and for
 Glade Myler, Office of the Attorney General
 Elton Nutman, Lincoln County citizen
 Dan O'Brien, State Public Works Board
 Jim O'Donnell*, UNLV
 Jon Price*, Nevada Bureau of Mines and Geology
 Jim Reagan*, Sierra Pacific Power Company
 Ray Shaffer*, former Nevada State Senator
 Burt Slemmons*, University of Nevada, Reno (retired, Las Vegas consultant)
 Catherine Snelson*, UNLV Geoscience Department
 Spencer Swan, Las Vegas Academy
 Lars Wright, Parsons Brothers

* indicates member of the Board of Directors.

A quorum of directors (the necessary 11) was present.

Board Members unable to attend or send a proxy included:

Ed Ruttan*, American Red Cross
 Jim Werle*, Converse Consultants

The minutes from the meeting on 17 November 2004 were approved. A correction should indicate that Bob Cullins now works with UNR.

COMMITTEE REPORTS

Awareness and Education Committee

Diane dePolo reported that the University of Nevada, Reno held an earthquake exercise on 1 February 2005. Participants and organizers felt that it went well. Diane, Craig dePolo, and Jon Price assisted. Craig noted that several issues were raised, and the University is responding to improve its ability to respond to an earthquake.

The committee is copying and preparing a bulk mailing for Earthquake Awareness Week (February 28 to March 5, 2005) to approximately 650 Nevada schools. The packets contain the poster contest rules, a classroom hazard hunt activity, and home hazard hunt activity, an earthquake drill and evacuation checklist, the "Beat the Quake" flyer, and information on the "Drop, Cover, and Hold On" theme for the week.

John Louie has installed new monitors for earthquakes in the hallways of the Nevada Seismological Laboratory on the UNR campus.

Ken Smith's project for the K-12 seismic network is progressing well. Students from the Reno-area are learning how to use the network.

Research Committee

Craig dePolo noted that a project to estimate the damage and economic cost of historical earthquakes in Nevada has been completed. The 19 earthquakes analyzed (from 1868 to 1994) resulted in only \$17 million in damage (in 2003 dollars). The figure is low primarily because so few people lived in the affected areas. Using FEMA's loss-estimation computer model, HAZUS, these same earthquakes today would cause \$1.57 billion in damage and economic loss.

Marge Gunn Nutman noted that although there does not appear to have been any damage from the 1966 Caliente earthquake, flooding has been a bigger issue in that town since the earthquake.

The AEG meeting will be held September 17-25, 2005 in Las Vegas. There will be a technical session on seismic hazards in the Las Vegas area.

Craig reported that he and Ron Hess have reviewed the fault database in the latest version of HAZUS. They are making recommendations regarding how to improve this database, which currently only lists the 130 most active faults in the state and excludes some faults that are important for earthquake planning scenarios.

Policy Recommendations Committee

Wayne Carlson reported that no bills regarding earthquake issues have been introduced in the current session of the Legislature. The Committee plans to evaluate future recommendations.

The next State of Nevada public safety meeting will be held this year in Las Vegas. Wayne will ask for an earthquake presentation at that meeting.

The Nevada Public Agency Insurance Pool is working on a document on non-structural mitigation. They are using materials from the NESC non-structural mitigation workshop in the spring of 2004.

Strategic Planning Committee

Jim Reagan submitted a proposed annual report of activities for plan year 2004 for input from the Council. It will be submitted to the Council for approval at the May 4 Council meeting. Please submit comments to Jim by April 30.

ACTION ITEM: Terri Garside will place approval of the annual report of activities for plan year 2004 on the agenda for the May 4 meeting of the Council.

Nominating Committee

Jon Price reported that Ron Lynn has been in contact with the Nevada Resort Association to request that they nominate an individual to fill the Business and Industry, Southern Nevada position on the NESC Board of Directors. Alan Bennett, Plans Examiner with the City of Reno, is nominated for the position for Building Official, Northern Nevada. At the time of the meeting, the Nominating Committee's recommendation for a Nevada Senator to serve on the Board of Directors had not be finalized, but on the following morning Senator Warren Hardy agreed to serve. The nominations have been approved beforehand by Frank Siracusa, Chief of the Nevada Division of Emergency Management (NDEM).

Ad Hoc Committee on Rockery Walls

Werner Hellmer submitted a draft copy of guidelines for construction of rockery walls (dated 14 February 2005). A copy is included in these minutes as Appendix A. The guidelines were developed by the Structural Committee of the Southern Nevada Building Officials. Please submit comments to Werner Hellmer (wkh@co.clark.nv.us; 702-455-8095) by April 1. He proposes that the guidelines be adopted by the Council at the May 4 meeting.

ACTION ITEM: To assure that the final proposed guidelines for construction of rockery walls be distributed prior to the May 5 meeting, Werner Hellmer will send Terri Garside an electronic copy by April 15, and Terri will see that these are posted on the NESC Web site and referenced in the agenda for the May 4 meeting.

Greg Moss and Craig dePolo discussed the problem that some local jurisdictions are not codifying standards for dealing with surface ruptures or liquefaction, although State law requires them to do so. They suggested that perhaps the NESC could do a better job of promoting the use of its guidelines.

DEM UPDATE

Rick Martin reported that there was a delay in funding for the Council. Funds are now managed through the Department of Homeland Security.

The Governor has requested four presidential declarations: one for Clark County floods, one for Lincoln County floods, and two for snow-related emergencies in northern Nevada. If these are approved, disaster field offices will be established in southern Nevada. The snow-related aid would cover emergency response efforts in the first 72 hours of the extraordinary snowfall.

The DEM Web site has been improved (dem.state.nv.us). Training schedules are available at this site.

Bob Hatfield, former Executive Director of the Nevada Association of Counties, chairs the Finance Committee of the Nevada Homeland Security Commission.

FEMA UPDATE

Glade Myler reported that the FEMA director met with the National Emergency Management Association earlier in the week at their meeting in Washington, D.C. and noted optimism for funding of FEMA programs.

Jon Price mentioned that the National Institute of Standards and Technology is now the lead coordinating agency for the National Earthquake Hazard Reduction Program (NEHRP), a role formerly held by FEMA.

Nevada Hazard Mitigation Planning Committee

Ron Lynn reported that the Proposal Review Subcommittee will meet on the afternoon of 16 February 2005, and the full Committee will meet the following day. Only four proposals have been submitted for this year's funds in the competitive Pre-Disaster Mitigation grants program. States and participating local agencies must have disaster mitigation plans approved by FEMA before funding can be approved for mitigation projects. However, funds are available from the grants program for local agencies to prepare these plans. The State of Nevada plan has been approved by FEMA.

Update on Recent Earthquakes

John Anderson reported on the great Sumatra (Indonesia) earthquake on December 26, 2004 (magnitude 9.0 to 9.3). Seismologists knew that the initial magnitude estimate (8.0) was low, because the locations of aftershocks indicated that the rupture length was 1,200 km long, much longer than would be expected for a magnitude 8. The USGS's "Community Internet Intensity Map" (or "Did You Feel It Map") showed broad effects around the Bay of Bengal (northeastern Indian Ocean). There were several small local earthquakes recorded by the Nevada network shortly after the event — three magnitude 3+ earthquakes in western Nevada in the first day and a magnitude 2.5 earthquake on the west side of Sun Valley, a suburb of Reno, about 1.5 days after the Sumatra earthquake. Whether the Sumatra earthquake triggered these Nevada earthquakes is uncertain, but clearly distant earthquakes can trigger small earthquakes at considerable distances. For example, in the ten days after the Landers earthquake (1992), there was a significant increase in earthquakes in Nevada, including a magnitude 5.6 earthquake at Little Skull Mountain. Filling Lake Mead and nuclear explosions on the Nevada Test Site also triggered earthquakes in Nevada. The seismologists' interpretation is that the timing of some Nevada earthquakes may be affected a little (i.e. advanced slightly) by large strains caused by earthquakes outside of the region. But earthquakes outside of the region do not cause any new earthquakes that would not eventually occur anyway.

Jon Price noted that there were 500 million hits on the USGS Web site in the first few days following the Sumatra earthquake. Through supplemental appropriations from Congress, the USGS hopes to increase the budget for its earthquake program and move to 24-hour, 7-day per week operation of the National Earthquake Information Center. John Anderson cautioned that the budget increase may not trickle down to increasing the number of instruments in local networks, such as the one operated by the Nevada Seismological Laboratory.

The Nevada Seismological Laboratory obtained a Disaster Resistant University grant from FEMA for the University of Nevada, Reno. The firm of Blakely, Johnson, and Ghusn is conducting a survey and rapid hazard assessment of the approximately 80 existing buildings on the UNR campus. They will prioritize retrofitting, demolishing, or changing use of the buildings. They will look at overall disaster concerns, including

not only earthquakes but also potential disruptions from terrorism. The evaluation will largely cover structural features of the buildings, rather than non-structural features, such as effects on contents.

Bob Cullins, former member of the NESC Board of Directors, is now with the UNR Environmental Health and Safety Program and will be leading the effort with a grant proposal for non-structural mitigation.

John Anderson participated in a Washoe County emergency exercise involving an earthquake that could affect the U.S. Bureau of Reclamation's Stampede Reservoir (in California on a tributary of the Truckee River near Reno). They used a magnitude 7.1 scenario on the Dog Valley fault. The Bureau of Reclamation is working on strengthening the dam and evaluating the hazard from the Dog Valley fault.

Recognition of Senator Ray Shaffer

Ron Lynn presented a certificate of recognition to Senator Ray Shaffer for his service as a member of the Board of Directors of the Nevada Earthquake Safety Council.

Fault Discovered in Boulder City

Werner Hellmer, Burt Slemmons, and Jim O'Donnell discussed their (and Wanda Taylor's) observations of a fault and fissure discovered in a construction site in Boulder City. The main feature strikes N26°E and dips 75°W. It has horizontal striations, implying that it is a strike-slip fault, subparallel to the left-lateral Lake Mead fault zone, which strikes about N40°E. The material in one fissure appears to be silicified alluvium. The fault cuts old (probably late Pleistocene) sediments but does not cut Holocene sediments. It is not obvious that all the features are tectonic faults. One consultant determined there to be a fault present. A second consultant called it a vein, not a fault. Burt Slemmons noted two different features – one probably a strike-slip fault and the other perhaps a fissure filled with silica. The City of Boulder has engaged a third consultant to evaluate whether the feature is a fault of concern.

Making Your School Earthquake Safe

Gloria Leggio, Jim O'Donnell, Alex Balint, and Spencer Swan talked about a grant for renovations at the old Las Vegas High School (built in the 1930s, now the Las Vegas Academy). During the 2003-2004 school year about 100 students were involved in earthquake mitigation at the school. They initially focused on non-structural mitigation, but they have also included some structural changes in a final phase.

Presentations of Awards for Excellence

Ron Lynn presented NESC Awards for Excellence to Gloria Leggio and Jim O'Donnell for their mitigation efforts at the Las Vegas Academy and to Don O'Brien for work by the State of Nevada Public Works Board for remodeling the former Carson City Courthouse, including earthquake retrofit features.

Jon Price presented a NESC Award for Excellence to Ron Lynn and the Clark County Department of Development for the nonstructural mitigation of the Clark County Operations Center West Building.

Ron Lynn announced a NESC Award for Excellence to Assemblyman Bernie Anderson and the Nevada Legislature for sponsorship and passage of Assembly Bill 57 in the 2003 legislative session.

Nevada Earthquake Risk Mitigation Plan

Craig dePolo reported on revising the Nevada Earthquake Risk Mitigation Plan, which was last updated seven years ago. He guided a discussion of generally excellent progress toward goals in the current version of the plan. Craig is moving toward completing the plan by February 2006.

Old Business

Ron Lynn reviewed action items from the last meeting.

Jon Price, with the help of Diane dePolo, prepared a communication from the Council regarding the "Duck, Cover, and Hold" issue and sent it to Elizabeth Ashby at NDEM for distribution. Rick Martin stated that the Division's public information officer is handling release to the public.

ACTION ITEM: Jon Price and Terri Garside will work with John Anderson to prepare a booth for the Nevada Earthquake Safety Council to display information about the Council's activities at the Seismological Society of America meeting in April. They will highlight earthquake hazards in Nevada and activities of the Council.

ACTION ITEM: Eric Hubbard will continue to solicit participation in the Ad Hoc Committee on Rockery Walls from the membership of the Great Basin Section of the Association of Engineering Geologists and other northern Nevada engineering groups. He will distribute Werner's draft to these groups. Eric will also look into having a discussion on rockery walls at the national AEG meeting in Las Vegas (September 17-25, 2005).

Craig dePolo distributed buttons stating "Beat the Quake" to promote earthquake preparedness in Nevada.

New Business

Jon Price reported on the USGS Earthquake Hazards Program. Their five-year plan (for fiscal years 2004-2008) calls for increased activities in urban areas in Nevada, including expanding ShakeMap to include better coverage of the greater Reno-Carson City and Las Vegas areas, development of a "community velocity model" for these areas, and collaboration with the Nevada Bureau of Mines and Geology and the Nevada Seismological Laboratory on hazard assessment for these areas. The USGS anticipates an increase in their Earthquake Hazards Program budget in federal fiscal year 2005 related to a supplemental budget increase covering the great Sumatra earthquake (including improving the global seismic network on moving to a 24-hour, seven-day per week coverage at the National Earthquake Information Center in Golden, Colorado). Much of the impetus for the supplemental funds regarding earthquakes and tsunamis comes from the recognition of a magnitude 9 earthquake hazard along the Cascadia subduction zone from northern California to British Columbia. An earthquake presumably along this zone in 1700 sent a large tsunami to Japan.

They also are hoping for an increase for the Earthquake Hazard Program in their fiscal year 2006 budget. In addition, the USGS is pushing forward on a fiscal year 2007 budget initiative regarding hazards; if successful, this would add between \$50 million and \$100 million to the annual USGS budget for fundamental work such as geologic mapping and additions to their programs regarding flood, earthquake, landslide, volcanic, and perhaps wildfire and other natural hazards.

At the recommendation of the Scientific Earthquake Studies Advisory Committee, the USGS is reassembling the National Earthquake Prediction Evaluation Council. Jim Dietrich, former USGS earthquake scientist, will chair the committee.

The National Institute of Standards and Technology (NIST) is now the lead agency for the National Earthquake Hazards Reduction Program (NEHRP). The other agencies are the USGS, FEMA, and NSF.

NIST is requesting eight to nine new positions and a budget of \$35 million, some of which will be for external research, to carry out its responsibilities in building research and as the coordinating agency for NEHRP.

Jon also reported on the Nevada Post-Earthquake Technical Clearinghouse. The Nevada Bureau of Mines and Geology and the Nevada Seismological Laboratory met on 31 January 2005 to discuss preparations for post-earthquake investigations, communication, and coordination. The clearinghouse will assist in the rapid collection of vital information by geologists, geodesists, seismologists, and engineers. The Bureau has purchased three satellite phones and is in the process of acquiring several field-rugged laptops. A Web-based bulletin board has been established for quick communication among the scientists and engineers. The UNLV Geoscience Department has agreed to help with a parallel Web site, should the UNR offices be down from a local earthquake. We are well prepared to respond to an earthquake.

The May 4 meeting will include discussions of proposals for year-end funding.

ACTION ITEM: Proposals for federal fiscal year-end funds, perhaps available through DEM, should be submitted to one of the four standing committees (Awareness and Education, Research, Policy Recommendation, or Strategic Planning) by April 15.

Mike Blakely discussed UNR's testing of a two-span concrete bridge. The test was broadcast on the Web. It was the largest test in the world and involved three shake tables simultaneously.

Greg Moss proposed that the Council annually alert counties about the NESC guidelines, Assembly Bill 57 (from the 2003 legislature).

ACTION ITEM: Terri Garside will ask Ian Buckle to make a presentation at the next NESC meeting about the UNR Earthquake Engineering Laboratory.

Ron Lynn mentioned that MMMX rebar uses a new steel that is more ductile than current rebar. It saves cost in buildings.

Burt Slemmons noted that the national meeting of the Association of Engineering Geologists will include field trips. He suggested that the UNLV and UNR Geoscience Departments and the Seismological Laboratory join the NBMG and others in having exhibits at the booth.

Gaye Cote reported that the UNLV Earthquakes in Southern Nevada project, a joint effort of the Geoscience and Engineering groups, is well underway and involves outreach to K-12 schools. The UNLV Communications group will be producing public service announcements.

Public Comments

No comments were made.

Announcement of Future Meetings

Future NESC meetings are as follows:

- Wednesday, May 4, 2005 (Reno)
- Wednesday, August 3, 2005 (Las Vegas)
- Wednesday, November 9, 2005 (Reno).

REVIEW OF ACTION ITEMS

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respectfully submitted by Jon Price, 23 February 2005

Nevada Earthquake Safety Council
c/o Nevada Bureau of Mines and Geology
University of Nevada/MS 178
Reno, Nevada 89557
775/784-6691 ext. 126

NEVADA EARTHQUAKE SAFETY COUNCIL
Members of the Board of Directors and Officers
(as of 22 February 2005)

Business and Industry, Southern Nevada	vacant
Business and Industry, Northern Nevada	Nevada Resort Association Michael Lynch Builders Association of Northern Nevada
Insurance Industry (statewide)	Greg Flanigan Farmers Insurance (Las Vegas)
State Government (statewide)	Mark Harris Public Utilities Commission (Carson City)
Local Government, City	Wayne Carlson Nevada Public Agency Insurance Pool (Carson City)
Local Government, County	Marge Gunn Nutman Nevada Assoc. of Counties & Lincoln Co. Office of EM
Seismology (statewide)	John Anderson Nevada Seismological Laboratory (UNR)
Geosciences, Southern Nevada	Burt Slemmons Las Vegas consultant, UNR (retired)
Geosciences, Northern Nevada	Jonathan G. Price Nevada Bureau of Mines and Geology
Engineering, Southern Nevada	Jim Werle Converse Consultants
Engineering, Northern Nevada	Mike Blakely Structural Engineers Association of NV
Education (statewide)	Jenelle Hopkins Clark County School District, Las Vegas
Community Organizations, Southern Nevada	Ed Ruttan American Red Cross
Community Organizations, Northern Nevada	Jim Reagan Sierra Pacific Power Company
University, Southern Nevada	Catherine Snelson UNLV Geoscience Department
University, Northern Nevada	Ian Buckle UNR Center for Civil Engineering Earthquake
Research	
Building Official, Southern Nevada	Ronald L. Lynn Clark County Building Department
Building Official, Northern Nevada	Alan Bennett City of Reno
State Senate	Warren Hardy Nevada State Senator (Las Vegas)
State Assembly	Bernie Anderson Nevada State Assemblyman (Sparks)
Member at Large, Southern Nevada	Jim O'Donnell UNLV
Member at Large, Northern Nevada	Greg Moss The Moss Group

Members of the Executive Committee

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First Vice Chair-South

First Vice Chair-North

Second Vice Chair-South

Second Vice Chair-North

Secretary

Past Chair

Division of Emergency Management Representatives

Ronald L. Lynn

Burt Slemmons

Jim Reagan

Jim Werle

Greg Moss

Jonathan G. Price

John Anderson

Rick Martin

Appendix A

**ROCKERY WALL CONSTRUCTION
SOUTHERN NEVADA LOCAL STANDARD
DEVELOPED BY SNBO STRUCTURAL COMMITTEE
DRAFT: February 14, 2005**

BOULDER CITY:	Ron Nybo
CLARK COUNTY:	Ted Droessler Werner Hellmer Kevin McOsker
HENDERSON:	Majid Pakniat Joel Ritchie
LAS VEGAS:	Lillian Beltran Earl Russell
MESQUITE:	N/A
NORTH LAS VEGAS:	Yolanda Aclaro Dale Daffern

100 Scope

101 This document provides a standard throughout Southern Nevada for the structural analysis and construction of Rockery Walls.

200 Definitions

201 **Rock** is natural solid mineral matter occurring in large masses or fragments.

202 **Rockery Wall** is a system of stacked rocks constructed to retain soil.

203 **Landscape Materials** such as vegetation, "landscape rock/gravel," chad, mulch and similar materials that are used are decorative elements.

300 Permit Application Requirement/Submittal Criteria

301 Construction of Rockery Walls four feet (4') high and greater shall require a permit issued by the authority having jurisdiction. The height of a Rockery wall shall be measured from the bottom of the base rock layer to the top of the uppermost rock layer.

302 Permit Documents

302.1 A dimensioned drawing that identifies the location of each Rockery Wall with respect to the property lines, easements, streets, and other rights-of-way. Existing construction, required setbacks as noted below, and drainage features shall clearly be identified on drawings.

- 302.2 Cross section of wall showing the rock size for each lift, maximum height, backfill, drainage, slope of ground, embedment, cuts, and batter.
- 302.3 Structural Analysis. All Rockery Walls four feet (4') and greater shall require engineering analysis.
- 302.4 Geotechnical Report. All Rockery Walls four feet (4') and greater shall require a geotechnical report.

303 Construction and Limitations

303.1 Construction

303.1.1 The base rock shall be embedded at least 12" into the soil. Placement of base rocks at grade followed by subsequent backfilling of the "toe area" shall not be permitted unless specific recommendations are provided by the Geotechnical and/or Structural Engineers.

303.1.2 The wall shall be battered to a ratio of at least 1

Horizontal

to 6 Vertical (1H:6V) measured at the exposed face of wall.

303.1.3 The surrounding site shall be graded such that water cannot flow over the top of the wall.

303.1.4 Landscape materials, if used, shall not have detrimental effect on the wall. The use of landscape materials in close proximity to Rockery Walls shall be specifically addressed in the structural analysis.

303.1.5 Walls greater than eight feet high (8') shall have Mechanically Stabilized Earth reinforced with geogrid or geotextile reinforcement as designed by Geotechnical Engineer or have a slope stability analysis.

303.1.6 Caliche and other "cemented soils" formed by precipitation shall not be used in Rockery Wall construction unless special design considerations are provided to address their suitability for use.

303.2 Limitations

303.2.1 The height of any single Rockery Wall shall not exceed 16 feet.

303.2.2 Walls shall be in a continuous alignment without abrupt changes in direction.

303.2.3 A minimum radius of curvature shall be four times the wall height.

304 Setbacks

304.1 The setback from a Rockery Wall to a building or structure shall be not less than the height of the retained earth. The distance shall be measured from the outside of the foundation of the structure to the exposed face of the Rockery Wall. This provision applies to buildings or structures at the low side of the wall.

304.2 Multiple Rockery Walls, designed as terraced retaining walls, shall be a minimum distance of ½ the height of the lower Rockery Wall to another Rockery Wall.

304.3 Ornamental fences, guards, or screen walls shall be a minimum of 2 feet from the top of the Rockery Wall. Ornamental fences, guards, or screen walls shall have their own foundations and not rely on the Rockery Wall for structural support.

304.4 Rockery walls shall be set back the required distances from fire hydrants, light standards, gas meters, water meters, electrical transformers, utility boxes or similar features. These distances shall be established and enforced by the authority having jurisdiction. Where permitted, Rockery Walls located within a utility or other easement shall be in accordance with the published standards of the department or agency having authority of the easements.

305 Structural Analysis

305.1 All structural analysis shall be in accordance with adopted building code of the jurisdiction having authority, the local amendment adopted by the authority having jurisdiction, and this document.

305.2 The minimum factor of safety for sliding and overturning of each rock in a Rockery Wall shall be 1.5. This shall include load combinations with seismic forces.

305.3 The following analysis provisions shall apply:

- 305.3.1 The maximum unit weight of the rocks used in the design of a Rockery Wall shall be 155 pcf unless field verified by special inspection.
- 305.3.2 The maximum coefficient of friction between rocks in a Rockery Wall shall be 0.5.
- 305.3.3 Surcharge load shall be taken into consideration in the analysis
- 305.3.4 Specifications shall be provided to clearly define acceptance criteria for rock materials.

400 Inspections

401 Inspections shall be performed as required by the authority having jurisdiction.

402 Special Inspections

402.1 Special inspection of Rockery Wall construction shall be required for all

walls four feet (4') tall and greater.

402.2 Continuous or periodic special inspection shall be specified on the construction documents.

402.3 Qualification of the special inspector shall comply with the requirements

of the authority having jurisdiction.

402.4 Details of special inspection:

1. Type of rock
2. Unit weight, if design exceeds 155 pcf
3. Rock size
4. Rock placement
5. Drainage layer
6. Embedment
7. Wall face slope (batter)
8. Mechanically Stabilized Earth, if specified

402.5 A final report shall be submitted to the authority having jurisdiction.

500 Reference Standards

501 “Rock Wall Construction Guidelines,” by the Associated Rockery Contractors,
August 15, 2000 edition.

Request for input and comments:

1. Any and all comments or criticisms are welcome. Please provide you input to: Werner K. Hellmer
4701 W. Russell Rd.
Las Vegas, NV 89031
Phone (702/455-8095)
Fax (702/380-9819)
Email wkh@co.clark.nv.us
2. Research of other rockery construction guidelines indicates that utilizing an inclined base to achieve batter of the front wall face is a preferred method. There are other supposedly less desirable methods of achieving batter; see section 303.1.2 and attachment.
3. The intent of section 303.2.3 is to prohibit positive or protruding corners from rockery construction. What do you think?
4. Copies of similar standards or more current versions of ARC Guidelines would be appreciated.