



SEAU NEWS

The Newsletter of the Structural Engineers Association of Utah

Volume VII- Issue II October 2002

This newsletter is a monthly publication of the Structural Engineers Association of Utah.

Articles or advertisements appearing herein may be submitted by anyone interested in expressing a viewpoint on structural engineering.

Articles for publication may be submitted to:

Mike Buehner, Editor

(801) 486-3883

mbuehner@reaveley.com

Advertisements for publication may be submitted to:

Jerod Johnson, Advertising

(801) 486-3883

jjohnson@reaveley.com



Khadeeja Mosque of the Islamic Society of Greater Salt Lake, West Valley City, Utah, by Mangum Engineering Consultants

IN THIS ISSUE

- Message From The Board p 1
- Member Forum..... p 2
- Finding Spectral Acceleration p 3
- Bulletin Board p 4

OCTOBER EVENT

ICBO Seminar

Presented by:
SEAU

Program Date:
Tuesday, October 22, 2002
8:00 a.m. – 5:00 p.m.

Location:
Little Theater, University of Utah
Union Building
200 South Central Campus Dr.

Cost:
\$35.00 for SEAU Members

MESSAGE FROM THE BOARD

ACHIEVING OUR GOALS



By James Williams,
SEAU Past President

At the SEAU Opening Social our president, Larry Reaveley pointed out that many of the issues and concerns that we are dealing with today, are in fact the same issues and concerns that we were dealing with in 1980, when SEAU was first organized. We have to ask ourselves, are we better off

now than we were 22 years ago? Do we promote high standards of Structural Engineering in the best interests of clients, community, public and the profession? Do we discourage unethical and detrimental practice? Has public awareness of Structural Engineering improved? Is there legislation relating to Structural Engineering? Have we promoted technical expertise? And has there been improved acquaintance and understanding among us? Are we united? Are we making more money?

Although we've made great strides in some areas over the years, we still have lots of room for improvement. Rolf W. Kerr once said, "If you always do what you've always done, you'll always get what you've always got!" If we as members of SEAU want to see greater change, then we need to start

CONTINUED ON PAGE 3

MEMBER FORUM

FOCUS

Utah Structural Engineers provide a significant contribution to a wide variety of projects for commercial, government, industrial, and residential clients. Each month, SEAU would like to focus attention on the accomplishments, successes, and hard work of our Utah Structural Engineering firms. This month the focus is on:

Ellis & Associates, P.C.

Ellis and Associates is a local structural engineering firm that was founded by Scott Ellis in the mid 1960's. His son, Gary, joined the firm in 1994 upon completing his Civil Engineering Degree from Utah State University. Both Gary and Scott have their CSE licensure in the state of Utah.

Ellis and Associates has specialized in the industrial, municipal, and mining industries in the western states. Projects include highway bridges, pedestrian bridges, cast in place concrete water tanks, steel water tanks, water and waste water treatment plants, hydro electric power plants, concrete dams, pipe crossings, box culverts, and numerous projects in the mining industry, including a locomotive repair facility and a new lime plant facility for Kennecott Utah Copper Corp.

The following projects are representative of the design work done over the past few years.

The Adams Avenue Bridge is located at the south end of Adams Avenue in Ogden, Utah. The bridge connects south Ogden to Interstate 84.

The bridge has 3 spans. 475 feet total length and is 63 feet wide. The middle span is 237 feet and bridges over the Weber River and 3 sets of Union Pacific Railroad tracks. The foundation consists of 12-inch diameter steel piles driven about 95 feet. There are 7



Adams Avenue Bridge

continuous plate girder beams that support a concrete cast in place deck. The beams vary in depth from 6 feet to over 12 feet. The flange thickness and width vary greatly to reduce dead load and costs. The dead load deflections of the steel beams supporting the wet concrete deck became quite large. The maximum was over 13 inches. The camber for the continuous steel beams had to be carefully computed such that when the wet concrete was placed, the surface of the deck would be on a uniform grade with no "bumps or dips". The calculation for the camber was complicated by the variations of the beam depth and the variations of the thickness and width of the flanges. The sequence of placing the concrete deck became crucial to reduce transverse cracking of the deck at critical locations, like over the piers. The bridge was designed using current AASHTO and UDOT specifications, which both required a Multimode Spectral Analysis.

The Adams Avenue Bridge was privately funded by the land owner. A toll booth was constructed on the north side of the bridge and fees are charged for travel in both directions.



Pedestrian Bridge on Bangeter Highway

There are 3 pedestrian bridges on Bangeter Highway, at 6200 South, 7000 South and 7800 South that Ellis and Associates designed. Each bridge spans 140 feet and is 8 feet wide. The walking surface is a cast in place, reinforced, concrete deck. Square tube was used for the entire bridge. Each top and bottom chord was fabricated of 3 sections of 8 inch square tube. They were joined together with a full penetration weld and ground smooth so that when painted, the joint could not be identified. The top and bottom chord were rolled to produce a mid span positive camber of about 2 feet.

Structural engineers at UDOT were concerned about tension on bottom chord welds. They have experienced cracking problems in welds in tension due to cyclic live loadings on highway bridges in the past. Ellis and Associates proposed to place tension cables in the hollow section of the bottom chords and tension them sufficiently to keep the bottom chord in compression, regardless of the various loading conditions. The tubes were grouted solid. This post tensioning affected stresses on the other bridge members, and some members had to be increased in thickness to support the additional load. Stress calculations with this post tensioning were complicated due to the camber of the bridge.

Ellis and Associates designed a concrete dam in the

Virgin River, which is located a few miles down stream from Virgin, Utah. The purpose of this structure was to take water



Concrete Dam in Virgin River (looking upstream)

out of the Virgin River and place it in a 60 inch diameter

pipe line for transport about 11 miles down stream to another drainage basin, which forms the Quail Creek Reservoir. The reservoir is about 10 miles north of St. George, Utah.

The inlet structure, to the left in the picture, lets water enter from horizontal slits in the wall on the river side. The inlet structure allows sand and silt to settle out. Clear water enters the pipeline on the left of the picture, which is buried in the concrete structure.

A 100-year flood routing model indicated that the entire dam, inlet structure and overflow weir would be topped by a 7 ½-foot flood. This posed special design concerns to the roof of the inlet structure and the main vertical abutments supporting the gates. Three months after the structure was completed a 3 ½-foot flood successfully overtopped the structure. There hasn't been a flood over the structure since then.

MESSAGE FROM THE BOARD (continued from page 1)

by changing ourselves. If we improve ourselves, then our companies will start to improve, and as our companies improve, our profession will also improve.

Charles Noble said, "You must have long-range goals to keep you from being frustrated by short-term failures." How many of us have personal professional goals? Are these goals in writing? How often do we review and ponder them? Are our goals in harmony with our company goals, and how do our company goals compare with the goals established by SEAU? Earl Nightingale gives an example of a large ship with a captain, capable crew, and a

course clearly mapped out. 99,999 times of 10,000 the ship will reach its destination, its goal. You can image what would happen to a ship leaving port with no planned destination, an inexperienced crew and no captain. What are the chances of ever reaching another port? Someone once wrote, "No decision at all is a choice. Never let the lack of decision bring a negative influence into your life. We must be people of integrity. We must choose the better path."

I know of no other profession as challenging as ours, and that literally affects the lives of everyone we see,

either directly or indirectly. There is nothing we are doing now that won't be done better in the future. If we want to succeed, then we must be proactive and embrace change. Personal goals and personal improvement are essential. To achieve something you have to give something (- Gandhi). I'm grateful to the members of SEAU that willingly give of their time in order to serve each other, support each other and help to improve our noble profession. Active association with SEAU will not only improve us individually, but it will help our companies and our profession.

FINDING SPECTRAL ACCELERATION VALUES

Greetings SEAU members from the Codes Committee.

A word of warning if you are obtaining IBC mapped spectral accelerations using the project zip code. Accessing the mapped spectral accelerations using the project zip code will yield results for the geographic center of the zip code. As we are all very aware, in our area of the country the acceleration contours can vary significantly over a very small distance.

The difference between the mapped spectral acceleration values at the geographic center of the project zip code and the mapped values at the actual project site could result in seismic forces in excess of code requirements, costing our clients money, or

worse, it could result in seismic forces below code requirements, putting the public at risk.

The preferred method for accessing the mapped spectral acceleration values is via latitude and longitude for the project site. This information has been readily available at a number of Internet map sites. Recently a number of these sites have discontinued latitude and longitude information. One site that we have found that still provides this information is www.maporama.com.

Provide the most accurate seismic analysis possible by accessing the mapped spectral acceleration values using the project latitude and longitude!

BULLETIN BOARD

BULLETIN BOARD EDUCATOR FEATURE

Each month from this issue and for the next several months, SEAU News will be highlighting a Structural Engineering educator from one of Utah's engineering schools. This month's feature is the following:



DR. RICHARD J. BALLING

Dr. Richard J. Balling has been a professor of Civil and Environmental Engineering Brigham Young University since 1982. Prior to joining the staff at BYU Professor Balling worked for some of the most prestigious and technologically advanced organizations in the country including ICASE-NASA Langley (visiting scientist), Hercules Aerospace, and URS John A. Blume Engineers. He received his B.S. in civil engineering and a B.A. in mathematics at the University of Utah after which he received M.S. and Ph.D. degrees at the University of California, Berkeley.

As a professor at BYU Dr. Balling has taught 8 different undergraduate courses and 7 different graduate courses with a very high instructor rating by students. He has advised 5 doctoral dissertations and 27 master's theses and is currently writing an undergraduate textbook: "Structural Analysis and Optimization" and a graduate textbook: "Continuum Mechanics and the Finite Element Method".

Dr. Balling's research interests include optimization-based civil engineering design, computer-aided structural design and analysis, computer-based methods in engineering design.

His research has focused on application of optimization techniques to engineering design. In particular, he has developed strategies for treating problems involving discrete-valued combinations of variables as well as tolerances on variables. He has explored the use of decomposition strategies on large problems, and he has developed techniques for interfacing analysis and optimization software. He is co-author of OPTDES.BYU design software. He has applied optimization techniques to various civil engineering design

problems including the optimal design of land subdivisions, steel-framed structures, water distribution networks, reinforced concrete buildings, and aerodynamic shapes.

Dr. Balling has authored journal publications and conference proceedings too numerous to list. He has also been the principal investigator for many funded research contracts and has authored several software products. He served as Associate Editor for ASCE Journal of Structural Engineering (1990-91). In addition, he served as Chair of the ASCE Methods of Structural Analysis Technical Committee (1991-1994).

SEAU News is proud to feature Dr. Balling in this month's newsletter and offers its gratitude to him for having such a positive influence over structural engineers educated at Brigham Young University.

If you had an engineering professor at BYU, the U of U, or USU that you believe should be recognized in SEAU News, please contact the SEAU Newsletter committee or send an email to jjohnson@reaveley.com.

CONTACT SEAU

For any information regarding the Structural Engineers Association of Utah, please contact us at:



SEAU
P.O. Box 581292
Salt Lake City, UT 84158-1292

www.seau.org

BULLETIN BOARD

SEAU MEMBERSHIP APPLICANTS

The following individuals have submitted an application for approval by the SEAU membership committee for new members:

1. Brett D. Veazie - Student
2. Jeffrey Ambrose - Associate
3. Troy Dye - Associate
4. Cameron Empey - Associate
5. Dorian Lee Adams -Professional
6. Ron M. Christensen - Professional
7. Matthew Roblez - Professional

SEAU FALL SOCIAL

The SEAU Fall Social at Wheeler Historic Farm held on Friday night, September 20, was great success with good food, fun entertainment, and friendly conversation. Attendance was good, but for those of you who didn't make it, you missed out on a very nice evening. (The editor hoped to insert a photo here supporting the above statement, but since his camera chose not to work that evening, he regrets that he has to convince you with words alone.) The *Obviously Had More Fun Than Anyone Award* goes to Ed and Sarah Allen who knew what they were doing on the dance floor.

Dave Pierson announced the winners of the SEAU Fall Golf Tournament. They were:

1st Place – Brent Roberts, Joe Walton, Matt McBride, and Troy Dye. Prize: \$35 gift certificate at Uinta Golf.

2nd Place – Ron Dunn, Dave Pierson, James Williams, and Andrew Bollschweiler. Prize: \$15 gift certificate at Uinta Golf.

Longest Drive – Mitch Mortenson. Prize: Barbecue cooking utensils.

Nearest to the pin – Chris Barker. Prize: Golf book, *On Hallowed Ground*.

THIS SPACE FOR RENT

The newsletter is an excellent forum to target a very select group of professionals for advertising. To find out more contact:

Jerod Johnson,
c/o Reaveley Engineers & Associates, Inc.
1515 South 1100 East
SLC, UT 84105
Phone 486-3883, Fax 485-0911
Email: jjohnson@reaveley.com

CLASSIFIDES**STRUCTURAL ENGINEER**

BHB Consulting Engineers, PC, is looking for engineers with a minimum of 1 to 2 years experience. Send resume to:

BHB Consulting Engineers, PC
5263 South Commerce Drive
Suite 200
Murray, Utah 84107

Fax: (801) 261-0614

email: chrish@bhbenigneers.com

STRUCTURAL ENGINEER

Dean L. Webb & Associates, a Consulting Structural Engineering Firm in Utah, is seeking a structural engineer with a minimum of four (4) years experience and a desire to be part of an established firm specializing in design, analysis, and detailing of structures.

Please send resume and statement of interest to:

Dean L Webb & Associates
580 East 9400 South
Sandy, Utah 84070
Attn: Dean L. Webb, P.E.

Fax: (801) 576-6424

email: dlwebb@xmission.com

Phone: (801) 576-6414.

STRUCTURAL DESIGN ENGINEER

Reaveley Engineers & Associates seeks structural engineers to be part of our consulting team. If you enjoy challenges, are self-motivated, have excellent verbal, writing and computer skills, and would like to work on large scale, high profile projects, we would like to talk to you! Three years or more building experience in structural engineering is preferred. Salary commensurate with qualifications. Send resume to:

Reaveley Engineers & Associates
1515 South 1100 East
Salt Lake City, Utah 84105
Attn: Parry Brown

Fax: (801) 485-0911

Email: pbrown@reaveley.com

SEAU Presents:

ICBO SEMINAR

FIRE PROTECTION & STRUCTURAL ENGINEERING

Tuesday, October 22, 2002

Registration 7:30 – 8:00 a.m., Program 8:00 a.m. – 5:00 p.m.

Morning Session:

ICBO Fire Protection Requirements
by Brent Snyder, Fire Protection Engineer

Afternoon Session:

Review and Clarification of ICBO Structural Requirements
by John Henry, S.E.

Location:

Little Theater, University of Utah Union Building
200 South Central Campus Drive
Salt Lake City, Utah

- Cost: \$35.00 per person for SEAU members. RSVP to 581-6931, bring your payment to the seminar.
- Morning and afternoon breaks with light refreshments provided by SEAU. Lunch on your own in the Union Cafeteria in the lower level of the Union Building.
- Parking in the visitor's parking lot east of the Union Building will be validated by SEAU.

STRUCTURAL ENGINEERS ASSOCIATION OF UTAH

P.O. Box 58628

Salt Lake City, Utah 84158-0628

www.seau.org



Board of Directors

Larry Reaveley, *President*

Ron Dunn, *Vice Pres./Pres. Elect*

James M. Williams, *Past President*

Barry Arnold, *Treasurer*

Jeff Miller, *Secretary/Historian*

Julie Ott, *Member of the Board/UEC Delegate*

Carl Eriksson, *Member of the Board/UEC Delegate Elect*