



SEAC

GENERAL NOTES

Structural Engineers Association of Colorado Newsletter

MARCH GENERAL MEETING

VOIDED “TWO-WAY” FLAT SLABS

Schedule

Mark Your Calendar
(2010)

General Membership Meetings

- (Breakfast 7:30 a.m.)
- January 21
- March 18
- May 20
- July 15
- September 16

Business Management Committee Meetings

- (Breakfast 7:30 a.m.)
- February 11
- April 8
- June 10
- August 12
- October 8/14

SEAC Board of Directors Meetings

- (7:30 a.m.)
- January 8
- February 5
- April 2
- June 4
- August 6
- October 1

Annual Dinner Banquet

- November 18
- 6 - 9 p.m.

Voided slabs are an old concept used in the construction of reinforced concrete floor systems dating back to early 1900's. The purpose of the voids is to remove concrete from areas in the slab where it is not required for load carrying. As a result of the reduced mass, the voided slab system is able to span further.

This presentation provides a historical perspective on the use of “one-way” voided slab systems and it introduces new improvements developed in Europe in the early 1990's that have expanded the use of voided slabs in the construction of two-way slabs. Several case studies are discussed that highlight the advantages of voided-slab construction.



Mike C. Mota, P.E., is the Regional Manager for the Atlantic States with the Concrete Reinforcing Steel Institute-CRSI and is responsible for providing technical assistance in all areas of building design and construction to engineers, architects, owners and contractors. Prior to joining CRSI, Mr. Mota worked for the Portland Cement Association. He is an active member of several ACI and ASCE committees; chairs the high rise building's committee of the New York City Concrete Promotional Council and serves on the Board of Directors of the Concrete Industry Board of New York City. Mr. Mota is also a PhD candidate in Civil Engineering at Drexel University in Philadelphia.

Contact Mike at 856.264.3851

Don't Miss Out - MARCH General Meeting

Date: Thurs. March 18, 2010
 Speaker(s): Mike Mota, PE
 Location: Renaissance Denver Hotel
 3801 Quebec Street
 (South of the I-70 Quebec Intersection)

Please e-mail your reservation to Caryn at: seac@martinmartin.com
Reservations MUST be made By Monday, March 15, 2010.

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Information for inclusion in the newsletter must be received one month prior to the next general meeting.

Caryn L. Bauer
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President's Message

I don't know what your destiny will be, but one thing I know: the only ones among you who will be really happy are those who have sought and found how to serve.
Albert Schweitzer

HAITI

I need to make a confession. I had written most of the March president's newsletter article back in early January when I had some down time available. On the late afternoon of January 12th my light, possibly humorous discussion about famous structural engineers became extremely inappropriate. The devastation that the people of Haiti have been dealing with exceeds anything I can imagine.

I have a small personal connection to Haiti, having been a member of a volunteer team working through Engineering Ministries International back in 2004 designing a small school for the people of Petit-Trou-de-Nippes. Petit-Trou is a village 80 miles west of Port-au-Prince on the southern peninsula and is on the grounds of St. Paul's Episcopal Church. Our team visited the site and did most of the design work in the field. We slept in tents we had brought with us and ate goat and conch. All in all, the experience was fantastic. While there, we had a great time playing with the local kids and were able start to understand how the locals live and the particular difficulties they face every day in Haiti. I don't claim to be an expert but my level of awareness was definitely raised and I left with compassion for the Haitians that I hadn't anticipated.

The school was eventually completed and although I have not seen it in person, I have seen pictures. Damage from the earthquake was limited and, more importantly, none of the students or teachers were injured and hearing that news was a great relief to me.

In January our speaker, **Jim Gusek** from Engineers Without Borders, talked to us about their projects in Ecuador, Togo and Madagascar. He urged us to consider volunteering our skills as structural engineers so they might benefit others. When we arranged to have Jim come and speak to us, we

certainly had not anticipated the events of the week before, but the timeliness of the topic of volunteering could not have been greater. I should mention that Jim was impressed with all of you in attendance. He really enjoyed seeing how engaged you were and appreciated the questions and interaction he had with some of you after the meeting.

I haven't figured out exactly how I want to respond to the crisis in Haiti. Almost two months later the needs are different but no fewer. It's easy to donate money and even in our uncertain economic times every one of us has so much more than the average Haitian will ever see. I have and will continue to help Haiti economically but I am looking for a more hands-on approach to go with that. The Structural Engineering Emergency Response Plan (SEER) is a great program. If you haven't already you might want to check out the webpage on the National Council of Structural Engineers site: <http://www.nseae.com/SEER.aspx>

Recently someone told me about a group called BuildOn that involves our high school students in a program that actually builds schools to bring literacy to children and adults in developing countries around the world. With all these opportunities, it's my own fault if I can't find a way to get involved.

This month, **Mike Mota** from CRSI is here to present a very interesting alternative to the traditional concrete flat slab approach. The voided two way concrete slab is being used in Europe to achieve clear spans up to 17 meters. Mike's presentation should be informative and thought provoking. You will not want to miss this.

And please do remember to look into how engineers are volunteering to help make the world a better place and helping those less fortunate.

GENERAL NOTES - ANNOUNCEMENTS

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SEAC GUEST POLICY

In an effort to keep our breakfast meetings open to non-members while controlling costs, SEAC will charge \$20 per guest per meeting effective in March. If a guest becomes a member of SEAC later in the year, breakfast meeting payments for that year will be applied toward the cost of his or her annual dues. If you are attending as a guest or are bringing a guest to our meeting, please indicate that in your RSVP. We will have a separate guest sign-in sheet at our check-in desk the morning of the meeting. Please make checks payable to Structural Engineers Association of Colorado (SEAC) and bring the check with you to the General Meeting.

SEAC WEBSITE

The SEAC website had been re-designed and is up and running. Please take a moment to check it out. Thank you to WebMuse for doing a great job on the SEAC website. There are still some sections of the website that need to be completed. Thank you for your patience.

Take a moment and visit.
www.seacolorado.org

The Colorado Association of Geotechnical Engineers (CAGE) is finalizing a position paper on the design of post-tensioned slab-on-ground foundation systems in Colorado (see attached). CAGE has asked that SEAC consider endorsing or jointly publishing this position paper. The subject matter is certainly relevant to both the geotechnical and structural engineering communities in Colorado. See attached document.

Welcome

Please welcome our newest members to SEAC:

Jerod Faris (Professional Member)
SBSA

Lawrence Graham (Professional Member)
Wiss, Janey, Elstner Associates, Inc.

Sonia Buckmaster (Affiliate Member)
Wiss, Janey, Elstner Associates, Inc.

Shane Essig (Affiliate Member)
Timberweld

Jared Lambrecht (Professional Member)
Neujahr & Gorman, Inc.

Dan Goodhart (Affiliate Member)
Palace Construction Company

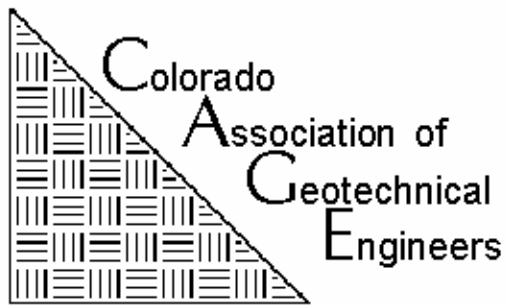
Architecturally Exposed Structural Steel
(AESS)

March 23, 2010

Presented By: Jack Petersen

The webinar will review information in the AISC Code of Standard Practice and interpret what is and is not covered. Understand shop processes and their effects on the appearance of the finished steel. Discuss how surface preparation of structural steel affects the bonding of paint and other high performance coating systems for steel. Discuss the relative cost ramifications of specifying AESS. Become familiar with a specification developed by the Structural Engineers Association of Colorado to define requirements of AESS on projects. Log on to the the website below for more information

<http://www.ncsea.com/webinar/JackPetersenWebinar.aspx>



CAGE POSITION STATEMENT ON THE USE OF POST-TENSIONED SLAB-ON-GROUND
FOUNDATIONS FOR SUPPORT OF RESIDENTIAL AND LIGHT COMMERCIAL BUILDINGS IN
THE COLORADO FRONT RANGE

Post-tensioned slab-on-ground (PT slab) foundations have been used for support of residential and light commercial building structures along the Colorado Front Range since the early 1980's. Design of these systems has typically been based on design procedures developed by the Post-Tensioning Institute (PTI) as presented in their "Design and Construction of Post-Tensioned Slabs-on-Ground" manuals, First Edition dated 1980, Second Edition dated 1996, Third Edition dated 2004, and the 2008 Supplement to the Third Edition.

The design methodologies and procedures presented by PTI were developed based, in large part, on research performed at Texas A&M University, and on an earlier precursor to the PTI manuals, BRAB Report No. 33, dated 1968. The BRAB report (Building Research and Advisory Board, a Division of Engineering and Industry Research, National Research Council, National Academy of Sciences) addressed reinforced-stiffened slab foundations without post-tensioning. During the 1960's, the process of post-tensioning ground-supported slabs was developed, with initial installations located primarily in Louisiana and Texas.

The PTI soil input parameters are based largely on assumptions relating clay mineralogy and presumed subsurface moisture distributions to soil heaving potential. The PTI methods do not take into account direct measurements of a soil's swell-consolidation characteristics, which are routinely used for foundation design and estimates of potential ground heave in the Colorado Front Range. The PTI procedures also do not account for the influence of perched ground water conditions on soil moisture distributions. Local experience has demonstrated that the PTI procedures have sometimes not worked well on Colorado Front Range sites with high and very high swelling soil, particularly those with shallow claystone bedrock, if the prescriptive PTI procedures were strictly followed.

There is also reluctance on the part of many Colorado Front Range structural engineers to utilize the PTI procedures for design of PT slab foundations. That reluctance is based on similar concerns with the PTI development and complex mathematical expressions associated with the structural design aspects of the PTI procedures. Consequently, many structural engineering firms avoid designing PT slab foundations. As a result, the majority of Colorado Front Range PT slab designs have been performed by a relatively few structural engineers specializing in PT slab design.

Some members of the Colorado Front Range engineering community have expressed concerns regarding the local applicability of certain PTI procedures, generally during public forums or training sessions presented by PTI or local post-tensioning practitioners. To date, CAGE has not seen those concerns addressed in the PTI design manuals.

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Regardless of the concerns described above, the consensus of CAGE members is that the majority of PT slab foundations constructed on sites along the Colorado Front Range with low to moderate swelling soils at depths likely to influence slab performance have performed well. The incidence of foundation movement problems on high to very high swelling sites has been higher, particularly if proper site preparation techniques have not been implemented to mitigate heave. As a result of these experiences, the typical approach to PT slab design on high to very high swelling sites in the Colorado Front Range has evolved to mitigate the site swell potential in the zone of soil influencing shallow foundation performance by means of extensive site grading, to provide good drainage to reduce the potential for heave of the building foundations, and to cautiously implement the PTI design procedures using swell test data and judgment to correlate modified site swell potential to PTI input parameters.

The most common approach used locally for preparation of PT slab building sites with relatively high swell potential has been to remove the high to very high swelling material to some depth below the foundation and to modify or replace that material with moisture-treated, compacted fill. The experience of CAGE members is that, when these measures are properly implemented, there is a high success rate with use of PT slab foundations, despite the local concerns with the PTI design procedures.

It is the position of CAGE that PT slab-on-ground foundations have a long history of generally acceptable performance in the Colorado Front Range, and their continued use for certain types of structures is appropriate when accompanied by proper geotechnical site characterization, proper structural design, proper site preparation, proper construction, and proper management of water.

CAGE believes the merits of the PT slab system should be judged based on the past performance of similar foundations under similar conditions in the Colorado Front Range, rather than on the claim that PTI procedures cannot be used because they do not account for the behavior of expansive soils in Colorado.

As with any foundation type:

1. Movements of PT slab-on-ground foundations should be expected and, in certain instances, the magnitude of movement may result in problematic distortion and cosmetic distress.
2. The risk of excessive movement of PT slab-on-ground foundations can be mitigated by appropriate design of the building pad and the foundation by experienced and qualified geotechnical and structural engineers.
3. Adherence to a prescriptive design method for PT slab-on-ground foundations, while at the same time disregarding local experience and basic engineering principles, may significantly increase the risk of unacceptable performance.
4. The risk of excessive movements of PT slab foundations is increased if the geotechnical engineer's recommendations for proper site preparation, irrigation and surface and subsurface drainage are not followed.

CAGE does not believe there is any engineering basis for the assertion that PT slab foundations cannot be successfully used on Colorado Front Range sites just because PTI design procedures have not been fully reconciled with local geotechnical conditions and practices.

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