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623 Cooper Court  
Schaumburg, IL 60173  
(630) 994-2657

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Transystems Corporation  
222 S. Riverside Plaza, Suite 610  
Chicago, IL 60606  
(312) 669-5815

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623 Cooper Court  
Schaumburg, IL 60173  
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303 E. Wacker Drive, Suite 1400  
Chicago, IL 60601  
(312) 373-6960

## ILLINOIS SECTION AMERICAN SOCIETY OF CIVIL ENGINEERS

35W749 Bluff Drive, St. Charles, IL 60175  
Phone \* (630) 443-8145

EMAIL: [illinoissection@isasce.org](mailto:illinoissection@isasce.org) \* WEBSITE: <http://isasce.org>



STRUCTURAL  
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## JANUARY DINNER MEETING Design and Construction of the IL 89 over the Illinois River

**Hossam M. Abdou, PhD, P.E., S.E.**  
**Sr. Vice President, Chief Structural Engineer, Alfred Benesch**

**ABSTRACT:** This presentation will discuss the new IL 89 over the Illinois River project (1,776' long) which is being built next to an existing bridge on an offset alignment. The old bridge consists of a series of truss spans that are in an advanced state of deterioration, as well as being geometrically deficient, and need to be replaced. Traffic is maintained on the old bridge, which will be removed when the new bridge is complete. The decision to keep the existing bridge open was driven by the communities on either side of the river for commercial, emergency and economic reasons. A detour route was exceptionally long and uneconomical. Also, there are major owners/facilities on the four quadrants of the river next to the existing bridge. Benesch prepared the necessary Phase I/II engineering to develop a design option that limits impacts to the surrounding land uses, minimizes environmental impacts and provides for an economical structure.

Some of the issues that will be discussed include:

- The new offset alignment was set to minimize the impacts not only to the functionality of the adjacent properties but also on Right-of-Way acquisition, as well as environmental impacts on wetlands and endangered plants.
- The layout of the new substructure units and how it was affected by the proximity to the existing structure and therefore we shifted the navigational channel by offsetting the location of the navigational span piers longitudinally from the existing ones to avoid interference.
- The overall layout and number of spans were affected by the hydraulics of the river, especially during the interim condition of having the existing and new substructure units at the same time during construction. If a causeway is used for construction, how much of the river can it block in order not to raise the back water and thus cause flooding to properties on the upstream side of the bridge (in this case the Boat Club). A viable construction layout of the causeway and other means of construction were presented to the Army Corps of Engineers (ACOE) in order to obtain the construction permit.
- Vessel Collision analysis, determined by the size, number and configuration, frequency of barge tows, resulted in the use of drilled shafts within the river. H-piles were used on the approaches where Vessel Collision forces were minimal.
- The drilled shafts sizes were also affected by the very poor soil properties of the overburden material on top of rock as well as the rock itself (shale with coal seams). The type of shale present, the variation in calculated shaft capacities and where to end the drilled shafts in rock prompted conducting a full-size drilled shaft testing during the design phase to determine accurate shaft length and avoid construction delays.
- With a new alignment, which was 6' higher than the original, comes new embankment behind the abutments. Settlements of more than 20" were anticipated. Soil improvement using wick drains as well as a surcharge on top of the new embankment were specified to accelerate soil consolidation and settlement. Because of the proximity of the embankment to the existing abutment, the settlement was feared to induce significant down drag forces on the existing bridge abutment piles (in use during construction) that it could not handle. Sheet piles to rock were used as a separator to prevent the influence of the settlement on the existing abutment piles.

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**Speaker:** Hossam Abdou is currently the Chief Structural Engineer at Alfred Benesch in Chicago, IL and is a Sr. Vice President with the company. He has over 30 years of experience in the evaluation, design and rehabilitation of various bridge structures and has been with Benesch for 24 years.

**Date & Time:** Wednesday, January 29<sup>th</sup>, 2020  
Registration & Cocktails at 5:30 pm; Dinner at 6:00 pm  
Presentation following dinner

**Location:** Pazzo's 311  
311 South Wacker Drive Chicago, IL 60606  
Self-service parking is available south of the building for \$10

**Cost:**  
\$50 – with reservation  
\$35 – government/education (with reservation)  
\$35 – lifetime members  
\$25 – fulltime students (with reservation)  
\$5 fee – without/late RSVP  
Make checks payable to ASCE Structural Group

**PDH:** 1.0 PDH will be awarded for continuing education  
**RSVP:** [Register](#) at Constant Contact