



Albany Airport Gateway Sign Structure

July 31, 2020

EXECUTIVE SUMMARY

The Albany Airport Gateway Sign Structure is located on Albany-Shaker Road, Northwest of the new Exit 3 of Interstate 87 in Colonie, NY and was completed on June 26, 2020. This unique structure was designed and constructed on a tight schedule in an area with a high water table and also located within the flight path of an active airport. The sign structure is 26 feet in height at its highest point and spans 83 feet over Albany-Shaker Road. Construction consists of steel shapes of various sizes and shapes supported by built-up precast wall panel columns and founded on a pile cap with a 50' deep drilled shafts and piles. Prominently featured on the Sign Structure are the steel channel arches which pull their inspiration from the Albany International Airport Terminal Canopy which features arches over each entryway.

ORIGIN

As part of the overall improvements of the Albany International Airport the decision was made to include a Gateway Sign to announce one's arrival to the airport while traveling northwest on Albany-Shaker Road and to the Capital Region of New York while traveling southeast. The sign structure design was awarded in December 2019 with the scheduled construction completion by March 2020 for the grand opening of the new parking garage and terminal revitalization at the airport.

The tight schedule was constrained further by the fact that the location of the sign structure was within the FAA flight zone of the airport that imposed a limited window in which cranes could be in place to erect the structure. This meant that modularity had to be built into the design so that most of the structure could be built offsite and erected on site in a short amount of time. The modularity would also assist as a secondary benefit to keeping the project on schedule.

STRUCTURE

A unique aspect of this structure is that a majority of the structure is included for architectural feature rather than primary load support. There are five architectural feature components to the structure. These feature components consist of three all welded MC18x42.7 and W14x53 frames and two radially curved arches. The radially curved C12x30 arches and the MC18x42.7 with W14x53 were selected for geometry and aesthetic as the primary driver. These shapes were selected to pull in the architectural features from the existing airport terminal canopies which were installed in the late 1990s. Even though these items are architectural features as part of the overall design they still were required to be self-supporting and resist the loads, ice, truck wind, fatigue, etc., as specified in the 2007 NYSDOT Standard Specification for Overhead Sign Structures. These features were all able to be shop fabricated and connected so that they could be shipped from Buffalo, NY on standard trailers.

The primary structural steel component is the horizontal steel truss spanning 83 feet between the two built-up precast columns. Two W30x132s created the chords of the truss with the perpendicular webs consisting of MC18x42.7s and the diagonal webs consisting of L4x4x3/8. This horizontal truss not only had to be designed for the same loading as the feature components, but also had to support the architectural feature components. Strength design of the horizontal truss was not the controlling limitation for the final selection of the shapes. Geometric constraints and deflection limits were the controlling limitation. Geometrically the horizontal truss depth needed to maintain a 30-inch depth to work with the rendering provided to the NYSDOT and the Albany County Airport Authority. In terms of deflection a NYSDOT mandate of 17'-0" clear after all deflections was required above the highest point on Albany-Shaker road. A splice was incorporated in the design of the



W30x132s, which allowed the horizontal truss to be shipped on standard trailers in two separate pieces from Buffalo, NY.

Supporting the steel are two built-up precast columns. Due to the tight schedule constraints the precast contractor from the Albany Airport Parking Garage was brought on to produce and consult on the construction of the concrete columns. Ultimately with team collaboration it was decided to use four precast concrete walls with integrally cast face brick for each column. These built-up precast panels were able to achieve the architectural look desired by NYSDOT and the Albany County Airport Authority as part of the approved rendering provided. An added benefit in utilizing the precast panels was a reduction in weight on the foundations below. The plan dimension of the columns are 7'-6" x 4'-6", by using the panels in lieu of a solid concrete column the weight was reduced by 50% and still was able to resist the design loads as the "tube" shape is effective in resisting the torsional loads the columns experience as a result of the wind loads. The reduction in weight was also a factor in the erection time for the precast panels. With the structure being located in the airports FAA flight path a height restriction was required on cranes, since each individual panel weighed significantly less than a large singular column a shorter crane was able to be used for erection. This shorter crane did not interfere with the FAA height restriction and allowed for the panels to be installed during normal hours of operation in lieu of off hour work saving cost to the project.

The foundation system for the sign structure was a collaborative effort between the NYSDOT and Bergmann. Initially the foundation below each column was a 5' diameter x 50' deep concrete drilled shaft with a 9'-0" x 6'-6" x 3'-0" concrete cap utilizing skin friction to resist the structure load. The challenge with the foundation systems at and around the airport is that the airport is located on top of an aquifer. For the gateway sign the water table was encountered at 5' below grade. During construction (late February) and after the drilled shaft was tested it was determined that the bottom 5' of the drilled shaft was compromised likely due the water pressure on the tremie shaft during drilled shaft installation. 14-inch diameter concrete filled steel piles were added and the concrete cap was enlarged during the construction phase as supplemental support for the reduced drilled shaft capacity.

DESIGN & COMMUNITY

The modularity of the design and collaborative teamwork between Bergmann, NYSDOT, Albany County Airport Authority, Turner Construction, and LeChase Construction allowed for the aggressive construction schedule to be met. Precast panel wall design allowed the panels to be erected into place efficiently and without special shutdowns of flights. The steel structure was able to be delivered and assembled on a large flatbed truck in the Albany Airport Economy parking lot and be set into place as one piece to reduce traffic disruption.

Permit documents were issued on January 10, 2020 and prior to the COVID-19 construction shutdown the fully assembled steel structure was scheduled to be lifted into place on March 23, 2020 for a total construction time of 10 weeks from start to finish. Ultimately the steel was lifted into place as part of a larger grand opening ceremony attended and celebrated by local and state dignitaries on June 26, 2020. This sign will aesthetically improve the area on Albany-Shaker road for travelers to and from the Albany International Airport in conjunction with the newly constructed Interstate 87 Exit 3.

Thank you for the opportunity to submit this project for award considerations.
Sincerely,

Cody A. Messier, PE, SE
PROJECT ENGINEER - STRUCTURAL, BERGMANN



PHOTOS

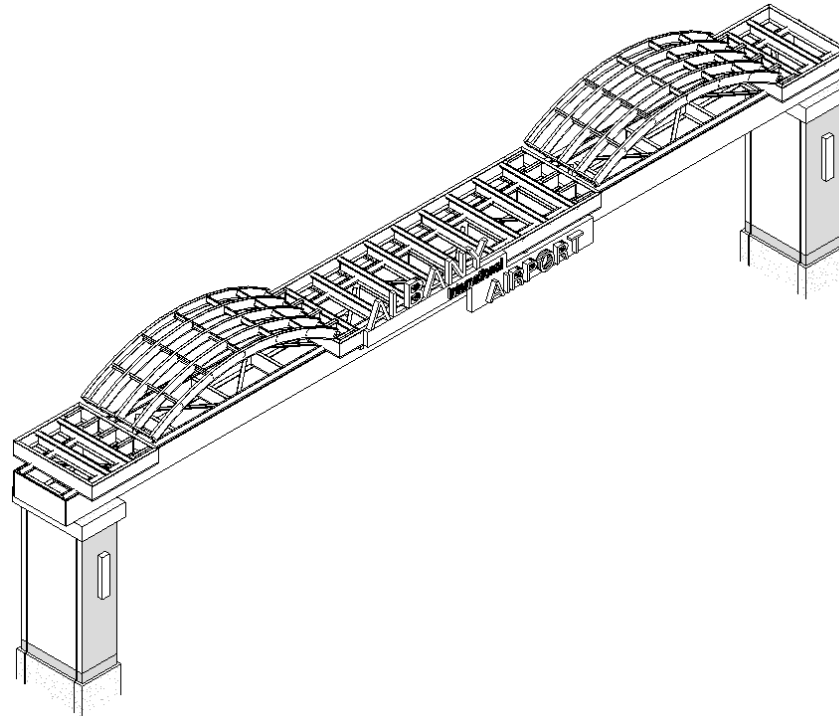
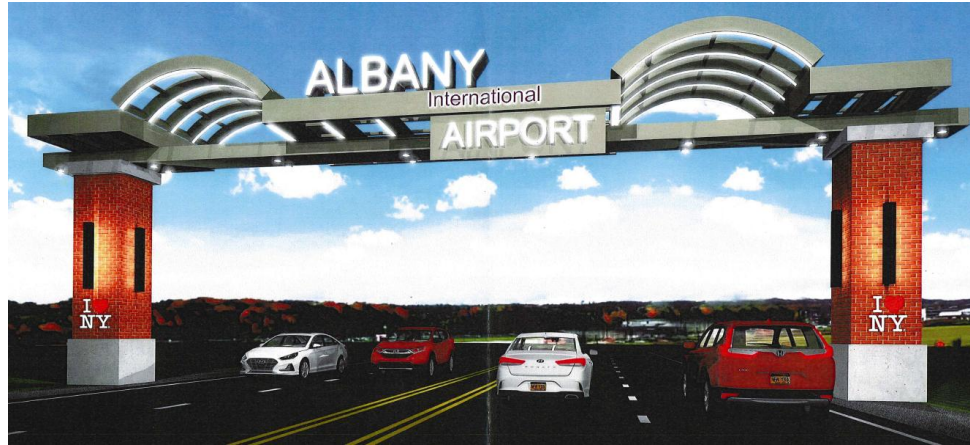


PHOTO #1 – ORIGINAL RENDERING PROVIDED BY NYSDOT (TOP) & REVIT MODEL RENDERING (BOTTOM)



PHOTO #2 – FINAL STRUCTURE – JUNE 26, 2020



PHOTO #3 – STEEL STRUCTURE IN ECONOMY LOT



PHOTO #4 – DRILLED SHAFT & STEEL PILE



PHOTO #5 – DRILLED SHAFT REBAR CAGE & PRECAST WALL PANEL ANCHORS