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### Aircraft Hangar Demolition and Reconstruction

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Feeney, Anthony; Luppino, Stephen; Simeone, Michael; and Carlino, Tony, "Aircraft Hangar Demolition and Reconstruction" (2018). *Student Research Symposium Posters*. 4.

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## HISTORY

- Built in 1941
- Finished construction in 1943
- Originally constructed as open, standard nine-truss hangar
- Converted to closed, eight-truss hangar
- Front truss was notched to support the hangar door
- Recognized as historic structure
- Has undergone severe deterioration
- Currently used as storage facility



## Construction Sequencing

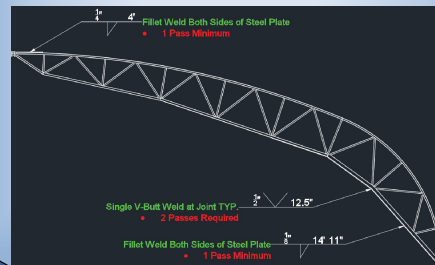
Of the three options that were provided, it was determined that Option 3 is the most suitable. In this option, the hangar will be surgically demolished, preserving the 8 of the original 9 historical bow trusses. The trusses will then be further treated and transported to a storage facility where they will be kept until reconstruction. Eventually a new hangar will be constructed at an alternate location at the airport. The new hangar will feature new concrete piers, new floor slabs, a new bituminous access apron, and the original bow trusses reinforced with steel plates.

## OBJECTIVES

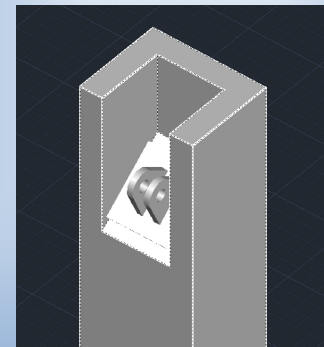
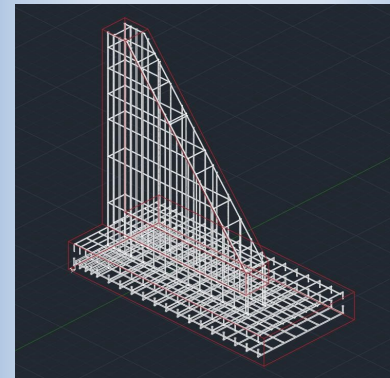
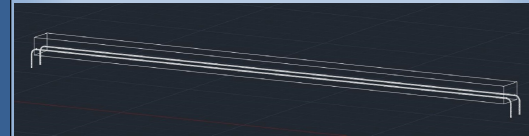
- Graphically model historical steel trusses with reinforcing steel plates
- Graphically model concrete buttress and piers
- Complete cost estimates for all project proposals including deconstruction, transportation of preserved trusses, and reconstruction.

## AutoCAD Modeling of Structures

- In order to successfully remodel the components of the Hangar Q located at Millville Airport, the original drawings for the construction of the hangar were analyzed.



## Concrete Buttress and Piers



## COST ANALYSIS

- Analyzed using 2013 RS Means Guide and C&S Engineer's estimate along with 2018 cost inflation
- Overall cost of demolition, preservation of trusses, and reconstruction of an open hangar in new location
- Includes new concrete structure estimate as well as overall updated estimates for demolition and reconstruction
- Added in cost of cranes to lower and raise trusses
- Added in new steel member cost

The table below shows the cost of reconstruction of each phase of the construction process which includes the new steel members and crane equipment rentals.

Construction Type	Cost
Architectural	\$ 174,166.02
Structural	\$ 209,145.49
Concrete	\$ 371,846.74
Electrical	\$ 129,835.89
Site	\$ 469,177.00

The total estimate included fees to the general contractor, engineers, operation and maintenance, etc. As well as including the cost saved from demolition that will need to take place regardless if the hangar is reconstructed. This can be seen in the table below.

Breakdown	Cost
Subtotal	\$ 1,651,198.79
General Conditions (5%)	\$ 82,559.94
OH&P (15%)	\$ 247,679.82
Construction Subtotal	\$ 1,981,438.54
Atlantic City Multiplication Factor (8.9%)	\$ 176,348.03
Contingency (10%)	\$ 198,143.85
Construction Total	\$ 2,355,930.43
Engineering and Administration (20% +/-)	\$ 471,186.09
<b>PROJECT TOTAL</b>	<b>\$ 2,827,116.51</b>
Complete Demolition	\$ 878,711.79
<b>ACTUAL COST</b>	<b>\$ 1,948,404.72</b>

## Conclusions

- The hangar is going to be demolished, with the historical trusses being preserved and moved to a new location
- At the new location, these trusses will be reinforced with steel plates and a new open hangar with new concrete piers will be constructed
- The cost estimate is updated to include the cost of all materials, equipment, and labor

## FUTURE WORK

- Design connections for steel truss
- Dimension concrete beam drawings

