Intramural Building: Detailed and Assembly Estimates

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Executive Summary

Space JAHM Construction has performed a series of detailed and assemblies cost estimations for Phase I of the Intramural Building. Estimations include general conditions, mechanical cooling generation systems, roof covering, interior metal studs wall partitions, concrete, and structural steel. Additionally, a separate roof systems estimate was provided for an alternate green roof system.

General conditions totals $64,117.51 after tax, overhead and profit, and adjustments are added in. This estimate includes a temporary fence on site, renting a job trailer, temporary sidewalks, temporary utilities, cleaning and waste management and quality control.

The assembly costs are broken up into different sections. The current roof system was estimated to cost $202,462.00. The alternate green roof was calculated to be $227,462.00. The interior metal stud with gypsum wallboard partitions cost $223,894.00. The cooling generation system was estimated to cost about $597,931.00.

Detailed estimations were performed for the concrete and structural steel in the building. The concrete is calculated to be $655,093.52. This estimate includes all foundation components as well as slabs, stairs, rebar, anchor bolts, and excavation.

The structural steel is estimated to cost $1,107,281.89. This estimate consists of beams, structural columns, base plates, bearing plates, decking, lintels, angle supports, and joists.

All together, the estimate performed for this portion of the work totals $3,078,241.92.
General Conditions

Site fence estimate was completed using a detailed estimate assumption and linear feet was measure from a civil existing conditions plan on C2 based off of a graphic of the site from a PSU website for their recreational facilities, which had a section for the IM Building Addition.

Figure 7: Site Logistics taken from http://www.athletics.psu.edu/rec/imbldg/imbldg_addition.asp

Figure 8: Drawing C2 Existing conditions with measurements based off of fence path in Figure 7
Performance Bond

Also from Division 1 of the RSMeans Building Cost data, a Performance bond percentage value was provided. As per cost code 01 31 13.90 0100, 2.5% of the job is the value of the bond.

Payment Bond

A payment bond in the state of Pennsylvania is for “100% of the contract price.”


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Amount of Bond: 100% of the contract price.

Labor and Material Covered: All labor or materials supplied to the prime contractor to whom the contract was awarded or to any of his subcontractors in the prosecution of the work provided for in such contract whether or not the material furnished or labor performed enters into and becomes a component part of the public building or other public work or public improvement including highway work. “Labor or materials” includes public utility services and reasonable rental of equipment, but only for the periods when equipment rented is actually used at the site. Materials supplied by a material supplier to another material supplier are not covered by the bond. Note: Under the Commonwealth Procurement Code, once a contractor has made payment to the subcontractor according to the provisions of the Code, future claims for payment against the contractor or its surety by parties owed payment from the subcontractor which has been paid, are barred.

Notice Required: A claimant who has a direct contractual relationship with any subcontractor of the prime contractor who gave a payment bond but has no contractual relationship with such prime contractor may bring an action on the payment bond only if he has given written notice to such contractor within 90 days from the date on which the claimant performed the last of the labor or furnished the last of the materials for which he claims payment, stating with substantial accuracy the amount claimed and the name of the person for whom the work was performed or to whom the material was furnished.

Notice shall be served by registered or certified mail, postage prepaid, in an envelope addressed to the contractor at any place where his office is regularly maintained for the transaction of business or served in any manner in which legal process may be served.

To municipality. Duplicate copy of financial security to be filed with contracting agency.

Time for Suit: An action upon any payment or performance bond must be commenced after the expiration of 90 days, but within one year, after performance.

Contracts Excluded: Under $10,000.

Penalty for Failure to Take Bond: No statutory provisions.
that a Heating/Cooling System (D3030 214) would not make sense for a building of this size, and
of the remaining two choices between air cooled (D3030 110) and water cooled, the water cooled
system (D3030 115) had closer square foot specifications in their descriptions for a
School/College. Furthermore, a water cooled system is more expensive, and therefore the
estimate would be high if anything.

Following the Chilled Water Flow Diagram on M601, there are no chillers or cooling towers as
the building will be connected to the campus chilled water loop. This being stated, the estimate
should be able to cover the piping to the eleven air handlers, the air separator, the pumps, the
FCU, and other equipment necessary more than adequately.

The area was calculated for the main floor, mezzanine, and basement as shown on the next page
for use in junction with the RSMeans to obtain a dollar value for procuring and installing this
system.

Figure 1: Main floor Sqft: 24,400 sqft (Taken from A120)

Figure 2: Basement Sqft: 8,300 sqft (Taken from A110)
Roof Covering Assembly Estimate

Performing an accurate roof covering assembly estimate required a few assemblies to be estimated. With RSMeans Assemblies as a guide when reading the drawings, several roof assemblies were identified on different sections of the roof. There was no single roof assembly that resembled the roof covering system of assemblies. Consequently, this assemblies estimate is broken into smaller assemblies estimates for different sections of the roof, and further broken down to the different roof covering assemblies as identified with the RSMeans assemblies.

Below, outlined in red, are the different sections of the roof identified in the Roof Covering Estimates:

Figure 4: Roof Above the Multipurpose rooms (Taken from A141)

Figure 5: ‘Wedge’ Roof as identified on the the drawings (Taken from A141)
A strict method was used when estimating the gypsum wallboard on metal stud partitions. The estimating chart was formed by looking at the wall schedules on G002 and the RSMeans Assemblies Cost chart layout for these walls. Once a makeshift schedule was produced, ceiling heights were obtained by looking at various building sections such as those on A401. Architectural floor plans, which call out the wall types, were then used to scale the linear feet of each type of wall called for to be estimated. An area of each of these types was calculated using the linear feet and ceiling heights. RSMeans wall assemblies resembling closest the walls called for by the drawings were chosen for each wall type, and a cost was procured using the calculated areas.

Any assumptions specific to a wall type were assigned a number, indicated within the chart for that wall type, and then listed in a chart with the corresponding number.

An additional $50,000 cost was figured in upon owner request to account for mold resistant gypsum wallboard.
- Wall type J sinks in ~4' at 7” wide and completes to foundation at 15"
  - 4’ deep hollow CMU on outside of wall

Slab: Total Basement Slab: 10619 cubic ft = 393.3 CY (3500 psi)
- 5” slab
- Slab begins above wall foundations and adjacent to walls

Main level Concrete:
- Anchor bolts: 37
- Total concrete slab (including dropped slab): 5177 cubic ft = 191.75 CY (3500 psi)

Mezzanine Concrete:
- Total slab: 3233 cubic feet = 119.75 CY (3500 psi)
- No special anchors or bolts in these slabs

Roof:
- NO concrete on roof other than CMU for elevator shaft, which is already taken into account in CMU elevator shaft note at top

Stairs:
- Assumed (as we saw on diagram) 4” pour for stairs
- Total Stair concrete: 156 cubic ft = 5.78 CY (4000 psi)

Rebar: See excel sheet on next page
Plates

Items estimated as plates include both the base plates for the columns and the bearing plates that serve as a connection for the beams to the masonry walls. The base plates are quantified based on drawing S601. Bearing plates were assumed to be located at every location where a beam bears on a masonry wall, mainly all on the main level façade wall and in the lobby. The dimensions of the bearing plate are the thickness of the wall and two inches greater than the width of the flange of the beam according to detail S/S405. All bearing plates are to be ¼” thick.

To estimate both the base plates for the columns and the bearing plates, the thickness was the base in RS Means. The plate thickness in RS Means only goes to one inch but the pricing follows a trend. A one inch plate costs double the half inch plate of the same square footage. Since most of the plates exceed one inch in thickness, the prices were added together to find values for plates greater than one inch. For example, a plate that is one and a quarter inch thick was estimated based on the price of the one inch plate plus the quarter inch plate.

Lintels

Lintels are located over openings in masonry walls. The Intramural Building has lintels over the door and louvers on the west elevations as well as over the louvers, small windows, and large span of windows on the south elevation. Lintels are sized based upon the lintel schedule in the general notes of the structural drawings, S001. Lintels less than six fee long were given 6 inches bearing length each side. Lintels spanning greater than six feet were designated one foot bearing length on each side.

The lintels over large spans such as the 95 foot span of windows on the front façade were assumed to be continuous. Again, not all the angles were given in RS Means so the angle pricing was done by weight, Plain Steel angles, shop fabricated 2000-4000lb. This value would give a better representation of the price because it goes by weight rather than make radical assumptions and groupings for angle dimensions not in RS Means.

Angle Supports

The angle supports are located at the top of masonry walls to support the floor decking. In the intramural building, angle supports are located at the top of the masonry walls in the lobby on the main level as well as under the mezzanine decking and at the top of the stairs near the telecom room on the mezzanine. The angles are assumed to all be 2”x2”x1/4” according to the response to the RFI titles “steel lintels.” They are to run the length of the wall in which they are located.

The angle supports were estimated using the same process as the lintels, pricing them by weight. The weight of the angles was based on the lb. /ft. weight of a 2”x2”x1/4” multiplied by the total length of angle in the building addition.