Executive Summary

Penn State Health and Human Development Building
University Park, PA

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Technical Report 1
September 16, 2013

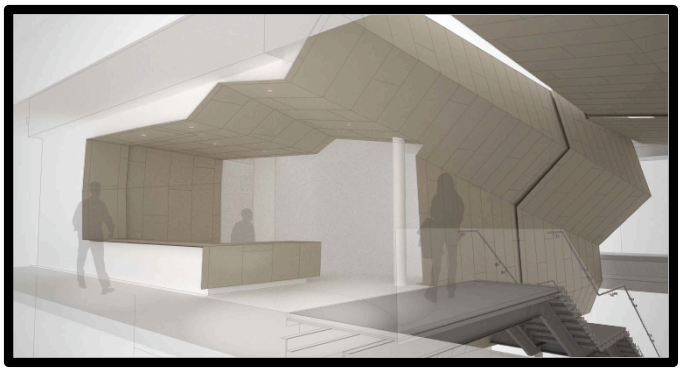
EXECUTIVE SUMMARY 1

The Penn State Health and Human Development building is phase 2 of the Henderson South project which includes the demolition and renovation of existing buildings that make up the Health and Human Development College. Penn State's push to improve the image of the campus from College Avenue is one reason for the project. The Health and Human Development College is composed of many different majors, which means a large amount of students and faculty. This means that office space and classroom/lab space is very important. Penn State has hired Bowlin Cywinski Jackson as the architect to design a structure that can meet all of the needs of Penn State and provide the visually appealing look from College Avenue.

The project began in February of 2013 and is to be completed for occupant move-in during the month of June in 2015. The project finish time is very important, as it must give enough time for the building occupants to move in before the semester of school begins. The schedule must be maintained to be constant because having the project completed earlier would not make sense because the faculty will be in the middle of the semester and having the project finish late would not allow Penn State to use the building for the fall semester. A key point to make is that this is Phase 2 of the Penn State's Henderson Project. This means that a learning curve has already been created with adjustments to foresee any conditions that caused problems on Phase 1. One of the major issues that came up in the project was the solid bedrock that was found during the excavation process. For this reason, blasting was utilized in order to break up the bedrock and cut significant time off of the schedule process. The major milestones of the project include the completion of steel erection in December of 2013, the building being watertight in August of 2014, substantial completion in December of 2014, and owner occupancy at the end of December of 2014.

This project is very unique in that it includes demolition, renovation of existing structures, and new construction. The building that stood before was first built in the 1950s and renovated multiple times on top of that structure. Penn State decided to keep one of these buildings because it contained a large amount of lab space, a large lecture hall, and it was in good shape. However, because this building was constructed 50 or more years ago, it needed to be abated of asbestos. Also, the façade of this existing to remain structure would be removed and replaced in order to match the façade of the surrounding buildings. The structural steel frame will be braced through concrete shear walls in the stair towers and elevator tower walls. Cast in place and precast concrete will be used on this project. The PowerPoint slides go into further detail regarding these systems. The mechanical system is comprised of steam and chilled water loops that run through campus. Air in the building is cooled and heated using VAV boxes. The electrical system is also tied into the campus line. The stone masonry and excavation support systems are described in further detail in the PowerPoint notes. This project

Figure 1 Architectural screen wall (BCJ)



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has many unique features. A few of these features include a curtain wall and a screen wall. The curtain wall will be used to showcase the large-scale atrium to the visitors on College Avenue. Inside this atrium is one of the major features of the building: the architectural screen wall. This screen wall is made of an aluminum frame that will include precast panels and will tie into the structure of the building. A finished layer of wood panels will go on top of the framing in order to create an appearance that is unique and functional in the form of desks and shading areas. As with all Penn State projects, this project is aiming to achieve a minimum of LEED certified.

The project is a Department of General Services, government-funded project. For this reason, it is important to have an accurate estimate in order to compare to the bids when they are coming in from the primes. For this project, Massaro CMS performed an estimate and it was found that the building construction cost $45 million and the total project cost was $59 million. A square foot estimate was completed based on RS Means with the idea that the building was composed of 91.8% office space and 8.2% lab space. The estimate was done with the assumption that the building was composed of face brick with concrete brick backup and a steel frame. Adjustments for perimeter and story height were done in order to establish the cost per square foot of both the office and lab spaces. It was found that the office spaces were $162.40/SF and cost a total of $22.4 million. The lab spaces were found to cost $160.72/ SF and sum to a total of $1.9 million. These two types sum to a total building construction cost of $24.3 million. Compared to the estimate done by Massaro CMS, this value is very low. This could be because it is a Penn State project. Penn State designs its buildings to last and it strives to have top of the line equipment and products. RS Means takes an average cost for typical buildings based on type and function. This average does not work well for a building such as this, which has major features (screen wall, curtain wall etc.). Also, the site work and demolition is not included in this estimate, which plays a large part in the completion of this project.

The site of this project presents a challenge for the construction manager. It is placed in one of the busiest areas in the entire State College region. The heart of the site is on top of the gathering area of the HUB on Penn State's campus. Entrance to the site is off of one of the busiest street on the campus. College Avenue is a 1 way street that is the main form of pedestrian and automobile traffic. For this reason, it is very important to have a traffic control station to control site safety and to operate the site entrance gate. Site safety is the most important thing for creating an effective logistics plan. With the Health and Human Development East Building remaining operable, it is important to have visual on this area and to stress safety of the pedestrians to the workers. The main staging areas will be in the northeast region of the site as well as certain areas in the south region, which could be used in the early

Figure 2 Rendered image of view from College Avenue (BCJ)

stages of the projct. Tree protection is very important to the University. Temporary tree protection zones will be set up in order to preserve these zones. Campus utilities will be used and tied into for the new construction. A visual description is shown in further detail on slide 6.

Penn State University is really beginning to renovate and construct buildings that show its supremacy. The main focus of the campus at this point in time is the image of the campus from College Avenue. This building is another piece of that procedure. Relating the project to the construction triangle, shown on slide 7, Penn State finds schedule and quality to be the most important factors when constructing this building. Seeing that the project is anticipating a completion by June of 2015, it is important to maintain a constant schedule in order to sustain that completion date. Because the project is a DGS government funded project, cost is not a major concern. Therefore, it is important to stress the quality of the product. Safety, as before mentioned will be a major focus as well.

The project is being delivered using a design-bid-build method (multiple prime with CM agent structure). The organizational chart shown on slide 9 depicts the muliple prime setup that is being utilized for the construction of this building. Penn State has hired Massaro CMS to act as the CM Agent. The reason why Penn State decided to do this was because there are 16 different primes on the project and it would be very difficult for the owner to handle all of them. Massaro CMS and Penn State conducted a prequalification phase in order to establish which primes were able to bid on the project. Once this was completed, the lowest bidder was chosen for each bid package. Each of the primes reports directly to the owner. All contracts held between the parties are lump sum. Performance and payment bonds are required for all of the primes on the project. This method could be very affective, however, it will be very important that collaboration is stressed.

As before mentioned, Massaro CMS is acting as the CM Agent for Penn State University. The project team is comprised of a senior project manager, which is in charge of the overall project management. The site manager acts as a superintendent and is in charge of all site management responsibilities. The project engineers are in charge of documentation, submittal registration, and RFI communication. A BIM manager is also on site to hold BIM coordination meetings and to answer any questions regarding coordination. A detailed staffing plan is shown on slide 9 of the PowerPoint presentation.

In conclusion, Penn State has hired a very experienced and well-qualified team of personnel to construct this aesthetically pleasing building. The team will be striving for maximum collaboration efforts in order to produce a quality product on time with a high stress on safety.

Bohlin Cywinski Jackson
Architecture Planning Interior Design

Massaro
CM SERVICES, LLC

Project Schedule Summary

Activity	Duration (days)	Early Start	Early Finish
Bid Documents, CA, and Submittals	79	4-Feb-13	20-May-13
Submittal Processing (submitted & approved)	475	1-May-13	22-Oct-13
Abatement and Demolition	80	25-Feb-13	29-May-13
Existing To Remain Building Renovation	416	30-May-13	17-Sep-14
Site control and E&S Controls	25	1-Mar-13	3-Apr-13
Site Utilities	60	30-May-13	22-Aug-13
Landscaping and Site Finishes	35	16-Mar-15	1-May-15
Foundation Excavation	30	30-May-13	11-Jul-13
Foundations	40	12-Jul-13	5-Sep-13
Shear Walls	50	16-Aug-13	24-Oct-13
Foundation Waterproofing	30	16-Aug-13	26-Sep-13
Steel Erection and Floor Decks	67	6-Sep-13	9-Dec-13
Foundation Backfill	20	27-Sep-13	24-Oct-13
Penthouse Roof Structure	25	22-Oct-13	25-Nov-13
Pour Floors	50	29-Oct-13	8-Jan-14
Exterior Masonry and Limestone Finishes	211	29-Oct-13	22-Aug-14
Roofing	61	26-Nov-13	20-Feb-14
Completion of Steel Erection	0	-	9-Dec-13
Mechanical, Electrical, Plumbing, and Fire Protection	190	10-Dec-13	4-Sep-14
Interior Framing	150	17-Dec-13	17-Jul-14
Tele/Data	158	20-Feb-14	30-Sep-14
Windows, Curtainwall, and Exterior Glazing	138	6-Mar-14	16-Sep-14
Building Dry-in	0	-	1-Apr-14
Interior Finishes	144	2-Apr-14	21-Oct-14
Ornamental & Misc. Metals	67	14-May-14	15-Aug-14
Atrium Construction	90	30-Jul-14	2-Dec-14
Completion of MEP/FP Fixtures/GRD's	0	-	2-Dec-14
Substantial Completion	0	-	2-Dec-14
Owner Furnishing, Fixtures, and Equipment	20	3-Dec-14	31-Dec-14
Building Commissioning & Occupancy Inspection	60	3-Dec-14	30-Dec-14
Owner Occupancy	0	-	31-Dec-14
Project Completion	0	-	1-May-15

Image courtesy pf BCJ

The Health and Human Development Building project began in February of 2013 and will be ready for occupant move-in in June of 2015. A key point that must be made is that this is Phase 2 of Penn State's Henderson Project so there is a significant learning curve and adjustments from Phase 1. One of the major issues that came up in the project was the solid bedrock that was found during the excavation process. An adjustment was made and the process of blasting was performed which turned the long period of time required for excavation and hammering into 3 weeks of blasting. The major milestones of the project include the completion of steel erection in December of 2013, the building being watertight in August of 2014, substantial completion in December of 2014, and owner occupancy at the end of December of 2014.

Building Systems Summary

Demolition

- Existing structure, façade demo, and asbestos abatement

Structural Steel Frame

- Bracing through concrete shear walls
- Composite Slab
- One tower crane on site

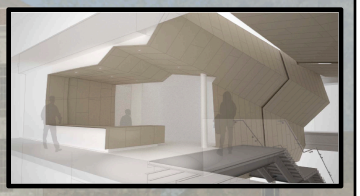


Image courtesy pf BCJ

Cast in Place Concrete

- Forms - Wood forms & Prefabricated forms
- Placement methods - Shotcrete, pump truck, and free fall

Precast Concrete

- Centre Concrete will cast the members
- Temporary lateral support → grouted → field weld

Mechanical System

- Mechanical rooms – ground floor and on the roof in mechanical penthouse
- Steam and chilled water loops that run through campus
- Air is cooled and heated using VAV boxes
- Fire suppression – Sprinkler system and spray on fire proofing on structure

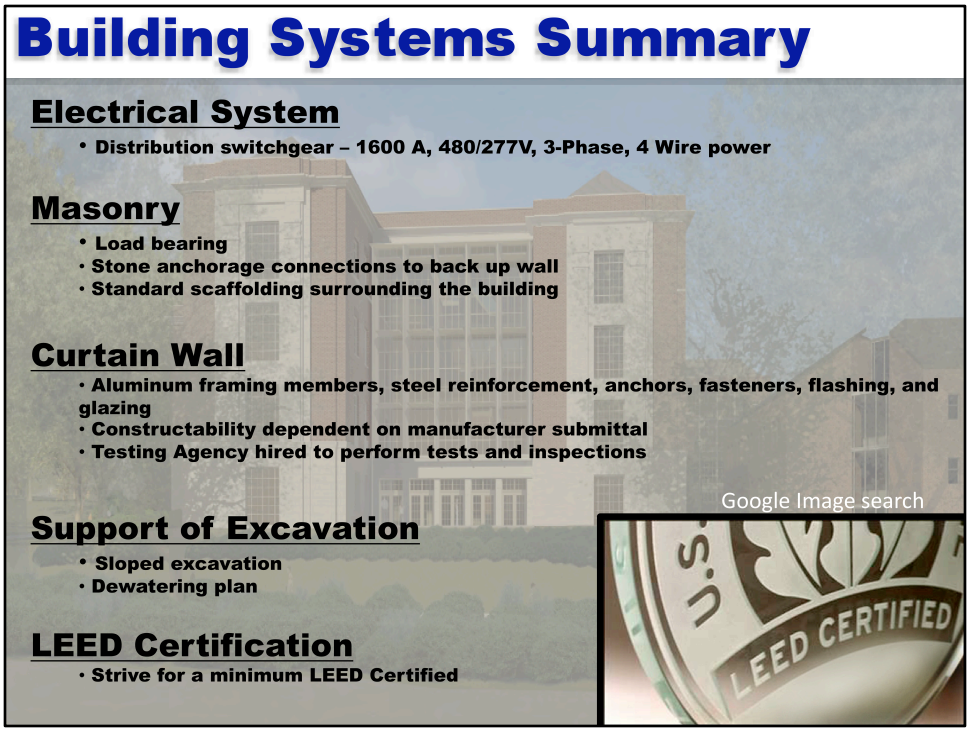
Asbestos abatement is required in the existing to remain building. Demolition of the existing structure as well as the brick façade of the existing to remain building is required.

The bracing of the building is done through concrete shear walls in the stair towers and elevator tower walls. There is a composite slab. There will be one tower crane on site, but the size and type has not been decided yet.

This project will utilize wood forms and prefabricated forms including steel forms and glass fiber reinforced plastic forms. Concrete will be placed with various methods including shotcrete, a pump truck, and free fall.

Centre concrete will cast the precast forms. They will be placed with temporary lateral support. Then joints will be grouted between the members and welding will be used to secure the units in place.

Mechanical rooms are located on the ground floor of the building and on the roof in the mechanical penthouse.



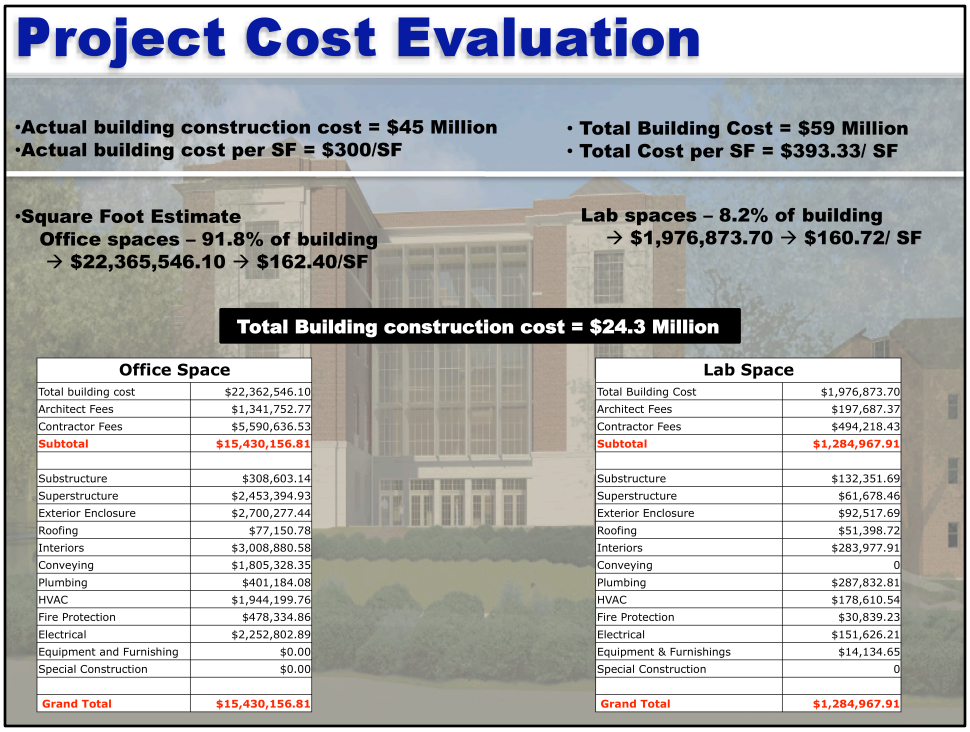
The electrical system is tied into the campus power and has a distribution switchgear with 1600A, 480/277V, 3-phase, 4 wire power.

The stone masonry is designed to withstand gravity, wind, and seismic loads. Stone anchorage systems are used to attach to the existing back up wall. Standard scaffolding will be used around the exterior of the building.

The curtain wall will be made up of aluminum framing members, steel reinforcement, anchors, fasteners, flashing, and glazing. The constructability of the wall will comply to the manufacturer's submittal. A testing agency will be hired to perform tests and inspections.

The excavation will be sloped so that a support system will not be required. A dewatering plan has been created in order to ensure that the removal of water from the excavation is done in a matter that does not harm the public health, property, and portions of work under construction. All excavation will be permanent and will be backfilled once the structure is completed.

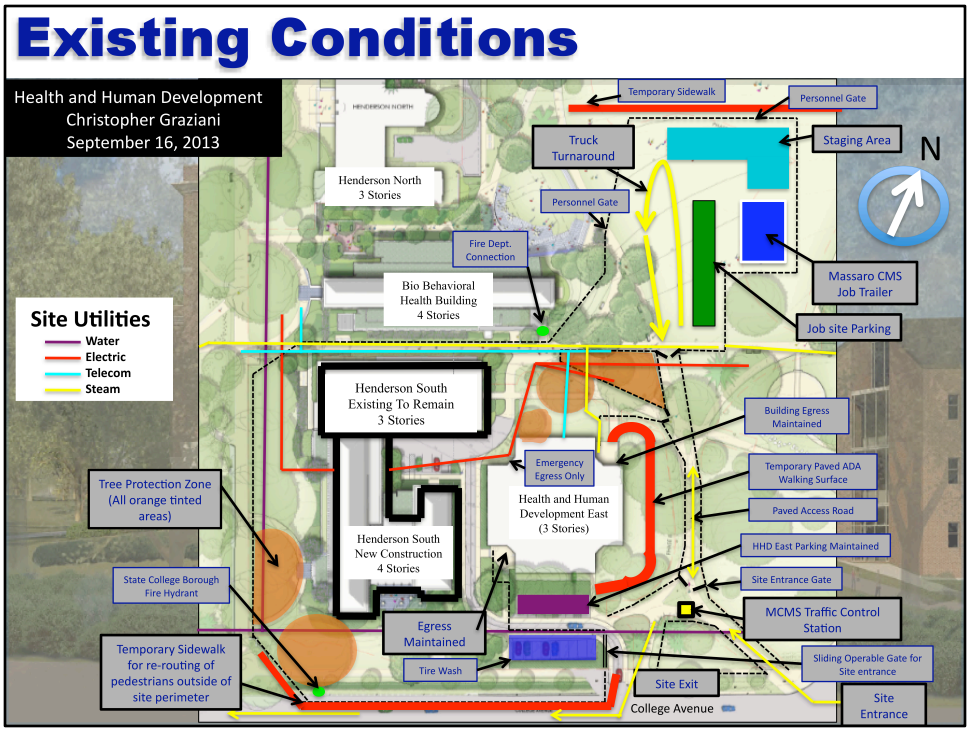
Project Cost Evaluation



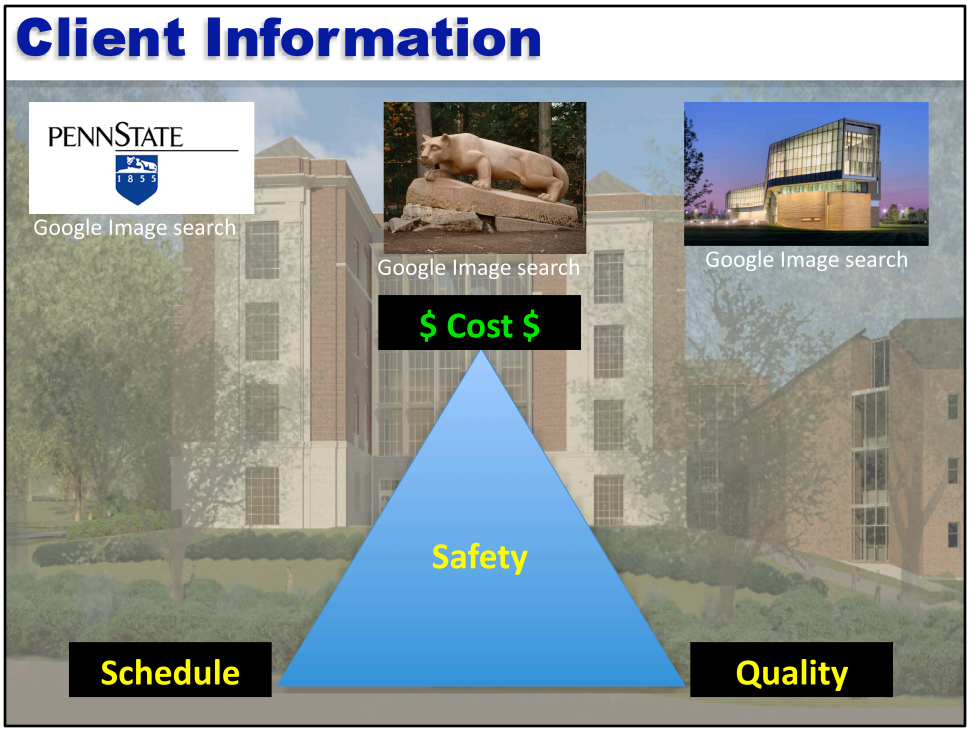
Office Space	
Total building cost	$22,362,546.10
Architect Fees	$1,341,752.77
Contractor Fees	$5,590,636.53
Subtotal	**$15,430,156.81**
Substructure	$308,603.14
Superstructure	$2,453,394.93
Exterior Enclosure	$2,700,277.44
Roofing	$77,150.78
Interiors	$3,008,880.58
Conveying	$1,805,328.35
Plumbing	$401,184.08
HVAC	$1,944,199.76
Fire Protection	$478,334.86
Electrical	$2,252,802.89
Equipment and Furnishing	$0.00
Special Construction	$0.00
Grand Total	**$15,430,156.81**

Lab Space	
Total Building Cost	$1,976,873.70
Architect Fees	$197,687.37
Contractor Fees	$494,218.43
Subtotal	**$1,284,967.91**
Substructure	$132,351.69
Superstructure	$61,678.46
Exterior Enclosure	$92,517.69
Roofing	$51,398.72
Interiors	$283,977.91
Conveying	0
Plumbing	$287,832.81
HVAC	$178,610.54
Fire Protection	$30,839.23
Electrical	$151,626.21
Equipment & Furnishings	$14,134.65
Special Construction	0
Grand Total	**$1,284,967.91**

The square foot estimate was completed using percentages. It was taken for the entire building as if it was all new construction. The estimate is much lower than the building construction cost that was provided from Massaro CMS. This could be due to the quality of projects that Penn State expects. They strive for buildings that are meant to last and they expect the best of the best products and equipment. Also, the renovation costs and demolition costs are not included in this summary. There is also a large amount of site work that is required for this project.



The site for this project presents a challenge for the CM. The entrance to the site is off of one of the busiest streets in State College. College Avenue is a 1 way street that is the main form of pedestrian and automobile traffic for the Penn State campus. For this reason, it is very important to have a traffic control station to control site safety and to operate the site entrance gate. Safety is the most important thing for creating an effective logistics plan. With the Health and Human Development East building remaining operable, it is important to have eyes on this area and stress safety of the pedestrians. The main staging areas will be in the northeast region of the site and certain areas in the south area can be used in the early stages of the project. Tree protection is very important to the University. Temporary tree protection zones will be set up in order to preserve these zones. Campus utilities will be used and tied into for the new construction.



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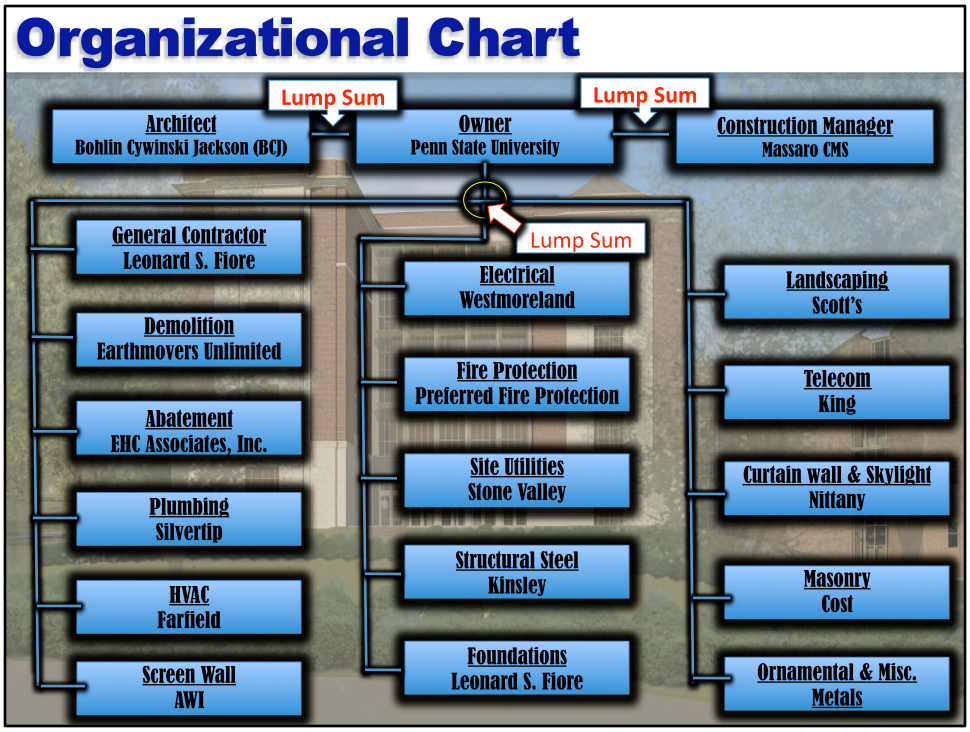

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Thank you
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