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CONSTRUCTION MANAGEMENT OPTION

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COURTESY OF ALEXANDER BUILDING CONSTRUCTION, INC.

TECHNICAL REPORT 1

UPMC: LOGAN MEDICAL CENTER

HOLLIDAYSBURG, PA

Executive Summary

The UPMC: Logan Medical Center is a new four story, 90,000 GSF, $22 million medical office building located in Hollidaysburg PA. The project is in accordance with UPMC's strategy for eastern expansion in the state of Pennsylvania after their merger with Altoona Regional in 2013. As the first newly constructed UPMC building in the Altoona region, the client wishes to make the building engaging to an expanding client base. Therefore the medical facility, which will house different outpatient specialists is fitted with high end finishes and an appealing metal panel and curtain wall building envelope. The building itself consists of three stories of medical space, a food service area, grand lobby, and fourth floor penthouse. Due to the open nature of the property, UPMC has plans for potential expansion in the future. This medical facility strives to provide superior care to an aging population in the region.

This technical report is an overview of the many aspects of the Logan Medical Center (LMC) project including site logistics, project schedule, estimates, building systems, project delivery, and CM staff breakdown. In summary, the LMC is on an expedited schedule of 12 months from start of construction to substantial completion. However, it has been delayed by several months due to soil contamination from the previous car dealership that was on the site. This issue has been brought to the attention of the DEP who have taken special note due to the river and wetlands that border the site to the west. The project is organized as a CM at risk delivery with a guaranteed maximum price. Alexander Building Construction, Inc., the CM, holds the majority of the sub-contracts with the notable exception of the medical equipment vendor which UPMC holds. The architect and engineers have a fixed price contract with UPMC and while they have no contractual obligation with the CM, many parties were brought on early to help in the design development of the project. The project is not seeking LEED status, but does take into consideration many of the environmental practices referenced in the LEED system.

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Existing Conditions & Site Logistics

Existing Conditions

The LMC is located off of Logan Blvd just between downtown Altoona, downtown Hollidaysburg, and Highway 99. This location is key for easy access from the Altoona metro area and the region at large. Logan Blvd makes up the eastern border and Brush Run flows along the west. The site is zoned as a C-1 space for professional services in Allegheny Township. Currently, the site is an open field, but prior to 2013, it was a large car dealership and repair shop. This, coupled with the river to the west have caused the state DEP to get involved to ensure that any previous contamination from underground oil tanks does not permeate into the watershed. Unfortunately for the project schedule, soil testing has concluded that the site is contaminated. UPMC and Alexander take this seriously and are working with the DEP and the civil engineer to determine the best way to proceed with the project. See Appendix 1 for a diagram of the surrounding region.

Site Logistics

Logistically, the LMC project is easy to coordinate because of the large size of the site compared to the building. See Appendix 1 for a diagram of the site logistics plan. The project trailer is located just to the north of the site entrance. This compound houses the CM and all sub-contractors in an effort to promote collaboration and efficiency. Site parking surrounds the project trailers. Material deliveries and the laydown area is flexible, but for the majority of the project, will be located south of the building. Once the building is nearing completion and work on the site is underway, material laydown with rotate around the site to make room for the new parking lots. During steel erection, one truck crane will be set up initially to the west then moved to the east elevation to erect that portion of the building. Contractors will have access to 360^{o} of the site, but will have to take careful note of the wetlands to the west as well as a Shell gas line that runs under the site.

Building Systems Summary

Since the project is on a green field site, no demolition was required. However, the presence of soil contamination will necessitate soil and site remediation.

Structure

The LMC has a cast-in-place concrete foundation with square footing pads arrayed throughout on the column lines. On the north, west, and south elevations, the foundation consists of concrete strip footings with integrated piers. The east elevation however, due to the elevation change on the site, is a full story concrete retaining wall which will be formed with reusable plywood forms. Since the site is largely open, the foundations will be placed directly by concrete truck. The superstructure is a steel moment frame system with wide flange girders running in the north-south direction and beams running east-west. HSS pieces make up the majority of column shapes and the enclosure system is supported largely through steel angles along the building perimeter. The floor structure is a composite system with wide ribbed steel decking and a 4” concrete slab placed on top via pump truck. The elevator core and emergency stairways are built with structural masonry and tie into the steel superstructure.

Envelope

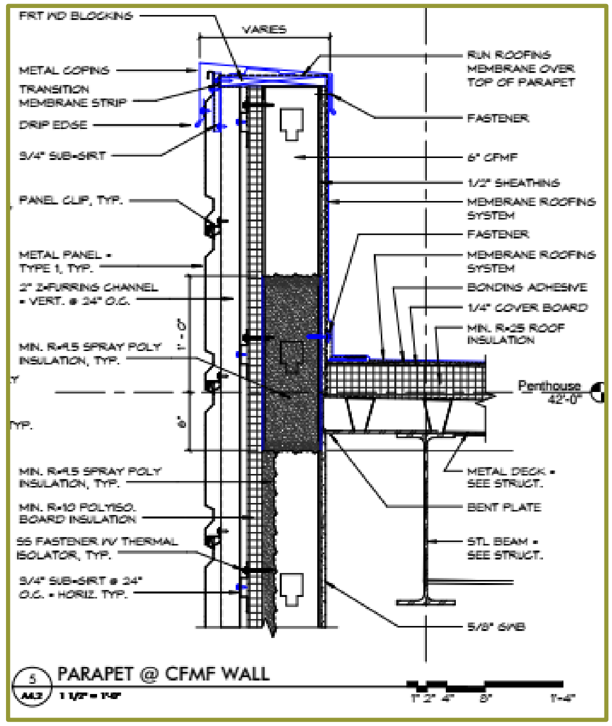


Figure 1 - Detail 5 on A5.2: typical wall section courtesy of Alexander

UPMC seeks to create an appealing exterior through a high-tech enclosure. The primary building façade systems for the LMC is architectural metal paneling on metal studs. This takes up the vast majority of elevation space along with glazed curtain wall on aluminum frames. More specifically, there are two metal panel types; both are different tapered-rib profile, concealed-fastener panels. They interlock with each other to create a raise trapezoidal rib varying between a wide and narrow profile. To main structurally sound, the panels clip into the 6” cold-formed metal framing with rigid insulation wedged in between and spray insulation between the studs. All pieces included, the wall system is 12” thick (see Figure 1). This metal thermal efficient panel wall system is manufactured by Syntheon Inc. The glass curtain wall is secured between the metal studs with woods blocking and a transition membrane. The glass itself is rated with a shading coefficient of 0.44 and visible light transmittance of 63%. This will limit the amount of solar radiation passing through the system. Closer to the foundations and at the first floor west elevation, the building envelope consists of red face brick capped with a cast stone sill. At the top of the building, a parapet of metal paneling extends 2’-6” above the roofline.

The roof is a membrane roofing system: ethylene-propylene-diene-monomer (EPDM) roofing which consists of a top membrane, air / vapor barrier and insulation all tied into a metal deck on steel beams. Sheet flashing is utilized between roofing connections and at the parapet. A single-component, butyl splicing adhesive and water cutoff mastic is applied to ensure a waterproof seal between all roofing components.

Mechanical & Electrical Systems

All major mechanical systems for the LMC are located in the fourth floor penthouse and then feed down into the building from two main shafts. Two 41,000CFM air handling units AHUs service the entire building in regards to moving conditioned air throughout the space. The air handling system exhausts 80% of the building’s air by way of the penthouse, but the remaining 20% gets recycled back into the AHUs, saving on energy. To aid in the process, the building utilizes a variable air volume (VAV) system with VAV boxes installed throughout the three floors to create a well-conditioned space. Two condenser-compressors, one for each AHU, are responsible for the cooling of building air. For the heating of air, two hot water boilers, located in the penthouse as well feed into the AHUs. The main lobby however, since much of it is clad in glass, has additional electric heaters along the perimeter floor. The LMC is protected with a standard sprinkler fire protection system that is fed by the water main in the first floor water operations room. The domestic and sanitary plumbing system is run out of the first floor where the water main enters the building. It is there where the water gets distributed with circulating pumps and expansion tanks.

Electricity comes into the building underground at the eastern elevation. The primary electrical room, with main switchboard and controls is located centrally on the first floor with many of the other "back of house" spaces. The building runs on a combination of 208/120V and 277/480V due to the large medical equipment in many of the examination suites. This requires different panel boards operating specific equipment at a higher voltage with more typical lighting needs being fed by 208/120V. In total, 14 feeders distribute the electricity throughout the LMC. In the event of a power outage, the LMC also has a 150KVa backup power generator to keep essential services online.

Project Schedule Summary

UPMC seeks an expedited construction process for the LMC. For the approximately 90,000GSF building, the timeline they wish is one year from start of excavation to substantial completion. This is an ambitious schedule and UPMC has incorporated this into their budgeting. The project, however, has been plagued by delays brought on by the DEP who are concerned with the environmental impacts. Construction was scheduled to begin in June 2015, but now is planned for October with a substantial completion of October 2016. Once the building is substantially completed, it will take the different clinics another month to move in all their necessary equipment for the building to be fully operational. The expedited schedule is made possible since the architect and CM were brought on early in the project, 6/15/14 and 9/10/14 respectively, and were given time to coordinate and analyze the project. A summary schedule of design and construction can be found in Appendix 4.

Project Cost Evaluation

The overall core and shell cost of the LMC, or actual construction cost, is $21,305,052 based on the final estimate from Alexander taken in August 2015 equating to $236.54 per square foot. This estimate is based off of the "for construction set" from the Architect that includes a major change order for a food service area on the first floor. The entire project cost with site work, contingencies, permits, fees, etc. comes to $24,205,526. However, this cost does not include the medical equipment to be installed by UPMC. These advanced machines usually add on another 50% to the project cost alone which would in theory, make the project come to approximately $36,308,289.

Compared to the actual project costs, the SF Estimate utilizing RS Means 2015 yielded a similar total project cost (see Appendix 2). This estimate, while the overall value may compare well to the actual project cost, is flawed because RS means does not account for a 3 story medical office building with a metal panel enclosure. This resulted in a lower construction cost and a lower building envelope cost per square foot than the LMC. The other striking different is the plumbing / mechanical square foot cost which was much higher than the actual. Further research with Alexander is needed to determine the source of this discrepancy.

Figure 2 - Actual Project Costs

Assembly Type	Cost	Cost per SF
Structural System	$2,748,495	$30.52
Building Envelope	$2,668,047	$29.63
Plumbing/Mech System	$3,236,448	$35.94
Electrical System	$2,485,167	$27.60
Construction Cost	$21,305,052	$236.54
Total Project Cost	$24,205,526	$268.75

Figure 3 - Project Costs based on SF Estimate

Assembly Type	Cost	Cost per SF
Structural System	$1,947,005	$21.64
Building Envelope	$2,472,696	$27.45
Plumbing/Mech System	$4,925,922	$54.69
Electrical System	$2,102,765	$23.35
Construction Cost	**$19,470,050**	**$216.34**
Total Project Cost	**$24,225,473**	**$268.97**

The Client

The University of Pittsburgh Medical Center (UPMC) is a nonprofit, private health care provider specializing in hospitals, outpatient facilities, and medical research. It is one of the largest health providers in Pennsylvania especially in the western portion of the state. Due to the recent trends in health care both in the public and private sectors, many larger providers are quickly expanding their services by buying regional health systems. This is the case for UPMC as they bought Altoona Regional Health System in 2013. To both improve the health services in the Altoona region and expand further east, UPMC has decided to create a top-of-the-line medical office building in Altoona: The Logan Medical Center.

The LMC is critical for the growth of UPMC as they expand eastward, competing with Geisenger Health and Penn Medicine. With an aging population, UPMC is forecasting an increase in specific outpatient care in the region. As a flagship project, it is required that the project be done quickly and at a high quality. The high tech façade and expensive finishes are meant to be an attractive sight to the citizens of Altoona, bolstering the UPMC brand. Also, the large sight allows for the possibility of a future expansion, which UPMC will address if the LMC is initially a success. UPMC's top priorities are in creating a high quality patient-focused medical center with a focus on a permanent presence on the site. This is why they have tasked the CM to handle and pass on all asset tracking and 6D facility management.

Project Delivery

The preferred method for project delivery for the LMC is a CM at risk where Alexander holds many of the subcontracts (all except medical equipment and signage which UPMC holds themselves). The relationship between UPMC and Alexander is a Guaranteed Maximum Price (GMP). Initially however, Alexander won the job in a low bid pre-qualified contractor scenario only to create a schedule and estimate for the design development phase. After completing this task, UPMC decided to bring Alexander on, non-compete, as the construction managers for construction of the LMC. Alexander's sub-contractors were selected as low bid GMPs with pre-bid recommendations from Alexander.

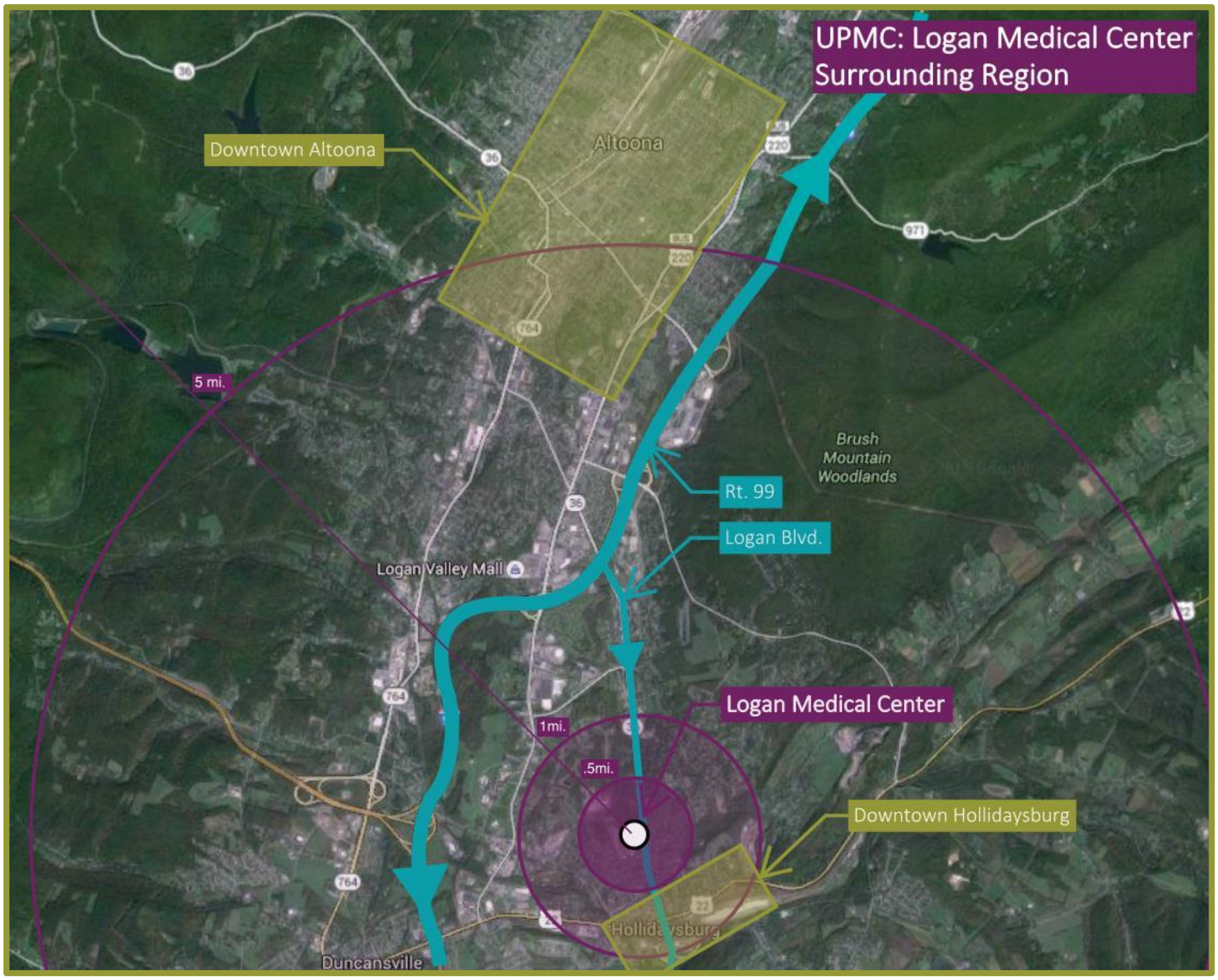
Separately, UPMC has contracts with the architect, WTW, and the civil engineer, EADS Group. WTW with a fixed fee from UPMC, in turn, contracts with the structural engineer, Keller Engineers, and the MEPFP engineer, Barton & Assoc. While the contracts are set up as a CM at risk GMP, both UPMC, Alexander, and WTW value the benefits of coordination in the pre-construction phase. Therefore, both were brought on early with the intent of developing constructability plans and evaluations. See Appendix 3 for a thorough breakdown of the CM staffing plan.

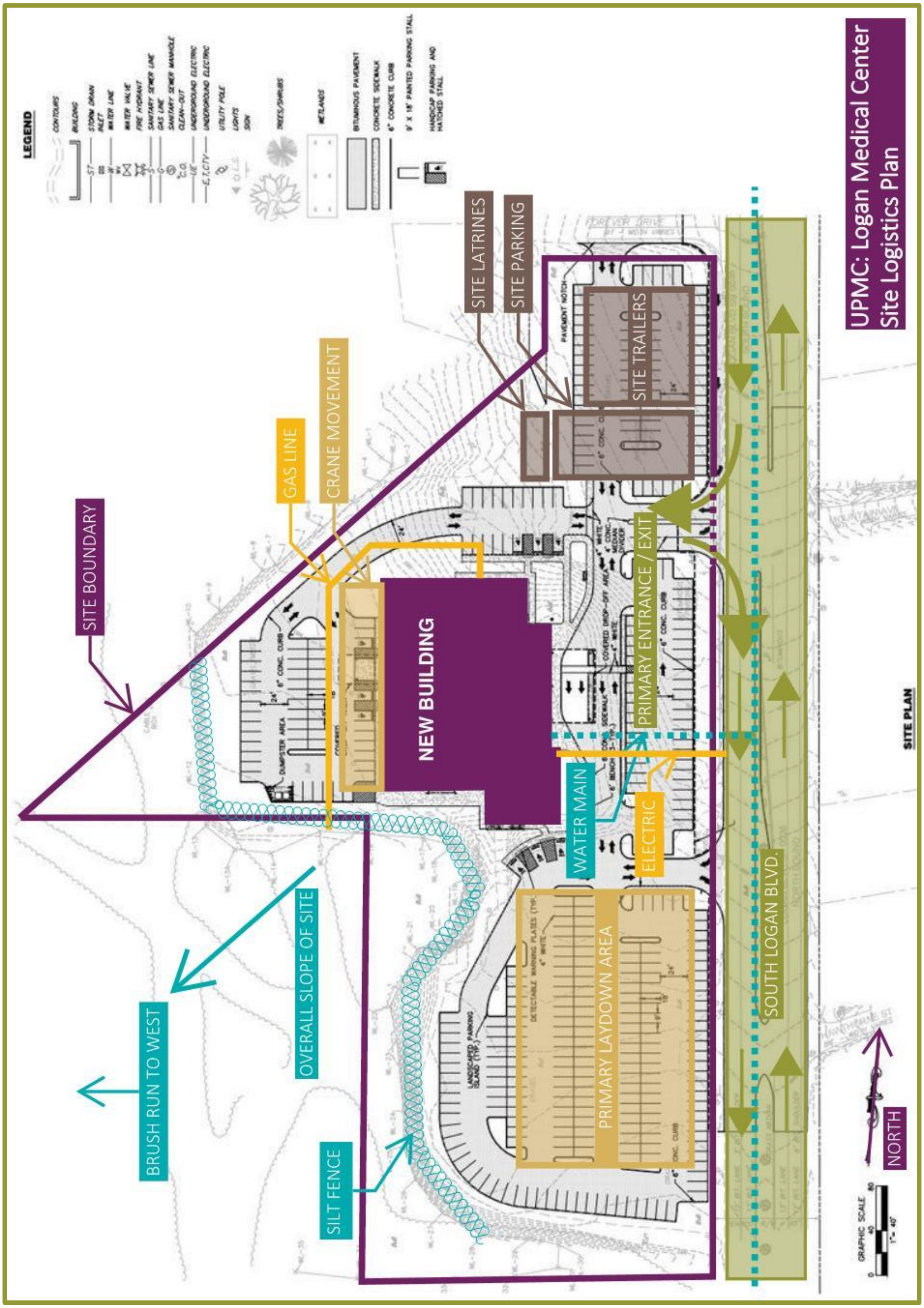
PROJECT TEAM

As the construction managers, Alexander developed a project hierarchy within their staffing in order to most efficiently construct the building as well as respond to the needs of the client. The staffing plan is laid out in a structure typical to the construction industry, especially of a project this size. A senior project engineer rests at the top of the pyramid with the engineers, superintendents, and support staff trickling down below. In total, there are 8 individuals working together to deliver a superior product to UPMC. The assistant project manager/engineer and superintendent are the primary representatives on site daily to address issues about construction and schedule. The assistant project engineer, office administrator, and MEP coordinator are the support staff to help make those day-to-day decisions as well as keep documentation in check. All contract and bigger picture questions are channeled through the senior project engineer. Also on the support side, the project executive is the primary contact for UPMC executives, and the scheduler/estimator was responsible for those scopes of work in the pre-con phase of the job. See Appendix 3 for a thorough breakdown of the CM staffing plan.

APPENDICES

APPENDIX 1: SITE REGION AND LOGISTICS




UPMC: Logan Medical Center
Site Logistics Plan
SITE BOUNDARY
GAS LINE
CRANE MOVEMENT
SITE LATRINES
SITE PARKING
SITE TRAILERS
NEW BUILDING
PRIMARY ENTRANCE / EXIT
WATER MAIN
ELECTRIC
PRIMARY LAYDOWN AREA
SOUTH LOGAN BLVD.
OVERALL SLOPE OF SITE
BRUSH RUN TO WEST
SILT FENCE
NORTH
LEGEND
SITE PLAN

Appendix 2: Cost Data

Building Parameters	Square Footage	Height per Story	Perimeter
	90,000/2 stories	14'	715

Adjusted SF Calc.	Base $/SF (After Interpolation)	Height Adj. per 1ft	Perimeter Adj. per 100ft	Adjusted Cost per SF
2 Story Medical Office	205.66	2.03	-0.75	**211.53**
		Contractor Fees	25%	52.88
		Architect Fees	9%	4.76
		Total Building Cost per SF		**269.17**

Final Calculations	
Type	Med Office, 2 story
SF	45,000sf per floor
Cost/SF	$211.53
Adjustments:	
Elevators	$ 137,600
Stainless Steel Cabinets	$ 134,000
Base Cabinets	$ 126,000
Smoke Detectors	$ 11,350
Emergency Lighting	$ 23,400
Construction Total	**$ 19,470,050**
Total Building Cost	**$ 24,225,473**

COMMERCIAL/INDUSTRIAL/ INSTITUTIONAL | **M.410** | **Medical Office, 2 Story**

Costs per square foot of floor area

Exterior Wall	S.F. Area	4000	5500	7000	8500	10000	11500	13000	14500	16000
	L.F. Perimeter	180	210	240	270	286	311	336	361	386
Face Brick with Concrete Block Back-up	Steel Joists	268.10	255.80	248.85	244.25	239.35	236.70	234.65	233.05	231.65
	Wood Joists	267.65	255.65	248.80	244.35	239.55	236.90	234.95	233.40	232.05
Stucco on Concrete Block	Steel Joists	256.00	245.55	239.60	235.70	231.65	229.40	227.70	226.35	225.20
	Wood Joists	255.65	245.50	239.70	235.90	231.95	229.70	228.05	226.75	225.60
Brick Veneer	Wood Frame	260.45	249.50	243.25	239.20	234.95	232.55	230.80	229.40	228.20
Wood Siding	Wood Frame	249.05	239.85	234.65	231.15	227.75	225.75	224.30	223.05	222.10
Perimeter Adj., Add or Deduct	Per 100 L.F.	30.95	22.50	17.65	14.55	12.35	10.75	9.50	8.50	7.75
Story Hgt. Adj., Add or Deduct	Per 1 Ft.	4.60	3.90	3.45	3.20	2.90	2.70	2.60	2.55	2.50
For Basement, add $35.40 per square foot of basement area										

The above costs were calculated using the basic specifications shown on the facing page. These costs should be adjusted where necessary for design alternatives and owner's requirements. Reported completed project costs, for this type of structure, range from $92.35 to $315.45 per S.F.

Common additives

Description	Unit	$ Cost
Cabinets, Hospital, base		
Laminated plastic	L.F.	415
Stainless steel	L.F.	670
Counter top, laminated plastic	L.F.	81
Stainless steel	L.F.	198
For drop-in sink, add	Ea.	1100
Nurses station, door type		
Laminated plastic	L.F.	465
Enameled steel	L.F.	450
Stainless steel	L.F.	785
Wall cabinets, laminated plastic	L.F.	305
Enameled steel	L.F.	355
Stainless steel	L.F.	630
Elevators, Hydraulic passenger, 2 stops		
1500# capacity	Ea.	65,700
2500# capacity	Ea.	68,800
3500# capacity	Ea.	73,300

Description	Unit	$ Cost
Directory Boards, Plastic, glass covered		
30" x 20"	Ea.	600
36" x 48"	Ea.	1500
Aluminum, 24" x 18"	Ea.	635
36" x 24"	Ea.	755
48" x 32"	Ea.	1050
48" x 60"	Ea.	2225
Emergency Lighting, 25 watt, battery operated		
Lead battery	Ea.	330
Nickel cadmium	Ea.	780
Heat Therapy Unit		
Humidified, 26" x 78" x 28"	Ea.	3975
Smoke Detectors		
Ceiling type	Ea.	227
Duct type	Ea.	565
Tables, Examining, vinyl top with base cabinets	Ea.	1500 - 675[illegible]
Utensil Washer, Sanitizer	Ea.	12,800
X-Ray, Mobile	Ea.	18,500 - 85,5[illegible]

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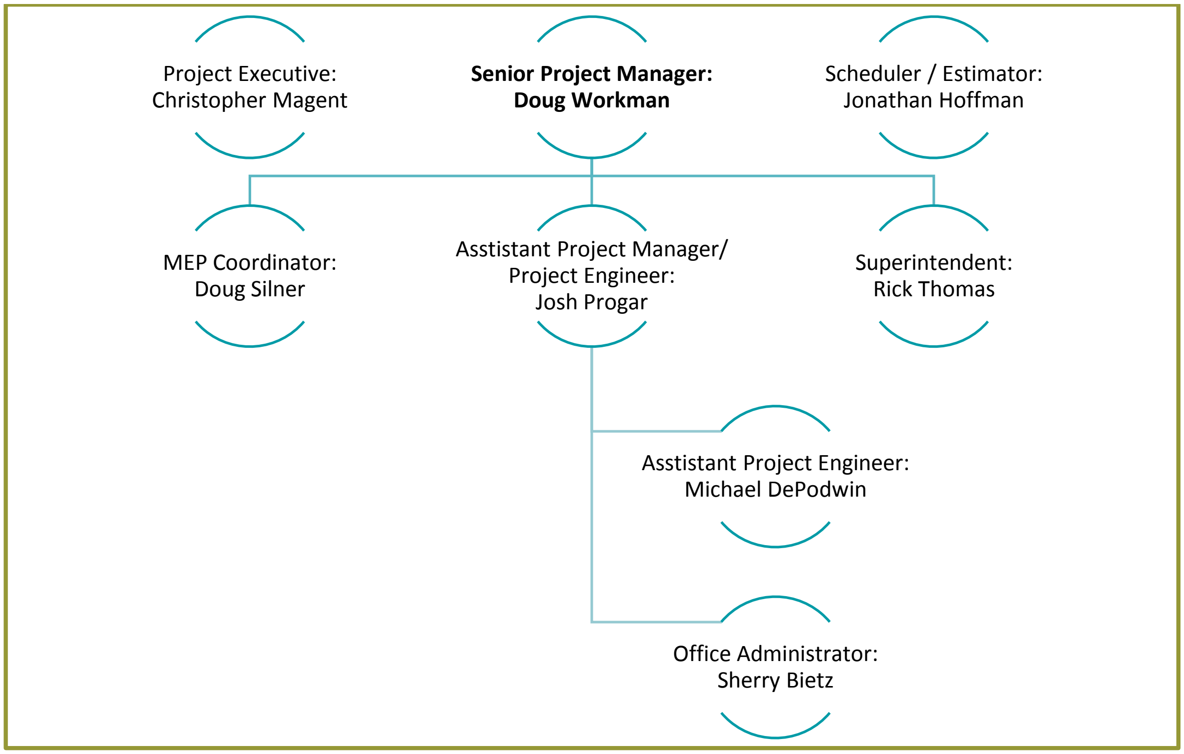
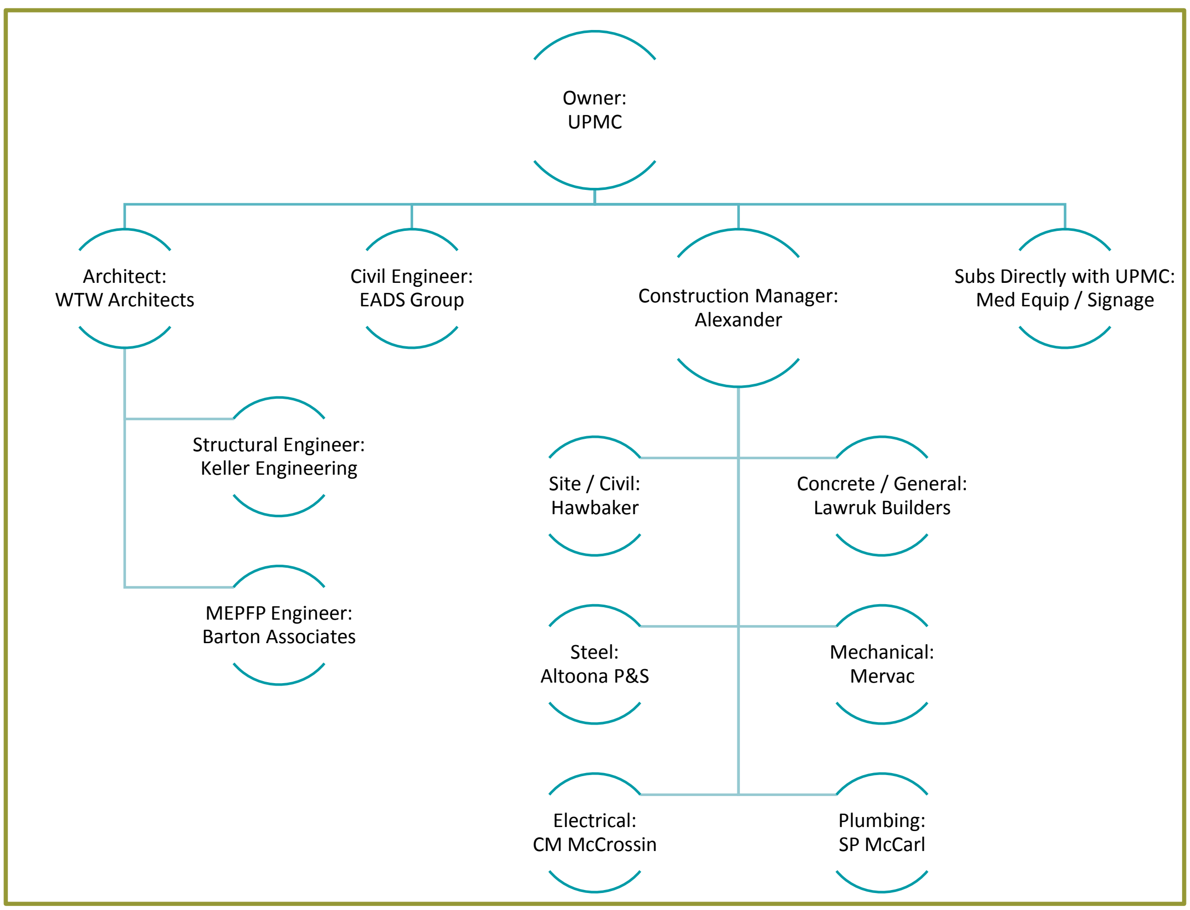
Important: See the Reference Section for Location Factor

APPENDIX 3: DELIVERY METHOD & STAFF DIAGRAMS





APPENDIX 4: SCHEDULE SUMMARY