Project Manager Guidance for Healthcare Projects and Varying Construction Scenarios [1]

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Introduction

My background is the planning and project delivery of healthcare hospitals, clinics, MoBs. These include Greenfield, building expansions, and renovations of all types and sizes. I have 40 years' experience national and international as a consultant and owner. Along the way my PM style has changed due to experiences along with mistakes. Youthful enthusiasm over time becomes more thoughtful and considered and as I aged my projects became easier to run by virtue of a team approach tempered with respect. I did not have privy to all the software applications nor a PMP certificate but probably used elements of them in my traditional project planning and delivery approach. Here I will present some lessons that crosses all PM projects and I hope they are some assistance to you and your PM projects. I do not expect agreement on all of these. I suspect Academia folks will consider my non complicated approach as lacking but I got my shoes dirty (no theory needed for that).

Random Tips (in no particular order)

1. Stay low key when project planning and/or construction is beginning. Set expectations (yours and projects) in a firm yet non-threatening manner. Convey team concept without being an overbearing leader. Remember many people in the meeting know more about their specific role tasks than you do.

2. DO NOT do any schedule except one that shows the beginning and desired end. Most PMs can sort of estimate design time and general construction completion but should not provide upper administration time lines without input from design and construction teams. Their schedules should be reviewed and discussed with upper administration to see if in line with projected schedule of revenues. Modify to extent possible if reasonable.

3. Pro forma involvement for PM is usually the provision of a premature cost estimate and a plus/minus schedule. The former is for financial feasibility and the latter for

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future revenue timing. I have seen absolutely terrible pro formas with assumptions like complete staffing in year one, 80% utilization of the entire facility, inflated market share, etc. In those cases it would appear that the preparers were told to demonstrate project feasibility regardless of reality. Unfortunately this realm is not in the PM purview and he/she just need to deliver the project on budget and on time. What happens financially after that is not their problem.

4. Project issues: this one is very important. Should an issue arise that appears to be critical do not run to the next person in the administrative chain and announce that WE have a problem. Perhaps in the long run maybe. But for the present, until the problem is vetted, it is YOUR problem. Never have a meeting in which you do not have proposed solutions along with the estimated schedule and/or budget impacts. No solution is stupid so lay them all out and include input not only from the contractor but also the affected sub-contractors. Now if the problem is political that is a different animal that may require solutions in an administrative forum but technical issues should stay in your immediate purview to the extent possible.

5. If you are embedded with a client it is recommended that you be attentive but do not address issues immediately unless you are asked. For over a month I attended client meetings and remained taciturn in that I was studying attendees for their roles and verbiage. In this manner you can differentiate between talkers and those who actually make decisions. This does not encourage favoritism but rather gives you a basis on how to participate and recognize of who to address for a consideration of your input. Also befriend other PMs who can assist in giving you pointers concerning who is who. Have him/her introduce you to folks in engineering and other support departments. Networking is important for you and ultimately the client.

6. OAC Teams meeting are usually conducted weekly and I let the contractor run the meeting to a set agenda that I reviewed and provided input prior to the meeting. If there was a special announcement I would present prior to the review of the set agenda. Participants should include the contractor, owner support department participants. ME and FFE as needed, user managers, design rep, engineering rep, and when the timing is correct, the operational lead assigned to the project. If issues arise not of interest to the entire group it should be addressed off line. These meeting were generally 30 minutes in length. This meeting was immediately followed by the contractor/sub-contractor meeting in which the PM is a guest and should answer direct queries or provide insight or decision as requested. I personally thinks that a PM should know the lead person for every sub-contractor to facilitate solving issues or providing input/decisions as needed.

7. I have had too many projects in which the user groups (nurses, MDs etc.) visited the site when they felt like it. We put a stop to that and informed them that they cannot be wandering around a construction site due to potential liability reasons should something go amiss. They do not realize that the building belongs to the contractor until it is formally turned over. We decided to set a schedule that would provide user access to tour along with the PM and the contractor lead. This issue should be supported by upper administration to make following the tour process mandatory.

8. There are two project schedules: one for the planning and design process and one for construction. The construction schedule is the baseline in which other non-construction activities are inserted. These include IT access to their closets (generally this is an owner hired function), room readiness for equipment vendors, furniture deliveries, stocking, CxA and building controls activities, security and a few others. Maintaining all activities means that the main schedule is viewed as solid and other activities are added to occur at the appropriate time. Should the completion date slip for any reason the non-construction activities need to be revised accordingly. Some of this is dynamic, which is not a desired status for an overall schedule but you need to remain flexible.

9. RFIs and Change Orders: for RFIs generally an agreed time for responses is in the contract or, if not, negotiated between the PM, contractor and design team. The contractor keeps a log as does the design team and the PM advised if answer are taking an unusual amount of time. This should not be discussed at the OAC meeting but another forum. The contractor should give the PM a heads up on any potential Change Orders. The PM should read the CO for review and approval prior to the contractor submitting a formal proposal. The PM should also seek a review by the design team and their opinion of the cause of the change. In the event that upper administration needs to sign the change the PM should submit a terse rational for the proposed approval. This can cause delays if the signees do not understand the change and/or the price but generally a good PM can provide a good explanation for the required change. Do not be surprised if there is disagreement as to the cause of the change on occasion.

10. CxA: prior to construction the CxA firm should review the plan to detect any issues. Later they should be allowed access for their inspection process; the time should be discussed with the contractor so as not to impede ongoing work. Do NOT wait until the end of the project for their inspection work in that close out will take longer and the contractor and/or key contractors might have removed needed folks who could remediate CxA findings.

There are more detailed actions to address as the project draws to an end such as punch list, owner activities etc. that will not be addressed here. Keep in mind that these are from MY experience and might not coincide with your experience but they worked for me over a 40 year career. What follows is some guidance for PM responsibilities under different construction scenarios.

Scenario One: Assigned as New PM Project Half Completed

Introduction

This, and following sections, presents a series of PM activities associated with healthcare construction projects under varying design/construction scenarios and addresses issues and some lessons learned. The author does not pretend to know everything in that every project, regardless of size, is different. Each type of design/construction situation requires different approaches on the part of the PM. The first presentation is one in which the PM is inserted into a project that is halfway through construction.

Project: New Rural Hospital 50% Complete

The author was hired by a major healthcare system as a Senior Project Manager to take over a 76,000 square foot rural area hospital under construction with budget woes. My immediate supervisor had been under pressure to bring the project in on budget and he had no intentions of requesting more monies from the Board of Directors. As such, since things flow downhill, the pressure shifted to me. To get familiar I reviewed the following:

- A complete set of design documents to ascertain the types of departments/services under construction. I was somewhat surprised by the scope for a rural hospital. It included 4 operating suites, 4 minor procedure rooms, central sterile, an oversized pre and post area relative to the intended volume (too late to downsize but apparently the space request were not challenged during the planning stage), CT scanner, MRI, ultrasound rooms, and 2 conventional diagnostic x-ray rooms, ED and some clinical and administrative areas. All this stuff is MEP and IT intensive.

- Reviewed medical equipment and tracking purchase data and discovered that $400,000 worth of surgical instruments had been purchased. Red flag in that it should have been an operational cost but no one had informed Purchasing and users dealt with them directly without going through the PM (a retained consultant whose place I took). In total equipment budget expenditures (actual and planned) way over budget.

- This project occurred during covid and various items in the supply chain were affected; particularly door access hardware. Fortunately not too detrimental in that it is typically installed towards end of project so no real adverse effect on schedule Also Security provided spares as well as access equipment from decanted areas.

- A VE process had been conducted and the list of deducts extensive. Unfortunately upon review it became apparent that many deducts were not code compliant nor considered good practice. The design/engineering group was told to reassess and develop a more suitable solution. From that a Change Order was developed and more outlets and valves added for better zoning. It should be noted that adding items back in a project can be more expensive than the credit for taking them out.

- Plans called for a single emergency generator which was a surprise in that this project was being constructed in a rural area with harsh winters. Given potential patient safety issues that would result from a single generator failure I recommended strongly the inclusion of a second generator despite the hit on the budget. In that the budge was considered my problem resistance to a second generator was minimal.

- Reviewed other budgets in the project including FFE, IT. ME, security. PM allowance and contingency. Difficult to reconcile the budgets for each in that my assistant had to interface with Purchasing directly, which was time consuming in that there was no project delivery software on the project other than Excel sheets. A great deal of dialogue and manual updating of Excel sheets required.

- I discovered that Materials Management had little input into the design process and their existing clinic storage room not capable of absorbing much more square footage to service. We ended up adding metal wall boards from which bins could hung to get more frequently used items closer to there place of use. The clean utility rooms were a good place for this addition.

- The two proposed elevators were the same size which became an issue when transporting patients from the emergency room. While it was a situation that could be lived with it was a lesson learned for subsequent projects.

- As with many projects the hiring of managers whose departments are in the project always entails a detailed review of what is being constructed. This project was no exception and the newly hired head nurse was disappointed with the lack of administrative space. We were able to change a few room uses for support but generally it was too small. A subsequent addition to the hospital solved that issue.

This was essentially the givens I inherited and what I had to provide solutions for.

In terms of controlling the logistical and budget issues and other facility concerns I was involved in the following:

- Reconciled the project budget to understand the fiscal situation exactly. It showed the various budget categories were stressed especially the contingency.

- The ME consultants were acutely aware of the ME budget issues and the first review was to see which soft costs could be reduced or eliminated. The consultants said that they had learned that a hospital in an adjacent was going out of business and in the process of taking bids for medical equipment. Our Bio-med folks in tandem with the ME consultant to ascertain what equipment might be of use for our project. When all was said and done we purchased a great deal of the used equipment. Our savings was close to $1.0 million dollars that put our ME budget in a much better situation. Also Purchasing was instructed not to purchase any equipment unless approved by the PM.

- Upon more detailed review of the budget it appeared that some departments wanted coverage of reoccurring operational costs and I told them that the project would cover some for the first year (software related) and others I told them no.

- I requested that the MEP design engineers and asked them to recheck the number of outlets and valves that were eliminated due to potential regulation non-compliance. A new layout was developed for the outlets and implemented. Similarly the shut off valves plan was redesigned to minimize disruptions to patient care functions.

- In terms of installing owner furnished/owner installed items hospital building engineering was requested to assist which they did with assistance from engineering folks from other hospitals in the system. We did not want to use the contractor due to the costs. Item placement had not been coordinated properly by design team so it took a few iterations to get it correct.

- Additional funds were saved by having the in-house sign shop installed the majority of the interior signs. A professional sign firm with proper equipment installed the exterior signage. In some cases electrical connections had not been provided.

- To avoid change requests from users I sent a memo informing administration and users that no changes (unless Life Safety items) would be addressed once the project reached 70% completion. When building turned over, we would entertain necessary changes during the punch list phase. If warranted and if project monies available they would be implemented. At some point it is necessary to make the project static so it can be completed.

- I minimized the PM hours that I charged to the project in that it was a drain and in point of fact the charges never made their way back to the Planning and Construction Department.

The project barely came in under budget but the pressure was off. I was the PM for a subsequent addition to the hospital that ran much smoother and COs were only 2% of construction budget.

Main lessons learned is to think out of the box and to extent possible solve issues within your realm without involving your boss. In the event you need support from higher up generate proposed solutions, costs and impact on schedule for review and consideration. You also must maintain a good working rapport with support departments that have a portion of the total project monies to ensure that they stay within their allocated budgets. Remember to work as a team in that you do not have to solve all problems alone.

Project: Mega Hospital International

This example of joining a large project in process is more humbling in that when I was retained I had over 30 years of planning and PM experience and felt like this project would be the apex legacy project in which I could excel. The position was for a site trailer based position known as Senior Project Coordinator. Unfortunately the position had no real viable detailed job description, except I was expected to know everything that the Project PM knew. As such this section is more anecdotal as opposed to delineating a PM process with any real guidance.

Fortunately I had an advantage over my 18 co-workers in that I was familiar with many hospital aspects including medical equipment, construction sequencing, bidding, submittals and meeting etiquette. I ended up also being the wordsmith for the group and edited virtually all memos from the Owner to the CA and construction teams. I also did the minutes of the OAC meetings and special topic get togethers. I ended up with lots of roles including being project safety rep for the PM team and updater of the monthly Risk Register for review with the client, and interface for ME and FFE bid reviews, selection and delivery monitoring.

The following is more observations about the project proper and my role,

- Construction was performed by mostly unskilled labor with as many as 4,000 laborers on site on any given day. I was astounded on my first visit to the site and wondered how the contractor had sufficient field supers to manage a work force of this size.

- My co-workers were from many different countries and fortunately all spoke English which facilitated oversight of written materials and knowledge of their roles.

- From a global perspective it was hard to determine who was actually in charge and the project appeared to move under its own weight; albeit at a very slow pace, During the course of the project a project delivery entity was placed between us and the actual client. They were not savvy about healthcare construction and actually slowed things down due to poor decision making process and generation of many more meetings.

- The contractor and sub-contractors compound had around 600 people on site on a daily basis. The CA team had 65, PM team had 20 and Owner 3 to 4 on site. The logistics of loading and unloading 3,500-4,000 laborers daily was also a challenge.

- The software product used by all participants was called Aconex and it was a very powerful too. My only issue with it was trying to search for specific historical data and it could be attributed to my not so great computer skills and patience.

- An air of distrust prevailed among all participants and made for some very exciting meetings. Retreats were held but really only resulted in short term good intentions. The change order amounts and slow processing associated with them caused the contractor to request that the Owner provide monies to keep the project moving. This caused some consternation of how the advance monies would be reconciled at the project end. I left prior to the project being complete but assuming that it took a couple of years to reconcile change orders given the large amounts of monies requested.

- The CA team was from the firm that designed the building and that caused issues processing change orders that were construed to be design errors and/or omissions. We, as the PM team were responsible for recommending to the Owner the reason for the change orders. However the CA team were responsible for writing up the CO and including their recommendation for the cause. The PM was to review and sign off and submit to the Owner. With this arrangement one can see the probability for contention. Lots of monies was at stake; it took many meetings to reconcile issues between the

CA team and the PM team. Lesson learned was not to have the CA team from the design team firm in that it gives the appearance of conflict of interest on occasion.

- On a personal level I realized that I was a small cog in a large construction machine. I communicated with as many participants as possible to stay abreast of the big picture and sticking points. I had hoped in some way to facilitate resolutions either face to face at meeting or through memos.

The preceding does not really provide great PM guidance but rather a raising of macro issues some of which that might be mitigated prior to the start of construction.

In terms of actually having a meaning affect, on the project I participated in the following:

- Assisted in convincing the Owner that the 18 operating suites would be better constructed by firms that specialize in the provision of modular operating suites. These rooms are highly specialized and we did not have confidence in the contractor being able to deliver the suites without a great deal of rework. We took the Owner on site visits to review the modular concept and they were impressed although the module approach had a cost premium. The result however was a quality product.

- The beds for the project arrived years early and we needed to develop a conditioned storage compound using part of the underground parking facility. The extreme heat and dust necessitated, along with security, the use of this solution.

- Another situation involved the revision of the designed hyperbaric chamber plan in that it was large and the contractor left no opening in the above floor to lower and they has also place the facade of the building for this area. It was further discovered that the floor load calculation was wrong and the unit would be too heavy. I spoke with the super for the CA team and suggested that we approach the client about developing a hyperbaric unit in closer to the outpatient clinic for ambulatory patients. The Owner agreed and we selected a new location and floor plan for review and approval. It was not an inexpensive fix and that it required two gas manifolds and a lot of piping. In the long run it was the appropriate solution.

- I was responsible for the updating of the project Risk Register through the use of a client provided spreadsheet with a lot of drop down menus whose selections were occasionally not inclusive or relevant to the Risk under consideration.

- I was interim PM for a while but given limited latitude for decision making without a great deal of oversight. We ended up being more of an administrative function than a viable PM team.

In summary you need to assess the construction and oversight functions and determine how best to use your expertise to benefit the project. Given the multitude of gaps in many aspects of the project it ultimately was not difficult to define your role with little push back from those in charge. I would suggest that anyone hired for a mega project that you research the project, progress, etc. to give you an idea of where you best can participate within the boundaries of your expertise. Given my expedited hiring I was thrown into the project with some knowledge gaps and had to feel my way through various aspects to determine where I could best support the PM and CA teams. With all that being said if was a fascinating work and cultural experience.

Projects 3/4 Introduction

The following two scenarios are ones in which the PM takes the project from the planning/design process through project delivery and the second scenario is one in which the design is essentially complete and the PM must take through delivery to Owner. I had an advantage in both these approaches in that I was originally employed by Ellerbe in my early years as a planning associate of their short lived hospital consulting firm. I was in reality a number cruncher who assisted in market share analysis and projections. This included utilization analysis of every departments including: current volumes, staffing, equipment needs and from that info future utilization projects were made which in turn was the basis for the development of general space programs to accommodate usually the following five years. However, given rapid changes in technology the horizon window is usually shorter now. Upon review and approval of the projections and associated revised spacial needs the space program was turned over to the design team to generate Master Planning options.

That initial experience was invaluable when I shifted to project delivery due to knowledge of general MEP and IT requirement and actual construction of the room along with ME needed. Despite discussions concerning if a PM should be technically proficient or just deploy a delivery process it really helps to actually know what it is you are building for asking questions and reviewing what the contractor is building. If the latter is deployed the PM is in for a long costly ride. Furthermore if you are either an in-house PM or a consultant being assigned to a client they are more apt to select one with previous hospital construction design and construction. I was also able to bring alternative viewpoints to bear in that I have been a consulting PM as well as an Owner side PM.

Project 3: Take Project from Design through Construction

In this scenario the PM is charged with not only construction delivery but also running the planning process in tandem with in-house users and the design team. The design team schedule is a function of scope and complexity. Assuming a project is around 250,000 square feet the design process could be 12-14 months for a complete set of documents suitable for /bidding/construction. These time frames assumes that administration and the departmental users are aligned with the initial scope developed whether in-house or through the use of retained consultants/architects. The initial project written project scope needs to be translated into a space program. Most larger hospital design firms have planners who develop space allocations and work with medical equipment planners to develop measurable footprint for major fixed equipment. I had a project that included inpatient beds and administration kept adding users to review design schematics resulting in a six months delay causing increased design and construction costs. As a PM you can only remind upper administration of these adverse side effects.

During this time the PM might be involved in coordinating the scheduling of user group meetings in conjunction with the design team. The PM should attend all initial departmental meetings and from that determine which departmental meetings are more complex or potentially prone to more decisions. As the design progresses and schematic design is approved by all departments the project shifts to design development and entails the involvement of support departments including: engineering, IT, materials management, life safety, food service, patient transport, security, and others as needed. The Bio-med department or retained consultant need to be engaged during this phase to prepare a comprehensive room by room medical equipment list. Of particular importance is the identification of major fixed equipment that requires dedicated floor space.

Ultimately departmental drawing are prepared showing fixed and other equipment. This is important for all the design engineering personnel to locate the appropriate infrastructure. As the support department are engaged the quantity of meetings increases, At this time Administration should be provided a major presentation to review and approve. Generally this is a formality but important to those line manager vice presidents that their departmental input has been satisfactory. It is important to note that most hospitals require users to sign off on the design development documents to ensure unanimous agreement. In tandem the medical equipment list needs to be reviewed for compliance with any standards used as well as quantity and placement. Before beginning construction documents it is crucial that support departments are satisfied with the infrastructure drawings. Engineering and IT are heavily involved in the page by page review of the drawings.

In tandem with the development of bidding documents the PM should be preparing a list of potential contractors and schedule meetings for them to present their general credentials. With that being said I have worked at hospitals where contractors were directly appointed in lieu of having a bidding process (this negates the need for preparing bidding documents). The strong point is that it saves time but does not allow the Owner to assess their price. One solution is to get an independent cost estimate from an estimating firm. This is money well spent and allows the Owner to review the contractors bid.

At this juncture it is prudent to review the plans with the building controls firm and commissioning firm. Their involvement can generate questions and suggestions that should be addressed early in lieu of waiting until substantial completion. It is important that all automatic card access doors be reviewed in ensures that proposed operation is compliant with Life Safety Codes. Plans should be reviewed by all support groups with emphasis on Engineering in that they are the department that will be responsible for operating and maintenance of building systems. IT needs careful scrutiny and approval in that they generally retain their own vendors who must coordinate with the contractor for timing of their install.

By now the PM's head is spinning for achieving all this coordination but if one keeps a cool head and the proper sequencing of events that require his input/coordination things should flow smoothly. It is imperative that the PM have a project controls person who is adroit at scheduling meetings and tracking and updating cost reports. Scheduling planning meetings along with specific topic get togethers is frustrating in that hospital users (i.e. MDs, managers and other support staff) have scarce time and generally prefer early morning or late afternoon meetings.

Other considerations that include PM involvement are reviewing cost estimates, contracts and monitoring the regulatory approval of plans. Cost estimating starts early in most projects and unfortunately sometimes dictated by Board meetings set scheduled. The CFO generally wants a solid estimate as possible for Board approval. However the Board meeting and the PM's ability to provide a solid project cost could be at odds. This occurs when the person who the PM reports to pulls an initial estimate out of their head based on their perceived cost per square foot of hospital projects within the region. This a good starting point but the number is given as a range and the CFO will run with the lower estimate for approval. If the PM has any timely input he/she should increase the estimate by at least 10%. The reason is because projects generally do not begin immediately and the time to initiation needs to be covered due to inflation or planning/design delays.

A topic I am not particularly deft at is construction contracts. Design contracts are relatively rote (make sure it stipulates as built files) while contracts with contractors is a

bit more muddled. When I worked at academic medical centers that had a fairly rigid contract process input from the PM was not required. The entire process was conducted in a legal forum without PM involvement. However with smaller hospital systems every contract approval from the Legal department who, in some instances used outside legal support due to inexperience with construction contracts. Some PMs are requested to review and usually they addressed correctness of items: name, address of project, and cost items. Beyond that the contention was that it was incumbent on the retained legal firms to ensure the contract protected the Owner in that was they were getting paid for. Many PMs have no signature authority for contracts so they remain passive to the extent possible.

There are many other activities that the PM needs to coordinate/participate in.

- Site planning to include trailer siting, parking, access/egress for deliveries to contractor and Owner. Coordination required with Owner loading dock area access, dumpster location, interim parking plan for staff/patients and site fencing.
- Security responsibilities including camera relocations if required.
- Interim signage for all parking and deliveries.
- Storage requirements and locations for containers as required for Owner medical equipment and contractor subs materials.
- Working hours in conjunction with hospital and a means of addressing complaints from nearby housing if proximity a consideration.
- Tie in locations for City and utility connections. Location of interim water and electrical panel.
- Agreed process for any required tie ins to adjacent facilities. Coordination with Engineering department who will inform Administration so proper departmental notice can be generated.
- City or county meetings for project approval in conjunction with hospital legal representatives. Plans need approval by the State but normally permission granted to start earthwork while review underway.
- Environmental control plan requires approval by local authorities for run off controls. Some projects require a truck tire washing systems to avoid the spread of mud on streets adjacent to the project. Plans and onsite inspection required by AHJ.
- Need review and approval of any aspects of projects that include city street closures/modifications, sign, and traffic signals. Their timing of their work must be planned to coordinate with project construction plans.
- Any building signage requires approval by the City or county.
- If required the state installed blue hospital signs needs plan and approval.

This might not be a comprehensive list but the PM should have a check list for various phases of the project to ensure appropriate approvals are in place so as not to impede progress. The Contractor usually assist by giving heads ups for when they need Owner controlled tasks completed. The hospital Engineering Departments are usually very cooperative in many of these activities.

In summary the PM has many tasks to attend to in order to keep the project on track. Other events will arise such as personality conflicts, unhappy subs, work slippage, dismal inspections by City and State inspectors who may change a previous approval to non-compliance, late deliveries for contractor and Owner, change of standards by materials management not announced to anyone causing creative construction solutions, etc. The PM needs to address issues in a professional manner and lead solutions; spending time assigning blame will not provide a solution. Again all this reflects my PM experiences only and other PMs might have differing opinions or approaches.

Project 4: PM Assigned to Project Already Designed

This scenario would likely occur you a new client direct employee or you are an outside consultant PM retained to represent the Owner during construction.

Depending on the timing the project might be either be ready for bid or the Owner might have selected a contractor directly. In any event you are inheriting an approved budget that might not jive with the contractor budget. The PM needs to bring his estimating experience to bear and review every line item in the budget to get a sense of where you stand financially. Usually the budget is fairly close but usually some overages. As such you need to review your project contingency to get a comfort level with where you are from the start. It should be noted that not many CFO want to return to the Board and seek additional funds so the PM should deploy some of the following suggestions to tightened up the budget:

- Meet with all support departments that provided estimates for their area to review assumptions and identify some potential areas to reduce.
- Review the medical equipment list to ascertain if discounts have been applied for larger items to purchase. This is especially relevant for surgery and imaging equipment. If list price used do not change the budget number and that you might require the savings later in the project. Also check the assumed soft costs in that some might not apply.
- Meet with contractor estimator to review the major cost elements and discuss alternatives if available. They usually can suggest cost savings but ensure that hospital engineering and the design team are involved.

- Check with design team for finish options, manufacturing vendors, and check facade options also.
- If grossly over budget see if some of the more expensive equipment items can be removed from the project and purchased through the capital equipment process. Also check with property control to see what they might have in their warehouse suitable for reuse. As noted in the previous scenario a great deal of money was saved by bidding on equipment from a hospital that was closing in a nearby state. The hospital Biomed folks along with equipment planning consultant (if used) should take the lead on this type of endeavor.
- Double check the furniture budget and review what has a been specified and see if something lower costs would meet the hospital standard.

These are starting points and at initial OAC meeting the PM should state that change orders are frowned upon (the author's last two projects change orders amounted to 2% of construction costs). This was achieved by a good set of construction documents and creative problem solving.

Since in either of the cases that you were brought into the project it is important to clarify the chain of command for your reporting function. You could have a VP of Facilities, PMO Manager or both. Attempt to keep direct reports as few as possible for obvious reasons. Whomever you report to, it is imperative that they get accurate information from the PM for their reporting to their administrators. I participated in many meetings with CFOs for tight budgets but I rarely provided exact numbers but presented an optimistic picture. This approach may or may not work but presenting actual figures is difficult given that a great deal of expenditure tracking was manual and interacting with purchasing was time consuming. Those support departments that had their own budgets as part of the project overall budget also had to be contacted to keep their expenditures current.

The PM should become familiar with the key design team players especially those involved in construction administration. They would be the ones that review submittals, coordinate RFI responses and review of change order request for actual need and costs confirmation. Typically on the design side a "a jack of all trades" is assigned and that person has a very prominent role during the course of construction including site visits to monitor quality and compliance with plans and specs. The same could be said for MEP designer's involvement during construction. Make sure that any design team visits to sites notify you of their schedule so you can interface with them. The author has experiences in which engineers come to the site without notification and think that a site visit report is all they need to submit.

In terms of contractor site deliveries for the big ticket items (AHU, generators, pumps, elevators, panels etc.) the PM needs to monitor closely in that any delays directly impact

the schedule or essential dates like power on. On a recent project I was walking the entire site and found that the AHUs had been delivered which made my day. I suggest PMs take site walks to see what contractors are on site, material locations (ensure weather protection as appropriate) and any obvious safety issues. This is all useful when reviewing payment applications in that you have personally seen the larger items. This approach is easier said than done for extremely large hospital projects.

As your project progresses the Owner will most likely appoint a person to head up the activation process. This could be a consultant, in-house employee or a combination of the two. Most of my careers I had not interfaced with these types of folks and when I finished teaching hospital projects, things became operational without my involvement and I had an Owner status at the time. I assumed that department managers interfaced with the activation team. However in that things are more complex now, the operational tasks are identified and incorporated into the overall project schedule. The activation team must closely monitor the status of milestones to allow them to schedule training for completed areas. The contractor needs to be made aware and approve of training activities while other parts of the building might still be under construction. My recent PM experience is that the activation team assisted with FFE installs and noted missing items. They can also assist earlier on with the mock up room process. I will admit initial skepticism regarding their role but through cooperation and setting of responsibility boundaries, it all turns out positive.

The CxA process should be substantially complete prior to building turn over and normally building controls and door operations are still in the calibration stage. The CxA team is brought in early so they can test/inspect items on an ongoing basis instead of waiting until the end of construction. There is usually a little friction between the contractor and CxA inspectors regarding access but this can be solved with meetings with the PM as arbiter.

Prior to opening the PM needs to coordinate as required the install of Owner provided items (mostly wall hung items), internal and exterior signs, and assisting in the development and close out of the various punch list (consolidate to one list). The AHJ will perform their inspection and depending on their finding might allow the Owner to set up computers and conduct trains sessions for staff but no patient care allowed until final inspection, sign off and licensure. The final push requires a great deal of cooperation from the team; especially the engineering department.

In summary starting a construction project after design is essentially complete necessitates that the PM him/her self to reviewing plans, budgets and schedule while simultaneously working with the contractor and hospital staff on site logistics. The PM needs to remember that there are numerous resources to initiate and maintain

momentum and the burden can be shared but not the overall responsibility. The PM is not alone and should remember that the entire team is working towards the same goal.

Anyone having and questions regarding any aspect of this paper or addressing a project that you are working on can email me at bjcamel2012@gmail.com.

About the Author

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William C Jackson, MS, MA Fellow HFI. has been involved with healthcare facilities planning, programming, design oversight and project delivery for over 40 years. He has consulted or worked directly for 60 hospitals in national and international settings. He has been associated with 9.0 million square feet of hospital projects put in place; He has worked for design firms (Ellerbe, HDR and Herry), consulting firms, PM firms and academic medical centers (17 years) including Bowman Gray School of Medical at Wake Forest and the Miller School of Medicine at the University of Miami. International work includes seven years of varying roles in the United Arab Emirates working on two 3,0 million square foot hospitals, Turkey, Haiti and Nassau. He is presently semi-retired, living in Medellin, Colombia, and can be reached at bjcamel2012@gmail.com.