Dialysis Facility Design—Part II: Minimize Costly Plan Changes

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During the development and construction of a dialysis clinic, there are decisions that influence the cost, building quality, and completion date of the project. Change orders—changes to the project after bidding and a contractor has been awarded—are often unavoidable. The owner, architect, and contractor, as well as outside agencies, will at times desire to make changes due to whim or necessity. Often, how you approach these changes has a larger impact on cost and schedule than the change itself. This article, the second of four installments focusing on dialysis clinic design, will review many of the issues that arise in successful project initiation and development from concept through construction, and will address several types of challenges that traditionally occur during the process.

The previous article (‘‘Developing a Strategic and Financial Plan,’’ August, 2006) discussed the importance of proper planning to avoid confusion later in the design and construction phases. All parties involved in the project must have a clear understanding of the desired final outcome. This is vital to all phases of planning, design, and construction. During the early phases of planning and design the owner and architect need to define the project goals and objectives. A meeting of the minds should happen, where the architect understands exactly what the owner is looking for in a final product. The architect should ask fundamental questions about project size, the owner’s desired level of quality, the assumed level of cost, and a target timeline. This is a key discussion that defines project success in terms of being on time, under budget, and aesthetically pleasing.

However detailed the results of this initial planning, changes to the design of a project will occur. The challenge is to approach these revisions in a way that will lessen their impact to both the budget and the schedule. How do the owner, architect, and contractors work together to meet this lofty goal of developing the ideal project? Each party should have a detailed list of responsibilities and authority to eliminate—or at least minimize—conflicts and changes.

Equipment Needs
The equipment selection should be done early enough in the design process (typically in the Design Development Phase) to ensure that the architects and engineers (A/E) have properly provided for this equipment. On a dialysis clinic project, the owner typically wants to provide all the medical equipment, including water purification and delivery systems, emergency power, special lights, special storage cabinets, medical gas, and any other equipment for the specific needs of a dialysis unit.

Additionally, most owners have a relationship with equipment manufacturers and can purchase specialized equipment at a much lower price than a contractor can negotiate. There are also advantages and disadvantages to every piece of medical equipment in the market, and those who use the equipment on a daily basis are the best people to select these items. Further, there are usually numerous options best selected by the owner and medical staff.

Developing the Contract Documents
Solidifying your equipment choices early in the game allows enough time for the A/E team to properly detail the Contract Documents, which are the basis of the permit drawings and the bid documents. They will include a list of all equipment to be installed in the clinic, specifying who provides the equipment, installs it, makes the final utility connections, and performs the final testing and approval.

Contract Documents are often erroneously referred to as Construction Documents, because they include the drawings and specifications the contractors will use to build the facility. However, Contract Documents define much more than just the construction plans and details. They may include survey data about the site, soil boring data about the bearing capacity and water table of the surrounding ground, existing building information, an air quality report, traffic analysis, to name a few. Also included are instructions to the
The Basis for Bidding

The architect is responsible for communicating the information provided by the owner and additional information from codes and zoning to the bidding contractors in the form of these Contract Documents. This information may be bid on by a dozen or more contractors. The information provided by the architect and engineers must be detailed, accurate, and specific to obtain fair and accurate bids.

Making Changes

At the conclusion of the Schematic Design Phase, the owner should review and approve the schematic design so the full architectural and engineering team can proceed to the next phase. Minor changes can be made at the end of the schematic design without significantly affecting the cost or schedule. If the owner requests significant changes, then changes in schedule and cost should be expected.

Keep in mind that changes at this early phase of design are easier to incorporate than in later phases. Each phase of design adds more team members and more detail, making changes that occur after the Schematic Design Phase more problematic.

Changes made early in the design process are easier to incorporate than those made later. Each design phase adds more members and more detail, making any changes more problematic.

The A/E team should inform the owner about the direction of the project design. This further development of the concept design may generate modifications or changes to the design to increase the project efficiency. Under normal circumstances, the A/E team usually can deal with this level of modification within the design schedule and fee. In a new building on a new site, the engineers will need to coordinate the design with the utility companies.

This effort can be arduous at times, depending on the jurisdiction in which your project is located, because the local utility companies may have a huge impact on the schedule and costs of the project. Due to a backlog of existing customers, utility companies typically are very slow to respond to inquiries and
may not provide schedule or cost information until the design has almost reached completion. The result may cause a series of changes and schedule delays, often at a very busy time in the schedule.

**Construction Documents**

Construction Documents take the detailed information created and developed in the previous design phases, and produce a set of documents suitable for permitting, bidding to contractors, and constructing the building. During this phase, changes become very problematic, as there is a large, multifaceted team of architects and engineers working on the project at a point when the schedule is very intense. Even minor changes can cause headaches, as every element of the project should have been carefully selected and coordinated prior to this phase. Changes during this phase require all elements affected to go back through a complete evaluation and coordination process, which may cause the entire team’s progress to grind to a temporary halt. Without this re-evaluation, the documents are at risk of being incomplete or not properly coordinated; either situation will cause a problem in the next phase, which may have a snowball effect on all subsequent phases.

**Dollars and Sense**

Cost is a consideration in almost every design. Early planning to define goals and a budget are critical elements when setting the design parameters. This does not mean that cost should totally handicap the design process; it just means that when an unusual design is called for, the designer should do enough research to find ways of mitigating unnecessary costs.

The designer should thoroughly define these potential extra costs and present them to the owner. This will help prevent conflict later when the actual bidding prices are received. The schedule should be re-evaluated on a regular basis so that the entire team can work toward meeting the goal or inform all parties involved as early as possible that a delay may occur. Communication is the key element in avoiding conflict and resolving problems.

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**Preparing for Bids**

Ideally, the permit review process should start before the bidding phase begins to allow some time for comments and changes from numerous review and utility agencies. These comments and changes can then be integrated into the construction documents. The permit review process for most substantial projects will take longer than the bidding phase. In an ideal world, the permit and all comments or changes would be approved prior to the final bid approval. Unfortunately, the permit review process, for most jurisdictions in the current building market, is so backlogged that delays are more typical than a speedy seal of approval.

The actual construction phase and the project cost will be based on the Contract Documents with any addendums that may have been generated during the bidding phase, the permit comments, contractor requested changes, owner-requested changes, and any part of the project that was not documented by the A/E team.

At this point in the process there is a network of groups that have an impact on the process and the actual building. The permit documents are reviewed by literally dozens of reviewers: from the fire marshal, health department staff, plumbing reviewers, electrical reviewers, structural reviewers, to public space staff, department of transportation staff, zoning staff, and utility companies, to name just a few. Each agency has an impact on the permit review process.

Even if every element of the entire set of documents is approved, there is still an impact on the schedule in the time taken for each agency to responsibly complete its review. In many cases each reviewer, on top of reviewing the documents for clear code discrepancies, may have their own personal interpretations that are not actually written in the code. In most cases, these are minor changes that must be incorporated into the documents and transmitted to all the bidders or the selected contractor.

**When to Substitute**

Along with the permit process, there will be subcontractors and material suppliers requesting to be included as alternatives to those specified in the bidding documents. For a change to make sense at this point in the project, the substitution should save money. If the proposed substitutions are found acceptable by the architect or engineer, then changes must be made to the Contract Documents to accommodate them, and then

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distributed to all the contractors for everyone to bid the job fairly.

**What to Expect During Construction**

Once all the bids are in and the contractor is selected, a contract is signed based on the final Contract Documents. This starts the construction process. During construction, the network of people who can affect the project, schedule, and costs grows to include the actual building site. Some problems that can occur here are:

- unseen site conditions;
- problems with utilities;
- bad soil or hidden rock affecting excavation and foundations; and
- underground utilities that are not in the proper location.

Changes at this point become change orders to the cost of the work. If you have been keeping track, there are five or six groups at this point that can affect the cost schedule: existing site and building, review agencies, contractors, product manufacturers, the owner, architect and engineers.

There will be conflicts throughout the construction process. Discovering a conflict before it is implemented should eliminate or minimize the impact. Just as with the design phase, there should be proper planning with a schedule that allows for regular coordination meetings and the submission of shop drawings by all major subcontractors to minimize and resolve any conflicts.

The design and construction of a project can be fun and challenging. Anyone who sets off on the path to building their ideal facility should realize that there will be challenges and obstacles along with the joy and thrill of seeing the final building completed.

In a perfect world, the architect and engineer would produce Contract Documents that are flawless, the review agencies would be timely with no comments, an owner would never change his or her mind, the contractor would always bid the project with enough money budgeted to do every element of the construction, each subcontractor would do the work perfectly without error, and the existing conditions would be ideal for the project as designed. But, this is not reality. The reality is that every element listed above will have some issues or conflicts that will force changes to the original project plan. Whether these conflicts are major or minor, their resolution is entirely dependent upon a team mentality focused on communication and collaboration.

**Up next:** Learn how to outfit existing buildings for use as dialysis clinics. We’ll discuss how to upgrade utilities, identify suspect materials, improve accessibility, and build security.