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Project Management Insights for Architects

By: Robert Larsen, NCARB

(bob.larsen@gmail.com)

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Preface

Having worked as an architectural project manager for a number of years in many parts of the world, I have learned a lot about what must be done and what should be avoided as an architectural project manager. The intent of this paper is to share some of my experience to provide an overview of *Project Management Insights for Architects* and to present some ideas of how project management can be implemented within an architectural firm. *(Note: This paper is not intended to be an exhaustive dissertation on the topic and is based almost entirely on my own personal experience and opinions.)*

It has been my observation that many architects who have been assigned the task of project management lack a working knowledge of what is required to effectively implement and execute the applicable responsibilities. As architects we are trained to design buildings, and project management is too often just a vague collection of administrative efforts that we are forced to do so we can keep designing. Hopefully, this paper will be of assistance in educating both the project managers and their principals as to the potential role of the project manager, provide assistance in evaluating their current project management processes, provide an orientation tool for new project managers, and provide a few new ideas for existing project managers.

Benefit objectives for architectural project management as presented in this paper include the following:

- Increased staff confidence, ability and satisfaction
- Better client service and satisfaction
- Increased efficiency for competitive fees and safeguarding profits
- Improved quality assurance and control
- Enhanced risk mitigation

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1.0 Introduction

1.1 Project Management Defined

Project management is the practice of initiating, planning, executing, controlling, and closing the work of a team to achieve specific goals and meet specific success criteria within a specified time. The primary challenge of project management is to achieve all of the project goals within the given constraints.

The above is based on the Wikipedia definition of “Project Management” as perceived and practiced by all sorts of teams working on all sorts of projects. Architecture is just one of the team/project types. Much can be learned from the general practice of “Project Management” as its own discipline (and for which a certification can be received). However, this paper is focused more on the specifics of *Project Management for Architects*, recognizing the unique aspects of the professional practice of architecture.

Architectural project management compared to project management of other types of projects.

1. Some Similarities:
 - a. Almost all projects are unique and/or have unique elements.
 - b. Projects have expected results and/or goals which must be defined.
 - c. All projects must have a start/beginning and a clearly-defined end.
 - d. Projects have limitations with respect to resources.
 - e. Projects have staffing and organizational structures.
 - f. Projects have clients who commission and define the work to be done.
 - g. All projects have risks associated with them.
 - h. Etc.

2. Some Differences:
 - a. Architectural projects have a higher level of similarity in that they are typically building (or similar) design projects – so totally new processes are not being reconstructed each time.
 - 1.) Same (or similar) design phases
 - 2.) Same (or similar) goals/objectives
 - 3.) Same (or similar) durations
 - 4.) Etc.
 - b. The same teams are often used for multiple projects.
 - 1.) Team members’ skill sets are often known
 - 2.) Team members are familiar with their roles with minimal management input
 - 3.) Etc.
 - c. *Due to the expertise and culture within the typical architect’s office, managing the architectural design process is not always the same as managing a research process, product development process, or other processes utilizing a more ‘typical’ project management approach.*

One of the reasons for differentiating architectural project management from general project management is based on personal experience working with a few foreign firms who had trained “project managers” attempting to manage their architectural projects with no prior architectural or engineering experience. I remember one coordination meeting in a Gulf country where I was representing the design architect by myself, and a team from another Gulf country included around 20 project managers and upper management staff representing the engineers and the architect-of-record. Of the 20, not one was able to constructively discuss the project’s design and technical issues. After enduring this for a number of months, the client was forced to replace them. It is my opinion that an architectural project manager needs to be an architect (or in some cases an engineer) who through experience and training has become a project manager.

Architectural project management is the process of providing the day-to-day management for an architectural design project. This process varies between (and within) firms – based on the size of the project, the size of the firm, the available staff, and the evolution of the individual firm’s management organization and processes.

To better understand the architectural project manager’s (APM’s) role, one must have an understanding of the other architectural, project-team leadership roles. Those other roles are as follows:

- > **Principal** (may also be referred to as a sole proprietor, partner, corporate officer, senior leader, owner, boss, etc.): This role represents the firm’s ownership, and is ultimately responsible to the client and to the design firm for the execution of the project. The lead principal for each project must be clearly identified, and the APM reports directly to this person. It is best if there is only one primary principal per project. Having to serve more than one “master” can be a source of conflicting management directions, differing objectives, etc., which can frustrate the design team and jeopardize the project’s success.

As a rule of thumb, the more projects a principal is involved with at any given time, the more that project management duties need to be delegated to the APM. Good APM’s enable principals to take on more projects and perform more effectively. Mutual respect and a good working relationship between the principal and the APM will facilitate projects that are both successful and enjoyable to work on.

- > **Lead Designer**: The lead designer is the architect responsible for designing the project. This person should remain the guardian of the project’s design intent throughout the project. However, to facilitate a better utilization of the lead designer’s talents for multiple projects, this person often directs the project’s design team’s daily efforts only through the initial design phases/stages.

Depending on the relationships between the APM and lead designer and their skillsets (plus office practices) some of the project management duties during the initial design phases may be completed by the lead designer. *(Note: For large and/or complex projects it is usually better to assign all of the project management duties to an APM from the start, and let the lead designer focus on the design.)*

- > **Project Architect** (may also be known as the assistant PM, technical lead, etc.): The project architect as defined here is the technical architect responsible for organizing the building and construction documents. The project architect is the APM's right-hand person for keeping on top of the project's technical and documentation requirements. (*Note: Having a project architect working as an assistant to a strong APM is a good way to train future APM's.*)

These roles can overlap, or even be combined. As an example, a firm that is a one-person practice will have the same person filling all four roles. In some practices the principal may be the lead designer and/or the APM; in others, the lead designer may be the APM; or the APM may also be the project architect; etc. The mixing of these roles allows flexibility to accommodate the skillsets of the persons involved and the level of complexity of each individual project. However, there have been cases where the discipline and efficiencies of good project management were sacrificed by the individuals involved who may tend to focus on aspects of the project that are more in keeping with their expertise. In this paper, the APM is presented as a separate role, although in reality, all (or some) of the tasks may be performed by the principal, lead designer, project architect, and/or others.

Architectural project management is a dynamic design process. Requirements change, opportunities change, personnel change, etc. What worked yesterday may not work today, and what works today may not work tomorrow. An APM should address each change as a design problem to identify and define, then to design strategies to mitigate any potential negative impacts and to capitalize on any potential opportunities. APM processes and strategies must be flexible in order to address the idiosyncrasies of specific project conditions and staff skillsets.

Mistakes are to be avoided, but they will occur. The sign of a true craftsman is how mistakes are addressed and resolved. Anyone who is afraid of making mistakes may not be able to function effectively.

As a caution to APM's, too much project management procedural interference can inhibit the design process, frustrate team members and create non-productive work efforts leading to increased inefficiency and potential project failure. Too many, or the wrong monitoring metrics can also result in wasted energy and/or working to satisfy the metrics rather than the project.

1.2 Organization of this Paper

It was someone from the former firm of Caudill Rowlett Scott (CRS) who said something similar to, "A successful architectural practice is like a three-legged stool. One leg being business/commercial; one being design; and one being technology. Remove any one of the three legs, and the firm collapses." The remainder of this paper has been organized to present the APM's tasks with respect to each of these three categories – business/commercial, design and technology.

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Double terms such as “business/commercial” and “schedule/program” are used throughout this paper for the benefit of persons working internationally. Typically, the American (U.S.) term will be used first, followed by the British (or international) term. This is intended to introduce the American APM to some of the international terminology and to assist the international APM with understanding the U.S. terminology.

Personal anecdotes and comments have been included to help provide additional insight into some of the concepts presented in this paper. These anecdotes and personal comments are written in *blue italics* to set them apart. (For examples, refer to the top of page 4 and to the paragraph below.)

Another anomaly in this paper is the consistent use of the “Concept Design Phase/Stage.” It is no longer included as its own phase in AIA Document B101™-2007, but it is being used here based on personal preference. Readers are encouraged to extrapolate the information provided in this paper to the requirements of their specific projects.

Any ideas and/or comments presented in this paper primarily reflect the personal experiences and opinions of the writer based on specific circumstances encountered during his career. They do not constitute professional legal advice, nor are they necessarily applicable to all situations. The information provided is not intended to be used for mediation, arbitration or litigation purposes. Where comments concerning contracts are used, attempts have been made to reflect generic contract terminology and/or concepts rather than reflecting specific language from standardized contracts as drafted by the American Institute of Architects (AIA), Fédération Internationale Des Ingénieurs-Conseils (FIDIC), or similar.

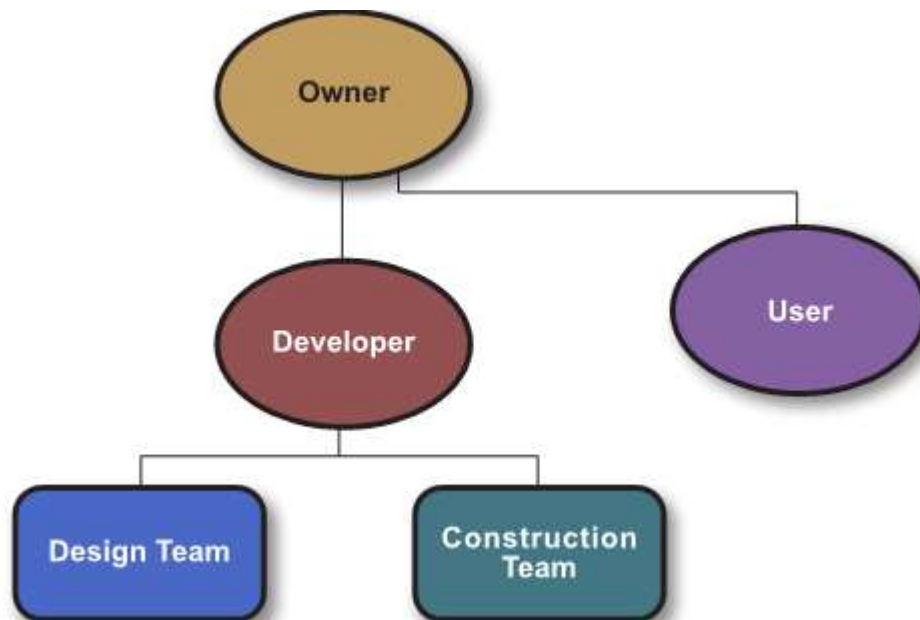
2.0 Business/Commercial Tasks

2.1 Project Organization

To understand where the APM fits into the scheme of things, one must understand the project's overall organization and the roles of the main participants. The organizational structures are what determine the contract and implementation strategies. The organizations as described below are prototypical examples. Each project and each firm may utilize different organization structures. It is important to identify and understand the project's organization, so hierarchies of responsibility and authority are understood, and so any exceptions or deviations that arise during the process can be identified and addressed for potential strategy changes, contract changes, etc.

Client Organization:

The main roles within a typical client's organization are the **owner**, the **user(s)** and the **developer**. The *ownership* role represents the component that provides the financing and the high-level project vision. The *user's* (or operator's) role represents the actual entities occupying and/or managing the completed project. The *developer's* role represents the person (or team) responsible to the *owner* for procuring and interfacing with the design and construction services required to realize the built project. The diagram below illustrates a prototypical client organization.



2.1.1 Prototypical Client's Project Organization

These client roles can be combined and mixed in a multitude of ways depending on the client's sophistication, staff capabilities, the specific project, etc. Some concerns for the APM to understand when interfacing with the client's organization include the following:

1. Who is the architect's primary client point-of-contact? There should be one client representative with the authority to act as a single point-of-contact between the architect and the client. Many contracts are written this way, but that concept can be easily eroded if the clients are not willing to delegate the proper authority to their points-of-contact, if there are other persons on the clients' teams vying for power within the clients' organizations, and/or if the persons acting as the point-of-contact do not have the requisite skillsets. In some cases, when the client's single point-of-contact has been compromised, the architect's default response is to ignore it. This works occasionally, but it can set a dangerous precedent where multiple parties representing the client give conflicting and/or unacceptable direction.

Note: The client's point-of-contact is often on the hot-seat within the client's organization as they work to guide the client's team, while at the same time interfacing with the design team. Unless that person is significantly underperforming, it is in the best interest of the project to support that person and attempt to make her/his work easier.

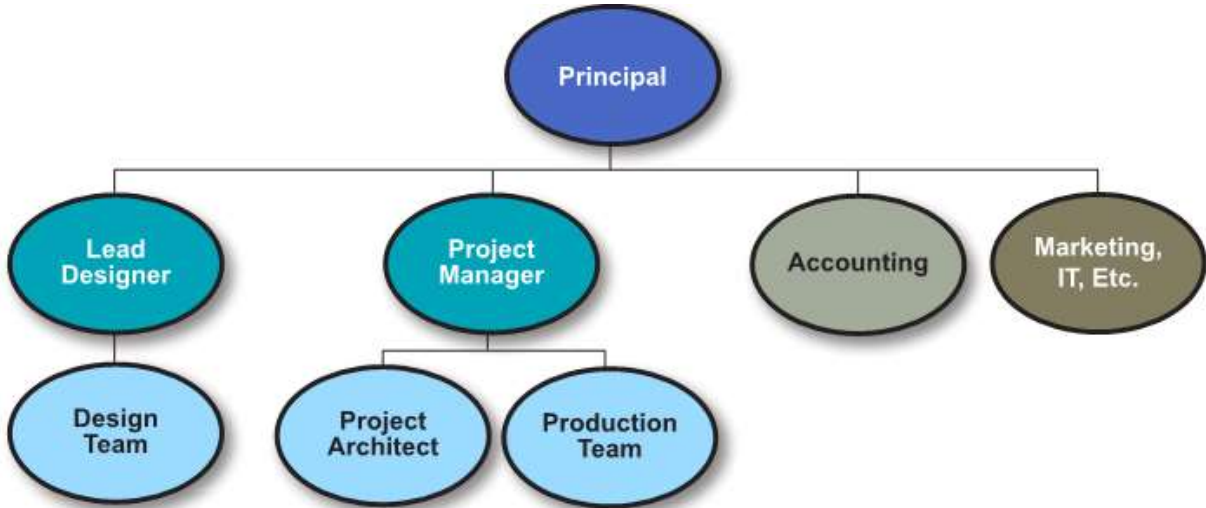
2. Who provides and/or approves the architectural design program/brief for the project on behalf of the client? For most projects it is the client's responsibility to provide the architectural program/brief based on their goals and financial objectives, including the user's needs. The *design program/brief* represents the requirements for the project to be designed as included in the agreement. As such, any significant revisions to the *design program/brief* may require a written amendment to the agreement, or it may become an amendment by default unless it is addressed by the architect. Therefore, it is important to know who on the client's team has the authority to change the *design program/brief* and accept corresponding amendments to the agreement. (See section 2.8 below regarding "change management" for additional discussion regarding managing changes to the architectural design program/brief.)
3. How is the architect's interface with the user handled? The users' input may relate to functionality, quality and/or aesthetics. A process is required for vetting users' comments, as well as a client-approval process for proposed user changes. Some users (hotel operators are an example) have their own design standards and review procedures which may impact the architect's scope of services, the design schedule/program, etc.
4. Who approves/accepts the designs on behalf of the client, and what is the client's review process? Most design agreements include milestone client reviews and approvals. These are required prior to the design proceeding to the next phase/stage. It is important to know who within the client's team has the authority for reviews and approvals. This is often not the same person as the client's primary point-of-contact, but the primary point-of-contact remains responsible for coordinating the client's reviews with the architect. It is beneficial to include specific time durations for client reviews in the design schedule/program; these durations could become a basis for requesting time extensions caused by any protracted client review periods.

5. Who on the client's team has the authorization to direct the architect to make changes and approve any corresponding revisions to the agreement? As discussed in item 1 above, there is a primary point-of-contact for the client's team. That person must know who within the client's organization has the authority to make changes of various magnitudes. The appropriate person(s) should properly vet all client-requested changes prior to presenting them to the architect (*which is not always the case*). The architect's APM and principal must monitor the project and keep the client informed of all perceived changes. (See section 2.8 below regarding "change management" for additional discussion.)
6. What are the client's payment procedures? The architect must understand the client's invoicing review and payment procedures, including what is required to be submitted, when it should be submitted, to whom it is to be submitted, etc. If the architect's invoices are not paid per the agreement, then the architect will need to evaluate and make decisions accordingly. (Refer to section 2.6 below for further discussion on invoicing and getting paid.)

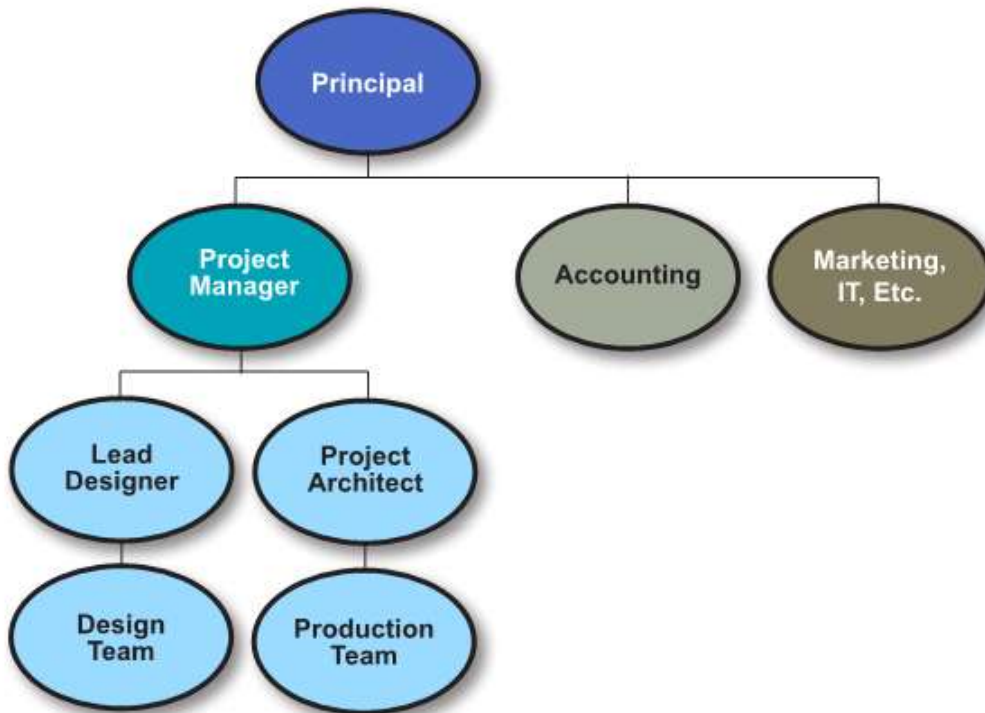
Professional construction management (CM) or project management (PM) companies are sometimes retained by the client to supplement their in-house development capabilities. In the United States construction managers can be used to provide administrative assistance to the client during the design and/or construction phases, or they can be hired to provide administrative assistance during design phases along with providing actual construction during the construction phase. (Refer to the American Institute of Architects (AIA) documents for the two types of construction management roles and how the architect's interface is addressed.) In other parts of the world, it is not uncommon for the CM/PM companies to manage the design contracts and the design process. These organizations can provide a valuable service to the client. However, some tend to manage the design projects as if they were construction projects, which unlike design projects have defined quantities and other defined parameters. Some (primarily international) CM/PM firms require the architect to prepare a number of tangential reports and studies. Although such items can be useful, they require significantly more administrative efforts which need to be considered when proposing on international projects managed by a CM/PM company.

Architect’s Project Team Organization:

An introduction to the architect’s project-team leadership roles was provided in section 1.1. The following diagrams illustrate two prototypical project organization models used by architectural teams.

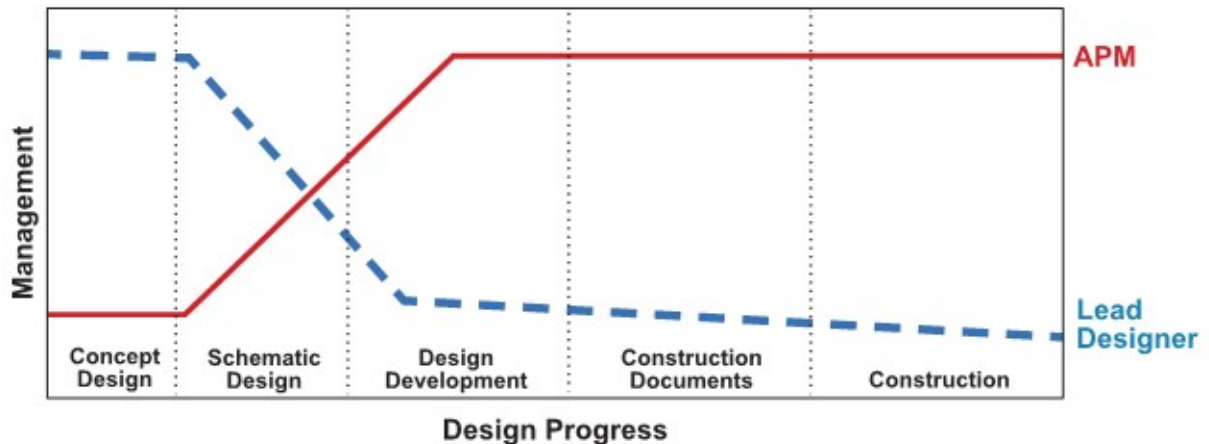


2.1.2 Prototypical Architect Team Organization – Designer Option



2.1.3 Prototypical Architect Team Organization – PM Option

The difference between these two organization charts is the placement of the design team. The first shows the lead designer reporting directly to the principal with the APM on a similar level. This is utilized when there is a lead designer with sufficient expertise and/or if it is for the initial design phases/stages only. The second chart shows the lead designer under the APM, which is applicable when the APM has sufficient expertise and/or during the latter design phases/stages. A common scenario found in some offices is to give the lead designer more control for managing the project in the beginning and then transitioning the management to the APM as the design progresses. This is conceptually illustrated in the diagram below.



2.1.4 Potential Management Shift as Projects Progress

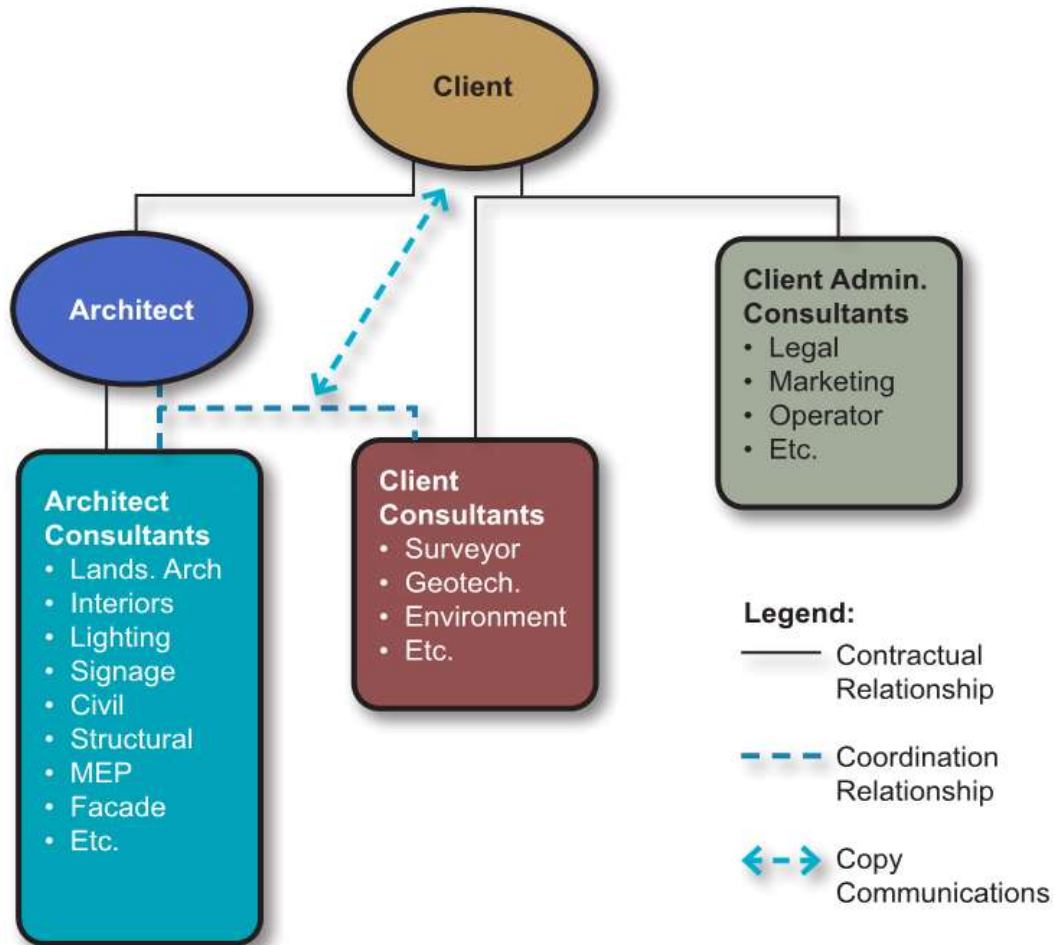
The organizational charts indicate a relative hierarchy, however, that does not mean that the person(s) shown “above” is(are) to micromanage the person(s) below. In fact, a major part of the APM’s role is to facilitate the peripheral administrative functions and provide the resources so those lower down on the organizational structure can work effectively. Mutual respect and positive attitudes working together are crucial for successful collaboration, and over-managing can frustrate the architect’s design and production teams and diminish their effectiveness and efficiency.

When staff performance issues arise, the APM should discuss such concerns directly with the person(s) involved in order to reach a mutually acceptable understanding. If this does not satisfactorily address the issues, the APM should discuss those concerns with the principal and develop a strategy to guide the team members. *(Note: Issues of misconduct and/or incompetence will typically require consultation with the firm’s human resources staff.)*

One example of a staff performance issue that sticks in my mind was working with a lead designer who kept discovering new ways to redesign a previously-approved design, rather than further developing the approved design. It was time-consuming and frustrating. In this case, after multiple discussions, the lead designer had to be replaced.

Overall Project Design Team Organization:

Rather than diagramming all of the potential permeations of the overall project design organization, the chart below illustrates a prototypical organization for a firm that practices architecture only.



2.1.5 Prototypical Overall Project Design Team Organization

If the architect has any responsibilities, she/he must also have the authority to implement those responsibilities. **Responsibility without authority is a recipe for failure.** With respect to the client’s consultants, the diagram above indicates the architect has coordination relationship responsibilities, but no contractual relationship authority. The required responsibilities and authorities for coordinating the client’s consultants should be identified in the agreements. The architect must have the authority to leverage the performance of the client’s consultants, and likewise, the consultants must have contractual requirements stipulating they have to follow the coordination leadership of the architect within the constraints of the design schedule/program. *(This is especially true when working in countries outside of the United States.)*

In summary, there are many options for organizing a design project based on the project's requirements, the client's organization, the architect's organization, the consultant/subconsultant strategy, etc. The architect should consider the project's organization structure during the proposal and/or negotiation processes, when there is an opportunity to make adjustments to the proposal and/or agreement that will acceptably mitigate the risks to the parties involved and facilitate an effectively managed project. *(Do not be too eager to sign a contract before all of the important interaction and business details have been resolved.)*

2.2 Proposals

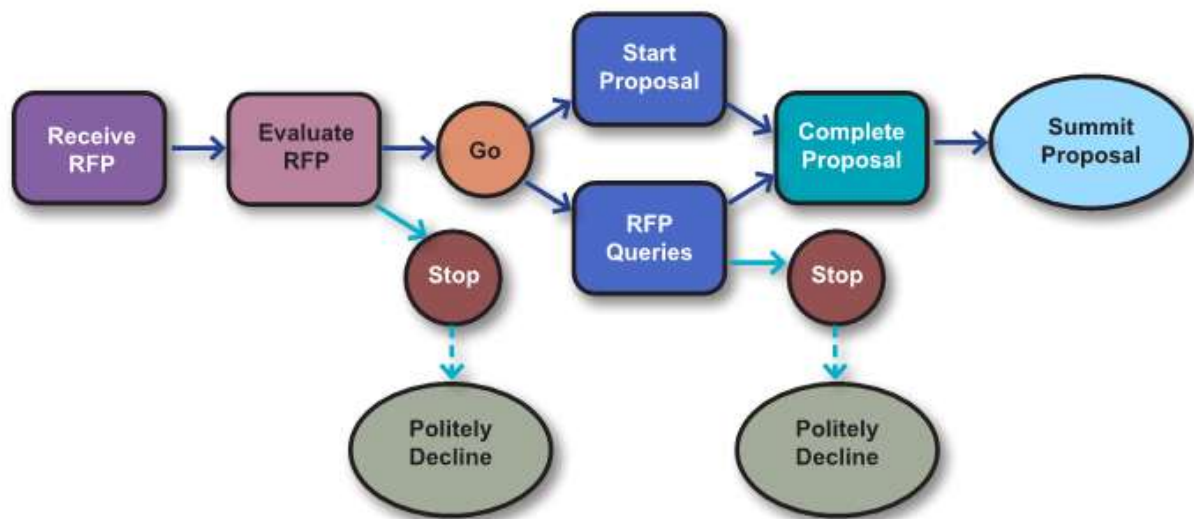
Client RFP's:

This section regarding *proposals*, starts with the client's "request for proposal" (RFP). It is advisable for the APM to be involved with the proposal review and preparation processes in order to exercise ownership of the proposal and to better understand the firm's commitments and strategies being proposed.

After receiving a formal RFP *(or documenting an informal one)*, the project needs to be evaluated for a "go or no-go" decision. Not all projects and/or clients are worth pursuing. This review and decision are usually undertaken by the firm's principals, but the APM also needs to be aware of the process and outcome. Some risks to be considered before deciding to submit a proposal for a project include the following:

1. Is this a new client who may or may not be reliable to work with, or is it a previous client with whom the firm has had a good working relationship? *(Good clients pay on time, honor their commitments, and accept the impacts associated with their changes.)*
2. What is the client's financial backing and credit rating? *(Due diligence often requires obtaining a credit report.)*
3. Is the project type one with which the firm is familiar, or is it an acceptable opportunity to expand the firm's expertise? *(New building types can be costly to learn, but they can also be an opportunity to expand the firm's expertise and service line.)*
4. Where are the project and client located? *(There can be risks when working with unfamiliar cultures and/or jurisdictions.)*
5. Does the current workload within the office allow for staffing the project? *(Some very large projects require extensive staffing. This creates risks if the office is unable to absorb the personnel should the project go on hold or stop, and when it is completed.)*
6. Are the project requirements too extreme to be viable? Some clients want to "force 20 gallons of program/brief into a 10-gallon container at a 5-gallon price, within an unreasonable time schedule/program." *(This also includes the client's perceived financial viability of the project. It is not always true that, "If we build it, they will come.")*

7. Is the client requesting too much in the way of administrative reports and peripheral efforts? *(This can usually be compensated for with higher fees and potentially more time.)*
8. What is the status of the planning/entitlement approvals? These reviews can involve a lengthy process that may require the project to go on hold for an indefinite period while approvals are being obtained, or even stopping the project.
9. Will the fee proposal be used as a comparison to rationalize the client using someone they have already selected? *(In the private sector outside of the United States, this practice is common.)*
10. Is the RFP for work originally started by another architect who the client has decided to replace? *(This is a significant red flag. Architects often think they can do better than the previous architect. However, there are many reasons why an owner may want to fire an architect, or in some cases why the architect resigns the commission. This could indicate the owners' lack of understanding for the complexity of design and documentation, or it may be their operational default to fire the architect when things get complicated.)*
11. What is your gut feeling? Are there other potential issues that may raise sufficient concerns so that providing a proposal should not be considered? Experienced principals and APM's can often sense that there are other potential issues and concerns that would deter them from proposing on a project. *(It often costs the design team thousands of dollars to prepare a proposal – so be certain it is a project worth going after before starting the proposal process.)*



2.2.1 Proposal Flow Process

Architects usually have questions regarding a client's RFP. Some questions are a result of formal RFP's being a compilation of excerpts taken from previous RFP's. This practice is a common source of conflicting information. Most RFP's include an opportunity to ask questions/queries regarding the RFP, the project's requirements, and the owner's expectations. If not formally stated, assume that asking questions is an option. It provides another opportunity to evaluate the project and the client. The responses can also trigger a "no-go" decision. *(As a recommendation, avoid getting too picky with the questions and focus on items of substance rather than grammar, spelling errors, etc.)*

Confidentiality:

It may seem strange to insert a presentation of "Confidentiality" between the discussions of "Client RFP's" and "Architect Proposals", but it is placed here to establish its importance early in the process. There are two types of confidentiality. One is based on professionalism, where it is professionally impolite/unethical to publicly share a client's private information. Clients need to be able to manage their own flows of information to enable them to obtain financing, to protect themselves against competitors, etc.

The second type of confidentiality is contractual. It is not uncommon for some clients to require a signed confidentiality agreement (also known as a "Non-Disclosure Agreement" (NDA)) prior to sending an RFP to an architect. The architect, in turn, needs to obtain signed NDA's from any consultants before RFP's are sent to prospective subconsultants. Though not signatories to the NDA's, it is also important that the architect's employees and the subconsultants' employees are aware of their confidentiality/non-disclosure requirements.

If your company does not have standardized language, or if the clients provide their own, your attorney should review all NDA's until you have sufficient understanding of the implications to review the simple ones yourself. One aspect to consider is that if "public information" about a project is shared by the design team, then it should not be a breach of contract. "Public information" means information that is available to the public in published sources, the internet, or similar (primarily through the client's own news releases). Another condition relating to NDA's is obtaining the client's permission to use appropriate information, renderings and/or photos of the completed project for the architect's promotional purposes.

I once heard a story about an employee of an architectural firm in London who was talking with a stranger in a pub. When the employee heard that the other person was from a particular country, the employee proceeded to tell the other person that he was working on a project in that same country and then shared some minor aspects of the project. The story then stated that the very next day the architectural firm got an irate call from the client stating that architect had been fired for breaking their NDA, and to expect a corresponding legal claim against them. Though I am uncertain of the authenticity and details of this story, it has become a reminder to me of the importance for everyone working on a project to realize their non-disclosure responsibilities.

Architect Proposals:

It is highly recommended that your firm have standardized proposal templates. Along with the proposal templates each firm should have standardized prequalification statements (“prequals”), including graphic presentations of representative projects (select those most appropriate to the project being proposed), key staff resumes/CV’s, etc. A firm should also have an internal quality control process to review all proposals before they are submitted.

Proposals must be edited to the specific project and the specific RFP requirements, and to use the same terminology (to the extent possible) as used in the RFP. Restating the client’s requirements illustrates an understanding of the project, which can enhance your positioning when the proposals are evaluated. Client RFP’s are typically formally written, but they can be informal or even verbal. In any case, the proposal must clearly restate the RFP requirements for the project in writing, so that all interested parties understand the architect’s response to the owner’s requirements, and/or to clearly state any proposed amendments or exceptions to the RFP.

The following presents some of the other proposal components.

- > **Scopes of Services:** A scope of service is a detailed description of what services an architectural firm and its subconsultants will provide. *(Somewhere in the RFP and/or proposal there should also be a clear listing of what services the client will be providing.)* It is typically broken down by disciplines into phase-by-phase/stage-by-stage descriptions of those services. Primarily for international work, a list of corresponding deliverables is also often required. Unless clearly defined, international design services can also experience misunderstandings of what is expected during each design phase/stage.

Most international RFP’s are not based on the AIA design phases, nor are they necessarily based on the current Royal Institute of British Architects (RIBA) design stages. Some are based on an odd mixture of multiple systems with significantly varying requirements. The most common misunderstanding is the confusion between the AIA “Design Development Phase” and the RIBA’s previous “Detailed Design Stage”. Many clients plan to go to bid/tender based on the “Detailed Design” documents and associated quantity surveys. Therefore, the documentation for RIBA’s former “Detailed Design Stage” is much further advanced than that required for the AIA’s “Design Development Phase.”

During negotiations it is helpful to provide the client with examples of each type of DD drawing, so there is a clear understanding of the level of completion proposed. Good quality drawings should be used as examples, but do not set the standard too high by providing the best examples that were produced under ideal circumstances. It is also better to not select drawings all from one project. Using drawings from multiple projects helps protect the confidentiality of the projects, and it limits the prospective client’s ability to overly scrutinize the drawings.

If the scope of services included with a RFP is not clear, prepare appropriate questions/queries to the client. A second option is to ignore the portions you do not agree with and propose your own alternative(s). As strange as the second option may sound, it has worked on multiple occasions. Clients approach architects for their expertise and experience on how to provide consultation and design services. *(Refer to section 4.2 below for a discussion regarding “work plans.” These can be used to help reinforce the clients’ perception of the architects’ proposed scopes of services, their management abilities, and their ability to give the clients what they want.)*

- > **Architect’s Fees:** There are at least four primary methods for estimating fees. The first is to identify the staffing positions envisioned for each phase/stage, the percentage of the phase/stage time each staff level will be used, and the duration of each phase/stage. Then, multiply all of that by the adjusted rates for each staffing level. *(Note: The adjusted staff rates include extended overhead and can include profit if not addressed elsewhere.)*

Many firms already have standardized Excel sheets for estimating fees using this method. Additional fees are added to cover the costs for renderings, subconsultant services, risk factors, expenses, contingencies, etc. Travel and other expenses can be either reimbursable or non-reimbursable, and need to be considered in the fee proposal accordingly. The advantage of including the expenses in the base fee as non-reimbursable, is that it eliminates the need for detailed expenses’ invoicing and the justification of the expenses – which in some instances, if not accepted by the client, can delay payments.

A second way of estimating fees is to use historic cost data from other projects. *(i.e., How much did they cost to design, etc.)* A problem with historic cost data is that many architectural firms do not maintain readily available and up-to-date cost information based on project types, project organization, unit costs per area, etc. Firms should at least know what they have been charging for similar projects, and if they made or lost money on them.

The third method is a more traditional method of basing the fees on a percentage of the construction costs. This method presents a potential conflict of interests because the more expensive the architect makes the design, the higher the architect’s fee. *(Note: The AIA had to abandon its standardized fee schedules based on percentage of construction costs for various building types due to it being considered as price fixing.)*

The fourth way of estimating a fee is by guessing what the market will bear – based on past experience, level of risk, etc. The most accurate method of setting fees is to utilize the first example above and potentially cross-checking that with one or more of the other three.

There are basically two types of fee proposals requested in RFP’s. They are as follows:

1. **Fixed-Price, Lump Sum:** This reflects the fees calculated as noted above, plus any subconsultant fees, etc. The fee is apportioned to the various design phases/stages (including mobilization), per the various design disciplines, and to the applicable sub-projects (if multiple buildings/projects are involved).

2. **Cost-Plus:** (*also incorrectly called “Time-and-Materials”*) Using this fee basis, the architects are compensated for the actual hours they work on the project. Fees are based on agreed hourly rates, plus any expenses and any mark-ups for subconsultants. Many clients want to place a cap on their exposure, so they require what is known as a “cost-plus not-to-exceed” fee.

The not-to-exceed amount should be higher than the amount the architect would have estimated for a fixed-price fee. With a not-to-exceed limit, the architect has lost the benefit of any potential contingency and is at risk of having to absorb any costs over the not-to-exceed amount. Therefore, if the client has the potential benefits of capping exposure and cutting costs, the architect should also be allowed the benefit of reducing risks with a higher not-to-exceed amount.

Note: Some clients, especially from certain regions of the world, insist on negotiating fees after they have been submitted. In those cases, it is recommended that a negotiation contingency/cushion be added to the initial fee proposal. Always, use any fee reduction as an opportunity to negotiate a reduction in the scope of services and/or deliverables. (*One potential scope-reduction target is to reduce the number of required reports.*) In some parts of the world, it can be difficult to receive the last payment from the client. In those instances, the fee structure should allow for the invoicing and collection of sufficient fees prior to the “final” invoice.

- > **Subconsultants:** Most buildings are so complex and sophisticated that their designs require the expertise of a team of designers, engineers and specialist consultants. The framework of the project is derived from the architect’s design, but it takes the services of the other engineers and consultants to help refine that framework and to add their systems to create a fully functioning design.

As indicated in diagram 2.1.5 above, some of the engineering and specialist consultants may be under contract to the architect as the architect’s subconsultants, and others may be contracted directly by the client. The proposal must clearly identify which subconsultants are included with the proposal, and which consultants are to be provided by the client. It is also important to include a brief description of the role of each discipline.

A high-level description of some of the design disciplines (other than the architect) that may be used on a project are listed in alphabetical order in Appendix A. The list is generic and may not reflect the terminology and/or separation/combination of disciplines as practiced by individual firms operating in different regions of the world. As with any template, it must be edited to meet the specific requirements of the project. The list is not necessarily exhaustive; it is only intended to give an introductory overview.

As the design work progresses, it may be discovered that additional expertise is required to realize the project’s unique opportunities. Therefore, appropriate language should be provided in the proposal and contract to allow for potential contract modifications to include additional consultants and the applicable fee and/or time adjustments.

Applicable RFP's are issued to the potential subconsultants describing the project, their specific scopes of services, the design schedule, the work plan, any special requirements, contract information (if available), details of what must be included in their proposals, and the timeframe for submitting their proposals. Proposing consultants are to be kept apprised of any updates to the status of their proposals. That includes informing them that another consultant has been selected to provide the requested services – and a reason *why (without telling them their competition's price – assuming that might be one of the reasons)*. Do not allow them to cut their fees after the fact – this is “bid shopping”, which is unethical and may even be illegal on U.S. government projects. *(Note: Things may be different if one is negotiating only with the selected subconsultants. Then if the client insists on a lower overall fee, the selected consultants might be asked if they are willing to adjust theirs.)*

There are two common ways of selecting sub-consultants. One is to have multiple “qualified” consultants bid/propose for the project. The other way is to work with only one “preferred” sub-consultant for each discipline. Single-source proposals are based on having strong, trusted and productive working relationships with selected sub-consultants.

Each firm should maintain a list of consultants with relevant background information for each. Relevant information would include a general description of the firm, disciplines offered, any mutual projects, who in the office was the principal and/or project manager, etc. Another part of the consultant list includes an in-house evaluation of the consultants the firm has worked with. There are three key aspects to consider when evaluating a consultant: 1) How easy are they to work with (*attitude and responsiveness*)? 2) What is the quality of their documentation (*accuracy and completeness*)? And 3) What is the quality of their design/engineering ability (*aesthetics and performance*)?

On occasion, the client may assign/delegate one or more consultants to be hired by the architect. In those instances, the architect is required to use a consultant that may, or may not be, qualified, and the architect is being required to use a consultant with whom there is most likely no prior experience. So the quality of the work and working relationships are unknown. Because of the added risks associated with this is due to the owner's direction, the owner should indemnify the architect for any work by the assigned/delegated consultants. *(An attorney should be consulted to draft the proper contract language.)*

- > **Project Design Schedule/Program:** Design schedules/programs reflect the sequencing of phases/stages and time allotted to produce the design for the project. From the client's perspective time is money. The sooner the project is completed, the sooner it can be enjoyed and/or start earning the revenue required to repay the development and financing costs, and eventually to earn a profit. However, time can also be an enemy to design quality and efficiency. So, a proper balance needs to be established between the duration of the design process and the capabilities of the architect.

For the architect, time costs money. The longer it takes to design and document a project, the more money it takes to pay the architectural staff and associated overhead. This is

why the design schedule/program is an important part of the proposal. It also becomes one of the main tools for guiding and monitoring the project's design process. *(Note: Some contracts defer the establishment of a design schedule until after contract award, based on the architect performing its services expeditiously with professional skill.)*

There are also construction and project schedules/programs which illustrate the estimated time allocations and sequencing for construction, and the time allocations and sequencing for both design and construction, respectively.

In the past I have used many different types of software and different levels of detail for my design schedules/programs. I now prefer to use Excel (rather than scheduling software), because of its ease of use, better graphics and general legibility. Providing too much detail in design schedules confuses the issues and does not provide the flexibility to easily accommodate the normal design processes. Rather than wasting time updating an overly detailed schedule/program and explaining to the client why it was not right to begin with, I prefer to keep things at a higher, less detailed level.

The example on the following page provides an illustration of a design schedule/program. Some comments regarding the example are as follows:

1. Using a single page is easier to follow and fits conveniently into a standard proposal format.
2. A "Concept Design Phase" has been included in the example. This phase is beneficial for many projects, because it can provide for a planning approval/entitlement process before completing an entire design; it can provide a better basis for the other disciplines to prepare their proposals *(assuming that their proposals can wait until the concept is reasonably complete)*; it allows for a client's approval of the general design direction before expending too much consultant time; etc. However, some types of projects may not benefit as much from a concept design phase/stage as other projects.
3. The first activity after having an agreement and after receiving any mobilization payments is a mobilization period. The client needs to be aware that it will take time to compile a project team. Some RFP's state, "The design work shall commence immediately upon receiving notice to proceed." This is impractical – It is not possible to know how long it will take to get any award notices and agreements, and no firm can afford to have staff idly waiting for a prospective project that may, or may not, start. *(An initial design team should be able to be assembled within one to three weeks, if the project is already on the firm's radar.)*
4. The schedule shows a number of milestones, primarily for meetings and workshops. Milestones are used to manage a project. In section 4.2 of this paper, expectations from the design team will be discussed for each milestone as part of a *work plan*. Another aspect of milestones is that they provide a way to document the anticipated number of meetings/workshops within the proposal. Additional meetings/workshops might then be considered as an additional service *(depending on circumstances)*.

5. Following each milestone workshop that includes design presentations, there has been included an activity for client reviews. Allotting time for client reviews and comments, provides a means of clearly identifying any related client-caused delays. In some cases, the design team is required to stop work until the formal review comments and approval are received. This requirement is often written into the agreement, but in some instances may be difficult to follow.

Many firms continue to proceed with their design effort during the client review periods, because they cannot afford to disband their teams and potentially lose continuity of staff. One way to mitigate some of the risks associated with the proceeding without formal client direction is to have a good understanding of the client's thinking based on the formal presentations at the workshops. However, until formal approval is provided by the client, there are risks of significant changes or of the project even going on hold.

6. Some RFP's contain specific design start and completion dates. If they are achievable, they should be included in the proposal schedule/program. A schedule/program that is tied to specific dates should also include specific holidays such as Thanksgiving, Christmas-New Year's, Ramadan, etc., that might impact the timing of meetings/workshops, reviews, etc. If the proposal is tied to durations only (as shown in the example), the program/schedule will require updating to indicate actual dates once they are known, and to include the holidays to avoid any surprises.
7. Contracts with "time is of the essence" clauses should be avoided if at all possible. This is legal language for "get it done on time, or else." Language stating, "The architect shall use reasonable diligence to complete the design services according to a mutually-agreed schedule/program consistent with good professional practice," (or similar) is better. Should this language not be acceptable, be certain that there is sufficient time provided in the schedule/program and that the time can be extended if delays are caused by circumstances beyond the architect's control.

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- > **Work Plans:** “*Work plans*” go by many names, including “method statements,” “execution plans,” “implementation strategies,” “project management plans,” “work breakdown structures (WBS),” etc. Regardless of the name or format, the intent is the same; it is a written document that breaks the overall project into smaller efforts/activities defining who is responsible for what and when. In essence, it becomes the road map for guiding the design and coordination of the project, and for verifying the required progress for the various team members.

Some client RFP's (especially from the Middle East) require a work plan as part of the architect's proposal. (It is a good practice to include them in all proposals, whether requested or not.) The format of the work pan is typically not stated, but I have developed my own format which is used for the example introduced in section 4.2. After the principles of an architectural work plan are understood, APM's may wish to evolve their own format(s) that may work better for them or their specific projects.

- > **Exclusions and Clarifications:** Equally important as stating what services are being provided, is stating what services are not being provided by the architect. This enables clients to understand those services they may need to provide, and/or it may identify services they wish the architect to add to the proposal.

There are often clarifications that need to be added to a proposal, such a detailed list of the spaces for which the interior designer (or others) is providing design services, etc. An example of potential proposal language for exclusions and clarifications is as follows:

“This proposal is based on the Architect's understanding of the project and the Architect's extensive experience with estimating the required work efforts to provide the proposed scope of services. An important aspect of determining the scope and fee is making assumptions as to what services will not be provided, which services are being provided by others, and what are some of the limits that apply to the Architect's and the Architect's Subconsultants' services. For clarification and to avoid any misunderstandings, some of these assumptions are stated in the following list.

No two projects are exactly alike, and if, based on your needs, you desire to have any of these assumptions amended, the Architect would be pleased to discuss any opportunities with you and amend this proposal accordingly.”

- Services provided for design disciplines listed in _____ as being provided by other consultants hired directly by the Client or the Client's agents
- Services not specifically listed or reasonably implied in the Architect's or the Architect's Subconsultants' scopes of services
- Translations of Architect's and/or the Architect's Subconsultants' drawings, documents, etc., into a language other than English

- Branding research and/or the development of user's brand standards
- Meetings with local authorities having jurisdiction/competent authorities (*This may apply to some international projects.*)
- Computer-generated, color-rendered, perspective sketches in addition to those listed in the scope of services
- Computer-generated fly-throughs and/or video renderings
- Scale models
- Interior design of tenant spaces
- Framed materials and/or other framed presentation board(s)
- Marketing drawings or information other than that which is provided as part of the listed deliverables
- Sustainability certification of designs per recognized standards such as LEED
- Hazardous waste and/or toxic substances engineering
- Significant revisions to the Client's brief/program
- Redesign for value engineering resulting from inaccuracies of the Client's Consultant's cost estimates
- Redesign of previously-approved designs
- More than one revision to generic BOH furniture layouts
- Selection of and/or specifying operational equipment and supplies (OS&E)
- Revisions to the design and/or construction schedule(s) due to causes beyond the Architect's control
- Providing and tracking systems and/or components and their numbering systems other than by CSI-formatted specifications
- More than one set of revisions to the model room design after being issued for construction
- More than one tender package for the Project's construction, and/or more than one tender package for the Project's furniture and furnishings procurement

- Revisions to the construction documents to accommodate Contractor-proposed changes and/or product substitutions after the initial tendering/bidding period
 - Reviews of more than four Contractors' bid/tender proposals
 - As-built documentation
 - Operations and/or maintenance manuals
 - Punch/snag listing of constructed and/or installed works designed by the Architect or the Architect's Subconsultants' in excess of prototypical areas only, and in excess of one review and one follow-up review of applicable areas
 - *Additional exclusions from sub-consultants*
- > **Contract Assumptions:** Architects often include some form of agreement comment with their proposals. This may include a copy of their standard terms and conditions and/or comments regarding their agreement assumptions/expectations. Some even include a signature line of acceptance for the client so the proposal can serve as a contract should it be accepted. Even if the client never signs a proposal, having some mention of contract expectations in the proposal can provide a starting point for the architect's contract negotiations.

2.3 Contracts

Client-Architect Agreements

Contracts state what the architect agrees to do in return for a specific compensation from the client. Contracts also include administrative items, such as insurance, notification requirements, payment requirements, etc. There are other terms and conditions that basically state what can be done if things go wrong. Reasonably acceptable legal requirements are provided in most standardized agreements, such as those produced by the AIA and FIDIC.

Some clients' attorneys prefer to amend the standard agreements or draft their own. Therefore, it is important for the architects' legal counsel to review all modified and/or unique contracts. There are also instances where it is advantageous for architects to include their attorneys in the contract negotiations.

The following is an overview of some of the contractual hot buttons that require caution.

1. Legal Counsel: If there is a new agreement format, or if the architect has any questions regarding the contract, an attorney should be consulted. If legal counsel is not involved on all contracts, they should at least be involved with the ones which have a high-risk exposure.

2. Standard of Care: For designers it can be an unwritten goal to achieve perfection. This goal is impossible to achieve; because architects are designing bespoke projects, within tight time constraints, coordinating with multiple consultants, incorporating client changes and desires, accommodating construction tolerances and contractor mistakes, etc. As perfection is not feasible, the U.S. courts have agreed that the minimum “standard of care” required of an architect is, “The Architect shall perform its services consistent with the professional skill and care ordinarily provided by architects practicing in the same or similar locality under the same or similar conditions.” Therefore, contracts should include similar language. Even if the contract includes the appropriate language for “standard of care”, there are occasionally other clauses buried in the agreement that may erode that standard. Be cautious of statements that require “100%” of anything, or “ensuring” or “assuring” that “all” of something, “insuring” or “warranting” anything, etc. (*Many of these “expressed warranties” are uninsurable.*) More acceptable language might use expressions similar to, “Architect shall endeavor to . . .”

3. Indemnification: Most clients would prefer to have all of their legal exposures allocated to others; as a result, they sometimes want the architect to indemnify them (*and anyone associated with them*) for almost anything and for an unlimited amount of money. First, architects should only potentially indemnify clients for added costs resulting from the architects’ actions, or lack thereof. Second, a reasonable limit needs to be placed on the exposure. One way this has been done is by stating that the exposure is limited to whichever is the lesser of the architect’s design fee or the professional indemnity insurance amount which is available at the time of award or judgement. Third, the indemnification should not include consequential costs such as lost revenue. Fourth, avoid the duty to pay for the client’s defense. Fifth, any indemnity claims must be based on the architect being at fault.

Another method at least one firm used to limit their indemnification exposure, was to include a contract clause that basically stated in the appropriate legalese that they would only consider compensating the client for non-betterment changes resulting from their errors and omissions after their total amount exceeded something like 2% of the construction costs. For a \$200million project that would amount to \$4,000,000. To my knowledge they never had to pay.

4. Insurance Requirements: Insurance requirements should always be discussed with your insurance provider. This often includes a review of the contract to see if there are any “uninsurable” requirements. If the client requests insurance coverage higher than the architect’s current policy limit, find out if the additional coverage is available and how much it costs. Then, if the client is willing to pay the additional premium for the higher coverage, proceed accordingly. For international work, verify that the firm’s standard policy provides sufficient coverage; also verify if there is a contract requirement to buy “local” insurance coverage.

5. Scope of Services: Scope of services has already been outlined above. Verify that the agreed-to scope of services is that which is included in the contract. Attorneys are great at advising architects regarding questionable contract clauses and language, but they are the less familiar with scopes of services – that is why the architect must review them in detail.

6. Payments: Contracts often define when invoices are to be submitted and when payments are to be made. It is important to look at the timing sequence for the following:
- How much time is allotted for a client to make a payment to the architect after the client receives an architect's invoice?
 - How long must an architect wait before issuing a formal written notification/objection to a client after the client has failed to make payments per the contract?
 - How long after the formal notification can the architect stop work? (*See discussion regarding invoicing and payments with section 2.6 below.*)

Large projects can generate salary burn-rates that run into the thousands (*if not tens of thousands*) of dollars per day. If the contract requires the architect to continue working on the project for upwards of 90 to 120 days after a payment was due, there can be a great deal of revenue at risk (*just one reason for a mobilization fee*). Other payment requirements may include the client-approval of an end-of-phase/stage submission prior to the release of payment. The worst-case scenario is when no payments will be made for a given design phase/stage until the final submission has been fully approved by whomever and whenever the client may desire. This is unacceptable.

The best-case scenario is when clients are willing to accept pro-rated monthly invoices and payments. At a minimum, in addition to an end-of-phase/stage payment, require at least one mid-phase/stage payment. A potential negotiating point would be to also require an 80% to 90% payment due upon submission of the end-of-phase/stage deliverables, and the other 20% to 10% within a reasonable time thereafter to allow time for client review and approval.

Another recommended contractual requirement is to require written notification within a relatively short time of any disputed items perceived in an invoice, and the requirement for payment of all undisputed amounts in accordance with the contract.

Even if the contract reflects an acceptable payment process, that information is not always conveyed to the client's accounting/finance department. In some countries it appears as if it is their job to hang onto as much of their employer's money as possible, and make payments only when forced to. I recommend discussing and understanding the client's internal review and approval processes as part of the contract negotiations, to be certain everyone on the client's team understands what is required.

7. Mobilization Fees: The primary reasons for a mobilization fee are to obtain a sufficient amount of the client's money to cover the architect's costs until receiving payment, and to mitigate the risks of not being paid. The risks associated with client payments are greater for new clients, clients with poor credit ratings, and international clients where the legal remedies for pursuing payments may not favor foreign firms. The amount of the mobilization fee is typically based on a percentage of the overall fee. The greater the risk the higher the percentage.

A secondary reason for a mobilization fee is to cover the risks associated with not being able to take on additional work due to having to commit the architect's resources to the project being considered. If an architect accepts a commission for a project, the firm may not have the resources to consider other possibly more profitable or prestigious work, or new projects from existing clients. If a client stops a project or fails to compensate the architect for a project without the protection of a mobilization fee, the architect has not only lost the fees from that project, but has also lost out on other potential revenue opportunities.

Another important reason for a mobilization fee is to confirm the client's commitment to the architect and to the project. If clients are unwilling to place their money on the line, it may be an indication the client is unwilling to commit or is experiencing other financial problems. This is a red flag when considering whether or not to accept a project.

There are three basic types of mobilization fees as follows:

- a. Non-refundable Mobilization Fee: This means that if for any reason (*other than due to the architect's negligence*) the client terminates the agreement prior to its completion, the architect keeps the entire mobilization fee, plus any other money due for services rendered. For accounting purposes this option is typically tracked as a distinct design phase/stage which can be recognized as revenue earnings on a prorated basis, or as may be internally agreed.
- b. Non-Refundable Advance Payment: The "non-refundable" attribute is similar to option "a" above. The difference is that this payment is allocated back to the client by deducting a prorated amount from each invoice. (*Note: It is best to use the same straight percentage of the fee for all phases/stages in order to simplify the invoicing calculations and payment processes.*)
- c. Refundable Advance Payment: This is the same as option "b" above, except that if the project is abandoned for any reason, the unused portion of the advance payment is applied to any outstanding architect's invoices and the remainder is returned to the client.

When proposing and negotiating mobilization fees it is best to start with option "a", and if required move on to options "b" and then "c" as may be appropriate. Also, be certain to incorporate mobilization fees for the applicable subconsultants.

8. Provision for Changes: The contract must include a provision for changes to the contractual scope of services, fees, schedule/program, etc. The change process needs to be clearly stated and understood by the client and architect.
9. Suspension of Services: Contracts typically have a provision for the suspension of services by the client. That provision should also include equitable payments to the architect for services already rendered, and potential additional closeout fees. There can also be a remobilization fee should the project ever be restarted.

10. Authority versus Responsibility: This is basic business sense. Do not agree to take on the “responsibility” to do anything without the commensurate “authority.” Responsibility without authority is asking for failure. As an example, if the architect is being asked to be responsible for coordinating the client’s design consultants but has no authority to provide leverage (such as approving their invoices) it may be difficult to fulfill that responsibility.

As a personal example, I was once to be responsible for coordinating with the client’s MEP and structural consultants, but I was not permitted to communicate directly with them. In other words, the client was not willing to relinquish the authority required for me to execute my responsibility.

11. Designing to a Budget: Designing to a “client’s budget” has been a part of the standard AIA agreements, and should be a fairly well understood concept in the United States. My comments are aimed more at international work where the rules of the game are not always as well defined.

First, when and how is the budget established – is it realistic – is it arbitrarily low in an attempt to “squeeze” the designers – does it include adequate contingencies – etc.? Second, who is responsible for the cost estimates? For international work it is usually the client’s cost consultant or quantity surveyor. Third, how are cost overruns resolved – value engineering? (*Refer to value engineering discussion included in section 2.8 below*)

12. Ownership of Design Documents: Some clients want to take full ownership of the architect’s design documents to use however they please, and do not want to allow the architect to reuse any of the information on those documents for any other projects. This is unacceptable. Many aspects of a set of drawings are utilized on multiple projects. What might be accepted is for the architect not to utilize the same overall design concept for another project located in the same region without the client’s approval. As with all contract clauses, the wording needs to be crafted with the appropriate legal advice.
13. Governing Laws: Will the contract be governed by the state (or country) where the architect’s office is located, or will it be governed by the state (or country) of the client or the project? For international projects this can create its own risks.
14. Project Delivery Strategy: The scope of services and their costs may vary considerably based on the project’s construction delivery strategy. There are various delivery options. The traditional design-bid-build model with one general contractor differs significantly from a fast-tracked project or one with a construction management model with multiple contractors, etc.

Be specific regarding which project delivery strategy is being proposed for inclusion in the agreement. This provides for compensation adjustments to be considered if that strategy changes. (*Note: If the architect is providing design services only, and an architect-of-record is providing the construction documents, then the delivery strategy might not be as impactful to the design architect.*)

15. Construction Phase Services: The contract should clearly delineate the role and what is expected of the architect during construction, including those services excluded from the architect's scope. *(Refer to section 4.7 below for further discussion of construction phase services.)*

The contract should also clearly state that the architect is not responsible for the construction means, methods, sequencing, techniques and procedures, including shoring, temporary bracing and scaffolding; nor is the architect responsible for the contractor's site safety. The Owner-Contractor Agreement should also include language to indemnify the architect against the contractor's negligence and/or misconduct.

Subconsultant Agreements:

Some comments regarding subconsultant agreements are as follows:

1. The Client-Architect Agreement ("Main Agreement") must be included *(typically without divulging the architect's fees)* as a part of the subconsultant agreement. *(This is often referred to as "bound-as-bound.")* The subconsultant agreement must state that the subconsultant is obligated to the Main Agreement as may be applicable. Main Agreements and subconsultant agreements are to be drafted with parallel/complementary language so they do not contradict each other. *(The AIA standard agreements have already been crafted to reflect this flow-down concept and do not conflict with each other.)*
2. It is sound professional practice to append all of the subconsultant scopes of services to the Client-Architect Agreement to avoid any confusion to the client regarding agreed subconsultant services.
3. Architects sometimes include a "pay-when-paid" clause in their subconsultant agreements. This means the architect is not obligated to pay the subconsultant until the architect receives the applicable payment from the client. *(Note: This practice is illegal in some countries, and that is why in some countries most of the consultants are under direct contract to the client.)*

2.4 Team Staffing

Tasks and Skillsets:

To organize a project's staffing, it must be divided into individual tasks, and those tasks assigned to specific staff members.

There are many times that I have assisted with projects that have been having "difficulties." The main problems are often that they have not divided the project into manageable tasks, and they do not have the appropriate staff to address all of those tasks. In other words, the skillsets of individual staff members must be capable of successfully completing the properly assigned tasks. (Note: Excessive staff overtime is often an indication of poor management and/or poor staffing.)

If architects' career paths have taken them to the point that they are project managers, or being considered to become one, they should already know what tasks need to be done to complete a project and in which order. When it comes to staffing a project, one of the first things that must be considered are the required tasks. An effective tool to facilitate this process is the work plan. *(See section 4.2 below for information regarding a work plan.)*

The next step is to compile a list (either written or mental) identifying the persons with the skillsets required to complete the tasks within the given time frame. Time is important. If there is enough time, the most efficient way to complete a project is to use as few people as possible to minimize the need for in-house coordination, etc. If the available time is insufficient to utilize a compact team, the next best thing is to use the more qualified people to guide the less qualified.

Unless there is a history of working with the available staff members, it can sometimes be difficult to assess their skillsets. Longevity may not always be a good indicator of an individual's abilities. Often, it takes time to understand each person's capabilities. The APM must monitor the staff to ascertain that they understand what is expected of them and that they are working at an acceptable level. This process may also require some subtle shifting of staff assignments to help optimize the team's productivity.

Just because a person lacks the skillset required to complete a certain task, does not mean that they cannot be useful if they can be aligned with tasks compatible with their skillsets. When under pressure to get the work done efficiently, it may be necessary to reassign tasks based on staff skillsets. This might upset some staff members who may feel that they are being demoted.

Managing people would be easy if it were not for the people. Everyone has a personality, and not all personalities work smoothly together. For example, I have a low tolerance for what I refer to as "incompetent arrogance." This applies to people who think they know everything but are making mistakes on a regular basis. These people can become a morale killer for the rest of the team. On the other end of the spectrum is the unassuming professional who plows ahead in a straight line with few mistakes and few comments.

From back in the days of hand drafting, I especially remember an architect I worked with who picked up his pencil at 8:00 a.m. sharp, set it down at noon, up again at 1:00 p.m., and down again at 5:00 p.m. He seldom spoke to anyone but me, but he was probably one of the best draftsmen and technical architects I have ever had on any of my teams. During a recession, management had picked him as one of the people to lay off – primarily because his personality made it difficult to appreciate his skills. Fortunately, I was able to convince them that he was essential to finish my project.

Mentoring:

As architects we have a responsibility to the profession and our firms to encourage staff members to grow in their professional knowledge and abilities. One of the most effective ways to mentor employees is to team them up on a project with more experienced staff members, who can show them how things can be done. This allows both sets of employees to learn – one is learning technical skills, and the other management skills.

Another means of encouraging learning is to explain the “whys” of doing things. Staff are then able to learn for themselves, to question things, and to grow in their knowledge of the design, technical, and documentation aspects of a project. This also provides an opportunity for the APM to better understand the staff and to develop alternative strategies for executing a project. Both the staff and the APM should always be on the lookout for better ways of doing things.

Some offices have formal mentoring programs where they assign each new employee to a mentor to help guide them through the company’s processes and to advocate for the staff member to obtain growth opportunities. Employees should also be encouraged to participate in continuing education courses, whether through in-house classes or other sources. (AIA, NCARB, and others offer some excellent continuing education programs.) Young architectural graduates should also be encouraged to study and obtain their licenses.

Travel experiences can also be invaluable. Some companies even award study-travel scholarships as bonuses. Another mentoring opportunity is for staff to travel for business, including time with a firm’s principal and attending client and consultant meetings (*Note: Encourage employees to piggy-back weekends into their business travel, so they have time to experience their destinations.*) One of the goals of a good mentoring process is to train those being mentored into those who are doing the mentoring.

Project Management Evaluation:

Timely evaluations of the project management staff are critical for the APM’s professional growth. The following list provides a tool for evaluating project management staff. Those persons being evaluated are to do a self-evaluation using the list, prior to a focused, evaluation work session with the appropriate management representative(s). The item titles are purposely left somewhat undefined, so that the persons being evaluated can express their thoughts regarding those items during the formal evaluation sessions. Their explanations can help guide the evaluation and help introduce mentoring opportunities for both the project manager and the senior management representative(s). (*Note: This is only a template to help others develop their own project manager evaluation process.*)

Project Manager Evaluation Form

Project Manager:

Reviewer(s):

Review Meeting Date:

Consolidated Evaluation Form Date:

Evaluation Type:	
<input type="checkbox"/>	PM's Self-Evaluation
<input type="checkbox"/>	Management's Evaluation
<input type="checkbox"/>	Consolidated Evaluation

Evaluation Scale

1	Novice. This activity/skillset is completely new to me.
2	Partial understanding or competence. I have a basic understanding of the requirements but still require support.
3	Average understanding or competence. I have a fair grasp of the requirements and its application.
4	Above average understanding or competence. I have a strong grasp of the requirements and could easily apply it in a variety of contexts.
5	Expert. I have mastered this subject area, and I could teach it to others.

Proposals

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments	
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5		
Evaluating RFP's														
Understanding Project Organization														
Drafting Scopes of Work														
Establishing Fees														
Evaluating/Developing Schedules														
Managing the Proposal Process														
Compiling & Submitting Proposals														

Contracts

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Contract Types													
Standard of Care Reviews													
Liability/Indemnity Reviews													
Legal Reviews													
Sub-consultant RFP's & Contracts													
Scopes of Service / Phases													
Change Process													

Financial Interface

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Project & Budget Setup													
Project Monitoring													
Time Sheets													
Invoicing & Payments													

Staffing

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Staffing Estimates													
Identifying skill sets													
Monitoring Progress													
Evaluating Performance													
Mentoring													
Relationship Skills													

Scheduling

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Scheduling Software													
Schedule Drafting													
Incorporation of Consultants													
Monitoring Progress													
Meeting Deadlines													
Mitigating Delays													
Minimizing Overtime													

Design Management

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Work Plans													
Interface w/ Designer(s)													
Coordination with Consultants													
Programming/Brief Develop.													
Company Standards													
Quality Control													

Technical Management

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Work Plans													
Sheet List/Cartoon Set													
Coordination with Consultants													
Construction Documents													
Construction Budget													
Company Standards													
Quality Control													

Client Management

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Point(s) of Contact													
Relationship Skills													
Business Issues Management													
Change Control													
Invoicing													

Communications

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Email & Telephone Protocols													
WeChat & Similar													
Filing / Information handling													
Client Meetings													
Design Team Meetings													
Sensitive Issues													

Construction Administration

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Experience													
Team Organization													
Responsibilities/Roles													
Site Visits													
RFI's													
Submittals													
Construction Change Process													
Contractor Pay Requests													
Project Close-Out													

Personal Development

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Continuing Education													
Travel													
Other													

Company Development

Activities/Skillsets	Experience		Self -Evaluation					Management Evaluation					Comments
	Prior	w/ Us	1	2	3	4	5	1	2	3	4	5	
Committee Participation													
Special Reports													
Office Contributions													
Mentoring/Teaching													
Other													

2.5 Accounting Interface

Project Setup:

All new projects being considered for a proposal require a project number and accounting support. It varies between companies, but one standard convention is for the accounting/finance department to assign a project number at the beginning of the proposal process and track all proposal-related efforts as a separate item, such as “business development.” As part of the project setup, either the accounting/finance department, the project principal, or the APM informs the IT department to establish a digital file template for the project.

Most firms have a project setup/kick-off form that the principal and/or APM completes, updates and sends to accounting/finance. Information typically included in the form is as follows:

- Date (*of setup form submission and/or its most recent amendments*)
- Space for a project number (*provided by accounting/finance*)
- Project name
- Project description (*building types, size, etc.*)
- Project location (*address when known, city, state, country*)
- Project leaders (*principal, project manager when known, designer when known, project architect when known*)
- Anticipated sub-consultant disciplines (*when known*)
- Client Information (*Name, legal address, contact person(s), submission address, phone number(s), email address(es), new or previous client status, etc.*)
- Type of fee (*lump sum, cost-plus*)
- Fee currency
- Invoicing Information (*when available*)

Project Budgets:

After a fee has been determined and before a project is activated, an overall project budget needs to be established. It is based on the fee proposal which may require further refinement for use by the accounting/finance department. The detailed budget breakdown provides the “Rosetta stone” between project management and accounting. An example of a potential budget spread sheet is shown in figure 2.5.1.

Some additional comments regarding a budget spreadsheet are as follows:

- “Phase/Stage” titles should be the same as in the agreement.
- If space is not available, include only the consultant totals and provide a separate consultant budget spreadsheet listing all subconsultants per phase, etc., similar to the spread sheet in figure 2.5.1.
- If multiple offices from the same firm are involved, set up separate budget columns for each discipline for each office, including expenses.
- Add rows for projects with multiple components and assign an appropriate prefix or suffix to the phase code number so the different components can be tracked separately. As an example, a large project may include multiple apartment buildings, a hotel and a retail mall. By having specific budgets for tracking each component separately, adjustments can be made if one or more components are put on hold and/or do not follow the same schedule/program. (*Note: A component breakdown of the fee must also be included in the Client-Architect Agreement.*)

% Fee	Phase/Stage		Labor Budget		Expenses Budget		Totals
	Code	Name	Arch.	Contingency (Optional)	Consultants	Non-Reimbursable	
	00	Mobilization					
	01	Pre-Design					
	02	Concept Design					
	03	Schematic Design					
	04	Design Development					
	05	Construction Documents					
	06	Bidding/Tendering					
	07	Construction					
	08	Record Drawings					
	09	Post Construction/Warranty					
	10	Contingency (Optional)					
100	NA	Totals (Includes mobilization, excludes advance payments)					

2.5.1 Example Budget Spreadsheet

- Important:** A true “mobilization” fee is tracked as a separate phase/stage within the budget and added to the total. If it is an “advance payment”, the payment is left in the phase budget line, but the advance payment line is not added into the total – this would be counting it twice, because a prorated portion of the advance payment is already included in each phase.
- Contingencies:** A contingency budget can be established with any additional fees available after allocating appropriate fees to the various project budget items. The contingency is treated similar to a phase/stage line, and is an excellent way to mitigate financial risks. The goal is to not spend the contingency unless events do not go as planned and the applicable budget is exceeded. To safe-guard the contingency, it is only to be used if agreed by both the project principal and APM. This dual approval is recommended because there are so many interests anxious to make revenue earnings look better than they might actually be.
- Mobilization Fees:** In its own way, a pure mobilization fee acts a bit like a contingency, except that it is often needed to complete budgets for each individual phase/stage and discipline. The mobilization needs to be pro-rated back into the appropriate phase/stage and discipline allowances as revenue at the end of each phase/stage.

Timesheets and Expense Reports:

It is part of the APM’s responsibility to be certain that timesheets and expense reports are filled out on time and correctly. Everyone’s time must be charged to something, and without charging it to the proper project, phase, discipline, change, etc., it is impossible to tell if a project is on track to achieve its targeted profit. Another reminder is that all expenses need to be identified as being either reimbursable as per the contract or non-reimbursable.

Project Status Reports:

Most companies produce periodic financial reports for all of their active projects. These reports can illustrate many different metrics, but those most relevant to the APM are the project status reports. Each report identifies how much of each project's budget allowances have been used through the report period. This gives an indication of where the project should be with respect to its completeness. The problem is that the reports reflect only what is on the timesheets and expense reports, and do not always indicate the actual work that has been accomplished on the project's design and documentation.

In an ideal scenario, both the status report and the estimated level of completeness should be within a few percentage points of each other. It is important to identify any conditions where the budgeted efforts spent are significantly in excess of the project's state of completion. Then the APM and/or principal can develop strategies for mitigating the associated risks.

Estimating the amount of work actually needing to be done can be challenging. When drawings were hand-drafted, there was an assumption that each construction document drawing sheet took about 40 hours to produce. It was a simple matter of looking at each sheet and estimating its level of completeness, then calculating the total completeness of the combined drawings. Computer Aided Drafting (CAD) has voided that method, mostly because the development of information for one sheet can often impact the development of other sheets.

To estimate the level of completeness of a set of drawings one must first start with a vision of what the final products/deliverables should include. Then the missing information can be better assessed. Refer to section 4.4 for a presentation regarding sheet lists, which are useful for identifying what is included in the finished product. *(Caution: Do not be too overly optimistic with the estimates. It is sometimes amazing how much effort it takes to complete what appears to be the last "10%" of a project.)*

Some companies also require their principals or office directors to provide consolidated reports for all of their projects. Rather than attempt to present all of the options these reports might take, this paper is just noting their existence and the potential requirement for the APM to provide a few more estimates and/or calculations to their individual project reports.

Project Name:		Estimate Date:			
Project Number:		Estimator:			
Phase/Stage	Basis	Architecture % Complete	Interiors % Complete	Landscape % Complete	Weighted Total % Complete
Pre-design	% Total Labor				
	% Estimated				
Concept Design	% Total Labor				
	% Estimated				
Schematic Design	% Total Labor				
	% Estimated				
Design Development	% Total Labor				
	% Estimated				
Construction Documents	% Total Labor				
	% Estimated				
Bidding/ Tendering (Procurement)	% Total Labor				
	% Estimated				
Construction	% Total Labor				
	% Estimated				
Totals	% Total Labor				
	% Estimated				

2.5.2 Example Project Status Report Spreadsheet

2.6 Invoicing & Payments

There are two primary types of invoicing cycles. One is *monthly billings*, and the other is *milestone billings*. The preference is for billing monthly based on a prorated fee over a given time. An advantage of monthly billings is a more consistent cash flow. However, even with monthly billings, some clients want to retain a given percentage of the fee (typically between 10% and 20%) until the final phase/stage deliverables have been approved. Many international clients prefer milestone billings, because then they can verify that they are receiving a product in return for their payments.

The worse-case scenario is the client who does not want to pay for anything until the design is 100% complete and approved by whoever, whenever. This is unacceptable. A compromise that can be considered is to have a milestone payment of around 40% (no questions asked) about half-way through the design phase/stage; then a second 40% payment when the final deliverables are submitted; and then a payment for the last 20% after the deliverables have been approved (within a reasonable time).

Some ways to mitigate the risks associated with payments include the following:

1. Executed Contracts: Do not do any work without a signed contract. In many states in the U.S., this is the law. *(Note: Originals of signed contracts are often stored in the accounting/finance department, but a digital copy should be kept in the active project files so the team can have access to the “rules of the game.”)*
2. Know the Client’s Invoicing and Payment Processes: Clients often have their own monthly payment cycles. *(As an example: Invoices received by the 10th of the month will be processed by the end of the month. All other invoices will wait until the next month to be processed.)* It must be known if the invoices are to be formatted in a special way, include any special information, to whom they are to be addressed, etc. If possible, find out the client’s internal processing and review procedures. This can help identify where any delays are occurring. All of the client payment requirements should be known before the contract is even signed *(unless one does not mind using the first invoice as a guinea pig to discover all of the requirements and to see how long it can take to get paid).*
3. Mobilization Fee / Advance Payment: If the agreement requires a mobilization fee or an advance payment, do not start work until it is received. *(I do not know why some architects think that they cannot enforce this for fear of offending the client. If the clients have already signed the agreements – payments of the required mobilization fees or advance payments should not be new news to them. This sets a precedent that payments are important and directly tied to the performance of the work.)*
4. Communicate with the Client: Let the client know when invoices have been sent and when payments are due and overdue. If late payments are accepted without written challenge, the architect’s acceptance of their delay might be assumed to amend the contract by mutual consent. *(See additional communications recommendations with item 7 below.)*
5. Monthly Statements: The accounting/finance department should be sending monthly billing statements for any outstanding invoices which have not been paid. *(All invoices to the client are to be approved by the APM prior to being sent to the client.)*
6. Work Stoppage: Be prepared to use strategic work stoppages and/or withhold deliverables to leverage the receipt of delinquent payments. *(Note: One way of providing deliverables when not being paid is to deliver low-resolution PDF’s (or similar) so the client can verify the work has been done without having a fully usable product.)*
7. Collection Response Strategy: Every company should have a standard response strategy for addressing overdue payments. Typically, the initial responses are firm, but not overly so. Then as the length of the delay is extended the pressure should increase proportionally. A potential example is shown below: *(Note: This is an example only, and it needs to be reconciled with the contracts and with each firm’s business philosophy.)*
 - **0 to 30 days**: The APM, or project principal, phones the client and informs him/her that the payment is overdue, and asks when it can be expected.

- **31 to 59 days:** The APM, or project principal, continues to phone the client respectfully reminding the client of the payment terms and due dates.
- **60 to 84 days:** Company executive team meets with APM, project principal, etc., to evaluate the situation and potential strategies, including who will contact the client to find out what is going wrong, when the payment can be expected, and that the architect has the right to stop work.
- **85 to 90 days:** The project principal sends a written notification to the client advising that if the payment has not been satisfied within five days all work on the project will stop, no more deliverables will be issued, no more project trips will be made, and there may be a remobilization fee and time required to restart the project. In the meantime, all work on the project commences the shut-down process.
- **100 days:** A five-day demand letter is sent to the client advising that if the payment has not been received within another five days, the account will go to a collection agency/solicitor.
- **105 days:** If no response has been received within the five days of the demand letter, the account is sent to a collection agency/solicitor, and the amount is recorded as a bad debt account receivable.
- **110 – 365 days:** If the collection agency/solicitor has determined that the debt is non-collectable or has not been collected within one year, the account receivable is written off as a bad debt.

2.7 Client Management

Over the years I have had the opportunity to work with some very fine clients, and some not so fine. At least one client ended up in prison (not through anything related to my involvement). There have been clients who appreciated my services and a few who did not.

Only once have I recommended that an architect stop working on a project and leave a client. The CEO of that architectural company had asked me to attend meetings in London with a troublesome client from another country. The meetings were held with the client's CEO, project manager, and others. Things appeared to be going well at the meetings. The client's CEO accepted most of the designs and seemed to be pleased with the design direction. However, the next day when I met with the client's project manager, he stated that he disagreed with all of the approvals from his CEO and wanted us to start over. Not only that, he wanted to decrease the fee, increase the scope of services, and decrease the design time – not to mention that he was not paying the architect.

When I returned to the U.S. the appropriate letter was sent to the client stating that the architect would no longer be providing services after the milestone delivery in four weeks' time; that the architect was proceeding on the basis of client's CEO's approvals, and that the architect expected to be paid in full for its services.

One of the things that went wrong with that project was that the architect broke rule number 1 – the work was started without a contract. About four years later the same client (different project manager) paid the outstanding invoices and hired the firm to complete the same project.

The managing of clients is often times as much a talent as it is a skill that can be learned. The following are a few guidelines that may be helpful to APM's wanting to improve their client-interface skills.

1. Personalities: There have been many books written describing different personality types. The following comments are limited to a couple of personal observations. First, personalities are not going to change – so if there is a problematic personality either do not get involved or learn to accept it, understanding that there are ways of staging interactions to optimize the relationship. Second, there are some personalities that have a tendency to clash. In those cases, it may be appropriate to change the project's staffing so that the design team's personnel interfacing with the client are more compatible with the client's personality.
2. Professionalism: Above all, keep interactions professional and do not allow interactions to disintegrate into an emotional level with personal assaults. This is especially true with respect to the written record. Anything in writing can be used as evidence in building a case for a claim. One does not want to provide a smoking gun to illustrate that your team exhibited an abusive attitude.
3. Integrity: *(In my opinion, integrity is nonnegotiable.)* Do not do anything to jeopardize a client's trust. This includes promising things by a specific time just to make the client happy, and then not delivering. *("promise low, but deliver high")* U.S. companies doing international work are also bound to comply with U.S. laws and regulations regarding various transactions and practices with foreign persons, entities, and/or governments, including the retention of foreign consultants and/or the export of products, technology, and services to foreign countries.
4. Performance: Consistently meeting project deadlines with the correct information and project understanding develops client confidence and can overcome a multitude of sins.
5. Flexibility/Adaptability: Many of the guidelines found in this paper and elsewhere in life only provide templates which need to be edited to meet the specific conditions. Each project has its differences that require both one's formal and intuitive "templates" to be edited accordingly. What is more important than following specific methodologies is to understand the parameters and drivers behind them, so the methodologies can be modified as may be appropriate.

Differing terminology can sometimes be another opportunity for flexibility. A client (or region of the world) may use terminology that is different from what one is accustomed to. Rather than demanding that familiar terminology be used, it is sometimes better to define the other terminology so there is no confusion, and then use it.

6. Culture: People are people all over the world. They have the same concerns about family, friends, work, etc. However, there are still cultural differences. To many Eastern cultures “saving face” is more important than being correct or sometimes even being honest. So, one should be careful not to embarrass them, especially in front of others. Some cultures use loud “argumentative” voices when discussing almost any topic. It is important not to be offended by them. A recommendation is to learn and respect some of the cultural differences before starting to work in a new region of the world.

Language is another item related to cultural differences. Many of the international clients and consultants may have English as a second (or third) language. Be forgiving of their grammatical and vocabulary mistakes, and if something does not make sense do not hesitate to ask for a clarification.

Another key to the successful management of clients is managing their expectations. One area of client expectations that sometimes requires special attention is the level of interdisciplinary coordination to be expected at each design milestone. Clients sometimes want to require that all design disciplines be fully coordinated at each milestone. *(This is especially true of international work in some parts of the world.)* This is another expectation that is not possible to achieve *(unless the client is willing to extend the schedule/program another month for each milestone and is willing to increase the architect's fees accordingly)*. The whole purpose of design phases/stages and milestones is to facilitate the sequential evolution of the design, and part of that evolution is the interdisciplinary coordination.

Initially, the architectural design is ahead of those from the other disciplines. If the architect's work was required to stop to wait for the other disciplines to catch up, the architect's design schedule would be significantly impacted *(and it would be difficult to reassign staff while the waiting takes place)*. Then, after the revisions by the other consultants had been made, the architect would need to revise the architectural drawings to reflect any revisions required to coordinate with the other disciplines; then the other disciplines would need to make any required revisions to coordinate with the architect's coordination revisions; etc., etc.

The proven process is for each discipline to put forth their best efforts to bring their designs to an acceptable level of development for each milestone. Then, at the milestone workshop (and during reviews following the workshops) the coordination issues can be identified and addressed as applicable to the level of development for each milestone. The process is designed so that the magnitude of the coordination issues becomes less as the design progresses. Then, by the time the project's construction documents are completed the project is substantially coordinated.

Other areas where the client's expectations often need to be managed include DD scope of services (see *related discussion in section 2.2 under "Architect Proposals/Scope of Services"*) and the architect's role during construction. The architect's construction phase services need to be clearly defined and understood as part of the Client-Architect Agreement negotiations. The client needs to be especially aware that in most instances during the construction phase/stage the architect is required to act with impartiality and fairness in administering and enforcing the contract, which in some instances may incorrectly give the appearance of favoring the contractor over the client.

2.8 Change Management

Client Interface:

Requesting changes (*especially those requiring fee increases*) to design contracts can be a sensitive issue with some clients. The thing to remember is that this is "business" and not personal. Most clients can understand and appreciate that. As a part of doing business, architects owe it to their companies as places of employment for themselves and their fellow workers, to address all applicable scope changes with the client.

For problem clients, it is sometimes better to leave the client-change-interface with the project's principal, so that the APM does not have to become involved in the associated political frustrations and jeopardize his/her effectiveness as an APM.

One thing that I like to do to facilitate the change process is to be up front with the client and establish/negotiate the process as part of the design interface manual that is done prior to starting the design process. (Refer to section 2.11 of this paper.) That way, there is an agreed change process established based on the contract, and when the occasion arises, there is less confusion about what is to be done.

An example of language that has been used for the applicable section of a *project design interface manual* is as follows:

"Changes are an inevitable part of projects similar to this one. It is assumed that the Consultants and Subconsultants have allowed for a certain amount of change that is a typical part of the design coordination process. This section addresses the management of proposed changes initiated by the Client, User and/or the Client's Subconsultants and Agents, or other third parties beyond the control of the Architect that impact the Architect's and/or its Subconsultants' ability to implement a proposed change without impacting design fees and/or schedule.

In accordance with Article 19.4 of Section C-2 General Terms and Conditions of Contract (*reference specific clauses to tie back to the Agreement*), the Architect will be identifying and managing the design change process endeavouring to minimize the impact of any changes and to provide an audit trail of all proposed variations."

Sources/Types of Changes:

The first step in understanding the process of managing changes is being able to identify and understand the sources/types of changes and their ramifications. The following table presents an overview of the typical sources/types of changes. (*Caution: Scope changes can “creep” into existence and the architect held responsible by the architect taking on tasks not included in the written contract.*)

Sources/Types of Changes	Comments
<p>Client Changes:</p>	<ul style="list-style-type: none"> • Architectural programs/briefs define the agreed scope of what is being designed – it becomes the “line in the sand” with respect to programmatic scope changes requested by the client. • Other client changes involve any changes to the design team’s scope of services as defined in the contract. • Clients’ verbal comments can fluctuate and be disclaimed, but if a design proceeds according to written directions – and the client later changes his/her mind, it is a potential scope change. • The later in the design process a client makes a change, the greater the potential impact of that change to the design team. • Client changes can not only impact a design team’s person-hours, but they can also impact the design schedule/program.
<p>Operator/User Changes:</p>	<ul style="list-style-type: none"> • Operator/user changes are similar to client changes, because they typically require client approval. • If there is to be a specific operator(s), the sooner they are onboard and their reviews are built into the schedule/program, the less risk they pose to the project’s design.
<p>Coordination Changes:</p>	<ul style="list-style-type: none"> • The vast majority of changes made to a design are made by the architects and other members of the design team. This is the essence of the design process – starting with a concept and then modifying it to make it work and to be coordinated with others.

	<ul style="list-style-type: none"> • However, coordination changes due to the late arrival of information from the client’s consultants are not always part of the “normal” process.
Design Opportunities:	<ul style="list-style-type: none"> • Sometimes design projects have unique opportunities not included in the original scope. These opportunities may add value based on the project’s location, site, theming, architect’s and/or client’s new ideas, etc. • Before presenting these opportunities, the architect must know how their design may impact the design team’s fees and schedule/program, and include that information in the presentation to the client.
Value Engineering Changes:	<ul style="list-style-type: none"> • Value engineering as used here are changes required to reduce the project’s construction and/or operating costs while maintaining an acceptable level of quality.
Regulatory Changes:	<ul style="list-style-type: none"> • Changes required to comply with <u>existing</u> codes and/or regulations. • Changes required to comply with <u>new</u> codes and/or regulations.
Construction Phase Changes:	<ul style="list-style-type: none"> • Construction phase changes to the Client-Contractor Agreement are discussed in section 4.7 of this paper. • Changes to the Client-Architect Agreement are the same as for other design phases/changes

Scope Changes:

All of the sources/types of changes can be further classified as being either contract “*scope changes*” or as “*normal changes*.” *Scope changes* are changes to the contracted scope of services. They reflect services that are either added to or deleted from the design contract. As such, they often trigger changes to the design fees and/or schedule/program. *Normal changes* are assumed within the contracted scope of services without a need for any changes to the architect’s fees and/or design schedule/program.

Client and operator/user changes are typically classified as scope changes. There are also times when the late arriving information from the client’s other design consultants can impact the rest of the design team’s ability to complete the project on schedule, and may also require

additional person-hours to integrate their design information out of sequence. This late arriving information from the client's consultants may then become a scope change.

There are instances where "design opportunities" may become scope changes if they require increased work efforts by the architect or by any of the architect's subconsultants. In some instances, value engineering can also be a source of scope changes. This is discussed further under the "value engineering" heading below.

Meeting existing regulatory requirements cannot be considered as a scope change, because that is the design professionals' responsibility. Governments entrust licenses to design professionals who they hold responsible for protecting the lives, safety and wellbeing of their citizens with respect to the design of the applicable projects. As such, the licensed design professionals are required to meet all applicable statutory codes and regulations without receiving additional compensation.

However, there is one exception where regulatory compliance may potentially be considered a scope change. That is when a new code and/or local interpretation change occurs in the later design phases/stages of a project. As professionals, we are expected to be knowledgeable of the regulations in place at the start of a project, but we are not necessarily required to be clairvoyant to predict new regulations and/or interpretations that may be implemented during the design period.

As an example, I had submitted a set of construction documents for permitting a project in Orlando. While they were being reviewed, a new Florida requirement for accessible toilets was established. It required lavatories/wash basins to be added to each wheelchair-accessible stall, which in turn required the stalls to be widened to avoid conflicts with a wheelchair side approach to the water closets (or something similar to that). It may not sound significant, but the project had some rather large toilet facilities and accommodating the extra widths required considerable additional work by the architect, interior designer, MEP engineers, etc. In this case, the client agreed to the additional service as being a change for which the design team had no responsibility for causing and had no substantial prior knowledge.

Normal Changes:

The very nature of the design process involves a continuous flow of changes, the majority of which are considered "normal changes." These *normal changes* occur as architects and the other design team members are searching for options that best optimize the design and the coordination between disciplines. The normal changes made during the initial design phases/stages may be fairly significant, but the scale of the changes decreases as the design progresses. A primary reason for design phases/stages and milestones is to control the decisions/approvals to manage the *normal changes*.

The types of changes typically considered as "normal" include the following:

- Developing the design in-house

- Coordination within each firm and between disciplines (*in normal sequence*)
- Design opportunities (*which do not significantly impact scope*)
- Accommodating existing regulations
- Value engineering (*sometimes – refer to discussion below*)

Design changes categorized as *normal* are typically ongoing and too numerous to track – so it is often a waste of time and money to track them. The significant changes should be documented by default as part of the milestone workshop documentation process.

Value Engineering (VE):

VE is intended to be the process by which the design team seeks to provide the best design options for the project taking into consideration the project's budgets, design brief/program, initial/capital costs, operating/maintenance (life-cycle) costs, functionality, availability of materials, constructability, environmental impact, aesthetics, etc. The VE process is most often requested by the client when a project is going over-budget. However, some clients (primarily government and international) will require formal VE exercises throughout the design process. A caution is that VE is sometimes used as a means of “managing” the design team, and potentially changing the scope. (*I have experienced this on international projects, especially where the client was unwilling to share the budget with the design team.*) VE can lead to a scope modification when there is a requested change to an approved design that was previously estimated to be within budget. Another instance where a VE item can become a scope change is when it is a result of an estimating error by the client's cost consultant.

To help mitigate the risk of misunderstandings with a client, it is best to define the budgeting and VE processes in the architect's proposal and have that language included in the contract. The budget and VE parameters need to reflect manageable processes which place the responsibilities with those who have the appropriate authorities and abilities. Potential language may be similar to the following:

“The Architect will design to the Client's construction budget which is to be commensurate with the Project's size (area program) and the Client's vision (quality and perception). The Client's Cost Consultant (*or Quantity Surveyor or Construction Manager*) will be the ‘guardian’ of the construction budget. The design team will rely on the Client's Cost Consultant's estimates as the basis to evaluate the construction costs of the designs and to maintain the budget. (*Note: This will need revising if the architect is providing the cost estimating services.*)

The first applicable construction cost estimate is to be based on the final concept design, and then it is to be updated with each successive milestone design effort. The Client's approval to commence to the next design phase/stage must include an acknowledgement that the Project is within budget, or the estimated cost reduction required to be within the budget must be provided. (*Typically, to benefit the schedule, the Client will rely on the cost estimate from an intermediate design milestone of the just-completed design phase/stage as the basis of the approvals.*)

If a Project's estimated construction cost exceeds the budget, the Client, Cost Consultant, Architect and applicable design consultants will use a portion of the milestone workshop to propose and discuss potential options for reducing the Project's costs. Options which appear to have merit will be investigated further to verify their estimated cost savings and design viability, so that the Client can make informed budget decisions."

The most effective way of providing VE is on an on-going basis, utilizing the design professionals' experience and judgement as part of their routine design process without formal documentation of the rationale for the thousands of design decisions being made. The architects and their subconsultants should strive to design and select design elements, systems and products which in their professional judgement provide the best value for the project.

An important aspect of VE is identifying optional ways of resolving design issues. These options may require further cost analysis to help with their evaluation. The options need to be clearly defined and presented to the client's cost consultant to estimate the comparative costs. *(This service is to be included in the clients' agreements with their cost consultants.)*

Scope Baseline:

Without an established baseline, it is difficult to determine when and where scope changes occur. If not managed properly, it is sometimes difficult to keep the scope clearly defined. The first places to start defining the scope are in the RFP and in the proposal, and then be certain there is a clear understanding stated in the contract. The APM requires an ingested knowledge of the scope of services so that the complete services can be provided, and so that potential scope changes can be identified when they occur.

One way to help establish a baseline for the project's scope and size is to have a complete "design program/brief." A preliminary *area program* is not a complete *design program/brief*. A complete *design program/brief* typically includes a statement of the client's expectations, a more detailed breakdown and verification of areas, required functional relationships, site constraints and opportunities, a budget, etc. *(Refer to section 3.2 for additional discussion of the design program/brief.)*

The sooner the complete *design program/brief* is established in writing and approved by the client; the sooner there is a solid baseline to design to and to identify changes against. *(Note: This is one of the objectives to be achieved during the concept design phase/stage.)*

In addition to changes to the project's scope and size there can be changes to the scope of services related to the professional services provided, the required deliverables, the schedule, the fee, etc. A clear understanding of the contractual requirements is needed by the APM so any changes can be identified and properly addressed.

Scope Change Impact:

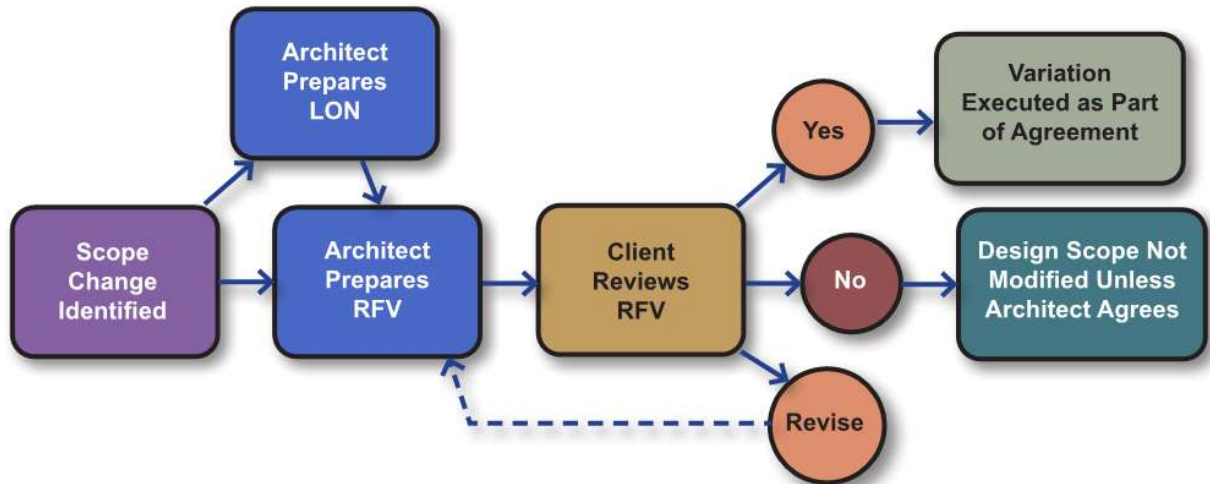
Determining the impact to the design team caused by a scope change takes consideration. The typical impacts are attributed to the increase (or decrease) of design person-hours and/or the increase (or reduction) of the design schedule/program. If time is critical and the impact is too difficult to estimate, clients will sometimes accept the design team proceeding on an hourly-rate basis. However, many clients prefer having a lump-sum compensation agreed prior to authorizing any changes to the contract.

A variation of the *hourly-basis* is an *hourly-basis* with a *not-to-exceed* limit. This gives the client the advantage of getting the change started quickly while still limiting the overall cost exposure. An hourly-based agreement reduces the design team's cost risks with respect to additional services. The not-to-exceed amount protects the client. The caution here is to clearly define the scope and to not use too low of a fee for the not-to-exceed amount. This is because if the amount of work required is unclear, it can easily expand beyond the not-to-exceed amount.

There are some changes that are just too small to consider, but at some point, the cumulative impact of several small changes can become significant. (*This will be addressed later.*)

In the United States we often apply the term "additional services" to contractual scope changes. This can be a sensitive issue with some clients, because it implies added costs and/or time and it does not reflect potential changes with scope reductions. Other parts of the world use the more neutral term "variation." Some other terms that have been used include "amendment," "scope change," "change order", etc. It is always best to use the terminology that is provided in the contract.

Be certain to communicate potential changes to the applicable subconsultants and give them the opportunity to identify any cost and/or time impacts they might incur. The architect's change proposal needs to be inclusive of all of the subconsultants hired directly by the architect.



Scope Change Identified	Architect Prepares LON or RFV	Client Reviews Proposal	Client Response Options	Variation Added to Agreement
Any applicable scope change is to be identified and reported to the Architect's Project Manager as soon as possible.	The Architect will evaluate the proposed change, and if merited will prepare a letter of Notification (LON) or a Request for Variation (RFV).	The Client will evaluate the RFV and respond accordingly.	A written acceptance of the RFV by the Client will constitute an authorization to proceed with the associated change(s).	Approved RFV's will be executed as variations to the Agreement. Changes will not be made based on rejected RFV's unless the Architect agrees to accept the change(s) with no modifications, or agrees to proceed reserving the right to submit a formal claim for additional fees and/or time.

2.8.1 Scope Change Process

Note: When a client refuses to approve an architect's Request for Variation (RFV) there are four potential options as follows:

1. The client elects not to proceed with the design change.
2. The architect refuses to make the change. *(Not always good for client relations.)*
3. The architect agrees to proceed with the design change without an adjustment to the design fee or schedule. *(This might set a dangerous precedent.)*
4. The architect agrees to make the design change, but reserves the right to file a formal claim. *(This allows the project to proceed while providing some protection for the architect.)*

Letter of Notification (LON):

Even if there are no perceived fee and/or schedule/program adjustments required to compensate for a scope change, it is best to document the change and notify the client that it is a change. An instrument that can be used to do this is a "Letter of Notification" (LON). LON's are written and issued for one of two reasons as follows:

8 April 2021

1. To notify the client that there is a scope change for which the architect will not be charging for at this time, but the architect reserves the right to make a claim should the cumulative effect of multiple minor changes constitute a need for a fee and/or schedule adjustment.
2. To notify the client that there is a scope change that will be impacting the design fee and/or schedule, and that the architect is still evaluating the impact. *(This option is used when there is a time limit in the agreement for the architect to make claims and/or when more information is needed to evaluate the impact.)*

One advantage of using LON's based on the first reason listed above is to be able to document the "no-cost" changes. If they become too numerous, their cumulative effect can impact the design fees and/or schedule/program. The combined LON's then substantiate a "Request for Variation" (RFV). *(This helps mitigate what I refer to as "death by a thousand paper cuts.")*

On the following page is an example LON template. Notice that it references a specific contract's applicable clauses. This provides a contractual link to explain the significance of the letter. LON's *(and similar)* are to have succinct "titles" as a means of identifying and tracking them. Also provided is a space for describing the "Source of the Change". This is critical, because memories often fade as to why a change is being considered. Sources of changes may be written directives from the client, comments made at review meetings, etc. Be specific and reference any applicable correspondence, telephone records and/or meeting minutes. Change descriptions should also be specific and reference current drawings and/or specifications when applicable.

Only include one of the two options shown in the template. They can be redrafted to suit the project's requirements. Because this relates to a contract revision, it is preferred to have the principal who signed the agreement also sign the LON.

Letter of Notification

Wild Oats Architects

LON Number:

Project Name: Notel Hotel

Project Number: 20832

Date:

Dear Client:

This letter is being sent in accordance with Clause 4.1 of the Client/Architect Agreement dated 25 October 2020 to notify you, the Client, that there have been changes proposed that impact our Scope of Services for the design of the Project as referenced above. These changes are as noted below:

Change Title:

Source of Change:

Description of Changes:

Design Impact:

At this time, the changes as described above do not appear to impact the Architect's scope of services and/or the design schedule sufficiently to merit a Request for Variation. However, the Architect retains the right to claim an adjustment in fees and/or schedule should these changes have a greater impact than anticipated, and/or should the cumulative effect of this change combined with other changes of similar levels of impact be such that their total impact constitutes sufficient cause to merit a variation.

OR

At this time, the changes as described above have not been sufficiently evaluated to determine the full potential of their impact to our scope of services and/or the design schedule. This letter constitutes official notification of our intent to request a variation as per Clause 4.4 of the Client/Architect Agreement dated 25 October 2020. The Architect will be submitting a formal Request for Variation when a better assessment of the impact of the referenced changes has been made.

Please do not hesitate to contact us should you have any questions or comments regarding this letter.

Sincerely,

Architect Principal

2.8.2 Example LON Template

Request for Variation (RFV):

A “Request for Variation” (RFV) (*also known by other names*) is an official request letter from the architect to the client to modify the contract. An example of one is provided on the next page. Note that the RFV includes language to tie it to the original contract. Refer to the previous comments made for LON’s regarding “Sources of Change,” “Change Description” and “Signature,” they also apply to the RFV’s. The “Design Impact” entry is typically a narrative of what has to be done to accommodate the changes.

As discussed under “Scope Change Impact,” fee proposals can be either hourly-based or lump-sum. It is best to not share with the client the estimated number of person-hours used to estimate fees. The reasons for this are that they may want to use that information for renegotiating the architect’s proposed fees and/or for micromanaging the architect. (*This is more typical for international work.*) Rather than being tied to specific staff and person-hours, architects require the flexibility to use the approved fees to manage the changes based on staff availability, other project priorities, etc.

It is often more difficult to quantify schedule/program changes. Based on the current project status and the amount of additional work to be done, the need for more time will have to be evaluated. Shortening a schedule/program can also have negative ramifications if the design progress is currently having problems meeting the design schedule/program. (*Comment: Adding staff to a project does not always accelerate the process proportionally. As a similar example, if 1 ship can cross the ocean in 10 days, it does not mean that 10 ships can cross it in 1 day.*)

There are instances where a client can extend the design schedule/program, but is unable to increase the design fee. Sometimes this is an acceptable compromise, but understanding that extending the design schedule/program to accommodate the changes at hand not only impacts the additional person-hours for implementing the change, but it also impacts the extended overhead for maintaining the support staff and other office resources for that same period. All of this needs to be taken into consideration when estimating and negotiating schedule/program and fee adjustments.

If there are no schedule/program adjustments being requested as part of a change, keep options open for future impacts. Example language that might be used for the “Schedule Adjustment” on the RFV is as follows:

“At this time the changes described above do not appear to impact the architect’s design time sufficiently to merit a change to the design schedule. However, the architect retains the right to claim an adjustment to the design schedule should the change have a greater impact than anticipated and/or should the cumulative effect of this change combined with other changes be such that their combined impact constitutes a sufficient cause to amend the design schedule.”

Request for Variation

Wild Oats Architects

RFV Number:

Project Name: Notel Hotel

Project Number: 20832

Date:

Dear Client:

This letter is being sent in accordance with Clause 4.1 of the Client/Architect Agreement dated 25 October 2020 to notify you, the Client, that there have been changes proposed which impact our Scope of Services for the design of the Project as referenced above. An adjustment to our fees and/or the design schedule is being requested as noted below:

Title:

Source of Change:

Description of Changes:

Design Impact:

Fee Adjustment:

Schedule Adjustment:

Client Authorization: By signing below the Client acknowledges the changes as described herein, accepts the Architect's requested fee and/or schedule adjustments, and authorizes the Architect to execute the changes.

Client's Authorized Signature

Date

Sincerely,
Architect Principal

2.8.3 Example RFV Template

Change Order/Variation:

In some cases, the RFV can be drafted and accepted as being a contract modification when signed by both parties. More typically, some form of “change order” or “variation” will be required to formally incorporate the approved RFV’s into the contract. All the applicable approved RFV’s need to be referenced in the change order/variation. The actual format options for this document are not being presented except with respect to how the fee and schedule/program adjustments are stated. For both items the contract base needs to be listed, followed by the total of the previous changes, followed by the amounts of the new changes, and followed by the new revised total fee and schedule. Draft examples are provided as follows:

Fee Adjustment:

Contract Amount:	
Total of Previous Changes:	
Previously Revised Fee:	
Amount of this Change:	
New Revised Fee:	

Schedule Adjustment:

	Days:	Completion Date:
Contract Schedule:		
Total of Previous Changes:		
Revisions this Change:		NA
New Revised Schedule:		

2.8.4 Example of Variation Change Tabulations

Scope Change Documentation:

The main rule for scope change documentation is to leave a clear and consistent audit trail. Keep copies of all relevant documents relating to each individual LON, RFV and/or change order/variation, each in its own separate file. This facilitates the review of that single file at any point in time, so authorized persons can have a relatively clear understanding of what the changes were and the events/correspondence related to those changes. Applicable information to be kept in the change files includes the following:

- LON’s, RFV’s and Change Orders/Variations
- Emails
- Meeting Minutes
- Telephone Record Memos
- Client Instructions
- Negotiation Correspondence
- Consultant Correspondence/Proposals
- Etc.

(Refer to section 2.10 below for additional comments regarding “Project Communications and Documentation”.)

Accounting/Finance Interface for Scope Changes:

When an RFV has been initiated, a separate project sub-number is to be established with accounting/finance so that its costs can be tracked. Members of the architect’s design team (and applicable consultants) need to be informed of the changes so they can assign hours on their timesheets accordingly. The design team also needs to be aware of the RFV’s approval status. In theory, no work should be done to incorporate an RFV’s scope (*other than possibly avoiding work in the affected areas*) until the RFV has been approved by the client.

RFV’s involving subconsultants will also require separate budgeting information for accounting/finance to track. If an RFV is not accepted by the client, any costs assigned to it will have to be transferred to the appropriate phase of the main project account.

Change Control Logs:

Separate logs for LON’s, RFV’s and change orders/variations need to be established. Example logs indicating the type of information expected are shown below. The top of the first page of each log is to include the relevant project information so that it is available as part of the audit trail. The applicable LON’s, RFV’s and change orders/variations are cross-referenced in the other logs in order to track their interfaces and resolutions. Additional comments regarding logs are as follows:

- There can be multiple dates in the date column. Each date indicating a revision and/or a client response.
- Under status, typically use cryptic comments similar to the following:
 - Pending Client (*response or action*)
 - Approved
 - Rejected
 - Resubmitted
 - Etc.

Project Name:					Latest Revision Date:	
Project Number:						
Wild Oats Architects				Architect Principal:		
1892 Breezy Road				Architect Project Manager:		
Nowhere, Utah 00000				Architect Accountant:		
Tel: (000) 000-0000						
Letter of Notification (LON) Log						
LON Number	Date	Description/Title	RFV Number	Variation Number	Status	Comments

2.8.5 Example LON Log

Project Name:						Latest Revision Date:		
Project Number:								
Wild Oats Architects			Architect Principal:					
1892 Breezy Road			Architect Project Manager:					
Nowhere, Utah 00000			Architect Accountant:					
Tel: (000) 000-0000								
Request for Variation (RFV) Log								
RFV Number	Date	Description/Title	Agreement Impact		LON Number	Variation Number	Status	Comments
			Fees	Schedule				

2.8.6 Example RFV Log

Project Name:						Latest Revision Date:		
Project Number:								
Wild Oats Architects			Architect Principal:					
1892 Breezy Road			Architect Project Manager:					
Nowhere, Utah 00000			Architect Accountant:					
Tel: (000) 000-0000								
Variation Log								
Variation Number	Date	Description/Title	Agreement Impact		LON Number	RFV Number	Status	Comments
			Fees	Schedule				

2.8.7 Example Variation Log

2.9 Risk Management / Tracking Issues

Few projects are ever executed totally as planned. There are risks of circumstances occurring which will force changes. The design and construction of projects are full of such risks. Many of which have attempted to be mitigated by contracts, standardized procedures and methodologies, budget contingencies, etc. The APM must be aware of the applicable risks so potential mitigation strategies can be developed and considered, and so reasonably informed decisions can be made. This process is referred to as “risk management”.

Risk management is one of the big buzzes in the professional project management world. Working with international clients who have hired project management companies, it is likely they will require a risk register/tracker. In its most general description, a risk is anything that might go wrong with a project. For inclusion in a risk register/tracker, that definition is a bit too broad. As an example, such things as alien invasions can be ruled out as being too far-fetched. Risks due to something like a canceled flight causing a meeting to be delayed are usually too mundane to include in a risk assessment.

Types of risks to be considered by APM's can be separated into two general categories. The first are those risks which could impact the ability to complete the design and/or construction to the desired quality on time and within the budget. The second are those risks which could impact the functioning and/or success of a finished project.

Risks potentially threatening the completion of the design within budget (both the design and construction budgets) to the desired quality and on time are a primary concern of the APM during the design phases/stages. These are specific risks to a specific project. Examples of some of the general risk categories that might be encountered are as follows:

- Incomplete program/brief information
- Client changes
- Consultant coordination issues *(including the hiring of consultants)*
- Delayed reports, studies and/or site information
- Approvals/interpretations by the Authorities Having Jurisdiction/Competent Authorities
- Materials availability
- Local construction technology availability
- Other

The second risk category, those that might impact the functioning or success of the finished project, may also need to be tracked. Because some of them may impact the project's design, and some may impact the finished project's success.

As an example, I once worked on the design of a coastal island project where the island had sensitive bird-nesting habitats. The client wanted a bridge connecting the island to the mainland. The bridge added the risk of providing an access for rats and other vermin that could potentially destroy the nesting areas. Having been alerted to the risk, the design team could look at ways of mitigating it and the client could then make informed decisions regarding the bridge.

Before discussing ways of tracking and managing risks, I have a couple of comments. First, some firms take risk management to its extreme. One that I worked for required cost estimates of the potential impact of the worst-case scenario for each risk. Then they estimated the probability of each risk occurring. Multiplying the two together gave them an estimate of their potential overall risk exposure. Though this might sound beneficial, it is time consuming and difficult to do. It is my opinion that an APM's time can be better spent managing the project so that the potential harm of any risk can be mitigated.

The second comment is in regards to international project management companies who often place a great deal of importance on having the design team maintain risk registers trackers. It is not uncommon to tie up several hours per week of multiple high-end design staff to review these. As a result, the design team is often unwilling to add any risk items and/or to air out any dirty laundry for fear that the project management company will use it to beat them over the head and waste even more time.

Even before “risk management” came into vogue, I kept an ongoing list of what I referred to as “pending design issues” for each of my projects. This was pretty much the same as a “risk register/tracker”, but it had a different connotation. It was understood to be a list of items that needed to be addressed as part of the design process, rather than an ominous list of pending disasters that threatened the project. In fact, I once changed the name to “risks register” on a project, and the client immediately called the project principal claiming I was mismanaging the project and just trying to set up documentation for future claims.

A risk register/tracker is a tool for tracking issues/risks. It can take on many forms. The one shown below provides a brief description of the issue, who needs to be addressing it, critical dates, and a status statement. It also provides a number for each risk so that each can be easily identified and tracked separately. This is intended to be a living document; when it is being updated the resolved issues are dropped (after being carried for one issue past their resolution) and new issues are added. The detailed information and related discussions for each risk are included in the meeting minutes under the applicable risk number.

Risk Register						
No.:	Description:	Action Required By:	Key Dates			Status
			Initiation	Required Resolution	Resolution	
12	Geotechnical report required for footing design	Geotechnical Consultant	12 Dec 20	18 Jan 21		Site investigations have been completed
13	City zoning approval of proposed setback variance	City (Client & Arch have presented)	6 Jan 21	30 Jan 21		Expected approval at next city council meeting
22	Local precast suppliers may not be able to provide proposed panels	Architect	2 Feb 21	28 Feb 21		Architect to meet with remaining fabricators

2.9.1 Risk Register Example

2.10 Project Communications & Documentation

If it is not in writing, it did not happen. There are at least three reasons for insisting on a proper written record. First, the written information can be shared with all relevant parties so everyone who needs to be informed can be informed. Second, it provides an opportunity for feedback from anyone with a different interpretation of what is required, and it allows feedback from anyone who has relevant information that may clarify and/or impact what has been written. Third, it provides a record and audit trail, because no one’s memory is perfect.

Some general guidelines with respect to written communications are as follows:

1. Email Topics: Because most people are receiving emails for multiple subjects, and because it makes emails easier to file and retrieve, the “subject” line for all emails associated with a specific project should start with a consistent name or acronym for that project, followed by a colon, followed by a succinct subject title.
2. Email Chains: Emails should be limited to one topic, as noted in the subject line. Strongly avoid using a previous email as a chain email for a new subject/topic.
3. Telephone Conversations: If any important information is conveyed during a telephone conversation, record those important issues in a confirming email which is to be properly distributed and filed.
4. Formal Correspondence: Primarily due to emails, formal letters have become less prevalent. Any contract changes, requests for payments, or similar issues with the client (or sub-consultants) should be in a formal letter format and often signed by the contract signatory (*Note: Some countries still do not recognize emails as legal instruments. So formal letters must be sent by courier, or sometimes by fax, to be considered as being “officially” delivered.*)
5. Meeting Minutes: All formal meetings are to be minuted by the appropriate entity. During the design phases that is typically the architect, and during construction it is the contractor. Everyone attending a meeting should review the minutes to be certain they are complete and in agreement with the reader’s understandings. If any important information is conveyed during an informal meeting, that information must also be documented and distributed in a confirming email.

I am particular about meeting minutes. Items need to be clearly stated in context using full sentences (not cryptic comments) so that a person not attending the meeting understands the context of what was decided and/or discussed. If there is general agreement about an item, I will typically state something similar to, “It was agreed . . .” If someone makes a comment or provides a direction, I typically reference that comment or direction as being made by the firm the person represents rather than the specific person.

To add another audit trail, number design meeting minutes sequentially, and use a decimal point with numbers after it to sequentially designate each meeting item. That way unresolved items (discussed as “old business”) can be added to the next set of meeting minutes with an address to backtrack to previous applicable discussions. Another item to be included in design workshop minutes is an “action required by:” column. It is used to inform readers as to who is responsible for addressing each action item.

When possible, meeting agendas are to be issued prior to the meetings. Everyone attending a meeting should have a general idea of what is going to be discussed so they can be properly prepared. That does not mean that no new items might be discussed at the meeting, but new items should be minimized. For design meetings, try to issue a draft agenda at least a week in advance, and request any additional agenda items be identified within two or three days.

6. Date, Project Name & Number: All documents, including sketches, generated by the design team must include a date, project name and project number. Sketches attached to documents should also reference the applicable document. Without this information it is often impossible to tie the document to the project or know its status relative to similar documents generated on other dates.
7. Not "I": Similar to using company names in the minutes rather than personal names, correspondence going outside of the office should avoid using the personal pronoun "I". Professional communications are for the company one represents. Use the company's name or refer to it as "our company", "our firm", etc., when needed in the correspondence. Of course, someone's proper name will appear as the signatory to the correspondence.
8. Internal Distribution: All project correspondence needs to be addressed to, or at least copied to, the APM. It is the APM's responsibility to have the appropriate information distributed to the applicable architectural team members. Emails need to be forwarded to the appropriate internal persons; incoming documents need to be filed, labeled and the team notified; meeting minutes, etc., need to be properly distributed internally; etc.

Though the APM is responsible for the internal distribution, portions of that responsibility can be delegated to a team member responsible for document control (or similar). This is especially true for managing CAD and BIM documents. The responsible person needs to verify the content of incoming documents, make certain that the files have the correct dates and appropriate headings, file the documents in their proper location, and then notify the team of their arrival and file address.

Only appropriate information needs to be distributed to the applicable team members; not all information needs to be distributed to everyone. Too many unnecessary emails can needlessly consume a lot of person-hours. The APM should use discretion when selecting to whom to copy or forward emails. This can be a balancing act between the need to know and the need to learn. It is sometimes helpful to share information with some staff just so they can be introduced to some of the "other" issues involved in a project.

Do not let staff use an email, text, or similar to ask a question to the person sitting next to them. They need to go talk to that person. Face-to-face conversations are extremely important to internal communications. Talking directly with a person often provides additional information and insights that an email response would not. *(I also encourage my team members to eavesdrop on conversations so they can learn and so they can add comments or questions that will add to the entire team's understanding of the project.) (It will be interesting to see how Covid 19 impacts face-to-face conversations.)*

9. Internal Meetings: Holding internal meetings on a regular basis just for the sake of having meetings is to be avoided. Having said that, Monday morning (or Sunday morning if in a Muslim country) team meetings can be helpful to make certain everyone knows what they are expected to be working on during the week and what the main pending issues are. If additional in-house meetings are required, limit the attendees to only those who need to attend – conserving person-hours is important. *(I sometimes inform the rest of the team of who is attending a meeting and what is being discussed, so those not attending are not left wondering and so they might approach me if they feel they have something to contribute.)*

10. Client-Required Reports: This applies mainly to international work where a client may require monthly, end-of-stage, etc., progress reports. Any requirements for reports need to be spelled out very clearly in the contract, and not added to the architect's scope after the fact. It is helpful if the outline format and responsibilities for each report type are agreed at the beginning of the project. Then the client may be less apt to hold a payment hostage because a report does not include the correct information in an acceptable format.
11. External Distribution: No company should be responsible for the internal distribution of information within another company. Communications between design firms should be at the project manager level, with a limited number of other persons in the firm being copied.

As part of the project kick-off with the consultants I introduce what I refer to as the "black box" approach to intercompany information distribution. Each company is its own "black box" with one point of contact for information going in and information coming out, and that single point-of-contact is each company's project manager. That being said, I will usually copy one or two other persons within a company so the lines of communication are not broken when their project manager is unavailable.

If one of your architects needs to ask one of the consultants a question, or vice versa, I may permit their direct communications if their project managers are copied. However, I will typically insist on being the one to do the communications until I have developed a level of trust with the specific employee and consultant. A reason for this is that not every architect understands the ramifications of their comments and/or the comments of the consultants. With almost no exceptions does anyone but the principal and APM communicate in writing directly with the client. (Some consultants and clients are like Mark Twain's cat. When his cat wanted out the front door and found out it was raining, he went to try the back door in hopes that it would not be raining there.)

12. Clarity of Language: With the texting shortcuts used today it is becoming a lost art for some to be able to write in full, coherent and grammatically-correct sentences. But this remains a required skill for an APM. Clear and complete thoughts are needed as part of written communications, not only for the record, but also so others can understand what is being said without ambiguity. Another thing to remember is that English may not be the first language of some of those reading a communication, so all the more reason for clarity.

I want to caution you on the use of acronyms. Some people love to use them. Many times, the acronyms are situationally specific. I remember one person's meeting minutes had "DOA" in it. I do not know what it meant to anyone else, but to me it meant "dead on arrival". My preference is to use as few acronyms as possible, and when I do, I try to write it out in words first (in each document where it is used) then follow that by the acronym in parentheses. Keep it simple, stupid (KISS).

13. Professionalism of Language: It is important that the written record reflects a professional attitude at all times. (This includes internal correspondence as well as external.) All correspondence and documents should be void of any personal criticisms, insults, emotional connotations and/or speculations. A worst-case scenario would be if a client should ever file a claim against an architect, and then the court reads documents the architect has prepared which have derogatory personal comments in them. Those comments could paint a very negative picture of the architect's character and professionalism – no wonder there is a claim against him/her.

Some tricks to avoid letting one's emotions from surfacing in written correspondence are: 1.) Proofread everything before sending it out; 2.) Go back through a correspondence and delete as many adjectives and adverbs as possible; 3.) For sensitive correspondence write it one day, then come back to it another day and edit it with a calmer head; and 4.) Have a trusted colleague proofread it for you. (*Note: All draft documents should be deleted from the files.*)

14. Filing: Every company should have a standardized system for storing and retrieving information (*i.e.*, a filing system). If it is a standardized filing system, it is easier for anyone within the firm to research the files of any project. This requires every applicable document to be properly filed in the appropriate file.

Much of my work has involved coming into projects well after they have started. One of the first things I do is go through the project files to gain an understanding of what is going on. The files often have more problems than the projects I have been asked to help with. Unfortunately, in the heat of the battle to get a project completed, correct filing seems to be one of the first casualties. This is unacceptable.

Some filing systems appear to have been driven by the CAD/BIM operations, and do not demonstrate an acceptable understanding of the project management documents or the construction administration documents. (*See section 4.7 below for additional discussion regarding construction administration files.*) The following page shows a draft outline of project management file headings that are required as a part of the architectural filing system. (*Note: The numbering of files is a carryover from manual filing days when file numbers were hand-written below the stamped "FILE COPY", so the administrative assistant would know in which file(s) a document was to be placed.*)

- Project Management
 - 1. Proposals & Contracts - Client
 - 1.1 Client RFP
 - 1.2 Proposal Development
 - 1.3 Proposals
 - 1.4 Draft Client Agreements
 - 1.5 Client Agreement
 - 1.6 Non Disclosure Agreement
 - 1.7 Agreement Correspondence
 - 1.8 Agreement Modifications
 - Claims
 - Letters of Notification
 - Requests for Variation
 - Variations
 - 2. Proposals & Contracts - Consultants
 - X Disciplines - X Consultant Name
 - 2.X.1 Consultant RFP
 - 2.X.2 Consultant Proposal
 - 2.X.3 Consultant Agreement
 - 2.X.4 Consultant Agreement Modifications
 - 2.x.5 Consultant Non Disclosure Agreement
 - 2.X.6 Consultant Agreement Correspondence
- 3. Correspondence
- 4. Meeting Agendas & Minutes
- 5. Method Statements
- 6. Design Program - Brief
- 7. Time Schedules
- 8. Cost Estimates
 - 8.1 Constrcution Cost Estimates
 - 8.2 Value Engineering
 - 8.3 Estimate Correspondence
- 9. Accounting Interface
 - 9.1 Project Initiation
 - 9.2 Project Budget
 - 9.3 Client Invocies - Copies
 - 9.4 Consultant Invoices - Copies
- 10. Project Data Sheets
- 11. Quality Control
- 12. Risk Register
- 13. Special Issues

2.10.1 Example Project Management File Headings

Consultant contracts, general correspondence, drawings, and similar files containing information received from or sent to another party need to be sorted by the various firms and/or disciplines. Rather than just using the firm's name for the file heading, it is preferred to start with the discipline (or role) then followed by the firm's name. Then a person unfamiliar with the project can locate needed information more quickly.

Almost all document names used for electronic filing should include a date before any written title. In order to have the files arranged chronologically, the dates need to start with the year, followed by the month, followed by the day. As an example, 30 September 2020 would be "200930". (*Comment: Adding the first two digits of the year only lengthen the title and file path.*)

Superseded documents can sometimes become confusing. Having a chronological date is helpful, but it is even better if the word “SUPERSEDED” is added at the end of any old document’s file name. If the document was merely a draft that was never distributed, it is often best to just delete it or at least label it as “NOT ISSUED”.

Horizontal filing systems have become popular because they require little, or no, effort to maintain. The idea is that everything (especially emails) is placed into a common bin, and a computer search app is used to retrieve the information whenever it is needed. One of the problems is that on large projects a search can identify literally thousands of emails, and drilling down to find the desired document is not always that easy. A compromise is to cross-file emails and documents related to specific topics with the appropriate files. This is especially true with emails and documents related to contracts, changes and claims.

The last file section in the example outline is for “special issues”. This can be for any number of things that might surface for which one may want to create a separate file in case the issue has a potential for involving a future dispute/claim, etc. There are two comments regarding the “special issues” file. The first is that much of the information located here should also be filed elsewhere in the system. The second comment is that as part of the general files, these files may be viewed by others if there should ever be any formal legal claims. To protect any confidential communications with your attorney, those specific documents should be clearly labeled as “CONFIDENTIAL Client and Attorney Privileged”, should only be distributed to the appropriate principals, and should not be filed with the project files.

Another filing comment is in regards to the “basis of design” files. This technical information (not project management information) file is organized by CSI sections. As specific product information is researched and selected, it is stored in the “basis of design” files. These files provide a guide for the specification writer and can be a valuable resource if required during construction or when reviewing an applicable claim.

Should there ever be any arbitrations and/or court proceedings, well-coordinated and well-filed documentation is invaluable. Such proceedings often occur a year or more after the project is completed. Memories and recollections are not as reliable or persuasive as well-organized documentation.

2.11 Project Kickoff & Post Mortem

All the project planning in the world is of little use unless it is communicated to the design team, client and other applicable participants before and as they are working on a project. After completing a project (or in some cases a project phase/stage) it is also important to gain insight as to which portions of the project went well, where it could have been improved, what was missing, etc. This section discusses some of the formal ways the project planning is communicated and evaluated as part of the project management process.

Project Design Interface Manual: Prior to starting the design process, the APM should compile relevant project and project process information together in a “Project Design Interface Manual” that can be used as an instruction and reference guide by all design team members (including the client). The purpose of this manual is to provide a clear understanding to the project’s design team members as to who is included on the team, what each firm’s roles are, what is expected of them, when it is expected, how the project will be managed, etc. The “Project Design Interface Manual” is a living document that can be updated as circumstances dictate. Feedback is welcomed from all design team members. A draft table of contents for a “Project Design Interface Manual” is listed below. Most of the headings should be self-explanatory, and the more intense topics are discussed elsewhere in this paper.

- Cover Page (*with a statement of the manual’s purpose*)
- Table of Contents
- Project Directory
- Project Organization Chart
- Project Goals and Objectives
- Project Schedule/Program
- Project Communications
- Project Meetings
- Project Reports
- Work Plan
- Cost Controls
- Changes
- Interfacing with the Authorities Having Jurisdiction

Design Kickoff Meetings: The first kickoff meeting(s) is(are) internal. The main purpose of the internal meeting(s) is to provide an in-house project orientation, including the client’s goals and objectives; and to present and develop an in-house strategy for meeting those goals and objectives. Before issuing the formal “Project Design Interface Manual” it is important that the key members of the architectural team have a clear understanding of the overall design team interface, and are in agreement. During the course of the project additional orientation presentations will need to be given to new team members as they join the project to help them understand what is expected and how the project is being managed.

The second type of design kick-off meeting is for the full design team, or at least the main design consultants (architect, landscape architect and interior designer) and the key engineering consultants (civil, structural and MEP). The purpose of this meeting is for introductions and to be certain that everyone understands what is expected of them. The agenda for the meeting is typically the “Project Design Interface Manual.” For large projects it usually takes most of a full day to go through it in detail while still allowing time for the all-important social interactions needed to build congenial working relationships between the team members. Coffee breaks and lunches provide good opportunities for informal interactions, but an evening out can be even better if time and the budget allow.

The importance of building personal relationships cannot be overstated. I remember one project where the consultants were coming to Southern California from all over the United States for a three-day, project coordination workshop. The first day everyone seemed to be positioning as to whose scope of services each element was and what they needed from the other consultants before they could even start. That evening we went to what was then a relatively new venue, Medieval Times. After we had all been seated at a large table in the bar area the waitress introduced herself with, "Good evening my lords. I will be your wench for the evening. How can I serve you?" That remark (though rather sexist by today's standards) got everyone laughing so hard that we all started letting down our guards and enjoying each other's company. The next day's meetings were fantastic. Everyone contributed to solve the problems.

The client should be represented at the design team kickoff meeting and at the milestone workshops. However, there are situations when the client's representation may need to be limited. There have been instances where the client has overly interfered with the meetings, wanting to direct everything, but lacking the technical capability to do so. *(This was also usurping the architect's authority to meet the architect's responsibilities.)* In those instances, the formal meetings and workshops can still be held, but additional coordination workshops may be required directly with the appropriate consultants.

I remember one instance where the client's board of directors wanted to attend a milestone workshop. All went well until the teams started breaking apart to discuss specific issues. That was not how their board of directors' meetings were conducted. It took a bit of convincing that it was not as chaotic as it appeared, and they seemed to accept it.

Project Design Post Mortem: Discussing a just-completed design project (or phase/stage) with the in-house team is an opportunity of which many firms fail to take advantage. It is a way to learn what went well with a project and where improvements might be considered. One way to conduct a post-mortem review is to allocate the better part of an afternoon (following a leisurely team lunch) to have an informal project discussion/download. This is a chance to thank the team for their work and contributions and to get their impressions of what was helpful to them and where adjustments might be made in future projects.

A post mortem review provides a chance for valuable insight from the rest of the architectural team to be expressed. To encourage uninhibited feedback everyone needs to be relaxed and non-threatened – there are *(almost)* no improper comments. *(Any personal attacks should be avoided and the discussion guided around them.)* The types of comments can be related to process, design decisions, schedule/program, staffing, consultants, client interfacing, or any other topic that might have been perceived as benefitting or impeding the project. Everyone should have an opportunity to share. This is a chance for individuals to feel empowered by voicing their observations, and it is a time for all to learn more about the project processes and team dynamics.

The final step of a project design post mortem is to update the project's record data sheet(s). It can go by several names, but it is a summary of the project for use when comparing project costs, schedules, etc., to those of other projects. Typical information included in a project's record data sheet(s) includes the following:

- Project Name & Number
- Project Location
- Team Members/ Directory
 - Client
 - Key Architect Members
 - Consultants
 - Contractor
 - Project Description
- Project Type & Written Description
 - Renderings/Photos
 - Site & Overall Plans
 - Area(s) in square units
 - Any Unique Conditions
- Project Design Phases/Stages
 - Name & Duration of Each
 - Person-Hours Expended for Each
- Project Construction
 - Construction Costs
 - Overall Construction Costs
 - Costs per Square Areas
 - Cost per Units
 - FF&E Costs
 - Etc.
 - Construction Duration & Dates

Soliciting feedback from the client can also be a valuable tool for learning what worked well and where improvements may be needed. It can also help to build and maintain client relationships. Depending on circumstances, client follow-up might be better done by someone in the firm's marketing organization. By giving the process a "corporate" face the client may feel more appreciated and may be more willing to share information than if someone from the project team is doing the interview.

Construction Interface Manual: This is similar to the "Project Design Interface Manual", but rather than being limited to the design team it is also addressed to the construction team. Whereas the contract states what each party is expected to do in relation to the others, the "Construction Interface Manual" presents a set of guidelines of how those key interfaces will actually occur. Though the guidelines included in a "Construction Interface Manual" are based on the contracts, they need to be agreed by the client, architect and contractor. Without a preconstruction understanding of administrative procedures there are too many opportunities for the construction phase/stage interfaces to be misused and/or abused. (*The "Construction Interface Manual" is discussed further as part of section 4.7 of this paper.*)

Construction Kickoff Meeting: This introductory meeting is held with the client/owner, contractor, architect, and key consultant and subcontractor representatives prior to the start of construction. Its purpose is to present and discuss each entity's expectations and interface requirements during construction. The "Construction Interface Manual" can be used as a major portion of the agenda.

Project Construction Post Mortem: During the construction process it is common to find that some of the architectural drawings and/or specifications may not have accurately depicted the design intent, or otherwise presented an unclear direction to the contractor. Rather than only addressing them as RFI responses, change orders, etc., it can be beneficial at the end of the project to identify lessons learned that can be shared with the production team as a means to improve the documents on future projects. There can also be procedural/administrative lessons learned that can be beneficial to the APM's.

Based on second-hand experience, the lessons learned need to be handled somewhat delicately. For one specific project that I am aware of, the client obtained a copy of the list and used it as a basis for a lawsuit against the architect. Therefore, it may be best if the specific project is not named in the written report, and the item descriptions kept on the generic side, or at least worded in such a way as to avoid a negative spin.

Updating the project data sheets noted with the discussion on "Project Design Post Mortem" above, is also a part of the construction post mortem. Another part of completing a project is cleaning up the project files and archiving them as may be required to close out the project.

Project Mothball Report: There are occasions when an owner may elect to stop work on a project for an indefinite amount of time. Typical reasons for placing a project on hold include, but are not limited to, the following:

- Waiting for planning and/or similar approvals
- Waiting for funding
- Refocusing assets/emphasis to another project or another portion of a project
- Waiting for a change in the commercial market

As should be included in the contract, the process of stopping work includes a written notification from the client, a date and/or level of design development at which the architect is to stop work, an agreement as to the amount of fee to be paid for services rendered at the time of stopping, and an understanding that depending on the duration of the work stoppage and potential other circumstances, the remaining contract fee may need to be adjusted when, and if, the project restarts. There are also often contractual provisions for a remobilization fee. The goal of these considerations is for the architect to be adequately compensated for the services rendered should the project never restart, and to allow for revisions to the contract to cover potential changes if it does restart.

In addition to the contractual issues, good practice requires the APM to be certain all project files are up to date, and to write an internal report to "mothball" the project. That report is to include the following:

- A current project directory
- A list of internal staffing assignments (who has been working on what)

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- A general description of the design status, including a list of pending design issues yet to be fully resolved
- Updated risk register (if being used)
- A summary of any potential political and/or personality issues that might be impacting the project (keep it professional without any name calling, etc.),
- Optional: travel tips as to hotels, restaurants, etc.
- Other

The primary reason for the mothball report is to assist with restarting the project. That can occur a few weeks, or years, after the project has been stopped. Memories fade, the available staff might be different; it may not even be the same APM and/or principal; etc. The mothball report reintroduces the project to the APM to reduce the learning curve required to efficiently provide professional services when the project restarts.

3.0 Design Tasks

3.1 Design Process

This paper will not be addressing the entire design process as most architects were taught in school; rather, it will focus on those elements of the process that reflect how a project is designed and managed in an architectural office. As an APM, the most important thing one needs to remember is to not over manage the design process. As long as the designers are producing good work and successfully meeting the schedule, it is best not to interfere too much with their own means and methods of design.

Design phases/stages are a series of sequential work efforts included in design contracts to define the evolving design requirements. The requirements and deliverables of each phase/stage provide the design objectives to be achieved by the designers at the end of each phase/stage. By introducing intermediate milestones into a *work plan* the objectives can be further broken down for use in monitoring the design process. (*Refer to section 4.2 for a discussion of work plans*) The main objective/goal of each of the typical (former) AIA design phases/stages are as follows:

- > Concept Design: Create a high-level project design to establish scope, scale, general geometry and architectural character.
- > Schematic Design: Develop the approved Concept Design into a scheme that evolves the architectural design; reflects the initial integration with engineered systems; accommodates the project's main spatial drivers; and establishes the landscape and interior design directions.
- > Design Development: Further refine the approved Schematic Design to fix and describe the project's form, size, materials and systems and to address the major interface requirements of all design disciplines in order to minimize the need for significant modifications during the Construction Document Phase/Stage.
- > Construction Documents: Provide documentation of a coordinated design for purposes of obtaining building permits, bidding/tendering the project for construction, and establishing base documentation of the design intent for the actual construction.

The role of the lead designer is typically most intense during the earlier design phases/stages, and tapers off during the later phases/stages. An important design management issue is to retain the input of the lead designer during the later phases/stages. The lead designer must maintain the design intent overview throughout the project.

3.2 Monitoring & Controlling

The *work plan* provides the milestones, objectives and goals to monitor the design progress. (Refer to the “*Work Plan*” discussion with section 4.2.) If those objectives and goals are not being met for the various milestones, project management intervention is required. Some red flags for the APM to watch for during the design phases/stages include the following:

- > Missing Deadlines: Missing a deadline is unacceptable. Anytime the design starts to fall behind schedule is a red flag for the APM to analyze why the design is lagging and implement a strategy to get it back on schedule/program.
- > Incomplete and/or Poorly Executed Deliverables: Incomplete deliverables are the same as missing a deadline. Poorly executed deliverables reflect negatively on the architectural firm and need to be avoided. The APM is responsible for providing a quality control review of the design teams’ list of proposed deliverables, reviewing drafts of their deliverables and proofreading the final deliverables. (*Though the APM is responsible for the quality control, portions of that responsibility may be delegated.*)
- > Incomplete and/or Inconsistent Designs: This refers to the design, not the deliverables. Sometimes the main areas and/or the main facades of a design have progressed, but other important areas are either not being addressed and/or are being designed in a manner inconsistent with the rest of the project. The APM is to monitor the design for these “holes” and keep them on the design team’s radar. (*Examples from my hotel experience are porte cocheres and miscellaneous site buildings, whose designs are sometimes not addressed until late in the design process.*)
- > Analysis Paralysis: This is not as common with experienced designers, but occasionally occurs with inexperienced designers (*and occasionally with clients*). It is sometimes easier for the designer to procrastinate by generating all sorts of relationship matrices, diagrams, charts, etc., rather than developing a conceptual design. (*Note: The studies and charts can be useful, but they are not an end in themselves.*) If this is observed, the APM may need to nudge the process forward, even if it takes assigning another designer to get things moving.
- > Chronic Redesigning: This occurs when a designer has developed an approved concept (or other) then starts to rethink it and basically starts all over (or nearly so). Sometimes the revised designs are slightly better, but often they are not. There are numerous ways a project can be designed, but once a design direction has been established and approved by the client, it must be developed rather than restarted (*unless there is an inherent flaw in the original design*).

I remember one example in particular where the rest of the architectural team was already cutting wall sections, etc., and the other consultants were moving ahead with their designs, when the lead designer came up with a new conceptual design entirely different from that which had already been approved by the client. Needless to say, I was not a happy camper.

- > Failure to Listen to the Client: Understanding client's desires is sometimes complicated. They change their minds; they do not always know what they want; some of their comments may not always be that clear; and they do not always speak with one voice. In addition, their comments can sometimes be misinterpreted by the designers. One of the APM's roles is to minimize ambiguity by seeking and establishing clarifications to unclear comments, and by being certain that the clients' directions are not being ignored by the designers.

I took part in a presentation where the client politely indicated that something was not a preferred design direction. Later the designer insisted that the client had not said "no", when I said he had. Since the element was only related to a color scheme, the designer agreed to develop an alternate scheme and keep the original. At the next meeting the client asked why we had wasted our time with the scheme he had rejected.

3.3 Design Program/Brief

As previously noted, the *work plan* provides the milestone objectives and phase/stage goals as part of the process. However, it is the *design program/brief* that defines the overall objectives and goals for the design itself. The concept of the *design program/brief* as being a document for setting the scope baseline was discussed with section 2.8. It was also noted that an *area program* is not a complete *design program/brief*. A complete *design program/brief* typically includes a statement of the client's expectations, a more detailed breakdown and verification of areas, required functional relationships, site constraints and opportunities, a budget, etc. The following is an introductory discussion of the basic components of an architectural *design program/brief*.

- > **General Description**: An introduction to the program/brief in the form of a general description of the project provides an overview orientation. It includes the buildings' use type(s), approximate size, location, client, etc.
- > **Client Expectations**: Most clients want the best possible project for the money ("*best bang for the buck*"), but there are often other expectations. Some clients want an iconic image; others may be seeking a project that blends into its surroundings. There are all sorts of expectations/agendas that the client may be able to express, and some that may be hidden. Part of the programming process is to listen carefully to the client to find out what those expectations are and what they mean. (*Note: I have found that some clients may ask for a latest "trend" without really understanding the implications.*) In addition, some corporate clients have their own design standards that may not only express their "image" requirements, but often provide more detailed project requirements. Without knowing and understanding the client's expectations for the project, it is difficult to manage the design to a successful conclusion.
- > **Users**: The client may not be the project's user(s), or may not be the project's only user. A program/brief needs to identify all user groups and any particular needs each of them may have.

- > **Functions and Activities:** This is a description of all of the functions to be accommodated within the project, including a description of the main activities associated with each function. A hotel lobby is an example of a function. Activities within the lobby might include reception, concierge, bell captain, access to internal public circulation, etc. Part of the function and activities descriptions should include which functions and activities can utilize the same spaces, which need their own spaces and which can be separated.

Depending on the architect's familiarity with the building type and the extent to which new alternatives are being sought, many of the function spaces may be synonymous with rooms, or similar. Another aspect of documenting the functions and activities is identifying their spatial drivers so that areas can be assigned and/or verified for each function and/or room. Understanding the spatial drivers is required for establishing minimum dimensions, area options, etc. *(Note: It is sometimes possible to simplify the descriptions of the various functions when both the client and architect are familiar with the building type. This is acceptable, but any unique conditions still need to be identified and defined.)*

- > **Area Program/Brief:** After the functions and their activities have been sufficiently defined and analyzed so that areas can be assigned to each, then an area program/brief can be established (or verified). Some clients provide an area program with their RFP. Others need more assistance in developing one. As part of the project management process, the initial, approved area program/brief becomes a scorecard for evaluating the design progression. The area program/brief can be maintained on a spreadsheet with the original areas in the first data column, and subsequent columns used to list the revised areas corresponding to the actual design at the end of each of the applicable design phases/stages. *(Note: There will almost always be changes, and the client should be aware of those changes so they can be accepted or rejected.)*

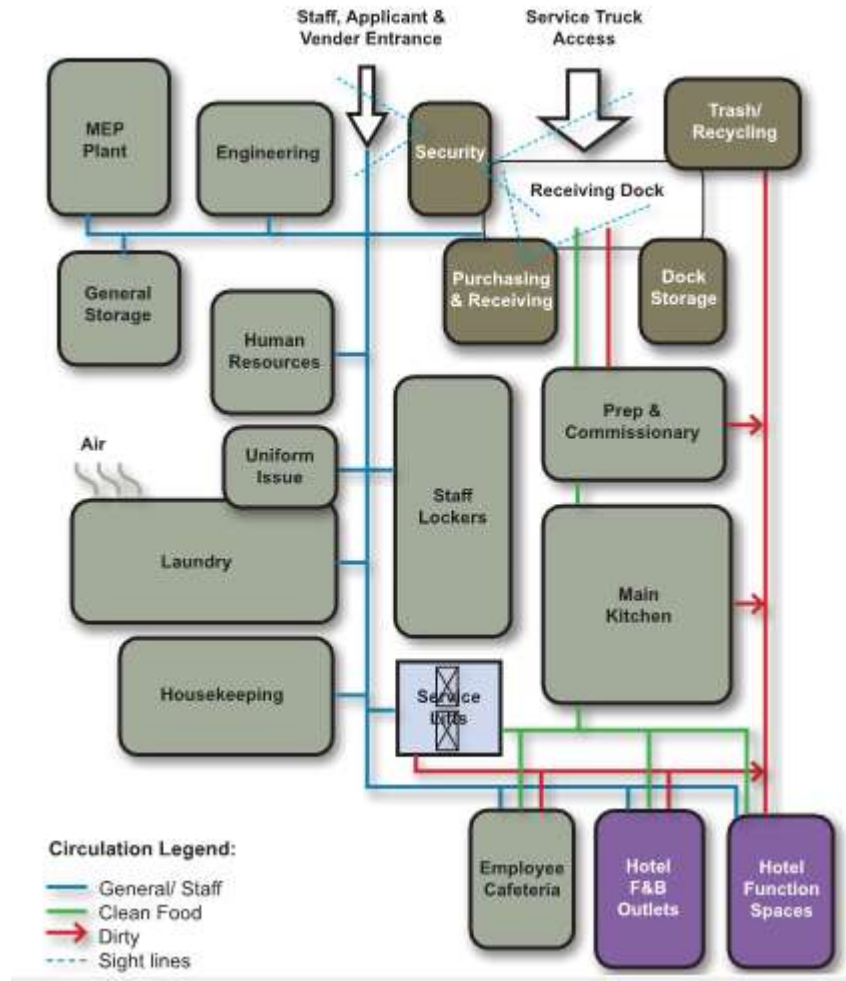
A good way of illustrating the area adequacy and functioning of a space is to provide a generic furniture and/or equipment layout *(for areas not included in the interior designer's scope)*. The layouts are also needed for MEP coordination, etc. Depending on the furniture and equipment layouts the area required for a given function can vary significantly.

Another caution regarding area programs/briefs is understanding whether the areas represent gross or net areas. One preference is to have net areas for the active functions and track gross areas as a function of the net areas. *(Gross areas typically add between 10% to 20% to the net areas depending on the building type and the individual functions.)*

- > **Functional Relationships:** A key element often missing from an area program/brief is an understanding of how the various functions relate to each other in terms of proximity and circulation. These are referred to as functional relationships. The main ways a given function can relate to other functions include the following:
 - **Contained:** One or more functions contained within another function *(As an example, a receptionist counter may be contained within a lobby.)*

- Overlapping: One or more functions overlaps with one or more other functions (*As an example, a sales department might overlap with a marketing department.*)
- Contiguous: One or more functions must be immediately adjacent to another function (*As an example, a projection room needs to be contiguous to the cinema auditorium.*)
- Close Proximity: One or more functions needs to be in close proximity/near to one or more other functions. This is usually required when there is a high degree of circulation, collaboration and/or supervision between functions where contiguity is not required.
- Isolated: One or more functions is required to be isolated from one or more other functions. The typical reasons for the isolation are for security, visual, acoustical, olfactory, etc., concerns.
- None: Functions that have no particular relationship to other functions – This is where a large portion of the design flexibility lies.

One way to analyze and illustrate the key functional relationships for portions of a project and/or for the entire project is by the development of “diagrams of functional relationships” (DFR’s). An example of a DFR for a portion of a hotel back-of-house is shown in figure 3.3.1.



3.3.1 Example DFR for a Hotel Partial Back-of-House

- > **Constraints and Opportunities:** Every project has its specific constraints that put limits on the design options. Some of these constraints are imposed by the site which is of limited size, with specific access opportunities, with existing grades, climate, etc. Other constraints are imposed by codes and ordinances or other issues. At the same time some of the imposed existing conditions can provide opportunities such as views, natural ventilation, etc. Identifying these constraints and opportunities provides important information supplemental to the *design program/brief*.
- > **Budget:** Project budgets are typically tracked separately from the *design program/brief*, but they are still part of it. A budget is indicative of the level of quality desired for a design. If a project's budget is not large enough to be consistent with the client's desires and vision, it will be difficult for the architect to create a successful design. It should also be noted that if the cost of the finished project is significantly less than the budget, then perhaps the architect failed to provide the level of quality, quantity and/or amenities that may have been beneficial to the client.

The initial *design program/brief* should be part of the client's RFP. If not, the development of the *design program/brief* should be negotiated as part of the architect's predesign services. Regardless of the initial information provided by the client, there is almost always missing information that needs to be identified by the architect and verified by the client. That is one reason why the architect should maintain a formalized *design program/brief* for each project. The format can be whatever the architect is accustomed to, but it must be flexible so that it can accept new information under the relevant headings as the information surfaces and/or evolves. New information added to the *design program/brief* is to include an "address" stating when and where the new information originated, so there is an audit trail.

The written *design program/brief* is a living document that should be updated every time new relevant information becomes available. The APM can then use it as a tool to manage the client and the design. Refer to the applicable discussions under section 2.8 above for further insight into managing the client's potential scope changes. As a tool to manage the design, the APM can check the design against the design program/brief to verify that the design objectives are being met.

Another comment relating to the client's *design program/brief* is in regards to the functions and/or activities that are not programmed, but could benefit the design. It is sometimes these un-programmed opportunities introduced by the architect that make a project special. One caution is not to let these items get out of control. This can be done by presenting the unprogrammed opportunities and their potential benefits and costs to the client as early in the design process as possible.

4.0 Technical Tasks

4.1 Schedules/Programs

Design schedules/programs are often a part of the architects' proposals. (Refer to section 2.2 for additional information.) The backbone of the design schedule remains the same for the start of the actual design process, subject to any adjustments which may have been agreed in the contract and the insertion of specific dates. This section will focus on using the approved "Design Schedule/Program" as a project management tool to guide and monitor a project's design progress.

A recommendation is to keep the schedule/program simple and not overly detailed. I have been involved with projects where schedulers/planners have been hired to provide detailed design schedules/programs. The process can take on a life of its own to the detriment of the project and its design. Detailed schedules/programs are useful during construction when there are multiple specialist contractors assembling a project with defined dimensions, materials, quantities, construction strategy, etc. The processes and requirements are less defined for a design project that starts out with a "blank piece of paper." Rather than including detailed activities in a design schedule/program, I have found it better to keep the schedule/program more general for use as a guide within which the creativity of the design process can evolve.

All design agreements have some reference to time durations anticipated for the project. However, some contracts are more restrictive with time as "being of the essence". The worst-case scenario is when a client wants to assign penalties/liquidated damages to late completions. *(This should be a red flag during negotiations, and should not be accepted.)* One of the problems with such an approach is that schedule/program issues can become overly contentious to the potential detriment of the client-architect relationship. It forces the architect to document with letters of notification (LON's) or requests for variations (RFV's), anything and everything beyond the architect's control that might impact the design schedule/program.

The way to incorporate detail into the design schedule/program is by establishing periodic milestones, and then listing what is specifically expected from each design discipline at each milestone. The tool used to communicate this detailed listing is a *work plan*, which is presented in the next section of this paper.

APM's need to be keeping the design team informed of pending issues, so they can be addressed in a timely manner. They should also be monitoring and encouraging all applicable disciplines to maintain their progress, and they must identify and address interdisciplinary interface issues to facilitate keeping the project on schedule.

Addressing schedule issues related to the in-house architectural team and the architect's sub-consultants can have its own challenges and solutions. Ultimately, including withholding payments and other contractual remedies. However, it can be more difficult to motivate consultants under direct contract to the client. In those instances, working relationships that have been developed over time and contractual leverage are not available to the architect. For situations where the client's consultants are jeopardizing the schedule/program, the APM must take a proactive approach to facilitate and encourage their timely performance. If that still fails, then there is often a legitimate basis for a delay claim.

Client-caused delays should be addressed in the contract. They usually come in three forms. The first are directions by the client, as stated in the contract, to stop working on a project. The second are delays caused by client changes. Addressing client changes has been presented in section 2.8 above as part of "Change Management". The third are delays caused by the client failing to respond in a timely manner. This is particularly true with respect to receiving timely responses to end-of-phase/stage reviews. Establishing client review periods in the design schedules/programs is one way to limit this exposure. If the client significantly exceeds the review period, there is a potential for a delay claim. Delayed client responses for other than end-of-phase/stage reviews also require tracking and appropriate actions.

APM's and principals should have a realistic appreciation of their clients' internal review processes and their clients' responses at the end-of-phase/stage presentations. Often architects will charge forward with the next design phase/stage without having the client's formal approval. This is risky, as a client may take significant exceptions to the work as submitted, and/or place the project on hold. Meanwhile, the architect has expended time and effort for services that cannot be invoiced.

The example schedule shown on the following page is for a fictitious project. It provides an example gantt chart with milestone examples used for the *work plan* presented in the next section.

8 April 2021

4.2 Work Plans

Work plans provide an excellent opportunity for APM's wishing to expand their project management skills. "Work plans" may be referred to by many names, including "method statements," "execution plans," "implementation strategies," "project management plans," "work breakdown structures (WBS)," etc. Regardless of the name or format, the intent is the same. It is a document that breaks the overall project into smaller efforts, and defines who is responsible for what and by when. It becomes the road map for guiding the design and coordination of the project and for verifying the required progress for the various team members. *(Note: Work plans as described in this paper are not the same as those described in "The AIA Handbook of Professional Practice," and work plans as described here do not include a detailed accounting interface tracking of individual tasks. My personal preference is to limit the interface with accounting at the phase/stage level.)*

Many APM's intuitively follow some form of an unwritten "work plan." However, a written version *(especially for larger projects)* provides opportunities for the various design team members to amend/negotiate changes during the proposal process, and to avoid ambiguity of responsibilities during the design execution. That does not mean the work plan is "written in stone," because there may be situations that require modifications to reflect changes and/or other requirements.

Like most designs, a work plan starts out with the general and works towards the specific. The concept design sets the overall design direction, organization and aesthetic character. The schematic design adds more detail and begins the incorporation of the engineered systems, with an emphasis on the spatial drivers (*i.e.*, the engineering aspects that require/consume space that must be integrated into the design.) During the design development, the direction of the design is further developed and many of the main details are prepared and coordinated. As part of the construction documents phase/stage any remaining coordination, details and documents are completed sufficiently for bidding/tendering, permitting and construction.

As the design moves through the design phases/stages, certain activities from one or more disciplines are required before other disciplines can commence portions of their work. The correct sequencing of these dependent activities must be reflected in the work plan. Another aspect of the initial work plan is that it reduces the specificity of the tasks during the latter design phases/stages. This allows the processes to evolve to reflect the actual project status, and it provides latitude for the disciplines to revert to their standard, in-house methodologies for completing the project. If required by project conditions, updates to the initial work plan can be used to add detail and/or to devise workable strategies to address the needs of the latter milestones.

Appendix B provides an example of an initial work plan for a fictional project. The project is a 450-key, luxury, full-service hotel with grand and junior ballrooms and various meeting rooms. *(To simplify the work plan, this is not a LEED project.)* The schedule/program in the previous section has been used to establish the key milestone events, including workshops, presentations, meetings, end-of-phases/stages, etc., that are referenced in the example work plan. This is a fictitious example *(which has not been vetted with any of the design disciplines)* can be useful as a starting point for a customized work plan for other projects.

4.3 Consultant Coordination

The starting point for consultant coordination is the *work plan*. Which is why it is important to have the consultants involved with the development of the agreed work plan prior to finalizing their proposals. Even if the proposed strategies are different from their standard procedures, they will understand what is expected and can be compensated accordingly.

Unfortunately, some consultants avoid doing as much work as possible until everyone else's designs have progressed sufficiently to have addressed most of the interface issues. Then, after waiting sufficiently to have a better understanding of what others might be doing, the consultant often wants the others to rework their more completed designs to solve the consultant's issues. This is one reason why the work plan has milestones with listed minimum efforts and deliverables for each consultant. If consultants do not properly perform at any milestone, strategies can be put in place to encourage any problem consultants, or in a worst case, replace them.

One of the advantages of milestone workshops is that they create intermediate deadlines for all applicable design disciplines. Some design firms will put things off in order to balance workloads, to investigate more design alternatives, to avoid making decisions, etc. The milestones provide the deadline incentives to pull everything together for presentations and coordination within the design team.

Milestone workshops are not the only consultant coordination interface opportunities. Most projects now have regularly-scheduled BIM model updates; some projects have regularly-scheduled teleconferences; and there are always the informal exchanges via telephone calls, emails and sometimes face-to-face meetings.

One thing I like to do is visit each of the main consultants' offices at least once during the project. Most consultants appreciate when the design team's leadership takes the time to meet one-on-one with them in their offices. Such visits provide an opportunity for the APM to get to know who the consultants are as a company and as individuals. It also allows the consultants' staff to have personal exposure to members of the larger project team.

Knowing what to look for and how to evaluate consultant work comes with experience, and is beyond the scope of this paper. Even without a work plan, most consultants know what they need to do, what information they need, and when they need it. One of the APM's tasks is to make certain each consultant is aware of their responsibilities relative to the other consultants and the project's completion. One goal for the APM is to facilitate the process so that it happens with minimal frustration and rework. *(Comment: The projects with the fewest consultant interface problems are often those involving proven consultants with whom there are ongoing professional relationships.)*

4.4 Architectural Production Management

Work Plan & Filing:

The *work plan* is the primary tool for managing the architectural team, just as it is for the consultants. Another key tool for managing the architectural team, is maintaining the filing system. *(Refer to section 2.10 for "filing" comments.)* A good filing system which is properly used is an integral part of the production management process. Design information must be consistently stored for convenient retrieval; otherwise, needless time will be wasted retrieving it and crucial information may be lost.

Sheet List and Drawing Sheets:

Another key tool for managing the production process is the project sheet list. The sheet list is a template for organizing the project documentation in a logical and structured manner.

After reviewing literally hundreds of architectural drawing packages during my career, I am still amazed at how confusing some sets of drawings can be – primarily due to poor drawing organization.

A sheet list is based on what is ultimately required for the construction documents. The initial architectural sheet list starts at the beginning of the schematic design phase/stage, because the project's scope, scale and general geometry were established as part of the preceding concept design phase/stage. Once the size and shape of a building are established, the drawing sheets can be identified to accommodate the design. The primary sheets to be established in the initial list are the overall and the area plans, which are needed as background plans for the other disciplines. ("Area plans" have also been referred to as "sector plans", "segment plans", etc.)

It is usually possible to also identify the majority of the exterior elevations, building sections, and wall section/elevation sheets at this time. By establishing the sheet list early in the design process, the computer-generated, two-dimensional sheets can represent consistent plan, elevation and section areas throughout the project duration. This makes it easier for digital sheet management, for interfacing with the cost consultant, for interfacing with other disciplines, etc.

Establishing a sheet list based on what is required for construction documents, which serves to keep the end goal in focus. The end goal of the construction documents is to clearly illustrate the design intent to the construction contractors and to the authorities having jurisdiction/competent authorities. With that in mind, the sheets and sheet list need to be designed to tell the story logically and efficiently. Some of the general rules to follow when drafting sheet lists and developing drawing sets include the following:

1. Target Audience: When designing the contract document sheets and their organization, always remember the primary objective is to clearly and efficiently convey the project's design intent to two primary audience groups, the authorities having jurisdiction/competent authorities and the contractor. A good set of contract documents reflects this understanding.
2. General to Specific: Drawings should be arranged showing the general, high-level information first and then transitioning towards more detailed information. The more general drawings are used to reference the more detailed information in context of the bigger picture. An example is the architectural site plan preceding the overall floor plans, which precede the area plans, which precede the enlarged plans, etc. The rule of organizing from general to specific also applies to sheet titles. An example is using "Overall Floor Plan – Level 2" rather than "Level 2 Overall Floor Plan". (*Refer to the example "Document Register" in Appendix C.*)
3. Sequential Sheet Numbers: Only use alpha-numerical sheet numbers that are sequential and can be digitally sorted as such. Avoid using letters in the middle of a sheet number – this can disrupt the sheet order. The goal is to make the drawing set easier to navigate during coordination, reviewing, bidding, construction, etc.
4. Information Grouping Types: The types of architectural drawings fall into basic groups, such as plans, sections, elevations, details, schedules, etc.; and within these grouping types there are sub-groupings relating to the level of detail and/or the location on a project of the item being shown. To conveniently locate information within a set of drawings, the same types of information should be grouped together. Using *grouping type* numbers for the main drawing types as part of the sheet numbering system further reinforces this concept.

An example *grouping type* numbering system is as follows:

- 0 General Information
- 1 Overall Floor Plans

- 2 Area Floor Plans
- 3 Building Elevations & Building Sections (*Note: Building sections are for overall orientation only and should not be overly detailed or noted.*)
- 4 Wall Sections/Partial Elevations (*Note: Having a portion of an applicable elevation next to a wall section adds clarity to the wall section.*)
- 5 Enlarged Floor Plans & Elevations
- 6 Reflected Ceiling Plans
- 7 Vertical Circulation
- 8 Schedules & Related Details
- 9 Details

NOTE: Dimensioned concrete edge-of-slab plans used to be developed by the contractors, but they have become a more prevalent part of the construction documents provided by the design team. My preference is to have these drawings included as part of the structural engineer's drawings developed with input from the architect.

5. Flexible Numbering System: The sheet numbering system should be such that new sheets can be added in sequence under their appropriate groupings. One approach is to use a two-place decimal system. There are seldom more than 99 sheets under any one of the groupings. It is often possible to also organize subgroups using the tenth's digit. As an example, 8.00 series might be room finish schedules; 8.10, finishes schedules; 8.20, partition types schedule; 8.30, door schedules; etc. Also, leave numbering gaps at strategic locations for the insertion of additional sheets if required.
6. Concise Sheet Numbers: Keep the sheet numbers as concise as possible. There are places in the world where elaborate sheet numbering systems have been developed. Rather than explain the particulars, an actual sheet number for a partial floor plan was "PAL-TAW-21-GF-M2-ARC-1221". These larger numbers can have a benefit for archiving and tracking sheets within an owner's maintenance organization, but are not acceptable as construction document sheet numbers. A compromise is to keep the sheet numbering system as described herein, but add a separate document control number for incorporating the complex numbering system. Another compromise option is to organize the last digits of the complex number into a numbering system similar to what is being proposed in this paper. As an example, rather than using "ARC-1221" as noted above, use "AR-2.24" (or similar).
7. Discipline Prefixes: In former years a single letter prefix was used as part of the sheet number to identify the design discipline, but things have become more complicated. As an example, "A" used to stand for architecture, but then what is used for "acoustics", "audio visual", etc.? Therefore, two-letter discipline prefixes are now acceptable – such as "AR" for architecture, "AC" for acoustics, "AV" for audio visual, etc. The APM must establish a list of prefixes for all disciplines. Do not permit the use of multiple prefixes to differentiate grouping types within a discipline's drawings. (*Refer to the following "Example Discipline Prefixes".*)

Prefix	Discipline
AR	Architect
AV	Audio-Visual
CV	Civil
EL	Electrical
FA	Facade
FS	Foodservice
ID	Interior Design
IT	Information Technology (IT)
LA	Landscape Architect

Prefix	Discipline
LD	Laundry
LG	Lighting
ME	Mechanical (HVAC)
PL	Plumbing
ST	Structural
SG	Signage
VT	Vertical Transportation
WF	Water Feature
WM	Waste Management

4.4.1 Example Discipline Prefixes

8. Sheet Index: The sheet index is a valuable tool for navigating the drawing set. For some projects the sheet index may be included as an exhibit to the construction contract. Therefore, it must be accurate with respect to all spellings, abbreviations, symbols, capitalization and punctuation. One way to make the sheet index more user-friendly is to add heading titles to the sheet grouping-types. If the heading titles are in bold typeface it is easier to grasp the overall drawing set organization and to locate specific information. *(Refer to the example “Document Register” in Appendix C.)*

9. Consistency: Consistency is a very important practice that adds to the legibility of the document set. There are many examples of “inconsistencies”, but a few that are often encountered are as follows:
 - Unrelated drawings placed in the wrong groupings and/or portions of the same groupings not located together
 - The numbering of details/drawings on a sheet starting on the upper left corner on some sheets and on the lower right corner on others *(Note: At one time some U.S. government agencies required detail numbering to start with “1” in the lower right corner. The logic stems from the left side of large drawing sheets being more difficult to read due to the binding of the drawings.)*
 - Using different abbreviations for the same item and/or using abbreviations that are not shown in the master abbreviation list included with the general sheets
 - Not maintaining the same north orientation on all plans
 - Using different drawing scales for the same types of drawings
 - Using different call-out legends for the same items on different drawings. As an example, an anodized storefront frame may be a keynote “3” on some of the elevations, and keynote “6” on other elevations and/or wall sections. Once a keynote numbering system has been established it needs to be consistent on all drawings to minimize confusion.

- Giving the same room different names and/or numbers on different sheets
 - Using multiple sheet sizes/formats for the large-format construction drawings sheets
 - Etc.
10. Redundancy: Some redundancy (*not to be confused with consistency*) on the drawings is acceptable, but repeating the same information on multiple drawings must be managed to avoid showing conflicting information. A common problem is when both a section and detail (or smaller-scale plan and larger scale plan) have all the similar levels of notes. In most instances, only include detailed finishes and material call-outs on the largest scale drawings for reasons of clarity and to avoid conflicting information.
11. Keynotes: Keynotes require another level of cross-referencing, which make the drawings more complicated to read. If one elects to use them, they need to be consistent, simple and relevant. (*One system that has been used is to base the material keynote numbers on the specification section numbers, but this system is usually too sophisticated for most production teams.*)
12. Referencing: The more general drawings are intended to provide clarity for locating the more specific details. For that reason, the sheet addresses of the detailed information must be provided on the general drawings. As an example, if a plan sheet has reference bubbles for doors and windows, where does one find the door and window schedules to interpret those bubbles? Those sheet locations should be called out on the sheet notes on each applicable plan sheet. The converse of this is also true. If one sees a detail on a detail sheet, that detail should have been referenced somewhere previously on a more general sheet in the drawings. Details not being referenced on the more general drawings is often a result of cut-and-pasting details from previous projects, without editing or referencing them for the new project. One convention is to list under each detail number all the general sheet numbers where a detail is referenced – or at a minimum, list the first sheet where it is referenced.
13. Drawing Scale: Related to level of detail is the scale at which information is shown. Too often drafters are viewing only the electronic drawings and are not envisioning the printed contractual drawings. Smaller scale drawings are to be used for referencing larger scale drawings where appropriate. The level of detail and amount of information should be greater on the larger scale drawings.

It is also important to draw at a scale appropriate to the information shown. As an example, area plans require a minimum scale of $1/8" = 1'-0"$ (1:100) in order to have sufficient space for noting rooms, doors, windows, partitions, etc.; for applicable reference bubbles; and for dimensioning. Drawing sheets will not always be reproduced at full size. Therefore, a graphic scale is required and/or a note in the title block is required to identify the full-sized format for the sheet. All text must also be legible on drawings printed at 50% reduction.

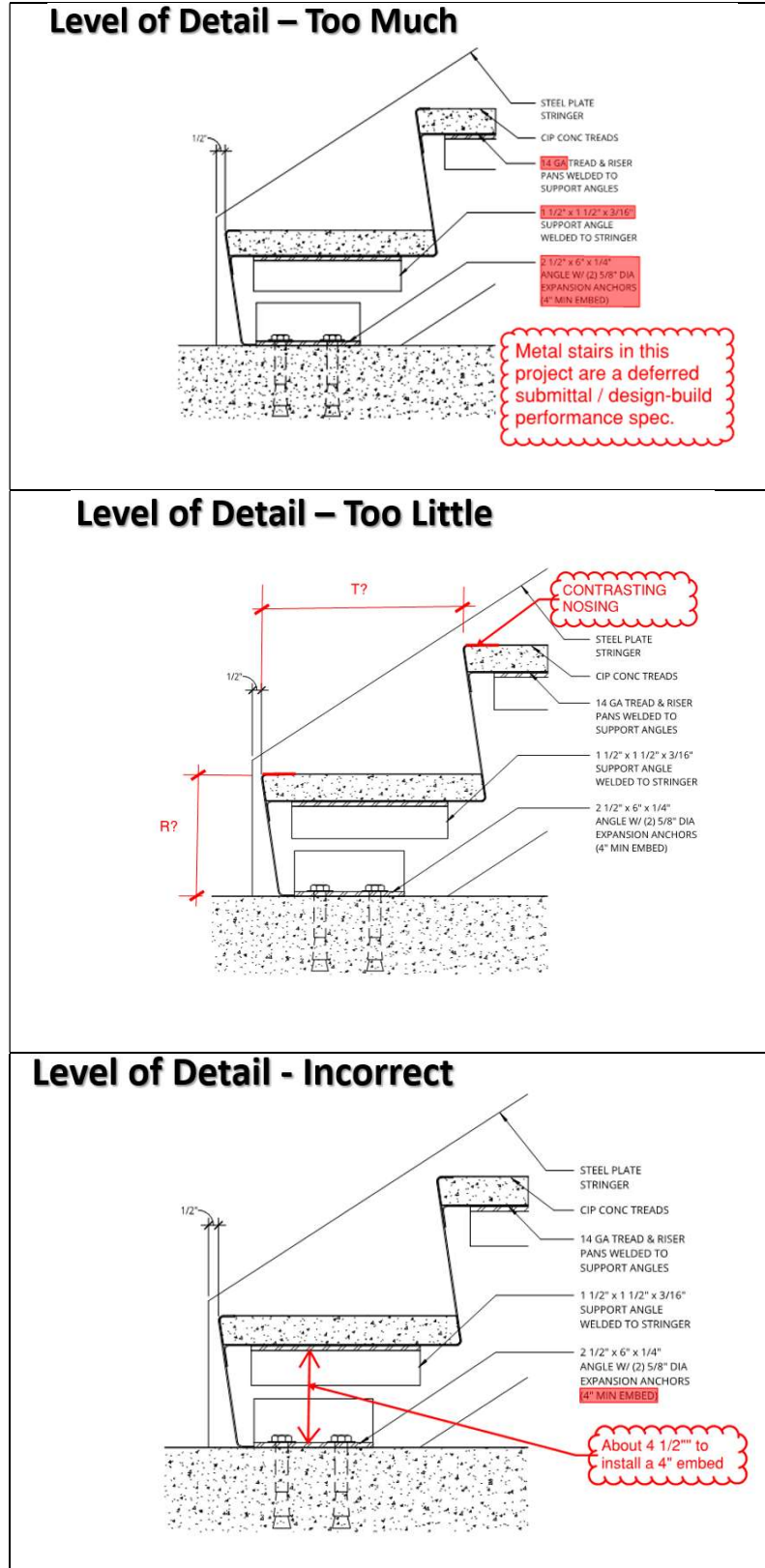
14. Key Plans: Every plan, elevation and section sheet requires a key plan to orient the drawings on the sheet to the overall plan. The key plan is best situated in the same location on all applicable sheets, preferably within the title block on the right side. A person thumbing through a set of drawings can use the key plans as another navigation tool to locate specific areas.

15. Multiple Buildings: There are various ways that multiple buildings have been incorporated into construction drawings. One method is to use a building prefix designation for each building and have a separate, stand-alone set of drawings for each building. As an example, the main building may be “MB”, the parking structure “PS”, etc. By each building having its own drawing package, the contractor (and design team) can more easily assign separate teams to each building.

Building:	Sheet Number:
BD-1	A2.30

4.4.2 Example Sheet Numbering for Multiple Buildings

16. Level of Detail: A common complaint about architectural construction documents is that they are often too detailed in some areas, and not detailed enough in others. As an example of too much detail, some architects like to call out the types of welds in their metal stair details, when those same stairs are specified as design-build (deferred submittals). There are too many examples of too little detail to list – they often result in costly construction change orders/variations and/or poor detailing. *(Comment: Keeping in mind the requirement for sufficient detail to convey the design intent is required, there is also a desire to simplify the construction drawings.)*

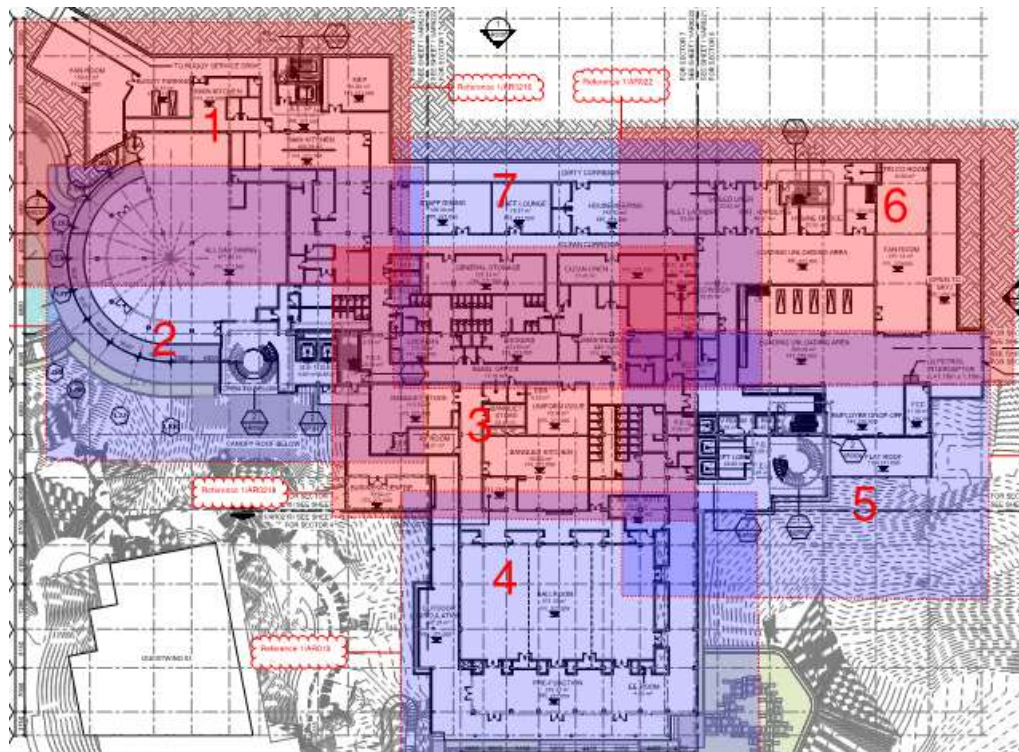


4.4.3 Examples of “Level of Detail” Errors

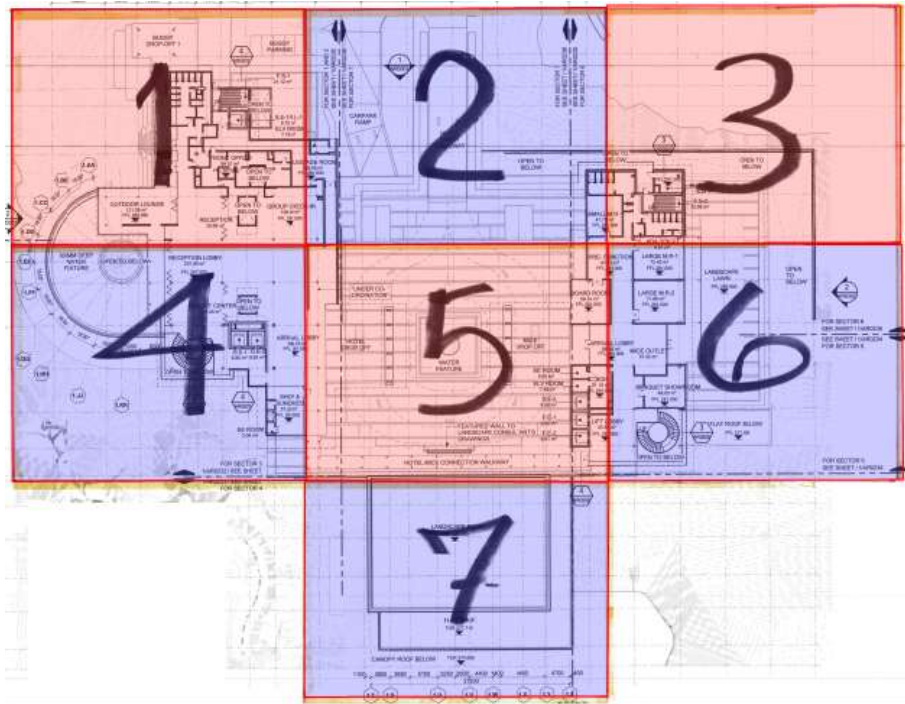
17. Plan Dimensioning: Dimensioning plans correctly appears to becoming a lost art. The first things that are often missing are the work points and/or dimensions to locate the building(s) on the site. The second thing that drafters tend to forget is that the dimensioning needs to be convenient for the contractor to use in laying out the actual partitions, etc. Some general guidelines for dimensioning plans include the following:
- Provide a separate string of gridline-only dimensions, and tie partition and wall location dimensions to the grid lines. (*Construction layout teams need to be working to gridlines, especially when they are locating items away from the building's perimeter.*)
 - Be consistent where partition dimensions are taken. Is it to the face or centerline of concrete and masonry? Is it to the centerline or the face of stud – or is it to the finish face of drywall or plaster? Etc.? (*Comment: Face of finish is good for establishing design intent, but adds complication for the contractor.*)
 - Be consistent with how door and window dimensions are shown. Typically, they can be taken to their centerlines for framed construction, but possibly to rough openings for concrete and masonry construction. Doors located next to the corners of rooms do not need to be located dimensionally if there is a standard note on the jamb details illustrating that such door openings are to be 6" (*or an appropriate dimension*) from the adjoining wall.
 - Verify that every partition has been dimensionally located. (*Note: If a partition is centered on a gridline, it does not need to be dimensioned.*)
 - Avoid using dimensions with units smaller than 1/8" (1/4" is even better), to allow for construction tolerances.
 - Indicate the alignment angles for walls that are not parallel to gridlines, or provide dimensions to their endpoints. (*I have seen many "slanted walls" with a dimension string tied perpendicular to gridlines, and then uselessly tied to the 'slanted' wall at some arbitrary point along the wall.*)
 - Dimensionally locate center points and provide radii of curved items.
 - If a clear opening is required, note it as being a clear dimension between finishes.
 - Avoid dimensioning partition thicknesses on plans.
 - Avoid closing dimension strings where not required.
 - Use consistent dimensions on both small scale and enlarged drawings to relate the two to each other.
 - Provide and locate perimeter gridlines. Show gridlines on perimeter wall sections and dimension elements relative to the gridlines.

18. Area Plan Divisions: Separating overall plans into area plans requires special attention, especially for irregularly shaped buildings, buildings that have a podium different from their upper floor levels, very large buildings, etc. Assuming 1/8" = 1'-0" (1:100) scale for the area plans, there is limit as to what will fit on the sheet. Some rules for establishing area plans are as follows:

- Do not shift/stagger area division lines. Keep the division lines continuously straight through the entire overall plan. *(I once worked during the construction of a large project where the area plans were offset. It became such a coordination nightmare that the contractor finally replotted the plans.)*
- Use the same scale for all area plans. Any required enlargements can be referenced on the area plans and shown on the enlarged plans.
- Use the consistent area segment numbers/letters, orientations and view ports for all levels, even if some of the areas from the lower levels are deleted and not shown at the upper levels.
- For buildings with larger lower levels than upper levels, attempt to use the first and/or last area designations for those end areas that drop out above given levels. This reduces the breaks in the numbering sequences for the upper-level area plans.

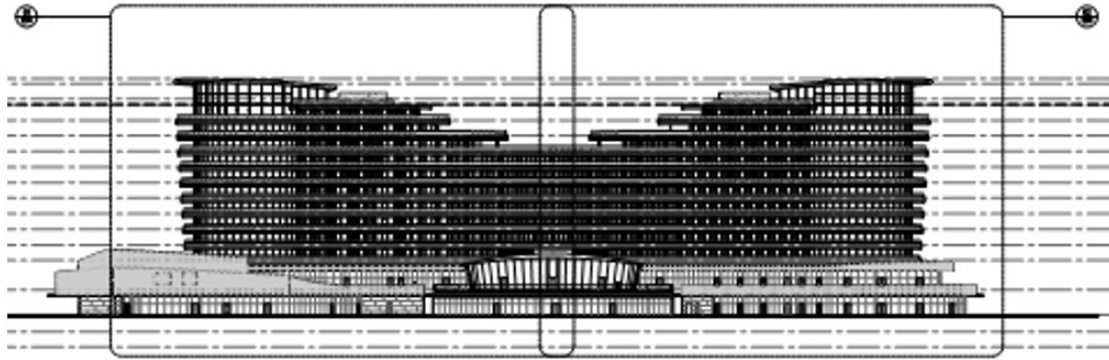


4.4.4 Example of Incorrect Area Plan Separations

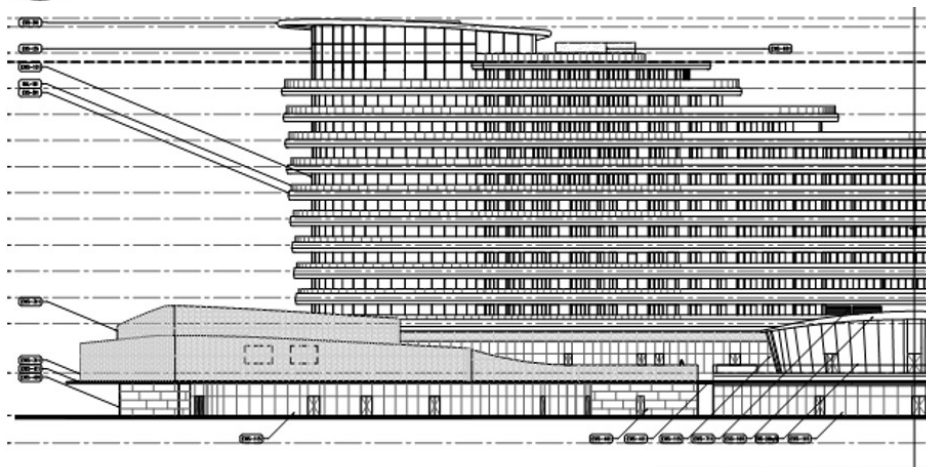


4.4.5 Example of Corrected Area Plan Separations

19. Exterior Elevation and Building Section Numbering: The typical rule is to restart the detail/drawing numbering with each new sheet. Two exceptions to that rule are for exterior elevations and for building sections. It is better to use one set of sequential detail/drawing numbers for each. To help tie drawings together, the same elevation or building section numbers with letter suffixes can be used to track the various enlarged elevations or sections back to their overall elevations or sections. As an example, the south elevation may be elevation 1 and it may be further subdivided into enlarged elevations 1A and 1B. Exterior elevations should also start at one side of the building, then each consecutive elevation being the adjacent side moving consistently in either a clockwise or counterclockwise direction. *(Note: If an elevation or section has a detail number, it should not have a second number in its title. This redundancy becomes confusing and has been observed on many drawing sets.)*



1 Elevation - South
1:400



1A Elevation - South - Part A
1:400

4.4.6 Overall & Partial Elevation Numbering Example

20. Wall Section Sequencing: The majority of the required wall sections can be identified in the initial schematic design phase/stage. The sequencing of wall sections should start with those on the same side of the building as the first building elevation, and then continue around the building in the same direction as the elevation sequence. Organizing wall sections in this manner embeds another level of logic and consistency to facilitate their use. *(It is a good practice to leave a couple of extra page numbers at the end of the drawing sequence of each side of the building, in case they are needed in the future.)*
21. Entourage: For design phases/stages prior to bid/tender documents, architects often include human figures, cars and similar entourage to provide a realistic appearance and to give the drawings scale. Any of these items that are not being provided by the construction contractor are to be eliminated from the bid/tender and construction documents.

22. Company Standards: Every architectural firm should have its own documentation standards, including standard abbreviations, general notes, legends, CAD standards, etc. These should be consistently implemented, but they must also be adjusted if required for specific projects. As examples of what to avoid, it is not uncommon to find several abbreviations for the same thing within a set of drawings, and it not unusual to find abbreviations that are not understood because they are not included on the abbreviations list. Another example is, that even though “general notes” are general by definition, they often need editing to fit the specific project.
23. Industry Standards: Construction drawings have evolved over the years in such a way that contractors have come to expect certain standards for symbols, drawing types, organization, schedules, specifications, etc. For the sake of clarity, it is best not to reinvent the system. *(One exception, which is now evolving, may be how to better capitalize on building information modeling (BIM).)*

Drawing Transmittals/Document Registers:

After drafting an overall sheet list, the list can be used in a document to record what drawings are being sent where and when. This document is referred to as a *drawing transmittal* or a *document register*. Even though many of the electronic data exchange/management software applications (such as Aconex) include some form of transmittal record, it is helpful to include a separate drawing transmittal document with each milestone submission. The best way to explain what is meant by a *drawing transmittal/document register* is to view the example provided in Appendix C. *(Remember, this is only an example that will need modifying to comply with the specific project.)*

One idiosyncrasy is that some of the lines have been “grayed/toned-down”. These lines represent sheets that will be included in the full construction document package, but which have yet to be started. The grayed sheet titles provide an indication to the production team, client, cost estimator, and others, of what work remains to be evolved and where it will be shown. *(It can be helpful to show the remaining work to clients, so they can better understand how information builds over time and the extent of the total deliverables.)*

Notice that the numbers following the decimal point are identical for the same areas shown on the area plans and the reflected ceiling plans. As an example, X.23 is for level 2 area 3 on both. The area plans produced by the other disciplines should follow the same convention. Then, when one is looking at architectural, structural, HVAC, plumbing, electrical, etc., area plans with the same digits after the decimal point, they are all on the same architectural background plan.

Specifications:

Building and construction technical specifications are the text portion of the contract documents produced by the design team to describe the scope of work, materials, products and systems to be used, installation requirements, and quality of workmanship for each given portion of the work. The specifications contain the detailed information regarding the materials, products and systems shown on the design team's drawings. They form the main component of the construction documents' "project manual", which is produced in an 8 ½" x 11" /A4 format.

The reason for describing specifications in the preceding paragraph is because some architectural designers and technicians do not fully know what specifications are, and that is often reflected in their drawings. In the United States, the Construction Specification Institute (CSI) has standardized the formatting and organization of construction specifications. Though it appears to be making inroads, CSI is not always used or correctly used in other parts of the world. It is recommended that CSI formatted specifications be required on all projects.

Whether a firm has an in-house spec writer or utilizes a consultant, the interface steps indicated below are an effective means of managing/staging their involvement.

1. Formatting Requirements: Typically, the architect's spec writer is responsible for the overall formatting and compiling of the specifications from each of the project's design disciplines. *(Note: Interior design FF&E specifications are an exception, but they are usually tendered separately from the main construction work.)* The spec writer needs to issue a document with specification formatting requirements to all of the applicable disciplines. This document defines the letter fonts and sizes, page numbering, indentations, etc., which are to be used by all, so that the overall specifications appear uniform. This document can be issued as early as the RFP, but no later than the end of the schematic design phase/stage. *(Note: The only time I have run into any formatting complaints was from an international engineering firm who attempted to use the same set of specifications for all of their projects, and their local office only had access to a PDF copy.)*
2. Draft Table of Contents: By the end of the initial milestone for the design development phase/stage the spec writer is to submit a draft table of contents for review by the architectural team. It is also recommended to have the other disciplines submit their draft table of contents at the same time, to encourage the development of their specification. The complete, compiled table of contents is to indicate which discipline firm is responsible for each spec section.
3. Outline Specifications: Outline specifications *(or initial draft specifications are sometimes just as easy to produce)* are required by the end of the design development phase/stage. They serve to add detail for the cost estimate, provide an opportunity for review, and establish much of the nomenclature to be used on the construction document drawings. *(Note: On projects where the design architect is handing the project off to an "architect of record" to produce the construction documents, the format of the "outline specifications" may need to be adjusted to be more general in nature.)*

4. Draft Specifications: Towards the end of the construction document phase/stage, the spec writer is to provide an updated, final draft for review and coordination.
5. Final Specifications: The final specifications from all disciplines must be completed and compiled prior to the completion of the construction document phase/stage.

The key to managing the coordination of a set of drawings with the specifications, is to educate those working on the drawings to the applicable requirements – some of which are as follows:

- Design and technical members of the architect’s team are to maintain a basis of design notebook/file that includes information regarding any specific materials, products and/or systems they have selected to use for the development of the design and/or construction drawings. The notebook/file should be arranged by CSI section numbers (or at least by CSI division numbers).

Note: As a supplement to the CSI numbering system, there are project component numbering systems that can be linked to BIM models. In the U.S., Uniformat II based on ASTM E1557 provides a building component numbering system which can be used to organize building information for describing, qualifying and quantifying project construction components. Information is organized for project component descriptions, cost estimating, client approvals, operational management of an asset during its full life cycle, etc. The CSI numbers can then be used to describe/specify the materials used in each component. At least one specification specialist consultant, Conspectus, has developed an approach to merge the CSI and Uniformat II systems into an interactive project management tool.

The International Organization for Standardization’s ISO 19650-1:2018 has similar uses to Uniformat II but its component numbering system did not appear to be as developed at the time of this writing. The British National Bureau of Standards (NBS) also has a similar system tied to the BIM components. Two concerns regarding tracking BIM project components are the potential for requiring additional production hours and the potential liability associated with providing an additional type of information documentation. Therefore, the requirements should be clearly stated in the contract, or provided as an additional service.

- The specifications and drawings should use the same terminology for materials, products and systems. As an example, if the specifications have a section for “Single-Ply Roof Membrane”, the applicable drawings should not reference “EPDM roofing”, but should note “single-ply roof membrane”.
- Keep the technical and performance requirements in the specifications, and do not include them on the drawings. An example would be labeling “metal flashing” on a detail as being “18-gauge aluminum flashing”. Unless there are multiple types of flashing on the project, “metal flashing” would be enough information on the drawings. The specifications would then spell out in detail the material, gauge, finish, etc. In the case of metal flashing there is a possibility that there are extruded aluminum cap flashings, stainless steel roof-to-wall counter-flashing, etc. In those cases, they should be referred to in both the specs and drawings as “cap flashing” and “counter flashing” (or other consistent terms).

Another potential trend that I have been observing is for specification sections (or portions thereof) to be included on the construction drawings. I do not know if this is a requirement of the authorities having jurisdiction (who often do not want to have to review a separate specification document), or it may be a shortcut on the part of the architect and/or engineer. Having been around long enough to see examples of construction documents prior to the full acceptance of CSI, I am not fond of the direction this potential trend is heading, especially for larger projects.

Partition Types:

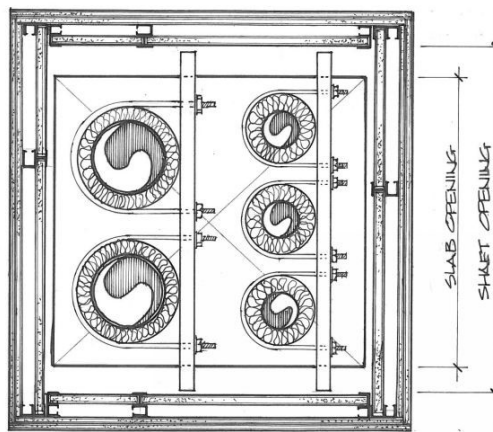
The reason partition types are being discussed here is because of their emerging importance in BIM modeling. The sooner the partition types can be established; the sooner the associated rework of the BIM model can be reduced. Therefore, establishing at least the main partition types during the schematic design phase/stage is strongly recommended. Full-height (floor-to-structure) versus partial-height (floor-to-ceiling) partitions need to be established, as well as any fire or acoustical ratings. There are various ways to number/label partition types. Providing an example is beyond the scope of this paper, but some concepts to consider are as follows:

- Keep it simple. Use an easy-to-understand numbering system for the partition types. Do not create new partition types for minor differences. It is easier for the contractor's coordination and often more cost-effective if there are fewer partition types.
- Use typical partition types where possible and only reference the unique conditions in plan.
- It is convenient for plan checking and MEP coordination if the hour-ratings of any fire-rated partitions is part of the partition type numbering system.
- Arrange the partition type details on the sheets in alpha-numerical order. This reduces searching through multiple sheets of partition types to find the right one.
- Limit the partition types to interior partitions. Exterior wall types should be shown on exterior wall sections.
- On details for fire and/or sound rated partitions list the rating levels and the tested assembly references (*i.e.*, Underwriters Laboratory (UL), or similar, assembly numbers).

MEP Shafts:

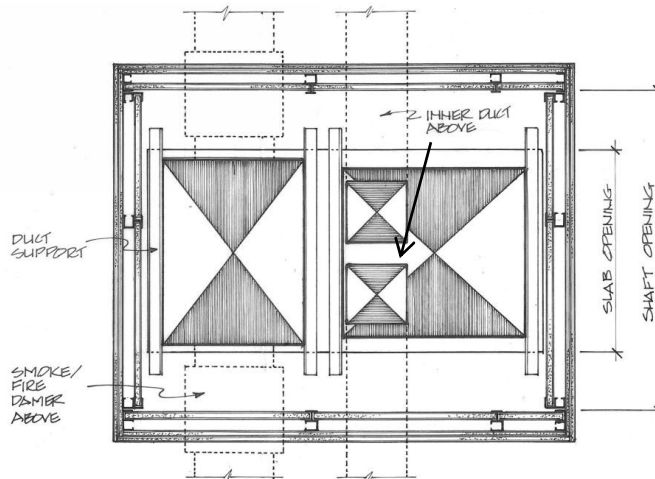
MEP shafts are another one-off mentioned here due to their significance as spatial drivers and as a tool for managing portions of the MEP coordination. A great deal of difficulty can be avoided if the main shafts are resolved early during the design process. The initial designs can be based on worst-case scenarios, and can be revisited if appropriate. A couple MEP shaft coordination observations are as follows:

- Vertical pipe shafts are sized and located in coordination with the MEP engineers. As can be seen in sketch 4.4.1 below, it is not simply determining how close a group of pipes can be crammed into a slab opening. There needs to be space for pipe insulation, pipe supports, pipe clamps, joints, installation clearances, 90° pipe exits from the shaft, etc.



4.4.1 Example Pipe Shaft Plan

- HVAC duct shafts are similar to pipe shafts in that they are sized and located in coordination with the MEP engineers. As shown in sketch 4.4.2 below, in addition to the actual ducts, space must be allotted for the duct supports, fire dampers, power-actuated smoke dampers, etc.



4.4.2 Example Duct Shaft Plan

4.5 Quality Assurance & Control

Establishing and consistently maintaining a high quality for an architectural firm's aesthetic, functional and technical designs is the main goal of an APM's quality assurance and quality control efforts. Producing quality design products is the cornerstone to the development of a successful and respected architectural practice. Talent plays a key part of this, but it also requires diligence and discipline to consistently maintain high quality. The APM's quality maintenance tools fall into two categories. One is "quality assurance" (QA), which relates to processes; and the other is "quality control" (QC), which in this case, relates to reviewing the deliverables to minimize mistakes.

Much of this paper has been about processes used to help manage and execute architectural projects. Firms that approach projects with the right processes (*i.e.*, implementing appropriate QA practices), are more likely to have successful projects. Every firm should establish at least a minimal set of processes to be used in managing, designing, and controlling their projects.

There are organizations, such as the International Organization for Standardization (ISO), that have developed standards for establishing QA procedures. Having an ISO 9001 certification is currently a popular marketing tool, and even required in some RFP's. However, it is important to remember that each project is different, each APM is different, and each project team is different. Therefore, some of the processes need to be flexible to allow for adaptation to the specifics of the project. If the APM is not committed to the processes and/or if the team is not educated in their requirements; then the benefits of any certifications and/or processes cannot be fully appreciated.

QC tools are utilized for milestone and/or periodic reviews of the design and technical deliverables. During the early design phases/stages, QC design reviews are best done by in-house persons not familiar with the project. Their input can stimulate discussions regarding the design and help maintain a design quality in keeping with the firm's design "image". They can also identify potential code and constructability concerns earlier, when they are easier to resolve. In terms of professional liability exposure due to potential errors and omissions, it is the construction documents that require the greatest QC scrutiny. Involving a qualified reviewer to provide an unbiased review of the construction documents with a fresh set of eyes, is an effective means of QC. It is ideal if such a person is available in-house, but far too often the right person is not available at the right time. One option is to utilize a consulting company for the QC reviews. (*One such company is "CheckSET Review".*)

Peer review QC comments come in two types. One is the type of comment that points out a potential concern, and the other is the type of comment that also indicates a potential solution. Both are valid, but it can be too time consuming to provide remedies for every situation, and it can be more productive for the project's technical team to address some of the review comments based on their knowledge of the project. The architect is trying to achieve a consistent aesthetic detail, and a solution proposed by a reviewer might trigger an undesired domino/knock-on effect.

A methodology I have used to manage the architectural team picking up the red-lined QC review comments is what I call the “red-line, yellow-line, green-line” system. It is based on the days when the reviewer would markup a set of prints with a red pencil. After picking up the corrections, the technician would highlight the red-line comments with a yellow highlighter, and then the project architect or APM would review the revised drawings and add a blue highlighter over the yellowed comments that were correctly addressed – resulting in a green color. This method allows a final opportunity to see if the review comments were all acceptably addressed. It also provides an opportunity for a one-on-one review of the technicians’ capabilities. Now, most of my redlining is done on PDF prints using Bluebeam Revu software, but the multi-colored highlighting and crosschecking system can still be used.

The use of checklists in the QC process has its pros and cons. Depending on the level of detail, they can include items from “lessons learned” (as previously discussed), and they can provide systematic reminders for the reviewers. Checklists can also be abused. In the rush to get a project completed, items can be arbitrarily ticked off just to get the review report logged into the system. Rather than checklists, the best way to insert QC into a project is to have qualified people working on it. An employee who knows what to do does not make as many mistakes, and a qualified reviewer usually does not require a checklist.

4.6 Authorities Having Jurisdiction Interface

Legitimate governments and their agencies are obligated to protect the life, safety and welfare of their citizens. Qualified persons can be licensed as architects by a government, and in exchange for the government’s trust, architects are obligated to provide “projects” compliant with the regulations and standards set forth by the applicable Authorities Having Jurisdiction (AHJ)/Competent Authorities. Therefore, it is of the utmost importance that the architect knows who the AHJ’s are for each project, what their regulations and standards are, how they are organized, and what their review and approval processes entail.

Because each jurisdiction is different, the AHJ interface should be identified as early in the design process as possible. This is typically led by the architect (or occasionally by the architect-of-record or the life-safety consultant), with input from the various disciplines. The first thing to establish is a list of all the AHJ’s entities, their contact information, their areas of responsibility, and the codes and regulations for which each requires compliance. The second thing to identify is when and how they process their reviews and approvals.

The most common AHJ categories are as follows:

- > **Planning:** Responsible for zoning/land use, density, setbacks, etc. Their reviews focus more on the big picture with respect to the regional, local and neighborhood contexts. Planning reviews usually take place early in the design process, and are often required to verify a project’s viability and constraints prior to the design progressing too far.

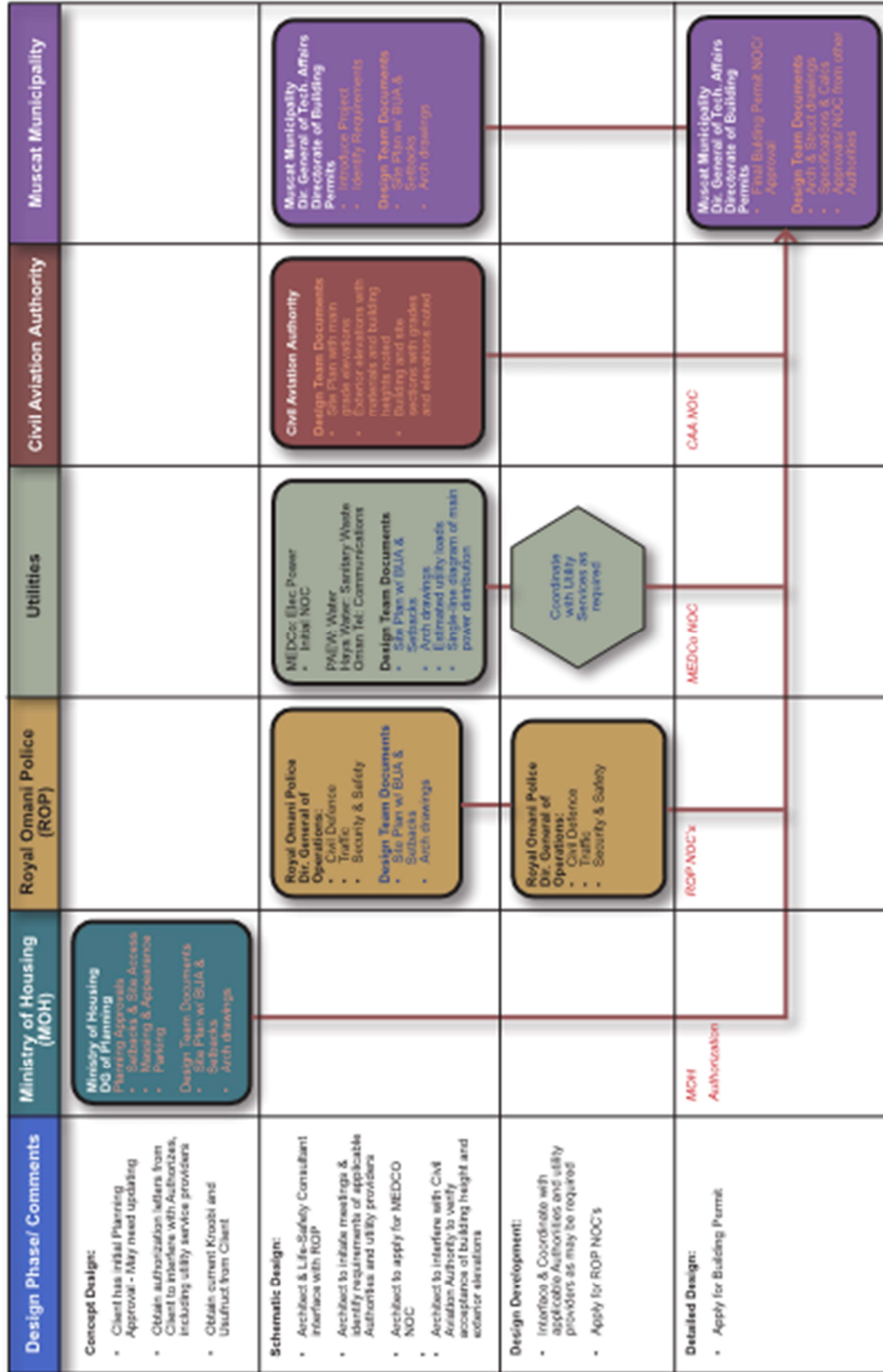
- > **Building:** Responsible for properly functioning buildings with respect to building areas and heights, exiting, structures, interior environment, accessibility, survivability of operations, etc. Their formal permitting reviews are often based on the final construction documents. However, some jurisdictions will make reviews and approvals based on lesser developed documents. Building departments are usually the clearing house for interfacing with most of the other AHJ's. It is important to have a good working relationship with the building department to better understand their objectives and processes, and to be in a position to discuss potential optional interpretations, or variations of specific code requirements.
- > **Fire:** Responsible for minimizing the dangers to life from the effects of fire, including smoke, heat and toxic gases (also often responsible for safety and crowd-control implications for disasters other than fire). Fire/civil defense departments' concerns overlap with many of those of the building departments. One theoretical difference is that building departments may be willing to look at a project based on how it is planned to be used, whereas fire/civil defense departments are concerned about how a project might be misused. Therefore, some compliance interpretations of the building code by the building department may not be acceptable to the fire/civil defense department's interpretations of the fire code.
- > **Other:** In addition to the big three above, there are often other AHJ's that have their own specific regulations and require their own reviews and approvals prior to the building department approving and issuing a project's construction permitting. Some AHJ's may require their own permitting process; others may require nothing more than a Notice of Compliance (NOC). Examples of other AHJ's that might require interfacing with the design team include the following:
 - Utilities/Services Providers
 - Department of Transportation
 - Elevator Regulators
 - Health Department (*food and beverage outlets, swimming pools, beauty salons, medical facilities, etc.*)
 - Civil Aviation Authority
 - Ministry of Tourism
 - Office of the State Architect
 - Federal Agencies (*such as US Forest Service, US Army Corps of Engineers, Bureau of Land Management, etc.*)
 - Etc.

Understanding and managing the required interfaces with the various AHJ's is an important role of the APM. Those architects working on projects in the United States should already have a basic understanding of how this is done, even though there are some variations between jurisdictions. International projects tend to generate the most questions regarding the AHJ interface processes.

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For international projects I will typically work with a local architect who is familiar with the local AHJ's and their requirements. Then working together, we will often develop diagrams and lists of what needs to be done when. An example of this type of overview is shown on the following pages. This permitting process was included as a part of that project's "Project Design Interface Manual" for a project in Oman, and is indicative of some of the differences that can be found working in other countries.

In addition to AHJ's having an influence on a project's design and approval, there are also other non-governmental organizations with their own regulations that need to be considered on some projects. These include such organizations as Factory Mutual, who represents the insurance industry's concerns; the Joint Commission on Hospital Accreditation, which has its requirements for hospital designs; etc. APM's need to identify which of these other organizations have an impact on their projects, and establish applicable interface processes similar to those for the AHJ's.



4.6.1 Example International Permitting Diagram

Ministry Of Housing (MOH)	
<ul style="list-style-type: none"> i. Administrative Content ii. Approval request letter (drafted by Architect) iii. Copy of Usufruct (attestation as original copy may be required) iv. Original + copy of Krooki v. Letter from Owner authorizing Architect to apply for building permit approval vi. Completed digital application (by MOH) vii. Technical Content viii. Three A1 drawing package (architectural package; site plan indicating plot area, total BUA, foot print, setbacks, and vehicle/pedestrian circulation with entries and exits; and site cross sections showing the total height of different buildings) 	
Royal Omani Police (ROP)	
Directorate of Operations	
<ul style="list-style-type: none"> a. Administrative Content i. NOC request letter (by Architect) ii. Copy of Krooki iii. Copy of Usufruct iv. Letter from Owner authorizing Architect to submit for the NOC v. Copy of Architect's Certificates of Registration (Life-Safety Consultant has a separate certification registration with the ROP) 	
<ul style="list-style-type: none"> b. Technical Content – Directorate of Civil Defense i. A1 drawing package (architectural firefighting package at initial stages) ii. Fire and Life Safety Strategy Report (by Life-Safety Consultant) 	
<ul style="list-style-type: none"> c. Technical Content – Directorate of Traffic i. Site Plan (min. scale 1:400) including total built-up area ii. Maximum users/vehicles occupancy for parking calculations iii. Vehicle and pedestrian circulations iv. Assembly points v. Traffic signs (if applicable) vi. Traffic impact study (if required) 	
<ul style="list-style-type: none"> d. Technical Content – Directorate of Security and Safety i. Site Plan (min. scale 1:400) including total built-up area ii. Building floor plans (min. scale 1:100) showing security system and CCTV strategy iii. Building sections 	
Civil Aviation Authority (CAA)	
<ul style="list-style-type: none"> a. Administrative Content i. ?? 	

<p>b. Technical Content (<i>Information required for CAA to insert the building into their flight path and radar study model(s).</i>)</p> <ul style="list-style-type: none">i. 3-D building AutoCAD information in the form of exterior elevations and building sections with grades notedii. Project site plan tied to control points with easting's and northing's noted, and with main grade elevations noted
<p>Muscat Municipality (MM)</p>
<p>a. Administrative Content</p> <ul style="list-style-type: none">iii. MOH Site Plan approvaliv. ROP approvals and NOC'sv. MEDCo NOCvi. All other applicable authorities' approvalsvii. Approval request letter (by Architect)viii. Copy of Usufructix. Original Krookix. Letter from Owner authorizing Architect to apply for approvalxi. Copy of Architect's Certificate of Registrationxii. MM on-line digital submission form (completed by Architect) <p>b. Technical Content</p> <ul style="list-style-type: none">i. A1 drawing package (architectural & structural drawings at Design Development Stage)ii. Structural Calculations
<p>Public Authority of Electricity & Water (PAEW)</p>
<p>a. Administrative Content</p> <ul style="list-style-type: none">i. Application Letter (by Architect)ii. Copy of Krookiiii. Copy of Usufructiv. Letter from Owner authorizing Architect to apply for utilitiesv. Copy of Owner's Certificate of Registration <p>b. Technical Content</p> <ul style="list-style-type: none">i. Engineering site planii. Water supply requirement Report
<p>Utilities/Service Provider – Electricity – Muscat Electricity Distribution Company (MEDCo)</p>
<p>a. Administrative Content</p> <ul style="list-style-type: none">i. Application Letter (by Architect)ii. Copy of Krookiiii. Copy of Usufructiv. Letter from Owner authorizing Architect to apply for utilityv. Copy of Architect's Certificate of Registrationvi. MEDCo submission form (completed by Architect) <p>b. Technical Content</p> <ul style="list-style-type: none">i. Electrical site plan

<ul style="list-style-type: none"> ii. Single-line diagram of the main electrical distribution iii. Electrical load calculation report
Utilities/Service Provider – Sewage & Water Treatment – Haya
<ul style="list-style-type: none"> a. Administrative Content <ul style="list-style-type: none"> i. Submission Letter (by Architect) ii. Copy of Krooki iii. Copy of Usufruct iv. Letter from Owner authorizing Architect to apply for utilities b. Technical Content <ul style="list-style-type: none"> i. Engineering site plan ii. Sewage capacity, water recycling strategy and water treatment Report
Utilities/Service Provider – Telecommunications – Omantel
<ul style="list-style-type: none"> a. Administrative Content <ul style="list-style-type: none"> i. Submission Letter (by Architect) ii. Copy of Krooki iii. Copy of Usufruct iv. Letter from Owner authorizing Architect to study utility provision b. Technical Content <ul style="list-style-type: none"> i. Engineering site plan ii. Telecommunication requirements

4.6.2 Example List of AHJ Interface Deliverables

4.7 Construction Phase/Stage Services

Introduction:

Some of the more successful architectural projects are those that never get built. The primary reason for this is that most of the potential errors and omissions embedded in the design documents never have the chance to see the light of day. Projects which actually make it to construction are the ones where architects have their greatest exposure to claims for errors and omissions, delays, negligence, etc. For this reason, APM's must have a clear understanding of their firms' roles and responsibilities during the construction phase/stage, as well as their limitations and what they should not be doing.

Because the risk exposure during construction is significant, the "design" architectural firm should be providing the appropriate construction phase/stage services. Without ongoing input during construction, the design firm does not have the opportunities to address and/or mitigate potential design issues before they escalate into bigger problems. Should a client for any reason request that another firm provide these services, the design firm needs to work with an attorney to draft agreement language to mitigate and/or indemnify the design architect from the corresponding increased risk exposure.

An alternative is for the design architect to hand the project off to an architect-of-record after the design development phase/stage. The architect-of-record then assumes the liability associated with the preparation of the construction documents and the construction phase/stage services.

If the APM is not the person providing the construction phase/stage services, then that responsibility must be assigned to someone within the architect's organization with the required experience and expertise. Managing construction phase/stage services is not for rookies. It is also important to know that just because someone has good design and/or technical skills, he/she may not necessarily be qualified without the requisite training and experience.

One of the differences between design phases/stages and the construction phase/stage is what I refer to as a shift in attitude. During the design phases/stages architects strive to be people-pleasers. They want to make the client happy and appreciative of the designs, and they want to be in a creative relationship with all involved. During construction, architects also want to be helpful and proactive, but the rules of engagement have changed. Many contracts have the architect as the first level of interpretation and resolution between the client/owner and the contractor. (Refer to the AIA's concept of Initial Decision Maker (IDM).) This requires unbiased, professional interactions to manage a client/owner who wants to believe that the construction documents are 100% perfect and that the contractor will be providing the project perfectly executed on time for the agreed price – and a contractor who wants to squeeze every possible dollar out of the project, and is willing to blame the design team for any additional costs, delays and lack of quality. In other words, providing construction phase/stage services is probably not a good choice for a person with thin skin and who does not enjoy working at the “sharp end of the stick”.

Something that can help keep the architect from becoming too defensive when minor discrepancies are found in the drawings, is to remember the *standard of care* the architect is required to provide. It is not 100% perfection. (See related discussion with item 2 under section 2.3 above.) Some mistakes are inevitable, and there is no need to be overly apologetic. The best way to address issues is by fully identifying and resolving any design problems quickly and effectively. Being a proactive problem solver and team player, performing the required duties professionally, is the best way for the architect to maintain good working relationships with the client/owner and the contractor. (*Note: A part of the architect being proactive includes not taking on responsibilities that are not in the architect's scope of work.*)

The following sections are intended to introduce some of the construction phase/stage architectural management processes. It is important to set and maintain the ground rules (based on the contracts and agreed procedures) from the beginning. After a project starts to go bad, it is often too late to reinsert the required procedures, interactions and quality. Although this approach may not win many friends at the beginning, it becomes appreciated by all, especially if the architect keeps up with his/her end of the process. If some contractors (or in

some cases, the owners) feel they can take advantage of the system – they will to their benefit. *(Note: If specific requirements written in the contract are not followed, U.S. courts have accepted the contract as being modified as it has been executed, or “implied-in-fact”.)*

Optional Services:

For the construction phase/stage the architect’s scope of services must be clearly defined and understood during the proposal and contract negotiating processes. The standard construction phase/stage services include the following:

- Address applicable contractor requests for interpretation of the contract documents (RFI’s.)
- Review and approval of applicable, required contractor submittals
- Provide site visits to observe applicable portions of the work for general conformance with the design intent of the construction documents
- Participate in applicable construction meetings
- Prepare and address modifications to the construction documents as may be required and agreed
- Participate in the review of contractor requests for payment
- Review the contractor’s work for acceptance

Each of the above services is further discussed below. The optional services relate primarily to site visits and the level of on-site representation during construction. This is important because of the cost implications to the architect. The majority of projects in the United States can probably be adequately served by the architect with periodic site visits occurring once a week, once every two weeks, or similar. However, larger and/or complex projects may require full-time, onsite representation by the architect and members of the other key design disciplines. The details and compensation for full-time site representation must be clearly defined in the design contract.

Many of the large-scale international construction projects require full-time site representation by the design team to “manage” the client’s interface with the contractor, as well as perform the other services noted above. Depending on the location of the international project, it is not uncommon for the site design team and contractor to complete many of the construction details and to provide more hands-on quality control.

On one of my last international construction projects, I had an onsite team of over thirty people working under me, and representing all the main design disciplines. The agreement with the owner was based on a daily/weekly fee rate for each onsite employee. This can be profitable for the design firms. In fact, some firms in the region will often accept a loss of profit during the design phases/stages just so they can make much larger profits during construction. (Note: Some of the discussions below may apply to international work, but they do not address the full scope for international construction phase/stage services by the design team.)

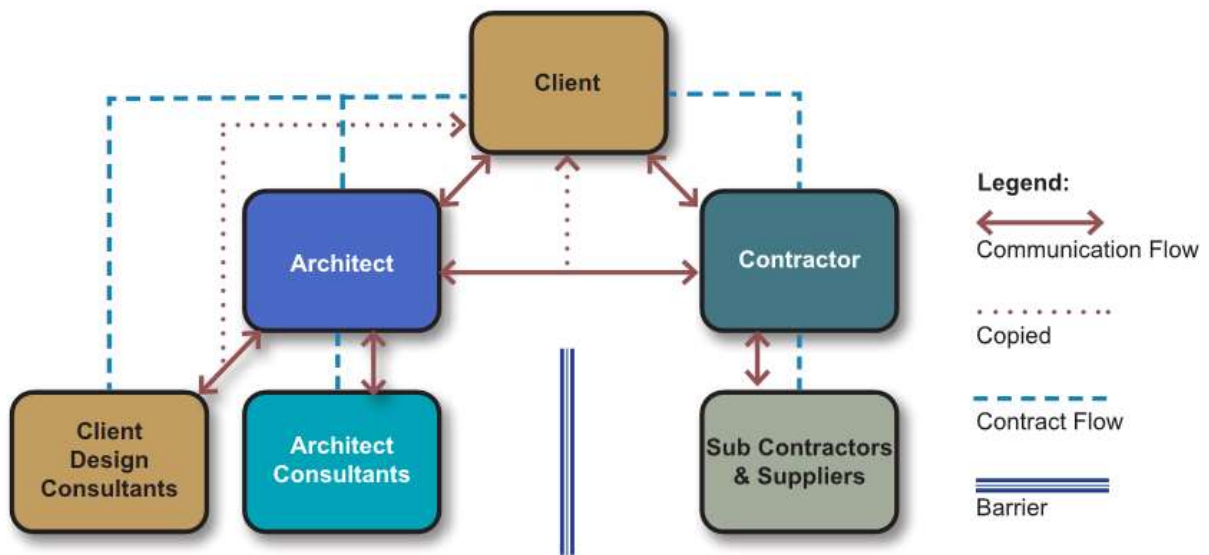
When providing full-time site representation during construction, be certain that the onsite accommodations have been agreed with the client, because they can become expensive to provide and/or inefficient to use. An outline list of some of the items to be provided by the client (typically through the contractor) for the design team's onsite staff is as follows: *(Note: This list is just a starting point. Some items may not be required and other items may be missing. More detail is usually included with any critical dimensions, specific furniture, computer and software requirements, etc.)*

- Open office space accessible to the design team only and with applicable furniture for site staff
- Private office(s) with applicable furniture for lead staff member(s)
- Private conference room
- Private restroom(s)
- Prayer room(s) *(if in a Muslim country)*
- Pantry area with refrigerator, microwave, coffee maker, potable water, cupboards, work counter, seating/table area, dishware, etc.
- Hanging-file racks and layout tables for project drawings
- File space for project documents
- Storage space for project samples, etc.
- Utilities/services including electricity, heating, AC, internet, telephone, potable water, sewer, trash/rubbish disposal, etc.
- Cleaning service
- Landline telephones for each staff member, tied to an internal phone network and connected to the public system
- Computers and software for each staff member – each connected to an internal network and the internet
- Standard-format sheet color printer and scanner *(including supplies and maintenance)*
- Large-format sheet printer and scanner *(including supplies and maintenance)*
- Pens, pencils, erasers, staplers, scissors, tape and similar office/stationery supplies
- Reserved, shaded automobile parking for each staff member
- Dedicated all-terrain vehicle(s) for staff use to access the site

Project Organization:

Project organization is based on the contracts between the client/owner and architect, and between the client/owner and contractor. To avoid any misunderstandings, both agreements must have parallel/complimentary language with respect to the architect’s role. *(An advantage of using AIA documents for the contracts is that all of the agreements have been drafted with parallel requirements.)* As an example, the Owner-Architect Agreement may allow the architect fifteen days for the review of submittals, but the Owner-Contractor Agreement may state that the architect will have all submittals reviewed within five days. Do not commence construction phase services until these issues are resolved. Better yet, review the proposed Owner-Contractor Agreement and resolve conflicts before it is issued to the Contractor. *(Note: The architect must have access to a copy of all of the applicable Owner-Contractor Agreements.)*

Rather than review all of the potential variations for project organization, the prototypical Client-Contractor-Architect organization is the basis for this paper. The readers may interpolate this information for other types of project organization they might encounter. An organizational diagram for the prototypical project is shown below:



4.7.1 Prototypical Construction Project Organization

The diagram above illustrates both typical contractual relationships and communication flows as part of a construction project organization. The contractual relationships are straight forward, but the communication flows need further elaboration. All of the information exchanges between the design team and the construction team are through the architect and contractor only. The only exception is when the architect and contractor are present. With respect to the architect, there are two main reasons for this requirement. The first is to satisfy the architect’s responsibilities to coordinate the consultants and interface with the contractor. Without the authority to control the consultant-to-contractor communications, the architect cannot meet these responsibilities. The second reason is that the architect has a more

complete overview of the project than the consultants. The architect should be in a better position to evaluate some of the consultants' submittal review comments, RFI responses, proposed revisions, etc., in the context of the project status, construction parameters, project politics, etc. Therefore, by having all communications go through the architect, the architect can direct the contractor's information to the proper consultants and can review the consultants' information prior to forwarding it to the contractor.

This can be confusing to some consultants who are accustomed to going directly to the subcontractors and/or suppliers without notifying either the architect or contractor. Unfortunately, there have been many occasions that I have had to process contractor claims for additional services due to such non-sanctioned interactions. My knee-jerk response to the consultants has become, "Get out your checkbook, because you are going to pay for it." (The consultant paying for the claim seldom happens, but it does drive home the point.)

The following is a brief summary regarding the responsibilities and authorities related to each of the three main members of the project team during construction.

- > Client/Owner: Has the ultimate responsibility of accepting the contractor's work, paying for it, and authorizing any changes to the scope, fees and/or schedule. The client/owner is also responsible for delegating the appropriate responsibilities and authorities to the architect and contractor. Therefore, the client/owner has full authority as provided by law to control the land, contract with the various entities, approve the design, construction, etc.
- > Contractor: Has responsibility to the client/owner to construct the project according to the construction documents for an agreed fee and within an agreed time period. That includes being delegated by the client/owner the authority to control the site, the construction of the project, the means and methods of construction, and the safety related to those efforts. Therefore, the contractor contractually has the authority to procure and manage the materials, labor, equipment, etc., required to construct the project.
- > Architect/Design Team: Has the responsibility to the client/owner to interpret (provide clarifications to) applicable portions of the construction documents, to provide information that may be missing, to correct the applicable portions of the construction documents, and to monitor the construction to facilitate compliance with the applicable design intent. Therefore, the architect has the authority to access the site; observe the work; require the contractor to provide submittals (as stated in the construction documents) demonstrating design compliance; advise the contractor of any observed non-complying work; advise the client/owner as to the contractor's general performance with respect to contractually-stated quality of the work; and (if included in the contract) review relative levels of completeness with respect to payment requests. On some projects the architect may have further administrative duties to provide additional contractor interactions and/or to provide coordination management of the various design consultants.

Construction Interface Manual:

The concept of a “Construction Interface Manual” was previously introduced in section 2.11. The objective of a “Construction Interface Manual” is to establish the administration and interface rules for the project, in order to mitigate confusion and associated delays during the construction period. The architect typically compiles the requisite information and drafts the manual, then negotiates its content with the client/owner and potentially, the contractor. The main headings for a typical construction interface manual are listed below. All of the heading topics (*with the exception of a project directory*) are being discussed in this paper.

- Project Directory
- Communications Routing and Distribution
- Requests for Interpretations
- Submittals
- Changes
- Payment Requests
- Project Closeout

I often have a separate consultant edition of the “Construction Interface Manual”. It is based on the one shared with the client/owner and contractor, but it has additional comments regarding the design team’s interaction responsibilities and limitations. A key concept to be stressed is that projects under construction are to have top priority in every office - prompt attention and responses are required for all related items.

Requests for Interpretation:

“Requests for Interpretations” (RFI’s) are known to some as “Requests for Information”. The first term is preferred because it better reflects the architect’s role during construction. During construction the architect’s primary role (assisted by the applicable disciplines) is to provide reviews and information with respect to the design intent as conveyed in the construction documents prepared by the design team. Almost everything the architect issues related to the construction phase/stage should be tied back to the contract documents.

RFI’s are requests for interpretation from the contractor to the architect regarding issues relating to the contract documents. The contractor will also be internally processing additional RFI’s from its subcontractors and suppliers, but only those internal RFI’s that cannot be addressed by the contractor are to be forwarded to the architect. This is consistent with the communications flow indicated in sketch 4.7.1 above. Likewise, the architect is the design team’s clearing house for incoming and outgoing RFI’s.

RFI's are a valuable tool for tracking architect-contractor communications. In addition to tracking questions and their responses, they can be used to verify and track verbal discussions. However, they can also be abused by both the architect and contractor. Architects sometimes attempt to use RFI's to make changes with cost implications, and contractors can use RFI responses as a reason to claim additional costs. Therefore, they need to be properly controlled. Some rules for managing the RFI process are as follows (*editorial comments are italicized in parentheses*):

1. RFI's are to be limited to one topic each. (*Some contractors like to bundle a group of questions from specific subcontractors and/or suppliers into a single RFI. Problems associated with bundling RFI's include that it makes it more difficult to track each individual question; it is easier for the contractor to include questions that he/she should have addressed; it can hold up responses to time-sensitive questions while more time-consuming responses are being formulated; etc.*)
2. RFI's are to have clearly written questions and responses, both of which are to reference the applicable drawings and/or specifications. (*If an interpretation of the contract documents is being requested, then the specific contract document drawing(s) and/or specification(s) must be identified to reduce any confusion.*)
3. It is assumed that the contractor is planning and coordinating construction efforts well in advance of the actual work being performed. As such, most RFI's should be discovered far enough in advance so that the architect's response time of 10 (*or other*) working days does not impact the construction schedule. The architect will endeavor to respond to each RFI as soon as practical. Expedited reviews of critical path items will occasionally be required, and will be considered on a case-by-case basis. (*The architect must police against the contractor abusing the privilege by requiring too many RFI's to be expedited.*)
4. Based on the architect's responses to RFI's, the contractor is not authorized to proceed with any changes to their work as a result of RFI responses which may impact construction costs, fees and/or schedule. (*This will be discussed further under the discussion below regarding "construction changes."*)
5. RFI questions and responses are to be on a format acceptable to the architect. (*Some RFI forms include unacceptable statements, such as limitations for response times, architect's certifications, etc.*)
6. The contractor and architect shall cross-check each other's RFI logs on a regular basis to verify receipt of RFI's and responses. (*Note: This may no longer be applicable in some instances, because most electronic management software systems do this automatically.*)

In addition to the general RFI rules listed above, there are other observations and recommendations that are relevant to the APM. They include the following:

- > Because the timing of responses can be critical during construction, the design team must endeavor to respond to RFI's as soon as practical in order to avoid delay claims. Rule 3 above attempts to alert the contractor to his/her responsibilities, but in reality, there will be occasions when issues surface unexpectedly. The caution here is to not let the contractor overwhelm the architect by requiring immediate responses to too many RFI's. Some contractors like to include a response due date on their RFI's to indicate the level of priority. Attempt to avoid this, because with their management software they can easily print out reports at any time stating that the architect has failed responding to RFI's on time by a total of "X" number of days. It is better to accept a priority rating system such as "high", "important", or "moderate".
- > Some contractors use RFI responses for claim positioning. So be alert to their motives and be careful how responses are stated.

In an example from an actual project, the contractor had missed embedding a critical conduit in a post-tensioned slab. The RFI asked if it would be acceptable to fir out a detail along the ceiling to accommodate the conduit. The architect's response was something similar to, "Proceed as shown." The contractor then submitted the RFI as part of a claim to the owner (which was later rejected). A better response from the architect would have been something like, "The Contractor-proposed correction can be accepted as a means of concealing the conduit as required on sheet XXX serving XXXX which was previously missed by the Contractor." That response clearly puts the responsibility on the contractor, rather than being an additional cost due to the architect's direction.

- > Another tactic used by some contractors in an attempt to strengthen their position for claiming additional money and/or time, is to use the total number of RFI's to illustrate what they claim are poorly executed construction documents. A response might be that the number of RFI's is indicative of the on-going, productive communications that should be taking place between the contractor and architect. The architect might also note that the answers to XX% of RFI's were to direct the contractor to the proper details already included in the construction documents, thereby suggesting the contractor's own potential inadequacies.
- > There are occasions when the resolution of an RFI response does require a significant enough change to the contract documents so that the contractor is entitled to additional money and/or time. Most of these should be recognized as such by the architect. Rather than playing games to see if the contractors might miss the cost implications (*they will not*), it is better to acknowledge the change and start tracking it as a *bulletin* in order to mitigate any potential delays. Part of the RFI response will then state that the proposed change is being issued and tracked as Bulletin XX. That way it is easier for the contractor to avoid double-dipping by claiming the same added costs for both the RFI and the bulletin. (*Refer to the discussion below under "construction changes" for additional comments.*)

- > The architect and/or the other consultants often attach sketches to their RFI responses. The sketch title blocks should be standardized for the project and include the type of information indicated in the illustration below. Note that there are places for cross-tracking sketches for RFI's that are also part of bulletins. Sketches should be numbered sequentially per RFI and/or bulletin. This numbering convention reduces the administrative complexities associated with tracking pending sketches for multiple RFI's and bulletins from multiple consultants, as would be required if the sketches were logged and numbered sequentially for the entire project. (See *additional comments with discussion below regarding "construction changes"*.)

Wild Oats Architects Applicable Contact Information	Project: Notel Hotel	Bulletin No: NA
	Project No: 20832	RFI No: 126
	Date: 5 Oct. 2022	Reference Drwg: A2.23
	Description: Adjusted location for door 2309a	Scale: 1/8" = 1'-0"
		Sketch No: SK-1

4.7.2 Example Sketch Title Block

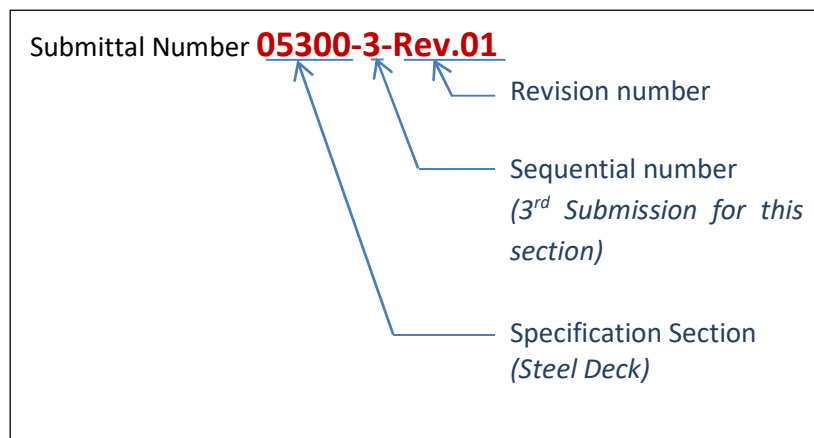
Submittals:

The specifications as part of the construction documents require submittals of certain materials, products, systems, certifications, etc., in order to illustrate that the actual items being provided and/or installed by the contractor are consistent with the contract requirements and the design intent. Submittals can be categorized as being one of seven types as follows:

1. Contractual / Administrative & Closeout: These include such items as construction schedules/programs, schedules of value, warranties, insurance certificates, periodic reports, as-built drawings, lists of attic stock materials, contractor punch lists, etc. Some of these items require owner approvals, some are reviewed by the design team, and some are submitted for record purposes only.
2. Coordination Drawings: To some extent, the construction documents are diagrammatic (*especially the MEP drawings*). For some of the more complicated building types, specifications may require the contractor to produce separate drawings to facilitate and show the coordination of spatial requirements, means and methods, etc., between the various trades. (*Three-dimensional BIM models are becoming more popular for this purpose.*)
3. Shop Drawings: Shop drawings are project-specific drawings produced by the contractor, the subcontractors and/or suppliers to illustrate the fabrication and/or installation of a project component. These are not to be a reproduction of the design team's construction document drawings.
4. Product Data: This is typically a manufacturer's standard printed information describing a product.

5. Calculations and Test Reports: These are more often required by the engineering disciplines, but need to be processed through the architect as a standard submittal. A review response is not always required, unless a nonconformance has been identified.
6. Samples: Samples are physical examples of the proposed products. They may be required for the approval of color, finishes, fabrication, etc.
7. Mock-Ups (including model rooms): Mock-ups are more typical for international locations to verify a contractor's proposed construction, but they are sometimes used in the United States to verify the intricacies of a repetitive assembly (or model room) prior to its going into full production, or to provide an assembly mock-up for specified performance testing. Note that the approval of any single component proposed for an assembly is subject to its compatibility with the entire system. Mock-ups should be completed with all applicable MEP systems (at least roughed-in, if not fully operational).

Included in division one of the specifications should be a requirement for the contractor to use a specific submittal numbering system that is based on the applicable CSI section numbers. This makes reviews, processing and filing much easier. Following the specification number is the sequential number for that submittal based on the other submittals included under that section number. Then following that is the revision number (if any) for that submittal. See the following example.



4.7.3 Example Submittal Number

Also included in division one should be some rules for the contractor to follow when making submittals. Example rules are as follows (*editorial comments are italicized in parentheses*):

- > Only items noted in the Owner-Contractor Agreement and/or specifications as requiring submittals are to be submitted for review. (*Contractors will sometimes try to get the architect to review other items in an attempt to transfer the verification and approval process and associated risks away from the contractor.*)

- > Within 30 days (*or other duration*) of signing the Owner-Contractor Agreement, the contractor shall provide a list of all required submittals along with a date of their expected submission. (*This requirement is intended to get the contractor planning the project early enough so that there are no surprises. It also allows the design team to schedule staff for their submittal reviews. Note: If this list is not received, its lack of existence can be used to counter contractor claims that any of the design team's reviews delayed the project.*)
- > The design team will endeavor to complete their reviews of each submittal within fifteen (15) working days (*or other duration*) of its receipt. There may be exceptions for submittals with a large number of sheets and/or numerous items to review. Submittals received after 4:30 p.m. will be logged in as being received on the following workday. The contractor shall integrate into the construction schedule/program the design team's review time, time for the contractor's internal processing, and time for any re-submittals.
- > All submittals shall be reviewed, coordinated, and accepted by the contractor prior to submitting to the architect. Each page/sheet of the submittal shall include a signed contractor's review stamp supporting that review and acceptance have been executed per the contract. Any deviations from the contract documents need to be clearly identified. (*If the contractor does not provide adequate review, the submittal is to be rejected. If this becomes an ongoing problem, it will need to be addressed more formally.*)
- > Every sheet of a submittal is to include the submittal number and/or the submittal number may be noted on a complete table of contents for a bound submittal. (*Note: If the specification section number is not part of the submittal number as discussed above, each submittal must reference the applicable specifications section in addition to the submittal number.*)
- > A submittal shall be limited to the products/items of one specification section only. (Mock-ups are an exception.)
- > A submittal shall be limited to one submittal type as follows: Contractual/administrative, coordination drawings, shop drawings, product data, calculations and test reports, samples, or mock-ups. (*Refer to the previous description of each.*)
- > The proposed use/location of each item/product being submitted needs to be clearly identified in the submittal.
- > With respect to manufacturer's or supplier's literature, specific items being submitted for review must be identified to clearly differentiate them from other products and/or options shown on the manufacture's or supplier's literature. (*Many times, a product submittal will include catalog pages with information on products and/or product options that do not correspond to the specified items.*)

- > When submitting an item based on a performance specification and/or specifically-specified requirements, the contractor's submittal for that item needs to acknowledge and provide documentation that the submitted item complies with each applicable specified requirement.
- > The design team does not typically intend to use a submittal as a format for changing the design. However, if a need to modify the design is discovered as part of a submittal review, the reviewer shall note that change on the submittal and label it as being included in a specific, pending bulletin. That bulletin shall be issued shortly thereafter, if not returned with the submittal.
- > The contractor is not authorized to proceed with any design modifications noted in a submittal review which may be perceived as impacting the project's contracted price and/or schedule/program. Such authorizations can only be provided by the owner.
- > Acceptance of products that need to be integrated with other submittal products as part of composite assembly, is contingent upon the products being compatible and coordinated with the full assembly, and/or the review of any given component may be deferred until all of the applicable assembly components have been submitted for review at the same time.
- > The contractor is not to use the submittal process for requesting substitutions. All substitution requests are to be submitted separately for consideration prior to being submitted for technical review. The specified procedures and form are to be used for substitution requests. *(If acceptable to the owner, all proposed substitutions are to be submitted and processed prior to the Owner-Contractor Agreement being executed. After that time, substitution requests will only be considered if there is a substantial cost savings to the owner, the specified item is no longer available, the specified item is not in compliance with applicable codes, and/or the specified item will not physically fit into the construction as detailed. The contractor is responsible for providing documentation to indicate that the proposed substitution is of equal or greater quality, can dimensionally fit into the project, etc. The contractor must also be willing to pay the architect and applicable members of the design team for their time to review and process any substitution request being proposed for cost savings and/or to expedite the project.)*
- > *(Note: When hard copies are submitted for review, the required number of copies need to be defined so that the design team is not spending needless hours transferring comments to and/or printing multiple copies. The contractor should submit a minimum of three hard copies to be retained by the design team, and up to a maximum of three additional copies for the design team to return with comments to the contractor. The architect may also elect to return only one copy to the Contractor with original markups and the other copies as reproductions.)*

When other members of the design team review submittals, they must appreciate that time is important. They also need to have their comments differentiated from those of the contractor and the architect. Possible methods for doing this include assigning different line types to the “bubbles” used to encircle review comments. As an example, the contractor might use rectilinear boxes for encircling his/her comments; the architect, wavy-lined bubbles; and the consultant, jagged-edged bubbles. Another system is to assign different colors to the contractor’s, architect’s and consultants’ review comments.

When the design team reviews submittals, it is not to be taken as an opportunity to change and/or improve the design. All submittals are to be reviewed for compliance with the construction documents. However, similar to RFI’s, there may be a few instances where changes are required to the contract documents. Similar to the RFI process, a corresponding bulletin is to be prepared and issued. As part of the submittal review comments, the corresponding bulletin is to be referenced to track the proposed changes to the construction documents. *(Refer to the discussion below under “construction changes” for additional comments.)*

Following is an example of an architect’s submittal review stamp. Each firm’s submittal review stamp should be reviewed by their attorney. Some attorneys believe this is one of those items that may help to mitigate the architect’s exposure to litigation.

<i>Wild Oats Architects</i>	
Architect’s review of this submittal is only for the limited purpose of checking for conformance with the design intent expressed in the Contract Documents. It is not for the purpose of determining the accuracy or completeness of details, dimensions or quantities, nor is it for substantiating instructions for installation or performance of equipment, or systems designed by the Contractor, all of which remain the responsibility of the Contractor. Review or acceptance of a specific item shall not indicate approval of an assembly of which the item is a component. Review neither extends nor alters any contractual obligations of the Architect or Contractor, and review shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents.	
<input type="checkbox"/>	No Exceptions Taken
<input type="checkbox"/>	Make Corrections Noted
<input type="checkbox"/>	Revise and Resubmit
<input type="checkbox"/>	Not Reviewed: Submittal not required per Contract Documents

4.7.4 Example Submittal Review Stamp

Explanations of the standard submittal review actions are as follows:

- > No Exceptions Taken: This indicates that the submittal has been reviewed for conformance with the design intent, and that no exceptions were taken. (Note: Failure of the contractor to note and/or the architect to discover any deviation from the contract documents does not alleviate the contractor's responsibility to correct any deficiencies subsequently discovered.)
- > Make Corrections Noted: This indicates that the submittal has been reviewed and is subject to the corrections and/or comments indicated by the reviewer. The contractor shall make the corrections indicated and take note of the comments made without resubmitting to the architect. (Includes qualifications stated in the "note" above with "No Exceptions Taken".)
- > Revise and Resubmit: This indicates that the submitted information is inconsistent with the design intent as presented in the contract documents, inadequate information has been submitted to evaluate the acceptability of the submitted item(s), and/or the contractor has failed to provide an adequate review of the submittal prior to forwarding it to the architect. The contractor must make the appropriate revisions prior to making a required re-submittal. *(Note: I prefer not to have the review action stating "REJECTED", and use the "REVISE AND RESUBMIT" for rejected submittals as well. In my opinion this takes some of the "emotion" out of the action.)*
- > Not Reviewed: The submittal is not required per the contract documents and is therefore not being reviewed by the architect. The contractor is required to provide and install the corresponding item(s) per the contract documents, and no prior architect's review is required.

Site Visits:

Visits to the construction site are invaluable to the architect (and design team) for maintaining an effective working relationship with the contractor. Face-to-face interactions with the contractor can help to avoid confusion and can encourage cooperation. The architect and contractor must work together to have a successful project. It is not only the contractor who makes mistakes; the design team does as well. A spirit of cooperation in helping each other resolve some of the issues can help to reduce any potential cost and/or delay exposures.

Discussions with the construction team while on site visits are valuable, but it is important that members of the design team be careful as to what they say and to whom they say it. Verbal comments are easily misinterpreted and/or manipulated to the listener's benefit. Three communication rules that apply are as follows:

1. If it is not in writing, it did not happen. All relevant comments need to be included in site visit reports, meeting minutes or confirming RFI's.
2. No conversations are to take place between the design team and construction team without authorized representatives of the architect and the contractor present. (Under special circumstances these interactions may take place with the proper authorization of the contractor and the architect.)
3. Do not feel obligated to answer every question while on site. The design team has the right to check the applicable documents and discuss the issues with other team members before providing an answer.

The other main reason for site visits by the design team is to observe the progress and quality of the construction work. Architects and their consultants “observe” the work for general compliance with the design intent of the construction documents they have produced. Architects and their consultants do not “inspect” the work. “Inspection” implies a greater level of scrutiny which can be difficult to limit and is often beyond the design team’s expertise. As an example, if there was a structural failure, the claimants could potentially argue that the design team failed to provide adequate “inspection” by not x-raying every structural weld, etc. *(Note: There are testing companies which do provide more detailed and specific inspections and tests, as may be required by the construction documents. These companies typically do not work directly for the design team.)*

Within one working day *(or possibly two)* of a site visit, a “Site Visit Report” is to be written by the applicable design team discipline(s) and then submitted by the architect to the owner and contractor. The site visit report should include the project name and number, the author, date of the visit, a listing of any unique observations, meetings attended, relevant conversations, etc. *(I typically rely on the contractor’s daily (or weekly) reports to document the work underway and the general construction progress.)* Photos are recommended as a means of illustrating observations. It is also preferable if a consistent format is used for all design-team site visit reports. *(Note: If the design team’s construction phase/stage documents are limited to specific types and have consistent formats, it makes them easier to write, file, recognize, etc.)*

Design team members visiting the site must understand that though site safety is everyone’s concern, it is the contractor’s responsibility. Therefore, site visitors must follow the contractor’s site safety rules. To avoid any appearance of taking on responsibility for site safety, design team members should avoid making any professional comments regarding safety. *(However, shouting out a warning to a fellow human being who is about to be hit by a truck (or similar) is an acceptable reaction.)* *(Note: Certain government projects and/or international projects may require a greater involvement by the design team with respect to monitoring site safety.)*

Another caution to the design team regarding site safety should there ever be a serious accident, is to discuss it with no one other than with your legal counsel. Claimants are anxious to drag as many entities into their claims as possible, and defendants (typically the contractor) have the need to be able to present their defense without speculations by others.

Occasionally, portions of the contractor's work may be found that is not in compliance with the construction documents. *(If there are no non-compliances ever found on a project, either the contractor is exceptionally good or the observer is not looking hard enough.)* All observed non-compliances should be noted in the corresponding site visit report. If the non-compliance is not being addressed by the contractor, and/or if the non-compliance is significant, a separate "Non-Compliance Report" (NCR) is to be issued to the contractor. Then, if the non-compliance is not addressed by the contractor, it is usually acceptable to withhold payment from the contractor for an amount sufficient to remove and replace the non-compliant work. An example of a non-compliance report form is shown on the following page. *(Note: The architect cannot accept non-conforming work; only the client/owner can approve the acceptance of such a modification to the Owner-Contractor Agreement. The architect needs to note these changes as either a bulletin and/or as items not being included in any of the architect's submittal reviews and/or certifications.)*

Project Meetings:

There are a number of specific meeting types during the construction phase/stage requiring the architect's (design team's) participation. The most common ones are as described below:

- > Construction Kick-Off: As previously noted under section 2.11 above, this is an introductory meeting held with the client/owner, contractor, key subcontractors, architect, and key consultant representatives prior to the start of construction. The purpose of the meeting is to present and discuss each entity's expectations and interface requirements during construction. The "Construction Interface Manual" can be used as a partial agenda.
- > Owner-Architect-Contractor (OAC): Regularly-scheduled meetings are established and administered by the contractor as required by the contract and/or by the contractor's operating procedures. The primary purpose of these meetings is to review the project's status and to identify and address potential issues that may require input from the owner, architect and/or contractor. Whenever possible, either a standing agenda is to be used for conducting the OAC meetings, or a special agenda should be issued in advance of the meetings. The contractor is required to produce minutes of the OAC meetings within "X" working days following the meeting. Participants need to review those minutes and issue any perceived inconsistencies or alternative interpretations within "X" working days of their receipt. *(Caution: The architect must watch out that the contractor does not abuse any meeting minutes to position for unmerited claims, nor as a format for making editorial comments about the design team, etc.)*
- > Preconstruction: The specifications require preconstruction meetings with the architect, applicable designer(s), contractor, installer and/or manufacturer to review the installation and quality control procedures for specific systems – such as roofing. The contractor must provide adequate notice of pending preconstruction meetings so that there is time to prepare and time to schedule consultants whose attendance may be required.

Wild Oats Architects

NONCOMPLIANCE REPORT

Project:
Project No:
Topic:

NCR No: **XX**
Date:

To: Project Manager
Construction Company
Address

Copy: Owner Representative
Owner Company
Address

Field observations have revealed the following discrepancies in the Work that appear to be in noncompliance with the intent of the Contract Documents. If you are in agreement with our comments below, please notify Wild Oats' Project Manager in writing within 5 working days of your intended corrective action(s) and the anticipated schedule for making those corrections. If you are not in agreement, please notify Wild Oat's Project Manager and provide your reasoning within five working days so a resolution process may be initiated.

Reference to Drawing No. and/or Specification Section:

Description of Discrepancies:

By: _____
Representing Wild Oats Architects

Date: _____

Contractor Response: Agree w/ the Above Disagree w/ the above

Proposed Action:

By: _____
Representing the Contractor

Date: _____

Copy Response: Wild Oats
The Owner

4.7.5 Example NCR Template

- > Pay-Request: Periodic meetings (*typically, monthly*) are held to review the contractor's progress with respect to progress payments being requested by the contractor. This will be further discussed below under the heading of "Pay Requests".
- > Other: The architect and/or consultants shall not be attending any other of the contractor's meetings with subcontractors and/or suppliers, unless there are special-issue and/or coordination meetings where the architect agrees his/her input may be appropriate. Meetings that the architect will not be attending include, but are not limited to, superintendent's meetings, safety meetings, etc. Also, the architect and/or consultants will not attend any project meetings with subcontractors, suppliers, etc., without appropriate representatives of the contractor present; or only under very special conditions with the architect's and contractor's prior approval. (*The design team must avoid being drawn into the contractor's coordination issues and/or taking on any related means and methods responsibilities.*)

Construction Changes:

"Construction changes" are changes that modify the construction documents, especially those changes which impact the construction costs and/or schedule/program. These are not the same as the design changes previously discussed under section 2.8. Construction changes relate to the "Owner-Contractor Agreement", and design changes relate to the "Owner-Architect Agreement". Construction changes are the number one area of liability exposure for the design team. The following addresses some management perspectives to help mitigate that risk exposure. (*Note: The presentation below does not follow the AIA documentation.*)

I was once asked to assist with a project in the Middle East where the local architect was having problems during the construction stage. One of his main confusions was differentiating changes to the Owner-Contractor Agreement from changes to the Owner-Architect Agreement. Once I was able to help him over this issue, many of his administrative issues were quickly resolved.

The first concept to understand is that there are various sources/causes that can trigger a change. The main sources of construction changes are listed below:

- > Client/Owner: The client/owner has the right to make any changes that might be desired so long as they are acceptable to the AHJ and any lenders. The owner must be willing to accept any costs associated with revising the construction documents and associated with the construction changes. The owner must also be willing to accept any impacts to the construction schedule/program. (*Note: AIA agreements and many jurisdictions, as well as many lenders, require the Architect to sign all change orders, but it is not always the case. Because the architect's legal documents are usually being modified, the architect should be required to sign the change orders. If there are significant owner changes to which the architect objects, due to their negative impact to the architect's design, the architect may want to consider options for disassociating with the project. However, a "Fountainhead" solution is not advisable.*)

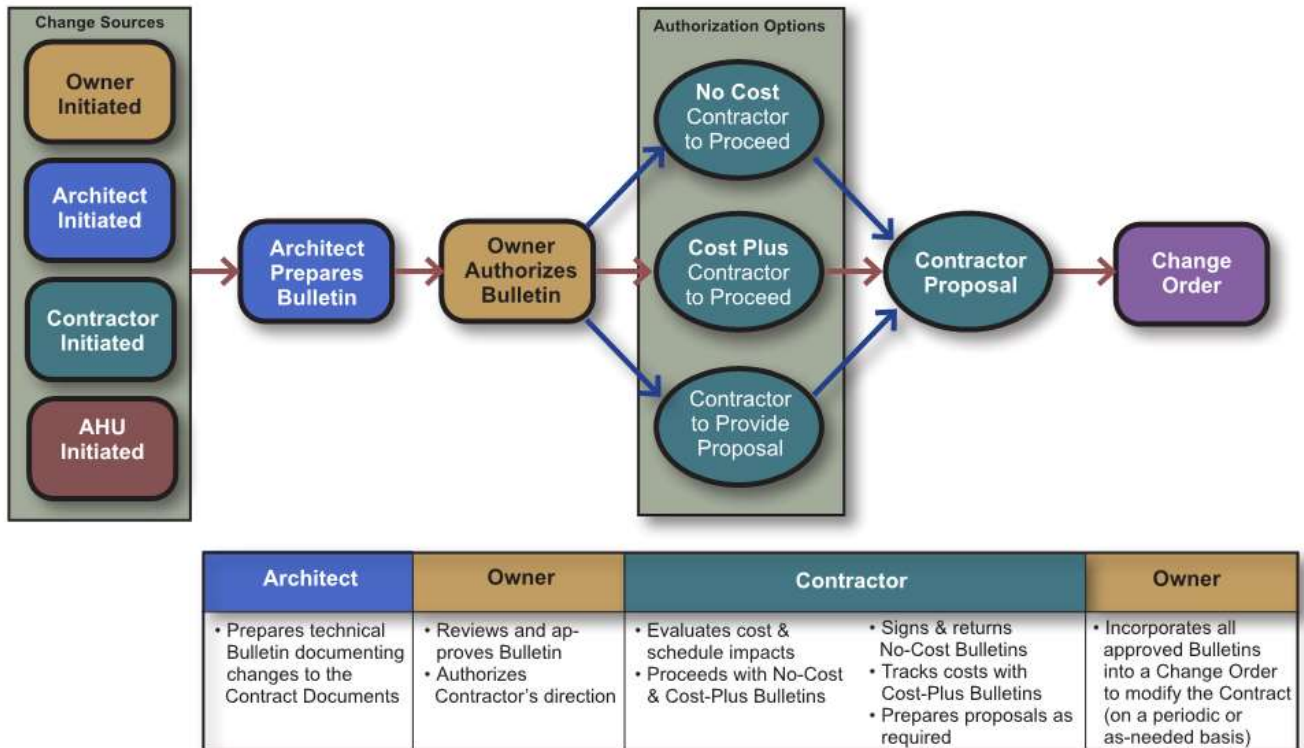
The typical reasons for client/owner changes are as follows:

- Aesthetic revisions
 - Operational revisions
 - Cost and/or saving revisions
 - Changes to the contract terms (*these can include allowance adjustments, contract closeout adjustments, etc.*)
 - Client/owner consultant revisions (*these are usually similar to the architect/design team changes*)
- > Architect/Design Team: Only the client/owner can authorize changes, but the architect/design team often find cause to instigate changes to their contract documents for various reasons including the following:
- Aesthetic revisions (*Some clients are more understanding of aesthetic changes requested by the design team - other clients often wonder why the architect did not get it right in the first place.*)
 - Design completion revisions (*primarily associated with fast-track projects*)
 - Design clarification/coordination revisions for omitted/missing and/or conflicting information (*typically, discovered by the RFI and/or Submittal processes, or discovered by quality control reviews*)
 - Cost and/or time savings revisions
- > Contractor: Changes initiated by the contractor are typically due to one of the reasons as follows:
- Cost saving revisions (*It is important that the owner receives a substantial portion of the savings*)
 - Time saving revisions (*Time saving changes are typically required due to the contractor being behind schedule, so there is often no financial compensation due to the contractor.*)
 - Substitution request revisions: (*These typically do not involve any additional costs, but may involve reductions in costs and/or schedule/program changes. See related comments with "submittals" above.*)
 - Unforeseen site condition revisions: (*These include cost and/or schedule/program impacts that could not have been anticipated by the contractor due to site conditions not identified in the soils report or site survey; existing conditions in a remodel that were not identified in the as-built conditions; the discovery of hazardous materials; etc.*)

- Remedial work due to non-conforming work (*These are no-cost revisions that are due to the contractor's mistakes.*)
 - Budgetary adjustments as may be required to reconcile such items as allowances, contingencies, unit prices, etc.
 - Delays beyond the contractor's control
 - Contractor claims (*Claims are usually in response to information provided by the client/owner and/or the architect/design team. See discussion below regarding "contractor claims".*)
- > AHJ: The authorities having jurisdiction/competent authorities can also generate a need for construction changes. The primary reasons for their changes include the following:
- Revised interpretation revisions (*Sometimes the plan checker has one interpretation of a code requirement, and the building inspector has another. In some instances, there may be new departmental interpretations after the plan checking has been done.*)
 - Missed item revisions (*Plan checkers are humans too. Sometimes they miss items that are later identified by the inspector on site.*)

The second concept to understand with respect to construction changes is that minor changes, clarifications to the contract documents which have no cost and/or schedule/program impact may be included in RFI responses, submittal review comments and/or Supplemental Instructions, if used. (*I prefer not to use Supplemental Instructions. They just add another document type to manage and track.*) Other clarifications and discussions may be included in meeting minutes, and/or site visit reports. All other changes need to be issued to the contractor as bulletins. (*Other names for "bulletins" include "proposal requests", "requests for proposal", etc. The terminology used in the contract should be used. When there is no specific term in the contract, I prefer "bulletin" because I perceive it as being more neutral.*)

The construction change process is illustrated in the diagram 4.7.6 below. When a change has been initiated, the architect and applicable design team members prepare a bulletin describing the revision(s) to the contract documents. The bulletin and associated contract documents are then issued to the client/owner and copied to the contractor. After the client/owner has selected a level of authorization, the signed bulletin is issued to the contractor, who is then authorized to proceed with the change, or price it prior to receiving authorization to proceed. Approved contractor's proposals are then incorporated into a Change Order/Variation which is the document that officially modifies the Owner-Contractor Agreement.



4.7.6 Construction Change Process

The contractor requires the owner's written authorization to proceed with any bulletin. Based on circumstances, the owner can select one of the three following options for authorizing a bulletin.

- > Amendments as described in this Bulletin are considered as clarifications and/or minor adjustments to the Contract Documents. As such, the Contractor is authorized to proceed without adjustments to the Agreement sum and/or schedule. *(This replaces the use of the "Architect's Supplement Instructions", AIA document G710.)*
- > Contractor is to submit an itemized quotation for any perceived adjustments to the Agreement sum and/or schedule associated with implementing the amendments to the Contract Documents as described in this Bulletin. Authorization to proceed with this Bulletin is withheld pending Owner approval of the Contractor's proposal.
- > Contractor is authorized and directed to proceed with the amendments to the Contract Documents as described in this Bulletin. Contractor to submit substantiating documentation for any perceived adjustments to the Agreement sum and/or schedule in accordance with General Conditions paragraph XX.X. *(tie this to specific contract clauses). (This option is most often used when time is critical, and the risks of delaying the project outweigh the risks associated with added costs. It replaces the use of "Construction Change Directives", AIA document G714.)*

An example *bulletin* is shown in the figure 4.7.7. The owner's authorization approvals are as discussed above. The reason for the change(s) is also provided. (*This is important because the memories can sometimes forget the reason(s) for a change.*) Also look closely at how the proposed amendments to the contract documents are described. First, there is an item number starting with the same digit(s) as the bulletin number, followed by a decimal point, then a sequential number for each item. These item numbers are beneficial for tracking specific items in correspondence and in the contractors' proposals.

As the bulletin amends the contract documents, the second and third columns reference those specific documents. The second column references the contract documents that are "affected" by the change (*but not necessarily being issued as part of the bulletin*). The third column lists the specific document(s) being issued to illustrate the change as part of the bulletin. The last column provides a written description of the specific change(s) to be made on the referenced contract document(s). A separate item line is used for each change on each sheet, rather than combining all of the changes on the sheet under one line item. This makes it easier to track the costs associated with each individual change.

The third column for "issued" documents, includes examples for three typical entry types for this column. (*The only example missing is for a specification section.*) The first example, "A2-21", indicates that a full drawing sheet is being reissued (*or issued for the first time if it is a new sheet*).

The second example, "SK-1", is a sketch. Sketches come in two forms. The first is as a revision to an existing drawing. In those instances, the existing drawing should be updated, and then the applicable portion placed on the sketch template at the same scale as it is on the full-sized drawing. The second type of sketch is for a whole new detail (*or similar*) that is being added to an existing sheet, or to a new sheet if there is insufficient space on the existing sheet. As a rule of thumb, if two prior sketches have already been issued for a sheet without the entire sheet being reissued, then the entire sheet should be reissued rather than issuing a portion of it as a new sketch.

The last "issued" example on the bulletin shows "NA" (not applicable). It designates that no new documents are being issued with the bulletin, because the written description is sufficient to explain the revision. (*The importance of these procedures will become more evident when addressed below under "Posted Set" as found under the heading "Project Records".*)

BULLETIN

Number: 072

This Bulletin describes the proposed amendments to the Contract Documents. Per clause 4.3 of the Owner/ Contactor Agreement dated May 12, 2021, the Contractor is to provide written documentation to address any perceived changes to the Agreement sum and/or schedule caused by this Bulletin. Owner's authorization is as noted below.

Date: July 32, 2022
 Subject: **Ballroom Storage Expansion**
 Project: Hotel Hotel
 Arch. No: 20832

Contractor:	Ohelp Mi Construction 6892 Repro Street Whatcha, FL 66666		
Architect:	Wild Oats Architect 2 Badyagotmi Road Irvine, CA 99999	Issued by: _____	
		Date: _____	
Owner:	Barbie & Ken Resorts 36 Woops Blvd. Feelgood, NJ 33333	Authorized by: _____	
		Date: _____	

By the Owner's signature above the Contractor is authorized and/or directed to proceed as checked below.

	Amendments as described in this Bulletin are considered as clarifications and/or minor adjustments to the Contract Documents. As such, the Contractor is authorized to proceed without adjustments to the Agreement sum and/or schedule.
X	Contractor is to submit an itemized quotation for any perceived adjustments to the Agreement sum and/or schedule associated with implementing the amendments to the Contract Documents as described in this Bulletin. Authorization to proceed with this Bulletin is withheld pending Owner approval of the Contractor's proposal.
	Contractor is authorized and directed to proceed with the amendments to the Contract Documents as described in this Bulletin. Contractor to submit substantiating documentation for any perceived adjustments to the Agreement sum and/or schedule in accordance with General Conditions paragraph 36.2.
	Other: Contractor is authorized to proceed with the amendments to the Contract Documents as per the requirements as stated in Owner's applicable letter.

Reason for Amendment(s): Owner-requested change to allow more space for ballroom storage. *(See OAC meeting minute item 18.07.)*

Proposed Amendments to the Contract Documents are as noted in the table below:

ITEM NO:	DRWG. / SPEC.		DESCRIPTION
	AFFECTED	ISSUED	
72.01	A1-02, A2-21, M2-21, E2-21, P2-21, F2-21	A2-21	Combine BOH rooms 213 and 215 to make one room, delete door 213, and add storage rack as shown the revised plan. Make corresponding changes to the design-build MEP drawings.
72.02	A9-21	SK-1	Provide storage rack for room 215 as shown on the attached sketch.
72.03	A10-01	NA	Delete door number 213 from the door schedule.
72.04	A10-10	NA	Delete room number 213 from the room finish schedule.

4.7.7 Example Bulletin

Any time a construction document is revised and reissued, the changes on that document need to be reasonably identifiable. With specifications, a vertical line in the margin adjacent to text revisions is acceptable. For drawings, the changes to existing drawings need to be clouded. For new drawings it is acceptable to cloud the sheet or detail number. On both specifications and drawings, each margin mark or cloud requires a number or letter enclosed in a delta/triangle. *(Note: It is my preference to use letters for pre-contract addenda and numbers for bulletins.)* The next time any addendum or bulletin is prepared which reissues any of the previously revised sheets, the previous clouds disappear but the deltas remain. The deltas provide an address to locate detailed information regarding the previous revisions. *(Refer to illustrations included with the discussions below regarding "Posted Set" found under the heading "Project Records".)*

Construction Change Costs:

If there were no cost or schedule/program considerations with modifications to the construction documents, the design team would have minimal risk exposure. Unfortunately, there often are. A common concern is that most clients/owners would prefer not to spend additional money for changes they perceive as being caused by the design team's "mistakes". The additional costs associated with revisions resulting from perceived "mistakes" by the design team come in two types. The first is what are known as "betterment" changes. These are additions to the project that the client/owner would have had to pay for if they had been in the initial construction documents. Assuming the proper contract language has been used, the costs of betterment changes should not be part of claims against the design team. The client/owner should be carrying a contingency reserve for such occurrences. *(However, I have been involved with claims where the client wanted to recover a percentage of the costs due to the fact that the items were not purchased in a competitive environment. This was even though the architect was never asked to take part in change negotiations with the contractor, etc.)*

On the few occasions I have been deposed regarding construction claims, there seemed to have been an unrealistic approach used by the claimants, that I refer to as the "Popular Mechanics Assumption." This position assumed that the architect's drawings should have been like those seen in the Popular Mechanics magazine, where each minute dimension and each little screw is called out. This exceeds the accepted standard of care for architects. The architect's documents are intended to provide sufficient detailing and specified standards to convey the design intent. It is the contractor's working/fabrication drawings, manufactures' and fabricators' instructions, standard technical practices, etc., that provide the detailed information.

The second type (*or portion thereof*) of changes involving perceived “mistakes” by the design team, are those that do not provide betterment or added value. This typically occurs when demolition of previous contractor work is required and/or when items that have already been purchased or fabricated need to be returned or abandoned. In theory, the design team could share some exposure for these mistakes, if it were not for the “standard of care” as previously discussed. (*The question then becomes; how extensive must the non-betterment changes be before the standard of care is not being maintained?*)

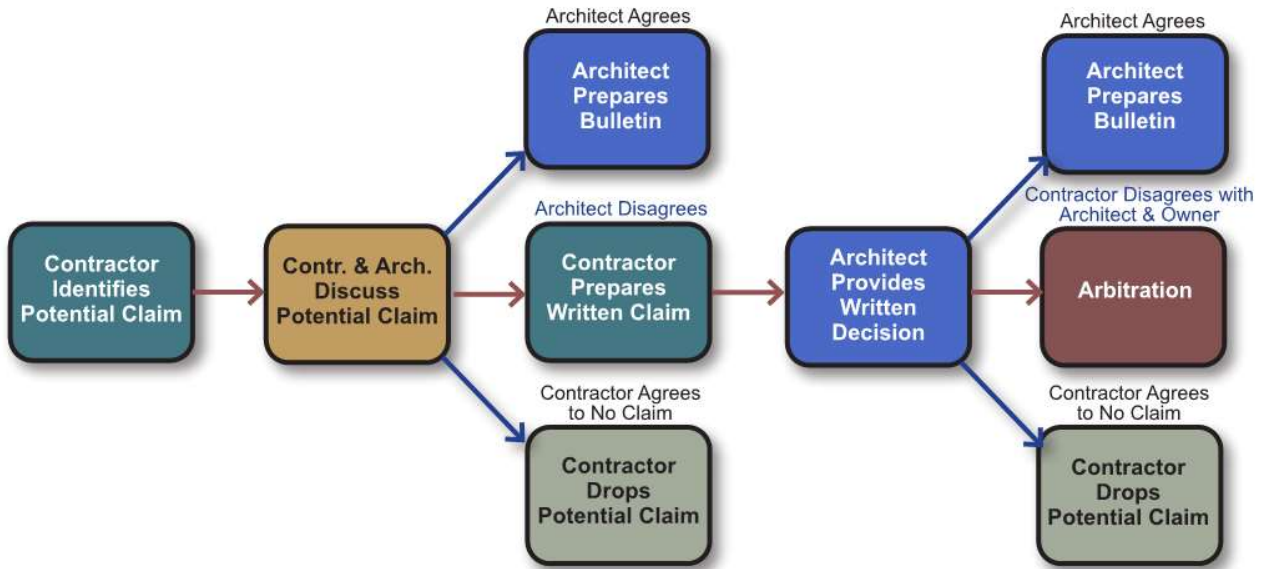
When a need to make changes to the contract documents has been identified, the architect should document any related construction progress to be able to substantiate, or refute, any potential contractor claims relating to non-betterment changes.

Time extensions to the contract can also have their costs. If there are liquidated damages involved and the owner grants the contractor additional time to benefit the contractor, it may sometimes be at no additional cost. However, if a time extension is required as a result of project changes, the contractor is typically entitled to additional compensation for what are known as “extended site overhead costs” (*if permitted by the contract and/or state laws*). These include time-based costs for such items as site offices, administrative staff, equipment rental, etc., which would have been based on the original contract duration.

Contractor Claims:

Contractors are entitled to reasonable compensation for items that they could not have reasonably foreseen when they bid the project. In such instances (*where the architect has not already issued a bulletin*) construction contracts typically have a provision for the contractor to make a claim for additional money and/or time. Most contracts spell out the procedures and timing for the contractor’s claim process. Limiting the timing of when contractors can make claims is important, because some contractors wait to file their claims at the end of the project. This does not allow for the client/owner and/or architect to explore optional solutions, nor does it allow the client/owner and/or architect to observe and audit the extent of the work.

The following diagram illustrates a conceptual process to address contractor claims. It starts out low-key by the contractor and architect informally discussing the potential claim items before expending the efforts required for a formal claim. Many times, the claim can stop there, either because the architect agrees that it is perceived as a valid claim and issues an applicable bulletin, or the architect convinces the contractor that it is not a valid claim and it is dropped. If the architect and contractor fail to agree after the initial discussions, then the contractor may exercise the prerogative to commence the formal written claim process per the contract.



4.7.8 Contractor Claim Process

Project Records:

No memory is good enough to keep track of all of the events that occur and documents that are generated in the course of a construction project. The inability to remember these items is even more of a problem with the passage of time. Therefore, the APM must have an efficiently organized set of project records. The need for good project records is even more important for when persons not familiar with the project need to locate information.

Project filing was discussed previously in section 2.10. In addition to the design management files, a whole separate set of file folders is required to track the construction phase/stage. During construction, the design files remain available for reference, and the majority of the project management files remain active. Some of the new file headings required during construction include the following:

- Construction Documents *(Restart the construction document files (drawings and specifications) as part of the construction phase/stage files, to track their evolution during construction and to provide a specific copy of each issue to the contractor, starting with the bid set.)*
- Construction Contracts *(includes Owner-Contractor Agreements, Change Orders, etc.)*
- Bulletins *(each bulletin to be filed separately with all related client/owner approvals, contractor proposals, correspondence, etc.)*
- Contractor Claims
- Contractor Requests for Payment *(including Pay Request Meeting Minutes, Architect's Certifications and correspondence)*
- OAC Meeting Minutes
- Preconstruction Meetings Minutes

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- Other Meeting Minutes
- Site Visit Reports
- Contractor Reports
- RFI's
- Submittals (*filed by submittal number based on CSI number*)
- NCR's
- Logs/Registers (*includes separate logs for RFI's, submittals, bulletins, NCR's, etc.*)
- Transmittals/Document Registers
- Construction Correspondence
- AHU Reports
- Construction Special Issues
- Acceptance Reports
- Etc.

Special Note: *If a contractor should ever fail to perform to the extent that they need to be replaced, or have key staff replaced, the architect's records must have clearly written documentation to support the need for replacement based on facts, not speculation. If at all possible, avoid ever having to recommend the replacement of a contractor. One reason is that some bonding companies will just rehire the same contractor to clean up their own mess and to cut the bonding company's costs.*

Posted Set:

Maintaining the architect's "*posted set*" is one of the more valuable construction phase management activities, and often one of the most neglected. A *posted set* is a hard-copy of a full-sized set of all the project's construction documents which have been posted with all the clarifications, revisions, etc., as issued to the contractor.

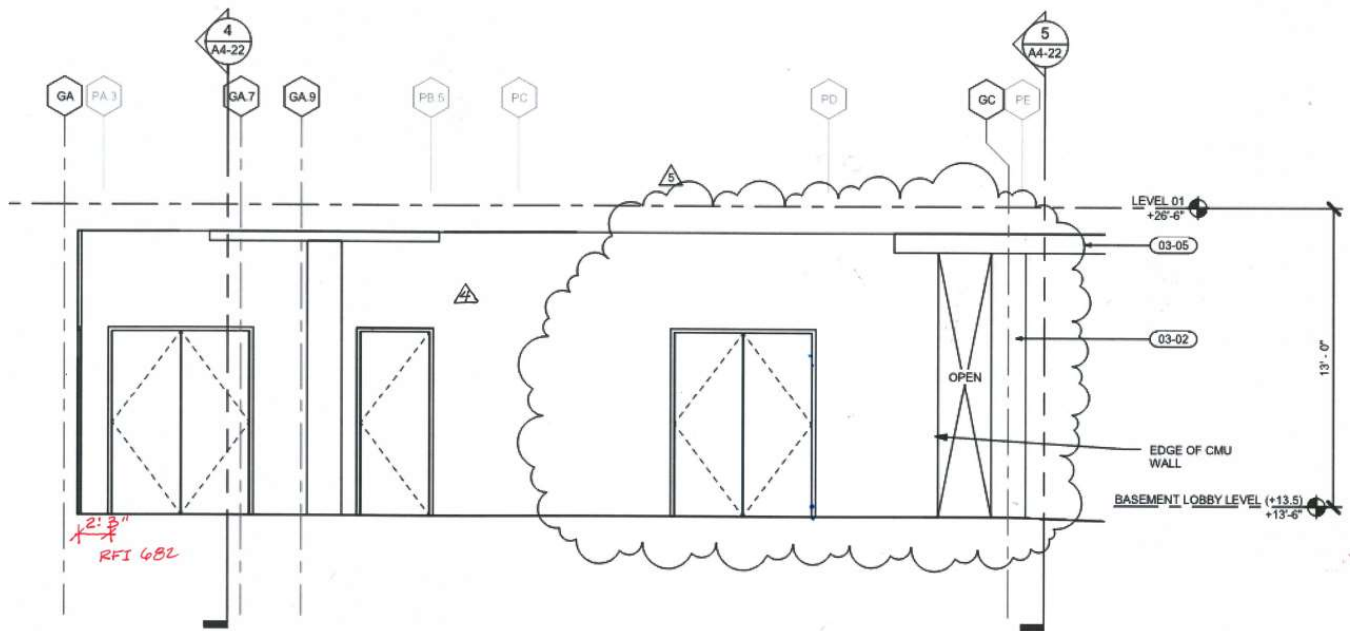
Hard copies are required because it is nearly impossible to manage and convey the same information on digital copies, especially on large or complex projects. Full-sized copies are required in order to have sufficient space for notes, and to have space for taping applicable sketches into the drawings or to the backside of the facing drawing sheet. *Posted sets* should be treated as quasi-legal documents that are to have no other sketches, comments, calculations, doodles, etc., except what has been formally issued to the contractor. If an architect is responsible for interpreting the construction documents, there must be a clear understanding of how they have been previously interpreted and what has been formally communicated to the contractor. (*I have seen some very well-qualified people attempt to keep digital posted sets, but failed to capture and retain all of the comments and history.*)

Office space is required to store, work on, and read the *posted set*; and it takes time and dedication to keep the *posted set* up to date. Prior to returning to the contractor, every RFI needs to be reviewed in context to the *posted set*. Are there any previous revisions impacting the response, and does the response properly address the RFI? Then, prior to forwarding the response to the contractor, the RFI is posted in the set. A similar process takes place with bulletins. This is one reason why it is important to identify all of the affected construction documents in RFI's, bulletins and similar documents – so that it facilitates the architect posting to the architect's posted set, and it also facilitates the contractor posting to the contractor's posted set. (*Note: Construction contracts should require the contractor to maintain a contractor's posted set and describe what that entails.*)

Some guidelines for maintaining the architect's posted set include the following:

- > All addenda and bulletin sketches and drawings need to have their revision(s) "clouded" with a corresponding delta number/letter adjacent to the cloud(s). Any reissues of a sheet after an addendum or bulletin has been issued are to retain the delta, but the previous revision clouds are to be removed.
- > When an entire sheet is reissued, it is inserted into the set, in front of all previous issues of that sheet, and the superseded sheet is stamped in bold red letters "SUPERSEDED". It is also a good practice to trim off a small piece of the lower right corner of the superseded sheet, without deleting the sheet number. This helps find the most current edition of the sheet quicker. (*Note: Retaining all of the superseded sheets in the posted set provides a valuable history should questions arise and/or claims be filed.*)
- > When sketches showing revisions to the construction documents are posted, they need to be at the same scale as the original drawing so they can be cut and taped into the applicable construction document sheets, or referenced on a construction document drawing and taped to the back side of the facing drawing sheet. (*A typical way to reference a revised detail posted on a facing sheet, is to cross out the detail on the construction document sheet and add a note similar to "See facing page for Bulletin XXX or RFI XXX"*)
- > Use the addendum letter or bulletin number and corresponding dates in the revision blocks for reissuing the drawing sheets (as an example: "Addendum A" or "Bulletin 36"). This provides a history of why and when each sheet is reissued. The delta letters and numbers then match the appropriate changes, making it easier to locate the issuing documents. This greatly simplifies the process of numbering the reissues of revised sheets.
- > Posting minor addendum, bulletin and RFI items without sketches can be done by noting the item(s) on the referenced construction document(s) in red. It is important to label a corresponding addendum delta, bulletin delta, or the RFI number adjacent to the redlined marks. Then, there is an address to the "official" document that conveyed that information to the contractor. (*Note: If an RFI is to become a bulletin, only post the bulletin.*)

An example of posted information can be seen in the following illustration. The clouded area is referenced by the delta as being from Bulletin 5. Note that there are unknown changes made as part of Bulletin 4. To find out what those changes were, one can look at Bulletin 4 or a corresponding, superseded sheet. The dimension at the lower left was added in response to RFI 682.



4.7.9 Example of Posted Set Markings

Pay Requests:

For most projects based in the United States, the contract requires the architect to be involved in reviewing and certifying the contractor’s pay requests/applications for payments. This involvement by the architect is also often a requirement of companies financing the project’s construction. In other countries, especially where bills of quantities are used, the quantity surveyor often replaces the architect for this role. The following discussion is based on U.S. projects.

The AIA has developed forms to assist with the contractors’ applications for payments and the architects’ certifications. *(Refer to AIA documents G702 and G703 for examples.)* The basis of these documents is the contractors’ “schedule of values”. Contractors are required to break down the costs of the project with separate line items for each project area, trade, main tasks, etc. As an example, the plumbing line-items for level 2 area 3 might be similar to the following:

Item No:	Description of Work	Scheduled Costs		
		Materials	Labor	Total
Level 2 Area 3 Plumbing				
P2.3.1	Plumbing Rough-in	\$36,0820.30	\$45,459.21	\$81,479.51
P2.3.2	Plumbing Fixtures and Trim	\$28,276.40	\$9,824.36	\$38,100.76
P2.3.3	Plumbing Testing & Balancing	\$400.00	\$4,000.00	\$4,400.00

4.7.10 Example Schedule of Values Breakdown

(Note: AIA documents G702 and G703 do not separate materials from labor.)

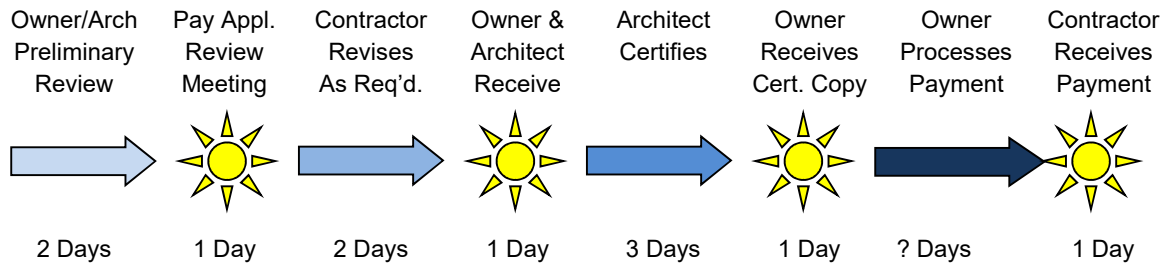
Rules typically applied to schedules of values are as follows:

- A schedule of values for any given segment of work must be submitted and approved by the owner and architect prior to a payment request for that segment of work. *(In an ideal scenario, the entire schedule of values for a project would be completed at one time. However, for fast-tracked projects and for some scope changes this is not possible. Part of the review should be for completeness and to minimize front-end-loading by the Contractor.)*
- Schedules of value are to be modeled after the AIA document G703 “continuation sheet” or a similar format approved by the owner and architect.
- Line items in the schedule of values must be in a sufficient level of detail so that the percentages complete for each line item can be reasonably estimated. *(The objective is to have the incremental quantities and costs for each line item be detailed/small enough so the actual work being viewed in the field is at a scale that is easily comprehended for estimating an approximate percentage complete, and so that the cost exposure for any miss-estimated percentages of completion is not overly significant. This is done to help manage the risk exposure when certifying pay requests.)*
- Additional backup documentation or interpretation of individual line items may be requested on an as-needed basis. *(This often applies for stored materials.)*
- Schedules of values for GMP work may be adjusted to reflect actual costs and redistribution of contingencies only as agreed to in writing by the owner and contractor. *(Tracking GMP costs is a separate discussion which is not included here, except to say that it is best for items with a guaranteed maximum price (GMP) to be rolled over into the fixed-price category as soon as possible.)*
- Bulletins as included in approved “Change Orders” shall be added to the Schedule of Values below the original contract entries, and broken down to the satisfaction of the owner and architect. *(Tracking changes can become confusing if the previously-agreed schedule of values’ line items are tweaked to accommodate the change orders. It is better to keep change orders separate at the end of the schedule of values.)*

Contractors not only appreciate getting paid regularly and on time for completed work, but it is a contract requirement. Therefore, the processes and timing for reviewing and approving their applications for payment are important. The application for payment review is typically done at a special monthly pay-request meeting attended by the owner, architect, contractor and often representation by the lender. During the meeting each line item of the requested payment is reviewed in detail and given verbal approval as presented, or adjusted as may be required by the owner, architect and/or lender. In addition to the meeting, there are requirements for items to be done before and after the meeting. These include the sequence of activities as follows:

1. Draft copies of the applicable AIA document G703 (*or similar*) are to be submitted to the owner and the architect by the contractor a minimum of two working days prior to the pay request review meeting. These are for the owner and architect to compare to the site progress prior to the meeting.
2. The pay-request review meeting occurs.
3. The contractor amends the applicable AIA documents G702 and G703 (*or similar*) as may be required following the pay-request review meeting. Then the contractor submits to the architect four (4) notarized copies of the formal pay request. Attachments to the pay request include the following:
 - Lien releases signed by the contractor and applicable subcontractors and suppliers as may be required in the owner-contractor agreement.
 - Any other evidence of performance of the work as may be required by the owner and/or the owner's lender.
4. The architect shall review the request to verify agreement with the pay-request review meeting. After reviewing, the architect shall certify the request and forward (3) copies to the owner. The architect's certification will be for the contractor's overall requested amount and will not include individual certifications of the various contractor line items, the subcontractors' pay request documents, nor approval of the attachments noted above. Any qualifications and/or exceptions to the pay request by the architect will be noted on a separate letter submitted to the owner with the pay request, and copied to the contractor. The architect's review and certification are based on estimated percentages of work complete as observed in the field and/or as acceptably documented.
5. After the owner receives the architect's certification, the owner completes any internal processing and issues payment to the contractor.

The following diagram illustrates the sequencing of the activities noted above, and also includes some hypothetical durations. Adjusting the durations allows contractual timing obligations (*if any*) to be reflected.



4.7.11 Example Pay Request Flow Chart

Additional rules to consider regarding contractor requests for payment include the following:

- > Approval of a contractor's request for payment by the owner and/or architect does not constitute an acceptance approval of the work in place. *(The owner's and architect's pay-request reviews are for quantity, not quality. However, if any significant noncompliance is observed, applicable payments may be withheld as provided by the contract or law.)*
- > Prior written approval from the owner must be obtained for payment of any items stored offsite and/or onsite. If approved, it will typically be limited to stored materials specifically manufactured for the project. *(Standard construction materials are often excluded, because they can easily be used by the contractor on other projects, etc.)* The pay request for materials stored offsite shall include bills of sale and evidence of insurance and warehouse bonding.
- > If it is discovered through subsequent pay-request reviews that any particular line item(s) on AIA form G703 has(have) been previously overpaid, and the work for the corresponding item(s) has(have) yet to reach the noted percentage complete, the owner and/or architect reserve the right to request a negative adjustment to the applicable line item(s).
- > The architect reserves the right to recommend withholding payment for specific items, and the owner reserves the right to withhold payment for the same - provided that written notification/explanation is given to the contractor. Reasons for potentially withholding payment include the following:
 - Work completed without approved, required submittals.
 - Work completed in noncompliance with the contract documents. Typically, the contractor will be informed of such by a written "Noncompliance Report". *(See related discussion with figure 4.7.5.)*
 - Work completed by subcontractors without approved subcontracts and/or certificates of insurance.
 - Improperly maintained progress record drawings and specifications. *(Accurate depiction of buried utilities is of special interest.)*
 - Other reasons as may be noted in the general conditions and/or elsewhere in the Owner-Contractor Agreement and/or as afforded by law.

Pay requests can also be an opportunity to motivate the contractor to stay current with other contractual requirements. Examples of items requiring periodic updating that should be current prior to approving payment requests include the following:

- Contractor's red-lined/posted sets
- Any required progress reports
- Construction schedule updates

(Note: These items should be reviewed by the architect each month, but emphasized the first few months. I have found it usually only takes one time of withholding, or threatening to withhold, payment to encourage the contractor's contracted performance.)

Payment retainage is required in most construction contracts. A certain percentage (*usually between 5% and 15%*) of the requested payment is withheld/retained until the project is completed. The objective is to help protect the owner by retaining enough money to complete the project should the contractor default. However, it can also be used to motivate the contractor to complete such items as their submittal process. Some contracts permit as much as a 50% reduction in retainage when all of the required submittals have been properly processed and approved.

The architect's certification should be for the portions of the work that are within the architect's (including the architect's subconsultants') scope of work. Any total amounts due the contractor may include work designed by other consultants, so the certification should note that it is for work specifically within the architect's scope.

Project Closeout:

All projects must have a clearly defined start and finish. Construction projects typically have three stages of completion, listed in order as follows:

1. Substantial Completion: This is defined as the work/project (*or designated portion thereof*) being sufficiently complete in accordance with the contract documents so that the owner may occupy and/or utilize the work/project (*or designated portion thereof*) for its intended purpose. At the time of substantial completion only minor work should remain to be done by the contractor. For projects based in the United States, substantial completion and its date are often certified by the architect. (*See AIA form G704 for an example.*) The significance of the substantial completion date is tied to warranty periods, the transferring of responsibility for maintenance and insurance to the owner, etc.

2. Final Completion: When all of the outstanding items noted with the acceptance of the substantial completion(s) of the total work/project are resolved, and all required documentation has been completed, then the project has reached final completion. At this point the contractor is due complete payment for the construction of the project in accordance with the Owner-Contractor Agreement or as may be agreed.
3. Warranty Period/Defects Liability Stage: Depending on the terms of the contract, the contractor is responsible for repairing any latent defects that might be discovered during the warranty period (*often one year*). Near the end of the warranty period, it is not uncommon for representatives of the owner (*usually including the user*), architect, and contractor to walk the entire project to identify any obvious defects in the construction. (*Work in some countries (especially in the Middle East) has an added after-construction liability lasting for ten years in the form of “Decennial Liability”, or “responsabilité décennale”. It is derived from French Civil Code, and is a form of strict construction liability under which no proof of negligence is required against either the architect or contractor.*)

When the contractor considers the work, or portion thereof, *substantially complete*, the following (*as should be required by the contract*) includes the items that are to be submitted for the owner and architect to verify the substantial completion:

- > Written notification of substantial completion and a request for the owner and/or architect to review the work (*Note: Prior to this time, the owner and architect are to endeavor to work with the contractor to identify and establish the acceptable levels of quality and finish for the various portions of the project.*)
- > A written description of the contractor’s inspection of the work (punch/snag list), listing items that require completion and/or correction to bring the work (or applicable portion thereof) into compliance with the contract documents. (*Note: It is often missed that the contractor is the one required to provide the initial punch/snag list, and the architect is to verify it. In cases where the architect determines there are too many items missing from the contractor’s punch/snag list(s) and/or the listed items are too significant, the architect can inform the contractor in writing that the work being considered is not sufficiently complete to be considered for “substantial completion”. Punching out/snagging a project can require a great many person-hours from the design team. It is therefore important to identify and agree what is expected of the design team prior to signing an agreement.*)
- > A schedule for remedying punch/snag list items.
- > Certificates of Acceptance by regulatory bodies having jurisdiction including, but not limited to the following (*Note: Some AHJ’s require the architect’s certificate of substantial completion prior to issuing their acceptances.*):
 - Certificate of Occupancy
 - Elevator
 - Mechanical
 - Electrical
 - Fire Protection
 - Health Department
 - Utilities Providers
 - Etc.

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- > Records of specified instruction for the owner's/operator's personnel regarding the operation of systems and equipment (mechanical, electrical, etc.) and the maintenance of special finishes. *(Some contract documents require video records of these instructions.)*
- > The required number of copies of maintenance and operations manuals in hard-cover, 3-ring view binders. *(Digital copies may be used if acceptable to the client/owner.)*
- > Proposed turn-over of responsibilities for utilities, security, maintenance, and insurance for the applicable portions of the work. *(To be approved by the owner.)*
- > Bound and indexed, fully executed warranties and guaranties as required by the contract documents.
- > Written inventory stating items with quantities and locations of extra/attic stock to be provided to the owner as required in the contract documents.
- > Test reports required by the contract documents which have not previously been transmitted.
- > A written response to, and the planned resolution of any outstanding *non-compliance reports* for the portion of the work/project identified in the notification of substantial completion.
- > *As-built drawings (Depending on the contract, the contractor's responsibilities with respect to as-built drawings can take on many forms. At a minimum it should include a completed set of posted drawings and plans with dimensioned locations of buried utilities. At the extreme, the contractor could also be responsible for updating a complete BIM model for the project. Architects should avoid including the production of as-built drawings as part of their basic services. This is because it is almost impossible to estimate the extent of revisions that may be required to be integrated into the as-built drawings, and because the architect does not have the responsibility to monitor and document all of the as-built conditions during the construction of the project. However, the design team must be updating their construction documents on an on-going basis to reflect all addenda and bulletins prepared by them.)*

On some projects there are requirements for the owner/user to use portions of the project prior to the completion of the entire project. An example is hotels, where access to guestrooms for installing furniture is often required before the entire project is completed. These early turn-over areas need to be stated in the construction documents or contract. The specific requirements need to include dates, applicable areas, access to the applicable areas, and responsibilities for damage repairs, utilities, insurance, security, trash removal, etc.

When the contractor considers the work, or portion thereof, has achieved final completion *(typically within a given time limit, such as thirty days following substantial completion)*, the following *(as should be required by the contract)* are to be submitted for the owner and architect to verify the final completion:

- > Written notification that the work is complete.

- > A copy of the substantial completion punch/snag list modified to include any comments added by the architect, and with each item initialed as being accepted by the contractor, owner, and if applicable, the architect.
- > Other requirements as delineated in the general conditions and/or specifications which have not been previously submitted.
- > Final Contractor's "Application for Payment" and corresponding lien waivers.

Selecting a Contractor:

Many clients select their contractors by themselves, and most government agencies have their prescribed selection processes. For the other clients, selecting a contractor can be a daunting task. The client will be risking time, money and resources, and will desire a contractor that can be trusted to provide the finished project on time, within budget and to the designed level of quality. For some clients this may be their only, or one of a few, construction projects they will ever attempt, and they may not have the expertise to comfortably select a qualified contractor.

The following are a few possible ways to assist a client in making this important decision. Please note that different regions of the world have different approaches to this process, and what is stated below will need to be adapted accordingly. Also, no matter what level of due diligence is performed in selecting a contractor, sometimes projects still have problems. *(Note: If Contractor selection is part of the architect's scope of services, there should be adequate compensation to cover the costs and risks associated with the effort.)*

> Identifying Potential Contractors:

o **Online (or Similar) Research:**

- Who are the registered/licensed contractors in the region based on local trade associations, government agencies, etc.?
- Who were the contractors for projects built in the region that are admired by the client and/or architect?
- What information is available regarding the contractors being considered for the project?
- Solicit contractors by advertisements in trade journals, etc. *(Then vet them.)*
- Other

- **Advice from Others:**
 - Have any friends and/or associates had any experience with similar projects in the region? If so, what were their experiences and recommendations regarding specific contractors? *(Note: Avoid giving unsubstantiated positive or negative comments regarding a contractor to persons outside of your firm.)*
 - Visit similar projects in the region and find out who the contractors were and what the client thought of them.
 - What are the project's architects' and engineers' experiences with contractors in the region?
 - Etc.
- > Prequalification Interviews/Presentations: Contractors usually welcome the opportunity to meet with prospective clients to introduce their firms. Although this is a productive way to learn about a firm, realize that they are putting their best foot forward and may not be as easy to work with on a project. *(Note: Clients should interview the final contenders and their proposed key staff members to gain a final evaluation before making their selection.)*
- > Contractor Information: As part of the bidding/tendering process, or as part of the contractor prequalification process, each potential contractor should be asked to present information about their company and their proposed approach to the project. Some potential requested information topics are listed below.
 - **Financial Information**: The financial stability of a contractor is crucial to the success of a project. If a construction company becomes insolvent and is forced to close its business, or even if its business is just struggling financially, it will most likely impact the time, cost and/or quality of the project. Examples of financial information that are sometimes requested include the following:
 - Bid bonds and certifications that the contractor and the key subcontractors can procure construction bonds, are indicative of the contractor's financial performance level and credibility as perceived by the bonding industry. If they cannot obtain bonding, the client should not consider them for any project of substantial size.
 - Legal registrations are those required by law and reflect a minimal level of competence and financial stability.
 - The annual construction costs of projects completed over the past five years.
 - A list of all projects currently under construction and contracted to start construction. *(This is to evaluate workloads.)*

- Detail of the bidder's/tenderer's audited financial statements over the last four (4) years, including the name and address of its banks, together with the authority to approach its bankers for relevant information and comment. *(More typically a requirement for doing work in some countries.)*
 - Financial Ratio - Current Assets / Current Liabilities *(More typically a requirement for doing work in some countries.)*
 - Financial Ratio - Total Debt / Total Equity *(More typically a requirement for doing work in some countries.)*
 - Financial Ratio - Gross Profit / Volume *(More typically a requirement for doing work in some countries.)*
 - Turnover four-year average *(More typically a requirement for doing work in some countries.)*
 - Etc.
 - It is also a good practice to solicit the financial credit report for a contractor using a third-party service, such as Dunn and Bradstreet.
- **Experience:** Past performance is one of the better ways to evaluate a potential contractor's capabilities. Items to be requested include the following:
- A list of all projects completed in the past five years
 - A list of completed projects in the region *(If this is their first project in the region, additional information will be required with respect to legal registrations, ability to procure staffing, etc.)*
 - A list of completed projects of the 'same or similar' building types
 - The construction costs, construction duration and the year of completion of each of the projects submitted as being the 'same or similar' building type
 - A list of owners and architects for each of the submitted 'same or similar' building-type projects, and a contact person for each *(A representative of the client and/or architect then needs to follow up and contact these persons to evaluate any comments they may have regarding the contractor. Questions should be geared towards evaluating time, quality, added costs, contractor's "attitude", etc.) (Note: Some clients and architects may be hesitant to divulge too much information for fear of being held liable for slander, etc.)*

- **Staffing:** A contractor's marketing team may seem very qualified and persuasive, but the marketing team is usually not involved with the actual construction of the project. Resumes/CV's of the key project personnel are required. It may not be possible for a contractor to know precisely who will be available for a project when, and if, it actually starts. As an option, request multiple candidates, understanding that any one of them may be the actual person. Multiple candidates can also reflect the depth of experienced staff within the contractor's organization. Sometimes none of the multiple candidates are available, but the quality standard for that position has been established. Key project staff information includes the following:
 - Project organization chart
 - Resumes/CV's for the Project Director, Project Manager, Site Superintendent(s), Head of Procurement /Purchaser for the project, Head Engineer for the project, etc.
 - Anticipated manpower flow charts and/or numbers and types of work, administration, supervisory staff (*More typically a requirement for doing work in some countries.*)
 - Number of available workers of each type (*More typically a requirement for doing work in some countries where the majority of the laborers are expatriates.*)
 - Ability to access and bring foreign workers to a site (sometimes includes information about the availability of workers' housing) (*More typically a requirement for doing work in some countries where the majority of the laborers are expatriates.*)
 - Other
- **Subcontracting Plan:** Most contractors cannot self-perform all of the work, so they have to subcontract some of the trades. Each of the proposed subcontractors will need to be vetted to some degree; the main ones especially. It is also a good sign if the contractor has had previous successful relationships with subcontractors.
- **Strategy:** It is not uncommon in some parts of the world to request a high-level work strategy for complicated projects. A review of the work strategy cannot only reveal how well a contractor understands a project, but it can often reflect how serious a potential contractor is. Types of information that may be included in a work strategy include the following:
 - High level construction schedule/program
 - Site utilization plan with office, staging, workers' amenities, and similar areas identified

- Site access and circulation plan
 - Proposed erection crane types and placements
 - Etc.
- **Assumptions, Clarifications, Exceptions, Exclusions, Etc.:** Every company works to reduce their risks, and that includes contractors. Each potential contractor must list and acknowledge all documentation received from the client in the preparation of the proposal. Most contractors will also list exclusions, limitations, assumptions and/or other similar criteria, each of which must be carefully evaluated.
- > **Costs:** To most clients cost is the most important selection criterium. It is listed last to emphasize the importance of the preceding items. Some owners will even require each contractor to provide two separate proposals. One technical, reflecting the items above; and the other commercial/financial, providing the actual proposed costs. The commercial proposals are not opened until the technical proposals have all been fully evaluated and accepted or rejected.

Some owners will establish a weighting system to numerically evaluate the technical submittals, and then use that weighting system to adjust the comparative commercial proposals.

Remember, the lowest bid/tender is not always the best option. Some clients will even dismiss the high and low proposals, and award to the contractor closest to the average of the remaining bids/tenders. The lowest bidder may have missed something(s), and/or they plan to make it up in change orders/variations. The bidder closest to the average is assumed to have included everything and has made informed decisions for pricing the project.

5.0 Conclusion

In this document, I have attempted to share some of my insights and experience regarding what an architectural project manager should do and how to do it. The concepts presented in this paper do not reflect all of the requirements and options for architectural project management. Each of the concepts discussed has been used successfully, but they may not all be applicable for every specific project. As an example, one probably does not require a detailed work plan for a small remodel project, etc.

The intent of this paper is to share some architectural project management concepts and opinions which may be beneficial, and may stimulate the readers' appreciation of architectural project management. Project management processes and strategies require their own analysis and strategies to meet the projects' objectives and goals.

I am often confused why other people do not do things the same way I do. But what is even more surprising is that things still get done – and sometimes even better. In other words, there is no one right way to manage an architectural project. Each project is different and the circumstances surrounding each project are unique. The APM must remain flexible to adapt processes and strategies to best facilitate the specific project. One of the potentially biggest mistakes an APM can make is doing everything the way it has always been done.

Tasks associated with architectural project management can be subdivided and evaluated to develop better ways of doing things. The goals of good architectural project management are to maintain quality in the business/commercial, design, and technology aspects of a practice. Implementing good project management tools is crucial to a project's success. A significant component of this is identifying and mitigating risks to prevent them from jeopardizing a project.

Though the items presented in this paper are based on actual experience and criteria, they must be adapted to the specific project and its applicable conditions. An APM must approach managing an architectural project as its own design process. The problems, goals, objectives, etc., must be identified and analyzed and then strategies designed to be incorporated into the project's management. This requires experience, education and experimentation – which is one reason why it is referred to it as “practicing architecture”.

Technology and market demands continue to evolve and place pressure on how building projects are designed and constructed. What has been presented as having worked in the past may not work in the future. It is crucial to the architectural industry's survival that APM's remain abreast of related changes, and are willing to become innovators and agents of change, as they integrate new systems and strategies into their project management practices.

During my career, the practice of architecture has changed considerably. Many of the changes have been due to the integration of computers and economics. I remember when the first practical computer aided drafting (CAD) programs were being introduced. It took a while for their introduction and acceptance. During a recession in the early 1990's, unemployed architects and recent graduates/trainees used their "down time" to become proficient with CAD, thereby becoming more employable. During that same time, many of the laid-off/redundant, senior technical architects found work in fields other than architecture, where they discovered the work was more lucrative, less stressful and more satisfying. In my opinion, when the industry began to regain momentum, a significant portion of the technical production was being done and managed by inexperienced staff who produced drawings that looked good but were full of mistakes.

Portions of the industry may never have fully recovered from this brain drain. Then, along came building information modeling (BIM) and other recessions, and another cycle of downgrading portions of the professions' "technical" abilities. At the same time, contractors were becoming more sophisticated with respect to their business models, project management and legal positioning for claims. All of which are currently impacting the future practice of architecture.

As advancement in design and construction technologies continue to grow, they will undoubtedly impact the architects' roles and services. The future may include such innovations as verbally-directed (or thought-directed) computers where the designer merely has to speak (or think) an image into existence. There may come a time when drawings as we know them become obsolete. Instead, computer images will be projected from drones while manufactured components are guided into place by robots. All of this, as well as the full utilization of the current BIM systems, will require better integration of the design and construction industries. The present integration appears to be inhibited by, "who is willing to take responsibility for what and when."

In my opinion, if the present trends in the architectural industry continue, design-build construction firms and/or integrated project delivery approaches may grow to replace the majority of traditional architectural firms. Contractors have often proven themselves to be more innovative, and it may not be long before they realize that they can hire all of the high-end design talent they require without going through a third-party architectural firm. The design-build contractor is able to provide a professionally designed and constructed project with a fixed price, sooner, and for less money than utilizing the traditional architect-and-contractor model.

In the ever-changing world of design and construction, architectural firms will continue to face challenges. To survive, they will need to improve their systems and management procedures, and provide training to their staff at all levels. In addition, they must continue to adapt to the new technologies, project delivery strategies, and project management processes that must continue to evolve and improve.

Appendix A: Consulting Disciplines

The following list provides a high-level description of some of the consulting disciplines (other than the architect) that might be utilized on a project. The alphabetical listing is generic and may not reflect the terminology and/or separation/combination of disciplines as practiced by individual firms operating in different regions of the world.

- **Acoustician** provides consultation, reviews the design, and provides specifications and details regarding the project's acoustical requirements and design, including sound transmission, noise-source isolation, and acoustic performance within sensitive spaces.
- **Architect-of-Record (AOR)** (*often utilized for international work*) is a local architect familiar with local construction practices and permitting processes, and is licensed to practice architecture in the jurisdiction of the project site. The AOR provides the primary interface with the authorities having jurisdiction/competent authorities and is responsible for submitting and obtaining all applicable permits. The AOR will provide the primary interface with the local utilities/services providers and will be responsible for submitting and obtaining all applicable permissions and interface information. The AOR also may be responsible for providing the construction document and construction phase/stage architectural services. (*Note: Corresponding engineers-of-record may be required in some jurisdictions for structural, mechanical, plumbing, electrical, civil and/or other engineering disciplines.*)
- **Art Consultant** selects and provides the project's artwork based on input from the client and interior designer. (*This service is often provided for hospitality, leisure and entertainment projects.*)
- **Audio Visual (AV) Consultant** designs and documents the project's sound systems (including those for public address, background music, voice amplification, but excluding life-safety alarm/notification systems), visual projection systems and closed-circuit TV (CCTV) systems.
- **Certified Value Specialist** provides methodology and coordination of value engineering processes.
- **Civil Engineer** provides engineered designs and documentation for the project's site grading and soil retainage (if any); the site storm drainage systems; roads and driveways, and bridges; site distribution of wet utilities/services with connections to the applicable service providers' systems and extending to within 5 feet/1.5 meters of the buildings to the wet utilities' connections being designed by the applicable building engineers; and the contractor's erosion control requirements.

- **Commissioning Engineer** reviews the mechanical, electrical, plumbing/public health (MEP), and equipment designs for quality control; balances the HVAC and plumbing pressurized systems on site; and coordinates/reviews the commissioning of the project's MEP, foodservice, laundry, etc., equipment.
- **Cost Estimator** provides estimates of construction costs to establish/verify an initial budget and updated estimates for milestone design submissions, design alternative comparisons, and changes during construction. (*Note: Typically, not required if a quantity surveyor or a construction manager is providing estimating services.*)
- **Electrical and ELV Engineer** provides the design and documentation of the project's electrical systems, including site distribution from the point of connection with the service provider, lightning protection, lighting design of spaces not included in the lighting designer's scope, and circuiting of lighting designs by the lighting designer. The extra low voltage (ELV) engineering scope includes the telephone systems, master TV antenna system, smoke and fire detection and alarm/annunciation systems, duress alarm system(s), and the conduit/trunking systems (conduit, junction boxes and/or cable tray systems) for the installation of AV, security and IT systems.
- **Environmental Consultant** provides environmental surveys and analyses of the site prior to construction, an assessment of the potential environmental impact of the project on the site, a listing of potential mitigation strategies, and/or other related information as may be required by the authorities having jurisdiction/ competent authorities for inclusion in an environmental impact study.
- **Façade Consultant** provides consultation, details and specifications for buildings' façade systems and for façade-access system/building maintenance unit (BMU).
- **Geotechnical Consultant** provides sub-surface soil investigations to establish soil bearing capacities, water table levels, soil corrosive properties and similar. Their "*soils report*" also includes recommendations regarding foundation systems, soil stabilization systems during construction, and similar. (*Note: Their specific scope of services is often written by the structural engineer as part of the structural engineer's scope of services.*)
- **Hardware/Ironmongery Consultant** selects and specifies the project's door hardware/ironmongery, including the listing of hardware sets for each individual door.
- **Industrial Process Engineer** provides designs, documentation and building criteria for the applicable industrial processes being housed within the project.
- **Installation Stylist** reviews and adjusts finishes, furnishings and accessories (FF&A / FF&E) installations based on compliance with the interior designer's design intent; and makes necessary field adjustments to maximize the users' interiors experience.

- **Interior Designer** provides interior designs and documentation of the project's public and living spaces. *(The specific spaces should be listed somewhere in the proposal.)* Also assists the architect in shaping and organizing the applicable spaces; designing, detailing and/or specifying all applicable casework, millwork, finishes, furniture and furnishings.
- **IT Consultant** provides the design and documentation of the information technology (IT) distribution systems for the project starting at the computer server and extending to the individual outlets. *(Note: It is assumed that the computer hardware and software will be selected and specified by the user/operator.)*
- **Kitchen/Foodservice Consultant** provides designs and documentation for the project's kitchens and other food prep, food storage, and foodservice areas. Also includes the selection and specification of equipment for any public area ice machines, refrigeration for trash holding rooms, flower room refrigeration, pantries, and similar spaces.
- **Landscape Architect** provides the design and documentation of the project site's landscape designs, including softscape, hardscape, finish grading, irrigation, site furnishings and similar. *(Note: May also include landscaped roof areas if applicable.)*
- **Laundry Consultant** provides designs and documentation for the project's laundry and staff uniform facilities.
- **LEED Consultant** manages and documents the LEED process, provides required energy analysis, and is responsible for registering, preparing applicable documentation, making required submissions, and other interfaces with the U.S. Green Building Council.
- **Life-Safety Consultant** provides additional expertise regarding the interpretation and application of building and fire codes for the specific project. Services include preparation of 'Fire and Life Safety Strategy Report', preparation of egress studies and exiting plans, and computer-modelling of fire and smoke behavior as may be required to assess the buildings' performance during a fire.
- **Lighting Designer** provides lighting designs and documentation for the project's interior spaces included in the interior designer's scope, the exterior landscaping, exterior driveways and parking, and the exterior façades.
- **Marine Engineer** provides surveys, analysis, and designs and documentation for stabilized marine edges and beaches, and dredging if applicable.
- **Marina Consultant** provides requirements, designs and documentation for boat/ship maneuvering, moorings, docks and docking systems.

- **Mechanical / HVAC Engineer** provides the design and documentation of the building's heating, ventilation and air-conditioning (HVAC) systems.
- **Model Builder** constructs physical scale models of a project, primarily for presentation purposes.
- **Operator** as a consultant provides operational program/brief information and design reviews; concepts for F&B outlets; selection of operational supplies, equipment, and furnishings (OS&E); and similar.
- **Parking Consultant** provides consultation, designs and documentation for structured and on-grade parking, including any required access control and/or automated payment systems.
- **Physicist** provides radiation analysis and shielding design requirements to be incorporated into the building's walls, floors and/or ceilings as may be required for x-ray and similar radiological equipment.
- **Plumbing / Public Health & Fire-Suppression Engineer** provides the design and documentation for the buildings' water (excluding chilled and hot water systems for HVAC), sanitary drainage, storm drainage, and fire-suppression systems. (Note: Plumbing designs will interface with the civil wet services designs at approximately 5 feet/1.5 meters outside the exterior face of the building.)
- **Quantity Surveyor (QS)** provides estimated construction cost information regarding milestone design submissions, design alternative comparisons, and changes during construction. The QS also prepares the Bills of Quantities for bidding/tendering, assists in the preparation and compilation of bidding/tender documents, participates in the evaluation of bids/tenders, and verifies the extent of completed work for contractors' requests for payments.
- **Renderers/Illustrators** provide three-dimensional representations/perspective views of the project in two-dimensional format, primarily for presentation purposes.
- **Security Consultant** provides a "security threat, vulnerability and risk analysis" of the project, recommends and evaluates options for mitigating potential vulnerabilities and the associated risks, and provides specifications for any security-specific equipment and/or materials required for the project.
- **Signage Consultant** provides designs and documentation for the project's signage systems as required for wayfinding, room identification, site/building identification, and code-required signage. *(May also include graphics design services.)*

- **Site Surveyor** provides full-description topographic survey also illustrating other particulars of the existing site conditions including property lines, easements, encroachments, restrictive covenants, structures and features, sub-surface utilities/services, adjoining site uses and adjoining roadways.
- **Spa Consultant(s)** provides the operational concepts and layout designs for spas and fitness centers, and provides the selection and specification of the spa and fitness center equipment. *(Any interfaces with the interior designer need to be defined in their respective scopes of work.)*
- **Structural Engineer** provides the design and documentation of the buildings' structural systems.
- **Structural Peer Review Engineer** reviews the structural engineer's calculations and designs as may be required by applicable building codes and/or good practice.
- **Testing Laboratory** provides on-site quality control inspections and testing of the construction work as stated in the construction documents' technical specifications.
- **Traffic Engineer** provides a traffic analysis report documenting the existing traffic in the vicinity of the site, analyzing the anticipated impact to the traffic resulting from the project, and proposing options to mitigate any potential, negative impacts.
- **Vertical Transportation Consultant** provides analysis, design and documentation for the project's fixed, mechanized transportation systems including elevators/lifts, escalators and horizontal people movers.
- **Wind Tunnel Testing Lab** provides simulation studies to determine design implications of wind loads on a proposed project.
- **Water Feature Consultant** provides engineered designs and documentation for the project's water feature and swimming pool MEP systems based on the landscape architect's and/or interior designer's designs.
- **Waterproofing Consultant** provides details and specifications for the project's waterproofing systems for below grade perimeter surfaces, roofs, structured parking decks, and similar conditions.
- **Waste Management Consultant** provides designs and documentation for the project's trash/rubbish internal collection and storage, and facilities for its pick-up/collection and removal by third-party vendors.
- **Others** as may be required.

Appendix B: Example Work Plan

Refer to section 4.2: Work Plans above for applicable comments.

(Note: This example of a “work plan” differs from what is presented as a “work plan” in the AIA’s “The Architect’s Handbook of Professional Practice.”)

Milestone Work Plan for the Notel Hotel

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Phase 1: Concept Design</p>	<p>Objective: Create a high-level project design to establish scope, scale, general geometry and architectural character.</p>
<p>Milestone 1: Site Workshop, Charrette</p>	<p>Objective: Establish a mutual understanding of the project and an initial design direction during on-site work sessions with the Client.</p>
<p>Architecture:</p> <ul style="list-style-type: none"> • Identify and acquire relevant information in preparation for the charrette • Lead the charrette efforts • Obtain insights from the Client, site, etc. 	<ul style="list-style-type: none"> • Relevant sketches, images, plans, massing studies, etc., developed during the charrette • Summary statement of key understandings and design directions as agreed with the Client as part of the charrette process • Draft design program (updated from Client’s)
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> • Participate in the site-planning portions of the charrette • Obtain insights from the Client, site, etc. 	<ul style="list-style-type: none"> • Deliverables combined with the Architect’s
<p>Milestone 2: Initial Concept Presentation</p>	<p>Objective: Formalize an initial design concept based on the direction agreed at the charrette.</p>
<p>Architecture:</p> <ul style="list-style-type: none"> • Further develop the charrette concept(s) for the next round of presentations and Client feedback • Present the initial concept(s) to the Client 	<ul style="list-style-type: none"> • Overall site plan(s) with building roof plans • Diagrammatic floor plans of main and prototypical levels of main building(s) • Overall site and building section(s) • Main exterior elevation(s) of main building(s) • Massing images of the main building(s) • Sketches and/or images to convey the design intent • Updated design program • Agenda and minutes of the presentation
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> • Further develop the charrette site concept(s) 	<ul style="list-style-type: none"> • Deliverables combined with the Architect’s

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Milestone 3: Final Concept Presentation</p>	<p>Objective: Refine the approved initial design concept into a presentation package to be used as the basis for planning approval and for further design development in the Schematic Design Phase.</p>
<p>Architecture:</p> <ul style="list-style-type: none"> • Finalize the concept design based on Client feedback from the initial concept presentation 	<ul style="list-style-type: none"> • Rendered overall site plan • Rendered, diagrammatic floor plans of main levels and prototypical level • Overall site and building section(s) indicating floor-to-floor heights and site vertical relationships • Main exterior elevation(s) • Exterior materials palate board • Massing model • Bird’s-eye and eye-level rendered perspective drawings (one each) • Sketches and images as may be required to convey the design intent • Written design narrative of the project • Updated area program and initial area tabulations • Finalized “base” design program • Agenda and minutes of the presentation • Note: <i>Concept design drawing may be hand-drawn and/or computer-generated at the Architect’s discretion</i>
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> • Finalize the overall conceptual site development 	<ul style="list-style-type: none"> • Deliverables combined with the Architect’s

Phase 2: Schematic Design

Objective: Develop the approved Concept Design into a scheme that evolves the architectural design; reflects the initial integration with engineered systems; accommodates the project’s main spatial drivers; and establishes the landscape and interior design directions.

<p>Milestone 4: Design Team Kickoff Meeting & Workshop</p>	<p>Objective: Introduce main members of the design team to each other, the project and the project management objectives and procedures, and to introduce each discipline’s proposed systems.</p>
<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the Client • Compile “Project Design Interface Manual” • Prepare agenda for and minutes of the design team kick-off meeting • Prepare initial draft of architectural construction document sheet list 	<ul style="list-style-type: none"> • Project Design Interface Manual • Kick-off meeting agenda • Kick-off meeting minutes • Initial draft of architectural drawing sheet list • Applicable record memos from telephone calls, etc. • Applicable work plan and schedule updates • Applicable invoices

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<ul style="list-style-type: none"> • Provide commercial administration of the Project for the Architect & Architect's Subconsultants 	
<p>Architecture (Design):</p> <ul style="list-style-type: none"> • Convert hand-drawn architectural concept to BIM & Model initial design in BIM • Participate in kick-off meeting • Establish overall level and area plans on 2-D background sheets 	<ul style="list-style-type: none"> • Initial BIM model • Overall level and area plans
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Develop initial material pallets and images for Client review 	<ul style="list-style-type: none"> • Initial landscape materials pallets and landscape design images
<p>Interior Designer:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Develop loose-tray materials and images presentation for Client review 	<ul style="list-style-type: none"> • Loose-tray materials and interior design images presentation
<p>Cost Estimator:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Develop ROM construction estimate based on the concept design • Present the project's budget as agreed with the Client 	<ul style="list-style-type: none"> • Concept design ROM construction cost estimate • Project budget
<p>Civil Engineer:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Identify points of connection to public sanitary sewer, water systems, natural gas (if available) and storm sewer (if available) along with the applicable service provider for each • Identify parameters for routing utilities/services • Identify initial storm water strategy 	<ul style="list-style-type: none"> • Site survey (<i>provided by the Client</i>) with planned utility connection/access points highlighted • Narrative/comments regarding concepts for routing utilities through the site • Narrative comments regarding concepts for managing the project's storm water
<p>Structural Engineer:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Identify potential optional structural framing systems for the project's main structures; provide a narrative of the pros and cons of each; and provide recommendations • Provide project-specific scope of services for the client-hired geotechnical engineer 	<ul style="list-style-type: none"> • Narrative of optional structural systems (<i>initial basis of design report</i>) • Geotechnical engineer's scope of services

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>HVAC Engineer:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Provide a list of all applicable systems and potential options for each where appropriate – include a list of the advantages and disadvantages of each option 	<ul style="list-style-type: none"> • Narrative of optional HVAC systems (<i>initial basis of design report</i>)
<p>Plumbing & Fire Suppression Engineer:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Provide a list of all applicable systems and potential options for each where appropriate – include a list of the advantages and disadvantages of each option 	<ul style="list-style-type: none"> • Narrative of optional plumbing and fire suppression systems (<i>initial basis of design report</i>)
<p>Electrical Engineer:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Provide a list of all applicable systems and potential options for each where appropriate – include a list of the advantages and disadvantages of each option 	<ul style="list-style-type: none"> • Narrative of optional electrical systems (<i>initial basis of design report</i>)
<p>Low-Voltage / IT Engineer:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Provide a list of all applicable systems and potential options for each where appropriate – include a list of the advantages and disadvantages of each option 	<ul style="list-style-type: none"> • Narrative of optional low-voltage systems (<i>initial basis of design report</i>)
<p>Foodservice & Laundry Consultant:</p> <ul style="list-style-type: none"> • Participate in kick-off meeting • Propose foodservice and laundry concepts 	<ul style="list-style-type: none"> • Narrative of overview of foodservice and laundry concepts
<p>Milestone 5: Initial Schematic Design Presentation & Workshop</p>	<p>Objective: Face-to-face interface of applicable design team members to review the design status of each of their efforts and to further integrate the engineering systems into the architectural design, primarily focusing on the main spatial drivers.</p>
<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the Client • Organize, administer and minute presentations, workshops and meetings • Update the work plan and design schedule as may be required • Provide commercial administration of the Project for the Architect & Architect's Subconsultants 	<ul style="list-style-type: none"> • Applicable meeting agendas and minutes • Applicable record memos from telephone calls, etc. • Applicable work plan and schedule updates • Applicable invoices

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Architecture (Design):</p> <ul style="list-style-type: none"> Participate in the design presentation, workshop and teleconferences Continue schematic development of the architectural plans and facades Generate first pass at interior partition types Develop initial exterior wall sections for at least two prototypical conditions Verify stairway layouts Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> Updated BIM model In-progress plans and elevations Updated building sections (if applicable) Initial schedule of partition types Plans and sections of main stairways Draft of initial prototypical wall sections
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> Participate in the design presentation, workshop and teleconferences Layout segmented site plans (<i>coordinate with the civil engineer</i>) Develop landscape layout drawings and images for presentation to the Client Provide preliminary estimate of irrigation water demands 	<ul style="list-style-type: none"> Computer-generated, overall and segmented landscape background plans Landscape design presentation for Client review and comment Preliminary estimate of irrigation water demands
<p>Interior Designer:</p> <ul style="list-style-type: none"> Participate in the design presentation, workshop and teleconferences Develop initial interior design presentations for the main lobby, a ballroom and a standard guestroom 	<ul style="list-style-type: none"> Initial interior design presentation for the main lobby, one ballroom and a prototypical standard guestroom
<p>Lighting Design Consultant:</p> <ul style="list-style-type: none"> Meet with the architect, interior designer and landscape architect to develop initial project understanding Provide an initial electrical load estimate/budget for lighting the applicable interior, landscape and façade areas 	<ul style="list-style-type: none"> Lighting energy estimates/budgets
<p>Cost Estimator:</p> <ul style="list-style-type: none"> Attend the presentations and workshop to evolve an understanding of the project and address potential VE opportunities 	<ul style="list-style-type: none"> NA
<p>Civil Engineer:</p> <ul style="list-style-type: none"> Participate in the workshop and applicable teleconferences Prepare preliminary mass grading study Prepare preliminary routing paths/corridors for the utilities through the site Update the site drainage concept as may be required Layout segmented site plans (<i>coordinate with the landscape architect</i>) 	<ul style="list-style-type: none"> Initial mass grading study with estimated cut and fill quantities Diagrammatic overall site plan with proposed routings/corridors for utilities Updated site drainage concept Computer-generated, overall and segmented civil background plans

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Structural Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Develop structural framing concepts based on the selected structural systems • Identify any required building/seismic joints 	<ul style="list-style-type: none"> • Structural floor plans with proposed columns, shear walls and/or in-wall bracing, column gridlines, and building joints indicated • Indications of proposed beam, truss and deck systems along with depths for long and typical span conditions
<p>HVAC Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Provide spatial requirements and location verification for all applicable plant spaces <i>(optional sizes if required for any of the proposed systems' options)</i> • Provide initial concepts for main distribution routings of applicable services throughout the Project • Provide a preliminary list of estimated cooling, heating and electrical loads 	<ul style="list-style-type: none"> • Preliminary HVAC floor plans indicating all applicable plant areas and their required spatial requirements • Enlarged plans (1/4" = 1'-0") of main plant rooms with preliminary equipment layouts to illustrate and verify spatial requirements • Preliminary main distribution routing concepts shown for each building level • Preliminary cooling, heating, and HVAC equipment electrical load estimates
<p>Plumbing & Fire Suppression Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Provide spatial requirements and location verification for all applicable plant spaces <i>(optional sizes if required for any of the proposed systems' options)</i> • Provide initial concepts for main distribution routings of applicable services throughout the Project • Provide a preliminary estimate of potable water, hot water (energy demands), and sanitary sewer demands • If applicable, provide sizing of any potable water and/or fire-suppression water tanks/reservoirs 	<ul style="list-style-type: none"> • Preliminary plumbing floor plans indicating all applicable plant areas and their required spatial requirements • Enlarged plans (1/4" = 1'-0") of main plant rooms with preliminary equipment layouts to illustrate and verify spatial requirements • Preliminary main distribution routing concepts shown for each building level • Applicable utility load estimates
<p>Electrical Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Provide spatial requirements and location verification for all applicable plant spaces <i>(optional sizes if required for any of the proposed systems' options)</i> • Provide initial concepts for main distribution routings of applicable services throughout the Project • Provide a preliminary estimate of project electrical loads <i>(allowing for input from applicable other disciplines)</i> 	<ul style="list-style-type: none"> • Preliminary electrical floor plans indicating all applicable plant and panel areas and their required spatial requirements • Enlarged plans (1/4" = 1'-0") of main plant rooms with preliminary equipment layouts to illustrate and verify spatial requirements • Preliminary main distribution routing concepts shown for each building level and the site • Applicable utility load estimates

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Low-Voltage / IT Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Provide spatial requirements and location verification for all applicable plant spaces <i>(optional sizes if required for any of the proposed systems' options)</i> • Provide initial concepts for main distribution routings of applicable services throughout the Project • Provide a preliminary estimate of low-voltage electrical loads 	<ul style="list-style-type: none"> • Preliminary low-voltage floor plans indicating all applicable plant and panel areas and their required spatial requirements • Enlarged plans (1/4" = 1'-0") of main plant rooms with preliminary equipment layouts to illustrate and verify spatial requirements • Preliminary main distribution routing concepts shown for each building level and the site • Applicable utility load estimates
<p>AV & Acoustical Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Identify acoustic performance requirements for the exterior walls, the applicable interior partitions, the applicable interior spaces, and the applicable MEP systems • Working with the architect, identify partition types for use where sound transmission needs to be controlled • Provide spatial requirements and location verification for all applicable plant spaces <i>(optional sizes if required for any of the proposed systems' options)</i> • Provide initial concepts for main distribution routings of applicable services throughout the Project • Provide a preliminary estimate of AV electrical loads 	<ul style="list-style-type: none"> • Narrative of acoustical performance criteria • Proposed partition types for guestroom demising and corridor partitions, and other applicable partitions requiring STC ratings <i>(developed in conjunction with the architect)</i> • Preliminary AV floor plans indicating all applicable plant and panel areas and their required spatial requirements • Enlarged plans (1/4" = 1'-0") of main plant rooms with preliminary equipment layouts to illustrate and verify spatial requirements • Applicable electrical load estimates
<p>Foodservice & Laundry Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Provide area requirements and general location recommendations for applicable foodservice, laundry (including uniform issue) and waste management spaces • Provide preliminary estimate of services/utility loads for the kitchen, laundry, and waste management areas 	<ul style="list-style-type: none"> • Initial draft of foodservice, laundry and waste management basis of design narratives • Estimated services/utility loads for foodservice, laundry and waste management equipment (including exhaust requirements)
<p>Vertical Transportation Consultant:</p> <ul style="list-style-type: none"> • Analyze the Project's elevator/lift requirements to establish their required number, size and speed (including shaft grouping dimensional requirements) • Identify escalator requirements, if any 	<ul style="list-style-type: none"> • Initial vertical transportation report • Sizing requirements for the Project's elevator shafts, any equipment rooms and any escalators

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Life-Safety Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Identify applicable building codes and authorities having jurisdiction (AHJ) • Provide initial consultation as may be needed to evaluate code compliance of the design • Commence initial draft of a Fire Protection Report to include the following: <ul style="list-style-type: none"> ○ Descriptions of uses within the building and occupancy classifications ○ Occupant load factors ○ Height and area analysis, building construction type ○ Structural fire resistance ○ Fire-rated separations ○ Means of egress requirements ○ Automatic sprinkler and standpipe criteria ○ Fire alarm system criteria ○ Smoke control criteria (if applicable) ○ Interior finishes criteria 	<ul style="list-style-type: none"> • List of applicable codes • List of applicable AHJ and contact information • Draft Fire Protection Report
<p>Spa Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Develop and present initial spa and fitness operational concepts 	<ul style="list-style-type: none"> • Initial draft of the spa and fitness center operational report for Client review and feedback
<p>Water Feature Consultant:</p> <ul style="list-style-type: none"> • Participate in teleconferences • Working with the Design Architect and the Design Landscape Architect, identify locations for the swimming pool and water feature plant rooms • Provide spatial requirements and location verification for all applicable plant spaces • Provide initial estimates of electrical, water, sewer, heating and cooling demands 	<ul style="list-style-type: none"> • List of all applicable plant areas and their required spatial requirements illustrated on preliminary floor (or site) plans with main pieces of equipment and access requirements shown • Preliminary estimate of electrical, water, sewer and heating demands
<p>Milestone 6: Final Schematic Design Presentation</p>	<p>Objective: Documentation of the schematic designs of the applicable design disciplines; and a face-to-face workshop to further coordinate the various systems into the architectural design during Phase 3, Design Development.</p>

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the Client • Organize, administer and minute presentations, workshops and meetings • Update the work plan and design schedule as may be required • Compile and submit final schematic design documentation for submission to the Client • Provide commercial administration of the Project for the Architect & Architect's Subconsultants 	<ul style="list-style-type: none"> • Applicable meeting agendas and minutes • Applicable record memos from telephone calls, etc. • Applicable work plan and schedule updates • Applicable invoices • Compiled final schematic design packages
<p>Architecture (Design):</p> <ul style="list-style-type: none"> • Participate in the design presentation, workshop and teleconferences • Complete schematic development of the architectural plans and facades • Complete schematic design of interior partition types • Complete schematic design wall sections of at least two prototypical conditions • Update area calculations and design narrative • Update rendered exterior elevations (<i>if required</i>) • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Updated BIM model • Schematic design plans and elevations • Schematic design building sections • Schematic design partition types • Schematic design prototypical wall sections • Updated area program and tabulations • Updated rendered perspectives (<i>if required</i>) • Schematic design narrative
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> • Participate in the design presentation, workshop and teleconferences • Complete landscape schematic design 	<ul style="list-style-type: none"> • Rendered site plans indicating the landscape schematic design • Sketches and/or images illustrating the schematic landscape design intent • Updated landscape material pallet • Landscape schematic design narrative
<p>Interior Designer:</p> <ul style="list-style-type: none"> • Participate in the design presentation, workshop and teleconferences • Refine interior design presentations for the main lobby, a ballroom and a standard guestroom based on Client feedback • Provide initial interior design concepts for the various suite types and guest floor corridors • Provide initial layouts for all public areas, including restrooms (excluding spa and fitness areas) 	<ul style="list-style-type: none"> • Updated interior design presentation for the main lobby, one ballroom and a prototypical standard guestroom, including a 3-D colored rendering of each • Initial interior design presentation for suites and guest floor corridors • Initial interior design presentation for public area plan layouts

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Lighting Design Consultant:</p> <ul style="list-style-type: none"> Participate in teleconferences and meeting(s) with architect landscape architect and interior designer Develop initial building façade lighting concepts Develop standard guestroom and guest floor circulation lighting concepts 	<ul style="list-style-type: none"> Design presentation of exterior façade lighting Design presentation of guest floor lighting
<p>Cost Estimator:</p> <ul style="list-style-type: none"> Attend the presentations and workshop to evolve an understanding of the project and address potential VE opportunities Update concept design cost estimate to reflect information acquired at Milestone 5 Maintain the potential VE list and status report 	<ul style="list-style-type: none"> Updated concept design cost estimate Potential VE list and status report
<p>Civil Engineer:</p> <ul style="list-style-type: none"> Participate in the workshop and applicable teleconferences Meet with applicable utilities providers to introduce the project, verify capacities, and verify interface/approval requirements Complete schematic civil engineering design 	<ul style="list-style-type: none"> Minutes from meetings with applicable utilities service providers In-progress mass grading study with estimated cut and fill quantities Diagrammatic overall site plan with proposed routings/corridors for utilities Updated site drainage concept Updated civil basis of design report
<p>Structural Engineer:</p> <ul style="list-style-type: none"> Participate in the workshop and applicable teleconferences Complete schematic design structural package 	<ul style="list-style-type: none"> Initial structural framing model Schematic framing plans Schematic column and beam sizing Updated structural basis of design report
<p>HVAC Engineer:</p> <ul style="list-style-type: none"> Participate in the workshop and applicable teleconferences Complete schematic design HVAC package 	<ul style="list-style-type: none"> Floor plans indicating plant areas and proposed routing of main ducts Enlarged floor plans with in-progress layouts of main equipment and/or equipment groupings Standard guestroom plan with proposed HVAC system and duct shafts Floor plan indicating proposed guestroom corridor HVAC Updated mechanical basis of design report
<p>Plumbing & Fire Suppression Engineer:</p> <ul style="list-style-type: none"> Participate in the workshop and applicable teleconferences Complete schematic design plumbing and fire suppression package 	<ul style="list-style-type: none"> Floor plans indicating plant areas and proposed routing of main pipes Enlarged floor plans with in-progress layouts of main equipment and/or equipment groupings Standard guestroom plan with proposed plumbing and fire protection systems, and pipe shafts

Milestone/Discipline Activities	Anticipated Milestone Deliverables
	<ul style="list-style-type: none"> • Floor plan(s) indicating proposed fire protection water risers and fire hose connections • Updated plumbing and fire suppression basis of design report
<p>Electrical Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Meet with electrical utility providers to introduce the project, verify capacities, and verify interface/approval requirements • Complete schematic design electrical package 	<ul style="list-style-type: none"> • Floor plans indicating plant areas and electrical panel rooms • Enlarged floor plans with in-progress layouts of main equipment and/or equipment groupings • Updated electrical loading estimates • Updated electrical basis of design report • Minutes from meetings with electrical service provider
<p>Low-Voltage / IT Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Meet with applicable services providers to introduce the project, verify capacities, and verify interface/approval requirements • Develop schematic design low-voltage package 	<ul style="list-style-type: none"> • Floor plans indicating plant areas and low-voltage panel rooms • Enlarged floor plans with in-progress layouts of main equipment and/or equipment groupings • Updated low-voltage basis of design report • Minutes from meetings with applicable services provider
<p>AV & Acoustical Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete schematic design AV & acoustical package 	<ul style="list-style-type: none"> • Floor plans indicating AV plant areas • Enlarged floor plans with in-progress AV layouts of main equipment and/or equipment groupings • Sketches/details of anticipated partition types with sound transmission ratings • Updated AV and acoustical basis of design report
<p>Foodservice & Laundry Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete schematic designs for foodservice, laundry and waste management areas 	<ul style="list-style-type: none"> • Floor plans of applicable areas with preliminary equipment layouts • Updated foodservice, laundry and waste management basis of design reports
<p>Vertical Transportation Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Complete the vertical transportation study and corresponding report 	<ul style="list-style-type: none"> • Vertical transportation report • Dimensioned elevator shaft and car plans, and sections • Dimensioned escalator plans and sections • Dimensioned plans of any required machine rooms
<p>Life-Safety Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Provide on-going consultation as may be needed to evaluate code compliance of the design • Complete the initial Fire Protection Report • Develop a strategy for interfacing with the AHJ's 	<ul style="list-style-type: none"> • Fire Protection Report • AHJ-interface strategy

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Spa Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Complete spa and fitness center operational briefs and design programs 	<ul style="list-style-type: none"> • Spa and fitness center operational briefs and design programs
<p>Water Feature Consultant:</p> <ul style="list-style-type: none"> • Participate in teleconferences • Develop schematic layouts for swimming pool and water feature plant rooms • Develop schematic routings for piping between the plant rooms and the corresponding swimming pools and water features 	<ul style="list-style-type: none"> • Schematic plans of the various plant rooms showing the main pieces of equipment and/or equipment groupings • Schematic plans indicating the proposed piping routings between the plant rooms and the corresponding swimming pools and water features

Objective: Further refine the approved Schematic Design to fix and describe the project’s form, size, materials and systems and to address the main interface requirements of all design disciplines in order to minimize the need for significant modifications during the Construction Document Phase.

Phase 3: Design Development

<p>Milestone 7: Initial Design Development Presentation</p>	<p>Objective: Face-to-face interface of applicable design team members to review the design status of each of their efforts and to further coordinate the various systems into the architectural design.</p>
<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the Client • Organize, administer and minute workshops and meetings • Update the work plan and design schedule as may be required • Provide commercial administration of the Project for the Architect & Architect’s Subconsultants • Compile and critique construction document drawing sheet lists and specification tables of contents from applicable disciplines noted below 	<ul style="list-style-type: none"> • Applicable meeting agendas and minutes • Applicable record memos from telephone calls, etc. • Applicable work plan and schedule updates • Applicable invoices • Compiled construction document drawing sheet lists and specification table of contents from applicable disciplines
<p>Architecture (Design):</p> <ul style="list-style-type: none"> • Participate in the design presentation, workshop and teleconferences • Continue to develop the architectural design based on the approved schematic design – including BOH RCP’s • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress architectural design development drawings – including BOH RCP’s • Updated list of anticipated architectural construction documents and a proposed table of contents of the applicable specification sections

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<ul style="list-style-type: none"> Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required Provide an updated draft list of the anticipated applicable drawing sheets and specification sections for the construction documents 	
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> Participate in the design presentation, workshop and teleconferences Continue to develop the landscape architectural design based on the approved schematic design Continue to interface with the other design disciplines Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> In-progress landscape architectural design development drawings List of anticipated landscape architectural construction document drawing sheets and a proposed table of contents of the applicable specification sections
<p>Interior Designer:</p> <ul style="list-style-type: none"> Participate in the design presentation, workshop and teleconferences Refine interior design presentations for the various suite types and guest floor corridors Refine interior design presentations and layouts for all public areas, including restrooms (excluding spa and fitness areas) and provide computer-generated background floor and reflected ceiling plans Provide initial layouts and interior designs for the spa and fitness center Provide draft model room package with plan backgrounds for other disciplines Continue to interface with the other design disciplines Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> Refined interior design presentations for the various suite types, guest floor corridors, and public areas Initial spa and fitness center interiors presentation In-progress interior design development drawings including computer-generated floor and reflected ceiling plans Draft model room package List of anticipated interior design construction document drawing sheets and a proposed table of contents of the applicable specification sections

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Lighting Design Consultant:</p> <ul style="list-style-type: none"> • Participate in meetings and teleconferences with the architect, landscape architect, and interior designer • Update façade lighting design (if required) • Develop initial concepts for landscape lighting in conjunction with the landscape architect • Develop concepts for various guestrooms and guest floor circulation lighting in conjunction with the interior designer • Develop initial lighting design concepts for interior public areas in conjunction with the interior designer • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress lighting designs • Lighting design presentations for the landscape and building’s public areas • List of anticipated lighting design construction document drawing sheets and a proposed table of contents of the applicable specification sections
<p>Cost Estimator:</p> <ul style="list-style-type: none"> • Attend the presentations and workshop to evolve an understanding of the project and address potential VE opportunities • Update cost estimate to reflect the schematic design • Maintain the potential VE list and status report 	<ul style="list-style-type: none"> • Schematic design cost estimate • Potential VE list and status report
<p>Civil Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Continue to develop the civil engineering design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress civil design development drawings • List of anticipated civil construction document drawing sheets and a proposed table of contents of the applicable specification sections

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Structural Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Continue to develop the structural design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress structural design development drawings • List of anticipated structural construction document drawing sheets and a proposed table of contents of the applicable specification sections
<p>HVAC Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Continue to develop the HVAC design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress HVAC design development drawings • List of anticipated HVAC construction document drawing sheets and a proposed table of contents of the applicable specification sections
<p>Plumbing & Fire Suppression Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Continue to develop the plumbing and fire suppression design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress plumbing and fire suppression design development drawings • List of anticipated plumbing and fire suppression construction document drawing sheets and a proposed table of contents of the applicable specification sections

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Electrical Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Continue to develop the electrical design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress electrical design development drawings • List of anticipated electrical construction document drawing sheets and a proposed table of contents of the applicable specification sections
<p>Low-Voltage / IT Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Continue to develop the low-voltage design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress low-voltage design development drawings • List of anticipated low-voltage construction document drawing sheets and a proposed table of contents of the applicable specification sections
<p>AV & Acoustical Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Continue to develop the AV and acoustical design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress AV and acoustical design development drawings • List of anticipated AV and acoustical construction document drawing sheets and a proposed table of contents of the applicable specification sections

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Foodservice & Laundry Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Continue to develop the food service, laundry and waste management design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • Initial equipment lists with utility loads • In-progress foodservice, laundry and waste management design development drawings • List of anticipated foodservice, laundry and waste management construction document drawing sheets and a proposed table of contents of the applicable specification sections
<p>Vertical Transportation Consultant:</p> <ul style="list-style-type: none"> • Provide updates to the vertical transportation report <i>(if required)</i> • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • Updated vertical transportation report <i>(if required)</i> • List of anticipated vertical transportation construction drawing sheets and a proposed table of contents of the applicable specification sections
<p>Life-Safety Consultant:</p> <ul style="list-style-type: none"> • Provide plan reviews and life-safety consultation to the design team as may be required 	<ul style="list-style-type: none"> • NA
<p>Spa Consultant:</p> <ul style="list-style-type: none"> • Participate in meetings and teleconferences with the interior designer • Provide initial fitness center equipment layouts and electrical requirements 	<ul style="list-style-type: none"> • Floor plan of fitness center with equipment shown to scale • Fitness center equipment schedule with utility requirements listed
<p>Water Feature Consultant:</p> <ul style="list-style-type: none"> • Participate in meetings and teleconferences • Continue to develop the water feature systems design development design • Continue to interface with the other design disciplines • Review and comment on applicable portions of the Cost Consultant’s cost estimates and participate in VE efforts as may be required • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • In-progress water feature design development drawings • List of anticipated water feature construction document drawing sheets and a proposed table of contents of the applicable specification sections

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Signage Consultant:</p> <ul style="list-style-type: none"> • Participate in meetings and teleconferences • Provide presentation of initial signage concepts • Provide draft list of anticipated applicable drawings sheets and specification sections for the construction documents 	<ul style="list-style-type: none"> • Presentation of initial signage concepts • List of anticipated water feature construction document drawing sheets and a proposed table of contents of the applicable specification sections
<p>Geotechnical Engineer:</p> <ul style="list-style-type: none"> • Provide finished geotechnical report 	<ul style="list-style-type: none"> • Geotechnical Report and recommendations
<p>Milestone 8: Final Design Development Presentation</p>	<p>Objective: Documentation of the design development designs of the applicable design disciplines; and a face-to-face workshop to further coordinate the various systems in preparation for the Construction Document Phase.</p>
<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the Client • Organize, administer and minute workshops and meetings • Update the work plan and design schedule as may be required • Provide commercial administration of the Project for the Architect & Architect's Subconsultants • Compile and submit final design development packages from all applicable disciplines • Compile and submit outline specifications from all applicable disciplines • Compile and submit the model room construction package 	<ul style="list-style-type: none"> • Applicable meeting agendas and minutes • Applicable record memos from telephone calls, etc. • Applicable work plan and schedule updates • Applicable invoices • Compiled final design development packages • Compiled outline specifications • Compile model room construction packages
<p>Architecture (Design):</p> <ul style="list-style-type: none"> • Participate in the design presentation, workshop and teleconferences • Complete the architectural design development package – including outline architectural specifications • Provide partition types, ceiling/roof framing and layout packages for the model room (<i>coordinate framing requirements with the structural engineer</i>) • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development architectural package • Updated area program and tabulations • Updated design narrative (<i>as may be required</i>) • Outline architectural specifications • Model room architectural package • Updated architectural basis of design report

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> • Participate in the design presentation, workshop and teleconferences • Complete the landscape architectural design development package – including outline landscape architectural specifications • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development landscape architectural package • Outline landscape architectural specifications • Updated landscape architectural basis of design report
<p>Interior Designer:</p> <ul style="list-style-type: none"> • Participate in the design presentation, workshop and teleconferences • Continue the interior design development focusing on work to be included in the general contractor’s scope of work • Prepare model room construction package • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress interior design drawings and presentations • Model room interior design construction package
<p>Lighting Design Consultant:</p> <ul style="list-style-type: none"> • Participate in meetings and teleconferences with the architect, landscape architect, and interior designer • Develop lighting layout plans and fixture selections for the prototypical guestroom types and the prototypical FOH areas. • Develop lighting layout plans and fixture selections for the prototypical landscape areas • Develop lighting layout plans and fixture selections for the prototypical façade conditions • Provide light fixture selections and layout plans for the model room 	<ul style="list-style-type: none"> • Design development lighting package • Model room lighting construction package • Draft fixture schedule and outline lighting and control specifications
<p>Cost Estimator:</p> <ul style="list-style-type: none"> • Attend the presentations and workshop to evolve an understanding of the project and address potential VE opportunities • Update schematic design cost estimate to reflect information acquired at Milestone 7 • Maintain the potential VE list and status report 	<ul style="list-style-type: none"> • Updated schematic design cost estimate • Potential VE list and status report
<p>Civil Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete the civil design development design – including outline specifications • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development civil package • Outline civil specifications • Updated civil basis of design report

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Structural Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete the structural design development design – including outline specifications • Advise architect regarding framing of model room • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development structural package • Outline structural specifications • Updated structural basis of design report
<p>HVAC Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete the HVAC design development design – including outline specifications • Develop HVAC construction drawings for the model room • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development HVAC package • Outline HVAC specifications • Model room HVAC construction drawings • Updated HVAC basis of design report
<p>Plumbing & Fire Suppression Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete the plumbing and fire suppression design development design – including outline specifications • Develop plumbing and fire suppression construction drawings for the model room • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development plumbing and fire suppression package • Outline plumbing and fire suppression specifications • Model room plumbing and fire suppression construction drawings • Updated plumbing and fire suppression basis of design report
<p>Electrical Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete the electrical design development design – including outline specifications • Develop electrical construction drawings for the model room • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development electrical package • Outline electrical specifications • Model room electrical construction drawings • Updated electrical basis of design report
<p>Low-Voltage / IT Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete the low-voltage design development design – including outline specifications • Develop low-voltage construction drawings for the model room • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development low-voltage package • Outline low-voltage specifications • Model room low-voltage construction drawings • Updated low-voltage basis of design report

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>AV & Acoustical Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete the AV and acoustical design development design – including outline specifications • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development AV and acoustical package • Outline AV and acoustical specifications
<p>Foodservice & Laundry Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and applicable teleconferences • Complete the foodservice, laundry and waste management design development design – including outline specifications • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development foodservice, laundry and waste management package • Outline foodservice, laundry and waste management specifications
<p>Vertical Transportation Consultant:</p> <ul style="list-style-type: none"> • Provide applicable input and update the vertical transportation report (<i>if required</i>) • Provide outline specifications for the vertical transportation systems 	<ul style="list-style-type: none"> • Updated vertical transportation report (<i>if required</i>) • Outline vertical transportation specifications
<p>Life-Safety Consultant:</p> <ul style="list-style-type: none"> • Provide plan reviews and life-safety consultation to the design team as may be required 	<ul style="list-style-type: none"> • NA
<p>Spa Consultant:</p> <ul style="list-style-type: none"> • Participate in meetings and teleconferences with the interior designer • Update as may be required the fitness center equipment layouts • Provide spa equipment selections and utility requirements 	<ul style="list-style-type: none"> • Fitness center equipment layouts and list with utility requirements • Spa equipment list and utility requirements
<p>Water Feature Consultant:</p> <ul style="list-style-type: none"> • Participate in meetings and teleconferences • Complete the water feature systems design development, including outline specifications • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Design development water feature package • Outline water feature specifications
<p>Signage Consultant:</p> <ul style="list-style-type: none"> • Participate in meetings and teleconferences • Update as may be required signage designs based on Client feedback and continue to develop 	<ul style="list-style-type: none"> • Updated signage designs as may be required for Client review and approval • Outline signage specifications

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Phase 4: Construction Documents</p>	<p>Objective: Provides documentation of a coordinated design for purposes of obtaining building permits, bidding the project for construction and establishing base documentation for the actual construction.</p>
<p>Milestone 9: Initial Construction Documents Workshop</p>	<p>Objective: Face-to-face interface of applicable design team members to review the design status of each of their efforts and to further coordinate the project's design details and systems.</p>
<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the client • Organize, administer and minute workshops and meetings • Update the work plan and design schedule as may be required • Provide commercial administration of the Project for the Architect & Architect's Subconsultants • Meet with the applicable AHJ's as may be required to address specific issues • Monitor the model room construction process 	<ul style="list-style-type: none"> • Applicable meeting agendas and minutes • Applicable record memos from telephone calls, etc. • Applicable work plan and schedule updates • Applicable invoices • Minutes from meetings with AHJ's <i>(if required)</i>
<p>Architecture (Design):</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the architectural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress architectural construction documents
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the landscape architectural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress landscape architectural construction documents
<p>Interior Designer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Finalize any remaining architectural interior design presentations • Continue with the development of the interior design architectural construction documents • Monitor and review the construction of the model room • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • Any remaining architectural interior design presentations • In-progress interior design architectural construction documents • Minutes from model room reviews

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Lighting Design Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the lighting design documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress lighting construction documents
<p>Cost Estimator:</p> <ul style="list-style-type: none"> • Attend the presentations and workshop to evolve an understanding of the project and address potential VE opportunities • Complete the design development cost estimate • Maintain the potential VE list and status report 	<ul style="list-style-type: none"> • Design development cost estimate • Potential VE list and status report
<p>Civil Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the civil construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress civil construction documents
<p>Structural Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the structural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress structural construction documents
<p>HVAC Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the HVAC construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress HVAC construction documents
<p>Plumbing & Fire Suppression Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the plumbing and fire suppression construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress plumbing and fire suppression construction documents
<p>Electrical Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the electrical construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress electrical construction documents

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Low-Voltage / IT Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the low-voltage construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress low-voltage construction documents
<p>AV & Acoustical Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the AV and acoustical construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress AV and acoustical construction documents
<p>Foodservice & Laundry Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the foodservice, laundry and waste management construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress foodservice, laundry and waste management construction documents
<p>Vertical Transportation Consultant:</p> <ul style="list-style-type: none"> • Address vertical transportation design issues (<i>if required</i>) 	<ul style="list-style-type: none"> • NA
<p>Life-Safety Consultant:</p> <ul style="list-style-type: none"> • Provide plan reviews and life-safety consultation to the design team as may be required • Develop draft exiting and fire separation plans 	<ul style="list-style-type: none"> • Draft exiting and fire separation plans
<p>Spa Consultant:</p> <ul style="list-style-type: none"> • Provide reviews and consultations as may be required for the spa and fitness center • Update the spa and fitness center equipment lists as may be required • Update the fitness center equipment plans as may be required 	<ul style="list-style-type: none"> • Applicable updates (<i>if required</i>)
<p>Water Feature Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Continue with the development of the water feature construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress water feature construction documents
<p>Signage Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Develop signage construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress signage construction documents

Milestone/Discipline Activities	Anticipated Milestone Deliverables
Milestone 10: ±60% Construction Documents Workshop	Objective: Face-to-face interface of applicable design team members to review the design status of each of their efforts and to further coordinate the project's design details and systems.
Architecture (Project Management): <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the client • Organize, administer and minute workshops and meetings • Update the work plan and design schedule as may be required • Provide commercial administration of the Project for the Architect & Architect's Subconsultants • Interface with AHJ's as may be required 	<ul style="list-style-type: none"> • Applicable meeting agendas and minutes • Applicable record memos from telephone calls, etc. • Applicable work plan and schedule updates • Applicable invoices • Minutes from meetings with AHJ's as may required
Architecture (Design): <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the architectural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress architectural construction documents
Landscape Architecture: <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the landscape architectural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress landscape architectural construction documents
Interior Designer: <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the interior design architectural construction documents • Monitor and review the construction of the model room • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress interior design architectural construction documents • Minutes from model room reviews
Lighting Design Consultant: <ul style="list-style-type: none"> • Participate in applicable teleconferences • Continue with the development of the lighting design documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress lighting construction documents
Cost Estimator: <ul style="list-style-type: none"> • Attend the presentations and workshop to evolve an understanding of the project and address potential VE opportunities • Update the design development cost estimate based on milestone 9 input • Maintain the potential VE list and status report 	<ul style="list-style-type: none"> • Updated design development cost estimate • Potential VE list and status report

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Civil Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the civil construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress civil construction documents
<p>Structural Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the structural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress structural construction documents
<p>HVAC Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the HVAC construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress HVAC construction documents
<p>Plumbing & Fire Suppression Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the plumbing and fire suppression construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress plumbing and fire suppression construction documents
<p>Electrical Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the electrical construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress electrical construction documents
<p>Low-Voltage / IT Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the low-voltage construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress low-voltage construction documents
<p>AV & Acoustical Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the AV and acoustical construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress AV and acoustical construction documents

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Foodservice & Laundry Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the foodservice, laundry and waste management construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress foodservice, laundry and waste management construction documents
<p>Vertical Transportation Consultant:</p> <ul style="list-style-type: none"> • Address vertical transportation design issues (<i>if required</i>) 	<ul style="list-style-type: none"> • NA
<p>Life-Safety Consultant:</p> <ul style="list-style-type: none"> • Provide plan reviews and life-safety consultation to the design team as may be required • Update exiting and fire separation plans (<i>if required</i>) 	<ul style="list-style-type: none"> • Updated exiting and fire separation plans (<i>if required</i>)
<p>Spa Consultant:</p> <ul style="list-style-type: none"> • Provide reviews and consultations as may be required for the spa and fitness center • Update the spa and fitness center equipment lists as may be required • Update the fitness center equipment plans as may be required 	<ul style="list-style-type: none"> • Applicable updates (<i>if required</i>)
<p>Water Feature Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Continue with the development of the water feature construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress water feature construction documents
<p>Signage Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Develop signage construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress signage construction documents
<p>Milestone 11: ±90% Construction Documents Workshop</p>	<p>Objective: Final face-to-face interface of applicable design team members to review the design status of each of their efforts and to further coordinate the project's design details and systems.</p>
<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the client • Organize, administer and minute workshops and meetings • Update the work plan and design schedule as may be required • Provide commercial administration of the Project for the Architect & Architect's Subconsultants • Interface with AHJ's as may be required 	<ul style="list-style-type: none"> • Applicable record memos from telephone calls, etc. • Applicable work plan and schedule updates • Applicable invoices • Minutes from meetings with AHJ's as may required

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Architecture (Design):</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the architectural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress architectural construction documents
<p>Landscape Architecture:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the landscape architectural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress landscape architectural construction documents
<p>Interior Designer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the interior design architectural construction documents • Monitor and review the construction of the model room (<i>if required</i>) • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress interior design architectural construction documents • Minutes from model room reviews (<i>if required</i>)
<p>Lighting Design Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Continue with the development of the lighting design documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress lighting construction documents
<p>Cost Estimator:</p> <ul style="list-style-type: none"> • Attend the presentations and workshop to evolve an understanding of the project and address potential VE opportunities • Update the design development cost estimate based on milestone 9 input • Maintain the potential VE list and status report 	<ul style="list-style-type: none"> • Updated design development cost estimate • Potential VE list and status report
<p>Civil Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the civil construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress civil construction documents
<p>Structural Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the structural construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress structural construction documents

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>HVAC Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the HVAC construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress HVAC construction documents
<p>Plumbing & Fire Suppression Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the plumbing and fire suppression construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress plumbing and fire suppression construction documents
<p>Electrical Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the electrical construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress electrical construction documents
<p>Low-Voltage / IT Engineer:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the low-voltage construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress low-voltage construction documents
<p>AV & Acoustical Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the AV and acoustical construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress AV and acoustical construction documents
<p>Foodservice & Laundry Consultant:</p> <ul style="list-style-type: none"> • Participate in the workshop and teleconferences • Continue with the development of the foodservice, laundry and waste management construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress foodservice, laundry and waste management construction documents
<p>Vertical Transportation Consultant:</p> <ul style="list-style-type: none"> • Address vertical transportation design issues (<i>if required</i>) 	<ul style="list-style-type: none"> • NA
<p>Life-Safety Consultant:</p> <ul style="list-style-type: none"> • Provide plan reviews and life-safety consultation to the design team as may be required • Update exiting and fire separation plans (<i>if required</i>) 	<ul style="list-style-type: none"> • Updated exiting and fire separation plans (<i>if required</i>)

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<p>Spa Consultant:</p> <ul style="list-style-type: none"> • Provide reviews and consultations as may be required for the spa and fitness center • Update the spa and fitness center equipment lists as may be required • Update the fitness center equipment plans as may be required 	<ul style="list-style-type: none"> • Applicable updates <i>(if required)</i>
<p>Water Feature Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Continue with the development of the water feature construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress water feature construction documents
<p>Signage Consultant:</p> <ul style="list-style-type: none"> • Participate in applicable teleconferences • Develop signage construction documents • Continue to interface with the other design disciplines 	<ul style="list-style-type: none"> • In-progress signage construction documents
<p>Milestone 12: Construction Document Submission</p>	<p>Objective: Complete and compile the construction document packages for bidding</p>
<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Compile construction document packages from all applicable disciplines • Compile basis of design reports from all applicable disciplines • Submit construction documents to AHJ's for permitting <i>(with client-provided application fees)</i> • Coordinate with Client and Cost Consultant to identify potential bidders, set up bidding and distribution procedures, etc. • Provide commercial administration of the Project for the Architect & Architect's Subconsultants 	<ul style="list-style-type: none"> • Consolidated construction document package • Consolidated basis of design reports • Record permitting documentation
<p>Cost Consultant:</p> <ul style="list-style-type: none"> • Coordinate with Client and Architect to identify potential bidders, set up bidding and distribution procedures, etc. • Up-date the cost estimate as may be required 	<ul style="list-style-type: none"> • Updated cost estimate <i>(if required)</i>
<p>All Other Applicable Disciplines:</p> <ul style="list-style-type: none"> • Complete all applicable construction documents for bidding by general contractors • Where required provide finalized basis of design reports including all applicable calculations 	<ul style="list-style-type: none"> • Applicable construction document packages for bidding • Applicable basis of design reports

Milestone/Discipline Activities	Anticipated Milestone Deliverables
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**Phase 5: Bidding & Negotiating
(Procurement)**

Note: No member of the design team is to be involved directly with the Owner-Contractor negotiations.

Objective: Provide opportunities and procedures for potential contractors to evaluate the project, ask for any clarifications and develop bids. Provides an opportunity for the design team to respond to the bidder’s questions and amend the construction documents as may be required. An Owner-Contractor Agreement is the completion of this phase.

<p>Architecture (Project Management):</p> <ul style="list-style-type: none"> • Provide the day-to-day interface between the design team and the bidders • Receive, process and distribute bidder questions and alternative proposals • Minute pre-bid meetings with bidders • Address any AHJ questions regarding the permitting documents • Compile construction document changes in the form of addenda <i>(if required)</i> • Provide coordination of design team’s technical reviews of bids <i>(if required)</i> • Assist the client in the evaluation of bids • Provide commercial administration of the Project for the Architect & Architect’s Subconsultants • Compile “Issue for Construction” documents <i>(if required)</i> 	<ul style="list-style-type: none"> • Applicable record memos from telephone calls, etc. • Compiled bidders’ questions, design team responses and corresponding log • Compiled bidders’ alternative proposals, design team responses and corresponding log • Minutes of pre-bid meeting with bidders • Minutes from meetings with AHJ’s as may required • Any Addenda to the construction documents • Compiled bid review report • Applicable invoices • “Issue for Construction” documents <i>(if required)</i>
<p>Cost Consultant:</p> <ul style="list-style-type: none"> • Participate in pre-bid meetings with bidders • Address any bidders’ questions applicable to pricing • Assist the client in the evaluation of bids 	<ul style="list-style-type: none"> • Responses to applicable bidders’ questions • Applicable portions of the bid review report
<p>All Applicable Disciplines:</p> <ul style="list-style-type: none"> • Respond to applicable bidder questions and alternative proposals through the architect’s project manager • Provide quality control reviews of applicable construction documents • Address any applicable AHJ questions regarding the permitting/construction documents • Landscape Architect, Interior Designer and Civil, Structural and MEP engineers participate in pre-bid meeting with bidders • Prepare any required revisions to applicable construction documents for inclusion in addenda 	<ul style="list-style-type: none"> • Responses to applicable bidders’ questions and alternative proposals • Responses to applicable AHJ questions • Applicable portions of any addenda • Applicable portions of the bid review report • Applicable “Issue for Construction” documents <i>(if required)</i>

Milestone/Discipline Activities	Anticipated Milestone Deliverables
<ul style="list-style-type: none">Finalize and submit to the architect the applicable "Issue for Construction" documents <i>(if required)</i>	
<p>Interior Designer:</p> <ul style="list-style-type: none">In addition to the architectural interior design elements included with the above, finalize the design and documentation of the FF&E	<ul style="list-style-type: none">Any remaining FF&E design presentationsFinal FF&E purchasing package

Appendix C: Drawing Transmittal / Document Register

Refer to section 4.4: Architectural Production Management above for applicable comments.

Transmittal/ Document Register

Wild Oats Architects

Project: Notel Hotel
 Project No: 20832
 Date: 19 Dec. 2020

Discipline: Architecture
 Design Stage: Schematic Design

Distribution	Copies Sent To:									
Client – Mr. Big Bucks										
Cost Estimator – Best Guess Corp.										
Landscape Architect – Green Memories										
Interior Designer – Fluff Unlimited										
Lighting Designer – Sparky Inc.										
Structural Engineer – Still Standing & Associates										
MEP Engineers – Larry, Moe and Curly Joe Consulting										
AV & Acoustical Consultant – UCM, Ltd.										
Food Service & Laundry Consultant – Feed M. Clean										
Life-Safety Consultant – Out On A Limb Consulting										
Water Feature Consultant – Spit and Phil Pool Specialists										
	Reason for Issue									
A – Review & Approval D – Design Coordination Printing O – Other (specify)	B – Bidding I – Information	C – Construction M – Milestone Progress								
	Format									
D – Disk E – Email H – Hardcopy W – Web-based										
	File Type									
B – BIM C – CAD P – PDF										

Day										
Month										
Year										

Copies of the following drawings are being transmitted herewith:

Sheet No.	Sheet Title														
	GENERAL														
A0.00	COVER SHEET														
A0.01	SHEET INDEX														
A0.02	<i>NOT USED</i>														
A0.03	LEGEND & ABBREVIATIONS														
A0.10	PROJECT INFORMATION														
A0.11	PROJECT INFORMATION														
A0.20	PLANNING COMPLIANCE REQUIREMENTS														
A0.21	PLANNING COMPLIANCE REQUIREMENTS														
A0.22	PLANNING COMPLIANCE REQUIREMENTS														
A0.30	PERMITTING COMPLIANCE REQUIREMENTS														
A0.31	PERMITTING COMPLIANCE REQUIREMENTS														
A0.32	PERMITTING COMPLIANCE REQUIREMENTS														
A0.33	ACCESSIBILITY COMPLIANCE REQUIREMENTS														
A0.40	EXITING PLAN – BASEMENT														
A0.41	EXITING PLAN – LEVEL 1														
A0.42	EXITING PLAN – LEVEL 2														
A0.43	EXITING PLAN – LEVEL 3														
A0.44	EXITING PLAN – LEVEL 4														
A0.45	EXITING PLAN – LEVEL 5														
A0.60	PROJECT DESIGN IMAGES														
A0.61	PROJECT DESIGN IMAGES														
A0.62	PROJECT DESIGN IMAGES														
A0.63	PROJECT DESIGN IMAGES														
A0.70	ARCHITECTURAL SITE PLAN														
	OVERALL FLOOR PLANS														
A1.00	OVERALL FLOOR PLAN – BASEMENT														
A1.10	OVERALL FLOOR PLAN – LEVEL 1														
A1.20	OVERALL FLOOR PLAN – LEVEL 2														
A1.30	OVERALL FLOOR PLAN – LEVEL 3														
A1.40	OVERALL FLOOR PLAN – LEVEL 4														
A1.50	OVERALL FLOOR PLAN – LEVEL 5														
A1.60	OVERALL FLOOR PLAN – ROOF														
	AREA FLOOR PLANS														
A2.01	AREA FLOOR PLAN – BASEMENT – AREA 1														
A2.02	AREA FLOOR PLAN – BASEMENT – AREA 2														
A2.03	AREA FLOOR PLAN – BASEMENT – AREA 3														
A2.04	AREA FLOOR PLAN – BASEMENT – AREA 4														
A2.05	AREA FLOOR PLAN – BASEMENT – AREA 5														
A2.11	AREA FLOOR PLAN – LEVEL 1 – AREA 1														
A2.12	AREA FLOOR PLAN – LEVEL 1 – AREA 2														
A2.13	AREA FLOOR PLAN – LEVEL 1 – AREA 3														
A2.14	AREA FLOOR PLAN – LEVEL 1 – AREA 4														
A2.15	AREA FLOOR PLAN – LEVEL 1 – AREA 5														

Sheet No.	Sheet Title													
A2.21	AREA FLOOR PLAN – LEVEL 2 – AREA 1													
A2.22	AREA FLOOR PLAN – LEVEL 2 – AREA 2													
A2.23	AREA FLOOR PLAN – LEVEL 2 – AREA 3													
A2.24	AREA FLOOR PLAN – LEVEL 2 – AREA 4													
A2.31	AREA FLOOR PLAN – LEVEL 3 – AREA 1													
A2.32	AREA FLOOR PLAN – LEVEL 3 – AREA 2													
A2.33	AREA FLOOR PLAN – LEVEL 3 – AREA 3													
A2.34	AREA FLOOR PLAN – LEVEL 3 – AREA 4													
A2.41	AREA FLOOR PLAN – LEVEL 4 – AREA 1													
A2.42	AREA FLOOR PLAN – LEVEL 4 – AREA 2													
A2.43	AREA FLOOR PLAN – LEVEL 4 – AREA 3													
A2.44	AREA FLOOR PLAN – LEVEL 4 – AREA 4													
A2.51	AREA FLOOR PLAN – LEVEL 5 – AREA 1													
A2.52	AREA FLOOR PLAN – LEVEL 5 – AREA 2													
A2.53	AREA FLOOR PLAN – LEVEL 5 – AREA 3													
A2.54	AREA FLOOR PLAN – LEVEL 5 – AREA 4													
A2.61	AREA FLOOR PLAN – ROOF – AREA 1													
A2.62	AREA FLOOR PLAN – ROOF – AREA 2													
A2.63	AREA FLOOR PLAN – ROOF – AREA 3													
A2.64	AREA FLOOR PLAN – ROOF – AREA 4													
BUILDING ELEVATIONS														
A3.01	EXTERIOR ELEVATIONS -OVERALL													
A3.02	EXTERIOR ELEVATIONS -OVERALL													
A3.03	EXTERIOR ELEVATIONS -OVERALL													
A3.10	EXTERIOR ELEVATIONS – ENLARGED													
A3.11	EXTERIOR ELEVATIONS – ENLARGED													
A3.12	EXTERIOR ELEVATIONS – ENLARGED													
A3.13	EXTERIOR ELEVATIONS – ENLARGED													
A3.14	EXTERIOR ELEVATIONS – ENLARGED													
A3.15	EXTERIOR ELEVATIONS – ENLARGED													
BUILDING SECTIONS														
A3.31	BUILDING SECTIONS – OVERALL													
A3.32	BUILDING SECTIONS – OVERALL													
A3.41	BUILDING SECTIONS – PARTIAL													
A3.42	BUILDING SECTIONS – PARTIAL													
WALL SECTIONS/PARTIAL ELEVATIONS														
A4.01	WALL SECTIONS / PARTIAL ELEVATIONS													
A4.02	WALL SECTIONS / PARTIAL ELEVATIONS													
A4.03	WALL SECTIONS / PARTIAL ELEVATIONS													
A4.04	WALL SECTIONS / PARTIAL ELEVATIONS													
A4.05	WALL SECTIONS / PARTIAL ELEVATIONS													
A4.06	WALL SECTIONS / PARTIAL ELEVATIONS													
A4.07	WALL SECTIONS / PARTIAL ELEVATIONS													
A4.08	WALL SECTIONS / PARTIAL ELEVATIONS													
A4.09	WALL SECTIONS / PARTIAL ELEVATIONS													

Sheet No.	Sheet Title														
A4.10	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.11	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.12	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.13	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.14	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.15	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.16	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.17	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.18	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.19	WALL SECTIONS / PARTIAL ELEVATIONS														
A4.20	WALL SECTIONS / PARTIAL ELEVATIONS														
ENLARGED FLOOR PLANS & ELEVATIONS															
A5.00	ENLARGED FLOOR PLANS – GUESTROOMS														
A5.01	ENLARGED FLOOR PLANS – GUESTROOMS														
A5.02	ENLARGED FLOOR PLANS – GUESTROOMS														
A5.03	ENLARGED FLOOR PLANS – GUESTROOMS														
A5.04	ENLARGED FLOOR PLANS – GUESTROOMS														
A5.10	ENLARGED FLOOR PLANS & ELEVATIONS – BOH TOILETS														
A5.11	ENLARGED FLOOR PLANS & ELEVATIONS – BOH TOILETS														
A5.12	ENLARGED FLOOR PLANS & ELEVATIONS – BOH TOILETS														
A5.20	ENLARGED FLOOR PLANS & ELEVATIONS – STAFF LOCKERS														
A5.21	ENLARGED FLOOR PLANS & ELEVATIONS – STAFF LOCKERS														
A5.22	<i>NOT USED</i>														
A5.23	ENLARGED FLOOR PLANS & ELEVATIONS – STAFF DINING														
A5.24	ENLARGED FLOOR PLANS & ELEVATIONS – STAFF DINING														
A5.30	ENLARGED PLANS & ELEVATIONS – PORTE COCHERE														
A5.31	ENLARGED PLANS & ELEVATIONS – PORTE COCHERE														
REFLECTED CEILING PLANS															
A6.01	REFLECTED CEILING PLAN – BASEMENT – AREA 1														
A6.02	REFLECTED CEILING PLAN – BASEMENT – AREA 2														
A6.03	REFLECTED CEILING PLAN – BASEMENT – AREA 3														
A6.04	REFLECTED CEILING PLAN – BASEMENT – AREA 4														
A6.05	REFLECTED CEILING PLAN – BASEMENT – AREA 5														
A6.11	REFLECTED CEILING PLAN – LEVEL 1 – AREA 1														
A6.12	REFLECTED CEILING PLAN – LEVEL 1 – AREA 2														
A6.13	REFLECTED CEILING PLAN – LEVEL 1 – AREA 3														
A6.14	REFLECTED CEILING PLAN – LEVEL 1 – AREA 4														
A6.15	REFLECTED CEILING PLAN – LEVEL 1 – AREA 5														
A6.21	REFLECTED CEILING PLAN – LEVEL 2 – AREA 1														
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A6.23	REFLECTED CEILING PLAN – LEVEL 2 – AREA 3														
A6.24	REFLECTED CEILING PLAN – LEVEL 2 – AREA 4														
A6.31	REFLECTED CEILING PLAN – LEVEL 3 – AREA 1														
A6.32	REFLECTED CEILING PLAN – LEVEL 3 – AREA 2														
A6.33	REFLECTED CEILING PLAN – LEVEL 3 – AREA 3														

Sheet No.	Sheet Title													
A6.34	REFLECTED CEILING PLAN – LEVEL 3 – AREA 4													
A6.41	REFLECTED CEILING PLAN – LEVEL 4 – AREA 1													
A6.42	REFLECTED CEILING PLAN – LEVEL 4 – AREA 2													
A6.43	REFLECTED CEILING PLAN – LEVEL 4 – AREA 3													
A6.44	REFLECTED CEILING PLAN – LEVEL 4 – AREA 4													
A6.51	REFLECTED CEILING PLAN – LEVEL 5 – AREA 1													
A6.52	REFLECTED CEILING PLAN – LEVEL 5 – AREA 2													
A6.53	REFLECTED CEILING PLAN – LEVEL 5 – AREA 3													
A6.54	REFLECTED CEILING PLAN – LEVEL 5 – AREA 4													
VERTICAL CIRCULATION														
A7.00	STAIR PLANS & SECTIONS													
A7.01	STAIR PLANS & SECTIONS													
A7.02	STAIR PLANS & SECTIONS													
A7.03	STAIR PLANS & SECTIONS													
A7.10	STAIR DETAILS													
A7.11	STAIR DETAILS													
A7.20	ELEVATOR PLANS & SECTIONS													
A7.21	ELEVATOR PLANS & SECTIONS													
A7.30	ELEVATOR DETAILS													
A7.40	ESCALATOR PLANS, SECTIONS & DETAILS													
SCHEDULES & RELATED DETAILS														
A8.00	ROOM FINISH SCHEDULE													
A8.01	ROOM FINISH SCHEDULE													
A8.10	FINISHES SCHEDULE – BOH INTERIORS													
A8.15	FINISHES SCHEDULE – EXTERIORS													
A8.20	PARTITION TYPES SCHEDULE													
A8.21	PARTITION TYPES SCHEDULE													
A8.22	PARTITION TYPES SCHEDULE													
A8.30	DOOR SCHEDULE													
A8.31	DOOR SCHEDULE													
A8.32	DOOR SCHEDULE													
A8.35	DOOR DETAILS													
A8.36	DOOR DETAILS													
A8.37	DOOR DETAILS													
A8.40	WINDOW & STOREFRONT SCHEDULE													
A8.41	WINDOW & STOREFRONT SCHEDULE													
A8.45	WINDOW DETAILS													
A8.46	WINDOW DETAILS													
A8.60	LOUVER SCHEDULE													
A8.61	LOUVER DETAILS													
A8.70	TOILET ACCESSORIES SCHEDULE													
DETAILS														
A9.00	BALCONY TYPES & DETAILS													
A9.01	BALCONY TYPES & DETAILS													
A9.02	BALCONY TYPES & DETAILS													

8 April 2021

A sincere thank you to Ron Van Pelt for his patience and very constructive review comments.