AIA-MBA Joint Committee
First-Time Building Owners

Overview

The purpose of this white paper is to provide a guideline to First-Time Building Owners further allowing an informed decision-making process that ultimately exceeds the goals of the project. Building a project can be overwhelming, especially for First-Time Building Owners. There are many steps involved including: identifying a location, programming and design, cost modeling, scheduling, securing funds, construction, and operation and maintenance. Every project is unique and there is no one size fits all solution. However, engaging qualified and collaborative partners early in the process will greatly improve the overall result.

1. Feasibility Study

As a potential first-time owner, you have likely identified a need for space. To determine feasibility of your project, a high-level assessment should be conducted. Factors to consider include possible locations, overall budget, financing requirements and timeline., Before securing financing or purchasing real estate, several initial steps will confirm the feasibility of the project. Specific considerations include Project Definition, Site Selection, Due Diligence, Zoning Analysis, and Permitting/Entitlement.

Partnering for Success

As a first step, an owner should seek the services of design and construction professionals. Early selection of an architect and contracting partner is critical to project success given that they are knowledgeable with each of the steps required during the design and planning phase of the project to allow owners to make timely, comprehensive, and informed decisions. Selection should focus on experience (i.e. do the design and construction firms have experience with projects similar to yours?), ability and talent to assist in defining the project. The decision should also consider working style and personality. A great local resource for assistance with architect selection is the Pittsburgh Chapter of the American Institute of architects (www.aiapgh.org). A great local resource for assistance with contracting, cost modeling and scheduling is the Master Builders Association of Southwestern Pennsylvania (https://www.mbawpa.org/member-directory). There are a number of collaborative contracting methods that could work and include construction management at risk and design build. You should discuss what is appropriate for your project with your design and construction partners.

Collaboration among owners and stakeholders – including neighbors, users, government entities, designers, and constructors – is critical to the success of every project. Success can be measured in many terms including initial cost, life-cycle cost, marketability, energy efficiency, on-time delivery, and ease of maintenance. architectural programming and

preconstruction planning should be a collaborative process, enabling research and decision-making to take place with input from the owner, its key stakeholders, the architect and contractor. The goal of the goal of this stage is to identify the ultimate design intent and appropriate project scope. Programming is a tool used to assist with your immediate and long-range planning that will evaluate spatial considerations and relocations, functional efficiency, user comfort, building economics, safety, environmental sustainability, and visual quality. Preconstruction planning services are provided by the contractor and include, among other deliverables, advice on cost modeling and scheduling. The AIA-MBA Joint Committee believes that early establishment of project goals and concerns via a collaborative process has a profound effect on the ultimate success of the project.

Site Selection

Proper site selection should consider not only the location, cost, and availability of the land, but many other factors. An Owner should consider the relationship to existing or potential transportation facilities (highway, rail, waterways, etc.) in the context of what is required for the success of the project. The overall use of the project will drive the demand for the types and level of transportation connectivity. More industrial or distribution uses will seek stronger intermodal connections between rail, highway, and waterways, while commercial uses may focus on access to public transit or connectivity with main commuter routes.

Another key factor to consider during site selection is the availability of supporting utility infrastructure. The site selection should consider the presence of a developed utility network, existing condition/age of the infrastructure, and suitability of the network in servicing proposed project needs. Varying types of projects will have different requirements to be successful.

Another more obvious factor during site selection is the physical topography, including levelness, tree coverage, and any areas of steep/unstable slopes. Many of these factors are readily apparent to a casual observer, but a more detailed understanding of the site topography is needed when selecting a site. Understanding the underlying geology, how much land area will be available after steep slopes are mitigated through earthmoving and the size and type of trees to be removed are cost of development factors, as well as the ability to create the suitable site conditions to support development along with influencing design considerations such as the building foundation system.

One of the more difficult factors to evaluate for site selection is the environmental concerns that may be present with a site. Often, inadequate records and incomplete documentation of prior use can lead to unknown environmental issues. These include hazardous waste contamination from a former use represented through areas of poorly compacted soils or buried debris. Beyond hazardous materials issues are a whole host of other factors included under the environmental umbrella. Items such as historic or archeological concerns within the site, impacts to wetlands and other riparian areas, as well as the habitat of protected or endangered species are all concerns that do not present themselves through casual site

observation. These are all items that require trained Professionals to facilitate the discovery and research into the presence of any environmental impacts.

The final, and most abstract item, to consider with informed site selection is whether the site, or building, lies within proximity to populated areas that may either place limits on the usage of the property or, conversely, may require specific uses for the project. This type of information is generally discovered beyond site selection through a comprehensive planning process that includes market research and demographic studies. These considerations will result in a better-informed location and conditions that favor the ultimate success of the project.

Due-Diligence

Due-diligence refers to the reasonable steps that can/should be taken to appraise a building project before it is built. The objective of due-diligence is to identify any potential risks prior to a commitment to purchase the property. It is typically recommended that due-diligence begins while the property transaction is still governed by an option agreement, allowing clarity on any unidentified issues or constraints. This understanding can also guide the development and design process with specific considerations revealed during the site investigation.

Initial steps involve a variety of tasks including evaluating applicable zoning code and local land development regulations, as well as the building permit process. In conjunction with this work, design professionals analyze existing utility connectivity through coordination with local utility providers. This results in securing "Will Serve" letters from the respective utility companies that verify applicable availability and capacity in the project vicinity. This step is critical if determined that offsite utility improvements are required to accommodate the development.

Beyond the evaluation of utilities, transportation infrastructure capacity is also an early consideration within the due-diligence process. design professionals will evaluate the current traffic capacities of adjacent roadways as well as anticipated trips that will be generated by the proposed project. Existing traffic information may be gathered from existing data available from the local transportation authority (DOT) or gathered through traffic counts. The existing data may be compared with the trip generation rates calculated to determine the impacts that the project may have on the surrounding roadway network. Like the evaluation of utilities, early evaluation of traffic impacts will help determine if significant offsite improvements may be required to traffic signals or turning lanes.

Once these preliminary steps yield an initial understanding of the constraints, your design professional should begin generating conceptual site plans to effectively conceive the project requirements and your contractor should provide preliminary cost and schedule information. In addition, these concepts should also develop preliminary topographical grading and utility designs to better understand the impacts to existing conditions. On agreement of a design

concept, due-diligence should progress towards investigating subsurface conditions through a program of geotechnical drilling and testing. This information will provide a clear understanding of all identifiable risks and probable costs to proceed with the proposed project.

If not readily available, additional specific site considerations investigated during the due-diligence phase may include ALTA/NSPS Land Title and Topographic Survey, Wetland, Stream, and Floodplain Assessment, and Geophysical Investigation including Ground-Penetrating Radar (GPR) exploration to more thoroughly characterize subsurface conditions identified by initial site investigation actions, such as existing foundations, subsurface structures, buried tanks, or remnants of existing utilities identified that may require remediation and/or construction recommendations. Additional site evaluation may also include Habitat Assessment, Rare Plant Assessment, and Historic Preservation/ Archaeological Assessment.

Regarding the acquisition and renovation of existing buildings, the owner should engage design and construction professionals to evaluate existing building components and systems, including: Exterior envelope (walls and roof) and interiors; structural systems and components with emphasis on areas of failure or strain (cracked slabs, heaved or bowed walls, deflected steel); Mechanical (HVAC) systems with life-span expectancy and efficiency for future occupancy; Plumbing, fire protection, and life safety systems; and electrical, data, and communications systems including power distribution, lighting, and fire alarm. In conjunction with existing conditions assessments, an evaluation of environmental issues and potentially hazardous materials related to the redevelopment, or demolition, of existing buildings should be considered. This evaluation should be performed by a qualified environmental specialist experienced with asbestos and lead-based materials identification and remediation planning. Due-diligence should also include a review of any available documentation, drawings, reports, and other information generated about the building and its systems, including discussions with appropriate tenant or other personnel during the site visit to better understand any building history, construction and/or repair activities. Concurrently, a summary building code evaluation should be conducted to determine potential renovation considerations required for compliance. Based on analysis of the information obtained through on-site information gathering, the site team should assemble the field data acquired and evaluate the adequacy of the existing systems and components to function as envisioned in support of the proposed recommendations for future development. Not only will renovation first-costs be considered, but additional efforts, such as sustainability, construction schedule and phasing, may be evaluated and weighed against the preliminary budget.

Zoning Analysis

Zoning is the governmental process of planning for land use by a locality to allocate certain kinds of structures in certain areas. Zoning codes and permits regulate land use and protect property values. The zoning of the proposed project property identifies a set of constraints requiring verification with the proposed project. A zoning evaluation will determine if the

project use may be permitted as a "by right" (allowed under the zoning code), conditional use (not allowed without specific zoning approval), or if it will require a zoning appeal approval, assessed as neither a "by right" or conditional use. In extreme circumstances, projects may require a zoning change for the property/parcel that requires approval by the local planning commission as well as the local government legislative body.

Once a zoning use is identified, the applicable code provides guidance as to the amount of parking required, setbacks from the property lines, screening required, amount of lot coverage permitted, minimum impervious space to remain, landscaping requirements, and many other local requirements that inform the programming and site planning of the exterior space.

Permitting / Entitlement

There are numerous aspects of a project that require permitting through the Local Authority Having Jurisdiction (AHJ) when progressing a design from a concept to construction documents. One of the most uniform permitting activities for New Construction is the permitting of the proposed stormwater site improvements which is regulated by the National Pollutant Discharge Elimination System (NPDES) permit process. This process is generally developed through the applicable County Conservation District (CCD) and requires the demonstration of an effective Erosion and Sedimentation (E&S) Control Plan combined with a plan to control post-construction stormwater runoff quantity.

Land development permitting is the vehicle by which local governments review project designs for conformity with the codified ordinances that govern development within their communities. This is separate from zoning review and focuses on design aspects of the project regarding impervious area, grading, and stormwater conveyance, as well as adherence to community standards for items like accessible accommodations, ramps, curbs, sidewalks and pavement types.

Utility permitting varies based on the ownership of the utilities that are being connected. For instance, water and sewer utilities are almost always owned and operated by the local community or a government authority. These agencies require the comprehensive evaluation of the proposed design for compliance with standards and requirements. The design documents will require a formal review and approval process. In the event of a private utility, the process is much less formal. The design is typically submitted to the utility for review; but the comments are limited to the modification of their facilities and the connections to the project network.

Other permits that may be required are the approvals of the local government for stormwater conveyance and implementation of Best Management Practices (BMP), approval of the state Department of Environmental Protection (DEP) for installation of new water and sewer mains, the addition of capacity to the existing network, or the installation of sewage pumping stations.

2. Planning and Design

The design process is a series of decisions that are only as good as the information produced during this stage of the project development. In order to make the best decisions, the owner should have a contractor provide cost analysis alongside the architect's technical analysis. The owner should anticipate an iterative process that will evolve as criteria are defined.

Identify the Project Scope

The building code regulations and limitations will depend on the identified use and occupancy of the building. Once the occupancy type of the building is established, the occupant load (estimated number of individuals occupying within the building at any given time) can be calculated. Many code requirements are based on the number of occupants per story. The project scope should identify any special requirements for each usage (structural loads, specialized MEP equipment, Hazardous material storage, etc.) and determine the level of finish and quality of materials desired. Do accommodations need to be made for future expansion or changes in use? Will the building be occupied in phases? Will any parts of the building be shell space at first and fit-out in the future?

Identify the Project Budget

To align expectations of all project stakeholders and guide future cost/benefit decisions, a project budget should be established at the start of the project. Your contractor can help with properly budgeting the construction portion of the budget (hard costs) and your design professional can help with design, permitting, furnishings and fixture and art (soft costs) to create a comprehensive project budget. The project scope, complexity, quality and schedule are the primary factors that impact the budget calculation. An owner's contingency should be included within the budget as a provision to account for potential design and construction costs that are unknown. The amount of budget contingency carried should align with the risks and uncertainties of the project. Contingency can be reduced during the course of the project as the known aspects of the project increase and the unknowns decrease.

Establish a Preliminary Schedule

Does the project need to be completed by a specific date? Permitting and approvals by Authorities Having Jurisdiction should be factored into any realistic schedule. Winter construction may also affect the work in terms of both costs and times as efficiencies are reduced and weather-dependent work such as paving likely cannot be completed during that season. There are many variables that can affect the project schedule. Similar to the budget, it is recommended that the schedule includes a schedule contingency. There will be factors within an owner's control and factors that are outside the project team's control. Plan for the best and prepare for the worst. Weather, supply chain disruption, unanticipated code authority's interpretations are elements that often affect projects. Look to benchmarked projects of similar scale and type to get a sense of timeline. The schedule should be a live document, constantly updated and discussed as a team throughout the project.

Do you need an Owner's Representative?

If you have not already done so in the planning phase, another major question to ask yourself at the onset of the execution phase is: do I need help from an experienced advocate to manage this project? We believe the answer lies in the amount of time you can dedicate to the project, the complexity of the work and the scale of the project. Your propensity for risk as it relates to the project delivery method should also be a consideration.

If you decide you need an advocate, who should it be? many projects, including conventional design-bid-build work, this level of oversight and guidance is appropriate. However, there are also situations where a third-party advocate can add value. These advocates are typically referred to as owner's representatives.

The AIA-MBA Joint Committee is a proponent of collaboration throughout all stages of a construction project. Accordingly, we tend to advance delivery methods and contract formats that encourage early involvement and enhanced communication between all project stakeholders. We find that the success of a project is advanced through the alignment of goals between the owner, design team, and contractor. Please feel free to review the information found within the url listed below for additional information on project delivery.

https://www.cmaanet.org/sites/default/files/inline-files/owners-guide-to-project-delivery-methods.pdf

Design

Design takes place in a series of contractually defined phases in which the project is developed and documented in an increasing level of detail. The phases are typically: Pre-Design (or Concept Design), Schematic Design, Design Development and Construction Documents. Please find a summary below of the different design phases on a project.

- ***Pre-Design:*** Define the overall vision for the project along with the objectives and performance goals; establish a program of internal spaces and functions.

- ***Schematic Design:*** Establish the basic plans, appearance, form and character of the project; prepare block and stack diagrams to demonstrate relationships, adjacencies and massing of components; prepare a building code analysis to ensure the project is compliant with all applicable municipal and regulatory authorities; design team shall publish a set of Schematic Design documents that can be utilized to prepare a construction cost estimate and construction schedule.

- ***Design Development:*** Based on the approved Schematic Design and any adjustments in the scope or quality of the project or in the construction budget authorized by the Owner, the team proceeds to the Design Development phase; the design team shall publish a set of Design Development documents that describe the size and character of the project that

includes architectural, interior design, structural, mechanical, plumbing, fire protection, and electrical systems. Colors, materials, and finishes begin to be selected. The construction cost estimate and construction schedule are updated accordingly.

- ***Construction Documents:*** Based on the approved Design Development documents and any further adjustments in the scope or quality of the project or in the construction budget authorized by the owner, Construction Documents are prepared in sufficient detail to communicate the scope and intent of the project for construction by qualified contractor. Once the appropriate plan review approvals and permits are granted, the Construction phase may begin.

3. Execution

At this point in the process, initial planning for the project is complete and key components of the project have been identified. Project goals and the delivery method are set, design criteria are established and an initial budget is in place. It is now time to put the plan in motion. In this section, we will discuss the process of initiating and managing the construction process.

The Building Process

- ***Site Development:*** Site development starts with establishing the limits of disturbance for the project site. Once physical boundaries of the site are established, erosion and sediment controls are put in place prior to commencement of any work. Once initial layout and controls are established, clearing of the site and other earthwork operations can commence. While moving forward with critical path work is always a priority, the interdependencies of early sitework activities to include utilities, bulk grading, storm water retention, and other site improvements must be considered in establishing the sequence of the work. It is important to monitor communication and understand the timeframes necessary to obtain approvals required for making utility connections such as power, water, sewer, gas and communications.

- ***Foundations:*** Foundation requirements vary based on geologic conditions and loading requirements of the structure. Whether your project requires shallow foundations or deep foundations, the process starts with layout. It is important that the contractor properly coordinate utility locations to the building and other underground mechanical, electrical and plumbing requirements. Third party testing during this phase is critical and is typically provided by the owner or its representative.

- ***Framing:*** Framing commences after foundation work is complete and consists of the building superstructure. The industry is seeing a shift towards modular or panelized constructing, whereby sections of framing are fabricated off-site in an effort to increase productivity, timeframe of construction and quality.

- ***Building Envelope and Roofing:*** Building envelope systems consists of the exterior "skin" of the building and its roof. Material options vary widely and are determined by the owner's budget, building use and material availability in conjunction with the schedule. There is direct correlation between building envelope performance and cost. Owner's should be sure to fully evaluate performance of the building envelope with the design team as it relates to energy usage, sustainability and building lifecycle.

- ***Mechanical, Electrical, Plumbing and Fire Suppression ("M/E/P/FS"):*** Aside from underground and in-slab preparations, M/E/P/FS work usually commences after framing is underway and continues through the finish stages of the project. The process starts with in-wall and ceiling rough-in and finishes with the installation of devices, fixtures and the start-up and commissioning of equipment.

- ***Finishes:*** Finishes consist of sheetrock, flooring, ceilings, trim, doors, paint, fixed carpentry items, accessories and other items seen in a building completed state. Much of this work requires inspections of framing and M/E/P/FS work and stable environmental conditions (i.e. conditioned air) prior to being installed.

Administration of a Construction Project

The following information discusses some of the basic contractor expectations and owner requirements during the construction phase.

- ***Meetings:*** There are multiple types of meetings that take place on most, non-residential construction projects. It is important to understand where you, as an owner, can bring value and where its best to let the professionals work without interference. Most projects conduct regular progress meetings which are attended by the owner (or his/her designee), the architect and contractor. As advocates of collaboration, we recommend that owner's (or their designee) actively participate in these meetings. As the saying goes, knowledge is power. In the case of a construction project, identifying a potential issue early can prevent it from developing into a major problem. Progress meetings also provide insight into interaction between project stakeholders. Interceding to correct any shortcomings surrounding the flow of information can prevent bottlenecks that often lead to delays and added costs.

- ***Metrics / Reporting:*** Similar to attending regular meetings, it is important to monitor data to understand the status of your project. For most projects, we suggest that the owner require the contractor to issue monthly reports that address the following items:

    - **Safety –** identify incidents, deficiencies, training requirements, etc.
    - **Project Schedule Updates –** monthly progress updates are required on most construction projects.
    - **Issues –** unforeseen conditions, scope issues and other potential problems that may affect schedule or cost.

- **Change Orders / Potential Change Orders –** changes, additions or deletions to the work that have, will or may affect cost.
- **Requests for Information (RFI) –** information requested from the design team by the contractor.
- **Submittals –** documentation that ensures the correct products, materials and installation methods are being used by the contractor and its subcontractors and suppliers.

Most of the information above is self-explanatory and is information any owner would want to be kept apprised of. In the case of RFI and submittals, it is important for contractors and the design team to submit information and associated responses in a timely manner. An owner may need to intervene in the event reporting shows a delay in the conveyance of information.

In addition to the architect and contractor having responsibilities during the design, planning, and construction phases of the project, so does the owner. Just as an owner should exercise due diligence when selecting the project team, contractors and consultants often look for certain information from the owner to control risk. Typical requests include: proof of adequate funds for the project (e.g. lender commitment letters), statement of the record legal title to the property, surveys, locations of utilities, and proof of insurance.

Managing payment effectively is key to keeping the project on pace. An owner must also make sure that contractor's invoices, often called applications for payment, are consistent with progress of the work. In many cases, the contract will require that the contractor provide a schedule of values for review and approval by the owner. The schedule of values breaks down the contract sum into specific components of work that can be evaluated during construction. It is important to have a competent person review and approve all contractor applications for payment prior to processing progress payments. Many contracts also require retainage withholding on applications for payment. Retainage is a portion of the agreed upon contract price deliberately withheld until the work is substantially complete. It is intended to assure that the contractor will satisfy its obligations and complete a construction project. It is important to work with the contractor early on to establish the correct procedures for retainage.

4. Project Close-out

The close-out process should begin long before the work comes to an end. A project close-out check list should be developed months in advance of completion and should become an agenda item discussed at progress meetings with the contractor, architect and owner's representative (if applicable). The following is an overview of terms that come up as construction comes to an end.

Financial

- ***Substantial Completion:*** A defined term in most construction contracts, substantial completion is reached when the work is sufficiently complete to the point that the owner can occupy or utilize the facility for its intended use. The architect typically certifies that contractor has reached substantial completion. Project incentives, disincentives and other financial repercussions are often based on the contractor's ability to meet substantial completion as defined by the project schedule. It is typical to have warranty periods take effect once this milestone is reached. In addition, the contract may require that retainage or a portion thereof be released at this milestone. Upon reaching substantial completion, the contractor typically prepares a list of uncompleted work and corrections to work in place that must be made prior to final payment. This list is typically verified by the architect and referred to as a punch list.

- ***Final Completion:*** As it implies, final completion is achieved when the contractor has completed all work in accordance with the contract documents. Typically, final completion requires all governmental approvals necessary to fully occupy the facility. There are many documents – defined by the contract – that the contractor must submit at final completion. Some of these documents will be discussed below. Once all conditions are met, the architect will typically certify that final completion has been achieved, at which point all undue sums are to be paid to the contractor.

- ***Lender Requirements:*** The terms of your construction loan, if any, will require many documents to obtained before final disbursements are made. Documents required from the contractor may include: (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents will remain in force, (3) consent of surety, if any, to final payment and (4) evidence of compliance with all requirements of the Contract Documents.

Turnover

- ***Certificate of Occupancy:*** This document is issued by the authority having jurisdiction over the project and allows for occupancy of the facility. This process is often phased, resulting in temporary or partial occupancy permits. Occupancy permits require many requisite inspections. These inspections include major building components (e.g. mechanical, electrical, plumbing, fire protection, fire alarm, elevator) as well as ADA accessibility compliance and final building review.

- ***Punchlist / Accepting the Work:*** As noted above, punch list work is most often identified formally after substantial completion. That said, the contractor may establish its own punch list in advance of substantial completion to minimize the time and effort from substantial to final completion. Construction contracts may limit the time the contractor has to achieve final acceptance of the work, at which point the owner has alternative options to complete any open items.

- ***Attic Stock:*** Usually defined in the contract documents, attic stock refers to requirements for extra materials – most often finishes and fixtures – that an owner retains for future maintenance purposes. Turnover of these items should be included on the close-out check list.

- ***Operation and Maintenance Manuals:*** These documents provide critical information on the operation, maintenance and cleaning requirements for finishes and components of equipment or systems. It is important to follow the requirements outlined in these documents in order comply with warranty provisions.

- ***As-Built and other Closeout Documents:*** Contractors are typically required to provide a full set of plans containing notations identifying all deviations from the original construction documents. These plans are critical for future identification of issues and maintenance and/or repair work. In addition, contractors typically provide other close-out submittals to include warranty letters, and operations and maintenance manuals.

- ***Equipment Start-up:*** This process is typically overseen by manufacturers' representatives or consultants to ensure proper installation and functioning of equipment.

- ***Warranty:*** Most contracts include a warranty period whereby the contractor is required to address deficiencies at its own cost (or that of its subcontractors and/or suppliers). In addition, there are typically product specific warranties that address certain components of the work, such as the roof, windows and equipment. These warranty periods are typically longer than the contractor's comprehensive warranty but may have limitations on what is to be covered under a warranty claim.

5. Operation and Maintenance

As you enter into your first construction project as an owner, your primary focus is going to be on doing what it takes to get the building designed and constructed. However, even before construction begins, you need to be thinking about how you will operate the building upon completion of the construction process. The reason is that the cost to operate and maintain the building over the entire life-cycle of the building will be much greater than the initial cost of construction. As such, it is very beneficial to start with the end of the project in mind.

From a financial standpoint, you will want to focus some efforts on how you will maintain the Mechanical / Electrical / Plumbing / Fire Protection (M/E/P/FP) within the building. The costs associated with heating and cooling a building can be rather large. Depending upon your geographic location the costs for water consumption can also add up. Hopefully, you will take these factors into consideration during the design of the building and choose more efficient equipment and fixtures to mitigate some of these costs. A few extra dollars spent during the

design and construction phases for more efficient products can reap substantial long-term savings.

Potentially even more expensive than the cost of the utility bills are the indirect costs that may be incurred by the building occupants when the M/E/P/FP is not functioning properly. If the Heating, Ventilation, and Air Conditioning (HVAC) are not performing well, it can lead to occupant discomfort. Occupant discomfort can lead to reduced productivity and / or reduced ability to rent a space. If utility down-times are experienced, it can halt the on-going operations within the building. If the building occupants are not able to go about their normal business during the down-times, then the indirect costs of that repair can rise exponentially.

The easiest way to mitigate the risks associated with poorly functioning M/E/P/FP is to have good documentation, regarding the systems that are put in place. This can be done in a number of different ways, ranging from basic to advanced:

- The basic way to obtain good documentation is to retain paper copies of all of the pertinent information (specifications, submittals, shop drawings, operation & maintenance manuals, etc.) for each system. However, the paper copies tend to get lost, damaged, or disorganized over time.

- A slightly better way to obtain good documentation is to retain electronic copies of all of the pertinent information for each system. Electronic copies allow for multiple backups, ensure that the information does not get damaged, can be accessible from anywhere (depending upon how it is stored), and is more easily searchable.

- A more advanced way to obtain good documentation is to implement a Computerized Maintenance Management System (CMMS) or Facilities Management (FM) software, which is capable of maintaining all of the electronic copies of the pertinent information, as well as tracking the history of the service related to each item tracked. These systems provide efficient access to the documentation, including 2D visuals. Some also offer 3D visuals allowing for integration with 3D models. Some systems also allow for integration with a Building Automation System, allow for access to both the documentation and the controls of the HVAC systems to make troubleshooting of issues that much easier. Taking things up another level, some systems offer the ability to utilize mobile devices, allowing the facility manager to troubleshoot issues at the source of the issue, providing the ultimate in efficient maintenance.

The goal of each of the above approaches is to allow for less time to resolve issues when they occur. However, they are only effective if the information obtained is accurate. To improve the chances of the information being accurate, as well as to improve the efficiency with which it is gathered, you will want to gather and/or populate the pertinent information throughout the design and construction process. Doing so will take less effort, as it will simply be an extra step in the typical processes. However, if you wait until the end of the project, or until after

the project is complete, it will take a substantially larger amount of effort. You will essentially be starting over with respect to locating, reviewing, and extracting the pertinent information needed for operations and maintenance.

The following are some other things to consider as you move from construction into operations of the building:

- If you want to have an environmentally-friendly building, or if you are planning to obtain LEED Certification for your building, you will need to take further steps regarding your operations and maintenance procedures. This may include the establishment of recycling and waste management procedures. This may also include the establishment of custodial and cleaning procedures to ensure that safe and sustainable products will be utilized to keep the building in tip top shape.

- If you are going to install landscaping at the exterior of your building, you will want to utilize plantings that are native to the geographic region, as doing so will minimize the amount of care and maintenance needed to allow the plantings to thrive. As a best-case scenario, you may even mitigate the need for an irrigation system.

- To keep your building running as smoothly as possible, and to minimize the potential for down-time, it is recommended that you consider implementing a preventative maintenance program. By taking this proactive approach, you can schedule when the maintenance will occur, minimizing the effect on building occupants.

6. Closing

As mentioned above, every project is different and will warrant varying needs. The underlying message is the importance to make timely, comprehensive, and informed decisions throughout the process. When to engage resources such as design and construction professionals is dependent upon the owner's schedule goals for the project along with having a level of comfort to advance the process. Most reputable design and construction professionals are always willing to help and will provide friendly advice to help potential clients make best value decisions. We encourage you to utilize the above referenced resources to assist with your journey of becoming a First-Time Building Owner. We wish you the Best of Luck!