



MANAGING CONSTRUCTION PROJECTS for Water & Wastewater Managers

Florida Rural Water Association Whitepaper

Do you have a new capital construction project in mind? Does your system need a new elevated storage tank, wellfield, or wastewater plant expansion? How do you start? And what are the steps along the way? Here are a few suggestions to help you plan your project.

This checklist is written for the owner or the owner's project manager. The owner is the entity (community, utility, etc.) that has conceived of; is overseeing the water / wastewater project design, permitting and construction; and will own it after construction is complete. There are unique responsibilities within the project that the Project Manager / Owner must handle.



The Five Major Project Stages. Water and wastewater construction projects involve a significant monetary investment, time, and effort. The resources available to the construction manager include funding agencies, engineering firms, contractors, fiscal agents, grant consultants, attorneys, and others. The construction manager uses these resources to build public works through a multi-step process while minimizing risks, delays, and cost overruns.

1. **Planning**
2. **Design**
3. **Bidding & Award**
4. **Construction**
5. **Post-Construction**

Step 1 ~ Planning. This stage often takes 12-months to complete, mostly as a result of funding.

- a. **Project Conception** – Every project starts with an idea or vision. Maybe the FDEP has you under Consent Order or perhaps you have failing infrastructure that needs urgent attention.
 - Compose a concise and clear project summary. The summary or scope should include: 1) a description of the problem the project will address; 2) description of your existing utility system; 3) the service area and demographics; 4) a list of project expectations; 5) regulatory issues; and 6) measures of success.
- b. **Conceptual Costs Estimate** – How much will this project cost? Have you included all elements? These estimates can be provided by engineers or contractors. The estimates should include all possible project costs, such as planning, land acquisition, engineering design, permitting, construction, grant administration, startup, etc. FRWA Engineers are available to help with cost estimates, just call us!

- c. **Alternative Evaluation and Selection** – It is important to consider all your options and factors. Pick the best alternative for your system and for the long-term. The selected alternate should address the problem not treat the symptom.
- d. **Capital Improvements Program (CIP)** – A grouping of projects in the conceptual stage can be organized into a capital improvements program. The CIP is a list of projects (needs and estimates) that are prioritized by working on the most critical project first based on available funding. This list is updated at least annually. The CIP is strong decision-making tool for prioritizing projects that you most need first.
- e. **Funding** – The next step will be finding funding sources that your project may be eligible to receive. Expect to find a combination loans and grants. Possible sources include USDA Rural Development, FDEP State Revolving Fund, Florida Small Cities Community Development Block Grant Program, US Department of Commerce, Economic Development Administration (EDA), Department of Economic Opportunity Rural Infrastructure Fund, Water Management District, banks, etc. When evaluating potential project funding sources, consider the following:
- Does your project meet the criteria for any of these funding source?
 - Is your system eligible? To be eligible for most funding sources your system needs to be a public body (municipality, county, authority, or special district) or a nonprofit corporations. We encourage systems to consider converting into a non-profit IRC 501(c)(4) entity.
 - Will funds be available to meet your project’s time constraints? Will waiting for grant funds be offset by increases in project costs due to inflation?
 - Is the project affordable to the utility’s users? At times, a low-interest loan results in lower monthly user charges than a mix of grant and loans at higher interest rates. Distrust any consultant that claims they can get you 100% grants. Only the funding agencies can determine grant/loan ratios and the day of free money is going the way of the Dodo Bird.
 - What is the impact of each funding source on the user charge (rates)? This user charge is designed to guarantee the lender that you will have sufficient revenues to repay the loan.
 - Does a particular funding source require additional engineering or other special studies that outweigh the benefits of the funding source?
 - Are there planning loans or grants available to help you pay for preliminary engineering?
- f. **Hire an Engineering Firm** – After you have done your homework on funding agencies it is now time to hire an engineering firm, if you don’t already have one.
- Choose the right engineering firm for your project. This is VERY important and one of the first steps in any construction project. Once selected, the engineer is involved in nearly every aspect of the project, including identifying alternative solutions, evaluating financing options, completing designs, obtaining permits, bidding the project, and the construction.
 - The Consultants Competitive Negotiation Act (CCNA) Title 19, Section 287.055, Florida Statutes controls how utilities must select and retain professional services and applies to municipalities, cities, counties, and special districts. Utilities regulated by the Public Service

Commission also must follow set procedures. While these statutes do not apply to private systems, they do offer a rational and systematic process.

1. Advertise for Engineering Proposals / Statements of Qualifications (use the FRWA free RFP Template for utilities).
 2. Review Firm Qualifications.
 3. Shortlist the Three Best Firms.
 4. Conduct Telephone Interviews.
 5. Check References to Determine the Quality of Past Performance.
 6. Rank the Firms.
 7. Negotiate the Scope of Work and Compensation.
- Check out the FRWA whitepaper to guide you through the process of hiring an engineering firm, see <http://www.frwa.net/manuals/frwa-choosingrightengineer-010207.pdf>. Our engineers and staff can assist you with the selection process including scoring proposals and interviews.
- g. **Preliminary Engineering Design** – In order to obtain funding you will need a preliminary engineering report (PER). Preliminary engineering is an extension and refinement of conceptual costs estimates. The PER focuses the project scope and budget.
- Be sure to carefully read and review the PER and direct your consultant toward the solution that works best for your community.
 - Consider using FRWA to prepare the preliminary engineering report. It is one of FRWA’s most valuable services to members. Engineering firms are not as interested in keeping project cost modest as they are paid on a percentage of construction costs – they have little incentive to find the most reasonably cost solutions for you.
 - Permits and Approvals. Have the engineer list all permits and approvals that MIGHT be needed for construction! Don’t forget FDEP construction permits; water management permits for wells and dewatering; water body crossings with drainage districts and FDEP; roadway permits with FDOT, county and city agencies; railroad crossing permits; US Corp of Engineers for navigable waters; and more.
 - Alternatives are more complete considered, refined, and evaluated. Do not be afraid to tell your engineer that the most expensive option is not the best fit for your community.
 - Preliminary Costs Estimate should include all project costs, such as planning, land acquisition, engineering design, permitting, construction, grant administration, startup, etc.
 - Is the cost estimate valid for 6-months? 12-months? 5-years?
 - Preliminary Drawings and Design Criteria for the project are often provided in the PER.
 - Environmental Reports are required projects using federal funds. These are prepared at the same time as the preliminary engineering report and includes notices and comments through the state clearinghouse. This avoids known problems that might stop work due to sensitive species, native artifacts, cultural preservation, protected environments, and so forth.
 - Fiscal impacts are often left out of preliminary engineering reports.
 - What is the financial feasibility of the project?

- What level of funding is needed? Do NOT count on 100% grants.
 - What rate increases will be necessary?
 - What is the cost for delaying the project – inflation and regulatory?
 - Has the engineer overestimated the number of customers or design flows?
 - What is the estimated annual increase in operating costs for the project?
- h. **Property Acquisition or Easements** – Start as soon as you know where and if property and easements need to be obtained. These can take many months to negotiate and purchase – failing to act early has caused many projects to be delayed.
- Attorneys and other agents are often engaged for property and easement acquisition.

Step 2 ~ Design. This stage often takes 6 to 9-months to complete.

Your role as Project Manager / Owner during design is to engage the consultant to generate drawings, specifications and bid documents to build the project as conceptualized. You review the consultant's progress at various stages of design, review plans & specs. Put directions in writing and copy other team members. Meet and coordinate to resolve any questions that arise. You make sure that the project stays within scope and budget – this can include reining in the engineer from overdesign. Ascertain that design meets your expectations. You must provide necessary design approvals – it is very important that you review the design closely.

- a. Negotiate the Engineering Scope of Work and Compensation.
- Do not agree to exorbitant design expenses. Avoid administrative costs and high overhead multipliers. You want more indians and less chiefs working on your project.
 - Do not allow the project engineer to design a system that is beyond what is needed or can be afforded, you cannot operate and maintain, or is overdesigned for your community.
 - The engineering contract, scope and budget is frequently written by the consultant and so favors the consultant. Carefully read every word. Ask questions. Details are important. The scope of work, invoicing, fees, etc. should spell everything out.
 - Look for items that may not be included in the scope that if added later as a change order will come at great expense to you.
 - Unnecessary services are wasteful. Instead of using the engineer's contract language consider drafting your own.
- b. Engineering contains the following elements: calculations; equipment selection; engineering drawings; technical specifications; details; bidding requirements; contract forms; contract conditions (general & supplemental); addenda; etc. Watch for the following issues:
- Keep track and document all design expenses. Do not pay more than is actually complete. If the engineer says they are 50% complete have them provide plans, specs, and documents to prove that they are halfway complete; instead of just spending half the budget.
 - Provide continuous input during design.
- c. Technical Specifications include general requirements; measurement and payment; sitework; piping; concrete; masonry; metals; wood and plastics; thermal and moisture protection; doors and windows;

finishes; pumping & treatment equipment; furnishings; special construction; conveying systems; mechanical equipment; electrical; instrumentation and control; telemetry systems; computer systems; O&M manuals; etc.

- d. Contract Documents contain the construction contract; scope of work; responsibilities of parties; who establishes surveyed grades and horizontal controls; who provides tests of materials, site security and others; effective date of contract; definition of terms; completion dates; liabilities and indemnification of parties; payment procedure and retainage; incentives; insurance & bond requirements; change-order procedure; settlement of disputes; contract termination procedures; warranties; etc.
- e. Bid Documents include bidding requirements; invitation to bid; bidding instructions; project information; bid form & bond; etc.
 - The bid schedule should also include a separate pay category¹ for the following items, needed but difficult to get out of the contractor at the end of construction: accurate as-built drawings; O&M Manuals; warranties that start at acceptable of construction (not lapse during construction); training on new processes or equipment; plant start-up and turnover; etc.
- f. Permitting Permits and Approvals may include FDEP construction permits; water management permits for wells and dewatering; water body crossings with drainage districts and FDEP; roadway permits with FDOT, county and city agencies; railroad crossing permits; US Corp of Engineers for navigable waters; and more.
- g. Engineer's Estimate of Construction Cost is obtained at the end of design and compared with the bids as the acid test to assure that the project is staying within the scope and budget.

Step 3 ~ Bidding & Award. This stage often takes 60 to 90 days.

During bidding your responsibilities as Project Manager / Owner involve:

- a. Obtaining approval to bid the project from the governing board and procurement.
- b. Issuing public bid notices in local newspapers (required for all public entities). You may send bid requests to prequalified contractors. You can notify construction bulletins such as Dodge Reports Bulletins. We recommend that the time from notice to bid opening be 4 to 6 weeks at a minimum – you can shorten the time for less complex projects.
- c. Conducting / attending pre-bid conference onsite (more complex projects).
- d. Receive questions in writing from contractors and have the engineer issue clarifications or addenda.
- e. Conducting / attending bid opening at your office, often with consultant present. Bids are opened and read. No comments are made at that time.

¹ Pay quantities on construction projects are usually divided into separate pay groups or items. Because the contractor pays close attention to pay items in the bid and during construction billing, you can take advantage of the contractor's attention on items or issues that are important to you the Owner / Project Manager!

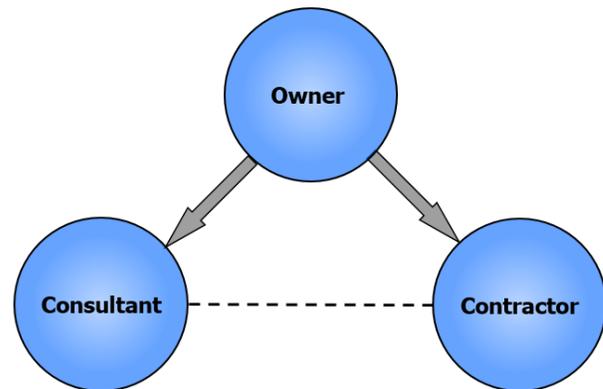
- f. Evaluate Bids with consultant assistance – the lowest responsive bid is often selected to construct the project. Purchasing must concur with your findings.
- g. Approval by governing body is required for the Notice of Award to be issued.

Step 4 ~ Construction. Construction can take a few weeks or a year to complete.

Do not forget that the engineering consultant and contractor work for you, the Owner! The consultant prepares the plans & specifications and acts as your representative. The contractor constructs the project infrastructure to the design parameters established in contract.

To control the project, work with both the engineer and contractor. Do not direct the contractor's work or provide instructions without the engineer's input on cost and impacts.

- Be careful as additional work will require additional payment – even minor changes can be expensive.
- Contractors will typically do whatever the owner requests, even when it is wrong.



Contractual Relationships between the Owner, Engineer, and Contractor

Construction responsibilities as Project Manager / Owner involve:

- a. Executing the Contract. The contractor signs 3 originals and provide construction bond, insurance, etc. The Owner also signs agreement and one original is given each to the Owner, Contractor and Engineer.
- b. Issuing the Notice to Proceed which defines start date and completion period.
- c. Holds the Pre-Construction Meeting which establishes the tone, procedures, communications, and expectations during construction.
- d. During construction the Project Manager / Owner documents progress and inspections; attends established progress meetings; approves appropriate changes; works with design consultant if changes involve design; issues payments to contractor; holds retainage to assure the project is staying within the scope and budget; collects warrantees; etc.
- e. At project completion the Project Manager / Owner reviews & approves punch-list; reviews & approves O&M Manual; accepts the work; releases the retainage; and issues a project completion statement – this date should establish beginning of warranty period. Contract documents must define terms of acceptance.

Step 5 ~ Post-Construction

At this stage the Owner accepts the constructed project and begins to assume responsibility for operation and maintenance as components become ready during latter stages of project.

- a. Final Certification performed by the engineer based on the as-builts provided by the contractor. It is very important to place a “separate pay item”¹ in the bid schedule to assure that you will obtain accurate as-built drawings at the end of construction, see item 2.d. above.
- b. O&M Manuals provided by the contractor, see item 2.d. above.
- c. Warrantees that start at acceptance of construction (not lapse during construction) provided by the contractor and manufacturer, see item 2.d. above.
- d. Training on new processes or equipment where staff receives training for new treatment component operation (provided by the manufacturer or contractor), see item 2.d. above.
- e. Plant start-up and turnover, see item 2.d. above.
- f. Operation – at this point the owner becomes responsible for O&M.

In summary, **Construction Management** (or construction project management) is the overall planning, coordination and control of a project from beginning to completion. Principle objective of a construction manager is to complete each project on time and within budget, while maintaining acceptable levels of safety and risk. You will be directing the project and ultimately have oversight of the physical, technical, managerial and financial aspects of the new infrastructure you put in place

- Do not forget to call FRWA anytime you have a question during any phase of design or construction. FRWA is available for advice as a free membership benefit!
- Consider using FRWA to prepare the preliminary engineering report to get you started on the right foot. It is one of FRWA’s most valuable services to members.
- FRWA also has a one-day Construction Management 101 seminar available for Owners / Project Managers that are interested in learning more.