Getting Your Project to Flow Smoothly

A Guide to Developing Water and Wastewater Infrastructure

RCAP

RURAL COMMUNITY ASSISTANCE PARTNERSHIP

an equal opportunity provider and employer

This guide was written by Great Lakes RCAP on behalf of
Rural Community Assistance Partnership, Inc.

The entire contents of this guide are available on the RCAP website at www.rcap.org

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Introduction

There is an infrastructure crisis currently facing both small and large water and waste waster systems in our country. This crisis results from a perfect storm created by an increasing lack of public resources, years of neglect, and mounting regulatory demands and restrictions. Moreover, many rural areas are struggling economically. The need to diversify economies and protect environmental resources increases pressure to develop or upgrade infrastructure. In the race to revitalization, communities that make wise investments in infrastructure will be more likely to succeed.

Accomplishing this is not easy. Unemployment, departing businesses, a small customer base, and changes in available public funding have made it harder to pay for improvements. Often the public is skeptical about paying for expensive new projects. Local decision-makers sometimes disagree with regulators about perceived problems and proposed solutions. When faced with difficult problems without clear solutions, it is easy to become paralyzed by the uncertainty, and opportunities for progress can be lost.

It is with these issues in mind that RCAP has developed this guide. It is designed for those who have little experience developing—planning and constructing—water infrastructure. It explains the steps that communities can take to gain control of the project-development process. It is our hope that elected officials, public works staff, and other leaders will find this guide useful and that a more thorough understanding of the process will lead to better decision-making throughout.

Many of the problems communities encounter when they attempt to develop their infrastructure stem from a lack of local experience,

lack of communication, and/or lack of community involvement. Sometimes community leaders are tempted to turn the project over to a consultant and let the outsider handle it because it is complicated and they fear they do not have the expertise to make the right decisions.

The problem with doing so is that the community's voice often gets lost and the project may end up being inappropriate, unaffordable, or not supported by the public. The best way to combat inexperience is to be actively involved in the infrastructure-development process.

Typically, the development of infrastructure projects follows a three-phase process: planning, pre-construction, and construction. This guide has been divided into three sections based on a typical project-scheduling timeline. The first steps include defining the problem, hiring an engineer, analyzing alternative solutions, selecting the most cost-effective alternative, and evaluating financing options. Collectively, these beginning steps can be thought of as project planning. Implementation of your plan will involve design and construction, which are the second and third sections of the guide.

The authors have written this guide to help users avoid the common pitfalls they have seen in many community projects. This guide is full of details on every step of the process and tips to make it smoother, but there is often no substitute for having a knowledgeable person available who can answer questions and accompany you through the complications of a project. Communities that are inexperienced in implementing a large, complex infrastructure construction project should try to find a technical assistance provider who can guide them through the process. RCAP is among the organizations across the country that provide assistance to small, rural communities (see the inside back cover for how to access RCAP's assistance). You may be able to follow the steps detailed in this guide on your own in your project, but the ideal situation would be to have both a technical assistance provider and this guide at hand so you have something written to follow and know what to expect.

Section 1
Planning a project

Getting started

Water and wastewater systems are critical infrastructure elements in every community, including rural communities. In areas of dense development, water and wastewater systems are necessary to protect public health. The availability of water and sewer services is also a major factor in determining the community's prospects for future economic development.

Water and wastewater systems are some of a community's largest investments and generally have long, useful lives. With proper maintenance, some water and wastewater infrastructure has been reported to last for more than double its original design life, so decisions made today will impact future generations. With so much riding on the process of developing an infrastructure construction project, it is clearly important that decisions be made and plans be laid thoughtfully and deliberately.

Definition of terms

Some of the terms used in this guide:

Owner: A town's or community's leaders, governing body or entity that is conceiving of and overseeing the infrastructure construction project. This term is used because it implies that there are certain key duties associated with a project, namely that you take responsibility for managing the project—you will direct it and ultimately have oversight of the physical, technical, managerial and financial aspects of the new infrastructure you put in place.

Project: In the water and wastewater sector, this term means a physical construction undertaking.

RD: Rural Development, part of the U.S. Department of Agriculture (see next entry below)
USDA: United States Department of Agriculture (used in this guide with Rural Development, as in **USDA Rural Development**, which is a mission area within USDA. Rural Development (RD) has state and local offices that administer water and waste-disposal loan and grant programs.

KEYS TO SUCCESS

1. **Coordination**—with regulators, potential funders, and all project team members. Keeping everyone on the same page is essential.
2. **Communication**—with the public throughout the process, with funders, regulators, project team members, and your consulting engineer.
3. **Documentation**—keep track of all project expenses and all project-related records in a project file or binder.
4. **Evaluation**—Don't be afraid to review the work of your engineer to ensure that it's in line with your expectations and *never* be afraid to ask questions.

Following are your primary responsibilities with operating a utility, which are helpful to keep in mind as you, as the owner, begin a new infrastructure construction project:

- protecting the health and well-being of your community's residents and the environment by operating your utility in compliance with the requirements of your state regulators and within industry standards
- complying with all legal requirements for operating a public utility

It is normal to feel overwhelmed during a critical decision-making process. You will undoubtedly need the expertise and guidance of certain professionals, such as consulting engineers and others, as you navigate through the process.

However, as the decision-maker for a community or utility system, you are (or will be) the owners of the infrastructure and ultimately responsible for it, so it is important that you stay involved in, and in control of, the process. In your role, the most critical part of any decision-making process is understanding the issue at hand as much as possible. You are not expected to know all of the answers. After all, no one can be an expert on every issue. But you can ask questions to make yourself more informed. It is also important to know and remember that you have options in almost all situations.

It is natural to be reluctant to ask questions of the experts you may employ, or even to wonder what questions should be asked. While asking questions may feel uncomfortable, it is important to remember that your consultants work for you, and part of their job is to ensure that you understand and are comfortable with the steps that you are taking as you develop your project and enter into significant contractual and financial obligations.

Moreover, it makes the job of a consultant easier if your community's needs and priorities are clearly communicated at the start of the project. At the end of the day, when all of the experts have gone home, your community will have to live with the decisions that have been made, and if you turn over control of solving the problem to someone else, then you are setting yourself up for future problems.

Ideally, it is best if you assemble a project team to guide the development process. This team should include members of the governing body of your community or organization, your operator if you have an existing utility, and other residents of the community who have an interest/specialized expertise and the time to devote to the project. If you lack in-house expertise to complete a project of this scope, consider bringing in staff of technical-assistance organizations (such as the Rural Community Assistance Partnership), representatives of your local health department, and/or representatives of your primacy agency (the state agency that regulates your water or wastewater facility).

Defining the problem

The most important part of the project-development process is defining the problem. The best chance your community has to control the project is at the beginning of the process by determining and agreeing upon what issues need to be addressed and figuring out your expectations and measures for success.

In many situations in which a group of people is in a governance position, individual members will often present ideas or solutions to a problem before there is group agreement on what the specific problem is or before priorities can be ranked. It is important to begin with the problem and define the problem as just that–a problem. If you begin by identifying solutions, then you may be inadvertently eliminating other alternatives. Hold a series of open discussions to develop a shared understanding of the perceived water or wastewater problem to get the process started. Create a problem statement, or make a list of the problems the community is trying to solve. Identify any resources (expertise) you already have in the community that might help you solve the problem. Through your discussions, you should be able to gauge whether resolving the problem is critical to the health and well-being of your community, the urgency with which it needs to be resolved, and whether there is adequate community support for proceeding.

Some problems are easily defined by casual observation and a general inspection of the facility, such as the condition of the clear well depicted in the photo. Other problems are not so obvious, and conducting a needs assessment can be helpful in determining the overall needs of the utility.

Needs assessment

Prior to formally starting a water or wastewater project, it is important to evaluate the current condition of the utility and determine what projects will need to be completed now or in the near future to keep your utility in compliance and ensure that it is well-maintained. Taking stock of your system will allow you to see items that need to be addressed from a technical standpoint as well as help to identify managerial and financial weaknesses. These issues could impact not only your future ability to sustain your operations, but also the project you are presently trying to develop.

While it is beyond the scope of this guide to deal with assessments of your utility's capacity, there are self-assessments readily available on the web, such as:

- the American Water Works Association's Self Assessment Workbook Checklist for water systems, which can be found at *www.awwa.org/files/Resources/SmallSystems/CAPSelfAssessmentChecklist.pdf*
- the National Environmental Service Center's Self-Assessment Tool for Small Community Decision Makers (both water and wastewater), which can be found at *www.nesc.wvu.edu/netcsc/Self_Assmnt/SelfAssessment.pdf.*

In addition, you will need to consider your community's long-term vision and goals and how your project fits into them. If your community has a master, or comprehensive plan, is the project consistent with proposed development patterns and identified land uses? Have you considered any new housing or other development plans to ensure that you will have enough capacity to serve them?

Even if you do not currently have a system and are trying to build a new one, it is important to make realistic assessments about what is needed to solve the problem at hand. There are a number of important questions that will need to be answered to ensure that you end up with a system that will meet your community's needs.

If you are planning to serve users outside your jurisdictional boundaries, have you communicated with them and invited them to be part of the development process? If receiving service is voluntary, have you realistically assessed the number of residents and businesses that will sign up, either through obtaining user agreements, deposits or some other method? Generally this question applies more to drinking water than to wastewater customers, but depending on your state laws, it might include both. In many states, municipalities can compel users within their boundaries to connect to a new system. Even outside a municipal jurisdiction, a wastewater connection can be mandatory if a sewer line comes within a certain distance of a residence or business. However, even when such laws exist, they still have to be enforced locally, and sometimes local officials are reluctant to do so in the face of opposition to the project. Therefore, it is important to ensure up front that those users will, in fact, be part of your project.

Are there existing systems nearby that you can consider purchasing services from or connecting to, and, if so, have you initiated discussions with them? Have you looked at demographic data for your community from a historic standpoint as well as future projections? It is important to be realistic in your assessment of future growth. Ideally, you want to have adequate capacity to allow for some growth, but your assessment needs to be balanced if you want to avoid the "if we build it, they will come" trap.

Whenever possible, utilize no-cost resources in completing this evaluation. These may include capacity-development staff at your state primacy agency or other technical assistance organizations, such as the Rural Community Assistance Partnership (RCAP).

Prioritize needs

In some cases, utilities may identify multiple needs. If you are unable to undertake a project large enough to address all of them at once, then your needs should be prioritized in order of their impact to the safety and well-being of the residents served by the utility. Needs should be further prioritized by their criticality, regulatory requirements, and which ones may cause the utility to interrupt service to customers.

Those needs that cannot be addressed right away should become part of your capital-improvement planning for future projects. If you do not currently have a capital-improvement plan, you need to start the process of formulating one. There are a number of no-cost resources that can help you with such planning, including your state's RCAP or other technical assistance providers. The Environmental Finance Center at the University of North Carolina has considerable information on this topic at *www.efc.unc.edu/projects/capitalplanning.html*.

Form a project team and develop a project summary

Ideally, communities should organize a project team to oversee the project from the planning stage to project closeout. It is critical to work with your regulatory and potential funding agencies to address any regulatory and financial-feasibility concerns at the beginning of the project. The project team should be composed of community members, utility board members, and elected officials.

Project team members must be willing to commit sufficient time over a one- to three-year period to provide oversight of the project. The first task of the project team should be developing a project summary. The project summary should include:

- description of the existing utility system (if applicable)
- description of the problem the project will solve
- project expectations
- measures of success

The project summary will be very useful in hiring an engineer for the project. Developing a project summary is critical in establishing expectations and accepting local control of the project.

Identify the service area and demographics

The project team should identify the proposed project service area. This area may be contiguous with the utility's existing service area or jurisdictional boundaries but may differ if the proposed project expands beyond the current service area, proposes to serve users outside your jurisdictional boundary, or proposes to serve only a part of your jurisdictional area. It is helpful to have a service-area map that clearly identifies the service area.

Demographic data should be assembled for the project service area. If your project is consistent with your jurisdictional boundaries (that is, you are serving only customers inside a municipality or other census-designated place), you can find demographic data, such as population, median income, historic population figures, number of housing units, etc., from the U.S. Census Bureau at *http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml*.

However, you will need to rely on other methods of obtaining that information if your area is not consistent with any identified census areas, for example, if you are a town planning to service some customers outside your jurisdiction or a township planning to serve only a portion of the potential customers in your jurisdiction. As long as you have a general idea of the area that you want to serve, your engineering consultant will help you determine the number of potential

customers during the planning stage of the project. You may need to conduct income surveys in your project area later, when you have determined which potential funding sources you intend to use. You will want to ensure that you conduct the survey in accordance with your funding sources' criteria so that you can avoid having to repeat they survey.

Document health hazards

Documenting any health hazards or violations of the Safe Drinking Water Act or Clean Water Act can be an important step in developing your project. Many funders give priority to systems that are trying to solve documented problems. If your project involves building a new system where none currently exists, contact your local health department to request documentation of any health hazards or records of any water-quality violations they may have for the project area. If you have an existing utility, your state primacy agency should have sanitary surveys or other tools that document any problems with your water and wastewater systems.

Project manual

A project manual can be a very useful resource for documents that you may need to reference. The purpose of the manual is to provide a central reference guide for the project's activities. The manual should contain all correspondence from regulatory agencies documenting a health hazard or unsanitary conditions resulting from non-compliant utilities or lack of a public utility. This correspondence may be shared with members of the community to explain the basis of the proposed project and resulting costs.

The project manual should also contain a copy of all public notices, newspaper articles, public meeting agendas, minutes of discussions of the project at local governmental meetings, ordinances, resolutions, and other efforts by the project owner to keep community members informed of the project. Many funders require documentation of public participation prior to awarding funds for a project.

Set up project files

In addition to the project manual, you will accumulate many files related to your project. A formal project filing system should be set up during the planning phase of the project. Maintaining adequate and orderly files is important because the amount of records and paperwork involved in a project can be overwhelming, and lost files may cause difficulties in closing out grants.

The task of filing the project's records should be assigned to a utility employee or project team member who is familiar with the project's records. While one person should be in charge of filing, the filing system should also be intuitive and understandable to other people who may need to access the files at times. The person in charge of the files should review and present all correspondence to the authorized utility representative to determine if actions must be taken regarding the correspondence. Documents should then be stored in the appropriate file. Project records should be stored in a safe, secure location at the utility. It is beneficial for project team members to periodically review the records to ensure files are being maintained in an orderly fashion.

Hiring an engineer

A first step in any construction project is selecting an engineer. 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.

Traditionally, when a community needs to carry out planning, it hires a consultant to prepare the necessary documents. Once a contract is signed, the consultant spends a few months on the project and comes back with a plan. But what if that plan fails to meet the community's needs? Perhaps the plan meets today's needs but failed to take future growth into account. Maybe the need to get the approval of a regulatory agency means that alternative means of solving the problem or new technologies were overlooked. Perhaps the goal of keeping costs down influenced the consultant's decision-making too much. Or, conversely, the plan proposes a high-end solution or uses the latest technology that will solve the problem but is not affordable or sustainable.

When these things happen, communities often feel that they did not get what they wanted or paid for, and consultants feel that they did not have enough direction from the client. What can result is frustration for both parties or even something as serious as legal challenges if one side does not feel the other held up its end of the agreement. Usually in these situations, neither party is completely right or wrong, which is why it is important to lay out your goals and expectations at the beginning of the process. And if at any point in the process you feel uncomfortable or unsure about something, it is better to raise a question or address your uneasiness, keeping the lines of communication open at all times, rather than letting a problem build or waiting until the final product is delivered and not getting what you had expected. Engineers' qualifications vary widely based

Roles & responsibilities in hiring an engineer

Owner's responsibilities

1. Follow a qualification-based selection (QBS) process for hiring engineers and other professionals.
2. Assemble a team to interview and rank engineers and other professionals.
3. Meet with potential funding agencies to determine the required format for the preliminary engineering report or general plan in advance of contracting with the engineer for services.
4. Thoroughly evaluate the preliminary engineering report. Question assumptions and recommendations made by your project engineer.

Engineer's responsibilities

1. Identify in advance all engineering costs and charges for services to be provided, and work within the scope of the agreed upon contract.
2. Prepare the plan in the format requested by the utility.
3. Consider all acceptable alternatives prior to making recommendations.
4. Provide, at a minimum, an acceptable level of professional services in accordance with engineering standards.
5. Respond to the utility owner's questions.

on training and experience. Engineers have different strengths. Some are experts in water distribution, while others excel in designing new wastewater systems. Engineers also have different skill levels when it comes to financing, developing plans, bidding, and managing construction. When selecting an engineer, you need to understand their individual strengths and weaknesses, as well as what your needs are.

Something else that is good to consider is how much work the engineering firm does with small communities. An engineer who recently designed and constructed an 80-million-gallon-per-day surface water treatment plant may not be familiar with technologies used by small groundwater plants, so it may be helpful to find a firm that has worked with projects that solved problems similar to yours. It may be advantageous to deal with a firm that has some familiarity with the challenges small systems face and the resources that are available to them.

Qualification-based selection

Many states require by law that public entities that expect the cost of engineering, architectural, or other professional services to be above a certain dollar amount (often $25,000 or greater for a project) to follow the qualification-based selection (QBS) process. The QBS process is designed to ensure that public projects receive quality engineering services and reduce the possibility of unethical behavior by consultants who market services based on costs without consideration for professional standards.

One of the most important things that you need to know about the QBS process is that ***at no time*** during the selection process can you discuss questions about specific costs for the firms' services. The goal of the QBS process is to find the most qualified firm, and cost becomes a factor only after you have chosen the most-qualified firm. Does this mean that you are stuck with a firm that you can't afford if it is the most qualified? Not at all. When you begin negotiations on a contract with a firm, you are free to eliminate the firm from further consideration if you cannot reach an agreement on what you consider a reasonable price. At that point, you should move on to negotiating a contract with the next-most qualified firm on your list (more on this topic later).

Some firms may tell you that you do not need to go through the QBS process if the funding source or state law does not require it, but it is a good idea to do so even if it is not required. Just as you usually do not buy the first car that you test drive, so it should be with hiring a professional for whom you will spend considerable money and with whom you will spend a great deal of time over the next couple of years.

Some firms may also try to convince you to allow it to carry out only the planning phase of the project, which may be under the dollar limit that requires the QBS process, but there are potential problems with this approach as well. First, once you have developed a relationship with a firm and project manager, you are unlikely to want to change firms partway through the project unless there are problems. This gives an unfair advantage to the firm that did your planning when you get ready to select a firm for the design and other phases of the project. In addition, should you decide to hire a different firm for other phases of the project, the new firm will likely not want to proceed based on another firm's planning document, and you may end up spending more than necessary to revise these documents.

For specific information on the QBS process, the Ohio Qualification Based Selection Coalition developed a manual that may be downloaded at *www.dot.state.oh.us/Divisions/Planning/Transit/Documents/Rural%20Transit%20Manual/CH%20%207%20Att%207%20D%20Ohio%20QBS%20manual.pdf* . The Texas Society of Professional Engineers also has a manual,

Professional Engineering Services: A Guide to the Selection and Negotiation Process, available for purchase at *www.tspe.org/Media/tabid/141/Default.aspx*. While some of the information in these manuals may be specific to those states, the QBS process will be similar regardless of what state you are operating in. Check with your state to see whether there are other specific provisions that may apply to your project.

The Rural Community Assistance Partnership offers free assistance to communities that are completing the QBS process to hire an engineer. The timeline for completing the process is dependent upon the involvement of the community and scheduling of the various steps in the process. Communities should allow one to three months for completion of the process.

Develop a request for qualifications

The first step in the QBS process is to develop a request for qualifications (RFQ). This is a critical step in the process, as the RFQ will let engineering firms know exactly what you are looking for. Your RFQ should contain a description of the problem you are trying to solve (your already-developed project summary is useful for this task) and should define the scope of services you are seeking. For most projects, you will generally want the following services:

- preparation of a general plan or preliminary engineering report that examines various approaches to the problem you want to solve
- recommendation of the best solution
- cost estimates for each alternative considered
- final design and construction drawings
- construction inspection services
- possible assistance with securing funding the project if other no-cost technical assistance is not available

The RFQ should ask for a minimum of the following with regard to qualifications:

- general description of the firm
- experience and qualifications with comparable projects
- experience of key personnel who will be assigned to your project
- the firm's understanding and approach to the problem you are trying to solve and its project-management approach
- a list of all projects of a similar nature that it has worked on in the last 3 to 5 years

There may be other specific items that you want to include in the request, depending on your project or preferences. One thing to consider asking about is the variance between estimated costs and final costs in the last three to five projects that the firm completed. While things that cannot be predicted have a way of occurring during construction, frequent and large variances between estimated and actual costs may be a red flag and may create a shortfall in funding if this happens on your project.

You can advertise your RFQ, but if you are in a rural area, you may need to advertise in a larger newspaper in order to attract a sufficient number of interested firms. You can also send your RFQ directly to engineering firms that you are familiar with, those that neighboring communities have used successfully, or contact your state's consulting engineering association for a list of registered firms. Sending the RFQs directly often yields a better response.

Form a selection committee

Forming the selection committee is the next step in the QBS process. Frequently, some or all of your project team members will serve on this committee. The selection committee's members should be organized and willing to devote adequate amounts of time to review responses from engineering

firms and to contact references. If your community has residents who are familiar with construction projects and contracts, use these resources in forming the committee.

Often it is beneficial to involve qualified community members who oppose the project in the process of selecting an engineer. This involvement permits those opposing the project to have a voice in the project and stay informed of project activities.

You will need to establish a schedule for completing the selection process.

Review and rate qualifications

Evaluation of the responses to your RFQ should be performed by the selection committee and should include:

- reviewing the professional credentials of the firms
- reviewing the firms' adequacy of staff to perform the engineering services required by the project
- contacting various clients the firm has worked with during the last five years for references

In most cases, past clients may be hesitant to openly criticize an engineering firm. Therefore, it is useful to develop a list of general questions to discuss with clients of each firm. Questions should be developed that allow project owners to indicate satisfaction by offering responses such as: *I would definitely use the engineering firm in the future on another project, or I most likely would not use this firm on future projects.* Take the opportunity to ask follow-up questions to comments made by project owners. Take detailed notes of prior clients' comments on the various engineering firms and review the notes during the selection committee's ranking session.

Short-list engineering firms

After reviewing firms' qualifications and the comments of prior clients, the selection committee should rank the firms from most- to least-qualified. The selection committee must document this ranking and then short-list firms. Short-listing means selecting the top three to five engineering firms for an interview based on their rankings. Send a notice to all engineering firms not selected for further consideration, thanking them for their response and offering consideration to them for future projects.

Interview and rate engineering firms

Send a notice to short-listed engineering firms inviting no more than three members of the firm (one being the project manager) for interviews at a comfortable location. The location should be able to accommodate the selection committee and the representatives of the firm as well as any audio-visual equipment the engineering firm decides to use in their presentation.

Develop a list of questions on how the firm will approach the project. Questions might address each firm's ideas on innovative solutions, potential cost-saving ideas, the firm's ability to meet project schedules, experience of staff, staff turnover within a firm, and methods of communication between the project engineer and the project owner. If you plan to ask specific questions about past projects, be sure to let the firms know in advance so that they can come prepared with this information.

Communication is crucial during a project. Good communication will help a project flow smoothly, with few interruptions. Poor communication will cause constant struggles throughout the project. Because communication is critical, require

INTERVIEW QUESTIONS/EVALUATION FORM

NAME OF PROJECT:_____

NAME OF FIRM:_____

NAME OF INTERVIEWER:_____

Rate the response of the engineering firm representative for each question listed below from 1-5, with 5 being the highest and 1 being the lowest.

#	QUESTION	1	2	3	4	5
1	How much experience do you have working with small systems?					
2	Can you assure us that an experienced engineer will handle our project?					
3	What are your ideas about how we can save money on this project?					
4	Is your firm familiar with all the latest technologies/ systems?					
5	How often would you meet with our community?					
6	How often will we receive progress reports?					
7	Is your firm working in this area currently?					
8	How do you charge your fees?					
9	What steps does your firm take to avoid cost overruns?					
10	If you are selected, what is your time frame for completing the work?					
11	How much input will we have on the project?					
12	Is your firm familiar with water and sewer funding program requirements?					
13	If your community is working with an outside technical assistance provider, such as RCAP: Are you willing to work with this independent technical expert?					
14	What kind of follow-up is provided when the project is completed?					
	TOTAL					

the engineering firm to be represented at the interview by the person who will be your project manager. The project manager will be working with the project owner and will be the main contact for the project. Typically, the engineering firm will also choose to be represented by a marketing specialist and/or principal of the firm.

Schedule interviews for a time of at least 45 minutes each with a 15-minute break between interviews. Each interview should begin with an introduction of the selection committee to the engineering firm, followed by a brief presentation of the process the selection committee will follow during the interview. After this, provide the engineering firm with approximately 15 minutes to introduce the firm. It is up to you if you wish to allow audio-visual presentations during this part of the interview.

The selection committee chairperson should then ask each of the questions on the pre-determined question list and allow the engineering firm to answer each question one by one.

The selection committee's members should use evaluation forms prepared in advance that permit a score for each question or topic (a suggested form is on page 13, which you can photocopy for each committee member). To avoid confusion, clearly indicate on the evaluation form the highest score and lowest score possible for each topic. Committee members should take detailed notes and ask follow-up questions to the engineering firm representatives when needed. In fairness to all firms, similar follow-up questions should be asked of all firms.

Do not permit the next scheduled engineering firm to enter the facility while another firm is responding to questions or making its presentation. A 15-minute break between interviews is usually adequate to permit one firm to exit prior to the next firm arriving for its interview. The selection committee chairperson should keep each interview on schedule and intervene if the discussions become lengthy.

Again, questions about costs for services are not permitted on the day of the interviews. Not until each firm has been interviewed and a ranking of firms has been established should negotiations with the highest-ranked firm begin. Evaluation forms should be collected after each interview by the chairperson of the selection committee. Following the conclusion of the interviews, the chairperson should tally all interview scores and announce the highest- to lowest-rated firms at the next selection committee meeting. All QBS documents should be retained for verification of compliance with the QBS process in hiring an engineer.

Negotiate the engineering services agreement

Only after the interviews and a ranking list of engineering firms have been completed may the project owner enter into negotiations over the cost of planning services with the highest-ranked firm. If the project requires a preliminary engineering report (or general plan) and final design, it is beneficial to negotiate only for the planning report work initially. This permits the project owner to determine his/her satisfaction with an engineering firm prior to signing a design contract with the same engineering firm.

Engineering agreements may be structured in many formats, and your consultant will provide you with a contract. At a minimum, you should ensure that your selection committee and your attorney have reviewed the contract thoroughly before you sign it. If your project is being funded by USDA Rural Development, each state RD office has an engineer on staff who may offer guidance on the structure of the contract and what is a reasonable fee for engineering work, or you can check with your state association of consulting engineers.

INTERVIEW TALLY SHEET

NAME OF ENGINEERING FIRM: _____

INTERVIEWER	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	TOTAL
													TOTAL POINTS		

Pitfalls to avoid

Problems can result if sufficient time is not taken and proper procedures are not followed when hiring an engineer. Here are some pitfalls to avoid:

- Costs of force main were not included in design.
- Outdated estimates resulting in cost overruns
- State regulatory guidelines not followed
- Improper siting of buildup, pump stations, towers, etc.
- Unstable engineering firm hired that had 4 managers throughout project
- Overestimated costs and inflated rates, making project unfeasible
- Underestimated costs in order to make project seem feasible, resulting in large cost overruns
- Overestimated grant financing amount in order to make project look financially feasible

Evaluating the preliminary engineering report

Establish a format

Preliminary engineering reports (or general plans) may be in various formats. If USDA Rural Development funds will be used to finance your project, it is essential that you notify your project engineer, as USDA has specific guidelines for this report. To get them, go to *www.rurdev.usda.gov/RDU_Bulletins_Water_and_Environmental.html*, and click on **Bulletin 1780-2** for water projects or **Bulletin 1780-3** for wastewater projects.

USDA Rural Development guidelines require information that may not be included in general plans, such as environmental reports and a minimum of three alternatives to be considered for the project. If the project is smaller in scope and will not require USDA Rural Development funds, a utility may consider another format for the planning report.

Many state regulatory agencies also have a list of required items for a general plan, which may be different from USDA's format. If your project needs to meet both requirements, talk to your consultant to ensure that he/she is are aware of everything that needs to be included.

If another format is utilized for the preliminary report, the utility should require the report to detail:

- alternative analyses with supporting documentation
- the basis for selecting "best-available technology"
- advantages of each alternative
- life-cycle costs of each alternative
- detailed cost estimates
- project components
- adequate maps to depict the project area
- reasons for the recommended alternative

Most reports will also contain a financing section with the engineer's suggestions for how to finance the project.

Identify alternatives and costs

Detailed cost estimates should be provided for each alternative. The estimates should list each estimated cost and state the period of time the cost estimate is expected to be accurate.

Cost estimates should consider inflation's impact on project costs. Many projects take one to three years (sometimes longer) from the completion of the preliminary engineering report until bidding of the project. The project's alternatives and associated costs should include an inflation factor of no less than two years.

The report should provide a present-worth analysis for each alternative. This analysis permits a comparison of all project costs, including operation and maintenance expenses for each alternative. This is important because sometimes an alternative may have lower initial capital costs than another but may be significantly more expensive to operate over the long term.

Evaluate the affordability of alternatives

An evaluation of alternatives for affordability should be completed during the planning phase. While this step may involve some added time and expense at the beginning of the project, it can prevent major and costly problems that could arise later. As part of the plan, most consultants will provide you with a minimum required cost per user for each of the alternatives that were considered. It is important to ask questions about the assumptions used to arrive at those costs. Mistaken assumptions can lead to problems later. For instance, if the number of users assumed is incorrect, or if the consultant assumed obtaining an amount of grant funding that is unrealistic, this can skew the cost per user significantly. More on this topic is covered in the Developing a Financing Plan section.

Obtain agency review

A copy of the draft report should be submitted to potential funding or regulatory agencies that are willing to review it and offer comments. These agencies review many similar reports and can provide valuable insight on possible errors or omissions, potential alternatives that may not have been considered, etc. Agency review should occur prior to the report being finalized by the project's engineer and most definitely before beginning work on the final design.

TIP

Don't overlook potential environmental impacts that may add costs or prohibit proposed actions.

Environmental requirements

Complete an environmental review

All federal funding sources require that environmental impacts be studied, documented and mitigated. Federal agencies follow the National Environmental Policy Act (NEPA) [42 U.S.C. 4321 et seq.] that was signed into law on January 1, 1970. The NEPA establishes national environmental policy and goals for the protection, maintenance and enhancement of the environment. It also provides a process for implementing these goals within federal agencies. State funding sources often utilize "pass-through" funds originate with the federal government and therefore require projects to follow NEPA requirements as well. Such agencies include state revolving loan funds and community development block grant (CDBG) funds.

It is vitally important to identify potential environmental impacts early in the planning process. Funding agencies will require all environmental issues to be adequately addressed before they will provide funding for the project. Failure to fully evaluate environmental factors could significantly change or prohibit the project from going forward as proposed in the plans or design, resulting in a significant loss of time and money.

The project owner should work with the expected funding sources to identify environmental requirements for each particular funding source. Completion of an environmental report may take three to six months.

All of the federal funding sources require approximately the same information, but review formats vary greatly. Once completed, an environmental report can be transferred to the format of another agency relatively quickly. Numerous attempts have been made over the years to standardize the format of environmental reports, and some states have done so. For others, differences remain. Therefore, projects receiving federal funds from multiple agencies often must complete multiple environmental reports.

Obtain agency approval

Agency approval of the environmental report varies by funding source. Some funding sources have their own staff complete the environmental report. Other funding sources require the project owner to prepare an environmental report and submit it for their review. Typically, the environmental report should be completed by someone who is familiar with NEPA and its requirements. There are consultants who can perform this task for you. In many states, RCAP staff can complete these reviews, and often a consulting engineering firm will have someone on staff who can complete a report as well. Adequate time should be allocated for agency approval of the environmental report.

Identifying environmental impacts

USDA Rural Development has one of the more detailed environmental-review processes. The required format for identifying environmental impacts is detailed in *RUS Bulletin 1794A-602*, December 1998, Version 1.0. This document is available at *www.usda.gov/rus/water/ees/pdf/1794-602A2.PDF*.

Most environmental assessments should contain the following items for consideration:

- purpose and need for the project
- alternatives to the proposed action
- affected environment/environmental consequences
- summary of mitigation measures
- correspondence of various agencies
- exhibits and maps

Securing financing for planning

During the planning phase of projects, there is little grant funding available to assist public entities. Therefore, planning expenses generally must be met by local funds or by state agencies that provide planning loans, such as the water and wastewater state revolving funds. These planning loans usually offer relatively easy repayment terms, but remember that they are loans that must be repaid even if you decide not to move forward with your project.

Project owners should review each possible source for planning loans and select the option that best fits their needs. Each funding source has different requirements for determining eligibility, applying for financing, and receiving a loan for planning. Most have application deadlines. Applications and supporting documents should be assembled well in advance of deadlines and reviewed for accuracy. At this stage of the project, a formal tracking system of records and expenses should be developed to ensure all loan agreements and supporting documents are filed in the appropriate location.

Establish a repayment source

Some lenders that offer planning loans require that start-up utility projects charge their customers a utility charge in advance of providing utility service. This user charge is designed to guarantee the lender that you will have sufficient revenues to repay the planning loan.

It is the owner's responsibility to establish an equitable means of funding expenses associated with the planning of the project. Sometimes this means that the owner will face the challenge of explaining to unsupportive prospective customers why there will be a utility charge prior to the customer actually receiving water or wastewater service. It is important to help residents understand that this is the only way to fund the planning costs that are required to get a new system underway. The fees that are collected will also offset the funds that have to be borrowed later, so your customers will either have to pay now or pay more later.

Many lenders also require start-up utilities to have a sufficient number of formal user agreements signed by customers (at least for water projects) obligating the customer to pay a utility charge.

All loans taken out to fund a utility project are the responsibility of the utility owner. Loans must be repaid in accordance to the loan agreement. Repayment of the loan is not contingent upon the utility project actually being constructed by the borrower. Failure to make repayment may result in the placing of liens on properties.

Developing a financing plan

One of the tasks that you will need to complete before going too far in the planning process is developing a plan for financing the construction of your project. This should be started as soon as you have a cost estimate from your engineer. Utility projects are generally complex and can be very expensive for small communities, often requiring multiple sources of funding to make them financially feasible.

In addition, as previously mentioned, it is important to make sure that the assumptions about financing made by your project engineer in the plan are realistic in order to ensure that your project is financially feasible. If your engineering plan assumes that you will obtain 60 percent of your project costs in the form of grants, while, in reality, you are able to obtain only 40 percent in grant funding, this will have quite a significant impact on the monthly rate that you will ultimately need to charge users.

One of the most difficult tasks, even for seasoned professionals, is ensuring that all of the funding that you are working to secure comes together at the same time, and by the time you are ready to bid your project. Coordinating funding streams becomes increasingly difficult with each funding source that you add to the project. Keep in mind that some sources may require months, or even longer in some cases, between the submission of your initial application and when the funds actually become available. Be sure to account for these time lags as you develop your financing plan.

Grant or loan funding?

Predictably, loan funds are more easily accessed in a shorter timeframe, while grant funds will require some time and patience. While it is extremely unlikely that you will find enough grant funds to cover all of your project's costs, most projects need at least some percentage of grant funds to maintain affordability for customers of the system. For all of these reasons, it is important to determine early in your project which funding sources you intend to pursue. This decision will be based in part on which potential sources' criteria best match your project and the timing of it.

One thing that needs to be noted is that over the past 20 years, grant funding has declined significantly at the federal level. Therefore, the funding that is available is more competitive. If your utility has not raised rates in the past ten years or wants to keep unrealistically low rates, it is unlikely that grant funds will be available to you. Most funding agencies now expect the users of your system to be paying what is considered their fair share of the project's costs before the agency will contribute grant funds to the project.

What do funding agencies consider a fair share of the project's cost for customers? It is generally calculated by looking at your system's average rates as a percentage of your community's median household income. While percentages and methods of calculation vary somewhat among funders and even for the same funder in different states, they are generally fairly similar. Most calculate the average rate either by determining what your average monthly residential usage is or using a figure that is common for rural areas (generally between 4,500 and 5,000 gallons per month) and determining what your monthly rate would be for that level of usage. For most funding agencies, the expectation is that customers should be paying between 1 and 1.5 percent of your community's median household income for water service, and between 1.5 and 2 percent of your median income for sewer service.

Evaluate financing sources

Projects requiring multiple funding sources should consider numerous factors in developing a funding package for utility projects. Utility projects typically are the most expensive project ever completed by a small community.

When evaluating potential project funding sources, consider the following:

- Does your project meet the criteria of this funding source?
- Will funds be available to meet project's time constraints?
- What is the impact of each funding source on the user charge? At times, a low-interest loan results in lower monthly user charges than a mix of grant and loans at higher interest rates.
- Will waiting for grant funds be offset by increases in project costs due to inflation?
- Does a particular funding source require additional engineering or other special studies that outweigh the benefits of the funding source?
- Is the project affordable to the utility's users?

This guide concentrates primarily on federal and state funding sources for infrastructure projects. There are, of course, other sources of project funding, such as local banks or issuing bonds. Local banks are generally only an option for smaller projects because the banks cannot offer the lengthy terms typically needed to keep major infrastructure projects affordable.

Bonds are used by many communities to finance infrastructure, but many smaller communities do not have the bonding capacity necessary to finance their own improvements. In general, a GO, or general-obligation bond, is backed by the full faith and credit of your local government. Depending on your state's laws, your community may be permitted to issue GO bonds up to a certain amount of your assessed tax valuation without voter approval, with a higher amount being dependent on voter approval. Again, for most small communities, this may not be a viable option unless your project is a smaller one. Revenue bonds are also an option, which are backed by the rates paid by your system users. These bonds typically carry a higher interest rate because they are less secure.

Pitfalls to avoid

- Failure to require the engineer to document the financial feasibility of the project while completing the preliminary engineering report.

  This may result in big problems when you are ready to apply for funding or begin construction.

- Failure to verify with your engineer what time period your cost estimate is valid for.

  Remember that inflation can quickly increase project costs.

Meet with potential funding sources

Most funding agencies will be willing to meet with you to discuss your project if you contact them. In many states, various funding agencies have formed coordination groups that allow you to work with all potential funders for your project in one place. Some states have gone even further and offer a comprehensive application that can be used for all, or at least most, potential funding agencies in the state.

If your state does not offer these options, you may need to research which funding sources are available to you. In most states, your state RCAP staff member can assist you with evaluating and structuring a funding package for your project, or your engineering firm may have staff available who can help.

Certain federal funding sources are available in every state, such as USDA Rural Development's Water and Waste Disposal Loan and Grant

program, the state revolving funds for drinking water and wastewater, and community development block grant (CDBG) funds (note that not every state makes funds available for water and sewer, and some restrict water and sewer funding to projects that are tied to job creation). If you live in a distressed area and your project is tied to economic development, the Economic Development Administration may also make funds available.

There may be other state sources of funding available as well. Often the local offices of your congressional representatives can help steer you to funding sources or to technical-assistance resources like RCAP that can help.

When contacting potential funding sources, here are some questions you will need to ask in order to put your plan together:

1. Do they offer loans, grants, or some combination of both? If grants are available, what is the maximum amount available? If funding is a combination of loans and grants, what is the typical percentage of grant funding, and how is it determined?
2. If they offer loans, what is the interest rate and the term of the loan?
3. What is the typical length of time to obtain funding from start to finish?
4. Can you apply anytime, or is there an application deadline?
5. What are their specific criteria for funding? Note that funding sources often have requirements related to income, population, and other criteria that vary significantly among sources.
6. Do they have a fact sheet about their program or a website where you can find more information?

When you have collected information about all of the potential sources of funding for your project, you can begin to put together a plan for the financing you need. The worksheets on the next two pages will help you determine the impact of borrowing funds on your monthly water or sewer rates. Even if you do not currently have a system, you can use the worksheets to determine what you will need to charge prospective customers in order to finance your new system.

Complete income survey

An income survey may be required to determine income levels in the project's area. There are two types of income surveys required by funding sources. A low-to-moderate income (LMI) survey is used to determine the percentage of low-to-moderate income residents in an area, typically for community development block grant (CDBG) funds. A median household income (MHI) survey is used to determine the median household income of an area. Prior to completing an income survey, project owners should contact the appropriate funding source to discuss income survey procedures and to determine if an income survey is warranted for your particular project. Income surveys are time-consuming activities. Therefore, it is critical that the income survey procedure proposed by the project owner is acceptable to the appropriate funding sources, and that it is actually necessary to conduct one.

Submit pre-applications

Funding sources have their own criteria and processes for applying for funding. Some funding sources require pre-applications. This is generally true of state drinking water and clean water revolving funds and for Appalachian Regional Commission projects (for communities located in Appalachia). These pre-applications may be accepted only once each year. Therefore, it is important for the project team to work together to meet required project milestones and submit pre-applications by established deadlines.

Worksheets for determining impact of financing improvements

Basic information

From your current budget or financial statements:

A. Total number of customers that will be supporting the debt service (include existing and proposed new customers) _____

B. Current average monthly residential bill (may be calculated by determining average usage multiplied by your existing rates. For new systems, average water usage in rural areas is generally about 4,500 gallons per month) _____

C. Current annual revenues from user charges _____

D. Current annual operating expenses _____

E. Current annual debt-service payments _____

From the preliminary engineering report:

F. Total amount you plan to borrow _____

G. Estimated annual increase in operating costs (for new systems, the total annual operating cost) _____

From potential lenders and the amortization table below:

H. For a loan of ___% and a term of ____ years, fill in the corresponding loan amortization factor from the table below _____

I. Debt-service reserve (some lenders require that you maintain a reserve in case of emergencies. For a 10% reserve, multiply the amortization factor by 1.1 to automatically include it in your calculations.) _____

Amortization table – Annual interest rate							
Repayment term	2%	3%	4%	5%	6%	7%	8%
5 years	0.21216	0.21835	0.22463	0.23097	0.2374	0.24389	0.25046
10 years	0.11133	0.11723	0.12329	0.1295	0.13587	0.14238	0.14903
20 years	0.06116	0.06722	0.07358	0.08024	0.08718	0.09439	0.10185
30 years	0.04465	0.05102	0.06505	0.07265	0.08059	0.08059	0.08883
40 years	0.03656	0.04326	0.05052	0.05828	0.06646	0.07501	0.08386

Worksheet 1

Helps you determine whether you are currently collecting any revenues that can be used to repay project financing

1. Annual revenues from user charges (line C from previous page)	
2. Add annual operating expenses (line D on previous page) + annual debt service (line E on previous page) + the amount you set aside for emergency reserves or other capital projects that are not part of this project.	
3. Subtract line 2 from line 1. This is revenue you are already collecting that can be used to help repay a new loan.	

Worksheet 2

Helps you determine how much you will need to raise monthly user rates (or, for new systems, to charge customers) to repay a loan for this project.

1. Amount you plan to borrow (line F from previous page)	
2. Loan amortization factor (line H or I from previous page)	
3. Multiply line 1 by line 2.	
4. Any revenues from Worksheet 1 that you are already collecting and that can be used for repayment	
5. Subtract line 4 from line 3. This is the additional revenue needed for debt service.	
6. Estimated annual increase in operating costs (line G from previous page) as a result of the project	
7. Add lines 5 and 6. This is the total amount of additional revenue needed annually.	
8. Divide the total amount of additional revenue needed in line 7 by the total number of customers (line A on previous page), then divide by 12. This is the monthly average increase needed per customer.	
9. Add the monthly average increase to your current average monthly bill (line B on previous page). This is what your new rate will need to be after financing the project.	

Worksheet 3

Helps you determine how much you can borrow if you raise your rates by a specific amount

1. Estimated increase that customers will be willing to pay in your best judgment	
2. Multiply line 1 by the total number of customers and then by 12 (months). This equals your additional estimated annual revenues.	
3. Estimated increase in annual operating costs (line G from previous page)	
4. Subtract line 3 from line 2. This equals additional revenues available for debt.	
5. Divide line 4 by loan amortization factor (line H or I from previous page). This is the amount you will be able to borrow with the monthly increase you have estimated.	

Tracking project expenditures

Develop a spreadsheet for sources and uses of funds

A spreadsheet for sources and use of funds should include the itemized project costs, itemized operation and maintenance costs, all expected financing sources, loan terms and interest rates, annual debt payments, and average user costs. This spreadsheet will help you determine the total cost for the project, the total operation and maintenance costs for the project, what financing is included in the overall project financing, what the annual debt repayments will be, how much additional debt customers should anticipate if you have an existing system, and how much your user charge needs to be in order to cover your operating expenses and repay your debt.

Develop a financial tracking spreadsheet

USDA Rural Development developed a spreadsheet in Microsoft Excel that allows a community to track project expenses from project inception to close-out. The spreadsheet enables tracking of planning, design, construction, miscellaneous expenses, and change orders. The spreadsheet is available by contacting your local or state USDA Rural Development office. It is much easier to track project expenses as they are incurred rather than reviewing the project's records and entering all of the data later. If you have an existing utility, the task of tracking project expenses should be assigned to a utility employee who is familiar with the project's finances. If this is a new utility, the task should be assigned to a member of the project team.

Developing a project schedule

Project owners should establish a schedule with tasks and completion dates clearly listed. Water and wastewater projects are extremely complex undertakings, and it is very difficult to remember each task and deadline without keeping a written project schedule. Maintain a schedule for the project, update it regularly, and make sure all project parties are meeting the schedule. A sample project schedule is included in this guide (see page 27).

The proposed schedule will vary greatly from project to project. In completing the schedule you will notice a couple of very important facts. First, a large amount of agencies (people) will be involved in the development of the project. Second, a large amount of critical activities must be completed. Many of these activities are time-critical, as very specific application deadlines must be met. It is not unusual for a project's development from the planning stage through the end of construction to take between three to five years.

The more funding agencies involved in developing the project, the longer the process is likely to be. Significant environment impacts will also extend the development. However, the most costly mistake is the omission of a critical step requiring one or more previously completed steps to be repeated. Missing a financing agency application deadline can easily add a year to the project schedule. Therefore, remember: Time is money. Project scheduling mistakes can be expensive.

A schedule should be developed with assistance from the project's engineer and RCAP or other technical-assistance providers. Consideration must be given to deadlines established by the various funding agencies. Consideration must also be given to mandated deadlines from

your regulatory agency, if applicable. Once completed, the schedule should be updated monthly and shared with all relevant parties at the time of each update.

What tasks should I include in the project schedule?

Engineer-selection tasks: Your project schedule should include all of the major milestones in hiring an engineer that have already been discussed, such as developing a project summary, forming a selection committee, preparing and distributing an RFQ, evaluating qualifications statements and short-listing firms, conducting interviews and ranking firms, and negotiating a contract. Completion of the engineering report should also be included in your schedule, as it will drive much of the rest of the timeline.

Financing tasks: Financing tasks begin with acquiring funding for a preliminary engineering report or other planning studies. It is important to understand that federal and state agencies follow different fiscal years for determining when their financing begins and ends. In the funding world, there is no calendar year.

Financing tasks include:

- determining the most appropriate funding source for planning and applying for funding
- scheduling a public meeting to explain the need for the project
- approving legislation required by planning funding sources
- developing a financing plan for design and construction financing
- beginning the funding application process, as appropriate

Environmental review tasks: The time required for completing an environmental report may be between three to six months or longer. Scheduled activities beyond hiring a consultant to do the work *may* include:

- preparing maps and requesting review from various agencies – 14 days
- receiving concurrence from reviewing agencies – 30 days
- If any issues requiring further consultation are identified by agencies – allow 30 to 60 days
- preparing draft environmental report – 30 days
- review of environmental report – 30 days
- completing revisions to environmental report – 7 days
- preliminary notification – 30 days
- advertising Finding of No Significant Impact – 15 to 30 days
- final approval of environmental report – 7 days

Note: Some of these activities may be taking place concurrently, so it will not necessarily take as long as the sum total of the activities. All federal funding sources will have environmental report requirements, while state or other funding sources may have limited or no environmental report requirements. This will usually depend on whether your state has its own environmental law comparable to NEPA.

Design tasks: Design tasks begin after approval of the preliminary engineering report. Time requirements for design tasks are dependent on the scope and cost of the project. These tasks include:

- negotiation of a design contract with the project engineer
- determining the time frame for the completion of a design by the project engineer
- applying for design funding
- authorizing the project engineer to begin work on the final design of the project

Permitting tasks: The project engineer should determine the time requirements for applying for and receiving the necessary permits for utility projects. Project owners should not assume the project engineer has allocated sufficient time for securing permits. The project owner should be involved and familiar with all aspects of the project schedule. Required permits may include those from your regulatory agency to install new project elements, permits from the U.S. Army Corps of Engineers for stream crossings or other wetland work, local building permits, and many others.

Construction tasks: A realistic schedule for construction activities should be developed by the project engineer. Included in this schedule should be property acquisition (including required easements), mobilization, and actual construction activities.

SAMPLE PROJECT SCHEDULE

PROJECT SCHEDULE

Project: _____ Date: _____

YEAR	2004												2005												2006												2007											
TASK	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Prepare RFQ, send to firms & advertise																																															
Evaluate qualifications/short-list firms																																															
Interview short-listed firms																																															
Negotiate contract w/selected firm																																															
VCIF planning app submitted/ approved																																														
Engineer preapres PER																																														
Submit pre-application/PER to USDA																																															
Submit nomination form to OEPA DEFA																																														
General information meeting with DEFA																																															
Conduct USDA public information mtg																																														
Complete USDA environmental report																																															
USDA issues AD-622																																														
Publish environmental report notices																																														
OWDA design app submitted/ approved																																														
Round 1 ARC caucus meeting																																															
Complete engineering plans/specs																																															
Submit ARC project summary																																															
Round 2 ARC caucus meeting																																														
USDA issues Letter of Conditions																																														
Submit letter of Conditions material																																														
Acquire easements, land, ROW																																															
Submit ARC pre-application																																														
OPWC application submitted																																															
Submit ARC full-application																																															
OEPA plan/approval PTI issued																																														
ARC funds approved/available																																														
USDA loan closing/funds committed																																															
Submit CDBG Formula app/CDBG PH #1																																															
CDBG ph #2/submit CDBG W&S application																																															
Complete CDBG EA																																															
OPWC financing committed																																														
CDBG W&S financing committed																																														
Publish CDBG EA notices																																														
CDBG release of funds/bid advertisement																																														
CDBG Formula financing available																																															
Big opening/award & pre-construction mtg																																															
Construction																																															

Public participation

Public support and acceptance of a project may be greatly increased by keeping community members informed during all phases of a project. Communities should develop and implement a plan for involving community members prior to the actual start of a project. Keeping the public informed and answering their questions throughout the project ensures that there will be few surprises by the time you are ready to start construction (people tend to speak up when streets start being blocked and torn up), and makes it less likely that you will encounter resistance. While it is unlikely that you will receive full support from 100 percent of residents, the goal is to have the majority of your community support the project. It is important to hold public meetings throughout the project. Periodic newsletters and mailers are good ways to keep residents informed between public meetings.

During the planning phase of the project, you should hold at least two public meetings. The first meeting should take place after you have assembled your project team and written your project description. At that time, you are simply informing the public that a project is being considered. The second meeting should be conducted after you have reviewed the preliminary engineering report and when you have made a decision on how to proceed. These meetings will be labeled Stage I and Stage II. Following is a list of the types of topics you will want to discuss at these meetings:

Stage I meeting

- Present the project's description and the need for the project.
- Briefly discuss the engineering procurement process.
- Discuss the plans for financing.

Stage II meeting

- Present the preliminary engineering report.
- Discuss the project schedule.
- Present the financing plan.

Pitfall to avoid

Failure to keep residents (your customers) informed may cause distrust and resentment of the project

Stage I meeting details

Present project description

Explain why the project is necessary. Reasons for completing projects could include public health hazards, insufficient water supplies, and anticipated interruptions of utility service due to failures of the system. Identify and clearly state the problem. Focus on the problem without trying to identify solutions. The project description should be a written document prepared by the project team. This description should be supported by letters from regulatory agencies, complaints from customers, and other documentation of the problem.

Discuss engineer procurement

Briefly discuss the process you intend to use for hiring an engineer. Explain that you intend to follow a specific, competitive process that involves a serious evaluation of professional qualifications. If you need additional people to serve on your engineer-selection team, this is a good time to ask for volunteers who have some time to donate for this purpose. Explain that this is one of the mostimportant decisions that the community will make with regard to this project.

Discuss plans for financing/user charges

Explain what sources of funding will be used to pay for the planning of the project. If the source of funding you are considering involves establishing a utility user charge in advance, explain why this charge is necessary, the amount of the charge, the date the charge will begin, the length of time for the charge (typically until you receive construction financing and can repay the planning loan), and what will happen to the funds generated from the utility charge in the future. Explain that this charge will help offset future charges, as it will go toward paying the upfront system costs so that they do not have to be financed later.

Stage II meeting details

Present the preliminary engineering report

Utility projects tend to be expensive activities that result in higher user charges to customers. Keeping the public informed during each phase of the project builds public support and may identify possible cost-saving measures for the project. Upon completion of the preliminary engineering report, hold a public meeting to present the report.

This should be a formal public meeting with a sign-in sheet and agenda. The project engineer, utility managers, regulatory agencies, and other project team members should attend to speak and respond to questions.

The meeting should begin by welcoming those in attendance and presenting the reason for undertaking a project (issues with complying with regulations, structurally obsolete facilities, expansion of services, etc.). Alternatives considered in the preliminary engineering report should be discussed, and the recommended alternative should be covered in detail.

Discuss the project schedule

The project's schedule should be presented at the public meeting. The schedule should be as detailed as possible, but speakers should be sure to note that the project is only in the planning phase and delays may occur as work on the project progresses.

Present the financing plan

Present the project funding plan at the public meeting, and explain what the anticipated user rate will be, or what impact the project will have on existing rates if you already have a utility. It is prudent at this early stage to provide a range of user charges rather than a specific rate as a result of the project.

You have made it through the planning stage of your project. The next stage is the design, or pre-construction, phase.

Section 2
Design

Getting started

You have reached the design, or pre-construction, phase of your project. At this point you have selected the option you plan to construct, you know how much the project is estimated to cost, you have assessed the environmental impacts of the project, and you have established a schedule for designing, financing, and initiating the construction of your project.

Now it is time to move forward with designing your project. As the owner of the project, it is your job to ensure that the design of the project meets your needs, is affordable to your customers, involves infrastructure that you can successfully operate and maintain after it is built, and hopefully exceeds its useful life.

At the beginning of each section in this chapter, you will find a list of Roles and responsibilities that indicates items that you, as the system owner, need to be responsible for during the design phase of your project and items that are typically expected to be performed by your consulting engineer.

10 Questions to ask before beginning a design

1. Do we have financing approved to pay for engineering design?
2. Is there construction financing available to pay for the system we're designing, or do we have a financing plan?
3. Have we coordinated with funding agencies to make sure our financing plan and grant expectations are realistic?
4. Can we afford what is being designed (have we done an affordability analysis)?
5. Will the regulatory agency approve and permit what is being designed?
6. Is there more growth or capacity being included in the design than funding agencies will allow? Conversely, is there enough room for anticipated growth?
7. Can we operate and maintain what is being designed (is it too complex, too expensive, etc.)?
8. Does the public understand what will be designed and why?
9. Is the land that needs to be acquired for the infrastructure available and affordable?
10. Can the system be constructed within the required time period (this is critical if you are under orders to complete construction by a specified date)?

Securing design financing

Roles and responsibilities	
Owner	Engineer
1. Identify financing source for design	1. Provide thw owner the total cost for design services
2. Establish repayment source for design financing	2. Develop certified construction cost estimate
3. Apply for financing for project design	3. Provide application documentation to owner

Establish repayment source

In order to acquire financing for design, you must first determine how the loan is going to be repaid. For an existing system to obtain a design loan, the system must show that current revenue is adequate to cover the repayment costs or institute sufficient rates to cover these costs. For a new system to obtain a design loan, many funders require that you either institute a user charge system immediately or be sponsored by another entity, such as the county.

While many systems are reluctant to charge rates to customers for a system that hasn't been built yet, it is necessary to keep the project moving forward. It is critical to help your customers understand the reason for these fees, including the fact that money that is collected now and used toward planning, designing, and building the system will help to reduce the user fees that will have to be charged when the system is up and running. In addition, it will be helpful when you have to apply for construction funding, as funders will see that you have taken the initiative to raise some funds of your own. If your county government is willing to "sponsor" your loan, which means taking financial responsibility if you are unable to pay, then these user charges can be avoided.

There is no question that designing a system without a clear commitment of funds for construction entails some risk. This is particularly true for new systems that do not have existing user rates to fall back on. Systems that cannot finance their design from their own funds and that are using USDA Rural Development funding exclusively may decide to wait until their funds are committed before beginning the design of the project. USDA is one of the few funding agencies that will commit funds without the project design having been completed. However, if your project needs multiple sources of funding to make it affordable, then waiting for Rural Development's commitment may not be an option, as it may be reluctant to commit without knowing that the other funding sources are going to as well. When that happens, you can get into a "chicken vs. the egg" cycle that is difficult to break out of (that is, you do not want to begin the design without a funding commitment, but the funder does not want to give a funding commitment without design, and round and round it goes.)

A certain amount of risk may be unavoidable in order to complete a project. This risk can be minimized by making sure that you have done all of your preparation and questions have been answered to your satisfaction, as noted in the **Getting started** section. It is important to note that once you take a design loan, you are incurring an obligation that must be repaid even if your plans fall through and you do not build your system in the timeframe planned. This means that asking the right questions in very beginning is critical to the sucess of the project.

Identify a financing source

Depending on the state you are in, there may be several agencies that provide loans for engineering design. Check with your state revolving fund to see if they provide design financing. Also, the Rural Community Assistance Partnership (RCAP) has small loans available that can be applied to expenses in the early stages of a construction project, such as design. Visit *www.rcap.org/rlf* for more information. Most design loans accrue interest as funds are drawn, and must be paid in full through a balloon payment either when construction financing is obtained or by some specified period (often five years).

Pitfalls to avoid

- Owner fails to track and document all design expenses
- Owner agrees to an exorbitant amount of design expenses
- Owner allows the project engineer to design infrastructure beyond what is needed or can be afforded
- Owner allows the project engineer to design a system that the owner cannot operate and maintain
- Owner fails to provide input during design
- Engineer overestimates the number of customers or design flows

Apply for financing

If you are seeking a design loan from your drinking water or clean water state revolving fund, you may need to be on the fund's priority list to be considered. Check with your state to find out what is required for consideration and how frequently the priority lists are updated. Getting on the list usually involves only the completion of a simple pre-application, but timing may be an issue depending on how frequently applications are accepted and how often the lists are revised.

Community approval of the final design

Roles and responsibilities	
Owner	Engineer
1. Monitor engineer's work during design	1. Update owner during design process
2. Conduct periodic design-review meetings	2. Attend periodic design-review meetings
3. Conduct public meetings	3. Complete design
	4. Attend public meetings and be prepared to answer

Updates from the engineer on a regular basis

It is important for the owner to be updated during the design process on the aspects of the infrastructure being designed. The infrastructure being constructed will be your responsibility after it is constructed. Therefore, you, as the owner, must make sure that what is designed meets your needs and abilities.

To help prevent unnecessary future change orders, it is important for the owner to:

- review plans and specifications prior to bidding and awarding the contract; look for unacceptable materials and equipment that may be specified in the plans
- include system operators/employees in the design review to ensure adequate serviceability (electrical service and equipment
- incorporate existing knowledge of the site into the plans and specifications. Perform adequate subsurface investigations.

The engineer should attend council or board meetings during the design process on a periodic basis. A committee can also meet with the engineer prior to the meeting to discuss detailed aspects of the project. Community input into the design should be recorded and tracked.

Monitor the engineer's cost estimate during design

The owner should continually monitor the engineer's cost estimate during design to ensure that the infrastructure is within budget at the end of the design period. The engineer should consult with the owner and provide alternative materials and equipment and the costs associated with each. If you have an existing utility, your operator can provide technical opinions and knowledge. If you are starting a new system and do not yet have an operator, there is a good chance that your primacy agency can help with technical questions and guidance.

Conduct design-review meetings

Review meetings should be held at various stages of the design stage. It is recommended that review of the design take place at the 30, 60, and 90 percent-complete levels. At the final design review meeting (90 percent complete), the engineer presents the designed project and the estimated construction cost. If you have an existing utility with an operator on staff, it is essential that your operator be involved in this meeting. If you are a startup system with no operator, it is strongly encouraged that you ask your regulatory agency to participate, because its technical knowledge is helpful.

Pitfalls to avoid

- Owner completes design before developing a plan to pay for construction
- Owner fails to understand when to apply for construction financing
- Owner fails to develop a project schedule, the project drags on and construction costs increase
- Regulatory agency is not consulted during project design
- Engineer designs infrastructure that regulatory agency will not permit
- Owner forgets to include permit costs in design budget

Coordinating the design with the primacy agency

Roles and responsibilities	
Owner	Engineer
1. Review final plans and specifications 2. Finance review fee for the permit-to-install application	1. Communicate with the primary agency during the design process 2. Submit the permit-to-install application 3. Submit engineering plans and specifications

Submit the permit-to-install application

Any time a new facility is developed or there is a substantial change to an existing facility, your primacy (regulatory) agency may require the facility to obtain a permit. Once the engineering plans are substantially completed, the engineer will submit the permit application to the regulatory agency. Most regulatory agencies charge a fee to review these applications, which may be substantial. Other associated fees include general-review fees and plan-review fees. It is important to include this cost in the overall project cost so that it can be financed. Review time may be between three and six months.

Submit the engineering plans and specifications

The engineer should submit the plans and specifications to the primacy agency for its review. The owner should also receive a copy of the plans and specifications at this time. The primacy agency will generally have comments on the plans and specifications and may require changes based on its review. Make sure the engineer consults the owner before making any changes to the plans and specifications based on the comments from the primacy agency.

Securing construction financing

Roles and responsibilities	
Owner	Engineer
1.Identify financing sources for construction	1. Provide application documentation to the owner
2. Establish repayment source for construction financing	2. Attend public meetings and be prepared to answer questions
3. Apply for financing for construction	
4. Conduct public meetings	

Finalize your financing plan

By now, you have hopefully developed a plan for financing your project and have had some preliminary discussions with potential funding sources. Now is the time to make any final adjustments in your financing strategy and update your spreadsheet of sources and uses of funds that was started during the planning phase of your project. There are many agencies that provide loans and grants for water and wastewater projects. It is helpful to consult with RCAP or other organizations knowledgeable of financing sources in order to decide which funding program or programs best fit your project type.

For example, some funding programs can be used to finance projects that only involve job creation or retention, while other programs are targeted to residential projects. Some sources are better suited for repair or replacement projects, some have income or population restrictions, and many other criteria that determine whether a project will be funded. See the planning section of this guide for more detailed information on funding your project.

Apply for financing

Due to the cost of developing new water or sewer systems or significantly upgrading them, it is typical for projects to be financed from multiple sources of funds from various state and federal agencies. These agencies follow different fiscal years, accept applications at different times of the year, and make funds available for construction at different times as well. Therefore, timing becomes a critical issue in funding your project and preparing for construction and is something you will need to think through before beginning the application process. You will need to know what fiscal year to apply for financing so that fiscal years and financing approvals from all of your funding sources match and so that all financing is available when you are ready to bid your project.

Sample Scenario Comparison Table

FINANCING SCENARIOS								
Project:						Date:		
			Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7
CUSTOMERS (EDU)									
TOTAL PROJECT COST			$	$	$	$	$	$	$
TOTAL ANNUAL OMR			$	$	$	$	$	$	$
FINANCING									
ARC Grant			$	$	$	$	$	$	$
CDBG W&S Grant			$	$	$	$	$	$	$
CDBG Formula Grant			$	$	$	$	$	$	$
OPWC Grant			$	$	$	$	$	$	$
OPWC Credit Enh (Interest)			$	$	$	$	$	$	$
USDA Grant			$	$	$	$	$	$	$
U.S. Army Corp of Engineers			$	$	$	$	$	$	$
Local Funds (Cash, Tap, Fees, Etc.)			$	$	$	$	$	$	$
Bonds/Notes/Bank Loans			$	$	$	$	$	$	$
OEPA Loan	20	0.0%	$	$	$	$	$	$	$
OPWC Loan	20	0.0%	$	$	$	$	$	$	$
OWDA Loan	30	2.0%	$	$	$	$	$	$	$
USDA Loan	40	4.25%	$	$	$	$	$	$	$
Total Financing			$	$	$	$	$	$	$
ANNUAL DEBT									
Annual Bonds/Notes/Bank Loans Payment			$	$	$	$	$	$	$
Annual OEPA Payment			$	$	$	$	$	$	$
Annual OPWC			$	$	$	$	$	$	$
Annual OWDA			$	$	$	$	$	$	$
Annual USDA			$	$	$	$	$	$	$
USDA Reserve			$	$	$	$	$	$	$
ANNUAL DEBT & OMR			$	$	$	$	$	$	$
Total Future Av. Mo. Cost Per Customer									
Total Bonds/Notes/Bank Loans Payback			$	$	$	$	$	$	$
Total OEPA Payback			$	$	$	$	$	$	$
Total OPWC Payback			$	$	$	$	$	$	$
Total OWDA Payback			$	$	$	$	$	$	$
Total USDA Payback			$	$	$	$	$	$	$

Public participation

The owner should hold a public meeting after the engineering design is complete and a construction financing plan is developed. You should have a good idea at this time what impact the proposed project will have on existing utility rates (or have an idea what the rates will need to be for customers of new systems) and will be able to relay this information to existing and potential customers.

Discuss the project's design

The owner should have the project engineer attend the public meeting and explain the design of the project. The engineer should be able to answer questions about capacity, operation and maintenance requirements, the location of infrastructure, and how the project will solve the water or wastewater problem.

Discuss land acquisition, user agreements, and required easements

This public meeting is also a good opportunity for you to discuss land acquisition, user agreements, and required easements with citizens so that they are not surprised later when you are working to obtain them. In fact, if you need to collect user agreements for your project, you may want to be prepared to collect as many as possible after the meeting by having a sign-up table with plans that show where the lines will be installed and someone available to collect down payments from new users. You should be prepared to answer questions about what land is required, what user agreements are required, and what the process will be for acquiring easements.

TIP

Communicate with the public early and often. It is far better to give them too much information than too little. Customers are much more likely to support the project if they have been involved and informed throughout the various stages of development

Discuss project financing and customer costs

Owners should also take this opportunity to discuss the source and use of funds mentioned previously. Owners should be able to answer questions about project costs, project financing, customer costs, such as hookup fees and assessments, and what impact the project will have on the utility rate (or what the user rate is expected to be for new systems). It is important to stress to the public that the rates shown are projections based on current assumptions and are subject to change if changes in the project occur.

Discuss the project schedule

The owner should also discuss the project schedule so that residents know when the project is expected to be completed. Owners should provide information on:

- when all financing is expected to be approved
- when the project will be advertised for bids
- when contracts will be signed
- when construction will begin/end
- when connections will occur

Again, it is important to stress once again that the schedule is based on current assumptions, and as such, is subject to change.

Land acquisition, user agreements and permits

Roles and responsibilities

Owner	Engineer
1.Follow the Uniform Relocation Act	1. Assist owner in acquiring easements, land, and user agreements
2. Obtain easements	2. Complete right-of-way map and certificate
3. Acquire land	3. Apply for and obtain permits
4. Review right-of-way map and certificate	4. Submit permit-to-install application
5. Follow up with engineer regarding permits	5. Submit engineering plans and specifications
6. Finance permit review fee	

TIP

Uniform Relocation Act (URA)

When acquiring land for your project (including permanent easements), certain federal funding sources require that you follow the Uniform Relocation Act (URA). The URA stipulates how land can be acquired, what steps must be taken, and how land value is determined. Because you may be unsure which funding sources you intend to use at the time that land is being acquired or optioned, it is best to follow the procedures set out by the act anytime you need to acquire property. The U.S. Department of Housing and Urban Development has published a handbook for the act, which can be found at *www.hud.gov/offices/cpd/library/relocation/policyandguidance/handbook1378.cfm*

For most water and sewer projects, land acquisition is considered an "involuntary acquisition" under the URA, even if you have a willing seller. This is because local governments have the power of eminent domain, which allows you to take the property if necessary. Therefore, unless you are *certain* that you will not do so, follow the procedures for involuntary acquisition.

Obtain easements

Acquiring easements is very important for utility projects. The owner must use the easement form for the agency that is involved with financing the project. Some agencies do not stipulate which easement form must be used, but others, such as USDA Rural Development, require that its easement form be used when it is involved with financing the project. The owner may require legal services at this time, but this is not always necessary.

When it comes time for the owner to visit or meet with property owners to acquire easements, it should not be a surprise to property owners. They should have been informed of the need for easements in advance, during the public meetings described earlier.

Owners should not delay in obtaining and recording necessary easements. All easements need to be obtained well in advance of construction. Delays can cause future problems, such as construction delays and additional change orders.

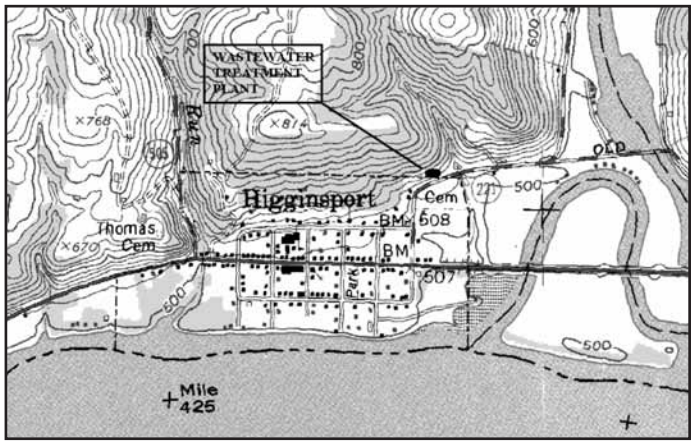
Acquire land

Your project may need land for pump stations, booster stations, treatment plants, or permanent

easements for lines. Owners should notify property owners prior to the time the actual land will be acquired so the property owners are not surprised at this time. The owner may require legal services at this time. Project owners are required to notify property owners of their rights under the Uniform Relocation Act.

Develop a right-of-way map and certificate

The owner should develop a right-of-way map and certify that all rights-of-way and land needed for the project have been obtained. This is more important for utility-line projects because lack of proper rights-of-way could lead to relocation of utility lines during the construction and delay the project. Not all funders require rights-of-ways to be mapped, but it is a good idea to ensure that these are secured prior to the start of construction.



Obtain user agreements

User agreements are often needed for utility projects because financing agencies often require assurance that a certain number of customers will connect when the service is provided so that debt repayment is assured. This is particularly true for water systems because connecting is voluntary. The owner should consult with the financing agency to determine if a user agreement is required.

For new water systems, or existing water systems extending service to new users, having user agreements in place is just good business practice, even if not required by the funder. The user agreement asks for a down payment from the prospective customer and shows the customer's intent to connect to the system. User agreements are legally binding documents and can protect the project owner from making costly investments in infrastructure without having sufficient customers to make debt repayment.

Sewer connections can be mandated if a sewer line is installed within 200 feet of a property in many states. However, if some of your prospective users are outside your jurisdictional boundaries, it is important to discuss this mandatory hookup with the local government entity that has jurisdiction in these areas or your local health department, as it will need to enforce the provision.

Obtain permits

It is the responsibility of the owner to acquire all necessary permits for a water or sewer project. The owner should consult with the engineer and make sure that acquiring permits is included in the engineer's scope of services. Permits are required for crossings of railroads, streams, wetlands, highways, for structures, electric, plumbing, etc.

Pitfalls to avoid

- Delaying obtaining easements, land, or user agreements, which delays construction and increases cost
- Moving forward with construction before securing easements or rights-of-way
- Failing to provide adequate time to acquire needed construction permits
- Proceeding on the assumption that users will sign up if you build it. This is a mistake that can plague your system for years with insufficient revenues.

Bidding

Roles and responsibilities

Owner	Engineer
1. Follow state laws and funders' requirements relative to bidding	1. Prepare bid document
2. Review bid document	2. Prepare bid advertisements
3. Finance bid advertisement costs	3. Schedule and attend pre-bid meeting
4. Attend pre-bid meeting	4. Conduct bid opening
5. Schedule and attend bid opening	5. Complete bid tabulation
6. Review bid tabulation	6. Review bonding requirements

Public entities in most states are required to follow certain procedures for bidding public projects. Your engineer with likely be familiar with the law, and your attorney should be able to answer any questions that you have on this topic.

Prepare a bid document

Prior to advertising for bids, a bid document must be developed for the project. This document must include:

- plans and specifications
- prevailing wage rates for projects that require compliance with federal Davis-Bacon laws
- required federal or state agency forms

It is typical for the engineer's scope of services to include preparation of the bid document. The owner needs to work with the engineer to make sure all necessary financing-agency requirements for the bid document are met. The engineer should also make sure that an addendum is sent to all potential bidders for the project. Addenda will often include changes to plans or specifications, additional agency forms, and updated prevailing wage rates.

Advertise for bids

After the bid document is prepared, the project is then advertised for bids. State laws often establish the length of time the bid must be advertised. The project engineer typically is responsible for preparing the bid advertisement and distributing it to the media. The owner is typically responsible for the cost of legal notices for bid advertisements. The bid advertisement must include a deadline for bids to be received and a date and time when bids will be opened.

Complete the bid opening

A bid opening is held at the owner's office. Typically, the project engineer opens each bid one by one and reads aloud the bidder's price quote. The project engineer also makes a list of each bidder's name and price quote.

Bid tabulation

Following the bid opening, the project engineer reviews each bid to make sure all required bidding documents are included and all forms were appropriately signed. The engineer develops a bid tabulation, which includes an itemized bid. The low bidder is identified, and the bid tabulation is sent to the owner and funding agencies. Contractor references need to be checked prior to awarding the contract.

Bonding

Proper bonding requirements for each contractor must be included in the bid

document. Each contractor must be bonded to a certain identified amount. This requirement protects the owner in the event that the selected contractor declares bankruptcy or performs improper work. The bonding company basically backs up the contractor's word that the company will complete the work in the contract. Financially sound contractors with a good reputation and work history will provide payment and performance bonds. Financially troubled or less-experienced contractors may bid less but may cost more in the long run.

Pre-construction activities

Notice of award

After the bids are tabulated, the project engineer prepares a notice of award that is signed by the owner and reviewed by the owner's attorney. The notice of award is then sent to the contractor that was selected. It is important for the owner not to issue the notice of award until all grants have been approved and environmental assessments have been completed for the project, including publishing notices and waiting for the comment period to expire, as well as release of funds by the funding agency. Issuing the notice of award prematurely could result in the owner losing certain grants for the project. The notice of award must be issued before the contractor's bid period (the specified length of time that the bids are valid) ends.

Notice to proceed

After the notice of award, the project engineer then prepares a notice to proceed. The notice to proceed tells the contractor that the owner has secured all necessary financing for the project and that construction can begin.

Pre-construction meeting

The owner then holds a pre-construction meeting. The project engineer generally facilitates the meeting. Items discussed at the meeting include the responsibilities of the owner, contractor, engineer, resident project representative, and financing agencies. It is very important to have representatives from any utility company that has infrastructure in the project area to attend the meeting so that coordination with the utilities can begin. Failing to communicate with utility companies at this point can result in construction problems and delays later.

Retainage

It is essential that the contractor understands the retainage requirements prior to starting construction. Retainage is money earned by a contractor but not paid to the contractor until completion of construction or some other agreed-upon date. The amount is held back as an assurance for the quality of the work. Retainage is generally 5.0 percent of each partial pay estimate. It is critical to withhold the correct retainage percentage from each partial pay estimate. Your state will most likely have laws about the maximum retainage allowable, so be sure to consult your attorney. When the project reaches substantial completion, the contractor requests that retainage be released and paid to the contractor by the owner.

You have now made it two-thirds of the way through your project. You can begin with the last phase of your project—construction.

Section 3
Construction

Getting started

You have finally entered the construction phase! However, this is not the time to let down your guard because you are about to enter the most intense and important stage of the project. Mistakes made during construction will not only increase costs, but may result in poorly constructed infrastructure. Underground work must be backfilled at the end of each workday for safety reasons. Therefore, the owner has very limited opportunities to detect and correct defective work. Competent and trustworthy construction inspection and management will be essential.

Everything you have done to this point was in preparation for construction. An engineer was hired, and the most cost-effective solution determined. The project was designed, and all necessary permits were obtained. All land, including easement rights-of-way, was secured. The project was bid out, and the best-qualified contractor was selected. All necessary financing was secured, and the appropriate loan and grant agreements were executed. A preconstruction conference was held, and the notice to proceed and notice of commencement were issued.

Any uncompleted steps must quickly be finished, as time delays during construction will be expensive. A three-person crew with equipment will cost several hundred dollars per hour. And it is not unusual for a contractor to have several crews working on the job at the same time. Large jobs are often bid to multiple contractors. The general or primary contractor will frequently subcontract jobs that require special skills or equipment. The coordination of construction activities will become a challenge for everyone involved.

At the beginning of each section in this chapter, you will find a list of Roles and Responsibilities of the owner, engineer, resident inspector and contractor. As the system owner, you must never lose sight of the project's purpose—to serve your residents—and you must be prepared to accept your ownership responsibilities. That includes keeping your customers informed of their responsibility to connect to the utility system in a timely fashion. Failing to be prepared to accept ownership responsibilities is perhaps one of the most common pitfalls encountered during construction. This is particularly true for new, start-up utility systems.

Pitfalls to avoid

Owner fails to prepare for the completion of construction by:

- not having written utility usage regulations with billing and collection procedures.
- not hiring and training staff necessary to operate the facility in a timely manner.
- estabilishing poor budgeting practices and internal control procedures.
- not acquiring hazard insurance in advance of substantial completion of the project.
- not enforcing timely customer connections.
- not implementing regulations to maintain quality control over customer-owned plumbing.
- collecting first year revenues that are inadequate to meet debt-service obligations.

The engineer is responsible for the coordination of construction. The engineering services agreement provides very specific guidelines on the responsibilities of the engineers, resident inspectors, contractor and owner. When in doubt about the proper chain of command, refer to your contract. Most engineering firms use contracts for design and construction developed by the Engineers Joint Contract Documents Committee (EJCDC) of the National Society of Professional Engineers (NSPE).

The duties and responsibilities of all parties involved in project construction are reviewed in detail during the pre-construction meeting. USDA has forms that can be downloaded from its website that provide detailed information about records to keep from the preconstruction meeting. These forms can be adapted with minor changes for projects that do not include USDA Rural Development funding. The preconstruction meeting outline and attendance record provide evidence that everyone involved is well-informed of their project responsibilities.

What is the condition of buildings, roads, sidewalks and plants which could be impacted by construction? Taking a video of areas before construction can prove valuable when dealing with customer complaints. Without it, what evidence do you have, say, that the $2,000 claim for replacement of a tree destroyed during construction is invalid because the tree died before it was removed by the contractor?

Construction should not begin until the contractor provides video files that document existing site conditions. Remember that "a picture is worth a thousand words."

Roles and responsibilities

Owner

1. Attend the preconstruction meeting. Be proactive.
2. Ask questions and voice your concerns. Focus on your customers' needs.
3. Establish accurate records on project management. *Review with auditor!*
4. Begin preparing to accept ownership duties and responsibilities.
5. Do not direct the contractor's work. The owner's instructions must be issued through the engineer.

Engineer

1. Coordinate activities of the owner, resident inspector, and contractor.
2. Direct contractor's work.

Contractor

Construct project infrastructure to the design parameters established in contract

TIP

Only the engineer has the authority to direct the contractor's work.

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.

Three generations of drinking water treatment plants in Hillsboro, Ohio

Public participation

While your council or board has likely been working on the project for many years, the beginning of construction often provides the first visible signs of change to your community's residents. This is when many of your citizens will first become aware of the project. The public will have many questions concerning their role in project development.

It is typical for people to talk and for rumors to fly in any situation of change. Rumors always gravitate toward the worst-case scenario or to center around negative news. Timely and accurate information is the only way to defeat the rumor mill. Although this guide encourages public participation from the beginning of the project, it is critically important during construction.

Progress in construction will be accomplished at the price of temporary disruptions in the lives of your residents. While all involved will endeavor to keep disruptions to a minimum, they cannot be entirely avoided. Residents need to know how the project will benefit and/or impact them personally.

Discuss project costs

Customers need to be informed about the project's benefits and cost. In particular, customers will want to know the following:

- total project cost
- justification for the option that was selected
- project service area and the number of new customers
- amount of grant and loan funding received
- amount and effective date of any necessary rate increase
- billing structure (who pays and how much?)

TIP

- *Keep the public informed.*
- *Develop a system for handling construction complaints*

Discuss construction schedule

Concerned citizens and customers need to be informed about how construction progress will impact their daily lives (traffic, access to homes and business, etc.). Citizens need to be informed of the following:

- construction start date
- estimated completion date
- approximate date construction will occur in their area
- date and duration of road closings and utility service shut-offs

Discuss connection guidelines

New customers need information about the availability of utility service, including:

- When can customer connections begin?
- When must customer connections be completed?
- Connection procedures; list of licensed installers
- Will plumbing upgrades be required? (description and estimated cost)
- Permit and inspection requirements
- What is the first billing date for new project customers?

Discuss construction activities

News releases should be provided throughout the project to keep customers updated on construction progress via media outlets. Specific construction activities, such as road closings and blasting, need to be disclosed several weeks in advance.

While the contractor may not be able to determine specific dates to these activities, the contractor should be able to provide a two- to three-week advance notification.

In the beginning, the owner will focus on overseeing the project to insure quality workmanship and timely payment of bills. As construction progresses, the owner must be able to handle traffic disruptions caused by construction and other construction complaints. The owner's involvement will increase as the amount of customer involvement increases. New systems will need assistance from technical assistance providers, funding agencies, the project engineer, and even the contractor to handle the increased workload. The owner will need to hire and train staff to deal with the increased workload. While temporary assistance is appropriate, eventually the community must develop the capacity to handle the responsibilities and duties of owning a utility on its own.

A procedure must be developed for handling construction complaints. All complaints should be received in writing. Complaints should be logged and forwarded to the project engineer as soon as they are received. The status of complaints that are resolved should be reviewed at each construction progress meeting. Customers should receive written notification when their complaint has been resolved. The engineer should have the final say on the resolution of all construction complaints. The community should never negotiate a resolution to complaints independent of the engineer's recommendation.

The contractor is responsible for addressing damages but must be given a reasonable amount of time to do the work. Problems often arise when people without the appropriate authority become involved in the process. The owner's job is to serve as the initial point of contact and to maintain a record of all communications. Do not create additional liability for yourself by expressing uninformed opinions. Everyone involved, from the mayor to employees in the field, needs to know how construction complaints will be handled.

Prepare for the time after construction

As the end of construction approaches, the owner's workload will increase, and the amount of professional assistance will decline. The owner needs to be prepared for this transition. Often customers are connected to a system by local contractors working under supervision of the owner. Things to consider at this point: Will the utility require these contractors to be licensed? The existing plumbing in many older homes may not meet current standards. Will plumbing upgrades be required? How will plumbing codes be enforced? Who will complete the necessary inspections? Consider working through your local health department and following its regulations and guidance.

Even when new customer connections are made by the project's general contractor, the owner will need to assume responsibility for any subsequent connections. The owner needs to be prepared to accept responsibility for customer connections. Utility-use rules and regulations must be developed. Rules and regulations are critical to the future operation of your utility, as they ensure that all connections to the system are properly installed. Illegal connections can cause significant storm water inflow/infiltration into a sewer system or drinking water problems. Enforcement policies need to be established. Billing practices need to be implemented.

The development and implementation of governing rules, regulations, policies, and procedures will require considerable time and effort. The owner should consult the project engineer, neighboring communities, and other technical service providers for assistance in developing utility-usage regulations.

Identify project representatives

One person should be designated as the owner's primary point of contact during the construction process. This person needs to oversee the project's construction, processing of partial payment estimates, and submission of payment requests to the funding agencies. He/she will also work to establish operating procedures and connection policies for the utility. Finally, he/she will need to maintain the office and establish billing practices.

This is not a part-time job—at least not in the beginning. For new, start-up utility systems, no one presently employed by the owner will typically be able to incorporate these additional job responsibilities into his/her daily schedule. The owner may need to consider hiring temporary or backup staff to maintain existing operations during construction and start-up.

Pitfall to avoid

Not assigning or hiring a staff member to oversee the project, including the completion of required and imporatnat paperwork.

Construction inspection

Roles and responsibilities

Owner

1. Review and approve resident inspector qualifications (along with the engineer). The resident inspector is your primary line of defense against poor construction.
2. Attend all construction progress meetings.
3. Monitor performance of the resident inspector. Daily inspection reports should be made available upon request. Ask to review all test results. Ask questions!
4. Follow up on the resolution of construction complaints.
5. Report and performance issues to the engineer.

Engineer

1. Oversee project construction and initial start-up.
2. Obtain resident inspection services to provide on-site observation of construction progress and insure compliance with approved plans and specification.
3. Supervise the resident inspector.
4. Document substantial completion and the beginning date for the warranty period.

Inspector

1. Act as the engineer's agent at the job site.
2. Serve as liaison between the contractor and engineer.
3. Maintain the construction office with copies of project-related documents (specifications, plans, contract documents, change orders, payment requests, etc.)
4. Oversee construction activities. Maintain daily construction reports. **The resident inspector should be on-site whenever work is being performed.**
5. Review construction progress schedules, shop drawings, and sample submissions of pay-draw with accompanying schedule of values and change orders
6. Monitor construction quality. Report adverse filed conditions and construction defects to the engineer and owner.
7. Maintain field measurements for the as-built drawings.

Contractor

Immediately notify the resident inspector and engineer of any change in field conditions that could result in a contract change order.

To save on costs, contractors will often substitute cheaper materials and faster construction techniques whenever the opportunity arises. Many times these substitutions can be made without adversely affecting quality. However, when quality is diminished, the results can be devastating. Underground utility construction is unique in that the majority of the work is backfilled daily. Once the work has been backfilled, construction problems are very difficult to correct.

For that reason, no utility project should ever be built without a highly qualified construction inspector to oversee the daily work of the contractor. The construction inspector's job is to insure that the project is implemented according to the plans, using construction materials required in the specifications, and with high-quality workmanship.

The resident inspector needs to be involved starting with the preconstruction meeting and continuing throughout construction to final inspection. Contract time extensions can increase the cost of the inspection. The increased cost of an inspector must, therefore, be considered whenever time extensions are reviewed.

Identify an agency and/or project inspector

The resident inspector typically works for the engineer. However, some communities with highly qualified staff will cover the resident inspection tasks internally. Before taking on this additional responsibility, the owner needs to determine who will perform the work normally completed by that employee while that employee is working as the resident inspector. Remember that the job responsibilities of your utility department workers will likely increase during construction. If the owner must hire backup employees to maintain workflow during construction, the owner might be better off hiring the resident inspector recommended by the engineer.

Maintaining the construction log

The resident inspector will be responsible for maintaining a construction log. The log should record construction activities, deliveries of materials, road conditions, weather, and anything else that may impact the contractor's performance. The construction log will record the daily activities of the resident inspector and therefore record all job-related activities. The construction log should be hand written in a hard-bound book to limit the possibility that project records could be modified. Should litigation ever become necessary, this document will prove to be invaluable.

TIP

Construction defects are difficult to detect and resolve once work is completed.

A resident inspector should never be on site whenever construction work is being performed.

The appropriate chain of command must be followed.

As-built field measurement responsibilities

Imagine your disappointment if, after excavating several thousand dollars worth of pavement and curbs and gutters, you discover that the pipeline you were looking for was actually located on the opposite side of the road. Pipeline locations can change significantly during construction. As-built drawings are essential for the successful operation and maintenance of a utility's pipeline project. It is the resident inspector's responsibility to take the field measurements necessary to create as-built drawings that will later become an important part of the records your utility will need to operate efficiently.

Develop a reporting procedure

The resident inspector is responsible for reporting the status of construction activities to the project engineer and owner. A daily inspection report should record the weather, which contractors were on site, and how many employees were working for each contractor. Also, equipment on site should be noted as well as whether the equipment was used or idle. The location and quantity of stored material should be recorded. This information will help the owner and engineer review proposed change orders.

Daily inspection reports will keep everyone informed of upcoming events, such as progress meetings, payment requests, change orders, substantial completion, initial start-up, final completion, etc.

Reporting guidelines that were established during the preconstruction meeting need to be followed. Guidelines should include the date that reports are due, method of delivery, and number of copies needed. Clear and consistent reporting guidelines will improve communications and avoid delays in processing partial-payment estimates and change orders.

Examples of…

Inadequate/incompetent inspection

The award for inadequate/incompetent resident inspection goes to a new, start-up sanitary sewer system (gravity-collection system with lagoon treatment). The project was significantly over budget. To save money, the community chose to enter the construction phase using a part-time resident inspector.

The inspector also worked as an inspector for a wastewater treatment improvement project approximately one and a half hours south of the subject community during much of the construction period. The inspector's attention was divided between the two communities. This worked reasonably well for the treatment plant portion of the project, but more than half the sewer-collection lines were installed without supervision.

Pipeline trenches were routinely backfilled during the resident inspector's absence. To compound the problem, much of the sewer-collection system was installed during the winter months. Winter freezing and thawing cycles made street conditions unbearable. Potholes quickly appeared wherever the sewer lines were installed.

In order to mitigate terrible street conditions, the community agreed to a large change order for granular backfill. The change order allowed the contractor to discard all of the native material excavated from the trench and replace it with granular backfill.

Granular backfill was used wherever open-cut sewer mains, manholes and laterals were installed in the street right-of-way. Gravel was used for bedding material at these locations.

Upon completion of the project, the community immediately began having inflow and infiltration problems. Storm water would overwhelm and flood the main pump station during

continued on page 51

Adequate/competent inspection

The project involved the construction of a treatment plant. Building construction could be left open for inspection and did not need to be backfilled each night. Above-ground construction was much easier to inspect on a part-time basis. An additional benefit was that the inspector lived relatively close to the project. No significant construction problems were encountered. The project was completed on time and within budget. Approximately 20 years later, the mechanical wastewater treatment plant continues to operate as it was designed.

The resident inspector was qualified to oversee the construction of utility projects. In fact, he had worked the majority of publicly funded water and wastewater projects installed in the area. The first community's problem stemmed from its decision to hire a part-time resident inspector, when a full-time inspector was needed. The impact of this decision was compounded by an inexperienced job superintendent working for a contractor who was experiencing financial problems. Of course, this information was only available in hindsight, which is always 20/20.

Inadequate/incompetent inspection

continued from page 50

even moderate rainfall events. Sand and gravel was entering the sewer system, and grit would cause the pumps to fail.

Much of the new collection system was videotaped during the warranty period as the contractor worked to locate and fix the problem. The community discovered that many of the sewer-line connections were not properly sealed. In a few instances, visible cracks between sections of pipe were large enough to allow the granular backfill material to enter the collection system.

Manhole lids and joints between manhole sections were likewise not sealed. Because of faulty installation, the granular bedding material operated much like a field drainage tile. Storm water traveled along the gravel backfill and immediately leached down along the cracks and unsealed joints where it entered the sanitary sewer collection system. Storm events would produce an almost immediate surge in the volume of wastewater transported to the lagoon.

Eventually the pumps had to be upsized to handle the additional storm water flow. While the pumps were replaced under warranty, the community had to pay the cost difference between the original design and the upsized pumps. Even after extensive collection system repairs were made, storm water inflow and infiltration continues to be a problem. The sewer system that was designed for 20 years of anticipated growth exceeded its design capacity during the first year of operations, requiring a non-seasonal emergency discharge.

Approximately 20 years later, the community continues to struggle with an inadequate wastewater treatment capacity. Economic development has been restricted. No new businesses could locate within the community, and a couple of the existing businesses were forced to expand elsewhere. The community's hope for 20 years of steady economic development was destroyed by poor sanitary collection system workmanship that remained undetected because of inadequate resident inspection until after the completion of construction.

TIP

- Hire a qualified resident inspector.
- Construction defects are very difficult to detect and almost impossible to resolve after installation is complete.
- All work should be left uncovered until the appropriate inspections are completed.
- Unresolved contractor problems only get worse with time. Corrective action should be taken as soon as problems are identified.
- Future serviceability will be reduced if project drawings are inaccurate.
- Hold final payment to the engineer until the operational manual and accurate as-built drawings are received.

Construction administration

Roles and responsibilities

Owner

1. Maintain accurate records of project expenses.
2. Process pay-draws in a timely manner.
3. Monitor compliance with wage rate and minority set-aside requirements

Engineer

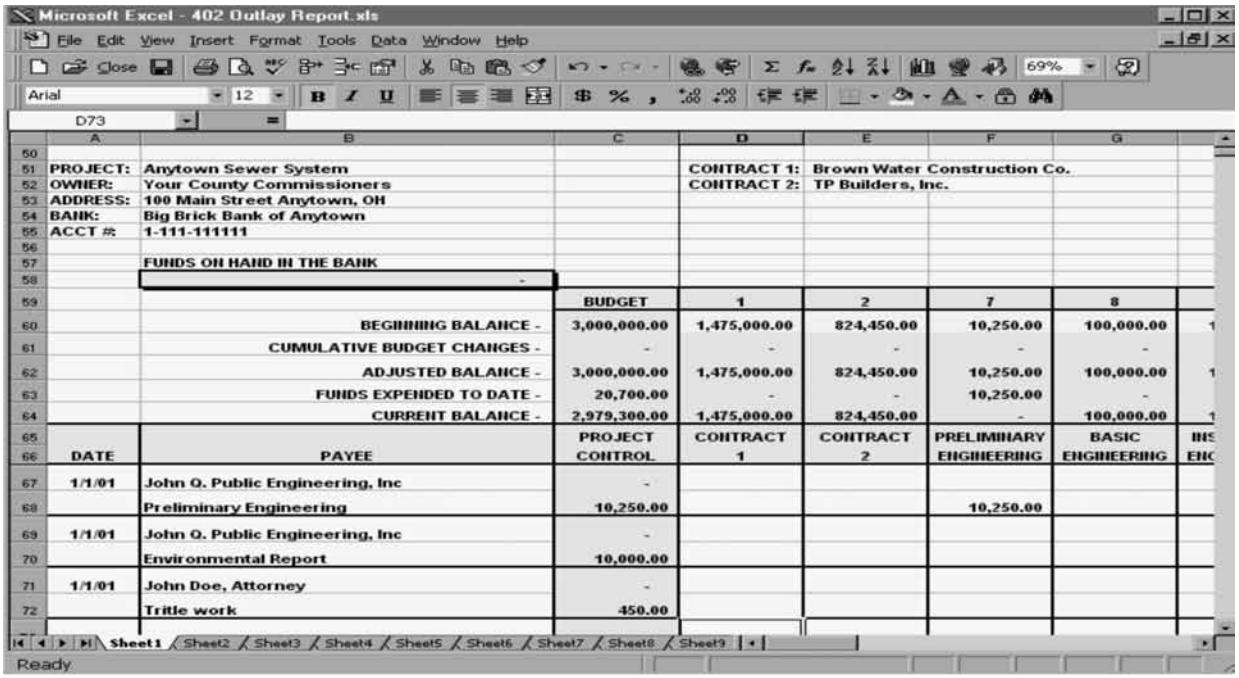
1. Issue clarifications and interpretations of the contract documents including the approval of equipment substitutions.
2. Issue field orders for minor changes to the plans and specifications.
3. Review and recommend change orders to the owner.
4. Document reasonableness of time-extension change orders.
5. Consult owner on acceptabiity of the “partial-payment estimates.”

Contractor

1. Submit contract change orders as soon as reasonably possible.
2. Initiate partial-payment estimates on the agreed-upon cut-off date.
3. Work to finish construction on or ahead of schedule. **Time extensions are never free.** At a minimum, additional costs of resident inspection must be covered.
4. If necessary, request time-extension change orders with a justification of why it is.

Maintaining construction progress will require money. The contractor will order materials almost immediately upon award of the contract. Delivery of materials will continue throughout the construction period, and materials and equipment suppliers are entitled to payment upon delivery. For highly specialized equipment, the contractor may need to make a down payment when the equipment is ordered. In addition, the contractor must pay for workers’ wages and leased equipment weekly. In order to reimburse ongoing construction costs, the contractor will need to receive partial payments for materials and construction work in progress.

The owner must maintain records showing project funding received and payments disbursed. The source and use of project funds should be tracked independently of the utility department’s operating funds. USDA has an automated outlay report form developed by Ohio Rural Development staff that works well for this purpose. As mentioned in a previous section, you should be able to obtain this by contacting your state or local Rural Development office. The spreadsheet and instructions are in Microsoft Excel. The spreadsheet should be updated whenever the financial status of the project changes. This includes engineering invoices, amendments to the engineering service contract, partial-payment estimates, change orders, time extensions, funding draw-downs, etc.



Microsoft Excel - 402 Outlay Report.xls

PROJECT:	Anytown Sewer System		CONTRACT 1:	Brown Water Construction Co.			
OWNER:	Your County Commissioners		CONTRACT 2:	TP Builders, Inc.			
ADDRESS:	100 Main Street Anytown, OH						
BANK:	Big Brick Bank of Anytown						
ACCT #:	1-111-111111						
	FUNDS ON HAND IN THE BANK						
		BUDGET	1	2	7	8	
	BEGINNING BALANCE -	3,000,000.00	1,475,000.00	824,450.00	10,250.00	100,000.00	1
	CUMULATIVE BUDGET CHANGES -	-	-	-	-	-	
	ADJUSTED BALANCE -	3,000,000.00	1,475,000.00	824,450.00	10,250.00	100,000.00	1
	FUNDS EXPENDED TO DATE -	20,700.00	-	-	10,250.00	-	
	CURRENT BALANCE -	2,979,300.00	1,475,000.00	824,450.00	-	100,000.00	1
DATE	PAYEE	PROJECT CONTROL	CONTRACT 1	CONTRACT 2	PRELIMINARY ENGINEERING	BASIC ENGINEERING	INS ENG
1/1/01	John Q. Public Engineering, Inc	-					
	Preliminary Engineering	10,250.00			10,250.00		
1/1/01	John Q. Public Engineering, Inc	-					
	Environmental Report	10,000.00					
1/1/01	John Doe, Attorney	-					
	Title work	450.00					

Some funding sources require wage-rate certification with Davis-Bacon or state prevailing wages. On these projects, the owner must certify that wage-rate and perhaps minority labor-utilization requirements were met. Wage-rate interview reports are also sometimes required.

This information will be subject to various agency reviews and a state audit. Time spent to maintain detailed and well-organized construction payment records will prove beneficial at project closeout. Projects that receive more than $500,000 in federal funds are subject to special audit requirements. Single audits are both time-consuming and expensive. It pays to plan accordingly.

Approving pay requests

Partial payment estimates are typically prepared monthly but can be requested more frequently. These must be initiated by the contractor.

The resident inspector will review a draft payment request and certify percentage completion and line-item quantities installed. The inspector will also verify the value of materials delivered to the job site and that the materials were stored satisfactorily. The inspector should check for math errors. A redline copy of the partial payment estimate should be returned to the contractor highlighting necessary revisions and corrections. Copies of the redline partial payment estimate will be forwarded to the project engineer and, if requested, to the funding agency construction analyst.

The contractor will use a redline partial payment estimate to make appropriate adjustments when preparing signature copies of the partial payment estimate. Typically everyone involved in project development and funding will need an original, signed copy. At a minimum, original copies will need to be prepared for the owner, project engineer, contractor, and funding agency. Additional copies must be prepared when multiple funding agencies are involved.

Original, signed copies of the partial payment estimate are now ready to circulate for approval.

Original, signed copies of the partial payment estimate should always be accompanied by appropriate lien waivers, wage-rate monitoring reports and minority-labor utilization reports. Wage-rate monitoring and minority-labor utilization reports are job-specific. These reporting requirements are carefully outlined in the contract specifications and should have been reviewed in detail at the pre-construction meeting.

The project engineer will provide first review and preliminary approval. The engineer will independently verify the calculations using quantities certified by the resident inspector. The engineer will also verify that all necessary supporting documentation has been submitted. The engineer will sign all copies of the partial payment estimate and forward it to the owner with recommendations for approval.

The owner will review the engineer's recommendation and supporting documentation. The owner review will focus on source of funds for payment and compliance with minority and wage-rate requirements. Engineers tend to focus on construction and sometimes are less focused on administrative requirements, such as lien waivers, insurance, and labor-reporting requirements. It is therefore always a good idea to double-check everything before issuing the owner's approval.

While the owner has the right to withhold payment at any time, every effort should be made to resolve conflicts outside the payment process. You should never withhold payment for concerns that were properly documented with the project engineer. Money is required to keep construction going. Withholding payment will only slow the progress of construction.

The engineer and resident inspector will also request reimbursement for work completed monthly. Before proceeding with payment, the owner should consult with the engineer and inspector to compare the amount charged against the amount specified in the professional service contracts.

Pitfalls to avoid

Failing to document and track:

- Project cost
- Wage rate monitoring reports
- Compliance with minority labor requirements

Processing draw-downs and disbursements

The lender provides the final step in the approval process. Most funding agencies require that the approval of the engineer and owner be obtained in advance of their review. Each funding agency uses a slightly different approval process. Some send payments directly to the contractor, while others transfer funds to the community. Some financing sources will transfer all project money to the community in advance and give the community permission to proceed with payment once all necessary approvals have been obtained. Others will not order funds until all necessary approvals have been granted. Pay draws are sometimes further complicated by partial funding from multiple sources.

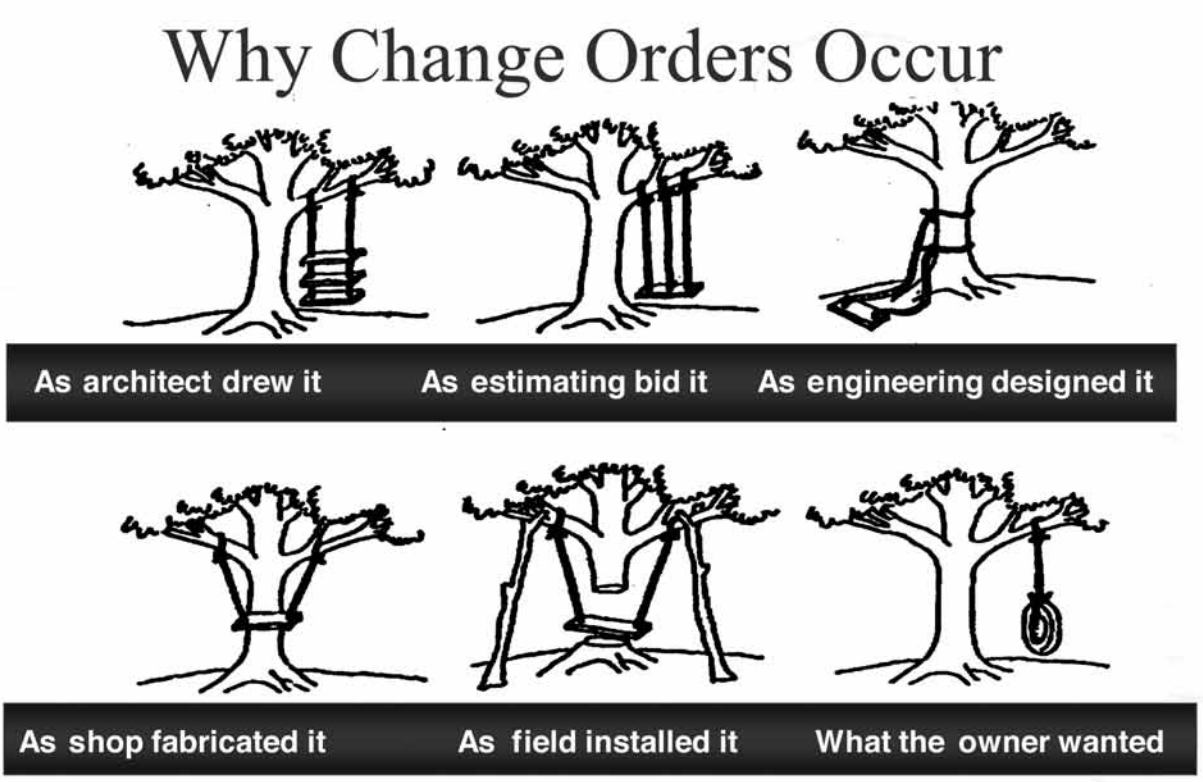
It is a good practice to base draw-downs and subsequent contractor payments upon approved partial-payment estimates even when it is not required. Regardless of the payment procedures used, you will need to keep track of requests and disbursements of funds.

Details on how the various financing sources will interact with one another should be resolved very early in the construction process. Partial-payment estimate processing as outlined above

TIP

Happy and well-paid contractors tend to do a better job.

Payment problems can slow construction progress and provide an opportunity for the contractors to request additional compensation.



Courtesy of USDA

can easily take 20 days. This leaves very little time to resolve funding issues if the goal is to pay within 30 days of the partial-payment estimate.

Change orders

Change orders are a necessary part of construction. To be financially prepared for unforeseen conditions that may increase construction costs, the owner should set aside a minimum of 10 percent of the construction contract as a contingency. Contingency funds should be monitored very carefully. Once expended, the owner will need to use cash reserves or secure additional loans to cover cost overruns.

Change orders should be processed using the same protocol that was established for partial-payment estimates. Change orders are prepared by the contractor and submitted to the resident inspector. The inspector will review the change order and forward it to the project engineer. The engineer will provide a detailed technical review. Because the costs of change orders must be negotiated without the benefit of competitive bidding, the engineer will need to carefully analyze the costs based upon time and materials. Therefore, the contractor will need to provide documentation to support change order pricing.

While the contractor may not request additional money but time instead in some cases, the owner may need to pay for more time from the resident inspector. Time is money, and, therefore, time-extension change orders are not free. In addition, there may be a loss in revenues from new customer connections. Additional staff may have been hired in anticipation of facility start-up. The date of the first loan payment may have already been set. The combined impact of delayed revenues and increased expenses could be financially devastating.

It is the responsibility of the contractor to request a time-extension change order. Approval of the time extension is at the discretion of the owner and engineer. Any additional costs associated with approval of a time extension are the owner's responsibility. An approved time-extension change order simply makes it official that the contractor is not responsible for the construction delay and therefore not liable for the cost incurred by the owner due to the delay.

Pitfalls to avoid

- Owner failed to review plans and specifrications prior to bidding and awarding of contract, resulting in unacceptable materials and equipment
- System operators/ employees were not included in design review, resulting in additional electricity service and equipment to operate the facility
- Existing knowledge of the site was not incorporated into the plans and specifications
- Inadequate subsurface investigations
- Easement/right-of-way was not recorded
- Paying partial-payment estimates without review and approval of engineer or funding agency
- Asking the contractor to perform additional work without the knowledge of the engineer, resident inspector and/or funding agency, project changes made after bidding will increase the cost, and funding agencies may not reimburse payment for construction outside original project scope
- Approving change order/ time extensions without knowledge of the engineer, resident inspector and/or funding agencies

Agency review

Each agency has its own review procedures and policies for approval of partial-payment estimates, construction draws, change orders and time extensions. Procedures for review of these items need to be established very early during the construction process. Once established, these procedures must be followed precisely. No one wants administrative processing delays to turn into construction delays. Likewise, an emergency caused by processing delays anywhere along the chain of approval cannot be used to push others into expedient action.

Liquidated damages

Time delays can prove to be very expensive. For that reason, the construction contract normally contains language requiring the contractor to reimburse the owner for financial losses incurred as a result of construction delays. Documentation is critical to assessing the amount of liquidated damages. Liquidated damages are not a penalty. Financial losses of the owner must be documented.

Progress meetings

Roles and responsibilities
Owner
1. Attend all progress meetings. 2. Follow up on the resolution of outstanding construction complaints. 3. Monitor the construction schedule. *Continue preparing customer connections.* 4. Report concerns in writing to project engineer.
Engineer
Report progress, problems, and other relevant issues.
Contractor
Report progress, problems, unresolved customer complaints, and other relevant issues.

Construction progress meetings are normally conducted monthly. They provide everyone involved an opportunity to review construction progress and voice their concerns. Progress meetings are normally held on or near the partial payment cut-off date. It is highly recommended that at least one representative of the owner attend each progress meeting. Minutes from the progress meeting should be discussed at the next owner board meeting for the benefit of those who were unable to attend.

Discuss work completed

Progress meetings normally start with a discussion of work completed during the last 30 days. This information gives the engineer and owner an indication of what to expect on the next partial payment estimate. It also provides an indication of whether the project is ahead or behind schedule.

Coordination of work is a major issue on projects with multiple contracts. The coordination of work is particularly important when the completion of a particular contract (Contract A, for example) is dependent upon the work being performed on another contract (Contract B, for example). Cooperation is essential. Work-scheduling conflicts will arise. It is important that the engineer take control of the situation to enact an immediate solution. Scheduling conflicts that are allowed to persist will eventually cause construction delays.

Discuss problems/changes

Pending change orders should be discussed. Progress meetings provide an early indication of upcoming change orders, including time extensions. Construction defects should also be discussed. The owner's representative should pay special attention to how construction defects will be corrected. Unresolved construction problems can have a lasting impact upon the project.

Progress meetings are the ideal time to monitor the contractor's progress in resolving customer complaints. This is likely the only time that everyone necessary to resolve a customer complaint will be together at one location. This opportunity should not be wasted.

As the project's completion draws near, there will be pressure on the community to spend contingency funds. Both the contractor and engineer know that you have additional funds available for unforeseen cost overruns. They will offer suggestions on how to spend the money. The community needs to hold off spending these funds until you are sure that the project can be completed within budget.

Contingency funds should not be wasted on cosmetic or convenience items. Surplus monies should be devoted to project improvements that increase revenue and/or reduce costs by improving operational efficiency or extending the facility's useful life. The funding agencies will need to approve the expenditure of contingency money, particularly when grant dollars are involved.

Discuss pay requests

The status of any outstanding partial payment estimates needs to be discussed. Hopefully the contractor has been paid for the previous month. If not, you should check on the status of the previous month's pay request. A draft copy of the currently proposed partial payment estimate is usually available at the progress meeting. The current request will be discussed in great detail. Attendance at the progress meeting will expedite and simplify your review of the pay request.

Discuss construction schedule

The construction schedule is normally reviewed at each progress meeting. An important item to discuss is the delivery date for specialty equipment. Time delays are often caused by equipment backorders. This is one of the few items that is truly outside the contractor's control.

TIP

Notify the engineer in writing if the project is not progressing as scheduled.

Time is money—remind the contractor of the liquidated damages caused in the contract if the project begins to fall behind schedule.

Keep good records of correspondence with the engineer. Serious concerns should be sent with a return receipt requested.

Follow up to make sure that appropriate corrective actions have been taken.

Do not attempt to settle construction complaints without the knowledge and involvement of both the engineer and contractor. The contractor may be able to hold the owner responsible for cost and resulting time delays caused by unauthorized settlement of construction complaints.

As the project nears completion, it is important to discuss the status of customer connections. The connection of new customers does not occur instantaneously or automatically. Timely customer connections will require significant planning and oversight by the owner.

Customer connections

Roles and responsibilities

Owner

1. Enact utiity usage regulations.
2. Develop an operating budget to justify user rates.
3. Start billing for utility service at the first available opportunity.
4. Legally enforce customer connection policies, if necessary.

Several important steps need to take place before customer connections can be completed. These include the collection of tap fees and getting customers' signatures on the user agreements. Hopefully these documents were collected during the project-planning phase. If not, they need to be collected before utility system connections are made.

Customer connection and billing must begin as early as possible on projects involving service to new users. When possible, the phasing of substantial completion is highly recommended. This practice is particularly advantageous when sections of the project are completed well in advance of the project as a whole.

Water customers can be billed as soon as the meter is installed in the meter pit. It is the customer's responsibility to make the necessary connections. Once service is made available, there is no need to wait on billing. The owner should ask for an updated list of customer connections each week and begin billing accordingly.

Sewer customers must often be forced to connect. This battle must be led by the owner. Mandatory hook-up legislation needs to be enforced. A deadline for connecting must be established. Customers must be placed on notice that billing will begin on a specified date regardless of the status of their connection.

Sometimes customer connections are

completed by local contractors. When this occurs, it will become important to coordinate work schedules to avoid conflicts between installation contractors and the general contractor.

One of the biggest sources of storm water inflow is caused by the improper connection of downspouts and sump pumps. When illegal cross connections are located, separate storm water lines will need to be installed.

When private septic tanks are being replaced by centralized sanitary sewer lines, the septic tank must be pumped and properly abandoned. Costs to abandon the septic tank will vary greatly depending on size and location. This cost is difficult to project until initial site work has been completed, but these costs are typically the responsibility of the homeowner.

Utility usage regulations need to be enacted in advance of customer connections. Usage regulations provide staff with written guidance on customer connections, permits, inspection, meter reading, billing, collection, etc.

Tap fees/capacity charges

The financial stability of the utility depends upon its ability to generate a projected level of revenues. When rate increases are necessary, they need to be enacted well in advance of the first loan payment date.

Rural water system connections cannot be mandated. Therefore, water tap fees should have been collected during the project's planning stage. You likely have been holding customers' money in escrow for many months, if not years.

The customers' tap fees were considered local matching funds by the funding agency when determining the project's feasibility. Once a service connection has been made, the money has finally been earned and may be applied toward project-related expenses. Your project would likely have never been funded if not for the commitment of these original customers. For that reason, people who agree to accept service prior to funding are often given preferential treatment. Often they are able to connect into the utility system for half of the normal tap fee (50 percent discount).

Once construction is officially underway, there may be additional customers who may want to jump on board. Tap fees, user agreements and easements need to be collected from these customers. Taps can be set during construction at a substantial savings to the owner. You may want to consider giving these customers a price break as well. Often customers who sign up for service before construction passes in front of their property are offered a 15 percent to 30 percent discount. Once construction has passed the property, the full tap fee amount should be charged.

Sewer tap fees are handled differently. Mandatory connection can be enforced inside your jurisdictional boundaries or outside your boundaries in cooperation with the local health department in many states. Everyone who has access to sewer service must connect. Therefore, it is not necessary to encourage connection by discounting tap fees. Sewer tap fees are usually collected when the customer comes into the community's offices to pay a permit fee. People are seldom agreeable to paying sewer fees in advance.

User agreements

The user agreement is a legal document outlining the terms and conditions of utility service. A signed user agreement should be obtained when the tap fee is collected. No one should be connected to the utility system until the tap fee is collected and the user agreement is signed.

Property assessments

If your project is being financed in whole or in part through assessments, these property assessments were estimated for your initial public hearings. The assessment amount must be recalculated once construction is finalized. Any cost savings achieved during construction must be applied toward reducing the amount of the assessment. Once the assessment amount has been finalized, customers will be given a limited amount of time to pay the assessment before it is certified to the auditor.

In some states, customers who qualify according to their income may have the ability to get grant funding to help pay for their assessments. Eligible households have a limited time frame to apply. Once an assessment has been certified to the auditor, it can be paid only from real estate tax receipts.

Communities that obtained community development block grant (CDBG) funds for project construction are often required to pay the assessment on behalf of income-eligible customers. Income eligibility must be certified on a household-by-household basis. Other funding agencies, such as USDA Rural Development, through its 504 Housing Program, also have funds available for this purpose. Obtaining this funding is the responsibility of each individual homeowner.

Note that not all projects require assessments, nor are they always the most desirable way to fund a project. Many projects are financed based on a system's revenues only (user charges). Many communities seek to avoid using assessments as they are often controversial.

Timely customer connections

Realizing the importance of early revenues, the funding agency may have required the owner to establish a plan for timely customer connections (this is a requirement for USDA Rural Development funding). It is now time to implement your customer-connection plan.

TIP

Early revenues are critical. Customers must be billed as soon as the utility service is made available.

Financial solvency of the utility is dependent upon revenues from new customers. Customers with access to service should be billed regardless of the status of their connection.

You must be prepared to operate the facility once construction is completed. Do not delay customer connections and/or billing.

Permits

In many areas, plumbing permits must be obtained before customer connections can be made. The permitting process allows the owner to require that a certified installation contractor make the customer connections. A listing of certified contractors, along with a copy of code regulations and material specifications, should be included in the permitting package. Normally a permit fee will be charged. The fee amount should be adequate to cover the cost of inspection.

Mandatory hookups

Sanitary sewer connections are subject to mandatory hookup. However, the specific regulations vary from state to state. You should obtain a copy of the appropriate state and local laws for reference in discussions with your customers. In some states, the local health department has the ability to require mandatory connection to a public sewer if it comes within a certain distance of a property.

Even at its best, enforcement of mandatory hookup regulation is awkward and can, at times, be problematic. Customers should be given the opportunity to connect voluntarily before

legal enforcement measures are undertaken. However, the community will need to follow through with legal enforcement once the grace period has elapsed. Your strongest enforcement tool lies within your billing policy. Customers with service access should be billed regardless of the status of their connection. Most people will eventually connect once they realize that they are going to be charged for the service anyway.

Inspection

As mentioned earlier, improper sewer connections provide the greatest risk of storm water inflow into new sanitary sewer lines. Inspectors need to be diligent in looking for downspouts and sump pumps that may have been connected to the sanitary sewer system.

Storm water/sanitary sewer cross connections were commonly made as recently as 40 years ago. The present owners may have no knowledge of the cross connection. The focus of the inspector should be on correcting the problem. The installation of new storm water lines to remove any sanitary sewer cross connections can significantly increase the cost of a customer's connection.

Water lines should be inspected as well to prevent cross connection of private wells with the public water system. Often customers will ask to retain their private wells to wash their cars and water outdoor plants. This request can be honored only if there is a distinct and permanent disconnection between the two water systems.

Project closeout

Roles and responsibilities

Owner

1. Hire and adequately train an operator.
2. Obtain hazard and liability insurance on the facility.
3. Obtain and properly safeguard O&M manuals and as-built drawings.
4. Follow start-up instructions and maintenance intervals exactly.
5. Ensure punch-list items are completed before making final payment.
6. Carefully monitor performance during the 12-month warranty period.

Engineer

1. Document the date of "substantial completion." Oversee the initial start-up.
2. Develop a punch list of uncompleted and/or unsatisfactory construction items.
3. Follow up on completion of punch-list items and certify "final completion."
4. Recommend final payment to the contractor.
5. Provide O&M manual and reproducible as-built drawings to the owner.
6. Oversee the first year of system operation.
7. Conduct an 11-month warranty inspection, and work with owner and contractor to resolve any remaining problems

Contractor

Construct project infrastructure to the design parameters established in contract documents plans and specificiations.

You have finally arrived at the end of construction. But before you are finished, there is some final paperwork that must be completed.

Pre-final inspection and walk-through

When the contractor believes that construction has been completed to the point where the owner can receive beneficial use of the facility, the contractor will request a walk-through and punch-list inspection. This inspection is highly significant.

Upon completion of the walk-through inspection, a punch list will be developed showing all unfinished and defective construction. Punch-list items will be valued and the amount of retainage reduced accordingly. Often contractors will schedule a punch-list inspection based upon a projected completion date. Work seldom proceeds as anticipated, leading to an excessive number of punch-list items. Contractors should therefore be discouraged from prematurely scheduling the walk-through and punch-list inspection.

If it is agreed that the owner can receive beneficial use of the facility, a time will be set for equipment start-up. Once start-up has successfully occurred, a certificate of substantial completion will be issued and the warranty period will begin. At that point, ownership of the facility will be transferred from the contractor to the owner.

Certificate of substantial completion

After considering any objections of the owner, the engineer is responsible for issuing the certificate of substantial completion. Construction on large projects is sometimes completed in phases with multiple substantial-completion dates. This practice can be beneficial to both the contractor and owner. The contractor may qualify for a reduction in retainage, and the owner will be able to start billing new customers. The engineer's decision concerning the status of project completion should be considered be final.

Responsibility for hazard insurance

The owner will assume responsibility for property insurance coverage as of the date of substantial completion. The owner, therefore, needs to make arrangements with an insurance carrier as soon as a punch-list inspection date has been established. If, for some reason, the owner cannot obtain insurance by the punch-list inspection date, written notice should be given to the engineer explaining the problem and specifying the date on which insurance coverage will begin. It is not unusual for substantial-completion date to be delayed a couple of days in order for the owner to obtain documentation of insurance coverage.

The contractor is responsible for insurance only through substantial completion. Do not allow the facility to become uninsured.

Builder's warranty

The date of substantial completion will become the beginning date on the builder's warranty. Typically a one-year builder's warranty is provided. The community should carefully track this date, as construction defects reported after the warranty period will not be covered.

Punch list/adjustments to retainage

Normally the engineer will estimate the cost of punch-list construction items at double their anticipated value and recommend an appropriate reduction in retainage. Depending upon engineer-contractor-owner relationships, further reductions in retainage are sometimes recommended. The amount of retainage held should always be adequate to cover the cost of paying a third-party contractor to complete the job.

Final completion/final payment to contractors

Final payment to the contractor is due when all of the identified punch-list items have been satisfactorily completed. The engineer will recommend final payment by issuing a "notice of acceptability of work." The final payment should be issued immediately after all contract work has been satisfactorily completed. The owner has no legal grounds to withhold payment once the notice of acceptability of work has been issued.

Pitfalls to avoid

- Owner fails to hold the correct amount of retainage
- Punch-list retainage amount is not sufficient to hire a third-party contractor to complete the job
- Contractor is paid in full before final punch-list items are completed
- Final payment to contractor is withheld after all work has been completed and certified by engineer

As-built drawings/operations and maintenance manuals

Upon completion of construction, the engineer is responsible for providing the community with an operations and maintenance manual (O&M manual) and a reproducible copy of the as-built drawings. The O&M manual will provide detailed instructions on how to operate equipment as well as suggested recordkeeping procedures. As-built drawings, which show the exact location of underground equipment, will be invaluable should emergency repairs become necessary.

The manual will also provide a suggested maintenance schedule. It is essential that start-up maintenance intervals be followed exactly. Failure to do so can void the manufacturer's and builder's warranty. Detailed records must be maintained to provide evidence that the work was performed.

Not following suggested maintenance procedures can have devastating, long-term impacts as all system components must work together to achieve the designed level of service. Overall performance of the utility system will be limited by the performance of the weakest component. It has been repeatedly proven that any weaknesses in the performance of a drinking

water distribution or wastewater collection system will adversely impact performance of the treatment plant and vice versa.

Successful implementation of a comprehensive preventative-maintenance program is the single most important factor in determining the facility's useful life and minimizing the lifetime cost. Deferred maintenance can never be completely erased.

Copies of the O&M manual and as-built drawings should be provided to all appropriate employees of the utility system. However, the original, reproducible copy of these documents should be maintained in a safe location. Over the years, many communities have lost these documents, resulting in many issues. For example, valves and hydrants were not exercised and became unusable. Unnecessarily large street cuts were made to repair underground piping because no one knew the exact location of lines. Equipment repairs were made when component replacements would have been less costly had appropriate wiring and plumbing diagrams been available. Not having the appropriate information available when needed will increase operation and maintenance costs.

The community needs to develop procedures to revise the as-built drawings whenever upgrades are installed. Likewise, the O&M manual should be updated to incorporate any manufacturer-recommended changes to the maintenance schedule. Periodically, updated versions of the as-built drawings and O&M manual should be distributed to the appropriate staff members.

Training on new equipment

The engineer is obligated to assist the owner in training the staff in the operation and maintenance of project-related equipment. The O&M manual and as-built drawings supplied by the engineer will be vital during this training period.

TIP

As-built drawings and operation and maintenance manuals are invaluable when completing emergency repairs.

As-built drawings should be prepared during all phases of construction to ensure that work completed is accurately recorded.

Working together, the engineer and utility staff need to develop procedures to monitor and record the system's operation and maintenance. Critical data from this recordkeeping system should be reported to the council or governing body on a monthly, quarterly and/or annual basis.

Training should be an ongoing process during the first year of operation. Usually splitting up the training in shorter sessions over several days is more beneficial than a single-day marathon session.

Final payment to engineer

The final payment to the engineer should be withheld pending receipt of the O&M manual with as-built drawings, completion of the required training on the system's operation and maintenance, and the 11-month warranty inspection. Often the warranty inspection is the last scheduled visit by the project engineer.

TIP

Hire an operator early enough in the construction process to allow time for necessary training.

Essential utility staff should be present for initial start-up to allow staff to benefit from training provided by equipment manufacturers.

Eleven-month warranty inspection

The engineer is required to provide an inspection of the project within one month of the warranty expiration to ascertain that the facility is performing according to design specifications. The owner's representative and system operator need to be present for this inspection. The 11-month warranty inspection provides a final opportunity to review the system's operation prior to the warranty period's expiration. Any outstanding construction defects and/or operational problems will be reviewed during this meeting.

Financing closeout

Nearly every funding agency will require an accounting of how their funds were used at the end of construction. This task will be easy if the owner maintained good records during construction. If, however, construction financial records were not well-maintained, the closeout report may be almost impossible to complete.

Closeout reports need to show that construction was completed as required in the loan/grant agreement. Many agencies have limitations on how their funds can be utilized. Documentation must therefore be provided to show how their funds were disbursed. The agency will review this information to ensure that funds were disbursed in accordance with its guidelines and for eligible project costs.

Grant funds are typically at the greatest risk of being lost. Grant funds also must be matched with other funds at the level indicated in the grant agreement. For example, if the $250,000 grant you received must be matched at a ratio of 1 to 1, then you must provide documentation of $250,000 in matching funds. Therefore, if your total project cost falls below $500,000, you will need to reduce the grant amount so as not to exceed 50 percent of the new total project cost.

TIP

Follow start-up instructions exactly, and maintain detailed records of maintenance work performed. Failure to do so can void the manufacturer's and builder's warranty.

Development grants are often based upon the number of new jobs created. If the grant required a specific number of new jobs and a reduced number of jobs was actually created, the amount of available funding may be reduced. But because the total project cost most likely did not decline, the amount of money lost will need to be replaced from another source. Typically grant dollars are replaced with additional loan dollars, and sometimes lost funds are not replaced at all, resulting in a reduction in project funding.

Many grant-funding sources require loan dollars to be spent first. If a project is constructed for less than the anticipated amount, the funder will ask that unused money be returned. Engineers and contractors are always eager to assist in spending unused contingency funds. However, care should be taken that you do not spend contingency funds too soon. If undocumented cost overruns arise after the majority of contingency dollars are spent on luxury or convenience items, there may not be adequate funds remaining to cover necessary changes. It is always best to err on the side of caution and seek an agency's approval before spending the money rather than proceeding and ending up seeking additional loan funds to reimburse unauthorized grant disbursements.

Auditing

A certified public accountant (CPA) audit is required whenever federal funds are used in a project's construction. It is therefore

important that the project's funds be separated from other funding sources. Careful records must be maintained in an audit-friendly format. An audit complying with OMB Circular A-133 must be completed for borrowers that received $500,000 or more in federal (loan or grant) assistance. Most construction projects will meet this threshold.

The OMB Circular A-133 requires that the auditor provide an opinion on the appropriate expenditure of federal funds in addition to the normal audit requirements. The audit must therefore trace each project transaction from contract signature to final payment. These audits are both time-consuming and expensive. Testing requirements and auditing costs for an A-133-compliant audit are almost double that of a typical audit. Communities must plan accordingly.

Contact your auditor in advance of the project's construction to review A-133 program requirements and negotiate the cost of the audit. If possible, you should retain enough contingency money to cover the additional cost of an A-133 audit.

End of the project

Congratulations! You have reached the end of your project, and you have probably learned more than you would have expected along the way. Hopefully you have a system that you are happy with and that is providing the expected services to your community. If you are better off as a community and as a group that has overseen this project, then it can be counted as a success.

Other RCAP publications to help in the operations and oversight of water systems

If you are a board or council member or staff member with responsibilities for overseeing your community's water system, the Rural Community Assistance Partnership (RCAP) has produced many other publications to assist you in these responsibilities. These publications are titled/on the topics of:

- *A Drop of Knowledge: The Non-operator's Guide to Drinking Water Systems*
- *A Drop of Knowledge: The Non-operator's Guide to Wastewater Systems*
- responsibilities (managerial, financial, legal, etc.) of board members of small water systems
- *USDA Rural Utilities Service Borrower's Guide: A How-to for Water and Wastewater Loans from USDA Rural Development*
- *ARRA Registering and Reporting Guide for Water/ Wastewater Systems with Loans/Grants from the U.S. Department of Agriculture-Rural Utilities Service*
- planning and resources for sustainable infrastructure for small water systems
- financial management of small water systems
- developing and managing a water- or sewer-construction project
- water-distribution system maintenance
- asset management and conducting vulnerability assessments and emergency-response planning

All of the above publications can be accessed and downloaded for free (in PDF) on the RCAP website at *www.rcap.org* (click on "Publications & Resources" on the main menu).

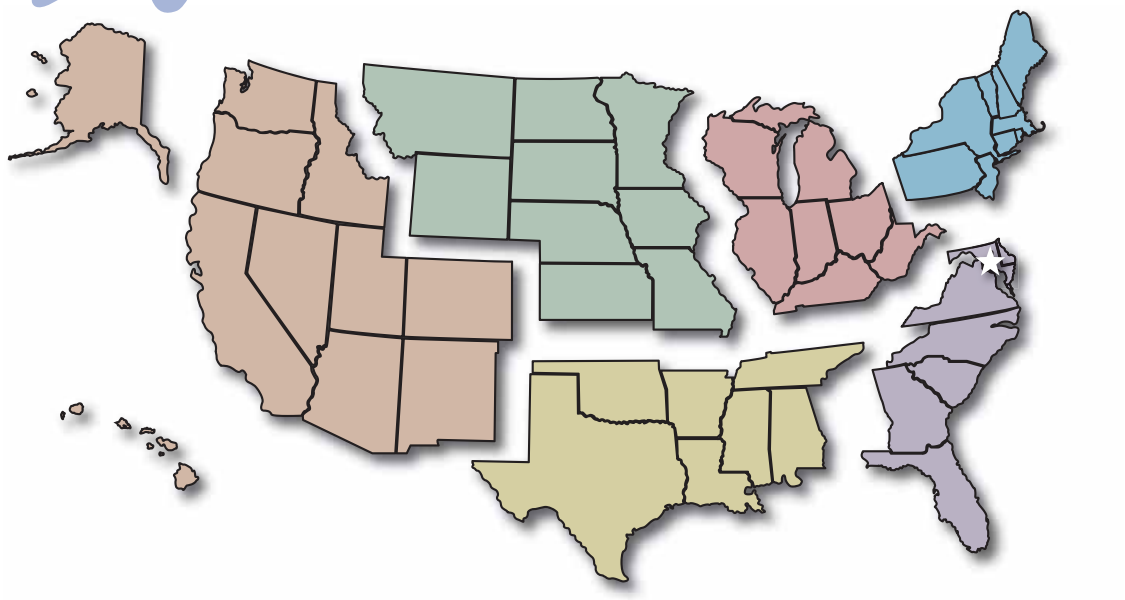
Free resources that can be sent to you regularly: RCAP has a magazine–*Rural Matters*–that is produced several times each year. Subscriptions are free. Included in each issue are articles that are useful to small community leaders and system operators. RCAP also produces an electronic newsletter, the eBulletin. Subscribing by email is also free. Each issue provides helpful tips, guides and resources on practical subjects. Find subscription information for both of these resources at *www.rcap.org* (click on Publications & Resources).

Need help with your community's water or wastewater system?

The Rural Community Assistance Partnership (RCAP) is a national network of nonprofit organizations working to ensure that rural and small communities throughout the United States have access to safe drinking water and sanitary wastewater disposal. The six regional RCAPs provide a variety of programs to accomplish this goal, such as direct training and technical assistance, leveraging millions of dollars to assist communities develop and improve their water and wastewater systems.

If you are seeking assistance in your community, contact the office for the RCAP region that your state is in, according to the map below. Work in individual communities is coordinated by these regional offices.

Rural Community Assistance Partnership



Puerto Rico (Northeast RCAP) and U.S. Virgin Islands (RCAC)

Western RCAP
Rural Community Assistance Corporation
3120 Freeboard Drive, Suite 201
West Sacramento, CA 95691
(916) 447-2854
www.rcac.org

Midwest RCAP
Midwest Assistance Program
P.O. Box 81
212 Lady Slipper Avenue NE
New Prague, MN 56071
(952) 758-4334
www.map-inc.org

Southern RCAP
Community Resource Group
3 East Colt Square Drive
Fayetteville, AR 72703
(479) 443-2700
www.crg.org

Northeast RCAP
RCAP Solutions
P.O. Box 159
205 School Street
Gardner, MA 01440
(800) 488-1969
www.rcapsolutions.org

Great Lakes RCAP
WSOS Community Action Commission
P.O. Box 590
219 S. Front St., 2nd Floor
Fremont, OH 43420
(800) 775-9767
www.glrcap.org

Southeast RCAP
Southeast Rural Community Assistance Project
P.O. Box 2868
347 Campbell Ave. SW
Roanoke, VA 24016
(866) 928-3731
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Visit our website for other publications, electronic and print periodicals, and ways your community can get assistance with its water and wastewater system.