



WORKING WITH YOUR CONSULTING ENGINEER

ENGINEERING 101

By Wessler Engineering

Working With Your Consulting Engineer

Consulting engineers are engineers that provide independent expertise in engineering, products, regulations, and related areas to governments, utilities, industries, developers, and construction companies. When you need a fresh perspective, an independent review of problems, or help with planning and design, it is good to employ the services of a consulting engineer.

Study Phase

PROBLEM DEFINITION

Projects often begin with challenges that need solutions. The study phase is where your challenge is discussed, evaluated, and defined. By clearly defining your problem and its solution in writing, you can effectively communicate the project to decision makers, regulators, customers, grant sources, and others who may be deciding to help fund or approve the work.

ANALYSIS

To define the problem, you and your consulting engineer should sit down to analyze relevant past records, field tests, and facility documentation. Your input is critical to helping the consultant understand your operation. With this understanding, the consulting engineer can perform calculations, modeling, and additional testing to document your issues.

EVALUATION OF ALTERNATIVES

Once the problem is defined and analyzed, alternatives can be developed to implement the best solution. Will your project entail a detour through your community? What materials, technology, and construction methods will be needed? Work with your consulting engineer to come up with alternatives suited for your project and community's needs. Often times the facility staff knows the best alternative to the problem but may need help in justifying or developing their ideas. A consulting engineer can provide ideas for alternative solutions.

REGULATORY AGENCY CONSIDERATIONS

Permitting requirements by the state and county can have major impacts on your project, especially related to schedule and cost. Your consulting engineer should determine which permits are required for each alternative and how they can affect your project. A 4-month floodway permit requirement might not be an issue if it is known at this stage of the process.

PRELIMINARY COST ESTIMATES

What costs are going to play a part in the overall completion of your project? A consulting engineer can help you develop preliminary construction costs, non-construction costs, capital vs. life cycle costs, and contingencies.

FUNDING ALTERNATIVES

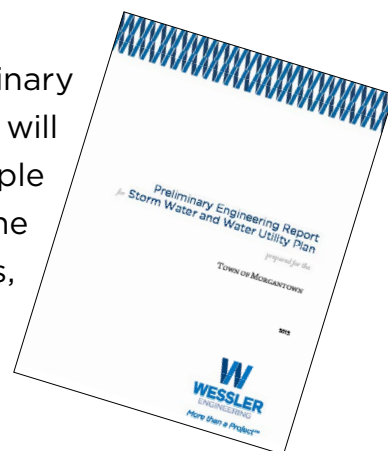
How will you fund the work? Will you be using grants or loans? Work with your consulting engineer to help you navigate state and county funding, such as the State Revolving Fund, Rural Development, and the Indiana Office of Community and Rural Affairs; discuss bond options, TIF funding, and private financing.

RECOMMENDATIONS

Once alternatives are reviewed, you will select the recommended alternative for the project. The recommendation may include action items such as a construction project and purchasing new equipment, but may also include non-action items or future planning options driven by funding or other limitations.

PRELIMINARY ENGINEERING REPORT (PER)

The written result of the study is a report, often called a preliminary engineering report (PER). This is the document that will communicate your problem and proposed solution to the people who need to approve and fund the work. The PER will include the alternatives considered, calculations, project costs, schedules, required permits, and recommendations. Often, an executive summary is provided to briefly outline the details of a PER.



OTHER CONSIDERATIONS

When embarking on a new project, don't forget to ask for input from those closest to the project and community residents at public meetings.

Design Phase

The design phase will develop the recommended alternatives into a format which can be used to implement the solution. You and your consulting engineer may collect additional field data, obtain input from suppliers and contractors, and review more detailed scenarios than were discussed during the study phase. Permits and easements are obtained during the design phase. Most often, drawings and specifications are created by your consulting engineer to describe the work to a contractor. The **drawings** are a graphical depiction of the work. The **specifications** are written requirements and are included on the drawings as notes or in a separate book referred to as the project manual.

DRAWINGS

Clear and consistent drawings are important to your project. Effort during the design phase to develop a good set of drawings will help get good bids and minimize questions and discrepancies during construction.

PROJECT MANUALS

The project manual contains text that supplements the drawings. Instead of including the type of finish needed for a concrete sidewalk or performance requirements for a pump, this information can be outlined in the project manual. The manual usually has three parts.

- » *Front End Documents: Legal and contractual requirements of the project.*
- » *Technical Specifications: Discusses the details of the project, along with the size, strength, material, and testing requirements for each detail.*
- » *Appendix: Contains copies of permits, test results, or other pertinent information the contractor needs to know.*

DESIGN SUBMITTALS AND MEETINGS

During the design phase, it is best to have periodic submittal deadlines and meetings. This gives you the opportunity to review the consulting engineer's understanding of the project and give input early on in case you would like to make a change. A design submittal will often include drawings for that level of submittal (i.e. 50% design), a design memo, opinion of probable construction cost, and schedule updates. Taking time to review submittals and provide feedback will benefit your project and help you achieve your overall goal.



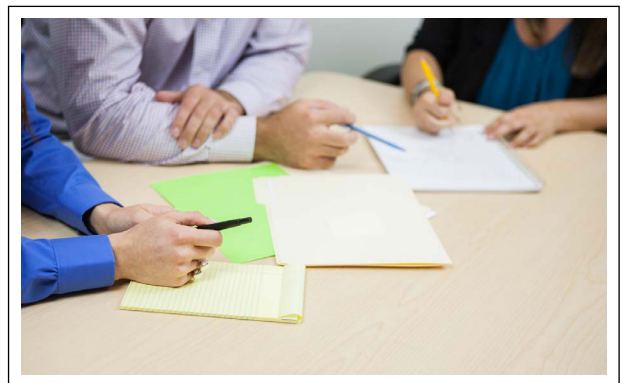
Bid Phase

The bid phase takes the finished drawings and project manual from the design phase and puts it out for pricing to contractors. Public advertising of bids in Indiana is required for all public works projects more than \$150,000 in construction costs, while quotes can be obtained for projects under that amount. The bid phase can last for a week or several months, depending on the size and complexity of the project. All publicly bid projects will have a public bid opening where the bids are opened and read aloud. Some projects will have a pre-bid meeting before bids are opened. This gives the owner, engineer, and bidders a chance to discuss the project, ask questions, and visit the project site.

**Don't be surprised...
to see a contractor
finishing his bid on the
hood of a truck just
before the deadline.**

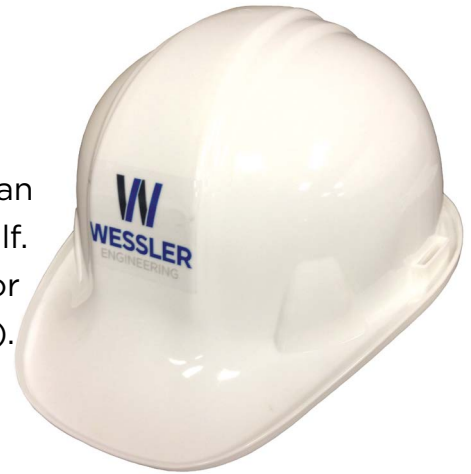
During the bid phase, your consulting engineer will assist with:

- » *advertising the project*
- » *distributing drawings and specifications to contractors*
- » *attending the pre-bid meeting*
- » *answering questions from contractors*
- » *issuing project addenda*
- » *attending the bid opening*
- » *reviewing the bids received*
- » *preparing a certified tabulation of bids*
- » *coordinating legal or financial review of bids*
- » *preparing the agreement documents for the owner and the contractor to sign*



Construction Administration Phase

Once construction begins, a consulting engineer can administer the construction of the project on your behalf. The construction phase begins when the contractor receives a notice to begin the work (i.e. Notice to Proceed).



PRE-CONSTRUCTION CONFERENCE AND PROGRESS MEETINGS

The first task for a consulting engineer during construction is to hold a Pre-Construction Conference with you, the contractor, and the engineer. This meeting is used to improve the project understanding among the parties, discuss schedules, receive submittals, and establish lines of communication between parties during the project. As the project progresses, the consulting engineer will hold meetings to discuss schedules and any issues.

SUBMITTALS

If submittals are required on a project, this will be one of the first things that a contractor will provide. Typical types of submittals include shop drawings, test results, pay claims, change order requests, operation and maintenance (O&M) manuals and as-built drawings. A consulting engineer will review the submittal and compare it to the drawings and specifications. If the submittal does not meet the project requirements or is different than what is specified, the differences will be discussed with you and you will make a decision to accept the change or not. A technical evaluation of the submittal may be very important in deciding if the differences will impact the final product.

CONSTRUCTION INSPECTION

The consulting engineer can assist your field inspector during construction and help to clarify the contract documents. Consulting firms may provide an inspector on your project, if needed.

An inspector from the consulting engineering firm will be most familiar with the consulting engineers' drawings and specifications and their role will include:

- » *assisting the contractor in obtaining information related to the work*
- » *ensuring the work is being performed according to the project requirements*
- » *observing the contractor's work*
- » *preparing daily field reports*
- » *witnessing field tests*
- » *helping develop a punch list of items to complete at the end of the project*

CHANGES

Construction projects may have changes from the beginning of construction to the end. The consulting engineer will help you and the contractor work through these changes, which may not require a cost adjustment but still might be important if the work is buried or inaccessible. A consulting engineer will help you document and track these changes. If the alteration requires a change in cost or time for the project, the consulting engineer will prepare the necessary change order and the supporting document to explain the reason for the change.

START UP, SUBSTANTIAL COMPLETION, AND PROJECT CLOSE OUT

If your project includes equipment or instruments that must be started up, your consulting engineer can attend the start-up meeting and help with field issues. Once the project is ready to be turned over to you, the consulting engineer will conduct a substantial completion inspection with you and the contractor. A punch list of items that need attention will be developed and written out by the consulting engineer. A final inspection walkthrough is also recommended to ensure the punch lists items have been completed. Once the project is finished, your consulting engineer can make sure you obtain warranties, O&M manuals, lien waivers, and close permit applications and funding documentation.

ONE YEAR WARRANTY INSPECTION

A warranty inspection should be completed in conjunction with you, the consulting engineer, and the contractor within one year of substantial completion of the project to fix any items under warranty needing attention.

About Wessler

Wessler is an engineering firm dedicated to bringing our clients' vision to life. We strive to make our relationships
More than a Project™



WWW.WESSLERENGINEERING.COM

Wessler Engineering is headquartered in Indianapolis, Indiana with additional offices in Fort Wayne, Evansville, and West Lafayette. Our markets and services include:

- » *Wastewater Treatment*
- » *Wastewater Collection*
- » *Drinking Water Treatment*
- » *Drinking Water Distribution*
- » *Stormwater*
- » *Environmental Services*
- » *Transportation*
- » *Electrical*
- » *Field Services*
- » *Construction Services*
- » *Airports*
- » *Industrial*

About the Author



EDUCATION

University of Miami
B.S., Civil Engineering
B.S., Architectural Engineering

Purdue University - Calumet
M.S., Multidisciplinary
Engineering

REGISTRATIONS

Registered Professional
Engineer, Indiana

CERTIFICATIONS

Leadership in Energy and Environ-
mental Design Accredited Profes-
sional (LEED AP)

PROFESSIONAL SOCIETIES

American Water
Works Association

Indiana Rural Water
Association

American Concrete
Institute - Indiana Chapter

Chi Epsilon Civil Engineering
Honor Society

Dylan Lambermont, LEED AP, is a project manager with more than five years of professional experience on drinking water projects. Dylan's expertise includes water system master plans; treatment plant evaluations and studies; water system modeling, and fire flow evaluations; and the design of new water mains, storage tanks, groundwater wells, and treatment facilities.

INSIDER'S SCOOP:

Dylan is an avid star gazer. His favorite constellation is Pleiades, an open star cluster.



6219 South East Street

(317) 788-4551

Indianapolis, IN 46227

DylanL@wesslerengineering.com

WWW.WESSLERENGINEERING.COM