

Recommendations for Moving from Design into Construction***Based on experience and discussions with other restoration professionals****The Nature Conservancy****January 2014****Design and bid document review**

- Its helpful to get individuals/companies with the following experience to review plans and specs:
 - Someone besides design engineer. The design engineer has looked at these documents for a long time; so you need a new/fresh set of eyes looking at them to catch things the design engineer may not see.
 - Someone with construction management experience. They will know the pitfalls to watch for in plans, specs and contract documents, and make it easier for both the construction contractor and owner to manage the project.
 - Someone with an eye for detail. The construction contractor can use unclear, incomplete or conflicting language in the contract documents to add costs during construction if you don't find them pre-bid/pre-contract.
- Ideally the contract language and any owner-generated info (special grant conditions, bid & performance bond requirements, insurance requirements, etc.) should be provided to the PE at the 60% design stage so that it can be incorporated into later stages of the design and the bid documents.
- If the person doing construction oversight/management is different from the design engineer, its helpful to have the construction manager review the 90% design so that they are comfortable with the content and format, can check for constructability and biddability issues, provide comments before 100%, and get familiar with the info so they're ready for bidding/construction.
- If the design engineer is doing construction oversight, a third party (construction manager within their company or at a different firm) should provide constructability/biddability review at the 90% design stage.
- After the 100% design is completed and bid documents are compiled, it's a good idea to have a final review done for any unclear or conflicting language or omissions by someone other than the design engineer or owner who has construction experience. We have found that quite a few details may be added or changed between 90% design and final bid documents. With every addition or change, there is a chance of introducing problems to the bid documents.
- Our experience is that review, changes and finalization from 100% design to bid-ready contract documents can take 3-6 months. In one case post-100% review included a partner-initiated third-party design review and subsequent design revisions (despite

outside technical review of the 50% and 90% design), and in another case it included a very thorough review of bid documents for completeness, consistency and biddability.

Construction management – who does it?

Construction management requires a thorough knowledge of the construction contract, making sure what's going on day-to-day is consistent with the contract, getting answers to any questions that come up, and addressing any changes under the terms of the contract, among other things. The choice between using the design engineering firm and a new construction management firm has risk management and liability implications for the owner that should be assessed carefully. Some of these issues are outlined below.

- **Design engineer** – The design engineer is the person most familiar with the details of the design and specs and any background studies, and so can quickly respond to questions that come up. No resources are needed to get the design engineer up to speed on the contents of the design documents. If problems arise post-construction, all liability lies with the design engineer and/or construction contractor. On the other hand, there is a chance that if there are problems with the design, the design engineer could protect him/herself and not work in the best interest of the owner. Design engineers don't always have extensive construction management experience, although they or their company may.
- **Hiring a new person/firm for construction management** – A new construction manager can bring impartiality to the construction process. Some firms/individuals specialize in construction management, which requires a different set of knowledge and skills than design work. On the other hand, if problems arise post-construction, liability may lie with the design engineer, construction contractor and/or the construction management firm. The owner will incur the cost of getting construction manager up to speed **(although if the construction manager does the constructability/biddability review, you can kill two birds with one stone)** and keeping the design engineer under contract during construction, and you rely on the construction manager to make appropriate decisions about when to consult the design engineer during construction.

TNC has taken different approaches at our restoration projects. In each case, the individuals involved (owner, construction manager and construction contractor), the complexity of the project, the conditions encountered all contributed to the outcomes and the condition of the construction contract (see design review above) all contributed to the outcomes. In our experience, each approach (or a hybrid of the two) has its pluses and minuses.

Construction team organization, roles and communication

The way you structure your construction team may depend on how much experience you have in-house vs what you need to hire out. As mentioned above, construction management takes technical construction expertise and the ability to interpret and apply the contract documents,

catch any problems that come up and resolved them quickly under the terms of the contract. At the same time, the owner will need to provide input as related to any number of things the construction manager may not be able to resolve. This could include questions/concerns that involve neighbors and landowner agreements, or changes to the cost (if they fall outside any provisions you outlined in the contract documents), among others. It is also possible that WDFW roles and communication channels will be dictated in part by WDFW internal processes and policies.

- It is valuable to have one person employed by the owner who knows almost everything about what is going on during construction (flight control), instead of divvying up the work between multiple staff. This person (the owner project manager) should be copied and generally track all correspondence, be at weekly meetings and have the opportunity for regular check-ins with the construction management project manager outside of weekly meetings if needed.
- The construction manager and construction contractor should also each have project managers who are flight control for their organizations.
- The construction contractor may also have a project engineer in addition to their project manager and superintendent.
- On TNC projects, the owner, construction management and contractor project managers and the construction contractor's project engineer were copied on almost everything. The owner project manager did not track all the details, but could keep an eye on progress at a high level and delve in when needed.
- The owner must have an onsite observer (often a person on construction management team) representing their interests who can track and document what's going on on-site, identify deviations from the plans and specs, and work with the construction contractor superintendent and project engineer to fix them or get help from others on the construction management team to get the construction contractor to correct them. You want to be able to catch problems early and correct them before they are literally buried and invisible, and to efficiently and fairly negotiate change orders.
- The owner can be more or less involved depending on how involved you want to be, what skills your staff has, whether you have the budget to hire help, and how much confidence you have in your construction manager.
- If owner representation/responsibilities are split between the owner project manager and construction management project manager, roles and responsibilities should be clearly defined so that nothing falls through the cracks and communication pathways for all parties involved are clear. You may also need to work within your owner team (project manager, contracts, finance) to clarify roles. Examples:
 - When a pay application comes in, who reviews it, who works with the contractor to make any necessary changes, who approves it, who authorizes payment?
 - When the construction contractor calls the owner project manager with a question, how is information distributed so that the appropriate parties are

- contacted for an answer, who makes sure the required Request for Information (RFI) timeline is met, and who is responsible for distributing the question and answer out to all who need to be informed?
- When the contractor comes to the owner project manager with a \$200,000 change order, what roles and responsibilities do the owner project manager (and team) and construction management project manager (and team) play to make sure it is assessed and resolved within required timelines?
 - It is easier and can be more streamlined to have the construction manager manage all subs related to construction. These subs might include an archaeologist, a surveyor, and also the design engineer and permit specialist if construction management is not being done by the design engineering firm. This can be more costly than the owner doing this coordination because the construction manager adds a mark-up, but may reduce cost because of streamlining communications.
 - It is helpful to have the owner at weekly meetings so that they can give quick answers to questions that come up and keep things moving.
 - Starting with hiring a construction contractor, we've needed 0.5 - 1.5 FTEs of owner project manager time on large complex construction projects. What were we doing?
 - regular site visits to see and document progress,
 - weekly meetings
 - regular check ins with construction manager
 - tracking project paperwork (submittals, RFIs, etc.)
 - coordination with project partners and neighbors
 - reviewing and processing pay applications
 - cultural resources response
 - contract management (up to five or more simultaneously)
 - media visits
 - tours (grantors, permitters, other staff, etc.)
 - project updates to funders
 - grant reporting
 - managing the project budget
 - requesting additional funding
 - working through internal TNC processes to respond to project needs
 - How much latitude will you give the construction manager to make decisions and act on things without your authorization? This should be partly addressed in the construction contract (is there a line item in the budget for "all other work" that the construction management team can use for small changes?), but also needs to be outlined in the contract between the owner and construction manager. Often decisions are needed quickly and if you're comfortable handing those decisions to the construction management team (often the construction management project manager and onsite observer), it can save time.
 - Make sure project partners (i.e. Dike District 22) understand the communication pathways they should follow if they have needs or concerns. Do they bring needs and concerns only to the owner? Or can they talk with the construction management project manager and onsite observer as long as the owner is notified and their request doesn't result in a change order?

- It can be helpful if the construction management team includes folks with a diverse set of skills who can provide information when new and challenging situations arise. You might not need them, but it's nice to have them on the team so you're not scrambling if/when you do.
- You will keep your design engineer under contract if they are not the construction manager so that the construction manager has access to them for questions. Keeping the engineer engaged (weekly site visits?) can be important in case the construction manager is missing anything.
- Think very carefully about how survey will be done – by owner and/or construction contractor – and how and when the construction manager and owner will get the info needed to track progress and make payments (both progress payments and final payments).
- A Construction Management Plan from your construction manager is only useful if you know what's in it and update it as things change. Parts of it would be useful to include in the owner-construction manager contract to set expectations about roles and responsibilities. In our experience, by the time you hire a construction manager, things are moving fast and no one seems to have time to prepare, review or finalize it, nevermind update it.

Construction contractor

- The process may depend in part or in total on WDFW's hiring procedures.
- Prequalification makes bid review simpler and is better for contractors – contractors know that if they're unqualified, you'll let them know and they won't waste time/resources bidding.
- Reference checks can be helpful but carefully assess +/- info from one person who may have strong impressions about the company based on a single experience.
- TNC had latitude in hiring the "best value" bidder. If that is an option for WDFW, TNC can make additional recommendations. We assume you have to take lowest bidder.
- The construction manager can be a great resource during bidding and reduce burden on owner staff. The construction manager knows the specs and can respond to bidders' questions, can pre-qualify bidders and review bids and make a recommendation.
- The construction manager will have to work with the selected bidder to successfully build the project on time and on budget, so you want the construction manager to be on board with the bidding process and chosen bidder.

Scheduling

- Scheduling timeline for design review provided above.
- Allow sufficient time for bid preparation (at least 4-6 weeks, ideally during winter - Jan/Feb). The quality of bids may suffer if the bidders are rushed and don't have time to understand critical project details.
- Get a contractor under contract before April or May when the contractor's work may have picked up again and/or they have already committed their best resources to other jobs.
- Allow sufficient time for contract negotiation (if you have allowed contractor to provide ideas about how to reduce costs) and finalization (realistically, how long will it take your agency?)

Change orders (AKA claims) and contingencies

- Its really important to have clear, non-conflicting, complete bid documents in order to reduce the chance of receiving frivolous claims, and to resolve claims quickly if a changed condition is encountered (see “design and bid document review” section above about how to achieve this).
- Make sure you identify as many potential risks as possible – cultural resources, weather, etc – and build language and pay items into your contract to address them.
- Add a provision in your contractor’s budget for “all other work” or similar so that small change orders don’t take a ton of administration to work through. With this in place the construction manager and construction contractor should be able to address small changes in the field and notify you before they show up on the next pay application.
- An onsite observer and construction management project manager who engage positively with the construction contractor team and can assess which issues they need to be sticklers on and which they can let slide will be an asset to the project when it comes to addressing changes with the construction contractor.
- A very experienced and engaged construction management project manager and onsite observer are critical in identifying, defining and negotiating the terms and payment for any changes that do arise under the terms of the contract.
- Onsite observer’s reports and construction management project manager documentation are critical to equitably resolving issues that get elevated (i.e. if the construction contractor aggressively pursues change orders).
- Having someone on the construction management team who has worked through negotiations with construction contractors can also be helpful if your agency decides that route to claim resolution is in the best interest of the project.
- Your overall project budget should include enough funding that you do not commit all project funds to contracts before construction begins. Even though you have thought of potential risks and addressed them in your contracts up front, there can be unforeseen changes that result in increased costs. Keep some funds in reserve for changes that may come up so that you are not in a situation mid-project where you are lacking enough funds to complete the project.