Responsibilities in Constructing New Facilities

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Once the business decision is made to construct new facilities, many other decisions must follow to produce a workable production facility. The whole process of design requires communication amongst the owner(s), workers, and the designer so the resulting design meets the needs of the users and the animals. Once the design is complete, contracts for construction can be made and construction can proceed to completion. Throughout this process it is extremely important for all parties to know who is responsible for each of the various phases of the process. Spelling out these responsibilities early (during the contracts phase) helps to avoid-some of the confusion which inevitably occurs during construction. Projects proceed much more smoothly when each party knows and accepts their responsibilities early in the process. Construction delays and additional costs are often incurred while disputes about responsibilities are being resolved. Many of these problems can be avoided by establishing responsibilities as early as possible.

The first step in assigning responsibilities is to identify as many of the needed activities as possible. Once this list of activities is made, the needed steps to achieve an activity must be defined. By reviewing the steps, the logical responsible parties can be designated. Through the contracting process, those parties will then agree to assume those responsibilities as their contribution to the project.

This paper attempts to explain many of the products needed to accomplish a construction project. It will also give suggestions of who are the likely parties responsible for implementing that portion of the project.

Design Phase

The end product of the design phase is a set of facilities plans and specifications. During the design phase, the design team must produce a set of functional requirements. These functional requirements explain how the various production tasks will be managed. For example, the design team could specify that herd health and pregnancy checks will be done in a freestall barn after all animals are captured simultaneously at the feed manger. The designer would then know to specify enough self-locking headgates at the manger to accommodate all animals in the group, and the number of cows in the group would not exceed the number of self-locks. With a stocking density of one cow per stall, this suggests two rows of freestalls for the group instead of three rows unless other arrangements are made for extending the bunk.

Members of the design team must be knowledgeable about the various options for management of the new system, including keeping initial and annual costs under control. Some logical people to include in the design team are: owner(s), herd manager, veterinarian, and the system designer. The design team will create a written report which documents the functional plan for the entire operation.

System Design

The system design integrates all of the functional plan components into a system of facilities which work together to achieve the management objectives. The system plan is often presented as a farmstead plan which shows relative positions of buildings, feed storages, wells, manure storage, roads, and cattle traffic lanes. The plan should show topographic information including original and finalized land surface elevations and surface water drainage systems. These plans evolve to a final system plan as the system designer interacts with the design team. The system designer must have knowledge and experience of the overall operation. This person needs to know how each component functions and how the components work together to produce a smoothly working system. For example, the system designer needs to know the milking capacity of a parlor so the size of freestall groups can be set so cows are not in the parlor/holding area for more than an hour. Thus the parlor/holding area component must match the freestall housing group component.

Component Design

Once the system design is developed, component designs must be completed. Component designs are usually done by those who have specialized training in the design of those components. Examples of this may include design of feed storage size and structural integrity or manure storage size and structural integrity, etc. The component designer often works closely with the system designer to assure compatibility of a component design with the system design. Because of the large number of components that go into a modern dairy system, there may be many component designers identified. Component designs will contain drawings and specifications which explain dimensions, slopes and product information, etc. These component designs become part of the total design.

Permitting

Various agencies have established regulations affecting the construction of dairy facilities. Some of these agencies require the dairy to have a permit to operate. To obtain a permit, written plans and a request for a permit must be submitted to the agency. Generally it is the responsibility of the owner to submit the plans and permit request. However, persons developing the system and component plans are often the logical choice for completing much of the documentation required by the agency.

Regulations and permits are generally intended to protect public health and well being, and to minimize expenditure of public funds. Environmental regulations are intended to protect water and air quality. Highway regulations help reduce spending for highways and help improve highway safety. Food quality regulations are generally intended to protect consumer health.

Permits may be required for federal and/or state agencies. Local county and town regulations are frequently administered through zoning boards who can issue conditional use permits. Some agencies may schedule public hearings or meetings as part of the permitting process to learn from the public about their concerns. Persons who will help develop the permit requests and who will explain the plans at the public hearing(s) should be identified.

Contractors

Kammel and Bohnhoff (1998) define the terms "owner", "general contractor", "specialty contractor", "prime contractor", and "subcontractor" as:

> ". . . the building *owner* is the company or individual for whom the building is being designed and constructed. Companies or individuals involved in the business of construction are known as *construction contractors* (or simply *contractors*) because they operate under a contract arrangement with the owner or another contractor. Contractors who enter into a contract with the owner are called *prime contractors*. Those contractors who contract to do work for another contractor are called *subcontractors*. Contractors are also categorized as either *general* or *specialty contractors. General contractors* are those who engage in a wide range of construction activity. *Specialty contractors* limit their activities to one or more construction specialties such as electrical, plumbing, concrete flatwork, excavation, etc. It is important to realize that use of the terms *general* or *specialty* have nothing to do with contractual relationships. A general contractor may be employed as either prime contractor or as a subcontractor. The same goes for any specialty contractor."

An owner may contract with one or more prime contractors and a prime contractor can have many subcontractors. An owner cannot have subcontractors by the above definition. An owner can employ a professional project manager who then acts as the prime contractor who employs subcontractors to construct the project. Frequently, the company hired to perform the project management function is a general contractor. When this occurs, the firms will act to manage the project, hire subcontractors, and even perform some of the construction work. In the common vernacular, this firm is referred to as a "general contractor". For the purposes of discussion in this paper, the firm should be referred to as a "prime contractor" with project management responsibilities.

Professional Project Manager

The project manager (often the prime contractor) for the project assumes the responsibility of arranging for and coordinating construction of the project according to the facility designs and specifications with completion in a timely manner. The project manager often hires and supervises the work of subcontractors (see below). Supervision of subcontractors is necessary to assure quality of construction, usability of final product, compliance with specifications, sequencing of work, and adequate progress toward project completion. The project manager maintains appropriate insurance and requires and checks that of subcontractors. The project manager frequently has employees and hired professionals (attorneys, engineers, soil specialists, etc.) to help fulfill assigned responsibilities. A firm providing project management services must charge fees to cover known costs, provide a profit, and cover unexpected costs.

Owner as Project Manager

Sometimes an owner feels project management fees are excessive and decides to assume the responsibility of a project manager. When this is the case, the owner assumes all of the responsibilities and known and unknown costs for the project. Construction errors not corrected

early may have higher corrective action costs or, if not corrected, may cause higher facility repair and/or operating costs throughout the life of the structure. While the owner functions as project manager (which requires a lot of time), someone else will have to be hired or diverted to the dairy business management so that business continues to operate efficiently. One must think very seriously about assuming the responsibilities and risks of a project manager, assessing one's capabilities and whether the savings of not hiring a project manager will be truly realized.

When the owner contracts with a professional project manager, the owner often has only one prime contractor, namely the project management firm. When the owner assumes responsibility of project management, the owner often has many prime contractors. These prime contractors could be general contractors and/or specialty contractors, depending on their capabilities. Depending on the size and capability of the firm, a general contractor may construct several components of a new facility with or without subcontractors. For example, a building general contractor may construct the barns and milking parlor. A specialty contractor may work within one or more components, e.g., install only the milking parlor, utility and milkroom equipment or do only the concrete work.

Some of the responsibilities for the above entities can be listed as follows.

Service	**Responsibilities**
Owner	Form and coordinate activities of the design team. Arrange for financing. Arrange for permits. Communicate functional requirements to designers. Determine who is the project manager. Contract with prime contractors.
System Design	Develop plans and specifications for the system of facilities.
Component Design(s)	Develop detailed plans and specifications for each of the components which make up the system of facilities.
Project Manager	Arranges for and coordinates construction and assures compliance with plans and specifications.

Construction Contractors

The list of construction contractors on a project is long and varied. Generally construction subcontractors purchase the materials, equipment and labor needed to complete their part of the project. The prime contractor(s) pay subcontractors for finishing their part of the project. Subcontractors handle their part of the project according to the plans and specifications under the overall supervision of their prime contractor. Some of the contracting which may be needed includes the following.

Contractor Service	**Responsibilities**
Drill Well	Construct a well of specified capacity in compliance with codes.

Contractor Service	Responsibilities
Excavate	Building site preparation, roads, manure storage excavation, feed storage site preparation, trenches for water/sewage lines.
Framing	Building shell(s).
Concrete	Concrete surfaces for floors and walls of buildings, feed storage, manure storage, drives, etc.
Freestalls/Feeding Fence	Provide and install equipment.
Manure Handling Equipment	Provide and install equipment.
Waterers	Provide and install waterers.
Wall Closures	Provide and install wall closure system (curtains).
Milking System/Utilities	Provide and install the milking system, milk cooling equipment, etc.
Parlor Stalls	Provide and install milking parlor stalls and support equipment including crowd gate.
Feeding Equipment	Provide and install scales, conveyors, TMR mixer, etc.
Electrical Power	Generally the responsibility of the power supplier is to bring power to the farmstead.
Electrical	Provide electric power to all locations where it is needed. Install and wire the standby generator. Wire according to codes to maintain human and animal safety.
Plumbing	Provide plumbing to convey water safely to areas where needed and to convey wastewater to storage/disposal areas. Plumbing must comply with codes to protect health of animals, workers, the farm family, the consumer, and the general public.

Some of the contracting activities listed above may be performed by employees of a company responsible for a different contract area. For example, a milking equipment contractor may employ electricians who wire the components of their system as well as connecting their system to the farm wiring system. They may also have plumbers doing some water supply plumbing. Where this is the case, that responsibility should be identified and communicated to any other affected contractor. On the other hand, some contractors may employ their own subcontractors to complete a portion of their responsibility. An example of this is a building contractor who hires a subcontractor to place concrete in the building, another subcontractor to install stall dividers and the feed barrier fence, etc. In this case, the building general contractor is offering to provide a more complete structure than just the building shell. This information will have to be understood by other contractors so as to avoid confusion about which subcontractors are responsible for what work and to whom they report.

In agricultural construction, the design-build process is frequently used by an owner. This process uses a firm which offers a service that combines system design, component design, and project management. The process is often referred to as a "turnkey" project. An owner who employs a firm to use the design-build process must assure the company has the capacity to perform all the needed tasks adequately.

Conclusion

Large facility construction projects require vast amounts of communications to arrive at a quality final product in a timely manner. One way to improve communications is to establish in the planning and contracting phases who is responsible for what activity and who is to supervise the work. Completing a list similar to the one below can help identify who is the responsible party for a given component. If the list of tasks is initially created, then deficiencies will be obvious until the blanks are filled in with the name of the responsible party. If a contractor is responsible for an entire building, that company's name will appear under several responsibility categories (e.g., framing, concrete, equipment, electrical, plumbing).

Reference

Kammel, D.W. and D.R. Bohnhoff. 1998. Developing preliminary specifications for agricultural buildings. ASAE Paper No. 984004. American Society of Agricultural Engineers, St. Joseph, MI.

RESPONSIBILITY	COMPANY	INDIVIDUAL	SUPERVISOR
Design			
Functional Specifications			
System Design			
Component Design for:			
Parlor/holding area			
Parlor/holding area building			
Milk house			
Utility			
Cow Freestall housing			
Cow Freestall barns			
Special needs housing			
Special needs barn			
Manure storage/handling			
Feed storage			
Heifer/calf housing			
Heifer/calf barn			
Assist in Developing Permits for:			
Water Quality			
Air Quality			

RESPONSIBILITY	COMPANY	INDIVIDUAL	SUPERVISOR
Milk Quality			
Zoning			
Public Hearing Presentation			
Construction			
General Contractor			
Well Driller			
Excavation			
Framing			
Concrete			
Freestalls/Feeding Fence			
Manure Handling			
Waterer			
Wall Closures			
Milking System/Utilities			
Parlor Stalls/Crowd Gate			
Feeding Equipment			
Electric Power			
Electrical			
Plumbing			