

Dairy Housing

Developing the Plan and Procuring Services and Materials for Constructing a New Dairy Barn

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Factsheet

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DEVELOPING A PLAN

The procedure for developing a plan (Figure 1), procuring services and materials, and overseeing construction can be made as formal or informal as you want, depending on your time, extra help on your farm, comfort level, experience and training. Remember that any time you spend on planning,

contracting and construction is time you must take away from some other activity on the farm or from your personal life. There are many different ways to approach a building project. There is no single right way, and in the end, most producers use a combination of approaches to complete their project.

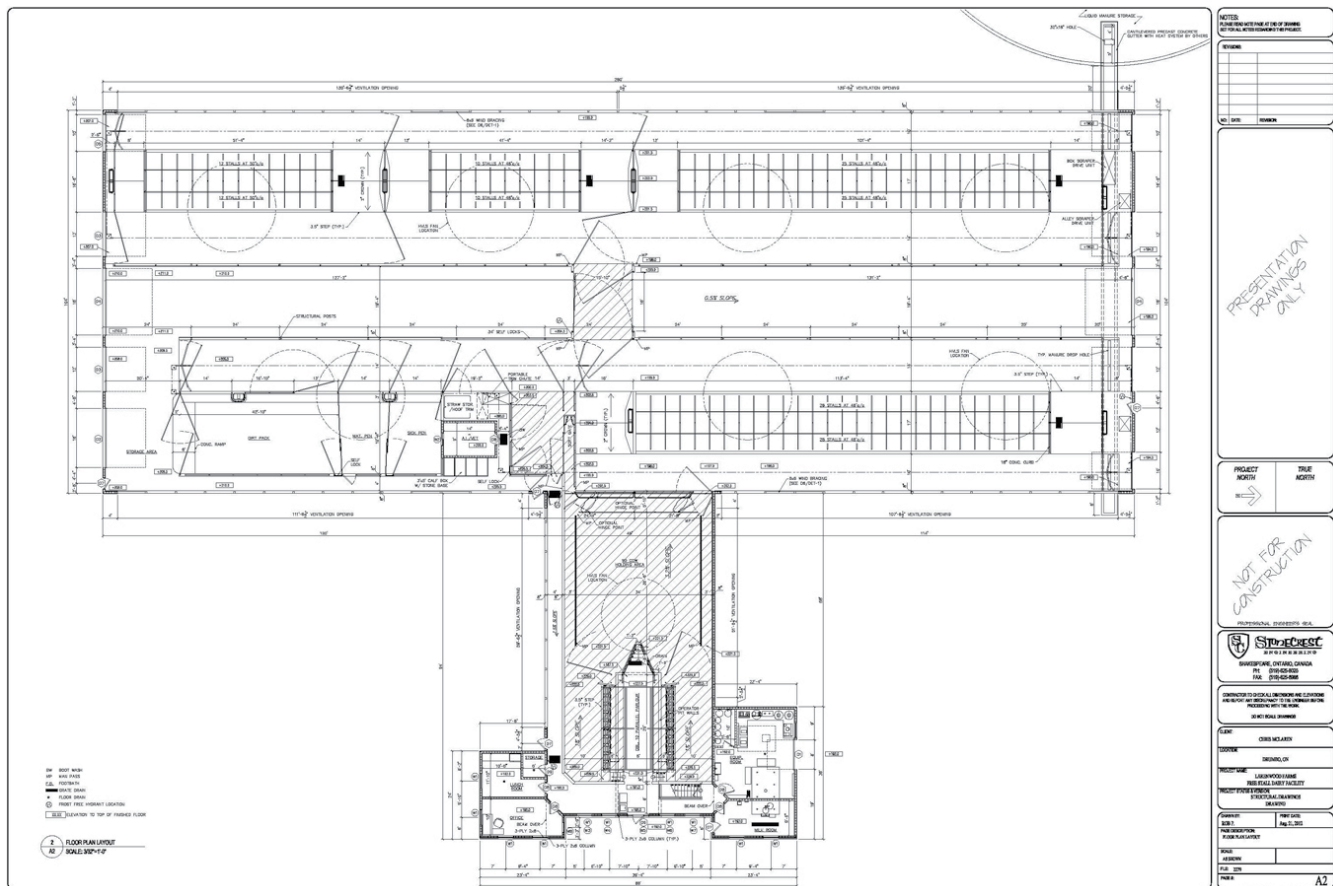


Figure 1. One example of a free-stall floor plan.

Some of the more common approaches are:

- **Hire a Design Consultant** — A design consultant could be an individual that has a strong background in dairy management and can work along with you to develop a functional layout or it could be a team of consultants that could include your veterinarian, nutritionist and others that you trust to give advice.
- **Hire a Consulting Engineer** — A consulting engineer may be able to help you with the functional and operational design as well as structural and other parts of the project, such as permitting. A consulting engineer may be able to take the floor plan developed by you and your consultant and provide the structural design that is needed by the municipality for approvals.
- **Use a Design, Bid, Build Approach** — Another approach, more similar to commercial buildings would be to develop a layout, have an engineer provide a structural design and specifications, then submit the design and specifications to several general contractors that could do a good job on the project. This way all the general contractors are bidding on exactly the same design and specifications and you should be able to compare prices on an “apples-to-apples” basis.

A slight variation to this approach would be to bid major parts of the design, like the milking equipment, separate from the rest of the project.

- **Use a Design and Build Contractor** — The most common approach is to use a design and build contractor, someone who can take your initial layout and provide the rest of the services. The contractor may have a large enough operation that there is an engineer on staff to do the structural work, or there may be an engineer they usually use. This could be the case with many of the components. The main contractor may have tradespeople that can do the concrete work, wiring, plumbing or may hire subcontractors to do the specialty work.

In this approach, you may have to have several companies quoting on your layout with very little additional information, because a final design hasn't been completed. You have to be more careful with this approach so you are not comparing “apples and oranges.” Your cost

control may not be as tight as the design, bid, build process, because the final design has not been completed.

- **Use the Owner as the General Contractor** — Another variation is to take on the bulk of the work yourself. You could act as the general contractor and take on the responsibility of having the design work done, hiring all the contractors and overseeing the construction. If you want to be more involved in the process and save some money, consider this option. You will have to ask yourself some hard questions, which are discussed in detail later.
- **Hire a Project Manager** — If the owner does not have time or is not confident in his or her ability to keep on top of the project, an option that could be used with any of the approaches is to hire a project manager. This needs to be someone you can trust, who understands what you want and is someone you can communicate with.

SHOULD I BE THE GENERAL CONTRACTOR?

This is a question many producers ask. As a producer, you are used to having control over your own operation and may feel it would not be too difficult to extend this control to your building project. You may be the type of person that enjoys a challenge and wants to make sure that the project is done according to your own specifications. Being the general contractor and doing your own planning, hiring and supervision may save you money, but it takes time. Will you need to hire someone else to look after the dairy while you go through the process, and will that person be able to manage as well as you?

This is a difficult decision to make. Before you do, talk to producers who have been through similar projects. Talk about what they did and how they went about doing it. What went well and why, what didn't go well and why? Would they take the same approach again, why or why not? Talk to others who know your temperament, strengths and weaknesses — do they think it's a good idea? Do your spouse and family think it's a good idea?

Some of the pros and cons identified by producers are:

Pros

- You have a more in-depth understanding of facility design and function.
- You'd have only yourself to blame.
- You'd be forced to hire great cow people in your place.
- You'd have tighter control of results.

Cons

- This would be a huge time commitment.
- Doing this may not be within your abilities.
- Being the general contractor may distract from running the rest of the dairy operation.
- You might get caught up in managing details that aren't really significant.

COMMUNICATION, NEGOTIATION AND CONFRONTATION

If you don't have good communication skills at the start of your project, they will have improved by the end. You need to communicate (talk and listen) to designers, contractors and builders to get the project done the way you want. It is also important to know how to negotiate — to give and take to get what you want done. This is very true when you get to the hiring process. You may need to trade time for price. You will also need to develop confrontation skills. This doesn't have to have a negative meaning; what are you going to do when you see something that isn't done the way you want it? What is the best way to approach the situation, and get it corrected?

It is important to have a contact or "go-to" person for each component of the project. If you have a question or concern, you can quickly get to the right person. Appendix 1 outlines the major components of a project, with space for identifying your "go-to" people. Keep it readily available, so you won't lose it or forget who does what.

PROJECT PHASES

The process of planning and building a new facility can be divided into a number of phases. There is no exact formula for these divisions. You could argue that there should be more phases or you may wish to subdivide them into smaller projects. Generally you will need to consider the following:

Developing the Plan

After farmstead planning is complete you will need to develop a plan for the actual facility with the aid of a dairy consultant, a team of consultants or a consulting engineer. Appendix 2 is a checklist that can help you decide on the options you want for the major barn features. You can also use this checklist when you are visiting other farms and you want to remember what features they have.

Permitting

There are always permits that need to be submitted, from zoning changes to manure management to building permits. Is this something you can do yourself, or is it best to let a consultant do it for you?

Arranging Finances

You will need to pay for this project. Financing is something you will have to negotiate with your lending institution or financial manager. They may ask you to develop a short-term and a long-term business plan, to prove the project will have cash-flow.

Design and Specifications

The structural design will have to be done by a professional engineer. The specifications may require a lot of detail if you are tendering and want to get competitive quotes. If it is a design-build project, the specification list may not be as detailed. The more you have down on paper, the more chance you have of getting exactly what you want.

Tendering and Hiring

The tender process does not have to be that formal. You should be confident that you are comparing "apples with apples, and oranges with oranges" when comparing prices. Are you confident in handling the hiring process? Would you rather have someone else do it? If you take the design and construction approach, you will not be faced with as many decisions.



Figure 2. A barn under construction.

Construction and Project Management

The construction phase of the project can be the most challenging part (Figure 2). This is where you make sure that your vision and plan are being implemented. As we have discussed, you may act as the general contractor, you may hire a project manager or you may leave it up to the design-and-build contractor. In all cases, it will require real communication between you and the building contractor to ensure the job gets done.

This communication may take the form of a formal meeting once a week or every day, at the start of the day. But you need regular communication, and it may have to be more frequent during certain parts of the project. There is a balance between good communication and interference or micro-management. It is your project, so you have the final say, but if you have hired good people, they are professionals and may have suggestions — things they have seen in other projects or others ways of doing something — that you may not be aware of. Let them do their job. If you see something you don't like, you are the one that will have to live with it for a long time. Make sure it gets changed so you are not regretting it in the years to come.



Figure 3. Cows settled into a new barn.

Commissioning

Commissioning the project is something you may not have even thought about. Make sure, when you finalize the contract on different components that are new to you or complicated, that the price includes training. This is often an oversight. Most equipment suppliers may provide this as a service. Make sure you know how everything works before the contractors are gone. In the case of electronics, this may be too much information to absorb at once, so make sure they leave “simplified” or “quick start” instruction guides so you can be up and running as needed. For some equipment, it is a good idea to have this information laminated and mounted right beside the controls.

The other piece of “commissioning” that is often over-looked is cattle (Figure 3). Prepare the cows and prepare the barn to receive them. Don't trim your cow's feet and then send them into a barn with “green” concrete. Concrete should have at least a month to cure, and then it should be washed with a neutralizing agent before the cows are moved. Better still, spread some of your cows' manure in the alleys so the barn doesn't smell so “new” or “strange” to your cows when they first go in. It is also a good idea to run the manure scraper system or tractor-scrape the alleys several times to remove any sharp concrete edges. Spreading bedding on the alleys may also be a good idea, but not to the point that cows find the alleys comfortable enough to lay in.

DEFINITIONS

The following are some definitions commonly used in the design and construction of a building:

- **Plans** — Plans show all necessary dimensions and details for construction. A floor plan and cross-section of the barn should be considered as minimal. Municipalities will likely want foundation plans and structural details, as well.
- **Specifications** — Specifications support the plans and describe the materials to be used, including size and quality, and often outline procedures for construction and quality of workmanship.
- **Contract** — The contract is an agreement between the builder or equipment supplier, and the owner. It includes such things as the price, schedule of payments, guarantees, responsibilities, change orders, and starting and completion days.
- **Owner** — “You” — The company or individual that the building is being designed and constructed for.
- **General Contractor** — Contractors who enter into a contract directly with the owner are called prime contractors or general contractors, as they may do a variety of things.
- **Subcontractor** — Subcontractors are contractors that contract to do work for the general contractor. These are specialty contractors, who may look after such things as the concrete work, ventilation or electrical.
- **Project Manager** — An individual hired by the owner to manage the entire construction project.
- **Construction Manager** — An individual hired by the owner to manage the actual construction.

SUMMARY

Time spent on planning is never wasted. It is easier to move components on paper than to try to rearrange concrete when it has hardened. Hiring people who know their business and who you can trust will make the job easier and result in a completed project will serve you well.

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This Factsheet was written by Harold K. House, P.Eng.

Appendix 1. Contact list

Responsibility	Company	Contact	Phone #
Design			
Functional specifications			
System design			
Component design			
Parlour/holding area			
Parlour/holding area building			
Milk house			
Utility room			
Cow free-stall housing			
Special-needs housing			
Manure storage/handling			
Feed storage			
Heifer/calf housing			
Assist in developing permits for			
Water quality			
Air quality			
Milk quality			
Zoning			
Public hearing (if needed)			
Construction			
General contractor			
Well driller			
Excavation			
Framing			
Concrete work			
Free stalls, feed barrier, penning			
Manure handling			
Waterers			
Ventilation			
Milking system/utilities			
Parlour stalls/crowd gate			
Feeding equipment			
Electric power			
Electrical			
Plumbing			

Appendix 2. Free-stall barn features checklist

Date _____

Phone/Fax _____

Producer _____

E-mail _____

Address _____

Emergency contact _____

Layout

- 3-row
- 4-row tail-to-tail
- 4-row head-to-head
- 6 row
- compost bed pack
- other _____
- # of stalls _____
- # cows milking _____
- length _____
- width _____

Roof

- laminated wooden beam
- wood truss
- steel frame
- fabric-covered
- other _____

Walls

- pole frame in ground
- pole frame on concrete wall
- stud wall
- steel frame
- fabric-covered
- other _____

Environment

- no insulation
- bubble
- rigid board
- blanket
- sprayed-on
- blown-in
- batt
- other _____
- R-value _____

Ceiling Covering

- plywood
- steel
- fabrene
- vinyl
- fibreglass

Side wall ventilation

- one-piece curtain
- split curtain
- inflatable curtain
- clear rigid panel
- insulated panel
- other _____

Ridge ventilation

- open ridge
- chimneys
- light vent
- overshot roof
- other _____

Supplemental ventilation

- basket or panel fans
- HVLS fans
- tunnel ventilation
- other _____

Manure collection

- tractor scrape
- mech. scraper-cable drive
- mech. scraper-chain drive
- mech. scraper-hydraulic
- tube scraper
- flush system
- slats — total pit
- slats — raceway
- other _____
- transfer pit size _____
- robotic scraper _____

Manure transfer

- tractor scrape
- gutter cleaner
- box or shuttle scraper
- gravity
- hydraulic
- centrifugal — electric
- centrifugal — tractor
- other _____

Stall base

- deep-bedded sand
- deep-bedded compost
- concrete
- rubber mats
- mattresses
- water beds
- other _____

Stall bedding

- sand
- compost
- chopped straw
- sawdust
- shavings
- other _____

Stall partition and size

- wide suspended
- narrow suspended
- flexible
- other _____
- width _____
- length _____
- distance to brisket lc _____
- height to neck rail _____

Brisket locator

- none
- pipe
- poly pillow
- rounded concrete
- other _____

Floor finish

- concrete — no grooves
- concrete — wet cast grooves
- concrete — saw-cut grooves
- continuous rubber
- interlocking pieces
- other _____

Barn lighting

- incandescent
- fluorescent
- LED
- mercury vapour
- metal halide
- high-pressure sodium
- induction
- other _____
- over feed alley _____
- over stalls _____
- wattage _____

Feeding system

- centre drive-through
- perimeter drive-through
- mechanical feed bunk
- other _____
- width _____

Feed barrier

- self-locks
- post and rail
- slant bar
- flexible bars
- other _____
- height _____
- barrier _____

Manger surface

- concrete
- concrete with hardener
- epoxy coating
- ceramic tile
- sunken
- barricade
- other _____
- width _____

Waterer

- low energy
- tip tank
- other _____

Parlour type

- herringbone
- parallel
- swing
- flat
- robotic
- other _____
- stalls _____
- company _____

Parlour features

- basement
- adjustable floor
- automation
- other _____

Parlour lighting

- fluorescent
- LED
- HID
- other _____

Parlour heat

- none
- space heater
- radiant tube
- hot water floor heating
- other _____

Holding area

- alleys as holding area
- separate holding area
- floor surface _____
- no crowd gate
- flexible crowd gate
- rigid crowd gate
- other _____
- size _____
- slope _____

Maternity & treatment area

- pens in free-stall barn
- pens in separate area
- automatic sorting
- other _____

Feed storage

- pile
- ag bags
- tower silos
- bunker silos
- other _____
- sizes _____

Manure storage

- earthen storage
- open top concrete
- open top steel
- slatted floor
- other _____
- fencing _____
- size _____



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