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Frequently Asked Questions About Construction Costs

How is cost per square foot calculated?

Cost per square foot is a commonly used figure to estimate and compare project construction costs. Due to the individuality of different projects and the inconsistency in the methods used to calculate this figure, it should be considered as a rough estimating tool only. Real estate professionals often use price per square foot figures to represent the sales price of a property divided by the square footage of the home, for example a 3,000 sf home that sells for a closing price of $500,000 = $166.67/sf. In addition to sales costs, this calculation includes the value of the land or lot in addition to the structure and so is only useful when used to compare properties with similar land or lot values. Home builders often use cost per square foot to describe the total cost to build divided by the square footage of the living space. For this to be a meaningful value when comparing costs of different projects adjustments have to be made to account for the individual nature of the projects and the methods used for the calculation need to be consistent. The square footage number is typically based on the amount of finished, heated living space not including garages or unfinished storage spaces, basements or attic "bonus rooms". However, extra large garages and unfinished spaces (especially those that can be finished later) add cost to the construction and need to be assigned some value when comparing per square foot costs of different projects. So called "soft costs" such as design and engineering costs, permit and utility connection fees and contractor profit & overhead should be included in the job cost calculation and can vary significantly from one project to another. Be cautious if a contractor quotes per square foot pricing that is below market averages as they may not be including everything, or may be using costs from their least expensive projects to create the impression that they can build for less.

How are the construction costs for a project calculated?

A reliable estimate of a project's cost is arrived at by the use of a comprehensive construction cost spreadsheet that has cost data from plan "take-offs" and subcontractor bids. The take-offs refer to the actual measuring of materials required such as concrete, lumber, roofing, siding, etc. If the plans are not specific the estimator must assume what the specifications are for different building components such as windows, doors, cabinets, plumbing & electrical fixtures, flooring, etc. The builder uses information from meetings with his client to create a specification or "spec" sheet to describe the building materials, fixtures and surfaces so that these can be accurately priced-out. Information from the specs and plans is given to the builder's subcontractors to obtain bids for their area of work. As the cost spreadsheet is filled in with data it becomes the means by which the overall construction cost is calculated and the basis for budgeting and planning. Eventually enough data is collected to create a final cost breakdown which allows the builder & owner to enter into a contract, and for the owner to acquire financing. The finalized costs can be divided by the square footage of living area to get a cost per sf number which now accurately represents the specific requirements of the project and decisions of it's owner.

What are the major factors that effect overall construction cost?

The cost of a project is really a sum of its parts, but there are some general factors to consider:

1. **The Building Site. The characteristics of sites can vary greatly and sometimes result in costs that are difficult to pinpoint on the front end. Degree of slope affects building design and when it exceeds about 10% usually creates the need for either a daylight basement or garage under plan in order to avoid the waste of an oversized crawl space. Although daylight basements and other subgrade living spaces are not of themselves inefficient in terms of cost, they do require work that above grade spaces do not, such as higher excavation and foundation costs. In addition to the waterproofing and water drainage work not necessary on level sites, ground conditions such as rock and subsurface water issues may be more likely to be encountered as the excavation depths increase. Unless preconstruction investigations by boring or test pits are made even level sites can encounter unexpected costs when ground breaking takes place, and this can add significantly to excavation & site work costs. Steeper sites may require geotechnical work to evaluate soil conditions and slope stability to determine how these may impact foundation design. Sites will offer different challenges for driveway access, landscaping, utility work and storm water disposal. Retaining walls or terracing may be required on slopes to create usable yard areas and retain fills for driveways and patios. There are some significant differences in site work and utilities depending on whether a site is in a development with power, sewer & water service already stubbed to the curb, as compared to a rural site that may require long access drives with lengthy power lines, transformers, wells and septic systems. However the rural site will not have the connection & system development fees for water & sewer that a city lot would. The site location also determines the permitting jurisdiction, which city or county will issue the building permit and perform inspections. Different jurisdictions will have different permit fees, system development fees, utility connection fees, etc. The permitting jurisdiction will be applying their own set of codes and regulations on many aspects of the project which can result in costs not incurred elsewhere. Examples of this are: structural & engineering requirements, septic system design, storm water disposal systems, fire sprinkler systems, fire truck access codes, erosion control requirements, environmental protection requirements, etc. Private development CC&Rs may also dictate or limit the use of certain exterior materials.**

2. **Complexity of Design. The most cost effective house shape would be a square two-story box built on 4 foot modules, although that is not most people's idea of a dream home. Some estimating techniques actually consider the number of exterior corners on a home and add material & labor costs as the number increases. As the number of wall jogs, varying wall heights, angles and curved surfaces increases, the design becomes more complex and expensive to build. Higher ceilings and vaulted spaces create more volume which requires more lumber, siding, insulation, drywall and labor to build. Steep roofs and roofs with more hips and valleys require more materials and framing & roofing labor. Complex roof systems may require stick framing rather than engineered trusses, increasing labor costs and construction time. Current codes require buildings to be strengthened in order to resist the lateral forces of wind storms and seismic events, and the costs to do this are directly related to the building's design. Large window walls that leave little solid wall surface to meet lateral strength requirements often require steel frames and hardware to meet engineering values. Use of materials not common to residential construction often increases costs, although the architectural result or long term durability may be desirable. Unconventional designs and materials will require more specialized tradesman and equipment, and increase the time needed by the builder to properly manage the construction.**

3. **Fixtures and Surfaces. Once a set of working drawings is complete the cost of the shell is relatively easy to identify as it will take a quantifiable amount of concrete, steel, lumber, etc. and labor to put it together – there will only be a limited range in cost depending on market price fluctuations for these materials and the labor to construct. However, the choices made by the owner for secondary materials and fixtures will result in a huge range in final cost. Most products can be categorized as average, better or best in terms of quality and value depending on the application and expectations of the end user. This is a personal as well as a budget driven set of decisions and relates to the style of the home as well as owner satisfaction and future marketability. In general it makes sense to stay consistent with the market price range of the home and not upgrade or downgrade fixtures & surfaces extremely as compared to homes of similar value in the surrounding area. Another consideration is the number of years that the owner expects to stay in the home. A longer time frame can justify spending more on customizing the home, whereas a short time frame would tend to make it more sensible to emphasize the future marketability by being more conservative in controlling costs and using more neutral selections. A short list of the decisions that will determine these costs would include:**

   Exterior: Windows (vinyl, clad wood), Doors (style, wood, fiberglass, glazing), Roofing (composition, tile, metal), Siding (cedar, composite - Hardiplank, plywood), Masonry (brick, natural stone, cultured stone), Decks (cedar, composite, railing types), Driveways, Patios, Walks & Steps (brushed, exposed/washed, stamped), Landscaping including irrigation.

   Interior Mechanical: Plumbing fixtures (tubs, showers, sinks, valves, water closets), Electrical fixtures (surface mounted, recessed), Low Voltage electrical components (audio, video, security, intercoms, vacuums, programmable lighting), Heating, Cooling & Ventilating equipment (furnaces, airconditioning & heat pump units, aircleaners, fans, water heaters, hydronic & electrical floor heat), Fireplaces (gas, wood burning), Appliances for kitchen & laundry.

   Interior Finishes: Doors & Millwork (style, paint or stain, wood species), Staircases (carpet, hardwood, stone, tile, railing designs), Door & Bath Hardware (style, finish), Drywall (smooth wall, spray texture, brocade, square or rounded corners), Paint schedules, Cabinetry (door style, wood species, finish – stain or paint, site finished or prefinished), Countertops & backsplashes, Tubs & Showers (laminate, tile, stone, composite, acrylic), Flooring (carpet, hardwood, ceramic tile, stone, linoleum).

4. **Economy of Scale. As the square footage of a home increases the cost per square foot will go down assuming site costs, complexity of design and fixtures & finishes stay similar. This is because there are many areas in which costs do not increase in direct proportion to increases in square footage of living space. Compare a 5,000 sf home to a 2,500 sf home. The 5,000 sf home still only has one kitchen, same number of appliances, one master bath, possibly the same number of fireplaces, garage doors, etc. The driveway, landscaping and other sitework may be similar. The permit and utility connection fees will not double, and either will professional fees such as design, engineering and project management. The cost of subcontracted labor includes a certain amount of estimating, consultation and mobilization time that does not increase in proportion to job size. So it can be seen that on a square foot basis the most expensive homes are of smaller size, on difficult sites, of complex design and with high end fixtures and finishes. The bottom line cost to build will be greater on the larger home, but the unit cost as expressed by the per square foot calculation will be less, making size a factor in determining construction cost.**

What are some guidelines for building cost efficient homes?

- **Cost efficiency and value is a function of initial cost to build, long term utility and maintenance costs, and the buildings ability to meet the owner's expectations for style, livability and comfort.**
- **As land in desirable areas becomes scarce the options for building sites becomes more challenging. The important thing is to identify as much as possible what the excavation, foundation and other sitework costs will be for the proposed home before committing to buy the property. Be aware that problem sites are rarely discounted enough to fully offset the additional construction costs. Even veteran builders are often surprised at what problems can be uncovered when excavation takes place – rock, unstable soils, water drainage issues, etc. When in doubt consider hiring a civil engineer to provide a geotechnical report.**
- **Obtain information from the city or county building and planning departments to find out about government codes and regulations that control the development of the site as these can require improvements unique to the site location.**
- **Home design should be responsive to site characteristics to be efficient. Stock plans that are used inappropriately do not take advantage of site amenities such as privacy and views, and can result in awkward architecture and poorly functioning floor plans. The cost of well thought out and accurately drawn plans is more than offset by the benefits of a truly custom design that optimizes the interaction of home and site and owner. Be aware that someday the home will be sold by you or your heirs, so marketability is always a consideration.**
- **Don't build more square footage and interior volume (high ceilings) than can be utilized, unless future marketability dictates otherwise, since initial cost, utility, maintenance, tax and insurance costs are all affected by size.**
- **Use high quality materials to gain long term durability and reduce maintenance and replacement costs. In the long term it's better to build less square footage of good quality than obtain the larger home by using inferior materials, fixtures and finishes.**
- **Beware of the low bid when evaluating contractors and their subs. The quality of the workmanship is just as critical to long term value as the quality of the materials. A good contractor has developed relationships with his subcontractors based on reliability, quality of work and ability to improve the final product, as well as price.**
- **Consult with the builder and his mechanical contractor to evaluate options in insulation and heating & cooling systems to take advantage of the current technology and building science to create a home that is as comfortable, healthy and energy efficient as possible.**
- **Remember that you hired your builder because of his knowledge and his relationships with his subcontractors and suppliers. The internet has made it possible for anyone to offer products at lower prices because they don't need to supply the service that local sources do. When shipping and handling costs and delays due to ordering errors and damaged goods are factored in, the potential savings are gone or worse. This is where the old adage "Price, Quality, Service – pick any two" rings true.**
- **Do the work on the front end to help the builder complete a set of specifications that clearly defines the materials, fixtures and finishes. This will enable the builder to accurately price the job and order products and schedule subcontractors to avoid delays. There will always be a certain amount of redesign on a custom job, but too many last minute decisions and change orders do not allow for efficient construction. Start visiting product showrooms and meeting with sales people early in the planning process as this information will be important to the designer/architect as well.**
- **Have fun! No one has built the perfect house and this is probably not possible as the owner's preferences and needs will change over time. Allow enough time to research products at a leisurely pace rather than feeling under pressure to make decisions. Keep in mind that it's a privilege to build a custom home, and don't take it so seriously that it is a stressful rather than an enjoyable experience.**