



Building Within Budget: Ideas for Shaving Months and Dollars Off Your Next Construction Project

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**Cold-Formed Steel Framing Resource
Center for Building Professionals**



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Over the course of any construction project, building professionals must ensure they meet strict timelines, safety requisites, code requirements, and quality control – but within all these considerations, there’s one factor that remains top of mind: BUDGET.

However, cost-effective building projects aren’t solely about choosing the materials that cost the least. Over the lifespan of any construction project, building professionals incur a variety of expenses, including labor, design, insurance, material-loss, repair, and replacement costs.

All things considered, cold-formed steel (CFS) framing systems can offer significant cost benefits over competitive building materials when the total cost of construction is considered

For example, cold-formed steel framing was chosen for an office renovation at the Chart Industries, Inc., manufacturing plant in La Crosse, Wisconsin, for its cost benefits and flexibility to integrate with other systems. Compared to masonry wall construction, the CFS system saved about \$2.50 per square foot on the exterior walls.



This eBook will highlight the qualities and benefits of CFS framing. It provides useful tips on how to make your next project more cost-effective and provides examples from general contractors who used CFS to achieve significant cost and time savings.

9 Ways Cold-Formed Steel Framing Can Lower Your Total Construction Costs

How can the use of CFS framing cut your construction costs while maintaining work quality and output?

CFS framing has a proven track record of providing cost-effective benefits for mid-rise buildings. Steel is resilient, adaptable and durable, which reduces life cycle costs. Steel framing systems can be readily and economically adapted to cope with the changing requirements of occupants, avoiding functional obsolescence and the high cost and disruption of refurbishment, redevelopment or demolition.

Here are nine ways that CFS framing systems can lower your total construction costs:



1. HIGH STRENGTH-TO-WEIGHT RATIO

Steel framing's strength-to-weight ratio significantly exceeds that of wood or concrete. Being strong and relatively lightweight, CFS systems reduce a building's total load which, in turn, allows the owner to save costs beginning at the foundation.



2. PANELIZATION

Panelizing CFS wall panels off-site reduces on-site labor costs and construction waste. It cuts the total project cycle time and improves quality control, since CFS components can be created to exact measurements.



3. SHORTER PROJECT CYCLES

The predictability and accuracy of steel components speed up the process and allow follow-on trades to get to work sooner. The shorter construction timeframe reduces interim financing costs for projects. It also narrows the window of construction-related liability and allows for earlier building occupancy, as was the case with a CFS project for student housing at **California Polytechnic State University**. The project was completed in six months less time than was predicted for a concrete structural form, saving the university's budget.



4. BETTER RESULTS DURING WINTER TIME

Ready-mixed supply of CIP concrete during winter construction can add cost to a project. And, concrete requires artificial heat in order to cure during cold temperatures. Neither of these costs are associated with steel framing.



5. EARLIER PROJECT COMPLETION AND BUDGET SAVINGS

Steel's shorter construction cycle means equipment can move on and off the job site faster. This lowers crane costs and reduces scaffold rental times, for example.



CFS framing has a proven track record of providing **cost-effective benefits for mid-rise buildings**. Steel is resilient, adaptable and durable, which reduces life cycle costs.



6. LOWER INSURANCE RATES

Builders risk insurance premiums are typically lower for steel than for wood. Builders risk insurance for a four-story, 400-unit hotel built over 24 months in Ohio cost \$360,000 because cold-formed steel framing was used. It **would have cost** \$1.6 million had it been built with wood — a savings of about \$1.3 million.



8. NO MANDATED SITE SECURITY

Several Canadian jurisdictions are requiring builders to post 24-hour security guards at their wood-frame construction sites. One builder reported paying up to \$10,000 per month for these security details. Another builder said the security needed for a \$8 million wood-framed project cost \$20,000. Steel-framed projects do not have such hidden or extraordinary site construction costs.



7. LOWER FIRE-RELATED LEGAL COSTS

Owners of wood-framed, mid-rise buildings need to consider the possibility of legal actions due to a construction or building fire which results in damage to, or destruction of, adjacent properties. This is of particular concern for mid-rise buildings which are often built on “infill” sites as a method to curb urban sprawl. In 2015, for example, a fire at apartments under construction in Edgewater, NJ, displaced hundreds of tenants from nearby buildings. Lawsuits were filed against the building owner citing the known risk of fire associated with wood construction. Steel, in contrast, is non-combustible. So, CFS framing minimizes the risk of any fire spreading to adjacent buildings and reduce the possibility for subsequent legal action, putting less burden on building owners and firefighters.



9. NO COSTS ASSOCIATED WITH SITE SAFETY COMPLIANCE

Since wood-framed buildings are highly susceptible to fire during the construction phase, many municipalities in British Columbia, Canada, require developers to submit detailed fire-safety plans when applying for building permits. Some municipalities mandate that sprinklers and standpipes be in place on floors where work is underway. They also require additional safety supervision, such as fire watches during hot work. These costly site safety practices are not required for noncombustible cold-formed steel buildings, providing peace of mind for owners and builders.



Built to Last: How Cold-Formed Steel's Durability Leads to Savings

One of the major material advantages of CFS framing is that it is impervious to the environmental factors that typically threaten the integrity and lifespan of other framing materials. Because the material is resistant to corrosion, mold and vermin, it does not require costly treatments or repairs typical of other building materials.



CORROSION RESISTANCE

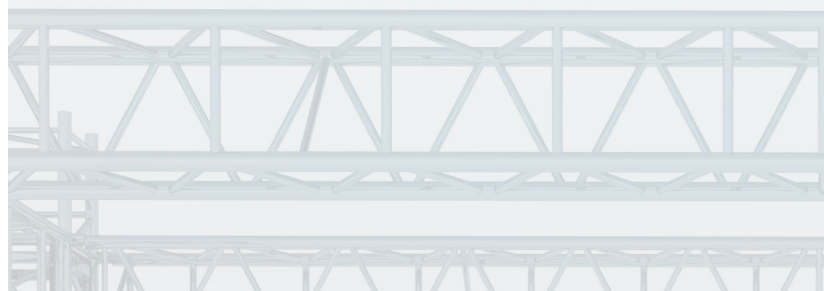
Properly designed and constructed steel structures provide long-term durability and demonstrate excellent service life. Building codes and industry standards require that steel-framed structures be designed to tolerate corrosion or be protected against it where corrosion may impair strength or serviceability. Steel framing may be protected by barrier paints or other coatings applied on site or during manufacture, or by galvanizing (coating with zinc), depending on the severity of exposure conditions.

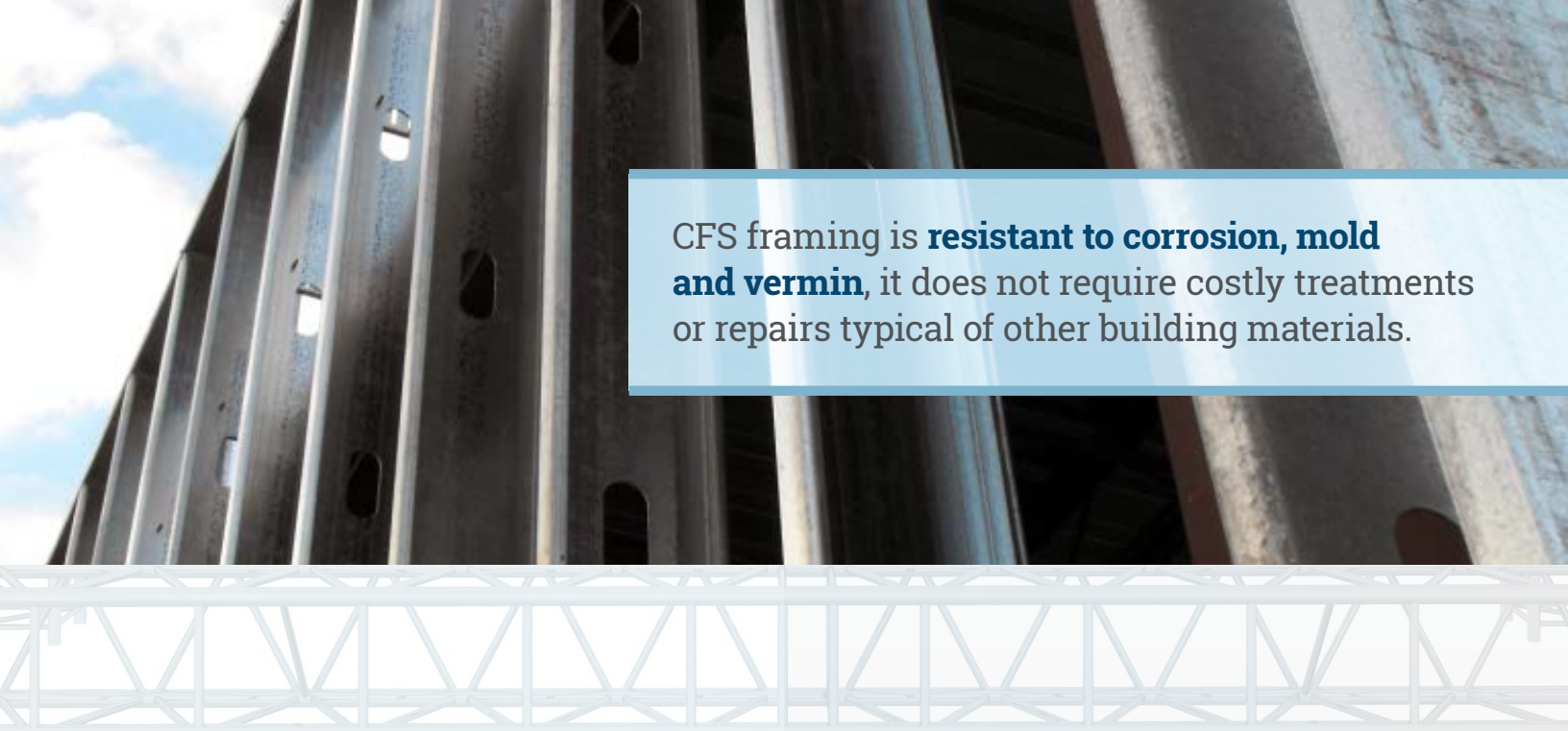
Zinc-coated steel — which is standard for cold-formed steel framing — will last far beyond the life of a building when properly installed and insulated. The zinc coating protects the underlying steel by “sacrificially” corroding over any area where the underlying metal becomes exposed.



MOLD RESISTANCE

Steel framing is inorganic, which means it offers no food source for mold to grow upon. Moreover, steel framing also can help resist the onset and growth of mold since its framing members are dimensionally straight and connected mechanically with screws rather than nails, providing a tight structural envelope with no nail pops or drywall cracks. Moisture does not seep into steel studs, substantially eliminating the expansion and contraction of construction materials around windows and doors, where leaks can occur.





CFS framing is **resistant to corrosion, mold and vermin**, it does not require costly treatments or repairs typical of other building materials.



VERMIN RESISTANCE

Termites cause more damage to wood structures than fire, floods and storms combined. And that destruction is rarely covered by insurance. But even the formidable Formosan termite — one of the most destructive termite species in the world — doesn't affect cold-formed steel. That's why the International Residential Code recognizes CFS as one of the methods for complying with its requirements for termite-resistant construction. The use of CFS reduces costs associated with annual chemical termite treatments or the use of pressure-treated lumber.



DIMENSIONAL STABILITY

Framing systems are designed with an eye to structural integrity and stability. The taller the structure, the more important these considerations are. Unintended structural movement can have expensive and potentially disastrous consequences on a building's structural, mechanical and finish systems. CFS framing is dimensionally stable and it is not subject to moisture-related expansion and contraction, or predisposed to shrink, split, warp, crack or creep.

Steel also is isotropic — meaning it has the same dimensional properties in all directions, with the same strength up and down a member, side-to-side, and in all loading directions. The tighter envelope provided by CFS framing enhances the structure's overall energy efficiency, reducing long-term maintenance and repair costs that often result from framing with less stable materials.

In addition to making a building safer and more stable, the durability of CFS framing directly leads to cost savings throughout the construction project cycle.

Building Your Most Cost-Effective Mid-Rise Building

The state of the global economy has changed the construction market for the next several years. Growing demand for mid-rise buildings, including apartments, condominiums, senior living, affordable housing, and mixed-use commercial/residential development is creating opportunities and challenges for builders and developers as they work to implement strategies to maximize return on investment.

Even with today's heightened environmental awareness, most builders and designers are still focusing on their bottom line. Some builders are fighting the increased environmental regulations and safety requirements, while others embrace them and find ways to simultaneously reduce consumption, increase safety, and increase return on investment for owners and developers. The question that arises is:

How can builders meet market needs, maintain safety, and build cost-effective and environmentally sensitive mid-rise buildings?

Here are four essential tips that can help make your next mid-rise project your most cost-effective one yet.



1. CHOOSE THE RIGHT MATERIAL


Mid-rise structures, which are 3 to 9 stories in height, are frequently used for hotels, motels, apartments, dormitories, barracks, condominiums, and multi-family housing. The structural details play a critical role in the cost and configuration of the building. That means choosing the right material is critical. Every additional square foot built onto a project means more potential revenue for the building owner. More stories and higher density mean more revenue from the same urban footprint.

Because CFS framing has the highest strength-to-weight ratio of any construction material, less material is required to carry the same structural loads as other materials. Cost savings in steel buildings start at the foundations, where the loads imposed by a steel frame are

up to 50 percent less than those of a concrete alternative, and therefore foundation costs can be considerably less. The light-weight quality of CFS framing also means that it is possible to build in difficult soil conditions where heavier materials would require expensive deep foundations.

Construction cycle time is another important factor. Take the example of a **five-story residential project in Brantford, Ontario**, where CFS framing reduced the construction timeline by six weeks and resulted in a significant cost savings.

Additionally, the consistent, high quality and dimensional stability of steel framing results in few warranty claims and call-backs. Builders can also trim their insurance costs. Using noncombustible steel construction will minimize the risk of **fire-related incidents** and subsequent legal action, resulting in significant insurance savings for the builder during construction and for the owner over the life of the structure.



Because CFS framing has the **highest strength-to-weight ratio** of any construction material, less material is required to carry the same structural loads as other materials.



2. MAKE IT SAFE

Along with its design flexibility, steel construction offers inherent safety advantages. Virtually all steel construction is manufactured offsite, which means most of the work is carried out in safer, factory controlled conditions, and fewer workers are required on site. There are fewer deliveries of materials and equipment to the site, which means fewer potential jobsite hazards. And using steel means shorter building programs, hence less pressure on workforces to reach completion targets.

It also leads to lower financing costs because shorter construction time means reduced interest charges. Time related savings can easily amount to between **3 and 5 percent of the overall project value** reducing the building owner's requirements for working capital and improving cash flow.

Speed is achieved without jeopardizing safety, making steel construction inherently safer than alternatives.



3. SPEED UP YOUR PROJECT AND MAXIMIZE VALUE

More efficient construction methods available for cold-formed steel projects can significantly reduce the construction schedule. Steel allows an early start on site and structures can be erected quickly. The predictability and accuracy of steel components allows follow-on trades to get to work sooner. This delivers time savings. In fact, speed of erection is often one of the main criteria for selecting steel. In many high-density urban projects, it is critical to reduce disruption to nearby buildings, minimize impact on neighboring residents and avoid causing traffic congestion. Short construction periods leads to savings in site preliminaries, earlier return on investment and reduced interest charges.

Faster construction schedules can help building owners earn money on their investment faster by moving clients in sooner.



4. MAKE IT SUSTAINABLE AND PROFITABLE

Consumer and market demand are driving more builders to use sustainable materials. According to a **World Green Building Trends 2016** report by Dodge Data & Analytics, the global green building sector continues to double every three years, with survey respondents from 70 countries reporting 60 percent of their projects will be green by 2018.

The additional benefit is that a sustainable building is a cost-effective building when constructed properly. Savings result during construction as the use of steel building components generates very little onsite waste, since components are manufactured to tight tolerances prior to being delivered to the building site. Any onsite steel waste generated can be easily collected for recycling or reuse.

Moreover, for mid-rise construction this is particularly beneficial because use of steel components can contribute to obtaining the **US Green Building Council's LEED** program points for building owners seeking certification.



6 Examples of General Contractors Who Saved by Building with Cold-Formed Steel Framing

The value of CFS framing is catching on among general contractors (GCs). “The quality is just phenomenal,” said Brandon Bergholz, project manager at Mortenson Construction, a large general contractor. More and more companies are discovering that CFS is effective in lowering commercial construction costs and cutting delivery times.

Here are six benefits GCs experienced when they used CFS framing systems as part of their projects:



1. SHAVE MONTHS OFF THE CONSTRUCTION CYCLE

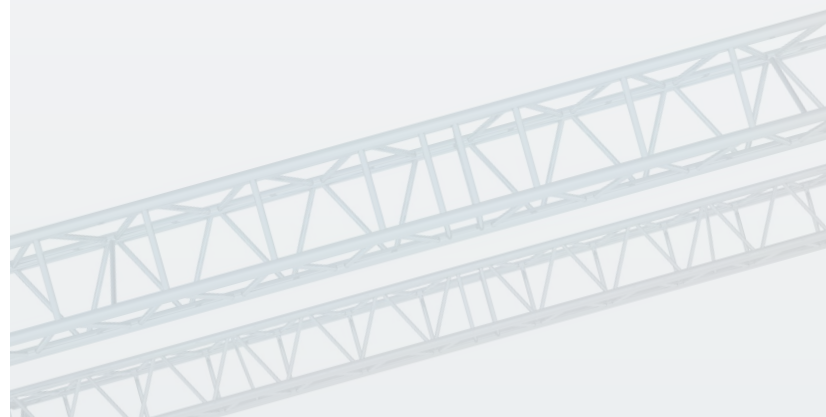
Normally, it would take a year to complete the enclosure of an 831,000-square-foot hospital, but construction on the **Exempla Saint Joseph Replacement Hospital** in Denver, Colorado was cut by more than seven months. Mortenson Construction used premanufactured cold-formed steel exterior panels. The 30-foot by 15-foot exterior panels, each built off-site in controlled conditions, made installation much quicker than “stick-built” construction on-site.


Construction on **Victory Hall**, a 163,415-square-foot dormitory at the University of North Texas, Denton, Texas, came in four months ahead of schedule — and just in time for the new school year. The design-build team at the university switched from concrete construction to a load-bearing CFS framed wall system after construction had begun in order to meet stringent schedules and cost constraints.



2. WORK DURING WINTER

A six-story **student residence at the Trafalgar Campus of Sheridan College** was built over a tough Canadian winter, when temperatures reached -10 to -20 degrees Celsius [14 to -4 degrees Fahrenheit] for three months. The structure’s foundation was poured in the fall, and rather than using concrete during the winter, CFS framing was specified. This was advantageous to the GC since heat was not required to install CFS, which would have been the case for masonry or concrete load-bearing systems — and would have added to overall construction costs.





Across North America, GCs are using CFS framing to **cut time, save costs, solve problems, improve modeling, and ensure a smoother decision-making process** and workflow for all teams involved.



3. REDUCE IN-PLACE WEIGHT

Pound for pound, CFS framing is much lighter than concrete, and it has a high strength-to-weight ratio and resists warping, mildew, and cracking. At **City Green condominiums** in Milwaukee, Wisconsin, exterior, load-bearing CFS framing walls support nine stories and steel balconies. Yet, the CFS framing design decreased the load on the foundation in comparison to other systems. The developer says the CFS framing system allowed for a reduction in the amount of concrete needed for each footing, which he thinks saved money.



5. REDUCE SCAFFOLDING

Stephen Bradford, a project manager with South Valley Drywall, likes panelized framing because it eliminates building by piecemeal, which includes setting up scaffolding on site and then framing, sheathing and insulating exterior panels by hand. At Exempla Saint Joseph Replacement Hospital, reducing the scaffolding cut costs and opened up the job site. All trades got on site sooner, and were not obstructed by excess equipment.



4. REDUCE CARPENTRY MAN-HOURS

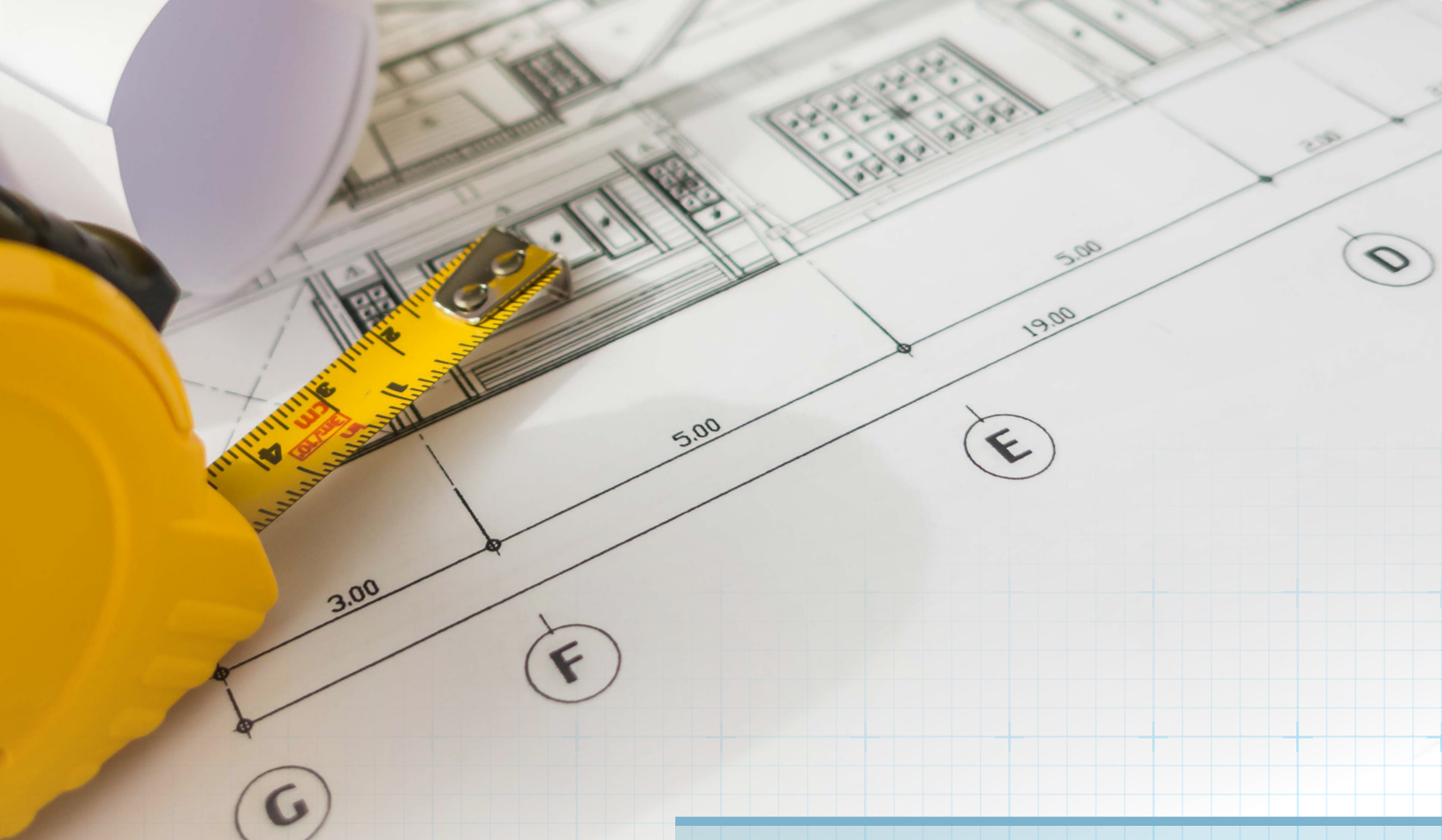
Since CFS framing is durable, non-combustible, cost-effective and easy to work with, it's the perfect framing material for prefabricating panels. At Exempla Saint Joseph Replacement Hospital, panelization reduced the number of carpentry man-hours by 30 to 40 percent.



6. CUT FINANCING COSTS

By using load-bearing, CFS framing, hollow-core concrete plank floor joists and CFS roof joists, the Sheridan College student residence project was able to shave three months off its construction cycle. As a result, the project saved an estimated \$300,000 just in financing costs.

Across North America, GCs are using CFS framing to cut time, save costs, solve problems, improve modeling, and ensure a smoother decision-making process and workflow for all teams involved.



When you consider the entire lifecycle of a building – from design to construction to maintenance – the use of CFS framing can offer significant cost savings due to reduced labor, off-site construction, and long-term resistance to mold, vermin, and termites.


If you have an upcoming project, and have specific questions related to cold-formed steel framing, request **complimentary assistance** from the BuildSteel team of experts.

About BuildSteel

BuildSteel provides valuable resources, education, and complimentary project assistance related to the use of cold-formed steel framing in low and mid-rise and multi-family construction projects.

As a centralized source for information, BuildSteel offers resources to help move your next cold-formed steel framing project forward efficiently and effectively.

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