



URBANA PARK DISTRICT
OPERATIONS + PLANNING FACILITY

BUILDING SYSTEMS COMPARISON

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PRECAST CONCRETE WALL PANELS:

SUSTAINABILITY

Precast concrete is an environmentally sound material. It is produced from natural materials. No toxic substances are produced in its production or use. Also, the production energy consumption of the concrete is quite small. The thermal mass of conc. saves energy year-round by reducing temp. swings.

The thermal mass of concrete allows shifting of heating and cooling loads in a structure to help reduce mechanical-system requirements.

Because precast concrete is factory-made, there is little waste created in the plant (most plants employ exact-batching technologies) and it reduces construction waste and debris on site.

Precast contain recycled materials such as fly ash, slag, and silica fume, which would otherwise go to landfills, can be incorporated into concrete as supplementary materials.

Precast concrete members are unique in that they are individually engineered products that can be disassembled. Designers can easily plan future additions to buildings, because the precast concrete components can be rearranged. Once removed, precast concrete members may be reused in other applications.

ENERGY EFFICIENCY

The thermal mass inertia of concrete, which is recognized in ASHRAE standards, also reduces peak heating and cooling loads, thus saving energy year-round by reducing large daily temperature swings.

The thermal mass of precast concrete absorbs and releases heat slowly, shifting air conditioning and heating loads to allow smaller, more efficient heating, ventilating, and air conditioning (HVAC) systems. Insulation is often used in architectural panels and sandwich wall panels to increase thermal efficiency, with continuous insulation in walls being possible. The resulting savings are significant up to 25% on heating and cooling costs

DURABILITY

Provides long-term durability and require little or no maintenance to preserve their original look.

Provides strength and inherent weather resistance.

The material stands up well to most environmental.

Precast sandwich panels provide protection to the insulation layer against flames, heat, moisture, and deterioration.

Does not require painting or other finish repairs.

Provides a high security enclosure.

AESTHETICS

Provides unlimited architectural vocabulary of expression.

LIFE CYCLE COST

A precast façade can be designed to match the intended life of a building with its minimal maintenance, provides substantial long-term savings. Life expectancy of panels 75 year +

INITIAL COST

Precast's speed of erection and its ability to be cast and erected in all kinds of weather aid the entire construction team. These advantages allow the building's shell, whether load-bearing or cladding, to be enclosed quickly. This, in turn, lets interior trades begin work earlier and reduces overall construction time.

Load-bearing panels can reduce framing costs by providing a column-free perimeter. Depending on the floor plan, there also is potential for reducing the number and/or size of interior columns, adding layout flexibility. This results in a more efficient and less costly construction.

A load-bearing insulated wall panel can serve as the structure, the thermal performance, and the durable interior surfaces. This reduces the number of systems used and the labor and time to install multiple systems

ACOUSTICS

The weight / mass of precast panels serves as a sound insulator both interior and exterior.

Panels usually do not need additional treatments in order to provide adequate sound insulation.

MOLD

Precast concrete is resistant to mold therefore potential for mold growth in all phases of building design, construction, operation, and maintenance is virtually eliminated.

ADVANTAGES + DISADVANTAGES

Prices can be very competitive with other systems when you use numerous pieces of the same size and shape. One of the most costly aspects of a precast system is the initial cost of making the forms. Once the forms are made, each additional piece becomes less expensive.

Precast concrete can save time because it is fabricated in a plant where weather conditions do not affect production. Once trucked to the site, it can be erected extremely rapidly.

The inherent nature of concrete eliminates the need for fire proofing or additional finishes for durability.

Every corner, reveal, embed, etc. adds to the cost of each piece.

Consider the local market when specifying precast. The material must be trucked from the plant to the site, so trucking costs must be considered. Also, if the amount of precast is not significant, the interest from the precast industry may be minimal – a lack of competition can drive up costs.

Provides a non-combustible construction with inherent fire-resistant capability, creating a safe envelope that helps protect personnel, equipment and the building itself.

PRE-ENGINEERED METAL BUILDINGS:

SUSTAINABILITY

Pre-engineered system optimizes a building design to enhance the most efficient use of raw material (steel).

A pre-engineered structure has an efficient design to maximize structural strength and reduce the amount of steel used. This not only reduces the amount material resources needed for the framing, but also the efficient lighter structure reduces the size of footings and foundations therefore reducing costs and materials.

Steel is 100% recyclable.

ENERGY EFFICIENCY

The standard pre-engineered system has a limited amount of batt insulation in the walls and the roof making it have low energy efficiency. Each manufacture of pre-engineered buildings have developed unique systems to provide more energy efficient buildings. However the addition of these systems makes the pre-engineered system not as cost effective as previously compared to other construction.

DURABILITY

Provides short to mid-term durability and will require maintenance the expected life of the system

Provides inherent weather resistance at the exterior.

The material does not stand up well to maintenance and shop environments without additional cost of other systems to be used with pre-engineered system.

Metal liner panels do not provide protection to the insulation layer against flames and heat. Metal liner panels are an additional cost to the pre-packaged system in order to provide a limited amount of moisture and deterioration of the insulation.

If used in areas where vehicle, forklift or materials are in motion, the metal siding should be protected with plywood wainscot, steel bumpers, etc. These buildings are not adaptable to areas which require fireproofing.

AESTHETICS

Metal panels can be utilized in many building configurations. However they have a limited color selection. The pre-engineered structural system is limited to its intended standard layout.

LIFE CYCLE COST

They have a durable skin and structure however the metal panels only have a life expectancy of 20 -30 year. The steel framing has longer term life expectancy if it is not subject to harsher interior environments.

INITIAL COST

As implied by the name, this building system uses standardized metal components which are engineered to maximize use of the material's structural properties. This system typically is offered as a complete building package, including structure, metal roof and metal wall panels. (Tiltup concrete walls can be used on a pre-engineered building also.) Because it has already been designed very close to its limit, the building system is meant to be used without modifying a manufacturer's standard design if you are to achieve the cost benefits of the system.

This is probably the least expensive quick way to enclose large areas, but the use must fit this system because it is very difficult to modify.

ACOUSTICS

Metal panel systems do not serve as a sound insulator either on the interior nor at the exterior.

Panels do need additional treatments in order to provide adequate sound insulation.

MOLD

Standard pre-engineered systems having exposed insulation are not resistant to mold therefore there is a potential of growth in both the construction and operation / maintenance.

ADVANTAGES + DISADVANTAGES

Because the systems are designed to their most efficient use within the intended building, it does not allow for the modifications nor expandability in the future.

The pre-engineered framing systems can be used in conjunction with other building system enclosures such as masonry.

Unlike many commodity materials used in construction projects, metal buildings are integrated assemblies of many structural members and related accessories, all of which are custom configured by the manufacturer as required by the nature of each specific project. Metal building systems present unique challenges in the preparation of drawings and project specifications. Because each manufacturer has its unique detailing, bid documents have to be designed using one manufacturer's system. If another manufacturer receives the bid then the detailing will need to be redesigned.

Virtually any low-rise building configuration, which can be framed in conventional steel, can be framed with a metal building system. However, Designers and Owners are cautioned that attractive square-foot cost estimates, derived from the most basic metal-clad building, will not be applicable to a fully engineered metal building that involves masonry wall systems, complex geometry, etc.

Not recommended for areas that require a security enclosure because the metal wall and roof panels are light gage.