

TOTAL PRECAST CONCRETE

It's common practice when detailing construction assemblies to treat the structural frame as an independent system assembled first, onto which lighter finish materials are hung, or clad, onto the supporting structure to complete the building envelope. Connections between the cladding and the frame are designed to transfer the dead load of the finish materials, and live loads such as wind, through the "cavity-wall" to the structure behind.

A "total precast concrete" building system reduces much of the redundancy found in this approach by combining the structural frame and exterior finish into a single, load-bearing "barrier-wall" element. Because of this combination, total precast is sometimes referred to as a "dual-use" design concept, but the term is actually a misnomer; the system offers many more benefits, including fire and vibration resistance, sound attenuation, and thermal mass. Many different building types, panel shapes, framing members, and exterior finishes are easily accommodated within the total precast system, including stone and brick cladding cast integrally into the structural panel.

Unlike cladding systems, architectural precast concrete panels are fabricated in large sizes. Bigger panels depend less on large quantities of applied sealant, unlike typical stone panel cladding, or the many vulnerable mortar joints of traditional masonry veneer construction. Using fewer lineal feet of sealant translates directly into less probability of sealant failure, which would allow both air and moisture infiltration into the wall cavity. Using fewer panels and construction materials also means less complex shop-drawing reviews, more efficient

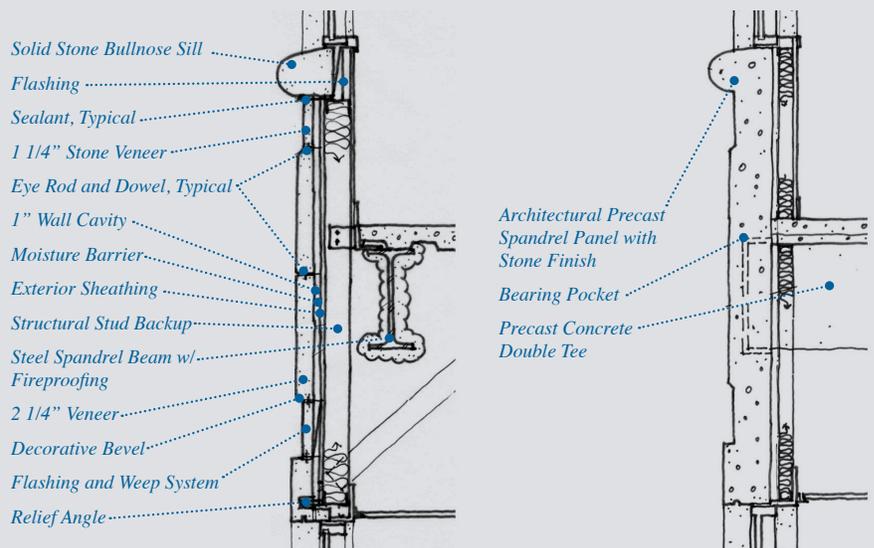
transportation to the job site from the precast plant, and a cleaner jobsite.

Consider these side by side wall sections illustrating the complexity of a veneer-type non-load bearing cladding system vs. a total precast approach (Figure 1). The profile and aesthetic appearance of the exterior wall is identical between the two systems. The redundant construction elements shared between the two systems (e.g. window and frame, window

perimeter sealant, insulation etc.) are NOT noted on the wall section, only the unique elements required for each system.

The stone veneer cladding system on the left presents a complex detailing challenge for the designer and constructability issues for the builder considering the number of separate trades involved, sequence of construction, and the greater risk of envelope failure (air

FIGURE 1



and water infiltration, mold, connection corrosion, weep accommodation, etc.) given the number and coordination of different building trades required. Complicated exteriors like the veneer wall involve more individual parts and materials, resulting in more intensive maintenance requirements over the life of the building.

A simpler wall construction has hidden benefits, too. Since the panels need only panel-to-panel or panel-to-window sealant and exterior glazing to be considered weatherproof, interior trades such as drywall can begin work much sooner. Also, the airspace cavity between the exterior cladding and the backup structure that is normally found in a veneer system is eliminated, along with the need to vent and weep this cavity to avoid condensation and mold formation. Lastly, construction speed can be accelerated because precast components may be prefabricated off-site during the regulatory review and permit processes, and when ready, assembled faster on-site due to fewer trades involved.

CONTINUING EDUCATION PROGRAM

Total Precast Building: Windom EMS Building – Windom, MN (Precaster: Wells Concrete)



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This one-hour program is intended for designers with some precast concrete experience and/or knowledge. Basic concepts of pre-stressing, components, and application towards a complete, total-precast building solution will be discussed. Typical design challenges and the unique project delivery process of total precast will be presented, and the unique ability of total precast to meet those requirements described.

Credits: 1 PDH or AIA LU

Contact PCI Midwest for additional information about this presentation.



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