PCI Precast/Prestressed Concrete Institute

Reveals

Designers can create more exterior interest by taking advantage of the variety of possibilities with these reveals or demarcation features

PCI designer's**notebook**

Reveals Add Interest to Precast Panels—Article IV

Designers can create more exterior interest by taking advantage of the variety of possibilities with these reveals or demarcation features

Reveal strips can add visual interest to a building clad with architectural precast concrete panels while eliminating some of the aesthetic concerns that develop when planning panel configurations. Used effectively, reveals offer the simplest way to break up the expanse of an architectural precast concrete panel or to keep the visual appearance from focusing on any differences that may occur in texture or coloration between panels.

A reveal or demarcation feature is a groove or a step in a panel face generally used to create a desired architectural effect. Another name for it is rustication or false joint. Reveals can run vertically, horizontally or diagonally, and there may be several bands of them on a building. Reveals typically measure $^{1}/_{2}$ to $^{3}/_{4}$ of an inch deep and $^{3}/_{4}$ to 4 inches wide, with 45- to 60-degree beveled surfaces allowing for ease of stripping.

Reveals Reduce Thickness

It's important to remember that a reveal, regardless of its depth, reduces the structural thickness of the panel. As a result, when a deeper reveal is required than is typical, its location and effect on the panel's structural performance must be considered.

Reveals and demarcations transform simple shapes into non-routine, visually arresting forms. The reveal can be used to separate multiple finishes, mixes or textures (**Fig. 4-1a**). When exposed aggregate is used, a reveal or demarcation feature is required to keep the retarder from spreading to adjacent areas. A single step in thickness is sometimes used to separate surfaces and/or finishes (**Fig. 4-1b**).

The exterior articulation helps modulate the scale of the building. Flat, windowless surfaces divided by reveals or demarcation features tend to call less attention to texture and color variations. When desired, the scale of large panels may be reduced by using reveals (**Fig. 4-2**).

Draft Requirements

The reveal should be wider than it is deep so the panel can be stripped without damaging the mold (**Fig. 4-3**). Generally, the minimum positive draft for ease of stripping a panel from a mold is one inch in one foot (1:12), with one in eight (1:8) preferred. The draft should be increased to 1:6 for repeated patterns, delicate units and narrow sections (such as reveals) where suction between the panel and the mold becomes a major factor in separation. For example: 1:6, $^{1}/_{2}$:3, $^{1}/_{4}$:1-$^{1}/_{2}$, $^{1}/_{8}$:$^{3}/_{4}$.

Reveals can be single (**Fig. 4-3**), double (**Fig. 4-4**), layered (**Fig. 4-5**) or repeated (**Fig. 4-3**). They also can run in patterns (**Fig. 4-6**) or feature various shapes (**Fig. 4-7**). Deep-set reveals are incorporated in façades to give visual relief and may require thickened sections (**Fig. 4-8**).

Typically, the mold cost associated with reveals is insignificant in comparison to bullnoses and cornices. However, deep-set reveals requiring thickened sections may add some mold costs, along with significant back-forming costs (**Fig. 4-9**).

Using Reveals to Design Architectural Precast Panels

Architect W. Kenneth Wiseman explains why reveals represent the most fundamental detail for producing aesthetically pleasing designs

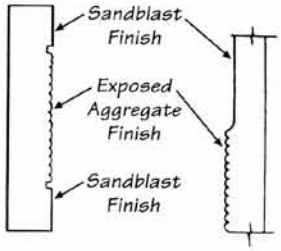
When you search the Internet for the meaning of "reveal," the first citation in Webster's electronic dictionary defines it as a verb that means "to open up to view, to display, to divulge or to make known what has been or should be concealed." It takes additional searching to find "reveal" as a noun in today's Webster dictionary. But if you go to the 1913 version of the Webster's unabridged dictionary, the first citation defines "reveal" as a noun, meaning, "the side of an opening for a window, doorway, or the like, between the door frame or window frame and the outer surface of the wall; or, where the opening is not filled with a door, etc., the whole thickness of the wall: the jamb."

Ironically, the use of reveals in precast design in the late 20th century has much more to do with its use as a verb than it does with 1913's foremost definition of "reveal" as a noun, despite its architectural context in that form.

As we all learned in grade school, a verb is an action word. That's exactly what architectural reveals provide to a precast panel: the visual action. Reveals do much more than simply articulate the thickness of the precast. Designing reveals with architectural precast components creates the most fundamental detail for producing a beautiful precast project.

Pragmatic Uses

Precast by its very nature is made up of panels or component pieces that are assembled to create the building's structure or skin. Those pieces obviously have joints between them, and reveals' most pragmatic uses come in articulating those fundamental joints. These joints can be either emphasized or minimized and hidden by the creative addition of reveals. Reveals' other pragmatic uses come in providing drips and/or small horizontal shelves to protect openings and control moisture as it moves along the exterior surface of the precast.



Figures 4-1a & 4-1b Sandblast Finish

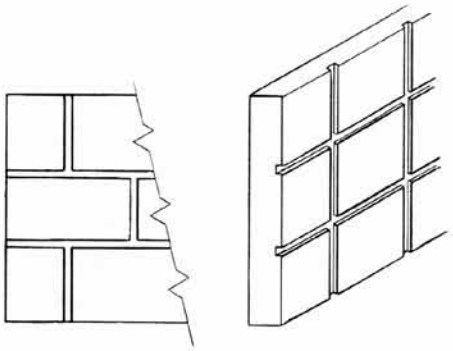


Figure 4-2 Scale Reducing

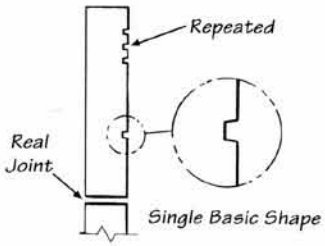


Figure 4-3 Single & Repeated

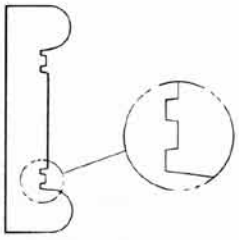


Figure 4-4 Double

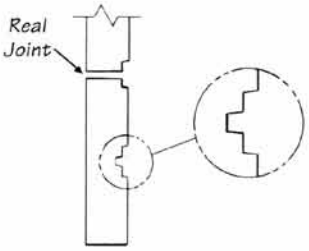


Figure 4-5 Layered

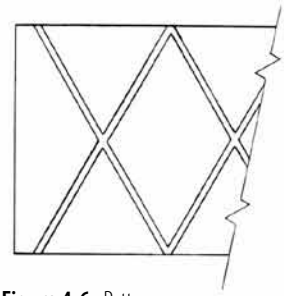


Figure 4-6 Pattern

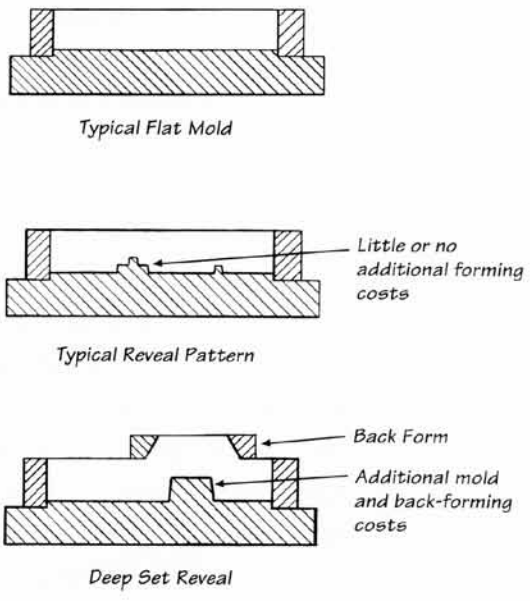


Figure 4-9 Molds

Figure 4-7
Various Shapes

Figure 4-8
Deep Set

Beyond the pragmatic applications of this most-important detail are the more practical uses. Reveals typically are designed where there are changes in the precast's surface. For example a shift in the panel's finish from smooth to textured can be emphasized by using a reveal at the point where the surface texture changes. Reveals also work well where fundamental materials change within a precast panel, such as from an exposed-aggregate finish to a non exposed-aggregate finish within the panel. Reveals allow a crisp, clean transition between these different textures or finishes.

Lastly, reveals can be placed where there are directional changes in the precast surface, such as between a vertical surface and a cornice or bullnose detail. These elements within a wall design can be emphasized or de-emphasized through the use of reveals. (For further discussion of bullnoses and cornices see the previous two sections of the Designer's Notebook.)

Aesthetic Uses

However, reveals can be much more than a joint or line of demarcation between textures or finishes. Designing reveals in varying shapes, sizes and depths for a precast wall can transform what initially might be considered a mundane, solid surface into a rich texture of shade and shadow, bringing visual interest to the building's façade. At Lehman/Smith/Wiseman Associates LLC, we strive to push the range of possible precast details to achieve their greatest aesthetic potential.

Reveals can take horizontal, vertical, diagonal, or curved forms, as well as any combination of these. They can be narrow and delicate or deep, wide and bold; they can offer a rectangular profile or take on any sectional shape desired, such as concave or triangular.

Using horizontal reveals within a precast wall emphasizes floor lines, ceiling lines, or roof lines. Vertical reveals can express the planning module on the building's exterior or its structural rhythm. Diagonal reveals are almost always a part of a pattern of reveals applied over the entire structure. Reveals can make openings within a wall more pronounced or less noticeable. Last but certainly not least, a combination of techniques can reduce or change the building's apparent visual scale.

Detail of Reveals

It is important to make use of the precasters' talents and insights when finalizing the details, dimensions and shapes of the reveals being considered. Reveals aren't built as architects draw them; we draw them as perfect rectangles or squares incised into the precast panel. But in order for the precaster to easily remove the precast panel from the formwork, a draft or subtle chamfer is required.

But in our opinion, these draft requirements and formwork dimensions aren't limitations, nor do they result in a negative aesthetic impact. We believe a designer can take advantage of the form work's nature to make reveals and joints even more powerful and pleasing. On many oc-

casions, we have gone beyond the minimum draft recommended by the precast fabricator, and in fact increased the draft so we can articulate and manipulate the way the reveal or panel joint is perceived.

For instance, within a large horizontal reveal, we have increased the draft angle on the reveal's lower portion to create an apparent highlight as the sun strikes the not-quite-horizontal surface. This produces a shadow, cast by the upper portion of the reveal, that seems even darker and more powerful than if it hadn't been overemphasized. We also have designed wider and shallower reveals with generous drafts on the panels' surfaces. This minimizes or de-emphasizes the reveal and softens its visual impact within the panel design.

The Budget

Reveals represent the most economical architectural technique for articulating panels or component pieces. They are, by their nature, relatively thin and small, and in general don't add significant thickness to the panel. As a result, the greatest value is achieved when reveals articulate the design in precast. It's important to work with both your structural engineer and the precast fabricator to determine how deep a reveal can be before the panel thickness needs to be increased. We've found on numerous occasions that reveals with slightly less than the planned depth of the face mix can be extremely economical.

Recent Examples

Rather than go further in describing the variety, potential impact, and flexibility of reveals in precast panels, here are some recent examples of our work that may be helpful in visualizing their potential.

The Aurora Municipal Justice Center, Aurora, Colo.

The City of Aurora's new Municipal Justice Center, which I designed prior to establishing our firm, represents an extensive precast project. As part of the design, I devised a system of horizontal and vertical reveals, both used in a variety of ways to articulate the wall panels on both the project's exterior and interior.

On the exterior, the first level's horizontal reveals were deep and placed every 4' 3". The reveals' depth was 2 $^1/_2$ inches and their width was 2 inches, and the draft at the bottom of these reveals differed from that on the upper portion. The vertical reveals were approximately 8 inches wide edge to edge, with the back face measuring 4 inches wide. Their draft was designed as more of a chamfer than a draft. The second-floor horizontal reveals were shallower so the shadows cast were smaller, making the building's upper portion somewhat lighter visually. The heavy vertical reveals occurred on both levels and were consistent.

The courtyard space of the Aurora Municipal Justice Center indicates the interplay of both vertical and horizontal reveals with the building forms.

(Courtesy ©*Ron Johnson*)

One of the center's most unusual characteristics came in its application of precast as an interior material. When moving to the project's interior, we scaled down all reveals to reflect a more-appropriate scale for an interior space and its artificial lighting. The same reveal detail was used, but its size was reduced by 30 percent. Thus the interior reveals are more in keeping with interior finish materials and joinery. In fact, some reveals on the column bases were as small as 1/8 inch by $^1/_8$ inch.

U.S. Olympic Training Center, Colorado Springs, Colo.

We have done several precast facilities in Colorado Springs as part of our work for the U.S. Olympic Committee at the U.S. Olympic Training Center. Lehman/Smith/Wiseman designed a state-of-the-art Aquatic Center, a multi-sport Gymnasium, a Sports Medicine & Technology Center, an expansion of the existing Sports Exhibition Center, and a national headquarters for the U.S. Swim Team.

All use precast as their structural and enclosure system because of the material's flexibility with a variety of building types. In many instances, reveals help add aesthetic elements and aid in design challenges.

Diagonal reveals were used on the athletic portion of the Gymnasium and Aquatic Center at the U.S. Olympic Training Center, while vertical and horizontal reveals were combined on the building's two-story support section. (Courtesy ©*Steinkamp/Ballog Chicago*)

This detail of the U.S. Olympic Gymnasium shows the operable garage door leading into the weight-training area. The space was designed with a pattern of vertical and horizontal reveals on the structural bay and the window articulation. The diagonal reveals of the building's main body can be seen beyond.

The Sports Medicine & Technology building and the new Sports Exhibition Center entrance feature horizontal and vertical reveals designed to work in conjunction with major building openings and the vertical and horizontal precast fins that create an entrance canopy.

A unique application came with the Aquatic Center and Gymnasium. These are large structures, with spans of 110 feet and no exterior windows due to the client's need to control light for filming events. Our design strategy created a diagonal pattern of deep reveals within the precast panels that carried around all four sides of the building's main mass. At the building's edge, the diagonal pattern disappears to create a large, smooth area for placement of the Olympic symbols. These photographs show how the diagonal reveal patterns meet each other, as well as the design of the vertical reveals, which were necessitated by the panel joints.

On the Sports Medicine & Technology building, we designed a system of vertical and horizontal reveals in the same family as those for the Gymnasium and Aquatic Center. But the reveal system is unique because of functional considerations in this building type, changes in the amount of glass, and differing floor heights.

This close-up shot of precast panels at the Ft. Eustis Aquatic Center shows the building's strong horizontal reveals in wave shapes adjacent to vertical panel joints.

Ft. Eustis Aquatic Center, Ft. Eustis, Va.

In Ft. Eustis, Va., we recently completed an Aquatic Center for the U.S. Army Corps of Engineers. The adjacent photo demonstrates how a system of wide horizontal reveals was designed within a large wall panel. Each wall panel was 10 feet wide and 42 feet tall, with reveals placed horizontally every 4 feet. The reveals measure 4 inches tall with a shallow draft or chamfer. The reveal transforms itself into a curvilinear form before merging with the panel joint, creating a symbolic aquatic element to project the building's functions.

As mentioned at the beginning and as these examples indicate, reveals are the most fundamental detail that can be designed when articulating architectural precast. They represent the departure point for creating beautiful precast structures.

— W. Kenneth Wiseman, AIA, partner, Lehman/Smith/Wiseman Associates LLC.

designer's**notebook**

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