

# Pixar Perfect

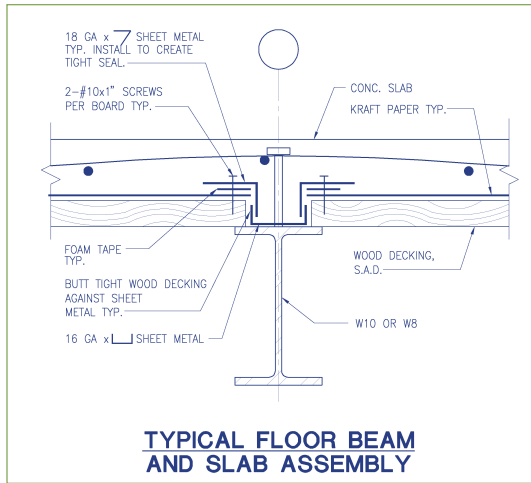
C. Mark Saunders, S.E.



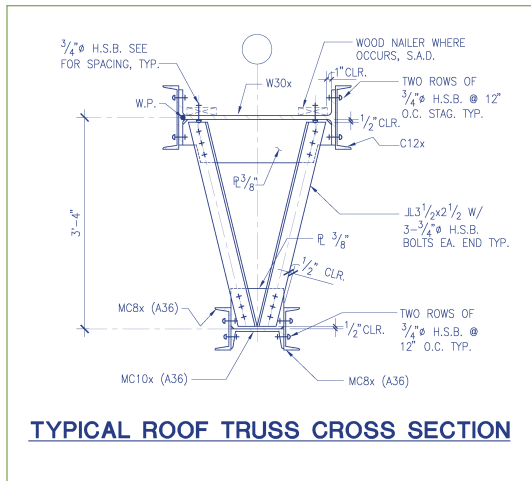
Exposed steel framing contributes to the loft-like feel of the new headquarters for Pixar Animation Studios in Emeryville, CA.

**W**hen the leaders of Pixar Animation Studios chose to build a new headquarters campus in an older warehouse district of Emeryville, CA, they worked with Architect Bohlin Cywinski Jackson and Structural Engineer Rutherford and Chekene to develop a concept that would express the vernac-

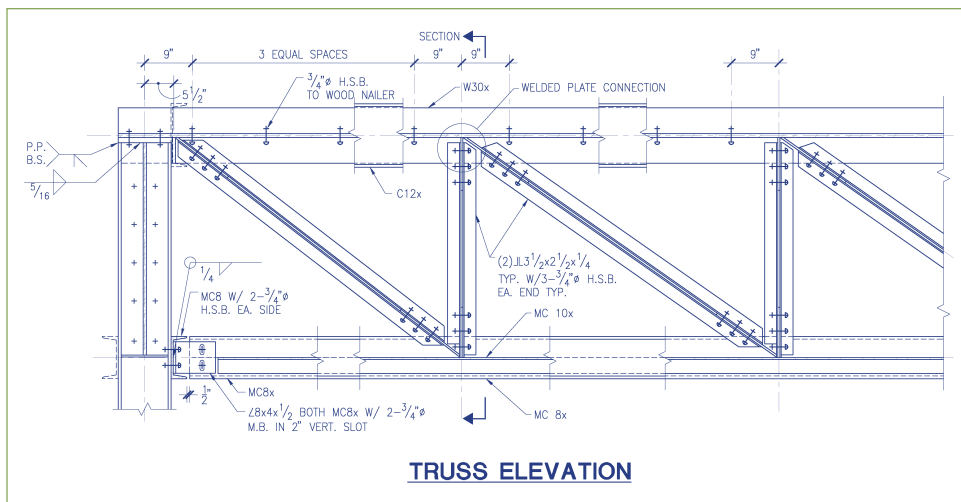
ular of the neighborhood and at the same time provide the state-of-the-art facility needed for their high-tech animated feature film production. The result was a highly refined “high-tech warehouse” that recalls the past but meets the needs of the future. The use of steel was essential to both the appearance and the structural performance of this unique building.



Wood decking with a water-proofing membrane serves as formwork for reinforced concrete floor slabs—and provides a wood-plank ceiling in the space below.



Left and below: Roof trusses in the central atrium circulation space are triangular in cross-section.



### SEISMIC CONSIDERATIONS

The Pixar Animation Studios facility is a two-story, 220,000-sq.-ft structure with two similar blocks flanking a large central atrium space that serves as a town square and interaction space for all employees. Pixar develops animated feature films for which completion times are often critical. Consequently, the facility was designed to meet high

seismic performance goals. In order to meet the performance goals, seismic isolation was recommended by Rutherford & Chekene and agreed to by Pixar. The seismic isolation system consists of a combination of high-damping rubber bearings and slider bearings placed between the steel-framed ground floor and the foundation. This will effectively separate the building from most

of the ground motion resulting from future earthquakes. Although the building steel frame itself readily could resist earthquake ground motions, the isolation system will limit, or prevent, damage to other building systems and to the contents and operations of the building. It is expected that, barring interruption of externally provided services, the Pixar facility will be able to





The large central atrium space serves as a town square and interaction space for all employees. The saw-tooth roof profile enhances the industrial feel of the space.

function after the occurrence of a very large earthquake and that damage to the building, its systems and its contents will be minimal.

#### LOFTY SOLUTION

In addition to seismic isolation, the facility features an exposed structural steel frame that is designed and detailed to emulate older construction through highly developed details and finishes, which are meticulously coordinated with the architectural design. Steel was chosen over other materials for its ability to meet aesthetic and structural goals. Although the “warehouse” look could have been achieved using heavy timber, fire requirements called for the building to be incombustible, and it was felt that steel would provide better long-term service. The exterior façade is brick masonry veneer designed to emulate the Emeryville warehouse vernacular.

The steel gravity-load system is unique in design and details. The floor and roof beams and girders are built as a “rafted system” with continuous beams spanning over the top of lowered girders. This allows the beams to

be shallow (W10) and creates an aesthetic for the exposed structure that is reminiscent of heavy timber construction used often in older warehouses. Additionally, the design concept called for the appearance of wood sheathing above the steel framing. This was accomplished by the use of tongue-and-groove spruce boards bearing on the edges of the steel flanges and serving as forms for the concrete floor that was cast over them. The concrete floor slabs were designed to span to the steel beams without reliance on the forming boards. Composite action of the steel with the concrete was accomplished by the use of typical welded studs placed in the gap between the ends of the sheathing boards. A waterproof membrane was placed between the wood and the concrete, with sheet metal flashings secured by the welded studs at the gaps over the beams.

The steel connections utilize ASTM A325 tension-controlled bolts with round heads, specifically detailed to expose the rivet-like heads in visible locations. Other detailing features include girder seats, haunches, and built-up girders in specific locations to

emulate riveted construction. Full-scale mock-ups of connections were constructed prior to final detailing.

The lateral force-resisting system is a steel, ordinary concentrically braced frame, with braces composed of bolted back-to-back channels. The bracing is designed to remain elastic in the design basis earthquake (DBE). The brace strength is governed by the strength of the bolted connections, which are designed using allowable “slip-critical” stresses with a one-third increase for DBE forces. The connections were checked at the LRFD bearing level for maximum considered earthquake (MCE) forces.

#### MAXIMUM EXPOSURE

The atrium roof area is framed with bolted steel trusses that are triangular in section. The trusses are composed of a top chord with a horizontal W30, triangulated to a bottom chord of back-to-back channels. The stable triangular shape was chosen so that the trusses could provide both the vertical support and the horizontal diaphragm between the sawtooth-shaped clerestories.

All of the exposed structural steel was bead blasted and clear coated after erection to highlight the natural patina of the steel. The previously mentioned connection mock-ups also served to allow study of the finishing techniques.

The framing below the ground floor and above the isolation system was conventional structural steel design with metal deck and concrete fill. The foundation system consisted of precast, prestressed concrete driven piles with concrete pile caps and grade beams. Seismic isolation consisted of 125 Bridgestone high-damping rubber isolators and 82 PTFE/stainless steel sliders.

The exterior façade is a highly articulated brick veneer system. The veneer is supported vertically and horizontally by a combination of light-gage metal studs and steel HSS frames connected to the perimeter framing.

The interior concept is a “building within a building.” The modular offices are constructed of metal studs and gypsum board that is essentially free of connection to the floor above and floats within the space, as might have been done if the building really had been an old warehouse. Ceilings are supported from the partitions, rather than hung from above. This office construction allows the structural steel and wood framing to be completely visible in all public locations, such as at corridors, atrium, etc. Ad-

ditionally, the exposed steel is more subtly perceived above the offices from the public spaces and corridors. The mechanical systems are also exposed in the space above the offices. ★

*C. Mark Saunders, S.E., is president of Rutherford & Chekene in Oakland and San Francisco, CA. He served as principal in charge of the Pixar project.*

#### OWNER

Pixar Animation Studios

#### ARCHITECT

Bohlin Cywinski Jackson, Berkeley, CA

#### STRUCTURAL ENGINEER

Rutherford & Chekene, Oakland and San Francisco, CA

#### SEISMIC ISOLATION PEER REVIEWER

Kircher & Associates, Palo Alto, CA

#### CONSTRUCTION MANAGER

SRM Associates, Oakland, CA

#### GENERAL CONTRACTOR

DPR Construction, Redwood City, CA

#### STEEL FABRICATOR

AFCO Steel, Little Rock, AR (AISC member)