

Engineering Ecology

J. Michael Desmond



Steel integrates with natural design at the Bluebonnet Swamp Interpretive Center in Baton Rouge, LA.

Two diverse ecological zones meet in Baton Rouge at the award-winning Exhibition Building for the Bluebonnet Swamp Interpretive Center, offering unique tourist, educational and recreational opportunities. The Exhibition Building is the first of several structures intended by the Baton Rouge Recreation and Parks Commission (BREC) to explore and articulate this meeting of ecologies within the context of wide community use. The building consists primarily of a large glass enclosed exhibition gallery. Support rooms focus outward toward a central meadow in the forest, under historically and regionally inspired overhanging roofs.

This project lies along the edge of the Highland Road Escarpment, which runs southwest along the Mississippi from the Old Louisiana State Capital Building in downtown Baton Rouge to Bayou Manchac. This geological feature is formed by a hard clay ridge that marks the easternmost boundary of the Mississippi River basin. It is the fur-

thest east the river has been able to cut in its millennial wanderings across southern Louisiana. Because the land above this ridge was never flooded by the river's annual inundation until the modern levee system was built, it was an important feature in the lives of Native Americans and European settlers.

A cross section through the site reveals the intersection of three important land and land use types in close proximity: deep water swamp, highland forest along the escarpment, and level agricultural land beyond. This ecological jewel provides an example of wetland and highland ecosystems in close proximity close to each other and to an urban area. It provides educational messages that are further enriched by the story of overlapping human uses of this site and its surroundings over the last 200 years. The upper forest hosts magnolia, sweet gum, tulip, hickory and a variety of oaks as a background to a wide diversity of animal life. Below, in the swamp itself, there are swamp-red maples, tupelo gums and red cypress. Many

species of birds are attracted to this diverse ecosystem, such as yellow-crowned night herons; great blue and green-backed herons; great white egrets; hooded, parula and prothonotary warblers; owls, and hawks.

The buildings are held back from the swamp to preserve its sense of remoteness. The architecture is placed at the edge of the forest facing into an open central meadow. The site is accessed by leaving personal vehicles in a parking lot and proceeding by foot through the forest to a meadow. The meadow connects the ecological zones and provides a setting for the architecture. The buildings are intended to become a part of a scenario in which the site and its attributes are the primary objective of an interpretive experience.

The design process involved balancing the desire to understand and experience the swamp directly with the disruption of construction. Factors like degree of site penetration by vehicles and utilities, overlapping of auto and pedestrian uses and defining of future building sites had to be taken into ac-



Above and opposite: The steel “trees” provide a dramatic sense of uplift within the exhibition gallery. The steel trees provide both drama and crucial moment resistance while reflecting the forms of the Louisiana oil industry.



Above: The rear of the building is broken into smaller scale units reflecting the pattern of its use. All of the exterior cladding materials—brick, metal siding and metal roof—were colored to reflect colors found on the site.

Below: The steel “trees” are set into 16 ft-deep drilled shafts that were then filled with concrete.



count. The disturbance of wildlife communities by both construction and daily use thereafter also had to be considered. The process of exploring and defining the role of architecture in the interpretive mission involved studies of buildings at various points across the site. Early preconceptions directed these studies to places with direct views of the swamp. In each of these cases, buildings were conceived to take advantage of the drama of elevation change to tie together the three ecological zones.

A concept of a meadow as an internal organizing device emerged as a way in which to foreground the natural features of the site while allowing the buildings a central role. A central meadow permits a glimpse of the agricultural uses which have been an important part of the interaction of man and nature across the history of this site. At the center of the site-plan concept is an area that has natural and

man-made features. To preserve the sense of remote attractiveness this body now offers, the building was pulled back from the swamp. The meadow became the heart of the interpretive program. It is the primary destination of the entry sequence and is ringed by a tree-shaded path, which provides a beginning point for various interpretive trails. The major portion of this almost 100-acre site will be left in its natural state.

The three-building program was conceived as a collection of related building forms at the southernmost end of the organizing central meadow. A form language based on large overhanging, or pavilion, roofs was developed in response to both the immediate environmental and the broader historical contexts.

A variety of building studies of the major structure addressed the possibility of a single exhibition space facing out across the meadow while giving

shelter to smaller service rooms on the shared court. A single, large, sweeping roof plane acts as the organizing form against a cluster of massive vertical service cores. The long horizontal plane of the northern window wall contrasts with the strong, but broken, vertical pillars to the rear. This exhibition space is conceived as being flexible in use, providing a backdrop for the construction of exhibition cases and a wide variety of educational and community uses.

The building faces out towards the meadow by means of a large pavilion roof. The roof is supported by a row of exposed steel trees that are inspired by the oil-rig construction techniques in this part of the country. Steel was chosen also because the round steel piping used to create the trees created a light and airy shape that could blend into its surroundings. Wooden or concrete trees would have been heavier in appearance and during construction.

A steel roof was chosen for economic and aesthetic reasons. Although a post-tensioned concrete slab roof was considered, steel would be easier to repair in the case of design errors or hurricane damage. In addition, the steel architectural features of the building were already such a key part of its design that a steel roof would better integrate visually and during the construction process.

The roof presented unique challenges. If subject to hurricane-force winds, the large, sweeping shape could cause the roof to act like a sail. Baton Rouge structural engineer Dean McKee dealt with this by sinking the base of the steel trusses into concrete shafts that were drilled into the clay soil to give them additional moment resistance. These are complemented by a series of three plywood-wrapped, steel-stud towers which together support a roof of 4 in. W-shapes on 4 ft centers.

The roofs are metal with the internal ceiling plane of the exhibition gallery faced in cypress tongue and groove. All exposed lines lead the eye out to the meadow. Metal roofs with a lack of valleys minimize both initial cost and

maintenance problems on this heavily wooded site. They are also to be with a rainwater collection demonstration policy, draining visibly into a rock collection bed after bouncing ceremoniously on the wooden deck just outside the exhibition space. In addition, the flow of run-off from the parking lot is directed through a series of retention ponds designed by Ted Jack and Gregg Grandy of BREC to purify the water before it is allowed back into the natural ecosystem.

Steel was also used in the steel mullion window system. The system used T sections made up of 1/2 in. by 5 in. steel plate spot welded to a 1 in. by 2 in. steel bar. The glass was attached using aluminum stops. This allowed the windows to play a role in supporting the wide front cantilever, without appearing to do so. It also allowed the economical use of large pieces of glass, another important part of the architectural esthetic. The steel window mullion sections play a quiet but large role in the architectural success of the building.

The architectural design of the Bluebonnet Swamp Exhibition Building

won a Gulf States Region Merit Honor Award from the American Institute of Architects in 2000. The 9500 sq. ft facility, was completed in June 1996.

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