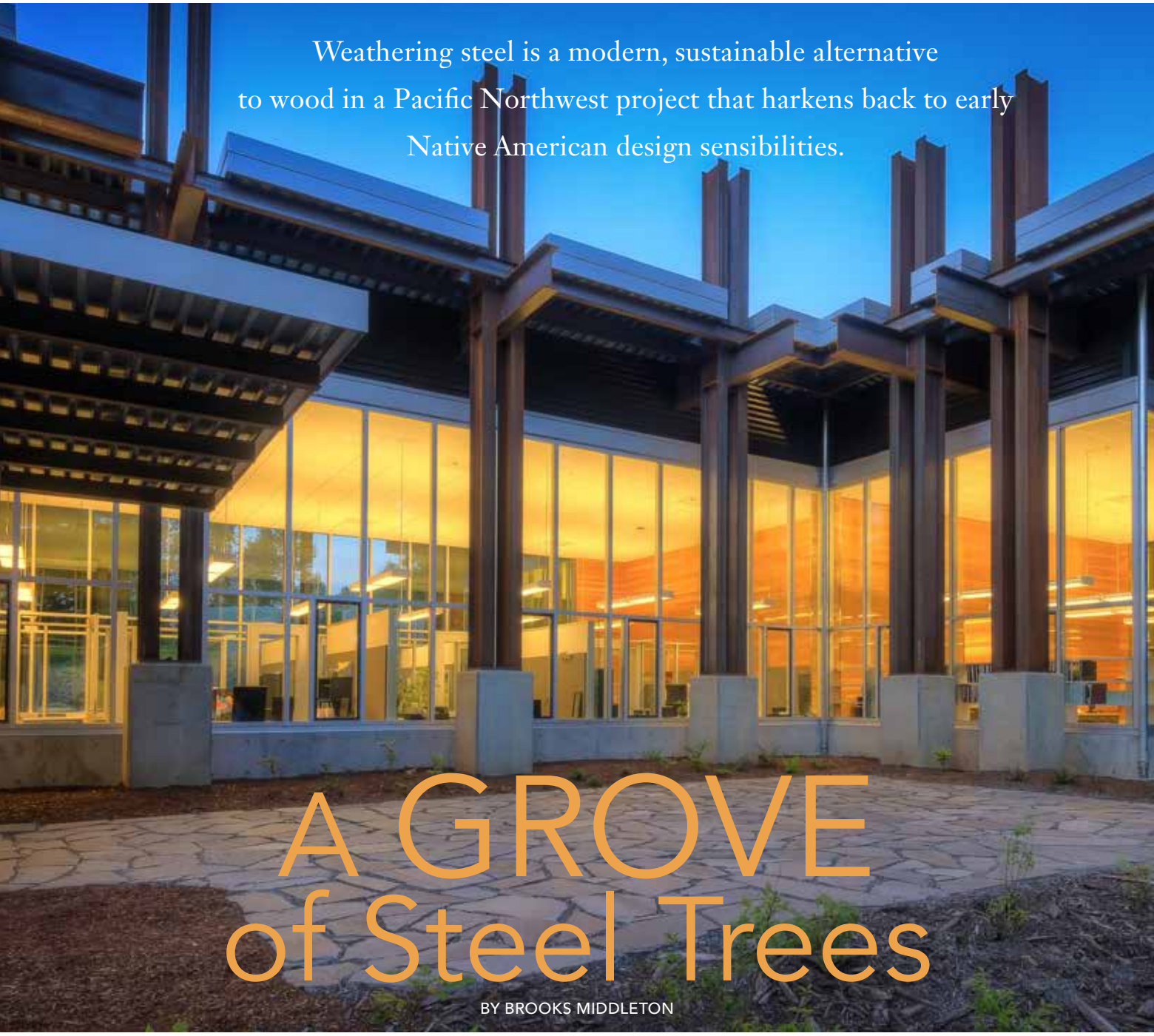


Weathering steel is a modern, sustainable alternative to wood in a Pacific Northwest project that harkens back to early Native American design sensibilities.

A GROVE of Steel Trees

BY BROOKS MIDDLETON

WHILE SOME BUILDINGS strive to gain notice, others, like the Stillaguamish Natural Resources Department Offices and Water Quality Lab building, would rather blend in.

Located in a forested area on a bluff above the flood-prone Stillaguamish River in Arlington, Wash. (about 50 miles north of Seattle) the building replaces several outdated structures that housed the Stillaguamish Tribe of Indians' Natural Resources Department (NRD) in the floodplain below. The 13,000-sq.-ft, one-story building and paved areas are sited in an existing clearing to minimize removal of the surrounding trees, and the natural setting enhances the work environment of the NRD employees.

Creating a sustainable, culturally sensitive structure was the driving mantra of the NRD's Building Committee. The project includes many green attributes, such as storm-water treatment via bio-retention rain gardens, permeable walkway paving, ground-source heat pumps, radiant-floor heating and extensive daylighting. And its architectural and structural design embraces sustainable practices and goals.

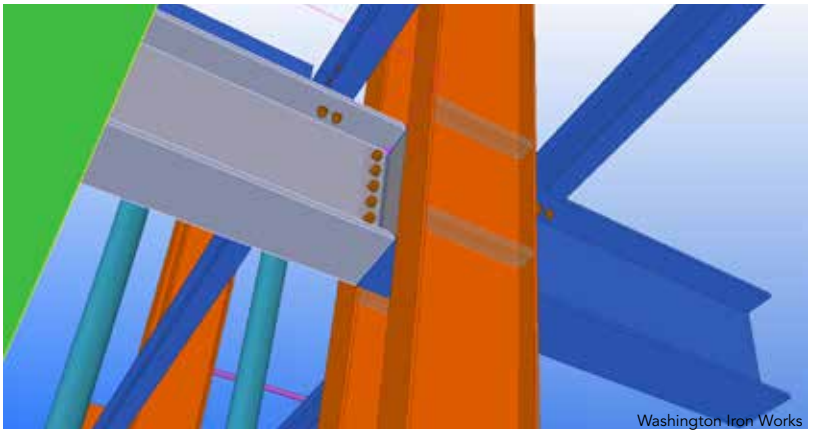
While researching early Northwest Coast Native American design style, which included reviewing countless historical building photos, the design team identified several common themes. The most prominent of these was the use of heavy wooden post-and-beam construction, resulting in straightforward structural design


Jacob Knapp C9 Photography


Brooks Middleton

Double-columns were used to emphasize the "knifed" structural connections of the roof beams.

A Tekla rendering of the roof edge assembly.


Washington Iron Works

The double-columns extend 10 ft beyond the roof line and intersect with the roof beams, which in turn project beyond the facade, to create the impression of a modernist log cabin.


Brooks Middleton

and simple material palettes. However, the use of exposed heavy timber was not appealing for this project, due both to the loss of trees and the short life span of exposed wood in built structures. The solution was to use weathering structural steel (200 tons) whose patina gives a nod to the large timber frames of the historical structures both in terms of mass and color. The perimeter framing columns are exposed on the exterior of the building and extend 10 ft above the roof line. The roof support beam assemblies also project beyond the facade—sometimes serving to cantilever the roof and sometimes simply cantilevering into open air.

The steel structural members were connected in a manner that brings attention to the intersections of the wide-flange beams and

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Jacob Knapp C9 Photography

The 13,000-sq.-ft building boasts column-free interior spaces.

columns. The 1-in.-thick base plates, using 1-in.-diameter anchor bolts with heavy nuts, are intentionally positioned in a repetitive manner around the building near eye level. The eye then naturally ascends the columns to observe the beauty and simplicity of the exposed-column-to beam connections. Exposed secondary and tertiary roof beams and the final layer of metal decking are all visible from below.

Once the framing plan was established, the interior and exterior walls were located to meet the program functions of the building. The concept of adaptable space was typical for large community buildings of early Northwest Coast Native American groups, where family units set up interior walls as needed to create their own spaces within the larger building. The interior column-free design allowed nearly all interior and exterior walls to be glazed, thereby providing the occupants a connection with one another as well as the surrounding natural environment.

By designing the steel framing using moment connections, the exposed beams and columns are actually the gravity and lateral load-bearing elements of the building. The vertical framing incorporates double-columns, which, again, were chosen to emphasize the "through" nature of the structural connections. Instead of roof beams butting into columns, the members run past and through each other, requiring two columns to achieve a balanced structure. These intersections were fairly complex. The double-column and exterior beam extensions were fabricated in the shop as a column tree assembly, and the main member running inside the building was added on-site, such that the roof beam appears as a single piece extending outside the envelope between the columns, but is actually three pieces. The assemblies are made up of two 27-ft-tall W18×50 columns, with an intermediate shop-welded W21×83 extending 5 ft, 6 in. from the center of the columns to form the roof edge. The fabricator/erector (Washington Iron Works) was careful not to paint itself into a corner with the welding sequence when it came to welding the double-columns to the beam extensions.

Jacob Knapp C9 Photography

The design allowed nearly all interior and exterior walls to be glazed, thereby providing the occupants a connection with one another as well as the surrounding natural environment.

Jacob Knapp C9 Photography

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Continuing the roof beam assemblies through the building envelope created another potential issue in the form of thermal bridging. There was concern that the temperature differential between the interior and exterior of the building, especially in the winter, could cause the beams to condense on the interior. As such, the team elected to cover the interior of the large penetrating beam assemblies (the portion a few feet in from the exterior wall) with spray-on rigid insulation and fireproofing. The building has made it through two winters with no condensation issues.

The seasonal changes that the facility have endured thus far have also allowed the exposed weathering steel to develop its patina, thus completing the natural, wood-like aesthetic. With its modern take on historic, natural architecture, the building will work in harmony with its surroundings for years to come, providing an appropriate and attractive work space for those who are tasked with managing the area's natural resources. ■

Owner
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Steel Fabricator, Erector and Detailer
Washington Iron Works, Inc., Oak Harbor, Wash.