



NEW FRP TECHNOLOGIES IN ARCHITECTURE

Project:
The Resnick Pavilion

Customer:
Los Angeles County Museum of Art
(LACMA)

Architect:
Renzo Piano Building Workshop
in collaboration with Gensler

<http://creativetehnologies.com>
sales@creativetehnologies.com



Celebrating the building's mechanical systems:

The Resnick Pavilion at the Los Angeles County Museum of Art (LACMA), the largest naturally lit exhibition space in the world, is a 45,000 sq. ft., open-plan, built of travertine, glass, steel and FRP. One of the most prominent features of the pavilion are the mechanical rooms and air handling units, each one located in the four outside corners of the building. Their presence recalls The Centre Georges Pompidou where the building is seen as an "organic breathing machine with a structure on which they displayed the building's color-coded pipes, ducts, gantries, and escalators".

At the Resnick Pavilion the mechanical systems seem to become the exposed and celebrated lungs of the building.

Renzo Piano wanted to create a sculptural housing around these units to beautify their mechanical nature and, at the same time animate the building façade. This scarlet housing also unified the museum campus, using the red coloration of the BCMA's (Broad Contemporary Museum of Art) escalator, the BP Grand Entry, and the Kendall Concourse running between the two buildings at LACMA.



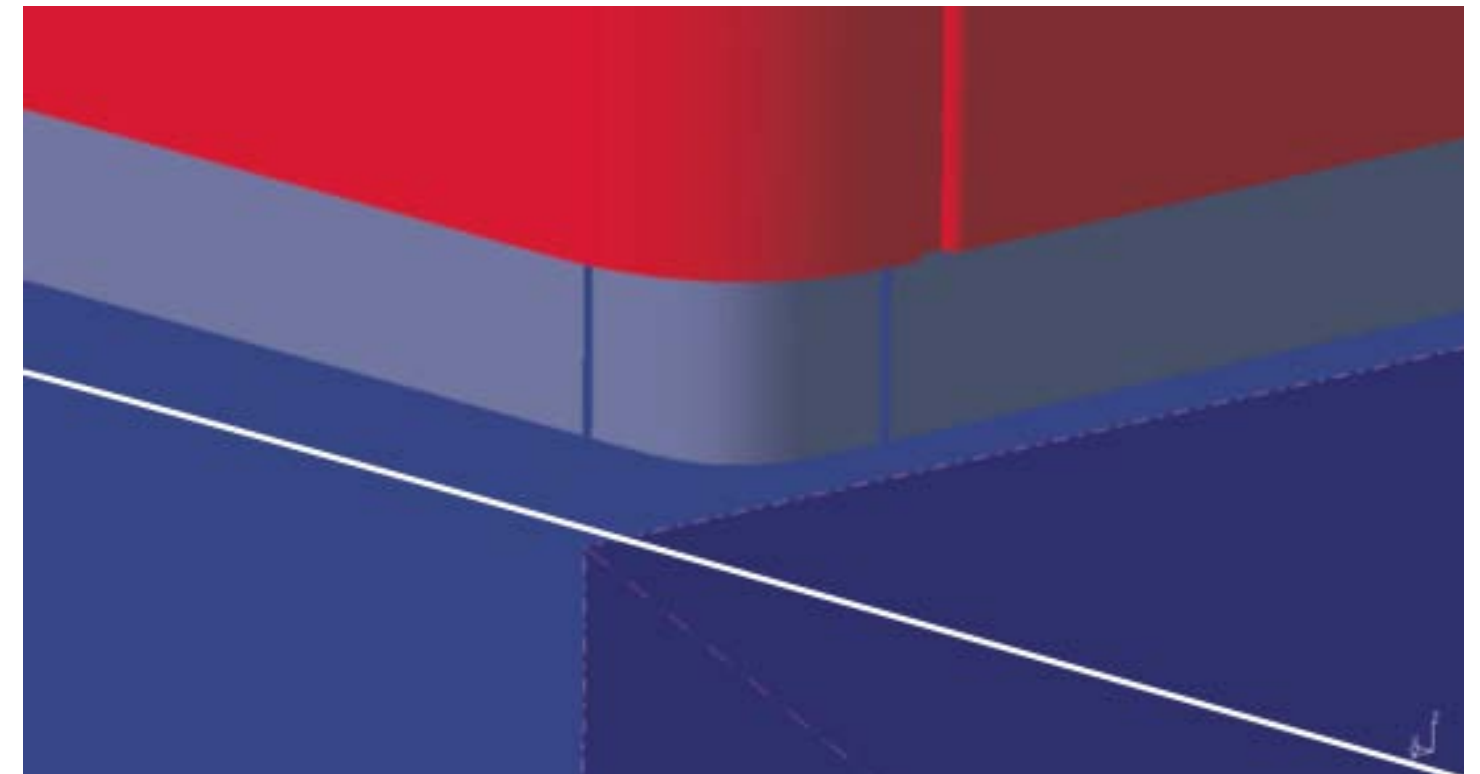
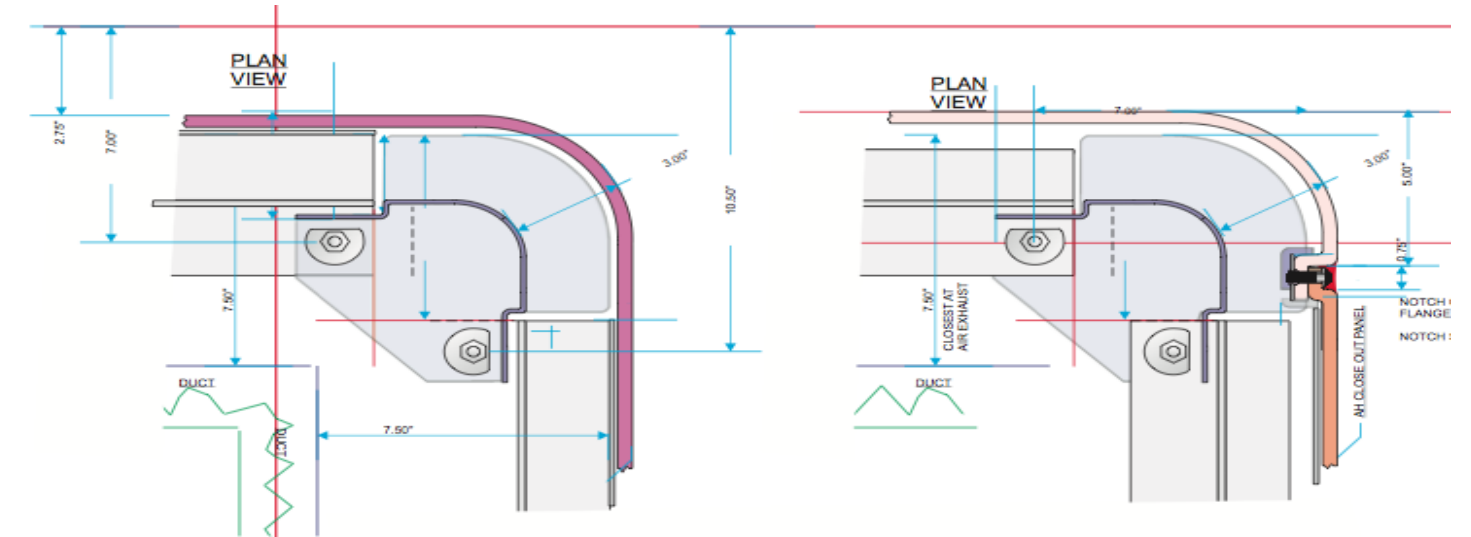
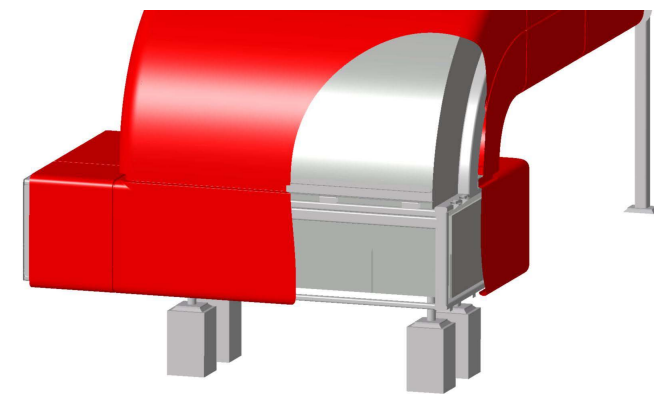
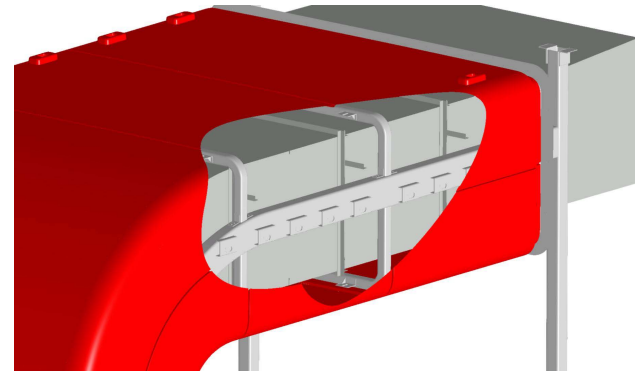
Collaboration, Integration, technology – the planning process:

The CTC team acted as a hub of information, providing a turnkey solution that maximized the project's quality. The initial phase of the process entailed incorporating Revit data from ACCO (the HVAC manufacturer) conceptual renderings from RPBW (the architect), and a 2D Auto CAD building CD from Matt Construction (general contractor). Once all the data was collected from these three parties, the design-build process began, incorporating installation site constraints for the optimal turnkey solution.

Using CATIA Software, CTC executed 3D modeling of the air conditioning ducts with specific Class "A" automotive-type surface development. This approach allowed CTC to incorporate the highly refined design that can be achieved with FRP material.

The 3D model also included requirements for spacing and clearances of hardware location, the architect's drawing of the building (to which the sculptural enclosing would interface), and requirements from the construction company that set the cement foundation.

CTC's engineering team took the data and modeled the entire integral steel and FRP structure. They collaborated closely with Renzo Piano's team while developing all the models throughout the design-build process, including installation.

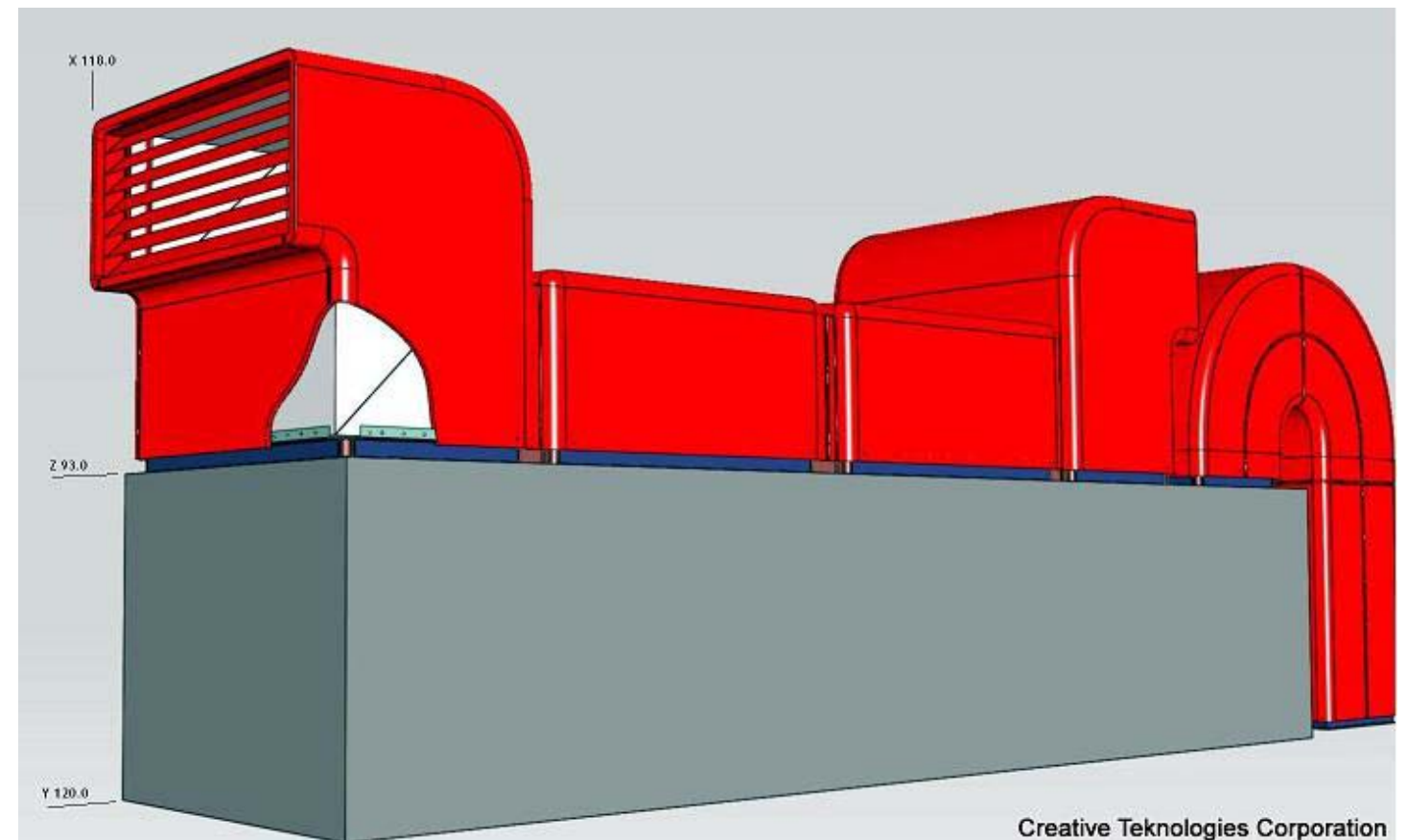
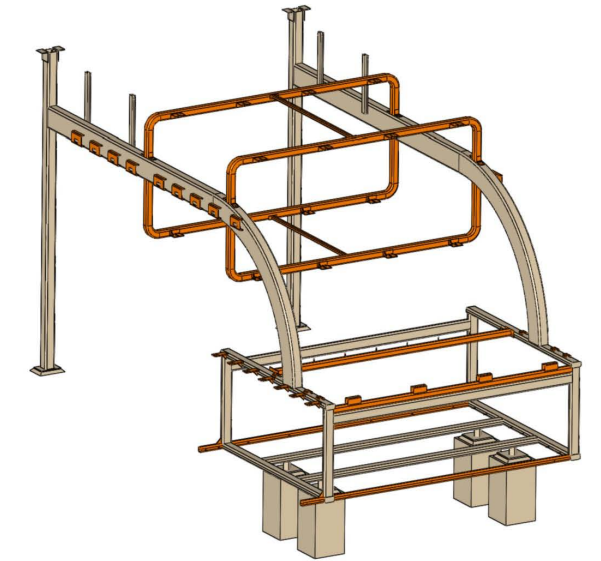
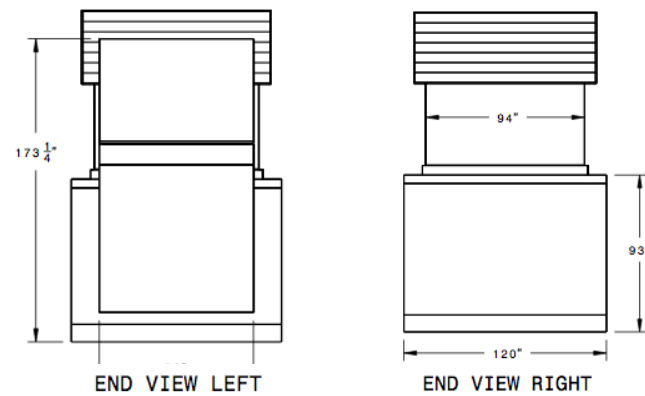


Structure and materials:

With extensive experience using different materials to realize highly complex projects, CTC's team decided that FRP would lend naturally to the requirements, creating a highly developed monolithic surface with no exposed fasteners.

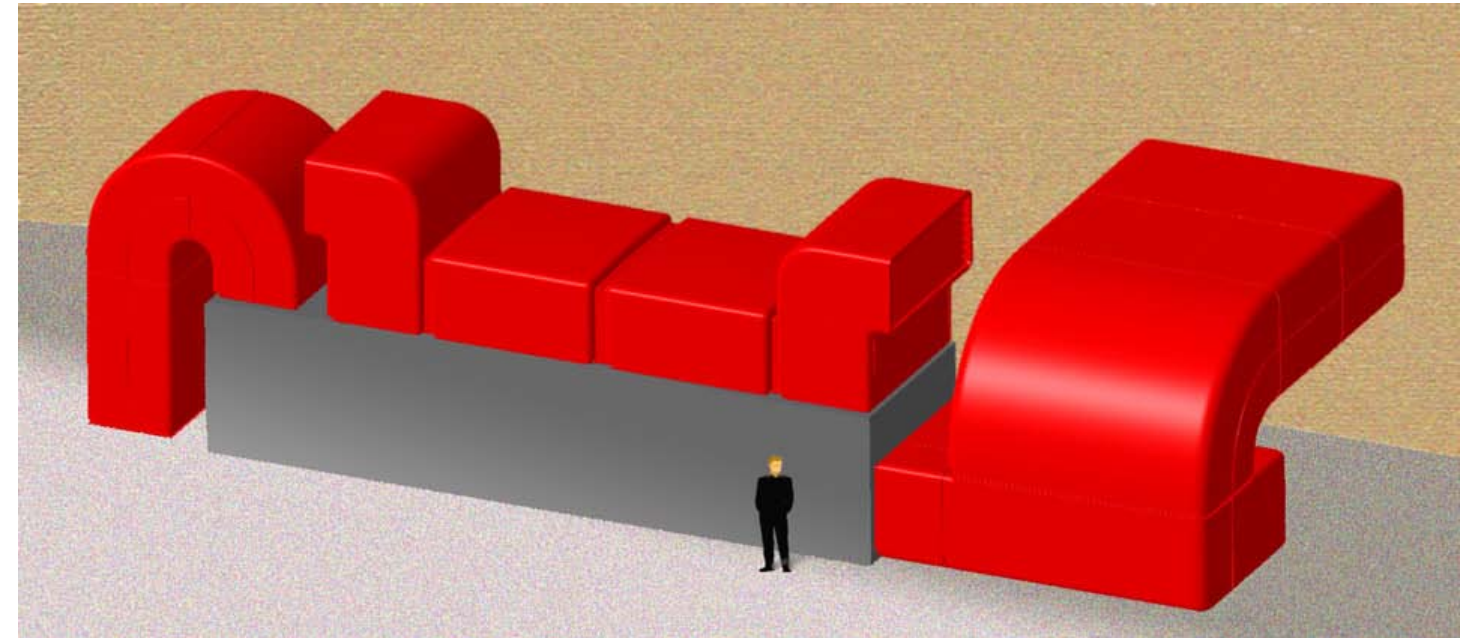
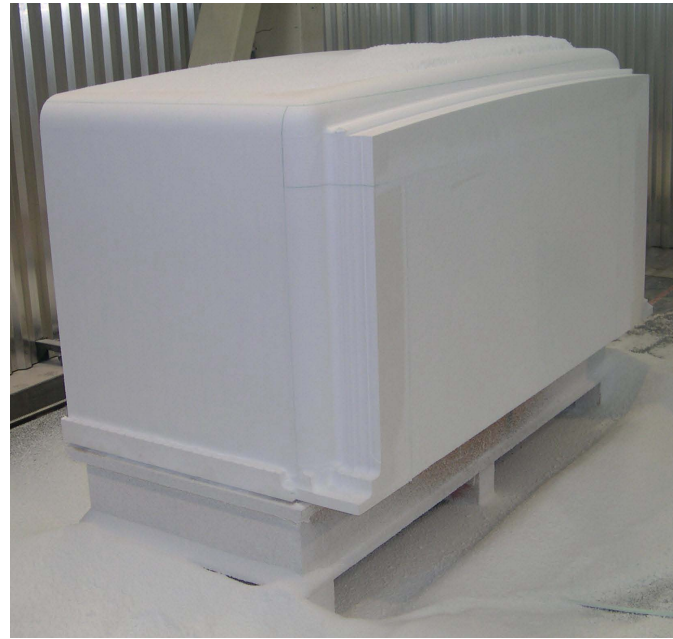
CTC fabricated all parts of the enclosure. The team understood the limitations of the material; this knowledge dictated radii limits, compound curved surface geometries, and minimum panel-to-panel seam widths for the least visible seam signature. The project also involved complex mechanical engineering; CTC designed and embedded hardware inside the material to create the composite structure that attached to the mechanical systems and dealt with the tolerances of the different materials. Knowledge of material behavior and performance of monolithic FRP and steel structures spanning over 50 feet allowed CTC's engineering and fabrication team to achieve this successfully.

With in-house expertise of FRP fabrication and a background in the automobile industry, the CTC team proactively brought the vision of surface development to the project. All the surfaces are developed with curves in two directions - similar to automotive surface development used to prevent "oil-canning" (the appearance of flat surfaces looking sunken or cheap).



This was key to the success and the superior quality of the expansive surfaces. Visually, the entire duct appears as rectangular linear surfaces (flat areas with large radius). In actuality, every surface is crowned in two directions - without exception. CTC balanced the architect's vision of "rectangular linear ducting" and its own knowledge of achieving quality-looking large scale FRP surface projects by incorporating automotive surfacing technologies.

"FRP lends itself well to the high detail and sophisticated surface development needed for the project. The rich look of the enclosure comes from the developed surfaces. Nobody told us to do that; we saw the opportunity to use our experience from the automobile industry and decided to implement this in the project from the beginning," said Eric Adickes, the President of CTC, "That's our true strength bringing in all our expertise from automotive, aerospace, and architecture, and effectively incorporating the technologies to all our projects. With LACMA these are larger-than-life feature elements right in front of the building, so it's like a giant Ferrari sitting there."



Installation:

The CTC team has significant experience installing their own projects; this is critical to the success of complex projects. They used that experience in handling the project from beginning to the end, checking for accuracies, making field measurements and incorporating the variables through modeling, engineering, and execution.

Eric: "We had so many different things to coordinate with this project. Coordination with an external installer would have been very difficult. With the ability of our team to carry out the installation, we were able to complete the project on time, within budget and with a higher level of quality."



The Sculptural Housing:

The CTC team took complete responsibility for the project, from concept development and engineering, to fabrication and installation - a process that would have been highly complicated to manage, if accomplished by several companies.



Renzo Piano Building Workshop

Architectes
RPBW
Paris

Paris, January 26th, 2013

To Whom it may concern:

I am writing this letter, on behalf of the Renzo Piano Building Workshop, to express our good experience working together with CTC on the Los Angeles County Museum of Art.

We envisioned the sculptural enclosure of the air handling units of the Resnick Pavilion to stress the industrial language of the structure, and also to enhance the visual cohesion with the neighboring museum buildings.

CTC's engineering and fabrication team came up with the material and process that realized this design vision effectively and within budget.

The CTC team led the feasibility analysis, engineering, fabrication and installation delivering a complete turn-key solution. The design of the hidden fastening system and rich surface development created a powerful aesthetic appeal we envisioned.

CTC was very collaborative, innovative and supporting the scheme.

I would happily recommend CTC, for any future projects being undertaken by RPBW or any other architectural firm.

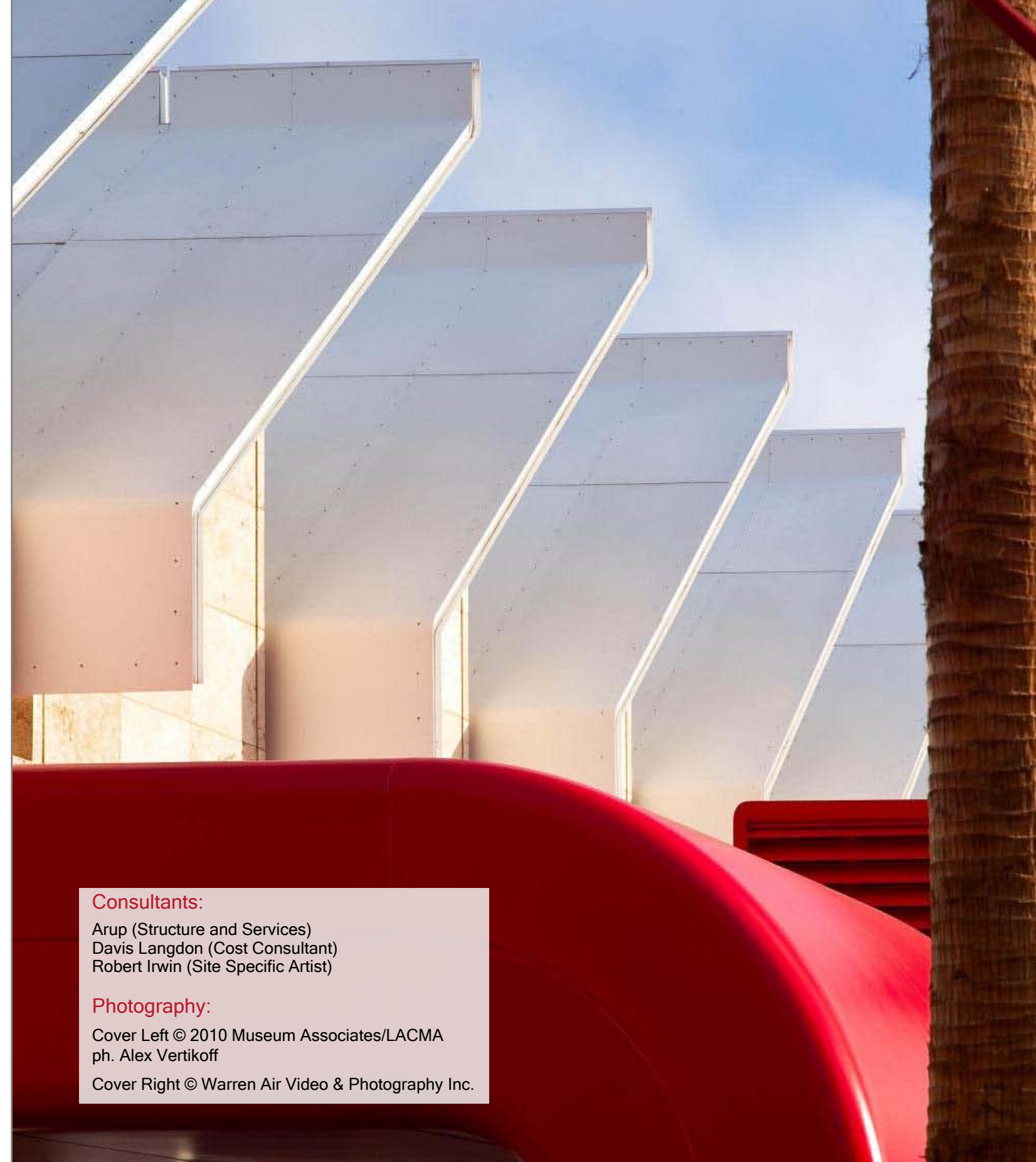
Sincerely,

Antoine Chaaya
Architect-Partner



Partners R.Piano S.Ishida B.Plattner M.Carroll P.Vincent G.Grandi G.Bianchi
E.Baglietto A.Chaaya P.Goubet J.Moolhuijzen S.Scarabicchi E.Trezzani A.Belvedere

Renzo Piano Building Workshop 34 rue des Archives, 75004 Paris France tel. +33 (0)1 44 61 49 00 fax +33 (0)1 42 78 01 98 france@rpbw.com
S.A.S. à capital variable ; R.C.S. Paris 432 802 429 ; inscription Ordre des Architectes IDF : S 13408 ; TVA : FR 25432802429



Consultants:

Arup (Structure and Services)
Davis Langdon (Cost Consultant)
Robert Irwin (Site Specific Artist)

Photography:

Cover Left © 2010 Museum Associates/LACMA
ph. Alex Vertikoff

Cover Right © Warren Air Video & Photography Inc.