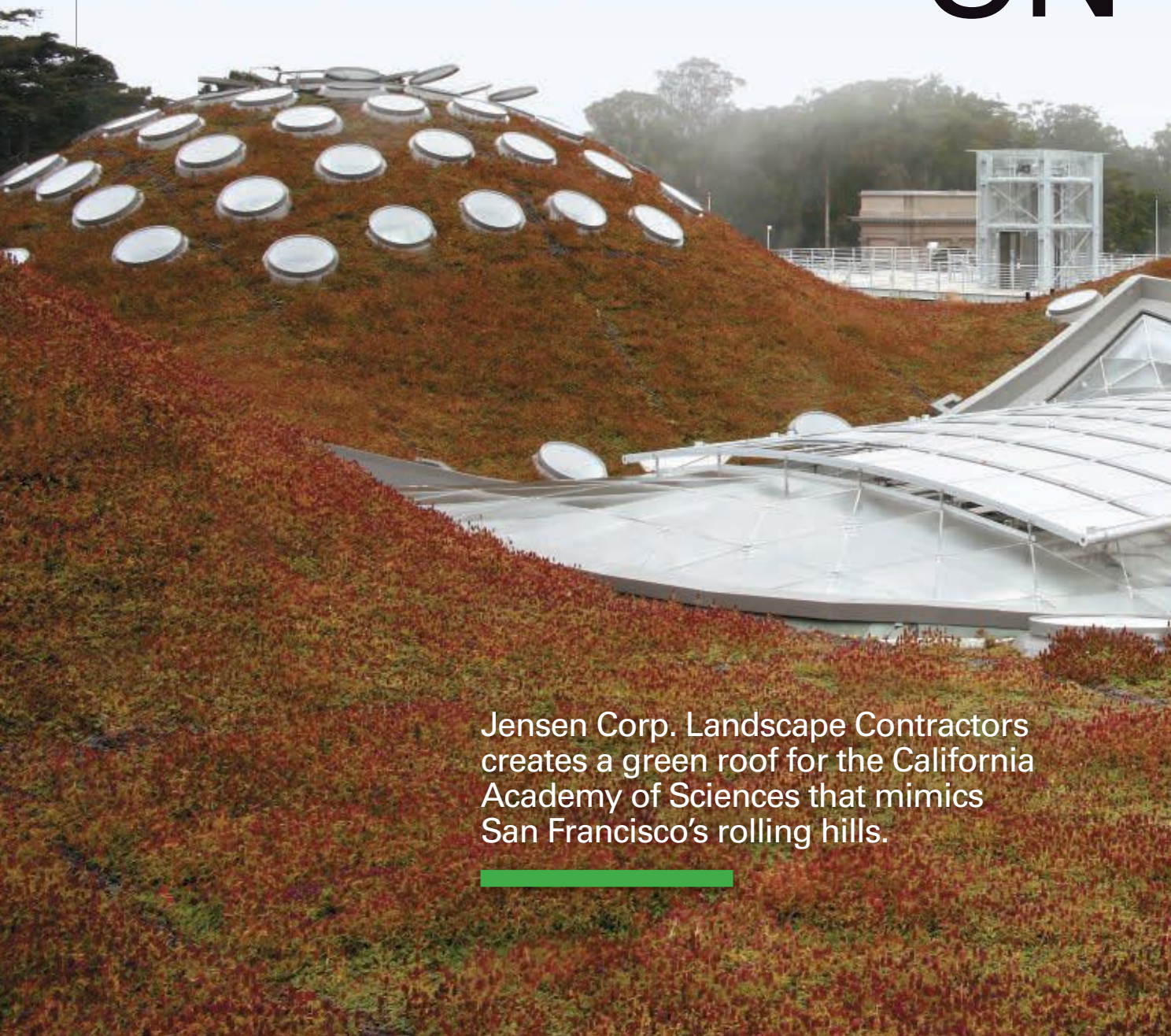


THE GREENEST ON



Jensen Corp. Landscape Contractors creates a green roof for the California Academy of Sciences that mimics San Francisco's rolling hills.

MUSEUM EARTH

BY **DANIEL G. JACOBS** MANAGING EDITOR



PROFESSIONAL LANDSCAPERS SPEND their careers making the grounds around homes and buildings a little more beautiful and a little more green. Jensen Corp. Landscape Contractors helped take that concept one step further when it installed a green roof on the California Academy of Sciences.

The roof, designed by architect Renzo Piano, echoes San Francisco's rolling hills, which posed some unique challenges for Jensen's workers.

"Keys to this job were the steep slopes," says John Vlay, CEO of Jensen Corp. Holdings, the parent company of the landscape contractor division. "Some of the slopes were greater than a 45-degree angle. We had to specially train our men with harnesses and climbing ropes, and how to tie-off to get the materials all the way up on the sides and up to the top of the hills."

Translating the design on paper to the reality of the 2.5-acre roof had its challenges, including transporting the material onto the roof.

Having built other green roofs, including The Gap's corporate headquarters in San Francisco, the team knew there were several ways to transport the 2.6 million lbs. of soil and plants up to the work site.

"We did a lot of analysis," Vlay says. "Did we want to blow the soil onto the roof? Did we want to crate it up using

The California Academy of Sciences' green roof is the largest living roof in the state and features seven dramatic hills to mimic those of San Francisco.



AWARD WINNER

containers? Or did we want to use conveyor belt systems?"

The company chose to use containers. It hoisted about 50,000 coconut husk trays, each with 3 in. of soil and native California plants, by crane to the roof. Crews also installed a grid of lava rock-filled gabions, reinforced with

steel and straps, to provide support for the roof's walkways. Another 1,000 cu. yds. of soil were distributed with old-fashioned wheelbarrows.

Only half the battle

Getting all the material up on the roof was a short-lived victory because there



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was the pesky matter of containing all the soil on the roof's hills.

"One of the biggest challenges, on these steep slopes, was holding the soil," Vlay says. "In some of these areas, the soil was starting to slip."

Because the roof was worked on in phases, the Jensen team was able to take more established material from different parts of the project and transplant it onto the slopes.

"We took some of the areas from the (flat) 'North 40' that were already rooted in and had almost fully grown sod, cut it out and put those into the areas that were very steep, so we didn't have to wait for them to take hold," Vlay says. "That's how we avoided some of the difficulties with the steep slopes."

What was planted was just as important as how they were planted. Designers wanted to use plants native to the area — and no grasses.

The Jensen team came up with what it called the Fab Four: *Fragaria chiloensis* (beach strawberries), *Prunella vulgaris* (self heal), *Armeria maritime* (sea pink) and *Sedum spathulitholium* (stonecrop).

"All the trays we put up only had those four," Vlay says. "Then we came back in and put down seed of five



50,000 coconut husk trays, each with 3 in. of soil and native California plants, were loaded onto the roof by crane.

WHAT'S UP THERE?

The native plants used on the green roof were included, at least in part, with the idea they would serve as a habitat for local fauna.

| Plants used | What they attract |
|---|---------------------------------|
| Beach strawberries (<i>Fragaria chiloensis</i>) | native birds |
| Self heal (<i>Prunella vulgaris</i>) | hummingbirds and bumblebees |
| Sea pink (<i>Armeria maritime</i>) | moths and butterflies |
| Stonecrop (<i>Sedum spathulitholium</i>) | San Bruno elfin butterfly |
| Tidy tips (<i>Layia platyglossa</i>) | parasitic wasps and pirate bugs |
| Miniature lupine (<i>Lupinus bicolor</i>) | bees and butterflies |
| California poppies (<i>Eschscholzia californica</i>) | bees and butterflies |
| California plantain (<i>Plantago erecta</i>): | butterfly larvae |
| Goldfield plants (<i>Lasthenia californica</i>) | beneficial native insects |

— Jensen Corp. Landscape Contractors

different types: tidy tips, miniature lupine, California poppies, California plantain and goldfield plants.”

Jensen planted the varying color flowers almost in a paint-by-numbers method.

“The Prunella have gone to a dark-red color,” Vlay said in mid-August.

“I was up there (in June), and it was a beautiful purple. As the seasons come and go, it takes on different colors. Even though it’s called a green roof, sometimes it’s a purple roof. Right now, it’s the maroon roof. Other times, it’s the yellow roof. It’s always changing based on the seasons.”



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"EVEN THOUGH IT'S CALLED A GREEN ROOF, SOMETIMES IT'S A PURPLE ROOF. RIGHT NOW, IT'S THE MAROON ROOF."

— JOHN VLAY, CEO OF JENSEN CORP. HOLDINGS

Maintenance strategies

The project's goal is to have the roof become self-sustaining in San Francisco's foggy, seaside climate, but that's still a year or more away, Vlay says. In the meantime, Jensen maintains the roof and grounds around the building, which it installed, too.

Until the green roof is more established, an irrigation system must be used to keep plants alive. But the California Academy of Sciences' roof has a number of skylights, which open automatically to release the heat that builds up during the day, particularly over an indoor rainforest.

"The irrigation water would get into the skylights, go down and hit the top of the rainforest, which was all glass,"

JUST THE FACTS

- › Largest living roof in California, featuring seven dramatic hills to mimic the hills of San Francisco
- › 50,000 of coconut husk trays were loaded onto the roof by crane and installed
- › The porous trays hold 1.7 million plants
- › 197,000 sq. ft. total
- › Cost was about \$17 per sq. ft.
- › 4.5 acres total roof space, including solar panel canopy
- › 2.5 acres of planted material
- › 2.6 million lbs. total weight of soil and plants
- › Four-month construction period
- › Absorbs about 98% of all storm water, preventing as much as 3.6 million gallons of runoff from carrying pollutants into the ecosystem each year
- › An overhead spray irrigation system, featuring its own weather-tracking system, is designed to establish plant material with the intent it will be shut off in a few years once the roof becomes fully sustainable
- › A wide grid of rock gabions with reinforced steel and straps provide additional support, and create walkways for future roof maintenance
- › Gabions filled with more than 30,000 lbs. of lava rocks

— Jensen Corp. Landscape Contractors

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Vlay says. "That required a lot of glass cleaning. We had to change our irrigation system so it didn't go off when the skylights opened."

The irrigation situation translated into having to hand-water the plants, to keep them from getting stressed during the heat of the day, until they became established.

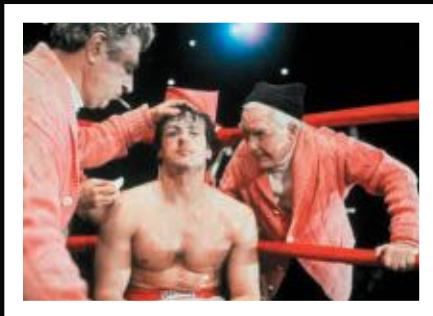
"Now that the plants are much more established, we don't have to water them throughout the day," Vlay says, noting the ultimate goal is for irrigation to be self-sustainable after two to three years.

Jensen's portion of the project was about \$4.7 million, with the green roof making up about \$2 million of the total. The project earned the company first-place honors in the Special Effects division of the California Landscape Contractors Association awards this past year. **LM**



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