

## Wrapmaster Gehry and the New Culture Palace

With High-Tech Acoustics Sheathed in Waves of Stone, L.A.'s Premier Architect Remakes the Music Center—and the Heart of the City

By Joseph Giovannini

Frank Gehry and a model of the Disney Concert Hall

# Scissors,

A thousand architects from dozens of countries presented designs at Italy's Venice Biennale last fall, but the pavilion that kept crowds milling around until the last moment of the last day was the American, with half its space devoted to studies of the Walt Disney Concert Hall, designed by Frank Gehry. The Los Angeles architect's models, some covered with furling pieces of white construction paper held together with Scotch tape, looked like a tall ship under full sail. It was a building with turbulence, a characteristic notoriously difficult and prohibitively expensive to build. Usually.

Just beyond Gehry's models stood a 15-foot-high-by-30-foot-long mock-up wall in limestone, complete down to its seismically correct joints. The wall scrolled as gracefully as the paper on the models, and visitors who walked to the end of the curve found it supported by a neatly bent frame—convincing evidence of how the full-scale facade would be erected. This wall, which should

# Papers,

have taken weeks to construct, had been erected in just four days, its stone and steel cut to specifications drawn up by an aerospace computer. For skeptics who doubted that

Gehry's improbably shaped concert hall could be constructed, the wall proved that his paper waves were indeed buildable.

In a way that Walt Disney would recognize, the hall, initiated by a gift of more than \$50 million from Lillian B. Disney, Walt's widow, puts sophisticated engineering at the service of a vision. But the hall's unexpected design has been a target of criticism. One self-appointed critic likened an early model to a shoe box left out in the rain, and another dubbed it "post-earthquake architecture." But other equally vocal critics call it a masterpiece, with a mission beyond its site. Urban planners and members of the arts community believe that Gehry's unusual and unusually beautiful building, more than four years in design, may give Los Angeles the equivalent of a cathedral. A structure like Gehry's, they say, has the power to re-center the city. "It's the opposite of the buildings around it that embody the idea that culture is corporate and not fun," says Peter Sellars, artistic director of the L.A. Festival. "You won't be able to just walk by it. You'll have to stop and look."

# Stone

**Frank Gehry and the  
Making of the Disney  
Concert Hall - By  
Joseph Giovannini**



**In his Santa Monica studio,  
Frank Gehry, right, consults  
with his Disney Hall project  
designer, Michael Maltzan.**

Independent of the design, discussions between the county and Music Center boards subjected the project to seemingly endless reviews—and the clock has been ticking. The Disney gift, offered more than five years ago, stipulates that construction must begin by the end of this year or the money will be withdrawn. Final agreements are expected to be signed this week, and groundbreaking, pushed to the 11th hour, is now scheduled for December.

The delays have had one advantage for Gehry: They've given him the luxury of being able to perfect his vision of a music hall, inventing ways to take his startling design from scissors and paper to stone.

IN HIS GLASS-WALLED OFFICE OVERLOOKING THE DRAFTING CORRALS OF HIS lofty Santa Monica studio, Frank Gehry sits on one of the shaggy cardboard chairs he designed nearly a decade ago and recalls how he designed the project. "I had no preconceptions," says the understated architect. It was in this office, in a way not too different from the way children play in grade school, that he tore, glued and pasted construction paper, sculpting the contours of the Disney facade.

No single metaphor quite captures the shape of the hall, to be built on Bunker Hill opposite the Dorothy Chandler Pavilion at 1st Street and Grand Avenue. "An incredibly beautiful, organic kind of flower, with its petals unfolding," says Ernest Fleischmann, executive vice president and managing director of the Los Angeles Philharmonic. But the design, says Gehry, didn't begin with a visual metaphor. It originated, instead, in the sound paths of trumpets, French horns and violins. No matter how it looks, he says, "if the hall opens but the sound isn't good, that will be what's remembered."

The story of the building's design is largely the story of its acoustics. On the walls of Gehry's office, 60 study models of the hall's interior—the first ones based on curved terraces and a stage surrounded by the audience—tell of a relentless search for perfect sound. The quality of the sound was also a primary concern of Lillian Disney, whose gift is perhaps the largest ever to an American cultural institution. When Frederick M. Nicholas, the head of the Walt Disney Concert Hall Committee, met her in the family screening room of her Holmby Hills home, Mrs.

*Joseph Giovannini is an architecture critic, author and architect based in New York.*

Disney, now 93, told him that she wanted only two things: a garden and a hall with superior acoustics.

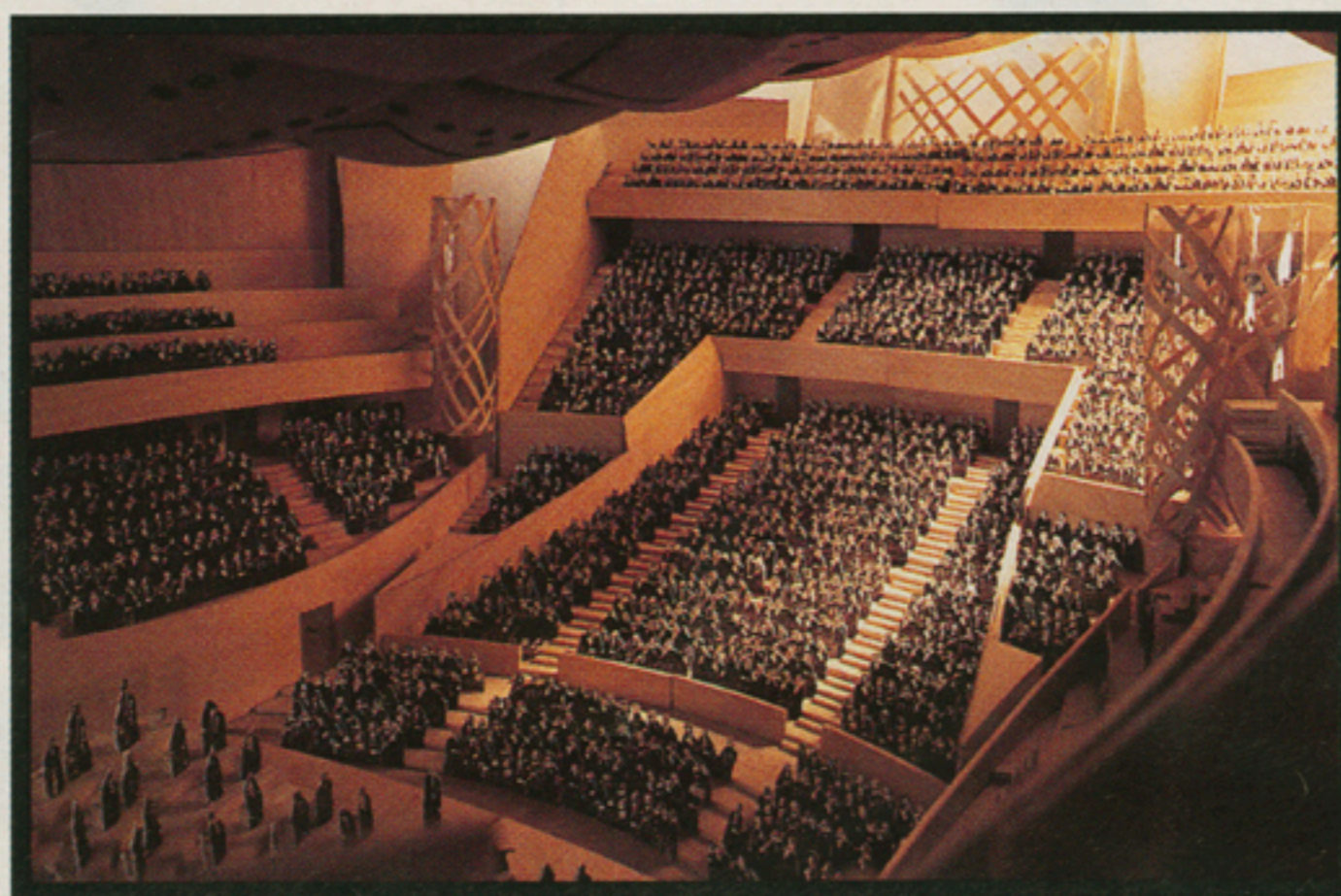
"She has a great interest in music but had no preconceived notions about the architecture and never asked for anything more," recalls Nicholas, a Los Angeles developer who has volunteered 5½ years of his time for the project.

But creating a hall that will allow audiences to hear a Paganini pizzicato in the last row is not an exact science. Acoustics has been called a black art and likened to the Bermuda Triangle, and after winning the Disney commission in 1988, Gehry began to immerse himself in its nuances. On research trips through Europe, America and Japan, he and members of the concert-hall committee and the Philharmonic board sat in concert hall after concert hall, listening for the sound they wanted to bring to Los Angeles. And when they found the balanced, smooth, clear and detailed sounds of Tokyo's Suntory Hall, they hired its acoustician, Minoru Nagata, as their principal acoustic consultant.

That decision radically changed the approach to sound in the hall. It also changed the position of the stage. The superior acoustics at Suntory, notable for a good "bass response" that builds up sound, came from a different shape: a modified shoe box.

Then there was the "psycho-acoustic" factor. The concert-hall researchers found that the perception of sound depends on the pleasure of the architectural experience. "In a dark hall, you're not exalted to listen to music," explains frequent guest conductor Pierre Boulez. In a hall such as the free-form, expressionistic Berlin Philharmonic, says Fleischmann, listeners feel a "bond of excitement" with the orchestra that charges the musical experience. Some musicians, including British conductor Simon Rattle, even claim that concert halls have souls.

To pin down the elements that would bring a musical soul to a shoe box, Gehry spent hours with Nagata in the architect's bare-bones conference room, with its natural plywood floors and exposed ceiling insulation. The two men, accompanied by their colleagues and by a "cultural facilitator" who occasionally clarified points, sat within an arm's reach of a model of the hall's interior, which rested on a pair of sawhorses. In these sessions, videotaped for the Getty Center archives, Gehry sometimes moved walls in the model to make a point. "We're trying to



**G**ehry's models for the concert hall interior, above, and exterior. Computer-generated close-ups, opposite, show interior supports, exterior walls and lighting towers on side wall.



understand the philosophy behind everybody's decisions," he told Nagata.

Smiling frequently and bowing slightly as his guests did, the architect gently questioned Nagata on every aspect of the hall's acoustics, trying to catch any inconsistencies or flaws in the concept of the hall as a box. "We don't have any other way of finding the visual options—we're trying to find out how many ways it can be done. The building in a way designs itself—the information is a liquid that we try to crystallize into a form. We want to make a building that looks inevitable and not contrived."

Asking the same questions several ways—"like a trial lawyer," Gehry said—he coaxed explanations from the reticent acoustician.

Though he had willingly changed from the original surround-sound configuration to the shoe box, Gehry noted that some recent shoe box halls do not work acoustically. "Why?" he asked. Nagata explained that the ear hears sound three-dimensionally and that the total proportions of a hall, including its width and height, are important. Give or take a foot, the world's best halls have a ceiling height over the orchestra of 52½ feet. And seating capacity is modestly scaled: In halls larger than 2,500 seats, the sound requires too much travel time, and the orchestra must play at full energy just to deliver sufficient sound, rather than focusing on its quality. When such calculations fall short, said Nagata, so does the performance of the hall.

But Suntory would not be an absolute guide. When Gehry noted that Americans like to feel sound vibrating through their seats, Nagata responded that sound is culturally relative: "We [Japanese] think weak sound is very important. Like the weak light of candlelight, weak sound can be very beautiful.

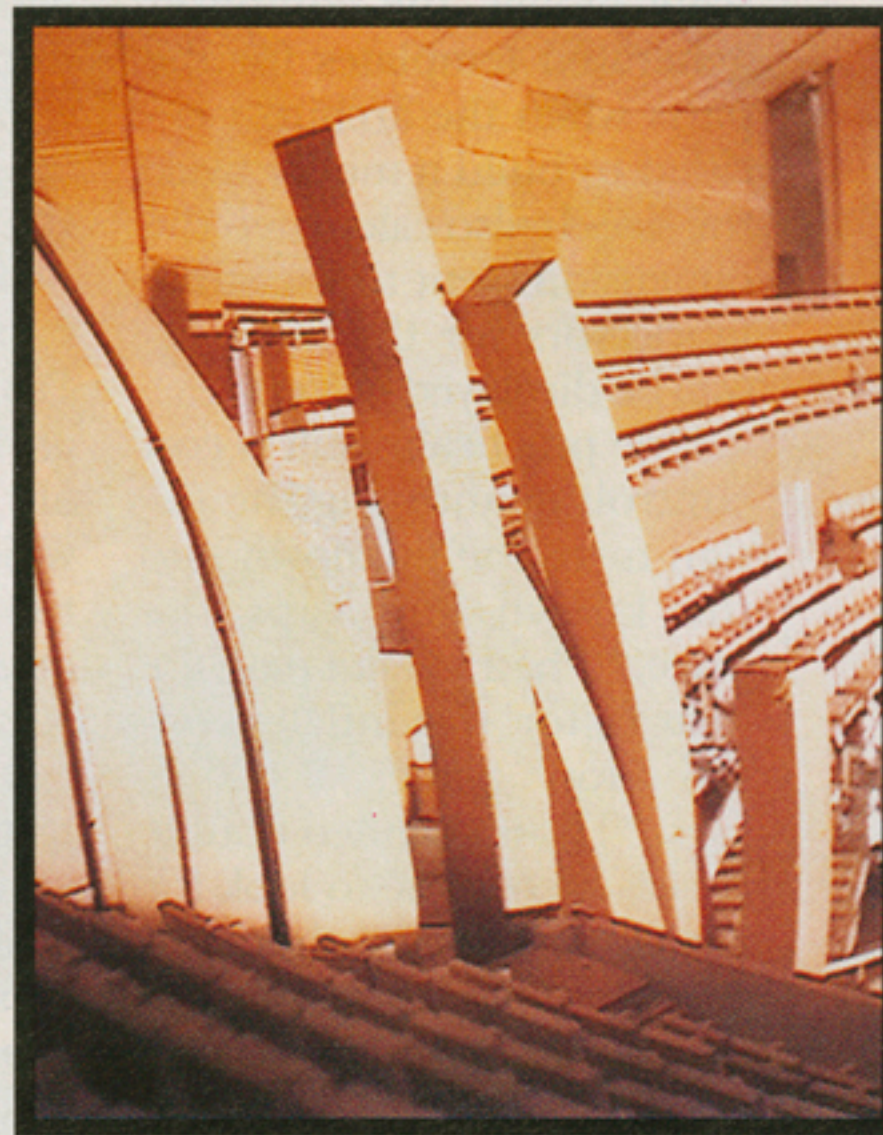
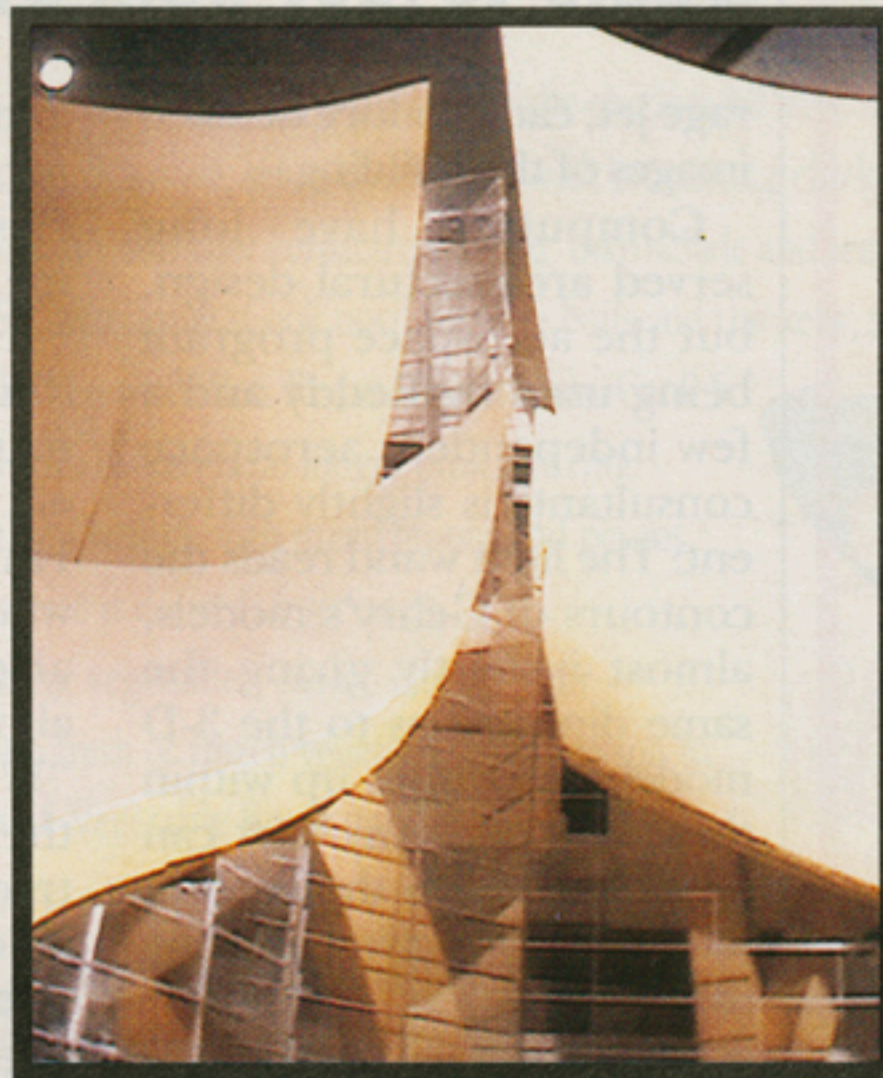
"Seventy percent to 80% of acoustics is scientific," he noted, "but 20% to 30% is a 'soft recommendation' based on experience." Then he paused and added, in a mixture of tentative Italian and English, "*Miracolo* and creation also includes danger," or, as the facilitator clarified, "Miracles include danger."

For Gehry, questioning and modifying the box—a static form he has long resisted in his designs—was critical. He needed to find a way to replace the sculptural energy of his original curved terraces. In his sessions with Nagata, Gehry learned that the box's far corners were not acoustically necessary, and because the violins and violas emit sound in a V, out and up, the far ends of the shoe box should incline upward so the audience will be in the direct path of the sound. Gehry also learned that just as convex mirrors disperse light efficiently, convex shapes disperse sound.

Because a full sound depends on mixing direct sound with sounds reflected later from the hall's interior surfaces, Gehry placed high walls on both sides of the orchestra to bounce early sound reflections back to the audience. But he found that a straight wall was "aesthetically brutal" and that a soft curve would disperse sound more evenly. The resulting "starched collar" on either side of the orchestra was the first of the curves that would eventually drive the geometry of the building.

Gehry dismissed the popular notion of movable sound reflectors hanging from the wall and simply brought the ceiling down to the proper 52 feet, billowed its form and stepped more billowing forms up the ceiling parallel to the inclined floor in the tilted shoe box. To avoid using balconies, which create acoustical problems and stratify the audience by ticket price, the architect widened the hall for more seats. The seating area naturally took on the shape of a ship's deck, wide at the beam.

"Architecture has been called frozen music, and the ceiling is a case of frozen motion," Gehry says. A sailor himself, with a boat in Marina del Rey, he cultivated the allusion to sailing. By leaving the far corners and back of the box, which do not reinforce the



sound, open for natural light, he has created the illusion that a boat, separated from its side walls, is sailing within a glass bottle.

IN HIS SKETCH BOOK, GEHRY NOTED THAT HE WANTED the concert hall complex to embody "a Walt Disney feeling"—an environment that was "welcoming, engaging, comfortable and designed to human scale." Unlike the Chandler, modeled after a Greek temple and set atop a plinth, the shapes of the Disney Hall invite passers-by to explore with what Gehry calls an open body language. With a 600-seat pre-concert auditorium, one formal and two informal amphitheaters and a chorus rehearsal room that doubles as a 200-seat theater, the hall will be able to accommodate five or six simultaneous events.

When the county, which donated the land, canceled a hotel planned for the site, and, for budget reasons, a chamber concert hall was dropped from the project, Gehry moved the main hall toward the center of the block, giving it more breathing room, and repositioned it toward the Chandler Pavilion and the Museum of Contemporary Art down Grand Avenue. A glass-enclosed conservatory originally planned to connect the chamber hall and concert hall has been replaced by an outdoor park with curved, sweeping staircases—suggesting Rome's Spanish Steps, but multiplied—a public living room that satisfied Lillian Disney's request for a garden.

With no single door or monumental entrance, the hall's curved exterior edge weaves together the inside and outside. It is a building designed to be climbed on, picnicked in and read on. "It's a powerful building but not forbidding," says Richard Koshalek, director of MOCA and head of the subcommittee on architecture for the Disney Concert Hall Committee. "It doesn't look like you need a ticket to get in."

Gehry has always tapped into the raw energy of everyday "found" materials such as plywood and chain-link, but for a high-profile public building that required dressier materials, he's had to generate energy with form. The most dynamic movement comes from what he calls the wrappers: tall, curved limestone walls that echo the peaks of the hall's corners and the contours of the interior. They curve around the front, creating lobbies, walkways and other auxiliary spaces inside, and near the ground they shape areas such as restrooms, stairwells and fire exits.

"The wrappers were a way of getting the building to read as one recognizable image, one institution, and not make it seem as if there were eight pieces to Disney Hall," says Michael Maltzan, Gehry's project designer. Gehry orchestrated the curving sections so that they turn around the hall, as though circling a merry-go-round. "I started applying the curves to soften the whole," he says, "and make it more festive." Walking along the edge of the building will be like driving along curving hillside roads, the rises and bends seen in constantly evolving relationships. And when the waves of the wrapper break—there are cracks between the sections—the garden will commingle with the interior spaces.

The curves here are distantly related to a benign and charming obsession that has been the mascot of Gehry's career for nearly a decade—the fish. Recalling, perhaps, the live carp his grandmother used to bring home every Thursday and keep in the bathtub before making gefilte fish, Gehry has designed fish lamps, fish-shaped conference rooms and a restaurant shaped like a fish in the throes of a magnificent leap. Dealing successfully with the problem of buildings molded with piscine curves seems to have given him the confidence to do buildings in which the image of the fish dropped out, leaving behind only the compound curves.

But it is one thing to build a fish lamp by hand in a studio and another to build Disney Concert Hall. Gehry has used the computer to rationalize and regularize the construction process—standardizing and

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Los Angeles Times

reducing the number of parts, simplifying the geometries.

In a far corner of Gehry's office, David Reddy, an affable 38-year-old architect in jeans and cowboy boots, touches parts of Gehry's taped models with the tip of a photosensitive light wand. The wand beams information to electronic eyes that relay data to a nearby computer customarily used to shape airplane fuselages and auto fenders. By plotting points along the surface of the models, the computer, used in the development of France's Mi-

tion cost." The computer has been used to simplify the design so successfully that only 1% of the stone now has complex curves, and the bids have come in on budget.

The computer may eventually bypass laborious architectural drawings by sending specifications directly to robotic milling machines that cut the stone for Disney Hall. "Architects have said for years we should learn from aerospace, but nobody has done this. This computer represents shapes—and I love to say this: 'to eight decimal points of accuracy'—

formance of Brahms' Second Symphony, conducted by Philharmonic music director Esa-Pekka Salonen, was videotaped and digitized into another videotape taken of an interior model to determine how the orchestra will look and feel in the hall.

Gehry has invited musicians, conductors and members of the Philharmonic board to his office to look at the scheme and poke their heads up into a large model of the interior. "Every time I talk to Esa-Pekka, Pierre [Boulez] and Zubin [Meh-ta], it's very difficult to get a

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rage jet, can produce detailed images of the building.

Computers have long served architectural design, but the aerospace program being used by Reddy and a few independent aerospace consultants is slightly different: The light wand reads the contours of Gehry's models, almost instantly giving the same dimensions to the 3-D model being built up within the computer. Any part can be called up on the screen, its dimensions given and any intersection of irregular forms accurately described. All dimensions refer to a fixed "zero-zero" point—which happens to be near the conductor's podium. While the computer model was made from Gehry's hand-sculpted one-eighth-scale model, the computer generated templates for the parts when the architect decided to build a model twice the size. It also calculated the dimensions sent to the stone fabricators for the mock-up wall he displayed in Venice.

One practical result is cost control; quantifying the design turns the unknown into the known and caps the price. "I had to eliminate the 'fear factor' that inflates construction prices," Gehry says. "Those damned double curves forced me to look for a way to explain them, so that they could be built without some extraordinary financial penalty in construc-

and you can build from it directly, so it gets architects closer to the craft. That, for me, is exciting."

Is it a feasible design? "Sure is," says Fred Stegeman, the MIT-trained project manager for the Disney Hall building committee who conducted Wednesday-afternoon team meetings about the hall for four years. "We're still working through the problems, but the contractors believe they're solvable. The entire exterior is one of the key areas of building, but the mysteries decrease by the day, and we know the directions to go and steps to take." The complexity is primarily in the facades and their support framing, he says, and not in the steel structure or trusses, which are basically conventional.

"The computer program has been used successfully in the aerospace industry on problems much more difficult than a building," says Daniel Dworsky, who heads an independent architectural firm in Mid-Wilshire, which is doing the construction drawings. "I have no question about its feasibility. It can be handled."

The technology being used in the design goes beyond the aerospace program. Nagata has trained lasers on each seat to test sound reflections and lines of sight. A Philharmonic per-

clear sense; everybody changes his mind," Gehry told conductor Simon Rattle in a working session in Gehry's office.

"We know so little about it, but we know what we like," replied Rattle. Then he added, joking: "Find out if the acousticians have been thinking about detail, and if they haven't, lower the ceiling a couple of feet."

The architects are now building a model of the entire interior at one-tenth the scale of the real hall in a warehouse near Gehry's office, where real music (at a high, mathematically determined pitch) will be tested. For a building that cultivates in its forms the poetics of chance, very little is being left unstudied.

FOR A GENERATION, cultural institutions have taken the place of churches as the main civic symbols in many American cities, and dozens have been built, always with good intentions but frequently with deadening results: Museums and symphonies hoping for a masterpiece have too often settled for pomposity. In Los Angeles, the problem has been compounded by the pleasures of the back yard and single-family house, which have long weakened the realm of public architecture.

*Continued on Page 70*

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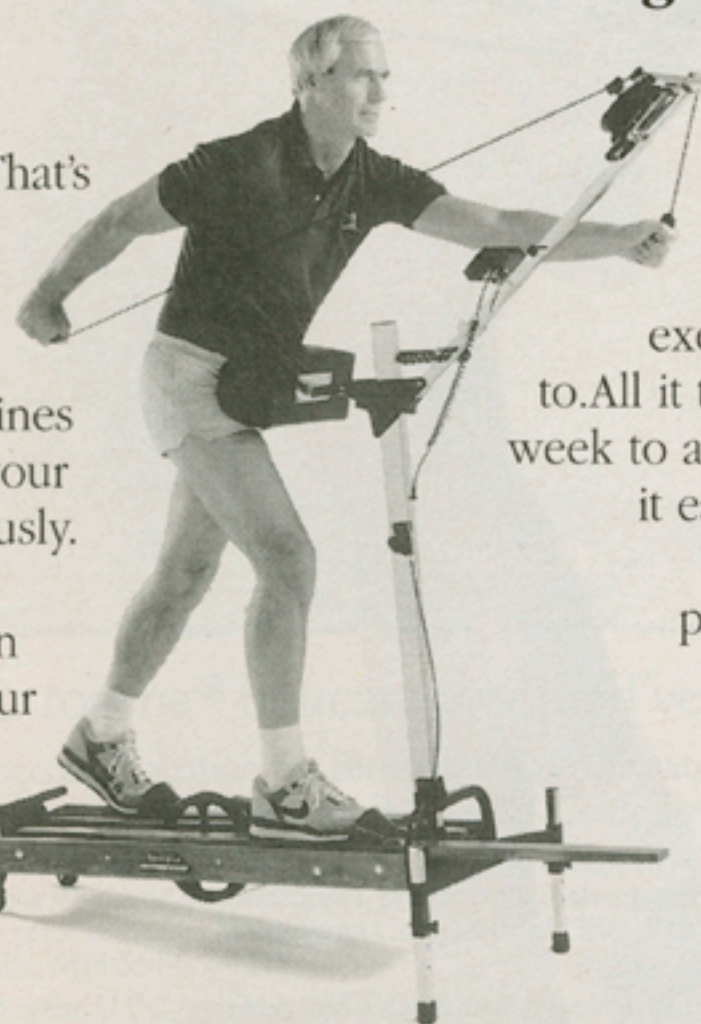
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Disney Hall

Continued from Page 28

Only in the past decade has the design intensity tucked away in Los Angeles' residential neighborhoods migrated to more public zones—first to its restaurants, then to its museums, and now downtown. The advent of the Disney Concert Hall reinforces Los Angeles' transformation from a suburban into an urban culture: The city is now one of the two poles of the United States, and it has had few public buildings commensurate with its status as a world capital. In that context, the Disney Hall is, as the Getty's Carol McMichael Reese has written, "a building that matters."

"We've seen a decline of public space in this country as a scene of encounter and diversity," says Peter Sellars, who sees the potential for performance sites in the hall's exterior spaces. He even rhapsodizes about the building as a metaphor for the multicultural city. "What Frank's architecture does is automatically insist on multiculturalism as a kind of multitiered thinking," he says. "Everything is multiple, the form and space comes in this way and comes in that way—space is constantly veering into another version of itself. Whichever angle you approach it from is going to be different. It's the exact opposite of the utilitarian one-size-fits-none kinds of buildings on Bunker Hill. Being in a building that's a fantasy run riot automatically puts you in a frame of mind to open rather than close your imagination."

Beyond its striking forms, the new building feels accessible in practical ways. It offers at its base not only the spilling staircases with attendant landscaping but also a restaurant, cafe, bookstore, gift shop and outdoor and indoor amphitheaters easy to reach from the street.

"I was struck, when I saw the models in Frank Gehry's studio, that this building seems to evoke open, friendly and welcoming feelings, unlike the Dorothy Chandler and the Music Center, which I enjoy, but where I do check to see that I'm properly dressed," says Councilwoman

Rita Walters, whose 9th District comprises downtown and much of South-Central Los Angeles. "This design, with the way they have sculpted the roof and placed windows so people outside can see in and those inside, out, is unique. When I was first elected, I was very interested in seeing to it that this new building not be another downtown building remote from the community, and I've been pleasantly surprised."

The design process has been assiduously protected by MOCA director Koshalek and especially by concert-hall committee head Nicholas, a seasoned developer and veteran of the design wars at MOCA. "You have to give the architect his room to create, and if he's creating in a political environment, he is going to be a loser."

After the design of Disney Hall was first published in Los Angeles amid some controversy, Diane Disney Miller in a letter to her mother reassured her that Walt Disney, too, had always been scorned and criticized. "Everything my father did was greeted with hoots," says Miller, speaking from her ranch in Napa Valley. "Mother said the building has got to work from the inside out, and it does. It serves its purpose. And part of that purpose is to provide a wonderful downtown space for a city that really needs it. We have no parks, no parks that really matter, unlike most cities. I guess you would call it a populist hall as opposed to an elitist place. We need some soul, something for the spirit."

In one way, Disney Hall promises to be very un-Disney, or at least unlike Disneyland. Disney, who was fascinated with cities, created cities of the imagination on vast tracts of vacant land outside everyday urban areas. The Disney bequest and the Gehry design have brought the imagination back into the working, 24-hour metropolis.

One admirer says, simply, that the design is musical, and Gehry in an anecdotal way admits that music was an intention. "My fantasy," he says, smiling, "is that when Esa-Pekka is conducting the orchestra on the podium, near that zero-zero point, he is really conducting the whole building."