A House for all seasons

After three decades, Toronto finally gets the Four Seasons Centre

By Julie Rekai Rickerd

According to Richard Bradshaw, general director of the Canadian Opera Company (COC), The Four Seasons Centre for the Performing Arts has taken as long to complete as the Thirty Years War. Unlike that event, however, Toronto's new opera house is a triumph. The COC and National Ballet of Canada, long-time tenants of Toronto's Hummingbird Centre, a venue castigated for its cavernous auditorium with poor acoustics, finally have a magnificent new home.

There were many detours and dead ends along the way, however. Plans for the house, first conceived three decades ago, were constantly thwarted: government land and funding were promised then revoked, leading to the departure to the San Francisco Opera of the COC's general director, Lotfi Mansouri, and the demise of architect Moshe Safdie's lavish C$320 million design. Nevertheless, Bradshaw, who was appointed in 1994, and a determined board of directors, kept the project alive.

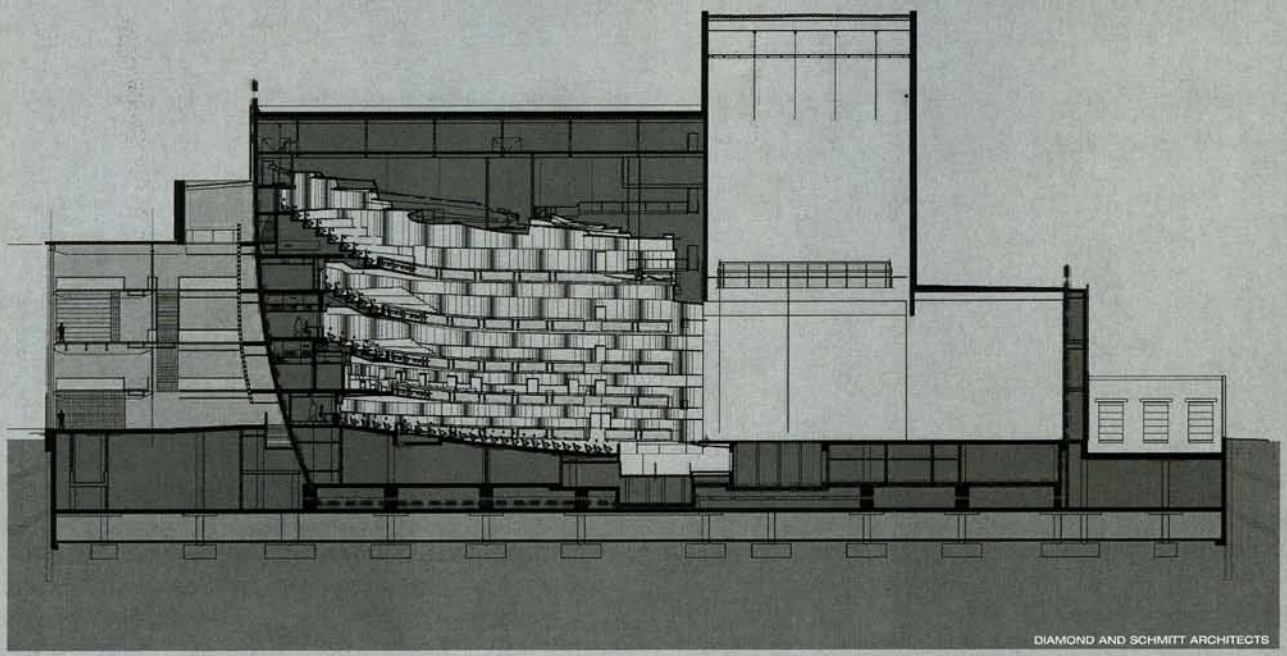
In 2002, Canada's first purpose-built opera house, now designed by Diamond and Schmitt Architects, Inc., was given the green light; this time, however, with less than half the original budget. Funding included a C$31 million parcel of land from the Ontario provincial government, C$25 million from the government of Canada, C$20 million from Four Seasons Hotels and Resorts (the naming donor of the building), and C$10 million from the Fraser Elliott Foundation (to name the auditorium).

The many delays had a beneficial side effect; they gave Bradshaw time to scour the world in search of the best houses to emulate. Complicit in this research were Josh Dachs, principal of Fisher Dachs Theatre Planning and Design and acoustician Robert Essert, then associate director of Arup Acoustics, now founder and director of Sound Space Design. Both men have worked together on the New Jersey Performing Arts Center in Newark and the soon-to-open Miami Performing Arts Center.

Among the auditoriums the team studied were Venice's La Fenice, Milan's La Scala, and Munich's Nationaltheater, the latter home to several Wagner premieres. "We were hoping to develop something that was completely contemporary but, at the same time, shared the most important qualities of the great opera houses of the world," says Dachs. Apart from "perfect acoustics," he also wanted "to create a room that was a marvellous place in which to share a performance, that made people feel like they were in a small room, sharing an moment."

Given the location of the 1.7-acre block in downtown Toronto, Essert's challenge lay in keeping the beautiful sounds inside while keeping extraneous noises, including the building's mechanics, out. This was no small challenge: heavy traffic surrounds the building, including a streetcar line; a subway runs below. Consequently, the auditorium, stage, and rehearsal halls have been placed in an entirely separate and isolated structure within the building, encased in a double layer of concrete one





DIAMOND AND SCHMITT ARCHITECTS

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story thick, and sitting on five hundred 2' square thick rubber isolation pads, strengthened with steel. Architect Jack Diamond describes it as "an egg in a nest."

Diamond came on board after winning a competition among four finalists from a pool of ten architectural firms that submitted proposals for the house. His goal was "to capture the characteristics of a 19th-century venue in a 21st-century design and configuration," believing that "both the art and science of architecture must fuse to create poetry of form." The key motivation of all three design teams: acoustics, acoustics, acoustics.

A contemporary room in a historical form

To facilitate that goal, R. Fraser Elliott Hall is a 2,000-seat proscenium theatre, with a horseshoe configuration and seating on five tiers. "We've got a vertically organized room," says Dachs. "By organizing people vertically, we bring them closer. The audience wraps around in that wonderful horseshoe shape and comes right up to the stage." A feeling of intimacy was important, he adds. "Although the walls enclose the room, we want everyone to feel that the theatre is only as big as the space embraced by the balconies." That concept is reinforced by the design of the ceiling, an inverted dome with a circular gesture that corresponds to the rings of the balconies, and a railing on the main floor level that wraps around and follows the line of the balconies above. "By repeating this horseshoe shape on the floor and on the ceiling, and by making the outer walls relatively darker and the balcony fronts brighter, we were able to emphasize the smallness of the room," he says.

"The ceiling was initiated by Jack Diamond, designed by computer and based on Robert Essert's criteria. It is basically 'hand-made' with one-story thick Venetian plaster and mesh," says Fisher Dachs associate principal Robert Campbell. "We recruited 90 retired Italian wet-plasterers for the job and it is truly a testament to our collaboration for meeting all of our different goals and needs," says project architect Matthew Lella. "We got the room to work; a contemporary room in a historical form," adds Campbell. "We aimed for perfect acoustics and worked with the basic data we received from our acoustician. Our mission was very focused and very clear. Essert had the upper hand, the lower hand, and every other hand."

"One of the more difficult challenges we had was how close to get the audience to the stage," says Campbell. "The first row of seats is about 90' from the stage but feels close because it's elevated. It took a lot of squeezing to get 2,000 seats in, from every one of which the conductor as well as the stage can be seen. The balconies dish, or warp, down to ensure perfect sightlines. They are fronted by lights that create the feeling of a wave. The geometry of the room, the materials, the colors [Diamond personally mixed the paint to get it just right] and the lighting were chosen with the same goal in mind: to make the performer seem big, make the room seem small, make the audience seem close."

Technology played a major role in plotting the seating layouts and sightlines. Fisher Dachs used "proprietary software that we developed in our office to enable us to study many alternatives with the design team," says Dachs. "We sat 'virtually' in each seat of the auditorium to note at what point the seats were not providing the best view." There is no seat that has not been carefully reviewed and approved. Low-pressure vents built into the pedestal of each seat allows ventilation, heating, and cooling to diffuse silently through the auditorium with no ducts or vents to create

noise of any kind.

Essert's "auralization," the technical means for sound rendering that parallels graphic visualization, complemented Dachs' software approach. Essert pioneered this technology, which visualizes and "auralizes" sound rays from a source onstage to a listener anywhere in the hall. This enabled the design teams to "see" sound from any source in the room. To provide the best sightlines and acoustics possible from each 21"-wide seat, some were angled slightly more steeply than others. The shallowness of the balconies brings them closer to the stage; their hard, plaster surfaces enhance the acoustics.

Opposite: A cross-section shows how the auditorium fits into the building. Below: The Henry N. R. Jackman Lounge.

There are 21 boxes of varying sizes, each accommodating two to12 armchairs, each box with its own sound-and-light-locked door, cloakroom and bar area.

The orchestra pit is 2 1/2' below stage level, has adjustable walls and is modelled on the Munich Nationaltheater, where all the orchestra members are visible. It can accommodate up to 110 musicians and is reconfigured by means of two Gala Spiralift elevators, according to the needs of particular operas and ballets. A 60 x 50', acoustically-isolated rehearsal hall is situated close to the north stage wing, making the movement of scenery and props easier and faster. Stage control systems are by Ontario-based Niscon. The hall has a sound-absorbing, sprung, bio-channel sub-floor and is surrounded by mirrors and collapsible barres. The space also serves as a public recital hall, seating 200. It and many of the dressing rooms and backstage spaces are awash in natural light. Other amenities in the rehearsal hall are 48 2.4kW dimmer circuits, with a fixed pipe grid and Strand or Horizon Marquee controller available, a fixed rig of JBL Eon speakers and a portable, eight-channel sound mixer. The loading dock is level with the rehearsal room, so scenery can be easily delivered there.



STEVEN EVANS PHOTOGRAPHY

Joel Theatrical Rigging Contractors did a remarkable job with the vast space and backstage areas. There are slots downstage from the 52 wide x 39.37' high proscenium and extra rigging incorporated in the ceiling. At the back and side of the main stage are two full-sized stages on which to prepare or store sets. A 121' high tower provides space to hang scenery onto more than 100 custom-designed, aluminum truss pipes, each 110' long, and 6" apart. With Wagner's *Ring Cycle* due to baptize the house and run in rep for three weeks, storage space for four different sets, costumes, props, and music is vital.

The theatre's fly house contains 86 manual counterweighted lines and four upstage/downstage stage sets, each containing six lines. In addition, there are eight CM Loadstar chain hoists, supplied by Christie Lites, which move at a fixed speed of 15.89' per minute, as well as two motorized winches—the lock rail and the electrics galley winch.

Utility is beauty

Defending himself against a critic of the architecture as "modest, not grand," and the suggestion that "Toronto deserved better," Diamond said, "I'm concerned about architecture that is more concerned with itself than the function it serves. There are projects in which the architect's willfulness becomes more important than making a building really work for its intended functions. My design basis is making virtues of necessities. If you start with the physics of sound and obey the basic requirements of producing music well, you may not have a great piece of architecture but you're going to make good acoustics. I think good architecture comes from that. This opera house is a marriage of simple form and perfect acoustics."



Diamond's "simple form" is orthogonal in shape, with each side lining the sidewalk of a city block. The service wing and the fly tower sides are clad in manganese iron-spot glazed bricks that adapt to light in a variety of shades reminiscent of titanium; they are silvery during the day, gold in the morning and evening, and lustrous black when wet. Black mortar adds to the bricks' plasticity. Positioning the loading dock at the same level as the stage required subtle ramping between the floor of the auditorium and the entrance atrium. The third side of the building, a 150 x 20' lounge/event space, richly panelled in wood and lit by Diamond and Schmitt-designed starburst chandeliers, overlooks a tree-filled streetscape through its multi-story glass wall. The structure's fourth side features a street-level, outdoor piazza leading to a Frank Lloyd Wright-ian side entrance, which is, in fact, the main entry. A spectacular, extremely transparent, low-iron glass wall cascades down the entire height of what is called the City Room. The natural light streaming in during the day can be completely shaded, thanks to a computer control system that drastically reduces heat gain but still allows patrons to see out. The large, point-loaded, double-glazed panels are supported off suspended steel crosses and laterally braced by horizontal glass shelves.

Inside the soaring atrium, "the high verticality was played to advantage," says the project architect, Matthew Lella, a Diamond and Schmitt associate, as he walks up the heat-tempered, low-iron, and extra-strong unsupported glass staircase. Small bulbs from within the structure light its opaque steps. A wide, upper-level staircase doubles as seating for 100 during free lunchtime concerts and pre-performance lectures. Double-layered plate glass self-supporting "bridges" lead to bars and wood-panelled lobbies. They are conveniently "decorated" with drinks rails and suspended in air, a tribute to the skill of the structural engineering firm, Yolles Partnership Inc.

It's inspiring to enter the auditorium from any level but, from the stage, it is breathtaking. The space exudes a startling silence, a palpable calm. No gild, frescoes, cherubs, or red velvet intrude. In their stead are five levels of elegant, gently undulating architectural forms, cradling 2,000 seats upholstered in bluish grey. The light beige to Weimeraner-brown palette enhances the grace and sophistication of the space. The "less is more" qualities recall the best of Bauhaus design. Despite its large scale, the auditorium feels intimate and warm. Simple elegance extends to the lean, modernist black uniforms created by fashion designer Franco Mirabelli for the 80 front-of-house staff, as well as the house curtain, made of 32oz. velour and run on a motorized counterweight-operated setting line. It was supplied by Ontario Stage Ltd.

Systems in detail

The auditorium's open lighting grid is fenced in and there are three main front-of-house lighting bridges with a rear followspot for ballet as well as a sine wave dimming system consisting of 16 racks of 98 channels. The eerie silence of the empty hall reflects the fact that the auditorium is de-coupled from the outside world and received an N-1 isolation rating certifying it completely silent.

Lella attributes a major part of the building's success to having the client onsite and at the table to address issues and make decisions. "COC's technical director, Julian Sleath, was available 24/7 and liaised among the design teams to facilitate their seamless coordination. He was and is an ideal overall supervisory presence. This has been a veritable accommodation of function and design. We worked hard to make value-engineering decisions. We have 100% natural acoustics through a network of hidden speakers. They were a lot of trouble to accommodate and we needed a lot of patience to carry it off," says Lella.

Essert's objectives had as much to do with silence as what might be heard: doors closing, air conditioning/heating, ventilation, electrical and mechanical equipment, and external vibrations. Essert resolved these problems in consultation with audio and video systems designers Engineering Harmonics and Aercoustics Engineering, both based in Toronto; vibration and isolation expert Wilson Ihrig of Oakland, California; and sound designer Roger Ganz of the San Francisco Opera. "We aimed to marry the pure aesthetic of opera with no electronics with the

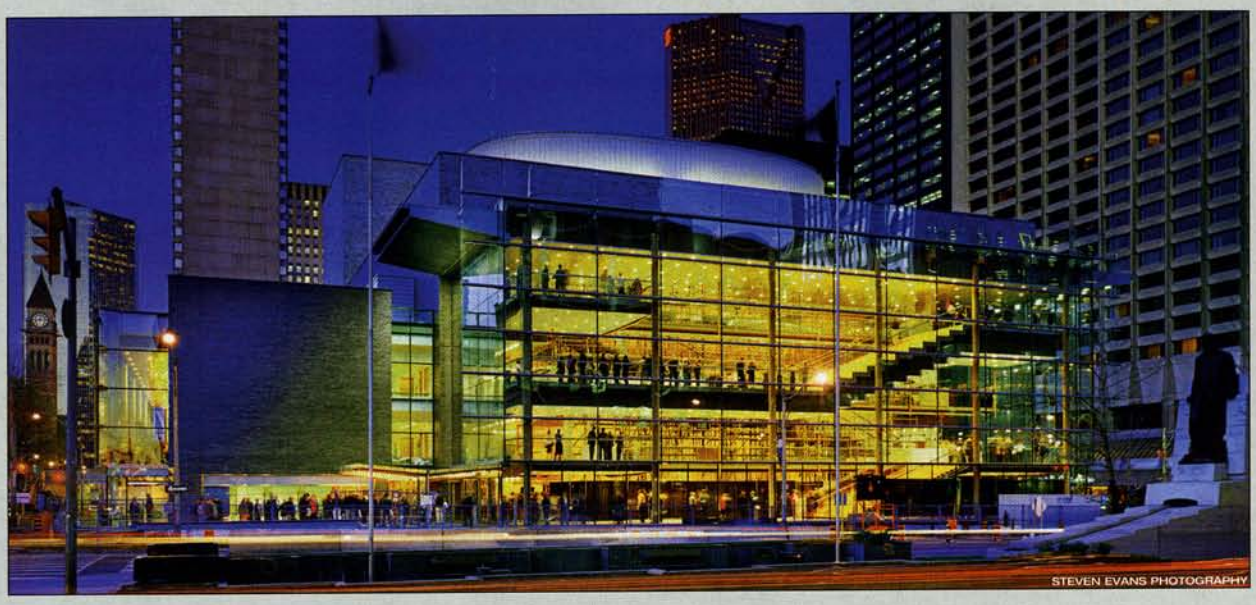
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technology available, but it was important to design the acoustics to allow the opera to expand into the equivalent of 'surround sound' when it wants to in the future. The COC has a history of sound reinforcement and amplification. This is a paradigm shift in performance, and all concerned are being coached in their operations."

Essert describes the auditorium acoustics as "a thousand-piece puzzle that must be carefully integrated." Acoustics are "invisible," he says, "built into the infrastructure with no architectural distraction." There is an acoustic gap of 2-3" between the auditorium walls, filled with dense rubber, to block out airborne sounds such as sirens and airplanes. Eight heavy, motorized velour curtains are computer-programmed and used, in part, to adjust the reverberation of the auditorium.

Since all the consultants were attuned to the auditorium's acoustical needs, few design changes were required. The choices made for the design strategy of the sound system left room for future expansion. "We have the best that's available for a modest sound system to meet present needs," Essert says. "It was clever to have only installed what is needed and to have left room to buy new equipment as the technology evolves. The full magic will be revealed when the company knows the hall better and there's an opera on the stage."

The sound equipment inventory for the building includes the following loudspeakers from Meyer Sound: 112 MM-4s to create the surround system, with a main rig consisting of one CQ-1, two CQ-2s, three UPA-1Ps, six UPJ-1Ps, and two UPM-1Ps. A pair of Tannoy studio monitors is also available, as are eight Bose MA12 line-array units. Also in house are QSC amps: 14 CX 168s, 11 CSX 240Vs, and seven CX 404s, plus



one Symetrix 581E audio distribution amplifier. Available mics include two Neumann KM184MTs, two Sennheiser EM550G2s, three Sennheiser MKH40s, two Sennheiser MKH416s, along with SurgeX surge projectors. A Marantz CD recorder and player system can be used. For processing, there are a number of BSS Soundweb units as well as a Lexicon PCM-91 reverb unit. Control is provided by a Yamaha CM2002V2 digital production console. The sound control room is located at the rear of the orchestra, with an alternate position for touring shows placed in the orchestra seating. Sound and video equipment were supplied by Maclean Media Systems, Inc.

Richard Hoyes of Fisher Dachs oversaw the production lighting system, most of which is concealed in layered plaster "clouds" in the ceiling that also provide sound reflection. "There are over a thousand dimmers in the installation for the opera orchestra, lots of sidelights, and two followspots for the ballet," he says. "Lighting pipes on four balcony levels allow for hanging lights at all levels. There are two boom box positions for side lighting used by both the opera and ballet."

Stage management control is through two permanent, customized AMX touch-screen systems, located stage left and stage right, for all house running and work lights; the computerized lighting console is a 4,000-channel Strand system. Portable AMX TS system units that can be set up anywhere in the house are used for tech rehearsals. There is a camera in the orchestra pit with integrated monitors.

A DMX control protocol for stage devices such as intelligent lights and a fog machine plugs in and can be controlled from the AMX console. All of the the above are attached to a CAT 5 Ethernet system to which any number of additional units can be added, including dimming and lighting systems of touring productions.

That's because the Four Seasons Centre also features one of the first really major sine wave dimming systems installed in North America, with eight hundred eighty six 2.4kW circuits, plus fifty-seven 6kW and six 12kW circuits as well. Strand Lighting provided the system, using its SST dimmers. Sine wave dimming, of course, thanks to its delivery of a symmetrical, continuous waveform, is famously intended to eliminate lighting-system noise, so its use was critical here. In addition, however, the SST dimmers provide an added bonus in savings on the building's power feeds from the heavily loaded downtown Toronto power grid. Also, it wasn't necessary to plan for the harmonic distortion present in a large conventional dimming system, which typically places additional loads on wiring and transformers. In these days of soaring energy costs, the savings are potentially substantial.

PRG supplied the lighting equipment for the house inventory, including gear from Strand Lighting, Selecon, Robert Juliat, ETC, Entertainment Technology, James Thomas Engineering, Doughty Engineering, Wybron, City Theatrical, Cast Lighting, Littlite, and Goddard Design. There is a small automated rig of ten Vari*Lite VL3500Q units. Control is provided by a Strand 550i control desk; backup is provided by a Strand 5101i. A 520i is used as the designer's remote console. A Horizon Marquee board controls the moving lights.

The house is equipped with an extensive Clear-Com system, with thirty CC-95 and six CC-26 headsets, four ES-1 handsets, and ten KB-211 speakers stations, plus hundreds of Atlas speakers, four JBL Control 29 paging loudspeakers, and six TOA paging horns. The video system includes 50 Panasonic TVs, five Panasonic plasma displays, and two Panasonic PRD5500U DLP projectors.

Several events have taken place in the opera house since the official ribbon-cutting on June 11: a VIP dinner on the massive stage was designed by veteran COC lighting and set designers Michael Whitfield and Susan Benson. Following the opening concert, a critic wrote that "the voices rang clear and the orchestra sounded as if every player had been given a better instrument." The proof of the pudding will come with the September 12 opening of Wagner's *Das Rheingold*, the first of the four operas in the company's new *Ring Cycle*. The productions have four different directors but one designer, Michael Levine, with lighting by David Finn. Opera and ballet aficionados alike will be elated by this superb opera house that eluded them for so long.