Drama Scenes

"What you will find about people in my business is that we love talking about what we do," says Rae Ackerman in Vancouver.

And talk he does, with detailed knowledge about all the theatre construction projects he has been involved with over the past 50 years.

At 67, Ackerman looks back on a career that began with studying theatre arts at the University of British Columbia in the 1960s. "I quickly realized my strength was not acting. I was much more involved in design and technical production," he says. He became the student assistant to the technical director at UBC's theatre program, and immediately became intimately involved with building a new theatre on the campus - the 400-seat Frederic Wood Theatre.

That was his first project. He has been everything from a stagehand to a lighting designer, but his greatest interest is in how theatres are designed and constructed. After university, he hitch-hiked across Canada visiting every theatre he could find to see how they were designed.

Since then Ackermen has been involved in the design and construction, as well as operations, of landmark theatres across Canada. His portfolio includes Place des Arts for Expo '67 in Montreal, the National Arts Centre in Ottawa, the Epcor Centre in Calgary, and renovations to the Neptune Theatre in Halifax. In the late 1980s he worked for Garth Drabinsky and Livent in Toronto and was general manager for the renovations and re-opening of the Pantages Theatre (now Cannon), which launched with the "Phantom of the Opera" in 1989.

Today, Ackerman is director of Vancouver Civic Theatres, a role which he took over in 1990. In 1993 he assembled a team of consultants to carry out an extensive program of renovations to all three downtown civic theatres in time for the 2010 Winter Olympics. The theatres are the ornately decorated Orpheum, originally a vaudeville venue built in 1927 (2,700 seats); the nearby Queen Elizabeth Theatre, which opened in 1959 on Hamilton at Georgia Street and which has undergone a complete overhaul (now 2,780 seats); third was the Vancouver Playhouse built in 1962, which is adjacent to the Queen Eliza-

beth Theatre (670 seats).

In short, this tall man with an arts academic background knows as much as anyone about constructing and renovating theatres. Engineers specialize in their own areas of building, but a knowledgeable client like Ackerman can see the entire picture and fit the pieces together.

John O'Keefe, P.Eng. of Aercoustics in Toronto has been working with Ackerman as acoustic engineer on projects since the Pantages. O'Keefe says: "Rae really knows his stuff. He's probably one of the most informed theatre operators in Canada. He knows when to press you, and when to say, 'fantastic job.'"

O'Keefe's Aercoustics played a key role on the team that Ackerman assembled for the Vancouver Civic Theatre renovations. Ackerman also attributes a lot of the Vancouver team's success to his long-time friends Thom Weeks and Jennifer Stanley, retired principles of Proscenium Architecture, who played a lead role in the Vancouver civic theatres team. Others on the team include Douglas Welch Associates (theatre consultants), Read Jones Christoffersen (structural); Stantec (mechanical), Schenke Bawol (electrical); RWDI (air-flow modelling), and Commonwealth Historic Resource Management (heritage consultants).

Wide theatres make for poor acoustics

Once Ackerman had the team assembled in 1993, they spent a year doing feasibility studies. There were serious problems to overcome: "I had been away from Vancouver for 25 years before I came back in 1990. When I began the job and walked through the theatres, what I was struck by was that they were not just shabby and uncared for, but they were also stuck in their time. They were a product of their era - most significantly the Queen Elizabeth Theatre. Large opera-ballet theatre design had evolved significantly since the 1950s so it was the one most in need of serious consideration."

So while the team went on to do technical, acoustic and HVAC upgrades to the Orpheum and Playhouse, the Queen Elizabeth was "the big one."

Like many theatres of the 1950s and 60s, the form of the Queen Elizabeth Theatre is very large, very wide, with a relatively low ceiling. It has a large balcony and originally

packed in over 2,900 seats. All this originally made for poor acoustics.

Ackerman explains that the 19th century opera houses with superb natural acoustics were narrow, horseshoe-shaped, with side boxes, and very high ceilings. During the 20th century and with the advent of cinema, "theatres were increasingly oriented to the projection screen," says Ackerman, "so the side tiers didn't work. There had to be a lot of seats facing straight on."

A typical theatre of the 1960s therefore had a very wide stage in imitation of wide screen movies. The Queen Elizabeth proscenium is 72 feet wide - "Huge," says Ackerman.

Making a superb opera house

Despite its unpromising 1960s configuration, Ackerman's team set out to make the Queen Elizabeth "as good an opera house as any in the world." At the same time, the theatre had to work acoustically for musical shows and rock concerts. The opera singers require acoustics with lots of clarity, intimacy and reverberations. The booming rock concert with its amplified sound requires almost the opposite.

To make the theatre more intimate for opera, Ackerman's team designed a scheme that drew seats forward from the back of the theatre, added some side boxes, and raised the ceiling by 40 foot at the stage end, and by about 27 feet at the back end.

Originally the plan was to add two more balconies - one above, and one below the existing balcony - but this was not to be. After lead paint was discovered on the building's steel structure, the theatre was forced to spend weeks sandblasting and removing all the toxic material in plastic bags. This was a huge blow, says Ackerman: "It cost $10.5 million and delayed construction for two months in a six month schedule. We had six weeks before construction started, and we had to redesign the project. It was a huge scramble."

In the course of the redesign the team had to abandon the plans for the two extra balconies and some side boxes. Still, they managed to create a more intimate space and find room for 2,780 seats, only about 150 fewer than the theatre originally held. They were also able to use space freed up at the back of the auditorium to expand the lobby into a large full-height atrium with a mezzanine.

The project took four years, six months at a time, but when the theatre reopened in November 2009 the performers were thrilled. Rock star Jann Arden was one of the first to perform there, and afterwards her manager announced on radio that it was the best venue in Canada.

And when the opera played, the orchestra and the singers both cheered. "For the first time they could hear each other," recalls Ackerman. "We have a huge success."

He says that they have measured the acoustics and they are equal to those at the Four Seasons Opera House in Toronto, which he holds as the top current standard in Canada.

At the Queen Elizabeth Theatre, Aercoustics used a software program for lighting design and adapted it for acoustic reflections to specify the angle and size of every reflective acoustic panel in the room. But the actual solution for converting between natural sound and amplified is very low tech - just four small curtains that are manually drawn across walls, and three that unroll in the ceiling.

Earthquake and rock band proofing

Two massive shear walls inserted in the foyer were part of many seismic upgrades that had to be made to the Queen Elizabeth Theatre.

Renato Camporese, P.Eng. was the project engineer with structural engineers Reed Jones Christoffersen. He says that typically older theatres have "eccentric" structures that make them difficult to reinforce against the impacts of an earthquake. At one end they have a lobby that is architecturally open and requires slender supports, while at the other end is the stage tower with heavy, massive high walls.

The shear walls used as seismic reinforcement in the Queen Elizabeth foyer are about 14 feet wide and 2 feet thick. They extend from the footings to the roof and are faced in white marble. According to Ackerman, other seismic upgrades include "huge angle irons bolting walls to floor slabs for stiffness," and concrete pillars for support in the auditorium. In the proscenium arch they drilled shoring rods into the concrete in order to stiffen it.

Another big structural issue, one which was tackled early on in the project, was acousti-

cally separating the Queen Elizabeth Theatre from the adjacent Vancouver Playhouse. The Playhouse used the back wall of the Queen Elizabeth stage tower as a supporting wall, but the boiler, water supply and the electrical transformer that service both theatres are all on the Playhouse side.

The engineers physically separated the two structures, built new walls and added an elevator shaft for seismic stability. They filled the 4" gap between the two buildings with acoustic insulation and isolated all the conduits, pipes and wires that pass through the two walls, using vibration isolators for 10 feet on either side, combined with fire stops.

"We can now put the loudest rock band ever in the Queen Elizabeth Theatre and we don't hear anything of it in the Playhouse," says Ackerman. "It's 100% successful."

Cooling without HVAC noise

Noise made by heating, ventilating and air-conditioning systems is an issue for theatres that aim for acoustic perfection. Ackerman explains that the usual solution is to have very large ducts with low velocity. Slower moving air doesn't make noise. Another key factor is keeping fans at a distance. "The goal with all systems operating is to get the noise constant in the theatre to NC 15 or 20," he says. "But if you are recording or playing concerts, you want NC 15."

Today (and during the 1920s), theatres prefer the air in the auditoriums to be supplied at floor level and exhausted at the roof. That way the air is warmed by bodies and rises naturally. In contrast, theatres built during the 1950s to 1980s supplied the air from the ceilings, with large air returns at floor level that can make for uncomfortable drafts.

The Queen Elizabeth Theatre upgrades changed the HVAC system from small ducts with high velocity, to large ducts with low velocity. However, the supply ducts had to stay in the ceiling because space in the basement is taken up by dressing rooms and parking.

RWDI modelled air currents in the theatre for the original redesign. They had to account for the sudden influx of people into the auditorium and deal with intense lighting and stage effects. "We don't want smoke and fog going into the orchestra pit, and we don't want it going into the auditorium so the audience can't see," says Ackerman. And air-

conditioning the stage area is complicated by the fact that the scenery has to remain perfectly still. "Part of the answer again is high volume, low velocity, air supply," says Ackerman.

"If we are having a problem. failing all else, we will turn the HVAC systems off," says Ackerman. "But that's the least desirable approach. So we try to give our building operating engineers the best tools we can and they work with it."

New technologies, same enthusiasm

Ackerman's latest project is a new studio theatre, the 220-seat Orpheum Annex, which has just opened. There he continues to test theatre technologies, describing them with his usual passion and attention to detail.

He's thrilled, for example, by a new platform they installed above the stage. "It's a grid -- a net -- of 1/16th inch aircraft cable tensioned side to side, length to length, interwoven. The technicians can walk on it, hang lights above it, put loudspeakers above it, and the sound and the light carries through. It's wonderful," he says. cce