

A House Divided

Two Vibrant Venues Emerge from an Underutilized Touring House

By: Alan Hardiman

The Toronto Centre for the Arts has taken a sword to its 1,800-seat Main Stage Theatre. In a radical approach to the problem of underutilization, it has severed the theatre into two smaller venues, sacrificing more than 900 seats in a bid to fill the remaining 870. The two new venues are the 296-seat Greenwin Theatre, built on the former stage of the Main Stage, and 574-seat Lyric Theatre, constructed in the original audience chamber. Completed at a cost of just $8 million, the renovation was intended to breathe new life into a cultural destination that had become unviable in its original form; all signs indicate that the effort is paying off.

When the theatre opened in October 1993 as the flagship venue of the new North York Performing Arts Centre, as it was then known, it was a different era. A Broadway-bound revival of *Show Boat* was packing the place under the management of Garth Drabinsky's Livent Corporation. Ford Motor Company eagerly bought the naming rights. In short order, *Show Boat* was followed by more blockbusters: the Canadian production of *Sunset Boulevard*, the world premiere of *Ragtime*, and a stop on the pre-Broadway tour of *Fosse.*

The ride came to a crashing halt when Livent went under, amid charges of massive accounting fraud that eventually saw Drabinsky and his business partner, Myron Gottlieb, heading to prison. Around the same time, the City of North York itself disappeared, absorbed into Metropolitan Toronto as a result of municipal amalgamation. The City of Toronto now owns the facility—renamed, after Ford's hasty withdrawal, the Toronto Centre for the Arts. It also comprises the 1,036-seat George Weston Recital Hall and 183-seat black-box Studio Theatre. The city does not own the land it sits on, however, and this effectively ruled out a sale.

The Main Stage Theatre went mostly dark for a decade, until Aubrey Dan's Dancap Productions lit it up again in 2008 with a short run of *My Fair Lady*, followed by *Jersey Boys*, which ran for two years. But the show often played to half-empty houses, despite Dancap's offer of discounted tickets, resulting in a succession of short-run productions that failed to entice theatregoers away from the downtown lights and into the suburbs for a night out. Dancap stopped producing shows there in 2012.

"After 20 years, the time has come to make a change," said the center's general manager, Pim Schotanus, in an interview at that time. "Enough time has gone by for me to stand up and say, 'Enough's enough.' We need to move forward."

The city was faced with the choice of watching the Main Stage continue to bleed cash or doing something—anything—to stanch the flow. Looking for options, the city held a competition. "They had done a study that said they needed more small theatres to serve local groups in need of space," says the project architect Antra Roze, of Diamond+Schmitt Architects. "We won the competition with our proposal to divide the theatre into two spaces."

One stipulation of the Main Stage reconfiguration project was that, in creating the two new theatres within the existing envelope of the Eberhard Zeidler-designed Main Stage Theatre, the original shell would be left intact, to allow the theatre to be returned to its original form, should that ever be desired.

Greenwin Theatre

The renovation fell naturally into two phases, with the deadline for completing the smaller Greenwin Theatre set for April 18, 2015, for the sold-out world premiere of *Therefore Choose Life, presented* by the Harold Green Jewish Theatre Company. This gave the construction team less than three months to get it done; fortunately, it was the easier of the two rooms to finish.

The architects divided the original theatre along the proscenium line, taking advantage of the existing firebreak afforded by the concrete block proscenium wall and completing the separation by filling in the proscenium opening with similar 8" CMU blocks. The new Greenwin Theatre thus sits entirely on the former Main Stage, and the 80'-high fly tower contained within it is featured as a major design element, along with much of the existing rigging. Orienting the performance axis at 90° to the original, the new stage consists of a 34' portion of the original 110'-wide stage and wings—the former stage-left area—with the audience area occupying the remaining 76'. The Greenwin is 47' wide, the depth of the original Main Stage.

"In a perfect world, we would have wanted greater separation between the two theatres, but floating it inside, you would lose a lot of gross floor area," says the acoustician Steve Titus, president and CEO of Aercoustics Engineering Ltd. "It gets really tricky to support a shell on a fully isolated structure, and it just wasn't feasible within the budget constraints of this project. We couldn't isolate the theatres using the traditional neoprene isolators and that kind of thing, so we have a single masonry wall that is furred on the Lyric side to give us a double-wall system between the theatres. The metal stud wall has two layers of 5/8" drywall, filled with fiberglass acoustic batt insulation to achieve pretty good isolation performance that meets the design expectations within the budget."

An L-shaped access corridor servicing both theatres from the loading dock was built between the old proscenium arch and the Greenwin, adding to the buffer between the theatres below the fly tower. "The loading door between the Lyric and corridor is a back-to-back double door with acoustical drop seals," says Kiyoshi Kuroiwa, senior engineer with Aercoustics, noting that the loading doors to the Greenwin are offset from them down the corridor.

"We tried to make use of as much of the existing equip-

Photo: Tom Arban

Lighting inside the Lyric Theatre's inner acoustic shell of 172 fabric-covered chevrons can be programmed to create an infinite variety of characters, or to extend the look of a production into the house.

ment as possible," says Jason Prichard, principal consultant with Theatre Consultants Collaborative. "The original stage rigging, some 70 line sets, was at stage right and it remains there. We're using those arbors to run eight line sets over the audience seating area in the Greenwin. We didn't have a way to put in a front-of-house catwalk to do frontlighting, so we reworked the rigging sheaves up in the gridiron and turned the line sets 90° to give us a series of pipes over the seating area, supported from the grid for easy access to the front-of-house lighting positions and to the house lights for maintenance. There are also two rows of acoustical reflectors on a couple of pipes that they can raise and lower for maintenance. We chained off and safetied everything else that wasn't used, but we didn't remove anything, in case the stage ever comes back as a proper stage."

A new tension wire grid, from InterAmerica Stage Inc., was installed 21' 6" over the stage. Comprised of 56 panels, each measuring 2m x 2m and consisting of a weave of 1/8" aircraft cable on 50mm centers, the grid is seven panels wide by eight panels deep. "The tension wire grid is a walking surface hung from the existing grid. They light through it and rig from it, but nothing moves over it. Any of the existing line sets that were over it have been locked off," Prichard says.

Benjamin Valliquette, project manager with the construction firm Gillam Group Inc., adds, "With Scapin Staging, we hoisted up all the grid panels, locking them into place, and then when the last piece went in it became rigid. As soon as it gets locked in, that grid is like a Cadillac. It's like walking on air. It's very versatile; you can put any little components on that grid. Its flexibility is fantastic."

Photo: Tom Arban

Sitting anywhere in the Greenwin Theatre, one has a distinct sense of being in a technical space. “One of the things I really love is that, instead of trying to pretend it’s not a stage, it’s aesthetically embraced so that the fly system is an important part of the look of the place,” says Curtis Kasefang, of Theatre Consultants Collaborative, who worked primarily on the lighting system design. “They got character for free, and that is a cool thing,” he says.

Kasefang reused most of the existing dimming system and distribution. Strand CD80 racks on the Greenwin side, with 288 available 2.4kW dimmers, and Johnson Systems CD-2000 controllers were in good condition. “The CD80s are war horses; they last.” he says. “The room divided rather neatly at the proscenium line between one set of four racks that were on the original stage and another set of four racks that were in the former audience chamber, which is how the two theatres divided out. Re-use was the theme of the day, but we would have fought them had there been something that they wanted to reuse that was going to be a waste of money in the long run. The technical staff were very knowledgeable and very capable, and they had done a really good job of maintaining the equipment. The TCA’s production manager Bruce Bennett was very active in the execution of all this, and was key to the success of the project. We went with what they had and split it up, based on where the circuits were physically landing at the time.”

Drop boxes of 20A circuits are fed from the upstage fly gallery and distributed throughout the tension-wire grid to the stage deck and front-of-house pipes. An ETC Ion 2000 lighting console, with a 2 x 20 fader wing, affords control of the lighting system through a sACN network with two 2-

port (two-universe) DMX nodes.

"It's still heavily an incandescent house," Kasefang says. "They really weren't in a budgetary position to leap over to LEDs. I would have preferred it if they had been able to do that, but, truth be told, LEDs are going to be used in somewhere around 10% — 20% of the circuits, so they can pop out their modules in the racks for non-dim modules or even constant modules—although I would prefer non-dims—for a fraction of the circuits that are out there and they'll be good to go."

Lighting instruments include 79 ETC Source Four units in various degree sizes, 12 Source Four Zooms, 24 Altman Lighting 1KAF 6" focusing Fresnels, six Martin by Harman Mac 301 Washes, 12 Chroma-Q Color Force 72 RGBA LED battens, and an MDG Atmosphere hazer. Six additional Color Force 72 battens at the rear of the theatre dramatically illuminate the fly lines.

"It took a couple of rounds to figure out how to power the house light fixtures intelligently," Kasefang says. "We have a grid of house lighting fixtures running parallel to the front edge of the stage, which is perpendicular to the existing rigging structure, and we had to get power and control out to those LED fixtures through drops, but when this renovation was built, there were not a lot of tools out there to take an emergency compliant UL924- or UL1008-compliant DMX line out to these fixtures. You could do it a single universe at a time, but we had to hit several pipes and we had to do it in a fashion that was still okay from the point of view of the code officials. It was odd little details like that which were difficult."

A new control booth, with space for two operators and a stage manager, is located at the back of the auditorium on a platform behind the tiered seating. Double-pane windows slide open and can be removed.

A retractable, telescopic Seda seating unit, accommodating 198 patrons, is supplemented by 13 seats on each side of the control booth, two rows of 14 removable seats on the floor directly in front of the seating unit, and 44 seats in three rows in a sunken section of the floor directly in front of the stage.

"We had to create sunken seating for the first three rows to generate the feeling that you're looking up to the stage," Valliquette says. "We cut out a large chunk for that, about one-quarter of the depth of the new stage area, and put in sunken seating that required extensive reinforcement and new concrete for the floor. In addition, the floor—the former Main Stage—had to be completely structurally reinforced, because we're creating a new point load when the Seda seating unit is fully retracted. Let's say it weighs about 10,000lb. When it's fully deployed, that load is spread over an area on the order of 100 sq. m. But when it's retracted, you're creating a massive point load on one portion of the stage, maybe on three structural members. It's no longer distributed all over the other structural members, so that area had to be significantly reinforced. We had to go all the way down to the soil. We cut open the slab, poured new footings, installed structural piers, and put in new structural columns that tied into new beams. The structural steel and concrete work was pretty extensive."

To extend its functionality, the Greenwin's design called for a flat floor, necessitating not only retractable seating but also bridging that can be installed over the sunken section when required. "The first three rows of seats collapse forward in place with a single flip, and we can fit custom risers over them to give us a completely flat floor," Bennett explains.

The space above the tension wire grid is fully open, and when the house lights are on, it's an immediately arresting sight. For sound, it's another matter entirely. "The fly tower is a huge volume to work with, and since this is a drama venue, we needed to get that reverberation under control as much as possible," Titus says. "The strategy was twofold: First, to optimize speech intelligibility in that space, we had to ensure that the mechanical equipment was quiet enough to yield a low background noise. The noise target for this space was PNC 25, so the HVAC is all low-flow velocity. The air velocity target was around 400' per minute or less, and we worked with mechanical engineers to achieve that. Once you get the background noise right then the energy piece is easier to solve.

"Second," he says, "from a treatment perspective, we had to introduce ceiling reflectors in order to get the sound energy from the stage into the audience, so it didn't dissipate into the tower. Two rows each, with seven slightly curved reflectors, were engineered to provide the angles and geometry to get that energy to where we wanted, to fill in the audience plane. Once we had the reflector design in place, we were able to introduce a significant amount of absorption, hence all the drapery and curtains in the tower and up high around the walls of the seating area. We wanted to keep a fair bit of the lower sidewalls relatively reflective, so that we could get lateral energy back to the audience plane. That gives a really nice acoustic envelopment, and while that's not as critical for speech performance as it is for music, it's still nice to have," Vibration isolation units are used to further reduce noise.

"When you walk in and look up, it's quite a dramatic effect. You don't see theatres with that kind of volume. The drapes allow for a little bit of customization, by moving them around or opening up certain walls to expose more hard surfaces. It wasn't intended to be a fully tunable variable acoustic design, but it does give the operator some flexibility in being able to make it more reverberant for certain productions."

Engineering Harmonics was retained as the audio-visual consultant on the project, "initially to provide some preliminary consultation," says Martin Van Dijk, senior consultant

and partner. “Then we drafted the specifications and tendering documents and assisted with the design, including some modeling to help with loudspeaker placement.” Given the intensive re-use of existing equipment throughout the renovation, the specification will continue to serve as a blueprint for system upgrades going forward.

The performance sound system consists of three Meyer CQ-1 active loudspeakers hung left and right in front of the main drape, and center above the tension wire grid. A Meyer UPA cabinet sits atop each of two Meyer 600-HP compact subs on the stage. Front fill is provided by four Meyer UPM-1P cabinets, installed on the tension wire grid. Eight JBL Eon 610 loudspeakers speakers are available with hanging hardware for effects and/or monitors.

audio and video is on hand for sound design.

Says Prichard, “Diamond+Schmitt did a very nice job of continuing to express the room as a former stage from an aesthetic standpoint. It’s really kind of fun, but it still feels like a proper black-box studio theatre.”

Valliquette agrees: “The Greenwin Theatre is one of a kind. It’s got 60' to 80' ceiling heights. Where do you see that in a black-box theatre? The audience, the performers, everyone loves the space. But when we first walked into the Main Stage Theatre, everything was ready to go for a show. The place had not been decommissioned—it was as it was in 1993. We were given two-and-a-half months to build a new theatre and have it fully functional. That was a huge pressure on us. We had components coming in from

The 674-seat Lyric Theatre was constructed within the audience chamber of the former Main Stage Theatre and retains one of the two original balconies.

Photo: Tom Arban

A Yamaha QL5 front-of-house console in the control booth is linked via an Audinate Dante digital audio network to a Rio3224-D remote stage box with 32 inputs and 24 outputs. The mic locker holds six Shure SM57s, four SM58s, two Crown PCC-160 boundary layer mics, and four Sennheiser ew300 G3 wireless systems with SKM 300-835 handheld plus SK300 G3 with ME 2 lav and ME 3 headset mics. The intercom system is by Clear-Com, and a Sennheiser hearing assist system with receivers is available to patrons. An iMac with QLab3 and a pro license for

all over the world; everything was custom. We had a design from Diamond+Schmitt, and we provided design-assist services to finish about the last 20% of it and fill in all the pieces. Over those two-and-a-half months we gave everything: We worked every evening and every weekend, and so did the client, the architect, and the rest of the design team to achieve the impossible. And we did it. We delivered a fully functional, world-class theatre in two-and-a-half months.”

The 296-seat Greenwin Theatre, built entirely on the former Main Stage, features retractable seating and a tension-wire grid.

Lyric Theatre

Construction of the Lyric Theatre, the second phase of the renovation, began in September 2015, and was complicated by rehearsals and performances going on simultaneously next door in the Greenwin. There was no hard deadline for opening, and construction was substantially completed in September 2016.

With the Main Stage now behind a concrete wall, a new

Dramatic illumination of the original fly system lends a distinct sense of a technical space to the Greenwin Theatre.

Photos: Tom Arban

performance platform for the Lyric was built over the original forestage, orchestra pit, and first 10 rows of seating. "That presented an interesting geometric problem: In creating the new stage space, we're much farther forward with sightlines, so how do we maintain as much of the orchestra level seating as possible?" says Diamond+Schmitt principal-in-charge Gary McCluskie. "We had to raise the floor under the first few rows slightly in order to get a good sight line, and also raise the balcony seating in the second and third rows to ensure sight lines over the people in the front row of the balcony."

For the same reason, the new performance platform is lower than the original stage. "We changed the level of the stage that we were building out, so that we would have to do less re-raking of the floor," Roze says.

All of the original Irwin seats and carpeting were removed, the floor polished, and the seats repadded (where necessary) and reupholstered in dark grey fabric by Eventscape, Inc., of Mississauga. With the exception of the orchestra seats on the newly raised front rows, the seats were then repositioned over individual HVAC ducts, which supply air through grilles in the pedestals. The seats were furnished with new plaques and row numbers in conformity with the new seating plan. Runners will be installed in the aisles.

The upper second balcony was closed off, but its seats were retained both for their acoustic properties and in the event that the theatre is ever returned to something approximating its original configuration. Two new side balconies, with six seats each, are cantilevered out on new beams tied into the original walls. "They're actually really good seats, which almost never happens with side balconies or boxes," Bennett says.

Chevron inner shell

What distinguishes the Lyric from any other theatre is a visually striking acoustical inner shell consisting of 172 fabric-covered chevron elements mounted on a metal strut framework, creating a uniquely intimate space. "The original walls are up to 20' behind the new shell in places," McCluskie says. "It's like pitching a tent in a big room to create a more intimate feel. Once you're saying 'tent' and it's fabric, you can backlight it and have fun with it. That lets you create an infinite variety of characters within the auditorium itself. That was our starting point."

Each chevron embodies one of 41 different shapes. Even when they are not illuminated, they create an illusion of movement and high relief, despite being only a few inches deep. But when they light up, the Lyric Theatre seems to take on a life of its own.

Within each chevron, a strip of RGB color-changing LEDs functions as a series of programmable pixels. Mississauga-based GVA Lighting's proprietary architectural cove modular LED lighting system features 18 mid-power LEDs per 300mm strip for even illumination. The LED pitch is maintained within and between strips to prevent dark spots. Adjustable mounting brackets on the 1"-wide strip permit aiming between 0° and 90° in 10° increments, for precise control of the lighting effect. No diffusion is required in front of the LED strip, aside from the fabric on the face of the chevrons. "That fabric comes from the world of signage technology," McCluskie says. "It's synthetic; you can print on it, wrap it around a metal frame, and backlight it."

Depending on its size, there are from two to eight LED strips laid end to end in each chevron. "They are set up to maximize the amount of horizontal distance that we fill with light," Bennett says. "They're all driven off 380V DC. At eight locations around the room behind the inner shell, the distributed DC goes into a power-data combiner with DMX, and then the power and data signal are sent on three wires down the strings of LEDs." Two GVA Lighting PS-INF-3000 3000W Infinity power supply units power close to 900' of linear LED lighting.

Patrick Hales, the TCA's head technician, says that the system can be programmed both as ambient and thematic lighting, as well as with video: "There are a total of 880 pixels in the 172 chevrons, with the longest lines being 50 pixels long. I'm running eight DMX universes just for the walls."

Bennett adds, "Originally, we thought it was going to be 16 universes for the walls. We were a bit of a laboratory for GVA. Initially, there were stability issues until they upgraded the hardware on the power-data combiners, but since they got it going, it's been as stable as a rock. It originally came with a Pharos controller, which is what they use in stadiums where you do a lot of programming, but coming from a theatrical lighting design background, it feels like you're hitting your head against a wall. It was simpler to take it all over with our ETC Gio board, because you can pixel-map in it. We're limited in what we can do with the wall only by the amount of time a client wants to devote to the programming.

"For example, we had a kids' show in here that was based on the movie *Frozen*," Bennett says. "They did a winter scene where the stage was all blue and we lit up the walls in blue, which extended the look right out into the house. That's a great example of being able to move what's onstage into the room, another way to break the fourth wall."

Roze paints another scenario: "Take the classical theatre people: They're doing *Macbeth* with a student group, and it starts to get really bloody. They can take this whole room and very slowly saturate it deep, deep red. They can drip it down the walls. They can make this into a tornado, or lightning. Because the pixels are all individually addressable, you can do so much with each one. Or it just sits neutral, whatever that neutral is, be it the sky or the ground, and it bubbles when and where you need it to."

McCluskie adds, "The chevron shape has a quiet geometry to do it, but enough geometry that it lets you make a curve out of faceted sections, and also to do more complex transitions, such as over and around the proscenium. There's no symbolism, no meaning to the chevron other than that, geometrically, it has so much flexibility. By its nature, the chevron suggests a volume, a changing plane, and the lighting effect creates a sense of more depth than is really there."

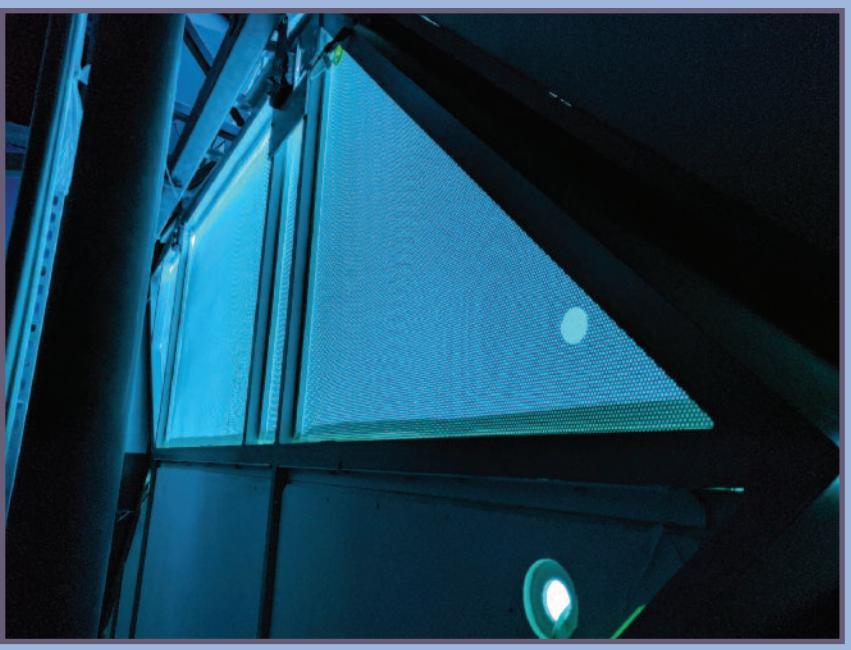
Fabricated by Eventscape, the chevron design involved almost the entire renovation team. "To get the lighting right, we probably went through more than a dozen mock-ups, internally, externally—the entire team participated in the mock-up review," says Ion Luh, lighting designer with CEL Consullux Lighting Consultants.

While the chevron is a primary visual design element, it also contains the main acoustic treatment in the Lyric's renovation. "Strategically, we've optimized the design," Titus says. "The chevrons all look similar because of the fabric covering, but about 40% of the back boxes behind are reflective, in order to reflect energy back to the audience. The remaining 60% are completely transparent, exposing the sound energy to the old existing theatre shell, so we're relying on the coupling of our new space to the old space. The tricky part of this design was figuring out what frequency levels we are working with within our own shell, and at what point we're coupled to the larger volume. The higher frequencies are going to be controlled more by the new shell, and it's the lower frequencies that are going to travel through to the larger shell that's still in place. Where we have the transparent chevron boxes, the higher frequencies are also allowed to escape the shell. We were designing to get the right balance between low,

mid, and high frequencies."

The backing on the acoustically transparent chevrons is perforated metal screening with approximately 50% open area. The reflective chevrons are backed with plywood.

The original variable acoustics in the existing theatre shell comprise drapes across the back wall behind the balconies, and 15 absorptive panels, on each of the side walls, that can be raised and lowered manually on tracks to alter the acoustic properties of the hard walls. The panels are each about 10' wide and 8' high, and have been deployed on one wall only. "The walls are hard on one side of the room and soft on the other, and it just seems to work," Bennett says. "We have the ability to play with it further but so far haven't found the need to." The drapes across the back wall have been closed to provide absorption in that area.



This rear view of an acoustically transparent chevron shows the perforated metal screening with approximately 50% open area.

"The second, unused balcony is not walled off," Kuroiwa says. "We wanted to be able to use the absorption of the seats and the back wall curtains, so it's hidden behind an acoustically transparent fabric wall. It is visually screened off, and they light the chevrons on the balcony face, so you don't see beyond that. They built a platform above the second balcony seats to create a followspot location there. The chevrons on all the balcony faces are reflective. We modeled the chevrons in order to optimize the reflections into the audience space. We were trying to get early energy to the audience areas to help with speech intelligibility. Some of them weren't helpful, so we made

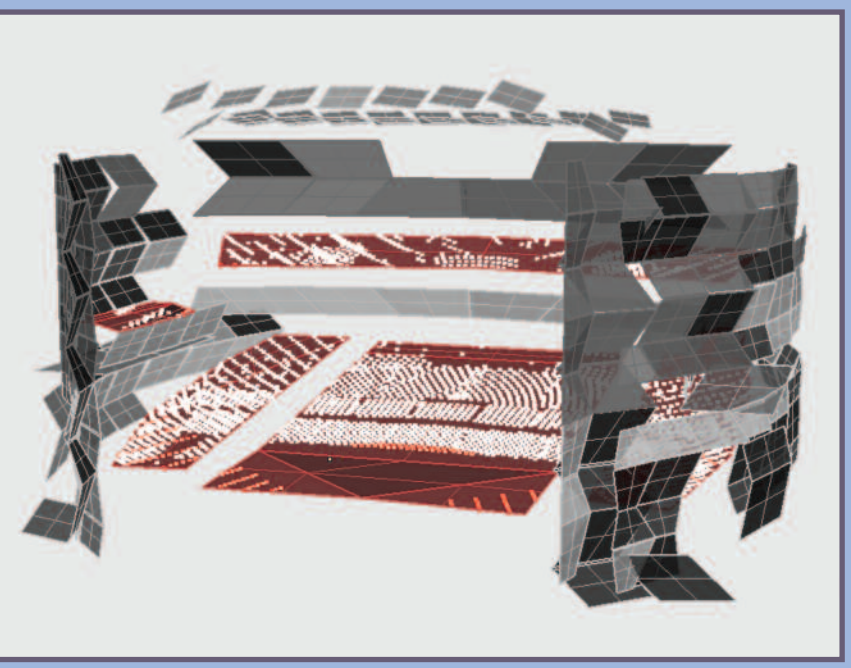
Below: Part of the infrastructure tying the inner shell of the Lyric to the existing structure of the Main Stage.

Photos: Alan Hardiman

them transparent."

Titus adds, "Regarding the chevrons that are transparent, it's about utilizing the treatment that's in the other space, in the coupled volume, to allow the energy to go into that space. As in the Greenwin, the lower portion of the chevron shell is reflective, so we're getting the energy back into the audience plane, which is the same strategy we use in putting reflectors up in the ceiling."

Seven ceiling reflectors are installed beneath the bridge over the forestage area, with a row of nine under each of the two catwalks over the orchestra seating. "The panels are made from two layers of 5/8" plywood," Bennett says. "While the angles they're deployed at were determined by the acoustician, the panels are mounted such that they



Lyric Theatre reflection pattern from sidewall and ceiling reflectors.

don't protrude into the work areas up there. The size of the acoustic reflectors and their spacing is limited by sprinkler coverage requirements. If the reflectors had been larger or closer together, sprinklers would have been needed beneath them. Also, the sprinkler contractor and mechanical engineers wanted sprinkler heads beneath the grids. Even with 70% open grate, inspectors ask for heads underneath, because material can be stored on a grid and block coverage. The hardest battle I had to fight on the whole job was to keep them from installing these heads."

No attempt was made to build a new ceiling in the Lyric. "Diamond+Schmitt did a nice job of using the strong architecture of the walls and the proscenium area to define where the new ceiling starts, and then just painted out everything up above so that it disappears," Prichard says. "This is not uncommon in many new theatres, particularly those that can't afford a proper ceiling."

LIDAR to the rescue

Suspending the bridge and catwalks through the existing plaster dome to the steel above and installing new structure for the interior shell and new side balconies in an already complete building were no easy tasks.

Valliquette asks, "How do you tie into an existing structure if you can't see behind the walls and ceilings, and if there are tons of electrical conduits, HVAC ducts, and sprinkler pipes in your way? That was a challenge that we saw down the pipeline, so we did a LIDAR [Light Detection and Ranging] scan, which is a laser scan that creates billions and billions of little points that yield what's called a point cloud. We took that point cloud, integrated it with the proposed design, and searched for clashes and interferences. If I need to run a structural steel column or a beam, what's going to be in my way? If I'm going to put in hangers for my catwalks, what are the clashes?

"The laser shoots out from point zero on an XYZ grid, and detects any surface that it hits, creating a bunch of dots on the grid in three dimensions," he continues. "It doesn't go through walls—you have to open up the walls and ceilings. After you do that, you can scan to create a true as-built condition, so you can see what all the possible interferences are. In order to design and build our catwalk and rigging systems, and our beautiful lighting system with the chevron panels, we absolutely had to do this LIDAR scan. This technology is already used in the aerospace and automotive industries, so we applied it to this job and got amazing results." Revit and Navisworks software were used for 3-D imaging.

The scan was conducted by students and staff from Toronto's George Brown College, where Petro Karanxha, an acquaintance of Valliquette's, is a building information modeling technologist who trains industry practitioners in BIM technologies. "I asked him if he'd be interested in helping out on this project," Valliquette says. "They have a theatre arts program, too, so there is some cross interest. They love the architect, they love the theatre, and they were onboard straightaway. They provided the scanner as well as the student techs who conducted the scan.

"As a result, we were able to design everything based on real conditions," he says. "We didn't have to force anything or kick anything; there was no rework. We got it to work right the first time, and that was huge for the client. This type of renovation had never been done before; no one has built anything like this before. How do you know you're going to get it right the first time? Well, you do your due diligence, you work on the design, you build it in a

Rendering: Courtesy of Aercoustics Engineering Limited

three-dimensional model, and then when you bring it to site, boom! It fits like a glove."

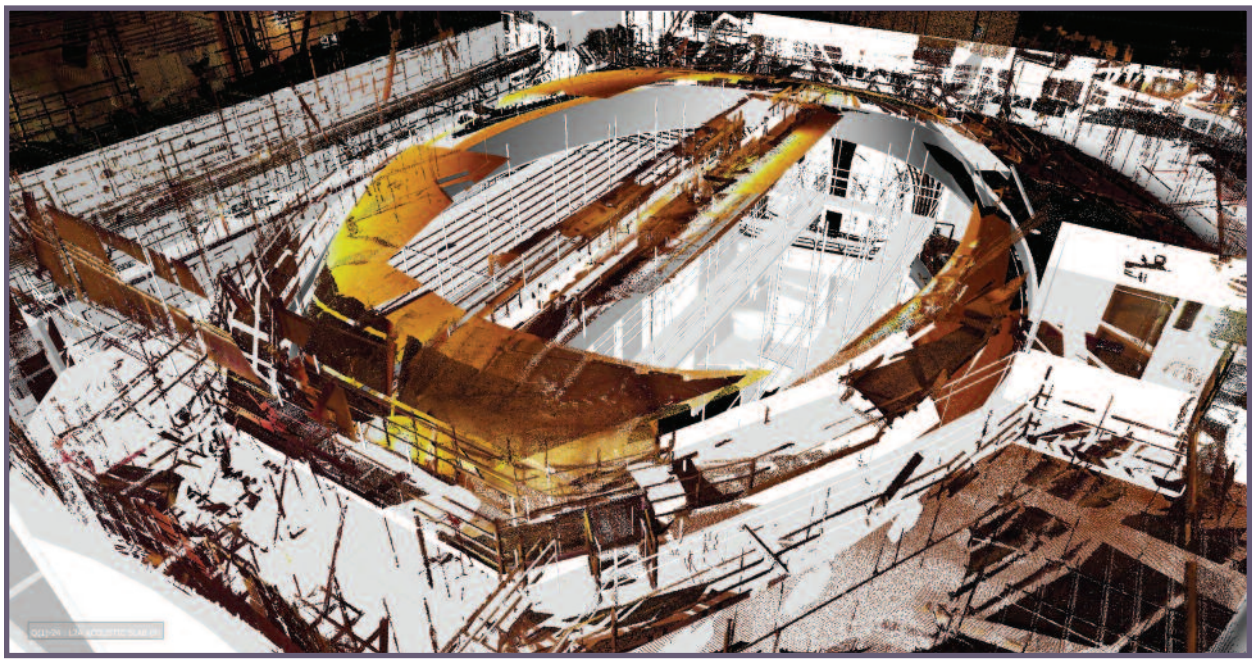
Rigging

The original forestage grid was retained, becoming an upstage grid 47' 6" over the new performance platform. A new grid was installed downstage of it, but slightly lower at 33' 9", due to the geometry of the existing celling, resulting in a split grid.

"The rigging in the Lyric is a combination of some dead-hung sets, a few hoists, and some manually operated traditional hemp sets with sandbags that we installed," Prichard says. "We worked with the client on what the plot was going to be, and we used as much of the original rigging equipment as possible, which ended up being 29 line sets. We used four of their existing hoists for stage electrics and integrated seven hemp-style line sets that went down to new pin rails that we mounted at the stage right floor. They're doing a lot of their drape masking on those. We even went through their existing drapery inventory and had those drapes cut down to appropriate sizes for the new theatre. There's a series of dead-hung pipes just below the grid for other uses. They're going to come back at a later date and slowly start adding hoists. The original concept was to provide full automation over the entire new stage, but we just didn't have the budget for it at the time." A stage-left pin rail at catwalk level is available for pick and spot lines.

Overall, the performance platform measure 81' 4" wide by 35' 7" deep. Leg to leg, the playing area is 39' wide. As in the Greenwin, the stage floor is finished with smooth Masonite painted black on top of two layers of ¾" plywood, sprung on neoprene pads. McCluskie is careful to note that the performance platform is not, strictly speaking, a stage: "A stage requires a fire separation between the stage performance side and the audience side, whereas a performance platform, such as you have with an orchestra in an audience chamber, isn't separated. And there is no way to do any fire separation here."

This means there is only one HVAC system serving the performance platform and the house—that is, the system that formerly serviced only the audience chamber in the Main Stage Theatre. Bennett says, "One thing that facilitated the separation at the old proscenium is the fact that the original stage was a stage and it had an entirely separate air-handling system. So we didn't have to get into huge money for the HVAC that we otherwise would have. If we had started with a theatre that had a performance platform, we would have been done before we started, because of the huge cost of having to create separate HVAC systems for two rooms."



A point cloud, resulting from a LIDAR scan of the existing Main Stage Theatre, revealed hidden structures that could clash with the proposed renovation.

Image: Courtesy of Benjamin Valliquette

Lighting

"We were fortunate in that the dimmer room sits roughly around the old proscenium line," Kasefang says. "Conduit is routed cross-stage on the old audience side of the proscenium line, and there's a junction box above the old forestage from which we took circuits and rerouted them out to the catwalks and the boom positions. We left the lower balcony rail position intact, but had to relocate positions that were on the upper balcony rail."

As in the Greenwin, lighting in the Lyric runs on a Cisco sACN control network. The architectural lighting is controlled by an ETC Paradigm controller, and the chevrons by an ETC Mosaic controller. "We used Pathport stuff for all the DMX conversion because I think it's a little bit more protocol-agnostic," Bennett says. "If we ever get someone in here who wants to run a different protocol, we can run it on top of our backbone. We have 32 DMX universes in our lighting console, probably more than any other room in the city," he says.

Kasefang adds, "The control infrastructure was the comparatively easy part of this job. This modern infrastructure didn't exist in the first iteration of the theatre, but the world is going to move to LED and this building has to adapt. Paradigm is just one of the many things talking to the backbone of each theatre's control system. It's what we overlaid on top of what existed there. Plus, we added in a motorized breaker panel to do a handful of switched circuits: things like the edge marker controller at the forestage. We've got little LEDs that indicate where the edge exists on the stage so you can see it during a blackout—stuff like that. The harder part was figuring out how to adapt, and most efficiently use, the existing circuits in new locations. The core of it was the performance lighting system and the architectural lighting control system, with the chevrons being essentially one big, honking fixture from the point of view of our system, where our system is calling presets. Sure, you can use a console and dive into the thing in a full and crazy way, but for the most part they will call up a preset to get something going there."

The complement of instruments in the Lyric's performance lighting plot includes 68 ETC Source Fours in various degree sizes (plus 89 spares), 45 ETC PARNels with doors (plus 11 spares), 10 Martin by Harman Mac 350 Entours, six Mac 301 Washes, 16 Chroma-Q Color Force 72 RGBA LED battens, and an MDG Atmosphere hazer, plus two Lycian Stage Lighting M2 medium-throw followspots on the platform above the unused upper balcony.

"Everything onstage is Socapex, with the exception of a couple of 50A circuits on either side. We're set up so we can do booms on both sides," Bennett says. Up to three hundred fifty-four 2.4kW and six 6kW dimmers are available in four Strand CD-80 racks, with Johnson Systems CD 2000 controllers.

The chevron wall lighting provides supplementary illumination that is subtly different from the house and performance lighting systems, suffusing the entire room with light that some say has a strangely calming effect.

"Think of the chevrons as one big light fixture with a control interface," Kasefang says. "That's the concept we took to how it's being controlled. It's a fixture that can do all sorts of wonderful things, but it's a fixture; just like when we have windows coming into a theatre, we look at the shades and the blackouts that cover them as lighting fixtures. The Mosaic control system speaks more video than master electrician, if you will. It's not an uncomfortable interface to use but it isn't something that every lighting guy is going to have touched before in their life either; they're going to have to get used to it. Mosaic is listening to a DMX line, which is telling it what to do with its universes. So DMX is controlling Mosaic and Mosaic is controlling a DMX output to all the chevrons. It's kind of a two-stepper. So you can use the performance lighting DMX world to say, 'We're going to turn all of this blue,' and Mosaic then takes that forward and tells the chevrons what to do."

Performance sound

The sound reinforcement system is centered on L-Acoustics line source array ARCS loudspeakers, dead-hung left-center-right over and midway up the sides of the proscenium. The center cluster is comprised of four cabinets oriented vertically; the left and right arrays consist of three cabinets each, oriented horizontally to optimize coverage.

"The ARCS weren't new, but we replaced a couple of drivers, and we've just finished cycling the main amps through for capacitor replacement. Our amp room is up out of the way, so it's a nice stable thermal environment—no temperature changes," Bennett says.

Four L-Acoustics MTD-108 compact coaxial loudspeakers are hung in the seating area to provide side fill, with five additional front-fill MTD-108s behind grilles in the front of the performance platform.

Two Adamson S218 subs are mounted in cavities within the performance platform. "In the sub cavities, there are five layers of drywall with green glue compound in between the layers," Bennett says. "It does a pretty good job of directing the energy out from under the stage. It's on a concrete slab, for the most part on the bottom, five layers along the sides and back, and this is a poured concrete deck—100 tons—and it doesn't move much."

The loudspeakers are powered by L-Acoustics LA-48A amplifiers, and Crest 7001 and 8001 amplifiers. A BSS BLU-806 processor takes care of loudspeaker digital signal processing. In the control booth at the rear of the auditorium, a Yamaha M7CL-48ES 48-channel front-of-house console is equipped with both Ethersound and Dante digital audio network cards. Inputs from the stage are handled

by a pair of Yamaha SB168-ES stage boxes offering a total of 32 inputs and 16 outputs. Up to 15 seats may be removed to create a house mix position in the auditorium.

Eight Sennheiser EM 500 G3 wireless mic systems with SKM 100-835 handheld transmitters and EW 500 G3 body packs are available, along with a selection of MKE-2 lavs and Countryman H6 headsets. Notable among the complement of wired mics is a pair of permanently installed Neumann KM 184 condensers.

Eight Turbosound TFM122M coaxial stage monitors are powered by Crest 4801 amplifiers. "The Turbosound wedges can be passive or active. We have eight passive mixes in the room, and two sets of rolling racks to bi-amp them if we want to," Bennett says. As in the Greenwin, the intercom system is by Clear-Com. A Sennheiser hearing assist system with receivers is available to patrons.

Wrap-up

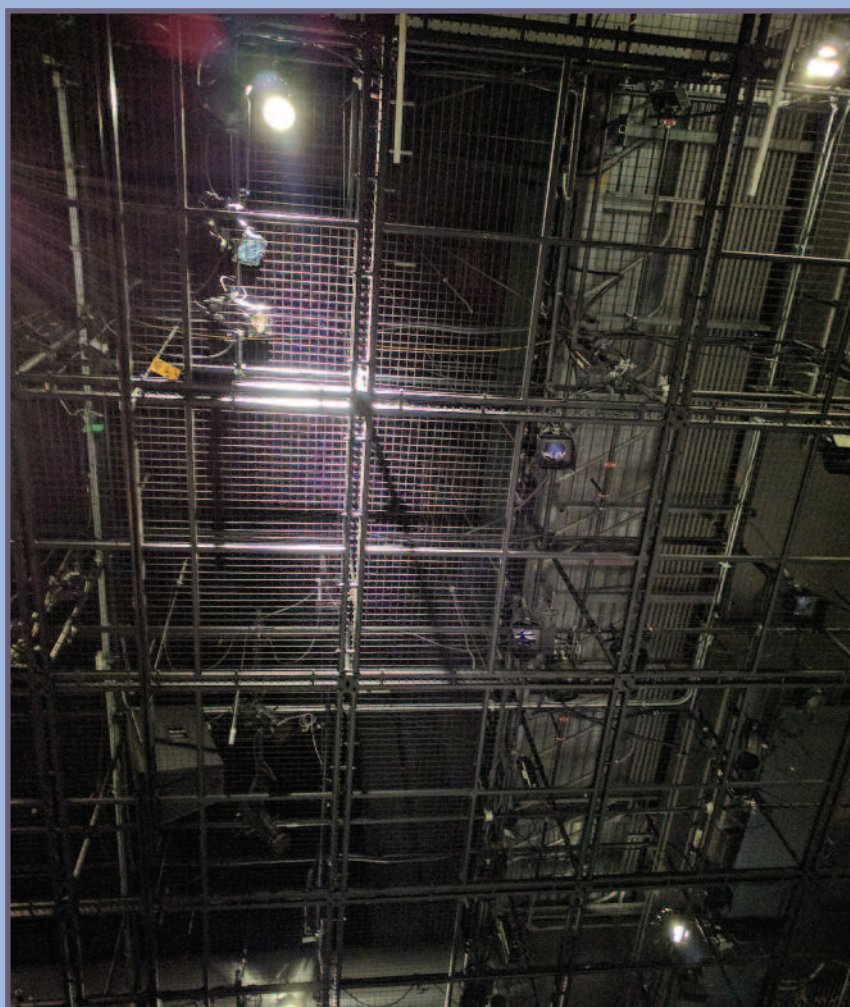
"I think that what people will appreciate most in the Lyric Theatre is the sense of intimacy in the room, given that it has almost 600 seats. You can be in a 500-seat theatre that feels like a barn compared to this," he says. "As for the Greenwin, our resident company, the Harold Green Jewish Theatre Company, is delighted with the theatre. They do four or five productions a year that run anywhere from two to six weeks. When they moved here, their subscription base increased 400%, and it continues to grow."

In the lobby, there is no visible evidence of the renovation, save for new signs over the doors to the new venues. Everything from the old Main Stage Theatre was salvaged and reused or put into storage, with the exception of a few rows of seats that were donated to Habitat for Humanity to raise funds for low-income housing. "This isn't just about bringing big Broadway shows to the city," Valliquette says. "This is about the identity of Toronto, how important our citizens are to us, and how important the arts and culture are here."

"There was a stated goal of a 20-year lifespan for this version of the building, and that's why the bones are still where they are. Part of it has to do with the mandate from the city," Bennett says, noting that downtown, the city owns and operates the 3,200-seat Sony Centre as well as the St. Lawrence Centre, with the 868-seat Bluma Appel Theatre and the 497-seat Jane Mallett Theatre. "This facility is intended to address the needs of smaller clients."

Says Titus, "I'm not really qualified to talk about underutilization across the board, but I think there is a general sense that we're not getting as many people out into these types of venues as in the past, for whatever reason. If everybody has done their jobs right here, this reconfiguration provides a model for other underutilized venues to consider—from a business case planning perspective—as opposed to tearing something down to build something smaller."

Above: The new front-of-house catwalk in the Lyric.
Below: A new tension wire grid runs over the Greenwin stage.



Top photo: Jason Prichard; Bottom photo: Alan Hardman