BUBZ VIA WIKIPEDIA COMMONS

LEFT Moriyama Teshima Architects' Ontario Science Centre was abruptly closed in late June.

REPAIRING THE ONTARIO SCIENCE CENTRE

Over 80,000 people have signed a petition demanding the reopening of the Ontario Science Centre. And it's clear, as with any older building, that repair and reinvestment will be needed.

It's true that in addition to the cost of roof repairs, there are other repairs needed to maintain the Science Centre's buildings in good working order. But the actual cost of repairs over the next 20 years, as estimated by consultants Pinchin in 2022, was $142 million—not the $478 million that the Province cites.

Pinchin's report was part of a business case presented to government decision-makers arguing for the relocation of the Ontario Science Centre to Ontario Place—a business case that the Auditor General has criticized as being based on "preliminary and incomplete cost information." In order to make their case, the Province aimed to maximize the costs of repairing and restoring the existing Science Centre, thereby minimizing the costs of building a new Science Centre.

To reach its grossly exaggerated cost of repairs, Pinchin was asked by Infrastructure Ontario to "adjust" its initial estimate of $142 million by a factor of 1.85 to account for project fees and complexity, and then further grow the estimate to factor in year-over-year inflation for the 20-year course of repairs. The Province then added 40% for cost escalation on top of this inflated estimate, coming up with a total repair estimate of $369 million. It topped this off with a generous $109 million for cosmetic and exhibition upgrades to reach the $478 million number.

This $109 million appears to double-count some $25 million in interior finish upgrades already included in the Pinchin estimate. At $66.5 million, the exhibition upgrade budget is equivalent to the entire budget for exhibitions at the proposed new location of the Ontario Science Centre at Ontario Place.

Starting from Pinchin's original construction cost estimates, adding in repairs not counted in this estimate, and using industry standard figures for construction escalation, consultant fees, and contingency (instead of the Province's markups) would give a final repair bill of $211 million.

But what about just keeping the building operating for a shorter term—say, until a new facility is opened at Ontario Place? In its business case for the relocation, Infrastructure Ontario had planned to do just that. It estimated that the repairs needed to keep the Science Centre functional on a smaller footprint (presumably within the valley-side Building C, which contains the bulk of the exhibitions) until a new Science Centre was ready would amount to $32 million.

Let's also assume that roof repairs were an unexpected addition to this cost—and that the Province opts to undertake the full $2 million in roof repairs and replacements recommended by their consultants to take place in the coming five years for Building C alone. The total comes to $34 million.

$34 million is not insignificant, but it is also far less than the $478 million figure that Infrastructure Ontario says it is unwilling to invest in a Science Centre that will be soon closed. It's also far less than the $83 million it may take to lease and fit-out a temporary location for the Science Centre.

Even if the Province manages to pull off the leasing and fit-out of a temporary location for $25 million (at the very lowest end of my calculations), that space would not be open for two years, costing $14 million in lost admission and membership revenue—a total of $39 million.

It would be less expensive, by the Province's own numbers, to simply keep the existing facility running on a smaller footprint. The repairs would more than pay for themselves.

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Canadian Architect is published 9 times per year by iQ Business Media Inc.

The editors have made every reasonable effort to provide accurate and authoritative information, but they assume no liability for the accuracy or completeness of the text, or its fitness for any particular purpose.

Subscription Rates Canada: $54.95 plus applicable taxes for one year; $87.95 plus applicable taxes for two years (HST – #80456 2965 RT0001). Price per single copy: $15.00. USA: $135.95 USD for one year. International: $205.95 USD per year. Single copy for USA: $20.00 USD; International: $30.00 USD.

MEMBER OF THE CANADIAN BUSINESS PRESS
MEMBER OF THE ALLIANCE FOR AUDITED MEDIA
PUBLICATIONS MAIL AGREEMENT #43096012
ISSN 1923-3353 (ONLINE)
ISSN 0008-2872 (PRINT)

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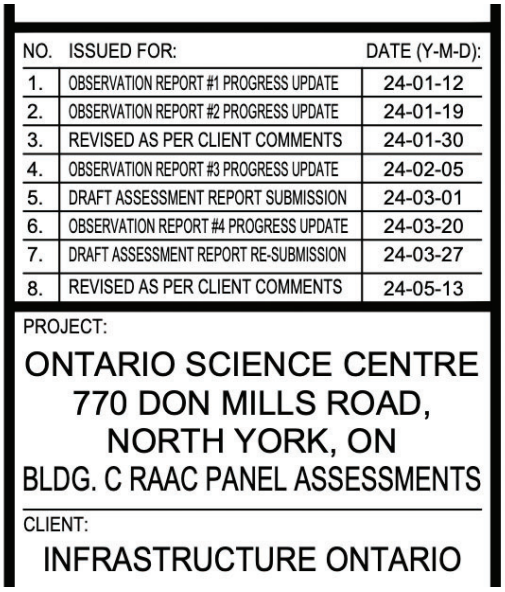
ONTARIO SCIENCE CENTRE CLOSURE: AN ANALYSIS

Science Centre Doesn't Require Full Closure: Engineers' Report

On Friday, June 21 at 4 pm, the Ontario government announced that the Ontario Science Centre's landmark 1969 building, by Japanese-Canadian architect Raymond Moriyama, would be closed immediately and permanently. The closure follows on a provincial announcement last year that the Ontario Science Centre would relocate to a new building at Ontario Place, and its present site redeveloped with housing. However, the Science Centre was expected to continue operating at its current site until the new facility was complete, around 2028.

The Province cited an engineering report by Rimkus to justify the sudden closure years ahead of schedule, saying that the report found "serious structural issues with the Ontario Science Centre building." While these issues would not be expected to materialize until the winter, according to Infrastructure Ontario, the intervening months were needed "for staff to safely vacate the building."

But a deep dive into the engineering report reveals a different story. It suggests that the building's key exhibition areas could continue to operate safely for years to come—even if the Ontario government chooses not to invest in any structural roof repairs this year.



NO.	ISSUED FOR:	DATE (Y-M-D):
1.	OBSERVATION REPORT #1 PROGRESS UPDATE	24-01-12
2.	OBSERVATION REPORT #2 PROGRESS UPDATE	24-01-19
3.	REVISED AS PER CLIENT COMMENTS	24-01-30
4.	OBSERVATION REPORT #3 PROGRESS UPDATE	24-02-05
5.	DRAFT ASSESSMENT REPORT SUBMISSION	24-03-01
6.	OBSERVATION REPORT #4 PROGRESS UPDATE	24-03-20
7.	DRAFT ASSESSMENT REPORT RE-SUBMISSION	24-03-27
8.	REVISED AS PER CLIENT COMMENTS	24-05-13

PROJECT:
ONTARIO SCIENCE CENTRE
770 DON MILLS ROAD,
NORTH YORK, ON
BLDG. C RAAC PANEL ASSESSMENTS

CLIENT:
INFRASTRUCTURE ONTARIO

ABOVE The engineers' drawings indicate that Infrastructure Ontario had a draft assessment report in hand on March 1, 2024—contradicting the agency's claim that they had received the report in June and acted quickly to impose an emergency closure.

The issue at stake is the presence of Reinforced Autoclaved Aerated Concrete (RAAC) roof panels, sold under the brand name Siporex, which make up 57% of the Science Centre's roofs. A popular material in Ontario from the mid-1950s to mid-1970s, the lightweight panels were made from an aerated blend of sand, Portland cement, and aluminum.

However, concerns have been raised that the panels have an overall reduced robustness compared to steel decks or traditional concrete, especially if there are leaks in the area. It's a known issue—over the past decades, the roofs of the Ontario Science Centre have been monitored and sections of the RAAC roof panels have been replaced with steel decking.

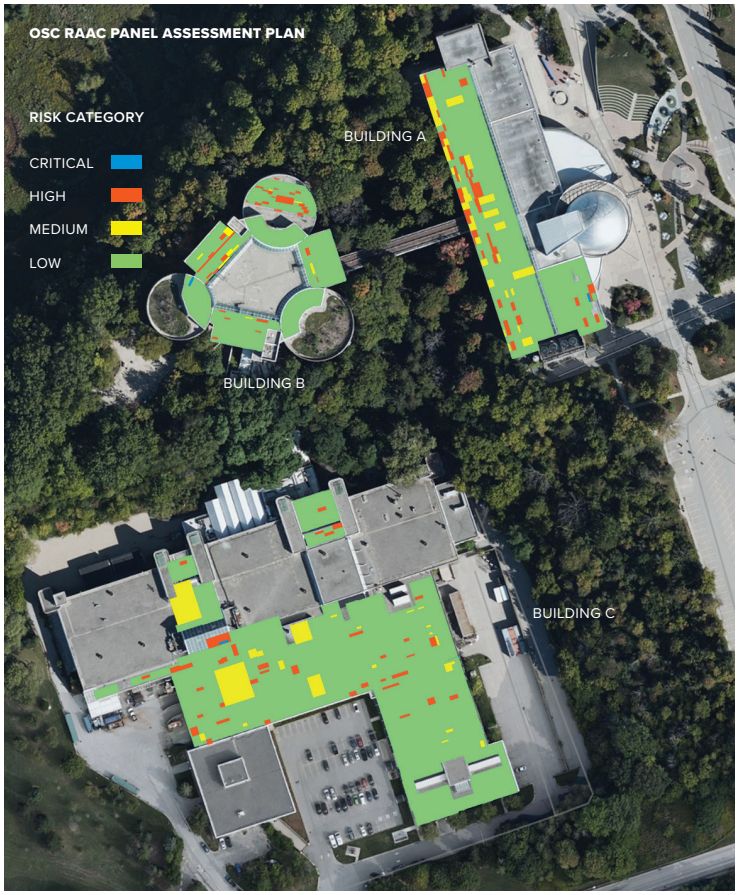
Rimkus's report is a comprehensive, panel-by-panel visual assessment of all accessible RAAC roof panels in the facility. It recommends a staged approach to addressing the RAAC issue once and for all: by removing and replacing all remaining RAAC panels with steel deck roofs, mostly when they come up for regular scheduled renewal over the next 10 years.

In assessing the panels, Rimkus found that a total of six of the 18-inch-wide, 5- or 10-foot-long RAAC panels in the facility were in what it deemed "critical" condition. These were reported as soon as they were identified, and all of these panels have been shored or are in the process of being reinforced.

Rimkus assessed a number of additional RAAC panels as being in "high risk" condition, and recommended that these be reinforced or replaced before the next snow season begins at the end of October, when an exceptionally large snow load could compromise the panels. In total, the "high risk" and "critical" condition RAAC panels constitute less than 2.5% of the Science Centre's overall roofs.

The remediation of these "high risk" panels is estimated to take at least three months per building—and floor areas directly beneath the high risk panels would "need to be treated as construction zones within the building," according to the report.

However, this doesn't mean closing the building entirely: it means restricting access or erecting barrier walls to eliminate pedestrian traffic in the areas directly below the 2.3% of the roof panels being repaired or replaced. The hoarding could be similar to what's currently present inside the ROM, where parts of the museum are undergoing renovation.



At the Ontario Science Centre, the construction would arguably affect visitors even less than at the ROM, because the RAAC panels do not exist above most key exhibition areas.

In the lowest and largest building, facing the Don Valley, the main exhibition spaces are in a part of the building with regular concrete panels on the roof—not the RAAC panels. Areas under the regular roof, which is not in need of repair, including the Weston Family Innovation Centre, AstraZeneca Human Edge, Living Earth, Science Arcade, Hot Zone, A Question of Truth, School Area Learning Centres, and the Valley Cafeteria.

In the trillium-shaped Building B, the highly popular KidSpark and the Space Hall—as well as the Rube Goldberg-esque machine outside of these areas—could also remain open, since they are not immediately beneath a roof, but one level down. The IMAX theatre and entrance, as well, have a different roof type and could remain open with no danger.

There are some areas that would be more affected, but these are largely outside of the permanent exhibition areas. The report notes that the Science Centre's in-house workshop would need to pause operations for the repairs to be completed, since that area includes large machinery that couldn't be easily moved out of the way for repairs.

The most notable temporary closure would be of the Great Hall, where special exhibitions are hosted; the special exhibition space at the lowest level may also need to be temporarily, partially closed. From what is shown on the drawings, the Rock Paper Science hall—a space that is currently only sparsely populated with a handful of exhibits—is the only permanent exhibition area that may require partial, temporary closure to accommodate repairs.

The Rimkus report acknowledges that getting the first wave of needed repairs done by October 31 may be challenging. So, it offers some alternate options for maintaining public safety. You could install temporary

reinforcement for the panels, it says, or horizontal hoarding below the panels. The absolute safest option, it notes, would be to close the areas immediately below the less than 2.5% of roofs with high-risk panels, to stop people from walking in these areas.

Since the areas with high-risk panels are largely above non-exhibition areas, this means that even if there was a need to delay roof repairs past October 31, the Ontario Science Centre's permanent exhibitions could remain safely open to the public.

In short, whether the roofs will be repaired or not, there is no material in the engineering report that calls for the complete closure of the Science Centre, either now or even by the October 31 deadline. Those repairs should be made, of course, presuming there is the intent to keep the building functional in some way in the future—but the idea that a life safety issue requires complete closure of the centre is false. If the repairs take longer than the fall, the construction hoarding can stay up, and this solution is judged by the engineers to "completely eliminate the risk to public or staff."

The timing of the sudden closure of the Ontario Science Centre on June 21 also seems to have been calculated, rather than resulting from a newly received report. Officials with Infrastructure Ontario said they had received the report detailing the building's structural roof issues in the week of the announcement, and made the decision to close the building "as quickly as we could move." However, the drawings included with the engineers' report indicate that Infrastructure Ontario had received progress updates about Rimkus's roof assessment as early as January 12, 2024, and that it had a draft assessment report in hand on March 1, 2024—almost four months before the June 21, 2024 announcement of the immediate closure.

A Costly Plan for Temporary Relocation

On Monday, June 24, 2024, just three days after the closure of the Ontario Science Centre's sudden closure, the government's search for a temporary location for the facility began. Infrastructure Ontario put out a Request for Proposals (RFP) for a 50,000 to 100,000 square foot commercial/retail space to house a temporary Science Centre until its planned new facility at Ontario Place is complete.

The temporary location, which would not be open until 2026, will put the Science Centre in a location that is significantly smaller—and likely much more remote—than its current site. It will be there for up to eight years until the new facility at Ontario Place is open.

Ironically, relocating to a temporary location will also be at least as expensive—and up to three times more costly—as making the $22 million in roof repairs which Infrastructure Ontario cited as the reason for the Centre's abrupt closure. The option that best serves Ontarians (and the one that may also prove the most economical) appears to be making repairs to the Science Centre, and reopening it.

The RFP for the relocation initiates a search for a space that the document says will take up to 12 months to fit-out, with a subsequent move-in date as late as January 1, 2026. In theory, the document implies, the renovation of a space could happen more quickly and the move-in date could be sooner, but the reverse is more likely the case: for a project of this size and scope, 18 to 24 months would be a more realistic schedule.

Even if the project moves exceptionally quickly, it means that Toronto would have no Science Centre for at least a year and a half, and more likely over two full years.

The RFP's terms also suggest that a new, smaller Science Centre would not be completed until 2030, or perhaps as late as 2034—not the 2028 date that has been publicized. This is apparent from the RFP's ask for a five-year lease starting as late as January 1, 2026, with the option to terminate the lease anytime after the fourth year, and to renew the lease for up to three years.

What would a temporary Science Centre look like? Overall, the new space will be a fraction of the current Science Centre's 568,000 square feet—possibly less than a tenth of its overall size.

The current Science Centre has been critiqued for having a small ratio of exhibition space to overall space, at around 25%. An environmental scan commissioned by the Province from Lord Cultural Resources says that the median ratio of exhibition-space-to-building-space for science centres in North America is somewhere between 39 to 45%. At the most efficient end, the exhibitions in the temporary location may occupy 22,400 to 44,800 square feet of space. That's a 61 to 85% reduction from the 153,360 square feet of exhibition space in the current location of the Science Centre.

While the RFP states a preference for a downtown, central location, the reality is that its requirements—a very large, high ceilinged building, with up to 500 parking spots, a bus drop-off, a freight elevator and loading dock, and the ability to accommodate up to 5,000+ visitors in peak periods—make a remote location more likely. It's probable that the location will be at the edge of TTC boundaries. An empty big box store might fit the bill, out near Kipling or Vaughan stations, or up by the zoo in Scarborough.

According to The Toronto Regional Real Estate Board, the average commercial/retail lease rate in Toronto is $29.08/square foot, meaning that annual rent on such a space, depending on its size, would be around $1.5 million to $3 million per year—$6 to $24 million over the four to eight year term of the lease.

Preparing such a space will be expensive. I spoke with an architect familiar with this project type, who estimated that bringing an empty commercial space up to public museum standards would cost from $200

to $300 per square foot, depending on the base building conditions, for a total of $10 to $30 million. If the government settled on a large industrial space, it would be especially costly to bring this up to public assembly standard, with modifications needed to meet requirements including fire code, exiting, floor loading, and HVAC. According to the industry expert, the cost could be as much as $400 per square foot—$40 million in all—if the location was a large, empty industrial shell building.

Standard practice would be to budget 12% on top of this, to cover the consultant fees of architects, engineers, project managers, and others involved in delivering the project, and to include a 10% cost contingency. This adds $2.2 to $8.8 million more.

The move itself is expensive, too—Infrastructure Ontario estimates that a single move to the smaller facility at Ontario Place would cost $4.9 million; a temporary space will mean paying for that move twice over. Since not all of the exhibitions could be shown in the temporary space, storage would also need to be arranged for a substantial amount of material. TRREB reports that the annual industrial lease rate in Toronto is $16.90 per square foot. Assuming that the contents of the remaining 500,000 square feet or so of building could be packed into a 20,000 square foot space, this would add up to half a million dollars in annual storage costs.

This back-of-napkin math brings us to a one-time cost of $17-55 million dollars, plus $8 to $28 million in rent, depending on the size of the temporary space and the length of the lease—$25-$83 million in all.

Ironically, the space that best meets all the needs of a temporary location, including the RFP's stated preference for a space that enables the Science Centre to "open more quickly," is almost certainly the Ontario Science Centre's current location on Don Mills Road.

It's centrally located, and on the doorstep of the Eglinton LRT.

The complex's lower building, Building C, alone contains 273,465 square feet of space, including almost all of the Science Centre's permanent exhibitions. As I have written in my analysis of Rimkus's engineering report on the roof, these permanent exhibitions are under a section of the building with a standard concrete roof.

RAAC roof does exist over the current temporary entrance to the Science Centre, and a temporary exhibitions hall. This area includes 11 RAAC panels classified as being high-risk, and a 2,500 square foot section of roof that is recommended for replacement in the coming year, as its EPDM membrane is in poor condition.

The cost to fix these areas? About $450,000, according to the Rimkus report. For an additional $17,200, the report details, you could also replace the three high-risk panels over an area that connects to the remaining permanent exhibition areas and school spaces on the balcony level of Building C, and to the permanent exhibition areas in Building B —the popular Space Hall and KidSpark. The latter, the engineering report suggests, can safely remain open as they are not directly under the roof, but one level down. Likewise, the Ontario Science Centre's full IMAX theatre, along with its entrance atrium, could remain open.

The RFP says that "IO is evaluating several alternatives and cost is a critical issue. Please specify any concession package to be provided by the Landlord (e.g. free rent, Tenant Improvement Allowance, etc)." The existing Science Centre is already fit-out and owned by the province, and rent on the land will continue to be a bargain at $1 a year.

As for timing?

A new location for a smaller, temporary Ontario Science Centre in a different location will likely take two years to materialize.

The existing location was closed within a single day. It could be reopened just as quickly. ◖▲

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06 NEWS

PROJECTS

Mass timber school opens in Vancouver

hcma architecture + design has recently completed wəkʷaṉəs tə syaqʷəm Elementary School, the Vancouver School Board's first school to be constructed entirely of prefabricated CLT panels. The school is part of a Vancouver School Board pilot project to assess the possibilities of mass timber.

The school's new həṉq̓əmiṉəm̓ name means "the sun rising over the horizon" and was gifted by Musqueam Indian Band, who was inspired by the Hastings Sunrise neighbourhood where the school is located.

The $22.4 million, 3,385-square-metre school accommodates 340 students, and features abundant natural light and the extensive use of wood, including exposed mass timber. The two-storey building is planned as a series of smaller quadrants, connected by a central, double-height atrium. Classrooms are grouped into learning communities, each of which shares a central breakout space.

The K-7 school is a showcase for how locally sourced engineered wood can reduce embodied carbon, as well as act as a compelling design feature.

hcma.ca

AWARDS

King Charles III Coronation Medal

The Royal Architectural Institute of Canada has announced the recipients of the King Charles III Coronation Medal. These 30 individuals have made significant contributions to their country, province, territory region, community or abroad.

The recipients are: Silvio Baldassarra (Ontario), Jonathan Bisson (Quebec), Shirley Blumberg (Ontario), Christopher Borgal (Ontario), John Brown (Alberta), Peter Busby (British Columbia), Michael Cox (Manitoba), Gerrie Doyle (Ontario), Heather Dubbeldam (Ontario), Valerie Gow (Ontario), Margaret (Meg) Graham (Ontario), Wayne Guy (Northwest Territories), Eric Haldenby (Ontario), Pat Hanson (Ontario), Peter Hargraves (Manitoba), Barry Hobin (Ontario), Leslie (Les) Klein (Ontario), Bruce Kuwabara (Ontario), Caroline Lajoie (Quebec), Yew-Thong Leong (Ontario), Marianne McKenna (Ontario), David Murray (Alberta), Diarmuid Nash (Ontario), Samuel Oboh (Alberta), Jason Robbins (Manitoba), Susan Ruptash (Ontario), Terrence Smith-Lamothe (Nova Scotia), Sim'oogit Saa-Bax Patrick Stewart (British Columbia), Terence Williams (British Columbia), and Betsy Williamson (Ontario).

The King Charles III Coronation medals will be presented to the recipients at a ceremony on October 7, World Architecture Day, during the RAIC Congress on Architecture, taking place in St. Andrews, NB.

raic.org

COTE Student Competition

Three Canadian student projects are among the 10 winners of the 2024 AIA COTE Top Ten for Students Competition, sponsored by the American Institute of Architects' Committee on the Environment (AIA COTE) in partnership with the Association of Collegiate Schools of Architecture (ACSA).

The competition recognizes 10 studio projects that work toward achieving carbon-neutral operations through daylighting, passive heating and cooling systems, sustainable materials, water conservation, energy generation, and other sustainable systems.

ANDREW LATREILLE

ABOVE Designed by hcma architecture + design, wəkʷaṉəs tə syaqʷəm Elementary School is part of a Vancouver School Board pilot to assess the possibilities of mass timber schools.

The program challenged students to submit projects that use a thoroughly integrated approach to architecture, natural systems, and technology to provide design solutions that protect and enhance the environment.

The three Canadian winners are: Stonehouse: More Than a Food Bank by Yoon Hur (advised by Jaliya Fonseka, University of Waterloo); Grow by Madeline Hope Engen (advised by Jaliya Fonseka, University of Waterloo); and Pinguatigaq by Thomas Biscaro, Zian Charron and Thomas Laprise (advised by Claude Demers and André Potvin, Université Laval).

www.acsa-arch.org

WHAT'S NEW

What would a science centre at Ontario Place look like?

The Ontario government has been adamant that building a new Science Centre at Ontario Place will be preferable to reinvesting in the Ontario Science Centre at its current Toronto site. But such an assessment does not hold up to scrutiny.

In past articles, I have examined how the cost of repairing the existing Ontario Science Centre is far less than the cost of building a new, half-sized science centre at Ontario Place. I've also looked at how a new science centre will not be ready until 2030-2034, depriving a full generation of Ontario kids and parents from a full science centre experience.

The current article takes a more granular look at the architectural details of a new science centre, based on currently available information, and what would be lost compared to reinvesting in the existing Ontario Science Centre.

An 18%-56% reduction in exhibition space

The government claims that the current Ontario Science Centre is inefficient in its layout, and that therefore, even though the new Ontario Science Centre has half the footprint, it will have a comparable amount of exhibition space.

But as the Auditor General has confirmed, the current Ontario Science Centre is 568,000 square feet in size, with 134,000 square feet of exhibitions. The proposed centre at Ontario Place is 275,700 square feet, with 110,000 square feet of indoor exhibit space—18% less than at the current Science Centre.

The amount of exhibition space in the proposed centre risks being reduced even further, considering that several key spaces have not been accounted for properly in the government's preliminary calculations.

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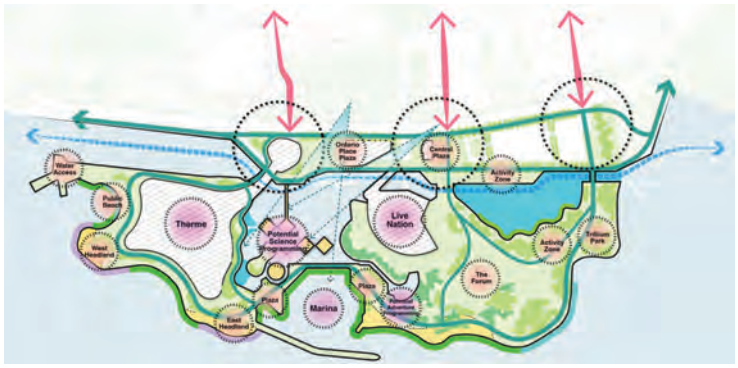

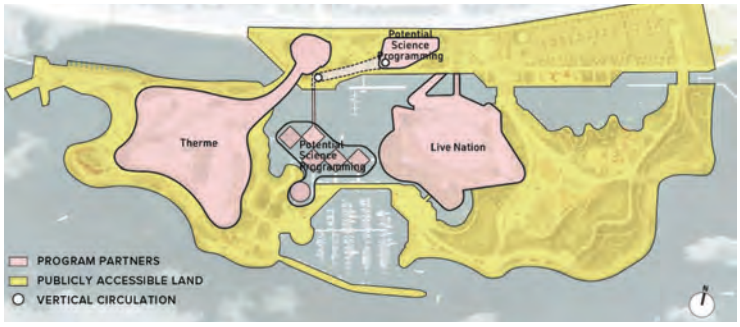

TOP The wedge-shaped science pavilion allows for select glimpses of the heritage pods and cinesphere. From almost all other city vantage points, the heritage structures will be blocked from view. **ABOVE** A massing diagram shows how the 8.4-acre Therme recreational facility (roughly the footprint of the Rogers Centre) and the massive Live Nation concert venue bracket the infield-sized science pavilion.

In the test fit, school intake, lockers, classrooms, unloading zones, first aid, storage, and exhibition maintenance and prep areas—some 23,226 square feet of functional program in all—were located on the P1 and P2 parking levels. However, as the design of these parking areas has evolved, the allocated space has been given over to other essential logistical needs, including a large underground bus drop-off loop and bicycle parking. As a result, these program elements will need to be accommodated in the above-ground portions of the building.

Another inconsistency is that in the business case, the heritage pods have been counted as being 100% usable space—adding up to some 40,000 square feet—whereas in reality, they will need to contain washrooms, exit stairs, mechanical areas, and corridors. In the test fit, some of these items begin to be blocked in, and the gross area comes in at 32,662 square feet—7,338 square feet less than originally anticipated.

In all, this adds up to another 30,564 square feet of space that is "missing" from the space planning calculations for the centre at Ontario Place. If this space comes out of the exhibition areas directly, this means that the exhibition space would be reduced to just under 80,000 square feet—a 41% reduction from the current Ontario Science Centre.

In the relocation business case, exhibitions for the proposed science centre are not fully funded. According to this document, there will be no exhibitions in three of the five pods on opening day—some 20,408 square feet of exhibition. This means that when the proposed science centre at Ontario Place opens, it will have under 60,000 square feet of exhibition space—56% less than the current Ontario Science Centre.

In the currently available drawings, the 130-metre-long underground tunnel linking the science pavilion to the pods is labelled as "Pavilion Gallery Space." Even though this is far from the optimal location for exhibitions, this comprises some 20,000 square feet of space that will likely be "counted" as part of the Ontario Place location's overall exhibition space. Accordingly, when the proposed science centre at Ontario Place opens, a third of its exhibition space may in reality be lower-quality space on a basement level that does triple-duty as a major circulation pathway, building flex space, and exhibition space.

Missing feature areas

What goes by the wayside when a Science Centre's overall area is reduced by 50%, and its exhibition spaces are significantly reduced? Within the relocation business case, a few key areas are identified. To start, the new centre will not have a large immersive space that replicates the experience of the TELUS Rainforest. Even the business case admits that "this creates a gap in the overall science centre experience," adding that "a unique and fully immersive experience is what helps create a world class tourist destination."

There will be no adventure playground, equivalent to the Cohon Family Nature Escape and Science Plaza at the current Ontario Science Centre. "The new OSC@OP has limited outdoor space envisioned in the current plans," the business case admits.

The planetarium, which was expected to reopen this year, will also be excluded from the new centre. "An immersive state-of-the-art modern New Planetarium is core to the science centre experience," the report says. "Planetariums are not just for young learners," it explains. "They welcome everyone from the community to attend public events. A state-of-the-art spectacular planetarium has the potential to engage researchers as scholars interested in engaging with the public."

A fabrication facility, too, is absent from the plans for a new centre. Creating exhibitions is part of the Ontario Science Centre's core mandate. It's also part of the Science Centre's magic: there is an immediate feedback loop from the exhibition floor to the workshop that allows the Science Centre's exhibition designers and fabricators to hone their work in response to visitor behaviour. Observers have noted how this design process would not be nearly as effective with an off-site fabrication facility.

The current facility generates $2.5-3 million annually from exhibition sales and rentals. The government's own pricing anticipates that leasing an appropriate space will cost $420,000 to $690,000 per year, plus an initial design and fit-out cost. While it notes that "ideally there is some proximity to the OP precinct," the industrial spaces it prices out in its business case are chosen for their proximity to the 400-series highways—not to Ontario Place.

More missing areas

Moriyama Teshima Architects, the firm that designed the original Ontario Science Centre, has compared the size of each major program component in the current Ontario Science Centre with the proposed centre.

In terms of public space, the IMAX theatre increases substantially in size, doubling its capacity from 300 to 600 seats. This is more space where it is not needed: while a large IMAX theatre may be useful for occasional evening premieres, the bread-and-butter of the Science Centre's IMAX is frequent, daytime showings for smaller audiences. Even the relocation business case notes that the larger "capacity is rarely likely to be reached."

Almost everything else goes down in size: the building entry and visitor amenities shrink by 43% from 46,200 square feet to 26,650 square feet, education spaces are reduced a whopping 88% from 11,700 square feet to 2,600 square feet, and the OSC School disappears entirely, as do dedicated event and rental spaces.

The lack of education spaces is particularly concerning: it will certainly mean the elimination of special immersive STEM programs geared to high school groups, such as the popular Voyage to Mars and Return to the Moon. The webpage for the OSC School—a specialized program that allows grade 12 students to spend a full semester at the


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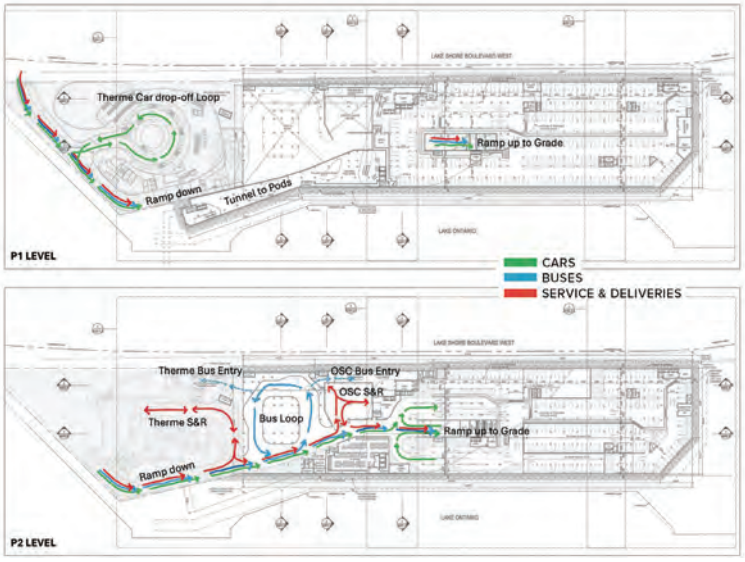
Ontario Science Centre—has already been taken down.

In addition to the noted 18-56% reduction in dedicated exhibition areas, the support space for those exhibitions is reduced by 38%, while overall building support spaces are reduced by 85%, and administrative spaces by 58%. The loss of support space is notable since the hallmark of an interactive science museums is the "host" concept, where staff interact with visitors, and provide demonstrations and assistance in interpreting exhibits. This program requires space both within and outside of the exhibit spaces for prep, storage and staff needs. The dramatic reduction in support spaces, along with proposed reductions of staff by at least 17% in the business case, indicates that this essential aspect of the science centre program will undoubtedly be compromised.

As mentioned in the last section of this analysis, exhibition design and fabrication spaces are absent from the proposed centre. This area is often used as part of "behind the scenes" public tours—another part of the visitor experience which will be lost in the proposed relocation to Ontario Place.

While it makes sense that some areas would shrink in a half-sized science centre, one would anticipate that if the intention was to maintain exhibition spaces at the current size, then the same size of support spaces for those exhibitions would also be required. Moreover, the business plan for a new science centre is premised on growing attendance by 50%—an indication that visitor amenities would need to expand, rather than shrink by 43%.

I have observed that the current Science Centre's cafeteria space is already at capacity on weekends. It is hard to understand how a significantly smaller cafeteria could hope to accommodate a significantly greater number of visitors. In a recent summer trip to Montreal, I visited the Montreal Science Centre, which did not have an operating cafeteria and also had little by way of a dedicated student intake area in evidence. At lunchtime, my child and I were obliged to walk through the rain throughout the Old Port area looking for a food concession. In any case, we would have had trouble making our way into the science centre, since the entry area was blocked by summer campers eating brown-bag lunches throughout the hallways—the kind of scenario that would be common in an Ontario Place science centre with insufficient student and visitor support spaces.



ABOVE While there is discussion of moving the below-grade parkade to Exhibition Place, two underground levels will be needed for site servicing to the Therme and science centre facilities.

Urban design

But what would the proposed science centre at Ontario Place look like? While there are no renderings available, we can get some sense of the answer by considering the immediate context.

Although Ontario Place as a whole is large, the proposed science centre would occupy a relatively constrained site between two private developments: the Therme indoor water theme park and spa, and the enlarged 29,000-capacity Live Nation concert venue. The Therme development has a footprint of 8.4 acres, comparable to the footprint of the Rogers Centre (formerly SkyDome). The proposed Science Pavilion's footprint on the mainland is 88% smaller—about the size of that baseball stadium's infield.

Detailed plans are not yet available for the Live Nation venue, but its new footprint will be of a similar scale to the Therme development, as seen in publicly available site diagrams.

Architect Brian Rudy of Moriyama Teshima Architects describes the situation like this: "This diagram strikes me as the most blatant representation of the problem: the massive Therme on one side, the huge future expansion of Live Nation on the other side—with the half-sized science centre squashed in the middle, almost literally as an afterthought. The science centre is like several leftover and insufficient bits and pieces of ill-arranged garnish, sandwiched between two slices of bloated and soggy white bread." He adds: "How can the science centre possibly stand on its own to create its own identity—let alone create an environment for inspiration and learning—in this location, squished between these two giant money generators?"

The Science Pavilion occupies a tight site, against Lakeshore Boulevard and the Martin Goodman Trail to the north, and Lake Ontario

to the south. There are two entrances to the Pavilion: a car drop-off to the east, and an entrance off an outdoor plaza to the west. (The same outdoor plaza also gives access to the Therme project.) Even though some reports say that the building is four storeys high, the "roof" includes a substantial built-up portion, so the true height of the building is five storeys. Overall, it will be around 115 feet tall—almost twice as high as the 60-foot-tall Cinesphere.

The moniker "pavilion" is somewhat deceptive, since "pavilion" usually indicates a low-slung, one-storey-high building. Instead, the science building will essentially form an opaque wall between Lakeshore Boulevard and the waterfront. While this means that the building will block views of the heritage Cinesphere and Pods, the Science Pavilion's wedge shape allows for glimpses of those structures from Lakeshore Boulevard and the Martin Goodman Trail, approaching Ontario Place from the east. From the west, views of the Cinesphere and Pods will be blocked by the Therme development.

In the original proposal, the Science Pavilion sits atop a five-storey, 2,000-car underground parkade meant to serve Ontario Place as a whole, including dedicated parking spots that the province is obliged to provide under its signed lease with Therme. (It is anticipated that the lease agreement with Live Nation will similarly require dedicated spots.) And while there is some discussion about this site-wide parking moving across the street to Exhibition Place, the need will likely remain for the Science Pavilion and Therme entrance pavilion to include two underground levels.

This is because of several shared services that take place in that underground area: notably, a double-height bus drop-off loop, shipping/receiving zones for both the science centre and Therme, and an underground car drop-off zone for Therme. While for many buildings, such services are located at street level, the tightness of the Ontario Place site makes these functions virtually impossible to accommodate anywhere except underground.

The P1 level also includes an underground link, which would allow for science centre visitors to connect to the exhibition-containing Pods and Cinesphere without exiting the ticketed zone. After travelling through the link, visitors would pop up into a tower squeezed next to the Therme entrance pavilion, from which a bridge crosses over to the elevated pods.

Visitor Journey

As a visitor to a science centre at Ontario Place, you would be dropped off at the east entrance or underground, travel through three floors of exhibitions, then travel through a tunnel and series of bridges to see the pods and Cinesphere.

Off the bat, there are some aspects of this journey that are less than ideal. IMAX theatres are typically located near the entrance of science centres, rather than at the end: this allows people to access them as a separate attraction, and also to more easily select a show time without having to account for finding and making one's way to the theatre. (As a mother with a young kid, I can tell you that making it to a ticketed show, at an unknown distance, for a specific time slot can be challenging.)

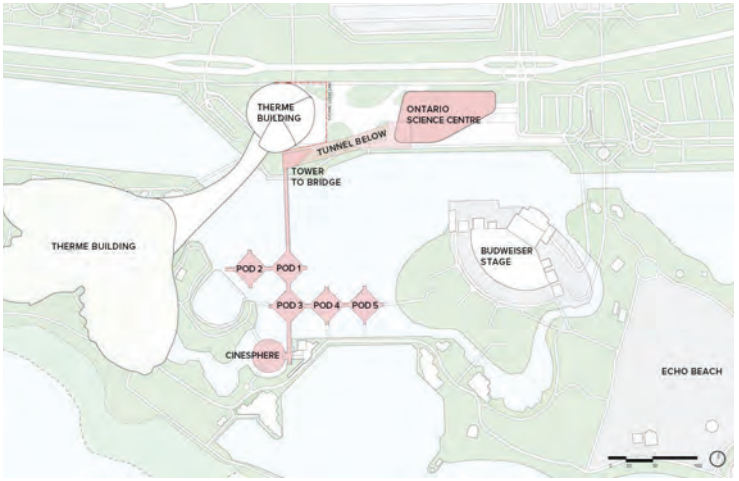
Moriyama Teshima's office has performed a helpful exercise of diagramming out what this visitor journey would look like, in comparison to a visitor journey at the current Ontario Science Centre. In the current Ontario Science Centre, a one-way trip that includes all of the exhibitions entails a 730-metre walk. In the proposed science centre at Ontario Place, that same trip would be 1.3 kilometres long—almost twice the distance—to see less exhibit space. While good for those counting steps, a longer journey can pose accessibility issues for older visitors, such as grandparents, or anyone pushing a stroller.

A risky proposition

The inclusion of a 130-metre-long underground tunnel and some 400 metres of bridges not only creates a long visitor journey, but also makes the building vulnerable to future major repair requirements.

As architect Brian Rudy explains: "As we have seen, the existing Ontario Science Centre had a vulnerability when the bridge between Buildings A and B was deemed unsafe and closed to the public. While we may debate why the province didn't immediately set to fixing this 60-metre-long bridge, imagine the vulnerability of the approximately 400 metres of bridge as part of the OP proposal, and then also consider that this bridge is already over 50 years old." He adds, "Speaking of vulnerabilities, also imagine a 130-metre-long tunnel built right next to—and 2.5 metres below—the waters of Lake Ontario [as it is shown in current sections]. Are we confident that the provincial government 50 years in the future will be willing to invest in a 50-year-old leaky tunnel?"

Rudy also notes that the presence of so many bridges makes for a very inefficient structure—echoing the Province's key criticism of the existing building. The Province wrote in its business case that "the 568,000 square feet of the [current Ontario Science Centre] is expansive and spread across three buildings and multiple levels, creating a highly inefficient structure…[resulting] in a significant amount of inefficient spaces." Says Rudy: "While it is hard to argue that the existing Ontario Science Centre is the most efficient building in the world, the Ontario Place proposal will almost certainly be less efficient than the existing Ontario Science Centre—given its constrained five-storey pavilion footprint, long tunnels, and bridges connecting relatively small spaces over a vast area. This lack of efficiency will cost more to build, cost more to maintain over the long run, and likely result in further compromises and reductions of usable (ie. exhibition) space."



ABOVE The proposed science centre relies on a 130-metre-long underground link and 400 metres of bridges to connect to the Pods and Cinesphere.

Customized design vs. P3

As with most endeavours, the process affects the product. In the case of the proposed science centre at Ontario Place, the architectural outcome will largely be related to the way it is procured: through a public-private-partnership, or P3.

A traditional procurement model for a building is straightforward: the client (Infrastructure Ontario and the Ontario Science Centre) would vet a number of architects, then choose one to work with in designing a building to suit their needs and the site. As part of this process, other sub-consultants, such as engineers and heritage specialists, are brought on to the team. When the design is complete, contractors are invited to bid on constructing the project. This is how all museums and cultural facilities in Ontario and Canada have been designed to-date.

Introduced in 2005 in Ontario, the P3 model is typically used for large infrastructure projects and buildings, including highways, hospitals, courthouses, and sporting venues. In this model, Infrastructure Ontario first vets and hires a compliance architect, who puts together a master specification, known as the Project-Specific Outcome Specification (PSOS). Instead of dictating the final design, this is intended to be a general specification that lists all of the project's requirements, but doesn't foreclose opportunities for saving money through a creative solution to those requirements.

Three teams—each consisting of a contractor, architect, and subconsultants such as engineers—are then invited to submit bids that include the price to design, build, finance, and maintain the project for a specified number of years. Once the winning team is selected, they are responsible for the full execution of the project.

In theory, this process results in competitive bidding, taxpayer savings, and the transfer of risk to the private sector. But as auditor general Bonnie Lysyk pointed out in a report nine years ago, this is not the reality of how P3s have played out. Because the private sector is taking on financing costs at a higher cost than the public sector, is responsible for higher ancillary costs (such as legal, engineering, and project management fees), and tends to over-price project risks, Lysyk concluded that the cost of the 74 projects taken on between 2005-2015 was 29% higher than if the same projects had been managed through traditional procurement—costing the government an additional eight billion dollars that decade.

Yet, P3s remain attractive to governments. This is largely because, despite evidence to the contrary, they still have the appearance of carrying taxpayer savings. In a Design-Build-Finance-Maintain con-

tract—the kind being used for the proposed Ontario Place—project costs are paid for in installments over a long period, usually 30 years. This means that a project can be started while putting little cost on the government's books, with the majority of costs ultimately passed along to future governments.

For architects, the downsides of P3s are well-known. Bidding for a P3 can involve a massive amount of work that isn't sufficiently compensated—a significant financial gamble for any office. The selection process generally weighs heavily on the side of lowest cost, rather than the most innovative design. As a member of the winning proponent team, architects work for a developer-contractor, not for the building's users. Often they have little direct contact with the client. On both proponent and compliance sides, reams of paperwork can bog down a project's progress—as well as the morale of employees.

Many players in the industry feel that overall, P3s also represent poor value for the built environment. With few exceptions, P3 projects fall short of the architectural quality that might have been achieved with a comparable budget, under a traditional stipulated-sum contract.

Because of its complex preparatory setup and legalistic nature, the P3 process also has a longer timeline than traditional projects.

For the proposed science centre at Ontario Place, the government has so far completed the selection of a compliance architect. An RFQ was issued for proponent teams last spring, with submissions due on July 4; an RFP with the completed PSOS is expected to be issued to the finalist teams in early November. At this rate, a proponent team would not be selected until 2025 or 2026. Construction documents and approvals would still need to be completed from that point. Optimistically, construction would not be finished until 2030, with exhibition installation and commissioning taking some months longer.

This timeline correlates with the government's RFP for a temporary science centre location, which asks for a lease going until 2030, with the possibility of yearly extensions until 2034. As I have written, the only plausible explanation for this long lease is that the Province does not expect the OSC at Ontario Place to be open until 2030-2034—not 2028, as they have been telling the public.

Reopen, renew and reinvest

Overall, a new science centre at Ontario Place will be a shadow of what we have at the Ontario Science Centre's current location. It will have significantly less exhibition space, will lack key feature areas, and will lose other important program areas, including educational spaces, event rental areas, the OSC school, and support spaces.

The proposed science centre at Ontario Place will be compressed on its site, where it will be dwarfed by the private Therme and Live Nation developments. It will necessitate a visitor journey that is twice the length, to see fewer exhibits. The P3 process by which it is being constructed will mean poorer quality architecture, delivered on a longer timeline.

The Moriyama-designed building was closed just three months ago, and while reopening it and performing necessary repairs will take some doing, it can happen more quickly than preparing a temporary location (which would not open until 2026) or pursuing a relocation to Ontario Place (which would not open until 2030-2034).

The right decision is clear: Ontario must reopen, renew, and reinvest in the Ontario Science Centre at its current location.

-Elsa Lam

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