From: Elsa Lam
To: councilmeeting
Subject: [External Sender] My comments for 2024.MM19.25 on June 26, 2024 City Council
Date: June 25, 2024 4:14:19 PM
Attachments: Ontario Science Centre doesn’t require full closure- A close reading of the engineers" report.pdf
Debunking the Business Case for relocating the Ontario Science Centre.pdf

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To the City Clerk:

Please add my comments to the agenda for the June 26, 2024 City Council meeting on item 2024.MM19.25, An Update on Work to Protect the Science Centre and Support Thorncliffe and Flemingdon Park - by Councillor Josh Matlow, seconded by Councillor Jon Burnside

I understand that my comments and the personal information in this email will form part of the public record and that my name will be listed as a correspondent on agendas and minutes of City Council or its committees. Also, I understand that agendas and minutes are posted online and my name may be indexed by search engines like Google.

Comments:
Hi, I’m Elsa Lam (PhD, Honorary member of Ontario Association of Architects, Fellow of the Royal Architectural Institute of Canada) and I am editor-in-chief of the magazine Canadian Architect, a national review of practice that goes out to 13,000 architects across Canada.

I have been closely following the sudden closure of the Ontario Science Centre’s landmark Moriyama-designed building and the proposed move of the Science Centre to Ontario Place – you may have seen the two articles I researched and authored on this topic (attached for your reference).

From my research, I’ve found that:
-A close reading of the engineers’ report suggests that the Science Centre doesn’t require full closure, either now or for repairs to take place.
-Even if no repairs are done, the facility can be safely occupied by continuing the current monitoring program and erecting construction hoarding this winter in areas under approx. 2.3% of the Centre’s roofs, to prevent staff/visitors from walking directly under the roof panels identified as “high risk”. The affected areas are largely back-of-house areas, not permanent exhibition spaces.
-The business case for the move of the Ontario Science Centre is full of holes; a close analysis suggests that building a new science centre will cost at least $170 M more than maintaining the existing science centre, even without factoring in the large cost of building the parking garage.

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Canadian Architect named **Best Publisher** in the 2020 National Magazine Awards: B2B

CANADIAN ARCHITECT

Debunking the "Business Case" for relocating the Ontario Science Centre

Scratch below the surface, and there's clear problems with the province's math.

By **Elsa Lam** — On **Dec 1, 2023**

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The current Ontario Science Centre on Don Mills Road, in Toronto. Photo by BuBZ at English Wikipedia – Transferred from en.wikipedia to Commons., Public Domain, https://commons.wikimedia.org/w/index.php?curid=3056582

This week, Doug Ford's government struck a deal with the City of Toronto giving the province fuller control over the future of Ontario Place, in exchange for the province taking on responsibility for the DVP and Gardiner Expressway, as well as additional funding for transit and addressing homelessness.

In the wake of this agreement, Infrastructure Ontario has released its business case for a major, and controversial, component of their Ontario Place plans: the closure of the existing Raymond Moriyama-designed 1969 Ontario Science Centre, and its relocation to a smaller, new-build facility at Ontario Place.

The 78-page document, accompanied by a 333-page appendix, argues that the Ontario Science Centre will require $369 million in deferred and critical maintenance over the next 20 years, and an additional $109 million to upgrade its exhibitions and public spaces, for a total cost of $478 million. In comparison, it says that the cost to build a new science centre at Ontario Place would be $322 million, plus $64 million for its exhibitions, for a total of $384 million—$94 million less.

It also argues that cost savings would be achieved through lower ongoing maintenance costs for the new building, and would be strongly offset through the larger attendance and new sponsorship opportunities that a new downtown facility might command. Overall, according to the report, the provincial government would save $596 million in nominal costs ($257 million net present value) over a 50-year period by relocating the science centre.

Scratch below the surface, though, and there's some clear problems with the province's math.

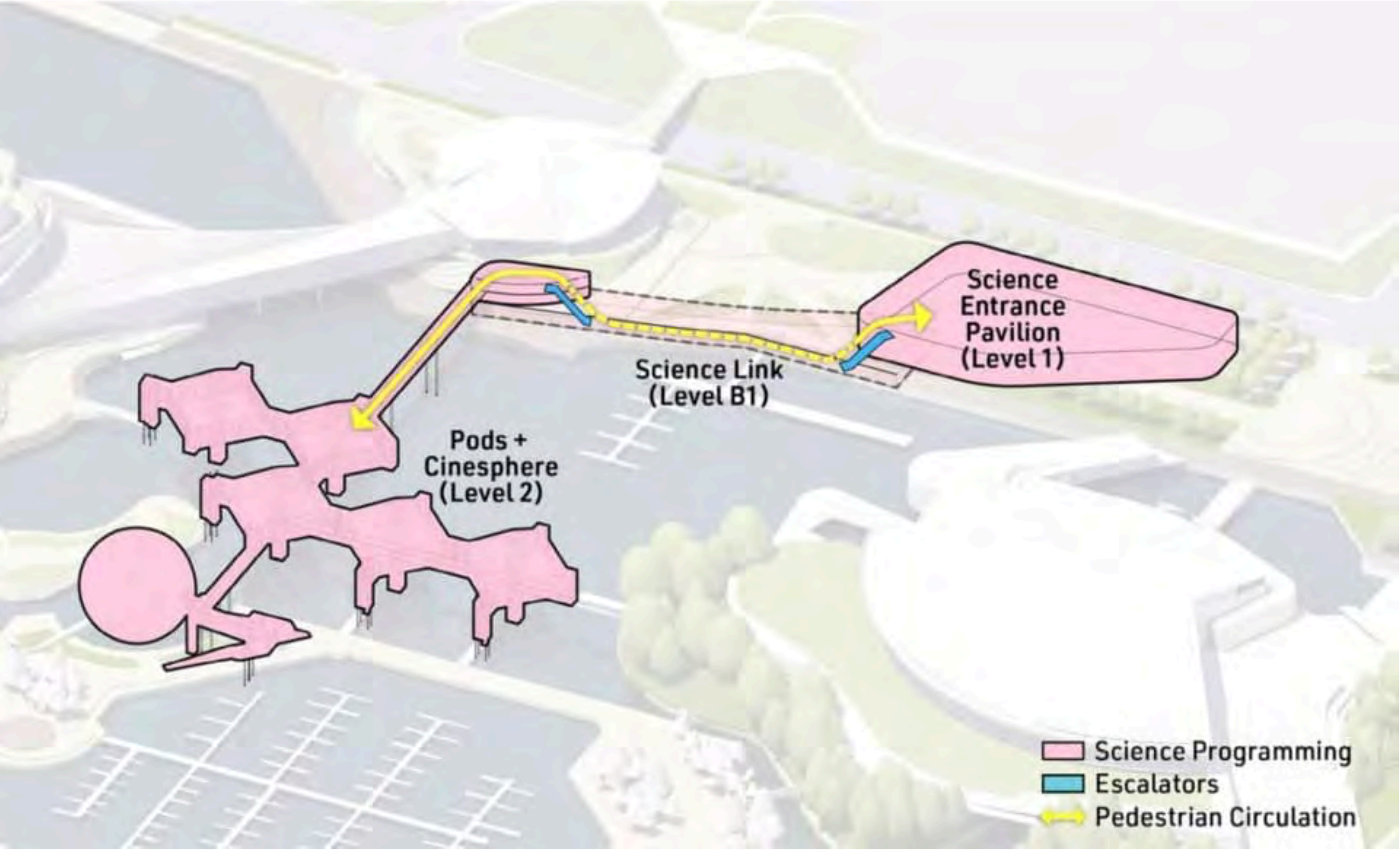
As the Globe and Mail's architecture critic Alex Bozikovic writes, the new Science Centre is proposed to sit on top of a 2,000-space underground parking garage, which, if built, will cost about half a billion dollars. If the parking moves to a different location, as Toronto Mayor Olivia Chow and Premier Doug Ford suggested earlier this week, the Science Centre will need to build its own basement and foundations—at a cost of perhaps some hundreds of millions of dollars.

On the other side of the equation, points out Bozikovic, the Science Centre's required repairs result from the government choosing not to invest in the building over many years. Someone will need to pay for those repairs eventually, should the building continue to be used, either as a cultural building or for another purpose. "If it survives, the province is saving money by dumping perhaps $300 million in liabilities on the city. It's a shell game, nothing more," he writes.

Even taken purely at face value, there are problems with the two figures.

The cost of building a new science centre, which the report pegs at $384 million, disregards pricing put forward by its own consultants. It doesn't include quantity surveyor A.W. Hooker's allowances for soft costs and a construction contingency—including consultant fees, project management fees, independent inspection and testing, third party commissioning, legal fees, development and permit charges, client FFE, and the cost of change orders made post-tender—which amount to an estimated additional $100 million. A.W. Hooker's overall estimate for the project is $499,200,000. And that's for a building whose program relies on 2,750 square metres of underground functional space—a full floor—but whose price tag does not include that floor, nor any type of parking, basement, or foundations.

Because no below-ground work is included, the price tag also excludes the cost for a 150-metre-long underground, 2-level link between the new Science Pavilion on the mainland and the bridge to the pods—an enormously expensive component of the project due to its proximity to the waterfront, and an essential element for allowing ticketed visitors to move from the main science pavilion to the Pods and Cinesphere.



The business case's costing for the relocated Ontario Place omits the costing for the the rehabilitation of the pods and cinesphere, as well as the cost for building the underground Science Link, shown on the site plan above, and detailed in the test fit documents as a two-storey underground link. Because this adjoins the waterfront and would be under the water level, the cost of constructing this component would be very high.

The $499-million price tag also excludes exhibitions from the majority of the pods ["OSC has opted to not program three of the pods on opening day, therefore remove $16.8M from the previous allowance"]. It doesn't include most of the renovations to the heritage pods, including the $25.5 million currently being spent on recladding those structures. It assumes that there will be no phased work, no accelerated construction schedule, and no work completed during the winter, after hours, or on weekends—all of which command premiums.

Diving into the $369 million repair bill for the existing Ontario Science Centre, on the other hand, it seems that the number is significantly inflated. Environmental consultants Pinchin pegged the cost at $228,604,000. This is already a generous number: the consultants note that an "adjustment factor" of 1.85 was "applied to all repair and replacement costs" due to the "fact that Ontario Science Centre is a complex facility with unique characteristics" and "per Client's [IO's] request to account for the hidden internal and external fees." Without this adjustment factor, the cost of repairs would be around $142 million.

To reach the estimated costs for its business case, IO then applied a mark-up of a whopping 40% to Pinchin's inflated $228-million bill "to account for uncertain and rapidly increasing cost pressures." (There is a similar contingency for cost escalation and market volatility in the estimate for relocating the Science Centre—but it amounts to 32.8%, and is applied to the base construction cost of $153,830,000 for that project, not to a total estimate that was already adjusted to account for unanticipated extra fees. Applying the same logic to the repairs for the science centre would result in a cost escalation contingency of $46.6 million—not the $141 million that the business case adds to the estimate.)

For the sake of simplicity, a somewhat more accurate high-level comparison might be to just put the two consultant estimates, in full, side-by-side: $499 million for a new science centre and partial exhibitions, to which should be added the cost of a basement level, foundations, and the underground link—versus $328 million to repair the existing Science Centre, including giving its exhibitions and public spaces a generous $100-million refresh.

From a sustainability perspective, one might also consider the massive carbon cost of building an underground, multi-level concrete parking garage and underground link next to a lake—as opposed to renovating an existing building whose embodied carbon has already been locked into place.

There's also a human cost to the math. The government's case for relocating the Ontario Science Centre is strongly based on the efficiencies of a smaller facility, but also on its ability, paradoxically, to attract more visitors. It estimates that 1.15 million people will visit the relocated science centre in its first years. It also expects to accrue cost savings through staffing reductions: the estimates count on laying off 53 people, or one out of every six people who currently work at the Science Centre.

In short, they are expecting that 50% more people will visit a facility that is 45% of the size of the current Science Centre, with a significantly reduced staff managing it all.

There's a few more salient details. On the side of retaining the existing building, the case assumes that the opening of the Eglinton LRT and eventually the Ontario Line, the densification of the area with condo towers, and the investment of over $100 million in exhibitions and public spaces in the building will result in precisely no increase in the visitors to the Science Centre in its existing location. The vaunted savings from maintaining a smaller science centre evaporate—and are in fact reversed—when you remove the "adjustment factor" of 1.3 that IO instructed its consultants to apply to the replacement value of the existing building, which carries forward in maintenance costs that are inflated by 30%.

Of course, it's not surprising that the business case contorts itself an attempt to justify the relocation. As the document states, it was prepared "in response to the December 2021 direction to identify order of magnitude costing and capital requirements associated with relocating the OSC to the Ontario Place site and subsequent April 2022 direction to seek Stage Two (construction) approval for the project." In other words, the provincial government had already determined, more than two years before any public announcement, that it was determined to relocate the Ontario Science Centre to Ontario Place. The business case was specifically constructed to justify this decision.

Whole sections of the business case are dedicated to another subject: the value of the current Ontario Science Centre lands, if redeveloped—a proposition in which the provincial government anticipates sharing profits with the City. There is a real hodge podge of ideas here, from repurposing the Valley building as a cultural facility to revamping it as a long-term care facility. Interestingly, there is no equivalent analysis of what the value of the waterfront-adjacent lands at Ontario Place would be worth if the Ontario Science Centre does not relocate there.

The horse may be out of the barn for building Therme's facility at Ontario Place, but there is still an imperative to change course on the government's idea of shuttering and relocating the Ontario Science Centre to the waterfront site. While we may take it for granted, there is value in taking care of what we have: a magnificent, much-loved museum at the Ontario Science Centre that is in need of some TLC. The value of such a gem isn't something we usually quantify, but if we did—in a neutral way that accounted for cultural value, economic value, social value, and sustainability—it's clear how the business case would land.

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Ontario Science Centre doesn't require full closure: A close reading of the engineers' report

A deep dive into the engineers' report suggests that the building's key exhibition areas could continue to operate safely—even if the Ontario government chooses not to invest in any structural roof repairs by the fall.

By Elsa Lam — On Jun 24, 2024

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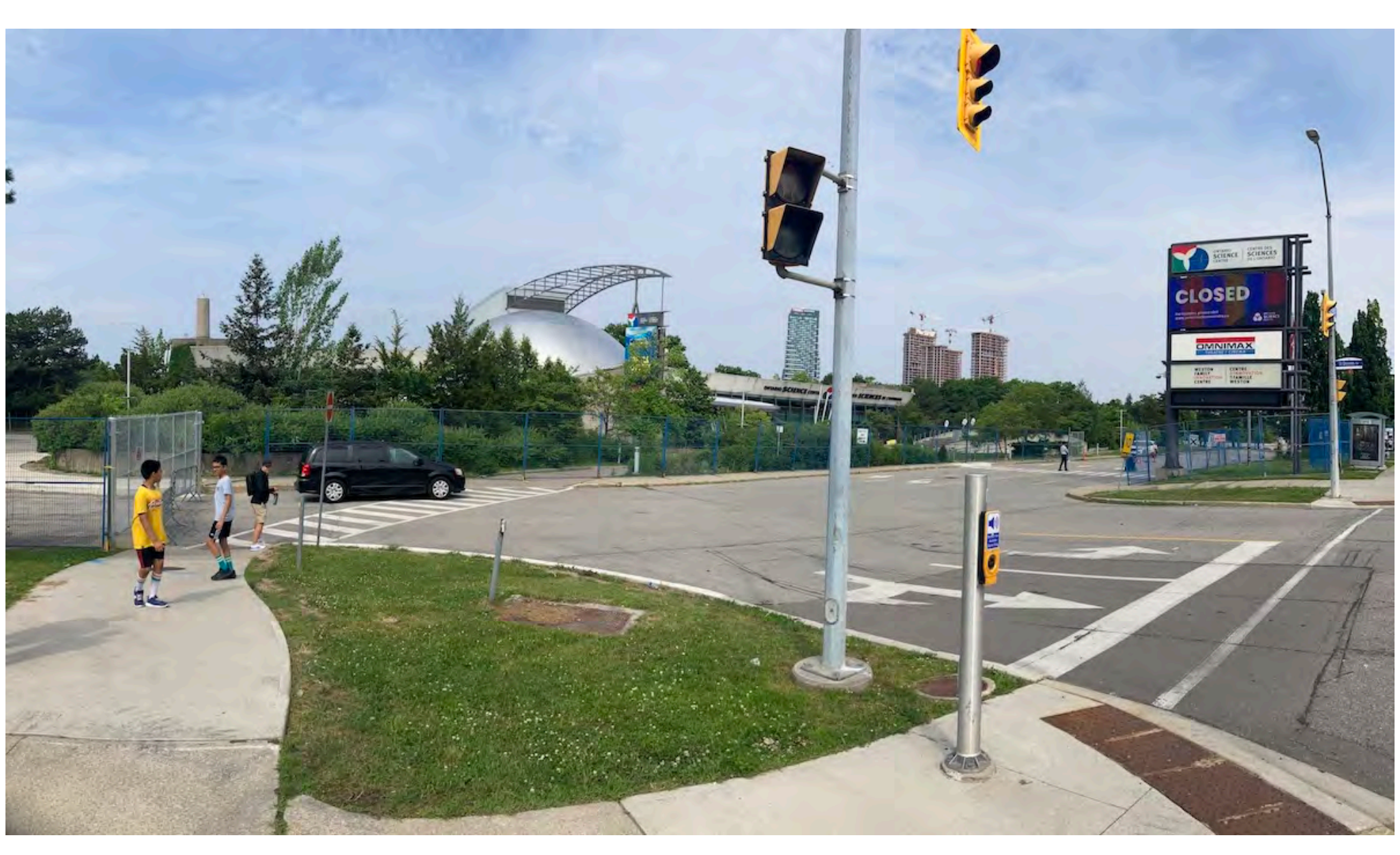


Construction fences were erected on Friday, June 21 around the perimeter of the Ontario Science Centre, following a provincial announcement of the Centre's immediate and indefinite closure. Photo by Elsa Lam

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, for an indefinite period of time. It cited an engineering report by Rimkus to justify the closure, 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 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.

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 form an aerated blend of sand, Portland cement, and aluminum.

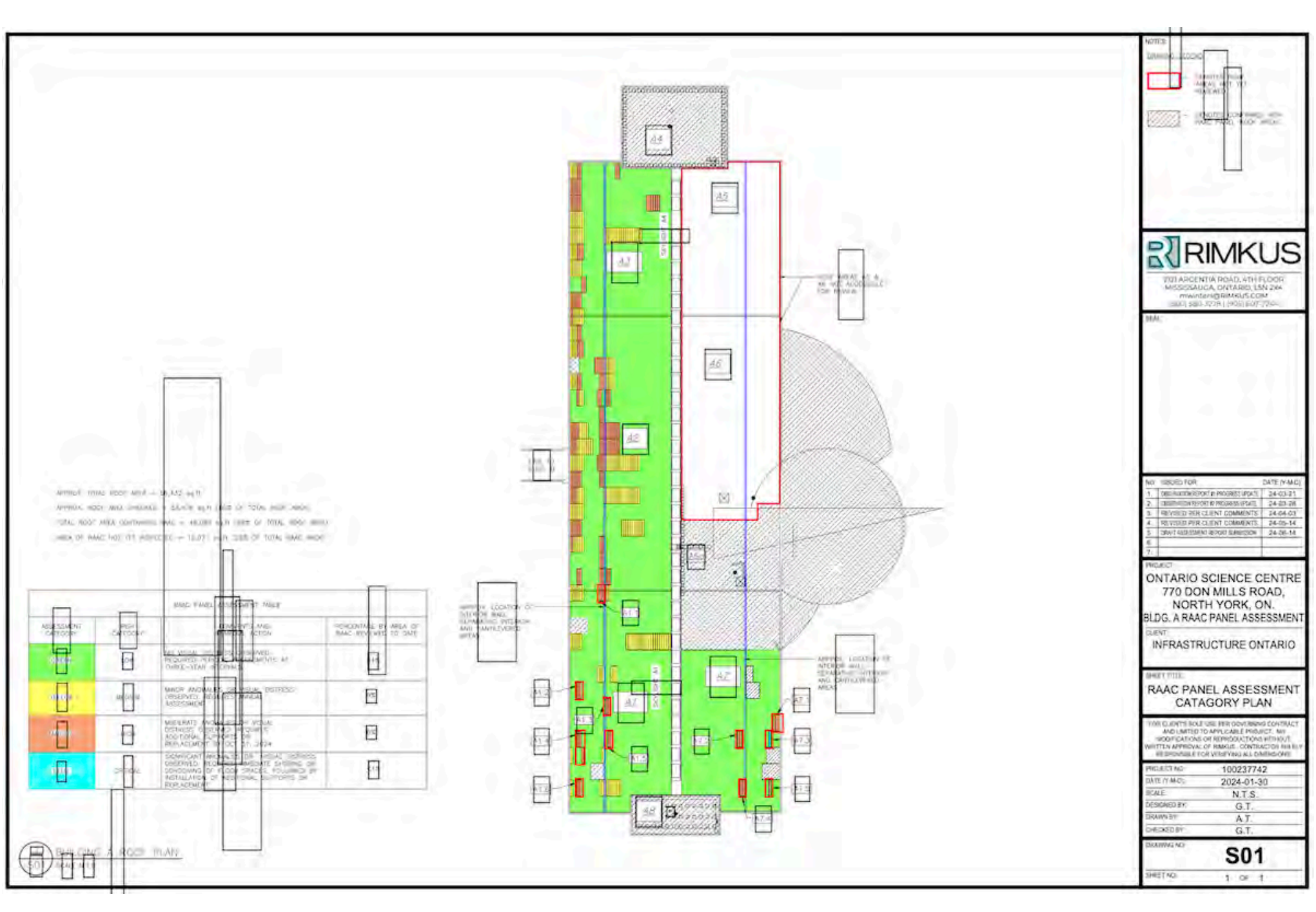
A palette of Reinforced Autoclaved Aerated Concrete (RAAC) blocks. Photo by Leo Miregalitheo via Wikipedia Commons

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 was 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 may compromise the panels. In total, the "high risk" and "critical" condition RAAC panels constitute less that 2.5% of the Science Centre's overall roofs.



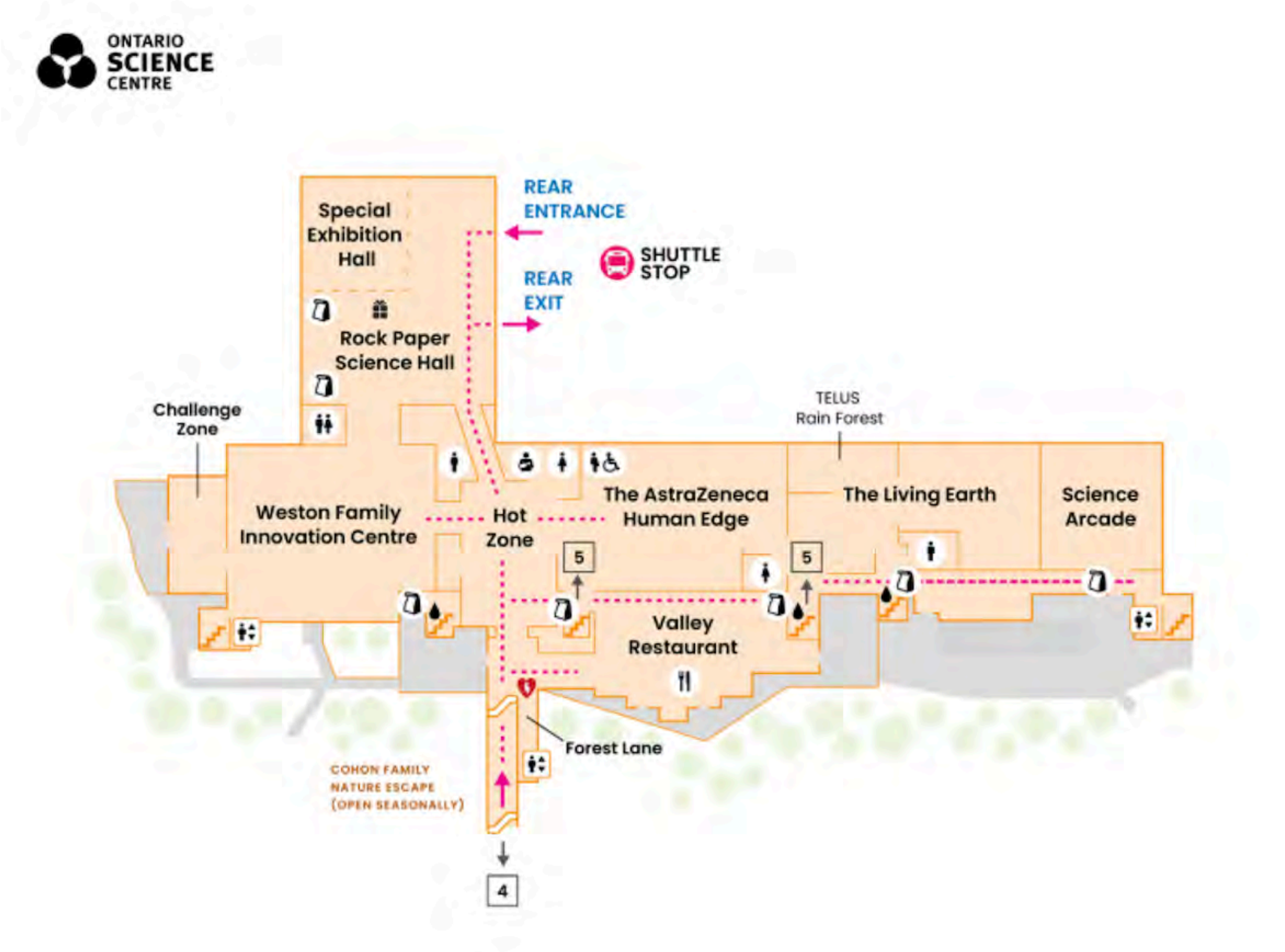
Engineers Rimkus performed a panel-by-panel assessment of the RAAC roof. The green shows low-risk sections of roof, whereas the red sections are recommended to be reinforced or replaced by the fall. If this is not possible, the engineers recommend restricting access to the areas directly below the affected roof sections.
In "Building A," facing Don Valley Road, the roofs are directly over the Ontario Science Centre's conference centre and part of its its entrance hall. The IMAX theatre and entrance are a different roof type that does not need repair, and the main floor lunch and locker areas are not on the top floor, so are also not affected by the recommendation for restricted access.

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 erecting barrier walls to eliminate pedestrian traffic in the areas directly below the 2.5% of the roof panels being repaired or replaced. The hoarding would 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



The main exhibition areas shown on this plan have standard concrete roofs. The only areas affected by the RAAC roofs, and which may require temporary/partial closure for proactive repairs, are the Rock Paper Science Hall and the Special Exhibitions Hall.

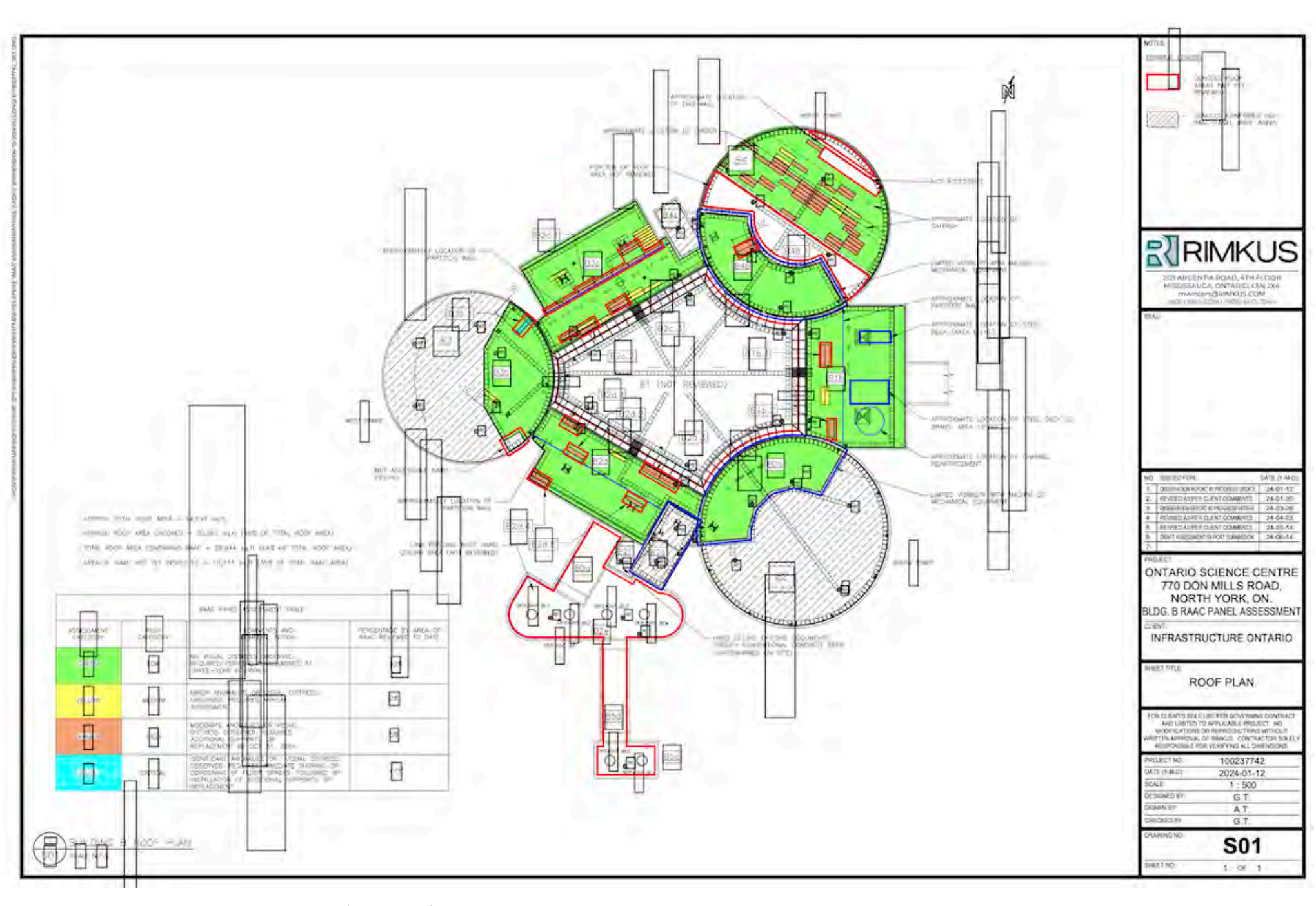
The highly popular Kidspark and the Space Hall—as well as the Rube Goldberg-esque machine outside of these areas—could also remain open, since they are not immediately beneath a roof, but one level down.

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.

In "Building C," on the valley floor, the main areas affected by a higher concentration of higher-risk RAAC roof panels include the Science Centre's in-house workshop for fabricating exhibitions, a temporary exhibitions space, and the Rock Paper Science hall. The areas in grey towards the top of the plan—including the Weston Innovation Hall, AstroZeneca Human Edge, Science Arcade, and Valley Restaurant—are under a different, standard roof type. Note that this plan is flipped upside-down from the partial Ontario Science Centre exhibitions plan above.

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 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 temporary closure to accommodate repairs.



In the central section of the Science Centre (Building B), repairs are needed throughout the roof, including in the central Great Hall portion, which the engineers were not able to access, but presumed was in a similar state to the surrounding roofs. However, the report suggests that the repairs could be completed while only restricting access to the floor areas immediately below the roof. This would affect the special exhibitions in the great hall, but the recommendation suggests that the popular exhibition areas on the floor below—KidSpark and Space Hall—could remain open.

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.

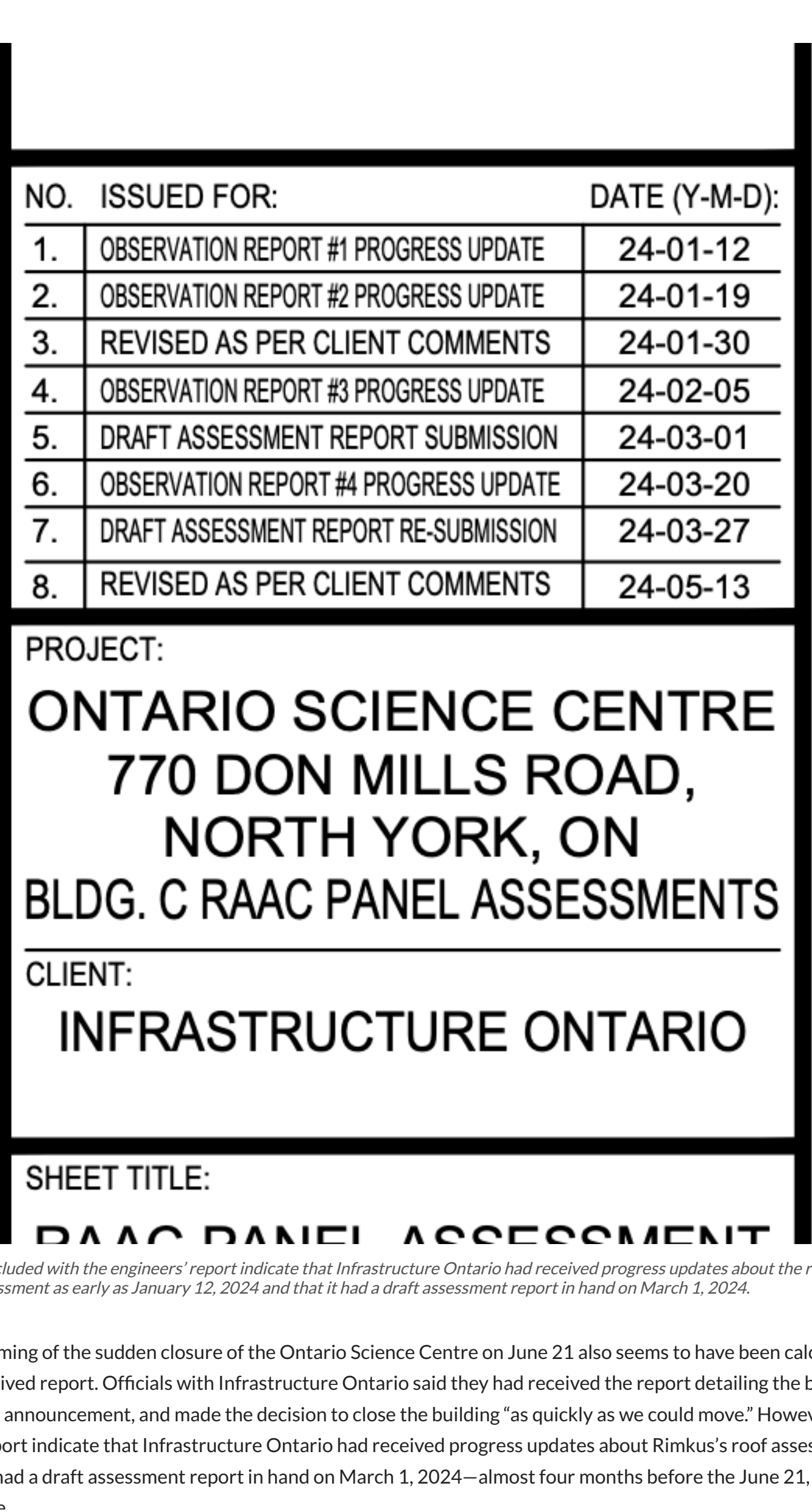
Since the areas with high-risk panels are largely above non-exhibition areas, this means that even if there was a need to delay roof repairs past October 31, the Ontario Science Centre's permanent exhibitions could remain safely open to the public.

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. The safety of staff and visitors can be ensured by simply sealing off the floor areas below less than 2.5% of the roof with construction hoarding, and completing the three-month-long repairs. 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."

There are no roofs needing repair directly above the key exhibition spaces—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 Restaurant. Therefore, the report suggests, these areas can remain safely open, regardless of whether or not roof repairs are undertaken immediately.

The Ontario government has stated that the summer camps scheduled at the Ontario Science Centre will take place at a nearby school. It has also said that it is issuing an RFP for a temporary location for science programming, while it continues work on a new location for the Ontario Science Centre at Ontario Place. This new location for the science centre will be 45% of the size of the current Science Centre, and there is currently a call out for companies to build the project through a public-public partnership (P3), a process that is known for prioritizing cost savings over design quality.

As I have written before, the relocation of the Science Centre is based on a faulty business case. As the business case states, it was prepared "in response to the December 2021 direction to identify order of magnitude costing and capital requirements associated with relocating the OSC to the Ontario Place site and subsequent April 2022 direction to seek Stage Two (construction) approval for the project." In other words, the provincial government had already determined, more than two years before any public announcement, that it was determined to relocate the Ontario Science Centre to Ontario Place. The business case was specifically constructed to justify this decision.



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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

SHEET TITLE:
RAAC PANEL ASSESSMENT

The drawings included with the engineers' report indicate that Infrastructure Ontario had received progress updates about the roof assessment as early as January 12, 2024 and that it had a draft assessment report in hand on March 1, 2024.

Meanwhile, 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.

The Ontario Science Centre's Joint Health and Safety Committee (JHSC) will be contacting the Ministry of Labour that the report was not conducted legally: staff were not notified that the report was being prepared, that inspections were being made, or that there would be people on site.

Even though the province has stated that camps would be relocated, staff also say that there is no plan in place at the moment, and that they are scrambling to find accommodation for summer camps.

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