

GOING UNDERGROUND

Who says Toronto isn't building subways? In 2008, the TTC began design and construction for six new subway stations, linking the subway to growing York University and beyond. Snaking northwest, this line brings the subway for the first time outside Toronto's boundary into the 905. The \$2.6-billion project involves hundreds of workers. The TTC vows to open the extension at the end of 2015.

The supply train continually moves back and forth from the tunnel entrance to the boring machine. On each trip in, it carries the concrete tunnel sections and other needed supplies, and on each trip out it hauls the excavated muck — most of which will end up in Downsview Park.

STATION FEATURES KEY

- GO bus connections
- YRT/Viva bus connections
- TTC bus connections
- GO train connections
- Bicycle racks
- Restrooms
- Passenger pick-up
- Wheelchair accessible
- Indoor public art
- Outdoor public art
- Retail
- Parking

MAP KEY

- Incomplete tunnel
- Tunnel bored so far
- Current position of tunnel-borer
- Station
- Spadina line
- Construction areas

VAUGHAN METROPOLITAN CENTRE STATION

This is one of just two of the six new subway stations whose name the TTC has approved. Plunked in a field at Highway 7, this station "will serve as a catalyst for the growth of a new mixed-use downtown precinct with the built-in potential to connect directly to adjacent developments," the TTC says. Pedestrians can also use the station tunnel, without paying a TTC fare, to walk under Highway 7, uniting the two halves of Vaughan's future downtown. The station design includes a kiss 'n' ride, connections to York Region Transit bus terminal and to the Viva bus running along Highway 7.

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STEELES WEST STATION

This station, which runs diagonally under the intersection of Steeles Avenue West and Northwest Gate will feature parking for a whopping 1,850 vehicles in the hydro corridor to the north of the station. Passengers will enter the station on the north side of Steeles Avenue West, also the location of a YRT bus terminal and a kiss 'n' ride. Two concourses, one at each end of the station, will allow utilities and future underground Light Rail Transit tunnels to cross over the top of the station. The final name of this station is still a topic of discussion.

SHEPPARD WEST CONSTRUCTION SITE

In January 2011, workers began digging a huge hole adjacent to the Downsview military base, to house a new subway station. Workers rerouted the Barrie GO train tracks temporarily in order to build a trestle to hold up the commuter train line, which will bisect the completed station above the subway tunnel.

All workers entering the tunnels leave their ID cards here. This ensures that everyone is accounted for at the end of the day.

Ventilation shafts provide fresh air to the workers.

Tunnel entrance

Supply train

A pair of cranes is responsible for raising and lowering the muck cars, as well as the TBMs and tunnel liners. Workers must lower crane booms when flights come into Downsview Airport.

TUNNEL BORING MACHINE

TTC staff, after "making a business case to go with four machines," purchased four soft earth tunnel boring machines, built at Lovat Inc. in Toronto, for \$58-million, and turned them over to the contractor. Transporting each gargantuan machine to the site required 25 transport trucks. The public, in a contest, named them Holey, Moley, Yorkie and Torkie. The machines can cut through clay, till and granite, advancing, on a good day, up to 18 metres, or 12 concrete segments. All four machines are now busy, and the TTC expects to complete the first "drive" (Holey and Moley's push from Finch West to Sheppard West) by mid-May.

HIGHWAY 407 STATION

The name, which the TTC has approved, is not romantic, but at least it's geographically descriptive. This station will connect the TTC to the YRT and GO Transit buses, with space for a future 407 Transitway. Drivers can park at 600 spaces to get on the subway. Among architectural features, the TTC says that "glazing to the bus terminal is bird-friendly fritted glass in black aluminum curtain wall framing. Cornice and roof overhang soffits are clad in zinc coated aluminum panels."

YORK UNIVERSITY STATION

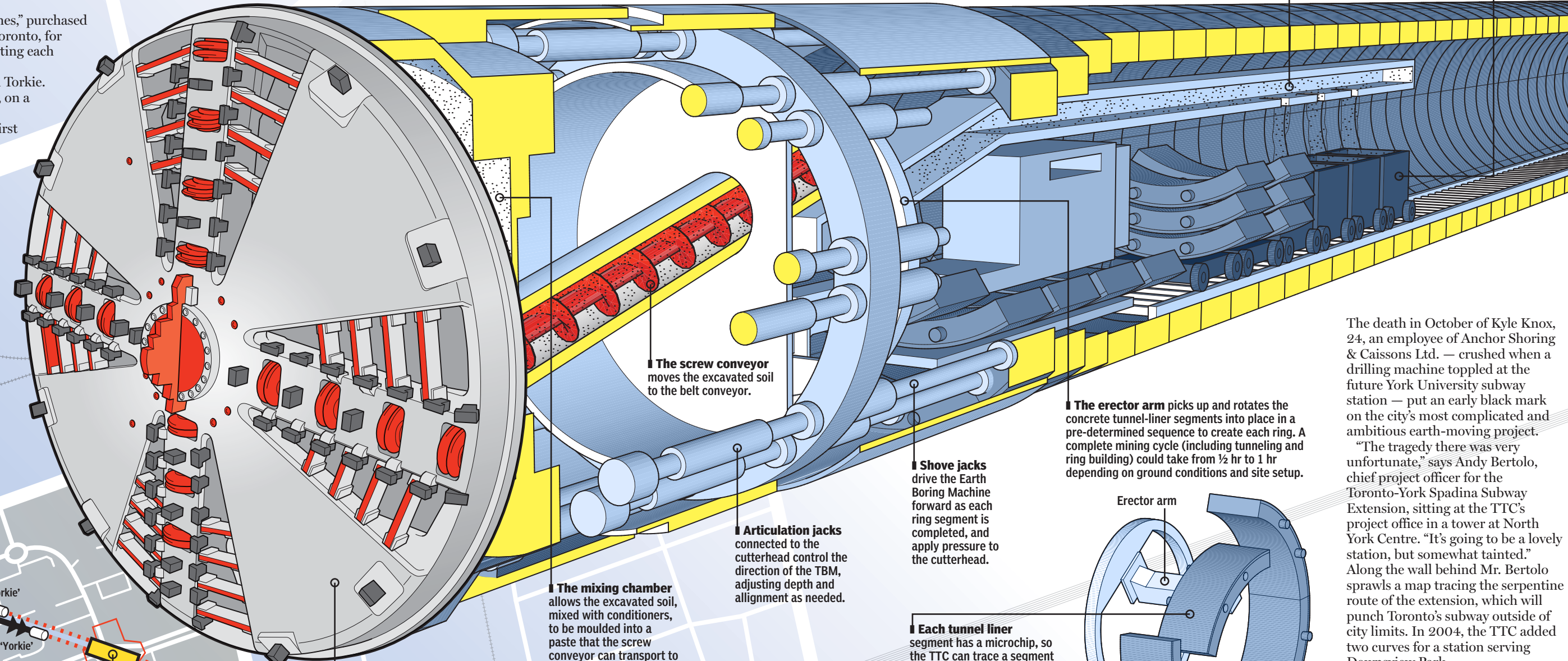
This is not the final name of this station, but the TTC confirms it is the only new station name about which few people have complained. The station is under construction at the heart of the York University Campus, crossing diagonally under Ian McDonald Boulevard near the gleaming Schulich School of Business. The station will replace some of the blighted, overpacked TTC buses that currently serve York, including the 196 from Downsview and the hated 60C from Finch subway station. Once the subway opens, TTC, YRT, Viva, and GO bus services no longer will ply the streets to the university, but instead serve Steeles West Station and Highway 407 Station. The main entrance "has a lightwell from the Common providing daylight into the concourse and views to the campus. Glazing on the east side of the entrance structure provides natural light down to the concourse level."

FINCH WEST STATION

Located under Keele Street, north of Finch Avenue West, this station will offer parking for 358 vehicles in the hydro corridor north of the station, along with a kiss 'n' ride. Passengers will enter on the west side of Keele Street just north of the intersection with Finch Avenue West: the east entrance will be for those with tokens or Metropasses only, without a fare collector. The station, with funky multicoloured glass walls, will also feature a green roof, and architects add that, "The parapet wall and facade above the glazing are clad with fibrous cement panels in a black and white graphic pattern." The TTC is still talking about the final name for this station.

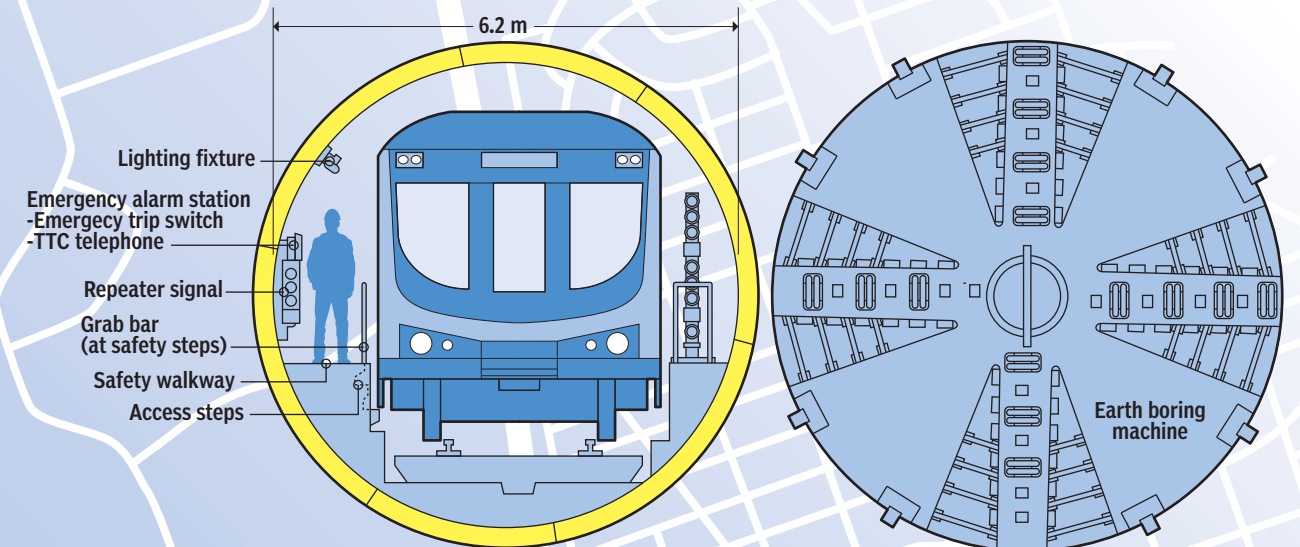
SHEPPARD WEST STATION

The TTC added this station to its plans for the Spadina subway extension, to bring riders to Downsview Park and the Keele Industrial area north of Sheppard Avenue. TTC staff has recommended naming this station "Downsview" and renaming the station to the south, currently called Downsview, as "Sheppard West." The commission has deferred this decision pending further consultation, according to Joanna Kerwin, the deputy chief project manager. The TTC plans no parking at this station, "to maximize transit oriented development."



NEW TUNNEL CROSS-SECTION

The new subway tunnels will be 6.2 metres in diameter, 0.2 metres wider than the last tunnels the TTC built, due to changes in fire-protection codes "to determine fire ventilation and other requirements," TTC staff says. This allows maintenance workers to work safely as trains go by, and could also help if passengers ever have to leave a tunnel on foot.



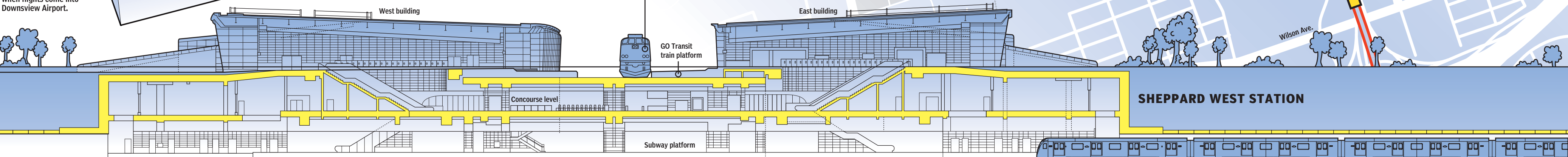
Concrete tunnel-liner sections are in a large area of the site. 9,000 sections will be used to complete the new tunnels and they are all stored at three sites: Sheppard West, Steeles West, and Highway 407.

Tunnel entrance

Metal bracing helps keep the wall of the station box from collapsing. They will be cut away when no longer needed as construction continues.

A heated, weather-proof enclosure called the 'material Quonset hut' houses the tunnel-liner sections that will be used next. The enclosure keeps the sections warm and clean so that the Earth Boring Machine will be able to manoeuvre them without problems. Sections must be at least 5 degrees C when workers install them, to avoid cracking.

Passengers can change inside this station for the GO Train to Barrie, whose track bisects the station at its centre.



SHEPPARD WEST STATION

The death in October of Kyle Knox, 24, an employee of Anchor Shoring & Caissons Ltd. — crushed when a drilling machine toppled at the future York University subway station — put an early black mark on the city's most complicated and ambitious earth-moving project.

"The tragedy there was very unfortunate," says Andy Bertolo, chief project officer for the Toronto-York Spadina Subway Extension, sitting at the TTC's project office in a tower at North York Centre. "It's going to be a lovely station, but somewhat tainted." Along the wall behind Mr. Bertolo sprawls a map tracing the serpentine route of the extension, which will punch Toronto's subway outside of city limits. In 2004, the TTC added two curves for a station serving Downsview Park. "From an engineering perspective it's not our ideal alignment," says Mr. Bertolo, who oversees a project management team of 130 people. "If you add the radius of all the curves, it adds up to more than 360."

Among other challenges, subway-diggers must relocate a water main and sewer main, each pipe nearly two metres in diameter, and "hand-mine" under three natural gas pipelines.

"High-pressure gas mains have to be suspended above the station box," explains Mr. Bertolo. "That stuff has to be planned."

Digging subways costs a lot because it is so complex. The TTC has 3,000 drawings for a single contract here, to complete the Sheppard West Station and tunnel connections. Another contract, for the Highway 407 station and the tunnels north of Finch Avenue, weighs 150 kilograms, says Joanna Kerwin, the deputy chief project manager. "Trust me. We had to courier these things."

Of the project's \$2.6-billion cost, the province is paying \$870-million, the federal government \$697-million, the City of Toronto \$526-million and the region of York \$352-million. The project began in 2008, and so far, the TTC has awarded \$1.6-billion in contracts.

"We are having struggles trying to maintain the schedule," says Mr. Bertolo, adding, "We are struggling with one poorly performing contractor and have other issues in finalizing design details. We've got mitigating measures in place."

"There are a lot of things remaining to go wrong," adds Mr. Bertolo, 65, a veteran of 14 years at the TTC (including building the Sheppard subway) and, before that, 26 years at Canadian National Railway. "A contractor goes into bankruptcy, or labour disruptions. We are still on budget."

The TTC plans a party in mid-May to celebrate completion of the first tunnel segment, from Sheppard West to Finch West, by Holey and Moley, two tunnel-boring machines. The commission plans to open this extension at the end of 2015.

Ms. Kerwin says the result will be worth all the struggle.

"This is exciting," she says. "This is great." Noting that the subway will eliminate many of the 1,700 buses that serve York University every school day, she says, "How fantastic is that? Take out the buses and it becomes a pedestrian area with a subway in the middle. It will be dramatically changed."

