

THE GEO-SAMPLER

When you spend a lot of time looking below the surface, like we do in the lab and in the field, you start to wonder what the heck is going on down there. Sometimes, you get a clue from surface level, like a bit of steam escaping from a vent, the site of a manhole cover ajar, or during this time of year in Pittsburgh, construction crews addressing potholes. So today we take a deep dive into the mysterious hidden cities below the surface.

*"It is a good thing to follow the First Law of Holes: if you are in one, stop digging."
— Denis Healey*

WHAT LIES BENEATH?

Underneath cities around the world, you'll find some pretty standard stuff. Pipes, piles and piers, oh my, along with networks for transporting water, sewage, electricity, and yes, even people. But you'll also find some pretty remarkable feats of engineering. Let's take a tour.

Buenos Aires, the capital of Argentina, has a large number of underground cities in its Subte, the oldest subway system in South America.

Sydney, Australia, has a series of underground shopping malls around the underground station, Town Hall.

Cold climates in Canada, make underground pedestrian malls pretty practical. In fact, **Montreal**, Quebec, has the largest underground network in the world. It sounds even cooler in French: la ville souterraine (also known as "underground city." Its 20 miles of tunnel cover more than 41 city blocks and connects 80% of office space and 35% of commercial space in downtown, including banks, hotels, apartment buildings, concert halls, cinemas, museums, train stations and, of course because this is Canada, the hockey arena.

China also has underground cities, specifically one called 地下城 in **Beijing**. It was built during the Sino-Soviet conflict, and fell into disuse in the 70's. It reopened in 2000 and closed again for renovations in 2008. Rumors abound that it was used by the army during the Tiananmen Square incident.

The mines of **Paris** are several disconnected networks of more than 186 miles of mining tunnels that were started in the 13th century. As a result of their age, you won't get good wi-fi there, but these passageways have been instrumental to commerce and were safe passageways during war and revolution. A section on the left bank was repurposed in 1789 as the "Catacombs de Paris," or final resting ground for seven million Parisians.

The top five largest underground "cities" can all be found in Japan. They're all shopping districts in **Osaka, Tokyo, Kawasaki** and **Nagoya**. Osaka's underground networks include more than 1,200 retail stores and restaurants, undoubtedly a great place to find sushi.

London, of course, is known for its massive underground subway system, or Tube. But people may not know that the city boasts extensive rooms, tunnels and chambers known as Churchill War Rooms created during World War II for use by Winston Churchill. Outside London, in Corsham, Wiltshire, an entire underground government agency was built in the 1950s as a response to Cold War threats. This Central Government War Headquarters, code name "Burlington," is a 35-acre subterranean site designed to house up to 4,000 central government staffers in the event of a nuclear strike. Thank goodness it hasn't gotten a lot of use for that.

Closer to home, or well actually, right here



Who's who?

1. Calvin Cordozar Broadus, Jr.
2. James Todd Smith
3. Stevland Hardaway Morris
4. Shaffer Chimere Smith
5. Anna Mae Bullock
6. Mark Vincent
7. Eilleen Regina Edwards
8. Gordon Matthew Thomas Sumner
9. Eric Marlon Bishop
10. Declan Patrick MacManus
11. Reginald Kenneth Dwight
12. Caryn Elaine Johnson

- a. Sir Elton John
- b. LL Cool J
- c. Jamie Foxx
- d. Ne-Yo
- e. Whoopi Goldberg
- f. Tina Turner
- g. Elvis Costello
- h. Stevie Wonder
- i. Vin Diesel
- j. Snoop Lion (Dogg)
- k. Shania Twain
- m. Sting



at home, the United States is home to several underground cities outside the famous **New York City** subway system. In **Albany**, New York, for example, the Empire State Plaza houses banks, a YMCA, restaurants, retailers, a police station, and a bus station. Still others connect with several government buildings including the New York State Museum, the Corning Tower, and the New York State Museum. It's also quite beautiful, as the Empire State Plaza Art Collection consists of 92 large-scale paintings, sculptures and tapestries along the main corridor.

Atlanta, Georgia's "Underground" represents the original surface level of downtown and has been converted into a shopping center.

Boise, Idaho's Capital Mall Complex is a large network of tunnels that connect all state buildings, complete with walkways, vehicle passageways and its own geothermal power plant. Recent remodeling of the Idaho State Building has added new underground wings for offices, meeting rooms, and records storage.

The Wright State University Main Campus in **Dayton**, Ohio, is believed to be one of the most extensive collegiate pedestrian tunnel systems in the U.S., with nearly two miles of tunnels that snake below the campus and link 20 of the university's 22 buildings. Now, as a result of this expansive network, Wright State is recognized nationally as one of the most accessible and disability-friendly universities in the country.

There were originally 16 tunnels between **Bakersfield**, California, and **Tehachapi**, California numbered one through 17. Why? Because, of course, number 13 was not used.

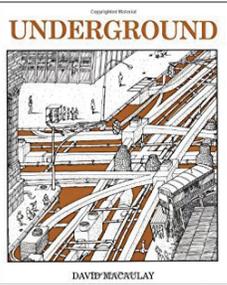
The **Oklahoma City** Underground is one of the most extensive all-enclosed pedestrian systems in the U.S., extending three-quarters of a mile and connecting more than 30 downtown buildings. Originally built in 1931, and named the

Conncourse after its founder, Jack Conn, it was renovated and renamed in 2007.

During the siege of **Vicksburg** in 1893, Union gunboats lobbed more than 22,000 shells into Vicksburg, Mississippi, and artillery fire was even heavier basically leveling the town. A ridge located between the town and the rebel defense line became lodging during the battle. More than 500 caves were dug into the yellow clay hills. People added rugs, furniture and pictures to make them comfortable, timing their movements with the rhythm of the cannon fire. Because of these dugouts, Union soldiers gave Vicksburg the name "Prairie Dog Village." Remarkably, fewer than a dozen civilians were reportedly killed during the ferocious siege.

Perhaps nowhere else in the United States is known as well for ducking and covering as **Washington, D.C.** All of the buildings in the United States Capitol Complex are connected by tunnels and underground walkways. Many tunnels connecting office buildings are open to the public, but those connecting to the Capitol require security clearances.

So there you have it, a deeper look at some of the engineering feats that exist well below the surface. Hope you've been digging this as much as we have.



If you're into all things underground, like we are, check out (literally, from the library) David Macaulay's book, *Underground*. It takes a visual journey through a city's various support systems by exposing a typical section of the network and explaining how it works. It's fascinating. And fortunately for us, filled with lots of pictures.

**Come visit us
in Tennessee**

Please update your rolodex to add our Nashville location:

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Answers from page 1: 1j, 2b, 3h, 4d, 5f, 6i, 7k, 8m, 9c, 10g, 11a, 12e



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