



Networks of Philly (v2)

Philadelphia's Hidden Network Infrastructure

Table of Contents

- Who Am I?
- How did this all start?
- Infrastructure! (Manholes, handholes, antennae, misc.)
- Sightseeing (Buildings of networking importance)
- Right To Know Requests
- What's next?
- Questions!

Who am I?

- Not an expert in anything, but really like networks.
- May have met me at *Philly 2600*. 
- Editor of the *N-O-D-E* zines.
- Run **networksofphilly.org**



Networks of Philly [MANHOLE COVERS](#) [STREET MARKINGS](#) [VARIOUS ANTENNAS](#) [KIOSKS](#) [CAMERAS](#) [SETTYPETTING](#) [TRYING TO KNOW](#)

Seeing Networks in Philadelphia

Philadelphia's network infrastructure is messy, clumsy, and often unseen by the general public. Wandering the streets, you may get a vague understanding of what's going on—a manhole cover sits unassumingly on the crosswalk, or maybe a mysterious box with an antenna sits high upon a wall in a back alley, humming into the night. Under your feet and above your eye line, data is soaring by through brightly-lit fiber cable and ethereal radio transmission. The city is alive, but few may ever understand to what extent.

What follows below is an ever-changing, work-in-progress project to present information about the network infrastructure as it exists within Philadelphia. Readers are encouraged to reach out by emailing hello@networksofphilly.org to share observations, photos, and information that may be suitable for the site. Contributions can also be made via [GitHub](#). Others may choose to reach out via [@netsofphilly](#).

This website is based off of [seeingnetworks.in](#), which focuses on New York City. Ingrid Burrington, who runs that site, also wrote a [really cool book](#).

Check out similar guides for [NYC](#), [Phoenix](#), and [London](#) (PDF).

Chat with us via Matrix, [#networksofphilly:matrix.org](#) or bridged IRC, [#networksofphilly/Libera](#).

How did this start?

- Ingrid Burrington's Book, *Networks of New York: An Illustrated Field Guide to Urban Internet Infrastructure* (2016)

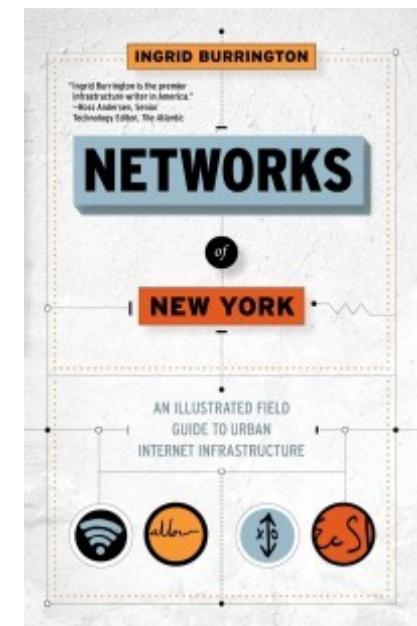
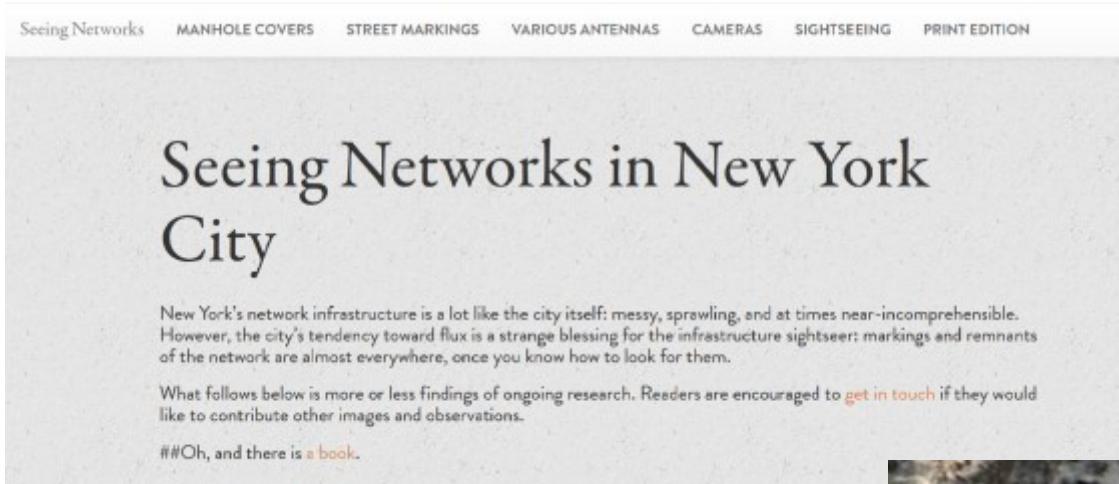
Seeing Networks MANHOLE COVERS STREET MARKINGS VARIOUS ANTENNAS CAMERAS SIGHTSEEING PRINT EDITION

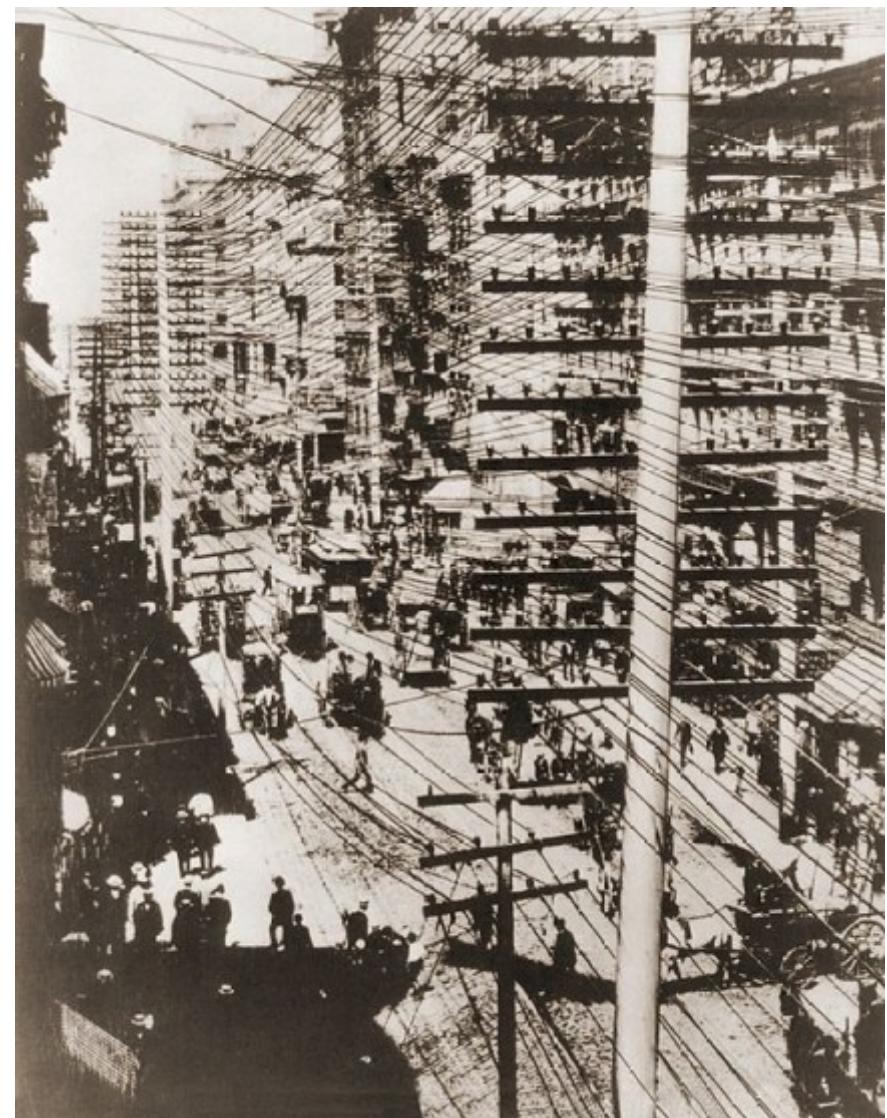
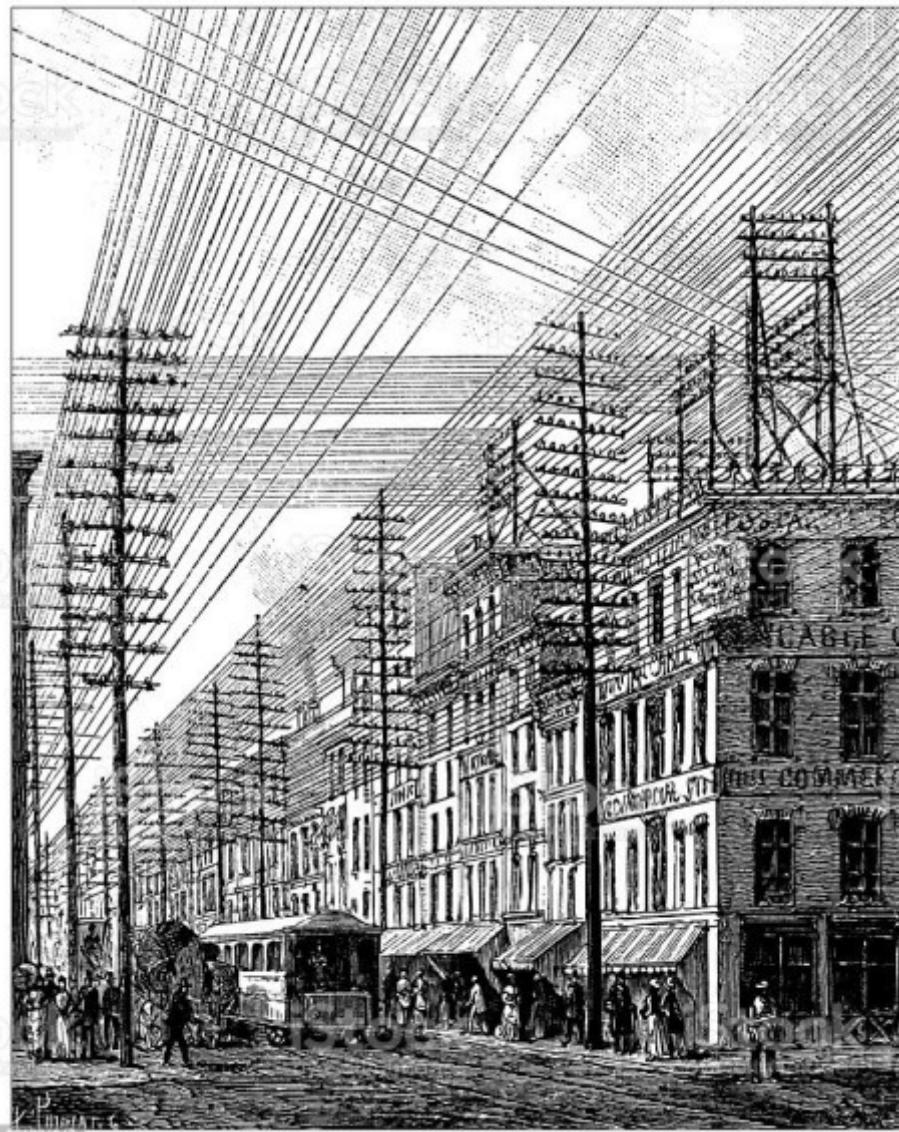
Seeing Networks in New York City

New York's network infrastructure is a lot like the city itself: messy, sprawling, and at times near-incomprehensible. However, the city's tendency toward flux is a strange blessing for the infrastructure sightseer: markings and remnants of the network are almost everywhere, once you know how to look for them.

What follows below is more or less findings of ongoing research. Readers are encouraged to [get in touch](#) if they would like to contribute other images and observations.

##Oh, and there is [a book](#).





Look at the ground a lot



RED
Electric Power Lines,
Cables, Conduit and Lighting
Cables

YELLOW
Gas, Oil, Steam, Petroleum
or Gaseous Materials

ORANGE
Communication, Alarm or
Signal Lines, Cables or
Conduit

BLUE
Potable Water

GREEN
Sewers and Drain Lines

PURPLE
Reclaimed Water, Irrigation
and Slurry Lines

PINK
Temporary Survey Marking

WHITE
Proposed Excavation

Line Markings



Utility identified by termite

Marking Gas Lines – High Pressure



Corridor Markings

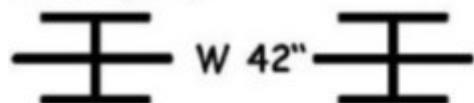


Identifies when location of line cannot
be determined.

Marking Termination Point, Dead End, Stub Outs

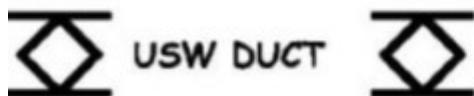


Oversized Utility Markings



Marking for large diameter structures

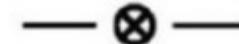
Conduit Markings

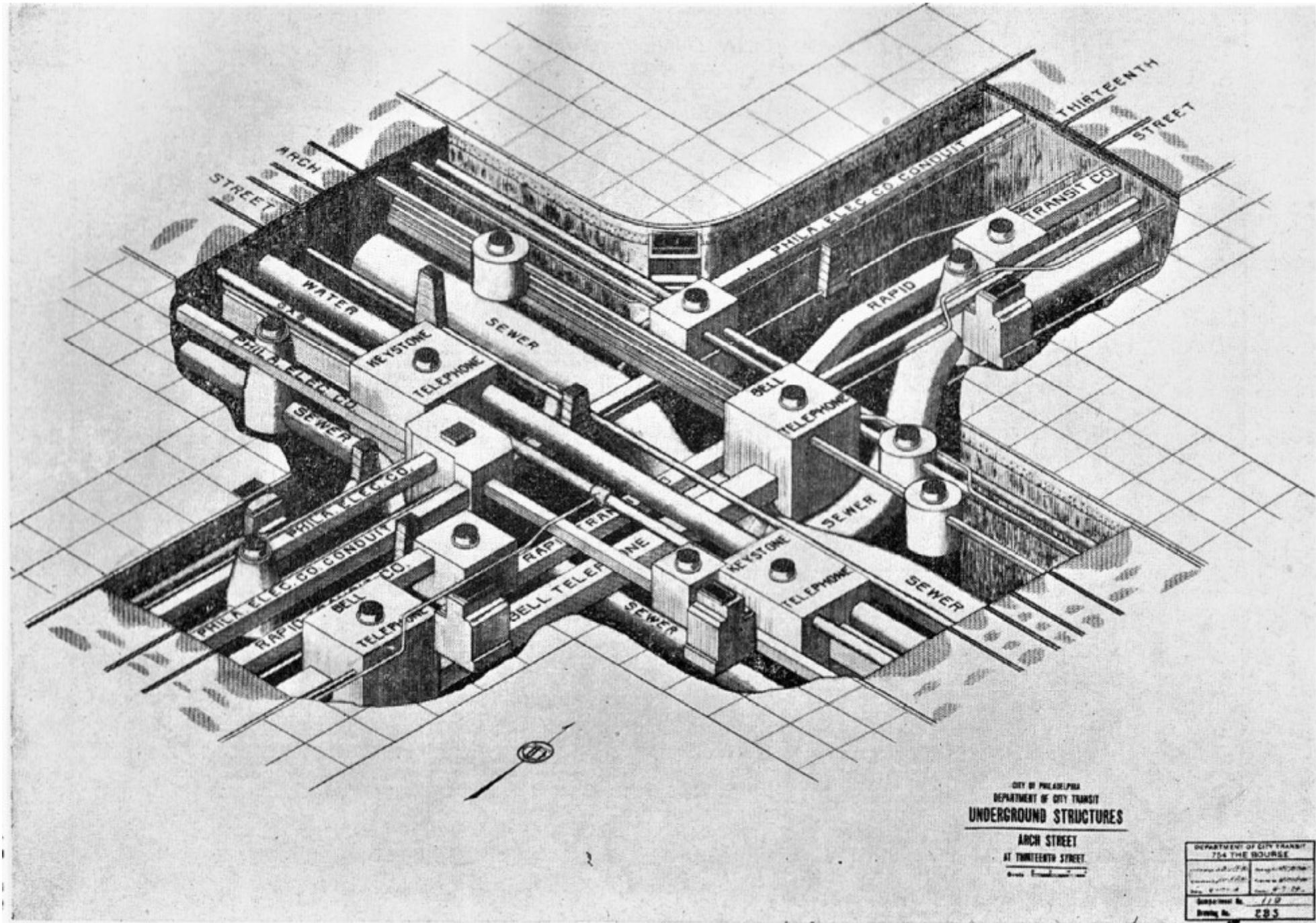


No Conflict (No utilities within the requested area)

NO/MCI **NO/EPG**

Marking Buried Splices, Valves, Manholes





CITY OF PHILADELPHIA
DEPARTMENT OF CITY TRANSIT
UNDERGROUND STRUCTURES

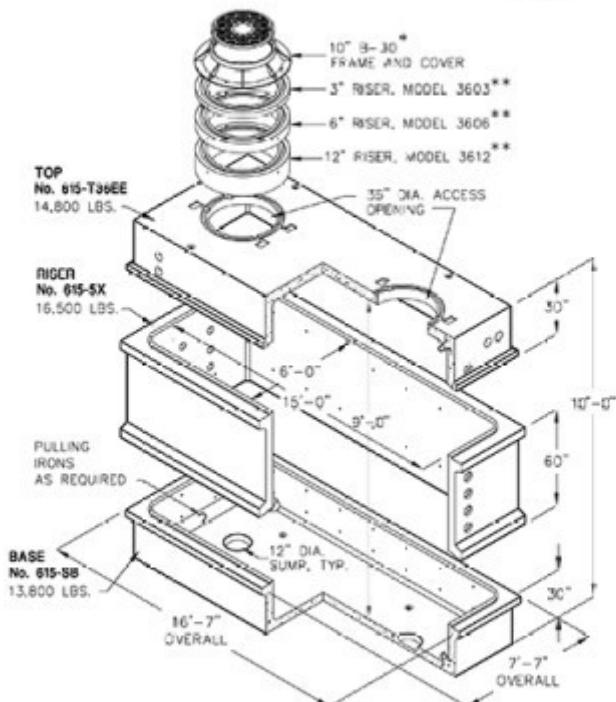
ARCH STREET
AT THIRTEENTH STREET.
Date: December 1, 1947

DEPARTMENT OF CITY TRANSIT	
754 THE BOURSE	
Engineering Dept.	Surveyor's Office
Architectural Dept.	Planning & Scheduling
Building Dept.	Permitting
Department No.	110
Drawing No.	283

Manholes

615-9 TELEPHONE MANHOLE

6' x 15' x 9' ID.
MANHOLE



BOX DESIGN LOAD:
H=20 TRAFFIC
WITH 1' TO 5' EARTH COVER

FOR COMPLETE DESIGN
AND PRODUCT INFORMATION,
CONTACT JENSEN PRECAST.

2/8/05
6-5_3dwg
© 2003 Jensen Precast

* SEE HARDWARE/APPLIANCE SECTION
FOR SPECIFICATIONS.
** RISERS OPTIONAL. SEE COLLAR/RISER
SECTION FOR SPECIFICATIONS.

JENSEN
PRECAST



RETHINKTANKDESIGN.COM

PECO

- Formerly **Philadelphia Electric Company**, founded 1881.
- Owns 1,607 miles of high-voltage transmission lines, 15,250 square miles of underground distribution cable, and 12,933 miles of aerial distribution lines.
- Part of **Exelon** as of 2000.



Steam

- System dates back to 1889 when a power station at 908 Sansom used exhaust to heat nearby 917 Walnut St.
- Third largest steam system in the United States.
- Steam runs through pipes at 450F to 162 customers.
- Now owned by Vicinity Energy, previously Veolia, Trigen, PECO.



Steam Distribution System

- 30 miles of pipeline
- System covers approximately 4.5 square miles
- 473 vaults



High Pressure Fire Service

- HPFS started 1903 as a better way to fight fires.
- Could shoot a two-inch stream 230 feet vertically at 400 PSI.
- Red hydrants with two independent gates, weighting 1000lbs.
- The 56-mile system was decommissioned in 2005 due to disrepair.



Philadelphia Transportation Co

- Main public transit operator from 1940 to 1968.
- Replaced **Philadelphia Rapid Transit Company** (PRT) founded in 1902, now replaced by **SEPTA**.

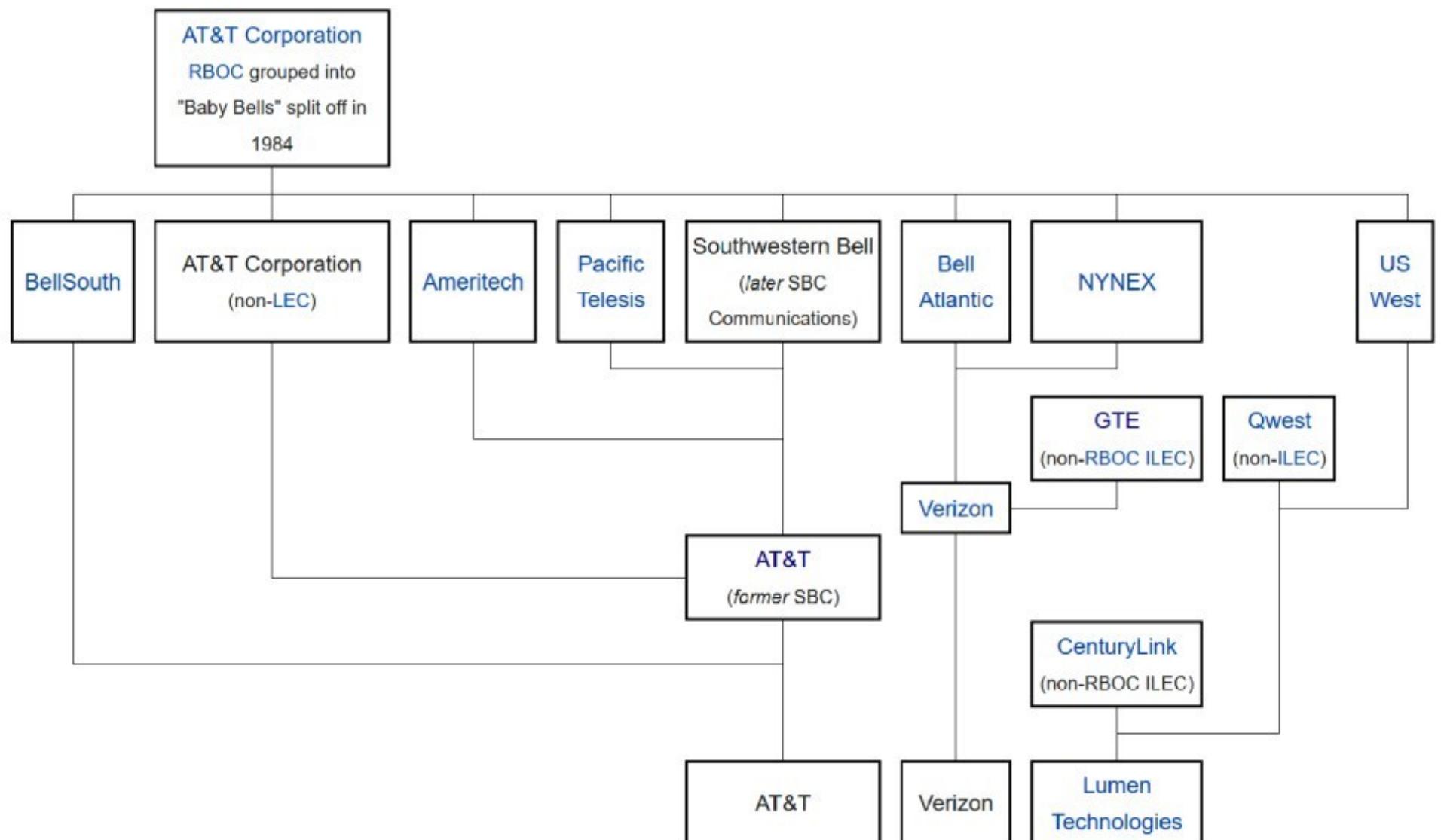


Bell Telephone Company



- **Bell Telephone Company** began as a company in 1879.
- **Bell Telephone Company of Pennsylvania** started the same year.
- Bell was broken up in 1984, Philly's RBOC became **Bell Atlantic**.





Keystone Telephone Company

- Founded 1900 as a direct competitor to **Bell Telephone Company**, bought by Bell in 1945.
- First telephone company in the world to have completely buried wires.
- Catered to businesses.
- Used for city communications.



Electrical Bureau

- City department from 1856 – 1951.
- Maintained communications systems (call boxes) for police and fire.
- Now Communications group within the Department of Public Property.



Western Union Telegraph Co

- Began operation in 1851.
- Telegraphy was spun off to **Western Union International** in 1963.
- Sold telegraphy system to **MCI** in 1983.



Metromedia Fiber Network

- Launched in 1993 as **National Fiber Network**.
- Dark fiber to communications carriers in the U.S. and EU.
- Bankrupt by 2002, back in 2003 as **Abovenet**, bought by **Zayo** in 2012.



MCI Metro

- Division of **MCI** that layed fiber in the '90s.
- Bought by **WorldCom** in 1998.
- **MCI** Acquired by **Verizon Communications** in 2006 after bankruptcy.



Level 3 Communications

- Started building nation-wide fiber in 1998.
- Received \$411 million from the DOD in 2012.
- Bought by **CenturyLink** in 2017, now **Lumen Technologies**.
- Tier 1 Network Operator.

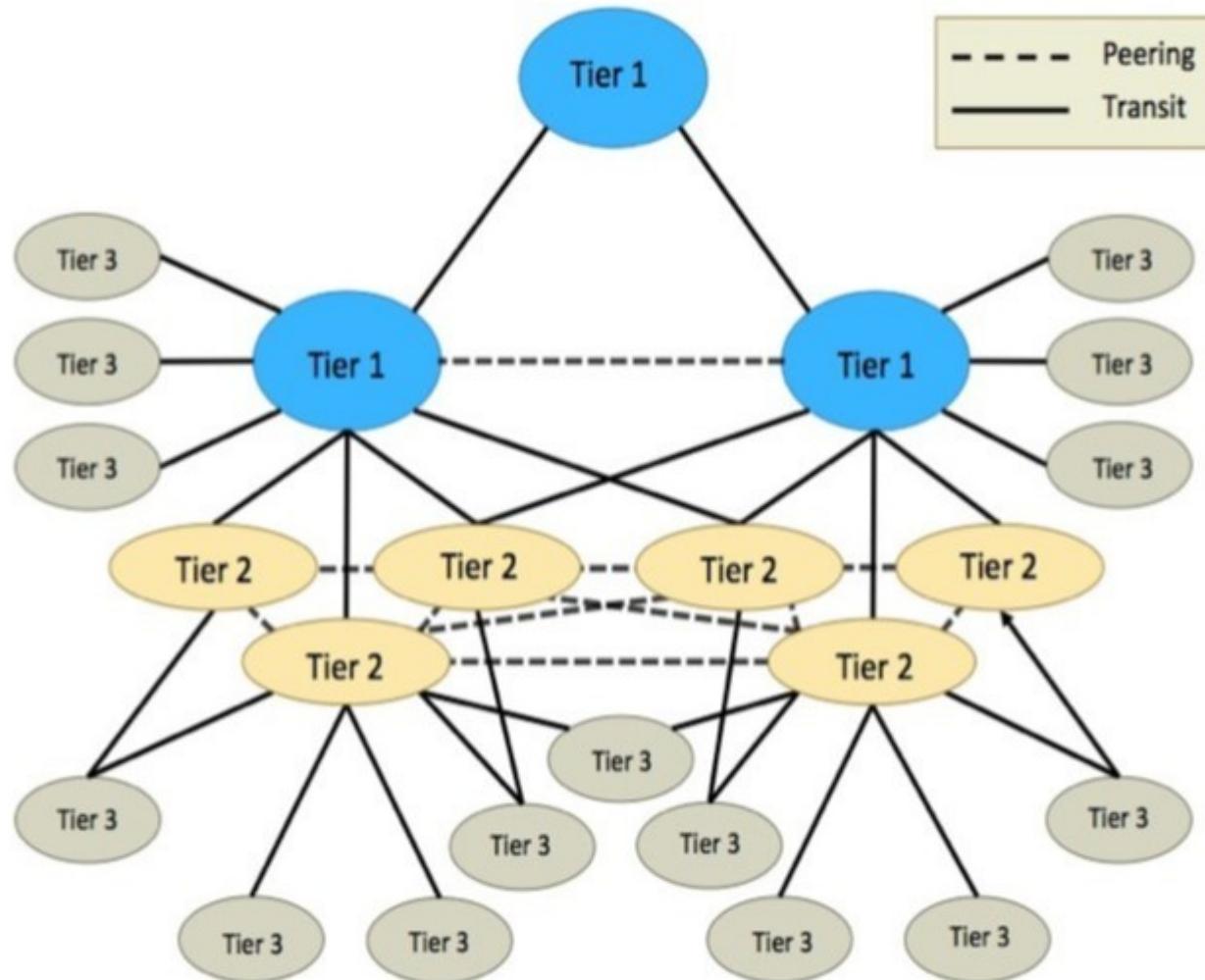
Level(3)[®]

 CenturyLink[®]

LUMEN



What the Internet Looks Like

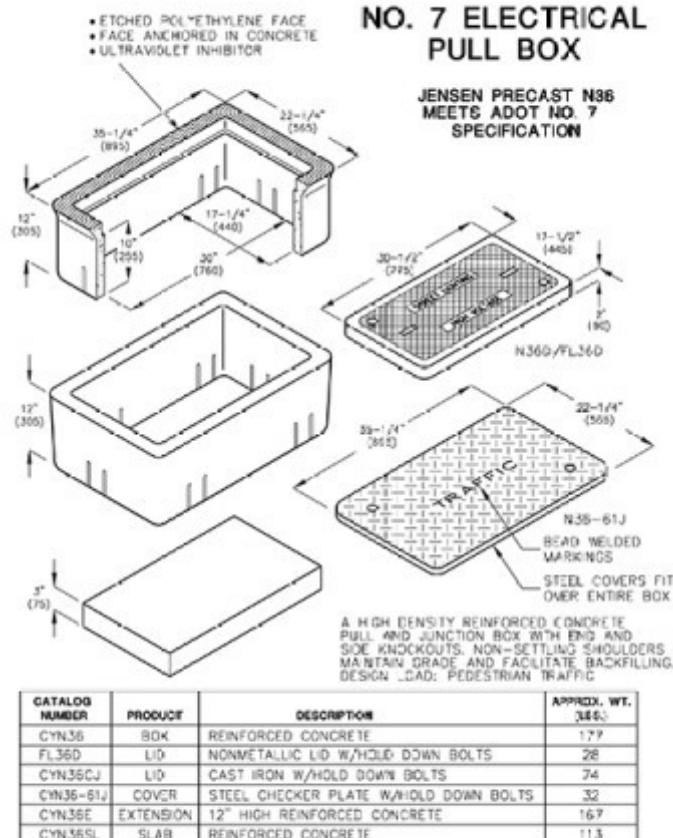


Telephone & Communication

- “Telephone” is likely a replacement.
- “Communication” is for private cables.



Handholes and Boxes



FOR COMPLETE DESIGN
AND PRODUCT INFORMATION,
CONTACT JENSEN PRECAST.

NOTE: METRIC DIMENSIONS
ROUNDED TO NEAREST 5 MM.

1/7/05
ADOT7.dwg
© 2005 Jensen Precast

JENSEN
PRECAST



CATV

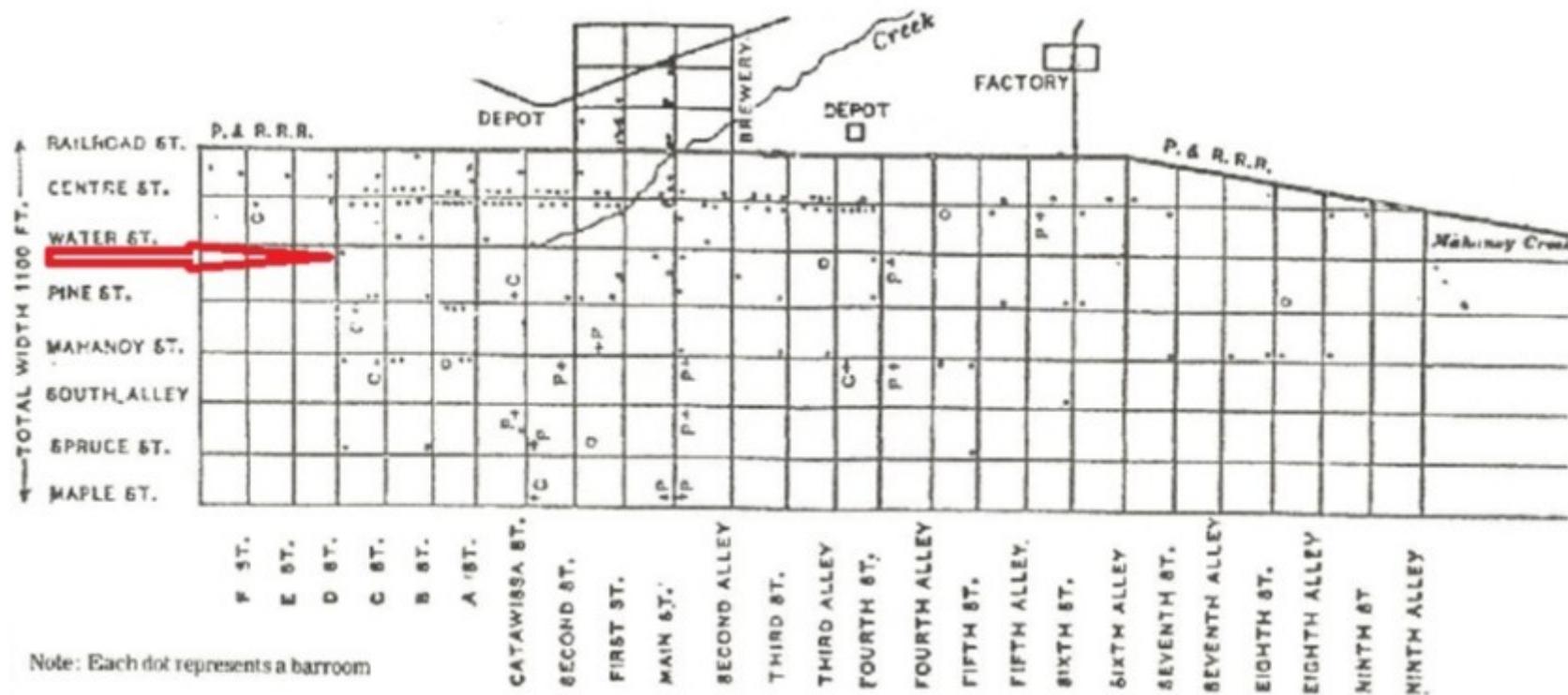
- Cable TV is a Pennsylvania first.
- Handholes provide cable services (coax) to buildings.
- Cable television came to Philadelphia in 1983 under 3 franchises: **Comcast**, **Cablevision Systems of Philadelphia**, and **Philadelphia Inner City Cable** (Wade Cablevision came in 1987).



The Drinking Capital of America

Mahanoy City 1903

Population: 13,725 – A total of 143 barrooms,
or for one for every 98 inhabitants.



Traffic

- Seen on the sidewalk corners near crosswalks.
- Cabling here connects traffic lights to large metal control (SCADA) boxes nearby.
- Adaptive Traffic Control Systems



Bell Atlantic

- Operated 1984 – 2000 as one of the 7 RBOCs.
- Was parent of **New Jersey Bell, Bell of Pennsylvania, Diamond State Telephone**, and the **C&P Telephone** companies.
- At its peak, it was the second largest telephone company in the USA with operations in 23 countries and 13 states.



Verizon



- Carries telephone and Internet services within Philadelphia and is *the* current telephone provider for the city.
- Formed in 2000 after merger between **Bell Atlantic** and **GTE**.



Zayo

- Founded in 2007, is a fiber network with 130,000 route miles of fiber laid in North America.
- Tier 1 Network Operator.
- Also work installing small cells.

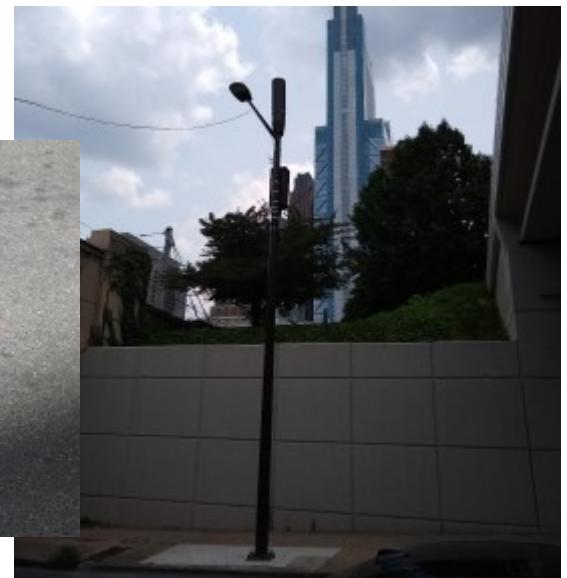


Antennae & Other Devices



Small Cell

- Low-powered cellular radio access nodes.
- Range of 10 meters to a few kilometers.
- **Crown Castle** installs Fiber and Small Cells in the North East, bought **Lightower**, a northeastern network provider in 2017.



Crown Castle (Continued)



Distributed Antenna Systems

- Expand cell coverage, adding capacity in under-serviced areas.
- Repeater vs Active
- Usually cover different frequencies and different carriers.
- These units are manufactured by **JMA Wireless**.



LinkPHL

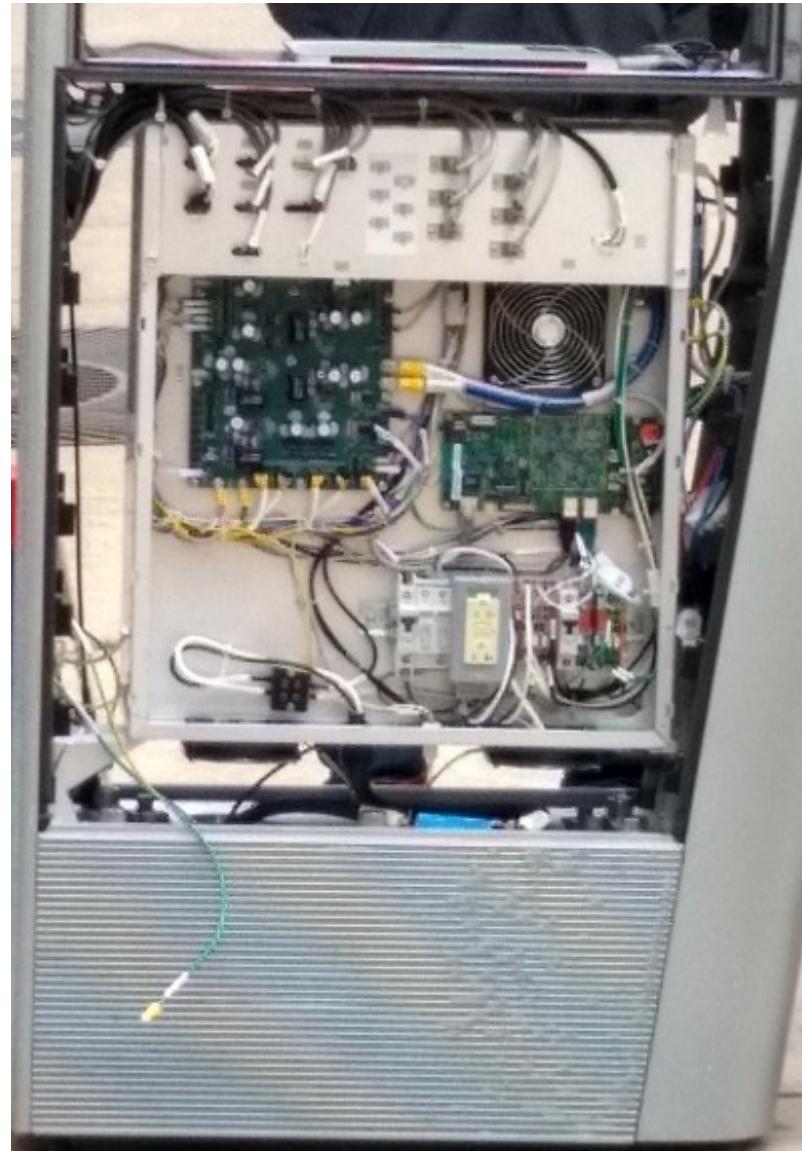
- Provide free WiFi access, mobile device charging, phone calls, access to municipal/emergency services, maps, directions.
- Each LinkPHL kiosk has three cameras, and microphones, among other sensors.
- Created by **Intersection** (formerly **Titan**), with investment from **Alphabet**.



LinkPHL



2022 Mike Dank @famicoman



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36 / 49

Police Cameras

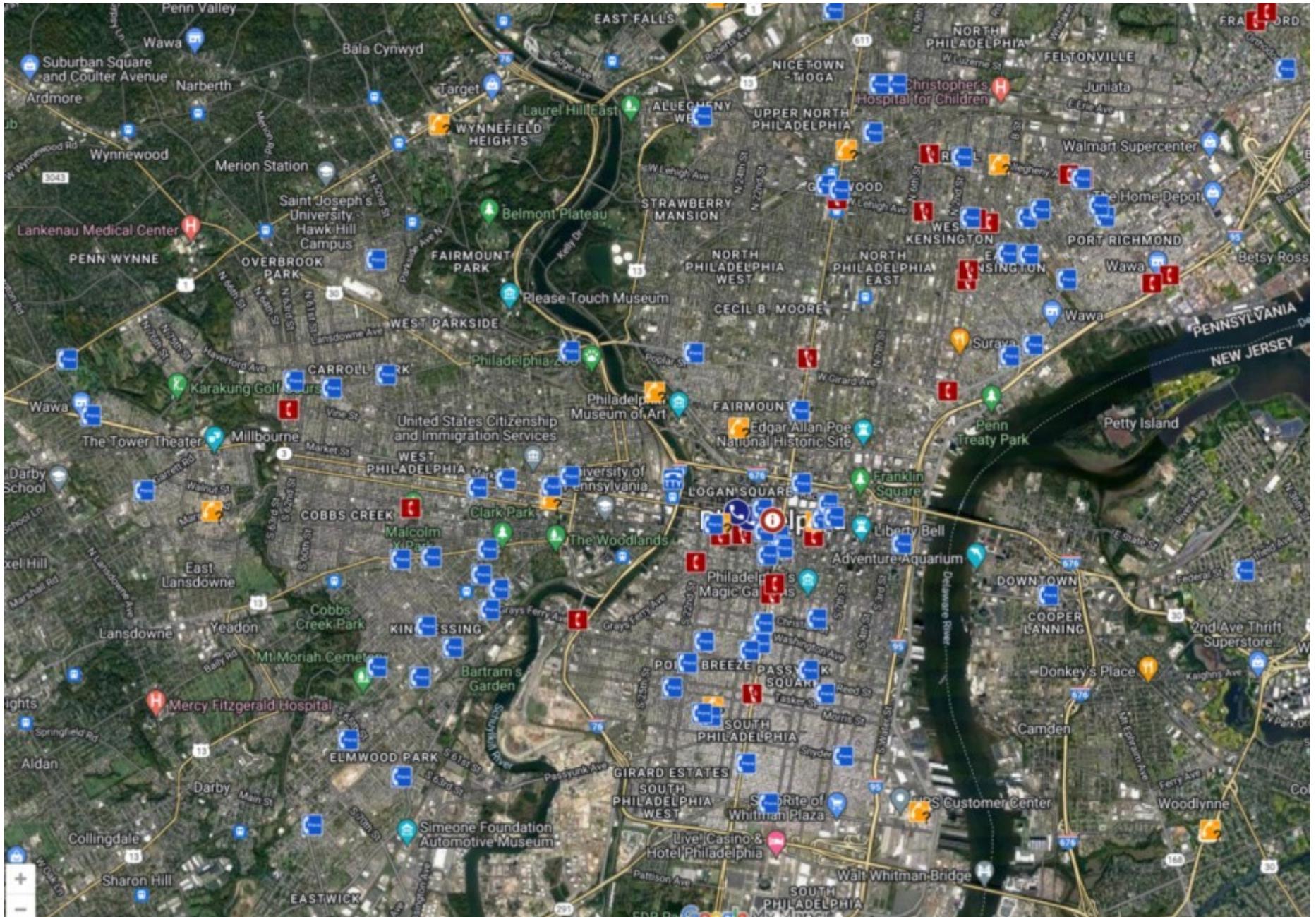
- Have been in the city since 2009, many are thought to be broken and in disrepair.
- Cameras automatically follow movement. Anyone watching?



Payphones

- Pacific Telemanagement Services (PTS) based out of California.
- NewTel based out of The Bronx, NYC bought remaining Verizon payphones in 2012.
- Please dial the MCI ANAC -> 1-800-444-4444





Not Yet Covered

- Parking Kiosks
- Transit Kiosks
- Shotspotters
- Ricochet (anything left?)
- More?



Sight Seeing



401 N Broad

- **Terminal Commerce Building**, this 14-story concrete building was built between 1929 and 1931 by the Reading Company.
- Largest carrier hotel within Philadelphia with over 80 carriers as of 2015.



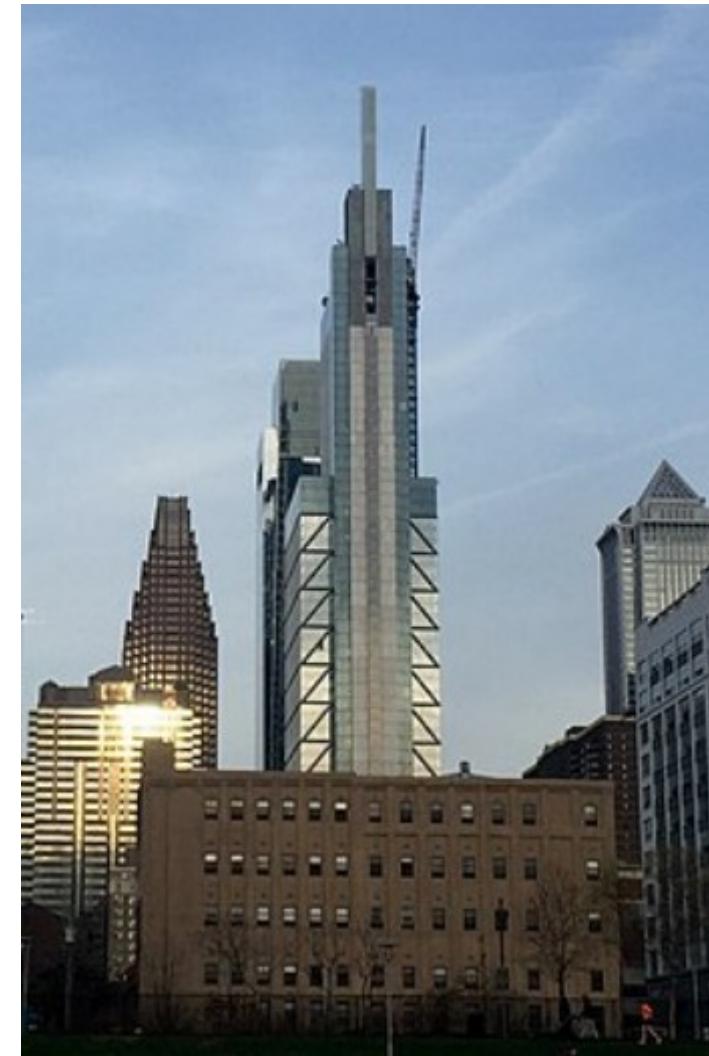
Three Logan Square

- Formerly the **Bell Atlantic Tower**, this 55-story office building was erected in 1991.
- After Bell split up, the Philadelphia-based Baby Bell **Bell Atlantic** headquartered within the building until 1996 when it purchased New York City-based **NYNEX** and moved operations to New York.
- Still houses **Verizon Communications of Pennsylvania** HQ.



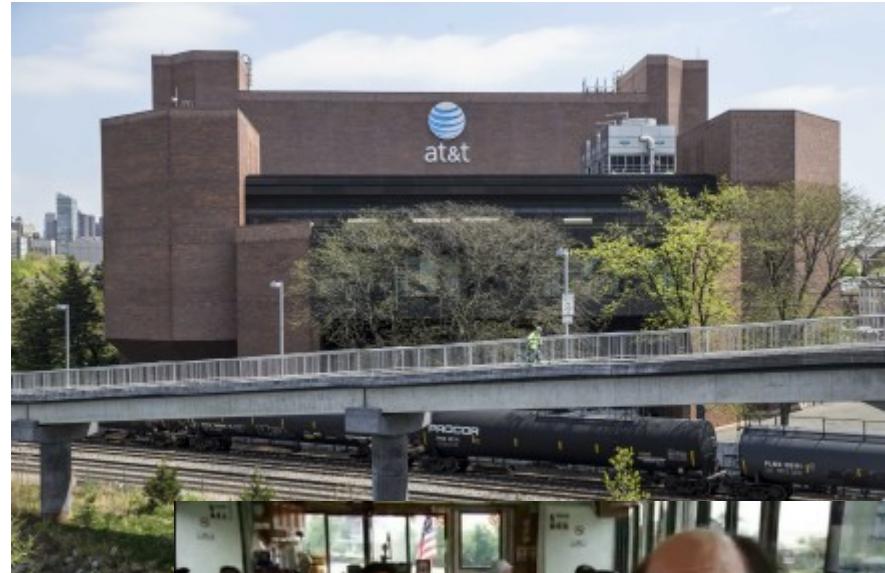
Comcast Center & CTC

- **Comcast** started as **American Cable Systems** in 1963.
- **Comcast Center** is a 58-story building built between 2005 and 2008, and is **Comcast's HQ**.
- **Comcast Technology Center** is a 60-story building built between 2014 and 2017.



500 South 27th

- AT&T building presumably used for continued AT&T service and collocation for other telephone companies.
- Built 1967 by Bell Telephone to replace an older exchange at 17th and the Parkway.
- Situated near railroad lines by the Schuylkill.



Right To Know

- Created **Right To Know** requests that will be submitted to various organizations within the Philadelphia government in an attempt to gain information on surveillance equipment deployed throughout the city.
- inspired by the *Aaron Swartz Day Police Surveillance Project #ASDPSP* and information brought to light via "The Wiretap Room" by Ryan Gallagher and Henrik Moltke in *The Intercept*.
- Requests filed through **MuckRock**,
<https://www.muckrock.com/project/philadelphia-police-surveillance-project-305/>



Right to Know Request List

- GUNSHOT DETECTION MICROPHONES (SHOTSPOTTER/SENTRI)
- IMSI-CATCHER EQUIPMENT
- SOCIAL MEDIA MONITORING SOFTWARE
- PREDICTIVE SOFTWARE
- FEDERAL MOUs
- AUTOMATED LICENSE PLATE READERS
- FLIR THERMAL CAMERAS
- FACIAL RECOGNITION SOFTWARE
- UNMANNED AERIAL VEHICLES (DRONES)
- BODY WORN CAMERAS
- EYE IN THE SKY

What's Next

- More walking around and looking at things.
- Ask for help to identify things I can't identify,
<https://github.com/networksofphilly/unidentified-infrastructure-objects>
- Walking tours?



Questions?

- Networks of New York, Ingrid Burrington
- Underground Philadelphia, Harry Kyriakodis & Joel Spivak
- The Anatomy of a City, Kate Ascher
- The Victorian Internet, Tom Standage
- Tubes, Andrew Blum
- The Undersea Network, Nicole Starosielski
- <https://hiddencityphila.org>