CityLaw Breakfast

April 6, 2017

Lessons from the Second Avenue Subway and other Megaprojects

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Second Avenue Subway: A Historical Perspective

- Long history of starts and interruptions since the 1920s
- Need to serve East Side of Manhattan became stronger after demolition of the 2nd Ave Elevated in the 1940's and 3rd Ave El in 1955
- Various tunnel segments completed in 1970s
- Most recent effort started with EIS in 2004 and start of construction in 2007
- Revenue Service began as planned on December 31, 2016 for Governor Andrew M. Cuomo's Inaugural New Year's Eve train ride

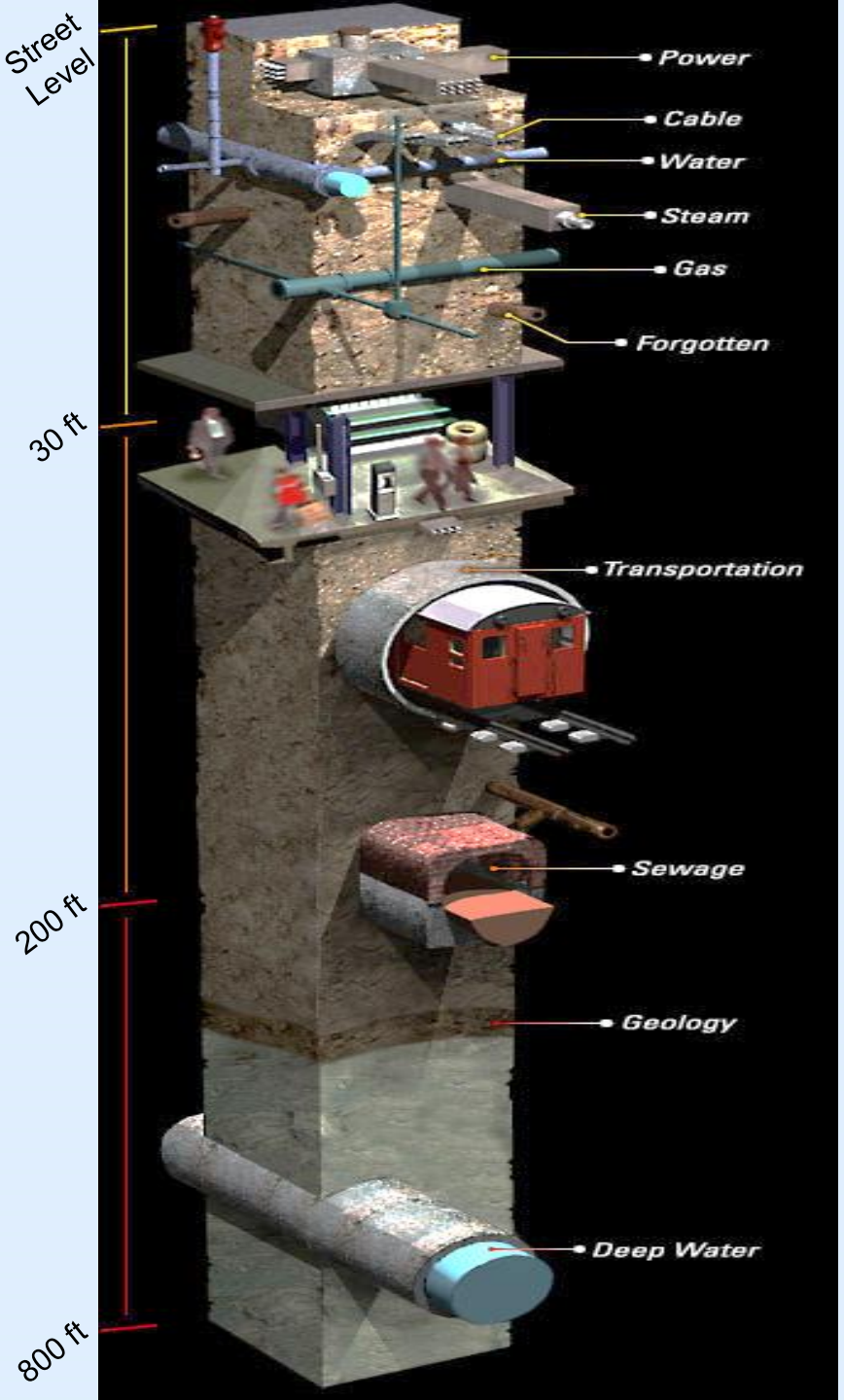
Dismantling of Second Ave El

SAS Project Profile

- 8.5 Route miles
- 16 new stations
- 1 renovated station
- linked to existing Q line

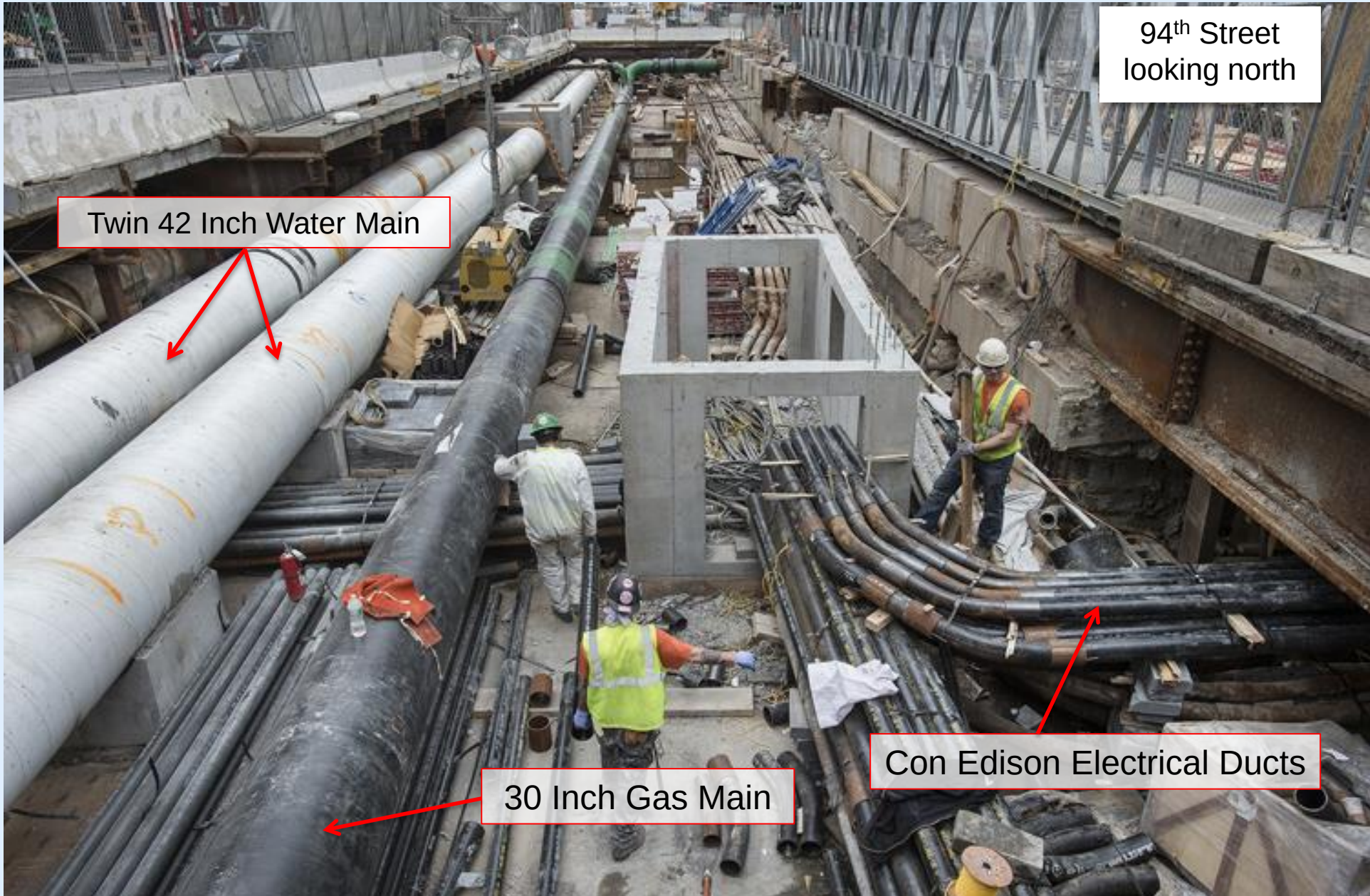
Challenge: Hidden and Extensive Infrastructure

- World's largest underground electrical distribution system with over 80,500 miles of cable (21,000 miles of cable in Manhattan)
- 6,200 miles of water mains
- 6,300 miles of gas mains
- World's largest underground steam network with over 100 miles of mains and service pipes (Manhattan)
- 7,400 miles of sewer lines



Lessons Learned: Street Utility Work

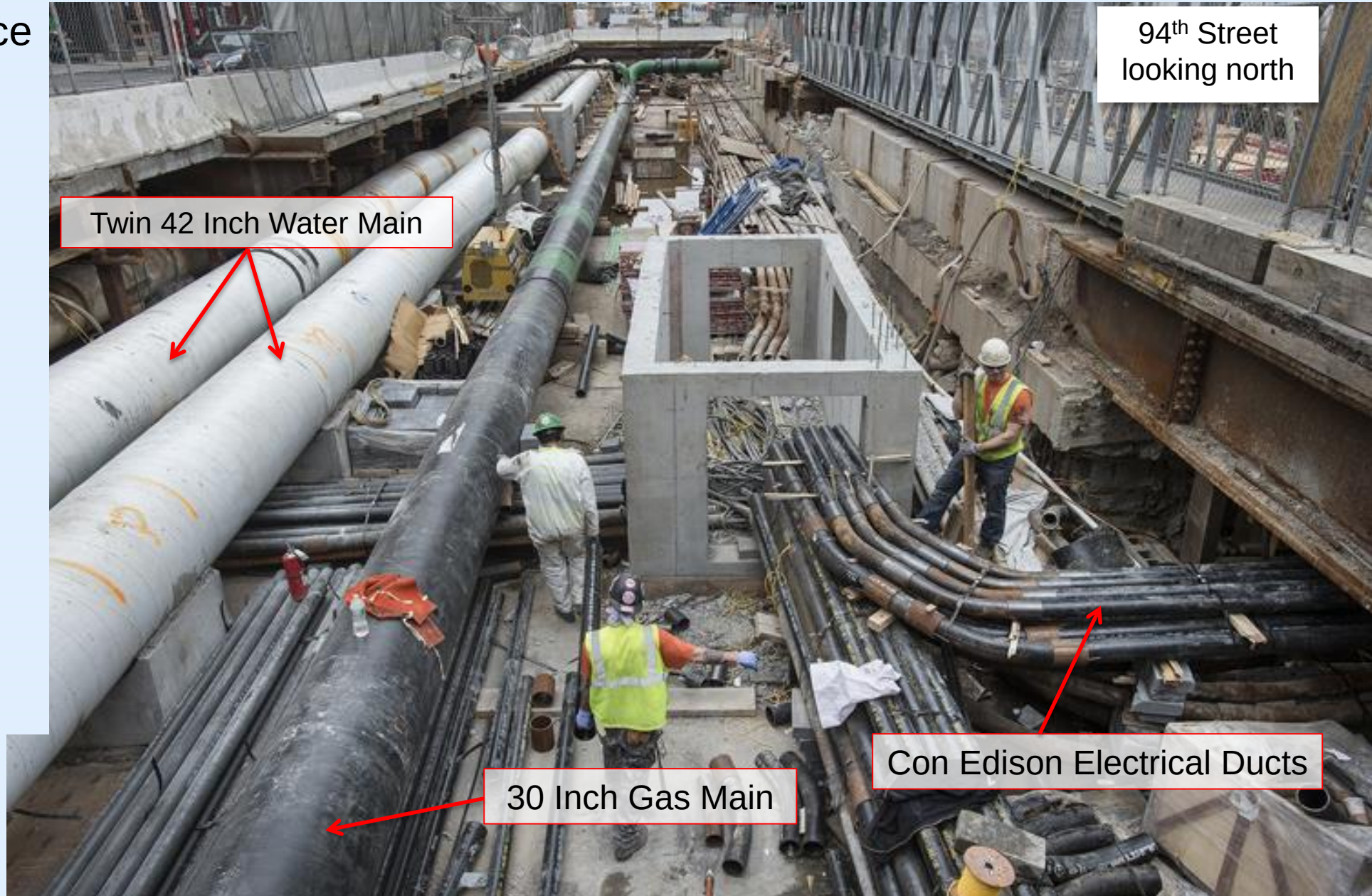
East Side of Second Avenue



Lessons Learned: Street Utility Work

East Side of Second Avenue

- Perform more advance surveys, condition assessments and preparatory work by utility companies
- Relocate all utilities under separate contract before other construction starts



Challenge: Launch Box Excavation

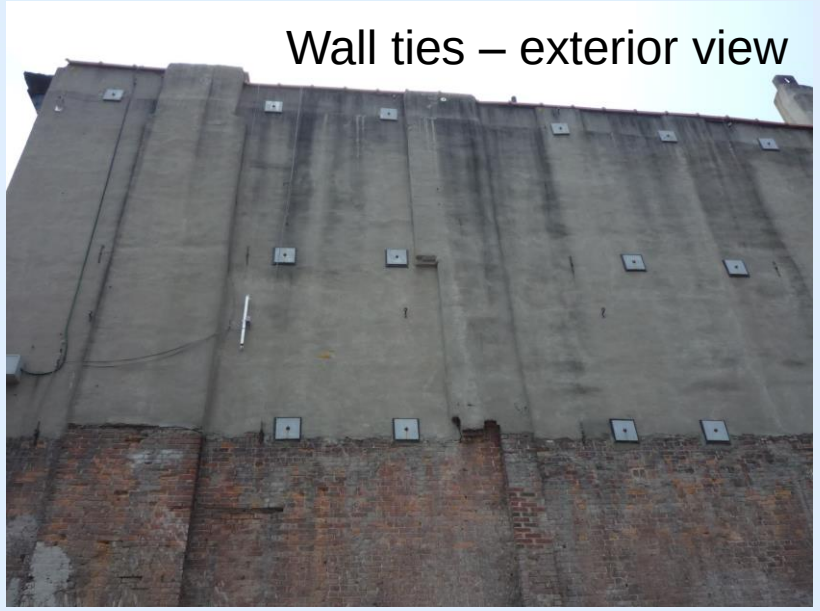
- Blasting next to fragile buildings
- Building slurry walls 8 feet from building lines
- Relocating sewer lines within 6 feet of buildings
- Maintaining vehicular & pedestrian traffic

Photo circa 2008

Lessons Learned: Fragile Building Repairs

- 225 buildings surveyed overall
- Remediation on 52 buildings (~25%)

Wall ties – truss on side wall



Wall ties – exterior view

1817 – 1829 Second Ave

1772 - 1766/68 2ND AVENUE
BEFORE STABILIZATION

1772 - 1766/68 2ND AVENUE
AFTER STABILIZATION

Lessons Learned: Fragile Buildings

- Identify fragile buildings and their condition prior to the building process
- Complete advance survey and monitoring program during design phase
- Share information with construction contract bidders to avoid change orders
- Deploy instrumentation to monitor building movement before construction

Challenge: Drill and Blast Mining Creates Noise, Vibration & Dust

86th Street Cavern Blast Video

Lessons Learned: Physical Mitigation

- Consider community impact
- Encapsulate environmental impacts
- Blasting limitations

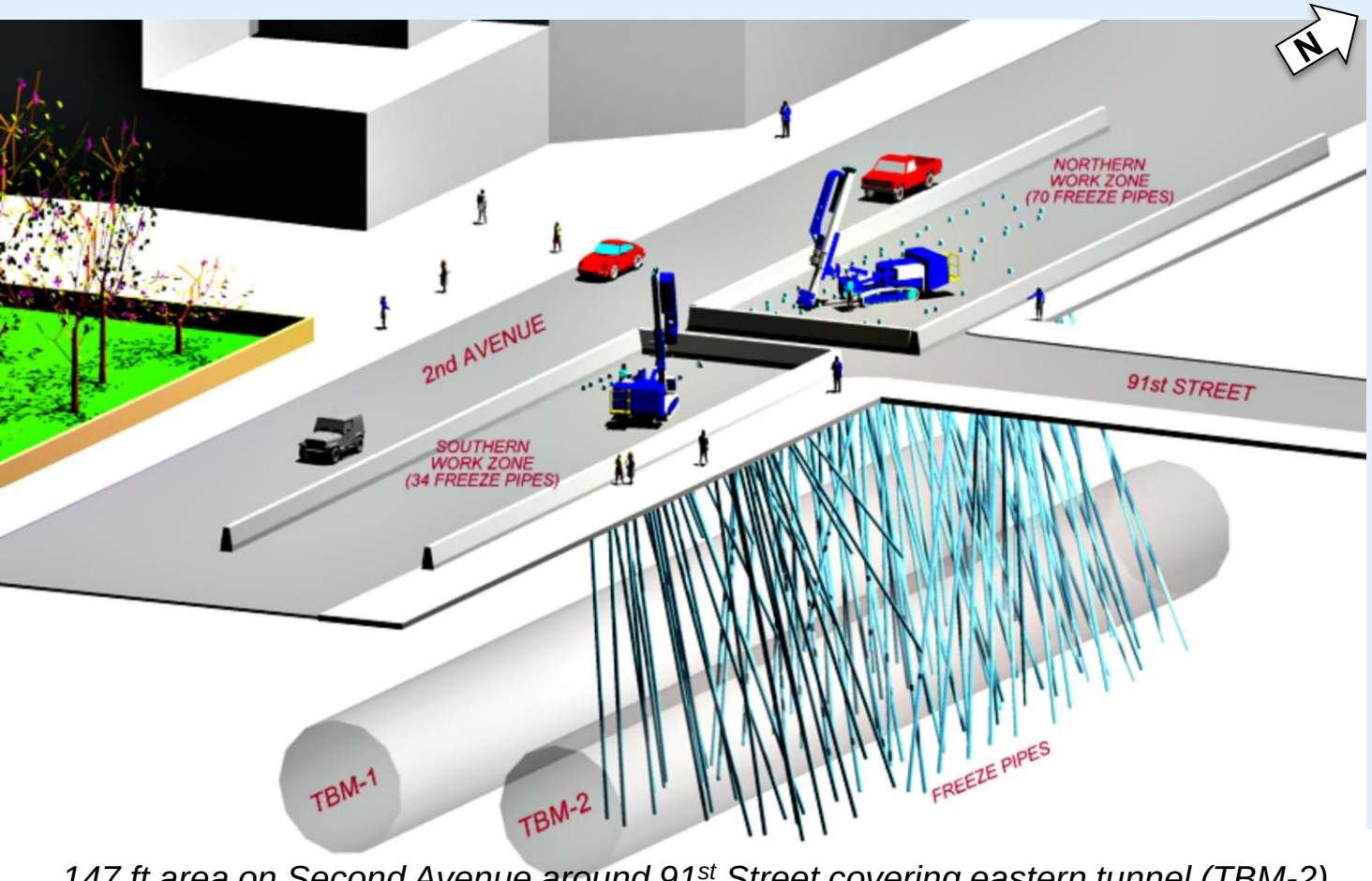
69th Street

- Use muck house enclosures to limit noise, dust and odor

- Spoils removal and delivery for minimized truck street traffic

Challenge: Geotechnical Conditions

- Post bid it was determined rock quality was poor (fragmented) over a 150’ section of the east tunnel
- A process to freeze the ground in that area was undertaken to allow TBM mining to continue
- Tunneling operations were re-sequenced to maintain schedule



147 ft area on Second Avenue around 91st Street covering eastern tunnel (TBM-2)

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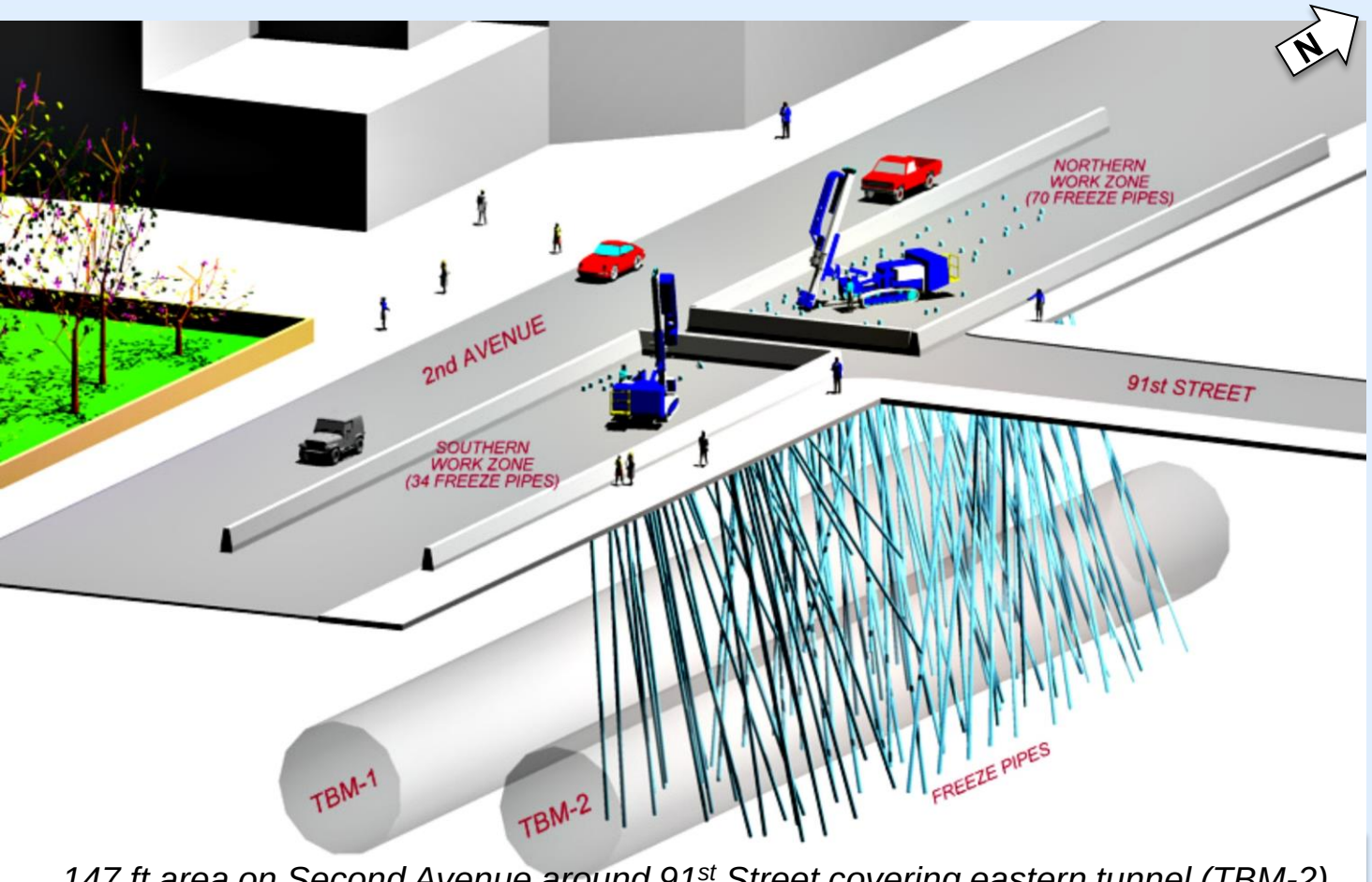
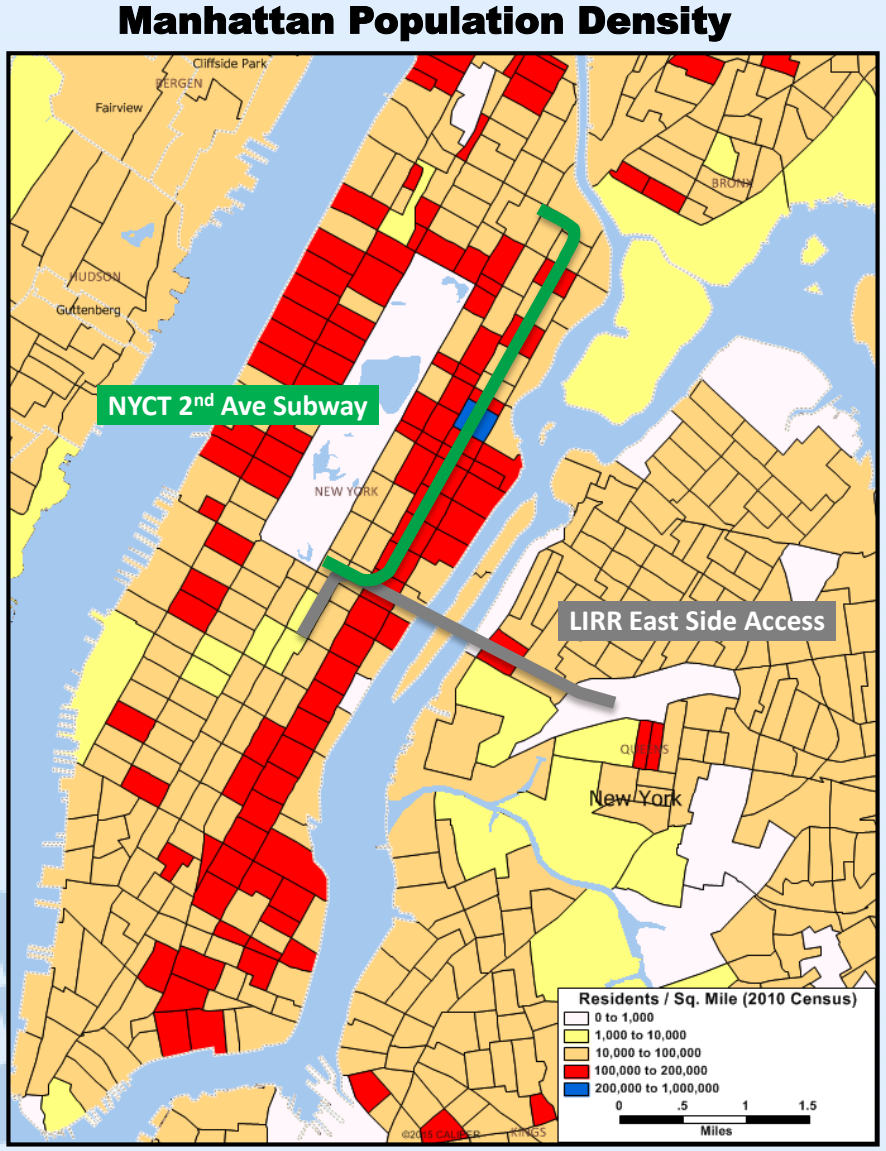


147 ft area on Second Avenue around 91st Street covering eastern tunnel (TBM-2)

- Perform more extensive geotechnical investigation prior to groundbreaking
  - Avoidance of schedule delays and cost impacts

Challenge: Building within the Densest Population in the U.S.



- 216 census tracts of over 100,000 residents/sq. mi. in N.Y.C.
- Only 3 other places with this density in the US – San Francisco, Chicago and Boston
- And 3 other tracts which are prisons:
  - San Quentin in Marin County, CA
  - Maryland Penitentiary in Baltimore
  - Trenton State Prison, NJ

Lessons Learned:
Community Engagement Model

- Communicate Often and Openly
- Deliver on Promises Made
- Build Trust

The New York Times November 1, 2010

Marcus Yam for The New York Times

Michael Horodniceanu, who leads construction on the Second Avenue line, visited first graders at Public School 290 on East 82nd Street.

Lessons Learned: Be A Good Neighbor

Address a Broad Range of Quality of Life Issues

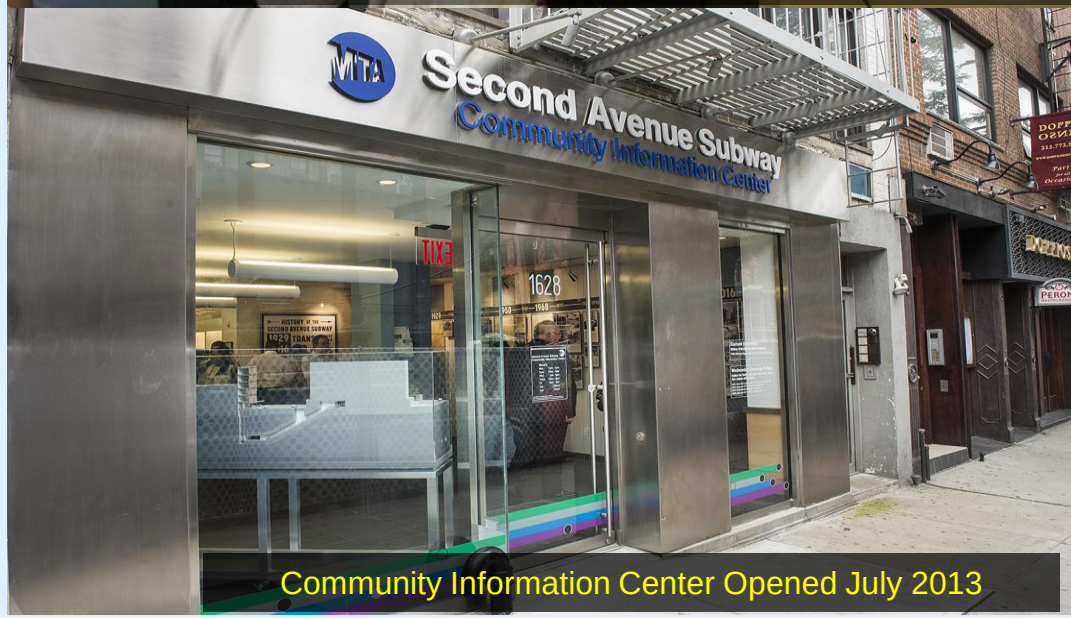
- Focused on Environmental Enhancements, Enforcement of Construction Site Upkeep and Maintenance
- Fence Wrap
- Retail Signage
- Sidewalk Width
- Pedestrian Safety
- Lighting Issues
- Environmental Compliance; Regular Inspections with Contractor and Construction Management Team

NE Corner of Second Avenue and 71st Street

Lessons Learned: Enhanced Community Outreach

1. Ongoing Construction Advisory Committee Meetings and Quarterly Public Workshops
2. Community outreach liaisons, email notifications and monthly newsletters
3. Outreach to local schools, elected officials, community boards and associations
4. Media engagement
5. Community Information Center
   - 25,000+ visitors since July 2013
   - Free informational presentations and events
   - 132 presentations to school groups; 2,900 students attending
   - 5 Interactive exhibits to date
5. Community Tours for residents and business owners
   - 73 Saturday tours (Dec. 2011 – June 2016)
   - 2,100 participants

March 28th, 2015 the CIC Train Simulator was unveiled



Community Information Center Opened July 2013

Challenge: Integrate Ancillary Structures

Lesson Learned: Ancillary Structures

Integrate public spaces into design

- Consider designing ancillaries with setbacks and landscaping to soften the visual effect at street level

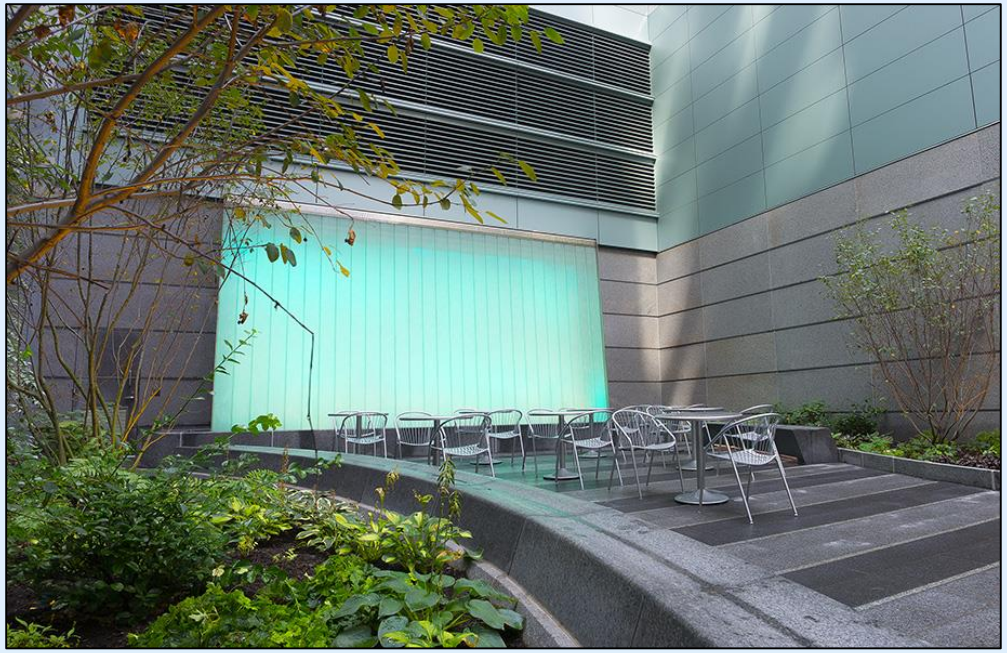
Lesson Learned: Ancillary Structures

East Side Access 50th Street Ventilation Facility

- Constructed an above ground ventilation and concourse service facility with integrated public open space
- Opened September 2014

Previous Structures

Rendering of completed structure and pocket park



50th Street Ventilation Facility - Public Space Integrated Design

Lessons Learned: Ancillary Structures

- **Integrate** retail opportunities at street level to create active streetscape

Rendering of Ancillary at 93rd Street and Second Avenue

Rendering of Ancillary at 69th Street and Second Avenue

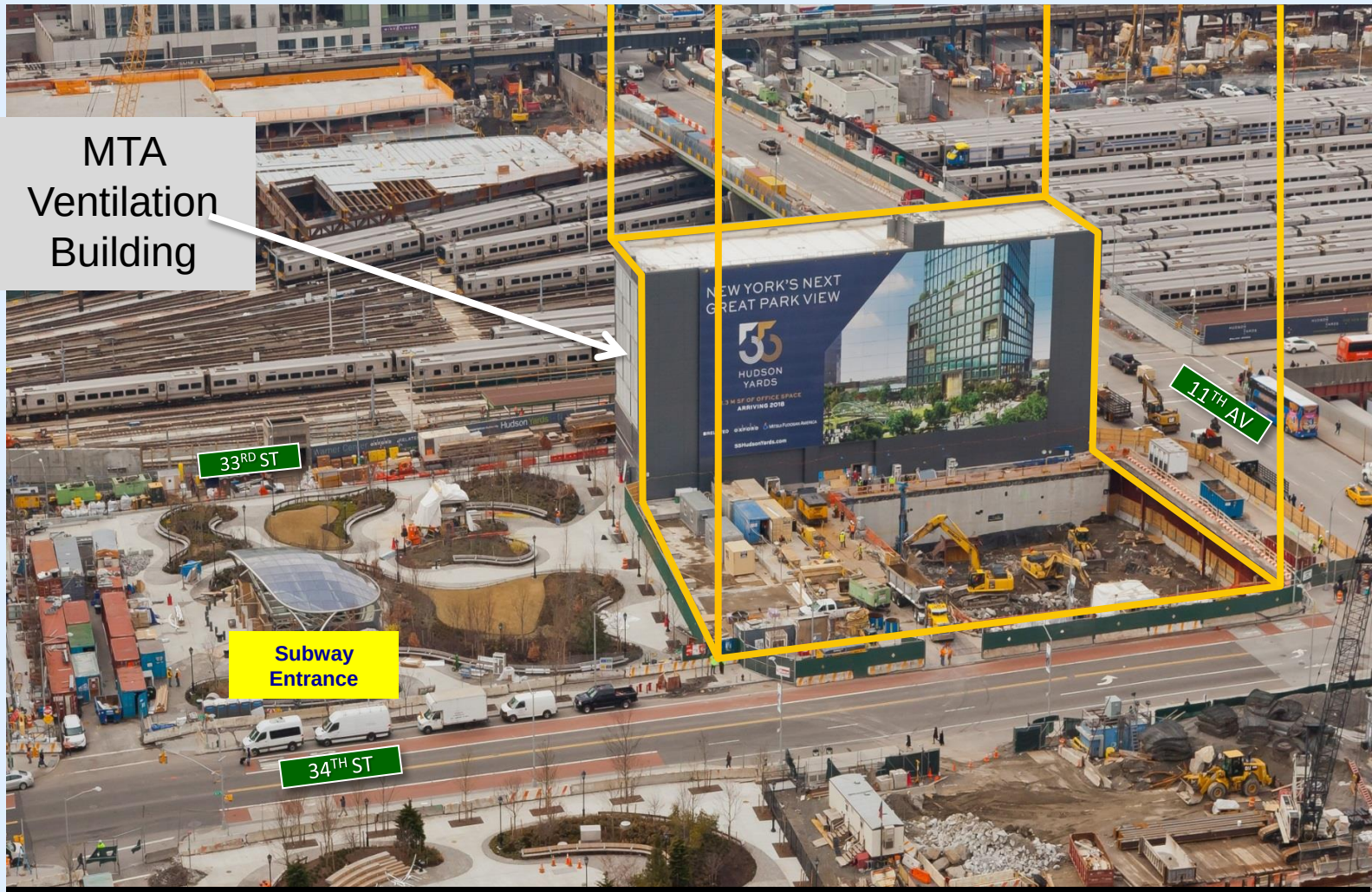
Lessons Learned: Ancillary Structures

- **Support Overbuilding**

Example: No. 7 Line Extension

34th St - Hudson Yards Station

January 2015



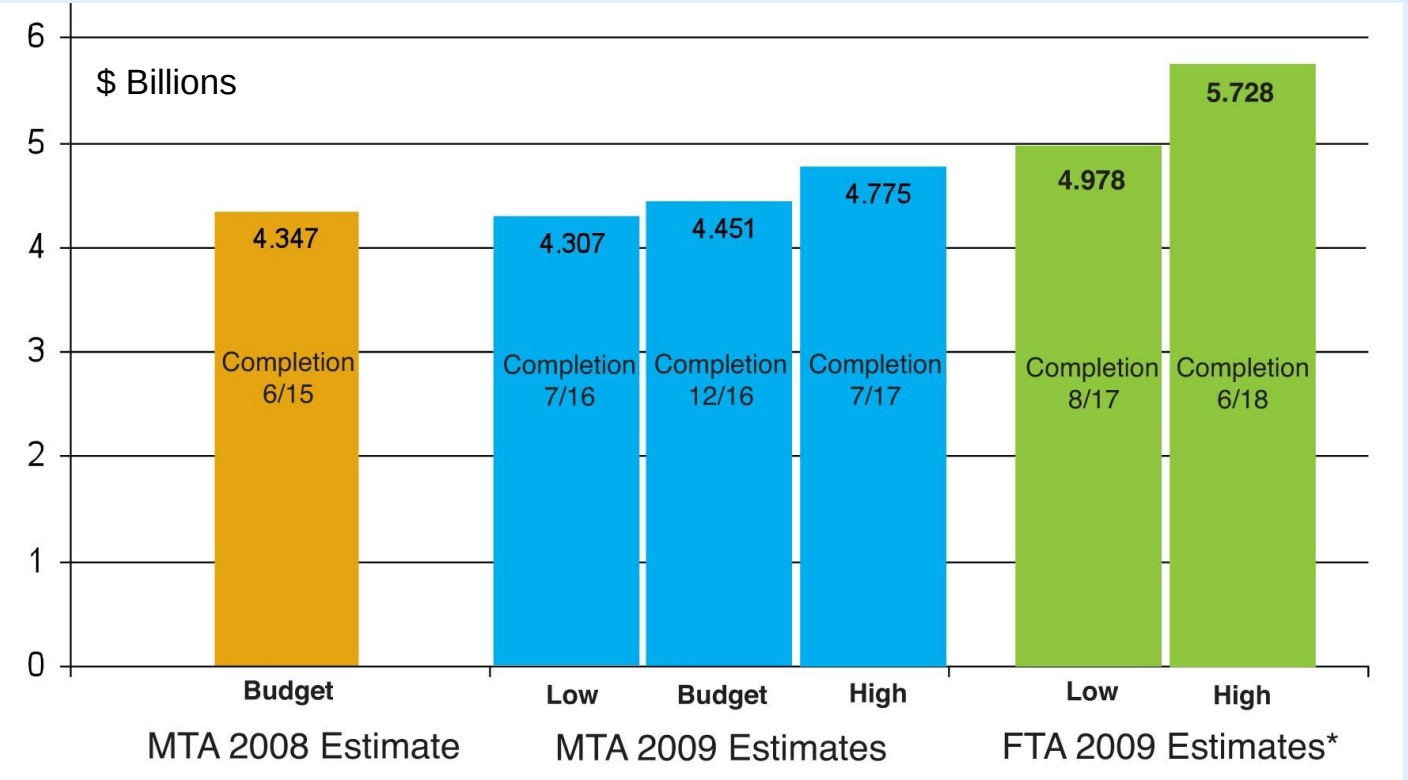
Site J Ventilation Building & Park Prior to Developer Construction

Rendering of completed building with integrated ventilation building.

Megaprojects: Risks and Rewards

- One cannot eliminate risk – acknowledge and manage it
- Institutionalize post-auditing requirements to better assess future risk
- Establish relationship between accessibility and economic activity
- Proposed megaproject costs and schedules are generally overly optimistic
- Do not use an “Everything Goes According to Plan” approach
- Utilize the “Most Likely Scenario” as the cure
- Determine worst-case scenario by analyzing negative conditions

Second Avenue Subway– Budget & Schedule



*** MTA costs assume $222 million in immediate savings opportunities, including meeting rolling stock needs through a small reduction to NYC Transit's existing spare fleet. For consistency with MTA estimates, deleted $222 million in mitigations from FTA estimates; these opportunities are still under review by FTA.**

Final Takeaway: Accountability Principles

- Establish Trust
  - Talk the talk
  - Walk the walk
- Rule-based approach vs. performance specifications
  - Design-Bid-Build vs. Design-Build

Thank You