In-Situ Thermal Remediation in Complex Urban Setting with Multiple Regulatory Agencies

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Electrical Resistance Heating
NOTES:

1. ALL LOCATIONS TO BE PRE-CLEARED TO ALLOW CLEARANCE FROM UTILITIES
2. FINAL ELECTRODE AND TMP LOCATIONS MAY SHIFT BASED UPON UTILITY LOCATIONS AS DETERMINED BY AIR KNIFE
3. CONDUCTIVE BACKFILL TO START AT 9 FT EGS AT G16, G17, H16, H17 SURROUNDING FIBER OPTIC VAULT
4. PUMP HOUSE TO REMAIN OPEN TO FACILITY PERSONNEL
5. SOUTHERN FENCE WILL BE INSTALLED 2 FT FROM KNOWN UTILITY CORRIDOR TO SOUTH
Aerial view – Long Island City
WHEN IN DOUBT...MUMBLE
Working into the Existing Environment
Long Island City – ERH Project Details

- Volume: 14,200 yd³
- Area:
  - 95% in basement
  - 5% in sidewalk below elevated rail line
- Heated zone: 12 to 37 - 55 feet
• Water table at 15 feet deep
• Primary contaminant: TCE
• Mass estimate: 300 lb
• Lithology: Silty sand with interbedded clay
OH REALLY? YOU KNOW WHAT THAT SOUNDS LIKE?

NOT MY PROBLEM.
Stakeholders

- New York Department of Environmental Conservation
- New York Department of Health
- Property Owner
- Property Management Company via engineering consultants
- 3rd Party Property Building Tenants
- New York City Department of Buildings
- New York City Electrical Advisory Board
- New York City Department of Transportation
- New York Metro Transit Authority
- New York Sewer and Water Department
- Consolidated Edison (electrical utility)
- New York City Fire Department
Project Pre-Planning

- Remediation work atypical of NYC construction
- Established NYC network critical
- Difficult recruiting subcontractors, due to limited scope
- Local construction general contractor essential
- Due diligence necessary for accurate scheduling
Public Safety

- NYC Transit Authority installation approval
- NYCTA monitored subway line during installation
- Below grade installations for tenant common space
- Proactive collaboration with electrical utility
- Preemptive voltage mitigation prior to operations
Schedule Expectations

- Unpredictable & intermittent agency/subcontractor interactions
- Local presence crucial to expedite progress
- Brutal permitting process
- Unsuccessful for over a year
- Success once local network established
Cost Assumptions

- Significant number of local subcontractors required
- High variability in subcontractor quotes
- Increased subcontractor oversight
- Scope itemization critical to avoid change orders
- Permit filing, renewal and associated fees
- Confirm union requirements
Subcontractors

- Soil Structural Engineer
- Mechanical Design Engineer
- Filing Engineer
- Filing Permit Expeditor
- Electrical Engineer #1 for Connection to grid
- Electrical Engineer #2 for connection to generator
- DOT General Contractor
- DOT Permit Expeditor
- Indemnity agreement with Consolidated Edison
- MTA Permit Expeditor
- Mechanical Contractor
- Generator Supplier
Remediation Results and Conclusions

- 12,000 lb of TCE removal
- 94% TCE groundwater reduction
- 112 days of operations (ongoing)
- Safely applied in urban setting
- Building and tenant unaffected

Site Average 94.1% Concentration Reduction
* no sample data for 48% energy sampling
Lessons Learned

• Allocate more time to develop network
• Vet subcontractors with scrutiny
• Establish realistic permitting expectations
• Identify local presence to expedite schedule
• Allocate funding: relationship building, pre-design work
• Refine cost and contracting mechanisms