Commercial Urban Drilling: Challenges and Successes

Stan Reitsma, CEO, Geosource Energy Inc.
Stan Reitsma
P.Eng., PhD | Chief Executive Officer

- Faculty - Civil & Environmental Engineering at University of Windsor from 1998-2004.
- Leading visionary & entrepreneur.
- Rockhound, innovation specialist, the ‘Master Chief’.
Passionate about sustainable solutions and environmental protection.

Relentlessly determined to change the way we see the world.

BASc, Geological Engineering; MASc, Earth Science; PhD, Civil Engineering
About Geosource

• Largest vertically integrated design/build geothermal constructor in Canada.

• Specialized in delivering vertical closed-loop geothermal systems.

• Province's largest geo-specific drill rig fleet.
About Geosource

• Industry’s leading innovator on all aspects of geothermal drilling, design, and implementation process.
• 350+ projects, including largest urban GX borefield in Canada.
• 4.8M vertical feet and counting.
Urban Drilling

- Dense Utilities
- Small Sites, Big Buildings
- Narrow Roadways
- Deep Parking
- Tight Timelines
- Neighbours
- Subways & Tunnels
Urban Drilling - Main Challenges

- Tight Sites
- Neighbours
- Permits & Utility Clearances
- Protecting the System in Future
Tight Sites

Tight sites can limit:

- Borefield capacity
- Equipment access
- Safe ingress/egress
- Onsite spoils storage
Tight Sites

Important to have efficient and functional equipment.
Tight Sites

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When you have immediate neighbours, you have to consider:

- Noise
- Mud
- Traffic Disruption
- Spoils
Neighbours
Permits and Utility Clearance

- Scheduling Impacts
- Borehole Locations
- Rig Orientation
- Protecting GHX in Future
Protecting the Boreholes in the Future
Protecting the Boreholes in the Future
Current Approaches for Urban Drilling

1. Drilling from Surface ★★★
2. Angled Drilling ★★★
3. Drilling in Coordination with Shoring & Excavation ★★★☆
4. Drilling from Subgrade Elevation ★★★
5. Drilling in Parkade Basement ★★★
Drilling From Surface
Drilling From Surface

• Our preferred (and patented) approach

• Allows drilling at existing to grade **prior to shoring & excavation**

• Tops of loops are cut & removed from excavation volume
Drilling from Surface Benefits

1. Better site access
2. Enhanced safety
3. Shorter schedule
4. Better production per rig
5. Better positioning
6. Easier spoils removal
7. Fewer rig restrictions
8. Less chance of artesian conditions
Drilling from Surface – Horizontal Work
Angled Drilling

- Custom rigs allow for drilling at up to a 20° angle off vertical
- Used for small sites & retrofit projects
- Lots of flexibility in timelines
Angled Drilling

- Existing building & new development
- Lots of mature trees
- 113 holes to 850' - 52 vertical, 61 angled
Angled Drilling – Horizontal Work
Drilling in Coordination with Shoring & Excavation

Not preferred, especially on smaller sites
Drilling in Open Excavations
Drilling in Open Excavations

Not preferred, can cause a number of issues
Drilling in Underground Structures

- Not done by Geosource
- Small, modular rigs that can fit within underground structures
- Innovation led by Geothermal Drilling Solutions - RIGINABOX™
Drilling in Underground Structures

- Electric rigs currently in design for Geosource
- Quieter, no air quality issues
- Need to ensure enough power is available
In Summary

• Urban drilling has its challenges, but many can be mitigated by your drilling method.

• Organization & advance planning are critical to keep site clean & safe.
Thank you!