



Horizontal Remediation Wells Overcome Remediation Obstacles from Installation to Closure

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Outline



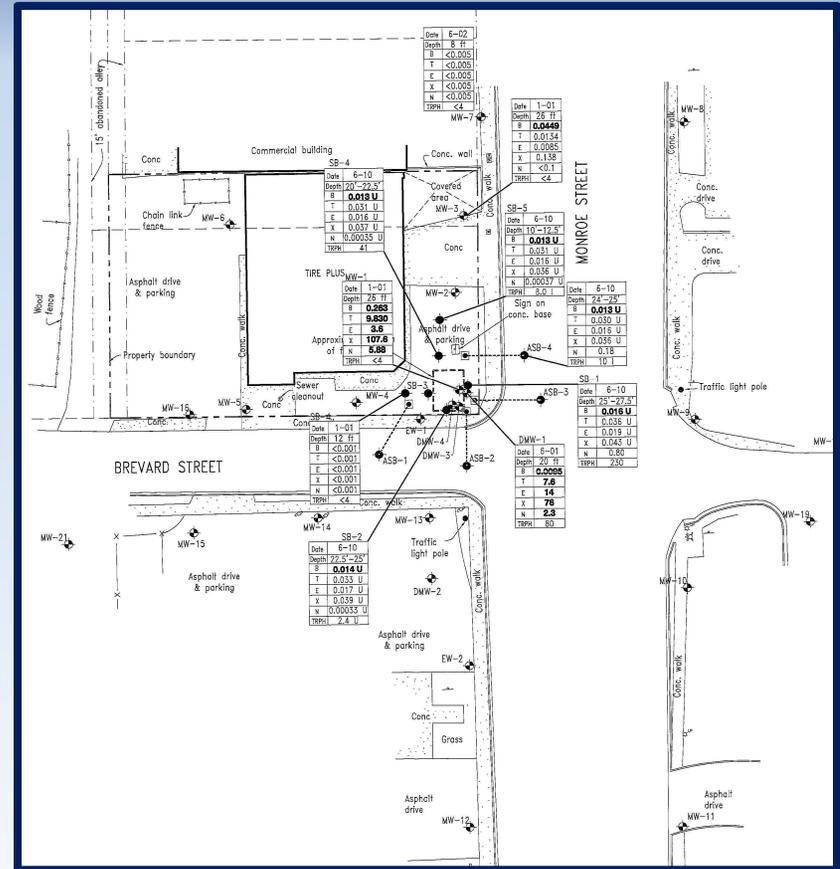
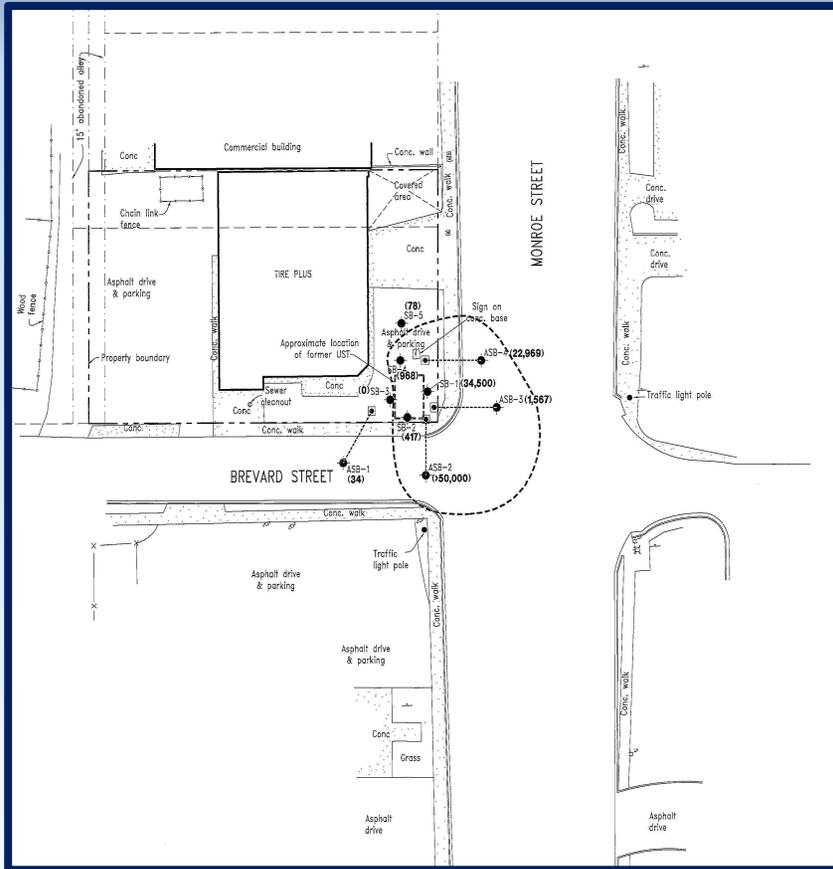
- Site History and Characteristics
- Obstacles presented during design
- Obstacles presented during installation
- Obstacles delaying site closure
- Conclusion
- Questions

Site History and Characteristics

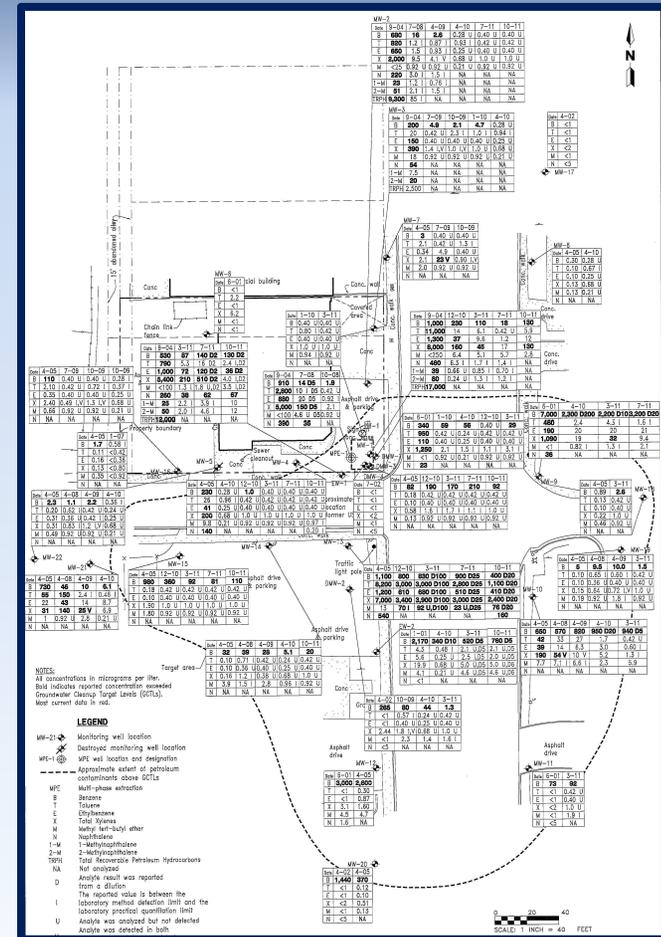


- Former retail gas station and automotive repair
 - 3 Gasoline Underground Storage Tanks (UST) improperly abandoned in place
 - 1 used oil UST removed from site
- Contaminants (Soil and Groundwater)
 - BTEX
 - PAH
 - TRPH
- Off-site soil and groundwater contamination under major intersection

Soil Analytical Maps



GW Analytical Map

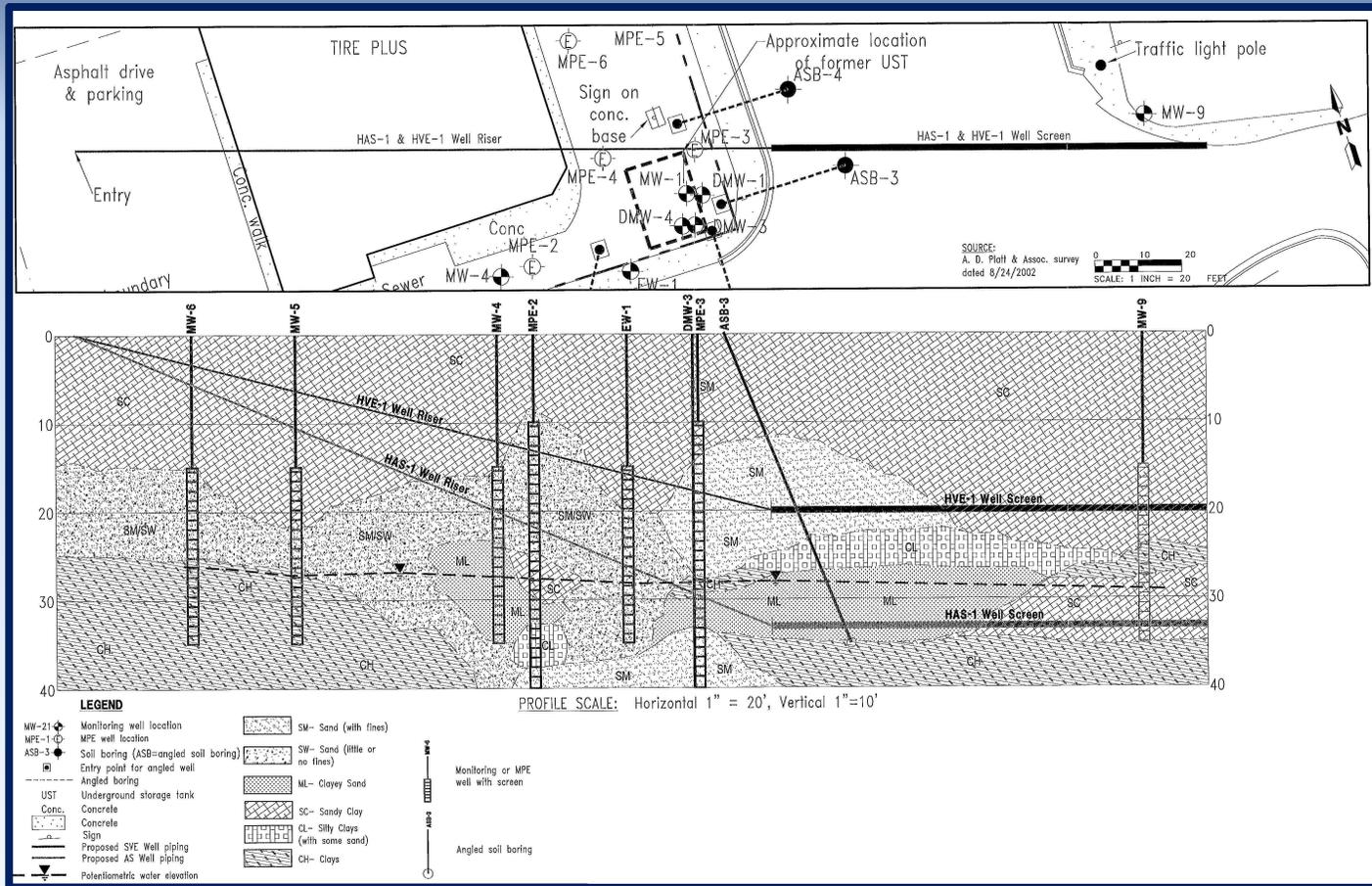


Obstacles Presented During Design Phase

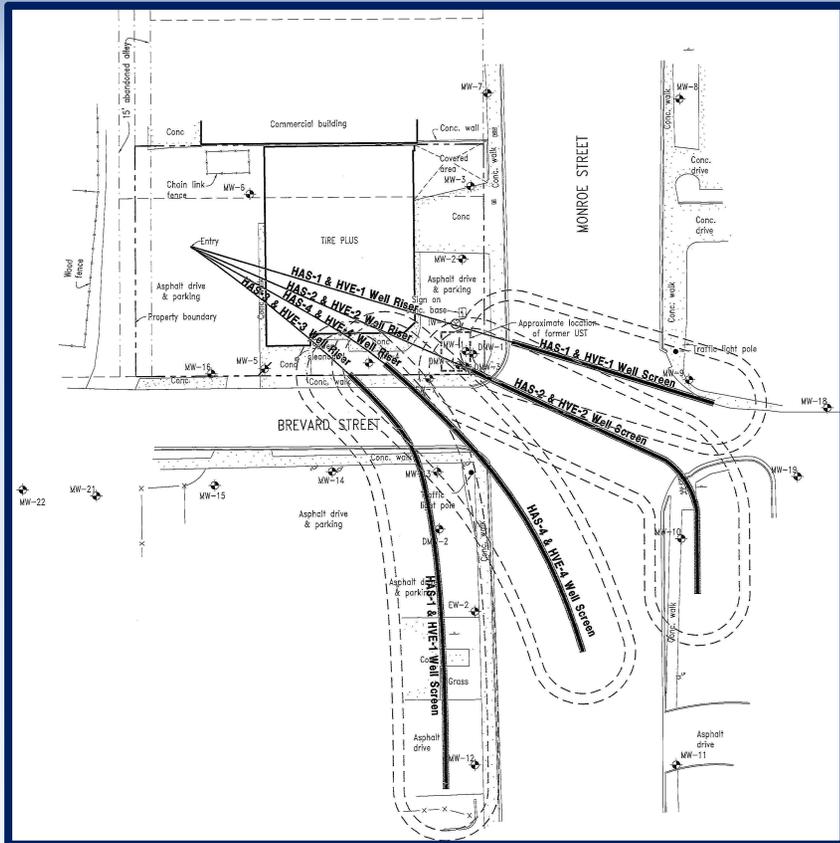


- Reach contamination under and across the intersection
- Cannot shut down roads
- Large plume
- Achieve cleanup target levels in identified key off-site monitoring wells per agreement
- Variable lithology with confining layer of clay
- Client's layout outside the capabilities of equipment (tight curve radii)

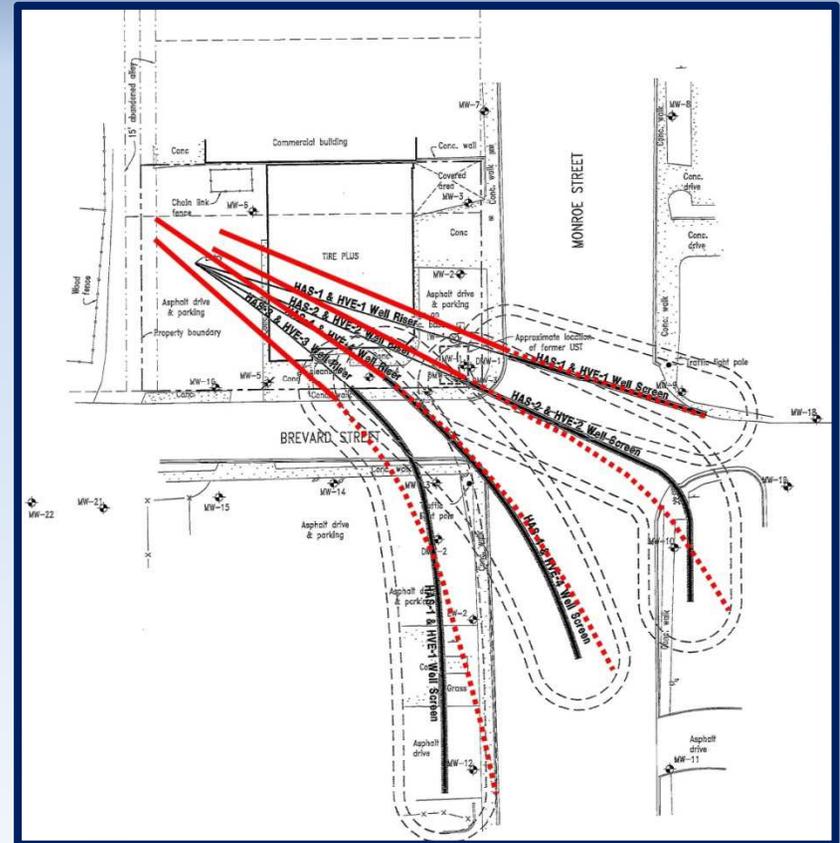
Lithology



Client's Original Design



Modified Design



Obstacles Presented During Installation



- Walk over locating without closing roads
- No business interruptions
- Drill under building and intersection without exiting ground
- Lithology – sand
- Underground and overhead utilities
- Confined site access

Obstacles Delaying Site Closure



- Mobilized contaminants
- Down-gradient key monitoring wells outside of the radius
- Pockets of contaminants around UST area
- Fluctuating water table, dry monitoring wells

Installation Hookup



Conclusions



After less than 1 year of horizontal remediation system operating:

Monitoring Well ID	Designation	Baseline BTEX (µg/l)	Year 1, 3 rd Qtly BTEX (µg/l)	% Reduction from Baseline
MW-1	Source area	277.9	dry	-
MW-9	Source area	3232	dry	-
MW-11	Source area	92	65	29.34
MW-13	Source area	4310	157	96.35
EW- 2	Source area	760	14	98.15
Totals		8671.9	236	-

Horizontal remediation wells were the right choice to overcome the many obstacles on this project.

DIRECTIONAL
Technologies, Inc
Horizontal Directional Drilling Services

Horizontal Remediation Wells

Horizontal Remediation Technologies • Installation • Design • Engineered Well Screens • Services

Questions?

Founded in 1992, Directional Technologies, Inc. has installed over 1,000 horizontal remediation wells thru out the world.

Corporate Headquarters in Wallingford, CT
Branches offices in Philadelphia, PA; Ashby, MA; Tallahassee, FL

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