



Guided Boring and Pipe Jacking Provides Relief from Flooding for the City of Mequon

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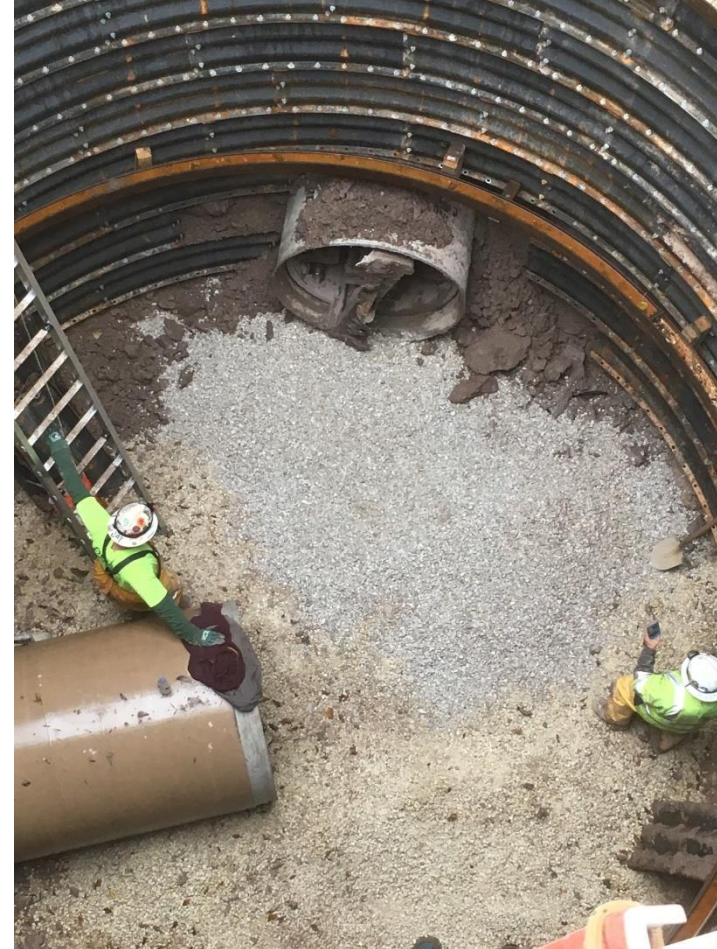
Minger Construction Co., Inc.





Outline

- Introduction
- Design
- Geotechnical Conditions
- Contracting & Construction
- Challenges
- Lessons Learned & Conclusions





Introduction

- Wet weather events in SE City of Mequon causing flooding and backups
 - WDNR & MMSD regulations not being met
- Commissioned wet weather relief sewer study in 2016
- Emphasis on minimized disruption to residents, businesses and traffic and future growth along Port Washington Road identified as design priorities



Introduction

- R.A. Smith Inc. designed the East Trunk Sewer design project
- SE Section of City of Mequon, WI, Ozaukee County, two miles west of Lake Michigan
- Low bid was \$14.8
 - Minger Construction Co., Inc. in April 2018 with an NTP in May 2018

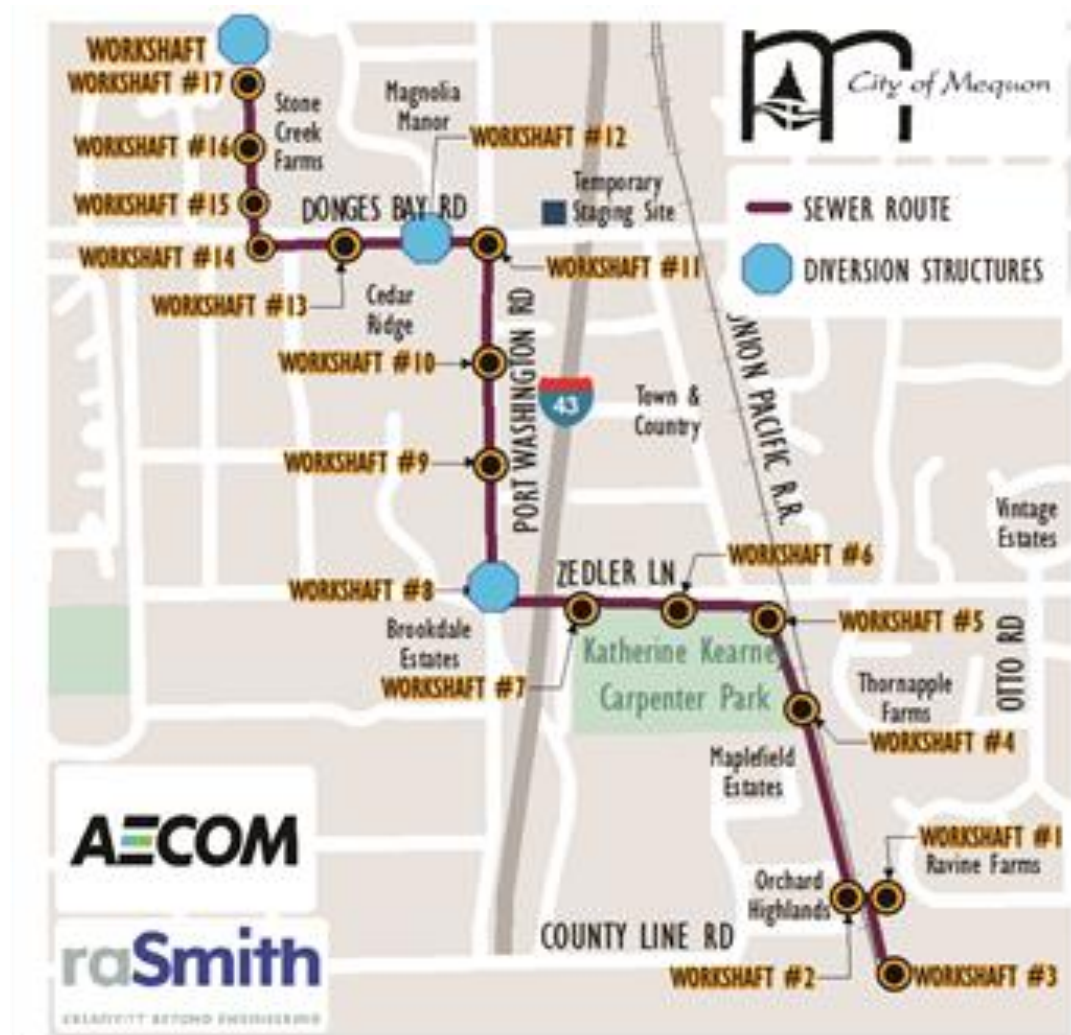


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Trenchless Construction

- 1,315-lf. of 24-in. – trenchless - PTMT
 - Increased to 2,365-lf.
- 7,985-lf. of 48-in. – trenchless – TBM
- 1,366-lf. of 24-in. – open-cut
 - Reduced to 316-lf.





Design

- Design considerations included:
 - Improved wet weather relief sewer
 - Minimal disruption to residents, businesses and surfaces
 - Minimal disruption to Katherine Kearny Park
 - Proximity to Union Pacific Railroad
 - Increased capacity for future development and lift station
 - Compliance with the WDNR and MMSD



Design

- Original design included 1,366-ft. open-cut
 - Three open-cut alignments converted to pilot tube guided boring
 - Reduced total open-cut to 316-ft.
- Microtunneling specified for longest 1,288-ft. run
 - Geotechnical conditions, lack of surface space made TBM installation feasible and cost-effective



Geotechnical Conditions

- Soil Test Borings:
 - Collected from 6-144 feet below existing grade
 - Strata composed of mostly clay 55-66%
 - Silt composed 22%
 - Sand composed 8-23%
 - No groundwater





Contracting & Construction

- Prime contractor Minger Construction Co. Inc. of Jordan, MN
- Two trenchless technologies used
 - 48" Hobas®, installed with (2) - Akkerman WM420 TBM systems, 11 drives
 - Minger of Jordan, MN and J & J Boring of Winfield, MO as subcontractor to accelerate installations
 - 24" Hobas®, installed with guided boring system, PTMT, 6 drives



Contracting & Construction - TBMs

- Minger completed 7 drives with TBM system
- J&J completed 4 drives with TBM system
- Installation at 26 – 32-foot depths
- Time of TBM project construction – 6 months
- 133 to 1,288-lf.
- Challenges: Proximity to UPRR, Katherine Kearney Carpenter Park, live traffic from freeway



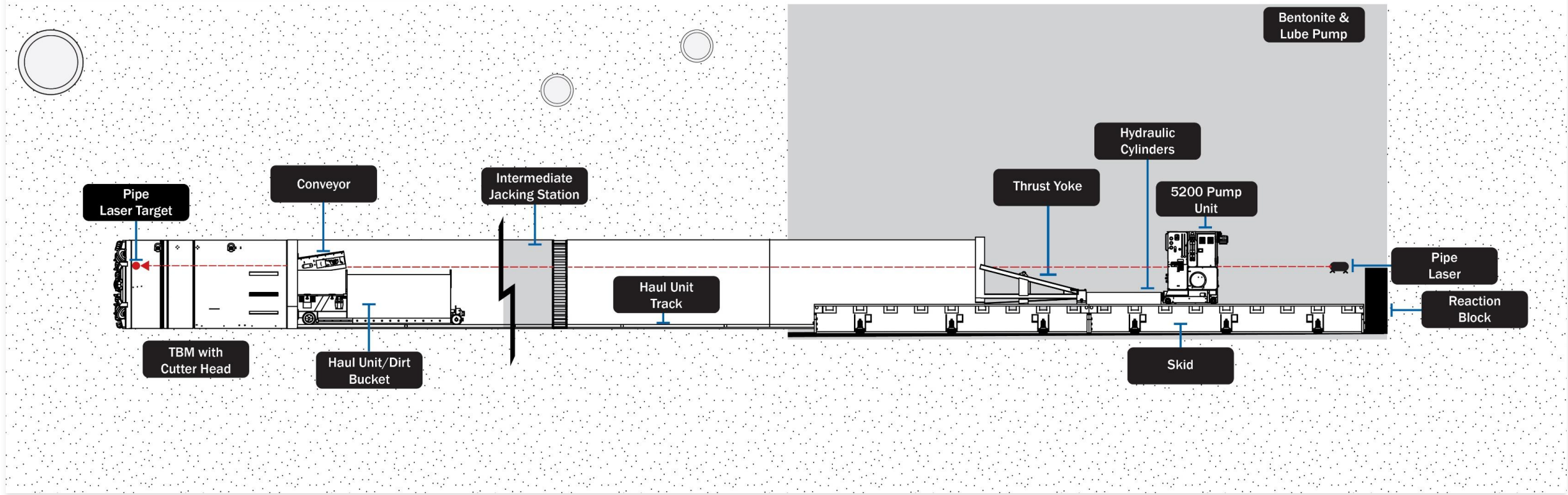
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Run #	Location	Length	Slope
1	Union Pacific Railroad (SE) (J&J)	1,288	0.3%
1	Along Union Pacific Railroad (SE) (Minger)	434	0.1%
2	Union Pacific Railroad & Katherine Kearney Carpenter Park (J&J)	921	0.08%
2	Between Union Pacific Railroad (SE) and McIntosh Lane at Orchard Highlands (Minger)	133	0.86%
3	N. Port Washington Road (J&J)	983	0.08%
3	Zedler Lane (Minger)	771	0.08%
4	N. Port Washington Road (J&J)	893	0.08%
4	Zedler Lane (Minger)	551	0.06%
5	Zedler Lane – Under I-43 (Minger)	619	0.09%
6	N. Port Washington Road (Minger)	752	0.08%
7	Donges Bay Road & North Magnolia Drive (Minger)	640	0.08%
	Total	7,985-lf.	



Contracting & Construction - TBM





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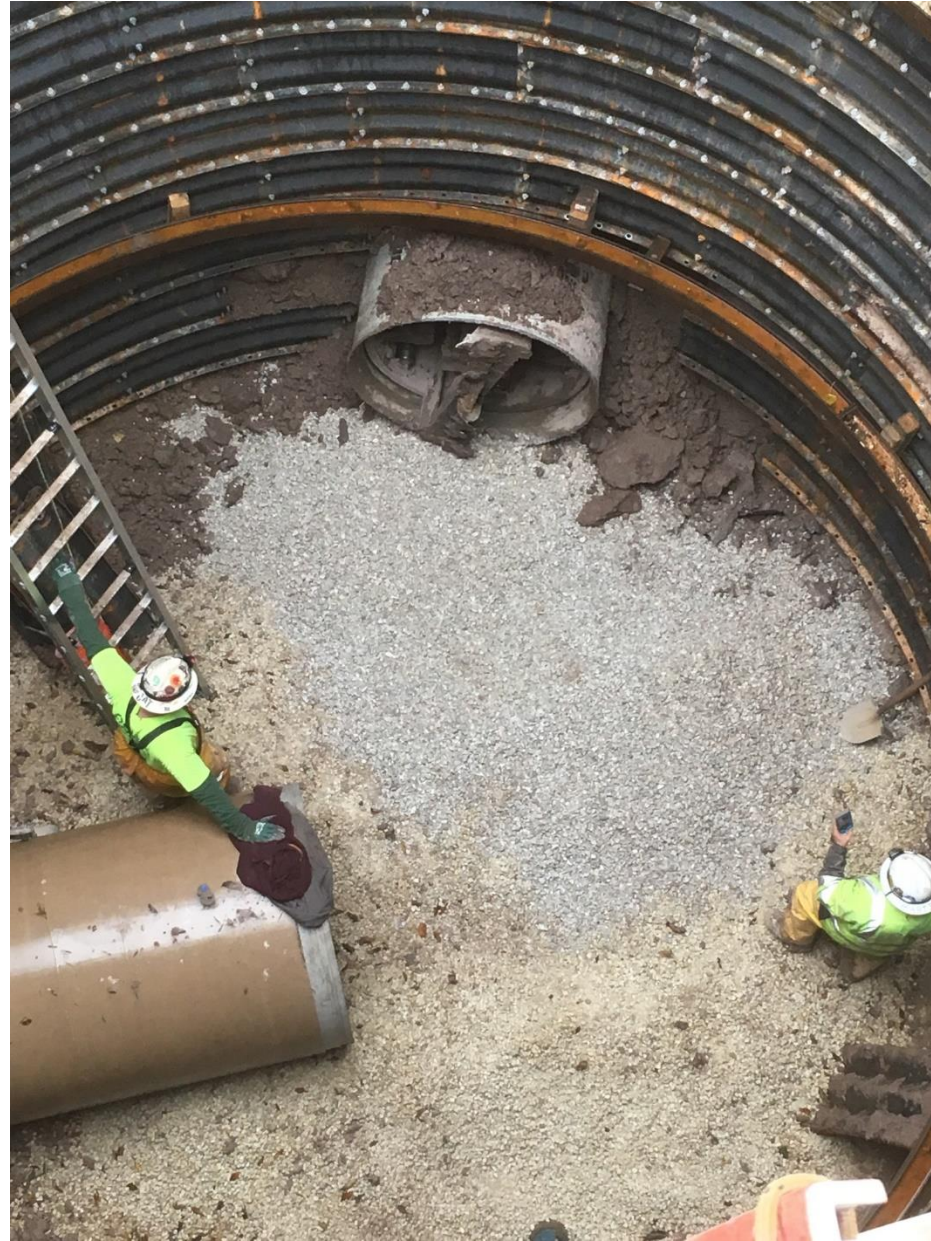






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Contracting & Construction - GBM

- Minger completed 6 drives with GBM system
- January – May 2019
- 294 to 570-lf.
- 1,050-lf. converted from open-cut to pilot tube for minimized disruption and efficiency
- Completion ahead of schedule



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Contracting & Construction – GBM

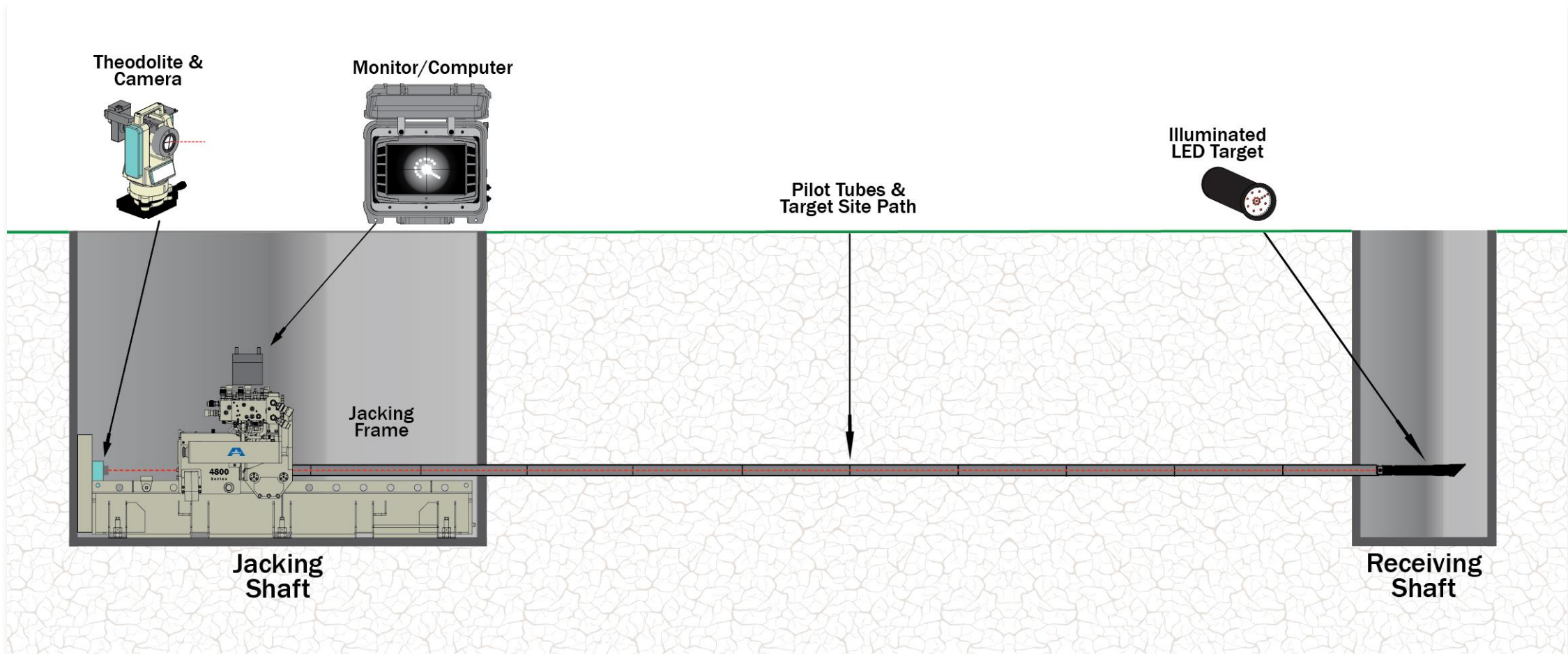
Run #	Location	Length	Slope
1	Dongers Bay Road	570	0.7%
2	Dongers Bay Road	451	0.7%
3	Stone Creek Drive	294	0.35%
4	Stone Creek Drive – Originally Open-Cut	331	0.1%
5	Stone Creek Drive – Originally Open-Cut	339	0.27%
6	Stone Creek Drive – Originally Open-Cut	380	0.2%
	Total	2,365-lf.	



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Contracting & Construction – GBM Step 1

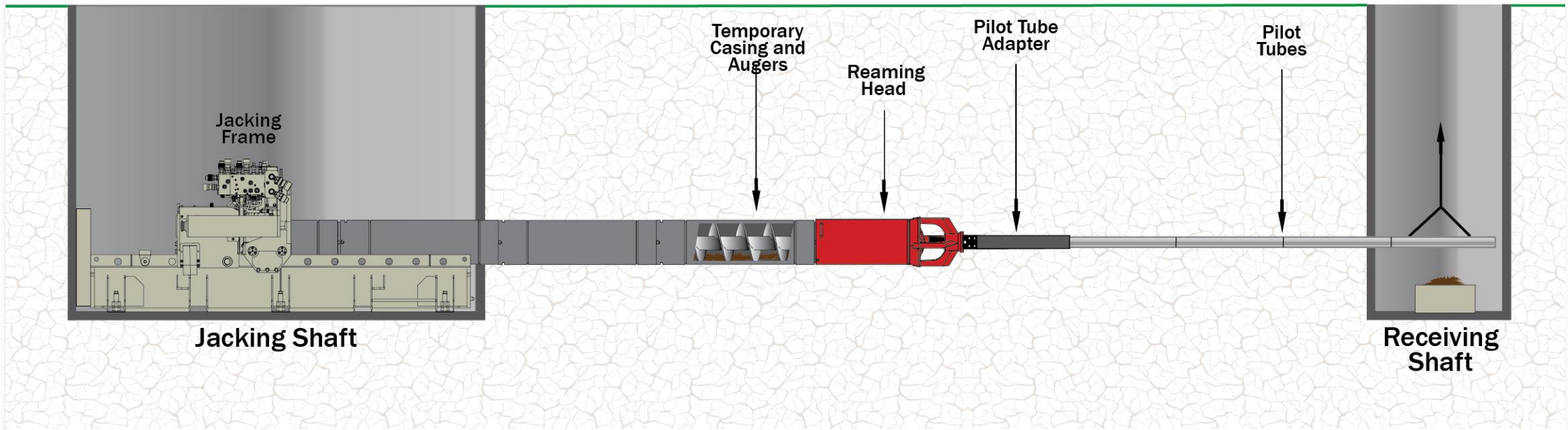




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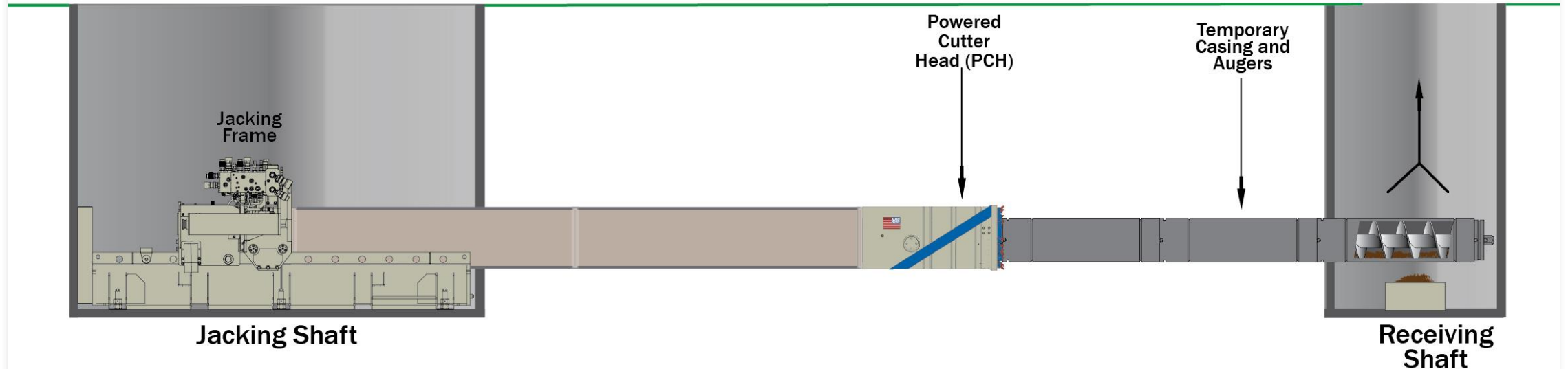
Contracting & Construction – GBM Step 2





Contracting & Construction – GBM

Step 3





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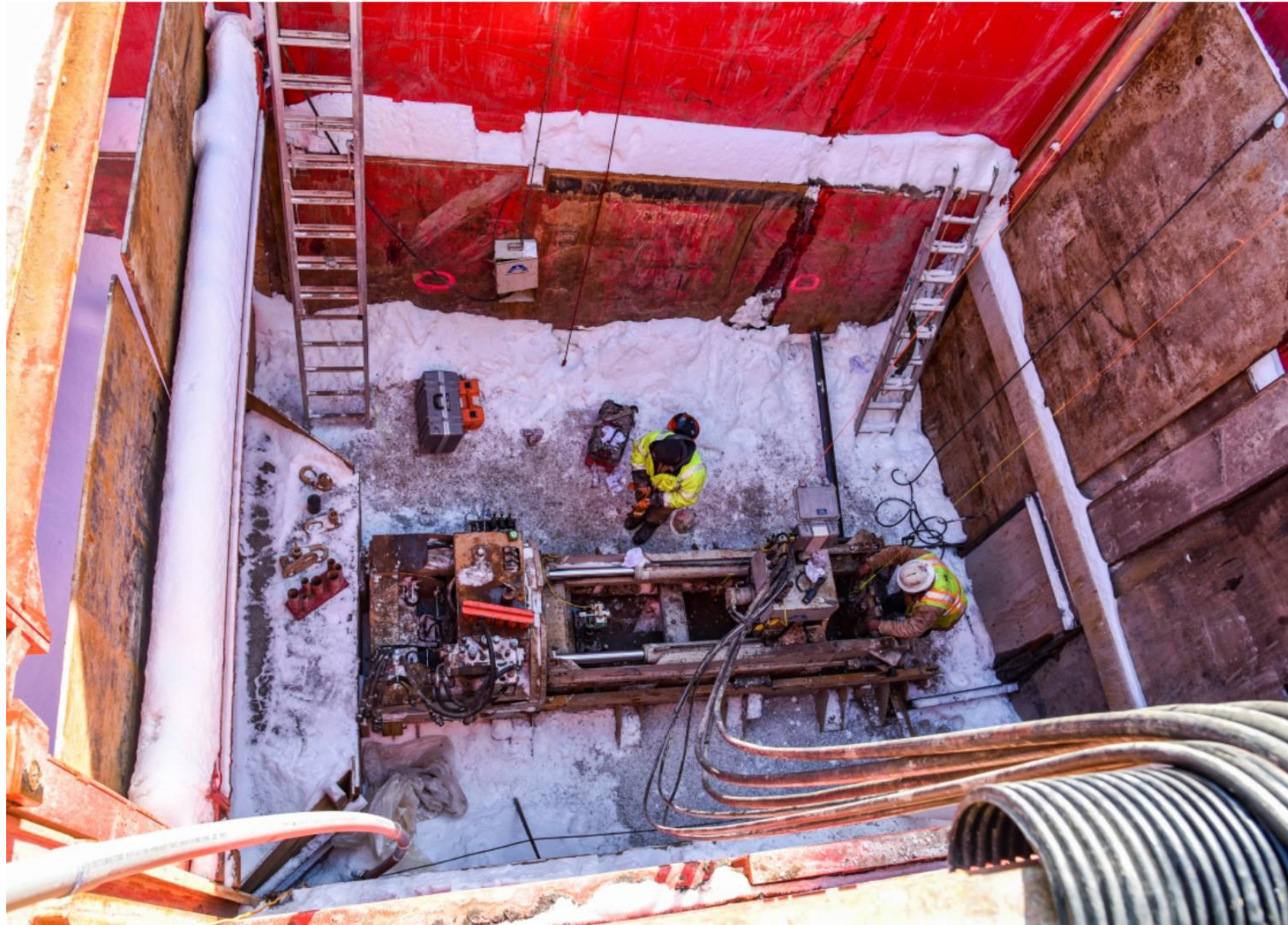
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Challenges

- Proximity to UPRR, Katherine Kearney Carpenter Park, live freeway traffic
- Squeezing clay
- Presence of existing buried utilities in proximity on all drives
- Risk associated with potential for settlement under the UPRR and several roadways
- Unanticipated boulders



Lessons Learned & Conclusions

- Thorough geotechnical summary and contact documentation for obstructions eliminates a lot of conflict
- New challenges = new solutions in the toolbox
- Smart design, good communication and coordinated schedules are a must
- Everyone wins when owners believe in inherent value of trenchless methods



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「 Questions? 」



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Thank you!

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