High Speed Installation of Buried Medium Voltage Electrical Distribution Lines Using a Single Pass System

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Category 1

Project Vision

Development of a novel prototype technology to seamlessly install medium voltage underground cables at a reduced cost of conventional approaches by simultaneously boring and installing conduits, thereby eliminating the pullback step required using Horizontal Directional Drilling (HDD).

GOPHURRS
Kickoff Meeting
May 2nd, 2024
Charlotte, NC

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Vermeer

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Conventional Utility Installation Methods

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Project Objectives

- **Project success should result in the following benefits:**
  - *Underground installation of medium density electrical distribution cables at a higher speed and lower cost*
  - *We aim to create a technology cable of boring and installing the conduit(s) during the same process thereby reducing the workface activity in half*

Metric	State of the Art	Proposed
Installation costs	$4.5M - $5M per mile	$2M - $3M per mile
Installation productivity	100 ft/day (12” conduit)	400 ft/day (12” conduit)
Conduit installation	Two step process	Single step process
Inadvertent returns	Possible	Eliminated

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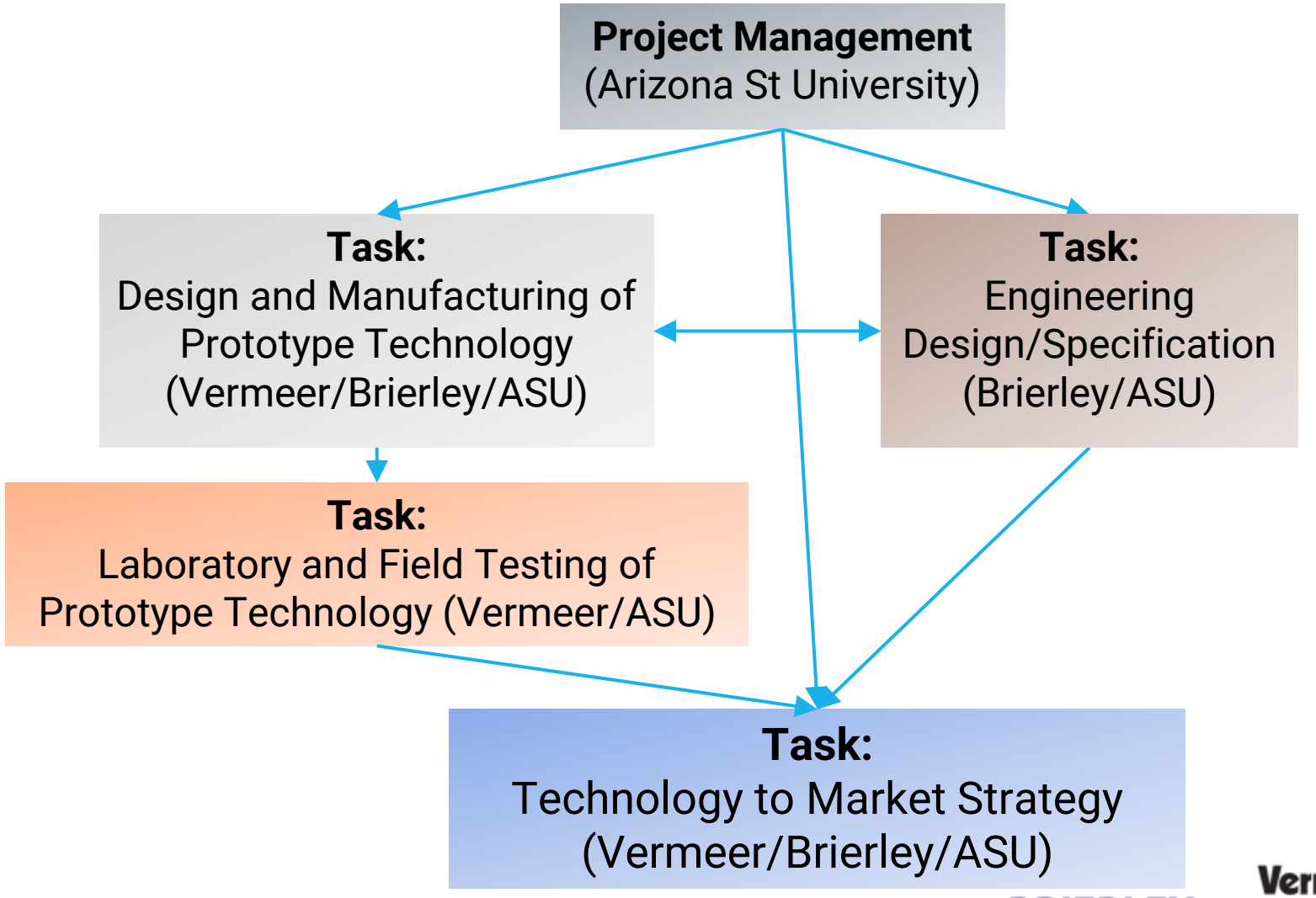
Project Team



The team is geographically spread out between Tempe, AZ/Pella, IA/Manchester, NH

Virtual project update team meetings will be held every 2-3 weeks

Face-to-face meetings will be held based on project milestones

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Overview of High-level Tasks

Water Jetting Approach for Soil Excavation

- Specifications to reach a nominal speed of 60 feet per hour while installing 3, 5” conduit that meets national electric code (NEC) requirements, consisting of materials like HDPE, PVC, or fPVC (along a 500 ft bore in soil).
- Fluid pressure inside of the rotary nozzles will be approximately 3,000 psi. Once the fluid is ejected from the nozzle the pressure is converted from potential energy into kinetic energy. The kinetic energy produced is what helps dislodge fresh soil.

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Overview of High-level Tasks

1) Development of drill head, spoils conveyance assembly, power system unit, and control systems
2) Integration of above components
3) Pre-field testing of prototype (100-foot section)
4) Field testing proposal to ARPA-E

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Technical R&D Details

- Components will be broken into subsystems for testing single or combined components.
- Laboratory testing performing incremental, subcomponent lab tests to ensure that high risk components are prioritized and validated that they are properly working in the early stages of the project.
- Once confirmed, integrated lab testing on the developed prototype will be conducted prior to field deployment. The down hole subsystems have been prioritized in the project schedule to focus on the greatest uncertainty early.
- The first (critical) step will be to design and assemble a steerable drill head and complete preliminary laboratory testing.

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Technical R&D Details

- *What are its novel aspects compared to the state of the art?*
  - *The ability to bore and install the conduit simultaneously.*
- *What are the current key performance metrics?*
  - *Drill head diameter, bend radius, slurrification, water pressure at nozzles, minimum friction force to overcome, etc.*
- *What key tests do you intend to do?*
  - Various component laboratory and field tests
- *What has been de-risked so far in the broader community? What are key challenges? How will **you** de-risk those challenges?*
  - Components are broken into subsystems for testing single or combined components
  - High risk components are prioritized and validated at an early stage of the project
  - Leverage existing experience in hydro-excavation and pneumatic conveyance to design using best practices

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Technology-to-Market Approach

- *What is your team's plan to commercialize your technology?*
  - *Patent applications will be submitted to protect the IP*
  - *Market analysis to determine size and entry points*

- *What is your anticipated business model (e.g., licensing, spin-out company, internal business unit)?*
  - *If viable, Vermeer may set up a commercial manufacturing line at their factory in Pella, IA*
  - *If viable, Vermeer has an international dealer network that may facilitate sales of the technology to industry stakeholders (contractors, agencies, etc.)*
  - *Team members may conduct technical presentation at various conferences*

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Industry Advisory Committee Guidance

Name	Organization	Title
Tober Francom, PE	Pacific Gas & Electric	Manager, North Coast Electric Distribution Construction Management Team
Joseph Somma	Consolidated Edison	General Manager, Project & Work Resources Mgmt./ BSTS EO Team
Ben Nelson	Michels Pacific Energy	President
Phill Perron	The HDD Company	Vice President, Projects
Jim Lagios	Atlas Trenchless	President/General Manager
Aaron Cohen	InEight: A Kiewit Company	Director, Estimating Products
Dennis Doherty, PE	Terracon	Senior Engineer
Kerby Primm, PE	Burns & McDonnell	Technical Consultant (Trenchless)
David Bennett, PE	Bennett Trenchless Engineers	Co-Owner/Principal Partner
Noel Guercio, PE	Stantec Consulting	Operations Leader – US Northeast

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Needs and Potential Partnerships

- *Anticipated needs following the completion of the award to continue to move your technology towards commercialization*
  - *Additional funding to move to full-scale development and manufacturing*
- *Capabilities or resources you can offer to others in the program*
  - *Our team has extensive expertise in trenchless technologies, particularly Horizontal Directional Drilling/Boring activities*
  - *Our team has expertise in various areas of Engineering (Civil, Mechanical, Electrical, Materials)*

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Q & A

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