

4-24-2020

## Prototype of and ISU Farm Disinfection System for Use in Emergency Disease Outbreak

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### Recommended Citation

Devine, Matt; Hinrichs, Noelle; Horbas, Taeh; Anderson, Michael; and Koziel, Jacek A., "Prototype of and ISU Farm Disinfection System for Use in Emergency Disease Outbreak" (2020). *TSM 416 Technology Capstone Posters*. 4.

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## Prototype of and ISU Farm Disinfection System for Use in Emergency Disease Outbreak

Client: Iowa State University, Ames, Iowa

### Problem Statement

As the nation's largest pork-producing state, Iowa has the upmost priority to protect its swine population from ailments, including biosecurity hazards such as swine disease. This is an essential issue for swine farmers across the state and worldwide need to have the ability to be prepared for. This project provides a design and list of materials for a system that removes organic material and disinfects both large machinery and small items efficiently, with a budget under \$1500.

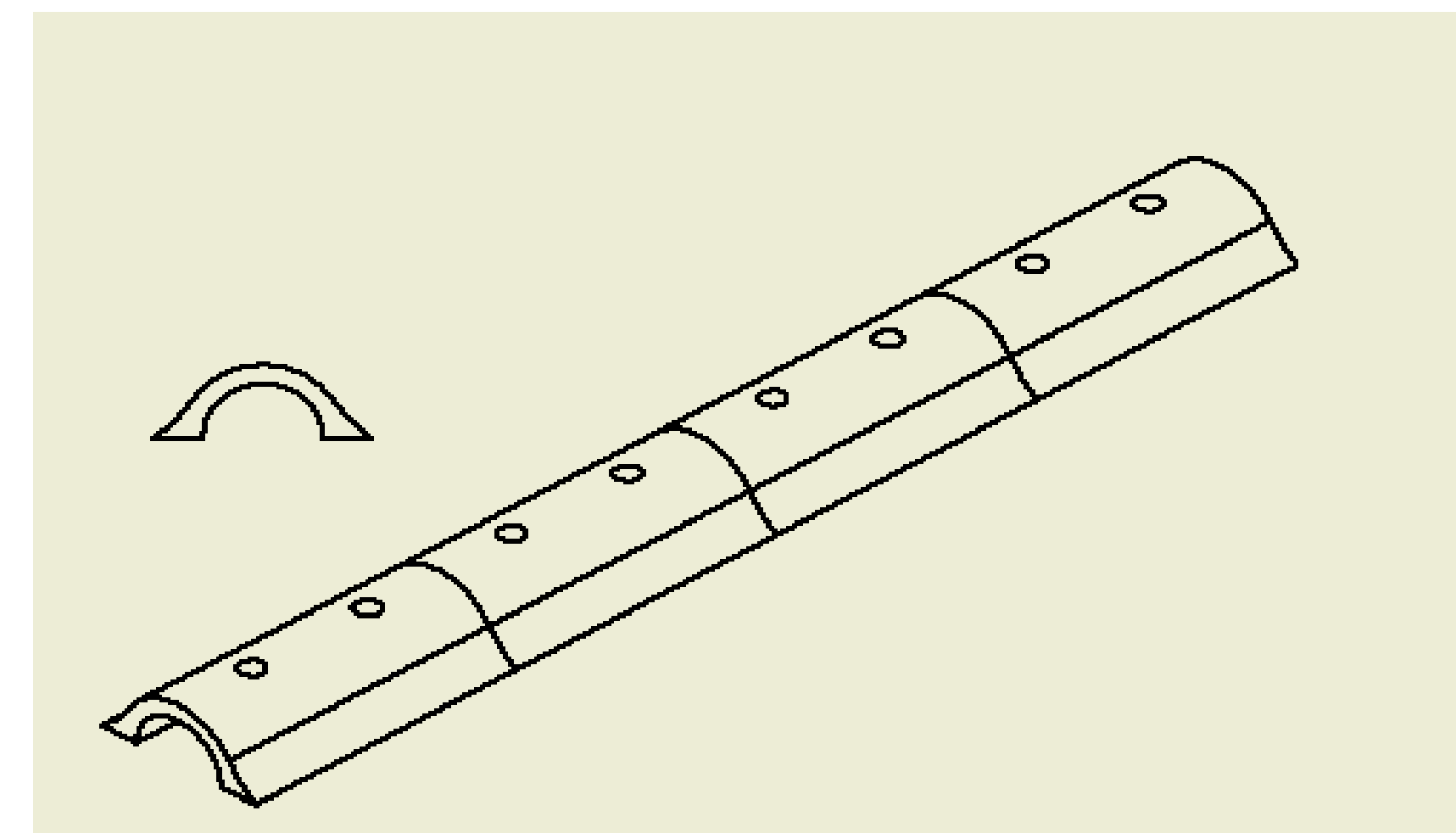
This design also utilizes a materials that can be accessed within a half hour drive of even the most remote lowan farms, along with nationwide vendors.

### Objectives

- Develop an efficient method of disinfection with materials that are readily available to rural farmers
- Prevent the spread of infectious diseases & promote biosecurity
- By completing this process, anything from large machinery to small items will be free from dirt, containments, and have at least 95% of its surface area disinfected

### Constraints

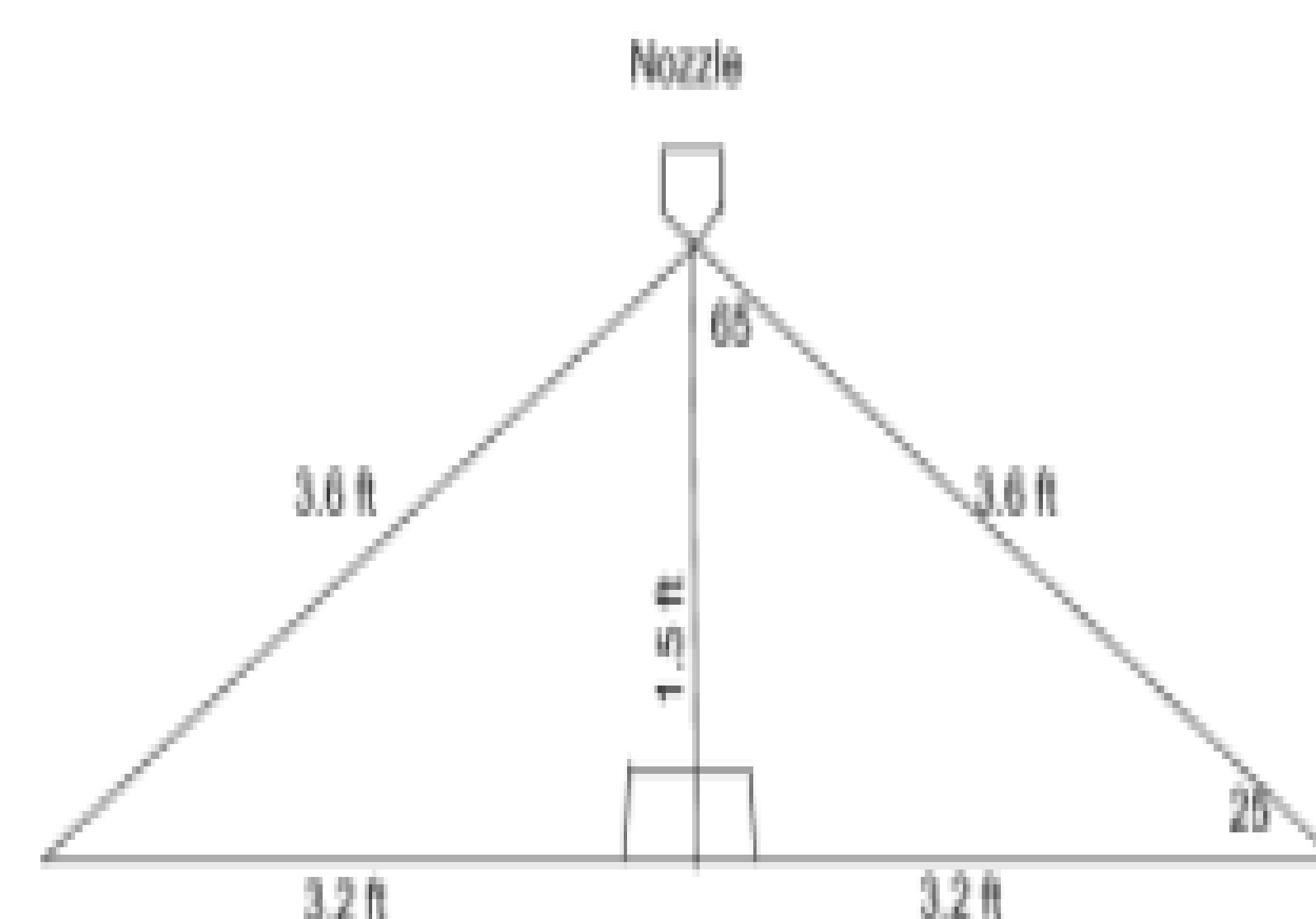
- Budget: \$1,500
- Materials: 2 sources acquirable in rural Iowa and 2 nationwide vendors sources
- Spray coverage must cover >95% of surface area
- Takes ½ the time as doing the disinfection process manually
- All surfaces the contaminated water must be collectable
- The waste water must be able to be contained



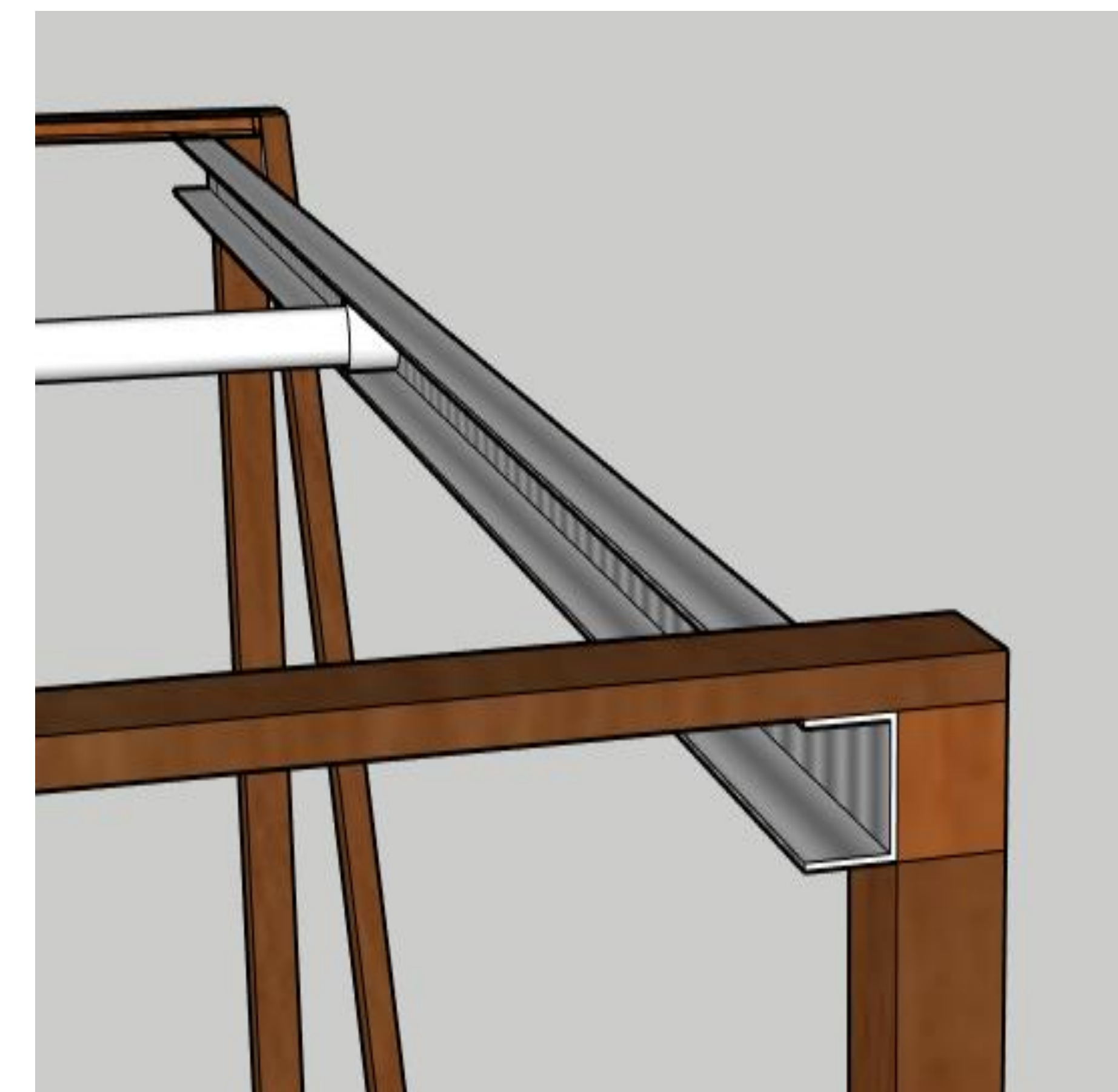
*Speed bump to go over drain. Pressurized water and disinfectant will remove organic material from the underbodies*



*Drive through rail design with a drain underneath to collect runoff*



*Each nozzle has a spray area of 6.4 feet*



*A pulley system is used to move the rail of nozzles to target different areas as necessary to decontaminate*

### Scope

- Design AutoCADs within constraints and have final design selected by client via decision matrix
- Develop material list within budget and ensure that materials are available or can be substituted for at various vendors
- Create an animated video
- Refine and build an improved prototype for further testing

### Methods/Approach

The vehicle drives into biosecurity wash at as high-pressured water removes organic material and disinfects. Different areas can be targeted by utilizing the pulley system to move the pressurized water and the wand on the power washer can reach niches and other hard-to-access areas. The waterproof tarp and drain collect the contaminated runoff for proper disposal

### Major Deliverables

- Multiple AutoCAD designs
- Decision Matrix
- Itemized Budget
- Animated video with chosen design displaying capabilities
- Theoretical mathematical evidence that our system would be effective with supporting diagrams
- Material list with state-specific and national vendors

### Recommendations

- Fully-automated system
- Metal materials for improved longevity
- Use a gravel surface
- Add motions lights for nighttime visibility
- Add heat cable to prevent freezing of tubing during cold weather

### Acknowledgement

A special thanks to Dr. Ramirez for his time commitment to this project.