

IOWA STATE UNIVERSITY

Department of Agricultural and Biosystems Engineering (ABE)

TSM 416 Technology Capstone Project

ISU Transportation Building Redesign

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Client: ISU Transportation Services, Haber Rd, Ames, IA 50011, <https://www.transportation.iastate.edu/>

1 PROBLEM STATEMENT

Problem Statement

ISU Transportation Services is an organization within Iowa State University that works on and maintains all of the rental vehicles. They need a more efficient way of maintaining their fleet of vehicles. They do not have enough space for the number of vehicles they are taking care of anymore and, therefore, need a larger area to work on, store, and clean their vehicles. As of now, there is no budget for this new design, but we must consider different alternatives that can be used or not used in the final design to keep the overall cost reasonable.

Business Case

ISU Transportation Services needs a more efficient way of maintaining its fleet of vehicles. This is because they have too many vehicles for the space they are currently in. From this overload of vehicles, the ISU Transportation services run out of space much faster than they can afford. The employees are doing everything they can with the space provided, but they need more space to work on the vehicles to be as efficient as possible. Our approach to solving this problem is to design a new building for working on the vehicles. This will give the technicians more space to work on vehicles, store parts, and a much more streamlined process to efficiently work on the vehicles. Other factors such as fueling stations, wash bays, and storage needs to be taken into account because, for the technicians to work as

efficiently as possible, they must be placed in a specific position to not get in the way of the main building or affect the flow throughout the main shop to be designed.

2 MAIN OBJECTIVE

The main objective for this project is to design a new shop that meets all of the needs of ISU Transportation Services but still improves the efficiency of flow, overall space, storage, and bringing all of the employees within one building. The new building concept and design must be approved by the technicians within Transportation Services and facility management. The new design must remain within property limits and improve the overall efficiency of the current operation.

Main and Specific Objectives

- **The main objective:** Design a new shop that will meet the specific needs of ISU Transportation Services
- **Specific objectives include:**
 - Design an efficient shop
 - Improve shop space
 - Improve storage space
 - Provide office spaces within the new shop
 - Include a wash bay
 - Include gas fill-up stations
 - Gas
 - Diesel
 - Electric power
- **Rationale**
 - Overall efficiency will be improved
 - The square feet of the new facility will be improved
 - Storage will be greatly improved
 - New offices will be included
 - The customer will be happy with the new design
- **Project Scope**
 - The new design must stay within the land constraints
 - The new design must meet the budget constraints
 - The new design must fit all of the customer needs

3 METHODS/APPROACH

The size of the concrete was measured. After the size of useable space was estimated, we designed a shop and stacked parking lot. We kept the Parts Delivered area, fueling areas, and the carwash. The bottom floor is for vehicle maintenance and all in-house tasks. During our design process, we toured shops in Des Moines to find design ideas. Many design inputs and ideas came from current technicians and staff associated with ISU Transportation Services.

Data collection: Data collection came from measurements and design inputs. Creating a better design to keep all work in-house, more space for technicians, a design that could keep the shop open while being created, and a better experience for customers.

Solutions: The solution was created through design input and ideas from group members and faculty. We created a design that would keep all tasks in the house, keep the shop open while being created, make more space for technicians, better parking and storage for parked vehicles, more office space so all members could be under the same roof, added break rooms and meeting rooms, as well as designed the parking, fueling, and interactive experience for the customers to be easier and more user friendly. We measured our design solution from the feasibility and usability of the final design.

Organization:

- Bi-weekly meetings with the client. Email communication.
- We designated work to be even and let team members use their strengths.
- Design drafts are considered major milestones.

4 RESULTS

Results/Deliverables

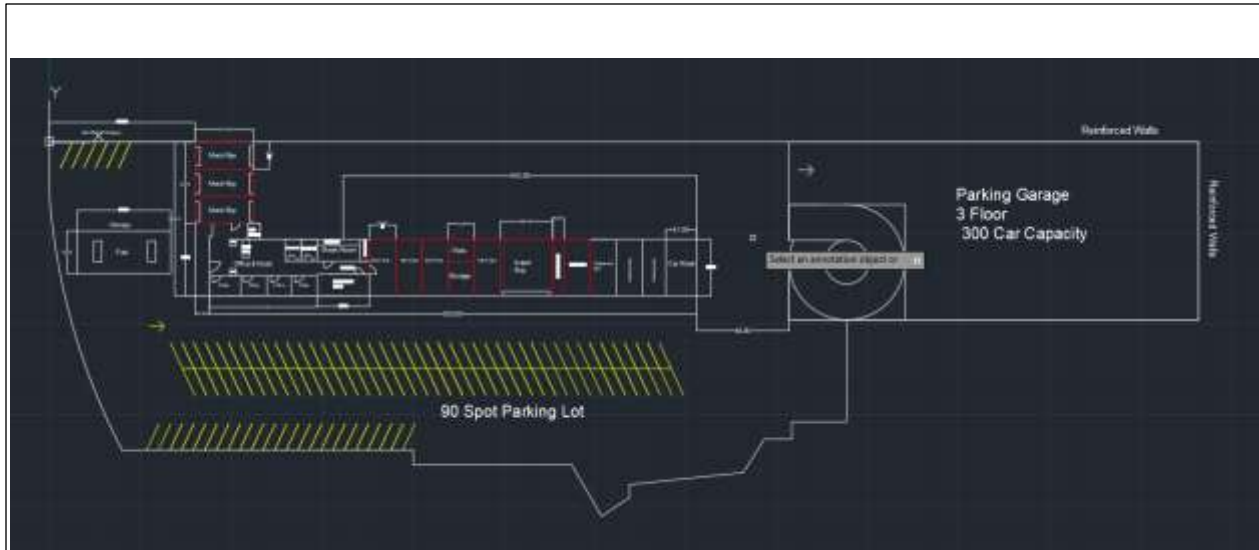
The main result was the design that will fit ISU Transportation service's needs.

Recommendations: Key recommendations are based on our final design for a possible garage. The next 3-to 5 follow-up steps would include representing the project and creating the design. The building process would include drafting the idea for contractors and creating the additions. If there were a next phase project, it would have to benefit the department of ISU Transportation.

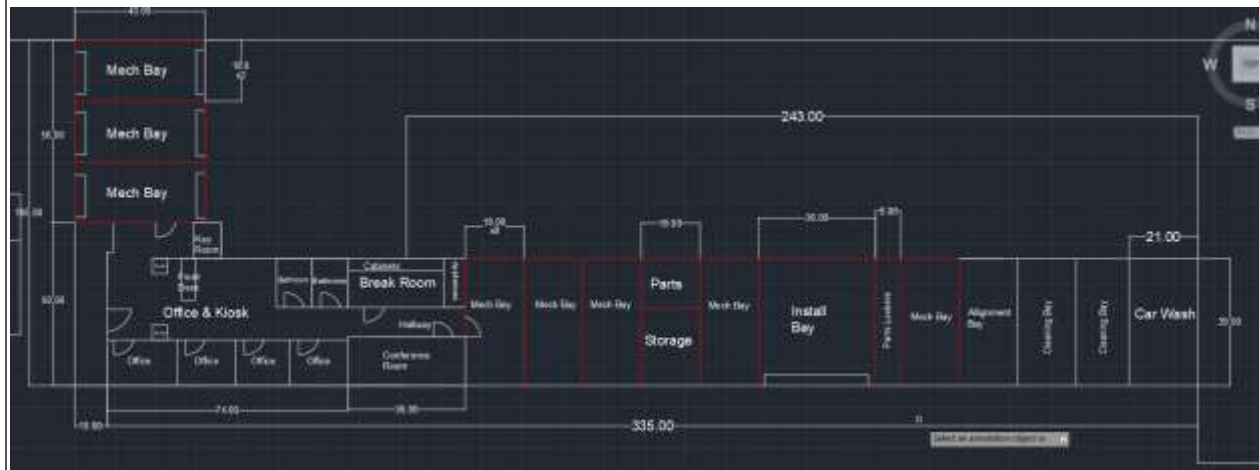
5 BROADER OPPORTUNITY

Our project will have both a visual and conceptual appeal to the general public as well as ISU employees. By improving the publicly accessible rental shop, the average person will be able to see the advancements in vehicle accessibility and efficiency of maintenance. By adding the ability to not only house an increased number of modern as well as electric vehicles but work on them as well, dealerships, repair shops, and other car rental companies wishing to upgrade their facilities will be able to take notes from our design to optimize space and function. The prices for the services necessary will vary depending from case to case; it will mainly depend on the budget and the land given to each company.

6 ISU TRANSPORTATION NEW SHOP LAYOUT



New ISU Transportation Lot Layout

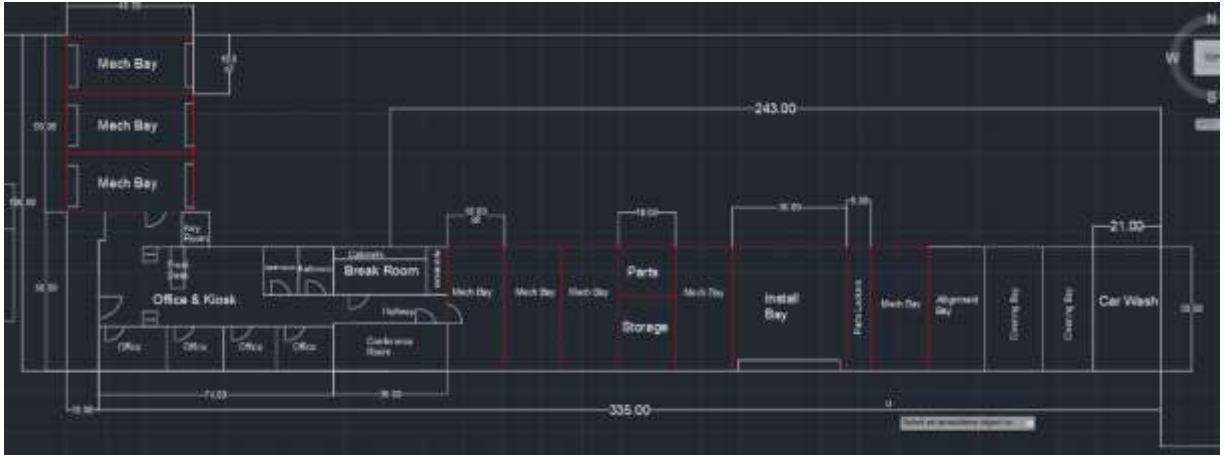


New ISU Transportation Shop Design

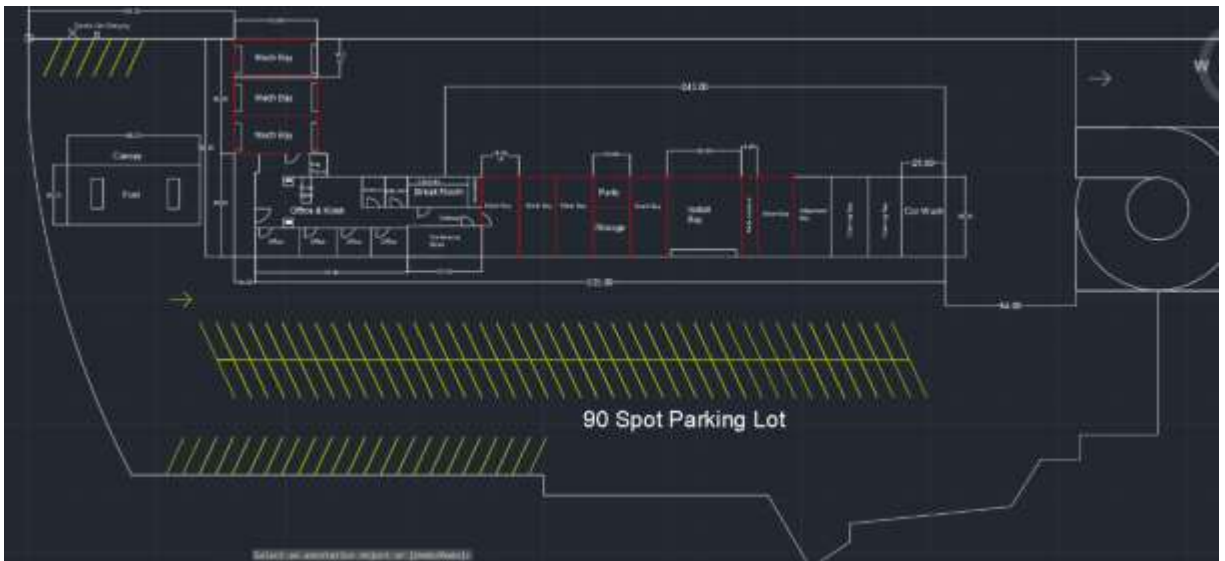
7 REFERENCES

- American Dream Machines <https://www.admcars.com/>
- Karl Chevrolet https://www.karlchevrolet.com/?utm_source=google&utm_medium=organic&utm_campaign=gmb-website

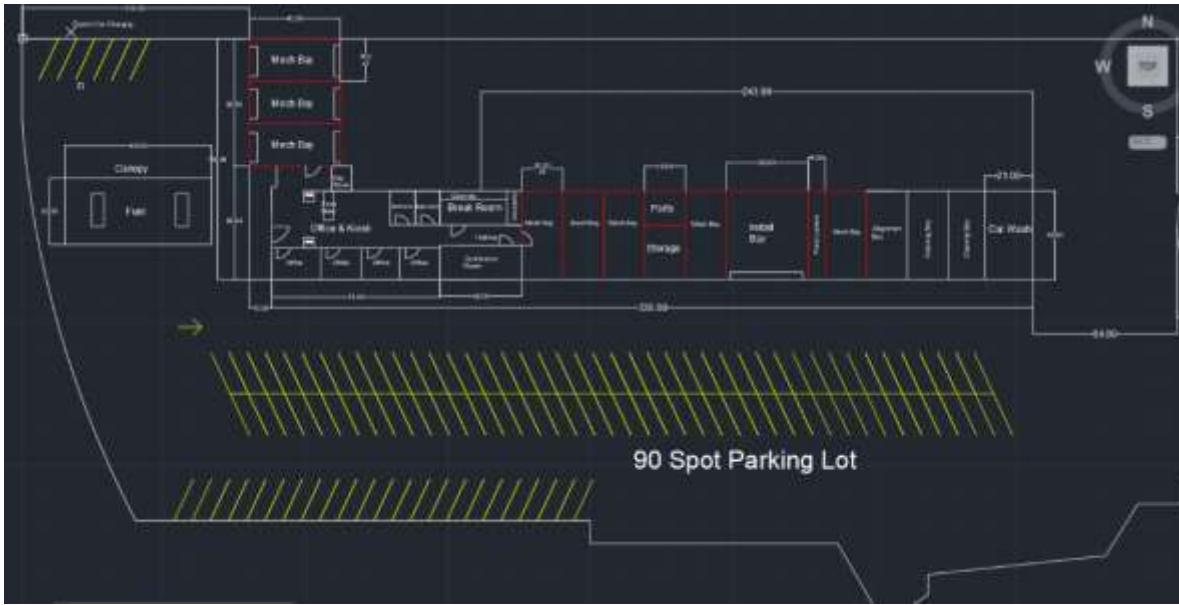
8 APPENDICES



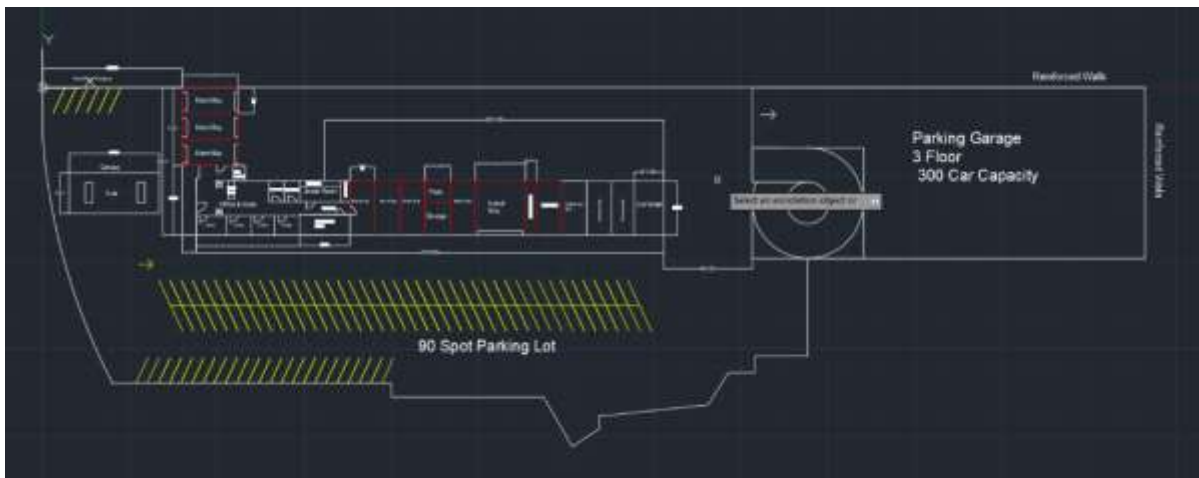
Full Building Layout



Parking Lot



Continuation of Parking Lot



Full Drawing