

INTRODUCTION

The scope of this project is to find an efficient and feasible method to transport the spent grain from mash tuns to a location outside the facility. This location typically would be a truck bed in which the spent grain is taken to a local farm.

CURRENT METHOD



POSSIBLE SOLUTIONS

The first method that is discussed is a grain auger that is fed onto a conveyor belt. This would give a visual spectacle for the customers that are eating at the restaurant as well as give the aroma of fresh malted grain.



The second method is a ponndorf system. This also would use a grain auger to push grain onto a conveyor compressed by a screw and then moves solids pneumatically through tubing using air "slugs." ^{2,3}

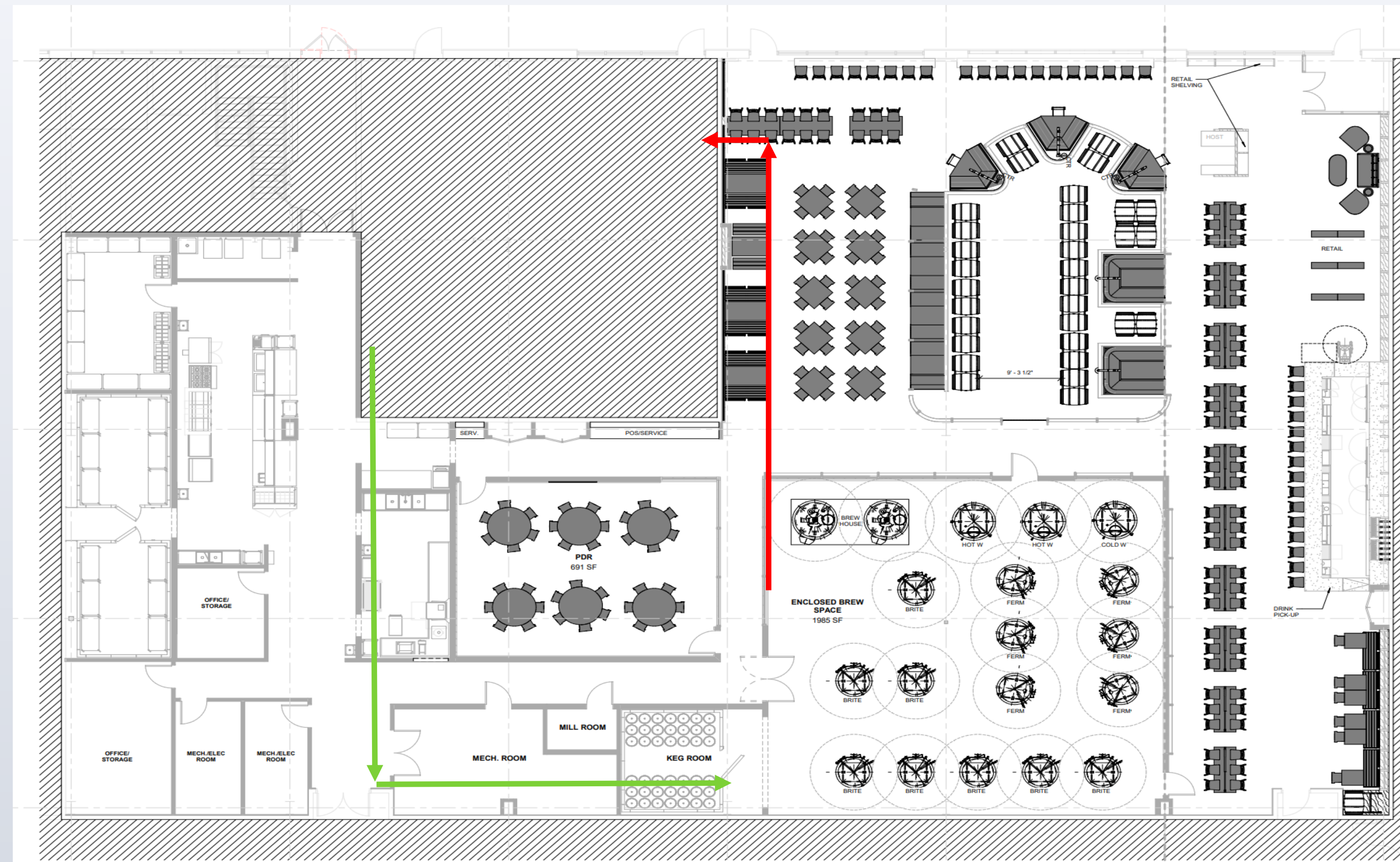


Figure 1: Current blueprint of the restaurant showing the recommended routes for both the incoming and outgoing grains



Figure 2: Example of the ponndorf pump that is recommended for Chapman's Brewing



Figure 3: Example of exit stream of spent grain to outdoor collection area

Pump	Max Flow (L/hr)	Time (hr)	Drive Power (kW)	Energy Cost (\$/yr)
PK15	700	34.0	0.5	290
PK25	2,100	11.5	2.0	1,200
PK40	7,700	3.0	4.0	2,100
PK50	15,500	1.5	7.5	4,000
PK65	30,000	0.8	11.0	5,800

Figure 4: Economic analysis of potential ponndorf pump systems¹

PONNDORF BENEFITS

- Operational safety
- Low air consumption
- Easy cleaning
- Easy maintenance
- Efficient and compact system
- Containment of spent grain aroma

RECOMMENDATIONS

- Implement a ponndorf system for spent grain removal
- Sell spent grain to farmers for animal feedstock
- Sell spent grain for use as a fuel source
- Document safe standard operating procedures
- Implement QR Code's to quickly and efficiently access safety information about the equipment

REFERENCES

1. Ponndorf. https://www.ponndorf.de/fileadmin/documents/Downloads/Datenblaetter/Datenblatt_Data_Sheet_P_high_pressure.pdf.
2. "Ponndorf Spent Grain Removal." Gusmer Enterprises, 11 Dec. 2021, <https://www.gusmerenterprises.com/catalog/distilling/distilling-processing-equipment/spent-grain-handling-2/ponndorf-spent-grain-removal/>.
3. "Spent Grain Pumps." ABM, 21 Feb. 2023, <https://abmbrewery.com/grain-handling/spent-grain-pumps/>.

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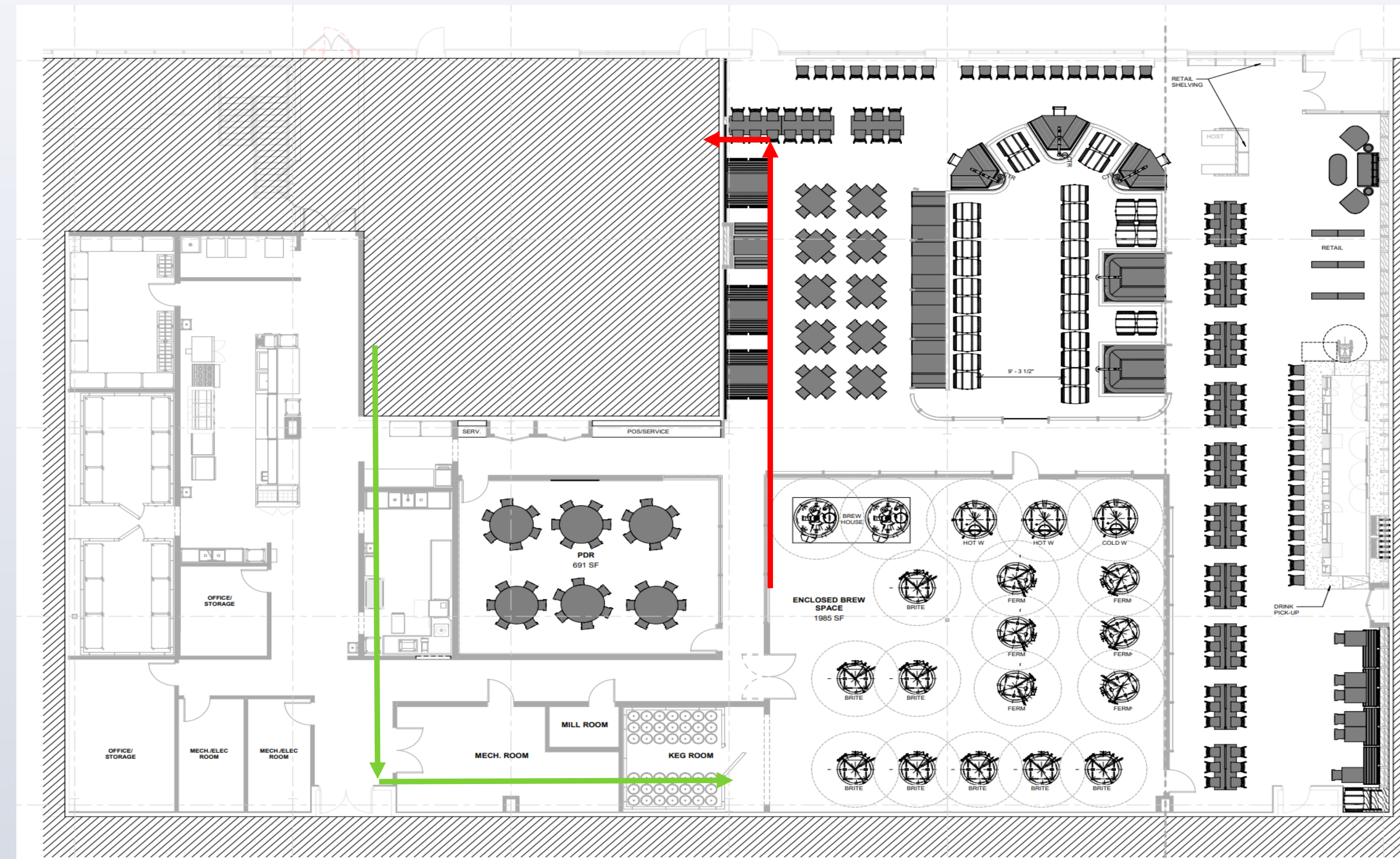


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