

# Low Charge Hybrid System

Mike Ellinger Whole Foods Market

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# Existing Store in Southern California

- One R448A rack with an air-cooled condenser
- Rack had numerous service issues including running water on the condenser during the summer
- Operating beyond useful life
- System monitoring not up to company standards

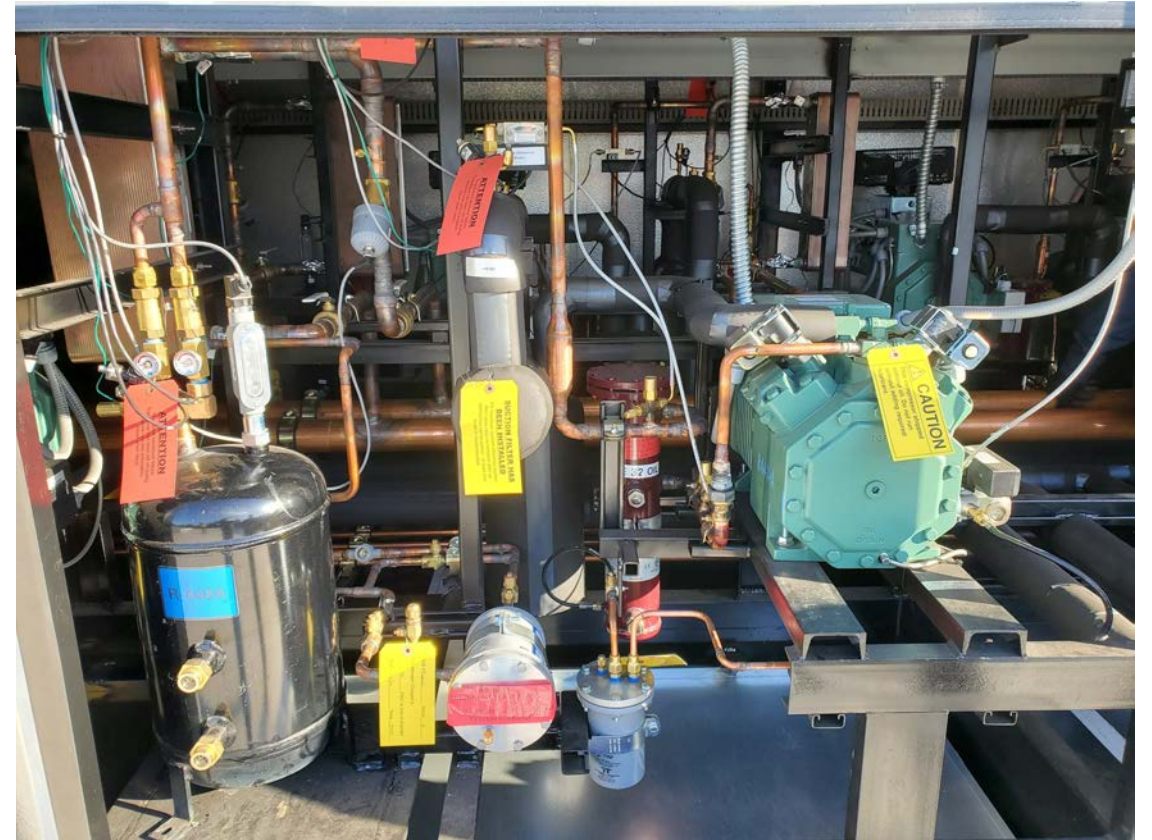
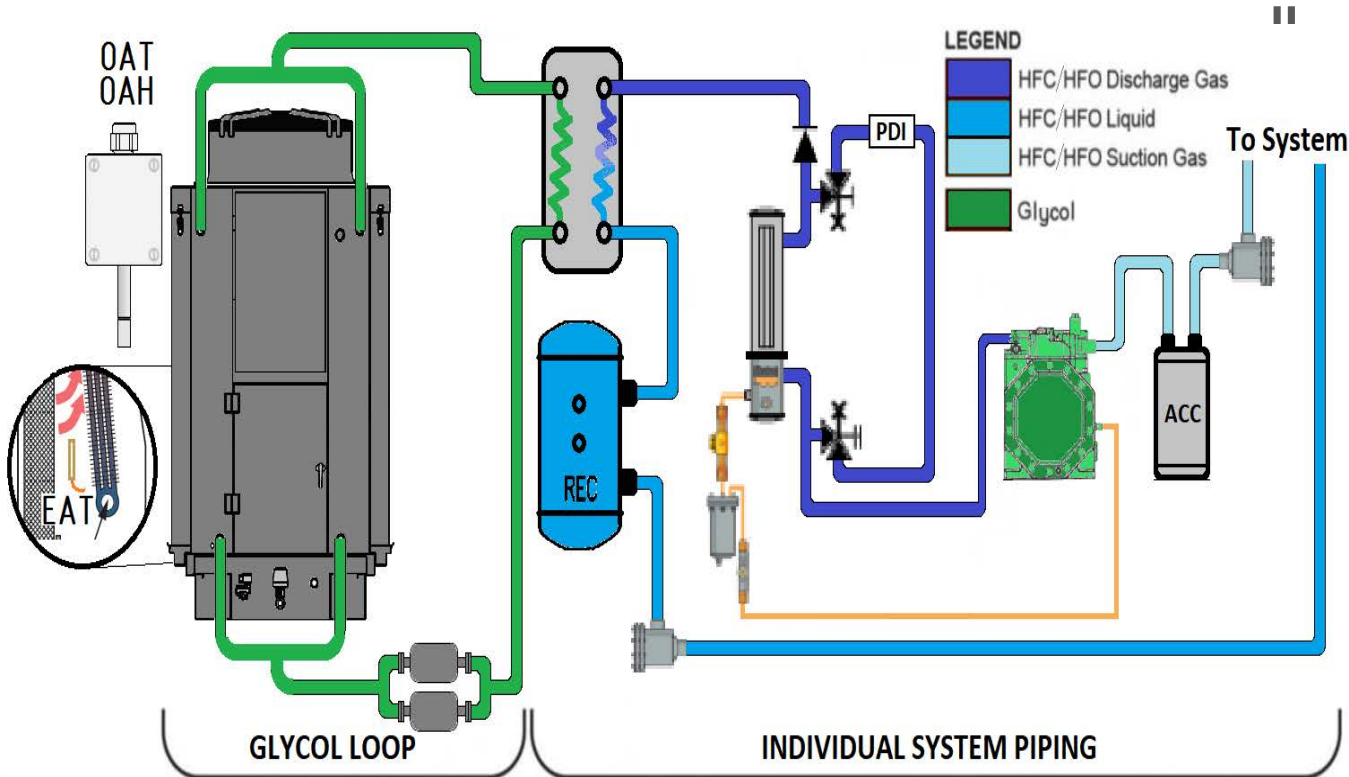




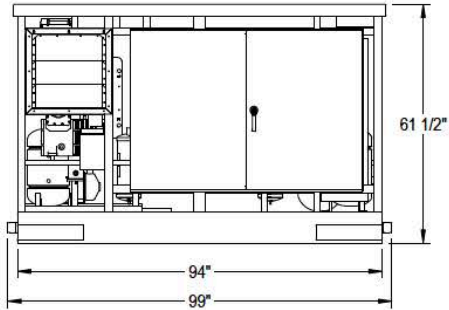
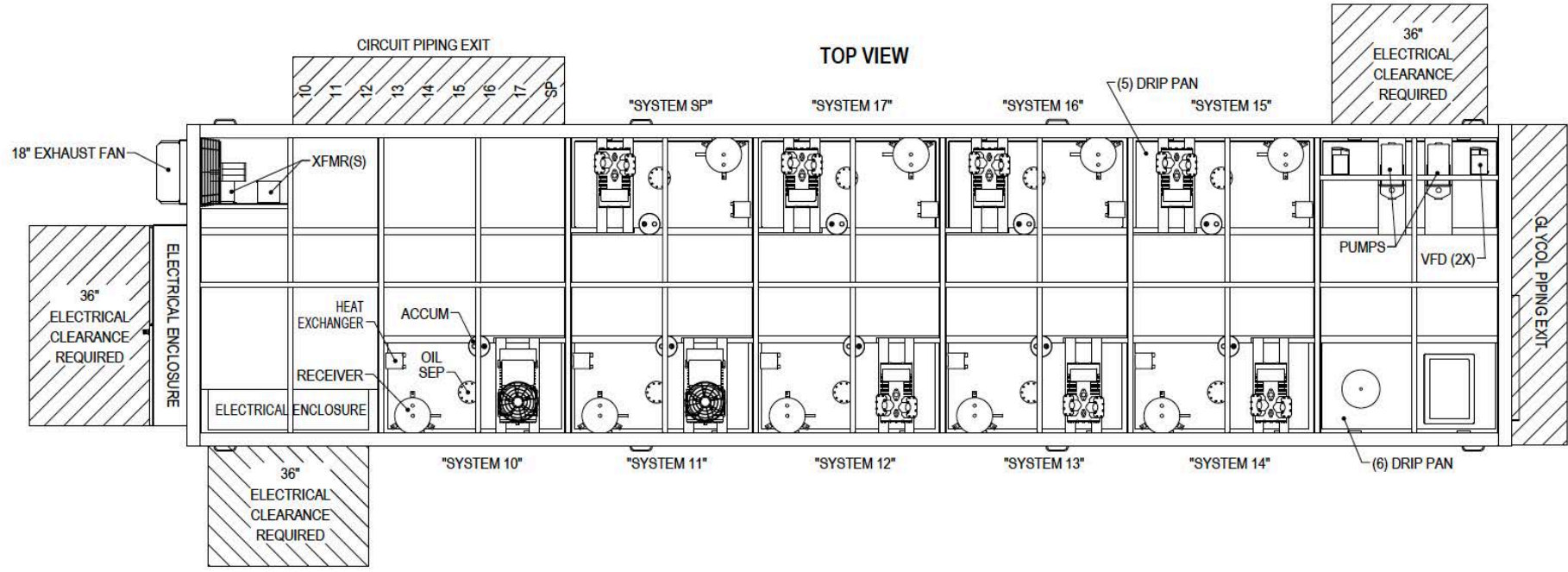
# Low Charge Hybrid Design

- Collaboration between Whole Foods Market, SEER2, CoolSys Engineering, and Zero Zone to develop a remote or outdoor rack with all appliances within the 50 lbs and under EPA threshold
- Utilizing existing cases, engineering selected systems for each compressor suction group to ensure we remained under this 50 lbs threshold
- System designed to utilize the existing refrigerant R448A
- Refrigerant recovery information will be recorded, however no leak rate calculations are reported to the EPA
- Condenser is an Adiabatic Fluid Cooler with individual plate heat exchangers per system
- New structural platform is centrally located on the roof, minimizing the refrigeration line length
- Rack turnover less impactful to store operations

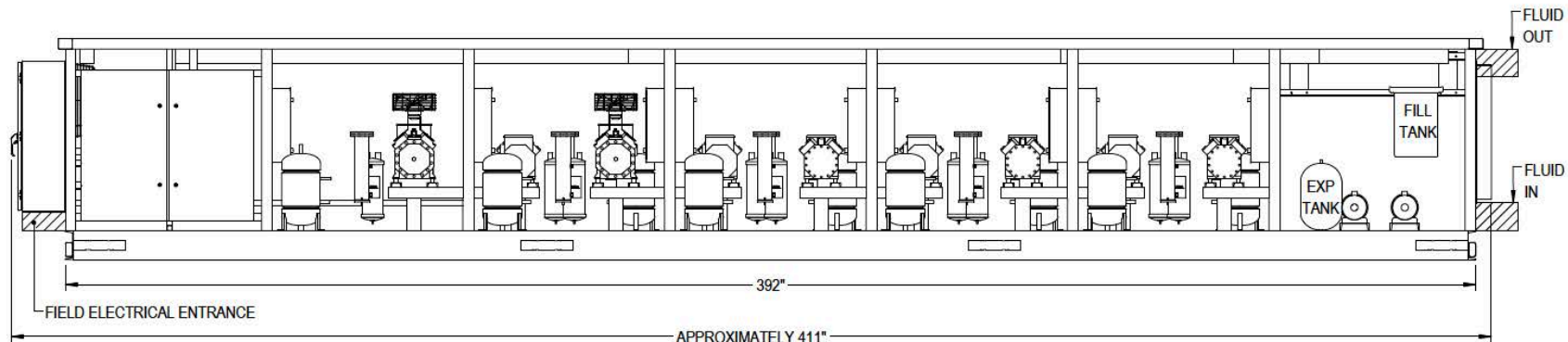
# Individual System Piping







LEFT SIDE VIEW

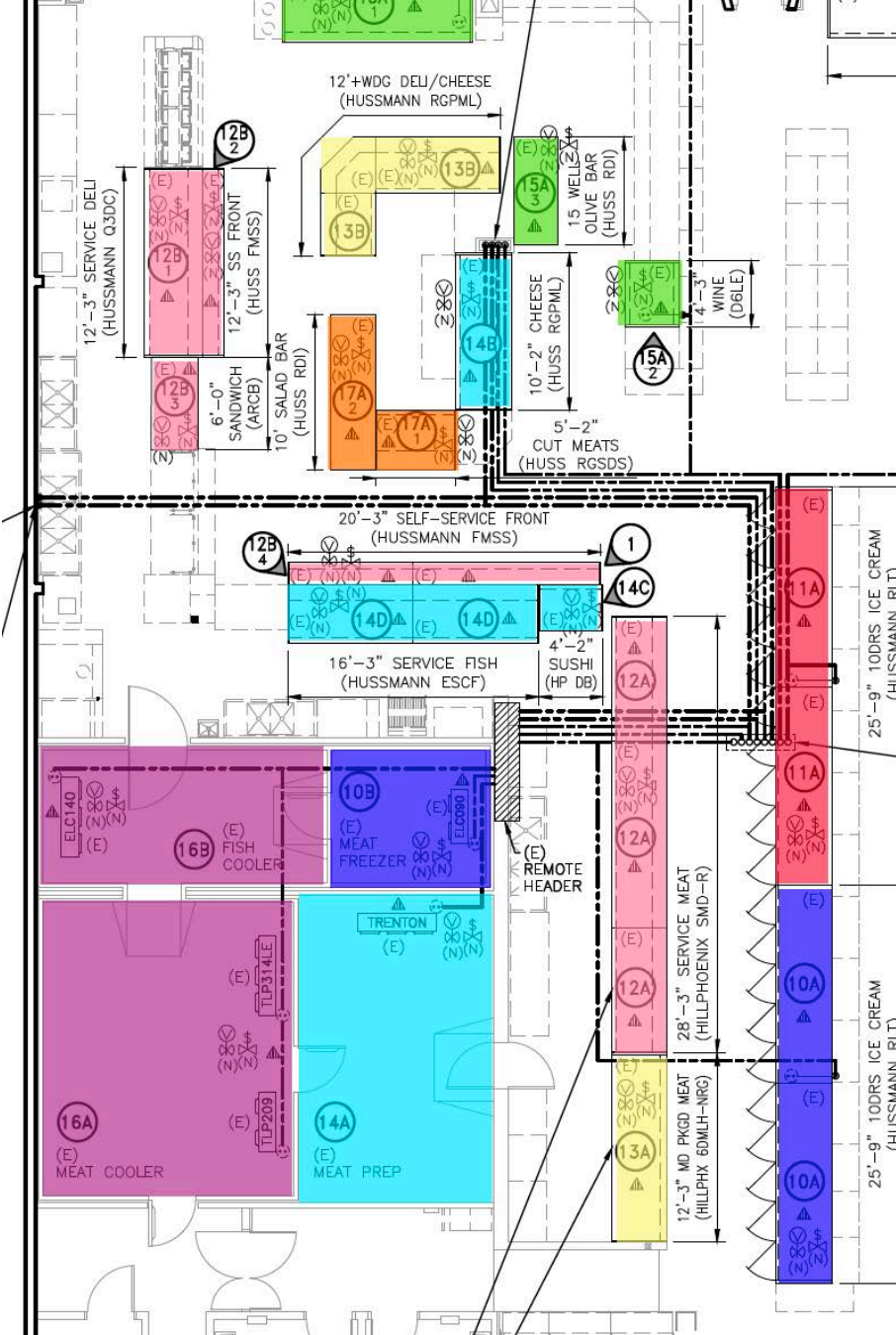


FRONT VIEW

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN DECIMAL INCH		<b>ZERO ZONE</b> 6151 140th Avenue NW Ramsey, MN 55303	
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# Floor Plan Design

- Eight systems with Bitzer CRII Compressors
- All eight systems divided up to keep the loads the same and keep the total charge below 50 lbs
- All (8) systems critically charged between 25 and 40 lbs
- Utilized existing cases
- All systems have CDS valves installed for suction control
- Installation of new control system with suctions groups for each compressor
- Installation of new sensors in all cases for proper monitoring













# Challenges

- Routing piping throughout the store to pick up systems while minimizing piping lengths
- Location of the new rack and condenser
- Oil return issues from low load conditions caused by night curtains
- Energy usage being monitored for comparison





# Benefits

- Reduced refrigerant loss due to systems being critically charged
- Each system under 50 pounds of R448A
- Single system startups are less impactful to store operations than whole rack turnovers
- Adiabatic Fluid Cooler will be more energy efficient during the summer months
- Floating suction groups for each system





# Potential Future Designs

- Single system CO2 design
- Utilize a lower GWP refrigerant
- Smaller rack design with a smaller footprint
- Phased solution for transitioning to natural refrigerants



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“Where sustainable refrigeration &  
energy resources are executed”

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Questions

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