



# FOOD PLANT OF THE FUTURE

FORTREX FOOD SAFETY WORKSHOP  
November 13<sup>th</sup>, 2025





# Introduction



# About Gray

## OUR PURPOSE.

Make a positive **difference** in people's lives and build a **better future**.

## OUR VISION.

Be the **trusted partner** to leading companies of the world, serving them with **diverse products and services of the highest value**.

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Established in 1960

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2024 Revenue: \$4.2 Billion



## AT THE CORE

# 01

We put **safety and quality of life first**.

# 02

We are **customer and relationship driven**.

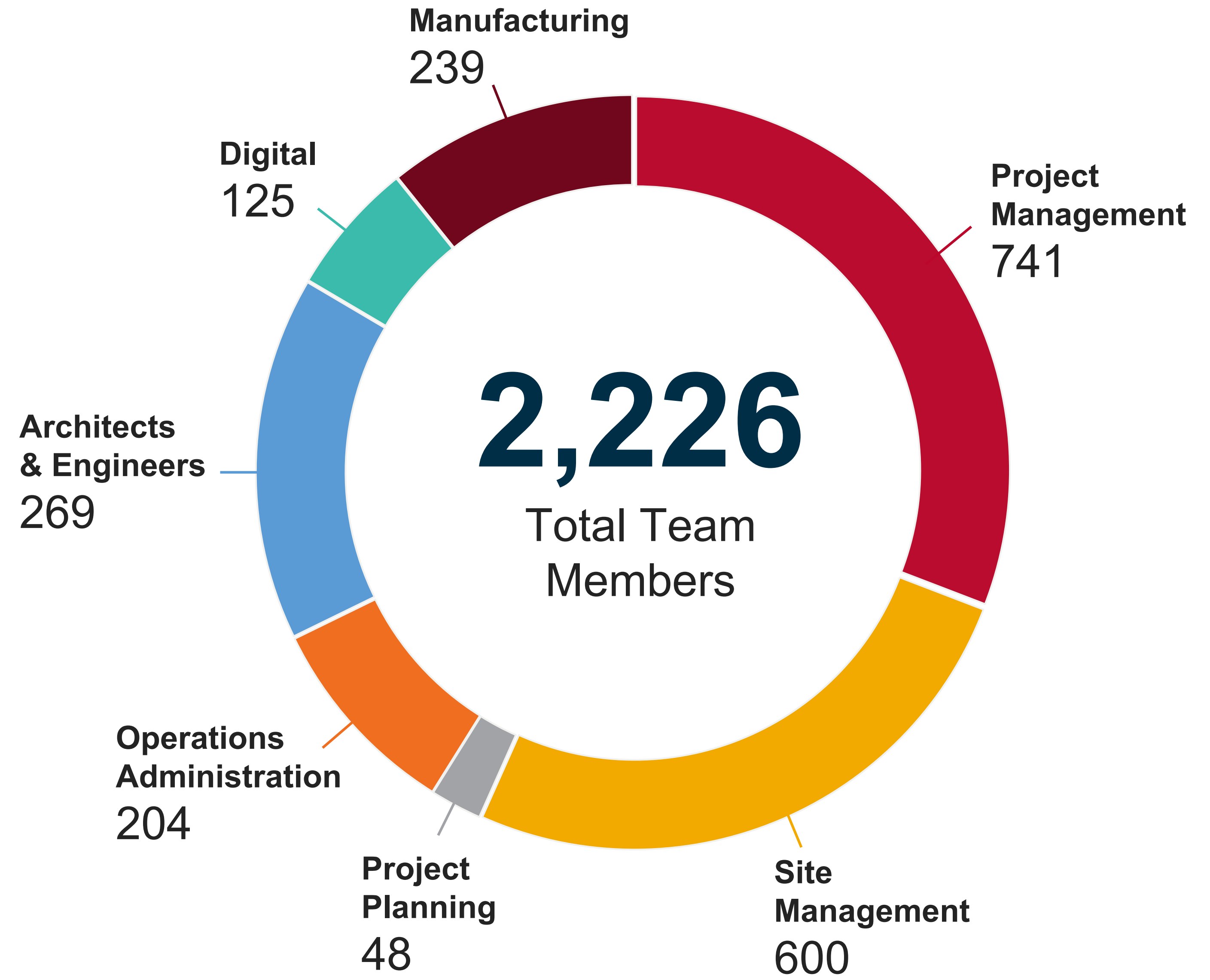
# 03

We treat others the way we want to be treated, where everyone is **welcome and respected**.



# Our Team

We have 2,000+ team members dedicated to making your project a success. These members include **designers, builders, fabricators, technologists, and engineers.**



# Our Safety Approach



## Communication

- Clear safety expectations with company philosophy and owner commitment
- Project and customer specific safety orientation
- Daily safety coordination of trades and customer requirements



## Pre-Planning

- Safety by Schedule
- Early risk identification and action planning (High-Risk Activity Action Plans)



## Execution

- Pre-construction critical task planning
- Site specific trade monitoring
- Safety status reporting including formal daily audits of all applicable trades.

# Safety7

## Accountability

Everyone is accountable:

- Craftsman
- Foreman
- Management

*\*If you see it, you own it.  
If you pass it, you condone it.*

## Planning

- Start early
- Involve the subcontractor
- Plan for every task
- Communicate

## Go Fever

- Recognize it
- Use STOP
- Take minutes to save days, weeks, or months

## Decision Making

- Make the safe decision
- If you don't know, stop and ask
- Consider the impact your decision can have on safety

## Blink Of An Eye

- Incidents can happen instantly
- Once an incident starts, you can't stop it

## Stop

- Everyone has the authority to stop

## Communication

- Communication is critical to setting our safety culture on site



# Trust the **No. 1 Firm in Food & Beverage**

**Ranked No. 1  
Firm by ENR  
in Food &  
Beverage for  
3 Consecutive  
Years**

No. 3 ENR in Food &  
Beverage Design

**\$844 Million**  
2024 REVENUE

**\$3.9 Billion**  
2021–2023 REVENUE



# End-to-End Solutions for the Industry's Biggest Challenges

As a **Top 5 Contractor in Food & Beverage for 6 consecutive years**, Gray understands the unique needs of this highly specialized market, providing the tools and talent to redefine your success.

Gray offers discrete to integrated turnkey services, including production equipment manufacturing. From design-build to process integration to automation & controls, we've got you covered.

## » OUR EXPERTISE:

- Bakery
- Bourbon
- Confectionary
- Dairy
- Dressing & Ingredients
- Food Tech
- Meat & Poultry
- Non-Alcoholic Beverages
- Pet Food
- Ready-to-Eat
- Seafood
- Snack Food
- Spirits



**Hill's Pet Nutrition**  
Tonganoxie, KS | 366,850 s.f.



**Clemens Food Group**  
Hatfield, PA | 308,000 s.f.



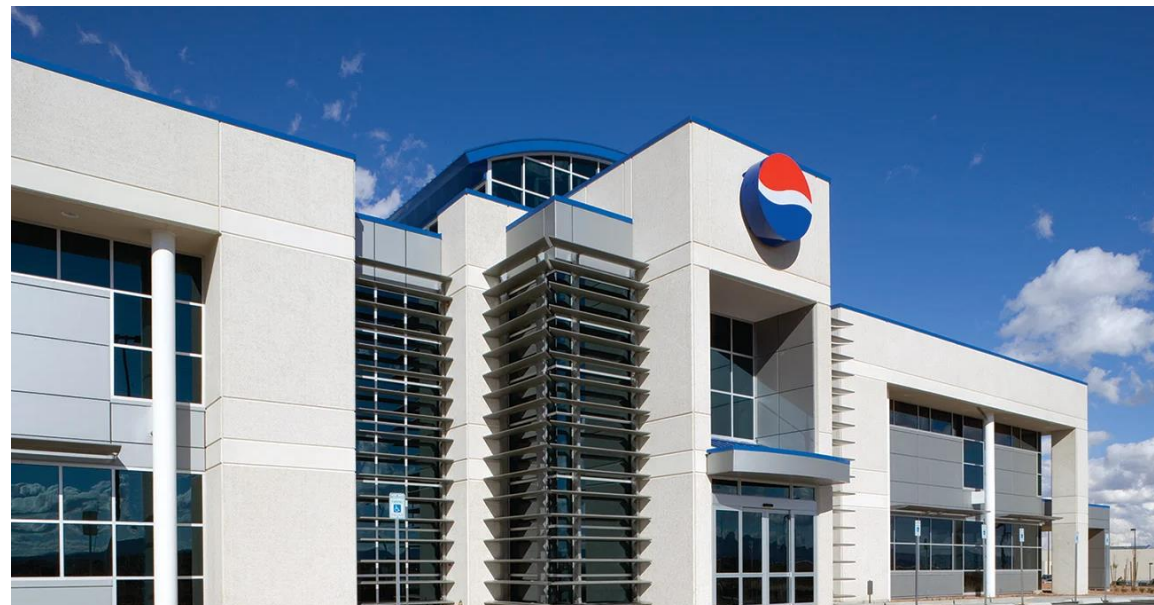
**Yakult USA**  
Cartersville, GA | 250,000 s.f.



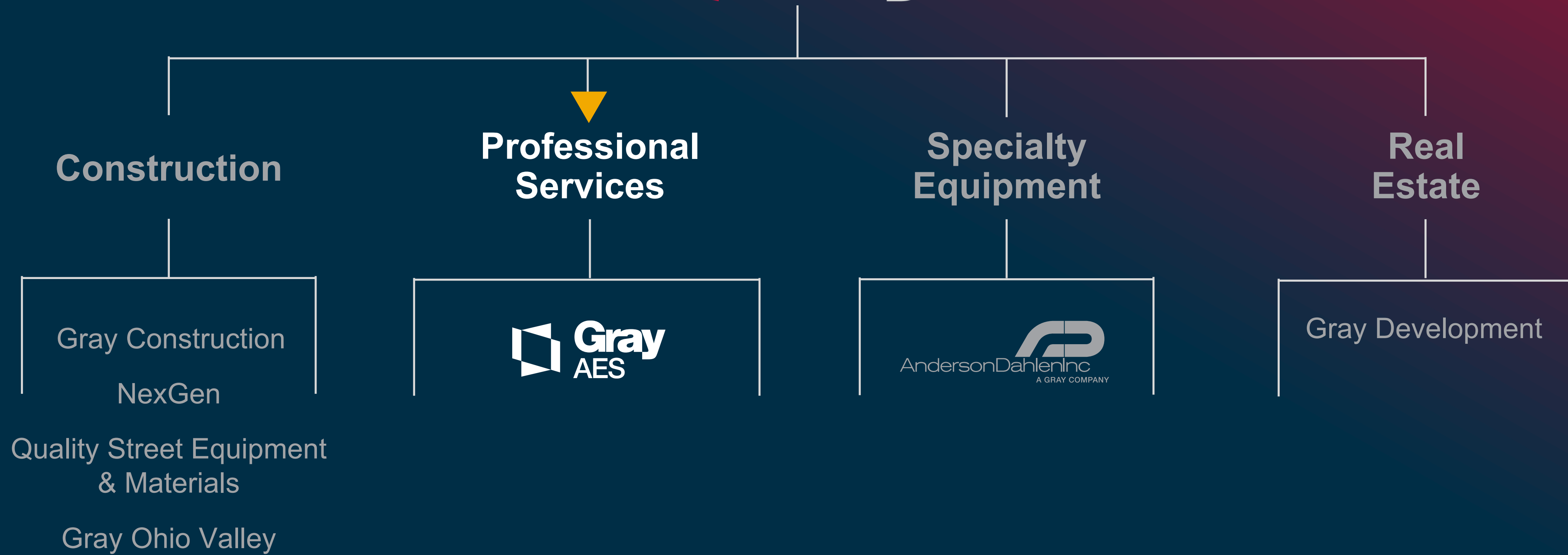
**Kraft Heinz**  
Davenport, IA | 382,157 s.f.



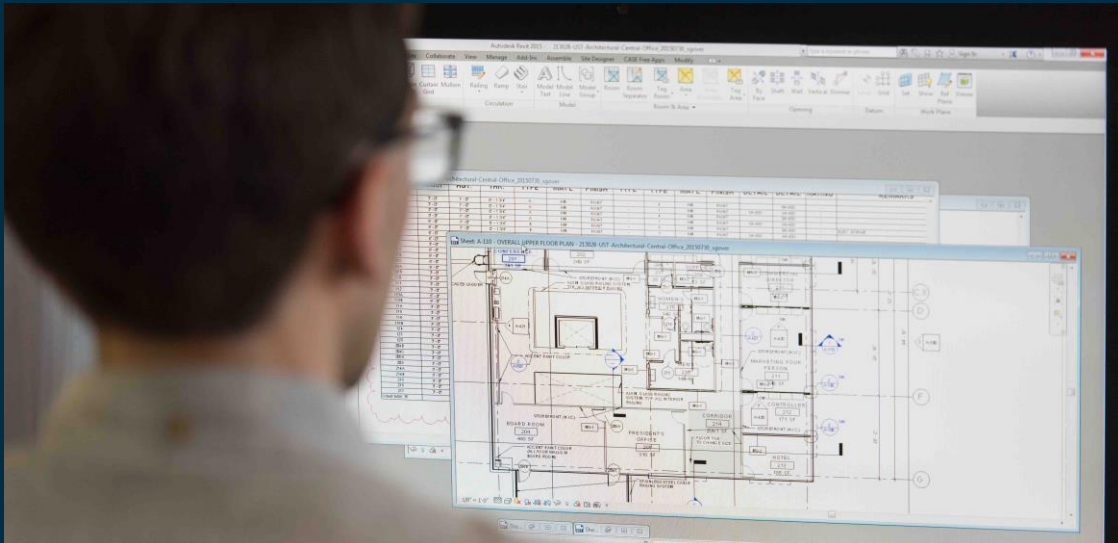
**Prestage Foods of South Carolina**  
Camden, SC | 295,000 s.f.



**Pepsi**  
Las Vegas, NV | 387,400 s.f.



# Our Services



## Facility Design

- Front-End Services
- EPC Turnkey
- Architecture
- Engineering
- Post-Design Services
- Specialized Services

## Process & Packaging Engineering

- Preliminary Engineering
- Detailed Design Engineering
- Execution and Installation
- Start-Up and Commissioning
- Operational Support

## Automation Solutions

- Automation & Controls
- Digital Transformation
- OT & Cybersecurity
- Technical Support

## Robotics & Vision

- Robotic System Integration
- Vision Systems
- AMRs & AGVs
- Spot®
- Technical Support

# Speaker Bio

## Brian Shoop

- Vice President, Process Engineering at Gray AES (Previously Gray Solutions)
- Joined Gray Nov 2018
- Previous professional experience:
  - CTI Foods/Custom Food Products (KY)
  - Summit Biosciences (KY)
  - Alltech Inc. (KY)
- Professional Affiliations
  - FPSA – Food Safety Network (Member, 2022-Present; Chairman, 2023-Present)
  - FPSA – Beverage Council (Member, 2022-Present)
- BS. Chemical Engineering, Lehigh University
- MS. Chemical Engineering, University of Cincinnati
- Located in Cincinnati, OH





# Purpose & Problem Statement



# Purpose

Why talk about this? Why now?



Changing regulatory requirements



Aging Infrastructure



Changes in Labor Market



Sustainability Targets



Digitization



Economic Forces

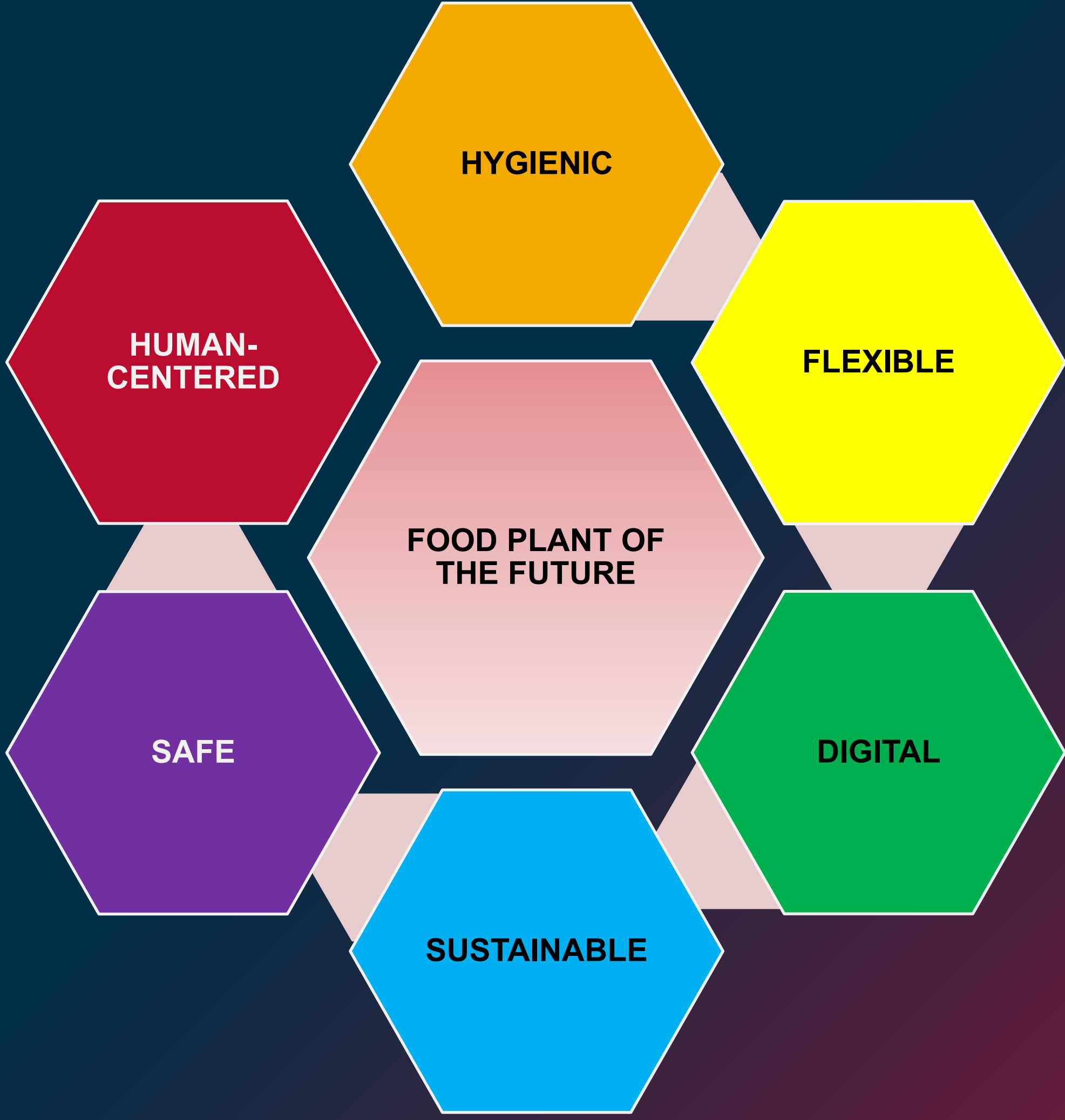


Changing Consumer Preference



Increased Engagement from Industry Leaders (YOU)

# Defining “Food Plant of the Future”



# Three “Pillars” of Food Plant Design



**SITE AND BUILDING SHELL**



**EQUIPMENT & PROCESSES**



**AUTOMATION**

# Problem Statement

How do I design and construct a new facility that:

- Is within our budget?
- Meets our operational needs?
- Is safe?
- Is “future-proof”?





# Inputs



# Inputs

What information is needed from the customer?





# Site & Building Shell



# Building Shell & Zoning

## Why it matters

- A well-designed facility will not compensate for:
  - An improperly designed or poorly maintained process
  - Toxic operational, safety, and food safety culture
- **However**, a poorly designed facility can put any business at risk regardless of what's happening inside.
- The building shell is more than simply a “box that goes around the process” – it is imperative to the success of any food manufacturing site.



# Hygienic Design

e.g. Meat Institute Facility Sanitary Design Checklist

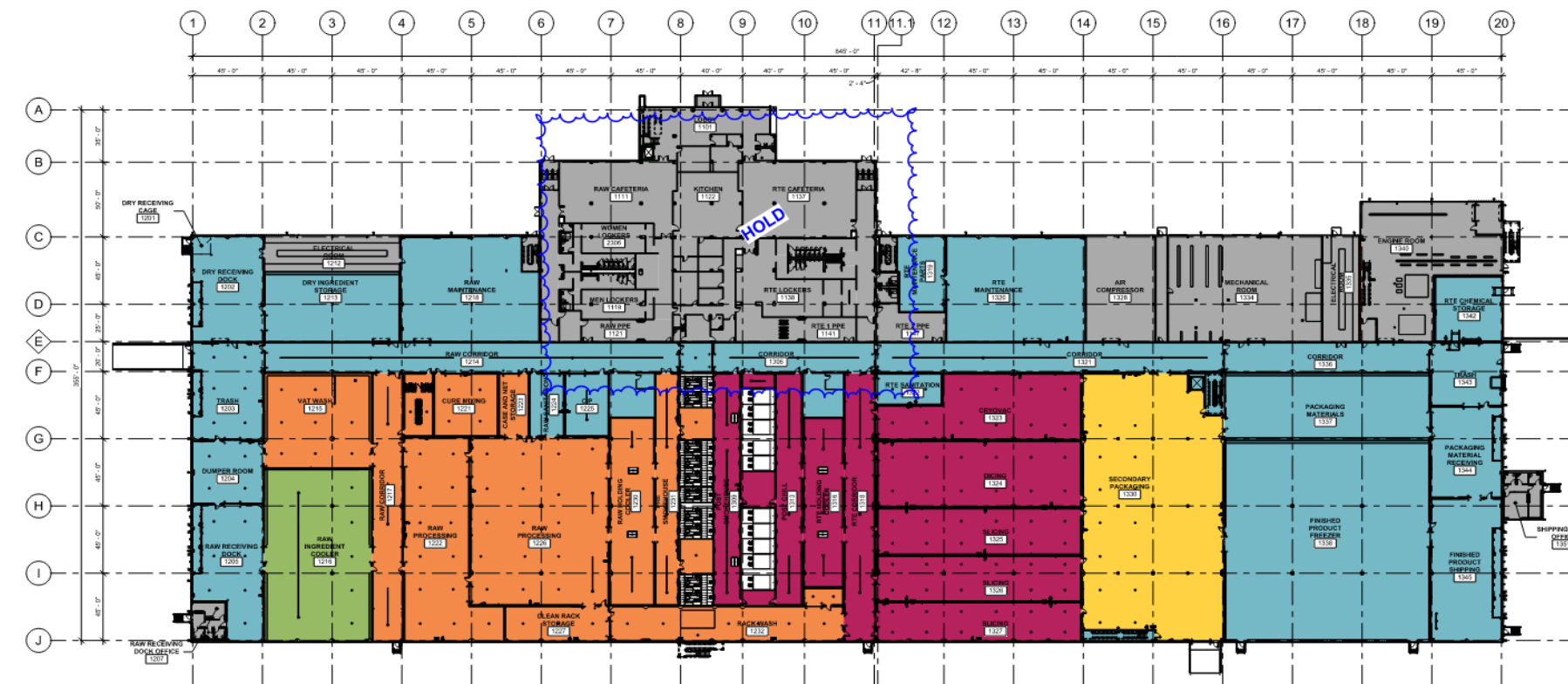
<b>11 Principles of Facility Sanitary Design Summary</b>			
<b>Principle</b>	<b>Score</b>	<b>Points Available</b>	<b>Percent (%)</b>
1. Distinct Hygienic Zones Established In The Facility		170	%
2. Personnel & Material Flows Reduce Hazards		80	%
3. Control Water Accumulation Inside Facility		60	%
4. Control Room Temperature & Humidity		40	%
5. Control Room Air Flow & Room Air Quality		80	%
6. Site Elements Facilitate Sanitary Condition		111	%
7. Envelope Designs Facilitate Sanitary Conditions		120	%
8. Interior Spatial Design Promotes Sanitation		80	%
9. Building Components & Construction Facilitates Sanitary Conditions		63	%
10. Utility Systems Design Prevents Contamination		126	%
11. Adequate Sanitation Systems		70	%
<b>Total Score and Average Percent</b>		<b>1000</b>	<b>%</b>

# Hygienic Design

By dividing the building up into various hygienic zones, Gray can define classifications to inform design decisions based on cleaning procedures and product risk. Hygienic zones inform our room criteria and MEP fit/finish requirements based on sanitation requirements.

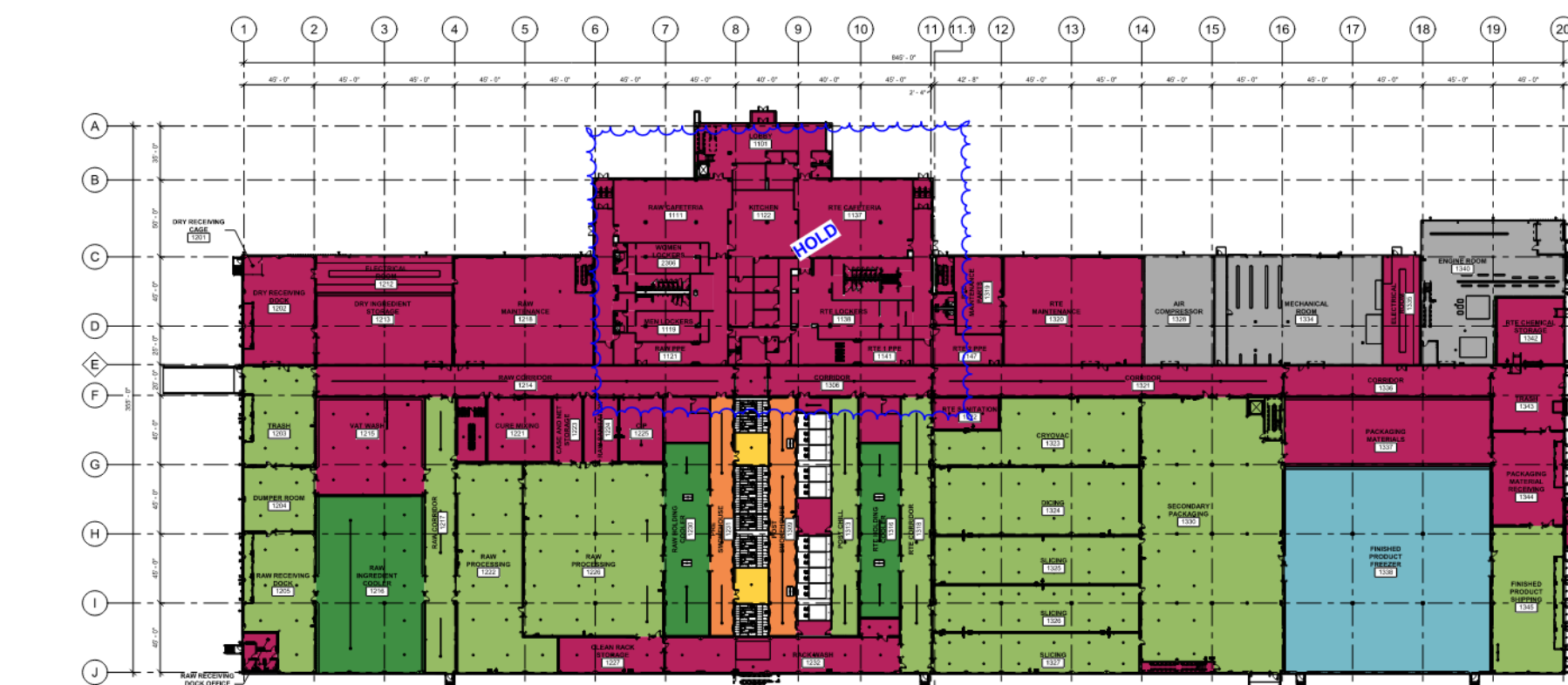
Temperature plans align mechanical and refrigeration requirements, humidity levels, and conditioned versus ambient spaces

Pressurization plans are created to ensure proper air pressure is maintained throughout production, process, and critical areas to ensure food safety and sanitary operations



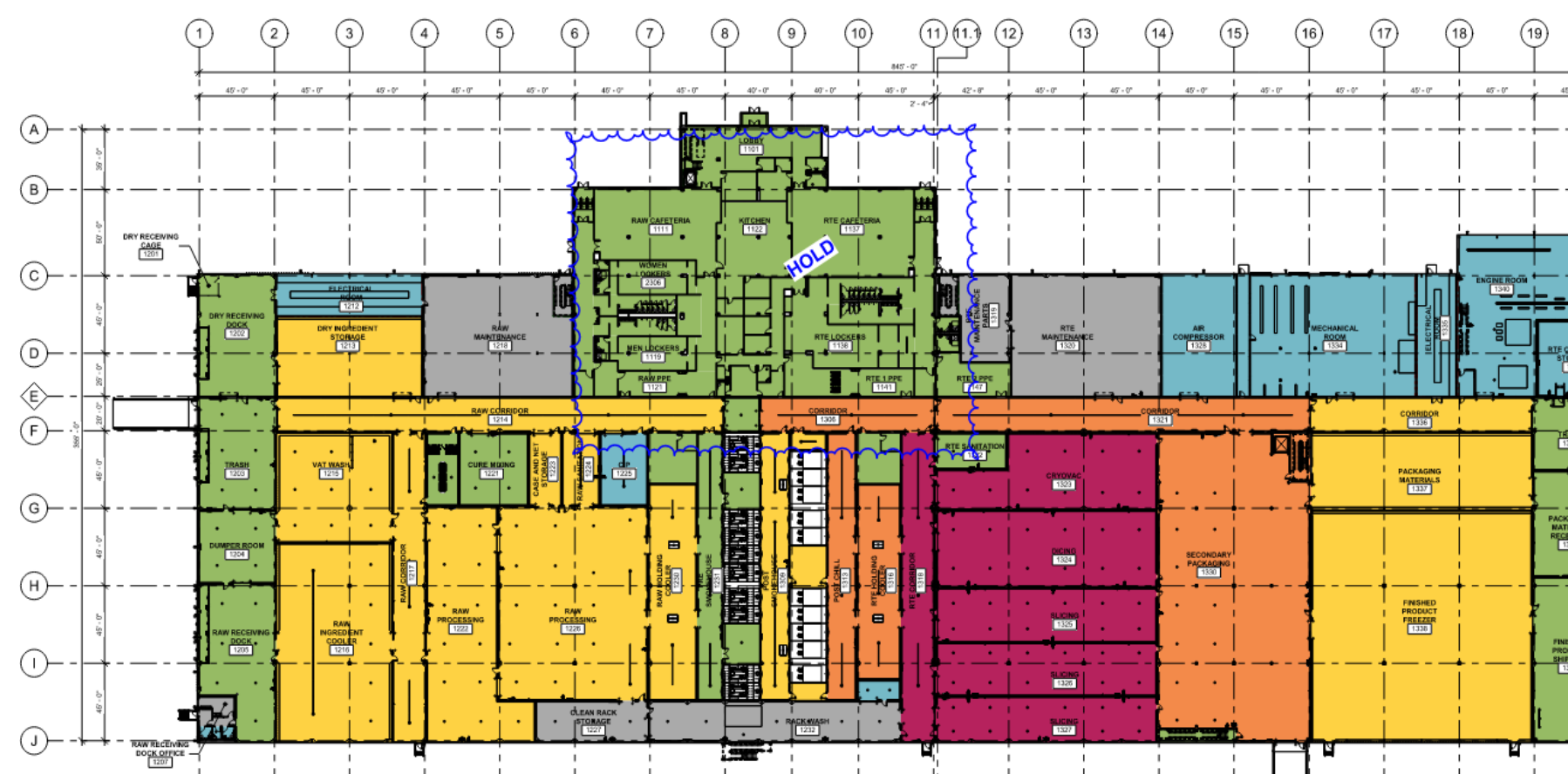
## HYGIENE CLASSIFICATION

- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- CLASS 5
- NON-CLASSIFIED



## TEMPERATURE LEGEND

- FREEZER -10 DEG F
- 34-38 DEG F
- 36-40 DEG F
- 50-90 DEG F
- REFRIGERATED AND  
CONDITIONED 70 DEG F W/50% RH
- 72-78 DEG F
- HEATED AND VENTILATED



## PRESSURIZATION LEGEND

- POSITIVE 4
- POSITIVE 3
- POSITIVE 2
- POSITIVE 1
- NEUTRAL
- NEGATIVE 1



# Materials of Construction

Hygienic zones inform our room criteria and MEP fit/finish requirements based on sanitation requirements.

Provides project team alignment and helps with change management

## PIPE SYSTEM MATERIALS AND JOINTS

### ALUMINUM PIPE

AL1 2-1/2 INCH OD AND SMALLER: ALUMINUM ALLOY PIPE, POWDER COATED; NYLON REINFORCED FITTINGS; MECHANICAL JOINTS

AL2 3 INCH OD TO 10 INCH OD: ALUMINUM ALLOY PIPE, POWDER COATED; STAINLESS STEEL FITTINGS; MECHANICAL JOINTS

### BLACK STEEL PIPE

BS1 NPS 2 AND SMALLER: BLACK STEEL, SCH40; CLASS 150 FITTINGS; THREADED JOINTS

BS2 NPS 2 AND SMALLER: BLACK STEEL, SCH40; CLASS 150 FITTINGS; SOCKET WELDED JOINTS

BS3 NPS 2-1/2 AND LARGER: BLACK STEEL, SCH40; SCH40 FITTINGS; BUTT WELDED JOINTS

BS4 NPS 2 AND SMALLER: BLACK STEEL, SCH 80; CLASS 3000 FITTINGS; SOCKET WELDED JOINTS

BS5 NPS 2 AND SMALLER: BLACK STEEL, SCH80; CLASS 300 MALLEABLE FITTINGS; THREADED JOINTS

BS6 NPS 2-1/2 AND LARGER: BLACK STEEL, SCH80; SCH80 WROUGHT STEEL FITTINGS; BUTT WELDED JOINTS

### CAST-IRON PIPE

CI1 ALL SIZES: CAST-IRON SOIL PIPE, SERVICE WEIGHT HUBLESS; DRAINAGE PATTERN FITTINGS; SHIELDED COUPLING JOINTS

CI2 ALL SIZES: CAST-IRON SOIL PIPE, SERVICE WEIGHT HUB AND SPIGOT; DRAINAGE PATTERN FITTINGS; COMPRESSION JOINTS

### COPPER TUBE

CU2 NPS 2 AND SMALLER: HARD COPPER, TYPE L; WROUGHT COPPER PRESSURE FITTINGS; PRESSED JOINTS

CU5 NPS 2 AND SMALLER: SOFT COPPER, TYPE K; CONTINUOUS LENGTHS; NO JOINTS

### FLEXIBLE GAS PIPE

FG1 NPS 2 AND SMALLER: PLASTIC-COATED FLEXIBLE GAS PIPE; CONTINUOUS LENGTHS; NO JOINTS

### PLASTIC PIPE - POLYPROPYLENE

PP1 ALL SIZES: POLYPROPYLENE DRAINAGE PIPE, ELECTRO-FUSION JOINTS, DRAINAGE-PATTERN FITTINGS WITH FIRE-RETARDANT ADDITIVE

### PLASTIC PIPE - PEX

PX1 NPS 2 AND SMALLER: PEX-a TUBING; PIPE BENDS FOR CHANGING DIRECTION; NO FITTINGS

### PLASTIC PIPE - PVC

PV1 ALL SIZES: PVC, SCH40; DRAINAGE-PATTERN FITTINGS; SOLVENT CEMENTED JOINTS

### STAINLESS STEEL PIPE

SS1 NPS 2 AND SMALLER: STAINLESS STEEL, T304L, SCH10S; CLASS 150 CAST FITTINGS; SOCKET WELDED JOINTS

SS2 NPS 2 AND SMALLER: STAINLESS STEEL, T304L, SCH40S; CLASS 3000 FITTINGS; SOCKET WELDED JOINTS

SS4 NPS 2 AND SMALLER: STAINLESS STEEL, T304L; T304L SCH10S FITTINGS; PRESSED JOINTS

SS5 NPS 2-1/2 AND LARGER: STAINLESS STEEL, T304L, SCH10S; T304L SCH10 FITTINGS; BUTT WELDED JOINTS

SS6 NPS 2-1/2 AND LARGER: STAINLESS STEEL, T304L, SCH40S; T304L SCH40 FITTINGS; BUTT WELDED JOINTS

SS7 NPS 2-1/2 TO 12: STAINLESS STEEL, T304L, SCH10S; T304L STAINLESS STEEL FITTINGS; PAINTED COUPLINGS; GROOVED JOINTS

SS10 NPS 2 AND SMALLER: STAINLESS STEEL, T316L, SCH10S; CLASS 150 CAST FITTINGS; SOCKET WELDED JOINTS

SS19 NPS 4 AND SMALLER: STAINLESS STEEL, T304L; SCH10S; VIEGA MEGAPRESS 200 PSIG FITTINGS, FKM SEALS

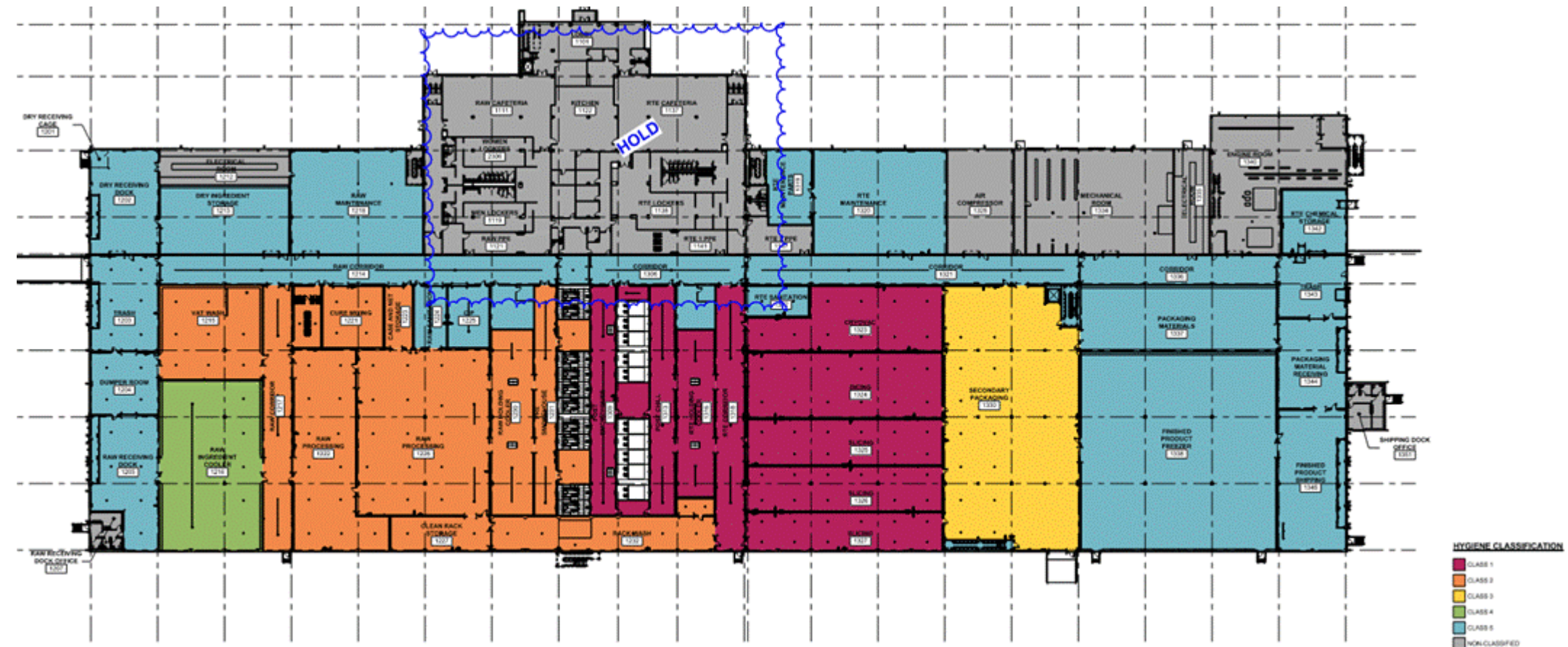
### STAINLESS STEEL TUBE

ST1 4-INCH OD AND SMALLER: STAINLESS STEEL, T316L, SANITARY TUBING; SANITARY FITTINGS; BUTT WELDED JOINTS

ST2 4-INCH OD AND SMALLER: STAINLESS STEEL, T316L, SANITARY TUBING; SANITARY FITTINGS; TRI-CLAMPED JOINTS

ST7 2-INCH OD AND SMALLER: STAINLESS STEEL, T304L, INSTRUMENT TUBING; 3000 PSIG COMPRESSION FITTINGS

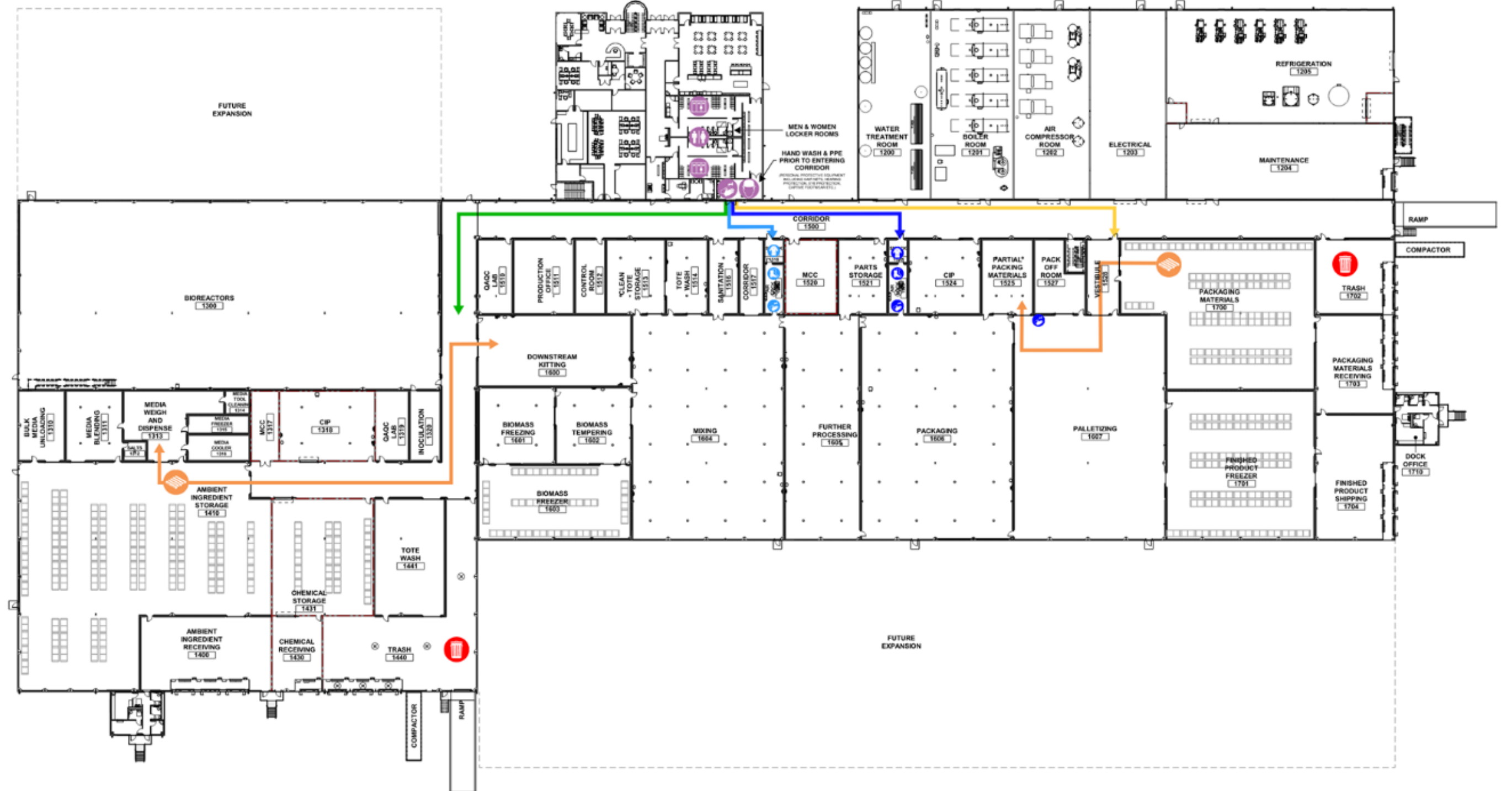
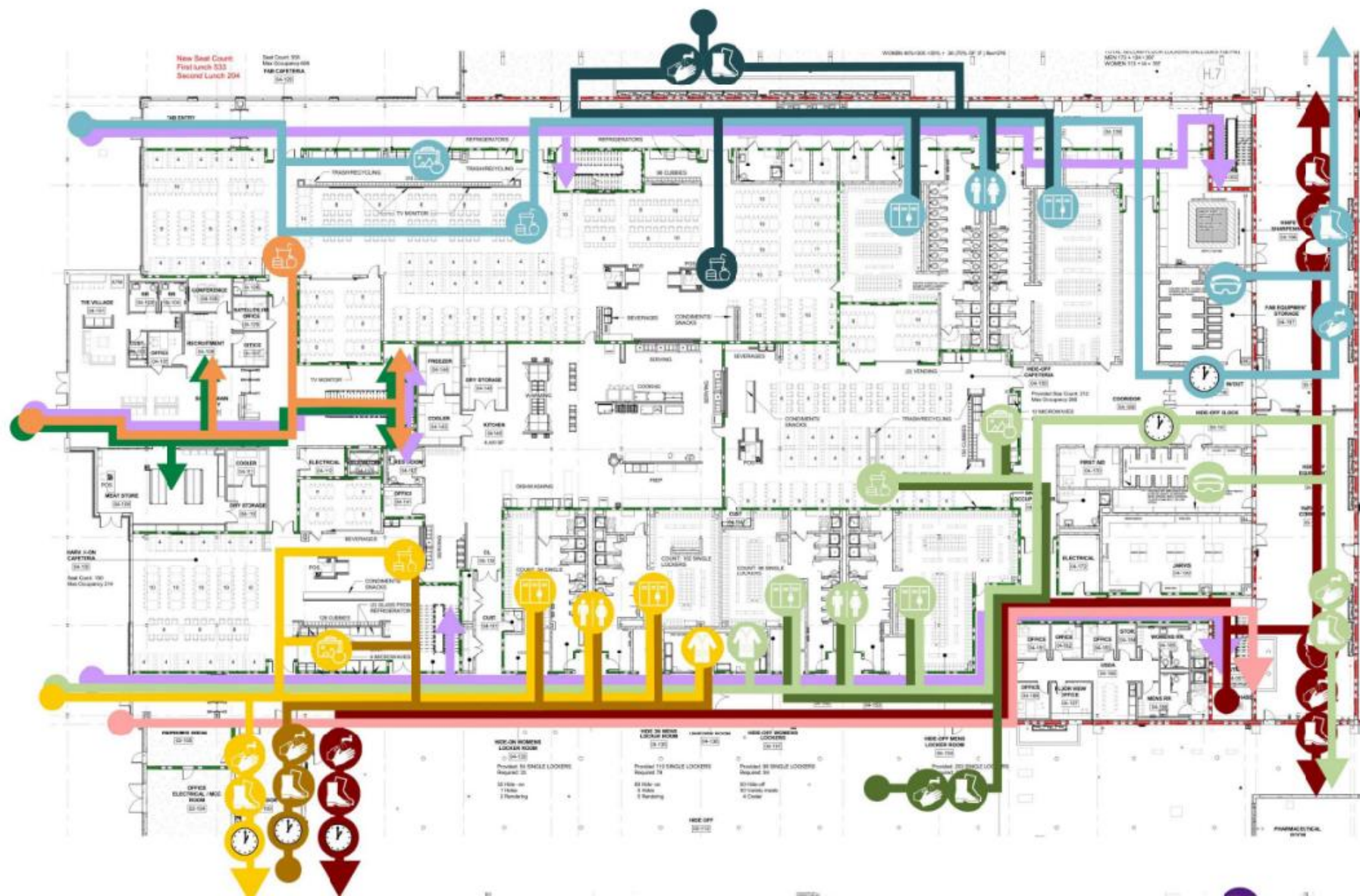
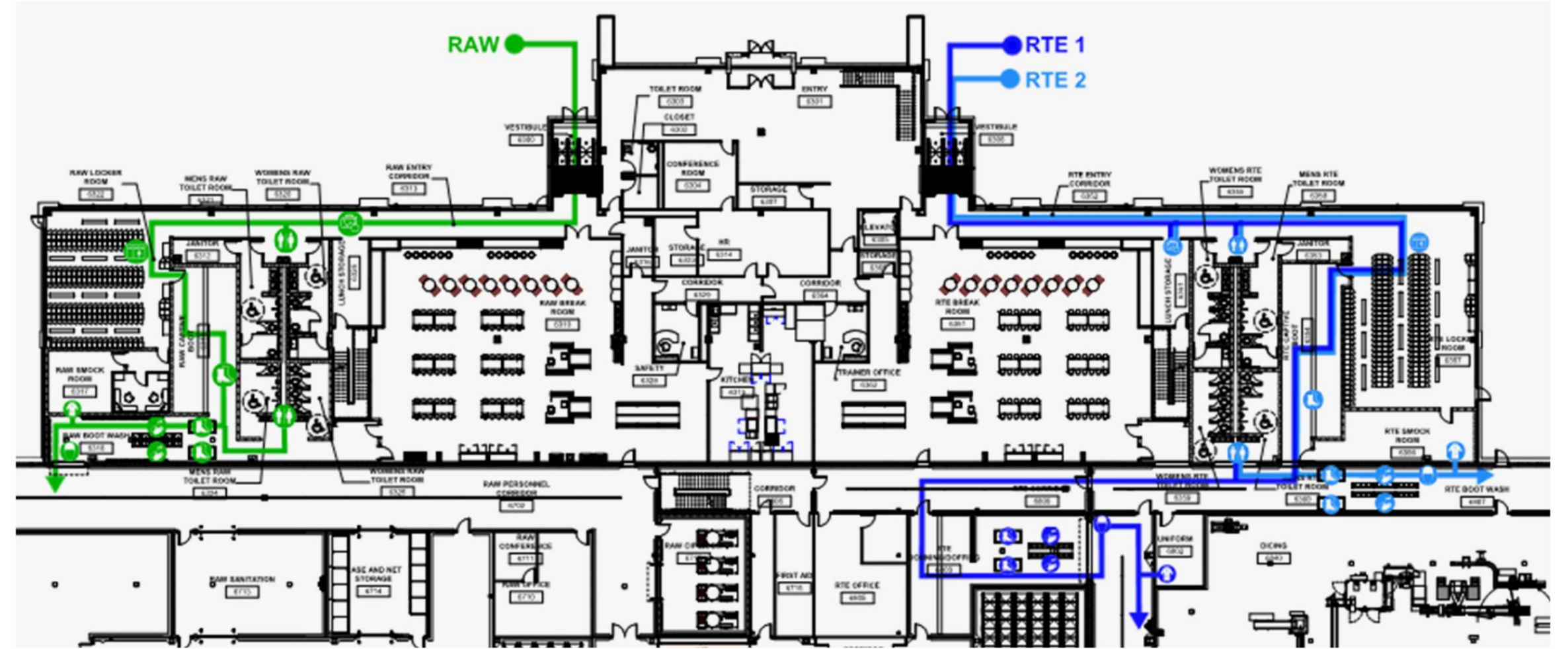
UTILITY PIPE MATERIAL SCHEDULE		STORM DRAINAGE	SANITARY SEWER & VENT	PROCESS WASTE DRAINAGE & VENT	DOMESTIC COLD WATER (CW)	DOMESTIC HOT WATER (HW)	TEPID WATER (85 DEG F) (TW)	SOFT WATER (SW) RO WATER (RW)	PROCESS DEIONIZED WATER (DI)	PROCESS HOT WATER (HW-180)
MATERIAL CODE: XX-## (PIPE-VALVE)										
INTERIOR	EXPOSED	CLASS 1 HIGH HYGIENE WET		-	-	-	-	-	-	-
		PIPE	-							
INSULATION	-	-	-	-	POLYISO	POLYISO	-	POLYISO	-	POLYISO
JACKET	-	-	-	-	WHITE PVC	WHITE PVC	-	WHITE PVC	-	WHITE PVC
PIPE	-	NOT PERMITTED	PP1	SS4-06, SS5-27	SS4-06, SS5-27	SS4-06	SS4-06, SS5-27	SS19-15, SS19-27	SS4-06, SS5-27	
INSULATION	-	-	-	-	POLYISO	POLYISO	-	POLYISO	-	POLYISO
JACKET	-	-	-	-	WHITE PVC	WHITE PVC	-	WHITE PVC	-	WHITE PVC
PIPE	-	NOT PERMITTED	PP1	SS4-06, SS5-27	SS4-06, SS5-27	SS4-06	SS4-06, SS5-27	SS19-15, SS19-27	SS4-06, SS5-27	
INSULATION	-	-	-	-	POLYISO	POLYISO	-	POLYISO	-	POLYISO
JACKET	-	-	-	-	WHITE PVC	WHITE PVC	-	WHITE PVC	-	WHITE PVC
PIPE	-	NOT PERMITTED	PP1	SS4-06, SS5-27	SS4-06, SS5-27	SS4-06	SS4-06, SS5-27	SS19-15, SS19-27	SS4-06, SS5-27	
INSULATION	-	-	-	-	POLYISO	POLYISO	-	POLYISO	-	POLYISO
JACKET	-	-	-	-	WHITE PVC	WHITE PVC	-	WHITE PVC	-	WHITE PVC
PIPE	C11, PV1	C11, PV1	PP1	CU2-05, SS7-21	CU2-05, SS7-21	CU2-05, SS7-21	SS4-06, SS5-27	SS19-15, SS19-27	SS4-06, SS5-27	
INSULATION	-	-	-	-	MINERAL FIBER	MINERAL FIBER	-	MINERAL FIBER	-	MINERAL FIBER
JACKET	-	-	-	-	WHITE PVC	WHITE PVC	-	WHITE PVC	-	WHITE PVC
PIPE	C11, PV1	C11, PV1	-	CU2-05, SS7-21	CU2-05, SS7-21	CU2-05, SS7-21	-	-	-	-
INSULATION	-	-	-	-	MINERAL FIBER	MINERAL FIBER	-	-	-	-
JACKET	-	NOT PERMITTED	-	-	WHITE PVC	WHITE PVC	-	-	-	-



# Facility Circulation

The basis of a facility layout is in the understanding of people, product, and waste movement.

In early programming, the project team must define the food process type, flow of people/products/waste, and cleaning methods. These inputs establish critical room adjacencies, hygienic zoning, and operational efficiency.



# Design Approach



## Project Programming

**Project Number:** 2#####XX  
**Project Name:** Project Name  
**Date:** MM/DD/YYYY

The purpose of this document is to help facilitate project programming and aid in project onboarding by providing a checklist for teams to systematically review, align on, and record the basis of design (what, why, & how) in the early stages of the project.

### PROJECT SUMMARY

Provide a brief summary of the project. This may be a 2-3 sentence summary of that end-state operational description, project specifics (# production lines with # shifts per week), etc.

### PROJECT GOALS

Provide a brief narrative to describe the corporate goals and interactions related to the following topics:

- Corporate Vision  
*Vision for the company / reason for the project / project impact on the business*
- Corporate Image and Branding  
*Both physically with the facility and from a marketing aspect (what the project will represent)*
- Project Drivers  
*When in conflict what factors are most important? (schedule, cost, quality, scope, etc.)*
- Opportunities for overall project  
*Opportunities for improvement, corporate challenges, etc.*
- Corporate initiatives to be included in project  
*Safety and maintenance, process improvements, automation, etc.*
- Sustainability  
*Corporate / project specific*
- Community Engagement Opportunities  
*Plant tours (public / investors and suppliers), public amenities (walking trail, community garden, dog park, etc.)*

### PEOPLE COUNTS

Provide answers to the following questions regarding people counts. For detailed information regarding project staffing, refer to the project's Staffing Matrix.

- Anticipated Total Number of Employees [Provide % Male/Female mix]

Priority Scales		Open (High)	Open (Low-Med)	Total Open	Task Legend:	
Low:	1				Task Item is Closed	
Med:	2	0	0	-1	Task Item is Due within (7) days	
High:	3				Task Item is Past Due	

ID	Area	Type	Subject / Discipline	Description	Request From	Assigned To	Priority	Task Start Date	Target Due Date	Revised Target Due Date	Actual Completion Date	Status	Activity: Comments/Notes
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													



## PROJECT RACI

**Project Number:** 2#####XX  
**Project Name:** Project Name

Customer Name	Project Management	Civil	Structural	Architecture	Fire Protection	Plumbing	Mechanical	Refrigeration	Electrical	Process Engineer	Process Equipment Vendor	Process Equipment Vendor	Construction Project Management	MEP Services	MEPR Design	Construction Site Management
GRAY AES	GRAY AES	COMPANY NAME	COMPANY NAME	GRAY AES	COMPANY NAME	COMPANY NAME	COMPANY NAME	COMPANY NAME	COMPANY NAME	COMPANY NAME	COMPANY NAME	COMPANY NAME	COMPANY NAME	COMPANY NAME	GRAY AES	COMPANY NAME

### Project Management

Project Definition / RFP	ESTIMATE	Level 1	Level 2	Level 3	Level 4	Level 5
Project Definition / RFP	ESTIMATE	Level 1	Level 2	Level 3	Level 4	Level 5
Building Design Coordination	Estimate Level	Order of Magnitude	Conceptual	Design Development	Construction Document	Bid/Contract
Process Coordination	Estimate Name	Order of Magnitude	Conceptual	Design Development	Construction Document	Bid/Contract
Customer Review Meeting	Estimate +/-	50%	30%	15%	5-7.5%	1-5%/GMAX
Milestone Design Review	Estimate Approach	Historical SF Cost & Equipment Cost	Historical Unit Cost	Subcontractor Validation for Major Trades	Subcontractor Validation for all trades	Subcontractor Validation for all trades
Document Release	Subcontractor Involvement	None	1-2 per major trade	3-4 per major trades	3-4 all divisions	all subs, all divisions
Maintain RFI Log (frequency)	Subcontractor Estimate Level	N/A	Budgetary	Firm Number with contingency/allowances	Firm Number with small contingency	Final Contract
Maintain Design Change Log						
Maintain/Update Access Control						
Procure Current Documents						
Create Record Drawings						
Execute Certificate of Occupancy						
Project Organization						

### CSA/MEP DESIGN INFORMATION

Design Level Terminology	Schematic Sketch	Conceptual	Preliminary	Design Development/ Detailed Engineering	IFC/Final
Design Level - Historical Percentage	<1%	10%	30%	60%	90-100%

### Project Controls

Contract, AIA					
BIM Level of Development		LOD 100-200	Preliminary - LOD 200-300	Detailed - Design Deliverables are coordinated, components located, quantities noted/identified, configuration/assemblies detailed, materials selected. LOD 300	Final means completion of shop drawings, changes to design deliverables as a result of: shop drawings, field coordination, field conditions, customer change orders

### PROCESS DESIGN INFORMATION

Design Level Terminology	Conceptual	Preliminary	Design Development/ Detailed Engineering	IFC/FINAL
Proposed Design Level	1-5%	10-15%	30%	60%
Design Level - Historical Percentage	10 - 15%	30%	60%	90-100%

### PROPOSAL DURATION (INCLUDES DESIGN & PRICING)

TOTAL Proposal Duration with Process	1 week	6-8 weeks	3 months	3-5 months	6-8 months
TOTAL Proposal Duration without Process	3 days	3 weeks	4-6 weeks	8-12 weeks	12-16 weeks

### ESTIMATE

Estimate Level	Level 1	Level 2	Level 3	Level 4	Level 5
Estimate Name	Order of Magnitude	Conceptual	Design Development	Construction Document	Bid/Contract
Estimate +/-	50%	30%	15%	5-7.5%	1-5%/GMAX
Estimate Approach	Historical SF Cost & Equipment Cost	Historical Unit Cost	Subcontractor Validation for Major Trades	Subcontractor Validation for all trades	Subcontractor Validation for all trades
Subcontractor Involvement	None	1-2 per major trade	3-4 per major trades	3-4 all divisions	all subs, all divisions
Subcontractor Estimate Level	N/A	Budgetary	Firm Number with contingency/allowances	Firm Number with small contingency	Final Contract

### CSA/MEP DESIGN INFORMATION

Design Level Terminology	Schematic Sketch	Conceptual	Preliminary	Design Development/ Detailed Engineering	IFC/Final
Design Level - Historical Percentage	<1%	10%	30%	60%	90-100%
BIM Level of Development		LOD 100-200	Preliminary - LOD 200-300	Detailed - Design Deliverables are coordinated, components located, quantities noted/identified, configuration/assemblies detailed, materials selected. LOD 300	Final means completion of shop drawings, changes to design deliverables as a result of: shop drawings, field coordination, field conditions, customer change orders

# Clash Detection

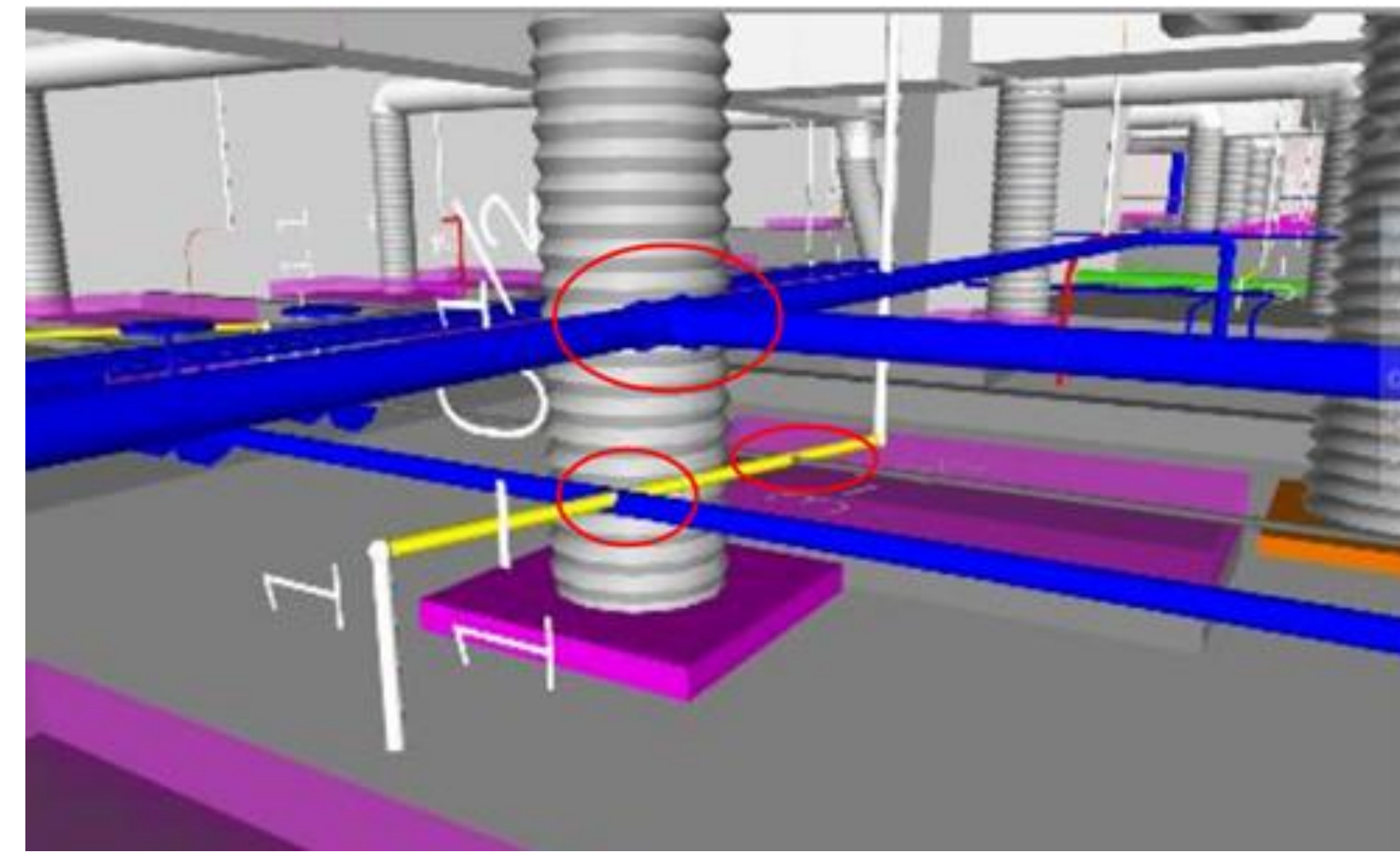
Gray uses 3D models to enhance the coordination process.

These models are clashed against one another to determine spatial conflicts as well as determine other means and methods.

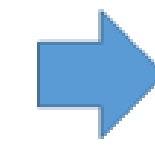
A dedicated BIM/VDC Specialist facilitates the process in conjunction with the Design Manager for the project.

Project benefits:

- Improves planning and coordination
- Minimizes rework in the field
- Reduces costs and change orders
- Saves time/schedule



3-D Model in  
REVIT



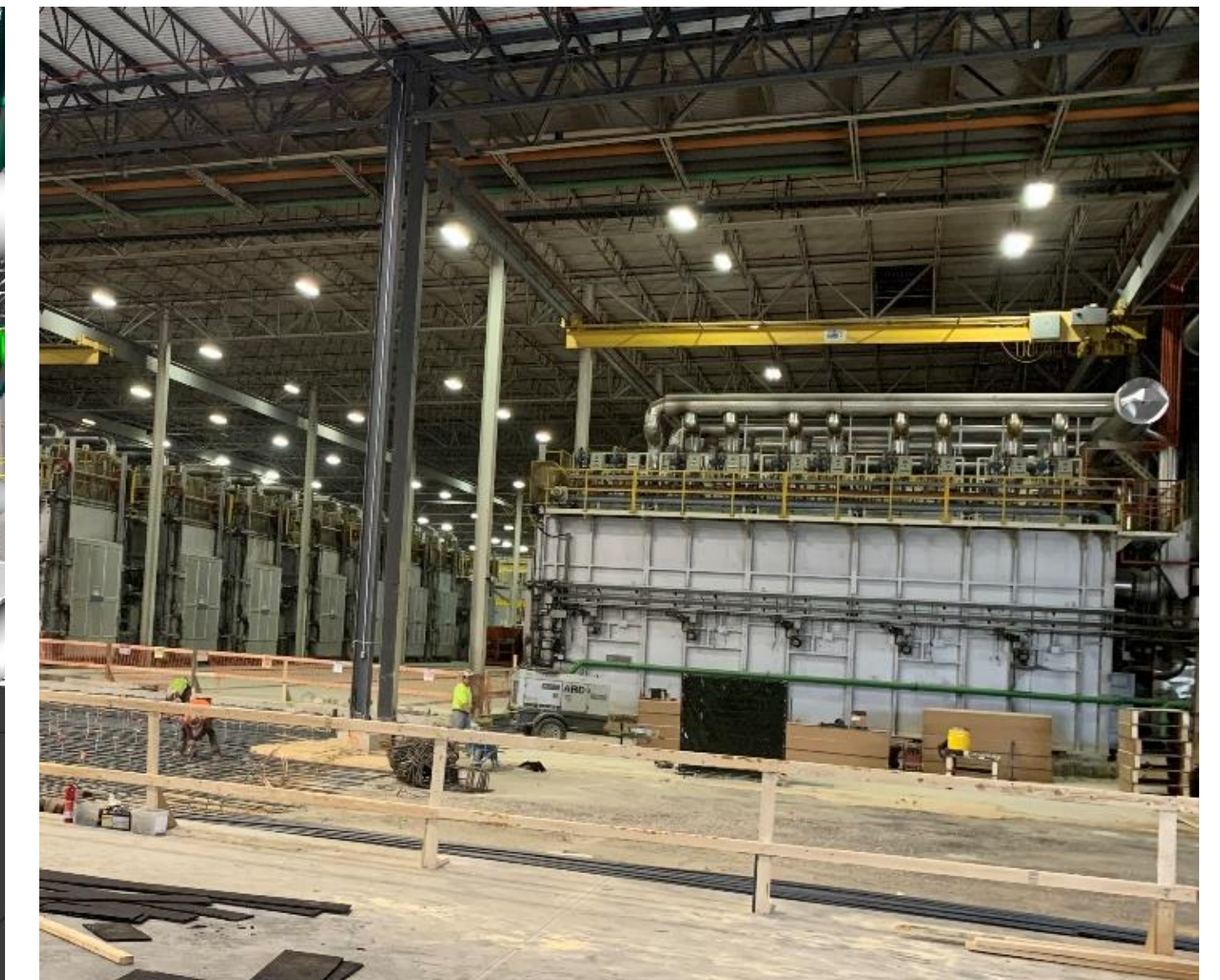
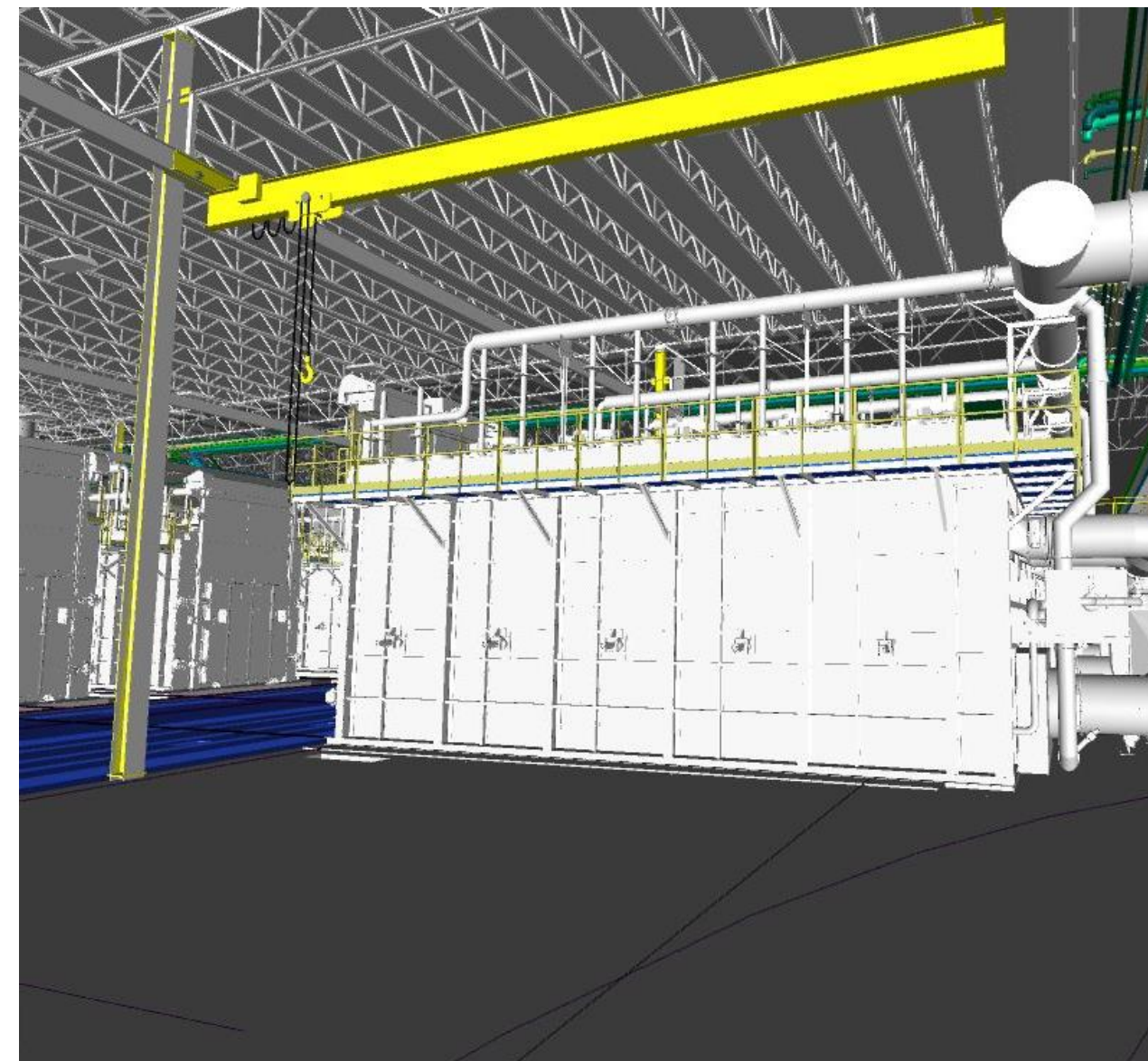
Export to  
Navisworks



Run Clash  
Detection



Review Clash Report  
With Stakeholders to  
Resolve Clashes



# Leveraging Technology

## LiDAR Scanning

- Generates detailed (to within fractions of an inch) 3D point cloud file of existing conditions
- Import into Revit, use to overlay accurate “as-built” model
- Can be used for existing facilities (brownfield, line expansions, restoration) as well as site surveys

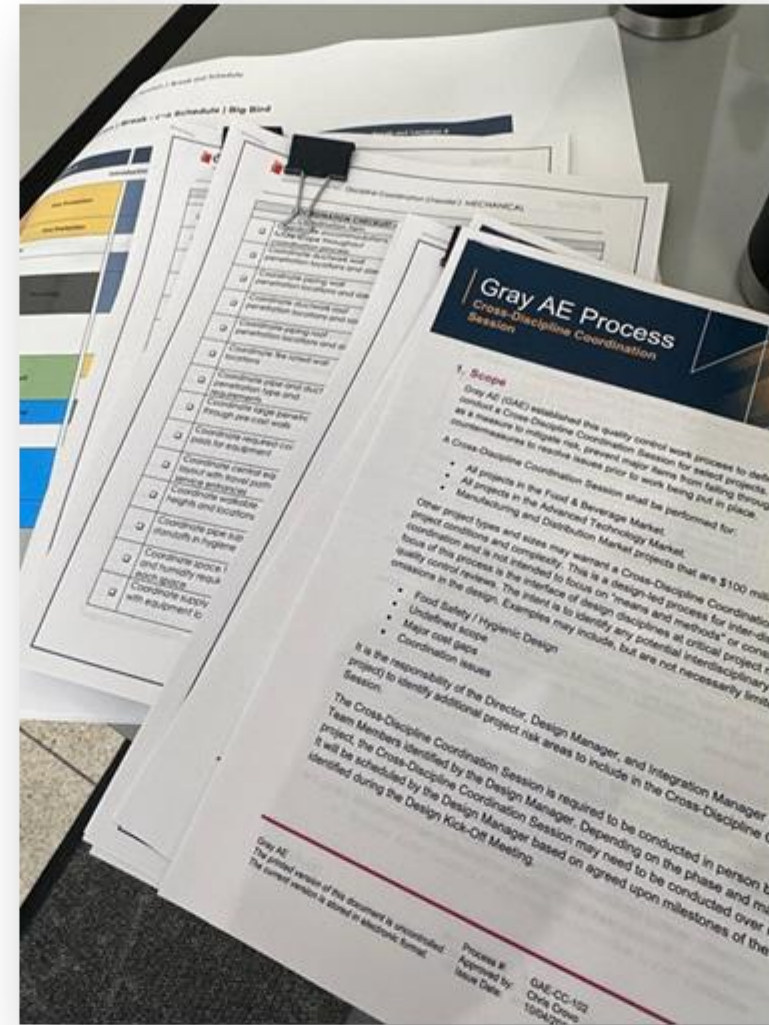


# Cross Discipline Coordination

## Purpose

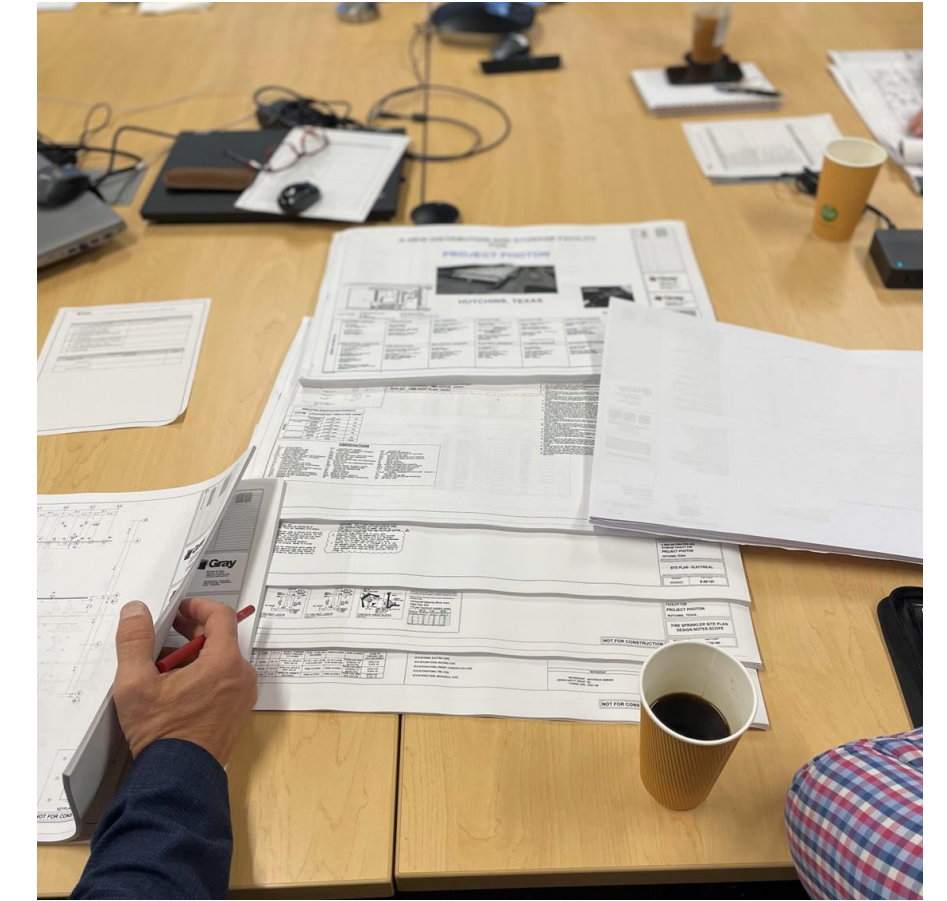
For projects in the Food & Beverage and Advanced Technology sectors, we've made our Quality Control Coordination Sessions a standard part of every job. **Why?** Because catching issues early means smoother construction, fewer delays, and better outcomes for you.

This design-led approach brings all disciplines to the table early on, helping us prevent costly oversights, reduce risk, and ensure your project is set up for success—before construction even begins."



## Objectives

- Facilitate coordination among design disciplines at critical project milestones.
- Identify and resolve potential interdisciplinary conflicts, errors, or omissions.
- Focus areas include:
  - Food safety and hygienic design.
  - Undefined scopes.
  - Significant cost discrepancies.
  - Coordination challenges.

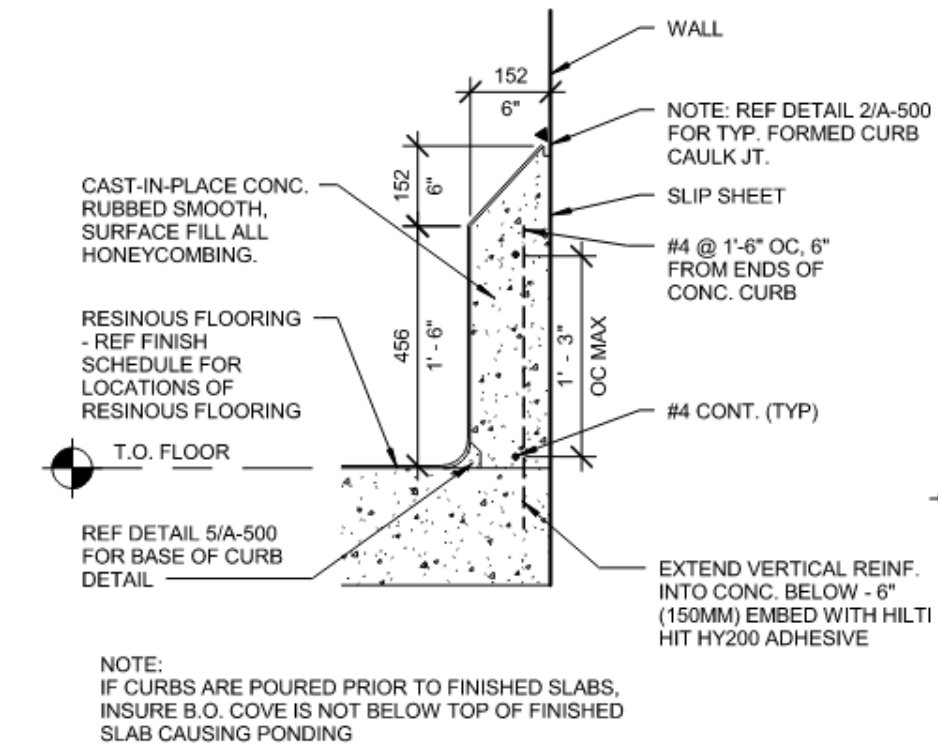
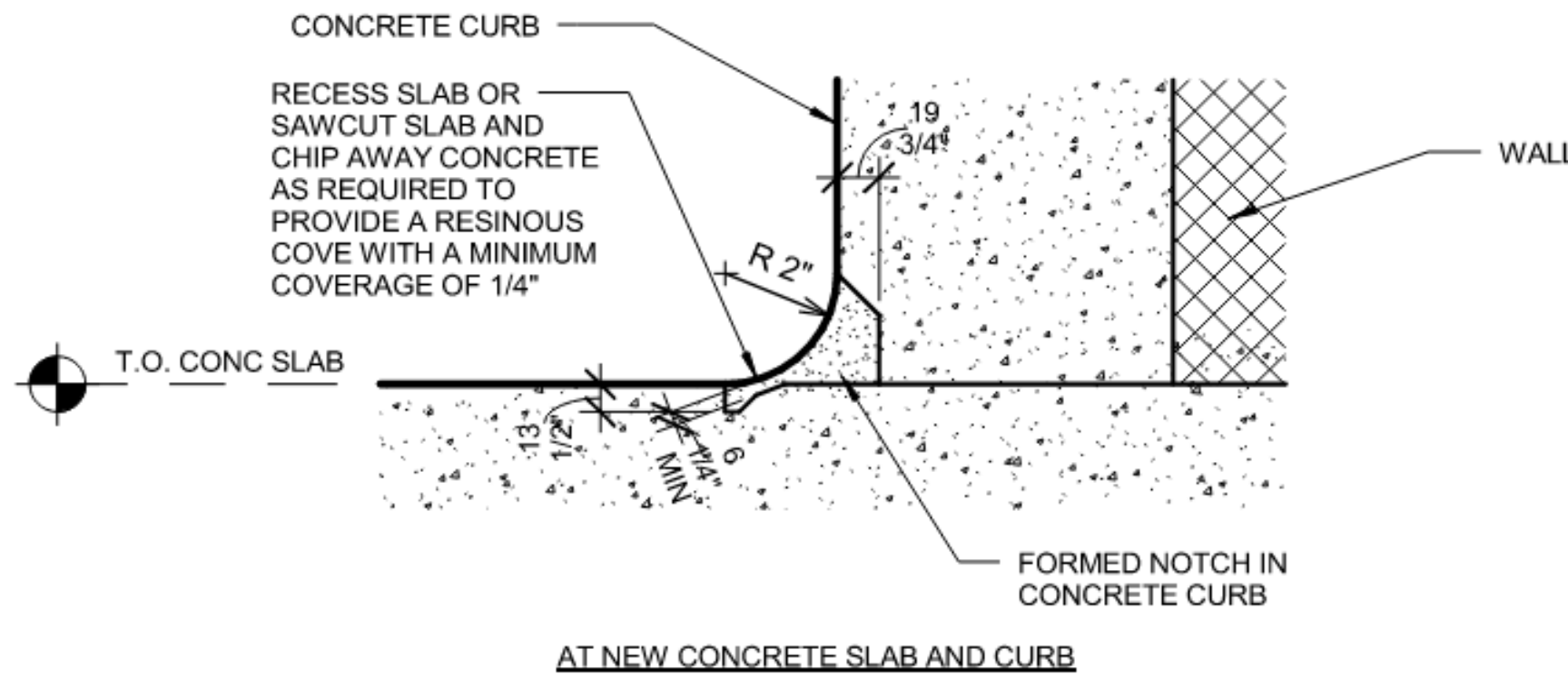
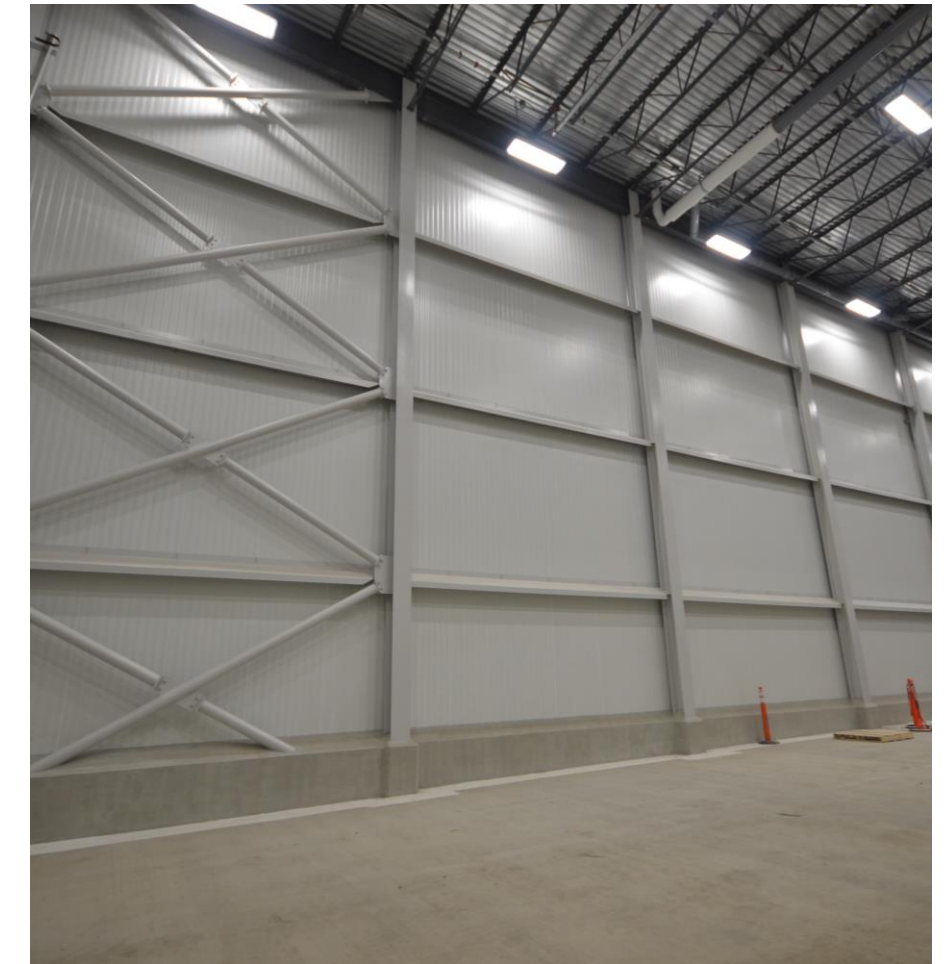


## Execution

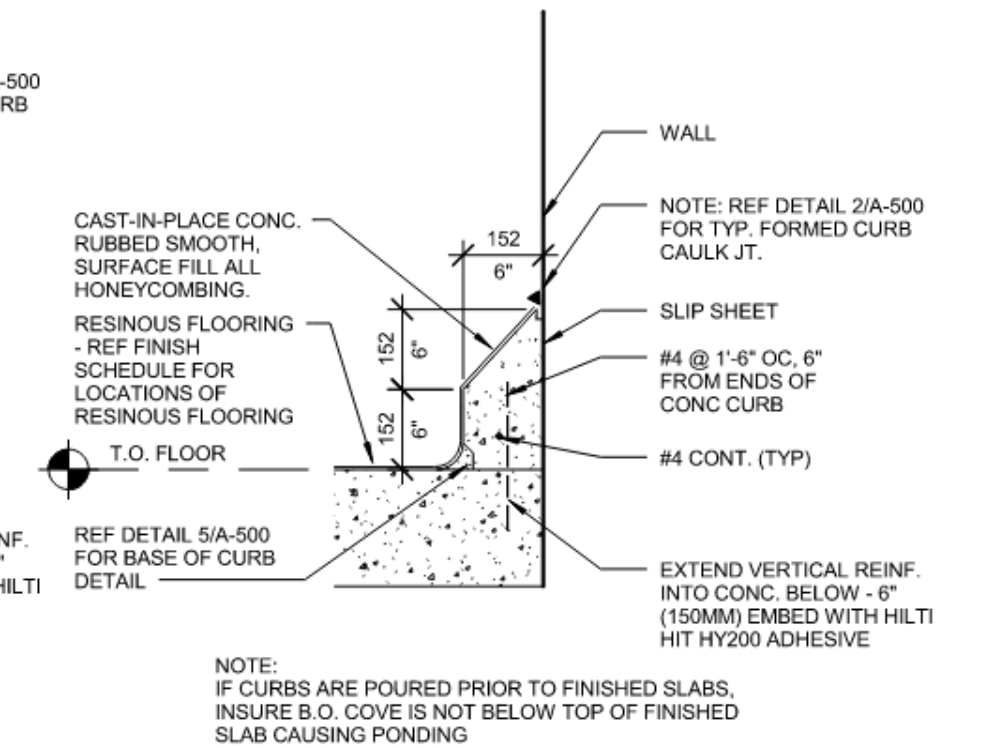
- Sessions must be conducted in person by key project team members designated by the Design Manager.
- Scheduling aligns with project milestones established during the Design Kick-Off Meeting.

Time	Break-out Location 1	Break-out Location 2	Break-out Location 3	Break-out Location 4
8:15 - 8:30	INTRODUCTION			
8:30 - 9:30	Architectural	Plumbing	Electrical	Fire Protection
10:00 - 10:30	Plumbing	Structural	Mechanical	Civil
10:30 - 10:45	Break			
10:45 - 11:15	Electrical	Mechanical	Architectural	Refrigeration
11:15 - 11:45	Civil	Structural	Process	Refrigeration
11:45 - 12:15	Civil	Structural	Process	Refrigeration
12:15 - 1:15	Lunch			
1:15 - 1:45	Architectural	Civil	Process	Refrigeration
1:45 - 2:15	Mechanical	Refrigeration	Civil	Electrical
2:15 - 2:30	Mechanical	Refrigeration	Civil	Fire Protection
2:30 - 2:45	Break			
2:45 - 3:15	Electrical	Process	Architectural	Mechanical
3:15 - 3:45	Process	Structural	Mechanical	Plumbing
3:45 - 4:15	Process	Structural	Architectural	Electrical
4:15 - 4:30	Break			
4:30 - 5:00	Architectural	Electrical	Fire Protection	Process
5:00 - 5:15	Wrap-up / Closing			

# Design Details



**A CONCRETE CURB TYPE A**  
1" = 1'-0"



**B CONCRETE CURB TYPE B**  
1" = 1'-0"

# Establishing Quality Expectation

- Approve Level of Fit and Finish
- Coordination of Trade Sequencing
- Establishes Accountability
- Minimize Change Orders





# Equipment & Processes

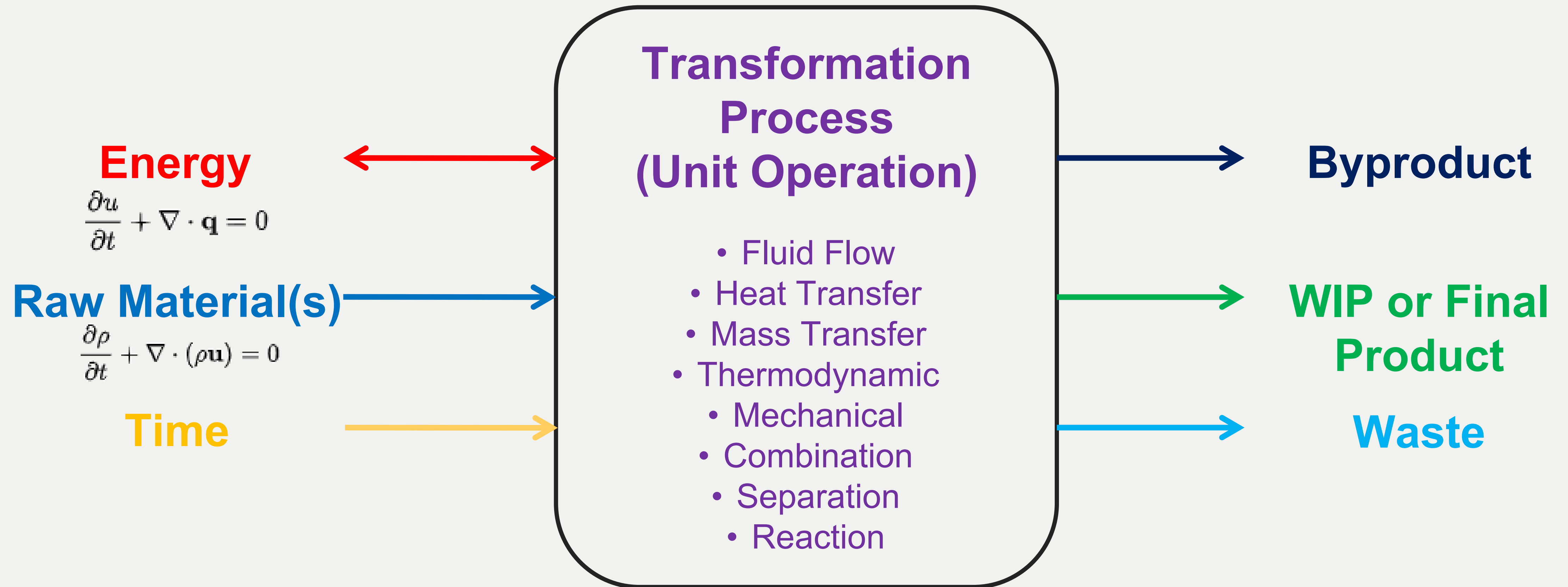


# Hygienic Design

e.g. Foundation for Meat and Poultry Research and Education – Food Safety & Equipment Design Principles

<b>10 Principles of Food Safety Design Summary</b>			
<b>Principle</b>	<b>Score</b>	<b>Points Available</b>	<b>Percent (%)</b>
1. Made of Compatible Materials		100	%
2. Accessible for Insepction, Maintenance, and Sanitation		150	%
3. No product, Liquid, or Other Material Collection		100	%
4. Hollow Areas are Hermetically Sealed		110	%
5. No Niches		150	%
6. Operational Performance		120	%
7. Maintenance Enclosures		50	%
8. Compatibility With Other Plant Systems		60	%
9. Cleanable to a Microbiological Level		100	%
10. Validated Sanitation Protocols		60	%
<b>Combined Score</b>		<b>1000</b>	<b>%</b>

# Process Systems Design & Integration



# Process & Packaging Systems Design & Integration

Freeze Dry PFD/Mass Balance		Utility Rates				Daily Utility Usage				Daily Utility Costs				Monthly Utility Usage		Annual Utility Usage	
1	9/11/2021 10:55	Electric	0.07	5 per kW/hr	Electric	44,795	kWh	Electric	\$3,134.9	30 days	1,343,544.43	12 months	16,122,533.14	30 days	1,343,544.43	12 months	16,122,533.14
3	D. Goods II	Natural Gas	7	5 per Mcf	Natural Gas	126.6	Mcf	Natural Gas	\$ 907.2	30 days	3,868.00	12 months	46,656.00	30 days	3,868.00	12 months	46,656.00
4		Water	1.75	5 per 750 gallons	Water	9,590	gal	Water	\$ 214.6	30 days	2,750,400.00	12 months	33,112,800.00	30 days	2,750,400.00	12 months	33,112,800.00
5		Waste Water	1.85	5 per 750 gallons	Waste Water	9,661	gal	Waste Water	\$ 147.2	30 days	1,789,830.00	12 months	21,477,960.00	30 days	1,789,830.00	12 months	21,477,960.00

Equipment	Capacity	Rate	Run Time	Power	Utility/day
Grinder/Block Breaker	1,500 kg/batch	1,500 kg/hr	6.0 hr/day	115 kW	690.0 kW/h
Emulsifier (optional)	2,500 kg/hr	2,500 kg/hr	10.0 hr/day	30.00 kW	200 kW/h
Bowl Cutter	500 kg	1500 kg/hr	10.0 hr/day	200 kW	2000 kW/h
Chub Maker Feed Pump	1500 kg/hr	1500 kg/hr	10.0 hr/day	300.00 kW/h	3000 kW/h
Chub Maker	1250.0 kg/hr	1250.0 kg/hr	12.0 hr/day	120 kW/h	1200 kW/h
IQF/Blast Freezer	636.4 kg/hr max	636.4 kg/hr	28.0 hr/day	100 kW/h	1000 kW/h
Dicer (50% of product made)	2500 kg/hr	2500 kg/hr	6.0 hr/day	120 kW	720 kW/h
Grinder	1500 kg/hr	1500 kg/hr	10 hr/day	100 kW	1000 kW/h
Santizer	1500 kg/hr	1500 kg/hr	10 hr/day	100 kW/h	1000 kW/h
Former/Waterwheel (50% of product)	4000 kg/hr	4000 kg/hr	3.75 hr/day	40 kW	150 kW/h
FD Chamber #1	3229.167 kg/cycle	3229.167 kg/cycle	15.5 hours	30 kW	30 kW/h
FD Chamber #2	3229.16667 kg/cycle	3229.16667 kg/cycle	15.5 hours	30 kW	30 kW/h
FD Chamber #3	3229.167 kg/cycle	3229.167 kg/cycle	15.5 hours	30 kW	30 kW/h

## Engineering

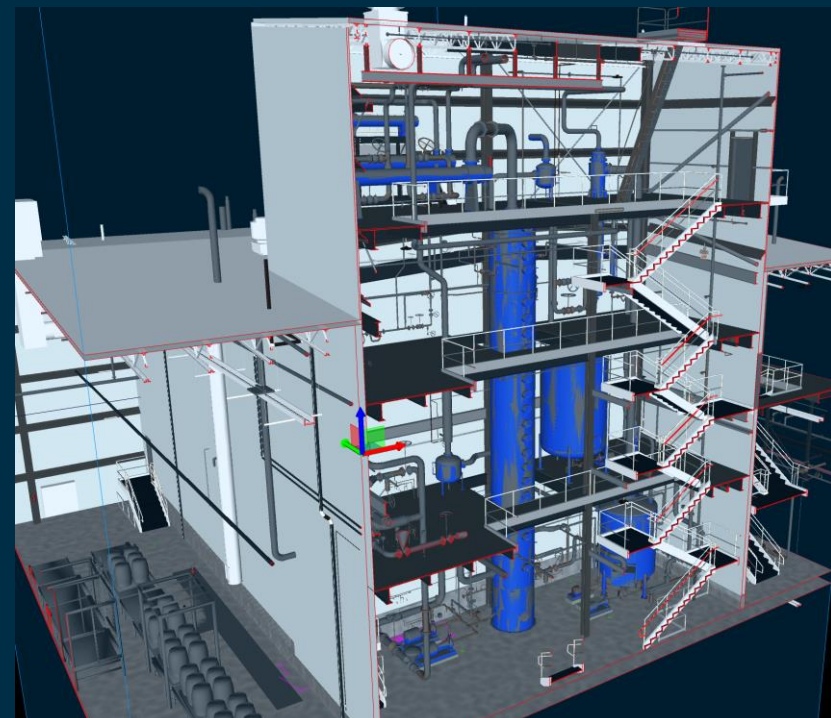
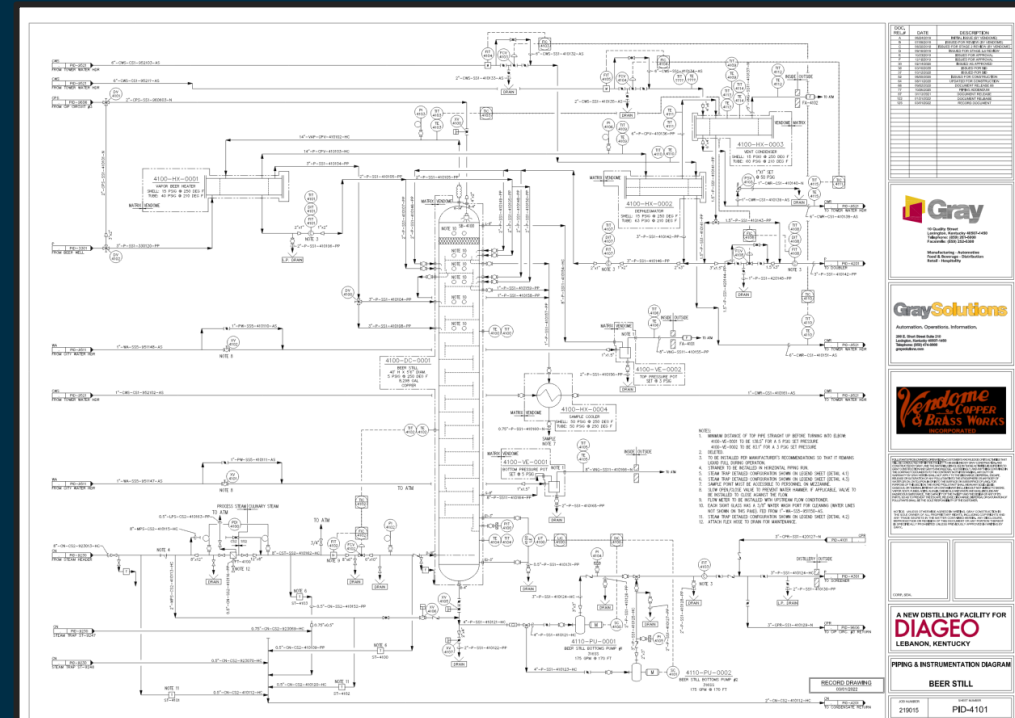
- Mass Balance
- Equipment Sizing
- Specifications

## Design

- BFD/PFD/P&ID
- 3D Model
- General Arrangement
- Asset Lists

## Implementation

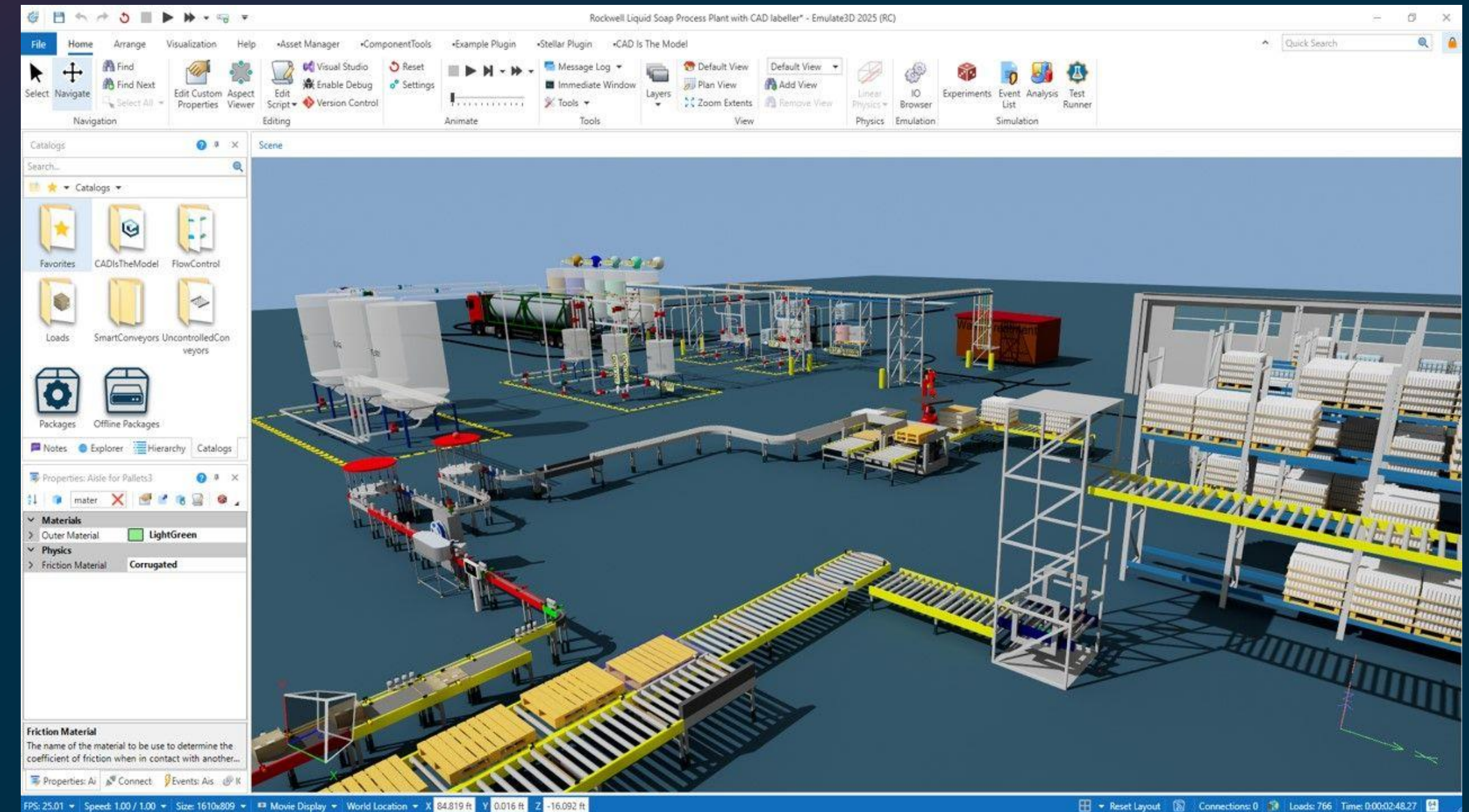
- Sourcing & Procurement
- Functional Description
- CQV

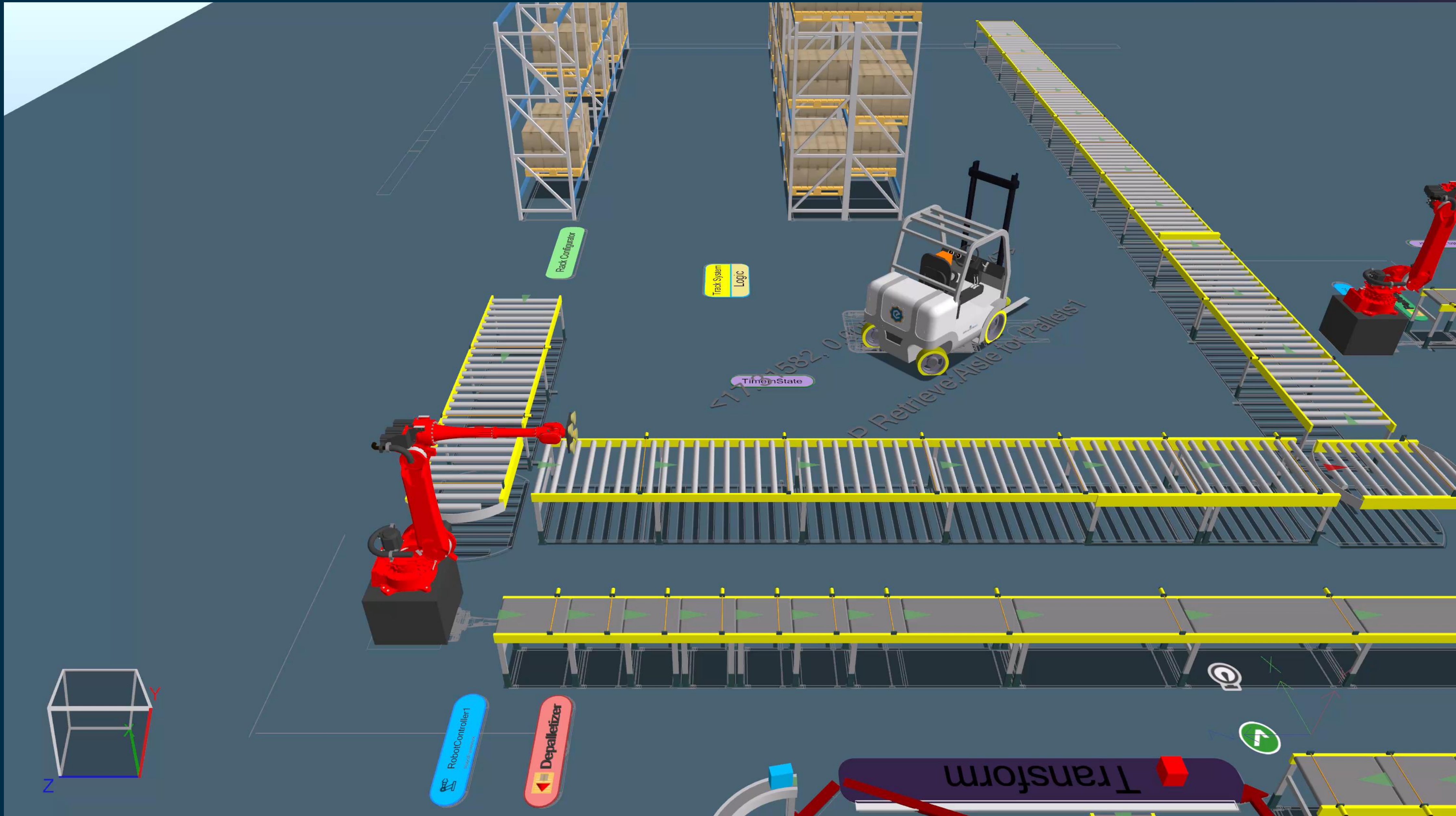


# Leveraging Technology

## Process Simulation & Emulation

- “Singing, dancing spreadsheet”
- Help visualize process to stakeholders
- Resolve design issues with discrete event simulations
- Validate operational requirements *in silico*
- Virtual commissioning





# Selecting & Procuring Equipment

## Best Value Option Analysis

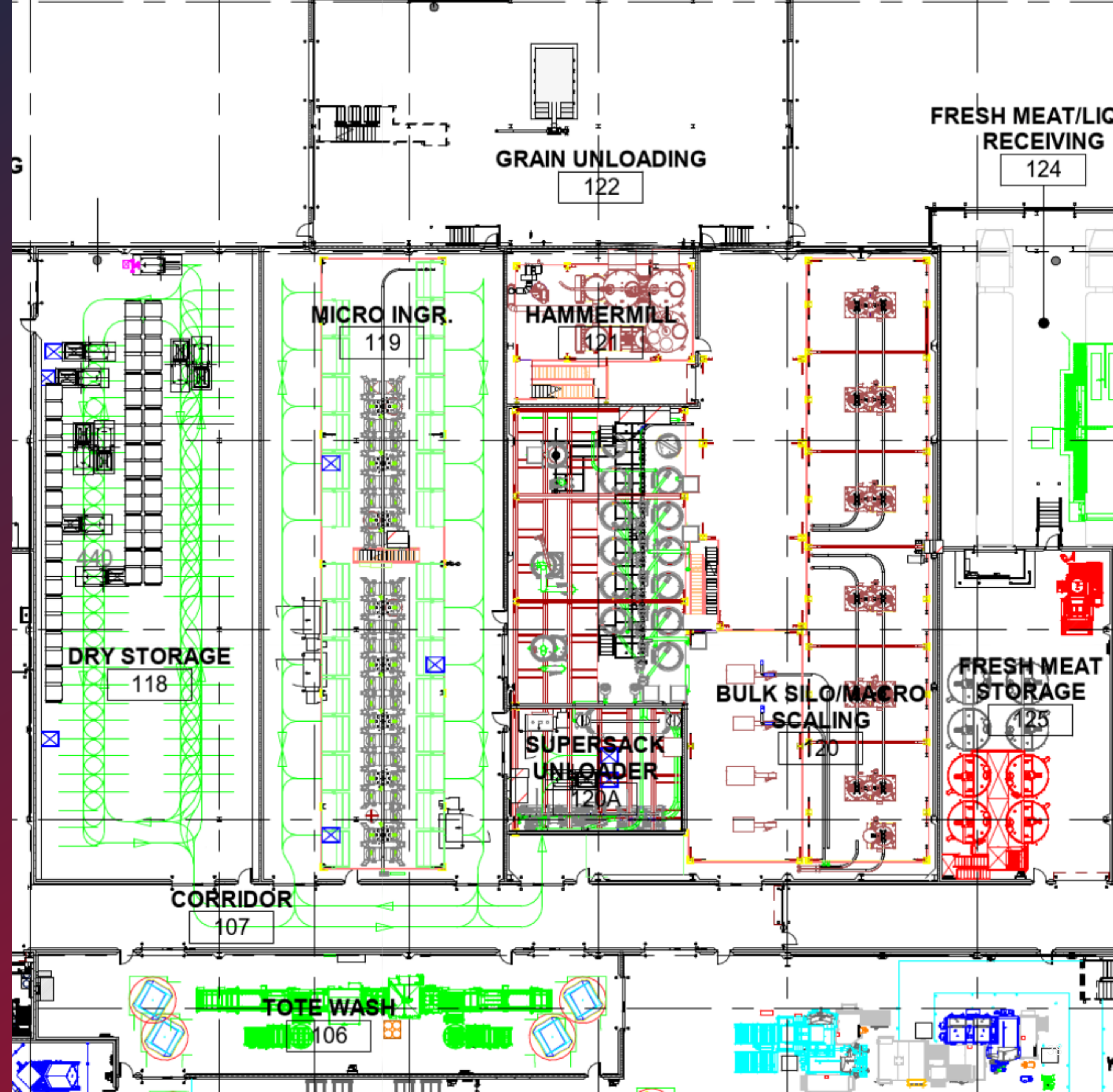
- Does the equipment meet the spec?
- Existing relationship/"fit"?
- Is the technology proven for this application?
- OEM - Domestic vs. international?
- Does the equipment meet schedule and budget?
- Hygienic design?
- Availability of service and spares?
- Commercial terms?
- Quality of submittals?
- CQV support?
- Packaged system vs. discrete equipment?
- Controls & automation compatibility?



# Layout & Adjacency

More than just “industrial Tetris”

- Maintenance Access
- Process interconnections
- Ergonomics
- Life safety
- Sanitation coordination
- Modularity & portability
- “Calamity” plan
- Clash resolution
- Sampling & QA access

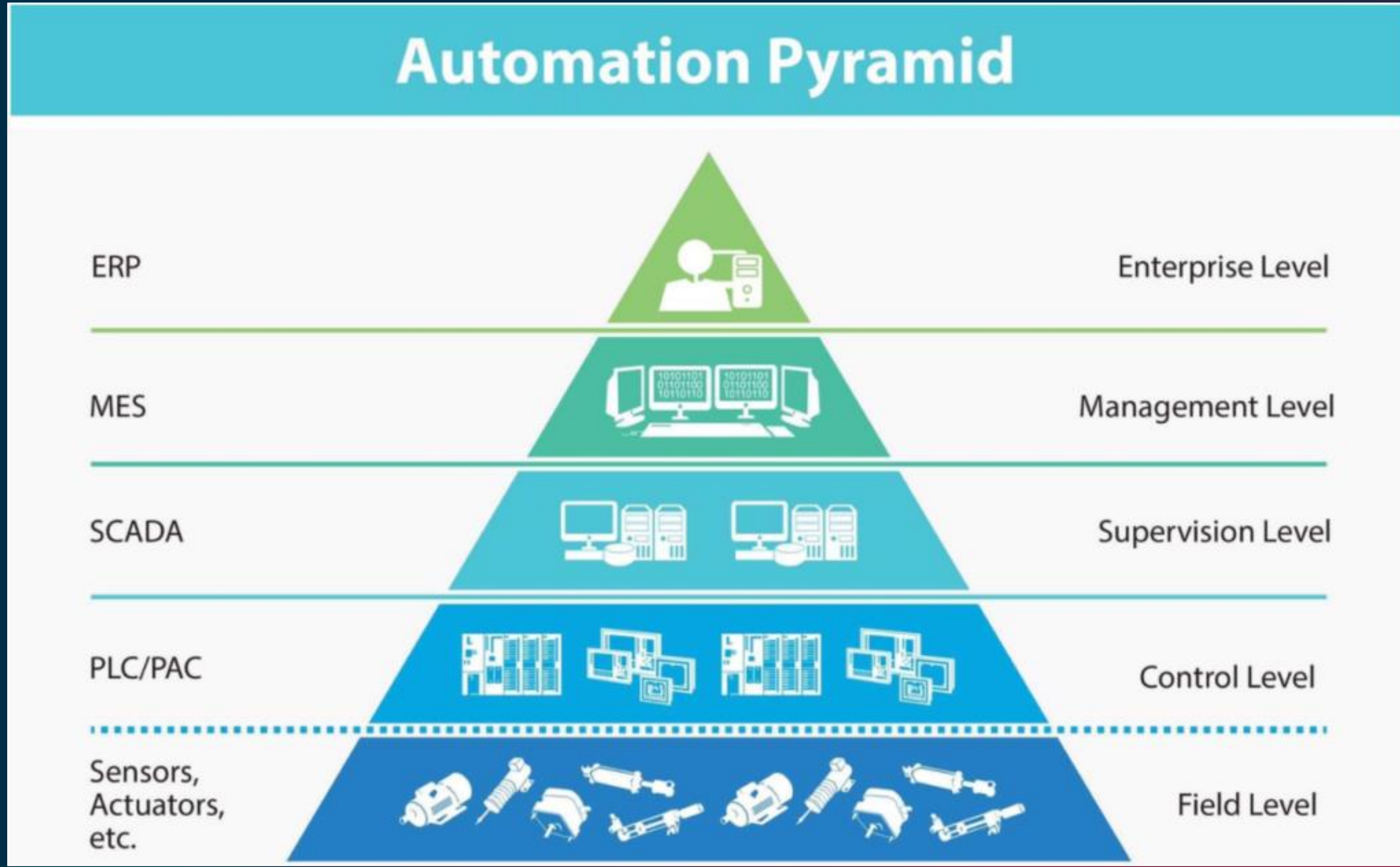




# Automation



# “Automation”



# Technology Partnerships

Experienced system integrators





# Automation + Controls

## From Complexity to Clarity

We evaluate, modernize, and upgrade automation and control systems to:

- ✓ Reduce Downtime
- ✓ Modernize Outdated Systems
- ✓ Achieve Plant-Wide Insight

**Services:**

Control System Consulting, Control System Design,  
Controls Integration



# Automation + Controls: Our Services



## Control System Consulting

After meticulously investigating your processes, equipment, and constraints, we develop a solution tailored to your unique requirements.



## Control System Design

We design reusable, scalable, flexible, and maintainable control and automation solutions to precisely fit your infrastructure.



## Controls Integration

We seamlessly connect new and existing equipment so you can quickly pass factory acceptance testing and achieve a successful commissioning process.



# Automation + Controls: Proof Points



## A Modernization Journey

**OVERVIEW:** Modernizing PLCs using Siemens SIMATIC PCS 7 and evaluating equipment, OT network, and processes.

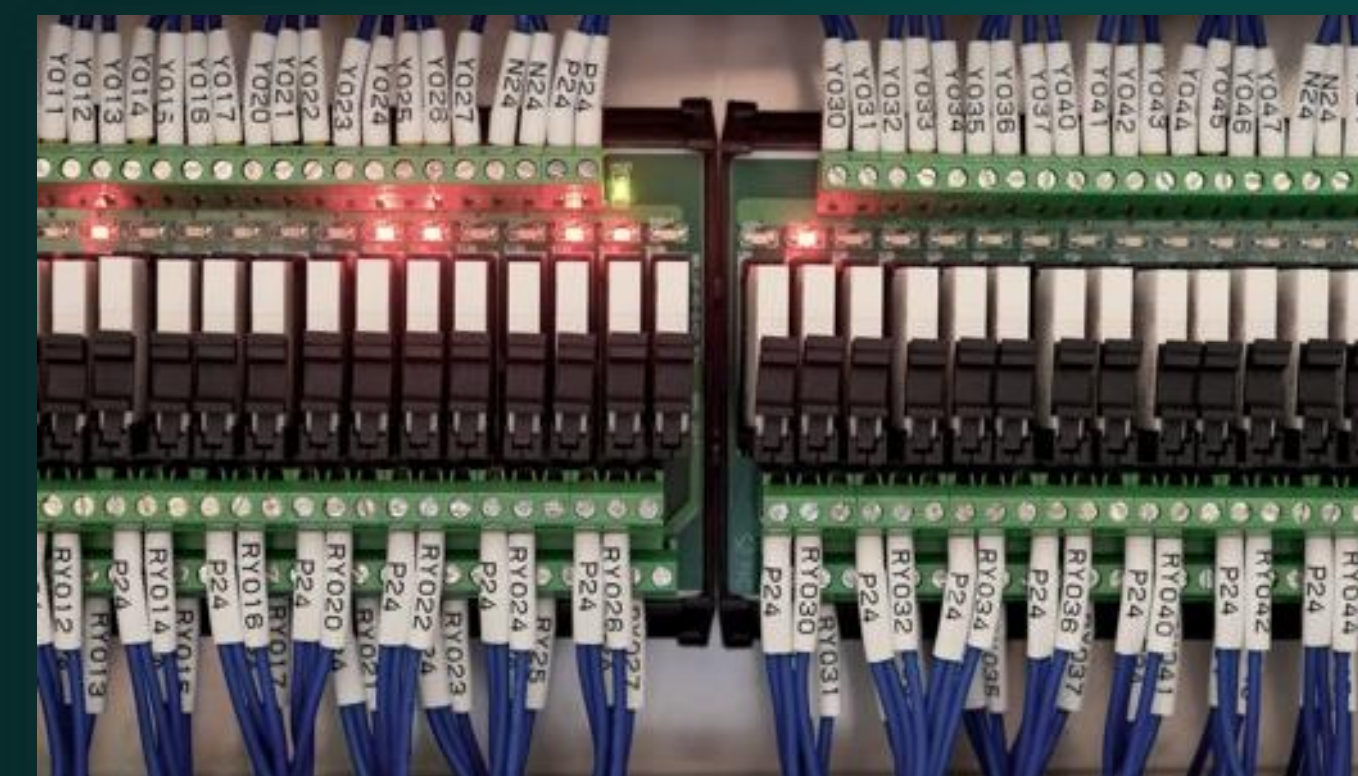
**RESULTS:** Accelerated blending process; revolutionized visualization, alarming, and interlock tracking.



## The Recipe Behind T. Marzetti's Expansion

**OVERVIEW:** Designing and installing a highly flexible batching and data collection solution, from receiving raw materials to palletizing products.

**RESULTS:** Provided flexible control systems, visibility into the entire plant, and streamlined workflows.



## Turning Cereal Dreams into Data Streams

**OVERVIEW:** Modernizing 12 control systems by transitioning from outdated PLC5s to sleek ControlLogix controllers.

**RESULTS:** Controllers integrated with manufacturing data, added reporting to PLCs, enhanced supervisory control.



# Digital Transformation

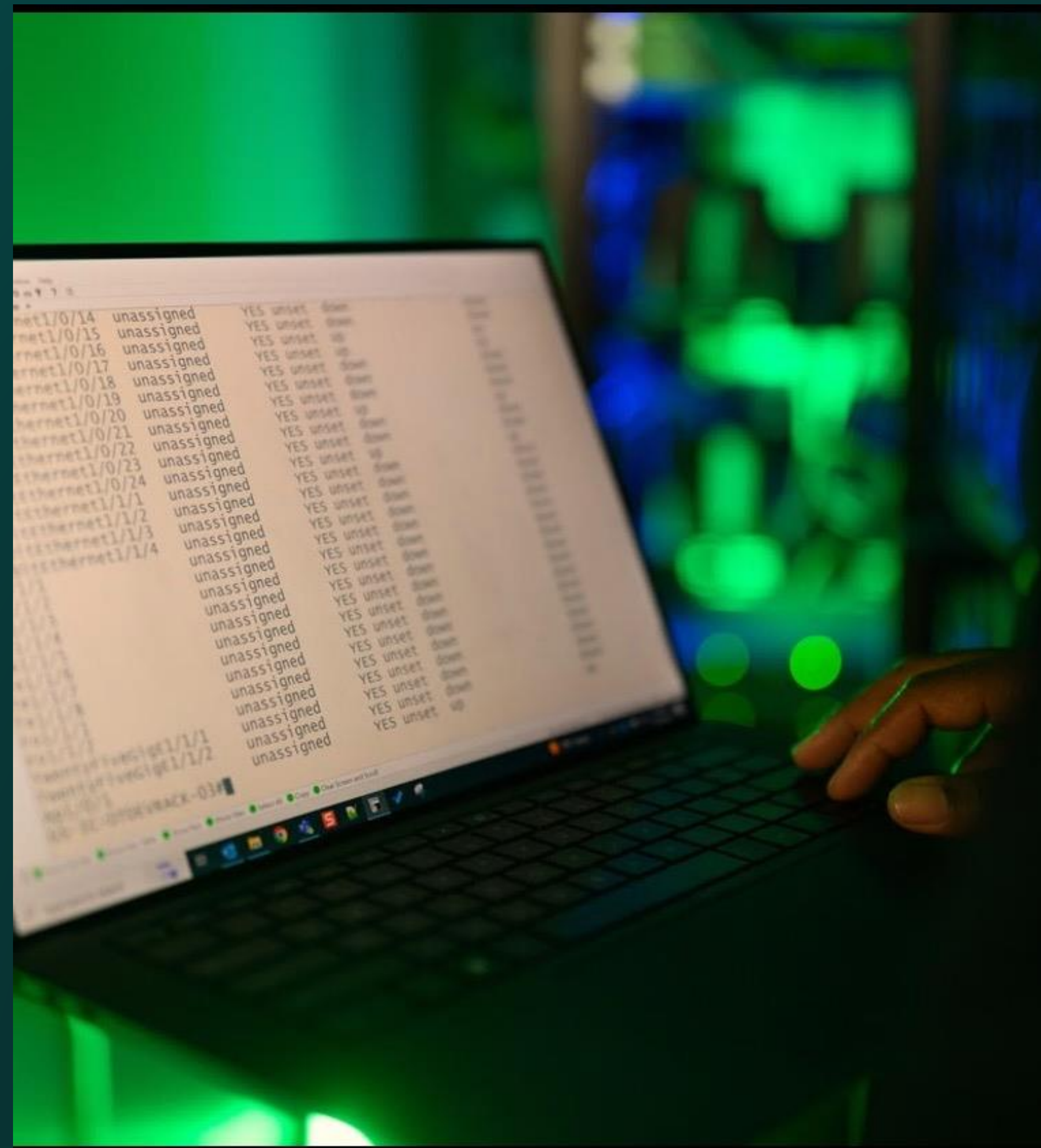
## Transform Information into Action

Consolidating information to create a single source of truth so you can:

- ✓ Gain Line of Sight to Meaningful Opportunities
- ✓ Improve Operations through Data & Reports
- ✓ Boost OEE of Existing Systems

### Services:

MES, IIOT Data + Visualization, Reporting + Analytics, Batch Control Systems



# Digital Transformation: Our Services



## MES: Make Better Data-Driven Decisions

We understand the root of your business problems and develop a tailored MES solution to improve efficiency, quality, and profitability of your manufacturing processes.



## IIOT Data + Visualization

We transform how you collect, analyze, and visualize data from distributed manufacturing systems by pinpointing key business and operational drivers.



## Reporting + Analytics

We scrub and fine-tune your critical data and connect the dots between systems to deliver contextualized data to everyone who needs it, exactly when they need it.



## Batch Control Systems

We leverage digital data collection to effortlessly analyze comprehensive batch information, pinpoint root causes of variability, and drive improvements for future batches.



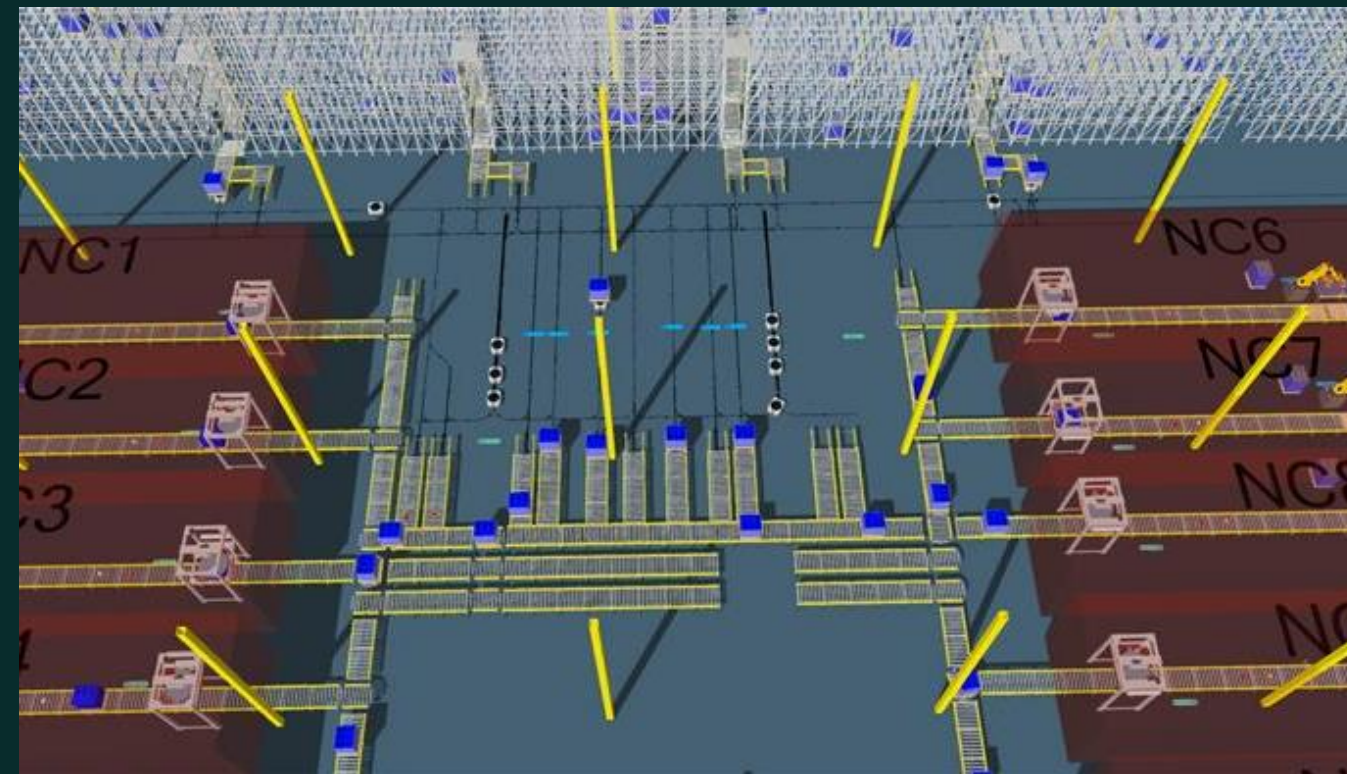
# Digital Transformation: Proof Points



## Brewing Up an MES Journey

**OVERVIEW:** Implementing AVEVA PI and Parsec TrakSYS software that integrated with existing ERP, WMS, and control systems to replace a 40-year-old custom MES solution

**RESULTS:** Revolutionized data collection / management and increased efficiency and consistency worldwide.

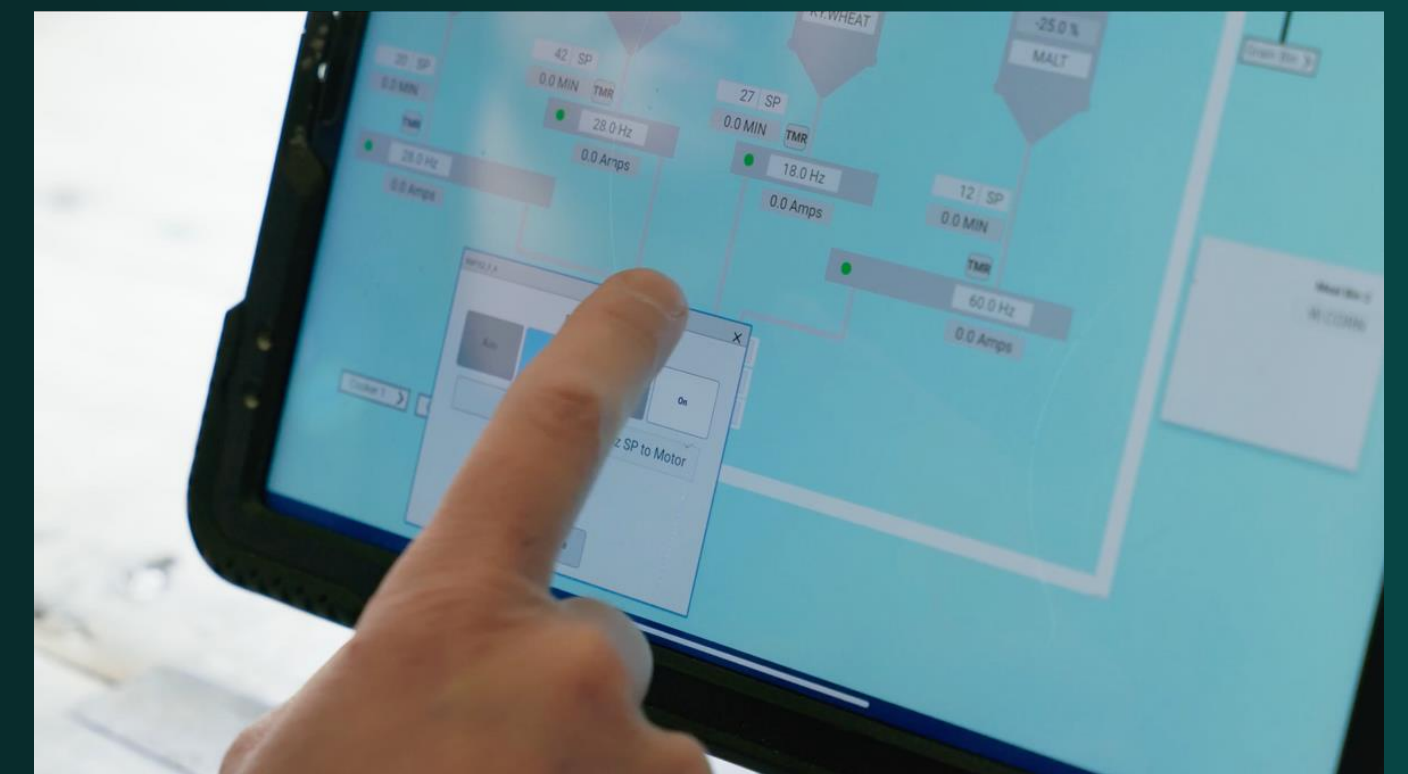


## Consulting on Digital Factory

**OVERVIEW:** Customer planning to build a new plant to handle the high demand for wet pet food.

Currently aging facility could not meet the demands. The intent on this new plant would be highly automated and meet the desired vision of a smart factory.

**RESULTS:** Digital Factory Implementation including Digital Modeling, Control Tower, Emerging Technologies, Advanced Data Analytics



## Recipe Management

**OVERVIEW:** New facility design with extensive recipe database with a variety of proprietary ingredients and mixes. Track and trace throughout multiple lines with multiple convergence and divergence paths.

**RESULTS:** Utilize scalability and flexibility of MES including Track and Trace / Recipe Management, monochrome (Gray-scale) graphic implementation for operator attentiveness.



# OT + Cybersecurity

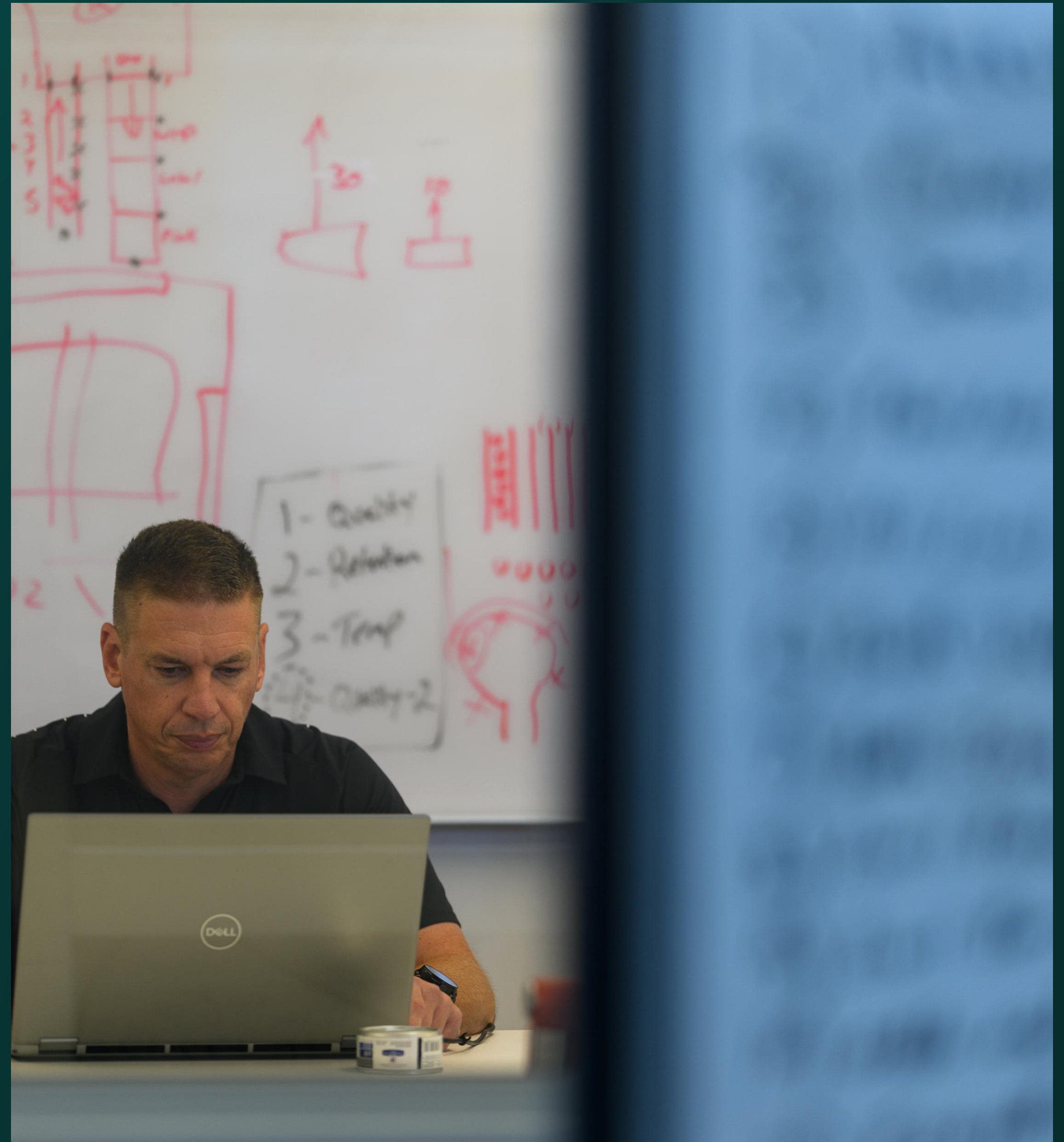
## Security, Functionality, and Reliability

We design, implement, and maintain enterprise-wide OT and cybersecurity solutions to:

- ✓ Enhanced OT Asset Visibility
- ✓ Maximize Uptime
- ✓ Reduce Threats

**Services:**

OT Networking, OT Servers + Virtualization,  
Cybersecurity



# OT + Cybersecurity: Our Services



## • OT Networking

- We deliver resilient OT networks to maximize connectivity, boost reliability, and reinforce security. With segmentation and robust architectures, your infrastructure runs with confidence.



## • OT Servers + Virtualization

- We virtualize OT servers to reduce hardware reliance, enhance resilience, and improve scalability. This simplifies management, strengthens security, and ensures long-term efficiency.



## Cybersecurity

We boost your cyber defenses through an initial gap analysis, breaking down silos between departments and implementing advanced threat detection.

# OT & Cybersecurity: Proof Points



## Obsolescence

**OVERVIEW:** The customer operated multiple sites with significant quantities of aging, unsupported equipment ranging from network devices to motor control systems.

**RESULTS:** Gray AES delivered a comprehensive asset inventory and lifecycle analysis across all sites. We have assisted the customer to secure replacement equipment at reduced costs and proactively launch upgrade initiatives, reducing the risk of unexpected outages and ensuring business continuity.

## Fresh Mark Wins Against Cyber Risks

**OVERVIEW:** Implementation of threat detection and remote access software followed by personalized training.

**RESULTS:** Visibility into the OT network, ongoing asset identification, cybersecurity monitoring, and secure remote access were implemented. Providing automated discovery and reporting for the customer while maintaining a secure point of access for required personnel.

## OT Discovery

**OVERVIEW:** Customer had an aging infrastructure and lack of visibility of that infrastructure. The customer needed a comprehensive list of assets before unplanned failures occur.

**RESULTS:** Discovery and documentation of infrastructure was critical for this customer. Gray AES used a combination of tools and manual discovery efforts to find and document all equipment. We developed a comprehensive list of equipment, life cycle information and identify potential risk to the business.



# Robotics + Vision

## Redefine Possible

Working with industry leading hardware partners, we scale custom robotic solutions that:

- ✔ Increased Operational Efficiency
- ✔ Fill Labor Gaps
- ✔ Master Quality Control

**Services:**

Vision Systems, Robotic System Integration,  
AMRs/AGVs

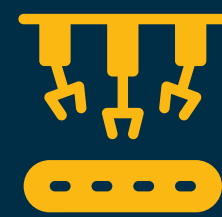


# Robotics + Vision: Our Services



## Vision Systems

We procure, configure, and deploy the ideal vision system for your needs – whether that's to perform inspections, make finite distinctions, or something else.



## Robotic System Integration

We provide sophisticated robotic systems to work seamlessly in your plant while also considering the impacts of robotics and providing training and support.



## AMRs/AGVs

We deploy autonomous mobile robots and automated guided vehicles to quickly transport materials and goods across your facility, optimizing workflows.

# Robotics + Vision: Proof Points



## Smart Cameras for Smart Packaging

**OVERVIEW:** Implementation of a new vision system using the Matrox Iris GTX Series camera from Zebra.

**RESULTS:** Improved accuracy of computer vision code inspection, integrated with existing Rockwell PLC.



## Palletizing Process Success

**OVERVIEW:** Implemented ten (10) Palletizing robots as a part of a customer's plant modernization.

**RESULTS:** Customer realized greater machine efficiency and reliability while future proofing their operation.



## AMR Delivery Activities

**OVERVIEW:** Deployed a fleet of AMRs to deliver raw and packaging materials in a pet food manufacturing operation

**RESULTS:** Eliminated the need for conventional conveyor systems while increasing material delivery flexibility .

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