USDA NCSL GREENHOUSES PHASE V

1307 18TH STREET NORTH, FARGO, ND 58102
95% DESIGN - NOT FOR CONSTRUCTION

GENERAL

0	COVER SHEET
ACC01	ARCHITECTURAL CODE COMPLIANCE
G001	SCOPE OF WORK

HAZARDOUS

H100	ASBESTOS ABATEMENT

ARCHITECTURAL

A000	ARCHITECTURAL INFO SHEET
AD122	DEMOLITION ROOF PLAN - HEADHOUSE
AD235-F	DEMOLITION PLANS & ELEVATIONS - RANGE F
AD236-G	DEMOLITION PLANS & ELEVATIONS - RANGE G
AD335-F	DEMOLITION BUILDING SECTIONS - RANGE F
AD336-G	DEMOLITION BUILDING SECTIONS - RANGE G
A111	FIRST FLOOR PLAN - COMPOSITE
A112	ROOF PLAN - COMPOSITE
A122	ROOF PLAN - HEADHOUSE
A235-F1	FLOOR PLAN / DOORS - RANGE F
A235-F2	RCP & ROOF PLAN - RANGE F
A236-G1	FLOOR PLAN / DOORS - RANGE G
A236-G2	RCP & ROOF PLAN - RANGE G
A321	BUILDING SECTIONS - HEADHOUSE
A335-F	EXTERIOR ELEVATIONS & BUILDING SECTIONS - RANGE F
A336-G	EXTERIOR ELEVATIONS & BUILDING SECTIONS - RANGE G
A435-F1	INTERIOR ELEVATIONS - RANGE F
A435-F2	INTERIOR ELEVATIONS - RANGE F
A436-G1	INTERIOR ELEVATIONS - RANGE G
A436-G2	INTERIOR ELEVATIONS - RANGE G
A521	ROOF DETAILS
A522	ROOF DETAILS
A531	WALL SECTIONS - ALL RANGES
A532	DETAILS - ALL RANGES

LABORATORY

Q101	LEGENDS, NOTES, AND ABBREVIATIONS
Q111	FIRST FLOOR PLAN - COMPOSITE
Q231-F	ENLARGED LAB FLOOR PLAN - RANGE F
Q231-G	ENLARGED LAB FLOOR PLAN - RANGE G
Q431-F1	INTERIOR LAB ELEVATIONS - RANGE F
Q431-F2	INTERIOR LAB ELEVATIONS - RANGE F
Q431-F3	INTERIOR LAB ELEVATIONS - RANGE F
Q431-G1	INTERIOR LAB ELEVATIONS - RANGE G
Q431-G2	INTERIOR LAB ELEVATIONS - RANGE G
Q431-G3	INTERIOR LAB ELEVATIONS - RANGE G
Q501	GREENHOUSE BENCH DETAILS

MECHANICAL

M001	MECH - LEGENDS, ABBREVIATIONS, AND GENERAL NOTES
MD231	MECHANICAL OVERALL DEMOLITION PLAN
M231-F	MECH - DEMO WORK & NEW WORK - RANGE F
M231-G	MECH - DEMO WORK & NEW WORK - RANGE G
M501	MECH - DETAILS
M601	MECH - SCHEDULES

GREENHOUSE CONTROLS

X131	GREENHOUSE CONTROLS - SINGLE LINE DIAGRAM - CELL
X132	GREENHOUSE CONTROLS - SINGLE LINE DIAGRAM - RANGE
X133	GREENHOUSE CONTROLS - NETWORK TOPOLOGY
X134	GREENHOUSE CONTROLS - INSTALLATION DETAIL
X136	GREENHOUSE CONTROLS - LOW VOLTAGE ROOM DETAIL
GHC8	GREENHOUSE CONTROLS -EQUIPMENT CABINET (ZONE B06) TYPICAL OF 1
GHC9	GREENHOUSE CONTROLS -EQUIPMENT CABINET DOOR PANEL (ZONE B06) TYP. OF 1
GHC10	GREENHOUSE CONTROLS -EQUIPMENT CABINET (ZONE B01-B05) TYP. OF 5
GHC11	GREENHOUSE CONTROLS -EQUIPMENT CABINET (ZONE B01-B05) TYP. OF 5
GHC12	GREENHOUSE CONTROLS -BLOCK B SENSOR INPUTS

PLUMBING

P001	PLUMBING - LEGENDS, ABBREVIATIONS, AND GENERAL NOTES
PD231	PLUMBING OVERALL DEMOLITION PLAN
P231-F	PLUMBING - DEMO WORK & NEW WORK - RANGE F
P231-G	PLUMBING - DEMO WORK & NEW WORK - RANGE G
P501	PLUMBING - DETAILS
P601	PLUMBING - SCHEDULES

ELECTRICAL

E001	ELECTRICAL LEGENDS, ABBREVIATIONS, AND GENERAL NOTES
ED231	ELECTRICAL OVERALL DEMOLITION PLAN
E231-F	ELECTRICAL LIGHTING & POWER PLAN - RANGE F
E232-G	ELECTRICAL LIGHTING & POWER PLAN - RANGE G
EM231-F	ELECTRICAL MECHANICAL EQUIPMENT PLAN - RANGE F
EM231-G	ELECTRICAL MECHANICAL EQUIPMENT PLAN - RANGE G
E501	ELECTRICAL DETAILS, LIGHTING FIXTURE SCHEDULE AND PARTIAL RISER DIAGRAM
E601	ELECTRICAL PANEL SCHEDULES
E602	ELECTRICAL PANEL SCHEDULES

USDA

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

COVER SHEET

PROJECT NO.:
DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: 0

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APPLICABLE CODES:

BUILDING:	2018 IBC
ACCESSIBILITY:	2015 ABA / 2010 ADA
LIFE SAFETY:	2021 NFPA 101
ENERGY:	2016 ASHRAE 90.1
MECHANICAL:	2018 IMC
PLUMBING:	2018 IPC
ELECTRICAL:	2020 NFPA 70 / 2021 NFPA 70E
OTHER:	

OCCUPANCY GROUPS

MIXED USE SEPARATIONS: 2 HR

BUSINESS (B)

UTILITY (U)

CONSTRUCTION TYPE

IIB

REQUIRED ASSEMBLY RATINGS

PRIMARY STRUCTURAL FRAME:	0
EXTERIOR BEARING WALLS:	0
INTERIOR BEARING WALLS:	0
FLOOR ASSEMBLIES:	0
ROOF ASSEMBLIES:	0

FIRE PROTECTION FEATURES:

FIRE ALARM:	
FIRE ALARM CONTROL PANEL:	
REMOTE ANNUNCIATOR PANEL:	
SMOKE DETECTION:	
HEAT DETECTION:	
FIRE PUMP:	N/A
BACKUP POWER:	
SUPPRESSION - STAND PIPES:	N/A
SUPPRESSION - AUTOMATIC:	
FIRE EXTINGUISHERS:	
TYPE 1 COMMERCIAL HOODS:	N/A

BUILDING HEIGHT & AREA

BUILDING HEIGHT: 26'

NUMBER OF STORIES: 1

BUILDING AREA	
REGION	AREA (SF)
HEADHOUSE	15263 SF
GREENHOUSE A	3925 SF
GREENHOUSE B	3875 SF
GREENHOUSE C	3926 SF
GREENHOUSE D	3872 SF
GREENHOUSE E	3934 SF
GREENHOUSE F	3865 SF
GREENHOUSE G	3932 SF
GREENHOUSE H	3865 SF
GREENHOUSE J	3991 SF
GREENHOUSE I	3871 SF
GROSS BUILDING AREA:	54319 SF

INCIDENTAL USES:

LEGEND:

- FIRE WALL, BUILDING SEPARATION (X HOURS)
- FIRE BARRIER (X HOURS)
- FIRE PARTITION (X HOURS)
- SMOKE BARRIER (1 HR)
- SMOKE PARTITION
- INCIDENTAL OCCUPANCY
- ACCESSORY OCCUPANCY
- NOT HABITABLE OCCUPANCY
- 75' NEW FIRE EXTINGUISHER- INSIDE RECESSED CABINET - (FE1)
- IMAGINARY PROPERTY LINE

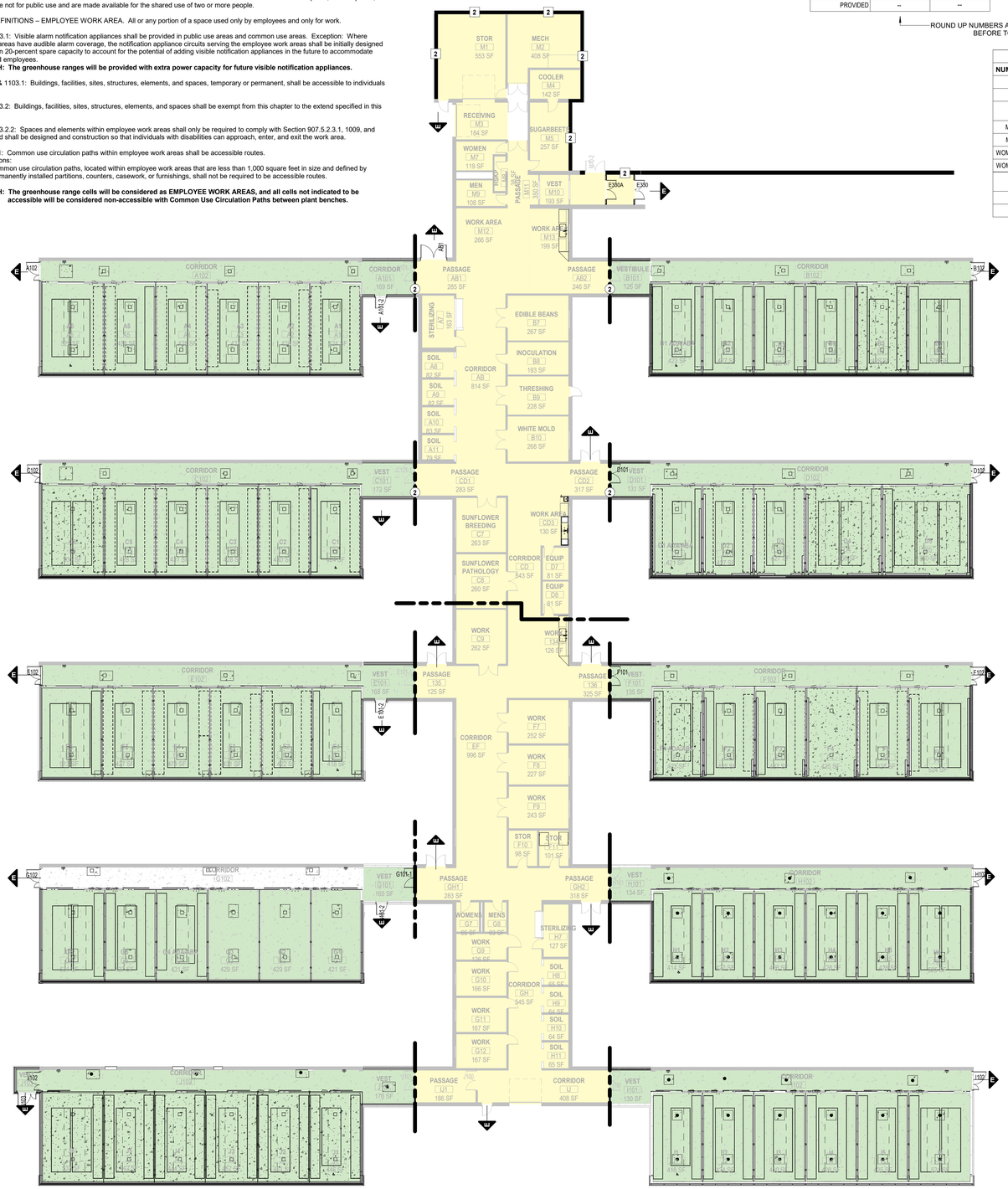
NOTES:

- CONTRACTOR SHALL PROVIDE PERMANENT SIGNAGE OR STENCILING WITHIN CEILING PLENUM AT ALL FIRE RATED WALLS, SMOKE BARRIERS & SMOKE PARTITIONS. LETTERING SHALL BE AT LEAST 1/2" IN HEIGHT WITH THE WORDING: "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS:. REPEAT AT INTERVALS NOT EXCEEDING 30'-0" MEASURED HORIZONTALLY ALONG THE PARTITION WALL.
- SEAL PENETRATIONS IN FIRE RATED SMOKE BARRIERS, FIRE RATED BARRIERS & SMOKE BARRIERS.

GENERAL NOTE: FLOOR PLAN SHOWN HERE DOES NOT DENOTE THE SCOPE OF WORK FOR THIS PROJECT. SEE SHEET G001 FOR SCOPE OF WORK.

- CHAPTER 2 DEFINITIONS – COMMON PATH OF EGRESS TRAVEL - COMMON USE. Interior or exterior circulation paths, rooms spaces, or elements that are not for public use and are made available for the shared use of two or more people.
- CHAPTER 2 DEFINITIONS – EMPLOYEE WORK AREA. All or any portion of a space used only by employees and only for work.
- Section 907.5.2.3.1: Visible alarm notification appliances shall be provided in public use areas and common use areas. Exception: Where employee work areas have audible alarm coverage, the notification appliance circuits serving the employee work areas shall be initially designed with not less than 20-percent spare capacity to account for the potential of adding visible notification appliances in the future to accommodate hearing-impaired employees.
  APPROACH: The greenhouse ranges will be provided with extra power capacity for future visible notification appliances.
- Section 1102.1 & 1103.1: Buildings, facilities, sites, structures, elements, and spaces, temporary or permanent, shall be accessible to individuals with disabilities.
  - Section 1103.2: Buildings, facilities, sites, structures, elements, and spaces shall be exempt from this chapter to the extend specified in this section.
  - Section 1103.2.2: Spaces and elements within employee work areas shall only be required to comply with Section 907.5.2.3.1, 1009, and 1104.3.1 and shall be designed and construction so that individuals with disabilities can approach, enter, and exit the work area.
- Section 1104.3.1: Common use circulation paths within employee work areas shall be accessible routes.
  Exceptions:
  1. Common use circulation paths, located within employee work areas that are less than 1,000 square feet in size and defined by permanently installed partitions, counters, casework, or furnishings, shall not be required to be accessible routes.

  APPROACH: The greenhouse range cells will be considered as EMPLOYEE WORK AREAS, and all cells not indicated to be accessible will be considered non-accessible with Common Use Circulation Paths between plant benches.



FIRST FLOOR - CODE REVIEW PLAN

SCALE: 1/16" = 1'-0"

PLUMBING FIXTURE REQUIREMENTS

GROUP B BUSINESS

NUMBER OF OCCUPANTS	35.01			
MEN	18			
WOMEN	18			
	WC	LAV	URINALS	TUB/ SHOWER
	1:25(21 / 1:50	1:40(21 / 1:80	50% MAX	N/A
MEN - REQUIRED	0.72	0.45	--	--
MEN - PROVIDED	--	--	--	--
WOMEN - REQUIRED	0.72	0.45	--	--
WOMEN - PROVIDED	--	--	--	--
	DRINKING FOUNTAINS		SERVICE SINKS	
	1:100			
REQUIRED	0.36		1	
PROVIDED	--		--	

PLUMBING FIXTURE REQUIREMENTS

GROUP U UTILITY

NUMBER OF OCCUPANTS	89.24			
MEN	45			
WOMEN	45			
	WC	LAV	URINALS	TUB/ SHOWER
	1:100	1:100	50% MAX	N/A
MEN - REQUIRED	0.45	0.45	--	--
MEN - PROVIDED	--	--	--	--
WOMEN - REQUIRED	0.45	0.45	--	--
WOMEN - PROVIDED	--	--	--	--
	DRINKING FOUNTAINS		SERVICE SINKS	
	1:400			
REQUIRED	0.23		1	
PROVIDED	--		--	

ROUND UP NUMBERS AT EACH OCCUPANCY BEFORE TOTALING

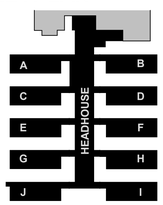
MIXED OCCUPANCY TOTALS

NUMBER OF OCCUPANTS	126			
MEN	63			
WOMEN	63			
	WC	LAV	URINALS	TUB/ SHOWER
MEN - REQUIRED	2	2	--	--
MEN - PROVIDED	3	3	1	--
WOMEN - REQUIRED	2	2	--	--
WOMEN - PROVIDED	3	3	--	--
	DRINKING FOUNTAINS		SERVICE SINKS	
REQUIRED	2			
PROVIDED	2			

ACC_ROOM SCHEDULE

ROOM NO	ROOM NAME	FUNCTION OF SPACE	CALC (SQF/OCC) AREA / OCC	OCCUPANT LOAD
FIRST FLOOR				
BUSINESS (B)				
134	WORK	BUSINESS AREAS	126 SF / 150 SF	0.84
A7	STERILIZING	STORAGE AREAS	163 SF / 300 SF	0.54
A8	SOIL	STORAGE AREAS	82 SF / 300 SF	0.27
A9	SOIL	STORAGE AREAS	82 SF / 300 SF	0.27
A10	SOIL	STORAGE AREAS	83 SF / 300 SF	0.28
A11	SOIL	STORAGE AREAS	79 SF / 300 SF	0.26
B7	EDIBLE BEANS	BUSINESS AREAS	267 SF / 150 SF	1.78
B8	INOCULATION	BUSINESS AREAS	193 SF / 150 SF	1.29
B9	THRESHING	BUSINESS AREAS	228 SF / 150 SF	1.52
B10	WHITE MOLD	BUSINESS AREAS	268 SF / 150 SF	1.79
C7	SUNFLOWER BREEDING	BUSINESS AREAS	263 SF / 150 SF	1.75
C8	SUNFLOWER PATHOLOGY	BUSINESS AREAS	260 SF / 150 SF	1.73
C9	WORK	BUSINESS AREAS	262 SF / 150 SF	1.75
CD3	WORK AREA	BUSINESS AREAS	130 SF / 150 SF	0.87
D7	EQUIP	STORAGE AREAS	81 SF / 300 SF	0.27
D8	EQUIP	STORAGE AREAS	81 SF / 300 SF	0.27
F7	WORK	BUSINESS AREAS	252 SF / 150 SF	1.68
F8	WORK	BUSINESS AREAS	227 SF / 150 SF	1.51
F9	WORK	BUSINESS AREAS	243 SF / 150 SF	1.62
F10	STOR	STORAGE AREAS	98 SF / 300 SF	0.33
F11	STOR	STORAGE AREAS	101 SF / 300 SF	0.34
G9	WORK	BUSINESS AREAS	126 SF / 150 SF	0.84
G10	WORK	BUSINESS AREAS	166 SF / 150 SF	1.11
G11	WORK	BUSINESS AREAS	167 SF / 150 SF	1.11
G12	WORK	BUSINESS AREAS	167 SF / 150 SF	1.11
H7	STERILIZING	STORAGE AREAS	127 SF / 300 SF	0.42
H8	SOIL	STORAGE AREAS	65 SF / 300 SF	0.22
H9	SOIL	STORAGE AREAS	64 SF / 300 SF	0.21
H10	SOIL	STORAGE AREAS	64 SF / 300 SF	0.21
H11	SOIL	STORAGE AREAS	65 SF / 300 SF	0.22
M1	STOR	STORAGE AREAS	553 SF / 300 SF	1.84
M2	MECH	MECHANICAL EQUIPMENT ROOM	408 SF / 300 SF	1.36
M3	RECEIVING	MERCANTILE AREAS STORAGE, SHIPPING	184 SF / 300 SF	0.61
M4	COOLER	STORAGE AREAS	142 SF / 300 SF	0.47
M5	SUGARBEETS	BUSINESS AREAS	257 SF / 150 SF	1.71
M12	WORK AREA	BUSINESS AREAS	266 SF / 150 SF	1.77
M13	WORK AREA	BUSINESS AREAS	199 SF / 150 SF	1.32
: 37				35.51
BUSINESS (B): 37				35.51
UTILITY (U)				
A1	A1	AGRICULTURAL BUILDING	424 SF / 300 SF	1.41
A2	A2	AGRICULTURAL BUILDING	428 SF / 300 SF	1.43
A3	A3	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
A4	A4	AGRICULTURAL BUILDING	428 SF / 300 SF	1.43
A5	A5	AGRICULTURAL BUILDING	428 SF / 300 SF	1.43
A6	A6	AGRICULTURAL BUILDING	529 SF / 300 SF	1.76
B1	B1 ADA/ABA	AGRICULTURAL BUILDING	423 SF / 300 SF	1.41
B2	B2	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
B3	B3	AGRICULTURAL BUILDING	428 SF / 300 SF	1.43
B4	B4	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
B5	B5	AGRICULTURAL BUILDING	428 SF / 300 SF	1.43
B6	B6	AGRICULTURAL BUILDING	528 SF / 300 SF	1.76
C1	C1	AGRICULTURAL BUILDING	424 SF / 300 SF	1.41
C2	C2	AGRICULTURAL BUILDING	430 SF / 300 SF	1.43
C3	C3	AGRICULTURAL BUILDING	428 SF / 300 SF	1.43
C4	C4	AGRICULTURAL BUILDING	431 SF / 300 SF	1.44
C5	C5	AGRICULTURAL BUILDING	428 SF / 300 SF	1.43
C6	C6	AGRICULTURAL BUILDING	530 SF / 300 SF	1.77
D1	D1 ADA/ABA	AGRICULTURAL BUILDING	421 SF / 300 SF	1.40
D2	D2	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
D3	D3	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
D4	D4	AGRICULTURAL BUILDING	650 SF / 300 SF	2.17
D5	D5	AGRICULTURAL BUILDING	750 SF / 300 SF	2.50
E1	E1	AGRICULTURAL BUILDING	418 SF / 300 SF	1.39
E2	E2	AGRICULTURAL BUILDING	422 SF / 300 SF	1.41
E3	E3	AGRICULTURAL BUILDING	431 SF / 300 SF	1.44
E4	E4	AGRICULTURAL BUILDING	474 SF / 300 SF	1.58
E5	E5	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
E6	E6	AGRICULTURAL BUILDING	513 SF / 300 SF	1.71
F1	F1 ADA/ABA	AGRICULTURAL BUILDING	422 SF / 300 SF	1.41
F2	F2	AGRICULTURAL BUILDING	425 SF / 300 SF	1.42
F3	F3	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
F4	F4	AGRICULTURAL BUILDING	425 SF / 300 SF	1.42
F5	F5	AGRICULTURAL BUILDING	424 SF / 300 SF	1.41
F6	F6	AGRICULTURAL BUILDING	524 SF / 300 SF	1.75
G1	G1	AGRICULTURAL BUILDING	421 SF / 300 SF	1.40
G2	G2	AGRICULTURAL BUILDING	429 SF / 300 SF	1.43
G3	G3	AGRICULTURAL BUILDING	429 SF / 300 SF	1.43
G4	G4 ADA/ABA	AGRICULTURAL BUILDING	431 SF / 300 SF	1.44
G5	G5	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
G6	G6	AGRICULTURAL BUILDING	531 SF / 300 SF	1.77
H1	H1	AGRICULTURAL BUILDING	414 SF / 300 SF	1.38
H2	H2	AGRICULTURAL BUILDING	427 SF / 300 SF	1.42
H3	H3	AGRICULTURAL BUILDING	426 SF / 300 SF	1.42
H4	H4	AGRICULTURAL BUILDING	426 SF / 300 SF	1.42
H5	H5	AGRICULTURAL BUILDING	428 SF / 300 SF	1.43
H6	H6	AGRICULTURAL BUILDING	525 SF / 300 SF	1.75
I1	I1	AGRICULTURAL BUILDING	418 SF / 300 SF	1.39
I2	I2	AGRICULTURAL BUILDING	424 SF / 300 SF	1.41
I3	I3	AGRICULTURAL BUILDING	430 SF / 300 SF	1.43
I4	I4	AGRICULTURAL BUILDING	426 SF / 300 SF	1.42
I5	I5	AGRICULTURAL BUILDING	425 SF / 300 SF	1.42
I6	I6	AGRICULTURAL BUILDING	524 SF / 300 SF	1.75
J1	J1	AGRICULTURAL BUILDING	446 SF / 300 SF	1.49
J2	J2	AGRICULTURAL BUILDING	451 SF / 300 SF	1.50
J3	J3	AGRICULTURAL BUILDING	457 SF / 300 SF	1.52
J4	J4	AGRICULTURAL BUILDING	444 SF / 300 SF	1.48
J5	J5	AGRICULTURAL BUILDING	442 SF / 300 SF	1.47
J6	J6	AGRICULTURAL BUILDING	533 SF / 300 SF	1.78
: 59				89.12
UTILITY (U): 59				89.12
FIRST FLOOR: 96				124.63
TOTALS.: 96				124.63

KEYPLAN



NORTH

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

SCHEMMER

PROJECT NO.: 09228.021

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: JMB	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA ARS — Agricultural Research Service

USDA NCSL GREENHOUSES — USDA ARS — PHASE V

1307 18TH STREET NORTH, FARGO, ND 58102

ARCHITECTURAL CODE COMPLIANCE

PROJECT NO.: 09228.021

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: ACC01

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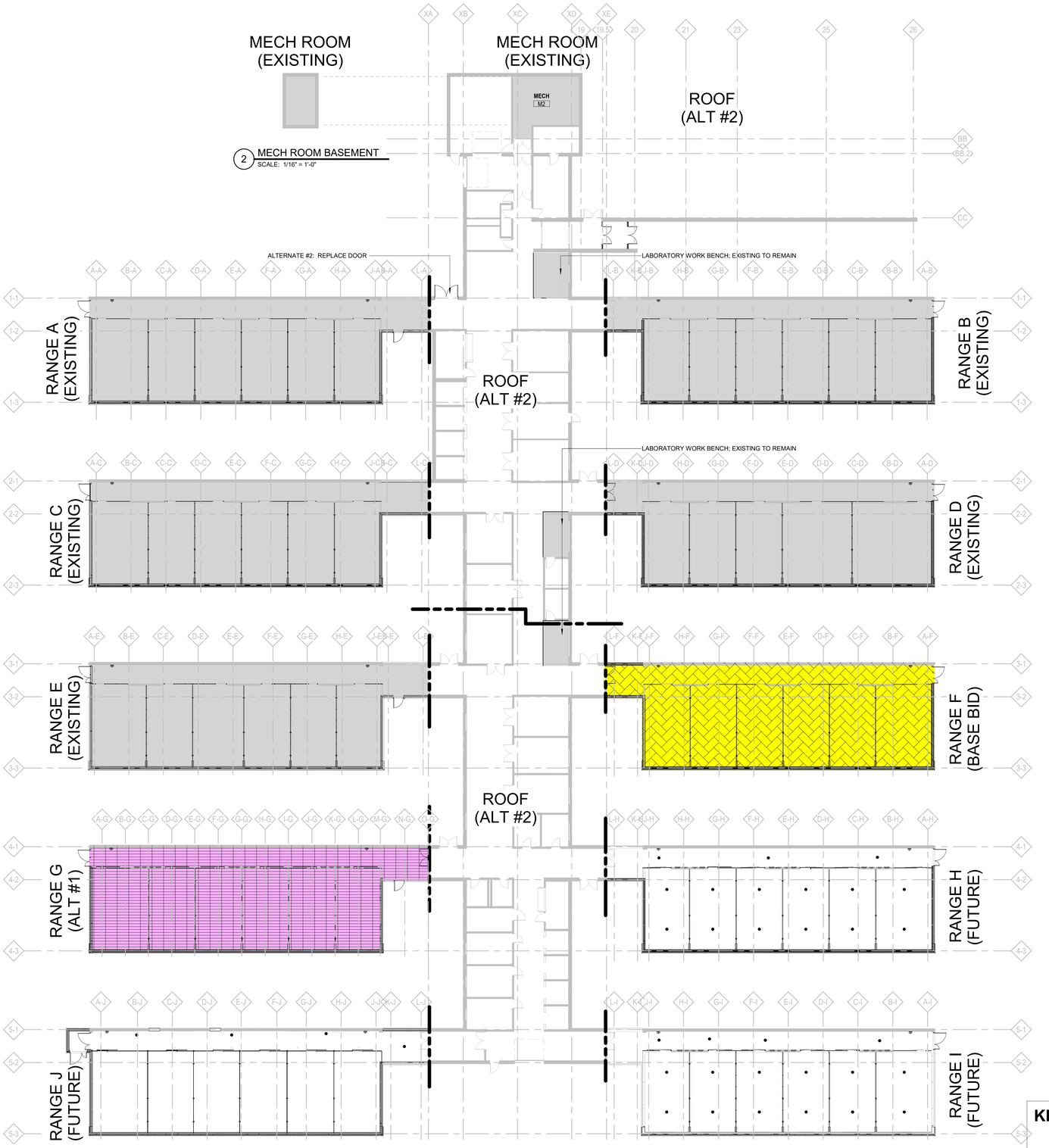


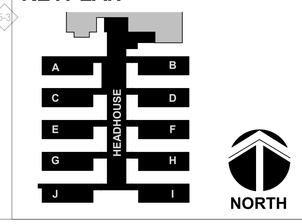
1 FIRST FLOOR - BASE BID / ALTERNATES
SCALE: 1/16" = 1'-0"

SCOPE OF WORK LEGEND

GENERAL NOTE: THIS LEGEND IS SUPPLEMENTAL INFORMATION TO THE BID SCHEDULE. SEE BID SCHEDULE FOR FULL DESCRIPTION OF THE SCOPE OF WORK; BASE BID AND ALL ALTERNATES.

- RANGE A - RANGE B - RANGE C - RANGE D - RANGE E	EXISTING TO REMAIN INDICATED HERE AND IN GRAY; NOT IN SCOPE
- RANGE F	BASE BID SCOPE (CLIN 0001) - RANGE F
- RANGE G	ALTERNATE #1 (CLIN 0002) - RANGE G
ROOF	ALTERNATE #2 (CLIN 0003) - HEADHOUSE ROOF
- RANGE H - RANGE I - RANGE J	FUTURE WORK, NOT IN SCOPE

KEYPLAN



SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

SCOPE OF WORK

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	SWS
EPM	M McWILLIAMS
CHECKED BY	TJS
SAFETY & HEALTH	E WELKER
DRAWN BY	SWS
REAL PROPERTY	W ROSS
PROJECT NO.	
DATE	05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET G001

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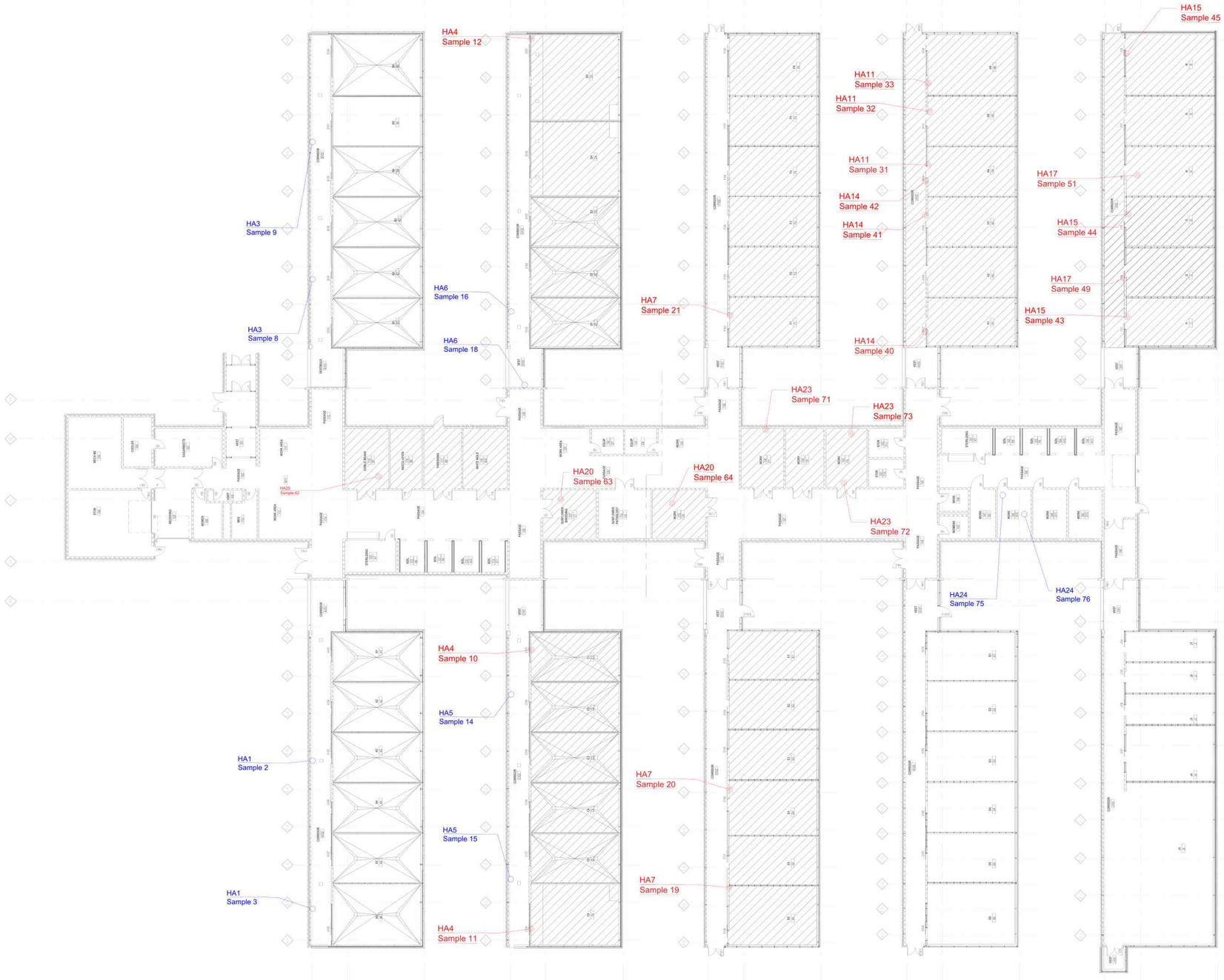

Table 1 – Identified Asbestos-Containing Materials by Homogenous Area (HA)

HA No.	Material Description	Location	Percent and Type Asbestos	NESHAP Category	Condition	OSHA Classification	Estimated Quantity
4	Off-white window glazing associated with 2' x 2.5' windows	Greenhouse Range C, Greenhouse Range D	PLM 3-4% chrysotile PC 1.50-3.50% chrysotile	Category II non-friable	Good	Miscellaneous	900 windows
7	Off-white window glazing associated with 2' x 2.5' windows	Greenhous Range E, Greenhouse Range F	PLM 2-5% chrysotile PC 1.50-5.75% chrysotile	Category II non-friable	Good	Miscellaneous	900 windows
11	Off-white window glazing associated with 2' x 2.5' windows	Greenhouse Range H	PLM 3-5% chrysotile PC 2.75-5.00% chrysotile	Category II non-friable	Good	Miscellaneous	450 windows
14	White caulking	Doorways to greenhouse rooms in Greenhouse H	PLM 2% chrysotile GPC 1.1-1.5% chrysotile	Category II non-friable	Good	Miscellaneous	55 LF
15	Off-white window glazing associated with 2' x 2.5' windows	Greenhouse Range I	PLM <1% chrysotile PC 1.25-1.5% chrysotile	Category II non-friable	Good	Miscellaneous	450 windows
17	White caulking	Doorways to greenhouse rooms in Greenhouse I	PLM 2% chrysotile GPC 1.9-2.2% chrysotile	Category II non-friable	Good	Miscellaneous	55 LF
20	12"x12" black mastic associated with tan speckled floor tile	Rooms B7, B8, B9, B10, C7 And C9	PLM 2-4% chrysotile PC 1.8-3.4% chrysotile	Category I non-friable	Good	Miscellaneous	620 SF
23	12"x12" and black mastic associated with tan with brown streaks floor tile	Rooms F7, F8, F9	PLM 2% chrysotile PC 1.2-2.7% chrysotile	Category I non-friable	Good	Miscellaneous	620 SF

Table 2 – Materials Containing 1% or less Asbestos by HA

HA No.	Material Description	Location	Lab Results	Condition	Estimated Quantity
1	Grey wall caulking	Greenhouse Range A	PLM <1% chrysotile PC <0.25% chrysotile	Good	300 LF
3	Grey wall caulking	Greenhouse Range B	PLM <1% chrysotile PC <0.25% chrysotile	Good	300 LF
5	Grey wall caulking	Greenhouse Range C	PLM <1% chrysotile PC 1.25% chrysotile	Good	300 LF
6	Grey wall caulking	Greenhouse Range D	PLM <1% PC.25% chrysotile	Good	300 LF
24	12"x12" black mastic associated with blue floor tile	Rooms H7 and G10	PLM 2% chrysotile PC 0.4-0.7% chrysotile	Good	400 SF

Legend

- POSTIVE RESULTS
- 1 ASBESTOS CONTAINING MATERIAL
- 2 CONTAINS <1% ASBESTOS

NOTES:

1) A LIMITED ASBESTOS SURVEY DATED MARCH 8, 2022 WAS COMPLETED AND HAS BEEN INCLUDED IN THE PROJECT DESIGN DOCUMENTS
2) ALL ASBESTOS SAMPLE LOCATIONS ARE PRESENTED IN THE LIMITED ASBESTOS SURVEY REPORT.

ISSUED FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

Terracon Consulting Engineers and Scientists
PROJECT NO. W3137096
866 8th ST. NE Unit K WEST FARGO, ND 58078
PH. (701) 282-8633 FAX. (701) 282-8635

SCHEMMER
Design with Purpose. Build with Confidence.

PROJECT NO.: 09228.021

A–E FIRM	USDA
PROJECT MANAGER	TJS
AREA ENGINEER	S KASEMAN
DESIGNER	LHS
EPM	M McWILLIAMS
CHECKED BY	LHS
SAFETY & HEALTH	I PERFETTI
DRAWN BY	SMG
REAL PROPERTY	W ROSS / S MUYSKENS
PROJECT NO.	
DATE	06/02/2026

USDA Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION
USDA ARS
1307 18TH STREET NORTH
FARGO, ND 58102

ASBESTOS ABATEMENT

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET H100

08222010- 000 ASBESTOS ABATEMENT

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SYMBOL LEGEND

PLAN VIEW

- SHEAR WALL
- MASONRY-VENEER
- MASONRY-CMU
- STUD WALL

SECTION / ELEVATION VIEW

- CONCRETE
- FLEXIBLE INSULATION
- GRAVEL
- GROUT
- EARTH / COMPACTED
- PLYWOOD
- EARTH / NONCOMPACTED
- WOOD (FINISH)
- RIGID INSULATION
- MASONRY-CMU FACE
- JOINT FILLER
- MASONRY-CMU
- STEEL
- MASONRY-VENEER
- GYPSUM

REFERENCE LEGEND

- **WALL TYPE** — X — LETTER INDICATES PARTITION OR WALL TYPE
- **TOILET ACCESSORY** — TA-X — TOILET ACCESSORY NUMBER
- **EQUIPMENT NUMBER** — XXXX — EQUIPMENT NUMBER
- **WINDOW DESIGNATION** — 00 — WINDOW DESIGNATION
- **DOOR NUMBER** — 101 — DOOR NUMBER
- **CASEWORK TAG** — WIDTH, DEPTH, HEIGHT — CABINET DESIGN SERIES MODEL
- **ROOM NUMBER** — ROOM NAME, 101, 150 SF — ROOM NAME; ROOM NUMBER DESIGNATION; ROOM AREA DESIGNATION
- **REFERENCE DEMOLITION NOTE** — DX — DEMOLITION DESIGNATION
- **REFERENCE KEYNOTE** — XX.XX.XX.XX — SPECIFICATION SECTION; GENERAL ITERATION #
- **ROOM / FRAMING ELEVATION** — 1, XX-XX, 1, 1 — ELEVATION LETTER; DIRECTION OF VIEW; SHEET NUMBER
- **EXTERIOR ELEVATION** — 1, XX-XX, 1, 1 — DIRECTION OF VIEW; ELEVATION LETTER; SHEET NUMBER
- **PLAN DETAIL** — X, XX-XX — DETAIL NUMBER; SHEET NUMBER
- **SECTION/ DETAIL** — SIM, X, XX-XX — SECTION/DETAIL NUMBER; SHEET NUMBER INDICATES DIRECTION OF VIEW
- **NEW COLUMN** — X — LETTER INDICATES NEW COLUMN LINE
- **EXISTING COLUMN** — X — LETTER INDICATES EXISTING COLUMN LINE
- **MATCHLINE** — AREA A / AREA B
- **LEVEL** — NAME, ELEVATION — LEVEL CALLOUT DESIGNATION; ELEVATION DESIGNATION
- **TITLE MARKER** — 1, VIEW NAME, SCALE: 1/8" = 1'-0" — GRAPHIC AREA FOR DRAWING DETAIL NUMBER; TITLE; SCALE OF THE DRAWING
- **NORTH ARROW** — NORTH; PLAN NORTH; TRUE NORTH

ABBREVIATIONS

A	COMPRESSED AIR	DIAG	DIAGONAL	LBS	POUNDS	S	SOUTH
A/C	AIR CONDITIONING	DIM	DIMENSION	LD	LOAD	SA	SUPPLY AIR
AB	ANCHOR BOLT	DIP	DUCTILE IRON PIPE	LDG	LOADING	SAN	SANITARY
ABS	ACRYLONITRILE BUTAD STYRENE	DISC	DISCONNECT	LE	LEFT END	SB	SECURITY BARS
AC	ALTERNATING CURRENT	DIST	DISTRIBUTION	LG	LENGTH (LONG)	SB	SPLASH BLOCK
ACI	AMERICAN CONCRETE INSTITUTE	DL	DEAD LOAD	LIN	LINEAR	SCH	SCHEDULE
ACSR	ALUMINUM CONDUCTOR STEEL REINFORCED	DMPR	DAMPER	LIS	LAWN IRRIGATION SYSTEM	SCHED	SCHEDULE
ACST	ACOUSTIC	DN	DOWN			SCR	SCREW
AD	ACCESS DOOR	DP	DAMP PROOFING	LL	LIVE LOAD	SCT	STRUCTURAL CLAY TILE
AD	AREA DRAIN	DPT	DEW POINT	LLBB	LONG LEG BACK TO BACK	SCUT	SCUTTLE
ADMIN	ADMIN ADMINISTRATION (IVE)	DR	DOOR	LLH	LONG LEG HORIZONTAL	SCW	SOFT COLD WATER
AFF	ABOVE FINISH FLOOR	DRN	DRAIN	LLV	LONG LEG VERTICAL	SD	STORM DRAIN
AFFF	AQUEOUS FILM FORMING FOAM	DS	DOWN SPOUT	LNTL	LINTEL	SD	SUBDRAIN
AGG	AGGREGATE	DV	DENTAL VACUUM	LP	LOW POINT	SDI	STEEL DECK INSTITUTE
AHU	AIR HANDLING UNIT	DWG	DRAWING	LPG	LIQUIFIED PETROLEUM GAS	SECT	SECTION
AI	AREA INLET	DWR	DRAWER			SECY	SECRETARY
AIC	AMPS INTERRUPTING CAPACITY (SYM RMS)	DWLS	DOWELS	LPS	LOW PRESSURE STEAM	SEQ	SEQUENCE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	DX	DIRECT EXPANSION	LR	LIVING ROOM	SF	SQUARE FOOT (FEET)
AL	ACTIVE LEAF	E	EAST	LS	LAWN SPRINKLER	SFU	STRUCTURAL FACING UNIT
AL	ALUMINUM	EA	EACH	LT	LIGHT		
ALT	ALTERNATE	EA	EXHAUST AIR	LT WT	LIGHT WEIGHT	SHLD	SHOULDER
AMP	AMPERE	EDH	ELECTRIC DUCT HEATER	LTG	LIGHTING	SHT	SHEET
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	EER	ENERGY EFFICIENCY RATIO	LVT	LUXURY VINYL TILE	SHTG	SHEATHING
						SHW	SOFT HOT WATER
		EJ	EXPANSION JOINT	M	MIDDLE	SHV	SHELF OR SHELVES
		EL OR	ELEVATION - GRADE OR	M	THOUSAND	SIM	SIMILAR
		ELEV	BUILDING	M & B	MATCHED AND BEADED	SJI	STEEL JOIST INSTITUTE
		ELEC	ELECTRIC OR ELECTRICAL	MA	MAKE-UP AIR	SL	SLIDING
		ELEV	ELEVATOR	MACH	MACHINE	SL	SNOW LOAD
		ENCL	ENCLOSURE	MAS	MASONRY	SLBB	SHORT LEG BACK TO BACK
		ENT	ENTERING	MAT or MATL	MATERIAL		
		ENT	ENTRANCE	MAX	MAXIMUM	SM	SPRINKLER MAIN
		EQ	EQUAL	MB	MACHINE BOLT	SNGL	SINGLE
APD	AIR PRESSURE DROP	EQUIP	EQUIPMENT	MBH	1000 BTUH	SOV	SHUT OFF VALVE
APPD	APPROVED	ES	EACH SIDE	MC	MEDICINE CABINET	SPA	SPACE(ING)
APPROX	APPROXIMATE	EST	ESTIMATE	MC	MISCELLANEOUS CHANNELS	SPEC	SPECIFICATIONS
ARCH	ARCHITECTURAL OR ARCHITECT	EVAP	EVAPORATOR			SPF	SOUNDPROOF
		EW	EACH WAY	MECH	MECHANICAL	SPH	SPACE HEATER
ARI	AMERICAN REFRIGERATION INSTITUTE	EWC	ELECTRIC WATER COOLER	MER	MECHANICAL EQUIPMENT ROOM	SPKR	SPEAKER
						SPL	SPECIAL
ASB	ASBESTOS	EXC	EXCAVATE	MET	METAL	SQ	SQUARE
ASPH	ASPHALT	EXD	EXIT DEVICE	MFG	MANUFACTURING	SS	SANITARY SEWER
AUTO	AUTOMATIC	EXH	EXHAUST	MFR	MANUFACTURER	SS	SOLID SURFACE
AV	ACID VENT	EXIST	EXISTING	MH	MANHOLE	SS	STAINLESS STEEL
AVG	AVERAGE	EXP	EXPOSED	MICRO	MICROWAVE	SSMR	STANDING SEAM METAL ROOFING
AW	ACID WASTE	EXPL	EXPLOSION	MIN	MINIMUM	STA	STATION
AWC	ACOUSTICAL WALL COVERING	EXPN	EXPANSION	MISC	MISCELLANEOUS	STAIR	STAIRWAY
AWG	AMERICAN WIRE GAUGE	EXT	EXTERIOR	ML	METAL LATH	STC	SOUND TRANSMISSION COEFFICIENT
B	ANGLE	F	FAHRENHEIT	MLDG	MOULDING		
BATT	BATT INSULATION	F	FIRE	MO	MASONRY OPENING	STD	STANDARD
BB	BULLETIN BOARD	FA	FLUSH or FRAME	MONO	MONOLITHIC	STGR	STRINGER
BBO	BOILER BLOW OFF	FBO	FRESH AIR	MT	METAL THRESHOLD	STIFF	STIFFENER
BC	BOOKCASE	FD	FACING	MTD	MOUNTED	STIRR	STIRRUPS
BD	BOARD	FDN	FLOOR DRAIN			STL	STEEL
BDY	BOUNDARY	FE	FOUNDATION	N	NORTH	STN	STONE
BEJ	BRICK EXPANSION JOINT	FEB	FIRE EXTINGUISHER	NC	NORMALLY CLOSED	STOR	STORAGE
BF(2)	BF(OLD (DOUBLE)		FIRE EXTINGUISHER BRACKET	NEC	NATIONAL ELECTRICAL CODE	STR	STRUCTURAL
BIT	BITUMINOUS	FEC	FIRE EXTINGUISHER CABINET	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION	SUB FL	SUB FLOOR
BKR	BREAKER					SUCT	SUCTION
BL	BUILDING LINE	FG	FULL GLASS			SUSP	SUSPENDED
BLDG	BUILDING	FH	FIRE HYDRANT	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION	SVF	SHEET VINYL FLOORING
BLK	BLOCK	FHC	FIRE HOSE CABINET			SW	SWITCH
BLKG	BLOCKING	FIG	FIGURE			SWBD	SWITCH BOARD
BM	BEAM	FIN	FINISH	NIC	NOT IN CONTRACT	SYM	SYMMETRICAL
BM	BENCH MARK	FIX	FIXTURE	NO	NORMALLY OPEN	T	TREAD
BO	BOTTOM OF	FL or FLR	FLOOR	NO	NUMBER	T or TLT	TOILET
BOT	BOTTOM	FLASH	FLASHING	NR	NOT REQUIRED	TAN	TANGENT
BRCG	BRACING	FLEX	FLEXIBLE	NS	NEAR SIDE	TBD	TACK BOARD
BRDG	BRIDGING	FLG	FLANGE	NTS	NOT TO SCALE	TE	TOP ELEVATION
BRG	BEARING	FLG	FLOORING	NV	NARROW VISION	TEL	TELEPHONE
BRK	BRICK	FLUOR	FLUORESCENT	OA	OUTSIDE AIR	TEMP	TEMPERATURE
BRKT	BRACKET	FP	FIRE PROTECTION	OB WG	OBSCURE WIRE GLASS	TER	TERRAZZO
BS	BOTH SIDES	FPM	FEET PER MINUTE	OBGL	OBSCURE GLASS	TERM	TERMINAL
BTU	BRITISH THERMAL UNIT	FPRF	FIRE PROOF	OBSC	OBSCURE	TGL	TOGGLE
BTUH	BTU PER HOUR	FR	FRAME	OC	ON CENTER(S)	TH	THRESHOLD
BUR	BUILT-UP ROOFING	FRG	FURRING	OCEW	ON CENTER EACH WAY	THK	THICK
BW	BOTH WAYS	FS	FAR SIDE	OD	OVERFLOW DRAIN/SCUPPER	THRD	THREAD
C	CENTER	FS	FLOOR SINK	OFF	OFFICE	TO	TOP OF
C OR	CONDUIT (ELECTRICAL	FS	FULL SIZE	OH	OVERHEAD	TOB	TOP OF BEAM
CND	SHEETS)	FT	FEET (FOOT)	OPNG	OPENING	TOC	TOP OF CONCRETE
C TO C	CENTER TO CENTER	FTG	FOOTING	OPP	OPPOSITE	TOF	TOP OF FOOTING
CAB	CABINET	GPH	GALLONS PER HOUR	OPS	OPERATIONS	TOJ	TOP OF JOIST
CAP	CAPACITY	GPM	GALLONS PER MINUTE	OS & Y	OUTSIDE SCREW & YOKE	TOPO	TOPOGRAPHIC
CB	CATCH BASIN (OR CIRCUIT BREAKER)	GR	GRADE	OSF	OUTSIDE FACE	TOS	TOP OF STEEL
		GRS	GALVANIZED RIGID STEEL CONDUIT	OV	OVERFLOW VALVE	TOW	TOP OF WALL
CBU	CEMENTITIOUS BACKER UNIT	GRTG	GRATING	OX	OXYGEN	TRANS	TRANSVERSE
		GSU	GLAZED STRUCTURAL UNITS	OZ	OUNCE	TSTAT	THERMOSTAT
CC	CENTER TO CENTER	GWB	GYPSUM WALLBOARD			TV	TELEVISION
CCT	CIRCUIT	GWT	GLAZED WALL TILE	P	PAINT	TW	TEMPERED WATER
CD	CONDENSATE DRAIN	GYP	GYPSUM	PA	PUBLIC ADDRESS	TWR	TEMPERED WATER RETURN
CE	COVER ELEVATION	H or HT	HEIGHT (HIGH)	PBS	PUSH BUTTON STATION	TYP	TYPICAL
CEM	CEMENT	HB	HOSE BIBB	PC	PIECE		
CF	CUBIC FEET	HBD	HARDBOARD	PC	POINT OF CURVATURE	U/C	UNDER CABINET
CFH	CUBIC FEET PER HOUR	HC	HANDICAPPED	PC	PRECAST	UC	UNIT COOLER
CFM	CUBIC FEET PER MINUTE	HD	HEAD	PCC	PORTLAND CEMENT CONCRETE	UG	UNDERGROUND
CHIM	CHIMNEY	HDPE	HIGH DENSITY POLYETHYLENE			UH	UNIT HEATER
CI	CAST IRON	HDR	HEADER	PCT	PORCELAIN CERAMIC TILE	UL	UNDERWRITERS LABORATORIES
CIP	CAST IN PLACE	HDW	HARDWARE	PD	PRESSURE DROP		
CIR	CIRCULAR	HG	HALF GLASS	PE	POLYETHYLENE	UNEX	UNEXCAVATED
CJ	CONTROL JOINT	HIP	HIGH PRESSURE	PEN	PENETRATION	UNFIN	UNFINISHED
CKT	CIRCUIT	HM	HOLLOW METAL	PERF	PERFORATED	UNO	UNLESS NOTED OTHERWISE
CL	CENTER LINE	HORIZ	HORIZONTAL(LY)	PH	PHASE		
CL WG	CLEAR WIRE GLASS	HP	HORSE POWER	PHAR	PHARMACY	UPS	UNINTERRUPTIBLE POWER SYSTEM
CLG	CEILING	HPS	HIGH PRESURE STEAM	PI	POINT OF INTERSECTION		
CLKG	CAULKING	HPT	HIGH POINT	PIV	POST INDICATING VALVE	UR	URINAL
CLO	CLOSET	HR	HOUR	PL or P	PLATE	UT	UTILITY
CMP	CORRUGATED METAL PIPE	HS	HIGH STRENGTH	PLAM	PLASTIC LAMINATE	UV	UNIT VENTILATOR
CMU	CONCRETE MASONRY UNIT	HSGYP	HIGH STRENGTH GYPSUM PLASTER	PLAS	PLASTER	V	VISION
				PLATF	PLATFORM	V	VOLT
CNTR	COUNTER	HTG	HEATING	PLBG	PLUMBING	VAC	VACUUM
CO	CLEAN OUT	HTR	HEATER	PLG	PILING	VAV	VARIABLE AIR VOLUME
CO2	CARBON DIOXIDE	HW	HEAD WALL	PLWD	PLYWOOD	VCP	VITRIFIED CLAY PIPE
COL	COLUMN	HW	HOT WATER	PNL	PANEL	VCT	VINYL COMPOSITION TILE
COM	COMMON	HWH	HOT WATER HEATER	POL	POLISH(ED)	VD	VAULT DOOR
COMB	COMBINATION	HWR	HOT WATER RETURN (HEATING)	PORC	PORCELAIN	VEL	VELOCITY
COMB	COMBUSTION	HWS	HOT WATER SUPPLY (HEATING)	PPM	PARTS PER MILLION	VENT	VENTILATOR(ION)
COMP	COMPRESSIBLE			PR	PAIR	VERT	VERTICAL
COMPR	COMPRESSOR	HYD	HYDRAULIC	PREFAB	PREFABRICATED	VEST	VESTIBULE
CONC	CONCRETE			PREFN	PREFINISHED	VFD	VARIABLE FREQUENCY DRIVE
CONF	CONFERENCE			PRESS	PRESSURE		
CONN	CONNECTION			PROJ	PROJECT	VOL	VOLUME
CONSTR	CONSTRUCTION			PRV	PRESSURE REGULATING VALVE	VPC	VERTICAL POINT OF CURVATURE
CONSTR JT	CONSTRUCTION JOINT			PS	PRESSED STEEL	VPI	VERTICAL POINT OF INTERSECTION
CONT	CONTINUOUS (CONTINUATION)			PSFT	POUNDS PER SQUARE FOOT	VPT	VERTICAL POINT OF TANGENCY
CONTR	CONTRACTOR			PSI	POUNDS PER SQUARE INCH	VS	VENT STACK
COR	CORNER			PT	POINT	VT	VINYL-TILE
CORR	CORRIDOR			PT	POINT OF TANGENCY	VTR	VENT THRU ROOF
COV	COVERED			PTD	PAINTED	VWC	VINYL WALL COVERING
CPL	CEMENT PLASTER			PTN	PARTITION		
CPS	CYCLES PER SECOND (HERTZ)			PVC	POLYVINYL-CHLORIDE	W	WEST
CPT	CARPET			PVMT	PAVEMENT	W	WIDE (WIDTH)
CR	CONDENSER WATER RETURN			PW	PASS WINDOW	W	WIRE
CRES	CORROSIVE RESISTANT STEEL					W/	WITH
CRG	CARRIAGE			1/4 RD	QUARTER ROUND	W/O	WITHOUT
CRSE	COURSE			QT	QUARRY TILE	WB	WET BULB
CS	CONDENSER WATER SUPPLY			QT	QUART	WC	WATER CLOSET
				QTRS	QUARTERS	WC	WATER COLUMN
CS	COUNTER SINK			QTY	QUANTITY	WD	WASTE DRAIN
CSMT	CASEMENT	I or FE	IRON	QTZ	QUARTZ	WD	WOOD
CT	CERAMIC TILE	IC	INTERCOM			WD BLKG	WOOD BLOCKING
CT	CURRENT TRANSFORMER	ID	INSIDE DIAMETER	R	REGISTER	WD DR	WOOD DOOR
CTL	CARPET TILE	IE	INVERT ELEVATION	R	RISER	WDW	WINDOW
CU	CONDENSING UNIT	IES	ILLUMINATING ENGINEERING SOCIETY	RA	RETURN AIR	WF	WIDE FLANGE
CU YD	CUBIC YARDS	IG	INSULATED GLASS	RAD OR R	RADIUS	WG	WIRE GLASS
CUH	CABINET UNIT HEATER	IN	INCH	R		WH	WALL HYDRANT
CV	CEILING VENT	INSUL	INSULATION	RB	RESILIENT BASE	WHT	WHITE
CW	COLD WATER	INT	INTERIOR	RC	REMOTE CONTROL	WI	WROUGHT IRON
CWR	CHILLED WATER RETURN	INV	INVERT OR INVERTER	RCP	REINFORCED CONCRETE PIPE	WKSH	WORK SHOP
CWS	CHILLED WATER SUPPLY	IP	IRON PIPE			WL	WIND LOAD
CYL	CYLINDER	ISF	INSIDE FACE	RD	ROOF DRAIN	WNSCT	WAINSCOT
				RE	RIGHT END	WP	WEATHER PROOF
D	DEPTH (DEEP)	JB	JUNCTION BOX	REC	RECEIVER	WP	WORK POINT
D	DIFFUSER	JBOX	JUNCTION BOX	RECP	RECEPTACLE	WPF	WATER PROOF
d	PENNY (as in nail - 10d)	JC	JANITOR CLOSET	RECR	RECREATION	WPFG	WATER PROOFING
D&M	DRESSED AND MATCHED	JCT	JUNCTION	RECT	RECTIFIER	WRB	WARDROBE
DA	DOUBLE ACTING	JST	JOIST	REF	REFERENCE	WS	WASTE STACK
DB	DRY BULB	JT	JOINT	REFR	REFRIGERANT	WT	WEIGHT
dB	DECIBEL			REFR	REFRIGERATOR	WWF	WELDED WIRE FABRIC
DBL	DOUBLE	K	KEY	REG	REGISTER	WWM	WOVEN WIRE MESH
DC	DIRECT CURRENT	KCP	KEENE'S CEMENT PLASTER	REINF	REINFORCEMENT		
DCJ	DOWELED CONTROL JOINT	KIP or K	KILOPOUND (1000 LBS)	REM	REMOVE(ABLE)	XFMR	TRANSFORMER
DCJT	DUMMY CONTROL JOINT	KIT	KITCHEN	REQD	REQUIRED		
DCL	DOOR CLOSER	KL	KEY LOCK	RESIL	RESILIENT	YD	YARD or YARD DRAIN
DCW	DOMESTIC COLD WATER	KP	KICK PLATE	REV	REVISIONS		
DEG	DEGREE	KV	KILOVOLTS	RFG	ROOFING		
DEMO	DEMOLITION	KVA	KILOVOLT AMPERES	RH	RELATIVE HUMIDITY		
DEPR	DEPRESSION	KW	KILOWATT	RL	REFRIGERANT LIQUID		
DEPT	DEPARTMENT			RM	ROOM		
DET	DETAIL			RND	ROUND		
DF	DRINKING FOUNTAIN	LAB	LABORATORY	RO	ROUGH OPENING		
DH	DOUBLE HUNG	LAU	LAUNDRY	RPM	REVOLUTIONS PER MINUTE		
DHW	DOMESTIC HOT WATER	LAV	LAVATORY	RT	RUBBER TILE		
DI	DEIONIZED WATER	LBR	LUMBER	RTU	ROOF TOP UNIT		
DIA	DIAMETER			RUB	RUBBER		

GENERAL DEMO NOTES

A. THE DEMOLITION PLANS WERE PRODUCED BY DUPLICATING THE ORIGINAL DRAWINGS PROVIDED BY THE OWNER AND LIMITED FIELD VERIFICATION. DIMENSIONS AND EXISTING CONDITIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS. ITEMS WHICH ARE INTENDED TO BE REMOVED, RELOCATED, OR SALVAGED ARE SHOWN AS FULL-TONE DASHED LINES AND ARE LISTED IN THE REFERENCED DEMOLITION NOTES. ALL OTHER ITEMS ARE INTENDED TO REMAIN IN PLACE AND ARE SHOWN HALF-TONE.

B. DEMOLITION SHALL INCLUDE, BUT IS NOT LIMITED TO, THE ITEMS BELOW OR HERE-IN. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED RENOVATION AND NEW CONSTRUCTION WITH THE EXISTING BUILDING TO IDENTIFY THE TOTAL EXTENT OF THE DEMOLITION REQUIRED AND AS LISTED BELOW.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DEMOLITION AND REMOVAL OF ALL EXISTING BUILDING COMPONENTS, MATERIALS, EQUIPMENT, AND APPURTENANCES AS REQUIRED TO BUILD, ERECT, INSTALL, OR ACCOMMODATE ALL NEW CONSTRUCTION WITH THE OWNER HAVING FIRST RIGHT OF REFUSAL ON ALL ITEMS.

D. ITEMS NOTED TO BE REMOVED AND SALVAGED OR REINSTALLED SHALL BE CAREFULLY REMOVED BY THE CONTRACTOR WITHOUT DAMAGE AND STORED OR REINSTALLED ON THE SITE AS DIRECTED. THE ITEMS TO BE REINSTALLED SHALL BE STORED CAREFULLY DURING CONSTRUCTION. REMOVED AND SALVAGED ITEMS SHALL REMAIN THE PROPERTY OF THE OWNER.

E. IN THE EVENT THE CONTRACTOR ENCOUNTERS ON THE SITE, MATERIAL REASONABLY BELIEVED TO BE ASBESTOS, LEAD-BASED PAINT, OR ANY OTHER HAZARDOUS MATERIAL WHICH HAS NOT BEEN RENDERED HARMLESS, THE CONTRACTOR SHALL IMMEDIATELY STOP WORK IN THE AREA AFFECTED AND REPORT THE CONDITION TO THE OWNER AND ARCHITECT IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT THEREAFTER BE RESUMED EXCEPT BY WRITTEN AGREEMENT OF THE OWNER AND CONTRACTOR.

F. THE CONTRACTOR IS RESPONSIBLE FOR THE ERECTION, MAINTENANCE, AND REMOVAL OF ALL CONSTRUCTION BARRIERS.

G. DOORS AND FRAMES SHALL BE REMOVED AS REQUIRED TO ACCOMMODATE NEW DOORS AND FRAMES AS SHOWN IN THE DOOR SCHEDULE.

H. REFER TO MECHANICAL DEMOLITION PLANS FOR ADDITIONAL DEMOLITION REQUIRED TO ACCOMMODATE NEW MECHANICAL PIPING AND ASSOCIATED EQUIPMENT.

GENERAL NOTES

A. EXISTING CONDITIONS ARE BASED ON DRAWINGS PROVIDED BY THE OWNER AND LIMITED FIELD VERIFICATION. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AND NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES OR VARIATIONS FROM THOSE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL ADJUST TO ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO THE OWNER.

B. ALL CONTRACTORS ARE RESPONSIBLE FOR REVIEWING ENTIRE SET OF DOCUMENTS TO DETERMINE THEIR FULL SCOPE OF WORK. CONTRACTOR SHALL NOT BE ALLOWED EXTRA COSTS DUE TO FAILURE TO REVIEW ENTIRE SET OF DOCUMENTS.

C. CONTRACTOR SHALL TAKE ALL MEASUREMENTS FOR WORK AND BE RESPONSIBLE FOR SAME. CONTRACTOR SHALL ADJUST FOR ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO OWNER. COORDINATE THE WORK AND SHOP DRAWINGS WITH ALL OTHER TRADES AFFECTED.

D. SCREENED HALF-TONE LINES INDICATE EXISTING CONSTRUCTION TO REMAIN. FULL-TONE LINES INDICATE NEW OR RELOCATED CONSTRUCTION.

E. DIMENSIONS ARE TYPICALLY TO FINISH FACE OF MASONRY, CONCRETE, AND METAL FRAMES; OR CENTER LINE OF COLUMN OR BEAMS, UNLESS NOTED OTHERWISE.

F. PROVIDE POSITIVE DRAINAGE TO ALL ROOMS WITH NEW FLOOR DRAINS.

G. IN VIEWING THESE DRAWINGS, THE CONTRACTOR SHALL PAY CLOSE ATTENTION TO THE MATCH LINES. SOME WORK AND NOTE REFERENCES MAY BE REPEATED, BUT DO NOT ALWAYS SHOW ON BOTH SIDES OF THE MATCH LINE.

H. EXTERIOR MASONRY CONTROL JOINTS IN NEW MASONRY SHALL BE 30'-0" ON CENTER MAX AND 18" EACH DIRECTION FROM ALL OUTSIDE CORNERS.

I. ALL CONTROL JOINTS (CJ) SHALL BE CAULKED AT EXTERIOR WALL LOCATIONS AND RAKED BACK 3/4 INCH AT ALL INTERIOR JOINTS UNLESS OTHERWISE NOTED.

J. PATCH EXISTING WALLS, FLOORS, AND CEILING SURFACES DEMOLISHED, CUT, CORED, OR ALTERED IN ANY WAY TO ACCOMMODATE NEW CONSTRUCTION OR TO RECEIVE NEW FINISHES.

K. CONTRACTOR SHALL VERIFY CMU WALLS HAVE NO CHIPPED EDGES AND THAT JOINTS HAVE BEEN TOOLED TO REMOVE EXCESS MORTAR AND ARE READY TO RECEIVE PAINT. CONTRACTOR SHALL APPROVE WALLS TO RECEIVE PAINT PRIOR TO HAVING PAINTER INSPECT FOR APPROVAL.

L. PATCH ALL CONCRETE SLAB LOCATIONS DEMOLISHED TO INSTALL NEW STRUCTURAL, MECHANICAL, OR ELECTRICAL WORK.

M. SEE SHEET A111 FOR PARTITION TYPES AND NOTES.

N. ALL SEALANT JOINTS THAT WERE REMOVED DURING HAZARDOUS MATERIAL ABATEMENT SHALL BE RERODDED AND RESEALED IN THEIR ENTIRETY, UNLESS NOTED OTHERWISE. SEALANT INFORMATION SHALL BE FOUND IN THE SEALANT SPECIFICATION SECTION.

O. THE EXISTING BUILDING WAS ORIGINALLY BUILT WITH LARGER DIMENSIONAL TOLERANCES IN COMPARISON TO MODERN STANDARDS. THE CONTRACTOR SHOULD ANTICIPATE FIELD ADJUSTMENTS TO ACHIEVE THE NEW DESIGN.

P. ALL FIRE EXTINGUISHERS AND FIRE EXTINGUISHER CABINETS SHOWN IN THE RANGES SHOULD BE NEW AND PROVIDED BY THE CONTRACTOR.

Q. PROVIDE GRASS SEED MIX FOR DISTURBED SOILS, PRIMARILY ON SOUTH SIDES OF THE RANGES. SPREAD FERTILIZER AND SEED VIA HYDROSEEDING. THE MIX SHOULD MEET THE "TYPE B - PARKS, BOULEVARDS, PRIVATE PROPERTY, BULK UP AREAS" CLASSIFICATION DICTATED BY THE CITY OF FARGO. CONTRACTOR TO REFER TO THE CITY OF FARGO CODE TO ASSURE THE LATEST ACCEPTED MIX IS USED.

THE MIX CONSISTS OF THE FOLLOWING AT THE TIME OF THIS DOCUMENT SET PUBLISHING:

KIND OF SEED	% BY WEIGHT	PURITY	GERMINATION
KENTUCKY BLUEGRASS	60%	90%	85%
CREEPING RED FESCUE	10%	90%	85%
FINE LEAF PERENNIAL RYEGRASS	30%	95%	90%

PERCENT BY WEIGHT SHALL BE PLUS OR MINUS 5% ON ALL SEED TYPES.

RATE OF SEEDING = 220 POUNDS PER ACRE (5 LBS PER 1,000 SF)

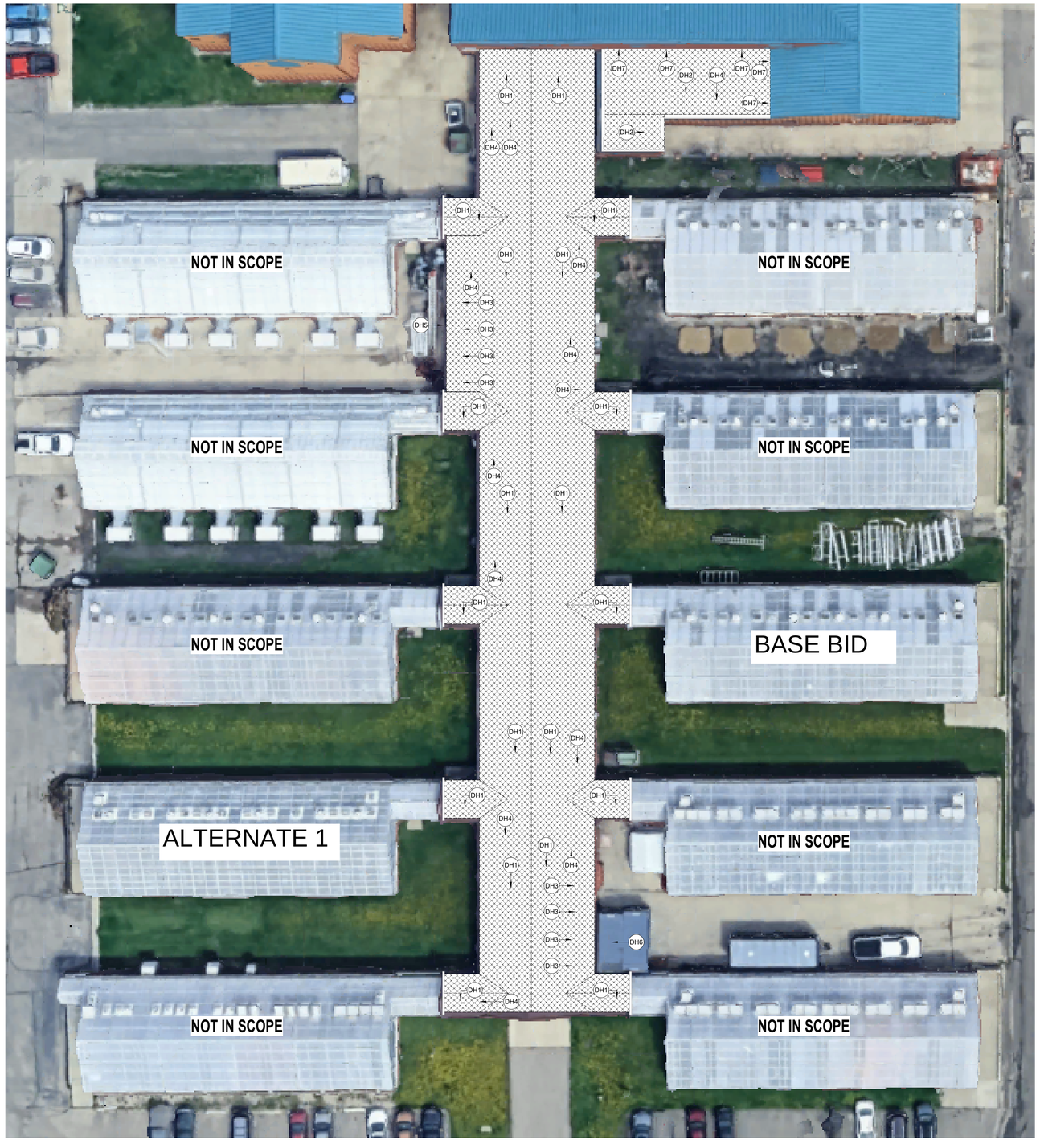
SHEET NUMBERING METHODOLOGY DIAGRAM

- PRIMARY TYPES OF DRAWINGS ON SHEET
  - 1 = OVERALL PLANS
  - 2 = ENLARGED PLANS
  - 3 = ELEVATIONS / SECTIONS
  - 4 = INTERIOR ELEVATIONS
  - 5 = DETAILS
  - 6 = SCHEDULES
- LOCATION-SPECIFIC INFORMATION ON SHEET
  - 0 = NOTES / INFORMATION
  - 1 = OVERALL
  - 2 = HEADHOUSE
  - 3 = RANGES
  - 4 = MECHANICAL ROOM
- SEQUENTIAL DIGIT
- DEMOLITION INDICATOR (NOT PRESENT FOR NEW CONSTRUCTION)
- RANGE-SPECIFIC LETTER (IF APPLICABLE)
  - A = RANGE A
  - B = RANGE B
  - C = RANGE C
  - D = RANGE D
  - E = RANGE E
  - F = RANGE F
  - G = RANGE G
  - H = RANGE H
  - I = RANGE I
  - J = RANGE J
- DESIGN DISCIPLINE
  - A = ARCHITECTURAL
  - S = STRUCTURAL
  - Q = LABORATORY
  - M = MECHANICAL
  - E = ELECTRICAL
  - P = PLUMBING

AD000-A1

REF. DEMO NOTES (DX)

	PROJECT ARCHITECTURAL REFERENCED DEMOLITION NOTES
D1	REMOVE DOOR, FRAME, AND HARDWARE; MAINTAIN ROUGH OPENING
D2	REMOVE DOOR, TRACK, AND HARDWARE; MAINTAIN ROUGH OPENING; RECOVER DOOR PANEL FOR REFURBISHMENT; TYPICAL FOR ALL CELLS
D3	CUT CONCRETE SLAB FOR FLOOR DRAIN REPAIR; TYPICAL FOR ENTIRE CORRIDOR
D4	DEMO SLAB, ASSOCIATED GRANULAR FILL, & UNDERSLAB PLUMBING IN ENTIRE CELL
D5	CUT CONCRETE SLAB FOR FLOOR DRAIN REPAIR; TYPICAL IN ALL CELLS
D6	DEMO GREENHOUSE FOOT RIDGE CAP
D7	CUT EXISTING MULLIONS TO ACCOMMODATE NEW OPERABLE RIDGE VENT
D9	DEMO MASONRY CAVITY WALL
D10	DEMO INTERIOR CMU WALL TO EXTENTS SHOWN; TYPICAL IN ALL CELLS
D11	DEMO MASONRY CAVITY WALL FOR NEW WIDER DOOR
D12	DEMO ENTIRE SOUTH EXTERIOR GREENHOUSE WALL
D13	DEMO INTERIOR GLAZED PARTITION ASSEMBLY
D14	DEMO ENTIRE UNISTRUT SYSTEMS; TYPICAL IN ALL CELLS
D15	DEMO GREENHOUSE WALL ABOVE NEW WIDER DOOR
D16	DEMO GREENHOUSE ROOF MULLIONS DUE TO DEMO OF ROOF MECHANICAL EQUIPMENT; TYPICAL ON NORTH SLOPE AS SHOWN
D17	DEMO MECHANICAL EQUIPMENT AND/OR ARCHITECTURAL MATERIALS IN MASONRY ROUGH OPENING; CLEAN REMAINING SURFACES OF ALL INSULATION AND ADHESIVE RESIDUE
D19	REMOVE ORGANIC OR MOLDY INFESTED TOPSOIL SHALL BE EXCAVATED AND DISCARDED TO A MINIMUM DEPTH OF 8 INCHES. DEEPER STRIPPING SHALL BE DONE IF ORGANIC MATERIALS REMAIN BELOW A DEPTH OF 8 INCHES.
D20	DEMO FOUNDATION WALL & SLAB & ASSOCIATED PLUMBING COMPONENTS WITHIN THE SLAB; CUT/REMOVE CONCRETE CLEANLY FROM EXISTING FOUNDATION WALLS TO REMAIN
D21	DEMO FOUNDATION INSULATION TO THE EXTENT OF THE SOIL EXCAVATION; PROVIDE CLEAN SURFACE OF FOUNDATION WALL FOR INSTALLATION OF NEW SLAB
D23	DEMO EXTERIOR RACK SYSTEM FOR EXISTING OPERABLE WINDOWS & ASSOCIATED FOOTINGS
D24	DEMO EXHAUST FAN & ASSOCIATED COMPONENTS; SEE MECHANICAL
D25	REMOVE DOOR, TRACK, HARDWARE, & ROUGH OPENING; RECOVER DOOR PANEL FOR REFURBISHMENT
D26	CUT CONCRETE SLAB TO CUT OUT DRAIN IN ITS ENTIRETY; PERMANENTLY CAP UNDERSLAB PLUMBING; TYPICAL IN ALL CELLS
D27	DEMO FLOOR COVERING & ASSOCIATED TRIM & ADHESIVES
D28	DEMO SINK & BENCH; SEE Q DRAWINGS
DH1	REMOVE EXISTING ROOF SHINGLES, UNDERLAYMENT, SHEATHING, INSULATION, AND STRUCTURAL DECK; STRUCTURAL STEEL TO REMAIN
DH2	REMOVE EXISTING



1 DEMOLITION ROOF PLAN - HEAD HOUSE COMPOSITE
SCALE: 1/16" = 1'-0"

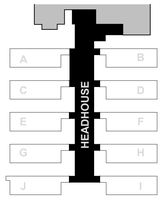
KEYNOTES

DH1	REMOVE EXISTING ROOF SHINGLES, UNDERLAYMENT, SHEATHING, INSULATION, AND STRUCTURAL DECK; STRUCTURAL STEEL TO REMAIN
DH2	REMOVE EXISTING ELASTOMERIC ROOF MEMBRANE AND TERMINATIONS; REST OF EXISTING ROOF ASSEMBLY TO REMAIN
DH3	REMOVE MECHANICAL PENETRATION / CHUTE; NOT TO BE REPLICATED IN THE NEW DESIGN
DH4	REMOVE MECHANICAL PENETRATION; WILL BE REPLICATED IN THE NEW DESIGN
DH5	REMOVE PIPING & CONDUITS SERVING EXTERIOR MECHANICAL UNIT GOING THROUGH EXISTING FASCIA CONDITION; REESTABLISH AT LOWER ELEVATION THROUGH MASONRY WALL & REESTABLISH FUNCTIONALITY OF SYSTEM
DH6	RELOCATE MOVEABLE STORAGE UNITS TO ALLOW FOR CONSTRUCTION ACTIVITY, FINAL DRAINAGE DESIGN, & TO ALLOW FOR UNIMPEDED CIRCULATION WITHIN EXTERIOR AREA
DH7	REMOVE EXISTING SHEET METAL COUNTERFLASHING; REINSTALL FOR NEW CONSTRUCTION

GENERAL NOTES

1. PHASING INDICATED ON SHEET A112 ILLUSTRATES HOW THE CONSTRUCTION SHOULD UNFOLD IN STAGES. WHEN ONE PHASE IS UNDER CONSTRUCTION, THE OTHER PHASES SHALL REMAIN OR BE REESTABLISHED AS OPERATIONAL FOR OWNER USE. THE SUGGESTED PHASES ARE GENERAL IN NATURE; THE PHASES MUST BE ANALYZED BY THE CONTRACTOR TO BE ESTABLISHED ON LOGICAL STRUCTURAL LOCATIONS. THE CONTRACTOR SHALL NEGOTIATE WITH THE OWNER AS TO HOW THE PHASES SHOULD UNFOLD IN AN AGREEABLE SEQUENCE IN ACCORDANCE TO IDEAL CONSTRUCTION SEQUENCES AND THE OWNER'S ABILITY TO VACATE CERTAIN AREAS IN CERTAIN POINTS IN THE CONSTRUCTION TIMELINE.
2. SEE SHEET A112 FOR NEW UNDERGROUND DRAINAGE SYSTEMS. ALL UNDERGROUND DRAINAGE SYSTEMS SHALL SLOPE TO DRAIN TO OUTLETS.
3. DEMOLISH ALL INSET EXTERIOR SHEET METAL DOWNSPOUTS FROM THE HEADHOUSE BRICK MASONRY. DEMOLISH ALL EXTERIOR GUTTERS AND ASSOCIATED SHEET METAL FLASHING. DEMOLISH METAL COPINGS AND BLOCKING AT INDICATED CONDITIONS.
4. SEE SHEET A001 FOR EXISTING ELEMENTS AND SYSTEMS THAT MUST EITHER BE REESTABLISHED AFTER CONSTRUCTION ACTIVITIES OR MAINTAINED DURING CONSTRUCTION ACTIVITIES.
5. DEMOLISHED EXISTING ELEMENTS RESPECTIVE OF THE NEW CONSTRUCTION ROOF DETAILS IN ORDER FOR THE NEW DETAILS TO BE EXECUTED.

KEYPLAN



NORTH

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

SCHEMMER

A-E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: JMB	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

DEMOLITION ROOF PLAN - HEADHOUSE

PROJECT NO.: 09228.021

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: AD122

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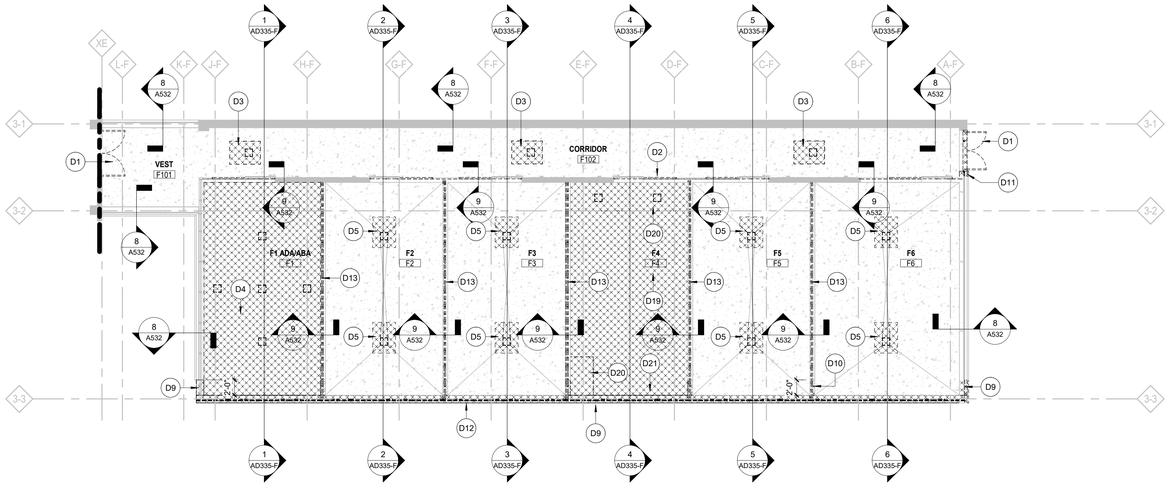
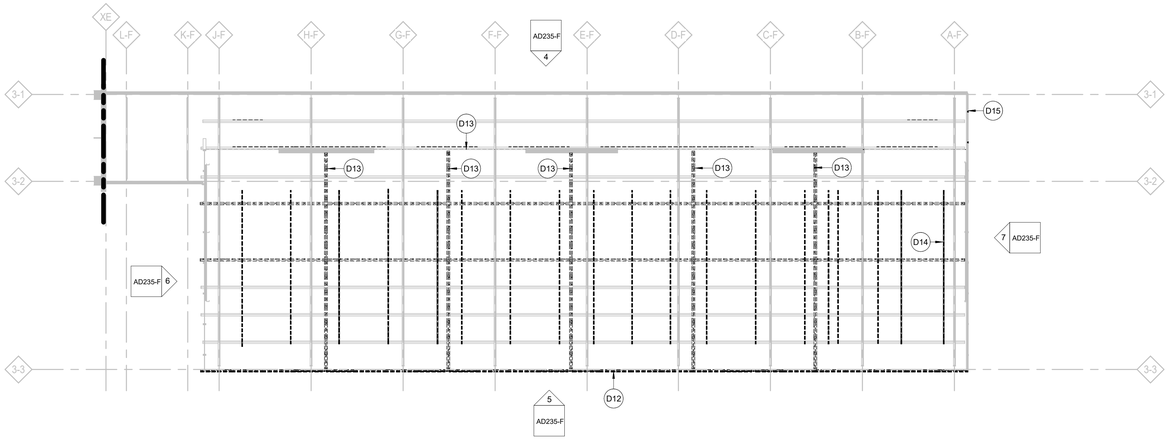
CAD | DSC | DH | PM



1 DEMOLITION PLAN - RANGE F
SCALE: 1/8" = 1'-0"



2 DEMOLITION CEILING PLAN - RANGE F
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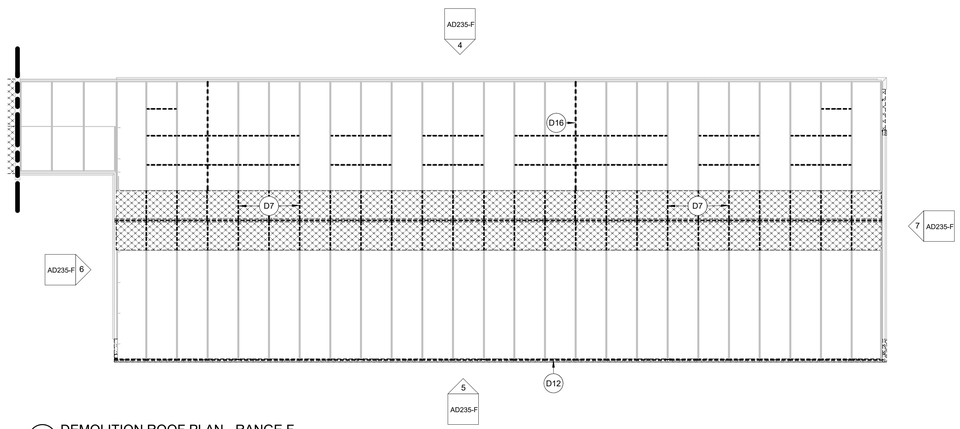
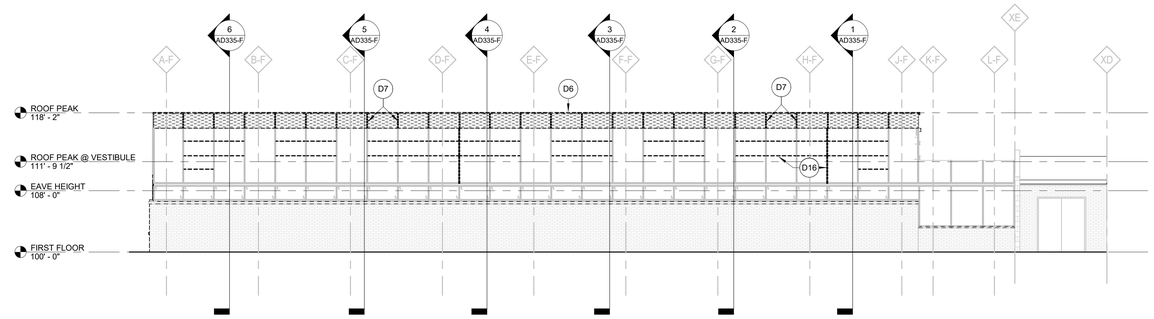
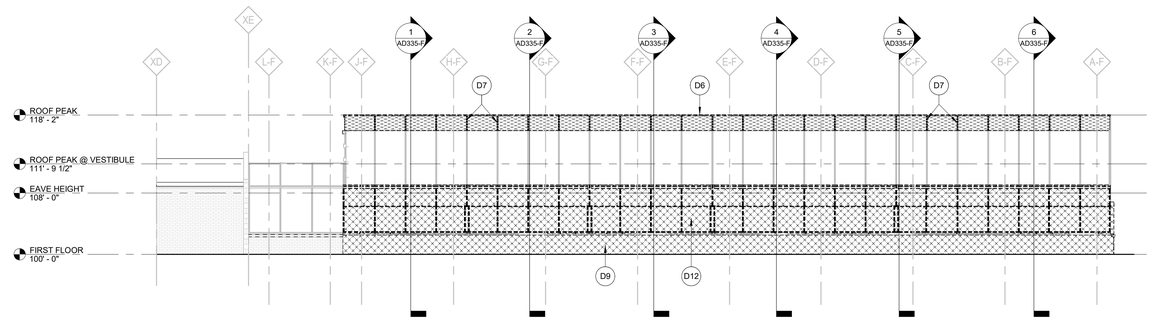


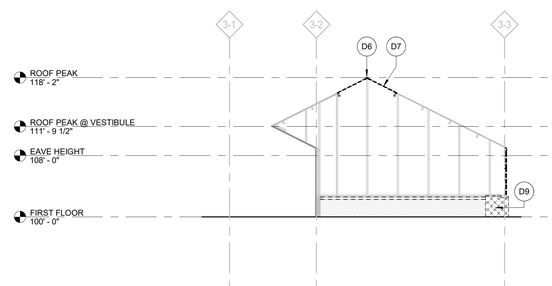
3 DEMOLITION ROOF PLAN - RANGE F
SCALE: 1/8" = 1'-0"



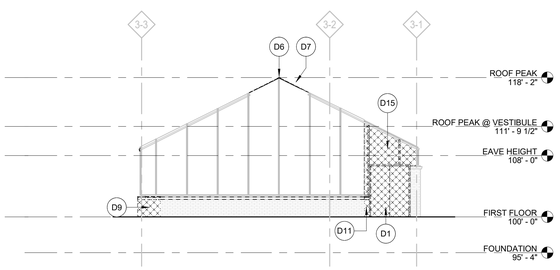
4 DEMOLITION NORTH ELEVATION - RANGE F
SCALE: 1/8" = 1'-0"



5 DEMOLITION SOUTH ELEVATION - RANGE F
SCALE: 1/8" = 1'-0"



6 DEMOLITION WEST ELEVATION - RANGE F
SCALE: 1/8" = 1'-0"



7 DEMOLITION EAST ELEVATION - RANGE F
SCALE: 1/8" = 1'-0"

REF. DEMO NOTES (DX):

D1 REMOVE DOOR, FRAME, AND HARDWARE; MAINTAIN ROUGH OPENING

D2 REMOVE DOOR, TRACK, AND HARDWARE; MAINTAIN ROUGH OPENING; RECOVER DOOR PANEL FOR REFURBISHMENT; TYPICAL FOR ALL CELLS

D3 CUT CONCRETE SLAB FOR FLOOR DRAIN REPAIR; TYPICAL FOR ENTIRE CORRIDOR

D4 DEMO SLAB, ASSOCIATED GRANULAR FILL, & UNDERSLAB PLUMBING IN ENTIRE CELL

D5 CUT CONCRETE SLAB FOR FLOOR DRAIN REPAIR; TYPICAL IN ALL CELLS

D6 DEMO GREENHOUSE ROOF RIDGE CAP

D7 CUT EXISTING MULLIONS TO ACCOMMODATE NEW OPERABLE RIDGE VENT

D9 DEMO MASONRY CAVITY WALL

D10 DEMO INTERIOR CMU WALL TO EXTENTS SHOWN; TYPICAL IN ALL CELLS

D11 DEMO MASONRY CAVITY WALL FOR NEW WIDER DOOR

D12 DEMO ENTIRE SOUTH EXTERIOR GREENHOUSE WALL

D13 DEMO INTERIOR GLAZED PARTITION ASSEMBLY

D14 DEMO ENTIRE UNISTRUT SYSTEMS; TYPICAL IN ALL CELLS

D15 DEMO GREENHOUSE WALL ABOVE NEW WIDER DOOR

D16 DEMO GREENHOUSE ROOF MULLIONS DUE TO DEMO OF ROOF MECHANICAL EQUIPMENT; TYPICAL ON NORTH SLOPE AS SHOWN

D19 HEAVILY ORGANIC OR ROOT INFESTED TOPSOIL SHALL BE EXCAVATED AND DISCARDED TO A MINIMUM DEPTH OF 8 INCHES. DEEPER STRIPPING SHALL BE DONE IF ORGANIC MATERIALS REMAIN BELOW A DEPTH OF 8 INCHES.

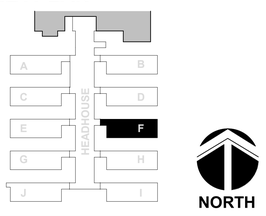
D20 DEMO FOUNDATION WALL & SLAB & ASSOCIATED PLUMBING COMPONENTS WITHIN THE SLAB; CUT/REMOVE CONCRETE CLEANLY FROM EXISTING FOUNDATION WALLS TO REMAIN

D21 DEMO FOUNDATION INSULATION TO THE EXTENT OF THE SOIL EXCAVATION; PROVIDE CLEAN SURFACE OF FOUNDATION WALL FOR INSTALLATION OF NEW SLAB

GENERAL DEMOLITION NOTES

1. ALL GREENHOUSE / RANGE GLAZING, INTERIOR AND EXTERIOR, WILL BE DEMOLISHED AND REPLACED. THE GLAZING SHALL BE REMOVED WITH THE CORRECT PROCEDURES FOR ASBESTOS REMEDIATION. REMOVE ALL EXISTING FASTENERS & GLAZING GASKETING.
2. ALL GREENHOUSE / RANGE MULLIONS SHOWN AS EXISTING TO REMAIN SHALL BE REMOVED AND REINSTALLED FOR THE PURPOSE OF REGLAZING.
3. ALL EXISTING ROOFTOP MECHANICAL LOUVERS & VENTS SHALL BE DEMOLISHED EXCEPT WHERE INDICATED TO BE REUSED; SEE MECHANICAL DEMOLITION SHEETS. EXISTING ROOFTOP LOUVERS & VENTS NOT SHOWN FOR CLARITY.
4. ALL GREENHOUSE / RANGE MULLIONS ON WALLS & ROOF (EXISTING IN PLACE, REINSTALLED, OR NEW) SHALL RECEIVE NEW FASTENERS W/ EPDM GASKETING & NEOPRENE GLAZING GASKETING. REMOVE ALL EXISTING FASTENERS.
5. MAINTAIN ALL EXISTING ALUMINUM CONDENSATION TROUGHS, CONNECTING EXISTING ROOF PURLINS AND DISCHARGING TO CORRIDOR FLOOR DRAINS, AND PROTECT FROM CONSTRUCTION ACTIVITY. DEMOLISH ALL PVC COMPONENTS OF THE CONDENSATION DISCHARGE SYSTEM AND REPLACE WITH NEW PVC PIPING OF SIMILAR DIAMETER, WALL THICKNESS, AND LENGTH.
6. ALL EXTERIOR SILLS AT GREENHOUSE WALLS, EXISTING TO REMAIN OR NEW, SHALL BE REBUILT PER DETAILS. MODIFY GREENHOUSE WALL MULLIONS TO ACCOMMODATE.
7. ALL MASONRY WALL MOUNTED DEVICES, USED FOR PREVIOUS SHADING DEVICES, SHALL BE REMOVED FROM THE EXISTING EXTERIOR MASONRY WALLS.

KEYPLAN



SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS
PROJECT NO.:	DATE: 05/11/2026

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA — Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

DEMOLITION PLANS & ELEVATIONS - RANGE F

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: AD235-F

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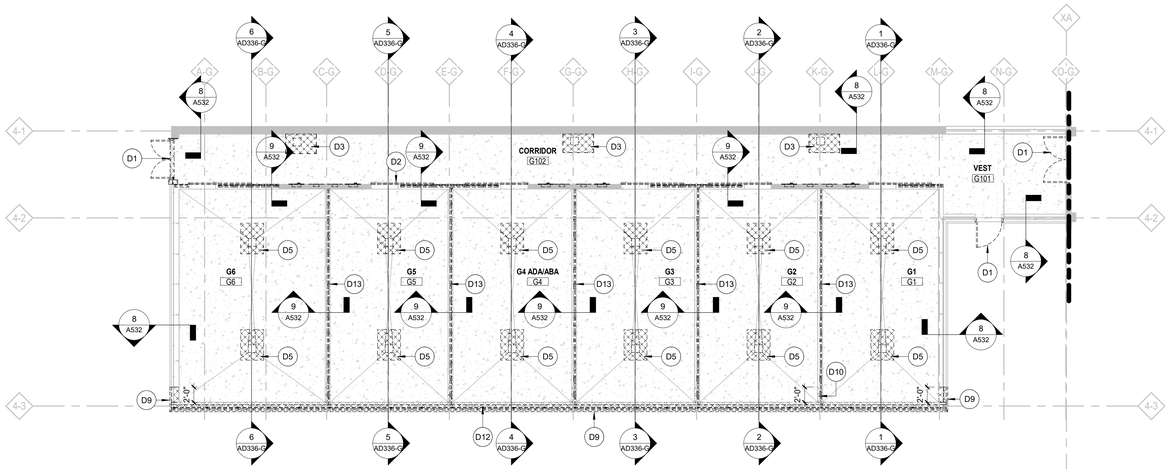
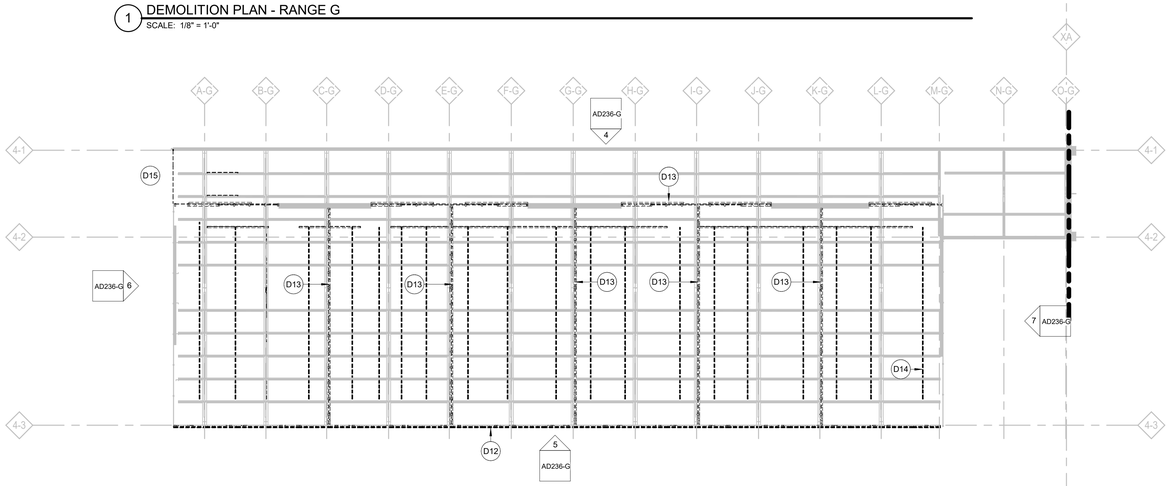


1 DEMOLITION PLAN - RANGE G
SCALE: 1/8" = 1'-0"



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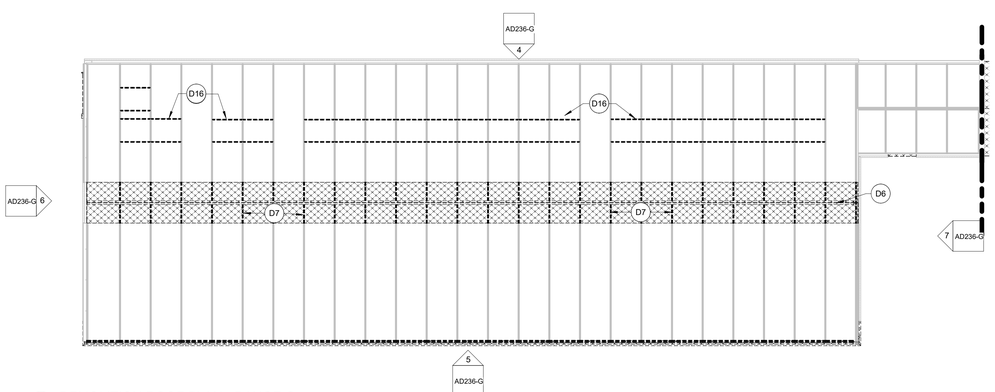
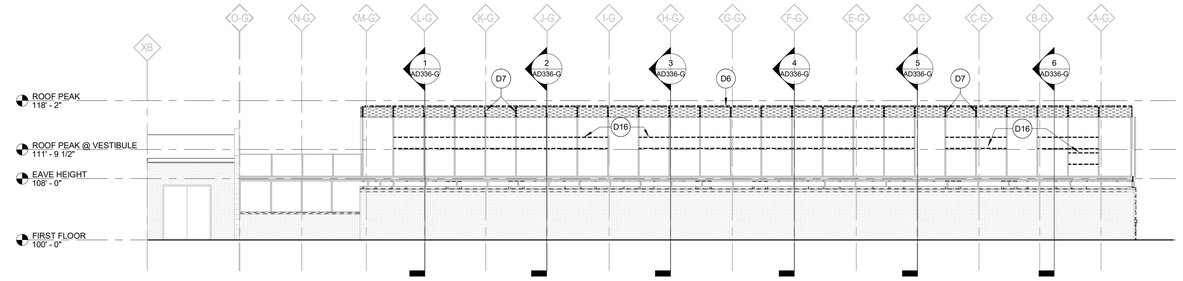
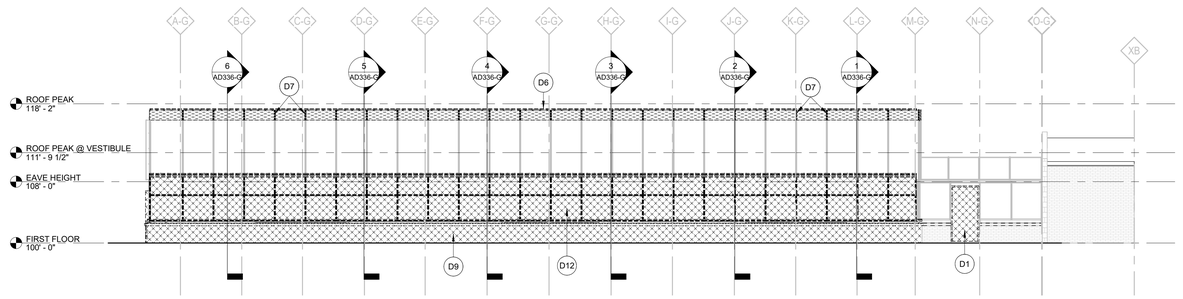
SCALE: 1/8" = 1'-0"



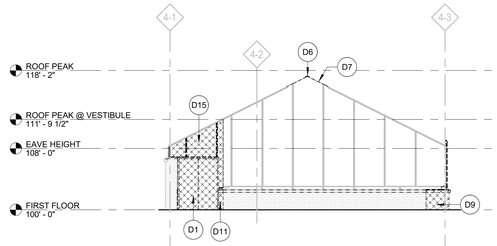
3 DEMOLITION ROOF PLAN - RANGE G
SCALE: 1/8" = 1'-0"



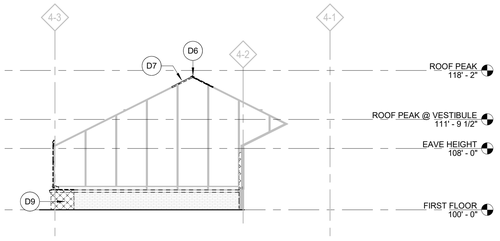
4 DEMOLITION NORTH ELEVATION - RANGE G
SCALE: 1/8" = 1'-0"



5 DEMOLITION SOUTH ELEVATION - RANGE G
SCALE: 1/8" = 1'-0"



6 DEMOLITION WEST ELEVATION - RANGE G
SCALE: 1/8" = 1'-0"



7 DEMOLITION EAST ELEVATION - RANGE G
SCALE: 1/8" = 1'-0"

REF. DEMO NOTES (DX):

D1 REMOVE DOOR, FRAME, AND HARDWARE; MAINTAIN ROUGH OPENING

D2 REMOVE DOOR, TRACK, AND HARDWARE; MAINTAIN ROUGH OPENING; RECOVER DOOR PANEL FOR REFURBISHMENT; TYPICAL FOR ALL CELLS

D3 CUT CONCRETE SLAB FOR FLOOR DRAIN REPAIR; TYPICAL FOR ENTIRE CORRIDOR

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D6 DEMO GREENHOUSE ROOF RIDGE CAP

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D14 DEMO ENTIRE UNISTRUT SYSTEMS; TYPICAL IN ALL CELLS

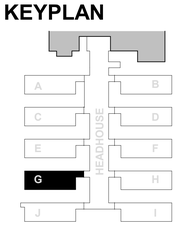
D15 DEMO GREENHOUSE WALL ABOVE NEW WIDER DOOR

D16 DEMO GREENHOUSE ROOF MULLIONS DUE TO DEMO OF ROOF MECHANICAL EQUIPMENT; TYPICAL ON NORTH SLOPE AS SHOWN

GENERAL DEMOLITION NOTES

1. ALL GREENHOUSE / RANGE GLAZING, INTERIOR AND EXTERIOR, WILL BE DEMOLISHED AND REPLACED. THE GLAZING SHALL BE REMOVED WITH THE CORRECT PROCEDURES FOR ASBESTOS REMEDIATION. REMOVE ALL EXISTING FASTENERS & GLAZING GASKETING.
2. ALL GREENHOUSE / RANGE MULLIONS SHOWN AS EXISTING TO REMAIN SHALL BE REMOVED AND REINSTALLED FOR THE PURPOSE OF REGLAZING.
3. ALL EXISTING ROOFTOP MECHANICAL LOUVERS & VENTS SHALL BE DEMOLISHED EXCEPT WHERE INDICATED TO BE REUSED; SEE MECHANICAL DEMOLITION SHEETS. EXISTING ROOFTOP LOUVERS & VENTS NOT SHOWN FOR CLARITY.
4. ALL GREENHOUSE / RANGE MULLIONS ON WALLS & ROOF (EXISTING IN PLACE, REINSTALLED, OR NEW) SHALL RECEIVE NEW FASTENERS W/ EPDM GASKETING & NEOPRENE GLAZING GASKETING. REMOVE ALL EXISTING FASTENERS.
5. MAINTAIN ALL EXISTING ALUMINUM CONDENSATION TROUGHS, CONNECTING EXISTING ROOF PURLINS AND DISCHARGING TO CORRIDOR FLOOR DRAINS, AND PROTECT FROM CONSTRUCTION ACTIVITY. DEMOLISH ALL PVC COMPONENTS OF THE CONDENSATION DISCHARGE SYSTEM AND REPLACE WITH NEW PVC PIPING OF SIMILAR DIAMETER, WALL THICKNESS, AND LENGTH.
6. ALL EXTERIOR SILLS AT GREENHOUSE WALLS, EXISTING TO REMAIN OR NEW, SHALL BE REBUILT PER DETAILS. MODIFY GREENHOUSE WALL MULLIONS TO ACCOMMODATE.
7. ALL MASONRY WALL MOUNTED DEVICES, USED FOR PREVIOUS SHADING DEVICES, SHALL BE REMOVED FROM THE EXISTING EXTERIOR MASONRY WALLS.

KEYPLAN



NORTH

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

DEMOLITION PLANS & ELEVATIONS - RANGE G

PROJECT NO.: 09228.021
DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: AD236-G

Autodesk Docs://09228/021 - USDA NCSL GREENHOUSES PHASE V/09228/021-ARCH_R25.rvt
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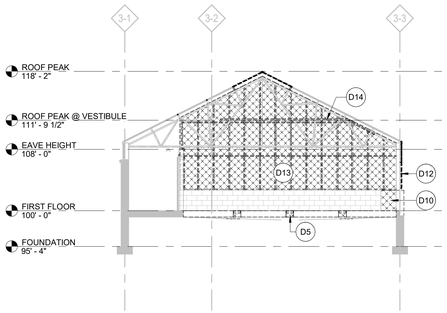
CAD | DSC | DH | PM



1 DEMOLITION BUILDING SECTION N/S 01 - RANGE F
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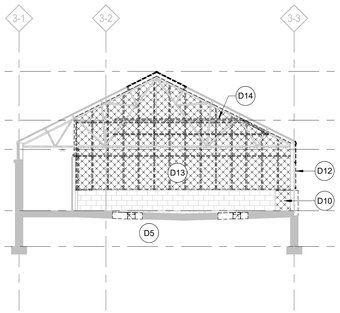

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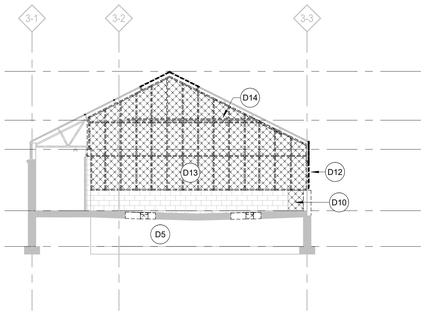

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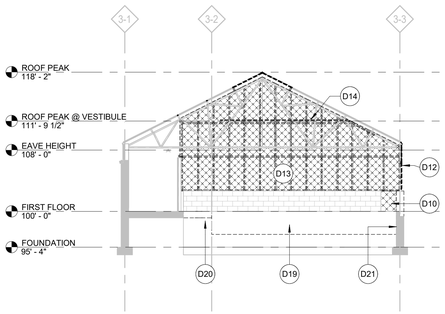

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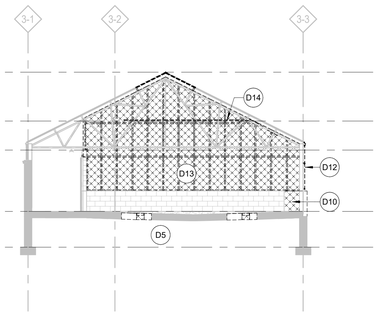

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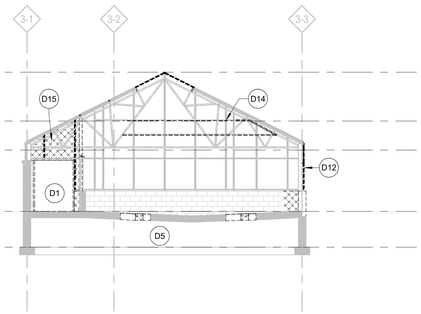

6 DEMOLITION BUILDING SECTION N/S 06 - RANGE F
SCALE: 1/8" = 1'-0"

GENERAL DEMOLITION NOTES

1. ALL GREENHOUSE / RANGE GLAZING, INTERIOR AND EXTERIOR, WILL BE DEMOLISHED AND REPLACED. THE GLAZING SHALL BE REMOVED WITH THE CORRECT PROCEDURES FOR ASBESTOS REMEDIATION. REMOVE ALL EXISTING FASTENERS & GLAZING GASKETING.
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3. ALL EXISTING ROOFTOP MECHANICAL LOUVERS & VENTS SHALL BE DEMOLISHED EXCEPT WHERE INDICATED TO BE REUSED; SEE MECHANICAL DEMOLITION SHEETS. EXISTING ROOFTOP LOUVERS & VENTS NOT SHOWN FOR CLARITY.
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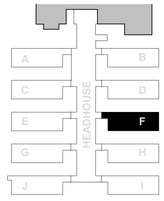
6. ALL EXTERIOR SILLS AT GREENHOUSE WALLS, EXISTING TO REMAIN OR NEW, SHALL BE REBUILT PER DETAILS. MODIFY GREENHOUSE WALL MULLIONS TO ACCOMMODATE.
7. ALL MASONRY WALL MOUNTED DEVICES, USED FOR PREVIOUS SHADING DEVICES, SHALL BE REMOVED FROM THE EXISTING EXTERIOR MASONRY WALLS.

REF. DEMO NOTES (DX):

D1	REMOVE DOOR, FRAME, AND HARDWARE; MAINTAIN ROUGH OPENING
D5	CUT CONCRETE SLAB FOR FLOOR DRAIN REPAIR; TYPICAL IN ALL CELLS
D10	DEMO INTERIOR CMU WALL TO EXTENTS SHOWN; TYPICAL IN ALL CELLS
D12	DEMO ENTIRE SOUTH EXTERIOR GREENHOUSE WALL
D13	DEMO INTERIOR GLAZED PARTITION ASSEMBLY
D14	DEMO ENTIRE UNISTRUT SYSTEMS; TYPICAL IN ALL CELLS
D15	DEMO GREENHOUSE WALL ABOVE NEW WIDER DOOR
D19	HEAVILY ORGANIC OR ROOT INFESTED TOPSOIL SHALL BE EXCAVATED AND DISCARDED TO A MINIMUM DEPTH OF 8 INCHES. DEEPER STRIPPING SHALL BE DONE IF ORGANIC MATERIALS REMAIN BELOW A DEPTH OF 8 INCHES.
D20	DEMO FOUNDATION WALL & SLAB & ASSOCIATED PLUMBING COMPONENTS WITHIN THE SLAB; CUT/REMOVE CONCRETE CLEANLY FROM EXISTING FOUNDATION WALLS TO REMAIN
D21	DEMO FOUNDATION INSULATION TO THE EXTENT OF THE SOIL EXCAVATION; PROVIDE CLEAN SURFACE OF FOUNDATION WALL FOR INSTALLATION OF NEW SLAB

USDA

KEYPLAN



NORTH

SCHEMMER

PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

DEMOLITION BUILDING SECTIONS - RANGE F

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: AD335-F

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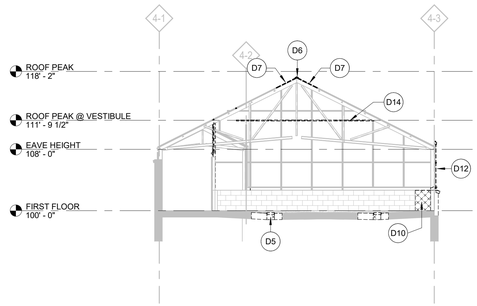
5/5/2026 9:21:20 AM

CAD	DSG	PH	PM



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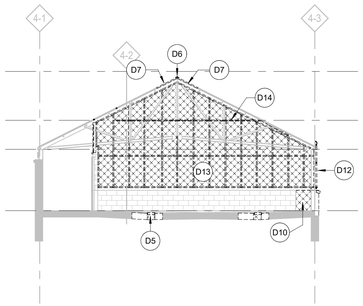
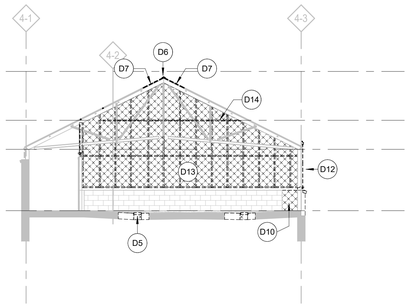
SCALE: 1/8" = 1'-0"



2 DEMOLITION BUILDING SECTION N/S 02 - RANGE G
SCALE: 1/8" = 1'-0"



3 DEMOLITION BUILDING SECTION N/S 03 - RANGE G
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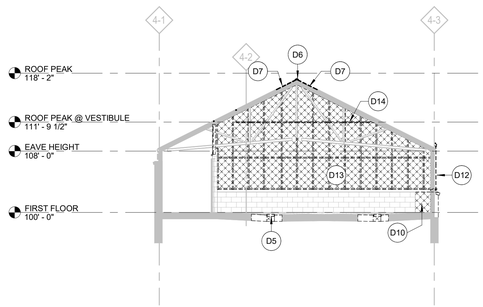
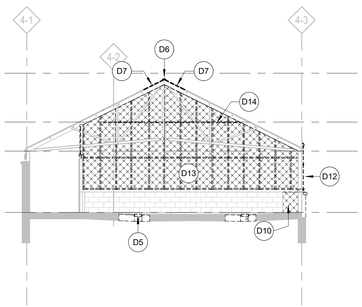


4 DEMOLITION BUILDING SECTION N/S 04 - RANGE G
SCALE: 1/8" = 1'-0"



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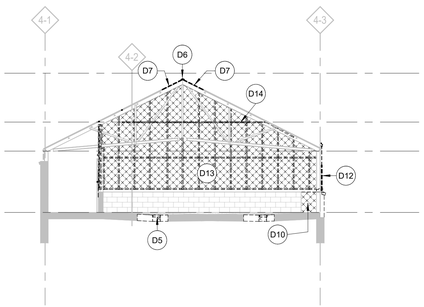
SCALE: 1/8" = 1'-0"



6 DEMOLITION BUILDING SECTION N/S 06 - RANGE G
SCALE: 1/8" = 1'-0"

GENERAL DEMOLITION NOTES

1. ALL GREENHOUSE / RANGE GLAZING, INTERIOR AND EXTERIOR, WILL BE DEMOLISHED AND REPLACED. THE GLAZING SHALL BE REMOVED WITH THE CORRECT PROCEDURES FOR ASBESTOS REMEDIATION. REMOVE ALL EXISTING FASTENERS & GLAZING GASKETING.
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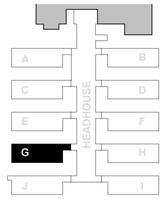
7. ALL MASONRY WALL MOUNTED DEVICES, USED FOR PREVIOUS SHADING DEVICES, SHALL BE REMOVED FROM THE EXISTING EXTERIOR MASONRY WALLS.

REF. DEMO NOTES (DX):

D5	CUT CONCRETE SLAB FOR FLOOR DRAIN REPAIR; TYPICAL IN ALL CELLS
D6	DEMO GREENHOUSE ROOF RIDGE CAP
D7	CUT EXISTING MULLIONS TO ACCOMMODATE NEW OPERABLE RIDGE VENT
D10	DEMO INTERIOR CMU WALL TO EXTENTS SHOWN; TYPICAL IN ALL CELLS
D12	DEMO ENTIRE SOUTH EXTERIOR GREENHOUSE WALL
D13	DEMO INTERIOR GLAZED PARTITION ASSEMBLY
D14	DEMO ENTIRE UNISTRUT SYSTEMS; TYPICAL IN ALL CELLS

USDA

KEYPLAN



NORTH

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

DEMOLITION BUILDING SECTIONS - RANGE G

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: AD336-G

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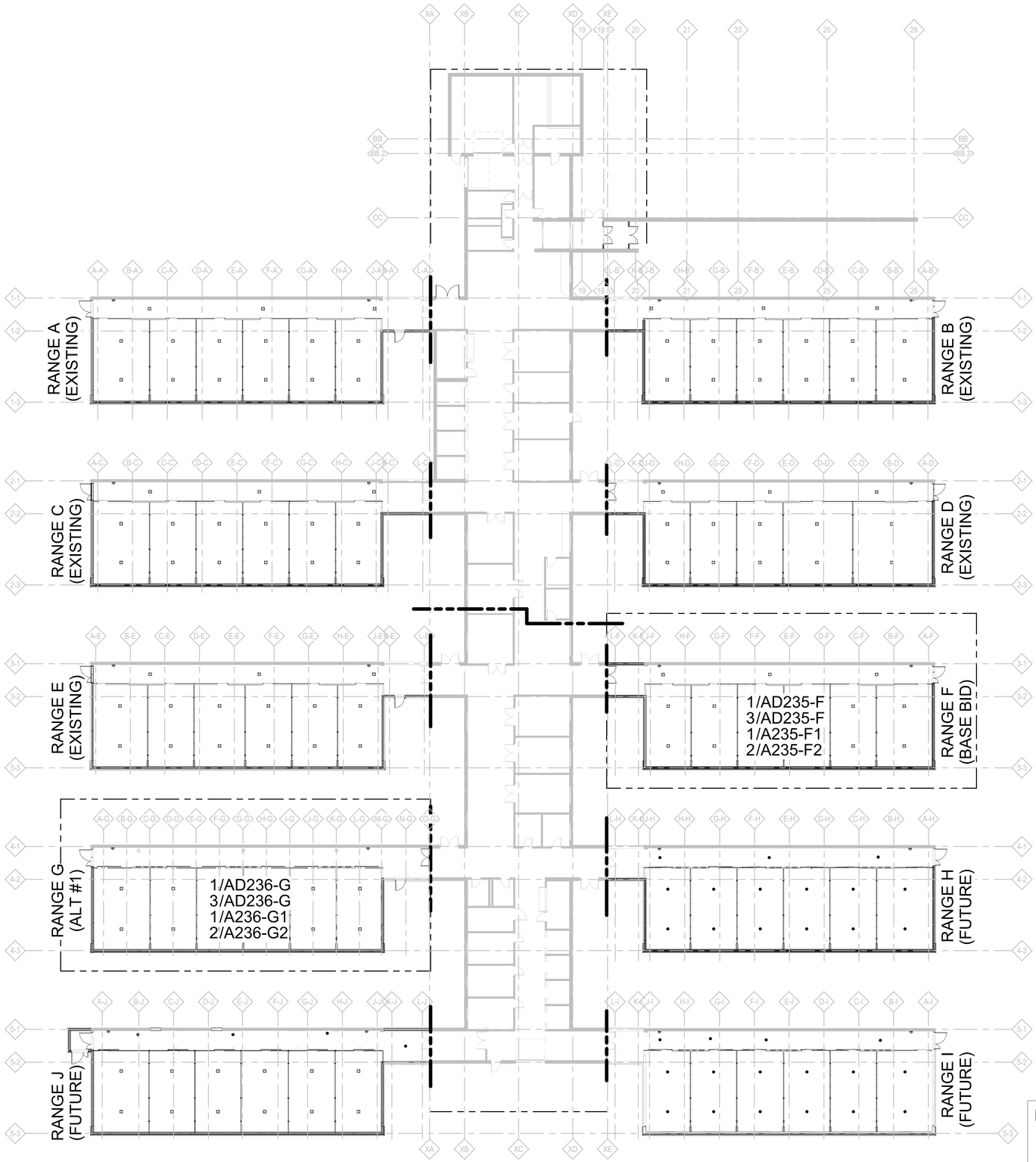
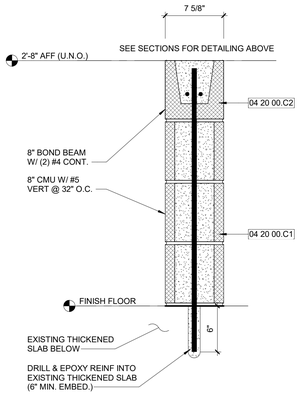
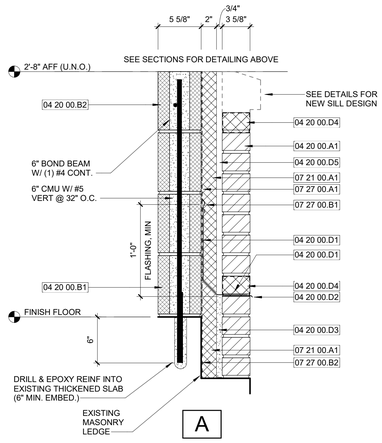


1 FIRST FLOOR - COMPOSITE
SCALE: 1/16" = 1'-0"

KEYNOTES

04 20 00.A1	CLAY BRICK MASONRY, MODULAR, RUNNING BOND; NEW, MATCH EXISTING
04 20 00.B1	CONCRETE MASONRY UNITS, 6"X8"X16", NEW
04 20 00.B2	CONCRETE MASONRY UNIT BOND BEAM, 6"X8"X16", NEW
04 20 00.C1	CONCRETE MASONRY UNITS, 8"X8"X16", NEW
04 20 00.C2	CONCRETE MASONRY UNIT BOND BEAM, 8"X8"X16", NEW
04 20 00.D1	STAINLESS STEEL / POLYMER FABRIC FLASHING - SELF-ADHERING
04 20 00.D2	STAINLESS STEEL DRIP EDGE W/ DRIP EDGE
04 20 00.D3	FULLY GROUT UNDER FABRIC FLASHING, BETWEEN BRICK & INSULATION, DOWN TO EXISTING MASONRY LEDGE
04 20 00.D4	WEEP VENT IN HEAD JOINTS, 24" O.C.
04 20 00.D5	AIR SPACE
07 21 00.A1	POLYISOCYANURATE (ISO) INSULATION, 2" THICK
07 27 00.A1	AIR BARRIER; AIR IMPERMEABLE, VAPOR SEMI-PERMEABLE, FLUID-APPLIED
07 27 00.B1	AIR BARRIER; LAP OVER MASONRY FABRIC FLASHING
07 27 00.B2	AIR BARRIER; CONTINUE UNDER MASONRY FABRIC FLASHING TO BOTTOM OF EXISTING MASONRY LEDGE

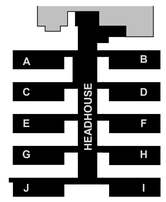




WALL / ASSEMBLY TYPES

USDA

KEYPLAN



NORTH

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REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: JMB	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

FIRST FLOOR PLAN - COMPOSITE

PROJECT NO. | DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: A111

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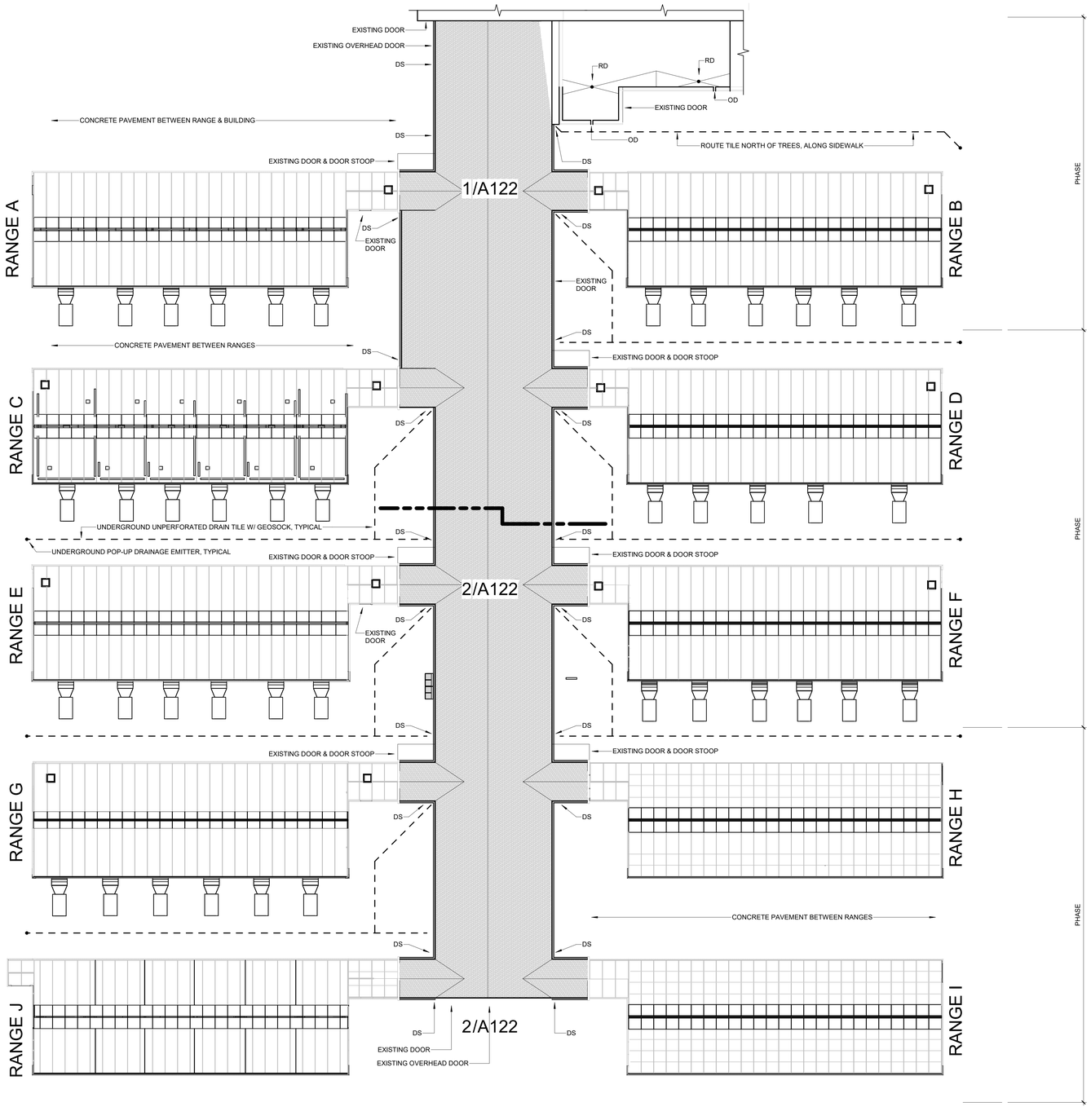

1 ROOF FLOOR - COMPOSITE
SCALE: 1/16" = 1'-0"

GENERAL NOTES

1. PHASING INDICATED ON THIS DRAWING TO ILLUSTRATE HOW THE CONSTRUCTION SHOULD UNFOLD IN STAGES. WHEN ONE PHASE IS UNDER CONSTRUCTION, THE OTHER PHASES SHALL REMAIN OR BE REESTABLISHED AS OPERATIONAL FOR OWNER USE. THE SUGGESTED PHASES ARE GENERAL IN NATURE; THE PHASES MUST BE ANALYZED BY THE CONTRACTOR TO BE ESTABLISHED ON LOGICAL STRUCTURAL LOCATIONS. THE CONTRACTOR SHALL NEGOTIATE WITH THE OWNER AS TO HOW THE PHASES SHOULD UNFOLD IN AN AGREEABLE SEQUENCE IN ACCORDANCE TO IDEAL CONSTRUCTION SEQUENCES AND THE OWNER'S ABILITY TO VACATE CERTAIN AREAS IN CERTAIN POINTS IN THE CONSTRUCTION TIMELINE.
2. IN ALL AREAS THAT ARE DISTURBED BY THE INSTALLATION OF NEW UNDERGROUND DRAINAGE SYSTEMS, REESTABLISH SOIL OVER TOP OF THE DRAINAGE SYSTEMS AND INSTALL GRASS SEED IN ACCORDANCE TO SEEDING INFORMATION ON SHEET A001.
3. ALL UNDERGROUND DRAINAGE SYSTEMS SHALL SLOPE TO DRAIN TO OUTLETS.
4. FILL THE DEPRESSED GRADE, CAUSED BY EROSION, AGAINST THE HEADHOUSE SO THE GRADE SLOPES AWAY FROM THE BUILDING AND INSTALL THE SPECIFIED GRASS SEED.
5. WHERE EXISTING DOWNSPOUTS ARE REMOVED, THE EXTERIOR BRICK MASONRY SHALL BE INFILLED AND TOOTHED TO MATCH SIZE, COURSING, AND FINISH. THE BRICK AND MORTAR TYPE SHALL MATCH EXISTING CONDITIONS AND ARE SUBJECT TO SUBMITTAL REVIEW.
6. REESTABLISH SCUPPERS IN THE EXISTING LOCATIONS IN REGARDS TO DIMENSIONS AND HEIGHT FROM ROOF SURFACES.
7. INTERNAL ROOF DRAINS SHALL BE MAINTAINED AND REESTABLISHED. CONTRACTOR TO NOTIFY OWNER ABOUT CONDITIONS OF THE EXISTING INTERNAL ROOF DRAINS.
8. SEE KEYNOTES AND SPECIFICATIONS FOR THE NEW DOWNSPOUTS. PROVIDE NEW SPLASHBLOCKS AT NEW DOWNSPOUT LEADERS.
9. SEE SHEET A001 REGARDING ACOUSTICAL PANEL SCOPE.

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SCHEMMER

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: JMB	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ROOF PLAN - COMPOSITE

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: A112

PROJECT NO.: 09228.021

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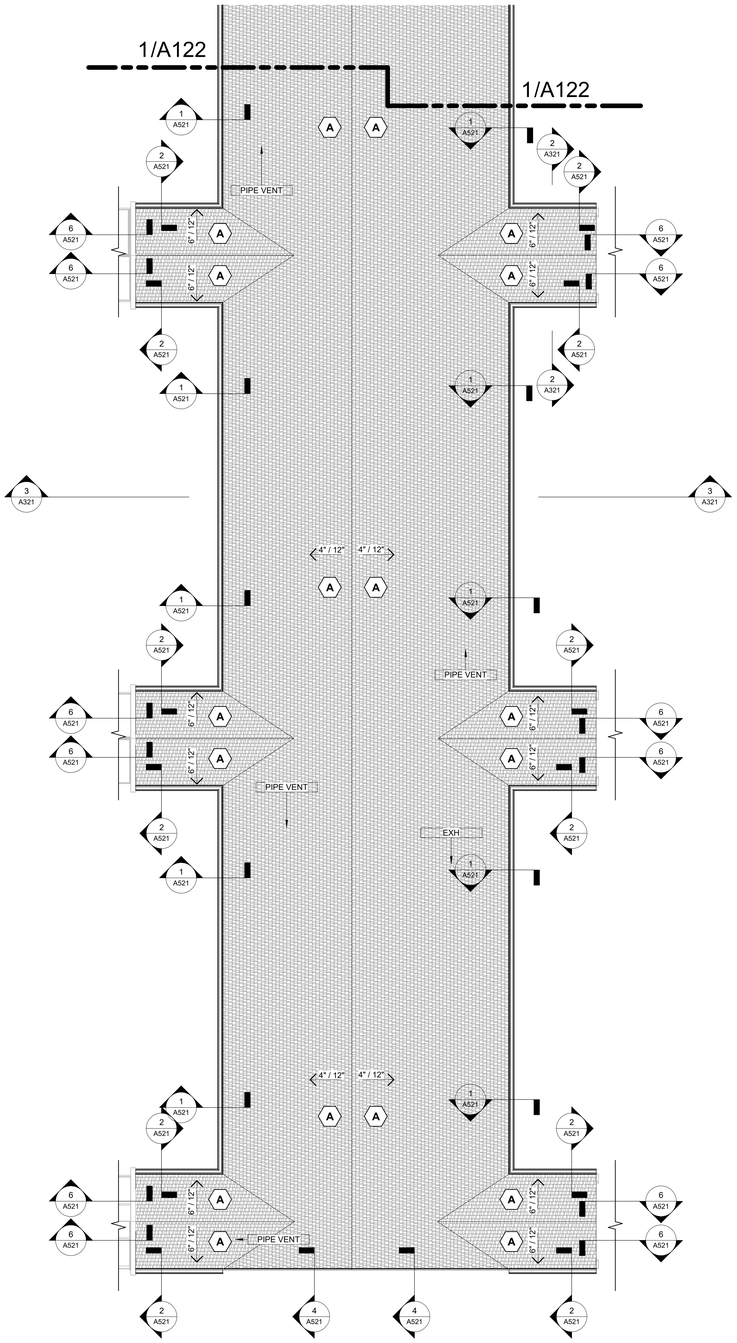
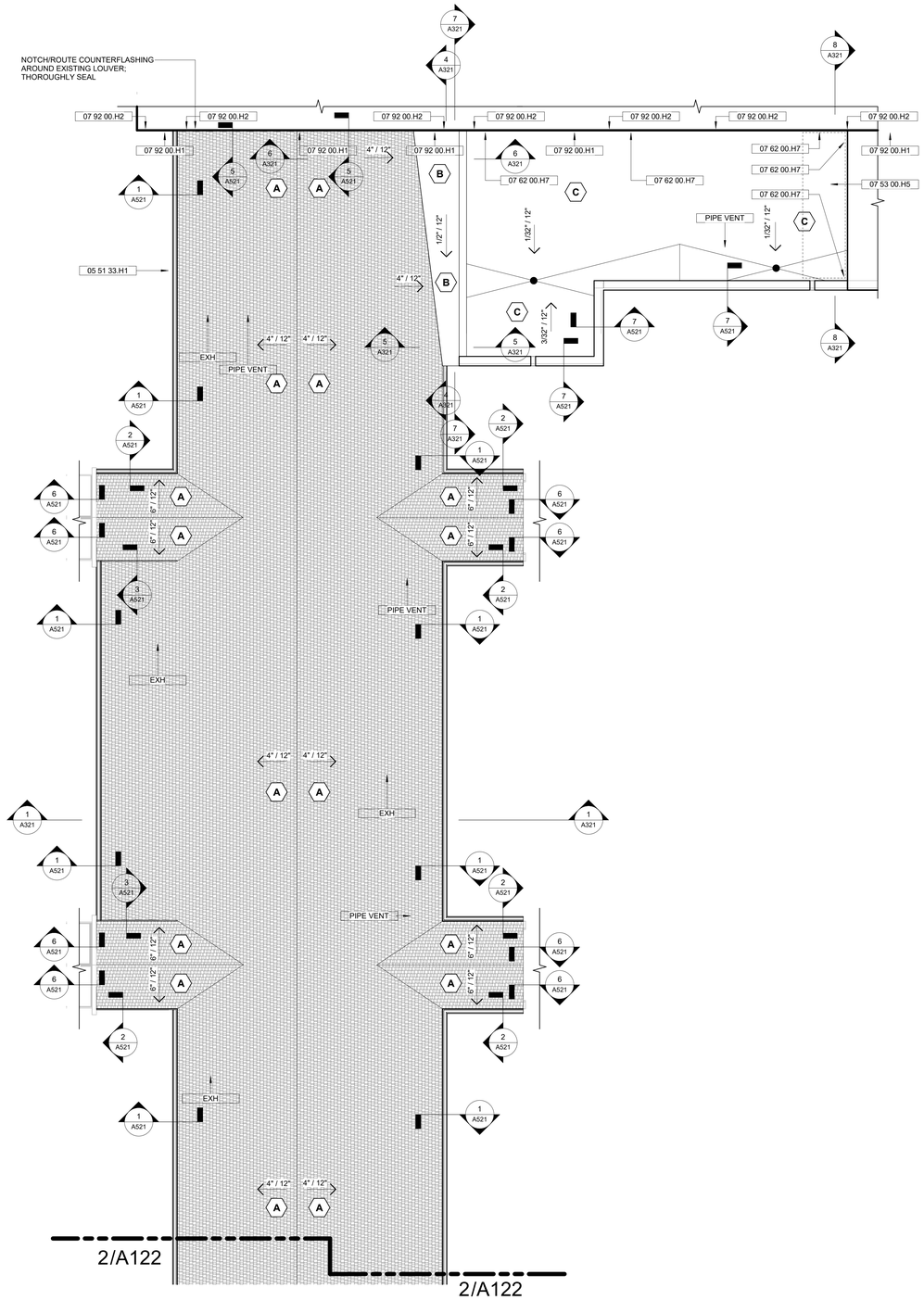
CAD | DSC | DH | PM



2 ROOF PLAN - HEADHOUSE SOUTH
SCALE: 1/8" = 1'-0"



1 ROOF PLAN - HEADHOUSE NORTH
SCALE: 1/8" = 1'-0"

KEYNOTES

05 51 33.H1	FIXED ALUMINUM LADDER, WALL MOUNTING, SECURITY DOOR, WALK-THRU DESIGN W/ PLATFORM 8" @ LEADING EDGE ABOVE ROOF SURFACE, FALL ARREST SYSTEM; EXTEND MOUNTING BRACKETS THROUGH BRICK & INSULATION TO MOUNT DIRECTLY TO STRUCTURAL CMU & PIECE BRICK BACK AROUND THROUGH-BRACKETS
07 53 00.H5	ADDITIONAL ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING LAYER; PROTECTION FROM SNOW & ICE FROM STANDING SEAM METAL ROOF; SEE SPECS
07 62 00.H7	SHEET METAL COUNTERFLASHING, EXISTING, REMOVE & REINSTALL OVER NEW ELASTOMERIC MEMBRANE W/ APPROPRIATE TERMINATION
07 92 00.H1	ROD & SILICONE SEALANT, NEW AROUND ALL FOUR SIDES OF LOUVER; REMOVE EXISTING ROD & SEALANT PRIOR
07 92 00.H2	ROD & SILICONE SEALANT, 3/8" WIDE BY 3/16" DEEP SEALANT, NEW FOR ENTIRE HEIGHT OF BRICK CONTROL JOINT; REMOVE EXISTING ROD & SEALANT PRIOR
EXH	NEW MECHANICAL EXHAUST; MATCH EXISTING CFM, POWER, & SIZE; CONNECT TO EXISTING SYSTEMS FOR FULL FUNCTIONALITY; NEW ROOF CURB TO MATCH ROOF SLOPE, INSULATED; BUILD ROOF CRICKET SIMILAR TO NEW ROOF CONSTRUCTION TO SHED WATER AROUND CURB; WATER & ICE PROTECTION UNDERLAYMENT FLASHING OVER CURB FLANGES; SHINGLES PER MANUFACTURER'S INSTRUCTIONS; FULLY SEAL FOR WATERTIGHTNESS
PIPE VENT	NEW / REESTABLISHED PIPE VENT TO EXTEND ABOVE NEW ROOF SURFACE; CONNECT TO EXISTING SYSTEMS FOR FULL FUNCTIONALITY; NEW PIPE BOOT TO MATCH ROOF SLOPE (SEE SPEC 07 72 00); WATER & ICE PROTECTION UNDERLAYMENT FLASHING OVER BOOT FLANGES; SHINGLES PER MANUFACTURER'S INSTRUCTIONS; FULLY SEAL FOR WATERTIGHTNESS

GENERAL NOTES

ROOF TYPE (A):

- ASPHALT SHINGLES, ARCHITECTURAL-GRADE
- ROOFING UNDERLAYMENT MEMBRANE, SELF-ADHERING
- ROOF SHEATHING UNDERLAYMENT, 5/8" PLYWOOD, FIRE-RETARDANT-TREATED; SCREW TO TOP FLUTES OF STEEL DECK
- POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 3-1/2" THICK
- POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 3" THICK
- VAPOR BARRIER UNDERLAYMENT MEMBRANE, SELF-ADHERING
- COVER BOARD, 5/8" THICK CEMENTITIOUS
- STEEL DECKING; NEW; SEE STRUCTURAL
- STEEL JOIST / BEAM FRAMING; EXISTING

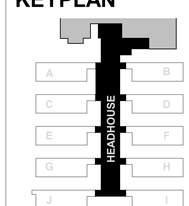
ROOF TYPE (B):

- ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING, REINFORCED; FULLY ADHERE TO SUBSTRATE
- ROOF SHEATHING UNDERLAYMENT, 5/8" PLYWOOD, FIRE-RETARDANT-TREATED; SCREW TO TOP FLUTES OF PLY DECK
- POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 3-1/2" THICK
- POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 3" THICK
- VAPOR BARRIER UNDERLAYMENT MEMBRANE, SELF-ADHERING
- ROOF SHEATHING UNDERLAYMENT, 5/8" PLYWOOD, FIRE-RETARDANT-TREATED
- 2x8 DIMENSIONAL LUMBER JOISTS, 16" O.C., FIRE-RETARDANT-TREATED

ROOF TYPE (C):

- ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING, REINFORCED; FULLY ADHERE TO SUBSTRATE
- EXISTING ROOF INSULATION TO REMAIN; SELECTIVELY REPLACE INSULATION WHERE WATER DAMAGE HAS OCCURRED

KEYPLAN



NORTH

USDA

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ROOF PLAN - HEADHOUSE

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: JMB	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

PROJECT NO.: 09228.021

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: A122

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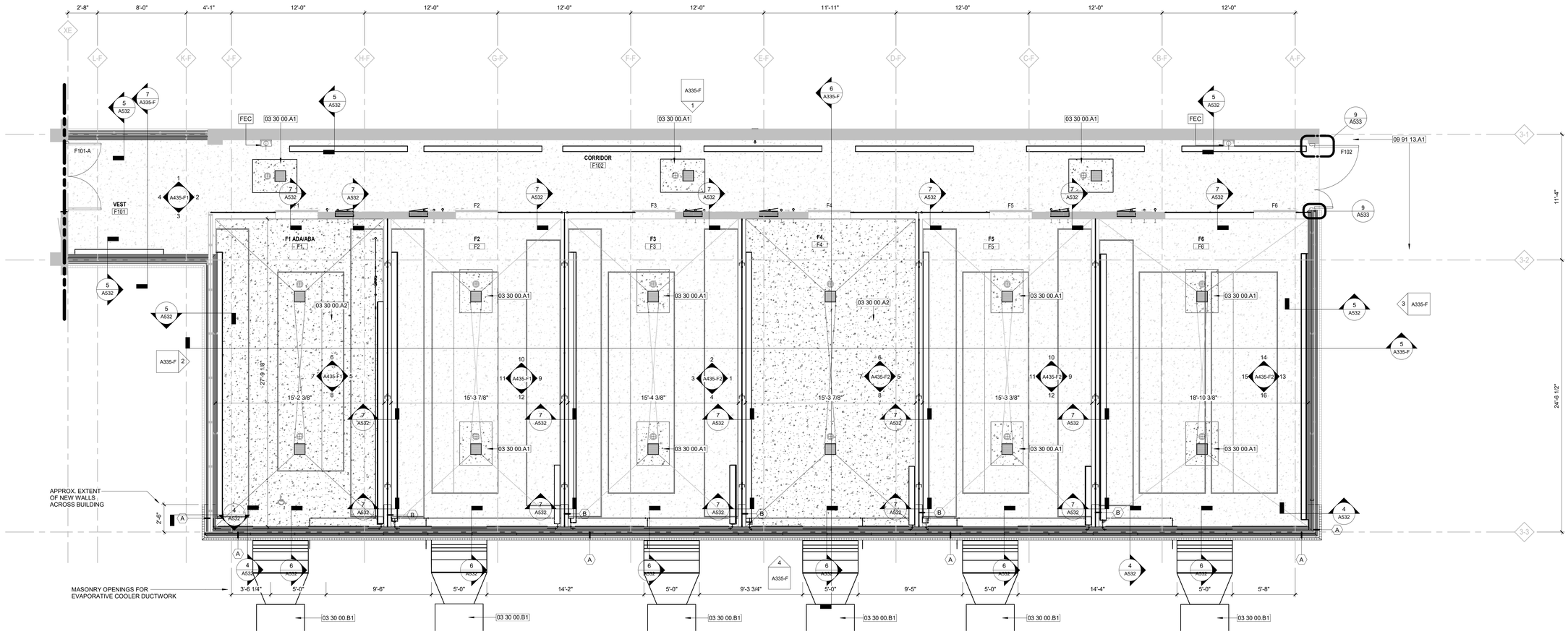


1 FLOOR PLAN - RANGE F
SCALE: 1/4" = 1'-0"

GENERAL ARCHITECTURAL NOTES

1. NEW EXTERIOR ACRYLIC GLAZING, REPLACING ALL EXISTING GLAZING IN ALL GREENHOUSE WALLS & ROOFS, SHALL BE 16MM (5/8") THICK. THICKNESS MATCHES EXISTING MULLION THROATS. NEW INTERIOR POLYCARBONATE GLAZING SHALL BE 8MM (0.315 INCHES) THICK.
2. NEW MASONRY, BRICK OR CMU, SHALL BE TOOTHED INTO ADJACENT EXISTING LIKE MASONRY. ALL VOIDS IN CMU CREATED FROM REMOVAL OF DEMOLISHED EQUIPMENT, THAT WILL NOT BE REUSED FOR NEW CONSTRUCTION, SHALL ALSO BE FILLED AND TOOTHED WITH NEW CMU.
3. ALL GREENHOUSE / RANGE MULLIONS ON WALLS & ROOF (EXISTING IN PLACE, REINSTALLED, OR NEW) SHALL RECEIVE NEW FASTENERS W/ EPDM GASKETING & NEOPRENE GLAZING GASKETING.
4. ALL EXISTING MULLIONS TO BE REINSTALLED SHALL BE FASTENED WITH THE SAME FASTENER HOLES TO AVOID EXCESSIVE HOLE PATCHING. REMOVE EYE BOLTS/SCREWS FROM EXISTING ROOF MULLIONS & PATCH WITH ALUMINUM CAP FLASHING AND THE APPROVED EXTERIOR SEALANT.
5. ALL EXISTING PAINTED INTERIOR SURFACES OF CMU WALLS SHALL HAVE PAINT REMOVED, CMU REPAIRED, PRIMED AND FILLED, AND BE REPAINTED. SEE SECTION 09 91 23.
6. INSTALL NEW PVC COMPONENTS OF THE CONDENSATION DISCHARGE SYSTEM OF SIMILAR DIAMETER, WALL THICKNESS, AND LENGTH.
7. CLEAN ALL EXISTING CONCRETE FLOORS OF DIRT BUILD-UP AND STAINING.
8. ALL NEW CONCRETE FLOORS TO HAVE NEW DRAINS INSTALLED TO MAINTAIN A 1/4":12" FLOOR SLOPE MAXIMUM IN ALL LOCATIONS WITHIN A CELL.

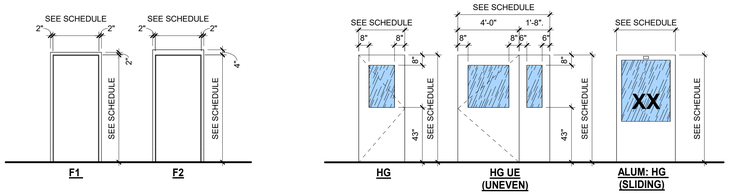
KEYNOTES

03 30 00.A1 CONCRETE SLAB INFILL; MATCH FINISH & SLOPE; SEE SHEET A532 FOR STRUCTURAL INFORMATION

03 30 00.A2 NEW CONCRETE SLAB, 4" THICK; MAXIMUM 1/4":12" FLOOR SLOPE IN ANY LOCATION; INSTALL FLOOR DRAINS ACCORDINGLY; PROVIDE 1/2" BOND BREAKING MATERIAL WITH 1/4" DEEP SELF-LEVELING SEALANT ON TOP OF BOND BREAKING MATERIAL AROUND ENTIRE SLAB PERIMETER; DO NOT DOWEL NEW SLAB INTO EXISTING FOUNDATIONS

03 30 00.B1 CONCRETE EQUIPMENT SLAB, 4" THICK W/ #5 REBAR @ 16" ON CENTER EACH WAY; EAST, WEST, & SOUTH EDGES 4" MINIMUM OUT FROM COOLER PERIMETER, NORTH EDGE TO EXTEND TO EXTERIOR BRICK FACE OF BUILDING (DO NOT DOWEL). SEE STRUCTURAL NOTES FOR REQUIRED PSI. PRIOR TO CONSTRUCTING EXTERIOR CONCRETE EQUIPMENT PADS, TOPSOIL SHALL BE STRIPPED, STOCKPILED, AND RE-SPREAD AFTER CONSTRUCTION OF THE EQUIPMENT PADS. THE UPPER 6 INCHES OF THE SUBGRADE BENEATH EXTERIOR CONCRETE EQUIPMENT PADS SHALL BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AT A MOISTURE CONTENT BETWEEN -3 AND +3 PERCENT OF OPTIMUM DETERMINED BY ASTM D698, STANDARD PROCTOR. SUBGRADE PREPARATION SHALL EXTEND A MINIMUM OF 1 FEET LATERALLY BEYOND THE EDGE OF THE EQUIPMENT PADS. FILL PLACED BELOW THIS LEVEL SHALL ALSO BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AT A MOISTURE CONTENT BETWEEN -3 AND +3 PERCENT OF OPTIMUM DETERMINED BY ASTM D698, STANDARD PROCTOR. THE CONTRACTOR SHALL SEED ALL DISTURBED AREAS WITH TYPE B SEED MIX PER CITY OF FARGO STANDARD SPECIFICATIONS SECTION 3100. THE CONTRACTOR SHALL MAINTAIN SEEDED AREAS UNTIL GRASS HAS BEEN EVENLY ESTABLISHED TO A HEIGHT OF 2" AND ACCEPTED BY THE USDA. CONTRACTOR IS RESPONSIBLE FOR SPOT SURVEYING EACH EQUIPMENT PAD IN RESPECT TO THE VARIED EXTERIOR GRADE IN EACH SPECIFIC LOCATION; A COMPREHENSIVE TOPOGRAPHICAL SURVEY AND AS-BUILT TOPOGRAPHICAL INFORMATION IS NOT AVAILABLE.

09 91 13.A1 STRIP EXISTING PAINT FROM ALL OF EXISTING PIPE RAILING SURFACES TO METAL SURFACES; PAINT NEW SAFETY YELLOW PAINT



DOOR FRAME TYPES
SCALE: 1/4" = 1'-0"

DOOR PANEL TYPES
SCALE: 1/4" = 1'-0"
SEE SPECIFICATIONS FOR LOCATIONS OF APPLIED LETTERING ON DOOR GLAZING

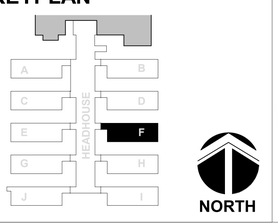
DOOR SCHEDULE - RANGE F

DOOR NO.		DOOR SIZE WIDTH	DOOR SIZE HEIGHT	DOOR MATL & TYPE	DOOR FINISH	DOOR GLASS	FRAME MATL & TYPE	FRAME FINISH	SET NO	LABEL	REMARKS
F1		3' - 8"	7' - 2"	ALUM : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
F2		3' - 8"	7' - 2"	ALUM : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
F3		3' - 8"	7' - 2"	ALUM : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
F4		3' - 8"	7' - 2"	ALUM : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
F5		3' - 8"	7' - 2"	ALUM : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
F6		3' - 8"	7' - 2"	ALUM : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
F101	PR	6' - 0"	7' - 0"	FRP : HG	FRP	G-2	FRP : F2	FRP	01	90-MIN	
F102	UE	5' - 8"	6' - 8"	FRP1 : HG	FRP	IG-1	FRP : F1	FRP	02		ACCESS CONTROL

GLASS TYPES

G-1	1/4" CLEAR, NON-FIRE-RATED, TEMPERED FLOAT GLASS
G-2	1/4" CLEAR, 90-MIN FIRE-RATED, TEMPERED GLASS
IG-1	1" INSULATED, CLEAR LOW-E GLASS

KEYPLAN



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PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

FLOOR PLAN / DOORS - RANGE F

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	SWS
EPM	M McWILLIAMS
CHECKED BY	TJS
SAFETY & HEALTH	E WELKER
DRAWN BY	SWS
REAL PROPERTY	W ROSS
PROJECT NO.	
DATE	05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526–8119

SHEET A235-F1

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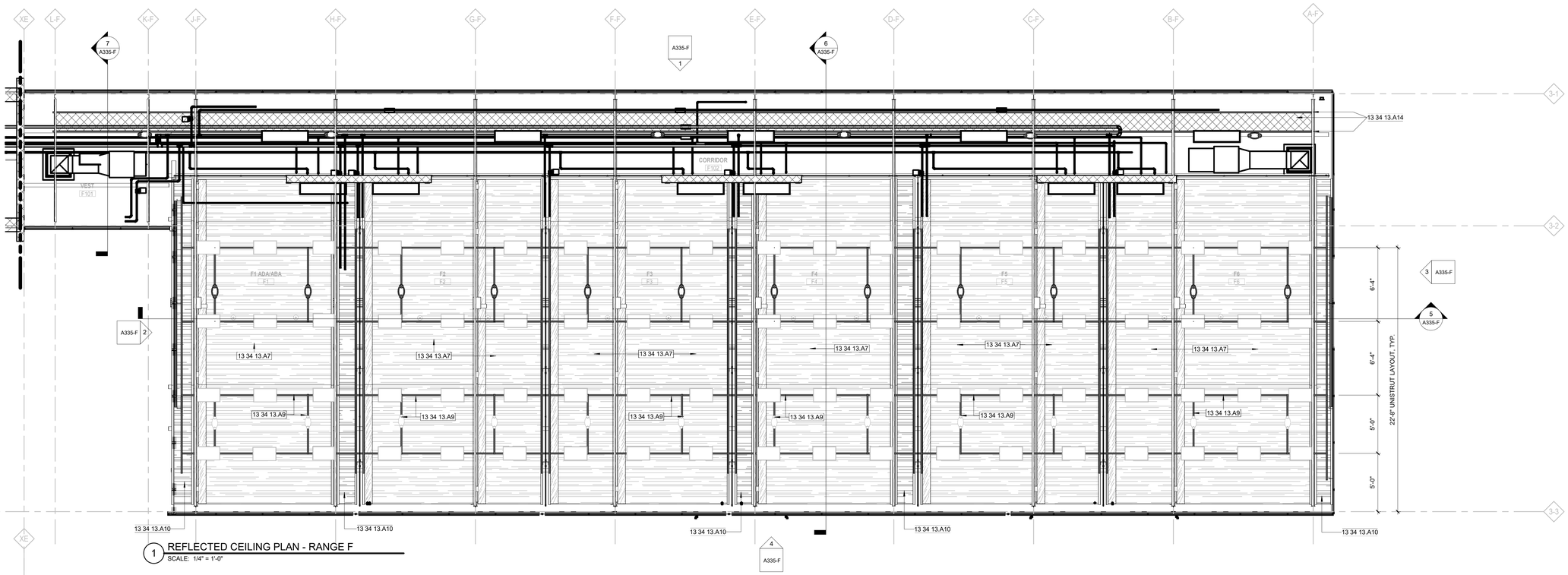
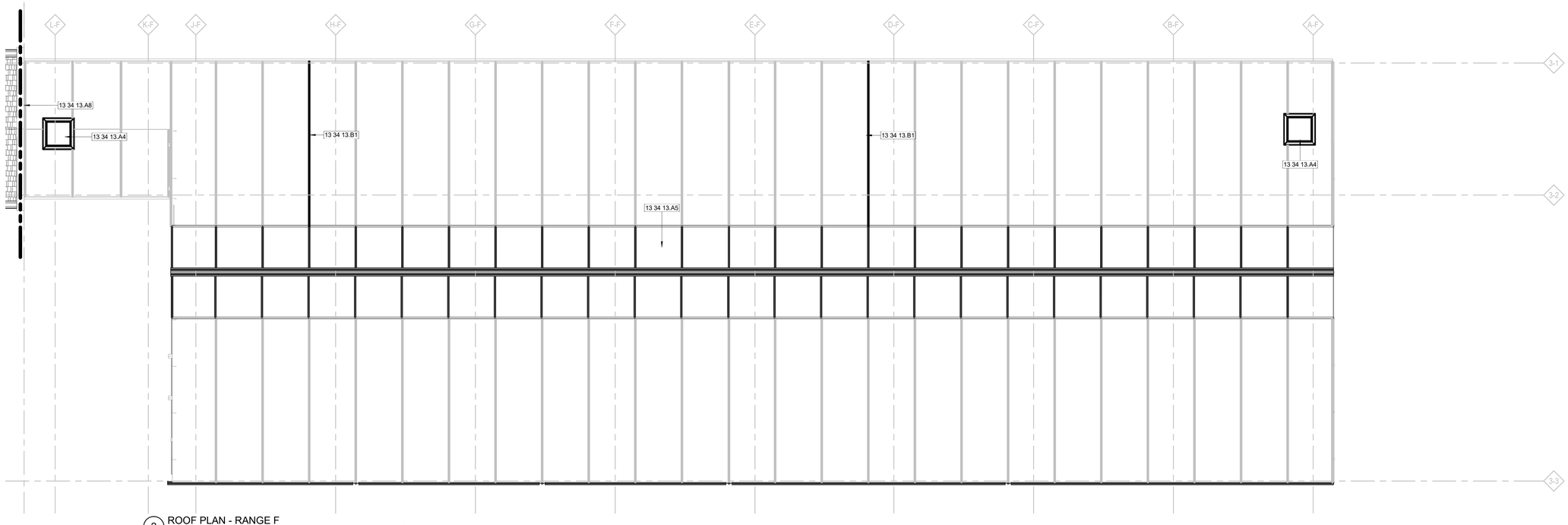


1 REFLECTED CEILING PLAN - RANGE F
SCALE: 1/4" = 1'-0"

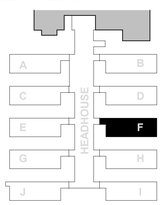


2 ROOF PLAN - RANGE F
SCALE: 1/4" = 1'-0"

KEYNOTES

13 34 13.A4	PENETRATIONS IN ROOF OF GREENHOUSES INTO 16 MM HIGH IMPACT ACRYLIC DOUBLED SKIN PANELS. MAKE ALL WALL/ROOF PENETRATIONS INTO 16 MM INSULATED WHITE 0.032" ALUMINUM FACED PANEL SYSTEM. INSTALL THE ALUMINUM FACED PANELS INTO THE RAFTERS OR GLAZING BARS AS REQUIRED. SEAL AROUND OPENING AND MECHANICAL PENETRATION WITH APPROVED GLAZING CAPS AND AN APPROVED SEALANT AS REQUIRED TO PREVENT WATER OR AIR LEAKS. INSTALL MECHANICAL LOUVERS OR EQUIPMENT BETWEEN THE GLAZING BARS IF POSSIBLE. WATER TEST ALL ROOF PENETRATIONS AS REQUIRED. DO NOT CUT HOLES INTO ACRYLIC PANELS.
13 34 13.A5	DOUBLE RIDGE VENT SYSTEM. REFERENCE SPEC AND SHEET A533
13 34 13.A7	CABLE DRUM SHADE CLOTH SYSTEM. REFERENCE SPEC AND SHEET A533; REFER TO SECTIONS FOR HEIGHTS AND EXACT PLACEMENT; CLOTH TO TRAVEL IN DIRECTIONS SHOWN BY ARROWS
13 34 13.A8	ALUMINUM EXPANSION JOINT COVER BY GREENHOUSE PROVIDER ALONG GREENHOUSE WALL GLAZING AND ROOF GLAZING; ALLOW FOR BELLOWS ACTION FOR EXPANSION; TO BE WATERTIGHT
13 34 13.A9	ALUMINUM UNISTRUT SYSTEM, SUPPORTED AT PERIMETER WALL GIRTS / COLUMNS, TO BE USED FOR SUPPORTING ALL LIGHT FIXTURES AND ELECTRICAL DEVICES. SUPPORT OFF OF EXISTING ROOF TRUSSES ARE STRICTLY PROHIBITED. LOCATE BEAMS TO BE ALIGNED TO THE RESPECTIVE SUPPORTED FIXTURES/DEVICES, PROVIDE DELEGATED ENGINEERED DESIGN.
13 34 13.A10	STATIC SHADE CLOTH BETWEEN EXISTING STRUCTURES; INSTALL AT SAME HEIGHT AND PLACEMENT AS OPERABLE SYSTEM
13 34 13.A14	ALUMINUM UNISTRUT SYSTEM FOR THE LENGTH OF THE CORRIDOR, TWO RAILS RUNNING OVER TOP OF EXISTING TRUSS BOTTOM CHORDS, 18" CLEAR DIMENSION BETWEEN RAILS; NO PIPES, CONDUITS, OR MECHANICAL SYSTEMS ALLOWED BETWEEN THE RAILS TO ALLOW FOR MAINTENANCE ACCESS FOR MAINTENANCE PERSONNEL, ALSO SHOWN WITH A CROSSHATCH
13 34 13.B1	NEW EXTERIOR GREENHOUSE MULLIONS IN PLACE OF DEMOLISHED ROOF MECHANICAL EQUIPMENT

KEYPLAN



NORTH

SCHEMMER

PROJECT NO.: 09228.021

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REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

RCP & ROOF PLAN - RANGE F

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: A235-F2

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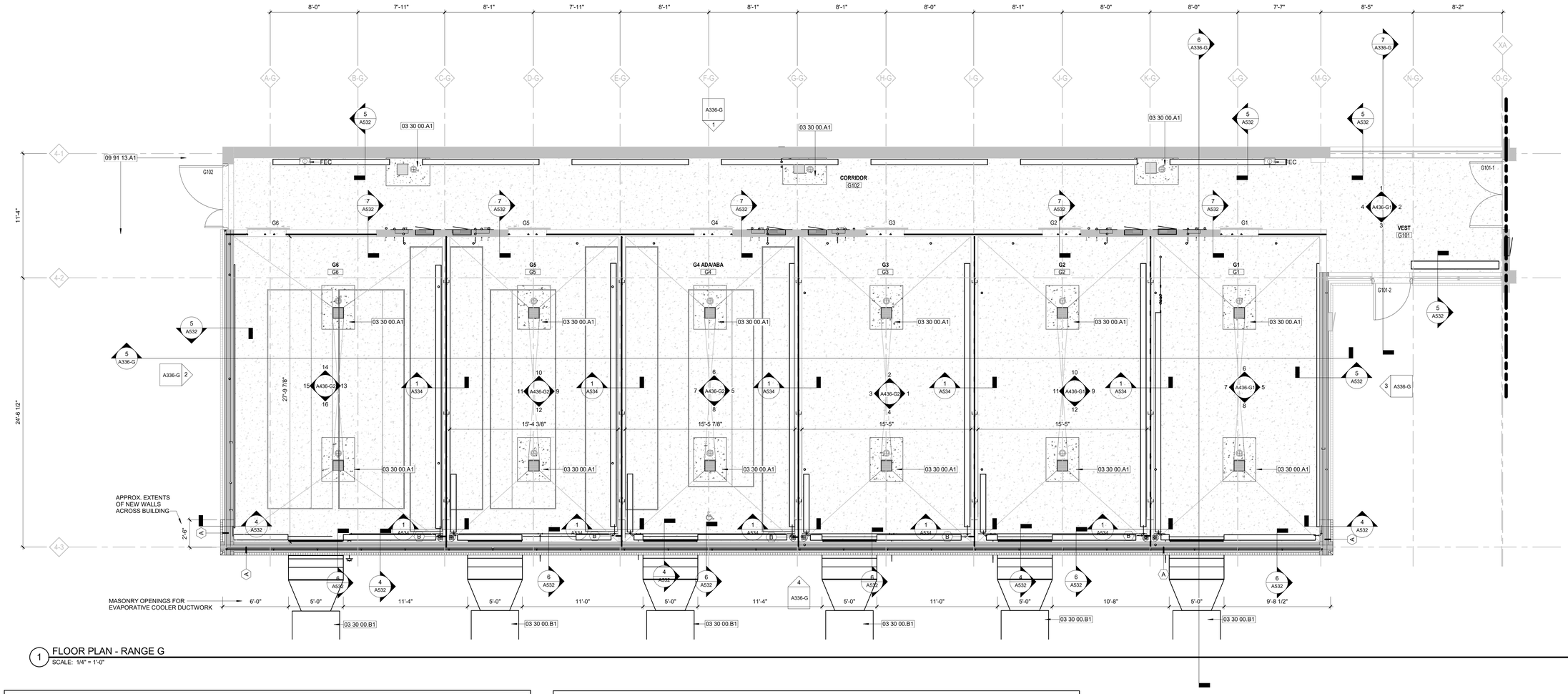


1 FLOOR PLAN - RANGE G
SCALE: 1/4" = 1'-0"

GENERAL ARCHITECTURAL NOTES

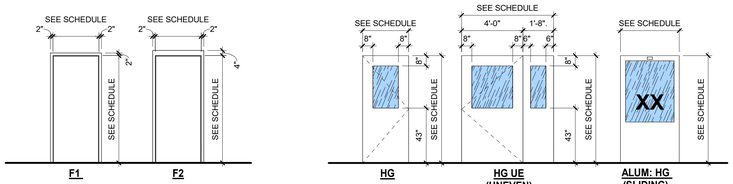
1. NEW EXTERIOR ACRYLIC GLAZING, REPLACING ALL EXISTING GLAZING IN ALL GREENHOUSE WALLS & ROOFS, SHALL BE 16MM (5/8") THICK. THICKNESS MATCHES EXISTING MULLION THROATS. NEW INTERIOR POLYCARBONATE GLAZING SHALL BE 8MM (0.315 INCHES) THICK.
2. NEW MASONRY, BRICK OR CMU, SHALL BE TOOTHED INTO ADJACENT EXISTING LIKE MASONRY. ALL VOIDS IN CMU CREATED FROM REMOVAL OF DEMOLISHED EQUIPMENT, THAT WILL NOT BE REUSED FOR NEW CONSTRUCTION, SHALL ALSO BE FILLED AND TOOTHED WITH NEW CMU.
3. ALL GREENHOUSE / RANGE MULLIONS ON WALLS & ROOF (EXISTING IN PLACE, REINSTALLED, OR NEW) SHALL RECEIVE NEW FASTENERS W/ EPDM GASKETING & NEOPRENE GLAZING GASKETING.
4. ALL EXISTING MULLIONS TO BE REINSTALLED SHALL BE FASTENED WITH THE SAME FASTENER HOLES TO AVOID EXCESSIVE HOLE PATCHING. REMOVE EYE BOLTS/SCREWS FROM EXISTING ROOF MULLIONS & PATCH WITH ALUMINUM CAP FLASHING AND THE APPROVED EXTERIOR SEALANT.
5. ALL EXISTING PAINTED INTERIOR SURFACES OF CMU WALLS SHALL HAVE PAINT REMOVED, CMU REPAIRED, PRIMED AND FILLED, AND BE REPAINTED. SEE SECTION 09 91 23.
6. INSTALL NEW PVC COMPONENTS OF THE CONDENSATION DISCHARGE SYSTEM OF SIMILAR DIAMETER, WALL THICKNESS, AND LENGTH.
7. CLEAN ALL EXISTING CONCRETE FLOORS OF DIRT BUILD-UP AND STAINING.
8. ALL NEW CONCRETE FLOORS TO HAVE NEW DRAINS INSTALLED TO MAINTAIN A 1/4":12" FLOOR SLOPE MAXIMUM IN ALL LOCATIONS WITHIN A CELL.

KEYNOTES

03 30 00.A1 CONCRETE SLAB INFILL; MATCH FINISH & SLOPE; SEE SHEET A532 FOR STRUCTURAL INFORMATION

03 30 00.B1 CONCRETE EQUIPMENT SLAB, 4" THICK W/ #5 REBAR @ 16" ON CENTER EACH WAY; EAST, WEST, & SOUTH EDGES 4" MINIMUM OUT FROM COOLER PERIMETER, NORTH EDGE TO EXTEND TO EXTERIOR BRICK FACE OF BUILDING (DO NOT DOWEL). SEE STRUCTURAL NOTES FOR REQUIRED PSI. PRIOR TO CONSTRUCTING EXTERIOR CONCRETE EQUIPMENT PADS, TOPSOIL SHALL BE STRIPPED, STOCKPILED, AND RE-SPREAD AFTER CONSTRUCTION OF THE EQUIPMENT PADS. THE UPPER 6 INCHES OF THE SUBGRADE BENEATH EXTERIOR CONCRETE EQUIPMENT PADS SHALL BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AT A MOISTURE CONTENT BETWEEN -3 AND +3 PERCENT OF OPTIMUM DETERMINED BY ASTM D698, STANDARD PROCTOR. SUBGRADE PREPARATION SHALL EXTEND A MINIMUM OF 1 FEET LATERALLY BEYOND THE EDGE OF THE EQUIPMENT PADS. FILL PLACED BELOW THIS LEVEL SHALL ALSO BE COMPACTED TO A MINIMUM OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AT A MOISTURE CONTENT BETWEEN -3 AND +3 PERCENT OF OPTIMUM DETERMINED BY ASTM D698, STANDARD PROCTOR. THE CONTRACTOR SHALL SEED ALL DISTURBED AREAS WITH TYPE B SEED MIX PER CITY OF FARGO STANDARD SPECIFICATIONS SECTION 3100. THE CONTRACTOR SHALL MAINTAIN SEEDED AREAS UNTIL GRASS HAS BEEN EVENLY ESTABLISHED TO A HEIGHT OF 2" AND ACCEPTED BY THE USDA. CONTRACTOR IS RESPONSIBLE FOR SPOT SURVEYING EACH EQUIPMENT PAD IN RESPECT TO THE VARIED EXTERIOR GRADE IN EACH SPECIFIC LOCATION; A COMPREHENSIVE TOPOGRAPHICAL SURVEY AND AS-BUILT TOPOGRAPHICAL INFORMATION IS NOT AVAILABLE.

09 91 13.A1 STRIP EXISTING PAINT FROM ALL OF EXISTING PIPE RAILING SURFACES TO METAL SURFACES; PAINT NEW SAFETY YELLOW PAINT



1 DOOR FRAME TYPES
SCALE: 1/4" = 1'-0"

1 DOOR PANEL TYPES
SCALE: 1/4" = 1'-0"
SEE SPECIFICATIONS FOR LOCATIONS OF APPLIED LETTERING ON DOOR GLAZING

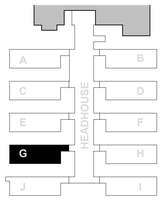
DOOR SCHEDULE - RANGE G

DOOR NO.		DOOR SIZE WIDTH	DOOR SIZE HEIGHT	DOOR MATL & TYPE	DOOR FINISH	DOOR GLASS	FRAME MATL & TYPE	FRAME FINISH	SET NO	LABEL	REMARKS
G1		3' - 8"	7' - 2"	AL : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
G2		3' - 8"	7' - 2"	AL : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
G3		3' - 8"	7' - 2"	AL : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
G4		3' - 8"	7' - 2"	AL : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
G5		3' - 8"	7' - 2"	AL : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
G6		3' - 8"	7' - 2"	AL : HG	ALUM	G-1		ALUM			REFURBISHED EXISTING PANEL & EXISTING ROUGH OPENING
G101 -1	PR	6' - 0"	7' - 0"	FRP : HG	FRP	G-2	FRP : F2	FRP	01	90-MIN	
G101 -2		3' - 4"	7' - 0"	FRP : HG	FRP	IG-1	FRP : F1	FRP	03		ACCESS CONTROL
G102	UE	5' - 8"	6' - 8"	FRP : HG	FRP	IG-1	FRP : F1	FRP	02		ACCESS CONTROL

GLASS TYPES

G-1 1/4" CLEAR, NON-FIRE-RATED, TEMPERED FLOAT GLASS
G-2 1/4" CLEAR, 90-MIN FIRE-RATED, TEMPERED GLASS
IG-1 1" INSULATED, CLEAR LOW-E GLASS

KEYPLAN



NORTH

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

FLOOR PLAN / DOORS - RANGE G

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS
PROJECT NO.	DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET A236-G1

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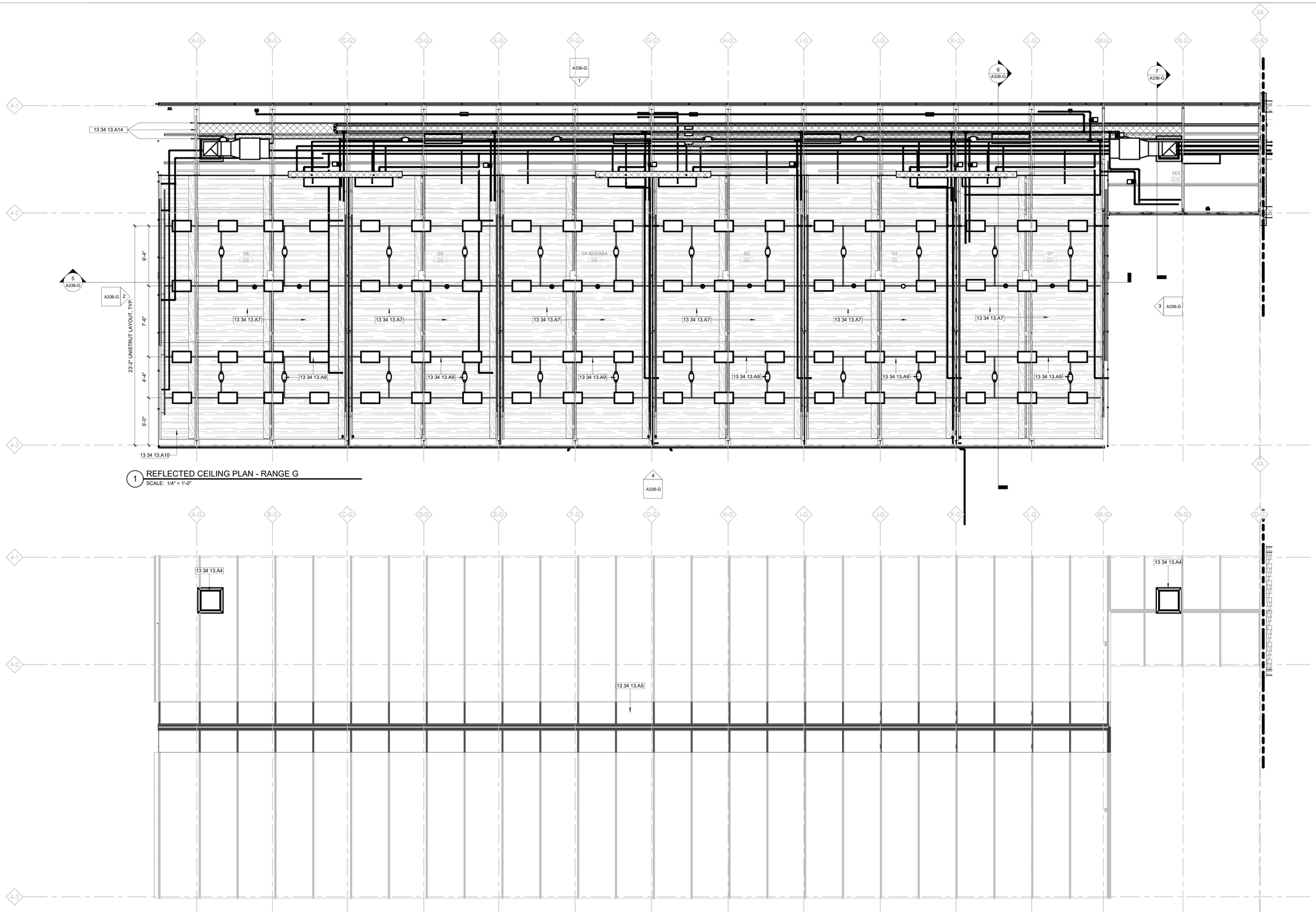
CAD | DSC | DH | PM



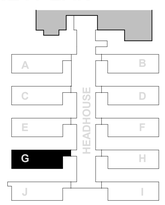
1 REFLECTED CEILING PLAN - RANGE G
SCALE: 1/4" = 1'-0"

2 ROOF PLAN - RANGE G
SCALE: 1/4" = 1'-0"

KEYNOTES

13 34 13.A4	PENETRATIONS IN ROOF OF GREENHOUSES INTO 16 MM HIGH IMPACT ACRYLIC DOUBLED SKIN PANELS. MAKE ALL WALL/ROOF PENETRATIONS INTO 16 MM INSULATED WHITE 0.032" ALUMINUM FACED PANEL SYSTEM. INSTALL THE ALUMINUM FACED PANELS INTO THE RAFTERS OR GLAZING BARS AS REQUIRED. SEAL AROUND OPENING AND MECHANICAL PENETRATION WITH APPROVED GLAZING CAPS AND AN APPROVED SEALANT AS REQUIRED TO PREVENT WATER OR AIR LEAKS. INSTALL MECHANICAL LOUVERS OR EQUIPMENT BETWEEN THE GLAZING BARS IF POSSIBLE. WATER TEST ALL ROOF PENETRATIONS AS REQUIRED. DO NOT CUT HOLES INTO ACRYLIC PANELS.
13 34 13.A5	DOUBLE RIDGE VENT SYSTEM. REFERENCE SPEC AND SHEET A533
13 34 13.A7	CABLE DRUM SHADE CLOTH SYSTEM. REFERENCE SPEC AND SHEET A533; REFER TO SECTIONS FOR HEIGHTS AND EXACT PLACEMENT; CLOTH TO TRAVEL IN DIRECTIONS SHOWN BY ARROWS
13 34 13.A9	ALUMINUM UNISTRUT SYSTEM, SUPPORTED AT PERIMETER WALL GIRTS / COLUMNS, TO BE USED FOR SUPPORTING ALL LIGHT FIXTURES AND ELECTRICAL DEVICES. SUPPORT OFF OF EXISTING ROOF TRUSSES ARE STRICTLY PROHIBITED. LOCATE BEAMS TO BE ALIGNED TO THE RESPECTIVE SUPPORTED FIXTURES/DEVICES, PROVIDE DELEGATED ENGINEERED DESIGN.
13 34 13.A10	STATIC SHADE CLOTH BETWEEN EXISTING STRUCTURES; INSTALL AT SAME HEIGHT AND PLACEMENT AS OPERABLE SYSTEM
13 34 13.A14	ALUMINUM UNISTRUT SYSTEM FOR THE LENGTH OF THE CORRIDOR, TWO RAILS RUNNING OVER TOP OF EXISTING TRUSS BOTTOM CHORDS, 18" CLEAR DIMENSION BETWEEN RAILS; NO PIPES, CONDUITS, OR MECHANICAL SYSTEMS ALLOWED BETWEEN THE RAILS TO ALLOW FOR MAINTENANCE ACCESS FOR MAINTENANCE PERSONNEL, ALSO SHOWN WITH A CROSSHATCH

KEYPLAN



NORTH

SCHEMMER

PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION
			REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

RCP & ROOF PLAN - RANGE G

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: A236-G2

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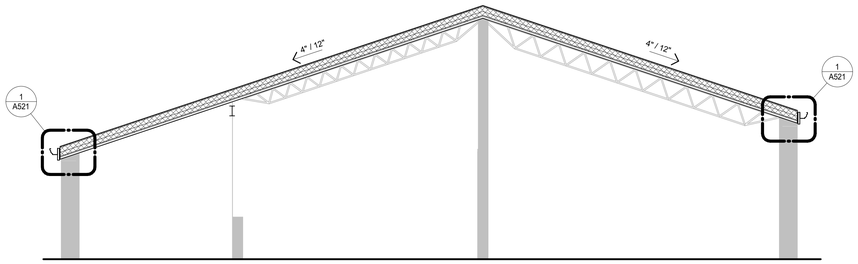
PW | DH | DSC | CAD



1 BUILDING SECTION 01 - HEADHOUSE
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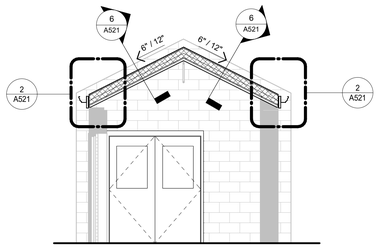

2 BUILDING SECTION 02 - HEADHOUSE
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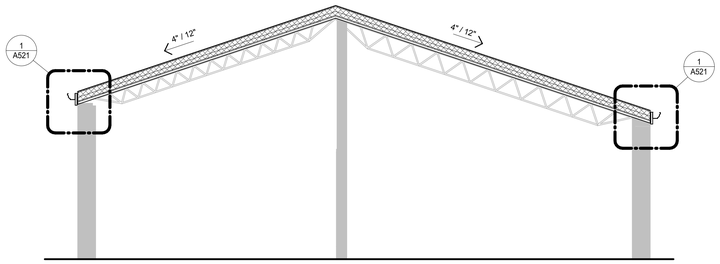

3 BUILDING SECTION 03 - HEADHOUSE
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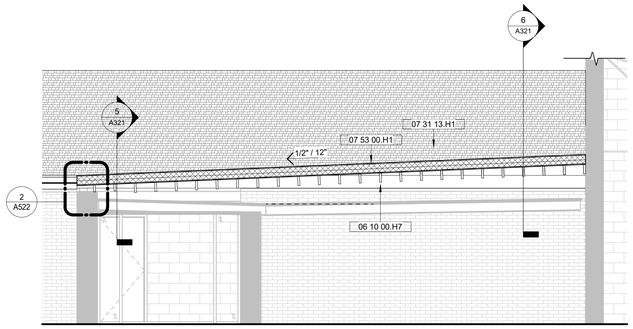
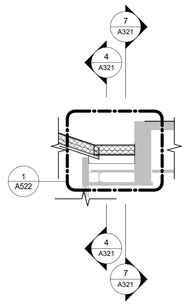


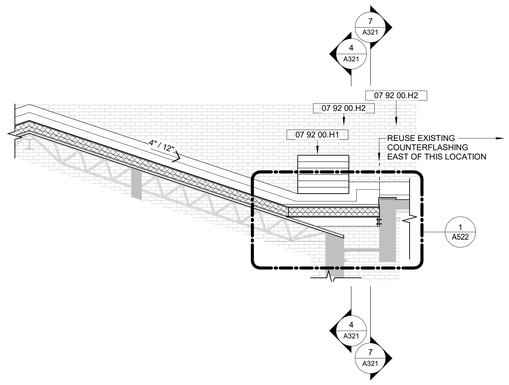
4 SECTION - LONG GUTTER, LOOKING WEST
SCALE: 1/4" = 1'-0"

KEYNOTES

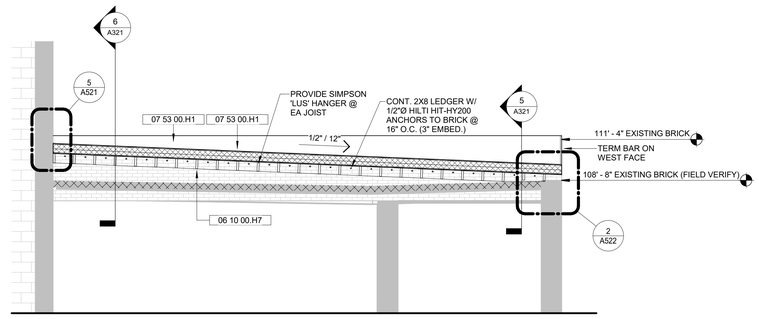
06 10 00.H7	2x8 LUMBER JOISTS, 16" O.C., FIRE-RETARDANT-TREATED
07 31 13.H1	ASPHALT SHINGLES
07 53 00.H1	ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING, REINFORCED; FULLY ADHERE TO SUBSTRATE
07 62 00.H7	SHEET METAL COUNTERFLASHING, EXISTING, REMOVE & REINSTALL OVER NEW ELASTOMERIC MEMBRANE W/ APPROPRIATE TERMINATION
07 92 00.H1	ROD & SILICONE SEALANT, NEW AROUND ALL FOUR SIDES OF LOUVER; REMOVE EXISTING ROD & SEALANT PRIOR
07 92 00.H2	ROD & SILICONE SEALANT, 3/8" WIDE BY 3/16" DEEP SEALANT, NEW FOR ENTIRE HEIGHT OF BRICK CONTROL JOINT; REMOVE EXISTING ROD & SEALANT PRIOR



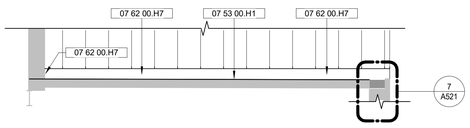
5 SECTION - SOUTHSIDE OF LONG GUTTER, LOOKING NORTH
SCALE: 1/4" = 1'-0"



6 SECTION - NORTHSIDE OF LONG GUTTER, LOOKING NORTH
SCALE: 1/4" = 1'-0"



7 SECTION - LONG GUTTER, LOOKING EAST
SCALE: 1/4" = 1'-0"



8 SECTION - STANDING SEAM TO LOW SLOPE, LOOKING EAST
SCALE: 1/4" = 1'-0"

USDA

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

BUILDING SECTIONS - HEADHOUSE

A-E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: JMB	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: A321

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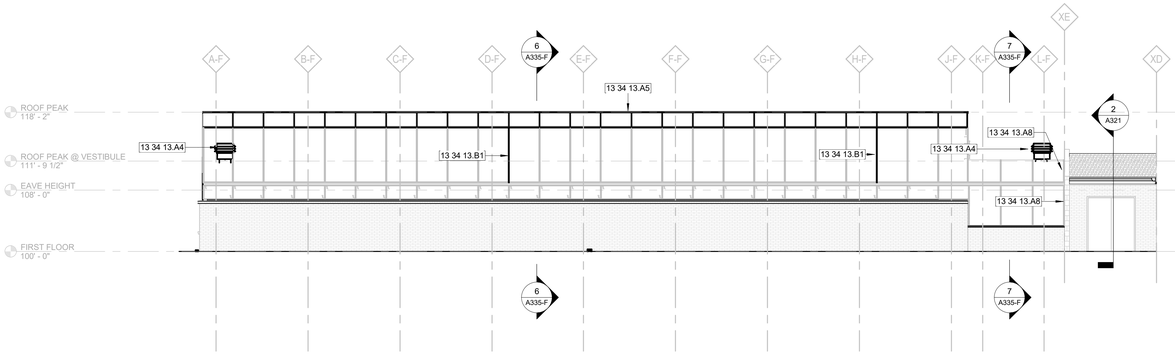
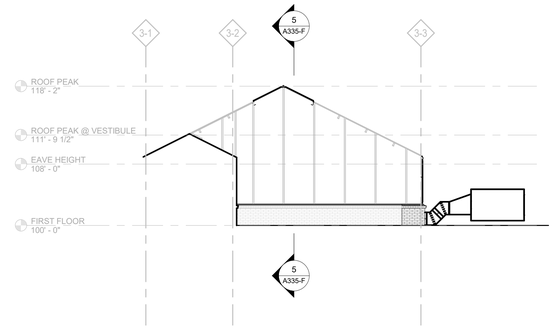
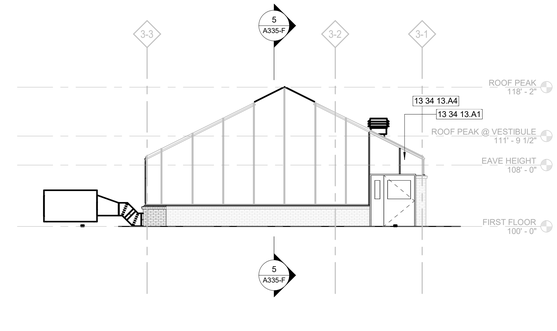
CAD | DSG | DH | PM



1 EXTERIOR NORTH ELEVATION - RANGE I
SCALE: 1/8" = 1'-0"



2 EXTERIOR WEST ELEVATION - RANGE F
SCALE: 1/8" = 1'-0"



3 EXTERIOR EAST ELEVATION - RANGE F
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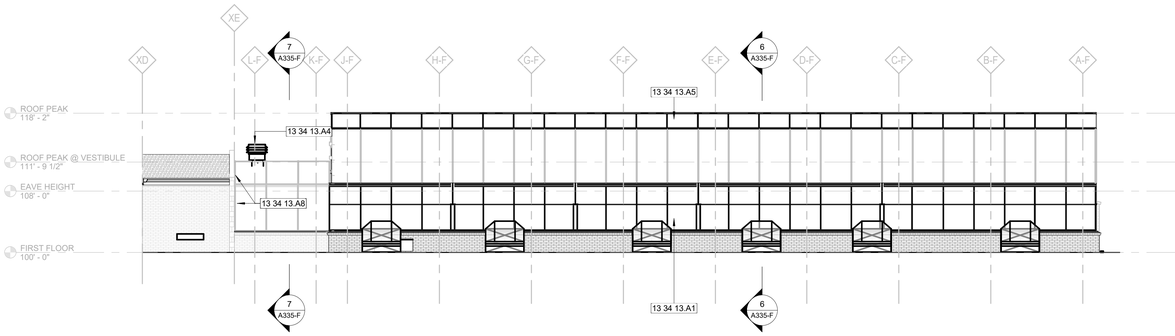
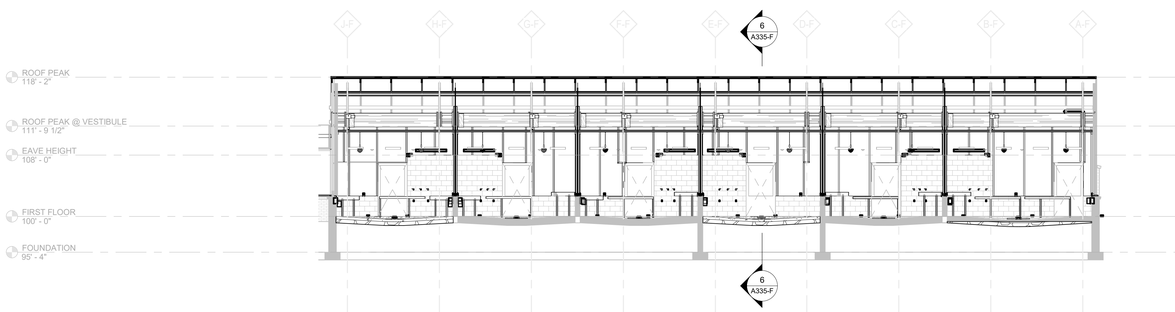


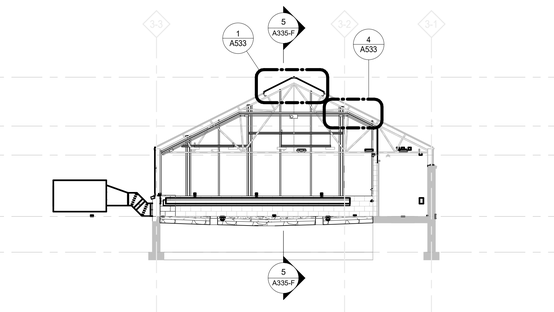
4 EXTERIOR SOUTH ELEVATION - RANGE F
SCALE: 1/8" = 1'-0"

KEYNOTES

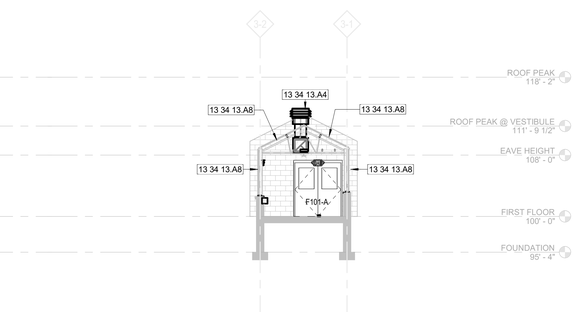
13 34 13.A1	NEW EXTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, EAVES, CORNERS, & SILLS
13 34 13.A4	PENETRATIONS IN ROOF OF GREENHOUSES INTO 16 MM HIGH IMPACT ACRYLIC DOUBLED SKIN PANELS. MAKE ALL WALL/ROOF PENETRATIONS INTO 16 MM INSULATED WHITE 0.032" ALUMINUM FACED PANEL SYSTEM. INSTALL THE ALUMINUM FACED PANELS INTO THE RAFTERS OR GLAZING BARS AS REQUIRED. SEAL AROUND OPENING AND MECHANICAL PENETRATION WITH APPROVED GLAZING CAPS AND AN APPROVED SEALANT AS REQUIRED TO PREVENT WATER OR AIR LEAKS. INSTALL MECHANICAL LOUVERS OR EQUIPMENT BETWEEN THE GLAZING BARS IF POSSIBLE. WATER TEST ALL ROOF PENETRATIONS AS REQUIRED. DO NOT CUT HOLES INTO ACRYLIC PANELS.
13 34 13.A5	DOUBLE RIDGE VENT SYSTEM. REFERENCE SPEC AND SHEET A533
13 34 13.A8	ALUMINUM EXPANSION JOINT COVER BY GREENHOUSE PROVIDER ALONG GREENHOUSE WALL GLAZING AND ROOF GLAZING; ALLOW FOR BELLOWS ACTION FOR EXPANSION; TO BE WATERTIGHT
13 34 13.B1	NEW EXTERIOR GREENHOUSE MULLIONS IN PLACE OF DEMOLISHED ROOF MECHANICAL EQUIPMENT



5 BUILDING SECTION E/W - RANGE F
SCALE: 1/8" = 1'-0"



6 BUILDING SECTION N/S - RANGE F
SCALE: 1/8" = 1'-0"

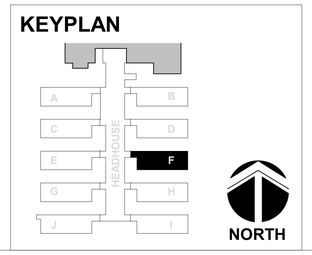


7 BUILDING SECTION @ CONNECTION - RANGE F
SCALE: 1/8" = 1'-0"

GENERAL ARCHITECTURAL NOTES

1. NEW EXTERIOR ACRYLIC GLAZING, REPLACING ALL EXISTING GLAZING IN ALL GREENHOUSE WALLS & ROOFS, SHALL BE 16MM (5/8") THICK. THICKNESS MATCHES EXISTING MULLION THROATS. NEW INTERIOR POLYCARBONATE GLAZING SHALL BE 8MM (0.315 INCHES) THICK.
2. NEW MASONRY, BRICK OR CMU, SHALL BE TOOTHED INTO ADJACENT EXISTING LIKE MASONRY. ALL VOIDS IN CMU CREATED FROM REMOVAL OF DEMOLISHED EQUIPMENT, THAT WILL NOT BE REUSED FOR NEW CONSTRUCTION, SHALL ALSO BE FILLED AND TOOTHED WITH NEW CMU.
3. ALL GREENHOUSE / RANGE MULLIONS ON WALLS & ROOF (EXISTING IN PLACE, REINSTALLED, OR NEW) SHALL RECEIVE NEW FASTENERS W/ EPDM GASKETING & NEOPRENE GLAZING GASKETING.
4. ALL EXISTING MULLIONS TO BE REINSTALLED SHALL BE FASTENED WITH THE SAME FASTENER HOLES TO AVOID EXCESSIVE HOLE PATCHING. REMOVE EYE BOLTS/SCREWS FROM EXISTING ROOF MULLIONS & PATCH WITH ALUMINUM CAP FLASHING AND THE APPROVED EXTERIOR SEALANT.
5. ALL EXISTING PAINTED INTERIOR SURFACES OF CMU WALLS SHALL HAVE PAINT REMOVED, CMU REPAIRED, PRIMED AND FILLED, AND BE REPAINTED. SEE SECTION 09 91 23.
6. INSTALL NEW PVC COMPONENTS OF THE CONDENSATION DISCHARGE SYSTEM OF SIMILAR DIAMETER, WALL THICKNESS, AND LENGTH.
7. CLEAN ALL EXISTING CONCRETE FLOORS OF DIRT BUILD-UP AND STAINING.
8. ALL NEW CONCRETE FLOORS TO HAVE NEW DRAINS INSTALLED TO MAINTAIN A 1/4":12" FLOOR SLOPE MAXIMUM IN ALL LOCATIONS WITHIN A CELL.

KEYPLAN



SCHEMMER

PROJECT NO.: 09228.021

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REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

EXTERIOR ELEVATIONS & BUILDING SECTIONS - RANGE F

A–E FIRM	USDA		
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN		
DESIGNER: SWS	EPM: M McWILLIAMS		
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER	PROJECT NO.	FACILITIES ENGINEERING SECTION, PLAINS AREA, 2150 CENTRE AVE., BLDG D, SUITE 330, FT. COLLINS, CO 89526-8119
DRAWN BY: SWS	REAL PROPERTY: W ROSS	DATE: 05/11/2026	

SHEET A335-F

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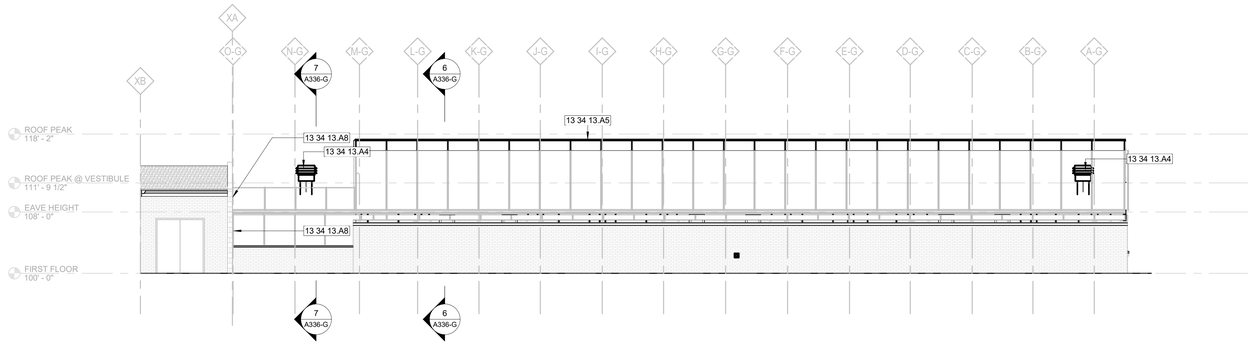
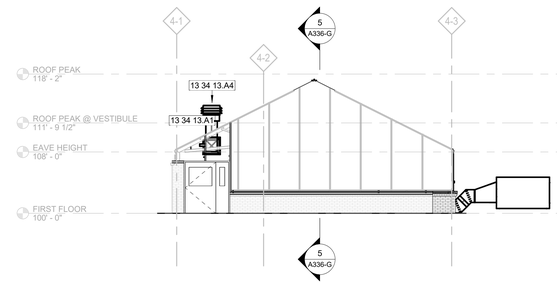
PLAD	BSO	DH	PM



1 EXTERIOR NORTH ELEVATION - RANGE G
SCALE: 1/8" = 1'-0"



2 EXTERIOR WEST ELEVATION - RANGE G
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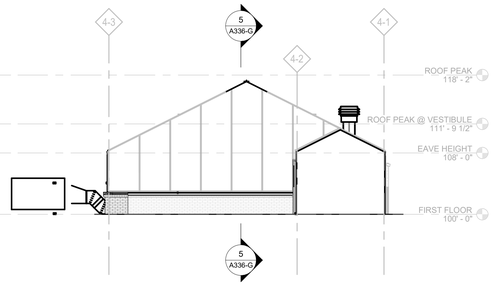
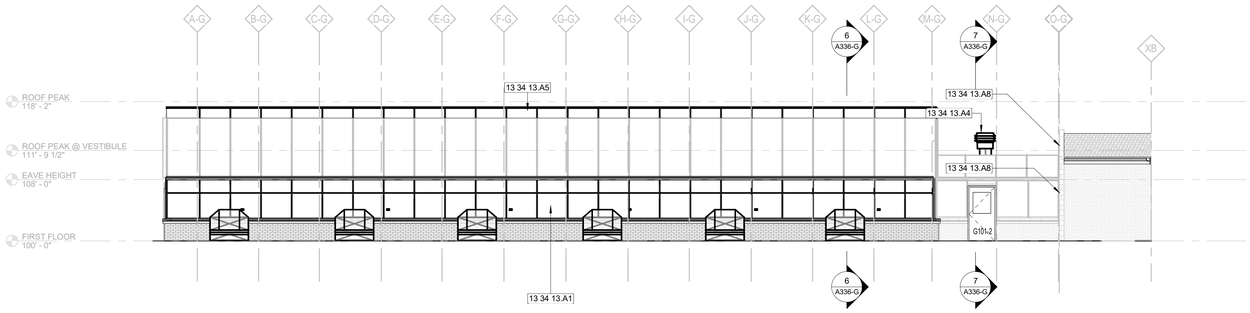


3 EXTERIOR EAST ELEVATION - RANGE G
SCALE: 1/8" = 1'-0"



4 EXTERIOR SOUTH ELEVATION - RANGE G
SCALE: 1/8" = 1'-0"

KEYNOTES

13 34 13.A1	NEW EXTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, EAVES, CORNERS, & SILLS
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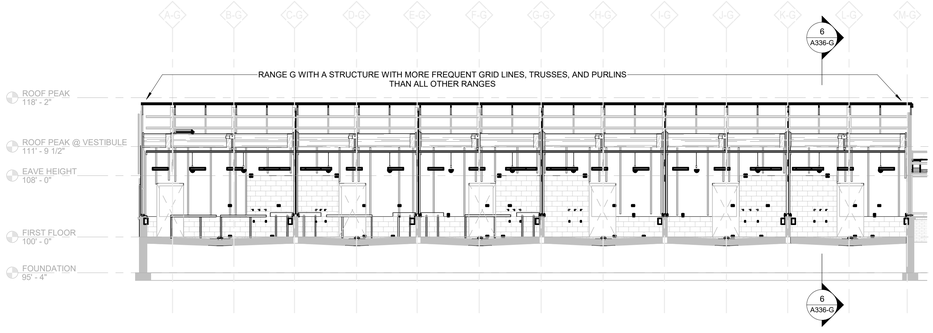
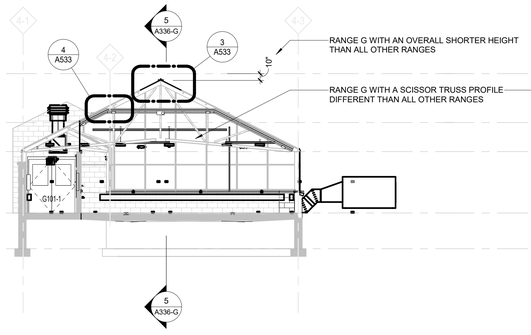
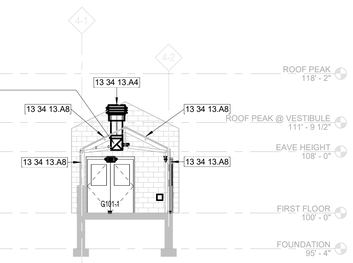


5 BUILDING SECTION E/W - RANGE G
SCALE: 1/8" = 1'-0"



6 BUILDING SECTION N/S - RANGE G
SCALE: 1/8" = 1'-0"

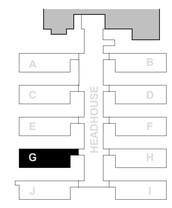


7 BUILDING SECTION @ CONNECTION - RANGE G
SCALE: 1/8" = 1'-0"

GENERAL ARCHITECTURAL NOTES

1. NEW EXTERIOR ACRYLIC GLAZING, REPLACING ALL EXISTING GLAZING IN ALL GREENHOUSE WALLS & ROOFS, SHALL BE 16MM (5/8") THICK. THICKNESS MATCHES EXISTING MULLION THROATS. NEW INTERIOR POLYCARBONATE GLAZING SHALL BE 8MM (0.315 INCHES) THICK.
2. NEW MASONRY, BRICK OR CMU, SHALL BE TOOTHED INTO ADJACENT EXISTING LIKE MASONRY. ALL VOIDS IN CMU CREATED FROM REMOVAL OF DEMOLISHED EQUIPMENT, THAT WILL NOT BE REUSED FOR NEW CONSTRUCTION, SHALL ALSO BE FILLED AND TOOTHED WITH NEW CMU.
3. ALL GREENHOUSE / RANGE MULLIONS ON WALLS & ROOF (EXISTING IN PLACE, REINSTALLED, OR NEW) SHALL RECEIVE NEW FASTENERS W/ EPDM GASKETING & NEOPRENE GLAZING GASKETING.
4. ALL EXISTING MULLIONS TO BE REINSTALLED SHALL BE FASTENED WITH THE SAME FASTENER HOLES TO AVOID EXCESSIVE HOLE PATCHING. REMOVE EYE BOLTS/SCREWS FROM EXISTING ROOF MULLIONS & PATCH WITH ALUMINUM CAP FLASHING AND THE APPROVED EXTERIOR SEALANT.
5. ALL EXISTING PAINTED INTERIOR SURFACES OF CMU WALLS SHALL HAVE PAINT REMOVED, CMU REPAIRED, PRIMED AND FILLED, AND BE REPAINTED. SEE SECTION 09 91 23.
6. INSTALL NEW PVC COMPONENTS OF THE CONDENSATION DISCHARGE SYSTEM OF SIMILAR DIAMETER, WALL THICKNESS, AND LENGTH.
7. CLEAN ALL EXISTING CONCRETE FLOORS OF DIRT BUILD-UP AND STAINING.
8. ALL NEW CONCRETE FLOORS TO HAVE NEW DRAINS INSTALLED TO MAINTAIN A 1/4":12" FLOOR SLOPE MAXIMUM IN ALL LOCATIONS WITHIN A CELL.

KEYPLAN



NORTH

SCHEMMER

PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

EXTERIOR ELEVATIONS & BUILDING SECTIONS - RANGE G

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: A336-G

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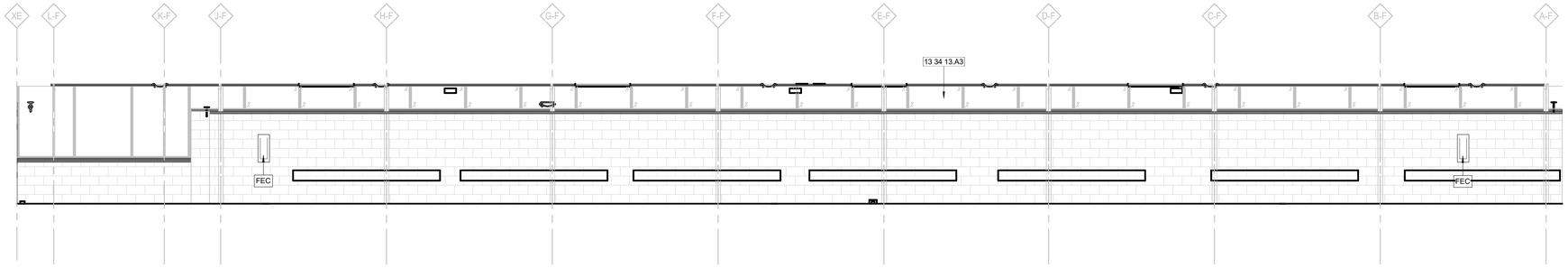
CAD	DSG	BH	PM



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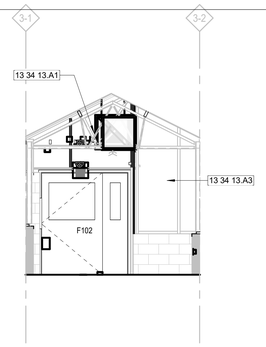
SCALE: 1/4" = 1'-0"



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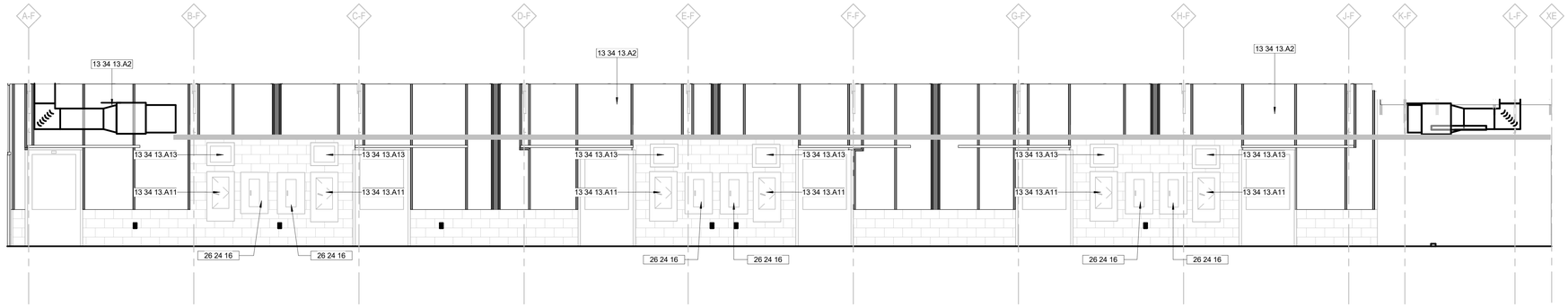

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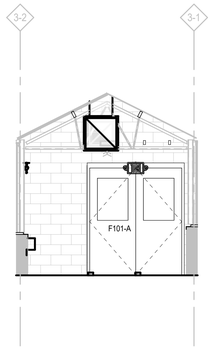

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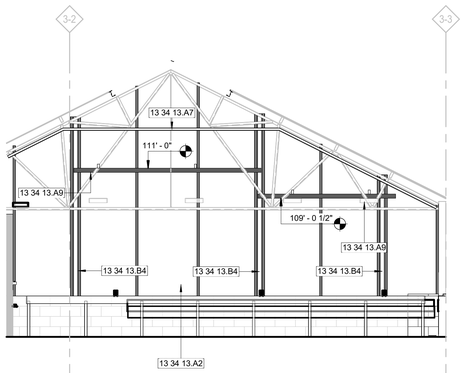

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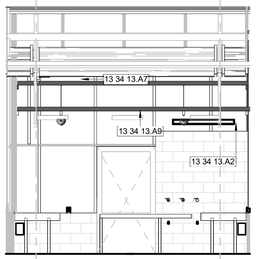
SCALE: 1/4" = 1'-0"



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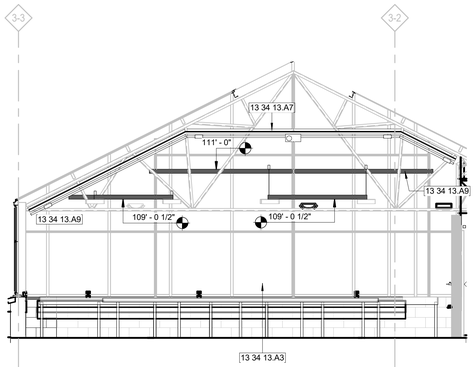
SCALE: 1/4" = 1'-0"



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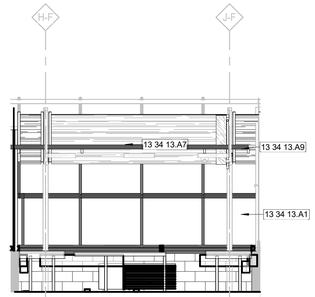
SCALE: 1/4" = 1'-0"



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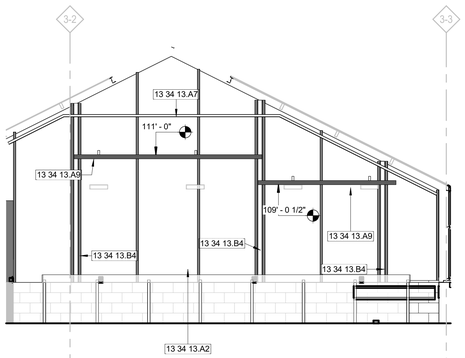

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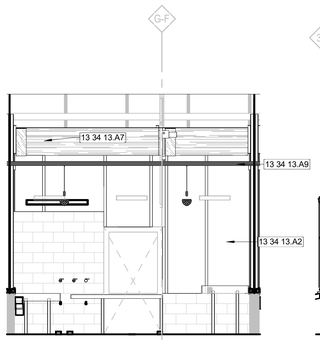

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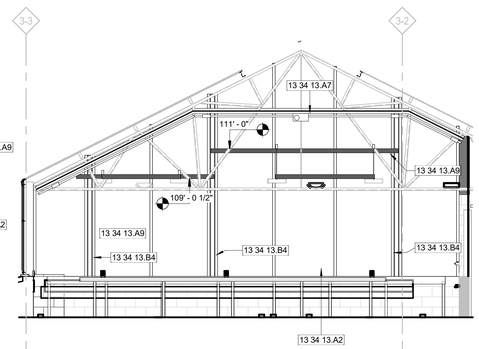
SCALE: 1/4" = 1'-0"



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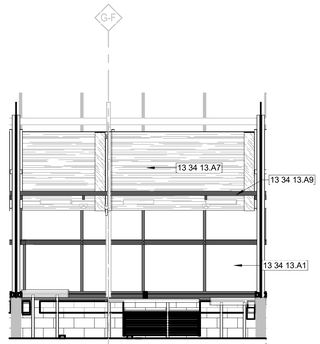

12 INT ELEV - CELL F2 SOUTH - RANGE F
SCALE: 1/4" = 1'-0"

KEYNOTES

13 34 13.A1	NEW EXTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, EAVES, CORNERS, & SILLS
13 34 13.A2	NEW INTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, COLUMNS, PURLINS, CORNERS, TRUSSES, & SILLS
13 34 13.A3	NEW EXTERIOR GREENHOUSE GLAZING W/ EXISTING MULLIONS/EXTRUSIONS MOUNTED ON EXISTING CONSTRUCTION
13 34 13.A7	CABLE DRUM SHADE CLOTH SYSTEM. REFERENCE SPEC AND SHEET A533; REFER TO SECTIONS FOR HEIGHTS AND EXACT PLACEMENT; CLOTH TO TRAVEL IN DIRECTIONS SHOWN BY ARROWS
13 34 13.A9	ALUMINUM UNISTRUT SYSTEM, SUPPORTED AT PERIMETER WALL GIRTS / COLUMNS, TO BE USED FOR SUPPORTING ALL LIGHT FIXTURES AND ELECTRICAL DEVICES. SUPPORT OFF OF EXISTING ROOF TRUSSES ARE STRICTLY PROHIBITED. LOCATE BEAMS TO BE ALIGNED TO THE RESPECTIVE SUPPORTED FIXTURES/DEVICES, PROVIDE DELEGATED ENGINEERED DESIGN.
13 34 13.A11	NEW CONTROL SYSTEM PANEL IN EXISTING CONTROL PANEL WALL RECESS, TYPICAL
13 34 13.A13	NEW CONTROL SYSTEM PANEL IN EXISTING CONTROL PANEL WALL RECESS IF NECESSARY; IF NOT USED FOR CONTROLS, DEMOLISH PANEL AND INSTALL NEW CMU IN VOID AND FINISH ACCORDINGLY
13 34 13.B4	NEW ALUMINUM COLUMN; PROVIDER RESPONSIBLE FOR APPROPRIATE CROSS-SECTIONAL DESIGN BASED ON HEIGHT AND ALL OTHER RELEVANT DESIGN FACTORS
26 24 16	NEW ELECTRICAL PANELBOARDS IN EXISTING PANELBOARD WALL RECESS, TYPICAL

USDA

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR ELEVATIONS - RANGE F

PROJECT NO.: 09228021

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: A435-F1

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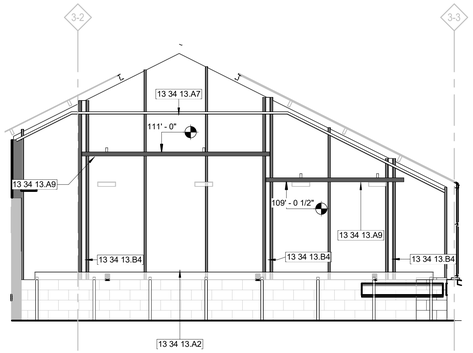
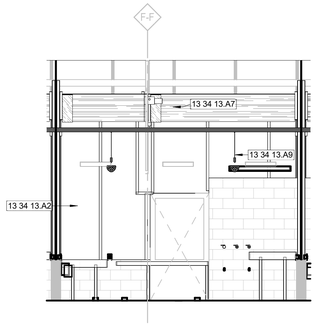


1 INT ELEV - CELL F3 EAST - RANGE F
SCALE: 1/4" = 1'-0"



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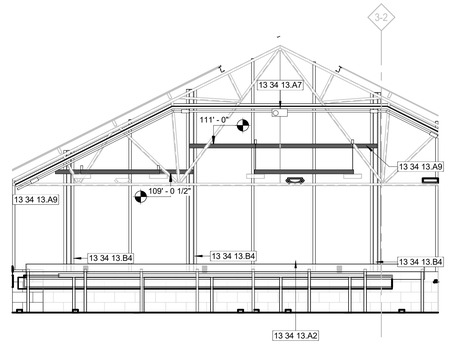

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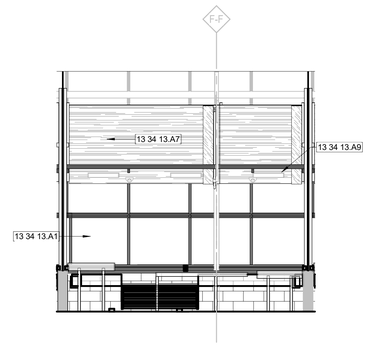

4 INT ELEV - CELL F3 SOUTH - RANGE F
SCALE: 1/4" = 1'-0"

KEYNOTES

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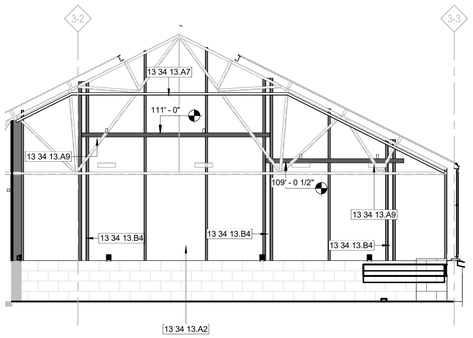

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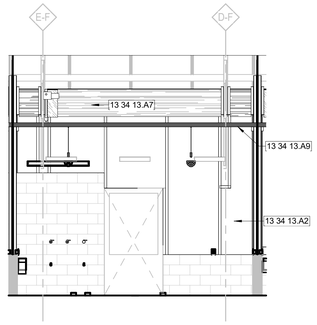
SCALE: 1/4" = 1'-0"



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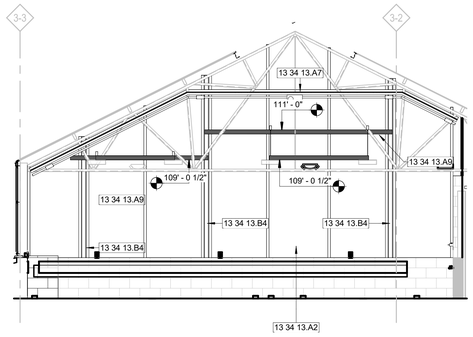
SCALE: 1/4" = 1'-0"



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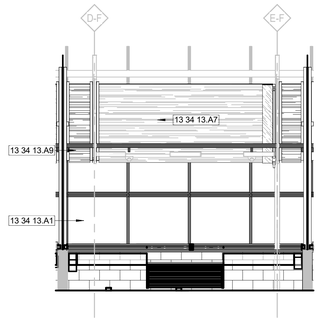

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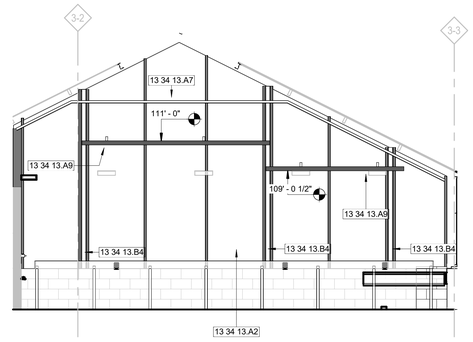

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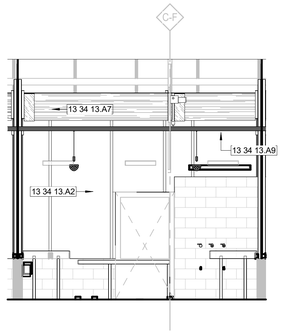

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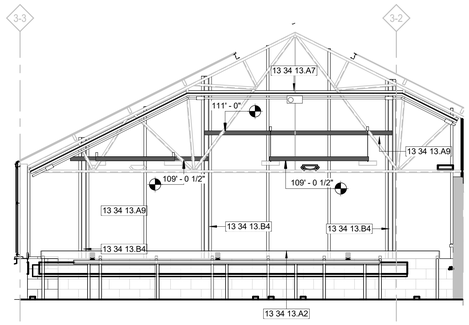

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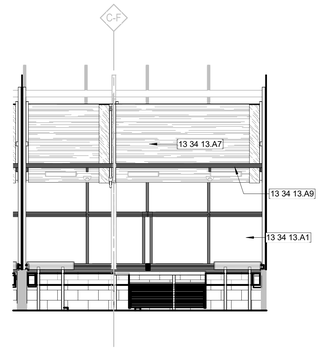

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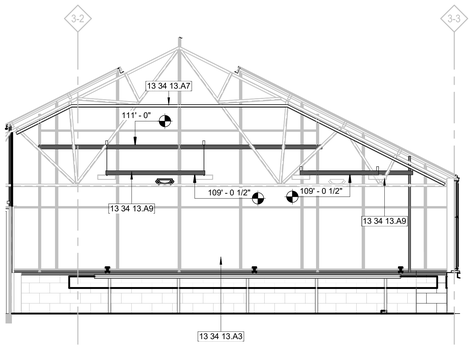

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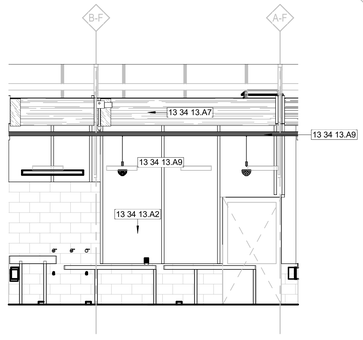

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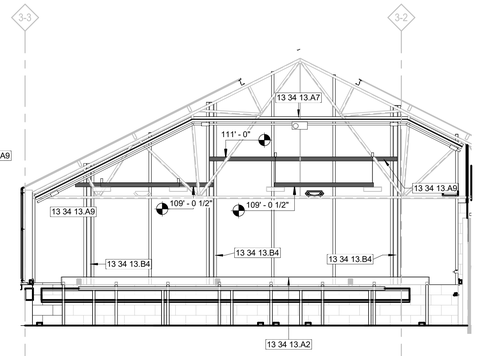

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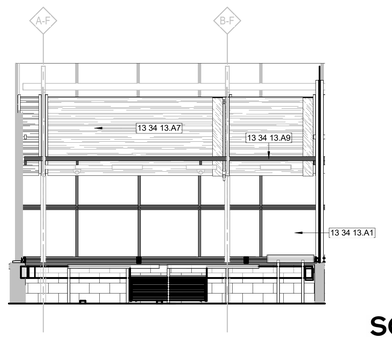

16 INT ELEV - CELL F6 SOUTH - RANGE F
SCALE: 1/4" = 1'-0"

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR ELEVATIONS - RANGE F

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	SWS
EPM	M McWILLIAMS
CHECKED BY	TJS
SAFETY & HEALTH	E WELKER
DRAWN BY	SWS
REAL PROPERTY	W ROSS
PROJECT NO.	
DATE	05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526–8119

SHEET A435-F2

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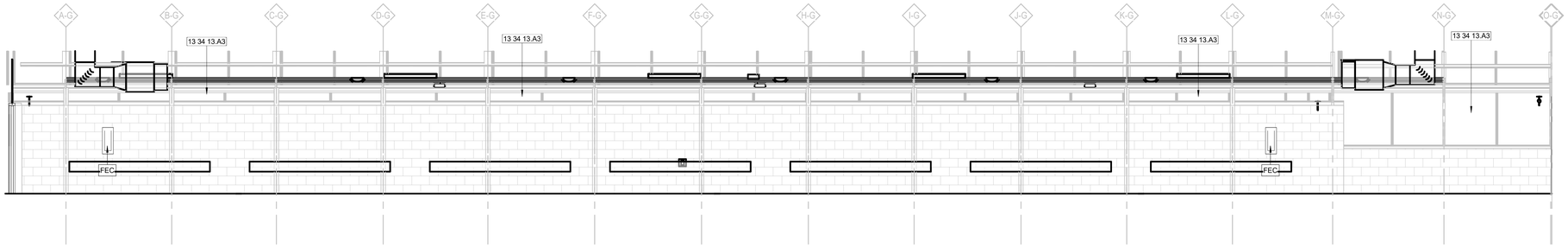
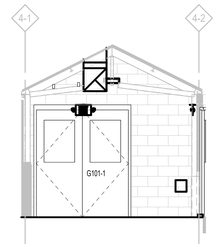
PW | PH | DSG | CAD



1 INT ELEV - CORRIDOR NORTH - RANGE G
SCALE: 1/4" = 1'-0"



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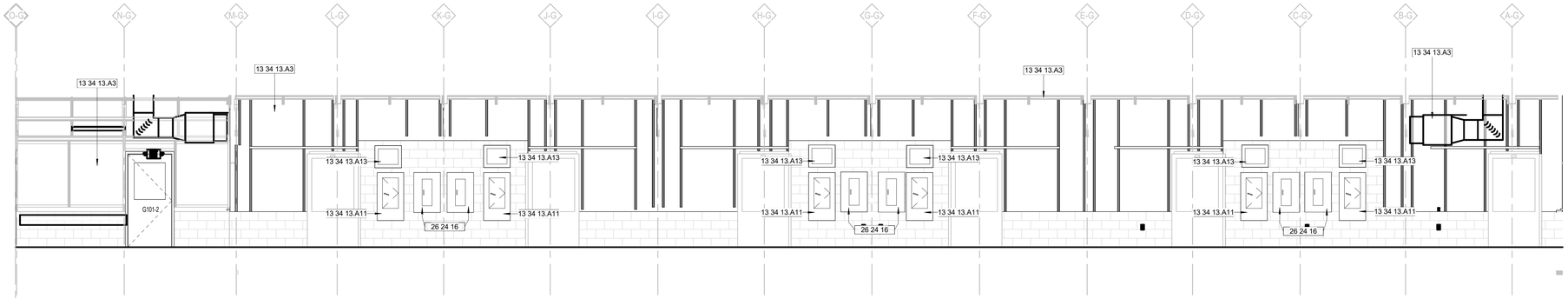
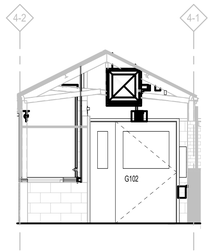
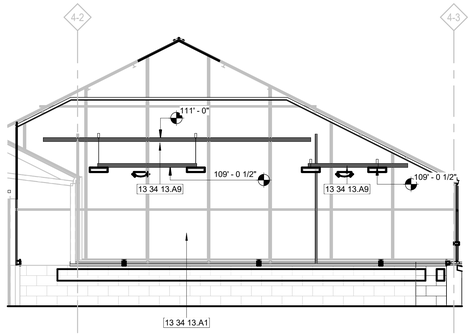
SCALE: 1/4" = 1'-0"



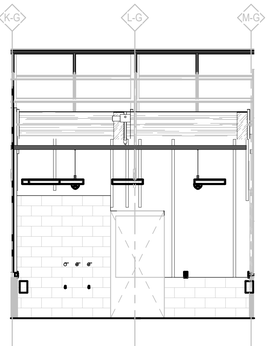
3 INT ELEV - CORRIDOR SOUTH - RANGE G
SCALE: 1/4" = 1'-0"



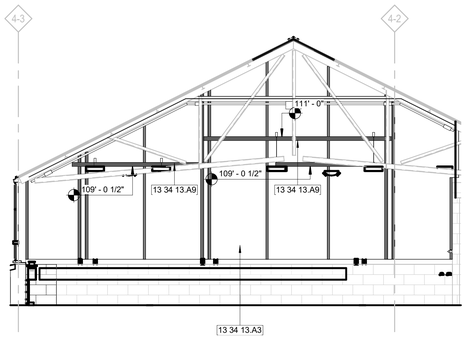
4 INT ELEV - CORRIDOR WEST - RANGE G
SCALE: 1/4" = 1'-0"



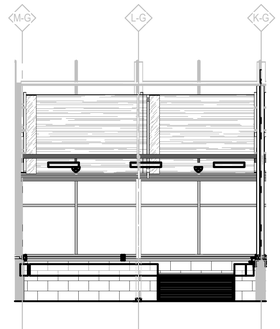
5 INT ELEV - CELL G1 EAST - RANGE G
SCALE: 1/4" = 1'-0"



6 INT ELEV - CELL G1 NORTH - RANGE G
SCALE: 1/4" = 1'-0"



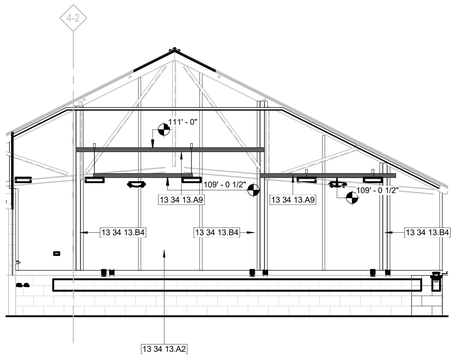
7 INT ELEV - CELL G1 WEST - RANGE G
SCALE: 1/4" = 1'-0"



8 INT ELEV - CELL G1 SOUTH - RANGE G
SCALE: 1/4" = 1'-0"

KEYNOTES

13 34 13.A1	NEW EXTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, EAVES, CORNERS, & SILLS
13 34 13.A2	NEW INTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, COLUMNS, PURLINS, CORNERS, TRUSSES, & SILLS
13 34 13.A3	NEW EXTERIOR GREENHOUSE GLAZING W/ EXISTING MULLIONS/EXTRUSIONS MOUNTED ON EXISTING CONSTRUCTION
13 34 13.A9	ALUMINUM UNISTRUT SYSTEM, SUPPORTED AT PERIMETER WALL GIRTS / COLUMNS, TO BE USED FOR SUPPORTING ALL LIGHT FIXTURES AND ELECTRICAL DEVICES. SUPPORT OFF OF EXISTING ROOF TRUSSES ARE STRICTLY PROHIBITED. LOCATE BEAMS TO BE ALIGNED TO THE RESPECTIVE SUPPORTED FIXTURES/DEVICES, PROVIDE DELEGATED ENGINEERED DESIGN.
13 34 13.A11	NEW CONTROL SYSTEM PANEL IN EXISTING CONTROL PANEL WALL RECESS, TYPICAL
13 34 13.A13	NEW CONTROL SYSTEM PANEL IN EXISTING CONTROL PANEL WALL RECESS IF NECESSARY; IF NOT USED FOR CONTROLS, DEMOLISH PANEL AND INSTALL NEW CMU IN VOID AND FINISH ACCORDINGLY
13 34 13.B4	NEW ALUMINUM COLUMN; PROVIDER RESPONSIBLE FOR APPROPRIATE CROSS-SECTIONAL DESIGN BASED ON HEIGHT AND ALL OTHER RELEVANT DESIGN FACTORS
26 24 16	NEW ELECTRICAL PANELBOARDS IN EXISTING PANELBOARD WALL RECESS, TYPICAL



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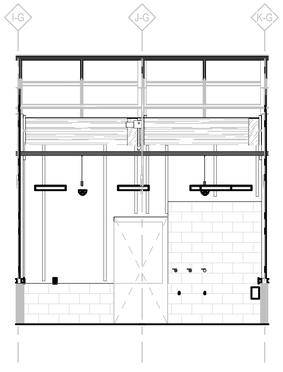
SCALE: 1/4" = 1'-0"



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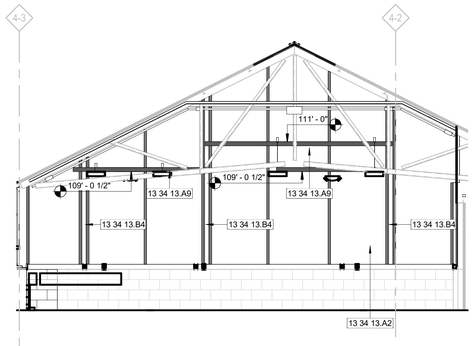
SCALE: 1/4" = 1'-0"



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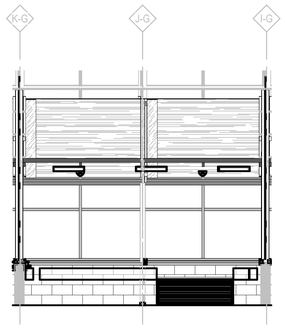
SCALE: 1/4" = 1'-0"



12 INT ELEV - CELL G2 SOUTH - RANGE G
SCALE: 1/4" = 1'-0"

SCHEMMER

PROJECT NO.: 09228.021

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — USDA ARS — PHASE V

1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR ELEVATIONS - RANGE G

A-E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: A436-G1

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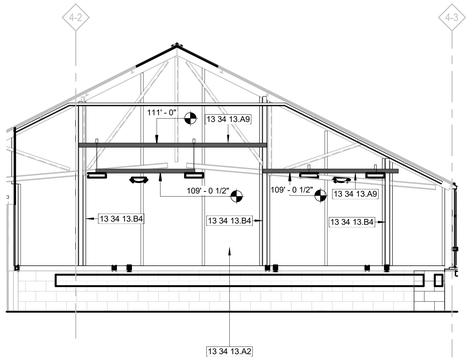
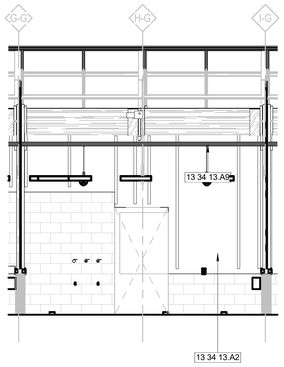
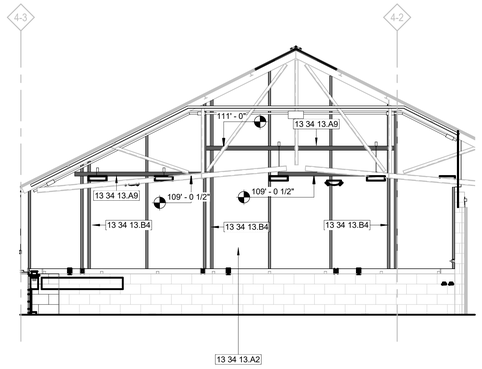
PW | PH | DSG | CAD



1 INT ELEV - CELL G3 EAST - RANGE G
SCALE: 1/4" = 1'-0"



2 INT ELEV - CELL G3 NORTH - RANGE G
SCALE: 1/4" = 1'-0"



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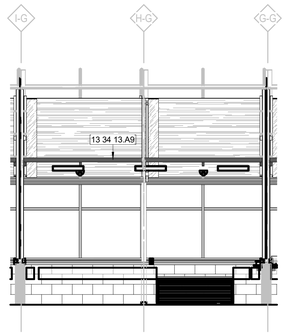
SCALE: 1/4" = 1'-0"



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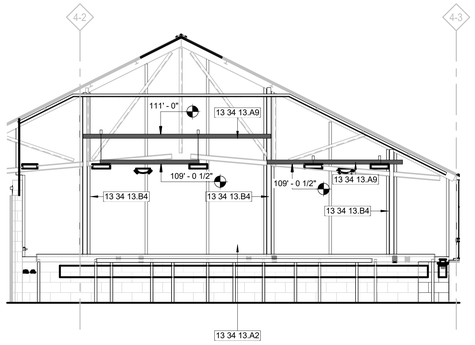
SCALE: 1/4" = 1'-0"



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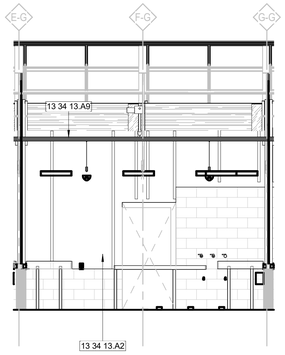
SCALE: 1/4" = 1'-0"



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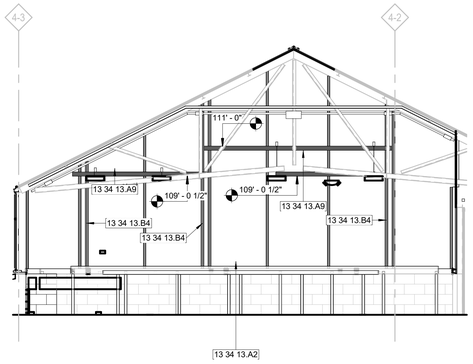
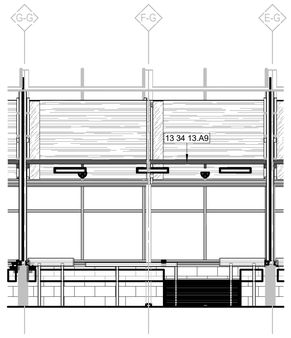
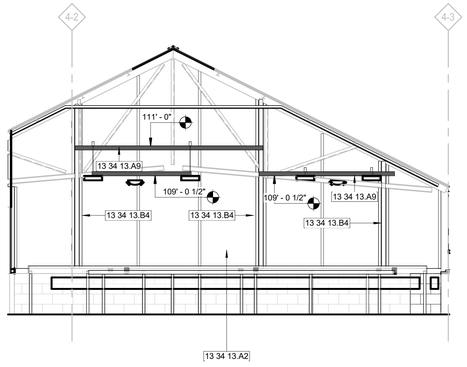
SCALE: 1/4" = 1'-0"



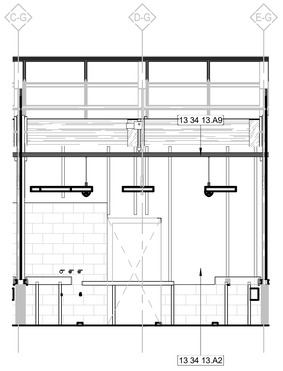
7 INT ELEV - CELL G4 WEST - RANGE G
SCALE: 1/4" = 1'-0"



8 INT ELEV - CELL G4 SOUTH - RANGE G
SCALE: 1/4" = 1'-0"



9 INT ELEV - CELL G5 EAST - RANGE G
SCALE: 1/4" = 1'-0"



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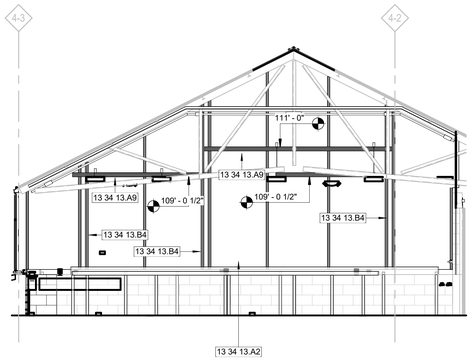
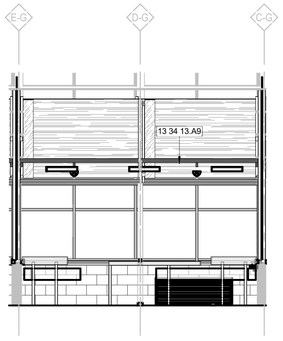
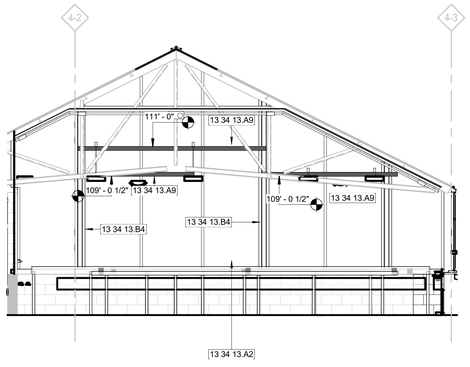
SCALE: 1/4" = 1'-0"



11 INT ELEV - CELL G5 WEST - RANGE G
SCALE: 1/4" = 1'-0"



12 INT ELEV - CELL G5 SOUTH - RANGE G
SCALE: 1/4" = 1'-0"



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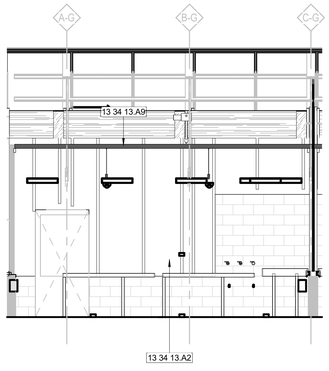
SCALE: 1/4" = 1'-0"



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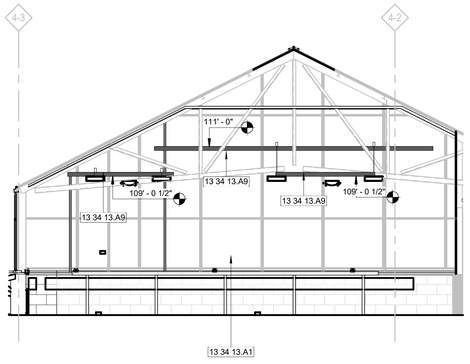
SCALE: 1/4" = 1'-0"



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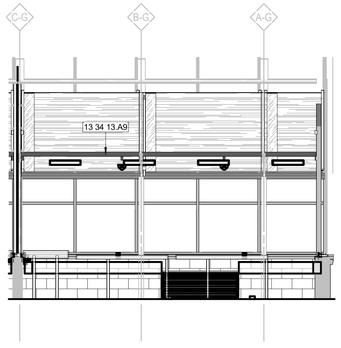
SCALE: 1/4" = 1'-0"



16 INT ELEV - CELL G6 SOUTH - RANGE G
SCALE: 1/4" = 1'-0"

KEYNOTES

13 34 13.A1	NEW EXTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, EAVES, CORNERS, & SILLS
13 34 13.A2	NEW INTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, COLUMNS, PURLINS, CORNERS, TRUSSES, & SILLS
13 34 13.A9	ALUMINUM UNISTRUT SYSTEM, SUPPORTED AT PERIMETER WALL GIRTS / COLUMNS, TO BE USED FOR SUPPORTING ALL LIGHT FIXTURES AND ELECTRICAL DEVICES. SUPPORT OFF OF EXISTING ROOF TRUSSES ARE STRICTLY PROHIBITED. LOCATE BEAMS TO BE ALIGNED TO THE RESPECTIVE SUPPORTED FIXTURES/DEVICES. PROVIDE DELEGATED ENGINEERED DESIGN.
13 34 13.B4	NEW ALUMINUM COLUMN; PROVIDER RESPONSIBLE FOR APPROPRIATE CROSS-SECTIONAL DESIGN BASED ON HEIGHT AND ALL OTHER RELEVANT DESIGN FACTORS

USDA

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR ELEVATIONS - RANGE G

A–E FIRM	USDA		
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN		
DESIGNER: SWS	EPM: M McWILLIAMS		
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER	PROJECT NO.	FACILITIES ENGINEERING SECTION, PLAINS AREA, 2150 CENTRE AVE., BLDG D, SUITE 330, FT. COLLINS, CO 80526–8119
DRAWN BY: SWS	REAL PROPERTY: W ROSS	DATE: 05/11/2026	SHEET: A436-G2

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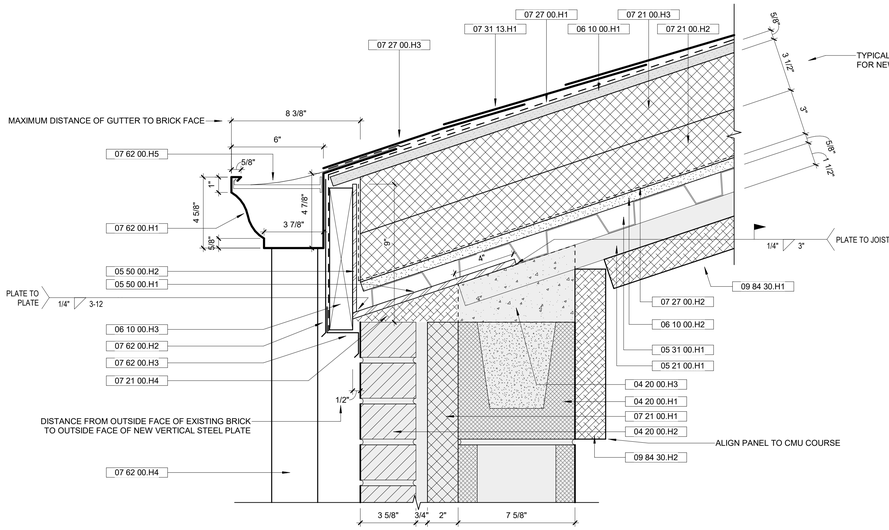
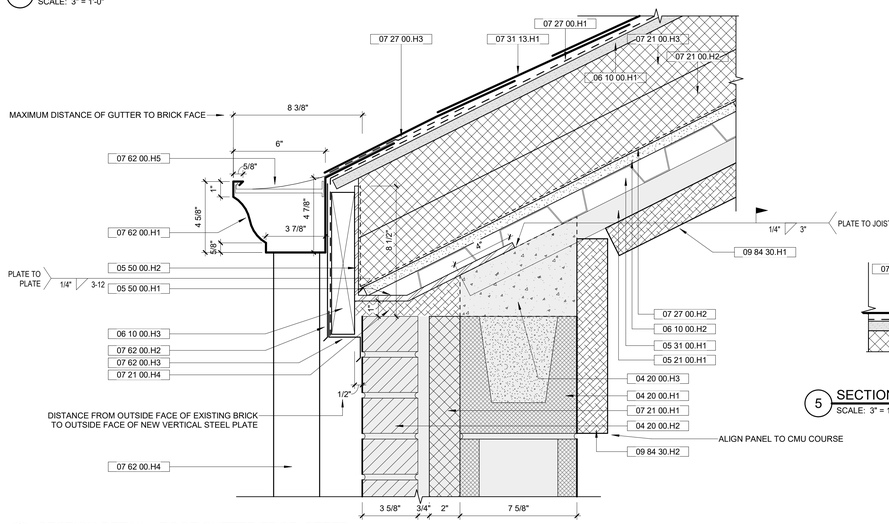
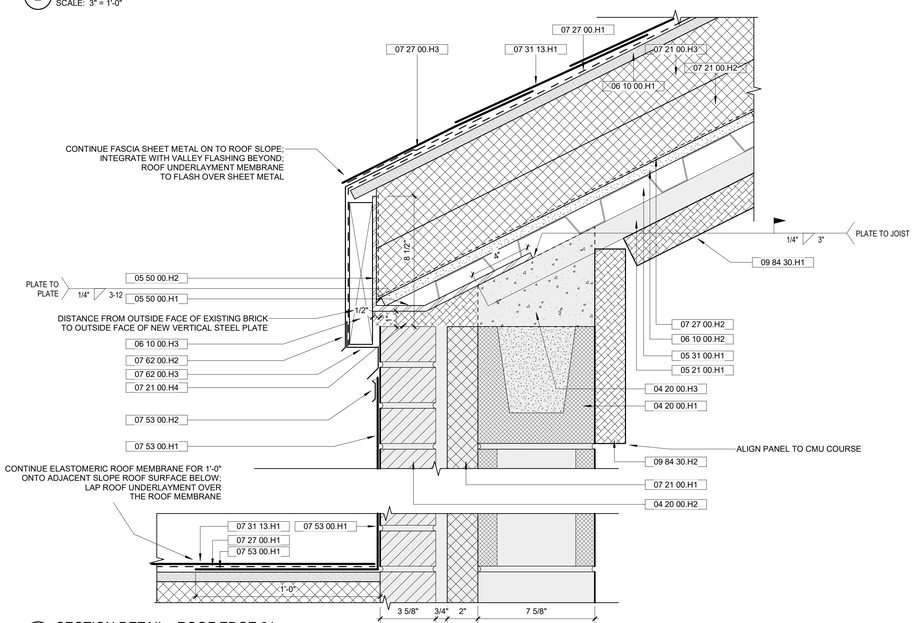
CAD | DSC | DH | PM



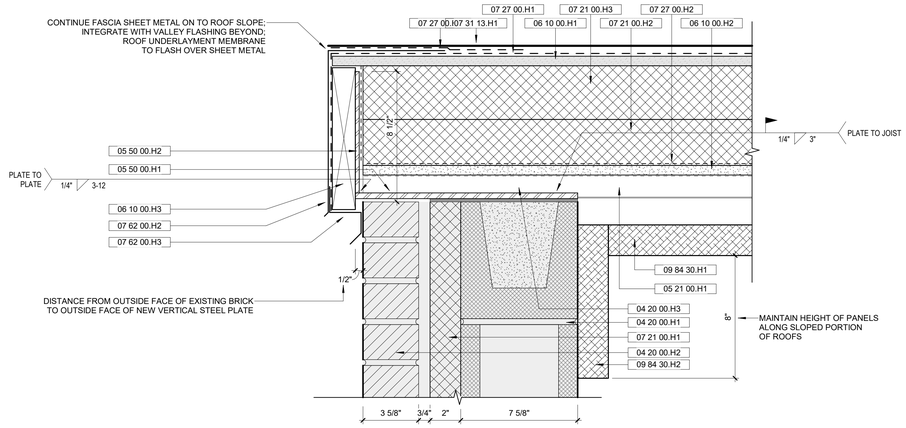
1 SECTION DETAIL - ROOF GUTTER EDGE, TYPICAL
SCALE: 3" = 1'-0"



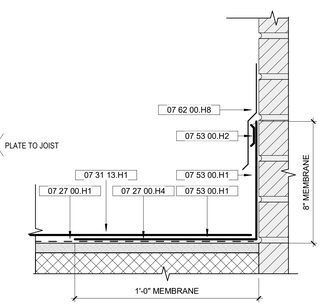
2 SECTION DETAIL - ROOF GUTTER EDGE, STEEP
SCALE: 3" = 1'-0"



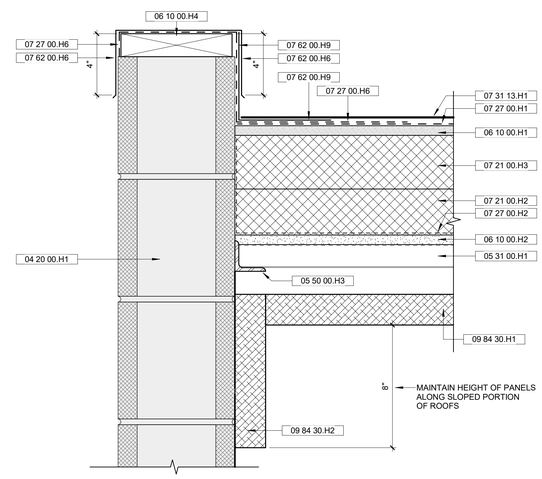
3 SECTION DETAIL - ROOF EDGE 01
SCALE: 3" = 1'-0"



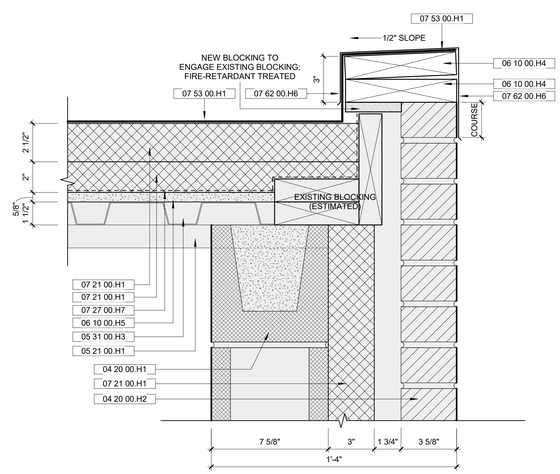
4 SECTION DETAIL - ROOF EDGE 02
SCALE: 3" = 1'-0"



5 SECTION DETAIL - ROOF TRANSITION TO MASONRY
SCALE: 3" = 1'-0"



6 SECTION DETAIL - ROOF EDGE 03
SCALE: 3" = 1'-0"



7 SECTION DETAIL - ROOF EDGE LOW SLOPE, TYP.
SCALE: 3" = 1'-0"

KEYNOTES

04 20 00.H1	CONCRETE MASONRY UNITS, 8"x8"x16", EXISTING
04 20 00.H2	CLAY BRICK MASONRY, MODULAR, RUNNING BOND; EXISTING
04 20 00.H3	GROUT FILL BETWEEN STEEL JOISTS AS SHOWN; EXISTING TO REMAIN
05 21 00.H1	STEEL JOIST FRAMING; EXISTING
05 31 00.H1	STEEL DECKING; NEW; SEE STRUCTURAL
05 31 00.H3	STEEL DECKING; EXISTING
05 50 00.H1	STEEL PLATE, 3/8" THICK, CONTINUOUS, ACHIEVE DIMENSIONS AS DRAWN, SHOP WELD W/ ADJACENT PLATE, HOT-DIPPED GALVANIZE
05 50 00.H2	STEEL PLATE, 1/4" THICK, CONTINUOUS, ACHIEVE HEIGHT AS DRAWN, CHAMFER EDGE TO MEET ADJACENT PLATE, SHOP WELD W/ ADJACENT PLATE, HOT-DIPPED GALVANIZE
05 50 00.H3	STEEL ANGLE FOR DECK SUPPORT; EXISTING TO REMAIN
06 10 00.H1	ROOF SHEATHING UNDERLAYMENT, NOMINAL 5/8" PLYWOOD, FIRE-RETARDANT-TREATED; SCREW TO TOP FLUTES OF STEEL DECK
06 10 00.H2	COVER BOARD, 5/8" THICK CEMENTITIOUS, CORRECTLY PRIME FOR VAPOR BARRIER UNDERLAYMENT ADHESION
06 10 00.H3	2x10 FASCIA LUMBER, FIRE-RETARDANT-TREATED
06 10 00.H4	2x8 BLOCKING LUMBER, FIRE-RETARDANT-TREATED
06 10 00.H5	COVER BOARD, EXISTING
07 21 00.H1	RIGID INSULATION; EXISTING
07 21 00.H2	POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 3" THICK
07 21 00.H3	POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 3-1/2" THICK
07 21 00.H4	MINERAL WOOL INSULATION; STUFF VOID ENTIRELY
07 27 00.H1	ROOFING UNDERLAYMENT MEMBRANE, SELF-ADHERING, FOR ENTIRETY OF SLOPED SHINGLED SURFACES, CONTINUE TO BOTTOM EDGE OF FASCIA LUMBER
07 27 00.H2	VAPOR BARRIER UNDERLAYMENT MEMBRANE, SELF-ADHERING, UNDER ENTIRETY OF SLOPED SHINGLED SURFACES; CONTINUOUS TO TOP OF EDGE OF ROOF STEEL FABRICATIONS
07 27 00.H3	ROOFING UNDERLAYMENT STRIP, SELF-ADHERING, LAP OVER HIGH-BACK GUTTER LEG & T-BAR HANGERS
07 27 00.H4	ROOFING UNDERLAYMENT STRIP, SELF-ADHERING, LAP OVER HORIZONTAL UNDERLAYMENT & VERTICALLY UP ADJACENT WALL W/ TERMINATION BAR
07 27 00.H6	ROOFING UNDERLAYMENT STRIP, SELF-ADHERING, LAP OVER HORIZONTAL UNDERLAYMENT & OVER PARAPET UNDER COPING
07 27 00.H7	VAPOR BARRIER UNDERLAYMENT MEMBRANE; EXISTING
07 31 13.H1	ASPHALT SHINGLES
07 53 00.H1	ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING, REINFORCED; FULLY ADHERE TO SUBSTRATE
07 53 00.H2	TERMINATION BAR, CONTINUOUS, ALUMINUM; SEAL TOP SIDE OF BAR
07 62 00.H1	GUTTER W/ HIGH BACK LEG BENT @ ROOF SLOPE, K-STYLE, 6" DEEP; PROVIDE GUTTER SLOPE IN HIGH BACK DESIGN; SHOP-FINISHED MITERS @ INSIDE CORNERS; END CAPS @ END OF RUNS
07 62 00.H2	SHEET METAL FASCIA W/ DRIP EDGE, TUCK BEHIND HIGH-BACK GUTTER, PREFINISHED
07 62 00.H3	SHEET METAL CLOSURE W/ 1" DRIP EDGE, TUCK BEHIND SHEET METAL FASCIA, PREFINISHED, EMBED IN SEALANT ON BRICK
07 62 00.H4	SHEET METAL DOWNSPOUT, 3" x 3"; PROVIDE 12" TALL OPENING OUTSIDE FACE NEAR GRADE WHEN CONNECTED TO DRAIN TILE & PROVIDE 6'-0" LONG LEADER WHEN DISCHARGING ON GRADE
07 62 00.H5	GUTTER HANGERS, MANUFACTURED ALUMINUM T-BAR DESIGN, STRAPS TO ANCHOR ON TOP OF HIGH-BACK METAL & UNDER ROOF UNDERLAYMENT, 30" ON CENTER
07 62 00.H6	SHEET METAL COPING, PREFINISHED
07 62 00.H8	SHEET METAL COUNTERFLASHING, NEW, SEAL & FASTEN TO EXISTING BRICK WALL, PREFINISHED
07 62 00.H9	SHEET METAL FLASHING, EXTEND 6" ACROSS HORIZONTAL SURFACE & VERTICALLY ON EXISTING MASONRY WALL AS SHOWN, PREFINISHED
09 84 30.H1	SOUND ABSORBING CEILING UNITS, FABRIC-COVERED, 2" THICK, MECHANICALLY FASTEN TO UNISTRUT SYSTEM; SEE SPECS
09 84 30.H2	SOUND ABSORBING CEILING UNITS, FABRIC-COVERED, 2" THICK, SURFACE MOUNT TO WALL

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95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A-E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: JMB	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ROOF DETAILS

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: A521

PROJECT NO.: 09228.021

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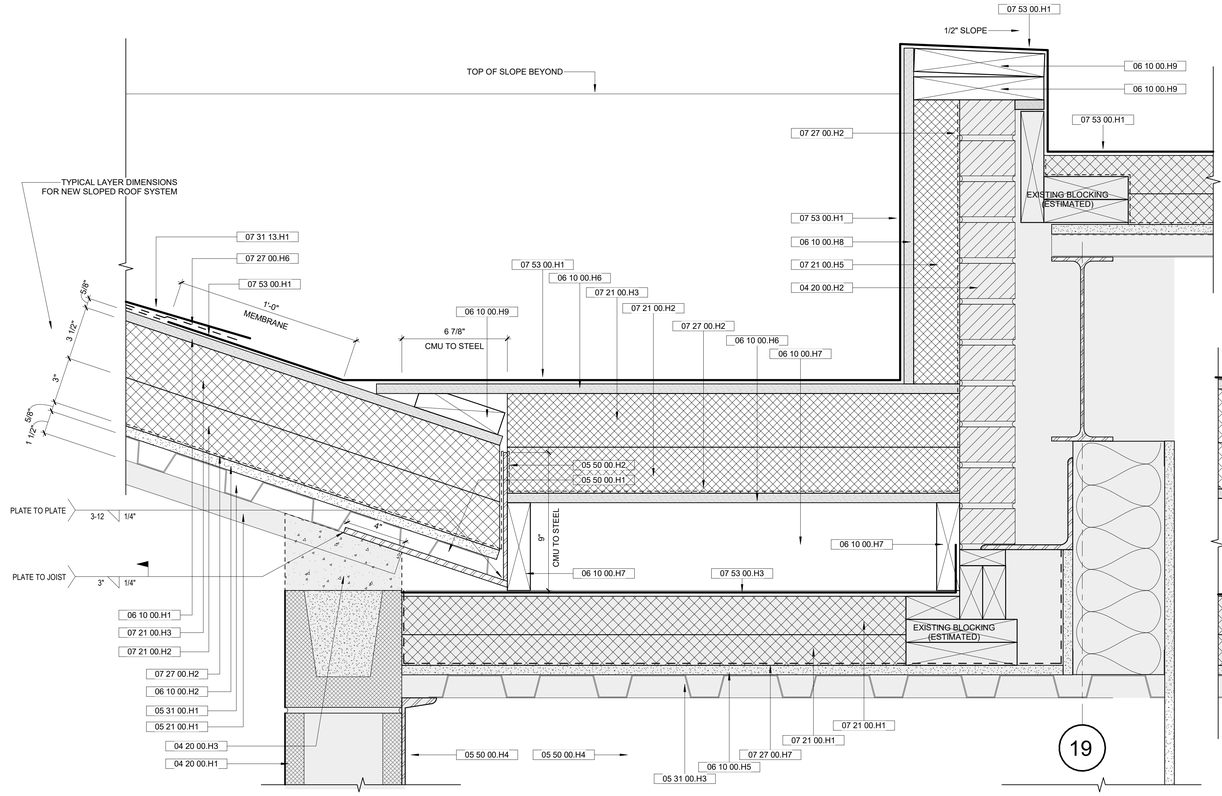
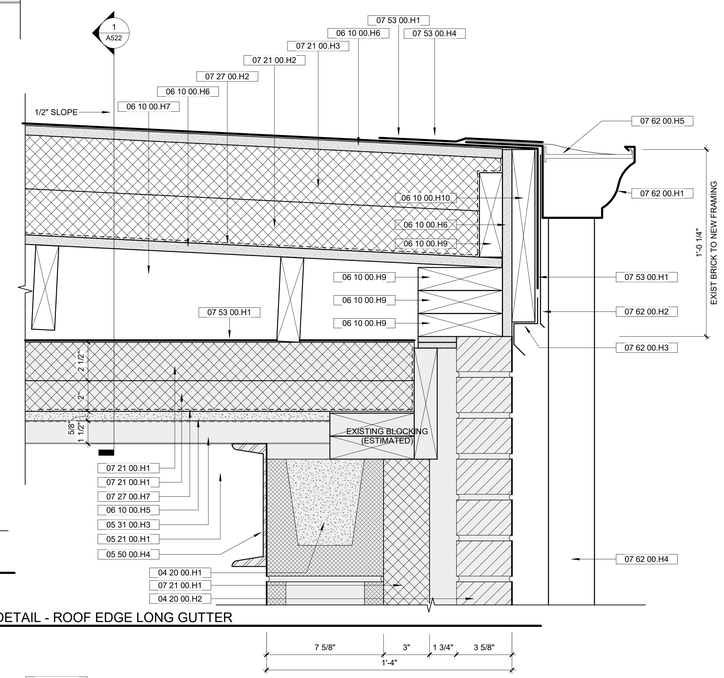
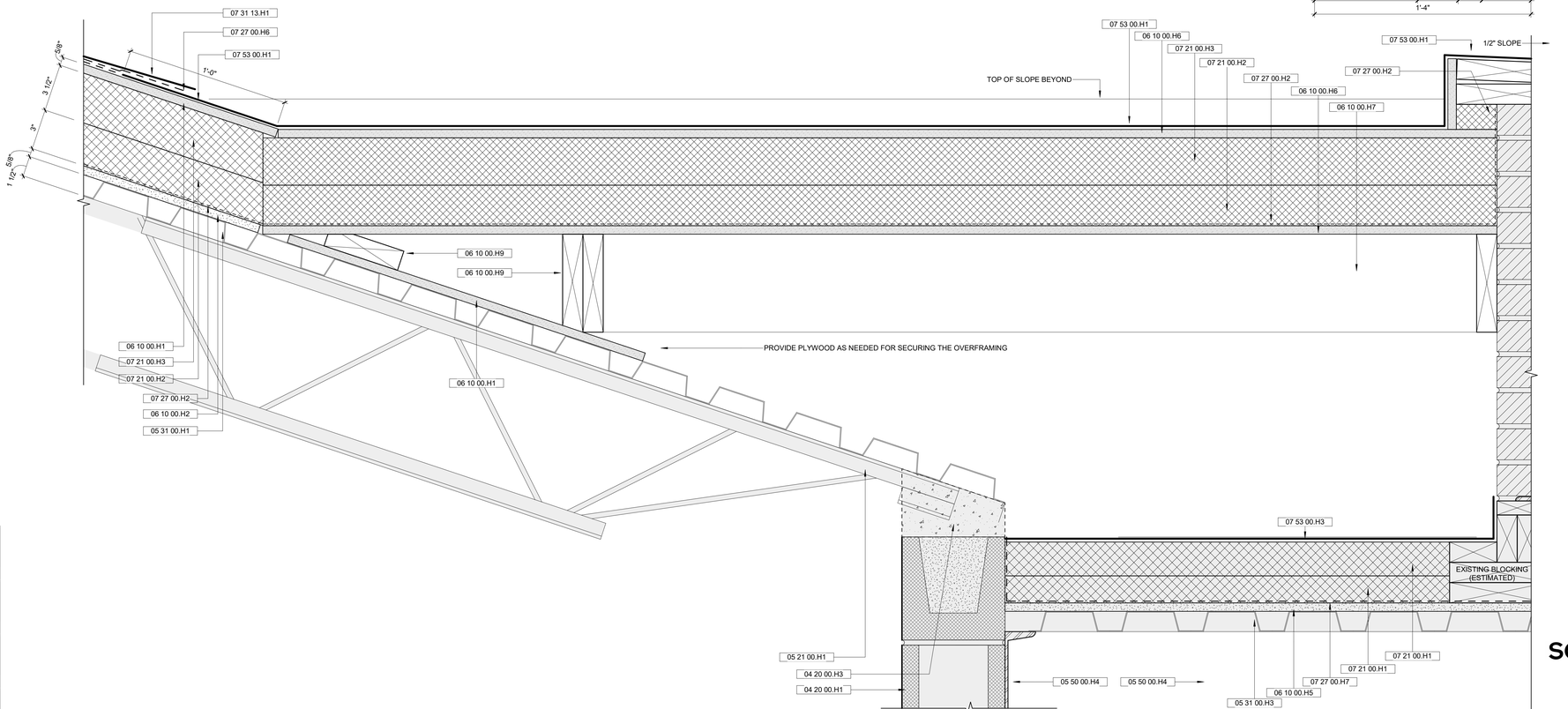


1 SECTION DETAIL - LONG GUTTER, SOUTH SIDE
SCALE: 3" = 1'-0"



2 SECTION DETAIL - ROOF EDGE LONG GUTTER
SCALE: 3" = 1'-0"



3 SECTION DETAIL - LONG GUTTER, NORTH SIDE
SCALE: 3" = 1'-0"

KEYNOTES

04 20 00.H1	CONCRETE MASONRY UNITS, 8"x8"x16", EXISTING
04 20 00.H2	CLAY BRICK MASONRY, MODULAR, RUNNING BOND; EXISTING
04 20 00.H3	GROUT FILL BETWEEN STEEL JOISTS AS SHOWN; EXISTING TO REMAIN
05 21 00.H1	STEEL JOIST FRAMING; EXISTING
05 31 00.H1	STEEL DECKING; NEW; SEE STRUCTURAL
05 31 00.H3	STEEL DECKING; EXISTING
05 50 00.H1	STEEL PLATE, 3/8" THICK, CONTINUOUS, ACHIEVE DIMENSIONS AS DRAWN, SHOP WELD W/ ADJACENT PLATE, HOT-DIPPED GALVANIZE
05 50 00.H2	STEEL PLATE, 1/4" THICK, CONTINUOUS, ACHIEVE HEIGHT AS DRAWN, CHAMFER EDGE TO MEET ADJACENT PLATE, SHOP WELD W/ ADJACENT PLATE, HOT-DIPPED GALVANIZE
05 50 00.H4	STEEL CHANNEL FOR DECK SUPPORT; EXISTING TO REMAIN
06 10 00.H1	ROOF SHEATHING UNDERLAYMENT, NOMINAL 5/8" PLYWOOD, FIRE-RETARDANT-TREATED; SCREW TO TOP FLUTES OF STEEL DECK
06 10 00.H2	COVER BOARD, 5/8" THICK CEMENTITIOUS, CORRECTLY PRIME FOR VAPOR BARRIER UNDERLAYMENT ADHESION
06 10 00.H5	COVER BOARD, EXISTING
06 10 00.H6	ROOF SHEATHING UNDERLAYMENT, NOMINAL 5/8" PLYWOOD, FIRE-RETARDANT-TREATED; SECURE TO WOOD JOISTS
06 10 00.H7	2x8 LUMBER JOISTS, 16" O.C., FIRE-RETARDANT-TREATED
06 10 00.H8	ROOF SHEATHING UNDERLAYMENT, NOMINAL 5/8" PLYWOOD, FIRE-RETARDANT-TREATED; ADHERE
06 10 00.H9	2x BLOCKING LUMBER, FIRE-RETARDANT-TREATED
06 10 00.H10	2x12 FASCIA LUMBER, FIRE-RETARDANT-TREATED
07 21 00.H1	RIGID INSULATION; EXISTING
07 21 00.H2	POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 3" THICK
07 21 00.H3	POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 3-1/2" THICK
07 21 00.H5	POLYISOCYANURATE (ISO) INSULATION, ADHERE LAYER, 2" THICK
07 27 00.H2	VAPOR BARRIER UNDERLAYMENT MEMBRANE, SELF-ADHERING, UNDER ENTIRETY OF SLOPED SHINGLED SURFACES; CONTINUOUS TO TOP OF EDGE OF ROOF STEEL FABRICATIONS
07 27 00.H6	ROOFING UNDERLAYMENT STRIP, SELF-ADHERING, LAP OVER HORIZONTAL UNDERLAYMENT & OVER PARAPET UNDER COPING
07 27 00.H7	VAPOR BARRIER UNDERLAYMENT MEMBRANE; EXISTING
07 31 13.H1	ASPHALT SHINGLES
07 53 00.H1	ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING, REINFORCED; FULLY ADHERE TO SUBSTRATE
07 53 00.H3	ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING; EXISTING TO REMAIN
07 53 00.H4	ELASTOMERIC SINGLE-PLY MEMBRANE ROOFING, LAP OVER HIGH-BACK GUTTER LEG & T-BAR HANGERS
07 62 00.H1	GUTTER W/ HIGH BACK LEG BENT @ ROOF SLOPE, K-STYLE, 6" DEEP; PROVIDE GUTTER SLOPE IN HIGH BACK DESIGN; SHOP-FINISHED MITERS @ INSIDE CORNERS; END CAPS @ END OF RUNS
07 62 00.H2	SHEET METAL FASCIA W/ DRIP EDGE, TUCK BEHIND HIGH-BACK GUTTER, PREFINISHED
07 62 00.H3	SHEET METAL CLOSURE W/ 1" DRIP EDGE, TUCK BEHIND SHEET METAL FASCIA, PREFINISHED, EMBED IN SEALANT ON BRICK
07 62 00.H4	SHEET METAL DOWNSPOUT, 3" x 3"; PROVIDE 12" TALL OPENING OUTSIDE FACE NEAR GRADE WHEN CONNECTED TO DRAIN TILE & PROVIDE 6'-0" LONG LEADER WHEN DISCHARGING ON GRADE
07 62 00.H5	GUTTER HANGERS, MANUFACTURED ALUMINUM T-BAR DESIGN, STRAPS TO ANCHOR ON TOP OF HIGH-BACK METAL & UNDER ROOF UNDERLAYMENT, 30" ON CENTER

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PROJECT NO.: 09228.021

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REVISIONS

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ROOF DETAILS

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	SWS
EPM	M McWILLIAMS
CHECKED BY	JMB
SAFETY & HEALTH	E WELKER
DRAWN BY	SWS
REAL PROPERTY	W ROSS
PROJECT NO.	
DATE	05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526–8119

SHEET A522

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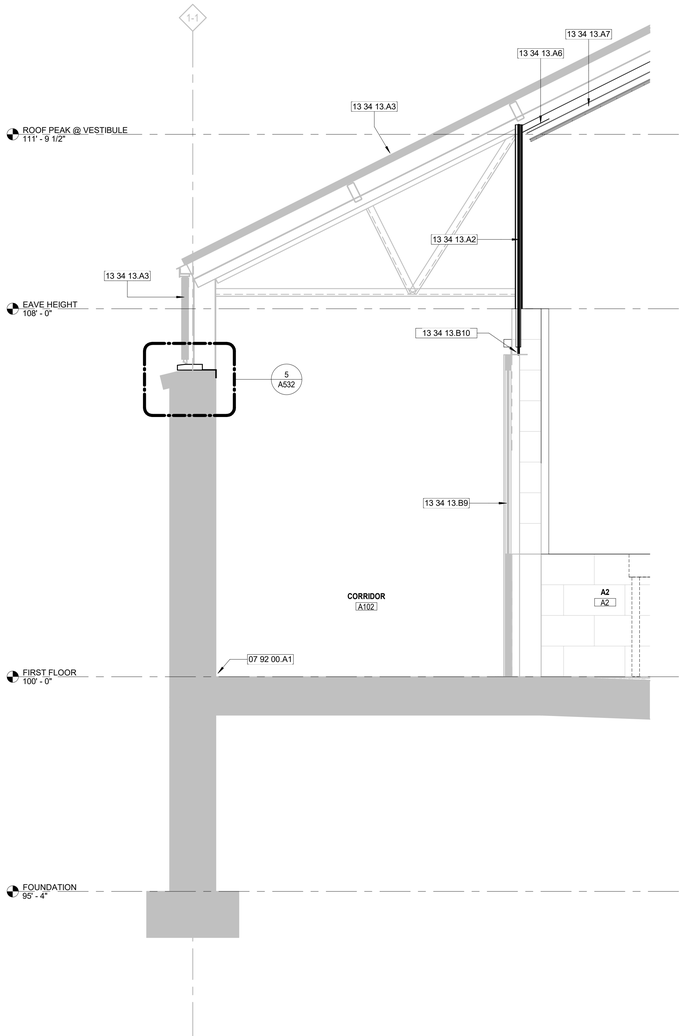
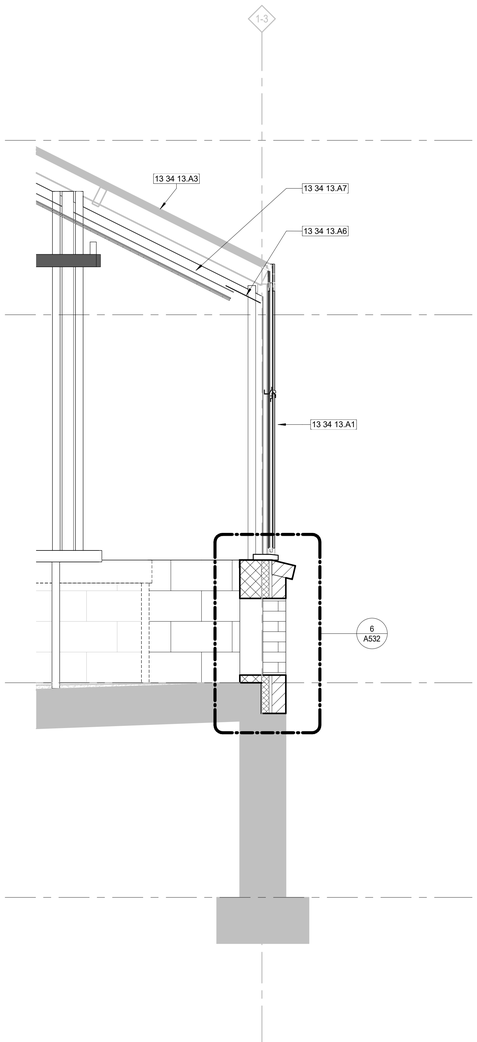
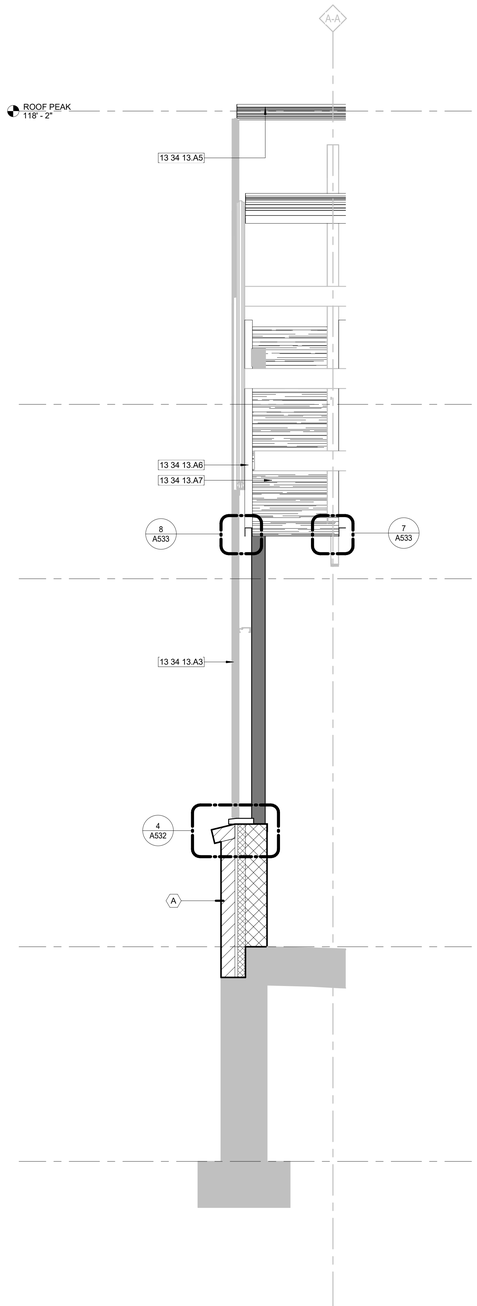


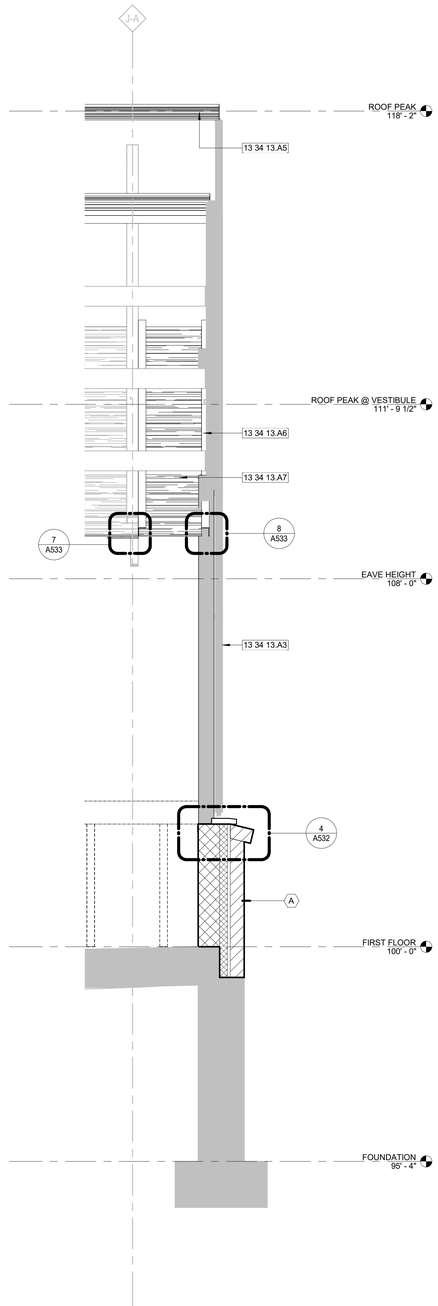
1 WALL SECTION CORRIDOR - RANGE A (TYPICAL ALL RANGES)
SCALE: 3/4" = 1'-0"



2 WALL SECTION SOUTH WALL - RANGE A (TYPICAL ALL RANGES)
SCALE: 3/4" = 1'-0"



3 WALL SECTION WEST WALL - RANGE A (TYPICAL ALL RANGES)
SCALE: 3/4" = 1'-0"

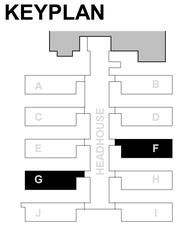


4 WALL SECTION EAST WALL - RANGE A (TYPICAL ALL RANGES)
SCALE: 3/4" = 1'-0"

KEYNOTES

07 92 00.A1	ROD & SILICONE SEALANT, 3/8" WIDE
13 34 13.A1	NEW EXTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, EAVES, CORNERS, & SILLS
13 34 13.A2	NEW INTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, COLUMNS, PURLINS, CORNERS, TRUSSES, & SILLS
13 34 13.A3	NEW EXTERIOR GREENHOUSE GLAZING W/ EXISTING MULLIONS/EXTRUSIONS MOUNTED ON EXISTING CONSTRUCTION
13 34 13.A5	DOUBLE RIDGE VENT SYSTEM. REFERENCE SPEC AND SHEET A533
13 34 13.A6	SHADE CLOTH PERIMETER SEAL FABRIC. TRIM AROUND OBSTRUCTIONS.
13 34 13.A7	CABLE DRUM SHADE CLOTH SYSTEM. REFERENCE SPEC AND SHEET A533; REFER TO SECTIONS FOR HEIGHTS AND EXACT PLACEMENT; CLOTH TO TRAVEL IN DIRECTIONS SHOWN BY ARROWS
13 34 13.B9	REFURBISHED SLIDING DOOR W/ NEW GLAZING; SEE SPEC FOR NEW HARDWARE
13 34 13.B10	EXISTING SLIDING DOOR ROUGH OPENING TO REMAIN

KEYPLAN



NORTH

SCHEMMER

PROJECT NO.: **09228.021**

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NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

WALL SECTIONS - ALL RANGES

A–E FIRM	USDA		
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN		
DESIGNER: SWS	EPM: M McWILLIAMS		
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER	PROJECT NO.	FACILITIES ENGINEERING SECTION PLAINS AREA 2150 CENTRE AVE., BLDG D, SUITE 330 FT. COLLINS, CO 80526-8119
DRAWN BY: SWS	REAL PROPERTY: W ROSS	DATE: 05/11/2026	

SHEET: A531

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CAD | DSC | DW | PM

MATERIAL DATA

CONCRETE AND REINFORCING
1. CONCRETE STRENGTH (f'_c @ 28 DAYS)
   A. GRADE SUPPORTED SLABS 4,000 PSI
   B. CONCRETE NOT SPECIFIED 3,000 PSI
2. ALL CONCRETE EXPOSED TO FREEZE-THAW CONDITIONS SHALL HAVE A MINIMUM STRENGTH (f'_c @ 28 DAYS) OF 4,500 PSI. THIS DOES NOT INCLUDE FOOTINGS/GRADE BEAMS THAT ARE COVERED BY SOIL.
3. CEMENT TYPE: PORTLAND TYPE 1L
4. AGGREGATES
   A. NORMAL WEIGHT, 1 1/2" MAX. SIZE - ASTM C33
   B. PROVIDE AGGREGATES FREE OF MATERIALS WITH DELETERIOUS REACTIVITY TO ALKALI IN CEMENT, FROM A SINGLE SOURCE WITH DOCUMENTED SERVICE RECORD DATA OF AT LEAST 10 YEARS SATISFACTORY SERVICE IN SIMILAR APPLICATIONS AND SERVICE CONDITIONS USING SIMILAR AGGREGATES AND CEMENTITIOUS MATERIALS.
5. REINFORCING STEEL ASTM A615, GRADE 60
6. PREFORMED EXPANSION JOINT (1/2") ASTM D1751

MASONRY
1. MASONRY STRENGTH (f'_m @ 28 DAYS) 1,500 PSI
2. CONCRETE UNITS ASTM C90 NORMAL WEIGHT
3. UNIT COMPRESSIVE STRENGTH 2,000 PSI (BASED ON NET AREA)
4. MORTAR TYPE ASTM C270, TYPE S
5. GROUT TYPE ASTM C476, 3/8" MAX. AGGREGATE SIZE
6. MORTAR STRENGTH (28 DAYS) 1,800 PSI
7. GROUT STRENGTH (28 DAYS) ASTM C476 - 2,000 PSI
8. WIRE REINFORCING ASTM A82, STD. LADDER TYPE - 9 GAUGE ZINC COATED PER ASTM A116 - (DUR-O-WALL OR APPROVED EQUAL @ 16" O.C. VERTICAL SPACING)

GEOTECHNICAL

8. STRUCTURAL FILL REQUIREMENTS:
   A. CLEAN, MEDIUM TO FINE GRAINED SAND W/ 100% PASSING THE 3/4" SIEVE, LESS THAN 2% PASSING THE 200 SIEVE.
   B. WATER CONTENT (% OF OPTIMUM) +/-3%
   C. MAXIMUM LOOSE LIFT 8"
   D. MINIMUM COMPACTION 95% (STANDARD PROCTOR TEST ASTM D-698)
9. CONTRACTOR SHALL PROVIDE FOR ADEQUATE DRAINAGE OF SURFACE WATER AWAY FROM THE STRUCTURE AND EXCAVATED AREAS DURING CONSTRUCTION. THIS INCLUDES NECESSARY PUMPING, TRENCHING, BACKFILL AND/OR DIKE CONSTRUCTION.
10. GRANULAR SUBBASE UNDER SLAB ON GRADE:
   A. MINIMUM THICKNESS 4"
   B. MINIMUM COMPACTION 95% (STANDARD PROCTOR TEST ASTM D-698)
   C. GRADATION REQUIREMENTS
      a. 100% PASSING THE 3/4" SIEVE
      b. LESS THAN 15% PASSING THE 100 SIEVE
      c. LESS THAN 2% PASSING THE 200 SIEVE

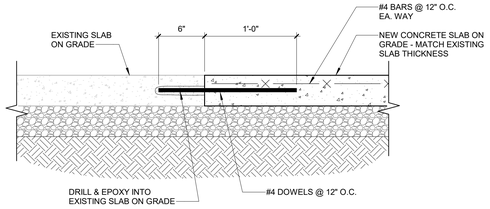
CAST-IN-PLACE CONCRETE (033000)

GENERAL CONCRETE REQUIREMENTS
1. CONCRETE BATCH DESIGN(S) SHALL BE PROPORTIONED AND PRODUCED IN ACCORDANCE WITH ACI 318, IN PARTICULAR CHAPTER 5, AND ACI 301. MIX AND DELIVER IN ACCORDANCE WITH ASTM C94.
2. CONCRETE STRENGTH: SEE MATERIAL DATA NOTES
3. SLUMP LIMITS
   A. GRADE SUPPORTED SLABS, SUSPENDED SLABS AND CONCRETE TOPPINGS: 5 INCHES OF SLUMP, PLUS OR MINUS 1 INCH.
   B. CONCRETE WITH PLASTICIZERS: 8 INCHES OF SLUMP, PLUS OR MINUS 1 INCH.
   C. ALL OTHER CONCRETE: 4 INCHES OF SLUMP, PLUS OR MINUS 1 INCH.
4. MAXIMUM W/C RATIO: 0.45
5. AIR ENTRAINMENT
   A. GRADE SUPPORTED SLABS, SUSPENDED SLABS AND CONCRETE TOPPINGS: DO NOT ALLOW AIR CONTENT OF TROWEL-FINISHED FLOORS TO EXCEED 3%.
   B. CONCRETE EXPOSED TO WEATHER: 5% MINIMUM AIR CONTENT
   C. ALL OTHER CONCRETE: 5.5% AIR CONTENT, PLUS OR MINUS 1.5%.
6. ADMIXTURES: SUBMIT AS REQUIRED FOR APPROVAL
7. FLY ASH: MAX. 25% OF CEMENT CONTENT
8. CONCRETE TO CONCRETE COLD JOINTS - PROVIDE 1/4" INTENTIONALLY ROUGHENED SURFACE AT ALL HORIZONTAL JOINTS.
9. CURING: CONCRETE SHALL BE MAINTAINED IN A MOIST CONDITION FOR A MINIMUM OF SEVEN DAYS AFTER ITS PLACEMENT. IF FORMWORK IS REMOVED PRIOR TO SEVEN DAYS, APPLY MOIST CURING TO NEWLY EXPOSED SURFACES. APPROVED CURING COMPOUNDS MAY BE USED IN LIEU OF MOIST CURING.
10. REINFORCING BAR WELDING: ABSOLUTELY NO WELDING OF REINFORCING BARS OR TORCHING TO BEND REINFORCING BARS SHALL BE ALLOWED WITHOUT THE SPECIFIC APPROVAL OF THE ENGINEER.
11. BAR SUPPORT ACCESSORIES SHALL BE PROVIDED IN ACCORDANCE WITH THE LATEST ACI MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES
   A. SLAB REINFORCING: ON BAR BOLSTERS @ 4 FT. O.C. MAX.
   B. NO ROCKS, CLAY TILE, OR CLAY BRICK SHALL BE USED TO SUPPORT REINFORCING.
12. NON-METALLIC, SHRINKAGE-RESISTANT GROUT
   A. GROUT SHALL MEET REQUIREMENTS OF ASTM C 1107
   B. GROUT SHALL BE FACTORY-PACKAGED, NON-METALLIC AGGREGATE GROUT
   C. GROUT SHALL BE NON-CORROSIVE AND NON-STAINING
   D. MIX GROUT WITH WATER TO CONSISTENCY SUITABLE FOR APPLICATION AND A 30-MINUTE WORKING TIME.
13. CONCRETE TESTING SHALL BE PERFORMED ACCORDING TO THE FOLLOWING REQUIREMENTS:
   A. TESTING FREQUENCY: OBTAIN ONE COMPOSITE SAMPLE FOR EACH DAY'S POUR FOR EACH CONCRETE MIXTURE EXCEEDING 5 CUBIC YARDS, BUT LESS THAN 25 CUBIC YARDS, PLUS ONE SET FOR EACH ADDITIONAL 50 CUBIC YARDS OR FRACTION THEREOF.
14. CONCRETE SHALL BE PLACED WITHIN 90 MINUTES OF ADDING WATER. CONTRACTOR SHALL REJECT ANY CONCRETE THAT HAS BEEN IN THE MIXING TRUCK MORE THAN 90 MINUTES AFTER ADDING WATER.

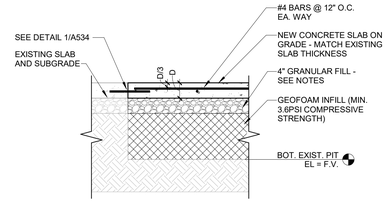
SLAB ON GRADE REQUIREMENTS
1. SLAB THICKNESS: SEE DETAILS
2. SLAB REINFORCING: SEE DETAILS
3. GRANULAR SUBBASE: SEE GEOTECHNICAL NOTES
4. CRACK CONTROL JOINTS (WHETHER CONSTRUCTION JOINTS OR SAWED JOINTS) IN SLABS ON GRADE SHALL OCCUR AS SHOWN AND ACROSS ALL DOOR OPENINGS. LOCATE JOINTS AT RE-ENTRANT CORNERS OF SLABS.
   A. MAXIMUM SPACING OF CONTROL JOINTS: 12 FEET
5. CURING: CONCRETE SHALL BE MAINTAINED IN A MOIST CONDITION FOR A MINIMUM OF SEVEN DAYS AFTER ITS PLACEMENT. APPROVED CURING COMPOUNDS MAY BE USED IN LIEU OF MOIST CURING. CURING COMPOUNDS SHALL BE NON-RESIDUAL TYPE AND COMPATIBLE WITH BONDING OF FLOOR COVERING AND/OR SPECIFIED SEALER.
6. FLOOR FINISH CRITERIA:
   A. COMPLY WITH ACI 302.1R RECOMMENDATIONS FOR SCREEDING, RESTRAIGHTENING, AND FINISHING OPERATIONS FOR CONCRETE SURFACES. DO NOT WET CONCRETE SURFACES.
   B. TROWEL FINISH:
      a. APPLY TO SURFACES EXPOSED TO VIEW OR TO BE COVERED WITH RESILIENT FLOORING, CARPET, CERAMIC OR QUARRY TILE SET OVER A CLEAVAGE MEMBRANE OR A THIN-FILM-FINISH COATING SYSTEM.
      b. AFTER APPLYING FLOAT FINISH, CONSOLIDATE CONCRETE BY HAND OR POWER-DRIVEN TROWEL. CONTINUE TROWELING PASSES AND RESTRAIGHTEN UNTIL SURFACE IS FREE OF TROWEL MARKS AND UNIFORM IN TEXTURE.
   C. BROOM FINISH:
      a. APPLY TO EXTERIOR CONCRETE PLATFORMS, STEPS, AND RAMPS.
      b. IMMEDIATELY AFTER FLOAT FINISHINGK, SLIGHTLY ROUGHEN TRAFFICKED SURFACE BY BROOMING WITH FIBER-BRISTLE BROOM PERPENDICULAR TO THE MAIN TRAFFIC ROUTE.

UNIT MASONRY (042000)

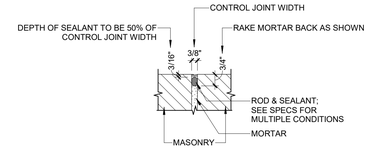
1. DESIGN CRITERIA: MASONRY SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF ACI 530.
2. UNIT TYPES: REFER TO DRAWINGS FOR CONCRETE MASONRY UNIT SIZE, FACE, COLOR, JOINTING, ECT.
3. UNIT COMPRESSIVE STRENGTH: SEE MATERIAL DATA NOTES
4. MORTAR: SEE MATERIAL DATA NOTES
5. GROUT: SEE MATERIAL DATA NOTES
6. CMU REINFORCING: UNLESS NOTED OTHERWISE, REINFORCE ALL CMU WALLS WITH VERTICAL #5 @ 32" O.C. FILL ALL REINFORCED CELLS WITH GROUT. MINIMUM GROUT BETWEEN MASONRY AND REINFORCING SHALL BE 1/2". MINIMUM GROUT BETWEEN PAIRS OF REINFORCING BARS SHALL BE 3/4".
   A. PROVIDE #5 VERTICAL REINFORCING AT THE FOLLOWING LOCATIONS:
      a. AT ALL CORNERS OF CMU WALLS
      b. AT ALL ENDS OF CMU WALLS
      c. EACH SIDE OF CONTROL JOINTS
      d. EACH SIDE OF WALL OPENINGS
   B. SEE DRAWINGS FOR LOCATIONS OF CONTROL JOINTS.
7. BOND BEAMS
   A. LOCATED AT TOP OF ALL CMU WALLS AND WHERE INDICATED IN DETAILS
   B. MINIMUM DEPTH UNLESS OTHERWISE NOTED = 8".
   C. REINFORCING - (1) #4 CONTINUOUS. LAP SPLICE = 28 IN.
   D. CORNER DOWELS - (2) #4 RIGHT ANGLE DOWELS THAT LAP A MINIMUM OF 2'-0" WITH ADJACENT BOND BEAM REINFORCING. IF BOND BEAMS AT INTERSECTING WALLS MEET AT DIFFERENT ELEVATIONS, EXTEND BOTH BOND BEAMS AROUND INTERSECTING CORNER TO FIRST INTERIOR REINFORCED CELL, BUT NOT LESS THAN 4 FEET.
   E. EXTEND BOND BEAMS THROUGH CONTROL JOINTS, BUT INTERRUPT BOND BEAM REINFORCING AT CONTROL JOINTS.
8. LINTEL BEARING: PROVIDE A MINIMUM OF 8 INCHES BEARING AT EACH END.
9. CONTROL JOINTS: EXCEPT WHERE OFFSETS OR SLIP JOINTS ARE SHOWN, CONTROL JOINTS SHALL BE A CONTINUOUS VERTICAL LINE FROM TOP OF FOOTING TO TOP OF MASONRY WALL. SPACE CONTROL JOINTS AS FOLLOWS:
   A. INTERIOR WALLS 36 FT. O.C. MAX.
   B. EXTERIOR WALLS 24 FT. O.C. MAX.



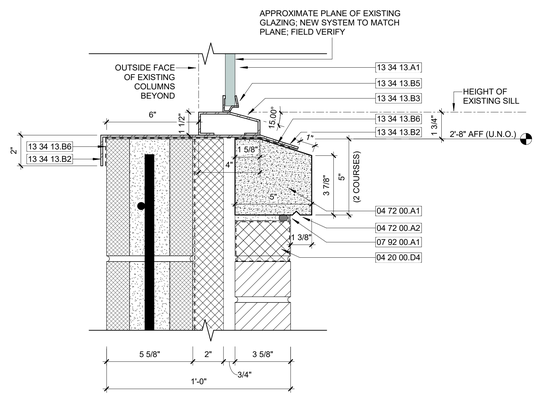
1 TYPICAL NEW SLAB ON GRADE AT EXISTING SLAB
SCALE: 1 1/2" = 1'-0"



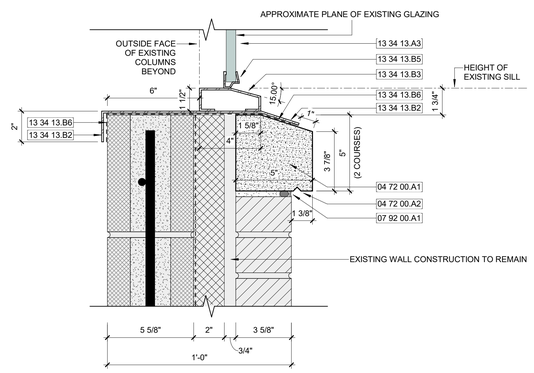
2 PIT INFILL DETAIL
SCALE: 3/4" = 1'-0"



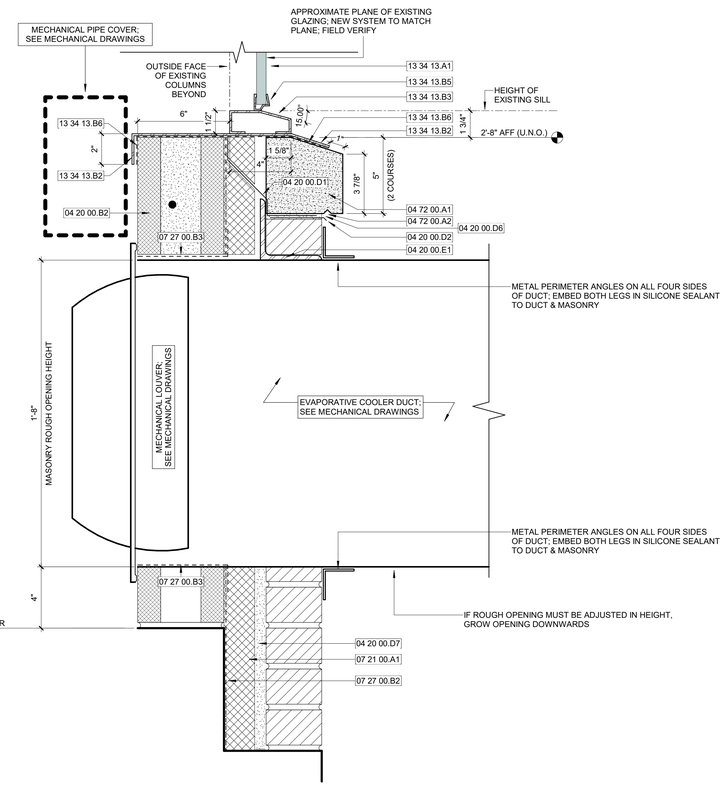
3 DETAIL - MASONRY CONTROL JOINT
SCALE: 3" = 1'-0"



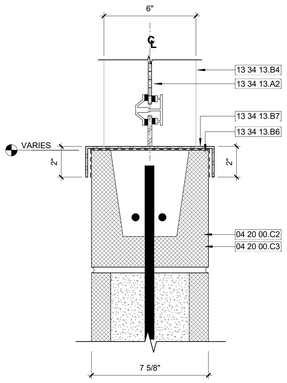
4 SECTION DETAIL - EXTERIOR SILL
SCALE: 3" = 1'-0"



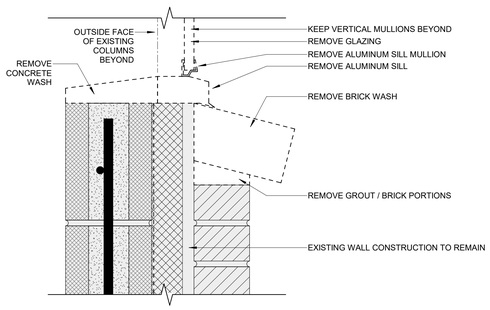
5 SECTION DETAIL - EXTERIOR SILL @ EXISTING WALL
SCALE: 3" = 1'-0"



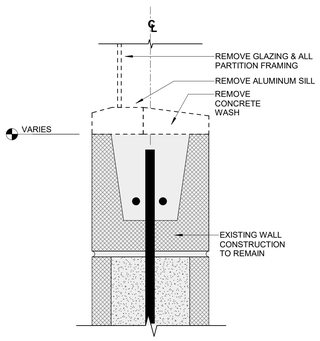
6 SECTION DETAIL - EXTERIOR EVAPORATIVE COOLER DUCT PENETRATION
SCALE: 3" = 1'-0"



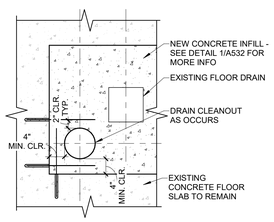
7 SECTION DETAIL - INTERIOR SILL
SCALE: 3" = 1'-0"



8 SECTION DETAIL - EXISTING EXTERIOR SILL DEMOLITION
SCALE: 3" = 1'-0"



9 SECTION DETAIL - EXISTING INTERIOR SILL DEMOLITION
SCALE: 3" = 1'-0"



10 SLAB INFILL AT DRAIN
SCALE: 3/4" = 1'-0"

KEYNOTES

04 20 00.B2	CONCRETE MASONRY UNIT BOND BEAM, 6"X8"X16", NEW
04 20 00.C2	CONCRETE MASONRY UNIT BOND BEAM, 8"X8"X16", NEW
04 20 00.C3	CONCRETE MASONRY UNIT BOND BEAM, 8"X8"X16", EXISTING
04 20 00.D1	STAINLESS STEEL / POLYMER FABRIC FLASHING - SELF-ADHERING
04 20 00.D2	STAINLESS STEEL DRIP EDGE W/ DRIP EDGE
04 20 00.D4	WEEP VENT IN HEAD JOINTS, 24" O.C.
04 20 00.D6	WEEP TUBE W/ DRAINABLE FILLER, ABOVE DUCT OPENINGS ONLY
04 20 00.D7	FULLY GROUT AIR SPACE BELOW DUCT
04 20 00.E1	L4"X4"X5/16" STEEL LOOSE LINTEL, GALVANIZED & SHOP PAINTED, SPAN & BEAR FOR 5'-0" WIDE DUCT OPENING
04 72 00.A1	CAST STONE MASONRY SILL; EXTEND UNIT LENGTHS TO MINIMIZE JOINTS; ALL JOINTS BETWEEN & AROUND TO BE RAKED & RECEIVE SILICONE SEALANT; PROVIDE APPROPRIATE ANCHORING
04 72 00.A2	CAST STONE MASONRY SILL DRIP EDGE
07 21 00.A1	POLYISOCYANURATE (ISO) INSULATION, 2" THICK
07 27 00.B2	AIR BARRIER; CONTINUE UNDER MASONRY FABRIC FLASHING TO BOTTOM OF EXISTING MASONRY LEDGE
07 27 00.B3	AIR BARRIER; CONTINUE INTO MASONRY ROUGH OPENING ON ALL SIDES
07 92 00.A1	ROD & SILICONE SEALANT, 3/8" WIDE
13 34 13.A1	NEW EXTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, EAVES, CORNERS, & SILLS
13 34 13.A2	NEW INTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, COLUMNS, PURLINS, CORNERS, TRUSSES, & SILLS
13 34 13.A3	NEW EXTERIOR GREENHOUSE GLAZING W/ EXISTING MULLIONS/EXTRUSIONS MOUNTED ON EXISTING CONSTRUCTION
13 34 13.B2	NEW 1/8" THICK ALUMINUM SILL PLATE; CONTINUOUS SILICONE SEALANT UNDER OUTSIDE EDGE
13 34 13.B3	NEW HORIZONTAL ALUMINUM EXTRUSION; MODIFY VERTICAL MULLIONS AS NEEDED TO ACCOMMODATE
13 34 13.B4	NEW ALUMINUM COLUMN; PROVIDER RESPONSIBLE FOR APPROPRIATE CROSS-SECTIONAL DESIGN BASED ON HEIGHT AND ALL OTHER RELEVANT DESIGN FACTORS
13 34 13.B5	NEW HORIZONTAL ALUMINUM SILL PROFILE; PROVIDE CORRECT PROFILE FOR FIXED GLAZING CONDITION
13 34 13.B6	NEW SELF-ADHERED EPDM MEMBRANE FLASHING
13 34 13.B7	NEW 1/8" THICK ALUMINUM SILL PLATE, CONTINUOUS FROM EXISTING TO NEW WALLS

USDA

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

DETAILS - ALL RANGES

PROJECT NO.:

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: A532

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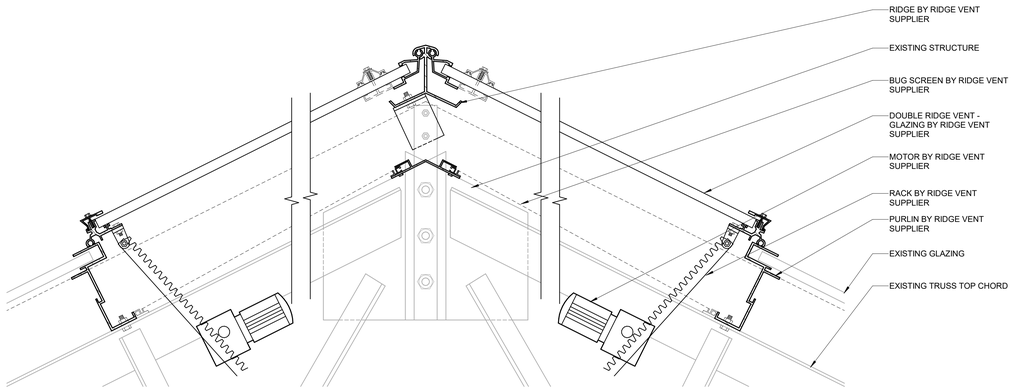
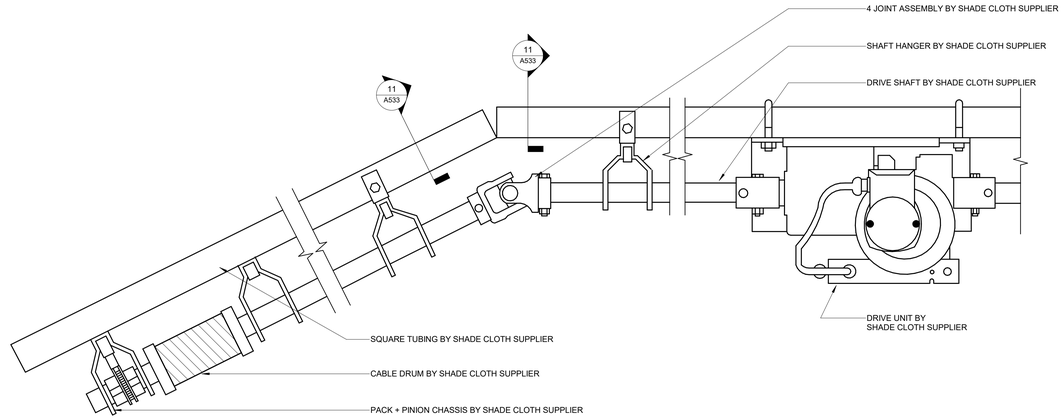
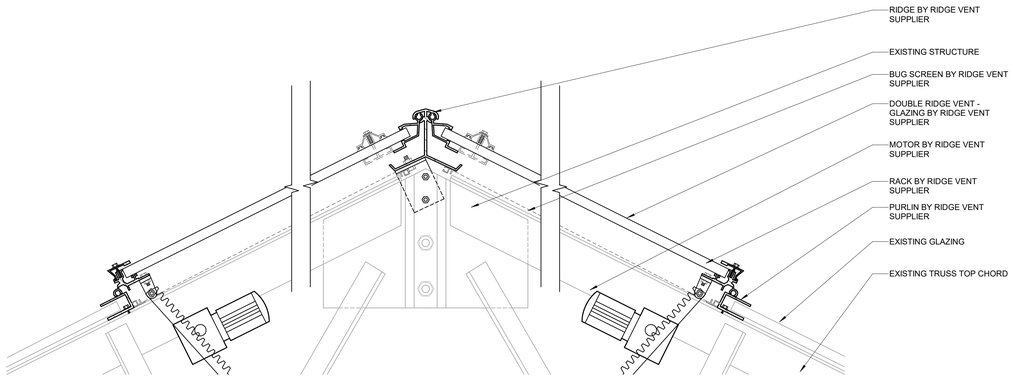


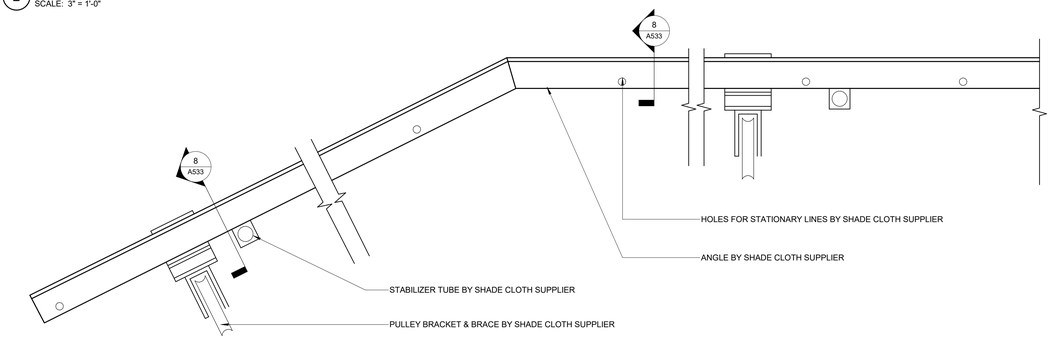
1 RIDGE/VENT DETAIL TRANSVERSE
SCALE: 3" = 1'-0"



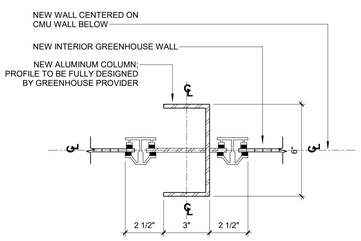
2 SHADE CLOTH - DRIVETRAIN
SCALE: 3" = 1'-0"



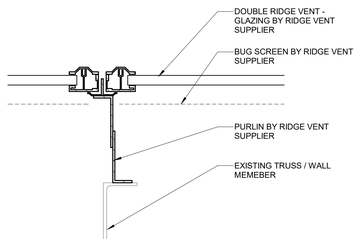
3 RIDGE/VENT DETAIL TRANSVERSE @ G
SCALE: 3" = 1'-0"



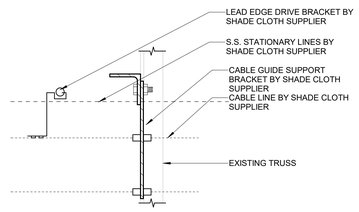
4 SHADE CLOTH - ANGLE AT ENDWALL
SCALE: 3" = 1'-0"



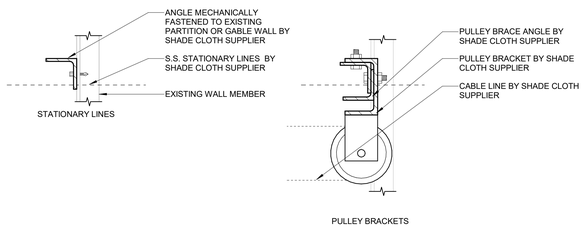
5 PLAN DETAIL - INTERIOR PARTITION COLUMN
SCALE: 3" = 1'-0"



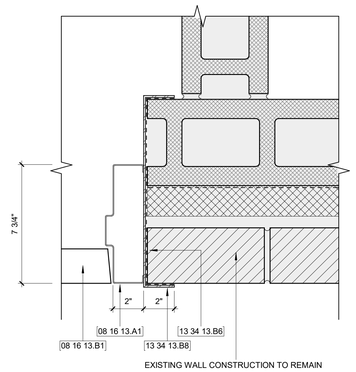
6 RIDGE/VENT DETAIL LONGITUDINAL
SCALE: 3" = 1'-0"



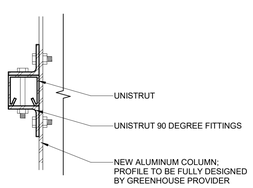
7 SHADE CLOTH - INTERMEDIATE
SCALE: 3" = 1'-0"



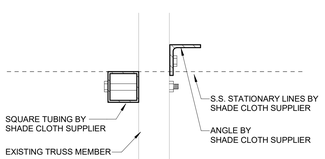
8 SHADE CLOTH - ANGLE AT PARTITIONS/GABLES
SCALE: 3" = 1'-0"



9 PLAN DETAIL - FRP DOOR JAMB (HEAD SIMILAR)
SCALE: 3" = 1'-0"



10 UNISTRUT - MOUNTING AT COLUMN
SCALE: 3" = 1'-0"



11 SHADE CLOTH - MOUNTING DETAIL
SCALE: 3" = 1'-0"

KEYNOTES

08 16 13.A1	FIBERGLASS DOOR FRAME, 7-3/4" DEPTH
08 16 13.B1	FIBERGLASS DOOR PANEL, 1-3/4" DEPTH
13 34 13.B6	NEW SELF-ADHERED EPDM MEMBRANE FLASHING
13 34 13.B8	NEW 1/8" THICK ALUMINUM CLOSURE PLATE, CONTINUE ON ALL THREE SIDES OF ROUGH OPENING

SCHEMMER

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

DETAILS - ALL RANGES

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: A533

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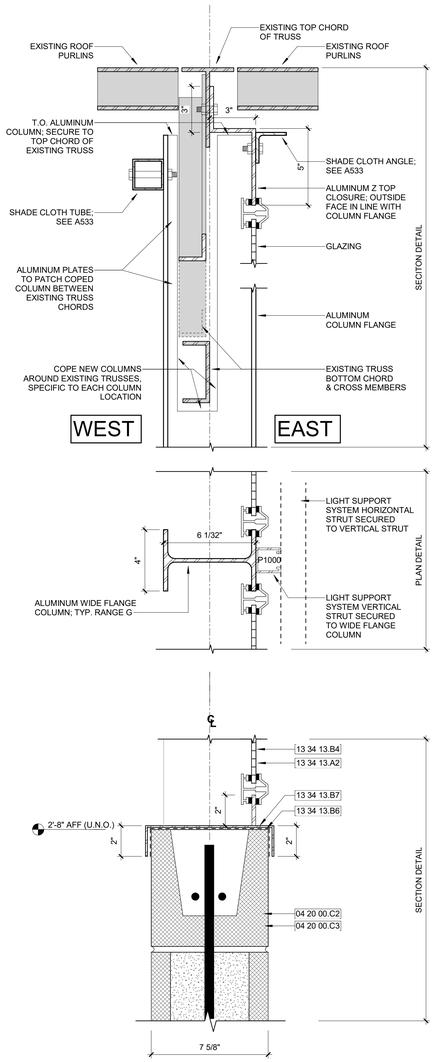
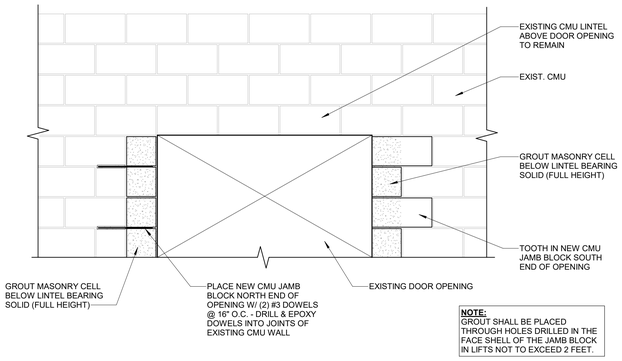
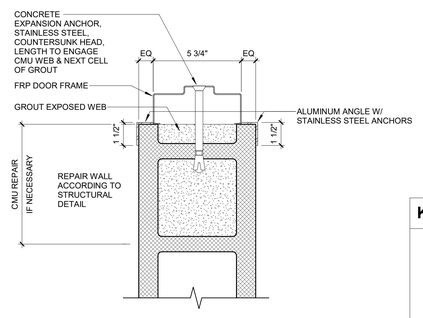


1 SECTION & PLAN DETAILS - NEW PARTITIONS @ GRIDS, RANGE G
SCALE: 3" = 1'-0"



NOTE:
GROUT SHALL BE PLACED THROUGH HOLES DRILLED IN THE FACE SHELL OF THE JAMB BLOCK IN LIFTS NOT TO EXCEED 2 FEET.

2 STRUCTURAL CMU JAMB REPAIR DETAIL
SCALE: 3/4" = 1'-0"
TYPICAL OF ALL DOOR OPENINGS WITHIN FIRE BARRIER WALLS BETWEEN THE HEADHOUSE AND RANGES THAT ONLY REQUIRE REBUILDING OF THE CMU DUE TO DEGRADATION



3 PLAN DETAIL - DOOR JAMB @ FIRE BARRIER
SCALE: 3" = 1'-0"
TYPICAL OF ALL DOOR OPENINGS, JAMBS & HEADS, WITHIN FIRE BARRIER WALLS BETWEEN THE HEADHOUSE AND RANGES

KEYNOTES

04 20 00.C2	CONCRETE MASONRY UNIT BOND BEAM, 8"X8"X16", NEW
04 20 00.C3	CONCRETE MASONRY UNIT BOND BEAM, 8"X8"X16", EXISTING
13 34 13.A2	NEW INTERIOR GREENHOUSE WALL (GLAZING, MULLIONS, GIRTS) MOUNTED ON EXISTING CONSTRUCTION; PROVIDE REQUIRED DETAILING AT ALL PARTITION INTERSECTIONS, COLUMNS, PURLINS, CORNERS, TRUSSES, & SILLS
13 34 13.B4	NEW ALUMINUM COLUMN; PROVIDER RESPONSIBLE FOR APPROPRIATE CROSS-SECTIONAL DESIGN BASED ON HEIGHT AND ALL OTHER RELEVANT DESIGN FACTORS
13 34 13.B6	NEW SELF-ADHERED EPDM MEMBRANE FLASHING
13 34 13.B7	NEW 1/8" THICK ALUMINUM SILL PLATE, CONTINUOUS FROM EXISTING TO NEW WALLS

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USDA NCSL GREENHOUSES — PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

DETAILS - ALL RANGES

A-E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: SWS	EPM: M McWILLIAMS
CHECKED BY: TJS	SAFETY & HEALTH: E WELKER
DRAWN BY: SWS	REAL PROPERTY: W ROSS

PROJECT NO.:
DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
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SHEET: A534

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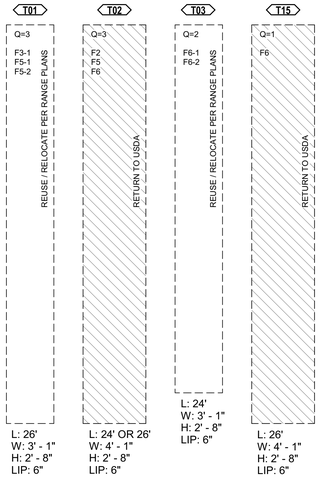
EXD	DSC	PH	PM

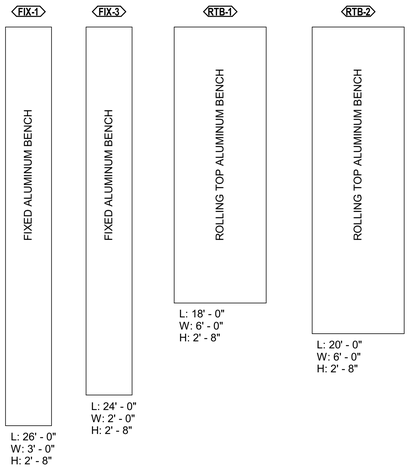
BENCH TYPES

EXISTING FIXED GREENHOUSE BENCHES



DISCARD MAKESHIFT WOOD BENCHES IN CELL: F2
RETURN TO USDA ALL PLASTIC BENCHES FOUND IN CELLS: F3, & F4
RETURN TO USDA MAKESHIFT ALUMINUM BENCHES IN CELL: F2

NEW GREENHOUSE BENCHES



HEIGHT TO THE TOP OF BENCH WORK SURFACE IS 2'-5"
HEIGHT TO THE TOP OF BENCH LIP IS 2'-8"
REFER TO DETAIL SHEET Q501 FOR MORE INFORMATION

GENERAL NOTES

1. SERVICE SHOWN ON PLANS ARE FOR INFORMATION ONLY. REFER TO MECHANICAL, ELECTRICAL & PLUMBING DRAWINGS FOR EXACT QUANTITY & LOCATION OF SERVICE FIXTURES.
2. SERVICES SHOWN ON PLANS ARE NOT NECESSARILY INDICATED ON ELEVATIONS.
3. DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO ESTABLISH BASIC DIMENSION OF UNITS, SIGHT LINES & UNITS PROFILES.

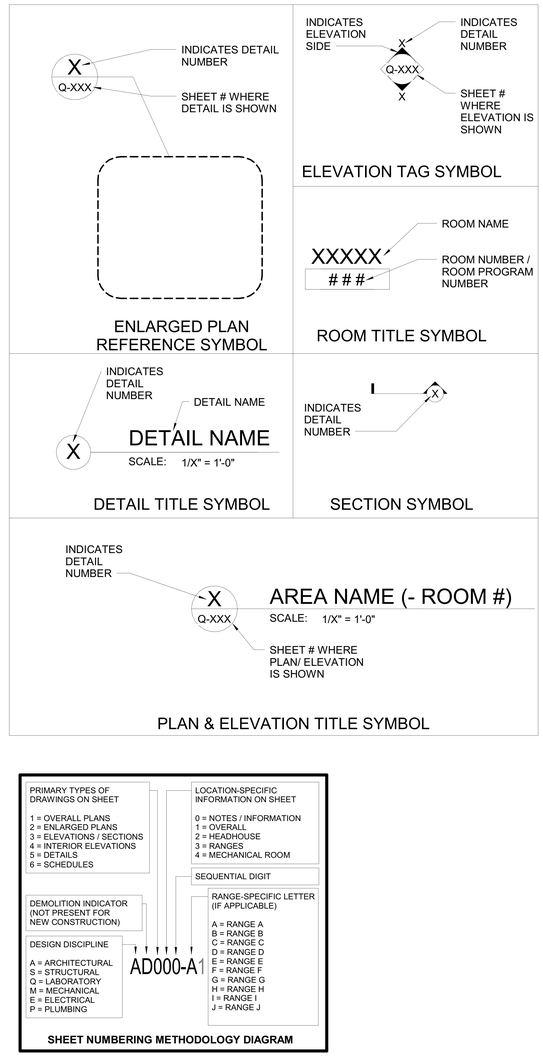
LEGEND - SERVICES/ ABBREVIATIONS

LABORATORY SERVICES	
FD	FLOOR DRAIN
HB	HOSE BIB
A	COMPRESSED AIR
RO	REVERSE OSMOSIS WATER

MISCELLANEOUS	
ADA	AMERICAN WITH DISABILITIES ACT
ADAAG	ADA ACCESSIBILITY GUIDELINES
A.F.F.	ABOVE FLOOR FINISH
V.I.F.	VERIFY IN FIELD
N.I.C.	NOT IN CONTRACT
S.S.	STAINLESS STEEL
UNO	UNLESS NOTED OTHERWISE
W/	WITH
M	MOVABLE
S	SINK
SH	SHELVING
SIM.	SIMILAR
OPP.	OPPOSITE
EQ.	EQUAL
EA.	EACH
MTD.	MOUNTED

LAB SERVICE SYMBOL	
◄ T	TELEPHONE
◄ D	DUPLEX DATA OUTLETS
⊶ A	BENCH MOUNTED SERVICE FIXTURE
A ⊶ A	BENCH MOUNTED SERVICE FIXTURE W/2 OUTLETS
⊠ A	BENCH MOUNTED SERVICE FIXTURE W/4 OUTLETS
⊣ A	WALL OR PANEL MOUNTED SERVICE OUTLETS
⊶ A	SINGLE WALL MOUNTED SERVICE OUTLET W/QUICK DISCONECT
⬭	CUP SINK

SYMBOL LEGEND: (PLAN / ELEVATION / DETAIL DRAWINGS)



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SCHEMMER

Page Stantec

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION
1			

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.: DATE: 05/11/2026

USDA

Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

LEGENDS, NOTES, AND ABBREVIATIONS

FACILITIES ENGINEERING SECTION
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2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET Q101

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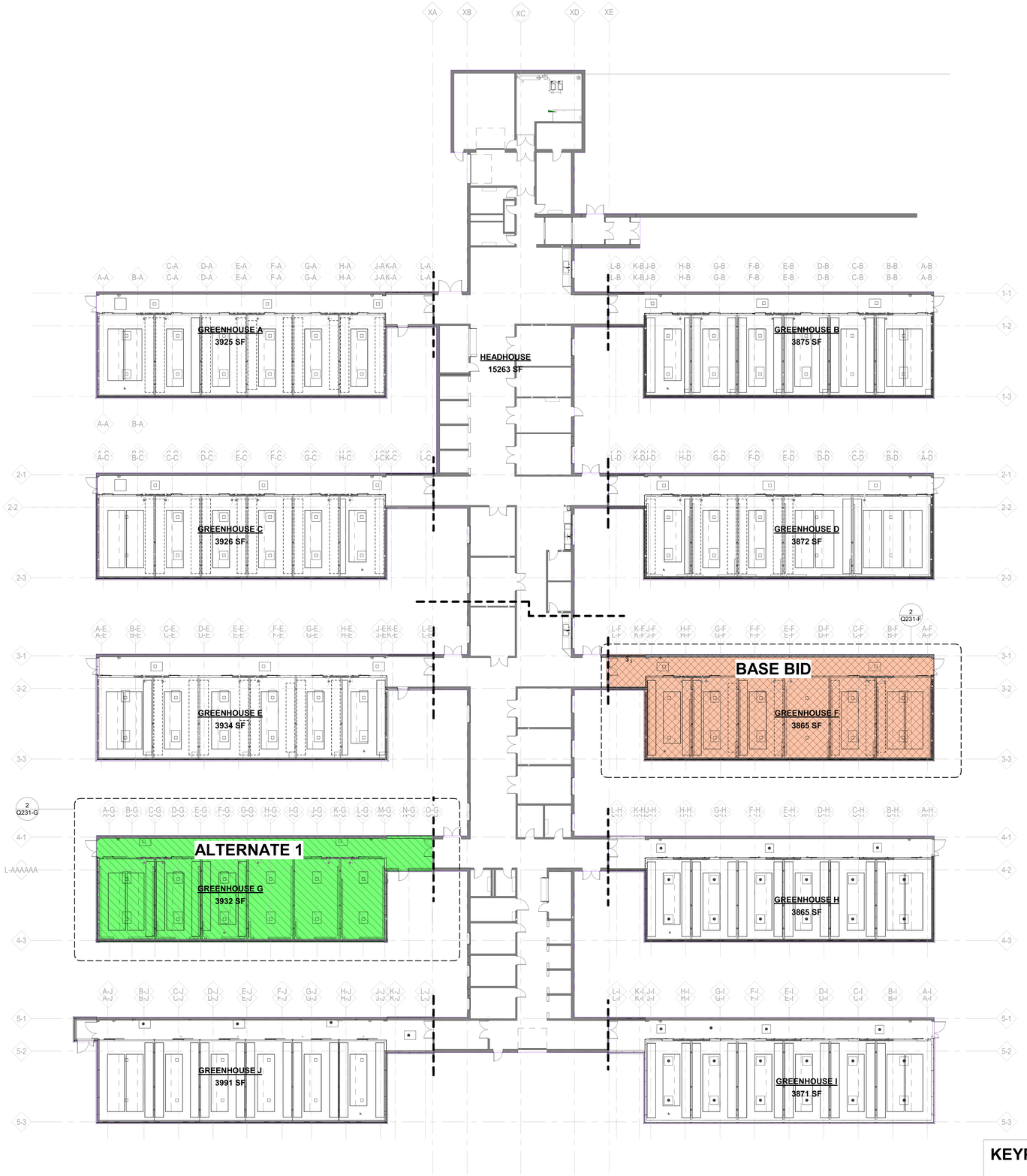


REFER TO SHEET G001 FOR ILLUSTRATION OF FULL SCOPE OF BASE BID, ALTERNATES, AND UNIT PRICES.

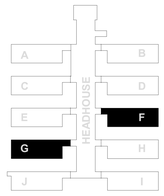
BASE BID - RENOVATE RANGE F

ALTERNATE 1 - RENOVATE RANGE G

1 FIRST FLOOR LAB PLAN - COMPOSITE

SCALE: 1/16" = 1'-0"

KEYPLAN



NORTH

SCHEMMER

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REVISIONS

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USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

FIRST FLOOR PLAN - COMPOSITE

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.

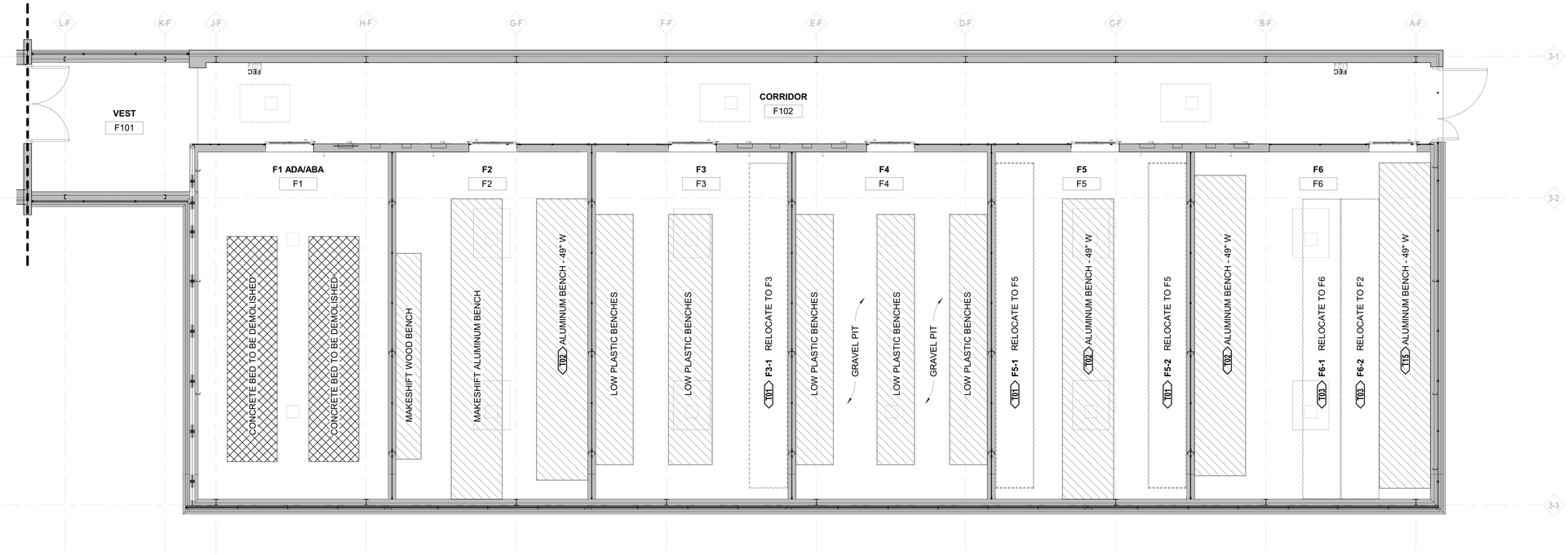
DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: Q111

Autodesk Docs://09228/021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - LAB.rvt
5/8/2026 10:37:41 AM

CAD | DSC | DW | PM



1 FIRST FLOOR EXISTING LAB PLAN - RANGE F

SCALE: 1/4" = 1'-0"

REFURBISH ALUMINUM FRAMES AND ALL EXISTING COMPONENTS AS NECESSARY.

REMOVE TRANSITE (ASBESTOS) SHEETS/INSERTS.

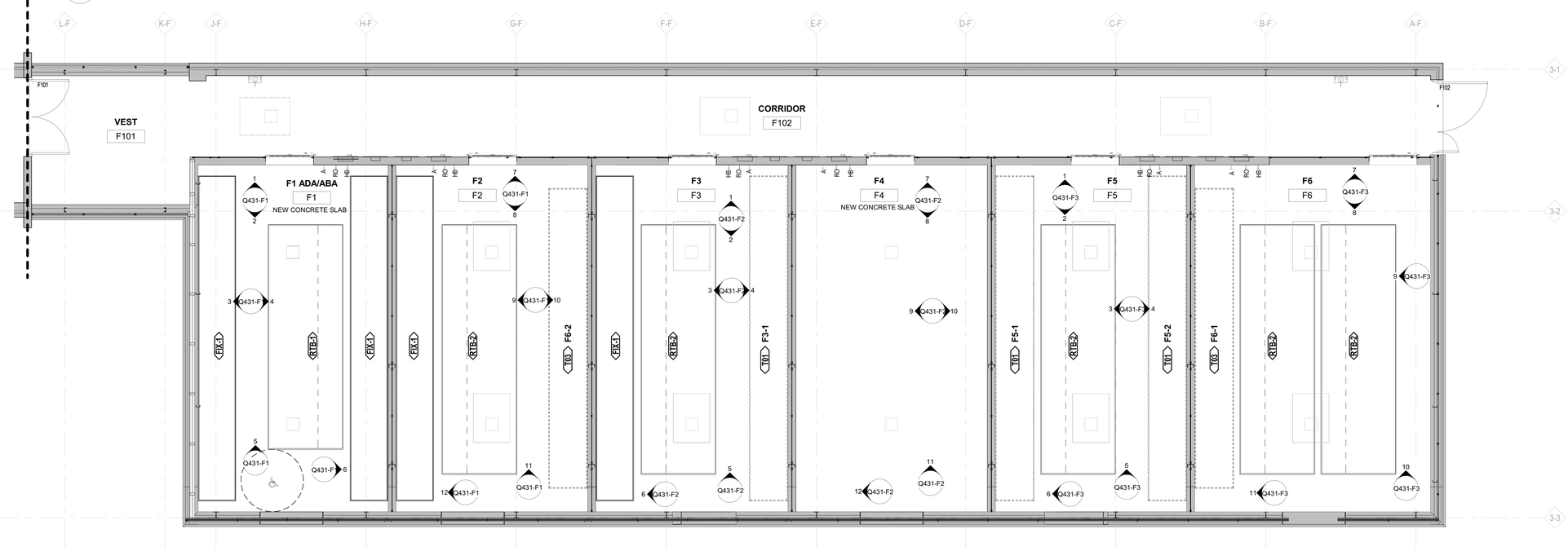
REPLACE REMOVED SHEETS/INSERTS WITH NEW PLASTIC INSERTS IN KIND OR SIMILAR TO THE EXISTING PLASTIC INSERTS. SIZE AND DIMENSIONS ARE BY THE FRAME SIZE.

RELOCATE PER NEW FLOOR LAB PLAN.

EXISTING / NOT USED. REFER TO NOTES ON BENCH TYPES ON SHEET Q101 AND PROCEED ACCORDINGLY. RETURN TO USDA IF APPLICABLE.

EXISTING / DEMOLISHED.

NEW BENCH.

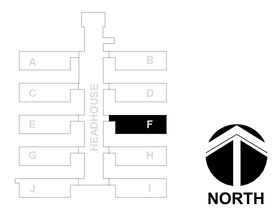


2 FIRST FLOOR LAB PLAN - RANGE F

SCALE: 1/4" = 1'-0"

THE SCOPE OF THIS SHEET IS PART OF BASE BID

KEYPLAN



SCHEMMER

Page Stantec

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ENLARGED LAB FLOOR PLAN - RANGE F

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.:

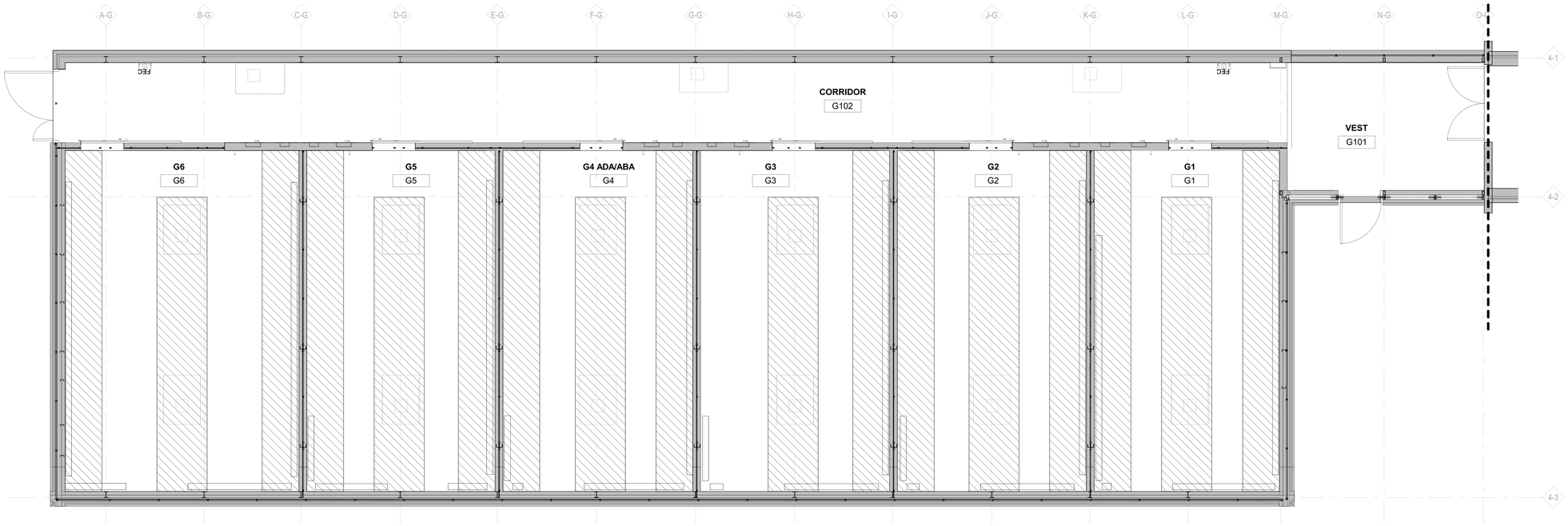
DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: Q231-F

Autodesk Docs://09228021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - LAB.rvt
5/8/2026 10:37:43 AM

CAD | DSC | DH | PM



1 FIRST FLOOR EXISTING LAB PLAN - RANGE G

SCALE: 1/4" = 1'-0"

REFURBISH ALUMINUM FRAMES AND ALL EXISTING COMPONENTS AS NECESSARY.

REMOVE TRANSITE (ASBESTOS) SHEETS/INSERTS.

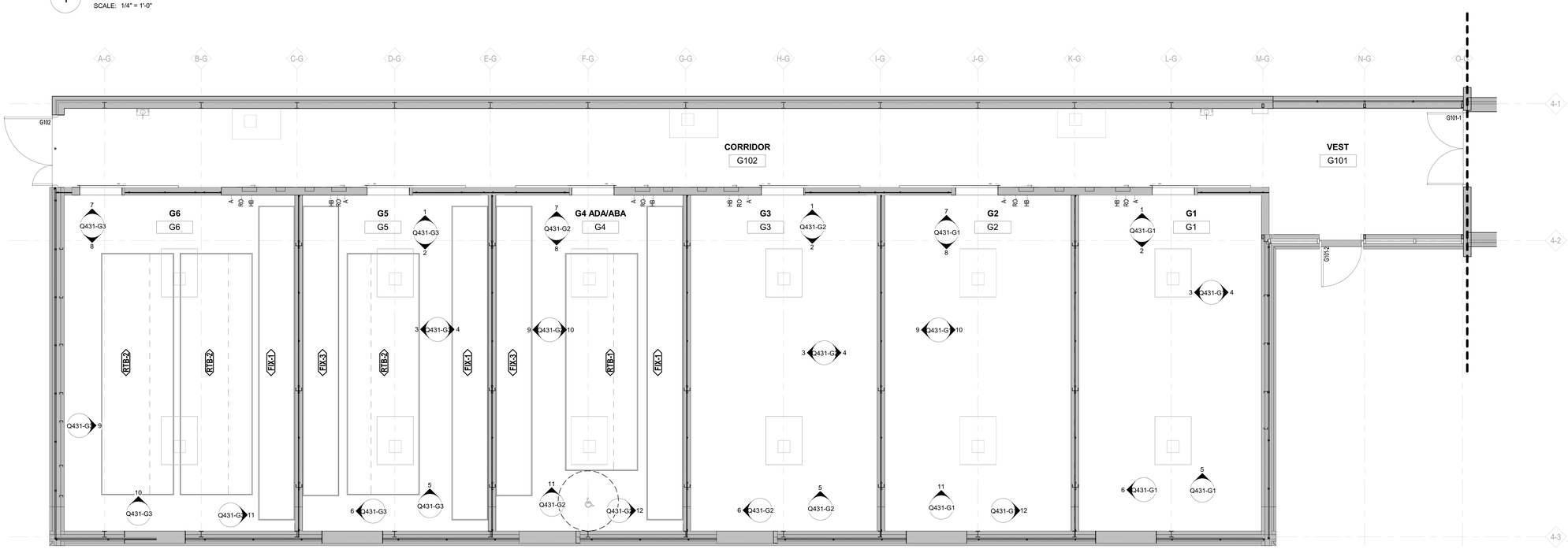
REPLACE REMOVED SHEETS/INSERTS WITH NEW PLASTIC INSERTS IN KIND OR SIMILAR TO THE EXISTING PLASTIC INSERTS. SIZE AND DIMENSIONS ARE BY THE FRAME SIZE.

RELOCATE PER NEW FLOOR LAB PLAN.

EXISTING / NOT USED. REFER TO NOTES ON BENCH TYPES ON SHEET Q101 AND PROCEED ACCORDINGLY. RETURN TO USDA IF APPLICABLE.

EXISTING / DEMOLISHED.

NEW BENCH.

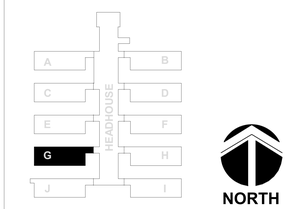


2 FIRST FLOOR LAB PLAN - RANGE G

SCALE: 1/4" = 1'-0"

USDA

KEYPLAN



THE SCOPE OF THIS SHEET IS PART OF ALTERNATE 1

SCHEMMER

Page Stantec

PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ENLARGED LAB FLOOR PLAN - RANGE G

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: Q231-G

Autodesk Docs://009228021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - LAB.rvt
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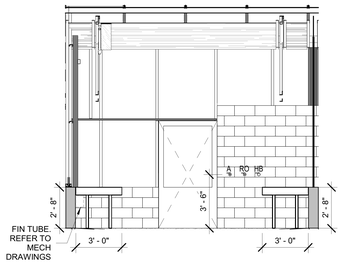
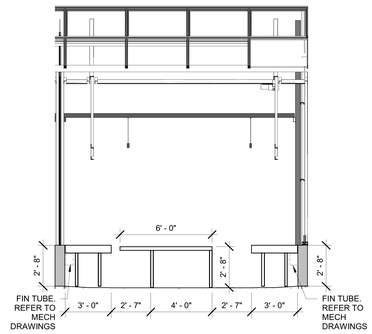
CAD	DSG	DH	PM



1 CELL F1 - RANGE - F

SCALE: 1/4" = 1'-0"



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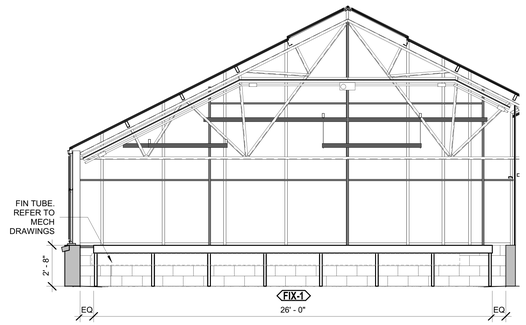

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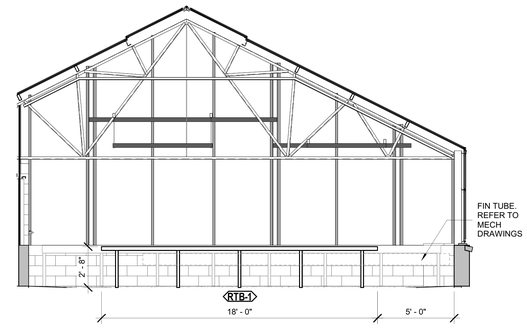
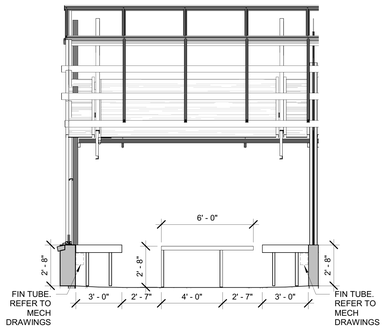


4 CELL F1 - RANGE - F

SCALE: 1/4" = 1'-0"



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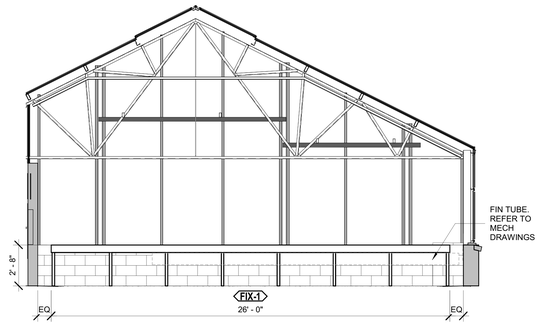
SCALE: 1/4" = 1'-0"



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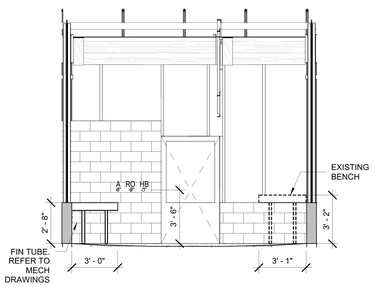
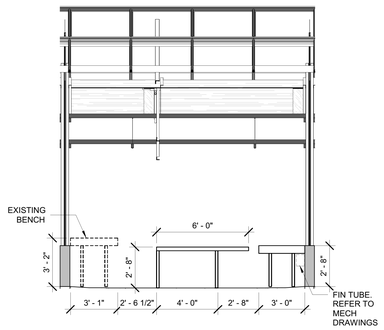
SCALE: 1/4" = 1'-0"



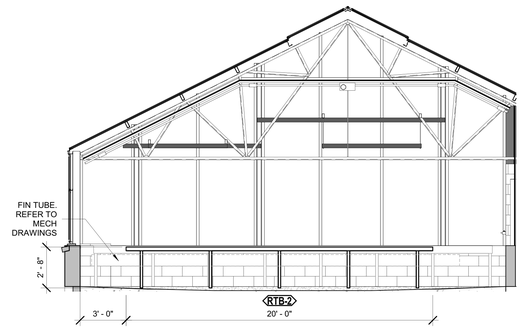
7 CELL F2 - RANGE - F

SCALE: 1/4" = 1'-0"



8 CELL F2 - RANGE - F

SCALE: 1/4" = 1'-0"



9 CELL F2 - RANGE - F

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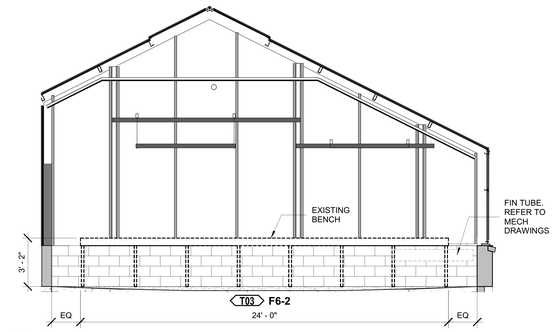

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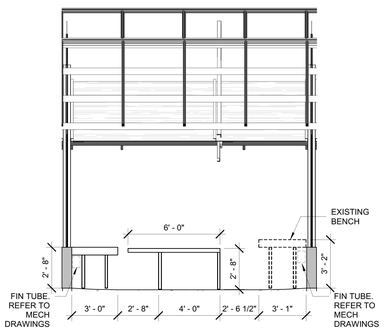

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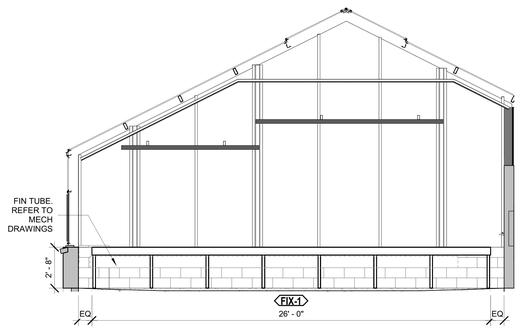

12 CELL F2 - RANGE - F

SCALE: 1/4" = 1'-0"

THE SCOPE OF THIS SHEET IS PART OF ALTERNATE 3

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR LAB ELEVATIONS - RANGE F

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.:

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: Q431-F1

SCHEMMER

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PROJECT NO.: 09228.021

Autodesk Docs://I09228/021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - LAB.rvt
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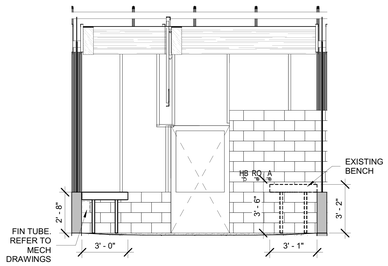
CAD	DISC	DH	PM



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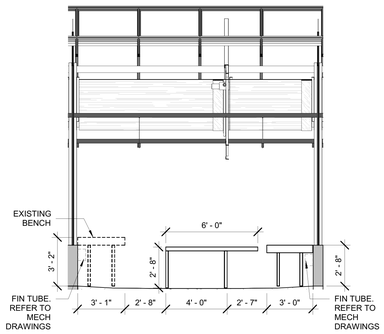
SCALE: 1/4" = 1'-0"



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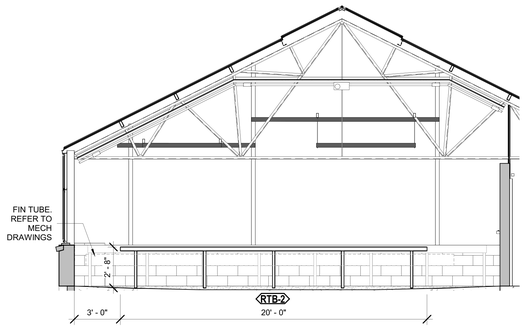

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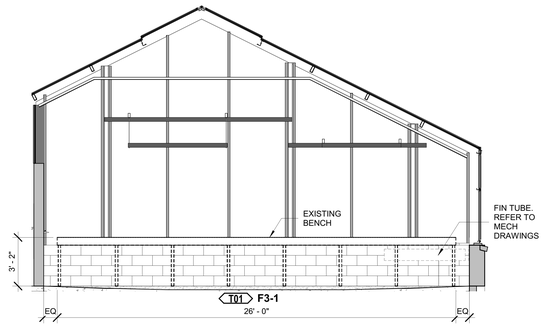

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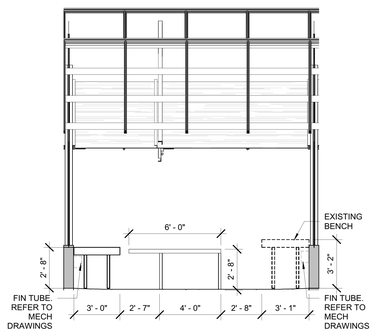

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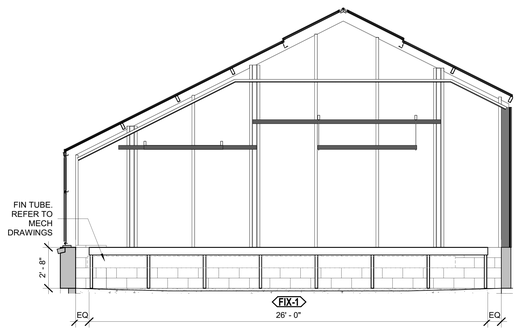
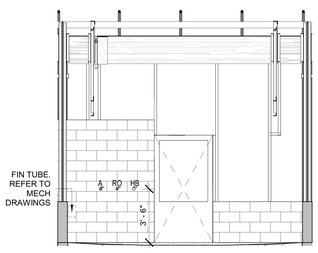


6 CELL F3 - RANGE - F
SCALE: 1/4" = 1'-0"



7 CELL F4 - RANGE - F
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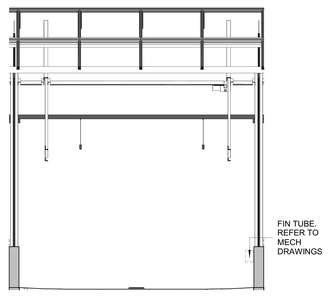

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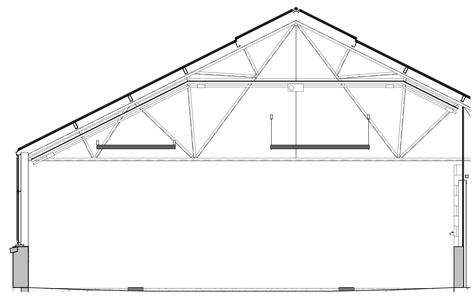

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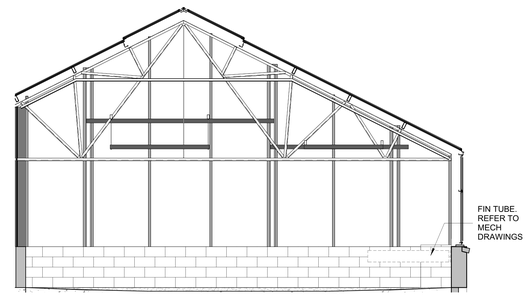

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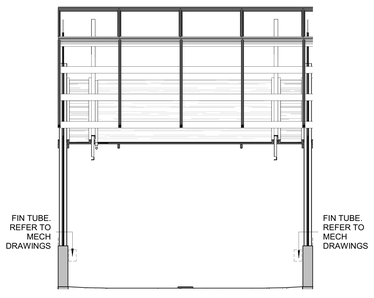

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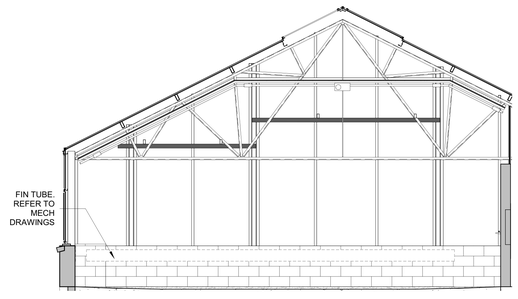

12 CELL F4 - RANGE - F
SCALE: 1/4" = 1'-0"

THE SCOPE OF THIS SHEET IS PART OF BASE BID

SCHEMMER

Page Stantec

PROJECT NO.: 09228.021

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.: 09228.021

DATE: 05/11/2026

USDA Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR LAB ELEVATIONS - RANGE F

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: Q431-F2

Autodesk Docs://09228/021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - LAB.rvt
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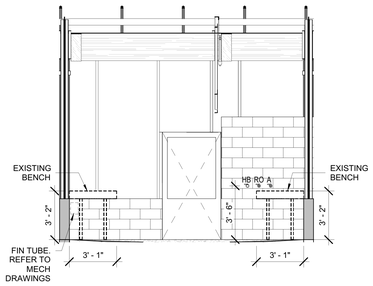
CAD	DISC	DH	PM



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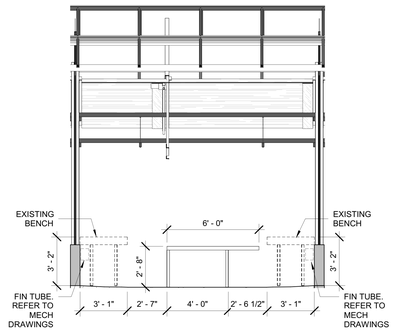
SCALE: 1/4" = 1'-0"



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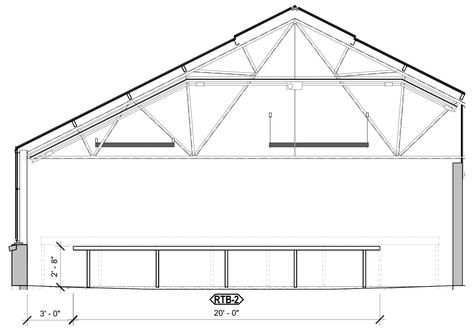

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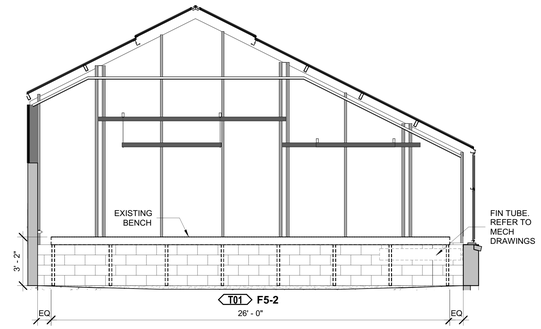
SCALE: 1/4" = 1'-0"



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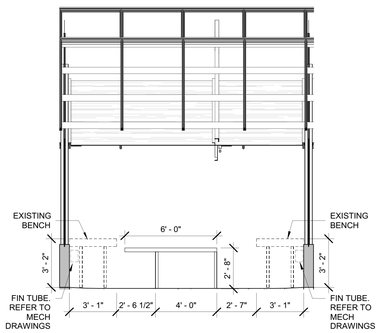
SCALE: 1/4" = 1'-0"



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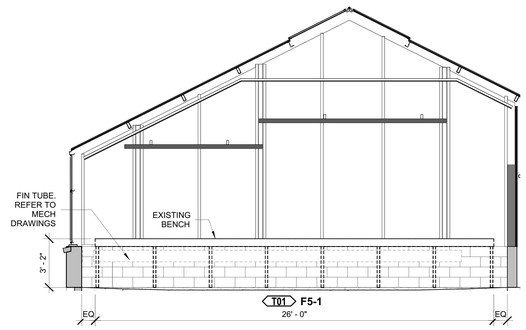

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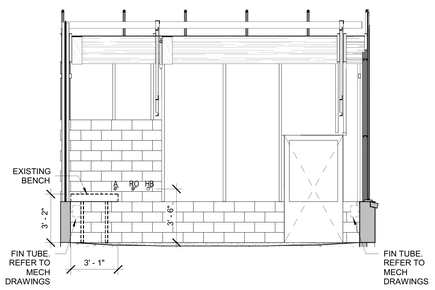
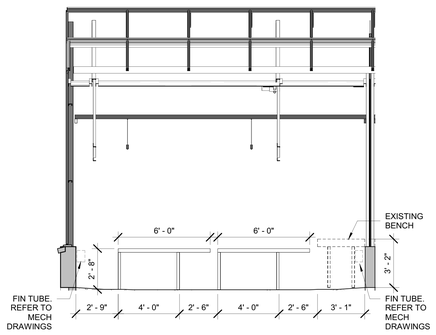
SCALE: 1/4" = 1'-0"



7 CELL F6 - RANGE - F

SCALE: 1/4" = 1'-0"



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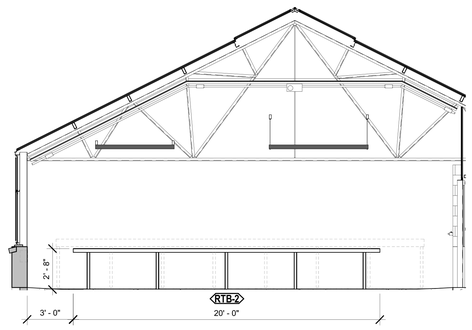

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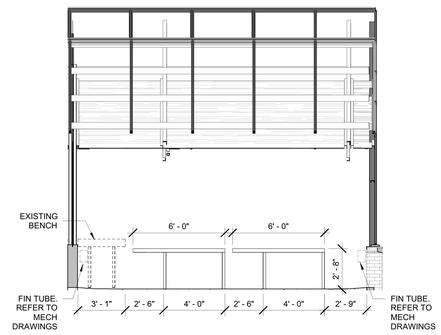

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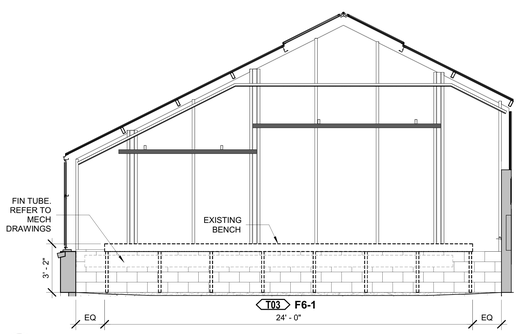

11 CELL F6 - RANGE - F

SCALE: 1/4" = 1'-0"

THE SCOPE OF THIS SHEET IS PART OF BASE BID

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NO.	DATE	BY	DESCRIPTION

REVISIONS

95% DESIGN - NOT FOR CONSTRUCTION

USDA

Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR LAB ELEVATIONS - RANGE F

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.: 09228.021

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: Q431-F3

SCHEMMER

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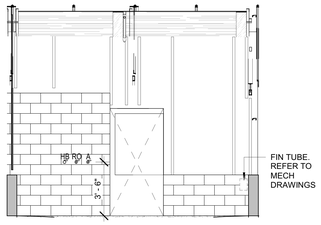

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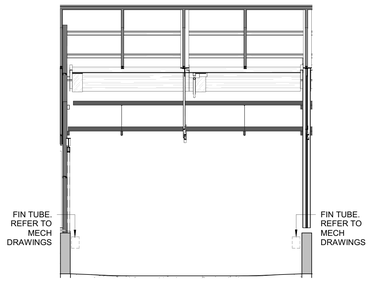

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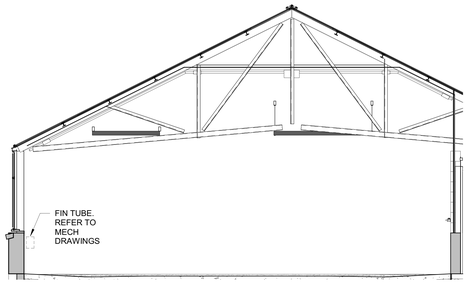

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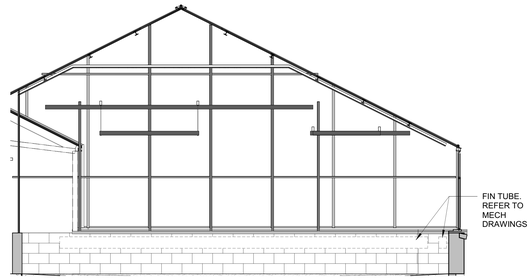

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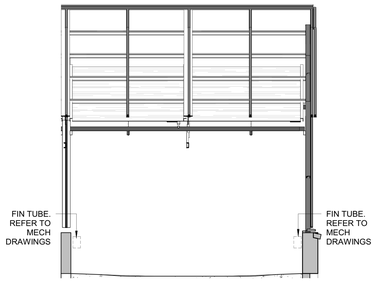

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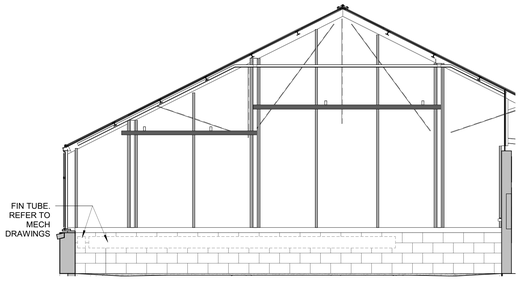

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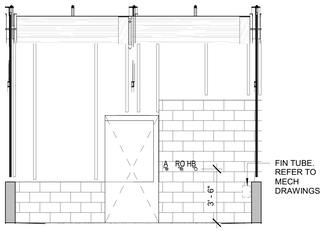

7 CELL G2 - RANGE - G
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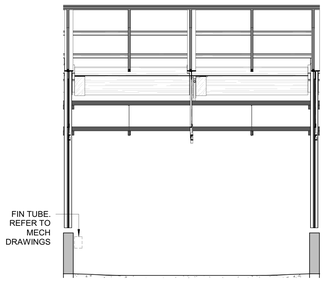

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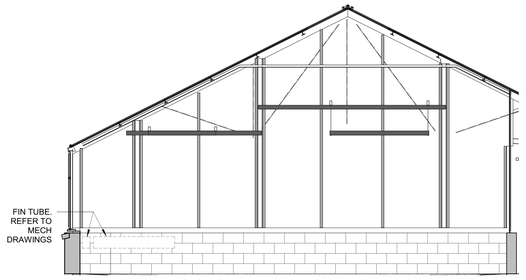

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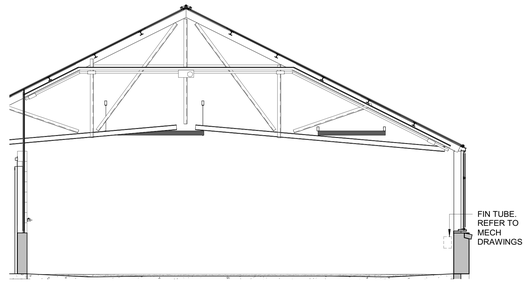

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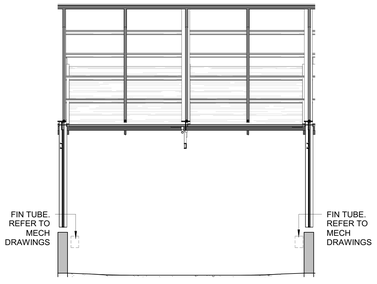

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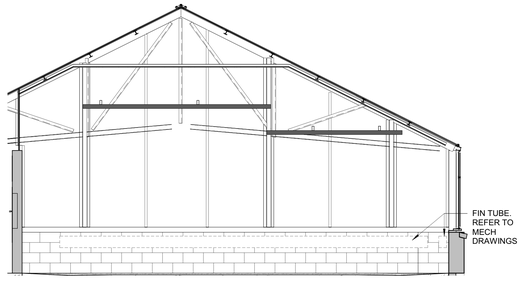

12 CELL G2 - RANGE - G
SCALE: 1/4" = 1'-0"

THE SCOPE OF THIS SHEET IS PART OF ALTERNATE 1

USDA

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REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR LAB ELEVATIONS - RANGE G

PROJECT NO.: 09228.021

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: Q431-G1

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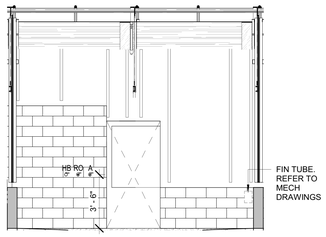

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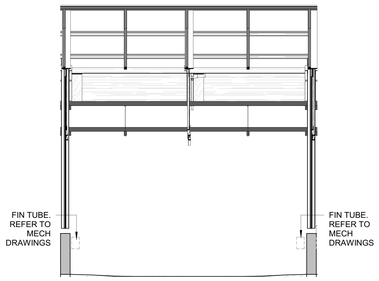

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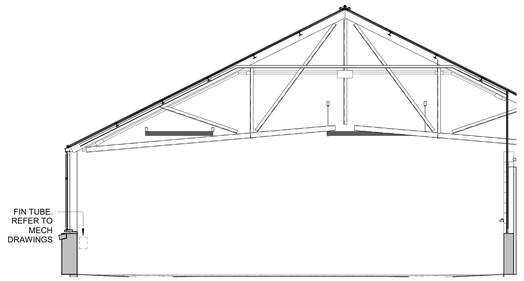

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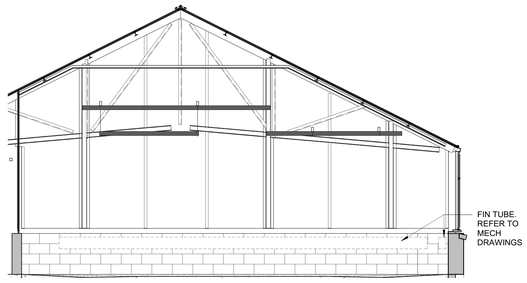

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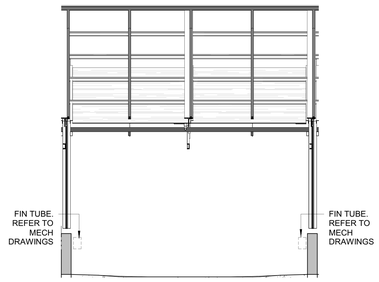

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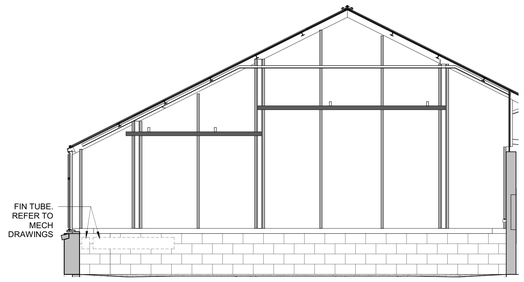

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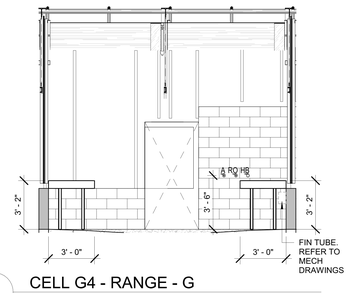

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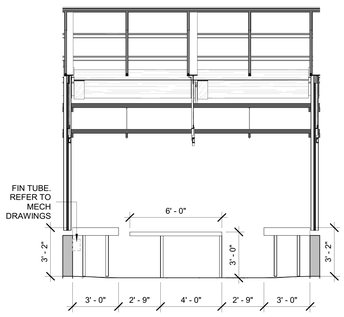

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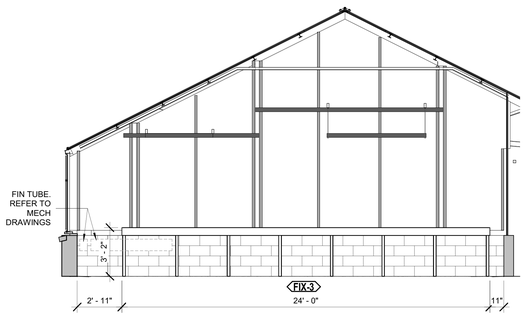

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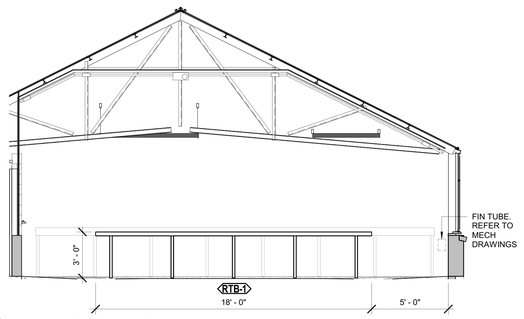

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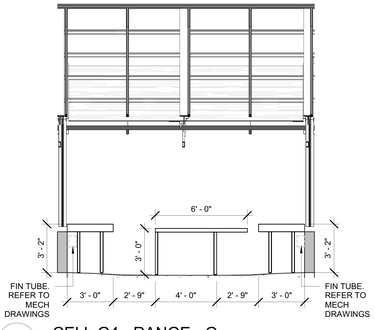

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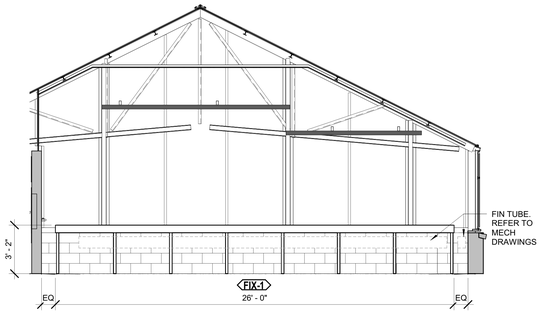

12 CELL G4 - RANGE - G
SCALE: 1/4" = 1'-0"

THE SCOPE OF THIS SHEET IS PART OF ALTERNATE 1

USDA

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REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR LAB ELEVATIONS - RANGE G

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.:

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526–8119

SHEET: Q431-G2

SCHEMMER

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PROJECT NO.: 09228.021

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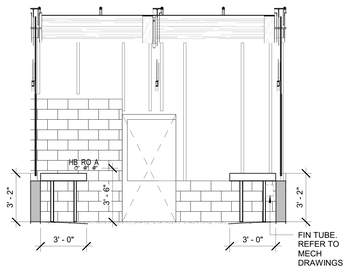
CAD | DSC | DH | PM



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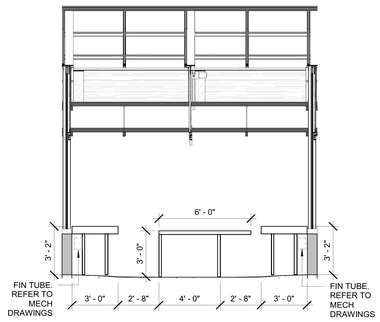

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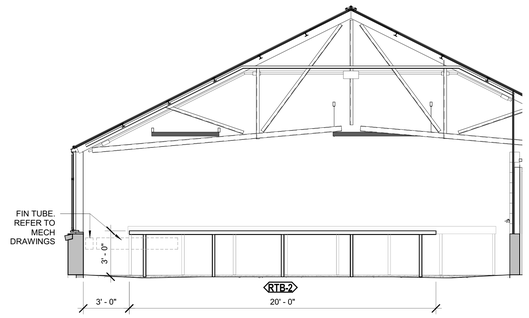

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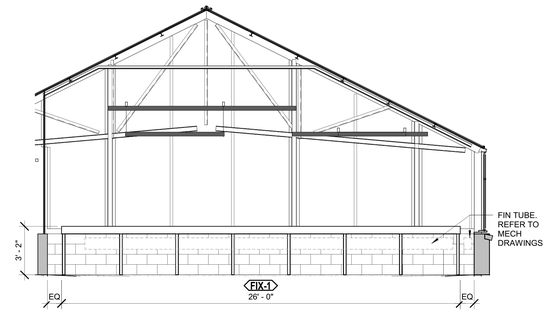

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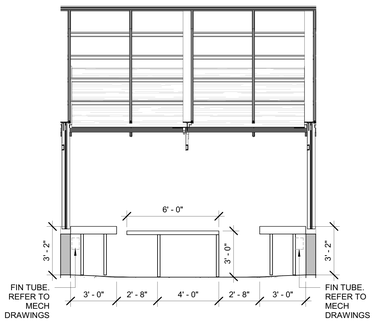

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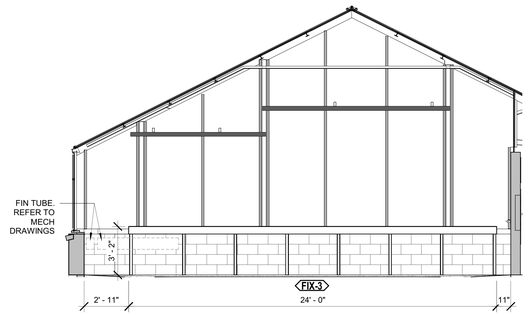

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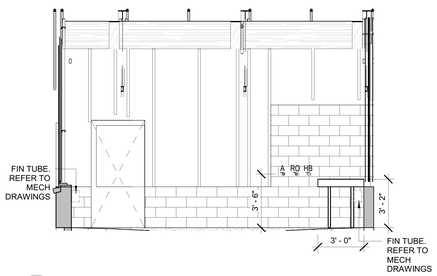

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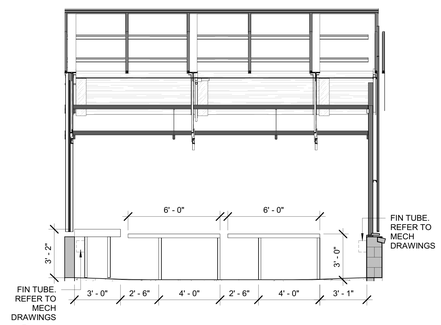

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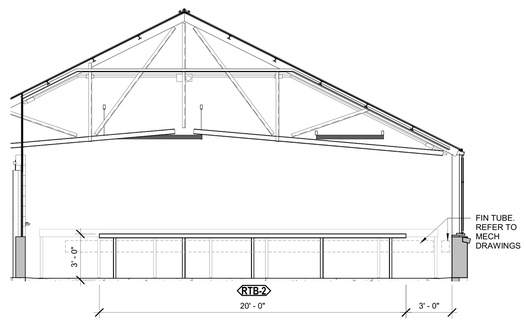

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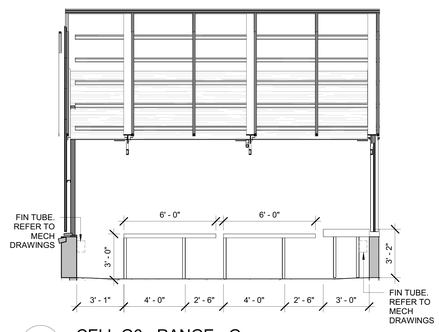

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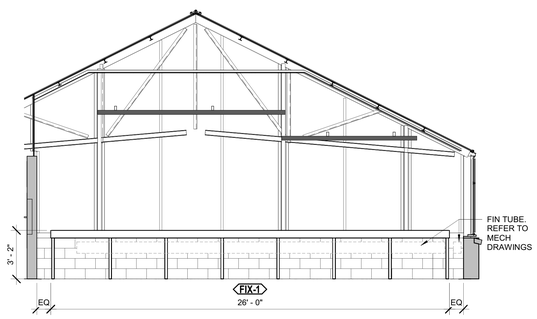

11 CELL G6 - RANGE - G
SCALE: 1/4" = 1'-0"

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USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

INTERIOR LAB ELEVATIONS - RANGE G

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.:

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: Q431-G3

SCHEMMER

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PROJECT NO.: 09228.021

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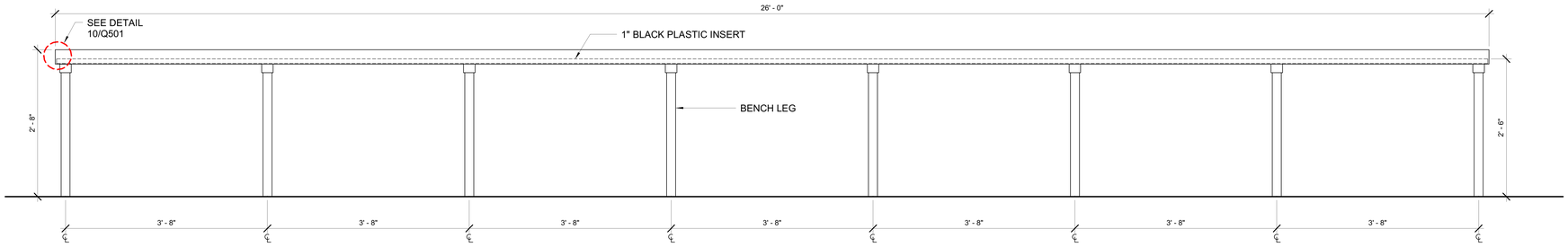
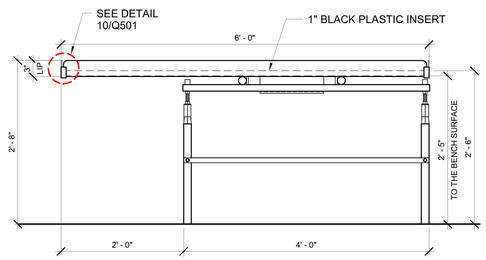
CAD	DISC	DH	PM



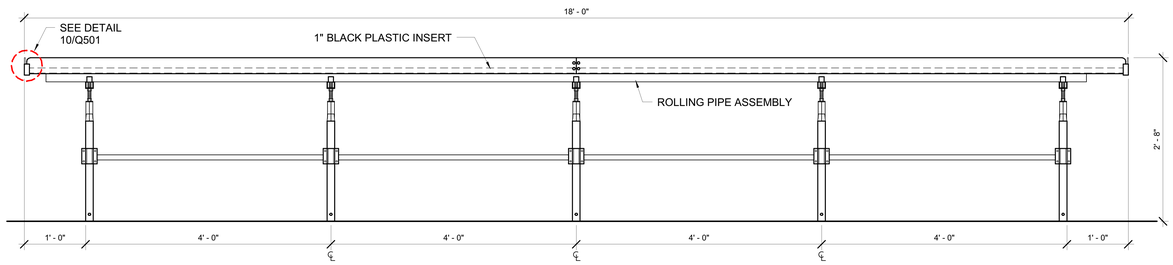
1 SECTION THOUGH NEW BENCH TYPE FIX-1

SCALE: 1" = 1'-0"



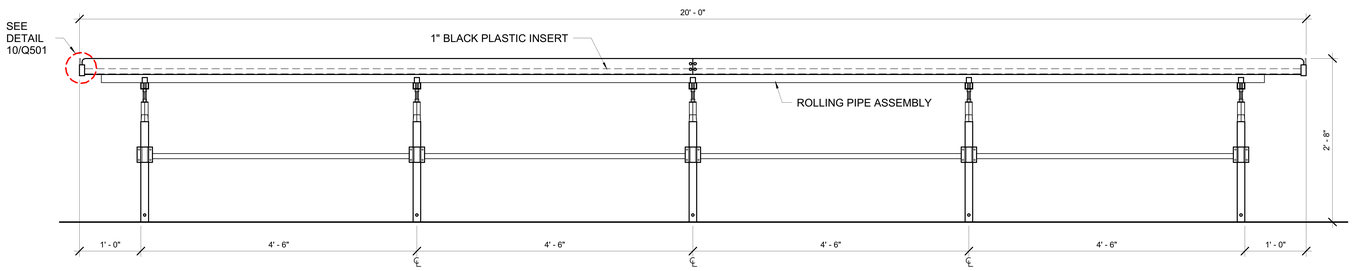
2 SECTION THOUGH NEW BENCH TYPE RTB-1 & RTB-2

SCALE: 1" = 1'-0"



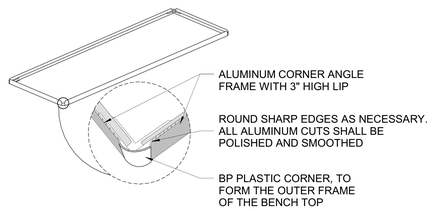
3 SECTION THOUGH NEW BENCH TYPE RTB-1

SCALE: 1" = 1'-0"



4 SECTION THOUGH NEW BENCH TYPE RTB-2

SCALE: 1" = 1'-0"



5 ROLLING TOP BENCH CORNER ANGLE PROTECTION - DETAIL

SCALE: 1" = 1'-0"

Autodesk Docs://09228/2021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - LAB.rvt
5/8/2026 10:38:01 AM

CAD	DSC	DH	PM

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: WA	EPM: M McWILLIAMS
CHECKED BY: SS	SAFETY & HEALTH: E WELKER
DRAWN BY: DR	REAL PROPERTY: W ROSS

PROJECT NO.: 09228.021

SCHEMMER

Page Stantec

USDA

Agricultural Research Service

USDA NCSL GREENHOUSE RENOVATION – PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

GREENHOUSE BENCH DETAILS

PROJECT NO. 09228.021

DATE 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET Q501

PIPE AND FITTING SYMBOLS

DOUBLE LINE | SINGLE LINE

- PIPE
- WELDED JOINT
- SCREWED JOINT (OR GENERIC SINGLE LINE)
- FLANGED JOINT
- UNION
- GROOVED END JOINT
- BRAIDED FLEXIBLE COUPLING
- SPHERICAL FLEXIBLE COUPLING
- BELLOWS-TYPE FLEXIBLE COUPLING
- MECHANICAL (BALL) JOINT
- GROOVED END ADAPTER FLANGE
- FLANGED COUPLING ADAPTER
- STUB END OR FLANGE ADAPTER W/ FLANGE RING
- ELBOW, 45 DEGREE (LONG RADIUS UON)
- ELBOW, 90 DEGREE (LONG RADIUS UON)
- ELBOW, 90 DEGREE - CHANGE IN DIRECTION TOWARD VIEWER
- ELBOW, 90 DEGREE - CHANGE IN DIRECTION AWAY FROM VIEWER
- TEE
- TEE, BRANCH TOWARD VIEWER
- TEE, BRANCH AWAY FROM VIEWER
- LATERAL
- REDUCER - CONCENTRIC
- REDUCER - ECCENTRIC
- CAP
- ANCHOR
- PG — PG — PIPE ALIGNMENT GUIDE
- BF — BF — BLIND FLANGE
- TEST PORT
- PIPING WITH INSULATION
- E E E E — INSULATED PIPE WITH HEAT TRACING TYPE AS NOTED (E=ELECTRIC, S=STEAM, HW=HOT WATER)
- SECONDARY CONTAINMENT (SLEEVED) PIPING
- STRAINER - "Y" TYPE WITH BLOW DOWN
- STRAINER - BASKET TYPE
- AIR SEPARATOR
- M — M — WATER METER
- THERMOWELL WITH THERMOMETER
- PRESSURE GAUGE W/GAUGE COCK (SERVICES EXCEPT STEAM)
- PRESSURE GAUGE W/GAUGE COCK AND SYPHON LOOP (STEAM / CONDENSATE SERVICE)
- VENTURI FLOW METER
- FLOW ORIFICE PLATE
- OFFSET (45° ELBOWS UON)
- F&T — F&T — STEAM TRAP, TYPE AS NOTED
  - IB = INVERTED BUCKET
  - F&T = FLOAT & THERMOSTATIC
  - TH = THERMODYNAMIC
  - BP = BALANCED PRESSURE
- GENERIC PUMP

NOTES:
1. ONLY WELDED FITTINGS ARE SHOWN FOR DOUBLE LINE PIPING. FITTINGS WITH OTHER END CONDITIONS ARE SIMILAR

PIPING DESIGNATION

EXAMPLE:

2" CHWS

2" CHWS

- SYSTEM SERVICE ABBREVIATION
- NOMINAL PIPE SIZE (IN INCHES)

VALVE SYMBOLS

DOUBLE LINE | SINGLE LINE

- GATE VALVE (GENERIC VALVE SYMBOL)
- CHECK VALVE
- NON-SLAM (SPRING) CHECK VALVE
- BUTTERFLY VALVE
- DIAPHRAGM VALVE
- BALL VALVE
- COMBINATION BALANCING & SHUT-OFF VALVE
- PLUG VALVE
- SELF-ACTUATING REGULATOR (DIAPHRAGM-TYPE ACTUATOR UON)
- 25 — 25 — PRESSURE REDUCING VALVE INDICATING LOW SIDE PRESSURE
- 100 — 100 — PRESSURE RELIEF/SAFETY VALVE INDICATING RELIEF PRESSURE
- TEMPERATURE CONTROL VALVE
- THREE-WAY VALVE (BALL TYPE BODY SHOWN)
- GLOBE VALVE
- GLOBE VALVE, SEALED STEM
- ANGLE VALVE
- CIRCUIT SETTER
- AUTOMATIC AIR VENT
- MANUAL AIR VENT
- VACUUM BREAKER

MANUAL ACTUATOR SYMBOLS

- HANDWHEEL ACTUATOR, NON-RISING STEM
- LEVER ACTUATOR
- HANDWHEEL ACTUATOR, RISING STEM, OUTSIDE SCREW AND YOKE (OS&Y)
- G — GEAR ACTUATOR (HANDWHEEL OR CRANK)

NOTE:
VALVE TYPE GRAPHICS ARE SHOWN FOR SIZES 4 INCH NOMINAL AND LARGER. MAY OR MAY NOT BE DESCRIBED ON VALVE SIZES SMALLER THAN 4 INCH NOMINAL.

AUTOMATIC VALVES

SEE AUTOMATIC ACTUATOR SYMBOLS (TYP)

- 2-WAY VALVE, GLOBE STYLE
- 3-WAY VALVE, GLOBE STYLE
- 2-WAY VALVE, GATE STYLE
- 3-WAY VALVE, BUTTERFLY STYLE
- 2-WAY VALVE, BUTTERFLY STYLE
- 2-WAY VALVE, BALL STYLE

AUTOMATIC ACTUATOR SYMBOLS

- S — ELECTRIC ACTUATOR, SOLENOID
- PNEUMATIC ACTUATOR, DIAPHRAGM
- M — ELECTRIC ACTUATOR, MOTOR
- M — PNEUMATIC ACTUATOR, MOTOR

MULTI-LINE DESIGNATION KEY

HORIZONTAL RUN ON PLAN READ TOP TO BOTTOM

2" HWS
2" HWR
4" CWR
4" CWS

BOP 12'-6" AFF LOWER PIPE RACK

4" HA (F) *
2" IA
2" IW
2" DIS
2" DIR

BOP 13'-6" AFF UPPER PIPE RACK

HWS
HWR
CWR
CWS

HA(F) *
IA
IW
DIS
DIR

VERTICAL RUN ON PLAN READ LEFT TO RIGHT

DIR DIS IW HA (F) *

CWS CWR HWR HWS

4" CWS
4" CWR
2" HWR
2" HWS

BOP 12'-6" AFF LOWER PIPE RACK

2" DIR
2" DIS
2" IW
2" IA
4" HA (F) *

BOP 13'-6" AFF UPPER PIPE RACK

* - (F) INDICATES FUTURE PIPING ON RACK

GRAPHIC SYMBOLS

- SECTION NUMBER
- DIRECTION OF CUTTING PLANE
- SHEET NO. OF THE PACKAGE ON WHICH SECTION IS DRAWN

EXAMPLE: ASSUME A SECTION IS CUT ON DWG. P2.01 WITH A TAG OF 1/P6.01. THE SECTION No. 1 IS ON DRAWING No. P6.01.

- SECTION OR DETAIL NUMBER
- DRAWING TITLE
- SCALE: 1/4" = 1'-0"
- DRAWING TITLE
- SCALE OF SECTION OR DETAIL

- DETAIL NUMBER
- SHEET NO. ON WHICH DETAIL IS DRAWN

DUCTWORK SYMBOLS

DOUBLE LINE | SINGLE LINE

- W/D — W/D — UNLINED DUCTWORK. FIRST DIMENSION (W) IS SIDE SHOWN
- W/D — W/D — ACOUSTICALLY LINED DUCTWORK. FIRST DIMENSION (W) IS SIDE SHOWN
- DØ — DØ — ROUND DUCT. D = DIAMETER
- W/DØ — W/DØ — FLAT OVAL DUCT (W=MAJOR AXIS WIDTH, D=MINOR AXIS DIAMETER)
- FLEXIBLE DUCT
- OFFSET, RECTANGULAR DUCT (45° ELBOWS UON)
- OFFSET, ROUND DUCT (45° ELBOWS UON)
- DIRECTION OF AIRFLOW
- R — R — DUCT SLOPE IN DIRECTION OF AIR FLOW (R=RISE, D=DROP)
- SUPPLY DUCT SECTION TOWARD VIEWER
- SUPPLY DUCT SECTION AWAY FROM VIEWER
- RETURN DUCT SECTION TOWARD VIEWER
- RETURN DUCT SECTION AWAY FROM VIEWER
- EXHAUST RELIEF DUCT SECTION TOWARD VIEWER
- EXHAUST RELIEF DUCT SECTION AWAY FROM VIEWER
- FLEXIBLE CONNECTION
- VD — VD — MANUAL VOLUME DAMPER, (PARALLEL BLADE UON)
- OBD — OBD — OPPOSED BLADE DAMPER (OBD)
- M — M — MOTORIZED VOLUME DAMPER, ACTUATOR TYPE AS SPECIFIED
- BDD — BDD — BACKDRAFT DAMPER
- FDx — FDx — FIRE DAMPER (FD) OR COMBINATION FIRE/SMOKE DAMPER (FSD)
  - = HORIZONTAL POSITION
  - = VERTICAL POSITION
  - x = HOUR RATING
- AD — AD — ACCESS DOOR
- HUMIDIFIER
- MITERED ELBOW (WITH TURNING VANES UON)
- R — RADIUS ELBOW (R=1.5W UON)
- W — 2-WAY T-SPLIT (FLOWS DIVERGING ONLY)
- BRANCH DUCT TAP (FLOW TO OR FROM BRANCH DUCT)
- DUCT TRANSTITION, ASYMETRIC (RECT x RECT)
- DUCT TRANSTITION, SYMETRIC (RECT x RECT)
- DUCT TRANSTITION (RECT x ROUND)
- SPIN-IN FITTING WITH DAMPER, FITTING TYPE AS SPECIFIED

ARROWS, IF SHOWN, INDICATE THROW PATTERN. LACK OF ARROWS AT CEILING DIFFUSERS INDICATES SCHEDULED THROW PATTERN UON.

ROUND | RECTANGULAR

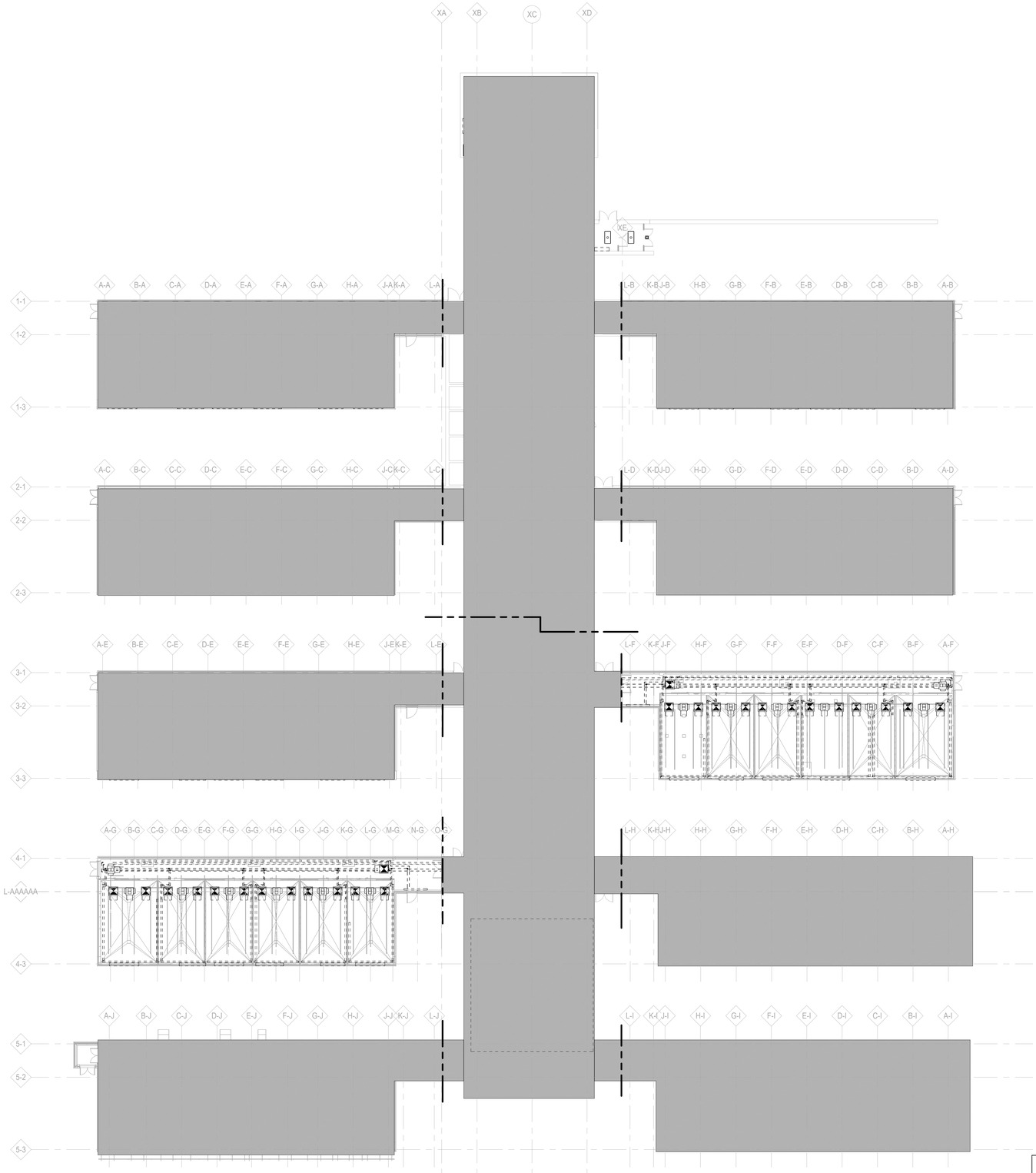
- CFM X — CEILING SUPPLY MARK (SEE SCHEDULE FOR FACE SIZE, NECK SIZE AND CONSTRUCTION) DESIGN CFM
- CFM X — CEILING RETURN OR EXHAUST MARK (SEE SCHEDULE FOR FACE SIZE, NECK SIZE AND CONSTRUCTION) DESIGN CFM
- CFM X, FxF — SIDEWALL GRILLE OR REGISTER DESIGN CFM MARK (SEE SCHEDULE FOR TYPE, SERVICE AND CONSTRUCTION) FACE SIZE (INCHES)
- CFM X, L — SLOT DIFFUSER MARK (SEE SCHEDULE FOR WIDTH AND NUMBER OF SLOTS, NECK SIZE AND CONSTRUCTION) LENGTH (FEET) DESIGN CFM
- DG — DOOR GRILLE
- UCD 1" — UNDERCUT DOOR (UNDERCUT HEIGHT SHOWN)
- LOUVER
- SUPPLY AIRFLOW
- RETURN OR EXHAUST AIRFLOW
- CONSTANT-VOLUME FAN-POWERED TERMINAL UNIT FLEXIBLE CONNECTIONS AT PRIMARY AIR INLET AND UNIT DISCHARGE (TYP. FOR ALL FAN-POWERED TERMINAL UNITS)
- VV (VARIABLE-VOLUME) OR CV (CONSTANT-VOLUME) TERMINAL UNIT (SHOWN WITH TERMINAL HEATING COIL)

ABBREVIATIONS

A	AIR LINE	FL	FLOW LINE (℄)	P	PUMP
AAV	AUTOMATIC AIR VENT	FOB	FLAT ON BOTTOM	P/E	PNEUMATIC ELECTRIC
ABS	ABSOLUTE	FOT	FLAT ON TOP	%	PERCENT
ABV	ABOVE	FLTR	FILTER	PA	PIPE ANCHOR
AC	ALTERNATING CURRENT, AIR CURTAIN	FPM	FEET PER MINUTE	PC	PUMPED CONDENSATE
ACCU	AIR COOLED CONDENSING UNIT	FPS	FEET PER SECOND	PCC	PRECOOL COIL
ACHKV	AUTOMATIC CHECK VALVE	FRP	FIBERGLASS REINFORCED PLASTIC	PD	PRESSURE DROP, PRESSURE DIFFERENTIAL
AP	ACCESS PANEL	FSS	FLOW SENSING SWITCH	PMPSCT	PUMP SUCTION
ACU	AIR CONDITIONING UNIT	FSTAT	FREEZE STAT	PCD	PUMPED CONDENSATE DISCHARGE
AD	ACCESS DOOR, AREA DRAIN	FT	FLOW TRANSMITTER, FOOT, FEET	PDISCH	PUMP DISCHARGE
ADP	APPARATUS DEW POINT	FT LB	FOOT-POUND	POS	POSITIVE, PROVIDED BY OTHER SECTION
AF	AIR FILTER	FP	FREEZING POINT	PE	PNEUMATIC ELECTRIC
AFF	ABOVE FINISHED FLOOR	FTR	FINNED TUBE RADIATION	PR	PUMPED RETURN
AHU	AIR HANDLING UNIT	FURN	FURNACE, FURNISH	PRESS SW	PRESSURE SWITCH
ALT	ALTITUDE	FVEL	FACE VELOCITY	PG	PRESSURE GAUGE
AMB	AMBIENT	FVNR	FULL VOLTAGE NON-REVERSING	PH	PHASE
AMP	AMPERE			PHC	PREHEAT COIL
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE			PHWR	PRIMARY HOT WATER RETURN
APD	AIR PRESSURE DROP	GA	GAUGE (INSTRUMENT), GAGE (THICKNESS)	PHWS	PRIMARY HOT WATER SUPPLY
APPROX	APPROXIMATE	GAL	GALLON	PRS	PRESSURE REDUCING STATION
APR	AIR PRESSURE RETURN	GEN	GENERATOR, GENERAL	PRV	PRESSURE REDUCING VALVE
AS	AIR SEPARATOR	GI	GALVANIZED IRON	PRV	PRESSURE REGULATING VALVE
ASU	AIR SUPPLY VENT	GIP	GALVANIZED IRON PIPE	PPM	PARTS PER MILLION
ASV	ANGLE STOP VALVE	GLV	GLOBE VALVE	PLBG	PLUMBING
ATC	AUTOMATIC TEMPERATURE CONTROL	GPD	GALLONS PER DAY	PRESS	PRESSURE
ATM	ATMOSPHERE	GPH	GALLONS PER HOUR	PRI	PRIMARY
ATV	ATMOSPHERIC VENT	GPM	GALLONS PER MINUTE	PS	PRESSURE SWITCH
AUV	AUTOMATIC VENT	GR	GLYCOL RETURN, GRAINS	PSF	POUNDS PER SQUARE FOOT
AV	AIR VENT	GS	GLYCOL SUPPLY	PSI	POUNDS PER SQUARE INCH
AVG	AVERAGE	GSH	GRAND SENSIBLE HEAT	PSIA	POUNDS PER SQUARE INCH ABSOLUTE
AWG	AMERICAN WIRE GAUGE	GTD	GREATEST TEMPERATURE DIFFERENCE	PSID	POUNDS PER SQUARE INCH DIFFERENTIAL
		GTH	GRAND TOTAL HEAT	PSIG	POUNDS PER SQUARE INCH GAUGE
		GTV	GATE VALVE	PSL	PIPE SLEEVE
				PSV	PRESSURE SAFETY VALVE
B&S	BELL & SPIGOT			PT	PIPE THREAD, PNEUMATIC TUBE
B/B	BACK TO BACK	H	HUMIDIFIER	PTAC	PACKAGED TERMINAL AIR CONDITIONER
BAL	BALANCE	HB	HOSE BIBB	PTRV	PRESSURE TEMPERATURE RELIEF VALVE
BARO PR	BAROMETRIC PRESSURE	HC	HEATING COIL, HOSE CABINET		
BBD	BOILER BLOWDOWN	HCONN	HOSE CONNECTOR		
BF	BOTH FACES	HD	HEAD	Q	TOTAL, TOTAL HEAT
BFV	BUTTERFLY VALVE	HEPA	HIGH EFFICIENCY PARTICULATE ARRESTANCE	QT	QUART
BFBP	BOILER FEED BOOSTER PUMP	HEX	HEAT EXCHANGER	QTY	QUANTITY
BFW	BOILER FEED WATER	HFC	HEPA FILTER CABINET		
BLDG	BUILDING	HG	MERCURY		
BHP	BRAKE HORSEPOWER, BOILER HORSEPOWER	HGR	HANGER	R	RELOCATED
BLR	BOILER	HGT	HEIGHT	RA	RETURN AIR
BLW	BELOW	HP	HEAT PUMP, HIGH PRESSURE, HORSEPOWER	RAC	ROOM AIR CONDITIONER
BLWDN	BLOW DOWN LINE	HPB	HIGH PRESSURE BOILER	RAD	RADIATOR
BO	BLOWOFF	HPDT	HIGH PRESSURE DRIP TRAP	RCVR	RECEIVER
BOD	BOTTOM OF DUCT	HPC	HIGH PRESSURE CONDENSATE	RECT	RECTANGULAR [DUCT]
BOP	BOTTOM OF PIPE	HPS	HIGH PRESSURE STEAM	REFR	REFRIGERATION, REFRIGERANT
BOS	BOTTOM OF STEEL	HR	HOUR	RD	ROOF DRAIN
BS	BOTH SIDES	HS	HUMIDITY SENSOR	RET	RETURN
BSP	BLACK STEEL PIPE	HSH	HUMIDITY SENSOR HIGH LIMIT	RED	REDUCER
BSTR	BOOSTER	HSTAT	HUMIDISTAT	REV	REVOLUTIONS
BSS	BOTTOM OF STRUCTURAL STEEL	HTHW	HIGH TEMPERATURE HOT WATER	REF	REFERENCE
BT WLD	BUTT WELD	HV	HOSE VALVE	RFGT	REFRIGERANT
BTU	BRITISH THERMAL UNIT	HVAC	HEATING, VENTILATING AND AIR CONDITIONING	RGH	ROUGHNESS
BTUH	BRITISH THERMAL UNIT PER HOUR	HW	HOT WATER	RH	RELATIVE HUMIDITY
BV	BALL VALVE	HWB	HOT WATER BOILER	RHC	REHEAT COIL
BW	BOTH WAYS	HWC	HOT WATER COIL	RHG	REFRIGERANT HOT GAS
BYP	BYPASS	HWCP	HOT WATER CIRCULATING PUMP	RHV	REHEAT VALVE
		HWP	HOT WATER PUMP	RLL	REFRIGERANT LIQUID LINE
		HWR	HOT WATER RETURN	RPM	REVOLUTIONS PER MINUTE
		HWS	HOT WATER SUPPLY	RPS	REVOLUTIONS PER SECOND
C	[THERMAL] CONDUCTANCE	HYD	HYDRANT	RSL	REFRIGERANT SUCTION LINE
°C	CELSIUS [DEGREES]	HZ	HERTZ (FREQUENCY)	RTU	ROOF TOP UNIT
C-C	CENTER TO CENTER			RV	RELIEF VALVE
C/C	COOLING COIL				
CA	COMPRESSED AIR	I/O	INPUT/OUTPUT	S	SECOND
CACU	COMPUTER AIR CONDITIONING UNIT	IA	INSTRUMENT AIR	SA	SUPPLY AIR
CAP	CAPACITY	ICW	INDUSTRIAL CITY WATER (NON-POTABLE)	SAF	SUPPLY AIR FAN
CB	CATCH BASIN	ID	INSIDE DIAMETER	SAT	SATURATION
CC	CUBIC CENTIMETER	IE	INVERT ELEVATION	SC	SHADING COEFFICIENT
CCW	COUNTERCLOCKWISE	IHP	INDICATED HORSEPOWER	SD	SMOKE DAMPER
CD	CONDENSATE DRAIN	IN WC	INCHES WATER COLUMN	SF	SAFETY FACTOR, SQUARE FEET
CDC	CONDENSATE DRAIN COOLER	INSTR	INSTRUMENT	SHP	SHAFT HORSEPOWER
CF	CHEMICAL FEED	INV	INVERT	SG	SPECIFIC GRAVITY, STEAM GAUGE
CFCI	CONTRACTOR FURNISHED/ CONTRACTOR INSTALLED	IP	IRON PIPE	SH	SENSIBLE HEAT
		IPS	IRON PIPE SIZE, INCHES PER SECOND	SHG	SENSIBLE HEAT GAIN
CFM	CUBIC FEET PER MINUTE	IPT	IRON PIPE THREADED	SHGC	SOLAR HEAT GAIN COEFFICIENT
CFS	CUBIC FEET PER SECOND	IR	INFRARED	SHR	SENSIBLE HEAT RATIO
CH	CHILLER	IW	INDIRECT WASTE, INDUSTRIAL WASTE	SHWR	SECONDARY HOT WATER RETURN
CHW	CHILLED WATER			SHWS	SECONDARY HOT WATER SUPPLY
CHWP	CHILLED WATER PUMP			SLNT	SEALANT
CHWPP	CHILLED WATER PRIMARY PUMP	K	KELVIN [DEGREES]	SL	SEA LEVEL
CHWR	CHILLED WATER RETURN	k	THERMAL CONDUCTIVITY	SLV	SLEEVE
CHWS	CHILLED WATER SUPPLY	KIP	THOUSAND POUNDS	SMP	SUMP PUMP
CHWSP	CHILLED WATER SECONDARY PUMP	KIP FT	THOUSAND FOOT-POUNDS	SNSR	SENSOR
CI	CAST IRON	KW	KILOWATT	SOLV	SOLENOID VALVE
CIP	CAST IRON PIPE	KWh	KILOWATT HOUR	SOV	SHUT OFF VALVE
CKT	CIRCUIT			SP	STATIC PRESSURE
CKV	CHECK VALVE			SPEC	SPECIFICATION
CL	CENTER LINE (℄)	LAT	LEAVING AIR TEMPERATURE	SPF	STAIRWELL PRESSURIZATION FAN
CLG	COOLING	LB	POUNDS	SPH	STATIC PRESSURE HIGH LIMIT
CMP	CORRUGATED PIPE	LDBT	LEAVING DRY BULB TEMPERATURE	SPL	STATIC PRESSURE LOW LIMIT
CNDS	CONDENSATE	LF	LINEAR FEET	SPLY	SUPPLY
COEF	COEFFICIENT	LG	LENGTH	SPS	STATIC PRESSURE SENSOR
COMPR	COMPRESSOR	LH	LATENT HEAT	SQ	SQUARE
COND	CONDENSER	LHG	LATENT HEAT GAIN	SSP	STAINLESS STEEL PIPE
CONDN	CONDENSATION	LMTD	LEAST MEAN TEMPERATURE DIFFERENCE	SST	STAINLESS STEEL
CONN	CONNECTION	LP	LOW PRESSURE	STGEN	STEAM GENERATOR
CPLG	COUPLING	LPAS	LOW PRESSURE ALARM SWITCH	STC	SOUND TRANSMISSION CLASS
CRP	CONDENSATE RETURN PUMP	LPB	LOW PRESSURE BOILER	STD	STANDARD
CT	COOLING TOWER	LPC	LOW PRESSURE CONDENSATE	STM	STEAM
CU	COPPER	LPDT	LOW PRESSURE DRIP TRAP SET	STP	STANDARD TEMPERATURE & PRESSURE
CU FT	CUBIC FEET	LPS	LOW PRESSURE STEAM	STR	STRAINER
CU IN	CUBIC INCH	LRA	LOCKED ROTOR AMPS	SUCT	SUCTION
CUH	CABINET UNIT HEATER	LT	LEAVING TEMPERATURE	SUP	SUPPLY
CV	CONSTANT-VOLUME [FLOW]	LTD	LEAST TEMPERATURE DIFFERENCE	SV	SAFETY VALVE
C_V	COEFFICIENT - VALVE FLOW	LTHW	LOW TEMPERATURE HOT WATER		
CW	CLOCKWISE, CONDENSER WATER	LVR	LOUVER	T	TEMPERATURE SENSOR
CWP	CONDENSER WATER PUMP	LWBT	LEAVING WET BULB TEMPERATURE	T&P	TEMPERATURE AND PRESSURE [VALVE]
CWR	CONDENSER WATER RETURN	LWCO	LOW WATER CUT-OFF	TA	THROWAWAY
CWS	CONDENSER WATER SUPPLY	LWT	LEAVING WATER TEMPERATURE	TC	THERMOCOUPLE
				TCP	TEMPERATURE CONTROL PANEL
DB	DRY BULB			TCV	TEMPERATURE CONTROL VALVE
DBT	DRY BULB TEMPERATURE			TD	TEMPERATURE DIFFERENCE
dB	DECIBEL	mA	MILLIAMPERES	TEMP	TEMPERATURE, TEMPORARY
DC	DIRECT CURRENT	MAU	MAKE UP AIR UNIT	TFA	TO FLOOR ABOVE
DCW	DOMESTIC COLD WATER	MAV	MANUAL AIR VENT	TFB	TO FLOOR BELOW
DDC	DIRECT DIGITAL CONTROL	MAX	MAXIMUM	THK	THICKNESS
DDCFP	DIRECT DIGITAL CONTROL FIELD PANEL	MB	MIXING BOX	TMH	TOP OF MANHOLE
DEG	DEGREES [CELSIUS OR FAHRENHEIT]	MCA	MINIMUM CIRCUIT AMPACITY	TNL	TUNNEL
DENS	DENSITY	MCC	MOTOR CONTROL CENTER	TR	TONS OF REFRIGERATION
DEWPT	DEW POINT TEMPERATURE	MCF	THOUSAND CUBIC FEET	TOP	TOP OF PIPE
DIA	DIAMETER	MDC	MOTOR DIRECT CONNECT	TRANS	TRANSFER
DIFF	DIFFERENCE OR △	MET	MEAN EFFECTIVE TEMPERATURE	TS	TUBE STEEL
DIP	DUCTILE IRON PIPE	MHP	MOTOR HORSEPOWER	TSTAT	THERMOSTAT
DIV	DIVISION	MIN	MINIMUM		
DPS	DIFFERENTIAL PRESSURE SENSOR	MOCP	MAXIMUM OVERCURRENT PROTECTION	U	HEAT TRANSFER COEFFICIENT
DPT	DIFFERENTIAL PRESSURE TRANSMITTER	MOV	MOTOR OPERATED VALVE	UH	UNIT HEATER
DR	DRAIN	MP	MEDIUM PRESSURE	UON	UNLESS OTHERWISE NOTED
DWV	DRAIN, WASTE & VENT	MPC	MEDIUM PRESSURE CONDENSATE		
		MPH	MILES PER HOUR	V	VENT, VOLTS
		MPS	MEDIUM PRESSURE STEAM	VAC	VOLTS ALTERNATING CURRENT
E	EXISTING	MPT	MALE PIPE THREAD	VAP PR	VAPOR PRESSURE
EAT	ENTERING AIR TEMPERATURE	MTD	MEAN TEMPERATURE DIFFERENCE	VAR	VARIABLE
ECC	ECCENTRIC	MTHW	MEDIUM TEMPERATURE HOT WATER	VAV	VARIABLE AIR VOLUME
ECON	ECONOMIZER	MU	MAKE-UP WATER	VDC	VOLTS DIRECT CURRENT
ECU	EVAPORATIVE COOLING UNIT			VEL	VELOCITY
EDBT	ENTERING DRY BULB TEMPERATURE			VENT	VENT, VENTILATION
EER	ENERGY EFFICIENCY RATIO			VERT	VERTICAL
EFF	EFFICIENCY	NA	NOT APPLICABLE	VFD	VARIABLE FREQUENCY DRIVE
EL	ELEVATION	NC	NOISE CRITERIA, NORMALLY CLOSED	VISC	VISCOSITY
ENT	ENTERING	NIC	NOT IN CONTRACT	VP	VELOCITY PRESSURE
EOV	ELECTRONICALLY OPERATED VALVE	NO	NORMALLY OPEN, NUMBER	VV	VARIABLE-VOLUME [FLOW]
EQIV	EQUIVALENT	NPS	NOMINAL PIPE SIZE		
ESP	EXTERNAL STATIC PRESSURE	NR	NOISE REDUCTION	W	WATT
ET	EXPANSION TANK, ENTERING TEMPERATURE	NRC	NOISE REDUCTION COEFFICIENT	WB	WET BULB
EVAP	EVAPORATOR	NTS	NOT TO SCALE	WBT	WET BULB TEMPERATURE
EWBT	ENTERING WET BULB TEMPERATURE			WC	WATER COLUMN
EWT	ENTERING WATER TEMPERATURE			WCHR	WATER CHILLER
EXCH	EXCHANGER			WCLD	WATER COOLED
EXH	EXHAUST	OA	OUTSIDE AIR	WG	WATER GAGE
EXP	EXPANSION	OAF	OUTSIDE AIR FAN	WH	WALL HUNG, WATT HOUR
EXP JT	EXPANSION JOINT	OAI	OUTSIDE AIR INTAKE	WL	WATER LINE
		OD	OUTSIDE DIAMETER	WLD	WELDED
		OFCI	OWNER FURNISHED / CONTRACTOR INSTALLED	WM	WATER METER
FA	FACE AREA, FREE AREA	OFD	OVERFLOW DRAIN	WNF	WELD NECK FLANGE
FCU	FAN COIL UNIT	OGA	OIL GAUGE	WP	WATER PUMP
FD	FIRE DAMPER	OLVL	OIL LEVEL	WPD	WATER PRESSURE DROP
FDW	FEEDWATER	OPRS	OIL PRESSURE	WPR	WORKING PRESSURE DROP
F-F	FACE-to-FACE	ORD	OVERFLOW ROOF DRAIN	WSP	WORKING STEAM PRESSURE
°F	FAHRENHEIT [DEGREES]	OS	OIL SWITCH	WT	WEIGHT
FLM	FLOW METER	OSP	OPERATING STEAM PRESSURE		
FL SW	FLOW SWITCH	OVFL	OVERFLOW	YD	YARD, YARD DRAIN
FLA	FULL LOAD AMPS	OZ	OUNCE	YR	YEAR
FLEX	FLEXIBLE CONNECTION				
FLG	FLANGE			Z	ZONE

GENERAL NOTES

1. THIS IS A STANDARD LEGEND SHEET. SOME INFORMATION ON THIS SHEET MAY NOT NECESSARILY APPLY TO THIS PROJECT.
2. ISOLATION VALVES SHALL BE PROVIDED IN ALL BRANCH PIPING AND AT EQUIPMENT CONNECTIONS.
3. PIPING CONNECTIONS TO ALL EQUIPMENT SHALL BE FABRICATED WITH THE ISOLATION VALVES, FLANGES AND/OR UNIONS POSITIONED TO ALLOW REMOVAL AND SERVICE OF THE COMPONENT PARTS.
4. INSTALL MANUAL AIR VENTS AT THE HIGH POINTS OF THE PIPING SYSTEMS.
5. ROUTE PIPING IN AN ORDERLY MANNER AND MAINTAIN PROPER GRADES. INSTALL TO CONSERVE HEADROOM AND TO CREATE MINIMUM INTERFERENCE WITH USE OF SPACE. ROUTE EXPOSED PIPING PARALLEL TO BUILDING LINES. GROUP PIPING AT COMMON BOP ELEVATIONS WHENEVER PRACTICAL. PIPES LOCATED IN CONCEALED SPACES SHALL BE ROUTED CLOSE TO THE BUILDING STRUCTURE UON.
6. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE OR EQUIPMENT CONNECTED.
7. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.
8. INSTALL VALVES IN ACCESSIBLE LOCATIONS. INSTALL ACCESS DOORS IN PARTITIONS WHERE VALVES WOULD OTHER WISE BE INACCESSIBLE.
9. WHEN SOCKET WELD OR SOLDER END VALVES ARE INSTALLED, SPECIAL CARE SHALL BE TAKEN TO AVOID OVERHEATING AND DAMAGING THE VALVE BODY, TRIM OR PACKING.
10. IDENTIFY EACH PIPE WITH LABELING AS REQUIRED BY SPECIFICATIONS.
11. SLEEVE ALL PIPING THAT PENETRATES FIRE RATED WALLS, FLOORS AND PARTITIONS. PENETRATIONS SHALL BE SEALED WITH A U.L. LISTED ASSEMBLY TO PROVIDE A RATING EQUAL TO OR GREATER THAN THAT OF THE PENETRATED WALL, FLOOR OR PARTITION.
12. SLEEVE ALL PIPING THAT PENETRATES EXTERIOR BUILDING WALLS AND GRADE BEAMS. SEAL PENETRATIONS WATERTIGHT.
13. COORDINATE WITH OTHER TRADES BEFORE FABRICATION OR INSTALLATION OF ANY SYSTEMS.
14. EXISTING DUCTWORK, PIPING AND EQUIPMENT SHOWN ON THESE DRAWINGS INDICATES THE GENERAL LOCATION AND ROUTING. THE ACTUAL LOCATION SHALL BE DETERMINED BY THE CONTRACTOR WHO SHALL COORDINATE ALL WORK WITH ALL TRADES NECESSARY TO INSTALL NEW DUCTWORK, PIPING OR EQUIPMENT AS SHOWN ON THE DRAWING.
15. THESE DRAWINGS DO NOT NECESSARILY SHOW ALL OFFSETS OR ELEVATION DIFFERENCES WHICH MAY BE NECESSARY FOR THE COMPLETE INSTALLATION.
16. ALL NEW DUCT SHALL BE EXTERNALLY INSULATED UON.
17. WHERE REMOVAL OF EXISTING DUCTWORK OR PORTIONS OF ANY AIR SYSTEM IS NECESSARY, THE DUCT SHALL BE PATCHED AND SEALED AIRTIGHT USING PATCH OF SAME MATERIAL AND EQUAL OR GREATER THICKNESS AS EXISTING. PATCHES SHALL BE ATTACHED WITH SHEET METAL SCREWS OR OTHER MEANS OF POSITIVE ATTACHMENT (WELDING, BONDING, ETC.) AS SPECIFIED FOR THE PARTICULAR DUCT SYSTEM. NEW INSULATION MATERIAL AND ITS THERMAL PROPERTIES SHALL BE EQUAL TO OR BETTER THAN EXISTING AND SHALL BE PATCHED AND SEALED TO MATCH EXISTING INSULATION.
18. NUMBER SHOWN IN PARENTHESIS (100) IS CFM OF EXISTING AIR TERMINAL, DUCT, OR AIR DEVICE AND IS FOR INFORMATION ONLY.
19. COORDINATE ALL REMODEL WORK WITH NEW CONSTRUCTION AND OTHER TRADES.
20. THE CONTRACTOR SHALL ADJUST AND BALANCE ALL MECHANICAL SYSTEMS TO DESIGN SETTINGS AS SHOWN AND SHALL REBALANCE TO RESTORE SETTINGS OF SYSTEMS TEMPORARILY ALTERED FOR THE PURPOSES OF COMPLETING THE WORK OF THIS PROJECT.
21. NOTIFY AND COORDINATE WITH OWNER PRIOR TO SHUTDOWN OF ANY EQUIPMENT. SHUTDOWN TIME TO BE MINIMUM.
22. ANY ITEMS DAMAGED DURING DEMOLITION SHALL BE REPLACED WITH NEW MATERIALS TO MATCH EXISTING.
23. CONTRACTOR SHALL PROVIDE TEMPORARY DUCTWORK, ELECTRICAL SERVICE, PIPING OR OTHER BUILDING SERVICES AS REQUIRED TO KEEP OTHER AREAS IN OPERATION DURING REMODELING. NOTIFY OWNER PRIOR TO SHUT-DOWN FOR ANY TEMPORARY SERVICE REQUIREMENTS.
24. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR LOCATIONS OF CEILING-MOUNTED HVAC DEVICES AND EQUIPMENT.
25. DUCT ROUTING CHANGES MADE BY THE CONTRACTOR FOR THE PURPOSE OF ACCOMMODATING FIELD CONDITIONS SHALL INCLUDE FIRE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS IN RATED PARTITIONS AS SHOWN IN ORIGINAL ROUTING ARRANGEMENTS.
26. FURNISH AND INSTALL ACCESS DOORS (AD) IN THE DUCTWORK IMMEDIATELY ADJACENT TO EACH RATED DAMPER WHICH HAS A FUSIBLE LINK. PARTITIONS SHALL BE PROVIDED WITH ACCESS DOORS TO PROVIDE SERVICE AND ACCESS TO DAMPER ACCESS DOORS.
27. FIRE, SMOKE, AND COMBINATION FIRE/SMOKE DAMPERS SHALL BE UL APPROVED, SHALL BEAR THE UL LABEL AND SHALL COMPLY WITH NFPA BULLETIN NO. 90A. FULLY-OPEN DAMPERS SHALL NOT HAVE ANY PROJECTIONS INTO THE AIRSTREAM.
28. ABANDONED DUCT SHALL BE REMOVED WHERE INDICATED ON THE DRAWINGS. DUCT REMAINING IN PLACE SHALL BE CAPPED AND SEALED AIR TIGHT AT POINT(S) OF DEMOLITION.
29. NEW HOLES THROUGH EXISTING FLOORS AND NO GREATER THAN 6" DIAMETER SHALL BE CORE DRILLED. AVOID BEAMS AND JOIST LEGS.
30. ALL DUCT SIZES SHOWN HEREIN REPRESENT INSIDE CLEAR DIMENSIONS. EXTERNAL SHEET METAL DIMENSIONS OF INTERNALLY-LINED DUCTWORK SHALL BE ADJUSTED TO ALLOW FOR THICKNESS OF LINING.
31. THE OWNER SHALL HAVE THE OPTION TO D

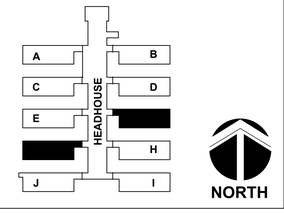


GENERAL NOTES

1. DRAWINGS ARE SCHEMATIC IN NATURE AND INTENDED TO CONVEY GENERAL DESIGN INTENT ONLY. FIELD-COORDINATE INSTALLATION OF NEW ITEMS PRIOR TO CONSTRUCTION AND INFORM EOR OF DISCREPANCIES.
2. PROTECT ALL EQUIPMENT FROM DEBRIS DURING CONSTRUCTION EFFORT AND CLEAN AT CONCLUSION OF WORK. PROVIDE NEW PERMANENT FILTERS WHERE UTILIZED.
3. REFER TO X100 SERIES FOR GREENHOUSE CONTROLLER INFORMATION.
4. ENSURE CLEARANCE IS MAINTAINED FOR HYDRONIC HEATING BALANCING VALVES.
5. NO PIPING / CONDUIT TO RUN BELOW THE EXHAUST AND SUPPLY FANS.
6. ENSURE WORKING CLEARANCE IS MAINTAINED FOR ALL VALVES.
7. NO PIPING/ CONDUIT SHALL RUN BELOW MECHANICAL EQUIPMENT TO MAINTAIN ACCESS.

1 **MECHANICAL OVERALL DEMOLITION PLAN**
SCALE: 1/16" = 1'-0"

KEYPLAN



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PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

MECHANICAL OVERALL DEMOLITION PLAN

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: EM	EPM: M McWILLIAMS
CHECKED BY: CB	SAFETY & HEALTH: E WELKER
DRAWN BY: EM	REAL PROPERTY: W ROSS

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: MD231

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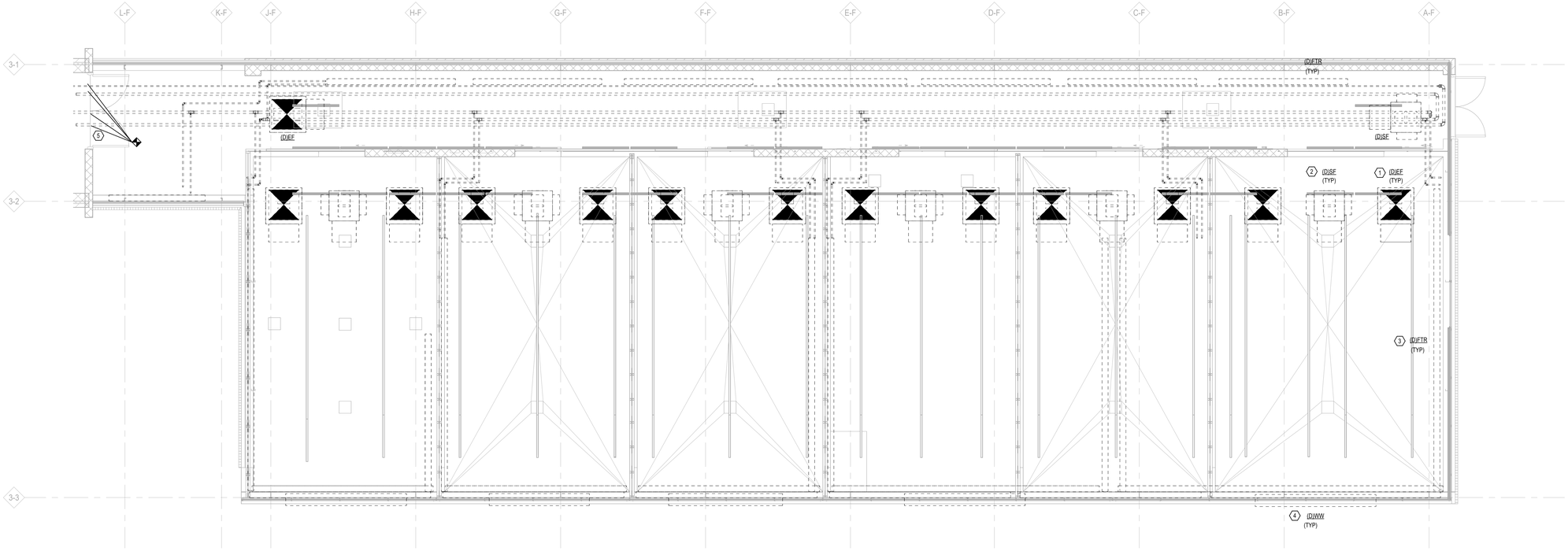
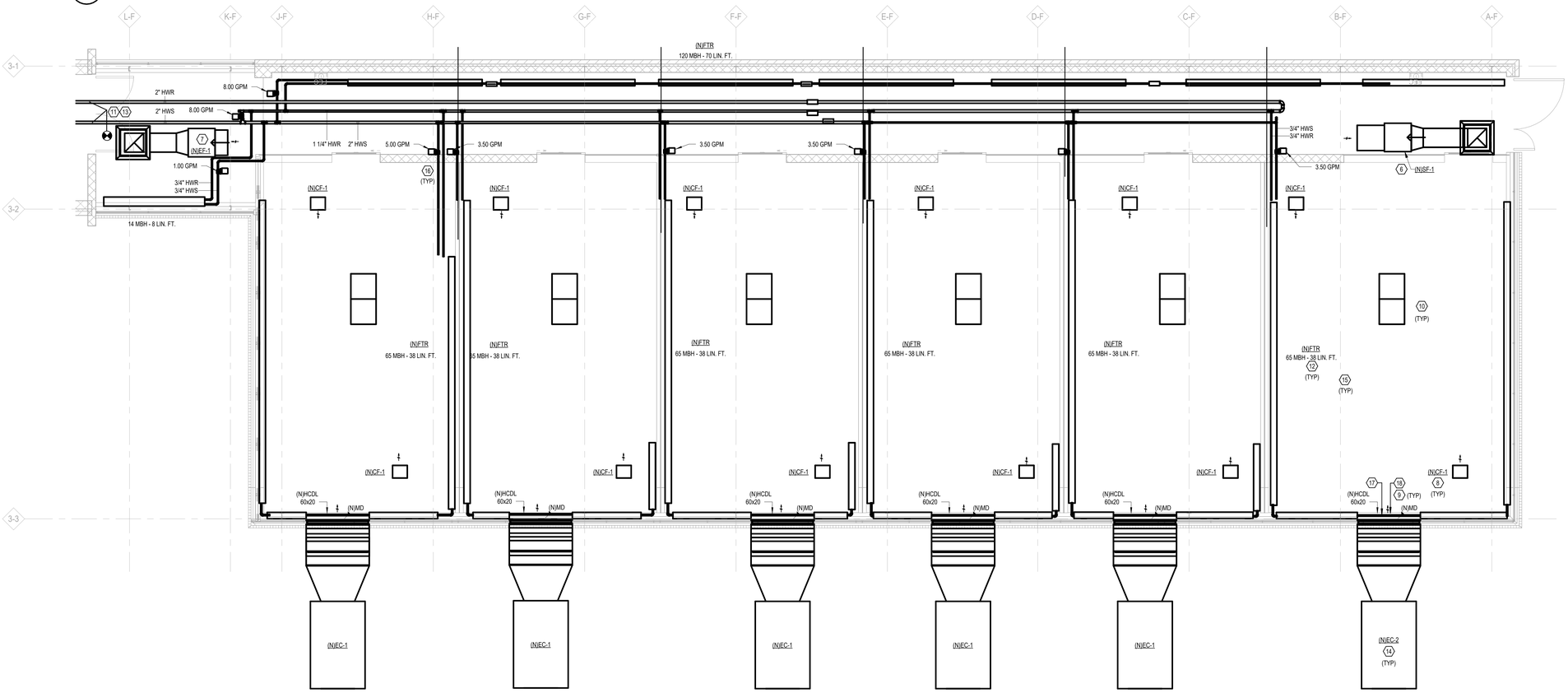


1 PHASE V - MECHANICAL - DEMO WORK - RANGE F

SCALE: 1/4" = 1'-0"



2 PHASE V - MECHANICAL - NEW WORK - RANGE F

SCALE: 1/4" = 1'-0"

GENERAL NOTES

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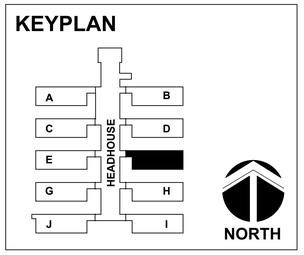
6. ENSURE WORKING CLEARANCE IS MAINTAINED FOR ALL VALVES.
7. NO PIPING/ CONDUIT SHALL RUN BELOW MECHANICAL EQUIPMENT TO MAINTAIN ACCESS.

KEYED NOTES (1)

NUMBER	DESCRIPTION
1	REMOVE ALL EXISTING EXHAUST FANS AND RELATED APPURTENANCES INCLUDING DUCTWORK, CONTROLS ETC (TYPICAL).
2	REMOVE ALL EXISTING SUPPLY FANS AND RELATED APPURTENANCES INCLUDING DUCTWORK, CONTROLS ETC (TYPICAL).
3	REMOVE PERIMETER FIN TUBE RADIATOR, PIPING, AND ALL ASSOCIATED APPURTENANCES BACK TO MAIN (TYPICAL).
4	REMOVE WET WALL, EVAPORATIVE PADS, PIPING AND ALL RELATED APPURTENANCES BACK TO MAIN (TYPICAL).
5	REMOVE STEAM, CONDENSATE, HYDRONIC HOT WATER SUPPLY AND RETURN BACK TO RANGE ENTRANCE AND CAP.
6	NEW MAKE-UP AIR FAN DUCTED FROM ROOF DOGHOUSE WITH BIRDSCREEN AND INSULATED MOTORIZED DAMPER. PROVIDE WALL-MOUNTED T-STAT.
7	NEW EXHAUST FAN DUCTED TO ROOF DOGHOUSE WITH BIRDSCREEN AND INSULATED MOTORIZED DAMPER. INTERLOCK WITH (N)SF-1.
8	NEW CIRCULATING FAN SUSPENDED FROM TRUSS ABOVE (TYPICAL).
9	NEW WALL-MOUNTED INSULATED MOTORIZED DAMPER DUCTED TO EVAPORATIVE COOLER. COORDINATE EXACT ELEVATION AND WEATHER-TIGHT WALL PENETRATION WITH ARCHITECTURAL DRAWINGS (TYPICAL).
10	INTERLOCK TWO ROOF GABLE VENTS WITH OPERATION OF EVAPORATIVE COOLER (TYPICAL).
11	PROVIDE NEW HYDRONIC HOT WATER BALANCING AND SHUT OFF VALVES AT RANGE ENTRANCE.
12	PROVIDE NEW PERIMETER FIN TUBE RADIATOR, PIPING AND ALL ASSOCIATED APPURTENANCES. COORDINATE ELEVATION WITH LAB BENCHES (TYPICAL).
13	REPLACE HYDRONIC HOT WATER SUPPLY AND RETURN IN KIND FROM RANGE ENTRANCE TO CELLS.
14	NEW EVAPORATIVE COOLER PAD-MOUNTED AT GRADE (TYPICAL).
15	EXISTING BASE BUILDING TEMPERATURE SENSOR AND RELATED APPURTENANCES ALARMING TO CENTRAL BAS TO REMAIN (ONE PER CELL, TYP).
16	PROVIDE COVER OVER BARE PIPE SIMILAR TO EXISTING IN RANGE A & C TO PREVENT ACCIDENTAL CONTACT WITH HOT SURFACES (TYPICAL).
17	PROVIDE NEW PIPING COVER FOR BARE PIPE ABOVE SUPPLY LOUVERS.
18	PROVIDE NEW DRUM LOUVER, HCDL, AT WALL IN CELL. COORDINATE WITH NEW MOTOR OPERATED DAMPER.

KEYPLAN



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NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: LB	EPM: M McWILLIAMS
CHECKED BY: ES	SAFETY & HEALTH: E WELKER
DRAWN BY: LB	REAL PROPERTY: W ROSS

USDA Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

MECH - DEMO WORK & NEW WORK - RANGE 'F'

PROJECT NO.: 09228.021

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: M231-F

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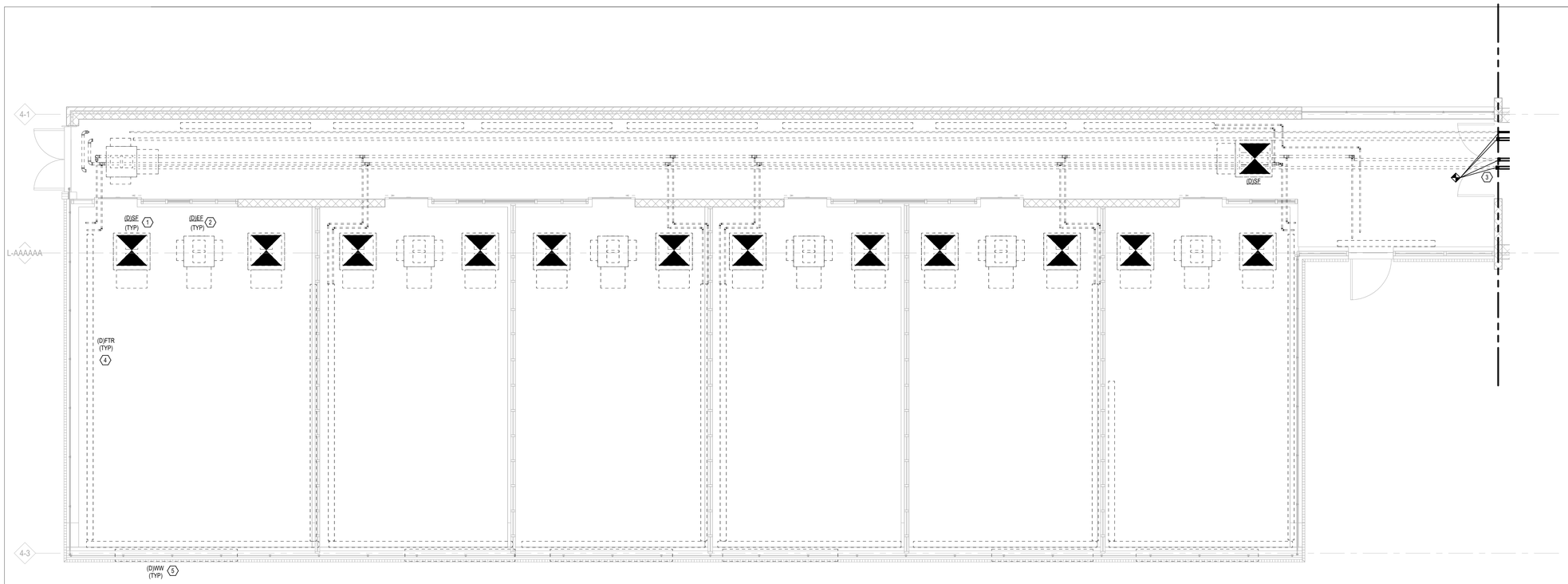
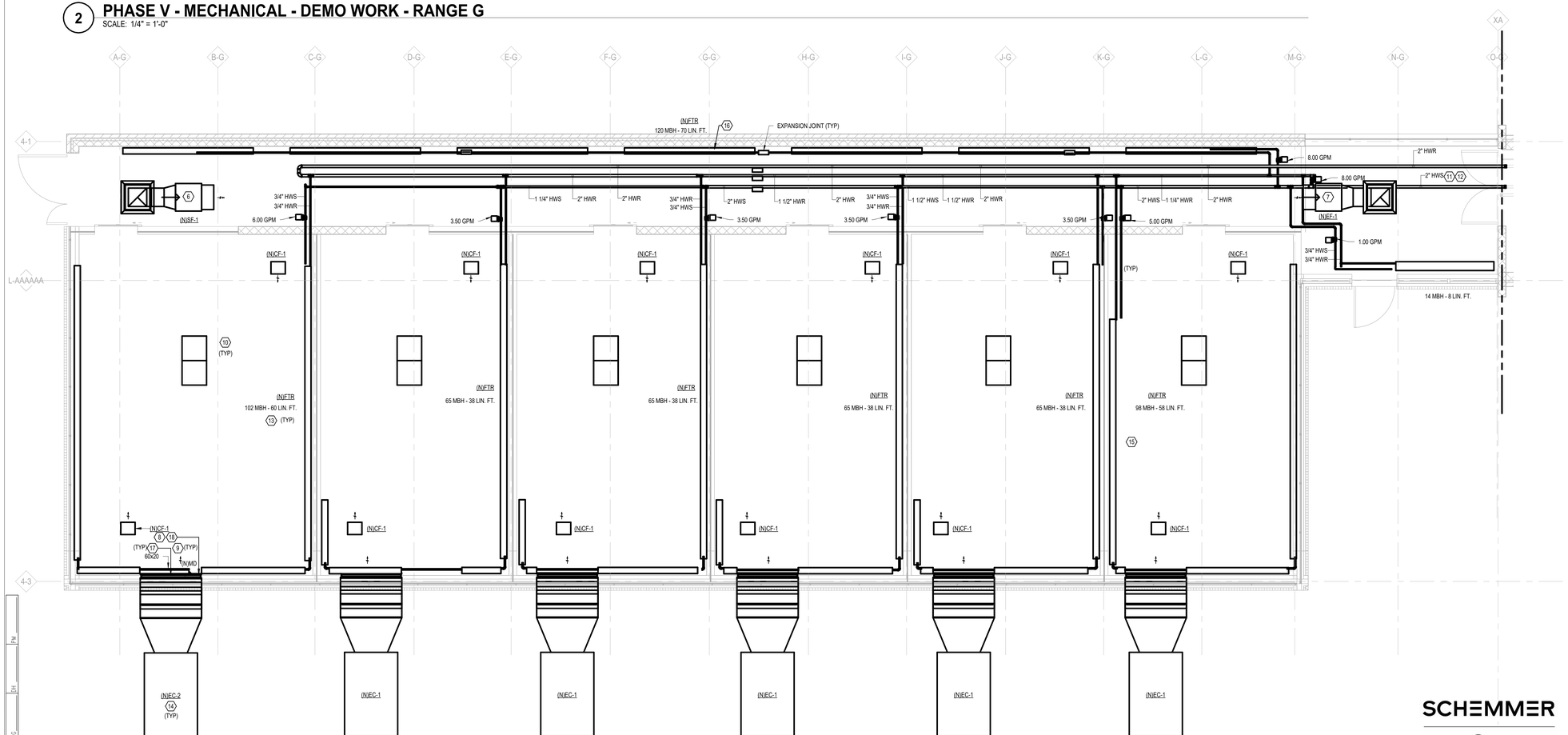


2 PHASE V - MECHANICAL - DEMO WORK - RANGE G

SCALE: 1/4" = 1'-0"



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SCALE: 1/4" = 1'-0"

GENERAL NOTES

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KEYED NOTES 1

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3	REMOVE STEAM, CONDENSATE, HYDRONIC HOT WATER SUPPLY AND RETURN BACK TO RANGE ENTRANCE AND CAP.
4	REMOVE PERIMETER FIN TUBE RADIATOR, PIPING, AND ALL ASSOCIATED APPURTENANCES BACK TO MAIN (TYPICAL).
5	REMOVE WET WALL, EVAPORATIVE PADS, PIPING AND ALL RELATED APPURTENANCES BACK TO MAIN (TYPICAL).
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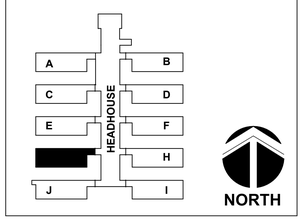
14	NEW EVAPORATIVE COOLER PAD-MOUNTED AT GRADE (TYPICAL).
15	EXISTING BASE BUILDING TEMPERATURE SENSOR AND RELATED APPURTENANCES ALARMING TO CENTRAL BAS TO REMAIN (ONE PER CELL, TYP).
16	PROVIDE FIN TUBE RADIATOR WITH (7) 10' MODULES, SPACE THE MODULES EQUALLY DOWN THE LENGTH OF THE CORRIDOR.
17	PROVIDE NEW PIPING COVER FOR BARE PIPE ABOVE SUPPLY LOUVERS.
18	PROVIDE NEW DRUM LOUVER, HCDL, AT WALL IN CELL. COORDINATE WITH NEW MOTOR OPERATED DAMPER.

KEYPLAN



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REVISIONS

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PROJECT NO.: 09228.021

A-E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: EM	EPM: M McWILLIAMS
CHECKED BY: CB	SAFETY & HEALTH: E WELKER
DRAWN BY: EM	REAL PROPERTY: W ROSS

USDA ARS Agricultural Research Service

USDA NCSL GREENHOUSES — USDA ARS — PHASE V

1307 18TH STREET NORTH, FARGO, ND 58102

MECH - DEMO WORK & NEW WORK - RANGE G

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: M231-G

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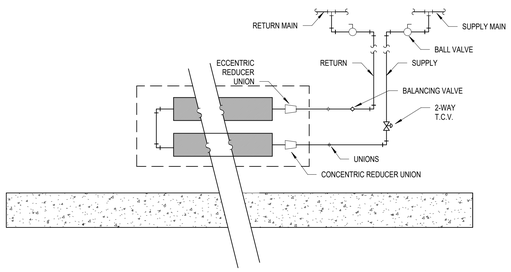
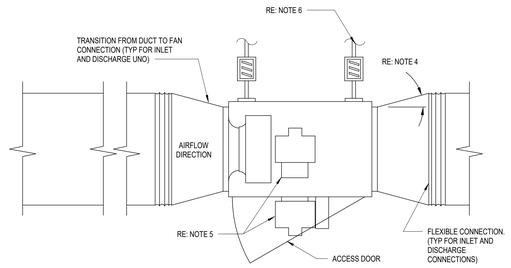
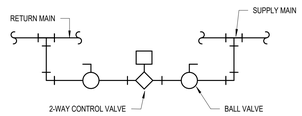


1 FIN TUBE RADIATOR PIPING
SCALE: NTS



NOTES:
1. WHERE SUSPENSION RODS PENETRATE THE STRUCTURE'S FIRE-RETARDANT COATING, THE CONTRACTOR SHALL PATCH AROUND RODS WITH A MATERIAL WHICH WILL RESTORE OR EXCEED THE INTENDED FIRE RATING OF THE PROTECTED STRUCTURE.
2. DETAIL APPLIES TO ALL INLINE FANS (INLINE CENTRIFUGAL SHOWN AS EXAMPLE).
3. REFER TO MECHANICAL FLOOR PLAN, SPECIFICATIONS, AND CONTROLS DESIGN DOCUMENTS FOR DAMPER TYPE, LOCATION, SPECIFICATION, AND SEQUENCE OF OPERATION.
4. REFER TO SMACNA STANDARD FOR DUCTWORK CONSTRUCTION FOR MAXIMUM DIVERGENCE AT INLET AND DISCHARGE CONNECTIONS, UON. (TYP.)
5. REFER TO MANUFACTURER FOR CLEARANCE REQUIREMENTS FOR OPERATION AND MAINTENANCE. SEE SCHEDULE FOR MOTOR AND DRIVE REQUIREMENTS.
6. MOUNT FAN FROM BUILDING STRUCTURE. PROVIDE SUPPLEMENTAL STRUCTURAL STEEL MEMBERS FOR SUPPORT AS NECESSARY. SUPPORT FAN WITH THREADED ROD AND VIBRATION ISOLATORS. SUPPORT PER MANUFACTURER'S RECOMMENDATIONS (TYP).

2 INLINE FAN MOUNTING DETAIL
SCALE: NTS



HEATING WATER BYPASS VALVE TO BE OPEN IF ALL CELL 2-WAY VALVES ARE CLOSED TO ALLOW HEATING WATER TO CIRCULATE THROUGH THE RANGE.
BAS TO MONITOR CELL CONTROLLER. ON A CALL FOR HEAT, THE BYPASS SHALL CLOSE AND THE CELL 2-WAY HEATING VALVE SHALL SEQUENCE PER THE CELL CONTROLLER.

3 HEATING WATER BYPASS
SCALE: NTS

SCHEMMER

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PROJECT MANAGER TJS	FACILITIES ENGINEER S KASEMAN
DESIGNER EM	EPM M McWILLIAMS
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DRAWN BY EM	REAL PROPERTY W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

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MECH - DETAILS

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CAD | DSG | DH | PM

GENERAL NOTE:

1. REFER TO SHEET G001 FOR BASE BID AND ALTERNATE SCOPES.

FAN SCHEDULE

MARK	BASIS OF DESIGN		TYPE	DRIVE	CFM	ESP	RPM	POWER (HP)	VOLTAGE	PHASE	WEIGHT	NOTES
	MANUFACTURER	MODEL										
(N)CF-1	SCHAEFER	VK12-GA	CIRCULATOR	DIRECT	1470	0.125	1725	0.10	230 V	1	20	1
(N)EF-1	GREENHECK	SQ-16-VG	INLINE	DIRECT	1600	0.2	655	1.00	208 V	1	105	2,3
(N)SF-1	GREENHECK	SQ-16-VG	INLINE	DIRECT	1600	0.2	655	1.00	208 V	1	105	2,3

NOTES

1. FAN CONTROLLED BY GREENHOUSE CONTROLLER ON A PER-CELL BASIS.
2. PROVIDE WITH DISCONNECT SWITCH.
3. PROVIDE WITH SPEED CONTROLLER, BIRD SCREEN, MOTORIZED DAMPER, AND WIRED WALL MOUNTED THERMOSTAT. FAN SHALL ENGAGE WHEN INDOOR TEMPERATURE EXCEEDS 75degF (ADJUSTABLE).

FIN TUBE RADIATOR SCHEDULE

MARK	PIPE SIZE	BTUh/FT	FINS/FT	FIN SIZE	BOD	MODEL	NOTES
(N)FTR	1 1/4"	1700	50	4x4"	AIRTEX	WF-7A	1,2,3,4

NOTES

1. CAPACITIES BASED ON 180degF AVG WATER TEMP AND 40degF WATER TEMP DROP.
2. CAPACITIES BASED ON 2 ROW, 6" ON CENTER CONFIGURATION.
3. PROVIDE RUST/CORROSION RESISTANT MATERIALS.
4. FIN TUBE RADIATOR CONTROLLED BY GREENHOUSE CONTROLLER ON A PER-CELL BASIS.

EVAPORATIVE COOLER SCHEDULE

MARK	BASIS OF DESIGN		TYPE	DRIVE	MAX CFM	ESP	MOTOR	VOLTS	PHASE	NOTES
	MANUFACTURER	MODEL								
(N)EC-1	PHOENIX AEROCOOL	IS500	HORIZONTAL	VARIABLE ECM	5900	0.2	1	208 V	3	1,2,3
(N)EC-2	PHOENIX AEROCOOL	IS500	HORIZONTAL	VARIABLE ECM	7900	0.2	2	208 V	3	1,2,3

NOTES

1. PROVIDE WITH INTEGRAL DRAIN PUMP, INTEGRAL CIRCULATING PUMP, 4X4 HIGH EFFICIENCY MEDIA, VFD AND DISCONNECT.
2. INTERLOCK ROOF VENTS AND MOTORIZED DAMPER WITH EVAPORATIVE COOLER OPERATION.
3. EVAPORATIVE COOLER OPERATION CONTROLLED BY GREENHOUSE CONTROLLER ON A PER-CELL BASIS.

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PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

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Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

MECH - SCHEDULES

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: EM	EPM: M McWILLIAMS
CHECKED BY: CB	SAFETY & HEALTH: E WELKER
DRAWN BY: EM	REAL PROPERTY: W ROSS

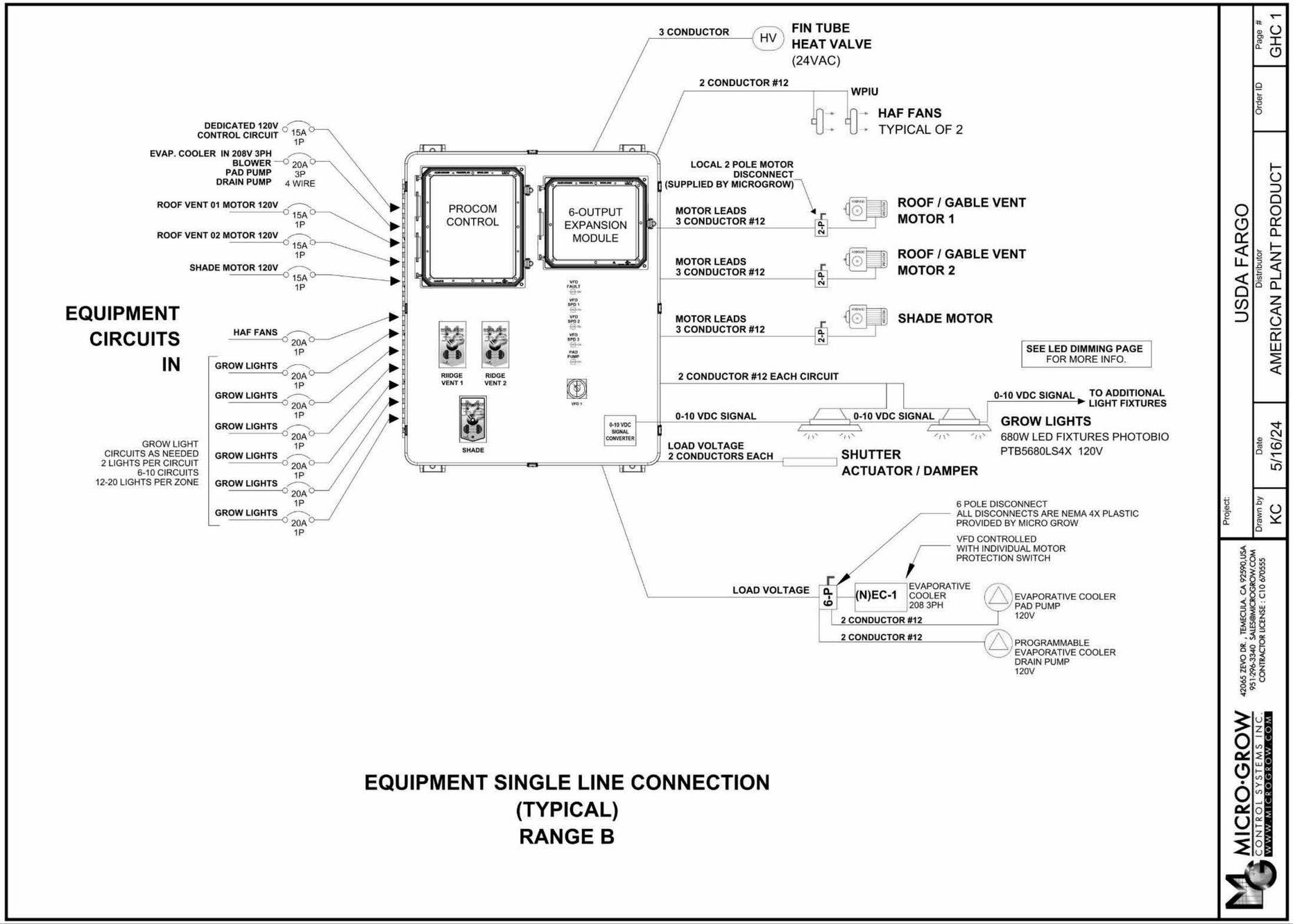
PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: M601

NOTE:
FOR INFORMATION ONLY. GREENHOUSE CONTROLS PACKAGE BY OTHERS.



EQUIPMENT SINGLE LINE CONNECTION (TYPICAL) RANGE B

Project: USDA FARGO

Distributor: AMERICAN PLANT PRODUCT

Order ID

Page # GHC 1

Drawn by KC

Date 5/16/24

MICRO·GROW CONTROL SYSTEMS INC.
WWW.MICROGROW.COM
42065 ZEVO DR., TEMECULA, CA 92590,USA
951-296-3340 SALES@MICROGROW.COM
CONTRACTOR LICENSE : C10 670555

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER TJS	FACILITIES ENGINEER S KASEMAN
DESIGNER LB	EPM M McWILLIAMS
CHECKED BY ES	SAFETY & HEALTH E WELKER
DRAWN BY LB	REAL PROPERTY W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

GREENHOUSE CONTROLS - SINGLE LINE DIAGRAM - CELL

PROJECT NO. 09228.021

DATE 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET X131

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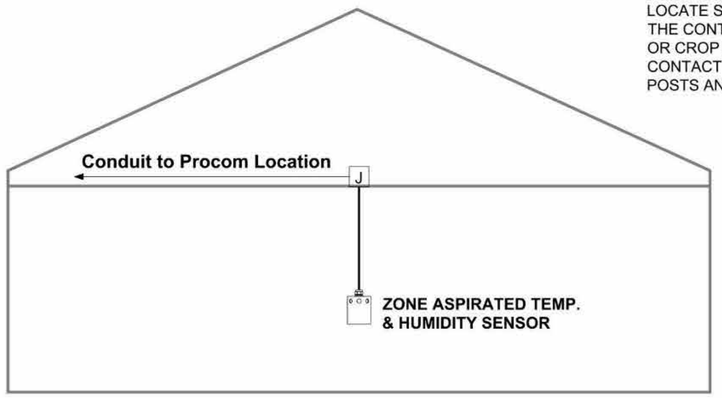
NOTE:
FOR INFORMATION ONLY. GREENHOUSE CONTROLS PACKAGE BY OTHERS.

LOW VOLTAGE CABLES

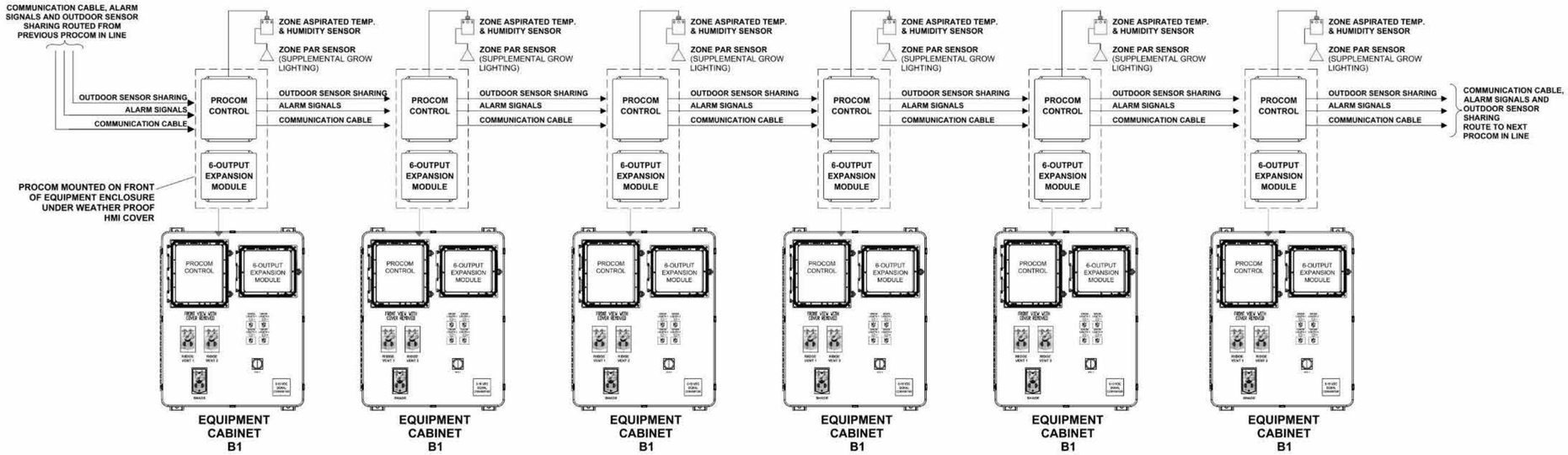
ALL CABLES ARE STRANDED, COPPER CABLES

OUTDOOR SENSOR SHARING & OVERRIDES 8 CONDUCTOR, SHIELDED
ASPIRATED TEMP & HUMIDITY SENSOR WITH PAR 9 CONDUCTOR, SHIELDED
ALARM SIGNALS 2 CONDUCTOR
COMMUNICATION CABLE (GROWLINK) 22 GAUGE, 2 PAIR TWISTED, STRANDED. EACH PAIR INDIVIDUALLY SHIELDED

ZONE SENSOR NOTE:
LOCATE SENSOR IN THE CENTER OF THE CONTROLLED AREA, AT BENCH OR CROP LEVEL, AWAY FROM DIRECT CONTACT WITH GREENHOUSE METAL POSTS AND MEMBERS.



SENSOR MOUNTING



CABINET CONNECTION DETAIL - ZONE F

Project: USDA FARGO

Distributor: AMERICAN PLANT PRODUCT

Order ID

Page # GHC 2

Date 4/09/24

Drawn by SB

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42065 ZEVO DR., TEMECULA, CA 92590,USA
951-296-3340 SALES@MICROGROW.COM
CONTRACTOR LICENSE : C10 670555

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PROJECT NO.: 09228.021

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: LB	EPM: M McWILLIAMS
CHECKED BY: ES	SAFETY & HEALTH: E WELKER
DRAWN BY: LB	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

GREENHOUSE CONTROLS - SINGLE LINE DIAGRAM - RANGE

PROJECT NO.

DATE 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET X132

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NOTE:
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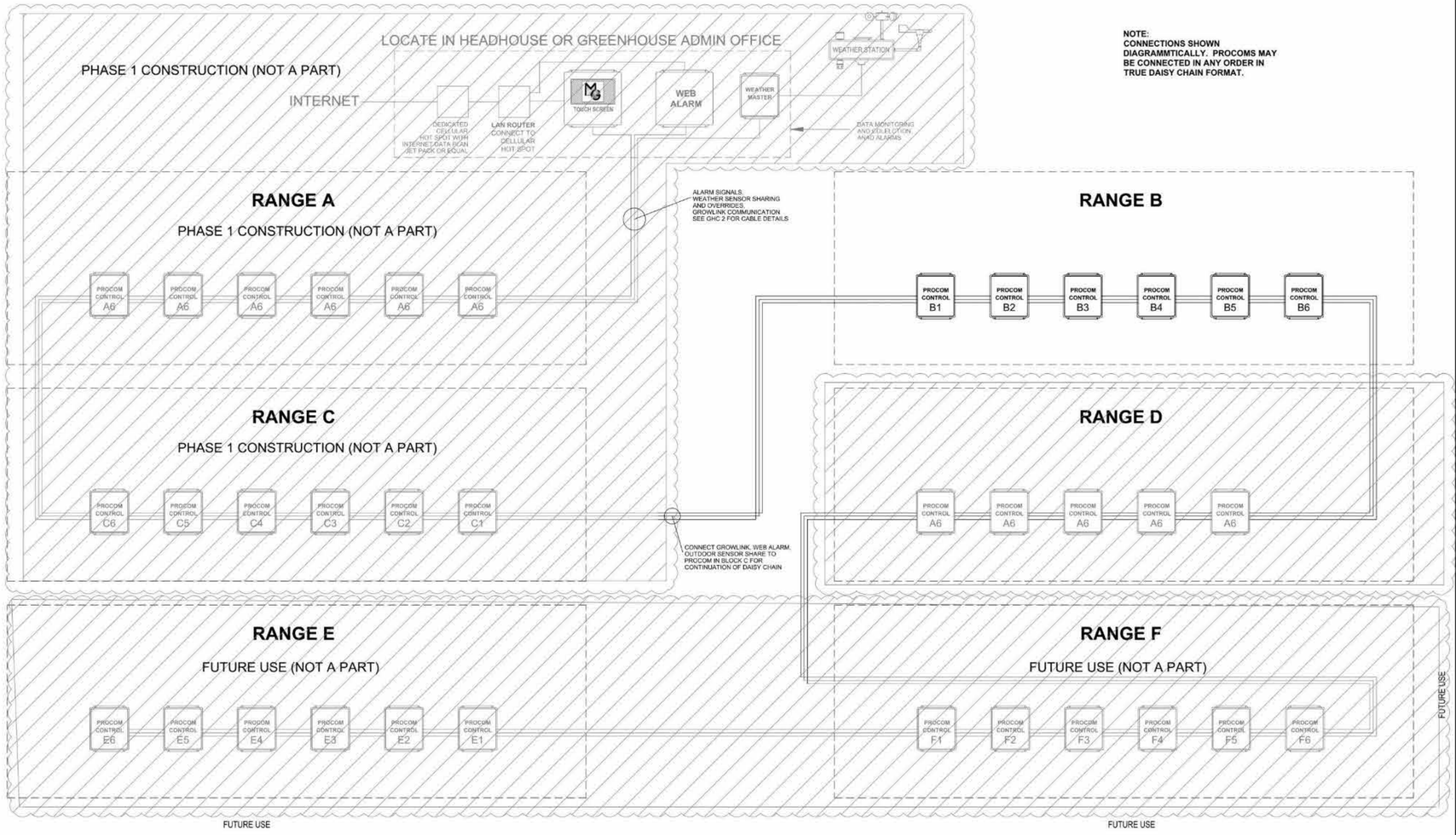

SYSTEM NETWORK TOPOLOGY - ZONE B

Project: USDA FARGO

Distributor: AMERICAN PLANT PRODUCT

Order ID

Page # GHC 3

Date 4/09/24

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951-296-3340 SALES@MICROGROW.COM
CONTRACTOR LICENSE : C10 670355

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A–E FIRM	USDA
PROJECT MANAGER TJS	FACILITIES ENGINEER S KASEMAN
DESIGNER LB	EPM M McWILLIAMS
CHECKED BY ES	SAFETY & HEALTH E WELKER
DRAWN BY LB	REAL PROPERTY W ROSS

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USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

GREENHOUSE CONTROLS - NETWORK TOPOLOGY

PROJECT NO.

DATE 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET X133

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NOTE:
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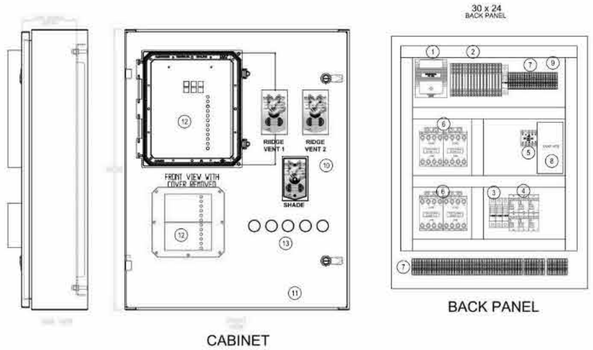
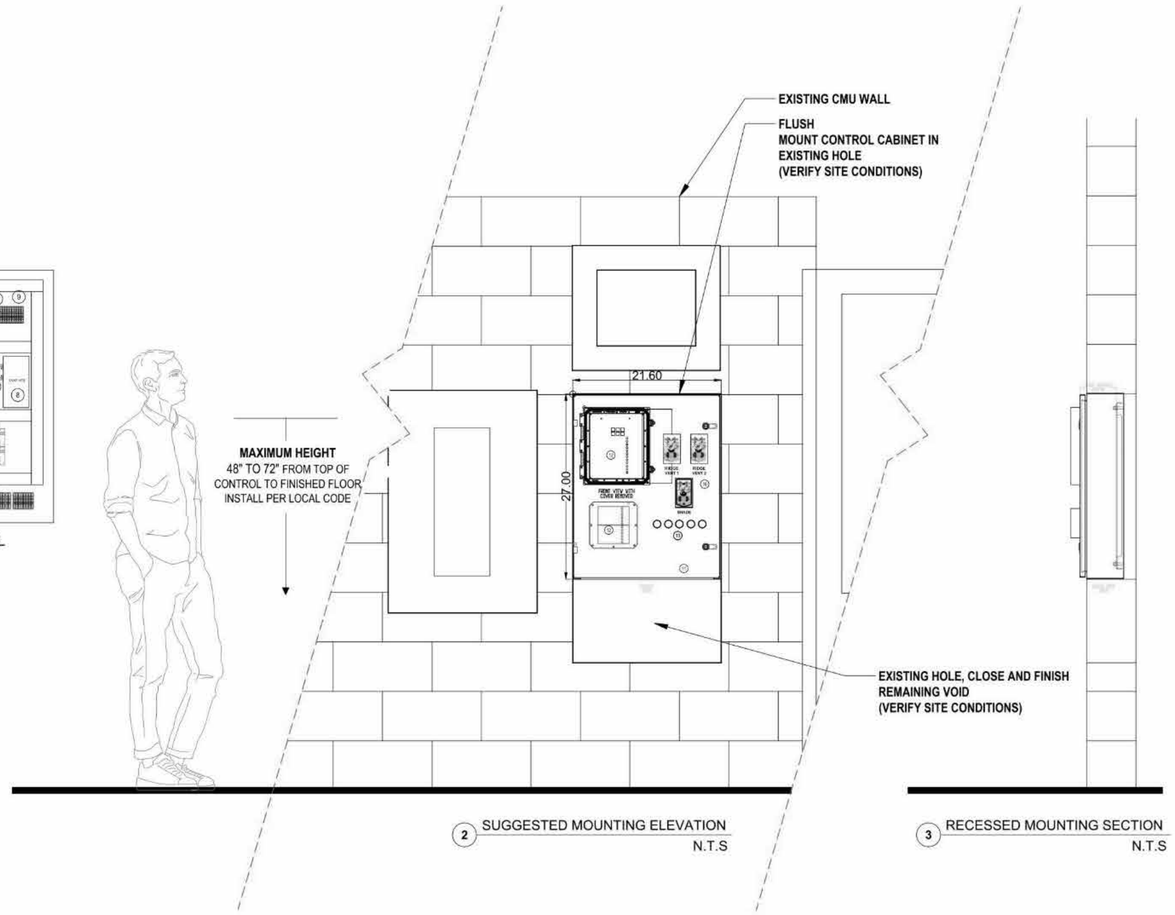
LEGEND

1. 24VAC CONTROL TRANSFORMER (120v PRIMARY)
2. CONTROL RELAYS. PHOENIX CONTACT OR EQUAL.
3. INDIVIDUAL MOTOR CONTROL CIRCUIT PROTECTON BREAKERS SPRECHER + SHUH OR EQUAL.
4. MOTOR CONTROL RELAYS
5. HAF CONTACTORS. SPRECHER + SHUH OR EQUAL
6. 20 AMP LIGHTING RATED CONTACTORS FOR LIGHTING CONTROL. SPRECHER + SHUH OR EQUAL
7. INPUT AND OUTPUT TERMINALS PHOENIX CONTACT OR EQUAL
8. VFD EXHAUST FAN CONTROL ABB OR EQUAL.
9. CABINET COOLING FANS WITH THERMOSTAT (NOT SHOWN)
10. VENT CONTROL WITH HOA SWITCH WITH CLEAR FLIP LID
11. SAGINAW ENVIROLINE OR EQUAL SCE-30EL2406LP 30"H X 24"W X 6"D STEEL ENCLOSURE WITH FLUSH MOUNT KIT
12. ZONE ENVIRONMENTAL CONTROL 1 PER GH ZONE. MOUNTED ON FRONT FACE OF EQUIPMENT CABINET UNDER LOCKABLE WEATHER PROOF HMI COVER
13. VFD SPEED AND FAULT INDICATOR LEDS

NOTE:
FINAL PANEL SIZE TO BE CO-ORDINATED WITH GREEN HOUSE PANEL SHOP



1 EQUIPMENT CABINET DETAIL
N.T.S



2 SUGGESTED MOUNTING ELEVATION
N.T.S

3 RECESSED MOUNTING SECTION
N.T.S

Project: USDA FARGO
Distributor: AMERICAN PLANT PRODUCT
Order ID
Page # GHC 4
Drawn by DY
Date 4/09/24

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42065 ZEVO DR. , TEMECULA, CA 92590,USA
951-296-3340 SALES@MICROGROW.COM
CONTRACTOR LICENSE : C10 670555

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REVISIONS

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	LB
EPM	M McWILLIAMS
CHECKED BY	ES
SAFETY & HEALTH	E WELKER
DRAWN BY	LB
REAL PROPERTY	W ROSS

USDA Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

GREENHOUSE CONTROLS - INSTALLATION DETAIL

PROJECT NO.
DATE 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

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NOTE:
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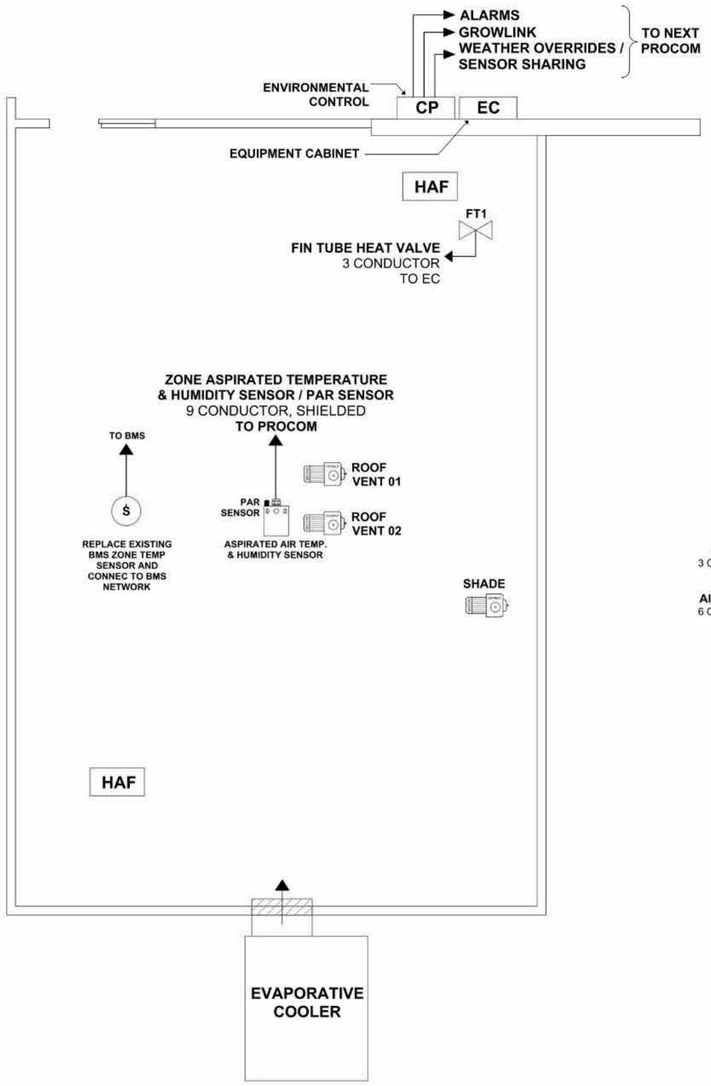
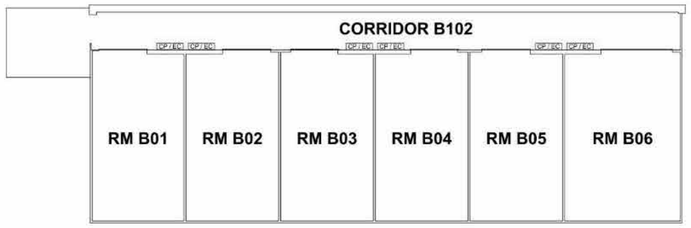


EQUIPMENT LAYOUT FOR 1 ROOM (TYPICAL OF 6)

1 LOW VOLTAGE ROOM DETAIL
N.T.S



2 GREENHOUSE RANGE LAYOUT
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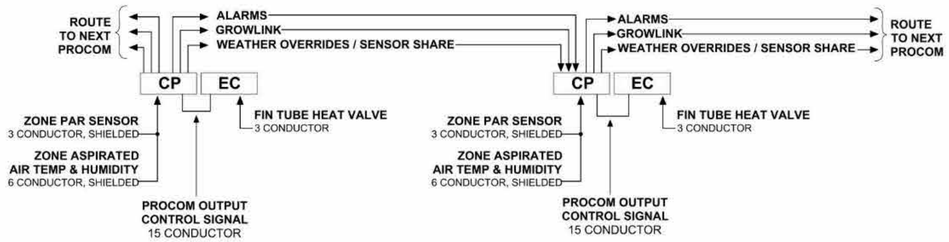

3 LOW VOLTAGE CABINET CONNECTION DETAIL
N.T.S

"AS BUILT"

LOW VOLTAGE CABLE
COMMUNICATION CABLE (GROWLINK) 22 AWG, STR, 2 PAIR TWISTED, EACH INDIVIDUALLY SHIELDED
ALARM SIGNALS 2 CONDUCTOR
OUTDOOR SENSOR SHARING & OVERRIDES 8 CONDUCTOR, 22 AWG, STR, SHIELDED
PAR LIGHT SENSOR 3 CONDUCTOR, SHIELDED
ASPIRATED AIR TEMP. & HUMIDITY SENSOR 6 CONDUCTOR, SHIELDED
PROCOM CONTROL OUTPUT SIGNAL 15 CONDUCTOR
HEAT VALVE 3 CONDUCTOR
HEAT DEMAND (TO BOILER) 2 CONDUCTOR

Project: USDA FARGO
Distributor: AMERICAN PLANT PRODUCTS
Order ID
Page # GHC 6
Date 05/16/24
Drawn by DY/KC

MICRO·GROW CONTROL SYSTEMS INC.
WWW.MICROGROW.COM
42065 ZEVO DR., TEMECULA, CA 92590,USA
951-296-3340 SALES@MICROGROW.COM
CONTRACTOR LICENSE - C10 670555

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NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: LB	EPM: M McWILLIAMS
CHECKED BY: ES	SAFETY & HEALTH: E WELKER
DRAWN BY: LB	REAL PROPERTY: W ROSS

USDA Agricultural Research Service
USDA NCSL GREENHOUSES — PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

GREENHOUSE CONTROLS - LOW VOLTAGE ROOM DETAIL

PROJECT NO.
DATE 05/11/2026
FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526–8119
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PROJECT NO.: 09228.021

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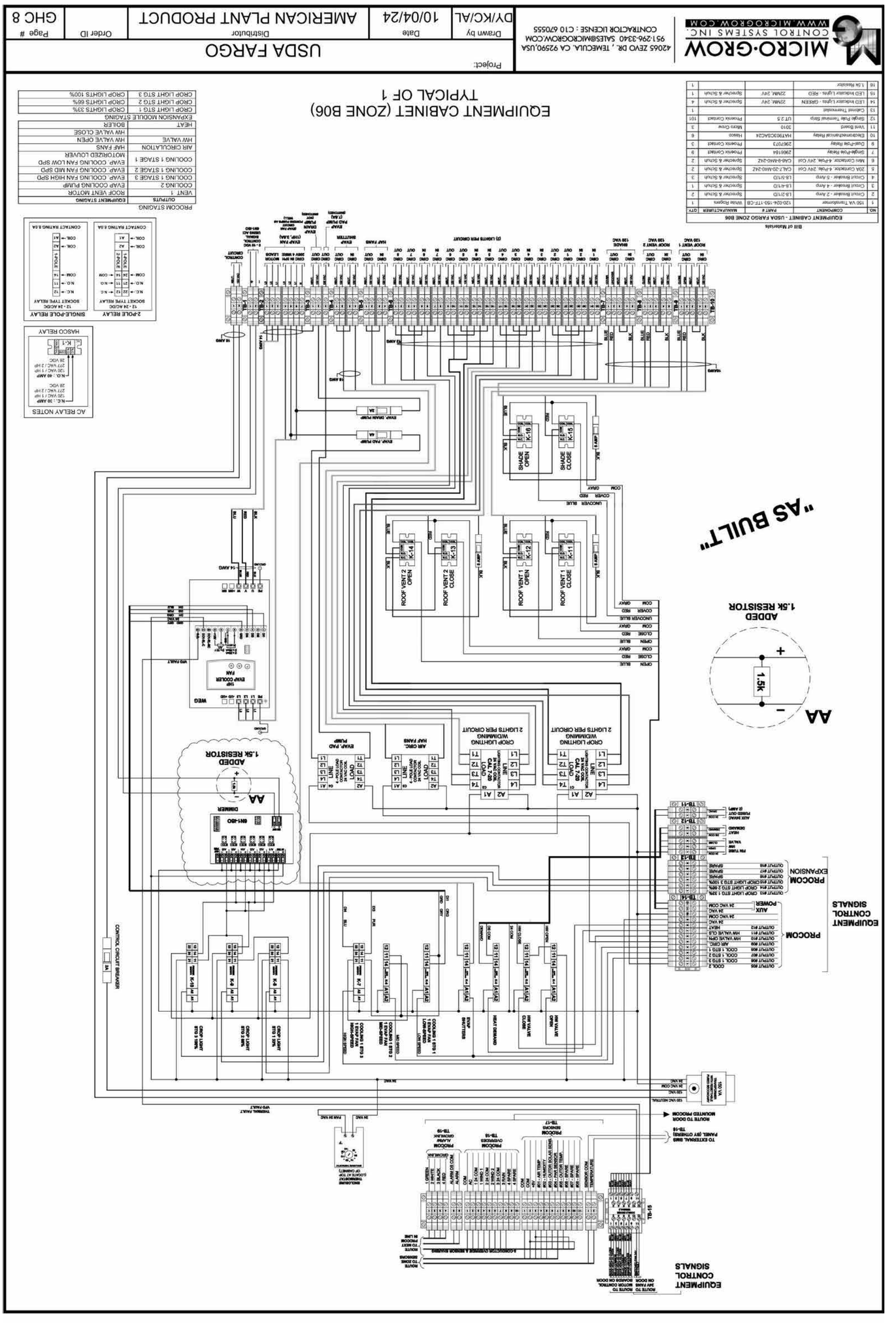

MICRO·GROW CONTROL SYSTEMS INC. WWW.MICROGROW.COM	42065 ZEVO DR., TEMECULA, CA 92590,USA 951-296-3340 SALES@MICROGROW.COM CONTRACTOR LICENSE : C10 670555	Drawn by DY/KC/AL	Date 10/04/24
Project: USDA FARGO		Distributor AMERICAN PLANT PRODUCT	
		Order ID	Page # GHC 8

NO.	COMPONENT	PART #	MANUFACTURER	QTY
1	150 VA Transformer	120-024-150-TT-C6	White Rodgers	1
2	Circuit Breaker - 2 Amp	LS-2/1D	Siemens & Schuh	2
3	Circuit Breaker - 4 Amp	LS-4/1D	Siemens & Schuh	1
4	Circuit Breaker - 5 Amp	LS-5/1D	Siemens & Schuh	3
5	20A Contactor, 4-Pole, 24V Coil	CAL7-20-M40-24Z	Siemens & Schuh	2
6	Mini Contactor, 4-Pole, 24V Coil	CAS-9-M40-24Z	Siemens & Schuh	2
7	Single-Pole Relay	2966164	Phoenix Contact	9
8	Quad-Pole Relay	2967073	Phoenix Contact	3
9	Electromechanical Relay	HA7B03C3AC24	Hasco	6
10	Video Board	3010	Micro Grow	3
11	Single Pole Terminal Strip	UT 2.5	Phoenix Contact	101
12	Chlorine Thermostat			1
13	LED Indicator Lights - GREEN	22MM, 24V	Siemens & Schuh	4
14	LED Indicator Lights - RED	22MM, 24V	Siemens & Schuh	1
15	1.5k Resistor			1
16				

Bill of Materials

EQUIPMENT CABINET - USDA FARGO ZONE B06

OUTPUTS	EQUIPMENT STAGING
VENT 1	ROOF VENT MOTOR
COOLING 2	EVAP COOLING PUMP
COOLING 1 STAGE 3	EVAP COOLING FAN HIGH SPD
COOLING 1 STAGE 2	EVAP COOLING FAN MED SPD
COOLING 1 STAGE 1	EVAP COOLING FAN LOW SPD
	MOTORIZED LOUVER
AIR CIRCULATION	HAF FANS
HW VALVE	HW VALVE OPEN
	HW VALVE CLOSE
HEAT	BOILER
EXPANSION MODULE STAGING	
CROP LIGHT STG 1	CROP LIGHTS 33%
CROP LIGHT STG 2	CROP LIGHTS 66%
CROP LIGHT STG 3	CROP LIGHTS 100%

PROCOM STAGING

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A-E FIRM	USDA
PROJECT MANAGER	FACILITIES ENGINEER T.I.S. S KASEMAN
DESIGNER LB	EPM M McWILLIAMS
CHECKED BY ES	SAFETY & HEALTH E WELKER
DRAWN BY LB	REAL PROPERTY W ROSS

USDA

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA ARS GREENHOUSES

1307 18TH STREET NORTH, FARGO, ND 58102

Agricultural Research Service

PHASE V

GREENHOUSE CONTROLS EQUIPMENT CABINET (ZONE B06) TYPICAL OF 1

PROJECT NO. 09228.021

DATE 05/11/2026

FACILITIES ENGINEERING SECTION PLAINS AREA 2150 CENTRE AVE., BLDG D, SUITE 330 FT. COLLINS, CO 80526-8119

SHEET GHC8

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PROJECT NO.: 09228.021

09228021- GHC8

GREENHOUSE CONTROLS EQUIPMENT CABINET (ZONE B06) TYPICAL OF 1

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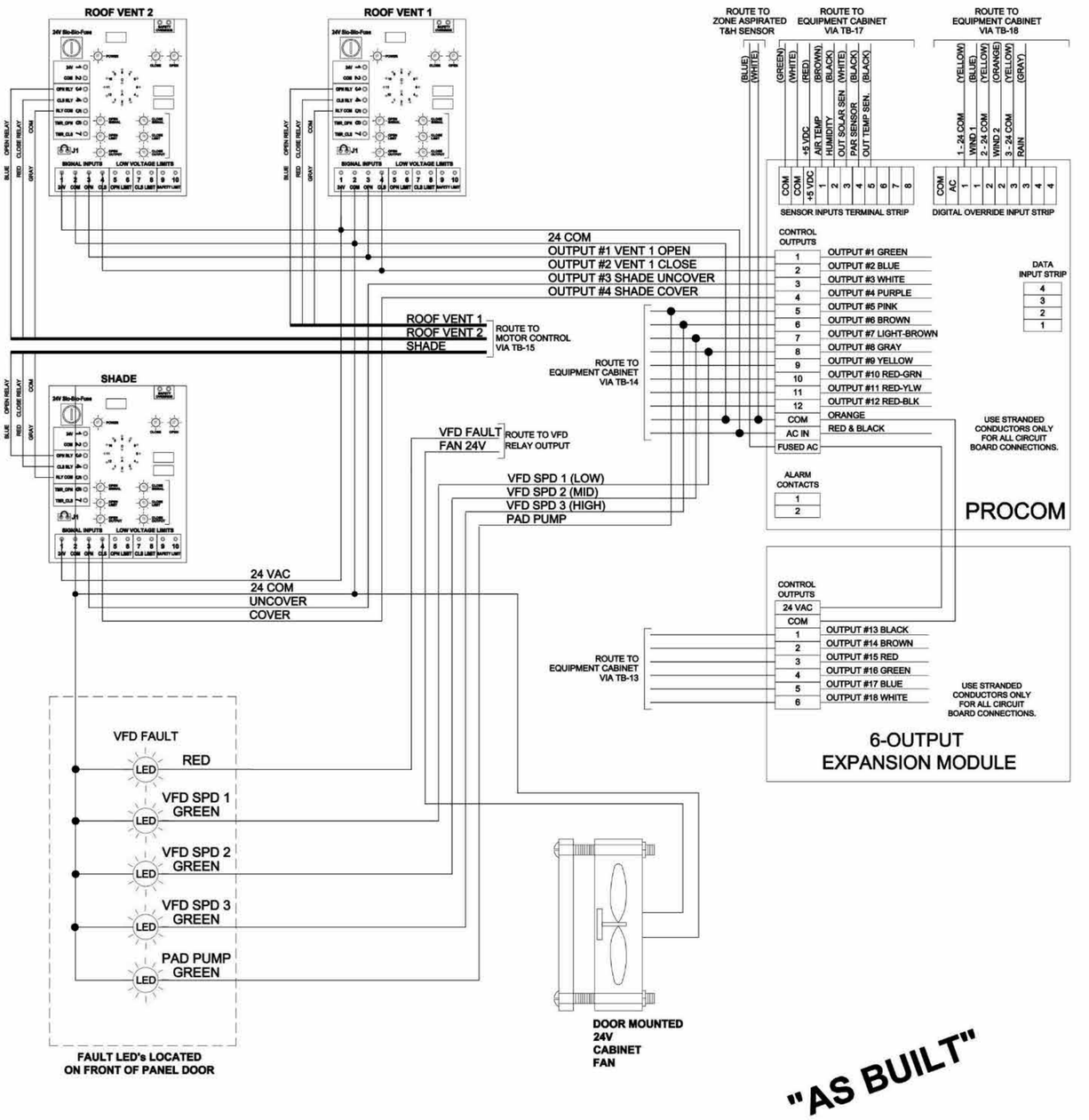

EQUIPMENT CABINET DOOR PANEL
(ZONE B06)
TYPICAL OF 1

MICRO·GROW CONTROL SYSTEMS INC.
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951-296-3340 SALES@MICROGROW.COM
CONTRACTOR LICENSE : C10 670555

Project:				
USDA FARGO				
Drawn by	Date	Distributor	Order ID	Page #
KC/AL	07/09/24	AMERICAN PLANT PRODUCT		GHC 9

USDA

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A-E FIRM: USDA
PROJECT MANAGER: TJS
FACILITIES ENGINEER: S KASEMAN
DESIGNER: LB
EPM: M McWILLIAMS
CHECKED BY: ES
SAFETY & HEALTH: E WELKER
DRAWN BY: LB
REAL PROPERTY: W ROSS

USDA
GREENHOUSE CONTROLS-EQUIPMENT CABINET DOOR PANEL (ZONE B06) TYP OF 1
PROJECT NO. 09228.021
DATE 05/11/2026
FACILITIES ENGINEERING SECTION
PROJECT MGR. 2150 CENTRE AVE. BLDG. D, SUITE 350 FT. COLLINS, CO 80526-8119
SHEET GHC9

NO. | DATE | BY | DESCRIPTION
REVISIONS

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USDA NCSL GREENHOUSES
1307 18TH STREET NORTH, FARGO, ND 58102
PHASE V

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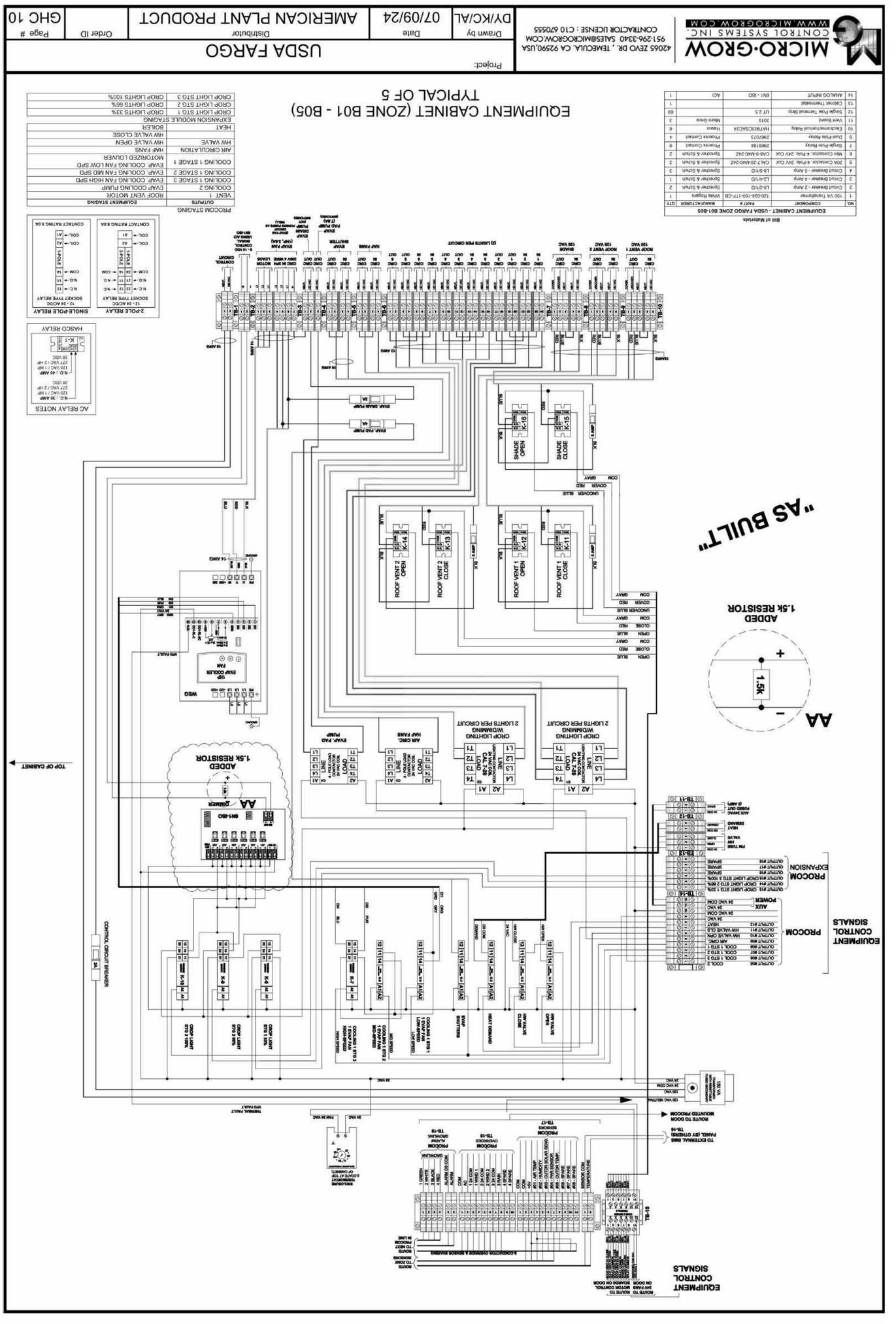
PROJECT NO.: 09228.021

09228021- GHC9

GREENHOUSE CONTROLS-EQUIPMENT CABINET DOOR PANEL ZONE B06) TYP. OF 1



USDA

NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA NCSL GREENHOUSES

1307 18TH STREET NORTH, FARGO, ND 58102

USDA ARS

Agricultural Research Service

PHASE V

GREENHOUSE CONTROLS-EQUIPMENT CABINET (ZONE B01-B05) TYP. OF 5

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET GHC10

PROJECT NO. 09228.021

DATE 05/11/2026

REAL PROPERTY W ROSS

SAFETY & HEALTH E WELKER

CHECKED BY ES

DRAWN BY LB

95% DESIGN - NOT FOR CONSTRUCTION

A-E FIRM USDA

PROJECT MANAGER T.IS

FACILITIES ENGINEER S KASEMAN

DESIGNER LB

EPM M McWILLIAMS

SCHEMMER

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PROJECT NO.: 09228.021

09228021- GHC10

GREENHOUSE CONTROLS-EQUIPMENT CABINET (ZONE B01-B05) TYP. OF 5

CAD DSC DH PM

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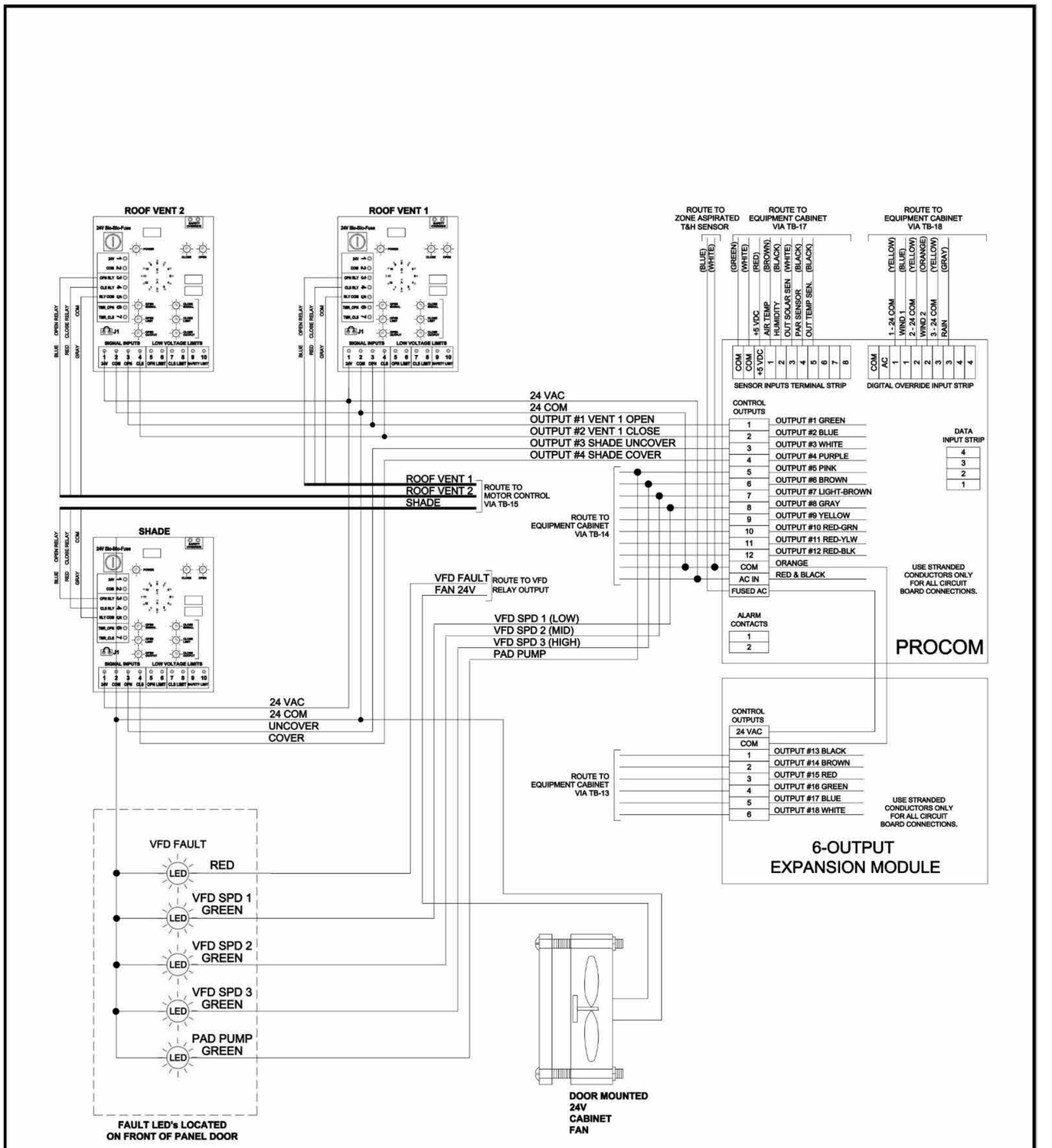
CAD ____ DSG ____ DH ____ PM ____



EQUIPMENT CABINET DOOR PANEL
(ZONE B01 - B05)
TYPICAL OF 5

MICRO·GROW CONTROL SYSTEMS INC.
WWW.MICROGROW.COM

42065 ZEVO DR. , TEMECULA. CA 92590,USA
951-296-3340 SALES@MICROGROW.COM
CONTRACTOR LICENSE : C10 670555

Project:				
USDA FARGO				
Drawn by	Date	Distributor	Order ID	Page #
KC/AL	07/09/24	AMERICAN PLANT PRODUCT		GHC 11

0922821- GHC11

GREENHOUSE CONTROLS-EQUIPMENT CABINET [ZONE B01-B05] TYP. OF 5

95% DESIGN - NOT FOR CONSTRUCTION

A-E FIRM: USDA
PROJECT MANAGER: TJS — FACILITIES ENGINEER: S. KASEMAN
DESIGNER: LB — EPM: M. McWILLIAMS
CHECKED BY: ES — SAFETY & HEALTH: E. WELKER
DRAWN BY: LB — REAL PROPERTY: W. ROSS

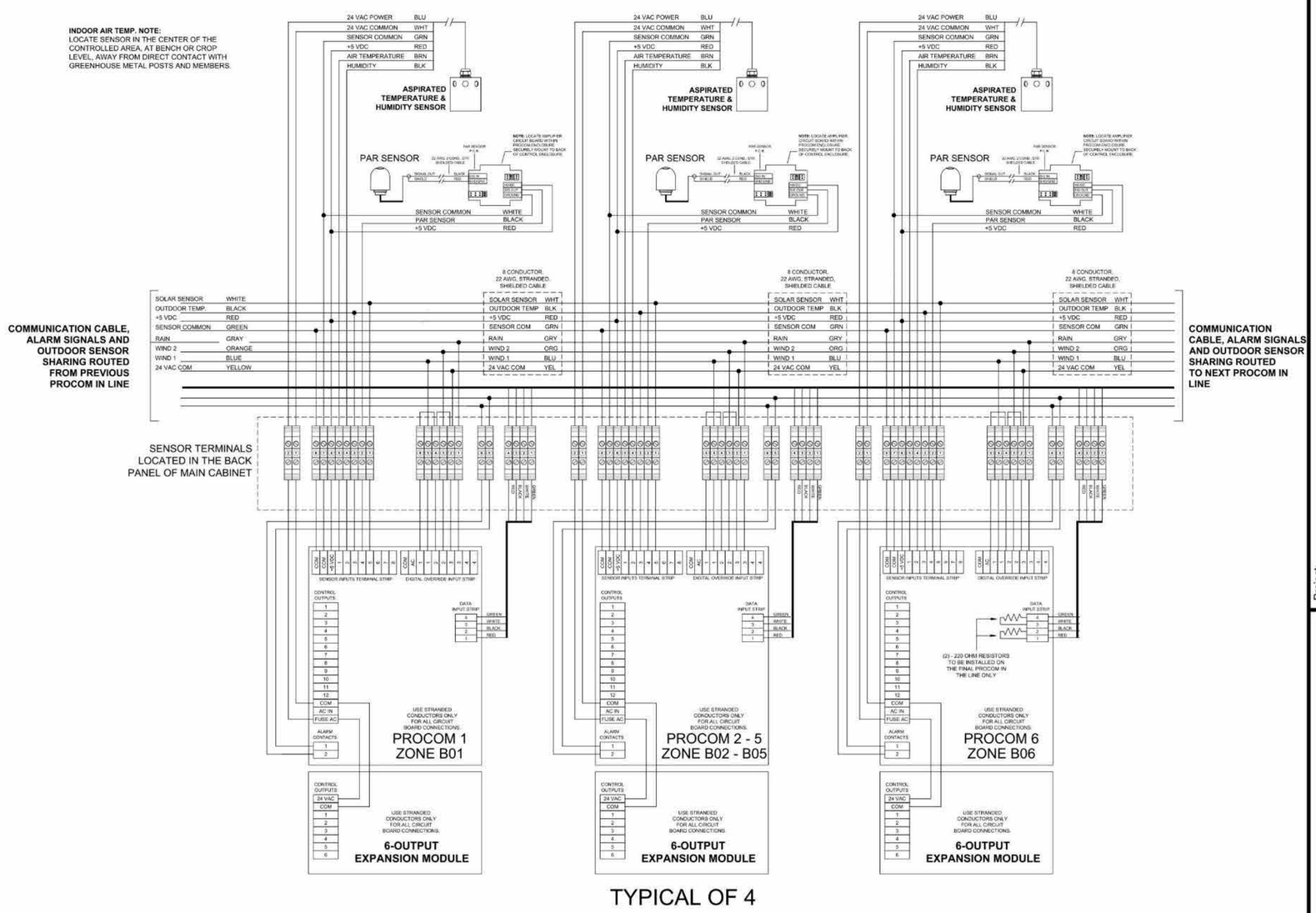
USDA
Agricultural Research Service
USDA, NCSL, GREENHOUSES — USDA ARS, 1307 18TH STREET NORTH, FARGO, ND 58102 — PHASE V
GREENHOUSE CONTROLS-EQUIPMENT CABINET [ZONE B01-B05] TYP. OF 5
PROJECT NO.
DATE: 05/11/2026
FACILITIES ENGINEERING SECTION, 2150 CENTRE AVENUE, BUILDING A, SUITE 330, FT. COLLINS, CO 80526-8119
SHEET: GHC11

NO.	DATE	BY	DESCRIPTION

REVISIONS

SCHEMMER
Page Stantec
PROJECT NO.: 09228.021

USDA



TYPICAL OF 4

NOTE:
ALL WIRE CONNECTIONS ARE TO BE MADE AT TERMINAL STRIPS WITHIN THE CONTROLS. DO NOT SPLICE WIRES.

BLOCK B
SENSOR INPUTS

Project: USDA FARGO
Distributor: AMERICAN PLANT PRODUCT
Order ID
Page # GHC 12
Drawn by AL
Date 07/25/24

MICRO-GROW CONTROL SYSTEMS INC.
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CONTRACTOR LICENSE : C10 670355

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NO.	DATE	BY	DESCRIPTION

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PROJECT NO.: 09228.021

A–E FIRM	USDA
PROJECT MANAGER TJS	FACILITIES ENGINEER S KASEMAN
DESIGNER LB	EPM M McWILLIAMS
CHECKED BY ES	SAFETY & HEALTH E WELKER
DRAWN BY LB	REAL PROPERTY W ROSS

USDA Agricultural Research Service
USDA NCSL GREENHOUSES — PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102
GREENHOUSE CONTROLS -BLOCK B SENSOR INPUTS

PROJECT NO. / DATE 05/11/2026
FACILITIES ENGINEERING SECTION PLAINS AREA 2150 CENTRE AVE., BLDG D, SUITE 330 FT. COLLINS, CO 80526-8119
SHEET GHC12

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CAD | DSG | JH | PM

PLUMBING ABBREVIATIONS

A	AIR LINE	MP	MEDIUM PRESSURE
ACU	AIR CONDITIONING UNIT	MS	MOP SINK
AD	AREA DRAIN	MV	MEDICAL VACUUM
AFF	ABOVE FINISHED FLOOR	N	NITROGEN
AFG	ABOVE FINISHED GRADE	N2O	NITROUS OXIDE
AHU	AIR HANDLING UNIT	NA	NOT APPLICABLE
AV	ACID VENT	NC	NORMALLY CLOSED
AW	ACID WASTE	NIC	NOT IN CONTRACT
BT	BATH TUB	NO	NORMALLY OPEN
BTU	BRITISH THERMAL UNIT	NTS	NOT TO SCALE
CD	CONDENSATE DRAIN	O	OXYGEN
CDA	COMPRESSED AIR	OD	OVERFLOW ROOF DRAIN
CFCI	CONTRACTOR FURNISHED CONTACTOR INSTALLED	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
CFH	CUBIC FEET PER HOUR	OFOI	OWNER FURNISHED OWNER INSTALLED
CL	CENTER LINE	OZ	OUNCE
CO2	CARBON DIOXIDE	P	PUMP
CS	CLINICAL SINK	PH	PHASE
CW	COLD WATER	PIV	POST INDICATOR VALVE
D	DRAIN LINE	PLBG	PLUMBING
DCO	DOUBLE CLEANOUT	PRV	PRESSURE REDUCING VALVE
DFU	DRAINAGE FIXTURE UNITS	PSI	POUNDS PER SQUARE INCH
DHR	DOMESTIC HOT WATER RETURN	PW	PROTECTED WATER
DHW	DOMESTIC HOT WATER	RD	ROOF DRAIN
DIA	DIAMETER	REF	REFERENCE
DWV	DRAIN, WASTE & VENT	RO	REVERSE OSMOSIS WATER
EL	ELEVATION	SAN	SANITARY WASTE
EQ	EQUIPMENT	SD	STORM DRAIN
ES	EMERGENCY SHOWER	SF	SQUARE FEET
ET	EXPANSION TANK	SH	SHOWER
EWC	ELECTRIC WATER COOLER	SPEC	SPECIFICATION
F	FIRE	SQ	SQUARE
FCO	FLOOR CLEANOUT	SSD	SUBSOIL DRAIN
FCU	FAN COIL UNIT	STM	STEAM
FD	FLOOR DRAIN	SW	SOFT WATER
FS	FLOOR SINK	T&P	TEMPERATURE AND PRESSURE
G	GAS	TD	TRENCH DRAIN
GAL	GALLON	TEMP	TEMPERATURE
GCO	GRADE CLEANOUT	TYP	TYPICAL
GPH	GALLONS PER HOUR	UH	UNIT HEATER
GW	GREASE WASTE	UR	URINAL
GWH	GAS WATER HEATER	V	VENT
HB	HOSE BIBB	VFD	VARIABLE FREQUENCY DRIVE
HC	HOSE CABINET	VOL	VOLUME
HD	HUB DRAIN	VS	SLIDE MEDICAL VACUUM
HP	HIGH PRESSURE	VTR	VENT THRU ROOF
HR	HOSE REEL	W	WATT
HW	HOT WATER	W.C.	INCHES WATER COLUMN
HWR	HOT WATER RETURN	WAGD	WASTE ANESTHETIC GAS DISPOSAL
HWS	HOT WATER SUPPLY	WC	WATER CLOSET
HZ	HERTZ (FREQUENCY)	WCO	WALL CLEANOUT
IA	INSTRUMENT AIR	WG	WATER GAGE
IE	INVERT ELEVATION	WH	WALL HUNG
INV	INVERT	WSFU	WATER SUPPLY FIXTURE UNIT
IW	INDIRECT WASTE	YR	YEAR
L	LAVATORY	Z	ZONE
LAP	MEDICAL GAS LOCAL ALARM PANEL	ZVB	MEDICAL GAS ZONE VALVE BOX
LF	LINEAR FEET	°C	CELSIUS
MA	MEDICAL AIR		
MAP	MASTER ALARM PANEL MEDICAL GAS		
MAX	MAXIMUM		
MG	MEDICAL GAS		
MGO	MEDICAL GAS OUTLET		
MIN	MINIMUM		

PLUMBING SYSTEM LABELS

	EXISTING PIPING/FIXTURES/EQUIPMENT TO REMAIN
	EXISTING PIPING/FIXTURES/EQUIPMENT TO BE REMOVED
CW	COLD WATER
	COLD WATER
HW	HOT WATER
	HOT WATER
HR	HOT WATER RETURN/RECIRCULATION
	HOT WATER RETURN/RECIRCULATION
SW	SOFT WATER
NPCW	NONPOTABLE COLD WATER
NPHW	NONPOTABLE HOT WATER
NPHR	NONPOTABLE HOT WATER RETURN/RECIRCULATION
NPSW	NONPOTABLE SOFT WATER
TW	TEMPERED WATER
PWS	PUIFIED WATER SUPPLY
PWR	PURIFIED WATER RETURN/RECIRCULATION
CA	COMPRESSED AIR
MA	MEDICAL AIR
IA	INSTRUMENT AIR
LA	LABORATORY AIR
V	VACUUM
MV	MEDICAL VACUUM
LV	LABORATORY VACUUM
WAGD	WASTE ANESTHETIC GAS DISPOSAL
N	NITROGEN
O	OXYGEN
N2O	NITROUS OXIDE
CO2	CARBON DIOXIDE
H2	HYDROGEN
G	NATURAL GAS
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN/RECIRCULATION
SS	SANITARY SEWER
SD	STORM DRAIN
SSD	SUBSOIL DRAIN
OD	OVERFLOW DRAIN
GW	GREASE WASTE
OW	OIL WASTE
FM	FORCE MAIN
AW	ACID WASTE
V	VENT
GV	GREASE VENT
AV	ACID VENT
GD	GARAGE DRAIN

VALVE SYMBOLS

DOUBLE LINE | SINGLE LINE

- GATE VALVE (GENERIC VALVE SYMBOL)
- CHECK VALVE
- NON-SLAM (SPRING) CHECK VALVE
- BUTTERFLY VALVE
- DIAPHRAGM VALVE
- BALL VALVE
- COMBINATION BALANCING & SHUT-OFF VALVE
- PLUG VALVE
- SELF-ACTUATING REGULATOR (DIAPHRAGM-TYPE ACTUATOR (ION)
- 25 — PRESSURE REDUCING VALVE INDICATING LOW SIDE PRESSURE
- 100 — PRESSURE RELIEF/SAFETY VALVE INDICATING RELIEF PRESSURE
- TEMPERATURE CONTROL VALVE
- THREE-WAY VALVE (BALL TYPE BODY SHOWN)
- GLOBE VALVE
- GLOBE VALVE, SEALED STEM
- ANGLE VALVE
- CIRCUIT SETTER
- AUTOMATIC AIR VENT
- MANUAL AIR VENT
- VACUUM BREAKER

MANUAL ACTUATOR SYMBOLS

- HANDWHEEL ACTUATOR, NON-RISING STEM
- HANDWHEEL ACTUATOR, RISING STEM, OUTSIDE SCREW AND YOKE (OS&Y)
- LEVER ACTUATOR
- G — GEAR ACTUATOR (HANDWHEEL OR CRANK)

NOTE: VALVE TYPE GRAPHICS ARE SHOWN FOR SIZES 4 INCH NOMINAL AND LARGER, MAY OR MAY NOT BE DESCRIBED ON VALVE SIZES SMALLER THAN 4 INCH NOMINAL.

GENERAL NOTES

1. CONTRACTOR SHALL COORDINATE ALL WORK WITH THE WORK OF OTHER TRADES TO AVOID CONFLICTS AND TO MINIMIZE INTERRUPTION OF SERVICES.
2. ALL WORK, METHODS, AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE PREVAILING BUILDING CODE, INSPECTION REGULATIONS AND ALL OFFICIALS HAVING JURISDICTION.
3. DUE TO THE SCALE OF DRAWINGS, NOT ALL PIPING AND APPURTENANCES TO BE PROVIDED ARE SHOWN. CONTRACTOR SHALL PROVIDE SERVICES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING: PIPING INSIDE WALLS AND CHASES TO SERVE ADJACENT PLUMBING FIXTURES AND EQUIPMENT, INDIVIDUAL FIXTURE SUPPLIES AND DRAINS, PIPING OFFSETS, VALVES, TRAPS, GAUGES, STRAINERS, AND UNIONS TO ENSURE THE COMPLETE AND FUNCTIONING INSTALLATION OF FIXTURES AND EQUIPMENT.
4. CONTRACTOR SHALL COORDINATE ROUTING OF PIPING BELOW SLAB WITH COLUMN FOOTINGS, GRADE BEAMS, UNDERGROUND PLUMBING AND ELECTRICAL UTILITIES, AND OTHER SUB-SURFACE BUILDING ELEMENTS.
5. DO NOT ROUGH-IN BASED UPON THESE DRAWINGS. REFER TO LATEST DRAWINGS PREPARED BY THE ARCHITECT. THE FINAL LOCATIONS OF ALL PIPING SHALL ALLOW INSTALLATION OF FIXTURES WITHOUT THE NEED TO FURR-OUT WALLS.
6. VERIFY EXACT LOCATION OF EQUIPMENT PRIOR TO ROUGH-IN OF DRAINS AND CLEANOUTS.
7. NO PIPING IS TO BE INSTALLED OPEN TO PUBLIC VIEW UNLESS NOTED OTHERWISE.
8. DO NOT INSTALL PIPING AT LOCATIONS THAT INTERFERE WITH SERVICE ACCESSIBILITY TO EQUIPMENT.
9. ALL PENETRATIONS THROUGH FLOOR SLABS AND EXTERIOR WALLS SHALL BE SEALED WATERTIGHT.
10. INSTALL FIXTURES ACCORDING TO ADA/TAS REQUIREMENTS.
11. WHEREVER EXISTING PIPING SYSTEMS ARE CONNECTED TO, RE-ROUTED, OR CAPPED, CLEAN AND TEST THE ENTIRE SECTION OF THE SYSTEM AFFECTED IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS.
12. SAWCUT OR COREDRILL AND REMOVE EXISTING FLOOR SLAB AS REQUIRED TO PROVIDE NEW FIXTURES, CLEANOUTS, AND UNDERSLAB WATER, WASTE AND VENT PIPING. PATCH AND REFINISH FLOOR TO MATCH EXISTING. COORDINATE WITH STRUCTURAL ENGINEER PRIOR TO CUTTING OR DRILING SLAB.
13. SAWCUT AND REMOVE EXISTING PAVING AND SIDEWALKS AS REQUIRED TO PROVIDE NEW SERVICES. PATCH AND RE-FINISH TO MATCH EXISTING.
14. ALL EXISTING WALLS, FLOORS, DRIVEWAYS, SIDEWALKS, PARKING AREAS, FENCING, ETC. DISTURBED DUE TO WORK DONE AND THAT ARE TO REMAIN SHALL BE REPAIRED TO CONDITION THAT IS ACCEPTABLE TO THE ARCHITECT/ENGINEER AND OWNER.
15. INVERT ELEVATIONS LISTED ARE APPROXIMATE. PRIOR TO CONSTRUCTION, FIELD VERIFY EXISTING CONDITIONS AND MAKE ADJUSTMENTS AS REQUIRED TO ENSURE PROPER CONNECTIONS TO UTILITIES.
16. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING A COPY OF THE OWNER'S MOST RECENT RULES AND REGULATIONS FOR CONSTRUCTION. THE CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH SUCH RULES AND REGULATIONS.
17. SITE INSPECTION. CONTRACTOR SHALL VISIT THE SITE OF WORK PRIOR TO SUBMISSION OF HIS BID AND THOROUGHLY FAMILIARIZE HIMSELF WITH THE WORKING CONDITIONS AND EXACT NATURE OF THE WORK. SUBMISSION OF A BID ACKNOWLEDGES FULL RESPONSIBILITY FOR PROVIDING ALL NECESSARY LABOR AND MATERIALS TO ENSURE COMPLETE, FUNCTIONAL, AND COMPLIANT SYSTEMS. FAILURE TO MEET THIS REQUIREMENT SHALL NOT BE CONSIDERED JUSTIFICATION FOR OMISSIONS, FAULTY WORK, OR THE PAYMENT OF ADDITIONAL COMPENSATION.
18. CONTRACTOR SHALL COORDINATE ROUTING OF PIPING IN CEILING SPACES WITH MECHANICAL AND ELECTRICAL EQUIPMENT, DUCTWORK AND CONDUIT. INSTALL TO CONSERVE HEADROOM AND TO CREATE MINIMUM INTERFERENCE WITH USE OF SPACE. SHOULD A CONFLICT OCCUR THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER PRIOR TO INSTALLING AN ALTERNATE PIPING PLAN. GROUP PIPING AT COMMON ELEVATIONS WHENEVER PRACTICAL.
19. PRIOR TO ANY ROUGH-INS, COORDINATE ALL FIXTURE AND EQUIPMENT LOCATIONS AND CONNECTION REQUIREMENTS WITH LATEST MANUFACTURER RECOMMENDATIONS AND DRAWINGS AND SPECIFICATIONS PREPARED BY THE ARCHITECT AND OTHER CONSULTANTS (FOOD SERVICE, LABORATORY PLANNING, ETC.). MAKE ADJUSTMENTS AND PROVIDE SERVICES AS REQUIRED.
20. ALL PENETRATIONS THROUGH RATED PARTITIONS AND FLOOR SLABS SHALL BE SEALED TO PROVIDE A FIRE/SMOKE RATING EQUAL TO OR GREATER THAN THE RATING OF THE PARTITION OR FLOOR SLAB. REFER TO ARCHITECTURAL DRAWINGS FOR RATINGS.
21. LOCATE VENT TERMINALS AND FLUES THROUGH ROOF TO MAINTAIN A MINIMUM OF 15'-0"' HORIZONTALLY FROM AND 3'-0"' VERTICALLY ABOVE ALL OUTSIDE AIR INTAKES, OPERABLE WINDOWS, DOORS, AND ANY OTHER BUILDING OPENINGS.
22. ALL VALVES INDICATED ON DRAWINGS SHALL BE LINE-SIZED (THE SAME SIZE AS THE PIPE THEY SERVE) UNLESS NOTED OTHERWISE.
23. PROVIDE LOCKING ACCESS PANELS ACCEPTABLE TO ARCHITECT/OWNER AS REQUIRED TO ENSURE ACCESS TO VALVES AND WATER HAMMERS.
24. PROVIDE CLEANOUTS IN ADDITION TO THOSE SHOWN AS REQUIRED BY CODE.
25. ALL ABOVE SLAB ON GRADE FLOOR DRAINS, P-TRAPS, AND CONNECTED DRAINAGE PIPING RECEIVING CONDENSATE, ICE MACHINE WASTE, OR CONVEYING CONTENTS HAVING TEMPERATURES BELOW 55°F SHALL BE PROPERLY INSULATED TO THE FIRST VERTICAL OFFSET AND VAPOR SEALED TO PREVENT CONDENSATION.
26. UPON COMPLETION OF WORK, THOROUGHLY ROD AND FLUSH OUT ALL GRAVITY DRAINAGE PIPING TO ENSURE IT IS FREE FROM BLOCKAGES AND FLOWING FREELY.
27. UNLESS NOTED OTHERWISE, ADDITIONAL PRECAUTIONARY MEASURES MUST BE PROVIDED IN SPECIAL ROOMS AND AREAS AND ABOVE SPECIAL EQUIPMENT. THESE SPACES INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING: IDF, MDF, SERVER, ELECTRICAL, TELECOM, FOOD STORAGE, FOOD PREPARATION, FOOD SERVING, CLEAN ROOMS, STERILE AREAS, DINING ROOMS, OPERATING ROOMS, IMAGING ROOMS, AND OVER VFD'S AND CONTROL PANELS. AT SUCH LOCATIONS, PROVIDE AUXILIARY DRAIN PANS BENEATH ALL WATER, STORM, WASTE AND VENT PIPING TO DIVERT POSSIBLE LEAKAGE OR CONDENSATION. PANS SHALL BE SUSPENDED FROM STRUCTURE ABOVE WITH GALVANIZED THREADED HANGER RODS AND HARDWARE. PANS SHALL BE GALVANIZED OR STAINLESS STEEL CONSTRUCTION, WITH ALL SOLDERED SEAMS AND JOINTS, MINIMUM 4"" DEEP, SLOPED, WITH A MINIMUM 1-1/4"" DRAIN OUTLET AT THE LOW POINT OF THE PAN. PROVIDE DIELECTRIC ADAPTER AND TYPE DWV COPPER DRAIN LINE AND FITTINGS SLOPED TO NEAREST APPROVED INDIRECT WASTE RECEPTOR.
28. EXISTING WATER, WASTE, AND VENT UTILITIES SHALL BE MODIFIED AS REQUIRED FOR THE INSTALLATION OF NEW PLUMBING FIXTURES. REFER TO PLUMBING FLOOR PLANS FOR POINTS OF CONNECTION.
29. PRIOR TO BEGINNING CONSTRUCTION, FIELD VERIFY THE EXACT LOCATION, SIZE, DEPTH, DIRECTION OF FLOW, CAPACITY, PIPE MATERIAL, AND CONDITION OF EXISTING PIPING TO ENSURE THAT PROPER CONNECTIONS TO AND EXTENSION OF SUCH UTILITIES CAN BE MADE.

APPLICABLE CODES & STANDARDS

2018 INTERNATIONAL PLUMBING CODE WITH USDA AMENDMENTS
2018 INTERNATIONAL MECHANICAL CODE WITH USDA AMENDMENTS
2020 NATIONAL ELECTRICAL CODE WITH USDA AMENDMENTS
2018 INTERNATIONAL BUILDING CODE WITH USDA AMENDMENTS
2018 INTERNATIONAL ENERGY CONSERVATION CODE WITH USDA AMENDEMENTS

DESIGN CONDITIONS

PIPE MATERIAL LIST

PLUMBING SYMBOLS

- ELBOW DOWN
- ELBOW UP
- TEE DOWN
- TEE UP
- PIPE CAP
- FLANGE
- UNION
- ANCHOR
- PIPE GUIDE
- PIPE SLEEVE
- ECCENTRIC REDUCER
- CONCENTRIC REDUCER
- DIRECTION OF FLOW
- DIRECTION OF PITCH
- PIPE FLEXIBLE CONNECTION
- EXPANSION JOINT
- FLOW SENSING DEVICE
- GAS REGULATOR
- HEAT TRACE TERMINATION
- HEAT TRACE POWER
- NFWH — NON FREEZE WALL HYDRANT
- HB — HOSE BIBB
- YH — YARD HYDRANT
- FLOOR DRAIN
- OVERFLOW DRAIN
- ROOF DRAIN
- FLOOR SINK
- P-TRAP
- WALL OR END CLEANOUT
- FLOOR CLEANOUT
- DOUBLE CLEANOUT
- BALL VALVE
- GATE VALVE
- GLOBE VALVE
- BUTTERFLY VALVE
- GAS VALVE
- BALANCING VALVE
- CHECK VALVE
- STRAINER
- PRESSURE REDUCING & REGULATING VALVE
- S — SOLENOID VALVE
- RELIEF VALVE
- PRESSURE OR VACUUM SWITCH
- THERMOMETER
- PRESSURE GAUGE WITH VALVE
- WATER HAMMER ARRESTOR
- FILTER
- INLINE PUMP
- PUMP

PIPING SYSTEM LABELS

EXAMPLE:

2" CHWS — SYSTEM SERVICE ABBREVIATION; NOMINAL PIPE SIZE (IN INCHES)

- XXX-1 — PLUMBING FIXTURE DESIGNATION
- PIPE END
- PIPE BREAK
- FLOW ARROW
- STANDARD BREAK
- SAW CUT SLAB AREA FOR NEW PIPING
- 1 — KEYED NOTE
- POINT OF DISCONNECTION
- POINT OF CONNECTION (NEW TO EXISTING)
- NEW ITEMS (PIPING/EQUIPMENT)
- EXISTING ITEMS TO REMAIN
- EXISTING ITEMS TO BE DEMOLISHED OR RELOCATED
- LIMIT OF EXISTING ITEMS TO BE REMOVED

GRAPHIC SYMBOLS

- SECTION NUMBER (X / XX.XX)
- DIRECTION OF CUTTING PLANE
- SHEET NO. OF THE PACKAGE ON WHICH SECTION IS DRAWN

EXAMPLE: ASSUME A SECTION IS CUT ON DWG. P2.01 WITH A TAG OF 1/P6.01. THE SECTION No. 1 IS ON DRAWING No. P6.01.

- SECTION OR DETAIL NUMBER (1)
- DRAWING TITLE
- SCALE: 1/4" = 1'-0"
- SCALE OF SECTION OR DETAIL
- AREA OF DETAIL ENLARGED
- DETAIL NO. (X / XXX)
- SHEET NO. ON WHICH DETAIL IS DRAWN
- RISER TYPE
- RISER NUMBER (X-X / XX")
- PIPE SIZE

DEMOLITION GENERAL NOTES

1. PRIOR TO BEGINNING EXCAVATIONS OR DEMOLITION OF ANY NATURE WHATSOEVER, CONTRACTOR SHALL LOCATE ALL SERVICES AND UTILITIES OCCURRING WITHIN THE BOUNDS OF THE PROJECT. THE CONTRACTOR SHALL THEN PROCEED WITH CAUTION IN HIS WORK SO THAT NO UTILITY OR LINE SERVING AREAS THAT ARE TO REMAIN IS DAMAGED WITH A RESULTANT LOSS OF SERVICE. VERIFY THE SOURCE AND SERVICE OF EACH AND EVERY LINE ENCOUNTERED AND RECORD EACH SERVICE, SIZE, AND LOCATION ON RECORD DRAWINGS.
2. ALL PLUMBING FIXTURES AND EQUIPMENT REMOVED SHALL BE SUBMITTED TO THE OWNER WITH THE OPTION TO BE REUSED. ITEMS THE OWNER DOES NOT WISH TO REUSE BUT WISHES TO RETAIN SHALL BE DELIVERED TO STORAGE AS DIRECTED BY THE OWNER. ITEMS THE OWNER DOES NOT WISH TO REUSE OR RETAIN SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF LEGALLY.
3. PLUG PIPES AND PATCH FLOOR FLUSH WITH EXISTING SLAB ON GRADE AT ANY PLUMBING FLOOR PENETRATIONS NO LONGER REQUIRED.
4. CONTRACTOR SHALL REMOVE ALL PIPING AND ASSOCIATED SUPPORTS FROM ABOVE SLAB ON GRADE TO BELOW ROOF WHICH WAS PREVIOUSLY ABANDONED OR WHICH SERVES PLUMBING FIXTURES AND EQUIPMENT DESIGNATED FOR REMOVAL. REFER TO PLUMBING FLOOR PLANS FOR NEW FIXTURES OR EQUIPMENT TO BE INSTALLED IN THOSE LOCATIONS. PRIOR TO ANY REMOVAL, FIELD VERIFY THAT LINES TO BE REMOVED DO NOT SERVE ANY FIXTURES OR EQUIPMENT TO REMAIN. CAP REMOVED BRANCH LINES AS CLOSE AS POSSIBLE TO EXISTING MAINS.
5. ALL PLUMBING FIXTURES AND EQUIPMENT NOT SPECIFICALLY IDENTIFIED FOR REMOVAL SHALL REMAIN. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE FIELD.
6. CONTRACTOR SHALL FIELD VERIFY AS NECESSARY THE EXACT LOCATION OF PLUMBING FIXTURES, PIPING, AND EQUIPMENT TO BE REMOVED. REFER TO ARCHITECTURAL DRAWINGS FOR CLARIFICATION AS REQUIRED.
7. COORDINATE EACH AND EVERY INTERRUPTION OF SERVICES AND UTILITIES IN ADVANCE WITH THE OWNER, FIRE DEPARTMENT, AND UTILITY COMPANIES TO ENSURE MINIMAL SHUT DOWN TIMES THAT ARE ACCEPTABLE TO THE OWNER AND AUTHORITIES.

DRAWING INDEX

DWG NUMBER	DWG NAME
P001	PLUMBING - LEGENDS, ABBREVIATIONS, AND GENERAL NOTES
P0231	PLUMBING OVERALL DEMOLITION PLAN
P231-F	PLUMBING - DEMO WORK & NEW WORK - RANGE F
P231-G	PLUMBING - DEMO WORK & NEW WORK - RANGE G
P501	PLUMBING - DETAILS
P601	PLUMBING - SCHEDULES

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS, 1307 18TH STREET NORTH, FARGO, ND 58102

PLUMBING - LEGENDS, ABBREVIATIONS, AND GENERAL NOTES

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	EM
EPM	M McWILLIAMS
CHECKED BY	CB
SAFETY & HEALTH	E WELKER
DRAWN BY	EM
REAL PROPERTY	W ROSS
PROJECT NO.	
DATE	05/11/2026

FACILITIES ENGINEERING SECTION, PLAINS AREA, 2150 CENTRE AVE., BLDG D, SUITE 330, FT. COLLINS, CO 89526-8119

SHEET P001

SCHEMMER

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PROJECT NO.: 09228.021

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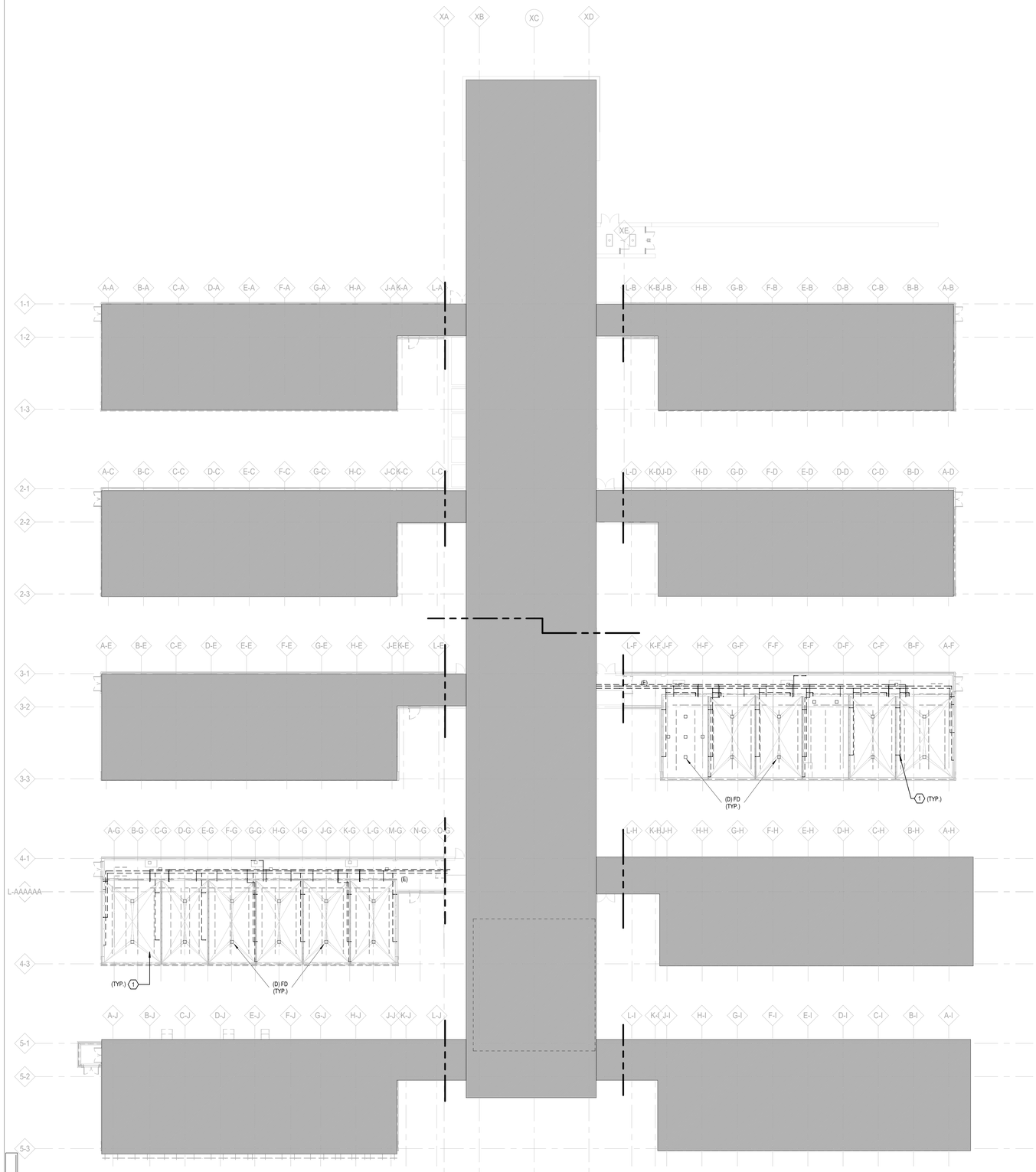


KEYED NOTES

NUMBER	DESCRIPTION
1	REMOVE EXISTING COMPRESSED AIR PIPING SERVING GREENHOUSE END CONNECTIONS. PREPARE/RECONFIGURE PIPING TO RECEIVE NEW CONNECTIONS AS SHOWN ON NEW WORK PLANS.

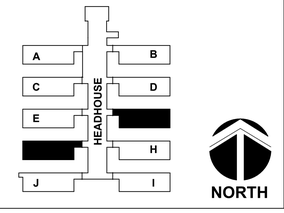
GENERAL NOTES

A. EXISTING SYSTEMS ARE SIZED/LOCATED BASED ON EXISTING DRAWINGS. FIELD CONDITIONS MAY VARY. CONTRACTOR TO NOTIFY ENGINEER OF RECORD OF ANY MAJOR DISCREPANCIES.

1 PLUMBING - DEMOLITION PLAN - LEVEL 01

SCALE: 1/16" = 1'-0"

KEYPLAN



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PROJECT NO.: 09228.021

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: EM	EPM: M McWILLIAMS
CHECKED BY: CB	SAFETY & HEALTH: E WELKER
DRAWN BY: EM	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

PLUMBING OVERALL DEMOLITION PLAN

PROJECT NO.:

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: PD231

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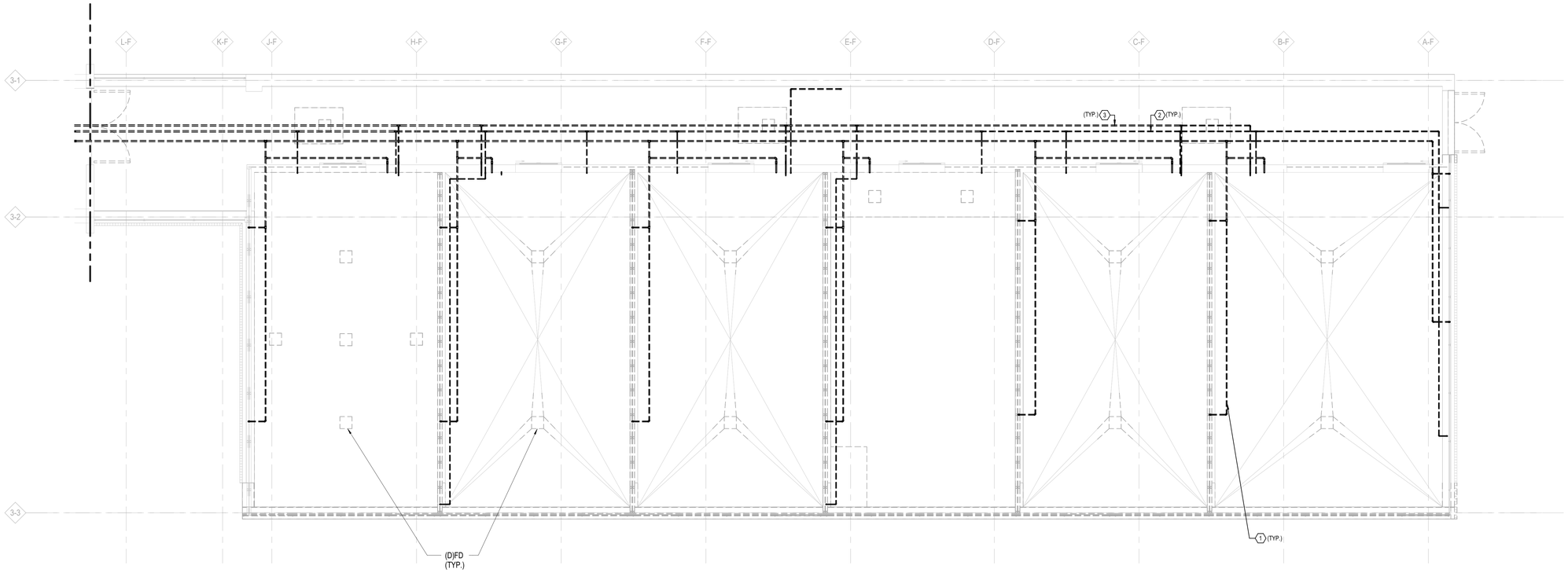
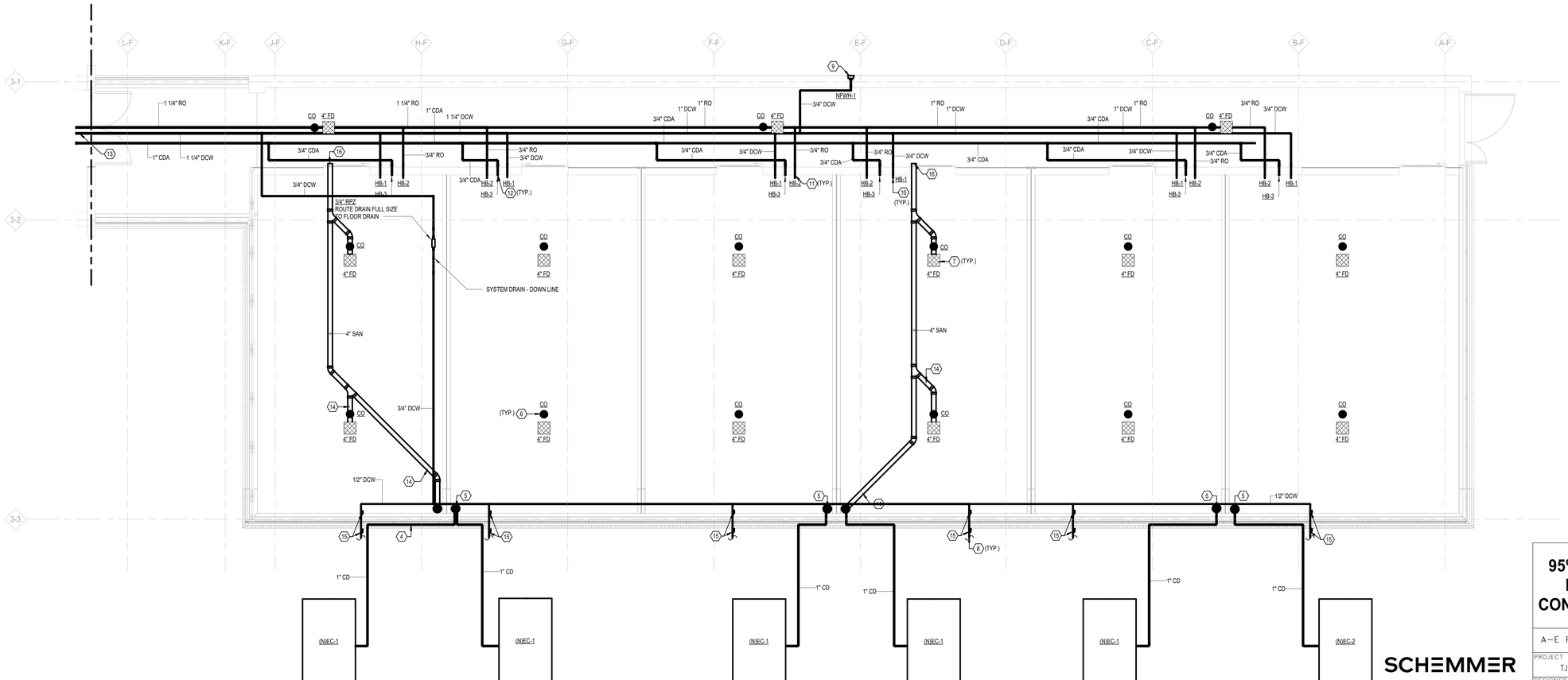


1 PHASE V - PLUMBING - DEMO WORK - RANGE F

SCALE: 1/4" = 1'-0"



2 PHASE V - PLUMBING - NEW WORK - RANGE F

SCALE: 1/4" = 1'-0"

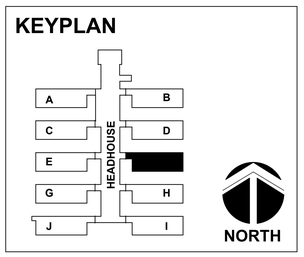
KEYED NOTES

NUMBER	DESCRIPTION
1	REMOVE EXISTING COMPRESSED AIR PIPING SERVING GREENHOUSE END CONNECTIONS. PREPARE/RECONFIGURE PIPING TO RECEIVE NEW CONNECTIONS AS SHOWN ON NEW WORK PLANS.
2	REMOVE ALL EXISTING DOMESTIC COLD WATER PIPING IN GREENHOUSE RANGES. CAP BACK TO MAIN AND PREPARE FOR RECONNECTION OF NEW BRANCH PIPING IN SAME LOCATIONS.
3	REMOVE ALL REVERSE OSMOSIS WATER PIPING AT EACH RANGE BACK TO HEAD HOUSE IN CORRIDOR. REPLACE ALL CURRENTLY SERVED FIXTURES, ROUTE NEW PIPING IN SAME LOCATION.
4	PROVIDE SUPPORT TO CONDENSATE PIPING.
5	CLEAN EXISTING FLOOR DRAIN AND PROVIDE NEW COVER.
6	PROVIDE NEW CLEANOUT IN LOCATIONS INDICATED.
7	PROVIDE NEW FLOOR DRAIN IN PLACE OF DEMOLISHED DRAIN.
8	1/2" DCW TO MECHANICAL EVAP. COOLER. PROVIDE "T" AT LOW POINT OF PIPING WITH A BALL VALVE AND HOSE BIBB CONNECTION FOR DRAINAGE.
9	3/4" DCW DOWN TO NEW WALL HYDRANT. PROVIDE ACCESSIBLE SHUT-OFF VALVE IN CORRIDOR AWAY FROM EXTERIOR WALL.
10	3/4" DCW DOWN TO HOSE BIBB. PROVIDE ACCESSIBLE SHUT-OFF VALVE.
11	3/4" RO WATER DOWN TO HOSE BIBB. PROVIDE ACCESSIBLE SHUT-OFF VALVE.
12	3/4" COMPRESSED AIR DOWN TO HOSE BIBB. PROVIDE ACCESSIBLE SHUT-OFF VALVE.
13	CONNECT NEW DOMESTIC COLD WATER, COMPRESSED AIR, AND RO WATER TO MAINS LOCATED IN HEADHOUSE, REPLACE ALL EXISTING VALVES OFF OF THE MAIN.
14	PROVIDE NEW FLOOR DRAIN IN LOCATION INDICATED.
15	PROVIDE SHUT OFF VALVES IN THE LOCATION INDICATED.
16	PROVIDE CONNECTION TO EXISTING SANITARY LINE. COORDINATE CONNECTION WITH EXISTING CONDITIONS.

GENERAL NOTES

A. EXISTING SYSTEMS ARE SIZED/LOCATED BASED ON EXISTING DRAWINGS. FIELD CONDITIONS MAY VARY. CONTRACTOR TO NOTIFY ENGINEER OF RECORD OF ANY MAJOR DISCREPANCIES.

KEYPLAN



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PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

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Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

PLUMBING - DEMO WORK & NEW WORK - RANGE F

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	EM
EPM	M McWILLIAMS
CHECKED BY	CB
SAFETY & HEALTH	E WELKER
DRAWN BY	EM
REAL PROPERTY	W ROSS
PROJECT NO.	
DATE	05/11/2026

FACILITIES ENGINEERING SECTION
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SHEET P231-F

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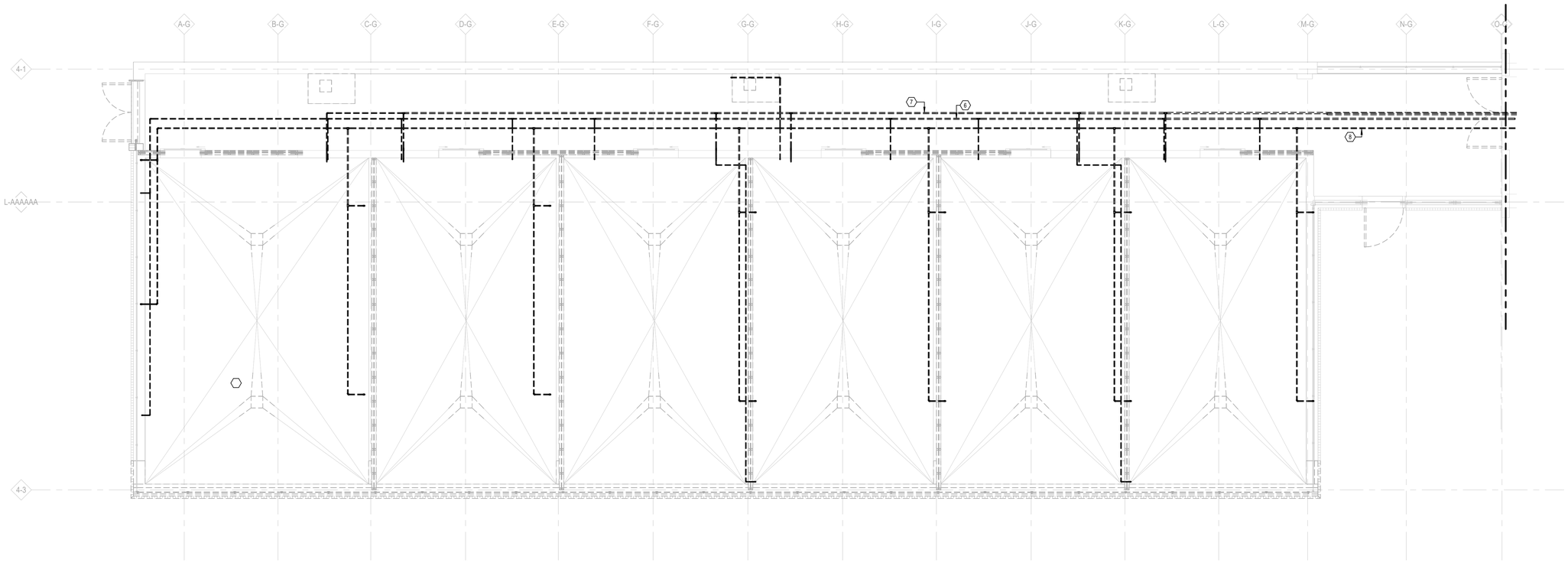
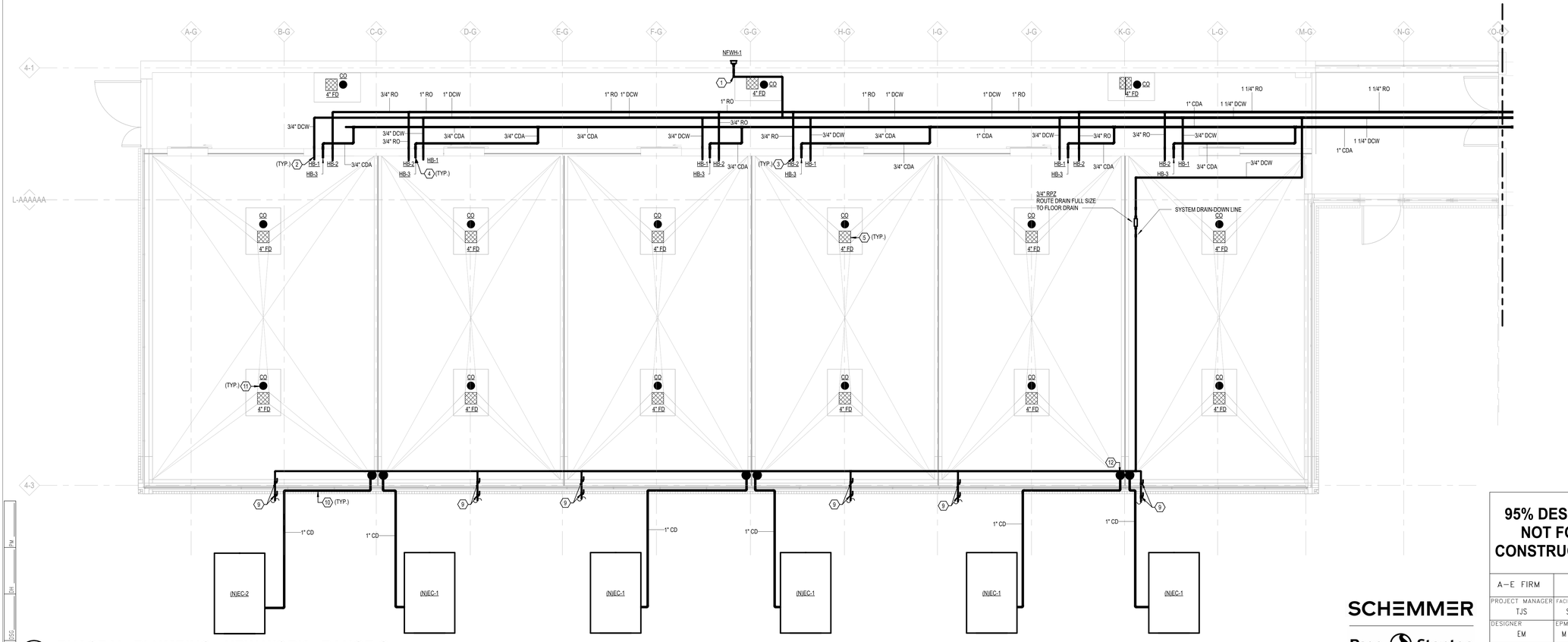


1 PHASE V - PLUMBING - DEMO WORK - RANGE G

SCALE: 1/4" = 1'-0"



2 PHASE V - PLUMBING - NEW WORK - RANGE G

SCALE: 1/4" = 1'-0"

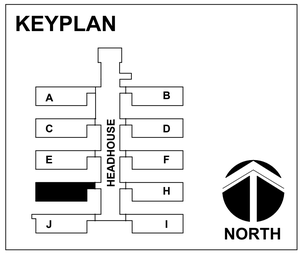
GENERAL NOTES

A. EXISTING SYSTEMS ARE SIZED/LOCATED BASED ON EXISTING DRAWINGS. FIELD CONDITIONS MAY VARY. CONTRACTOR TO NOTIFY ENGINEER OF RECORD OF ANY MAJOR DISCREPANCIES.

KEYED NOTES (1)

NUMBER	DESCRIPTION
	REMOVE ALL EXISTING GREENHOUSE FLOOR DRAINS AND PREPARE PIPING TO RECEIVE NEW DRAINS IN SAME LOCATIONS WHERE SHOWN ON NEW WORK PLANS. ATYPICAL CELLS WILL BE MODIFIED TO MATCH OTHERS WITH GRADING TO (2) CENTRALIZED DRAIN. RECONFIGURE PIPING AS REQUIRED.
1	3/4" DCW DOWN TO NEW WALL HYDRANT. PROVIDE ACCESSIBLE SHUT-OFF VALVE IN CORRIDOR AWAY FROM EXTERIOR WALL.
2	3/4" DCW DOWN TO HOSE BIBB. PROVIDE ACCESSIBLE SHUT-OFF VALVE.
3	3/4" RO WATER DOWN TO HOSE BIBB. PROVIDE ACCESSIBLE SHUT-OFF VALVE.
4	3/4" COMPRESSED AIR DOWN TO HOSE BIBB. PROVIDE ACCESSIBLE SHUT-OFF VALVE.
5	PROVIDE NEW FLOOR DRAIN IN PLACE OF DEMOLISHED DRAIN.
6	REMOVE ALL EXISTING DOMESTIC COLD WATER PIPING IN GREENHOUSE. RANGES. CAP BACK TO MAIN AND PREPARE FOR RECONNECTION OF NEW BRANCH PIPING IN SAME LOCATIONS.
7	REMOVE ALL REVERSE OSMOSIS WATER PIPING AT EACH RANGE BACK TO HEAD HOUSE IN CORRIDOR. REPLACE ALL CURRENTLY SERVED FIXTURES. ROUTE NEW PIPING IN SAME LOCATION.
8	REMOVE EXISTING COMPRESSED AIR PIPING SERVING GREENHOUSE END CONNECTIONS BACK TO MAIN IN HEADHOUSE. PREPARE/RECONFIGURE PIPING TO RECEIVE NEW CONNECTIONS AS SHOWN ON NEW WORK PLANS.
9	PROVIDE SHUT OFF VALVES IN THE LOCATION INDICATED.
10	PROVIDE SUPPORT TO CONDENSATE PIPING.
11	PROVIDE NEW CLEANOUT IN LOCATIONS INDICATED
12	CLEAN EXISTING FLOOR DRAIN AND PROVIDE NEW COVER.

KEYPLAN



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PROJECT NO.: 09228.021

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REVISIONS

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Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

PLUMBING - DEMO WORK & NEW WORK - RANGE G

A-E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: EM	EPM: M McWILLIAMS
CHECKED BY: CB	SAFETY & HEALTH: E WELKER
DRAWN BY: EM	REAL PROPERTY: W ROSS

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
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SHEET: P231-G

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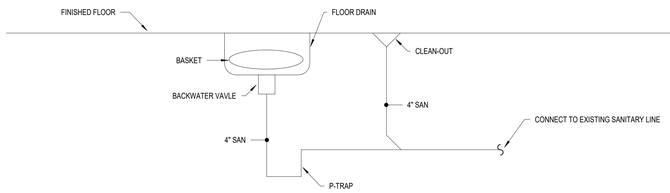
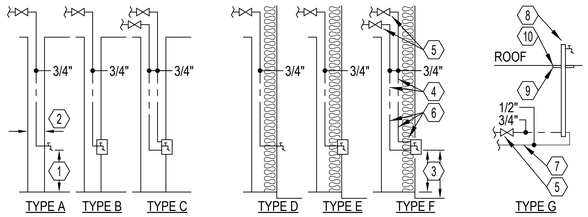
PLV | PLH | DSG | CAD



1 FLOOR DRAIN CLEAN-OUT

SCALE: 1/8" = 1'-0"



1. MIN. 6" CLEAR TO ADJACENT WALLS OR ADJACENT EQUIPMENT. 18"-30" HEIGHT TO HOSE CONNECTION. COORD. WITH ARCH.
2. COORDINATE WALL THICKNESS REQUIREMENTS WITH MANUFACTURER. AVOID WALL CORNERS AND INTERSECTIONS. COORD. WITH ARCH.
3. INSTALL 18"-30" ABOVE FINISH FLOOR AND MAXIMUM 48" ABOVE FINISH GRADE. COORD. WITH ARCH. & CIVIL.
4. INSTALL PIPING ON THE INSIDE OF THE BUILDING INSULATION ENVELOPE, NOT WITHIN THE INSULATION. INSULATE PIPE.
5. ISOLATION VALVES AS CLOSE AS POSSIBLE TO NEAREST ACTIVE LINE. LOCATE ABOVE THE CEILING. LABEL WITH THE FIXTURE NAME AND LOCATION. RECORD LOCATION ON AS-BUILT DRAWINGS.
6. COORDINATE PIPING SUPPORT AND CLAMPS WITH WALL CONSTRUCTION AND EQUIPENT.
7. DRAIN. VERIFY CONNECTION WITH MANUFACTURER. MIN. LINE SIZES SHOWN. PROVIDE PIPE INCREASER AS NEEDED. SLOPE TO INDIRECT WASTE RECEPTACLE AT 1/16" PER FOOT MIN.. DO NOT TRAP LINE.
8. ROOF POST HYDRANT. COORDINATE CONNECTION METHOD TO ROOF WITH MANUFACTURER. AVOID CASTING THE BOTTOM OF THE HYDRANT BODY WITHIN THE STRUCTURAL. DO NOT OBSTRUCT HYDRANT BODY DRAIN AND DRAIN LINE CONNECTION.
9. UNDERDECK CLAMP.
10. REFER TO ARCHITECTURAL FOR ALL ROOF FLASHING INSTALLATION REQUIREMENTS. COORDINATE FLASHING ACCESSORIES WITH HYDRANT MANUFACTURER.

2 WALL / ROOF HYDRANT

SCALE: 1/8" = 1'-0"

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PROJECT NO.: 09228.021

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: EM	EPM: M McWILLIAMS
CHECKED BY: CB	SAFETY & HEALTH: E WELKER
DRAWN BY: EM	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

PLUMBING - DETAILS

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526–8119

SHEET: P501

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CAD | DSC | DH | PM

PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE	MANUFACTURER	MODEL	COLD WATER	HOT WATER	WASTE	VENT	RO WATER	CDA	COMMENTS
HB-1	HOSE BIBB	CHICAGO FAUCET	952-CP	3/4"	-	-	-	-	-	POLISHED CHROME SILL FAUCET WITH VACUUM BREAKER.
HB-2	HOSE BIBB	AMERICAN VALVE	M71QTSS	-	-	-	-	3/4"	-	STAINLESS STEEL QUARTER TURN HOSE BIBB.
HB-3	HOSE BIBB	WATER SAVER FAUCET CO.	L2880	-	-	-	-	-	1/2"	POLISHED CHROME STRAIGHT PATTERN FORGED BRASS HOSE BIBB. (FOR USE WITH COMPRESSED AIR)
NFWH-1	WALL HYDRANT	ZURN	Z1320-CXL	3/4"	-	-	-	-	-	BOX TYPE NON-FREEZE WALL HYDRANT WITH HOSE CONNECTION, AND BACKFLOW PROTECTION HOUSED IN A FLUSH-MOUNTED TAMPE R FREE BOX. COORDINATE INSTALLATION WITH WALL CONSTRUCTION.

CLEAN-OUT DRAIN SCHEDULE

MARK	FIXTURE DESCRIPTION	MANUFACTURER	MODEL	REMARKS
CB	CATCH BASIN	ZOELLER	31-0866	SOLID FIBERGLASS BASIN WITH SOLID FIBERGLASS COVER AND ANTI-FLOTATION RING. PROVIDE P-TRAP AT PIPE CONNECTION.
FD	HEAVY DUTY FLOOR DRAIN	JAY R. SMITH	2450Y	HEAVY-DUTY GALVANIZED STEEL DRAIN WITH CAST IRON GRATE AND STAINLESS STEEL SEDIMENT BUCKET. PROVIDE WITH TRAP SEAL DEVICE EQUAL TO "TRAP GUARD".

PLUMBING SPECIALTIES SCHEDULE

MARK	FIXTURE DESCRIPTION	MANUFACTURER	MODEL	REMARKS
RPZ	REDUCED PRESSURE ZONE BACKFLOW PREVENTER	WATTS	LF909-QT SERIES	LEAD FREE. PROVIDE WITH EPOXY-COATED FDA QUARTER TURN BALL VALVE SHUT-OFFS, EPOXY-COATED FDA STRAINER, AND AIR-GAP FUNNEL ATTACHMENT.

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USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

PLUMBING - SCHEDULES

A-E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: EM	EPM: M McWILLIAMS
CHECKED BY: CB	SAFETY & HEALTH: E WELKER
DRAWN BY: EM	REAL PROPERTY: W ROSS

PROJECT NO.: 09228.021

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: P601

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CAD | DSG | JH | PW

PLAN VIEW

- DUPLEX RECEPTACLE
  - * IG FOR ISOLATED GROUND RECEPTACLE
  - H FOR PLUG-IN HEATER
- REEL RECEPTACLE
- CEILING MOUNT DUPLEX RECEPTACLE
- DISTRIBUTION PANELBOARD, 480Y/277V OR 480V
- DISTRIBUTION PANELBOARD, 208Y/120V OR 120/240V
- RECESSED BRANCH PANELBOARD, 480Y/277V OR 480V
- RECESSED BRANCH PANELBOARD, 208Y/120V OR 120/240V
- F — FIRE ALARM SPEAKER/STROBE
- M — MANUAL PULL STATION

LIGHTING

- 1' x 4' LINEAR LIGHTING FIXTURES
- EMERGENCY LIGHTING FIXTURE
- EXIT SIGN, SINGLE FACE, CEILING MOUNTED
- EXIT SIGN, DOUBLE FACE, CEILING MOUNTED
- EXIT SIGN, SINGLE FACE, WALL MOUNTED
- EXIT SIGN, DOUBLE FACE, WALL MOUNTED
- EXIT SIGN DIRECTIONAL CHEVRONS

LINE VOLTAGE SWITCHES:

S*a *=
- 3 = THREE-WAY
- 4 = FOUR-WAY
- O = OCCUPANCY SENSOR
- D = DIMMER
- K = KEY OPERATED
- P = PILOT
- T = TIMER (ELECTRONIC- PROGRAMMABLE
- EXP = EXPLOSION PROOF
- a,b,c,... = DENOTES SWITCHING CONTROL

OCCUPANCY SENSOR - DUAL TECHNOLOGY CEILING MOUNTED

*OS *=
- BLANK = 360° FIELD OF VIEW, 500FT²
- a = 360° FIELD OF VIEW, 1000FT²
- b = 360° FIELD OF VIEW, 2000FT²
- h = 360° HALLWAY/CORRIDOR, 2000FT²

LS — LIGHT SENSOR

BRANCH CIRCUIT SCHEDULE

CIRCUIT TYPE	CIRCUIT BREAKER		CONDUCTORS (COPPER)	CONDUIT
1 POLE - 1 PHASE 2 WIRE + GROUND	20A-1P		2 #12 + 1 #12 GROUND	3/4"
	30A-1P		2 #10 + 1 #10 GROUND	3/4"
2 POLE - 1PHASE 3 WIRE + GROUND	20A-2P	20A-3P	3 #12 + 1 #12 GROUND	3/4"
	30A-2P	30A-3P	3 #10 + 1 #10 GROUND	3/4"
3POLE - 3PHASE 3 WIRE+ GROUND	40A-2P	40A-3P	3 #8+ 1 #10 GROUND	3/4"
	50A-2P	50A-3P	3 #6+ 1 #10 GROUND	1"
	60A-2P	60A-3P	3 #4+ 1 #10 GROUND	1-1/4"
3 POLE - 3PHASE 4 WIRE + GROUND	20A-3P		4 #12+ 1 #12 GROUND	3/4"
	30A-3P		4 #10+ 1 #10 GROUND	3/4"
	40A-3P		4 #8+ 1 #10 GROUND	3/4"
	50A-3P		4 #6+ 1 #10 GROUND	1"
	60A-3P		4 #4+ 1 #10 GROUND	1-1/4"

ABBREVIATIONS

ABBREV.	DESCRIPTION
A, AMP	AMPERES
AC	ALTERNATING CURRENT
AF	AMPERE FRAME
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	AMPERES INTERRUPTING CAPACITY
AL	ALUMINUM
ARCH	ARCHITECT, ARCHITECTUAL
ARF	ABOVE RAISED FLOOR
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
AV	AUDIO VISUAL
AWG	AMERICAN WIRE GAUGE
BAS	BUILDING AUTOMATION SYSTEM
BC	BARE COPPER
BKR	BREAKER
BLDG	BUILDING
C	CONDUIT
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CKT	CIRCUIT
CLG	CEILING
CMH	COMMUNICATIONS MANHOLE
COAX	COAXIAL CABLE
CONT	CONTINUATION
COORD	COORDINATION/COORDINATE
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
CU	COPPER
DATACOM	DATA AND/OR COMMUNICATION
DB	DUCT BANK
DC	DIRECT CURRENT
DDC	DIRECT DIGITAL CONTROL
DEMO	DEMOLITION
DIA	DIAMETER
DIV	DIVISION
DPDT	DOUBLE POLE, DOUBLE THROW
DPST	DOUBLE POLE, SINGLE THROW
DWG	DRAWING
E.O.	ELECTRICALLY OPERATED
EA	EACH
EDF	ELECTRIC DRINKING FOUNTAIN
EG	EQUIPMENT GROUND
ELS	EMERGENCY LIFE SAFETY
EM	EMERGENCY
EMS	ENERGY MANAGEMENT SYSTEM
EPO	EMERGENCY POWER OFF
EXIST, EX, (E)	EXISTING
F	FUSE
FA	FIRE DETECTION AND ALARM SYSTEM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FLA	FULL LOAD AMPS
FLR	FLOOR
FO	FIBER OPTIC(S)
FSD	FIRE SMOKE DAMPER
FTL	FEED-THROUGH LUGS
G, GND	GROUND
GEN	GENERATOR
GFCI	GROUND FAULT CURRENT NTERRUPTER
GFEP	GROUND FAULT EQUIPMENT PROTECTION
H	HOT
h1	
HH	HANDHOLE
HMT	HARMONIC MITIGATING TRANSFORMER
HOA	HAND OFF AUTOMATIC
HP	HORSEPOWER
HVAC	HEATING, VENTILATION, AND AIR CONDITIONING
I/O	INPUT/OUTPUT
IG	ISOLATED GROUND
IT	INFORMATION TECHNOLOGY
JB	JUNCTION BOX
K	KILO, THOUSAND
KA	KILOAMPERES
KAIC	THOUSAND AMPERES INTERRUPTING CAPACITY
KCMIL	THOUSAND CIRCULAR MILS
KV	KILOVOLT
KVA	KILOVOLT AMPERES
KW	KILOWATT
KWH	KILOWATT-HOUR
LAN	LOCAL AREA NETWORK
LC	LIGHTING CONTRACTOR
LCP	LIGHTING CONTROL PANEL
LED	LIGHT EMITTING DIODE
LP	LIGHTNING PROTECTION
LRA	LOCKED ROTOR AMPERES
LSI	LONG TIME, SHORT TIME, INSTANTANEOUS
LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND
LTG	LIGHTING
mA	MILLIAMPS
MAX	MAXIMUM
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MECH	MECHANICAL
MFAP	MAIN FIRE DETECTION & ALARM PANEL
MFR	MANUFACTURER
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MTD	MOUNTED
MVA	MEGA VOLT AMPERES
MW	MEGA WATTS
N, NEU	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NF	NON-FUSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
OCPD	OVERCURRENT PROTECTIVE DEVICE
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
OH	OVERHEAD
OL	OVERLOAD
P	POLE
PA	PUBLIC ADDRESS
PB	PULL BOX, PUSHBUTTOM
PC	PHOTOCELL
PDU	POWER DISTRIBUTION UNIT
PF	POWER FACTOR
PH	PHASE
PIR	PASSIVE INFARED
PIV	POST INDICATOR VALVE
PLBG	PLUMBING
PMH	POWER MANHOLE
PNL	PANELBOARD
QTY	QUANTITY
RCPT	RECEPTACLE
RE	REFER TO, REGARDING, REFERENCE
RM	ROOM
RMS	ROOT MEAN SQUARE
SCADA	SUPERVISORY CONTROL & DATA ACQUISITION
SCH	SCHEDULE
SPD	SURGE PROTECTION DEVICE
SPDT	SINGLE POLE, DOUBLE THROW
SPST	SINGLE POLE, SINGLE THROW
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STP	SHEILD TWISTED PAIR
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYNCH	SYNCHRONOUS
TBD	TO BE DETERMINED
TELECOM	TELECOMMUNICATIONS
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UL	UNDERWRITER'S LABORATORY
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLE
UTIL	UTILITY
UTP	UNSHIELDED TWISTED PAIR
V	VOLTS
VA	VOLT AMPERES
VAC	VOLTS ALTERNATING CURRENT
VDC	VOLTS DIRECT CURRENT
VFD	VARIABLE FREQUENCY DRIVE
VT	VOLTAGE TRANSFORMER
W	WIRE, WATTS
W/	WITH
WG	WIRE GUARD
WP	WEATHERPROOF
XFMR	TRANSFORMER
Y	WYE
Y-Δ	WYE-DELTA
Z	IMPEDANCE

GENERAL NOTES

1. ALL SYMBOLS SHOWN ON THIS LEGEND MAY NOT APPEAR ON THIS SET OF DRAWINGS.
2. THE GENERAL NOTES APPLY TO ALL ELECTRICAL DRAWINGS UNDER THIS CONTRACT. REFER TO INDIVIDUAL DRAWINGS FOR ADDITIONAL NOTES.
3. ALL ELECTRICAL WORK AND MATERIAL IS NEW, AND PROVIDED BY THE CONTRACTOR UON. SEE GRAPHIC LINE LEGEND TO DETERMINE WHEN ELECTRICAL EQUIPMENT SHOWN ON PLANS IS NEW OR EXISTING.
4. THE CONTRACT DRAWINGS ARE DIAGRAMMATIC IN NATURE AND NOT EVERY DETAIL OR EXACT LOCATION OF EQUIPMENT AND/OR CONDUIT IS SHOWN. VERIFY ALL CONDITIONS AND DIMENSIONS IN THE FIELD PRIOR TO ORDERING ANY MATERIAL OR PERFORMING ANY WORK. NOTIFY THE ENGINEER OF ANY CONDITIONS OR DIMENSIONS WHICH WOULD AFFECT THE PERFORMANCE OF WORK IN ACORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS.
5. IEEE STANDARD C37.2-1991, ELECTRICAL POWER SYSTEM DEVICE FUNCTION NUMBERS.
6. UPPER CASE LETTER ADJACENT TO LIGHTING FIXTURE ANNOTATION INDICATES FIXTURE TYPE. LOWER CASE LETTER ADJACENT TO FIXTURE INDICATES CONTROL CIRCUIT. EACH SWITCH LOWERCASE CHARACTER INDICATES AN INDIVIDUAL SWITCH. TWO OR MORE CHARACTERS AT A LUMINAIRE INDICATES MULTI-LEVEL SWITCHING OF THE LUMINAIRE.
7. COORDINATE WITH OTHER TRADES.
8. MINIMUM CONDUCTOR SIZE IS #12 AWG UNLESS OTHERWISE NOTED.
9. CONTRACTOR TO VERIFY ALL PANEL BOARD LOADS AFFECTED FOR THIS PROJECT PER NEC 220.87.

GENERAL DEMOLITION NOTES

1. DRAWINGS ARE BASED ON EXISTING BUILDING PLANS AND FIELD INVESTIGATION WITHOUT DEMOLITION. RENOVATION HAS OCCURRED IN VARIOUS STAGES AND RECORD DRAWINGS ARE NOT AVAILABLE FOR ALL STAGES OF PAST CONSTRUCTION. EXAMINE AVAILABLE DRAWINGS TO AVOID CONFLICTS.
2. VISIT THE SITE PRIOR TO COMMENCING WORK TO DETERMINE THE EXISTING SITE CONDITIONS. IF THE CONTRACTOR DETERMINES THAT ANY CONDITIONS EXIST THAT WILL MATERIALLY AFFECT THE PROJECT, INFORM THE OWNER IMMEDIATELY AND DO NOT PERFORM ANY WORK BEFORE RESOLUTION OF THE PROBLEM.
3. CONFIRM THE LOCATIONS OF EXISTING UTILITIES AND SERVICES WITHIN THE INDICATED CONSTRUCTION AREA. MAINTAIN EXISTING SERVICES TO ADJACENT AREAS THAT WILL REMAIN IN OPERATION AND SERVED BY THESE SERVICES. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF DAMAGES TO EXISTING SERVICES OR UTILITIES.
4. DEMOLITION AND CONSTRUCTION ACTIVITIES SHALL BE COORDINATED WITH THE OWNER TO MINIMIZE DISRUPTION OF THE NORMAL DAILY FUNCTIONS WITHIN THE AREAS TO REMAIN IN OPERATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY POWER AS MAY BE REQUIRED TO MAINTAIN SERVICE FOR THE AREAS TO REMAIN IN OPERATION. PROVIDE ALL EQUIPMENT, MAKE ALL ARRANGEMENTS, AND MAKE ALL CONNECTIONS REQUIRED FOR TEMPORARY POWER.
5. GENERAL SCOPE OF ELECTRICAL DEMOLITION CONSISTS OF DISCONNECTING AND REMOVING ALL LUMINAIRES, WIRING DEVICES, EQUIPMENT, BRANCH CIRCUIT WIRING AND CONDUIT WITHIN THE CONFINES OF THE DEMOLITION AREA, AS DEFINED ON THE DEMOLITION DRAWINGS. LUMINAIRES AND OTHER ELECTRICAL ITEMS OR EQUIPMENT AS DEFINED BY THE OWNER SHALL BE TURNED OVER TO THE OWNER.
6. WHERE EQUIPMENT OR DEVICES ARE NOTED AS "REMOVE", REMOVE ALL CONDUCTORS ASSOCIATED WITH THESE ITEMS TO THE LAST ACTIVE ITEM ON THE CIRCUIT, OR TO THE BRANCH CIRCUIT BREAKER IF ALL ITEMS ON THE CIRCUIT ARE REMOVED. EXISTING CONDUITS THAT WILL NOT BE REUSED SHALL BE REMOVED WHERE THEY ARE RUN EXPOSED, RUN ABOVE CEILING OR IN FLOOR PLENUMS. CONDUITS RUN CONCEALED IN WALLS OR FLOOR SLABS SHALL BE CUT OFF FLUSH WITH SURFACE AND ABANDONED. ALL VOIDS IN WALLS OR FLOOR LEFT BY THE REMOVAL OF ELECTRICAL EQUIPMENT OR CONDUITS SHALL BE FILLED WITH NON-SHRINK GROUT AND FINISHED TO MATCH EXISTING ADJACENT SURFACES.
7. THE CONTRACTOR SHALL REROUTE AND RECONNECT ANY CIRCUIT OR CIRCUITS THAT WILL REMAIN IN USE BUT INTERFERES WITH NEW CONSTRUCTION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING EXISTING EQUIPMENT THAT COULD BE DAMAGED DUE TO CONSTRUCTION. EXISTING EQUIPMENT DAMAGED DURING DEMOLITION OR CONSTRUCTION SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR, AT NO COST TO THE OWNER.
9. EXISTING JUNCTION BOXES TO REMAIN SHALL HAVE COVERS. PROVIDE COVERS AND INDICATE THE TYPE OF CIRCUIT OR CIRCUIT NUMBERS PASSING THROUGH THE BOX.
10. FLOURESCENT AND HID LIGHTING REMOVED DURING DEMOLITION SHALL BE ASSUMED TO HAVE COMPONENTS THAT CONSTITUE HAZARDOUS WASTE. BALLASTS ARE ASSUMED TO CONTAIN PCB'S AND SHALL BE DISPOSED OF AS PCB CONTAMINATED WASTE. LAMPS THAT ARE SCHEDULED FOR DISPOSAL SHALL BE REMOVED PRIOR TO THE START OF ANY OTHER DEMOLITION AND DISPOSED OF AS MERCURY-CONTAMINATED WASTE.
11. ANY OPENINGS CREATED IN A FIRE OR SMOKE RATED WALL BY PROVISION OR REMOVAL OF ANY ELECTRICAL DEVICE OR CONDUIT, SHALL BE SEALED AFTER THE WORK IS COMPLETED WITH A UL APPROVED FIRE/SMOKE SEALANT APPROPRIATE TO RE-ESTABLISH THE PREVIOUS RATING OF THE WALL. SEE ARCHITECTURAL PLANS FOR FIRE RATED WALLS/ FLOORS AND THEIR RATING.

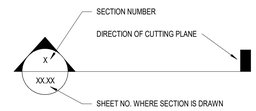
APPLICABLE CODES & STANDARDS

NATIONAL ELECTRICAL CODE - 2020 EDITION
USDA STANDARDS

GRAPHIC LINE AND HOMERUN

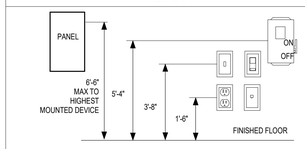
- DEMOLITION PLANS: EXISTING TO REMAIN
- RENOVATION PLANS: EXISTING TO REMAIN
- NEW WORK PLANS: NEW WORK TO BE PROVIDED
- FLEXIBLE CONDUIT
- CONDUIT RISER UP
- CONDUIT RISER DOWN

GRAPHIC DETAIL SYMBOL



EXAMPLE: A SECTION IS CUT ON SHEET E-101 WITH A TAG OF 1/E-301. THEN. SECTION NO. 1 IS DRAWN ON SHEET NO. E-301

ELECTRICAL DEVICE MOUNTING HEIGHT



NOTE: ELEVATION INDICATED ARE TYPICAL; SEE ARCH DWGS AND ELEVATIONS FOR SPECIFIC DEVICE MOUNTING HEIGHTS.

ELECTRICAL SHEET INDEX

DWG NUMBER	DWG NAME
E001	ELECTRICAL LEGENDS, ABBREVIATIONS, AND GENERAL NOTES
ED231	ELECTRICAL OVERALL DEMOLITION PLAN
E231-F	ELECTRICAL LIGHTING & POWER PLAN - RANGE F
E232-G	ELECTRICAL LIGHTING & POWER PLAN - RANGE G
EM231-F	ELECTRICAL MECHANICAL EQUIPMENT PLAN - RANGE F
EM231-G	ELECTRICAL MECHANICAL EQUIPMENT PLAN - RANGE G
E501	ELECTRICAL DETAILS, LIGHTING FIXTURE SCHEDULE AND PARTIAL RISER DIAGRAM
E601	ELECTRICAL PANEL SCHEDULES
E602	ELECTRICAL PANEL SCHEDULES

USDA

SCHEMMER

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PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: YSB	EPM: M McWILLIAMS
CHECKED BY: MM	SAFETY & HEALTH: E WELKER
DRAWN BY: MB	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL LEGENDS, ABBREVIATIONS, AND GENERAL NOTES

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: E001

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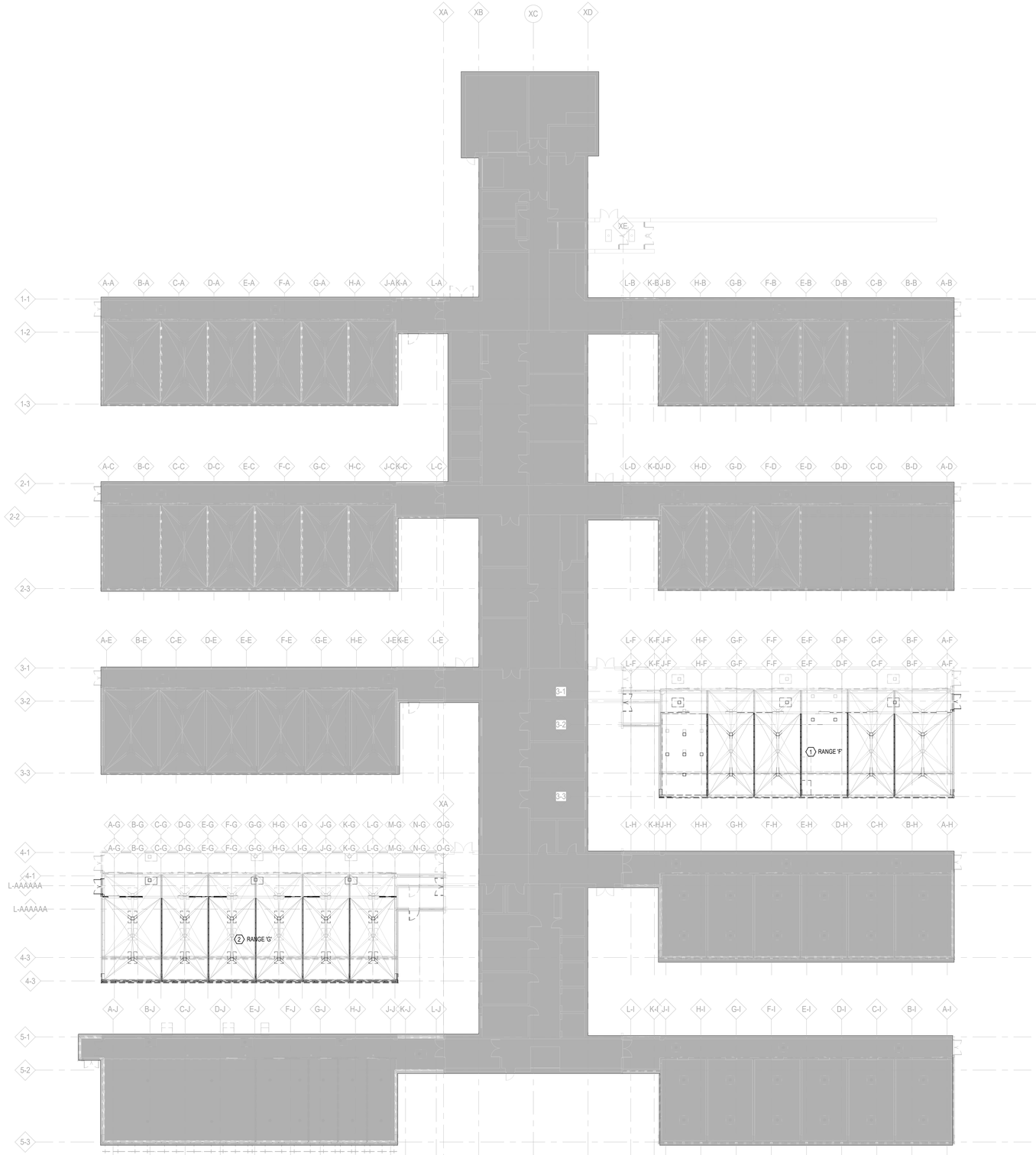
CAD | DSG | DH | PM



GENERAL NOTES

A. REFER TO E-001 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

B. SHADED AREAS ARE NOT IN SCOPE.

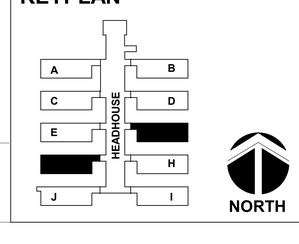
KEYED NOTES

NUMBER	DESCRIPTION
1.	ALL ELECTRICAL WORK IN RANGES 'F' SHALL BE DEMOLISHED UON.
2.	ELECTRICAL DEMOLITION FOR RANGE 'G' SHALL BE PRICED AS AN ADD ALTERNATE. ALL ELECTRICAL WORK SHALL BE DEMOLISHED UON.

1 ELECTRICAL OVERALL DEMOLITION PLAN - PHASE V

SCALE: 1/16" = 1'-0"

KEYPLAN



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REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL OVERALL DEMOLITION PLAN

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: YSB	EPM: M McWILLIAMS
CHECKED BY: MM	SAFETY & HEALTH: E WELKER
DRAWN BY: MB	REAL PROPERTY: W ROSS
PROJECT NO.	DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: ED231

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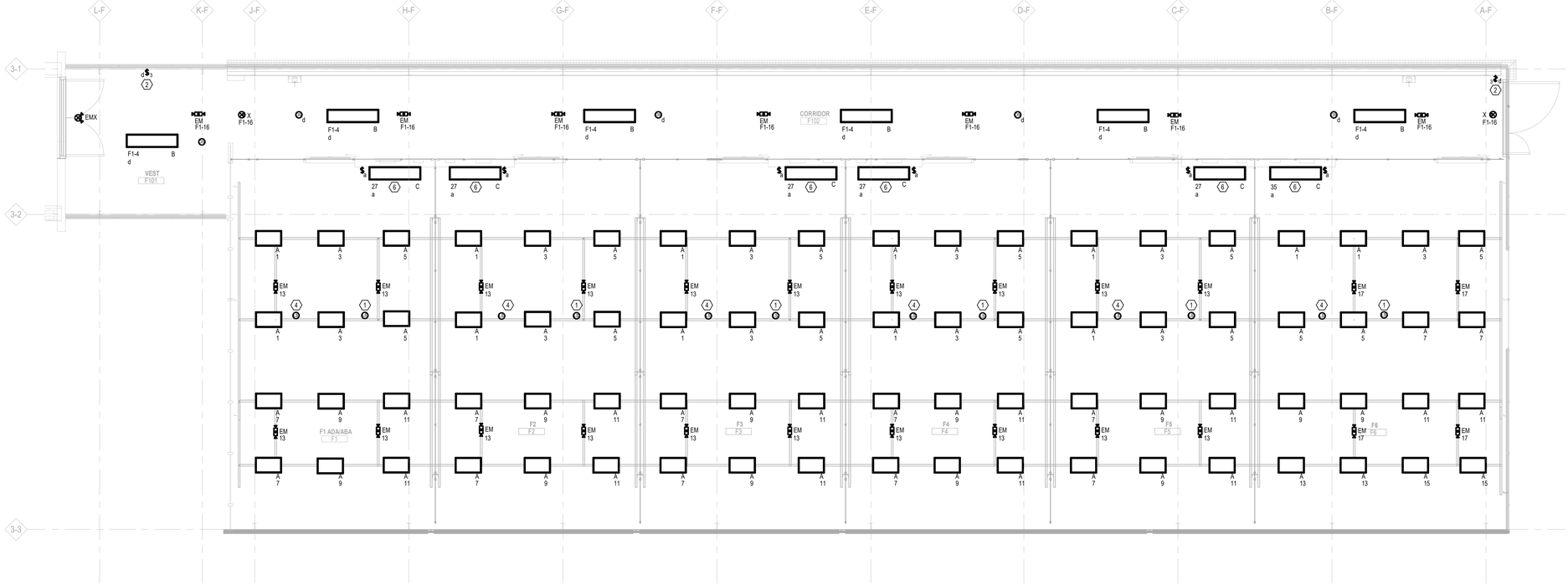
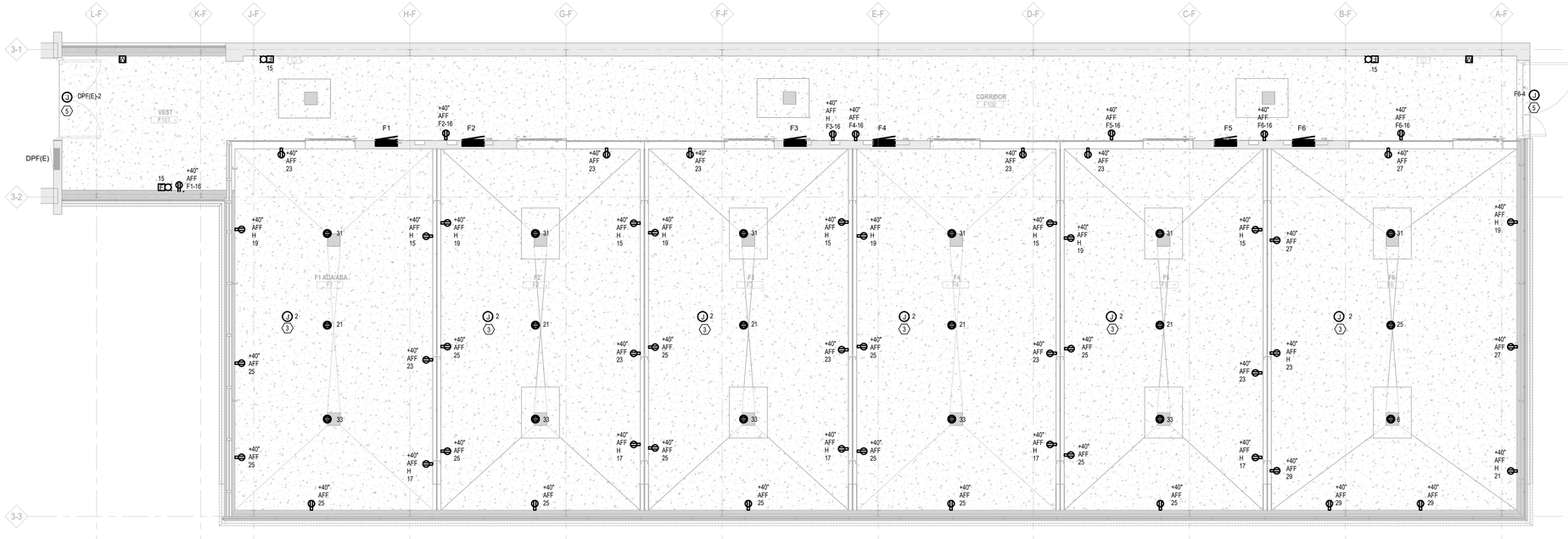
CAD | DSG | DW | PM



1 PHASE V - LIGHTING PLAN - RANGE F

SCALE: 1/4" = 1'-0"



2 PHASE V - POWER PLAN - RANGE F

SCALE: 1/4" = 1'-0"

GENERAL NOTES

A. REFER TO E-001 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

B. COORDINATE WITH OTHER DISCIPLINES PRIOR TO COMMENCEMENT OF INSTALLATION.

C. LIGHTING CONTROLS BOD: MICRO-GROW. LIGHTING CONTROLS FOR EACH CELL SHALL BE CONNECTED TO NEW GREENHOUSE MASTER CONTROLLER. REFER TO MECHANICAL SHEETS FOR ADDITIONAL INFORMATION.

D. ALL WORK SHOWN ON THIS DRAWING IS NEW UNLESS NOTED OTHERWISE.

E. ALL RECEPTACLES IN GREENHOUSES SHALL BE GFCI IN WEATHER-PROOF ENCLOSURE.

F. ALL DISCONNECTS IN GREENHOUSES AND ON THE EXTERIOR SHALL BE NEMA-3R RATED.

G. LIGHTING AND POWER IN CELLS CONNECTED TO ITS ASSOCIATED PANELBOARD. PANEL BOARDS SHALL BE NEMA 1 RATED.

H. ALL EMERGENCY LIGHTING FIXTURES AND EXIT SIGNS SHALL COME WITH UL924 LISTED BATTERY PACK RATED FOR 90 MIN.

I. PROVIDE EXPANDER PANEL AS REQUIRED TO ACCOMMODATE ADDITIONAL FIRE ALARM DEVICES. NEW EXPANDER PANEL SHALL BE COMPATIBLE WITH EXISTING FIRE ALARM SYSTEM AND SHALL HAVE MINIMUM 20% SPARE CAPACITY.

J. ALL CEILING RECEPTACLES SHALL BE LOCKABLE.

K. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS ON SITE. INFORMATION PROVIDED ON CONSTRUCTION DOCUMENTS ARE BASED ON AS-BUILT DRAWINGS DATED 1981 AND LIMITED SURVEY INFORMATION. IF ANY DISCREPANCIES OCCUR, DO NOT PROCEED WITH THE WORK AND CONTACT ENGINEER FOR FURTHER DIRECTIONS.

L. MICRO-GROW TO PROVIDE 0-10V DIMMING RELAY CONTROLS TO ALL TYPE 'A' LIGHTING FIXTURES IN EACH GREENHOUSE CELLS. REFER TO SHEET SERIES 'X' FOR MORE INFORMATION.

M. SWITCH SHOWN IN THE CELL TO PROVIDE MANUAL OVERRIDE FOR FIXTURE 'C'.

N. PROVIDE A NEMA 3R WIRE TROUGH INSIDE INDIVIDUAL GREEN HOUSE CELLS FOR CONTROL WIRING. SEPARATE LOW VOLTAGE AND LINE VOLTAGE WIRING WITHIN THE WIRE TROUGH.

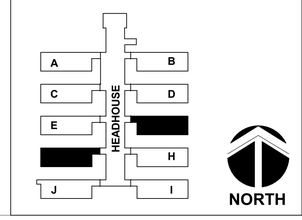
O. O. COORDINATE ELECTRICAL EQUIPMENT TO MAINTAIN REQUIRED MECHANICAL EQUIPMENT CLEARANCES. AVOID CONDUIT RUNS BELOW SUPPLY AND EXHAUST FANS.

KEYED NOTES (1)

NUMBER	DESCRIPTION
1.	LIGHT SENSOR TO ACCESS THE PLANT'S EXPOSURE TO LIGHT. INTERCONNECT WITH SHADE AND LIGHTING CONTROLLERS.
2.	PROVIDE LIGHT SWITCH TO OVERRIDE OCCUPANCY SENSOR TO TURN LIGHTS OFF MANUALLY. OCCUPANCY SENSOR SHALL FUNCTION NORMALLY WHEN SWITCHES ARE IN THE ON POSITION WHEN OCCUPANTS ARE DETECTED.
3.	PROVIDE MOTOR RATED SWITCH FOR SHADE MOTOR (BY MICROGROW). COORDINATE LOCATION IN THE FIELD. THE SWITCH SHALL BE LOCATED PER NEC 430.102(B). LOCATION FOR THE MOTOR SHALL BE COORDINATE WITH SHADES MANUFACTURER.
4.	PAR SENSOR. COORDINATE LOCATION AND WIRING REQUIREMENTS WITH MICROGROW. THE CROP LIGHTING SHALL OPERATE BASED ON THE AVAILABLE SOLAR LEVEL AS SENSED VIA THE WEATHER STATION SOLAR SENSOR, AS WELL AS THE TIME OF DAY. A PAR SENSOR SHALL MONITOR THE AMOUNT OF PAR LIGHT THAT THE PLANTS HAVE RECEIVED. LIGHTING CONTRACTORS SHALL CONTROL LIGHTING CIRCUITS.
5.	PROVIDE POWER FOR DOOR HARDWARE AND ALL ASSOCIATED EQUIPMENT. REFER TO ARCHITECTURAL DRAWINGS FOR COORDINATION. INTERCONNECT TO FIRE ALARM SYSTEM TO ASSURE FAIL SAFE CONFIGURATION. POWER SUPPLY PROVIDED BY DOOR HARDWARE PROVIDER. COORDINATE FINAL CONNECTIONS WITH THE MANUFACTURER. COORDINATE WITH SECURITY FOR ALL SECURITY CONNECTIONS AND REQUIREMENTS. PROVIDE COMPLETE AND OPERABLE SYSTEM.
6.	ALL TYPE C FIXTURES ARE TO BE MOUNTED 8' AFF ON THE WALL NEXT TO THE DOOR.

USDA

KEYPLAN



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PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL LIGHTING & POWER PLAN - RANGE F

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	YSB
EPM	M McWILLIAMS
CHECKED BY	MM
SAFETY & HEALTH	E WELKER
DRAWN BY	MB
REAL PROPERTY	W ROSS
PROJECT NO.	
DATE	05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET E231-F

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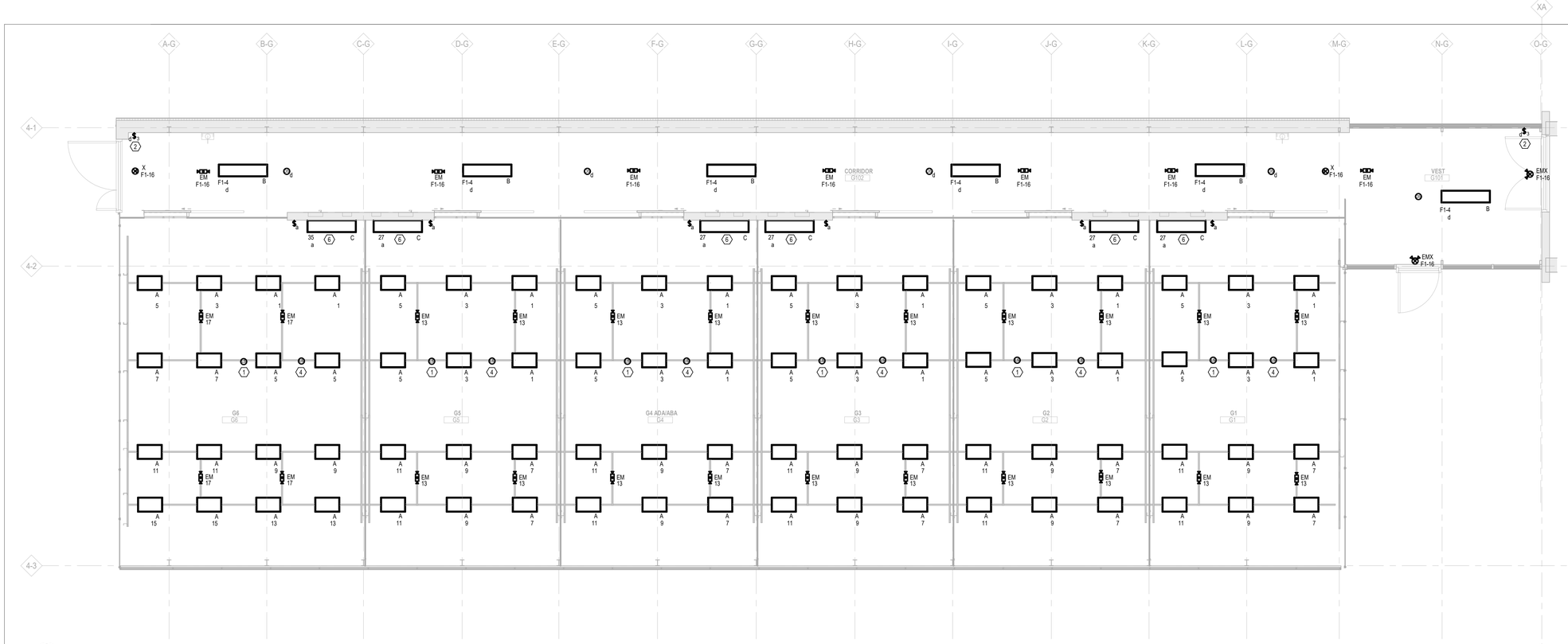
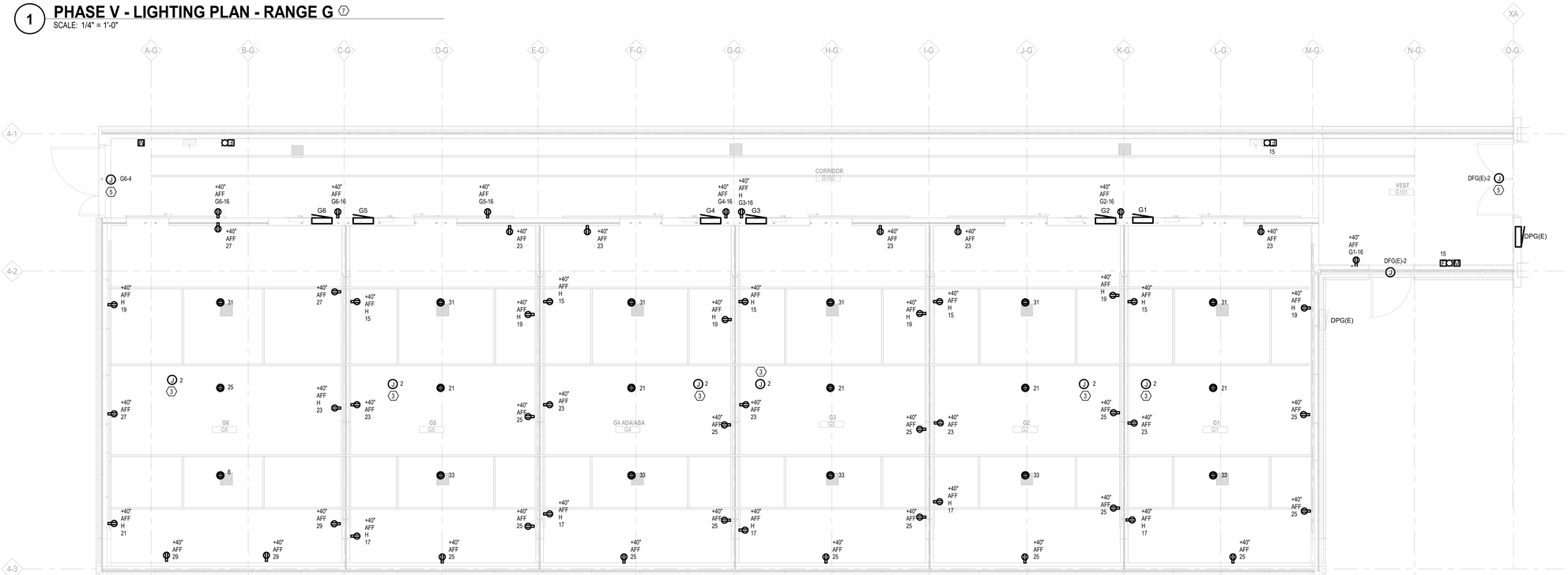


1 PHASE V - LIGHTING PLAN - RANGE G ⑦

SCALE: 1/4" = 1'-0"



2 PHASE V - POWER PLAN - RANGE G ⑦

SCALE: 1/4" = 1'-0"

GENERAL NOTES

A. REFER TO E-001 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

B. COORDINATE WITH OTHER DISCIPLINES PRIOR TO COMMENCEMENT OF INSTALLATION.

C. LIGHTING CONTROLS BOD: MICRO-GROW. LIGHTING CONTROLS FOR EACH CELL SHALL BE CONNECTED TO NEW GREENHOUSE MASTER CONTROLLER. REFER TO MECHANICAL SHEETS FOR ADDITIONAL INFORMATION.

D. ALL WORK SHOWN ON THIS DRAWING IS NEW UNLESS NOTED OTHERWISE.

E. ALL RECEPTACLES IN GREENHOUSES SHALL BE GFCI IN WEATHER-PROOF ENCLOSURE.

F. ALL DISCONNECTS IN GREENHOUSES AND ON THE EXTERIOR SHALL BE NEMA-3R RATED.

G. LIGHTING AND POWER IN CELLS CONNECTED TO ITS ASSOCIATED PANELBOARD. PANEL BOARDS SHALL BE NEMA 1 RATED.

H. ALL EMERGENCY LIGHTING FIXTURES AND EXIT SIGNS SHALL COME WITH UL924 LISTED BATTERY PACK RATED FOR 90 MIN.

I. PROVIDE EXPANDER PANEL AS REQUIRED TO ACCOMMODATE ADDITIONAL FIRE ALARM DEVICES. NEW EXPANDER PANEL SHALL BE COMPATIBLE WITH EXISTING FIRE ALARM SYSTEM AND SHALL HAVE MINIMUM 20% SPARE CAPACITY.

J. ALL CEILING RECEPTACLES SHALL BE LOCKABLE.

K. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS ON SITE. INFORMATION PROVIDED ON CONSTRUCTION DOCUMENTS ARE BASED ON AS-BUILT DRAWINGS DATED 1981 AND LIMITED SURVEY INFORMATION. IF ANY DISCREPANCIES OCCUR, DO NOT PROCEED WITH THE WORK AND CONTACT ENGINEER FOR FURTHER DIRECTIONS.

L. MICRO-GROW TO PROVIDE 0-10V DIMMING RELAY CONTROLS TO ALL TYPE 'A' LIGHTING FIXTURES IN EACH GREENHOUSE CELLS. REFER TO SHEET SERIES 'X' FOR MORE INFORMATION.

M. SWITCH SHOWN IN THE CELL TO PROVIDE MANUAL OVERRIDE FOR FIXTURE 'C'.

N. PROVIDE A NEMA 3R WIRE TROUGH INSIDE INDIVIDUAL GREEN HOUSE CELLS FOR CONTROL WIRING. SEPARATE LOW VOLTAGE AND LINE VOLTAGE WIRING WITHIN THE WIRE TROUGH.

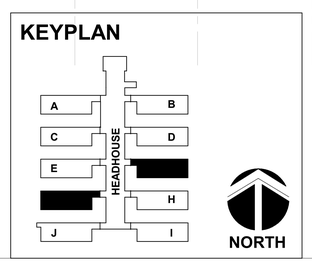
O. O. COORDINATE ELECTRICAL EQUIPMENT TO MAINTAIN REQUIRED MECHANICAL EQUIPMENT CLEARANCES. AVOID CONDUIT RUNS BELOW SUPPLY AND EXHAUST FANS.

KEYED NOTES ①

NUMBER	DESCRIPTION
1.	LIGHT SENSOR TO ACCESS THE PLANT'S EXPOSURE TO LIGHT. INTERCONNECT WITH SHADE AND LIGHTING CONTROLLERS.
2.	PROVIDE LIGHT SWITCH TO OVERRIDE OCCUPANCY SENSOR TO TURN LIGHTS OFF MANUALLY. OCCUPANCY SENSOR SHALL FUNCTION NORMALLY WHEN SWITCHES ARE IN THE ON POSITION WHEN OCCUPANTS ARE DETECTED.
3.	PROVIDE MOTOR RATED SWITCH FOR SHADE MOTOR (BY MICROGROW). COORDINATE LOCATION IN THE FIELD. THE SWITCH SHALL BE LOCATED PER NEC 430.102(B). LOCATION FOR THE MOTOR SHALL BE COORDINATE WITH SHADES MANUFACTURER.
4.	PAR SENSOR. COORDINATE LOCATION AND WIRING REQUIREMENTS WITH MICROGROW. THE CROP LIGHTING SHALL OPERATE BASED ON THE AVAILABLE SOLAR LEVEL AS SENSED VIA THE WEATHER STATION SOLAR SENSOR, AS WELL AS THE TIME OF DAY. A PAR SENSOR SHALL MONITOR THE AMOUNT OF PAR LIGHT THAT THE PLANTS HAVE RECEIVED. LIGHTING CONTRACTORS SHALL CONTROL LIGHTING CIRCUITS.
5.	PROVIDE POWER FOR DOOR HARDWARE AND ALL ASSOCIATED EQUIPMENT. REFER TO ARCHITECTURAL DRAWINGS FOR COORDINATION. INTERCONNECT TO FIRE ALARM SYSTEM TO ASSURE FAIL SAFE CONFIGURATION. POWER SUPPLY PROVIDED BY DOOR HARDWARE PROVIDER. COORDINATE FINAL CONNECTIONS WITH THE MANUFACTURER. COORDINATE WITH SECURITY FOR ALL SECURITY CONNECTIONS AND REQUIREMENTS. PROVIDE COMPLETE AND OPERABLE SYSTEM.
6.	ALL TYPE C FIXTURES ARE TO BE MOUNTED 8' AFF ON THE WALL NEXT TO THE DOOR.
7.	ALL ELECTRICAL WORK ON RANGE 'G' SHALL BE PRICED AS AN ADD ALTERNATE.

USDA

KEYPLAN



SCHEMMER

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PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL LIGHTING & POWER PLAN - RANGE G

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	YSB
EPM	M McWILLIAMS
CHECKED BY	MM
SAFETY & HEALTH	E WELKER
DRAWN BY	MB
REAL PROPERTY	W ROSS
PROJECT NO.	
DATE	05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET E232-G

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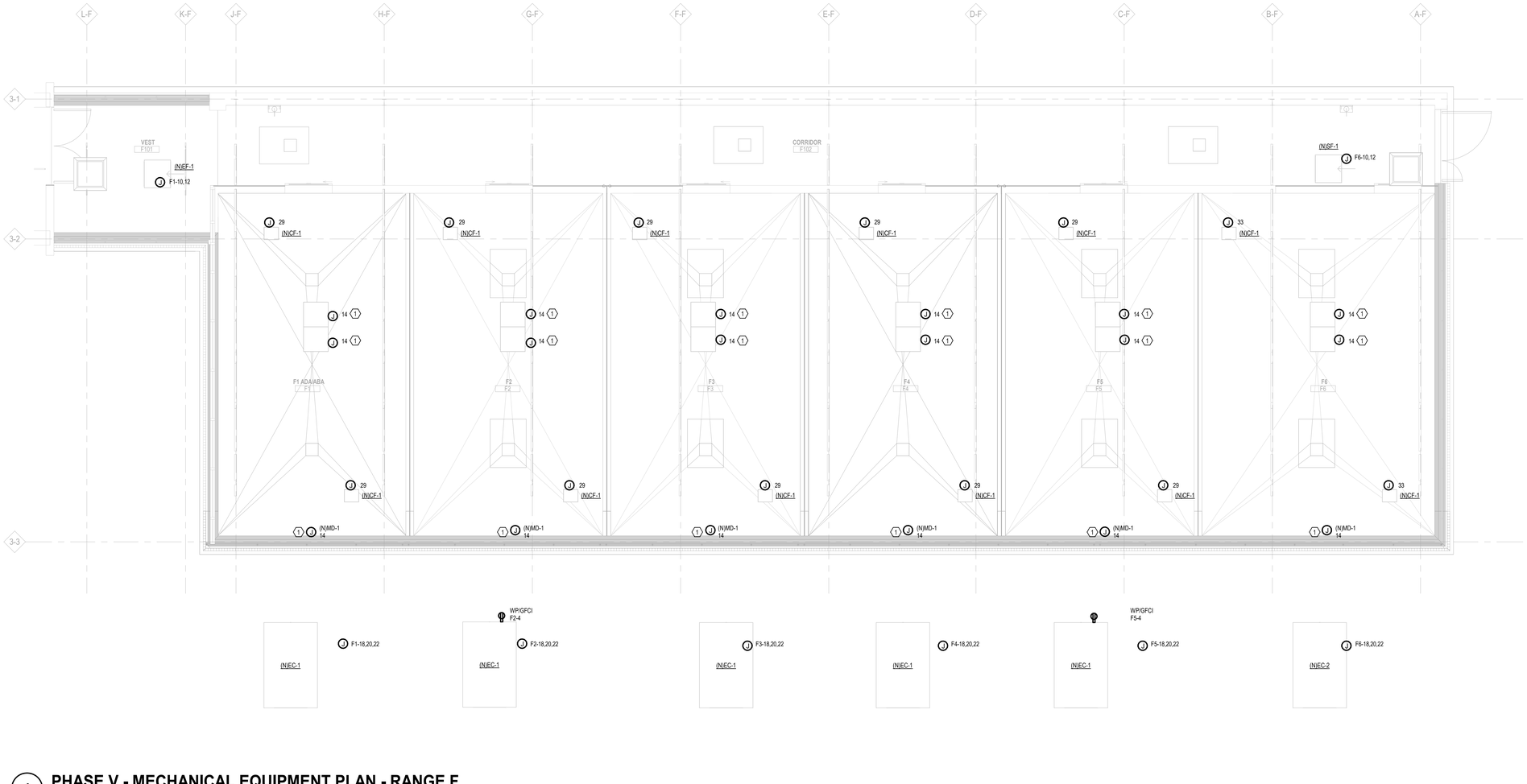
5/8/2026 10:52:19 AM

CAD | DSC | DH | PM



1 PHASE V - MECHANICAL EQUIPMENT PLAN - RANGE F

SCALE: 1/4" = 1'-0"

GENERAL NOTES

A. REFER TO E-001 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

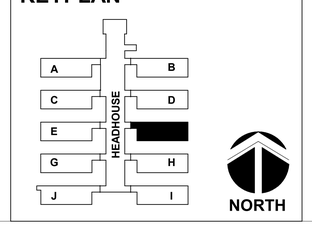
B. PROVIDE MANUFACTURER RECOMMENDED DISCONNECT FOR ALL NEW MECHANICAL EQUIPMENT.

C. POWER FOR MECHANICAL EQUIPMENT PER CELL COMES FROM CELL PANELBOARD AT THE CELL ENTRANCE.

KEYED NOTES (1)

NUMBER	DESCRIPTION
1.	PROVIDE MOTOR RATED SWITCH FOR LOUVER. COORDINATE LOCATION IN THE FIELD. THE SWITCH SHALL BE LOCATED PER NEC 430.102(B). COORDINATE ELECTRICAL WIRING REQUIREMENTS WITH MANUFACTURER.

KEYPLAN



SCHEMMER

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REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: YSB	EPM: M McWILLIAMS
CHECKED BY: MM	SAFETY & HEALTH: E WELKER
DRAWN BY: MB	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL MECHANICAL EQUIPMENT PLAN - RANGE F

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: EM231-F

Autodesk Docs://09228021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - MEP - R25.rvt
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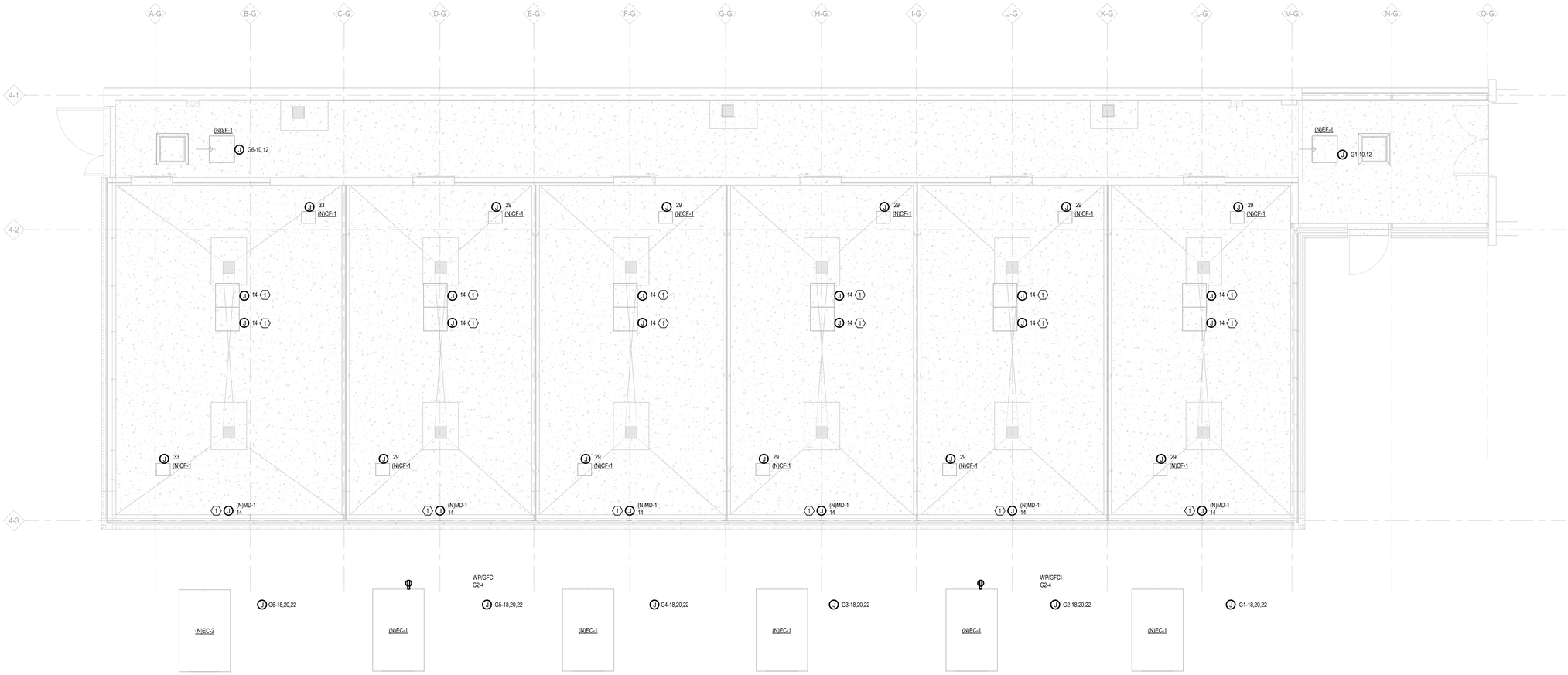
CAD | DSG | DH | PM



1 PHASE V - MECHANICAL EQUIPMENT PLAN - RANGE G ②

SCALE: 1/4" = 1'-0"

GENERAL NOTES

A. REFER TO E-001 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

B. PROVIDE MANUFACTURER RECOMMENDED DISCONNECT FOR ALL NEW MECHANICAL EQUIPMENT.

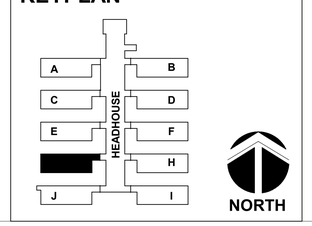
C. POWER FOR MECHANICAL EQUIPMENT PER CELL COMES FROM CELL PANELBOARD AT THE CELL ENTRANCE.

KEYED NOTES ①

NUMBER	DESCRIPTION
1.	PROVIDE MOTOR RATED SWITCH FOR LOUVER. COORDINATE LOCATION IN THE FIELD. THE SWITCH SHALL BE LOCATED PER NEC 430.102(B). COORDINATE ELECTRICAL WIRING REQUIREMENTS WITH MANUFACTURER.
2.	ALL ELECTRICAL WORK ON RANGE 'G' SHALL BE PRICED AS AN ADD ALTERNATE.

USDA

KEYPLAN



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PROJECT NO.: 09228.021

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NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: YSB	EPM: M McWILLIAMS
CHECKED BY: MM	SAFETY & HEALTH: E WELKER
DRAWN BY: MB	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL MECHANICAL EQUIPMENT PLAN - RANGE G

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 80526-8119

SHEET: EM231-G

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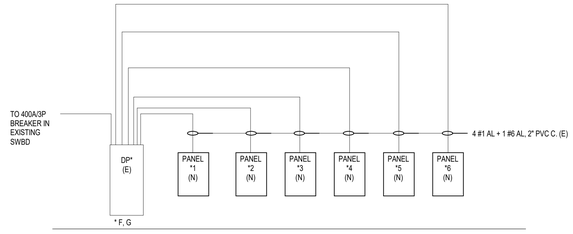
LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	FIXTURE VOLTS	LAMPS		REMARKS
					TYPE	MOUNTING	
A	GREENHOUSE LED	PHOTOBIO	PTB8850LS4X	120	850W LED	SURFACE	HARDWIRED. PROVIDE AT LEAST 2' EXTENSION CORD.
B	4FT INDUSTRIAL TYPE LED	COLUMBIA OR EQUIVALENT	LXEM4-40ML-EDU	120	43W LED	SURFACE	
C	4FT INDUSTRIAL TYPE LED - WALL	LITHONIA OR EQUIVALENT	WL-40L-GZ10-LP835-NESPDT7	120	39.5W LED	WALL	
EM	EMERGENCY LED FIXTURE	LITHONIA OR EQUIVALENT	ELM2	120	6W LED	SURFACE	
X	EXIT SIGN	LITHONIA OR EQUIVALENT	EDG-R	UNV	5W LED	RECESSED	REFER TO LIGHTING PLANS FOR NUMBER OF CHEVRONS AND FACES

IN LIEU OF THE MAXIMUM AVAILABLE FAULT CURRENT MARKING AS REQUIRED BY 110.24, A PERMANENTLY AFFIXED LABEL SHALL BE APPLIED WITH THE AVAILABLE FAULT CURRENT AT THE TIME OF INSTALLATION AND CALCULATION. THE LABEL SHALL BE 2"X3" IN SIZE AND SHALL BE BLUE LETTERING ON A CONTRASTING BACKGROUND. THIS LABEL SHALL ALSO INCLUDE THE DATE OF THE CALCULATION.



1 **ELECTRICAL - RISER DIAGRAM**
SCALE: NONE

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM	USDA
PROJECT MANAGER: TJS	FACILITIES ENGINEER: S KASEMAN
DESIGNER: YSB	EPM: M McWILLIAMS
CHECKED BY: MM	SAFETY & HEALTH: E WELKER
DRAWN BY: MB	REAL PROPERTY: W ROSS

USDA

Agricultural Research Service

USDA NCSL GREENHOUSES — PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL DETAILS, LIGHTING FIXTURE SCHEDULE AND PARTIAL RISER DIAGRAM

PROJECT NO.

DATE: 05/11/2026

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET: E501

SCHEMMER

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PROJECT NO.: 09228.021

Autodesk Docs://09228021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - MEP - R25.rvt
5/8/2026 10:52:19 AM

CAD | DSG | JH | PM

EXISTING PANEL

PANEL: DPF(E)

AMP: 400 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: MLO AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
F1	6.94			100/3	1	A	2	20/1	0.30			DOOR OPERATOR CORRIDOR
-		6.90		-	3	B	4	20/1		0.00		SPACE
-			6.80	-	5	C	6	20/1			0.00	SPACE
SPACE	0.00			20/1	7	A	8	100/3	6.76			F2
SPACE		0.00		20/1	9	B	10	-		5.88		-
SPACE			0.00	20/1	11	C	12	-			5.97	-
F3	6.94			100/3	13	A	14	20/1	0.00			SPACE
-		7.02		-	15	B	16	20/1		0.00		SPACE
-			5.79	-	17	C	18	20/1			0.00	SPACE
SPACE	0.00			20/1	19	A	20	100/3	6.94			F4
SPACE		0.00		20/1	21	B	22	-		5.70		-
SPACE			0.00	20/1	23	C	24	-			5.97	-
F5	6.94			100/3	25	A	26	20/1	0.00			SPACE
-		7.20		-	27	B	28	20/1		0.00		SPACE
-			5.79	-	29	C	30	20/1			0.00	SPACE
SPACE	0.00			20/1	31	A	32	100/3	8.27			F6
SPACE		0.00		20/1	33	B	34	-		9.00		-
SPACE			0.00	20/1	35	C	36	-			6.97	-
	20.82	21.12	18.38	<< PHASE SUB-TOTALS >>					22.27	20.58	18.91	

PHASE A 43.09 kVA
PHASE B 41.70 kVA
PHASE C 37.30 kVA

122.09 kVA TOTAL CONNECTED LOAD
122.05 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:

4/9/20264:30 PM DPF(E)

PANEL: F1 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.28		LIGHITNG CORRIDOR
LIGHTS			1.60	20/1	5	C	6	20/1			0.09	EM LIGHTS/EXITS CORRIDOR
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F1 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	15/2		0.92		EF-1
LIGHTS			1.60	20/1	11	C	12	-			0.92	-
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		0.18		REC CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.36	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.54			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.00	20/1	35	C	36	20/1			0.00	SPARE
	5.46	5.10	5.37	<< PHASE SUB-TOTALS >>					1.48	1.80	1.43	

PHASE A 6.94 kVA
PHASE B 6.90 kVA
PHASE C 6.80 kVA

20.64 kVA TOTAL CONNECTED LOAD
20.64 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

4/9/20264:29 PM CELL F1

PANEL: F2 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.18		EC EXTERIOR RECEPT
LIGHTS			1.60	20/1	5	C	6	20/1			0.00	SPARE
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F2 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	20/1		0.00		SPARE
LIGHTS			1.60	20/1	11	C	12	20/1			0.00	SPARE
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		0.18		REC CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.54	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.36			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.00	20/1	35	C	36	20/1			0.00	SPARE
	5.28	5.10	5.55	<< PHASE SUB-TOTALS >>					1.48	0.78	0.42	

PHASE A 6.76 kVA
PHASE B 5.88 kVA
PHASE C 5.97 kVA

18.61 kVA TOTAL CONNECTED LOAD
18.61 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

4/9/20264:29 PM CELL F2

PANEL: F3 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.00		SPARE
LIGHTS			1.60	20/1	5	C	6	20/1			0.00	SPARE
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F3 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	20/1		0.00		SPARE
LIGHTS			1.60	20/1	11	C	12	20/1			0.00	SPARE
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		1.50		RECEPT HEATER CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.36	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.54			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.00	20/1	35	C	36	20/1			0.00	SPARE
	5.46	5.10	5.37	<< PHASE SUB-TOTALS >>					1.48	1.92	0.42	

PHASE A 6.94 kVA
PHASE B 7.02 kVA
PHASE C 5.79 kVA

19.75 kVA TOTAL CONNECTED LOAD
19.75 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

4/9/20264:29 PM CELL F3

PANEL: F4 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.00		SPARE
LIGHTS			1.60	20/1	5	C	6	20/1			0.00	SPARE
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F4 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	20/1		0.00		SPARE
LIGHTS			1.60	20/1	11	C	12	20/1			0.00	SPARE
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		0.18		REC CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.36	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.54			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.18	20/1	35	C	36	20/1			0.00	SPARE
	5.46	5.10	5.55	<< PHASE SUB-TOTALS >>					1.48	0.60	0.42	

PHASE A 6.94 kVA
PHASE B 5.70 kVA
PHASE C 5.97 kVA

18.61 kVA TOTAL CONNECTED LOAD
18.61 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

4/9/20264:29 PM CELL F4

PANEL: F5 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.18		EC EXTERIOR RECEPT
LIGHTS			1.60	20/1	5	C	6	20/1			0.00	SPARE
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F5 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	20/1		0.00		SPARE
LIGHTS			1.60	20/1	11	C	12	20/1			0.00	SPARE
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		1.50		RECEPT HEATER CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.36	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.54			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.00	20/1	35	C	36	20/1			0.00	SPARE
	5.46	5.10	5.37	<< PHASE SUB-TOTALS >>					1.48	2.10	0.42	

PHASE A 6.94 kVA
PHASE B 7.20 kVA
PHASE C 5.79 kVA

19.93 kVA TOTAL CONNECTED LOAD
19.93 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

4/9/20264:29 PM CELL F5

PANEL: F6 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.20		DOOR OPERATOR CORRIDOR
LIGHTS			1.60	20/1	5	C	6	20/1			0.18	DED RECPT
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F6 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	15/2		0.92		SF CORRIDOR
LIGHTS			1.60	20/1	11	C	12	-			0.92	-
LIGHTS	1.60			20/1	13	A	14	20/1	0.20			MD-1
LIGHTS		1.60		20/1	15	B	16	20/1		0.36		REC CORRIDOR
EM LIGHTS			0.04	20/1	17	C	18	15/3*			0.55	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.55			-
DED RECPT		1.50		20/1	21	B	22	-		0.55		-
DED RECPT			1.50	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.18			20/1	25	A	26	20/1	0.00			SPARE
RECEPTACLES		0.36		20/1	27	B	28	20/1		0.00		SPARE
RECEPTACLES			0.54	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
CF		0.31		20/1	33	B	34	20/1		0.00		SPARE
LIGHTS			0.04	20/1	35	C	36	20/1			0.00	SPARE
	6.66	6.97	5.32	<< PHASE SUB-TOTALS >>					1.61	2.03	1.65	

PHASE A 8.27 kVA
PHASE B 9.00 kVA
PHASE C 6.97 kVA

24.24 kVA TOTAL CONNECTED LOAD
24.24 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

4/9/20264:29 PM CELL F6

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

SCHEMMER

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PROJECT NO.: 09228.021

A–E FIRM	USDA
PROJECT MANAGER	TJS
FACILITIES ENGINEER	S KASEMAN
DESIGNER	YSB
EPM	M McWILLIAMS
CHECKED BY	MM
SAFETY & HEALTH	E WELKER
DRAWN BY	MB
REAL PROPERTY	W ROSS
PROJECT NO.	09228.021
DATE	05/11/2026

USDA Agricultural Research Service

USDA NCSL GREENHOUSES PHASE V

USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL PANEL SCHEDULES

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET E601

Autodesk Docs://09228021 - USDA NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - MEP - R25.rvt
5/8/2026 10:52:21 AM

EXISTING PANEL

PANEL: DPG(E)

AMP: 400 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: MLO AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
G1	6.94			100/3	1	A	2	20/1	0.30			DOOR OPERATOR CORRIDOR
-		6.90		-	3	B	4	20/1		0.00		SPACE
-			6.80	-	5	C	6	20/1			0.00	SPACE
SPACE	0.00			20/1	7	A	8	100/3	6.76			G2
SPACE		0.00		20/1	9	B	10	-		5.88		-
SPACE			0.00	20/1	11	C	12	-			5.97	-
G3	6.94			100/3	13	A	14	20/1	0.00			SPACE
-		7.02		-	15	B	16	20/1		0.00		SPACE
-			5.79	-	17	C	18	20/1			0.00	SPACE
SPACE	0.00			20/1	19	A	20	100/3	6.94			G4
SPACE		0.00		20/1	21	B	22	-		5.70		-
SPACE			0.00	20/1	23	C	24	-			5.97	-
G5	6.94			100/3	25	A	26	20/1	0.00			SPACE
-		7.20		-	27	B	28	20/1		0.00		SPACE
-			5.79	-	29	C	30	20/1			0.00	SPACE
SPACE	0.00			20/1	31	A	32	100/3	8.27			G6
SPACE		0.00		20/1	33	B	34	-		8.17		-
SPACE			0.00	20/1	35	C	36	-			6.97	-
	20.82	21.12	18.38	<< PHASE SUB-TOTALS >>					22.27	19.75	18.91	

PHASE A 43.09 kVA
PHASE B 40.88 kVA
PHASE C 37.30 kVA

121.26 kVA TOTAL CONNECTED LOAD
121.22 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:

DPG(E)

4/9/20264:33 PM

PANEL: G1 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.28		LIGHITNG CORRIDOR
LIGHTS			1.60	20/1	5	C	6	20/1			0.09	EM LIGHTS/EXITS CORRIDOR
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F1 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	15/2		0.92		EF-1
LIGHTS			1.60	20/1	11	C	12	-			0.92	-
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		0.18		REC CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.36	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.54			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.00	20/1	35	C	36	20/1			0.00	SPARE
	5.46	5.10	5.37	<< PHASE SUB-TOTALS >>					1.48	1.80	1.43	

PHASE A 6.94 kVA
PHASE B 6.90 kVA
PHASE C 6.80 kVA

20.64 kVA TOTAL CONNECTED LOAD
20.64 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

CELL G1

4/9/20264:29 PM

PANEL: G2 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.18		EC EXTERIOR RECEPT
LIGHTS			1.60	20/1	5	C	6	20/1			0.00	SPARE
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F2 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	20/1		0.00		SPARE
LIGHTS			1.60	20/1	11	C	12	20/1			0.00	SPARE
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		0.18		REC CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.54	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.36			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.00	20/1	35	C	36	20/1			0.00	SPARE
	5.28	5.10	5.55	<< PHASE SUB-TOTALS >>					1.48	0.78	0.42	

PHASE A 6.76 kVA
PHASE B 5.88 kVA
PHASE C 5.97 kVA

18.61 kVA TOTAL CONNECTED LOAD
18.61 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

CELL G2

4/9/20264:30 PM

PANEL: G3 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.00		SPARE
LIGHTS			1.60	20/1	5	C	6	20/1			0.00	SPARE
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F3 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	20/1		0.00		SPARE
LIGHTS			1.60	20/1	11	C	12	20/1			0.00	SPARE
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		1.50		RECEPT HEATER CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.36	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.54			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.00	20/1	35	C	36	20/1			0.00	SPARE
	5.46	5.10	5.37	<< PHASE SUB-TOTALS >>					1.48	1.92	0.42	

PHASE A 6.94 kVA
PHASE B 7.02 kVA
PHASE C 5.79 kVA

19.75 kVA TOTAL CONNECTED LOAD
19.75 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

CELL G3

4/9/20264:30 PM

PANEL: G4 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.00		SPARE
LIGHTS			1.60	20/1	5	C	6	20/1			0.00	SPARE
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F4 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	20/1		0.00		SPARE
LIGHTS			1.60	20/1	11	C	12	20/1			0.00	SPARE
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		0.18		REC CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.36	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.54			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.18	20/1	35	C	36	20/1			0.00	SPARE
	5.46	5.10	5.55	<< PHASE SUB-TOTALS >>					1.48	0.60	0.42	

PHASE A 6.94 kVA
PHASE B 5.70 kVA
PHASE C 5.97 kVA

18.61 kVA TOTAL CONNECTED LOAD
18.61 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

CELL G4

4/9/20264:30 PM

PANEL: G5 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.18		EC EXTERIOR RECEPT
LIGHTS			1.60	20/1	5	C	6	20/1			0.00	SPARE
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F5 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	20/1		0.00		SPARE
LIGHTS			1.60	20/1	11	C	12	20/1			0.00	SPARE
EM LIGHTS	0.04			20/1	13	A	14	20/1	0.20			MD-1
DED RECPT		1.50		20/1	15	B	16	20/1		1.50		RECEPT HEATER CORRIDOR
DED RECPT			1.50	20/1	17	C	18	15/3*			0.42	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.42			-
RECEPTACLES		0.18		20/1	21	B	22	-		0.42		-
RECEPTACLES			0.36	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.54			20/1	25	A	26	20/1	0.00			SPARE
LIGHTS		0.04		20/1	27	B	28	20/1		0.00		SPARE
CF			0.31	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
DED RECPT		0.18		20/1	33	B	34	20/1		0.00		SPARE
SPARE			0.00	20/1	35	C	36	20/1			0.00	SPARE
	5.46	5.10	5.37	<< PHASE SUB-TOTALS >>					1.48	2.10	0.42	

PHASE A 6.94 kVA
PHASE B 7.20 kVA
PHASE C 5.79 kVA

19.93 kVA TOTAL CONNECTED LOAD
19.93 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

CELL G5

4/9/20264:30 PM

PANEL: G6 (NEW)

AMP: 100 VOLT: 120/208
PHASE: 3 4 WIRE + GND
MOUNTING: RECESSED MAIN: 100 MCB AIC: 22k AMPS RMS SYM

Branch Circuit Load Description	KVA Load A	KVA Load B	KVA Load C	Trip Poles	Ckt. No.	Phase	Ckt. No.	Trip Poles	KVA Load A	KVA Load B	KVA Load C	Branch Circuit Load Description
LIGHTS	1.60			20/1	1	A	2	20/1	0.36			SHADE CLOTH
LIGHTS		1.60		20/1	3	B	4	20/1		0.20		DOOR OPERATOR CORRIDOR
LIGHTS			1.60	20/1	5	C	6	20/1			0.18	DED RECPT
LIGHTS	1.60			20/1	7	A	8	20/1	0.50			F6 CONTROL PANEL
LIGHTS		1.60		20/1	9	B	10	15/2		0.09		SF CORRIDOR
LIGHTS			1.60	20/1	11	C	12	-			0.92	-
LIGHTS	1.60			20/1	13	A	14	20/1	0.20			MD-1
LIGHTS		1.60		20/1	15	B	16	20/1		0.36		REC CORRIDOR
EM LIGHTS			0.04	20/1	17	C	18	15/3*			0.55	EC EXTERIOR
DED RECPT	1.50			20/1	19	A	20	-	0.55			-
DED RECPT		1.50		20/1	21	B	22	-		0.55		-
DED RECPT			1.50	20/1	23	C	24	20/1			0.00	SPARE
RECEPTACLES	0.18			20/1	25	A	26	20/1	0.00			SPARE
RECEPTACLES		0.36		20/1	27	B	28	20/1		0.00		SPARE
RECEPTACLES			0.54	20/1	29	C	30	20/1			0.00	SPARE
DED RECPT	0.18			20/1	31	A	32	20/1	0.00			SPARE
CF		0.31		20/1	33	B	34	20/1		0.00		SPARE
LIGHTS			0.04	20/1	35	C	36	20/1			0.00	SPARE
	6.66	6.97	5.32	<< PHASE SUB-TOTALS >>					1.61	1.20	1.65	

PHASE A 8.27 kVA
PHASE B 8.17 kVA
PHASE C 6.97 kVA

23.41 kVA TOTAL CONNECTED LOAD
23.41 kVA TOTAL DEMAND LOAD

PROVIDE THE FOLLOWING:
*HACR

CELL G6

4/9/20264:30 PM

Autodesk Docs://09228021 - USDA_NCSL GREENHOUSES PHASE V/USDA_NCLS Greenhouse Ph V - MEP - R25.rvt
5/8/2026 10:52:23 AM

CAD | BSG | DH | PM

SCHEMMER

Page Stantec

PROJECT NO.: 09228.021

USDA

95% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

REVISIONS

A–E FIRM: USDA
PROJECT MANAGER: TJS
FACILITIES ENGINEER: S KASEMAN
DESIGNER: YSB
EPM: M McWILLIAMS
CHECKED BY: MM
SAFETY & HEALTH: E WELKER
DRAWN BY: MB
REAL PROPERTY: W ROSS
PROJECT NO.:
DATE: 05/11/2026

USDA Agricultural Research Service

USDA NCSL GREENHOUSES PHASE V
USDA ARS
1307 18TH STREET NORTH, FARGO, ND 58102

ELECTRICAL PANEL SCHEDULES

FACILITIES ENGINEERING SECTION
PLAINS AREA
2150 CENTRE AVE., BLDG D, SUITE 330
FT. COLLINS, CO 89526-8119

SHEET E602