MUSCATINE COUNTY BOARD OF SUPERVISORS

Danny Chick, District One | Kurt Kirchner, District Two | Scott Sauer, District Three
Nathan Mather, District Four | Jeff Sorensen, District Five

AGENDA

Monday, March 30, 2026

9:00 a.m.

You can watch the meeting live from your computer, laptop, or smartphone at https://www.youtube.com/user/MuscatineCounty/

1. Call to order.

2. Review agenda.

3. Discussion and possible action to approve claims dated March 30th, 2026, in the amount of $333,054.37.

4. Public hearing on proposed plans, specifications, form of contract and cost estimate for the Muscatine County Engineer Satellite Facility Project. **(roll call vote to close public hearing)**

   Discussion and possible action to approve Resolution #03-30-26-01 Approving Plans, Specifications, Form of Contract and Cost Estimate for the Muscatine County Engineer Satellite Facility Project. **(roll call vote)**

5. Items with County Engineer Bryan Horesowsky:
   a. Discussion and possible action to approve the Muscatine County DOT FY 2027 Secondary Roads Five Year Program and Secondary Roads Budget.
   b. Other.

6. Discussion and possible action to approve the minutes of the March 23, 2026 regular meeting and March 23, 2026 special meeting.

7. Correspondence.

8. Committee Reports.

9. Items with the Administration Office:
   a. Action to approve the proposed FY26/27 Muscatine County budget for publication.
   b. Action to set a public hearing on the proposed FY26/27 Muscatine County budget for Monday, April 13, 2026 at 9:00 a.m.
   c. Discussion and possible action to approve Resolution #03-30-26-02 Taking Action to Set a Public Hearing for Monday, April 13, 2026 at 9:00 a.m. to Facilitate the Repurposing of Prior Bond Proceeds. **(roll call vote)**
   d. Other.

Muscatine County Administration Building 414 East Third Street, Suite 101 Muscatine, Iowa 52761-4142
Phone: (563)263-5317 Fax: (563)288-4235 e-mail: administration@muscatinecountyiowa.gov

10. Receive information from County employees.

11. Receive comments from the public.

12. Closed session (at employee's request) pursuant to Chapter 21.5(1)(i), Code of Iowa, for performance evaluation. **(roll call vote to enter and exit closed session)**

13. Closed session (at employee's request) pursuant to Chapter 21.5(1)(i), Code of Iowa, for performance evaluation. **(roll call vote to enter and exit closed session)**

14. Adjournment.

Hirings approved:

Lawrence Murray	Transport Officer II	Sheriff's Office/Jail

March 30, 2026

Agenda Packet

Item #3

Muscatine County, IA

Pending Expense Approval Report

By Segment (Select Below)

Post Dates 03/30/2026 - 03/30/2026

Vendor Name	Payable Number	Post Date	Description (Item)	Account Number	Amount
Depart: 00 - NON-DEPARTMENTAL					
WALKER, WESLEY	3/10/26	03/30/2026	CANCEL FROM ACH	5093-00-9050-000-99900	4,187.00
DIETZ, RACHEL	0826205060	03/30/2026	PROPERTY SOLD 0826205060	5093-00-9050-000-99900	991.00
PERSHING, LLC - FBO JAMES B...	945 3/26	03/30/2026	ANNUITY TRANSFER TO INDIVIDUAL IRA	5200-00-9000-000-11700	19,794.38
CHARLES SCHWAB & CO - FBO...	945 3/26	03/30/2026	ANNUITY TRANSFER TO INDIVIDUAL IRA	5200-00-9000-000-11700	3,639.61
				Depart 00 - NON-DEPARTMENTAL Total:	**28,611.99**
Depart: 01 - BOARD/ADMINISTRATION					
ADVOCATE NEWS	183433	03/30/2026	BOS MINUTES 1/26/26	0001-01-9000-000-40000	391.53
ADVOCATE NEWS	183434	03/30/2026	BOS MINUTES 2/2/26	0001-01-9000-000-40000	69.15
ADVOCATE NEWS	183435	03/30/2026	BOS MINUTES 2/9/26	0001-01-9000-000-40000	72.74
ADVOCATE NEWS	183436	03/30/2026	JAN 2026 CLAIMS REGISTER	0001-01-9000-000-40000	210.13
ADVOCATE NEWS	183437	03/30/2026	BOS MINUTES 2/16/26	0001-01-9000-000-40000	229.89
OFFICE EXPRESS OFFICE PRO...	161291	03/30/2026	CASE COPY PAPER	0001-01-9000-000-26000	39.87
				Depart 01 - BOARD/ADMINISTRATION Total:	**1,013.31**
Depart: 02 - AUDITOR					
DES MOINES STAMP MFG CO	1258851	03/30/2026	HD DATER	0001-02-9010-000-26000	73.00
ZELLMER, ELAINE	3/10/26	03/30/2026	POST AUDIT TEAM DAVENPORT SCHOOL SPECIAL ELECTION	0002-02-8000-000-48200	12.00
EVERETT, ABIGAIL	3/10/26	03/30/2026	POST AUDIT TEAM DAVENPORT SCHOOL SPECIAL ELECTION	0002-02-8000-000-48200	12.00
RIBBINK, CATHY	3/10/26	03/30/2026	POST AUDIT TEAM DAVENPORT SCHOOL SPECIAL ELECTION	0002-02-8000-000-48200	12.00
ESSVR LLC	CD2139157	03/30/2026	LICENSE & MAINTENANCE	0002-02-8000-000-44600	19,514.81
VANDER LINDEN, TIBE	REIM 3/26	03/30/2026	MILEAGE ISAC CONFERENCE	0001-02-9010-000-41300	93.87
VANDER LINDEN, TIBE	REIM 3/26	03/30/2026	LODGING, PARKING & MEAL ISAC CONFERENCE	0001-02-9010-000-42233	200.89
VANDER LINDEN, TIBE	REIM 3/26	03/30/2026	ELECTION POSTAGE	0002-02-8000-000-41200	1.90
				Depart 02 - AUDITOR Total:	**19,920.47**
Depart: 03 - TREASURER					
PROFESSIONAL OFFICE SERVIC...	003835067	03/30/2026	APRIL MV RENEWAL 2774	0001-03-8100-000-41200	1,659.68
PROFESSIONAL OFFICE SERVIC...	003835067	03/30/2026	APRIL MV RENEWAL 2774	0001-03-8100-000-42100	394.39
OLSON, KIM	REIM 3/2026	03/30/2026	REIM MILEAGE - MARCH 2026 ISAC	0001-03-8100-000-41300	208.53
OLSON, KIM	REIM 3/2026	03/30/2026	REIM MEALS & LODGING - MARCH 2026 ISAC	0001-03-8100-000-42233	224.99
				Depart 03 - TREASURER Total:	**2,487.59**
Depart: 04 - COUNTY ATTORNEY					
CROSSROADS INC	2603-SH20	03/30/2026	SHREDDING	0001-04-1100-000-47510	50.99
KRAFKA, HEIDI L	6172	03/30/2026	TRANSCRIPTS OF DEPOS FECR073699	0001-04-1100-000-42617	316.05
DAVIS HEALTH CARE	FECR072360	03/30/2026	TRIAL TESTIMONY (4.5 HOURS)	0038-04-1100-000-39900	900.00
KRAFKA, HEIDI L	6180	03/30/2026	TRANSCRIPTS OF DEPOS FECR069924	0001-04-1100-000-42617	264.45
FIELDER, HEATHER	REIM 3/2026	03/30/2026	REIM MILEAGE TRIAL ADVOCACY TRAINING	0001-04-1100-000-41300	349.02
FIELDER, HEATHER	REIM 3/2026	03/30/2026	REIM MEALS TRIAL ADVOCACY TRAINING	0001-04-1100-000-42233	95.45
BREITBACH, HOPE	FECR069904	03/30/2026	EXPERT WITNESS TESTIMONY FECR069904	0038-04-1100-000-39900	1,000.00

The payables contained in this report are in an open packet, and have not posted to the General Ledger

Vendor Name	Payable Number	Post Date	Description (Item)	Account Number	Amount
IOWA COUNTY ATTORNEYS A...	14073	03/30/2026	2026-2027 DUES	0001-04-1100-000-42232	1,031.00
JOHNSON COUNTY SHERIFF	26-00785	03/30/2026	MILEAGE	0001-04-1100-000-42618	10.08
JOHNSON COUNTY SHERIFF	26-00785	03/30/2026	SERVICE/ATTEMPTED SERVICE OF PAPERS	0001-04-1100-000-42618	33.00
IRISH, KRISTA	I-5111A	03/30/2026	TRANSCRIPTS OF DEPOS 6/19/25 FECR070444	0001-04-1100-000-42617	138.90
				Depart 04 - COUNTY ATTORNEY Total:	**4,188.94**
Depart: 05 - SHERIFF					
TRANSUNION RISK AND ALTE...	6384112 010126	03/30/2026	MONTHLY CONTRACT 1/1-12/1/26	0029-05-1010-000-26700	1,824.00
MIDTOWN TOWING & REPAIR...	1132	03/30/2026	OIL FILTER AND TIRE ROTATION 70-20	0001-05-1000-000-44000	32.90
MIDTOWN TOWING & REPAIR...	1132	03/30/2026	OIL FILTER AND TIRE ROTATION 70-20	0001-05-1000-000-44000	50.02
MIDTOWN TOWING & REPAIR...	1137	03/30/2026	OIL FILTER FLUIDS AND TIRE ROTATION 70-29	0001-05-1000-000-44000	67.01
MIDTOWN TOWING & REPAIR...	1137	03/30/2026	OIL FILTER FLUIDS AND TIRE ROTATION 70-29	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	11141	03/30/2026	OIL FILTER FLUIDS AND TIRE ROTATION 70-24	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	11141	03/30/2026	OIL FILTER FLUIDS AND TIRE ROTATION 70-24	0001-05-1000-000-44000	56.83
MIDTOWN TOWING & REPAIR...	1148	03/30/2026	OIL FILTER FLUID AND TIRE ROTATION 70-3	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	1148	03/30/2026	OIL FILTER FLUID AND TIRE ROTATION 70-3	0001-05-1000-000-44000	43.43
MIDTOWN TOWING & REPAIR...	1024	03/30/2026	OIL FILTER BRAKE PADS DISC ROTOR	0001-05-1000-000-44000	274.85
MIDTOWN TOWING & REPAIR...	1024	03/30/2026	OIL FILTER BRAKE PADS DISC ROTOR	0001-05-1000-000-44000	464.51
MIDTOWN TOWING & REPAIR...	1162	03/30/2026	OIL FILTER FLUID LUG NUTS TIRE ROTATION 70-2	0001-05-1000-000-44000	90.23
MIDTOWN TOWING & REPAIR...	1162	03/30/2026	OIL FILTER FLUID LUG NUTS TIRE ROTATION 70-2	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	1118	03/30/2026	OIL FILTER TIRE ROTATION AND WASHER FLUID 70-21	0001-05-1000-000-44000	62.51
MIDTOWN TOWING & REPAIR...	1118	03/30/2026	OIL FILTER TIRE ROTATION AND WASHER FLUID 70-21	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	892	03/30/2026	OIL FILTER CHANGE AND TIRE ROTATION	0001-05-1000-000-44000	27.99
MIDTOWN TOWING & REPAIR...	892	03/30/2026	OIL FILTER CHANGE AND TIRE ROTATION	0001-05-1000-000-44000	58.51
MIDTOWN TOWING & REPAIR...	1216	03/30/2026	OIL FILTER FLUID ANTIFREEZE TIRE ROTATION 70-13	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	1216	03/30/2026	OIL FILTER FLUID ANTIFREEZE TIRE ROTATION 70-13	0001-05-1000-000-44000	58.51
MIDTOWN TOWING & REPAIR...	1225	03/30/2026	OIL FLUIDS REAR PADS ROTORS TIRE ROTATION 70...	0001-05-1000-000-44000	544.61
MIDTOWN TOWING & REPAIR...	1225	03/30/2026	OIL FLUIDS REAR PADS ROTORS TIRE ROTATION 70...	0001-05-1000-000-44000	212.24
MIDTOWN TOWING & REPAIR...	1226	03/30/2026	STRETCH FIT WATER PUMP ANTIFREEZE 70-21	0001-05-1000-000-44000	444.22
MIDTOWN TOWING & REPAIR...	1226	03/30/2026	STRETCH FIT WATER PUMP ANTIFREEZE 70-21	0001-05-1000-000-44000	478.00
MIDTOWN TOWING & REPAIR...	1202	03/30/2026	OIL FILTER ANTIFREEZE ROTATE 70-8	0001-05-1000-000-44000	74.69
MIDTOWN TOWING & REPAIR...	1202	03/30/2026	OIL FILTER ANTIFREEZE ROTATE 70-8	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	1199	03/30/2026	OIL FILTER CABIN FILTER ROTATE 70-6	0001-05-1000-000-44000	88.19
MIDTOWN TOWING & REPAIR...	1199	03/30/2026	OIL FILTER CABIN FILTER ROTATE 70-6	0001-05-1000-000-44000	32.50
MIDTOWN TOWING & REPAIR...	1206	03/30/2026	OIL FILTER ANTIFREEZE FLUID TIRE ROTATION 70-25	0001-05-1000-000-44000	32.99

Vendor Name	Payable Number	Post Date	Description (Item)	Account Number	Amount
MIDTOWN TOWING & REPAIR...	1206	03/30/2026	OIL FILTER ANTIFREEZE FLUID TIRE ROTATION 70-25	0001-05-1000-000-44000	54.83
R-O GUNS	345197	03/30/2026	HANDGUN ASSISTANCE PROGRAM - SPRINGFIELD 1911-A1	0034-05-1000-000-63782	625.00
LIFELOC TECHNOLOGIES	428628	03/30/2026	PORTABLE BREATH TESTER	0001-05-1003-000-63893	1,100.65
ADVANCED BUSINESS SYSTEM...	INV466860	03/30/2026	CONTRACT CHARGES 3/11-4/10/26	0029-05-1010-000-26700	34.92
ADVANCED BUSINESS SYSTEM...	INV466860	03/30/2026	CONTRACT OVERAGE CHARGES 2/11-3/10/26	0029-05-1010-000-26700	35.88
U S CELLULAR CORP	0796268867	03/30/2026	DTF MONTHLY SERVICE 3/14-4/13/26	0001-05-1011-000-26000	131.56
U S CELLULAR CORP	0796268867	03/30/2026	DTF MONTHLY SERVICE 3/14-4/13/26	0029-05-1010-000-26700	131.56
A-1 QUALITY TIRE	I052583	03/30/2026	DISMOUNT/MOUNT/BALANCE TIRE-SPARE TRUCK PATROL DIV	0001-05-1000-000-44000	84.00
A-1 QUALITY TIRE	I052583	03/30/2026	DISMOUNT/MOUNT/BALANCE TIRE-SPARE TRUCK PATROL DIV	0001-05-1000-000-44000	547.26
CUMMINS SALES AND SERVICE	J9-260398086	03/30/2026	INSPECTION - PLANNED MAINTENACE FULL SERVICE	0001-05-1000-000-44100	380.00
MIDTOWN TOWING & REPAIR...	1258	03/30/2026	OIL FILTER FLUID ANTIFREEZE TIRE ROTATION 70-10	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	1258	03/30/2026	OIL FILTER FLUID ANTIFREEZE TIRE ROTATION 70-10	0001-05-1000-000-44000	56.29
MIDTOWN TOWING & REPAIR...	1259	03/30/2026	OIL WASHER FLUID TIRE ROTATION 70-18	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	1259	03/30/2026	OIL WASHER FLUID TIRE ROTATION 70-18	0001-05-1000-000-44000	52.33
MIDTOWN TOWING & REPAIR...	1263	03/30/2026	OIL FILTER TIRE ROTATION 70-17	0001-05-1000-000-44000	32.99
MIDTOWN TOWING & REPAIR...	1263	03/30/2026	OIL FILTER TIRE ROTATION 70-17	0001-05-1000-000-44000	58.51
				Depart 05 - SHERIFF Total:	**8,641.43**
Depart: 06 - JAIL					
MIDTOWN TOWING & REPAIR...	001150	03/30/2026	REMOVE & REPLACE PRESSURE SENSOR 70-93	0001-06-1050-000-44000	327.88
MIDTOWN TOWING & REPAIR...	001150	03/30/2026	REMOVE & REPLACE PRESSURE SENSOR 70-93	0001-06-1050-000-44000	274.85
MIDTOWN TOWING & REPAIR...	001176	03/30/2026	OIL CHANGE & FILTER, ROTATE TIRES 2020 VOYAGER	0001-06-1050-000-44000	43.66
MIDTOWN TOWING & REPAIR...	001176	03/30/2026	OIL CHANGE & FILTER, ROTATE TIRES 2020 VOYAGER	0001-06-1050-000-44000	32.50
HY-VEE INC, ATTN: STORE CH...	580185007001	03/30/2026	KITCHEN (KOSHER DIET)	0001-06-1052-000-23000	37.69
CUMMINS SALES AND SERVICE	J9-260398121	03/30/2026	FULL SERVICE-QUICK FIT PART TO BE INSTALLED	0001-06-1050-000-42620	1,307.54
KEEFE SUPPLY COMPANY	2040551	03/30/2026	COMMISSARY ITEMS FOR SALE	0030-06-1053-000-23087	162.00
PINNACLE TECHNOLOGIES INC	26-052	03/30/2026	ARMBANDS W/ HARDWARE	0030-06-1053-000-63800	913.24
THOMS PROESTLER CO	8124501	03/30/2026	KITCHEN FOOD	0001-06-1052-000-23000	9,153.25
THOMS PROESTLER CO	8124501	03/30/2026	KITCHEN NONFOOD	0001-06-1052-000-63800	787.56
THOMS PROESTLER CO	8124502	03/30/2026	E & S FOR COMMISSARY	0001-06-1050-000-63800	1,197.66
NATIONAL TEST SYSTEMS	INV-87829	03/30/2026	DRUG SCREEN PANEL CUPS	0030-06-1053-000-63800	395.48
SECRETARY OF STATE, NOTARY..	RENEWAL 3/11/2026	03/30/2026	NOTARY RENEWAL (1)	0001-06-1050-000-48000	30.00
CHARM-TEX INC	0438190-IN	03/30/2026	BOXERS & SOCKS	0001-06-1050-000-29410	255.90
CHARM-TEX INC	0438190-IN	03/30/2026	PADS & TAMPONS	0001-06-1050-000-63800	346.70
GREENWOOD CLEANING SYST...	541256-000	03/30/2026	TOILET TISSUE	0001-06-1050-000-63800	1,021.50
CITY OF MUSCATINE	0028244	03/30/2026	FEB 2026 WASTE DISPOSAL	0001-06-1050-000-47500	21.00
KEEFE SUPPLY COMPANY	2042108	03/30/2026	COMMISSARY ITEMS FOR RESALE	0030-06-1053-000-23087	2,886.30
MCKESSON MEDICAL-SURGIC...	25206295	03/30/2026	OSTOMY POUCHES	0001-06-1050-000-42871	181.80
MCKESSON MEDICAL-SURGIC...	25206295	03/30/2026	OSTOMY RINGS	0001-06-1050-000-42871	168.60

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Vendor Name	Payable Number	Post Date	Description (Item)	Account Number	Amount
MCKESSON MEDICAL-SURGIC...	25206295	03/30/2026	IBUPROFEN	0001-06-1050-000-42871	87.80
MCKESSON MEDICAL-SURGIC...	25206295	03/30/2026	ACETAMINOPHEN	0001-06-1050-000-42871	79.29
MCKESSON MEDICAL-SURGIC...	25206295	03/30/2026	SWABSTICK	0001-06-1050-000-42871	8.49
GOOD SOURCE SOLUTIONS INC	SI0581578	03/30/2026	KITCHEN FOOD	0001-06-1052-000-23000	2,455.60
THOMS PROESTLER CO	8130119	03/30/2026	KITCHEN FOOD	0001-06-1052-000-23000	8,390.83
THOMS PROESTLER CO	8130119	03/30/2026	KITCHEN NONFOOD	0001-06-1052-000-63800	763.29
KEEFE SUPPLY COMPANY	2043618	03/30/2026	COMMISSARY ITEMS FOR RESALE	0030-06-1053-000-23087	44.64
KEEFE SUPPLY COMPANY	2043738	03/30/2026	COMMISSARY ITEMS FOR RESALE	0030-06-1053-000-23087	2,495.66
SMART VENDING SERVICES LLC	9672	03/30/2026	WINTERGREEN	0030-06-1053-000-23087	1,560.00
SMART VENDING SERVICES LLC	9672	03/30/2026	GLACIER MINT	0030-06-1053-000-23087	1,112.30
KEEFE SUPPLY COMPANY	2039594	03/30/2026	COMMISSARY ITEMS FOR RESALE	0030-06-1053-000-23087	3,249.16
ALLIANT ENERGY	5412121000 3/26	03/30/2026	JAIL 2/9-3/9/26	0001-06-1050-000-43000	1,759.62
				Depart 06 - JAIL Total:	**41,551.79**
Depart: 07 - RECORDER					
HEARST, SARAH	REIM 3/17/26	03/30/2026	REIM MEALS, MILEAGE & LODGING MARCH 2026 ISAC	0001-07-8110-000-41300	207.90
HEARST, SARAH	REIM 3/17/26	03/30/2026	REIM MEALS, MILEAGE & LODGING MARCH 2026 ISAC	0001-07-8110-000-42233	314.89
				Depart 07 - RECORDER Total:	**522.79**
Depart: 20 - ENGINEER					
MIDAMERICAN ENERGY COM...	577629939	03/30/2026	utilities	0020-20-7210-650-49500	65.00
SPRATT OIL SALES INC	142947	03/30/2026	diesel dist 6	0020-20-7210-632-25000	175.80
ALTORFER INC	PC110429046	03/30/2026	plate	0020-20-7210-621-44300	54.84
ALTORFER INC	PC110429047	03/30/2026	plates, clamps	0020-20-7210-621-44300	1,526.81
ALTORFER INC	PC110429048	03/30/2026	latches	0020-20-7210-621-44300	110.08
ALTORFER INC	PC110429068	03/30/2026	plate	0020-20-7210-621-44300	63.79
RDO Truck Centers, LLC	75333V	03/30/2026	cone, axle stud, block heater, cord	0020-20-7210-621-44300	396.84
ALTORFER INC	PC110429721	03/30/2026	adapter	0020-20-7210-621-44300	6.20
BLICK & BLICK OIL INC	179525	03/30/2026	gasohol, diesel	0020-20-7210-631-25000	9,342.66
BLICK & BLICK OIL INC	179525	03/30/2026	gasohol, diesel	0020-20-7210-632-25000	6,891.42
ALTORFER INC	PC110429802	03/30/2026	pipe	0020-20-7210-621-44300	9.48
LEWIS INDUSTRIAL SERVICE I...	66106-IN	03/30/2026	steel for v-picks	0020-20-7210-621-44300	97.76
GRAINGER	9838951771	03/30/2026	timers	0020-20-7210-621-44300	567.84
CITY OF MUSCATINE	28226	03/30/2026	transfer station charges	0020-20-7210-650-49500	58.00
FASTENAL CO	IAMUS224753	03/30/2026	zip ties	0020-20-7210-621-44300	78.72
AMAZON CAPITAL SERVICES	1YTQ-LF1G-MN6T	03/30/2026	filters, chains	0020-20-7140-490-44800	84.53
PHELPS THE UNIFORM SPECIA...	2264874	03/30/2026	restock towel rolls	0020-20-7210-650-49500	69.01
MIDAMERICAN ENERGY COM...	578252126	03/30/2026	utilities	0020-20-7210-650-49500	71.00
ALLIANT ENERGY	0221851000 3/17/26	03/30/2026	utilities	0020-20-7210-650-49500	198.01
AMAZON CAPITAL SERVICES	1WMJ-76FY-9TJC	03/30/2026	spark plugs, springs	0020-20-7140-490-44800	20.76
LEWIS INDUSTRIAL SERVICE I...	66142-IN	03/30/2026	steel for v-picks	0020-20-7210-621-44300	32.65
MUSCATINE LAWN & POWER	200780	03/30/2026	sharpen chains	0020-20-7140-490-44800	110.00
MIDTOWN TOWING & REPAIR...	26-02020	03/30/2026	pull unit 19 out of ditch	0020-20-7210-623-44300	750.00
MIDTOWN TOWING & REPAIR...	26-02021	03/30/2026	winch unit 36 out of ditch	0020-20-7210-623-44300	650.00
MIDWEST WHEEL CO	4564288-00	03/30/2026	LED lights	0020-20-7210-621-44300	159.27
FRED'S FEED & SUPPLY	2603-187160	03/30/2026	fill valve	0020-20-7210-650-49500	9.99
MIDWEST WHEEL CO	4564288-01	03/30/2026	LED lights	0020-20-7210-621-44300	53.09
SPRATT OIL SALES INC	142953	03/30/2026	diesel dist 2	0020-20-7210-632-25000	732.50
AMAZON CAPITAL SERVICES	1M7D-GXGV-RRM3	03/30/2026	11x17 paper	0020-20-7000-120-63600	112.70
IOWA BRIDGE & CULVERT, LC	BROS71 voucher 9	03/30/2026	BROS-C070(71)--8J-70 voucher 9 final	0020-20-0201-320-62000	15,365.18
IOWA BRIDGE & CULVERT, LC	BROS71 voucher 9	03/30/2026	BROS-C070(71)--8J-70 voucher 9 final	0020-20-0201-351-62400	90.00
IOWA BRIDGE & CULVERT, LC	BROS71 voucher 9	03/30/2026	BROS-C070(71)--8J-70 voucher 9 final	0020-20-0201-352-62400	1,302.54
IOWA BRIDGE & CULVERT, LC	BROS71 voucher 9	03/30/2026	BROS-C070(71)--8J-70 voucher 9 final	0020-20-0201-361-62100	779.58

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IOWA BRIDGE & CULVERT, LC	BROS71 voucher 9	03/30/2026	BROS-C070(71)--8J-70 voucher 9 final	0020-20-0201-382-62600	142.49
IOWA BRIDGE & CULVERT, LC	BROS71 voucher 9	03/30/2026	BROS-C070(71)--8J-70 voucher 9 final	0020-20-0201-384-62600	1,600.43
IOWA BRIDGE & CULVERT, LC	BROS71 voucher 9	03/30/2026	BROS-C070(71)--8J-70 voucher 9 final	0020-20-0201-390-62300	586.50
Metro Pavers, Inc	FR6 voucher 12	03/30/2026	LFM-(FR-6)--7X-70 voucher 12	0020-20-0201-351-62400	3,600.00
Metro Pavers, Inc	FR6 voucher 12	03/30/2026	LFM-(FR-6)--7X-70 voucher 12	0020-20-0201-352-62400	5,476.65
Metro Pavers, Inc	FR6 voucher 12	03/30/2026	LFM-(FR-6)--7X-70 voucher 12	0020-20-0201-367-62100	72,160.60
Metro Pavers, Inc	FR6 voucher 12	03/30/2026	LFM-(FR-6)--7X-70 voucher 12	0020-20-0201-384-62600	18,140.59
Metro Pavers, Inc	FR6 voucher 12	03/30/2026	LFM-(FR-6)--7X-70 voucher 12	0020-20-0201-390-62300	25,137.50
EASTERN IOWA LIGHT & POW...	21135201 3/3/26	03/30/2026	utilities, light	0020-20-7130-595-44810	10.96
EASTERN IOWA LIGHT & POW...	21135201 3/3/26	03/30/2026	utilities, light	0020-20-7210-650-49500	125.01
ALLIANT ENERGY	5650451000 3/3/26	03/30/2026	utilities	0020-20-7210-650-49500	367.75
ALTORFER INC	PC110429217	03/30/2026	plate	0020-20-7210-621-44300	869.40
ARNOLD MOTOR SUPPLY LLP	39NV377878	03/30/2026	filter	0020-20-7210-637-25400	26.90
ARNOLD MOTOR SUPPLY LLP	39NV377940	03/30/2026	filters	0020-20-7210-637-25400	53.80
A-1 QUALITY TIRE	I052476	03/30/2026	service call, tire switch	0020-20-7210-623-44300	239.50
A-1 QUALITY TIRE	I052477	03/30/2026	tire repair	0020-20-7210-623-44300	45.95
ALTORFER INC	PC110429533	03/30/2026	blades	0020-20-7210-621-44300	1,313.04
MENARDS	29477	03/30/2026	rust remover, wax ring, toilet valve, brush	0020-20-7210-650-49500	36.34
VISA	3026 3/9/26	03/30/2026	notary renewal	0020-20-7000-120-63600	30.00
ARNOLD MOTOR SUPPLY LLP	39NV378064	03/30/2026	air hose fittings	0020-20-7220-655-29000	29.88
ARNOLD MOTOR SUPPLY LLP	39NV378100	03/30/2026	air hose fittings	0020-20-7220-655-29000	20.92
ALTORFER INC	WO100260247	03/30/2026	PM1	0020-20-7210-621-44300	241.01
ALTORFER INC	WO100260247	03/30/2026	PM1	0020-20-7210-623-44300	1,047.41
ALTORFER INC	WO100260282	03/30/2026	PM2	0020-20-7210-621-44300	243.67
ALTORFER INC	WO100260282	03/30/2026	PM2	0020-20-7210-623-44300	1,751.21
				Depart 20 - ENGINEER Total:	**173,333.56**
Depart: 22 - CONSERVATION BOARD					
MENARDS	29620	03/30/2026	GREEN TREATED WOOD	0001-22-6110-000-21000	97.07
MENARDS	29620	03/30/2026	VINEGAR, ACETONE, GARB BAGS, GLOVES, BRUSH	0001-22-6110-000-23200	96.24
PANKEY'S CARBON CLIFF BAIT...	70152	03/30/2026	DEW WORMS	0001-22-6120-000-20000	28.00
CITY OF MUSCATINE	0028193	03/30/2026	TIRE DISPOSAL	0001-22-6110-000-47500	12.00
KELLOR & KELLOR LANDSCAPE ..	252850	03/30/2026	MINNOWS	0001-22-6120-000-20000	14.00
MENARDS	29736.	03/30/2026	VINYL TAPE, ELECTRICAL TAPE, CHARGER	0001-22-6110-000-29000	20.96
MENARDS	29892	03/30/2026	STEEL CART, MAGNETIC TOOLS, KEY TAGS, CHARGER	0001-22-6110-000-29000	171.20
CITY OF MUSCATINE	0028259	03/30/2026	FEB WATER SAMPLES-SB LODGE & CAMPGROUND	0001-22-6110-000-43200	19.00
MENARDS	29919	03/30/2026	RETURNED STEEL CART	0001-22-6110-000-29000	-99.99
MENARDS	29922	03/30/2026	BLACK COATED FENCE MATERIALS, CONCRETE MIX	0027-22-6110-000-63800	699.39
MENARDS	29941	03/30/2026	HIDE A KEY, 5 TIER SHELVING UNIT	0001-22-6110-000-29000	147.98
MENARDS	29950	03/30/2026	SUNFLOWER SEED	0001-22-6120-000-20000	53.98
MENARDS	29342	03/30/2026	DRIVE BITS, SCREWS, GREEN TREATED WOOD	0001-22-6110-000-21000	153.89
JOHN DEERE FINANCIAL	3132305	03/30/2026	PICKUP BODY PART	0001-22-6110-000-44600	5.99
ESI	7820	03/30/2026	PORTABLE TOILET RENTALS FEB 2026 DLP & DISC PARK	0001-22-6110-000-47500	285.00
REPUBLIC SERVICES, LLC	0400-002492200	03/30/2026	WASTE DISPOSAL APR 2026 SAULSBURY	0001-22-6110-000-47500	241.73
REPUBLIC SERVICES, LLC	0400-002492200	03/30/2026	WASTE DISPOSAL APR 2026 DLP	0001-22-6110-000-47500	216.50
REPUBLIC SERVICES, LLC	0400-002492200	03/30/2026	WASTE DISPOSAL APR 2026 DISC PARK	0001-22-6110-000-47500	216.50
				Depart 22 - CONSERVATION BOARD Total:	**2,379.44**

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Depart: 24 - DHS					
PITNEY BOWES INC	1029138898	03/30/2026	POSTAGE METER SUPPLIES	0001-24-3100-000-41200	91.29
AMAZON CAPITAL SERVICES	16LW-HRRN-9VKV	03/30/2026	SHARPIES, PENS, BADGE HOLDERS	0001-24-3100-000-26000	41.16
MUSCATINE POWER & WATER	168651 3/26	03/30/2026	SERVICE 2/20-3/19/26	0001-24-3100-000-26200	112.97
PITNEY BOWES INC	1029061224	03/30/2026	POSTAGE METER SUPPLIES	0001-24-3100-000-41200	91.29
THE SHREDDER	328547	03/30/2026	SHREDDING SERVICE	0001-24-3100-000-26000	48.00
				Depart 24 - DHS Total:	**384.71**
Depart: 25 - GENERAL ASSISTANCE					
HY-VEE DRUGSTORE #7060	30573 2/9/26	03/30/2026	GA PRESCRIPTION ASSISTANCE	0001-25-3110-000-30600	72.89
SNYDER AND HOLLENBAUGH ...	725906	03/30/2026	CREMATION ASSISTANCE	0001-25-3110-000-39000	1,500.00
RALPH J WITTICH-RILEY-FREER...	725950	03/30/2026	CREMATION ASSISTANCE	0001-25-3110-000-39000	1,365.00
TYLER TECHNOLOGIES INC	PRI101-00002698	03/30/2026	VETRA SPEC COUNTY SOLUTION RENEWAL 5/31/26-5/30/27	0001-25-3200-000-26800	475.94
LINDLE, RICHARD	0326	03/30/2026	VA COMMISSION & MILEAGE	0001-25-3200-000-12100	25.00
JOHNSON, LISA LEOTA	0326	03/30/2026	VA COMMISSION	0001-25-3200-000-12100	25.00
ROYAL-GOODWIN, JODI	0326	03/30/2026	VA COMMISSION	0001-25-3200-000-12100	25.00
ORMSBY, KEITH	0326	03/30/2026	VA COMMISSION & MILEAGE	0001-25-3200-000-12100	25.00
LINDLE, RICHARD	0326	03/30/2026	VA COMMISSION & MILEAGE	0001-25-3200-000-41300	5.29
ORMSBY, KEITH	0326	03/30/2026	VA COMMISSION & MILEAGE	0001-25-3200-000-41300	23.31
VERIZON	6138885166	03/30/2026	GA MONTHLY SERVICE 2/19-3/18/26	0001-25-3100-000-41400	78.49
ERIC SANDERS	0326	03/30/2026	REIM MILEAGE TO WILTON LEGION 2/3/26 & 3/3/26	0001-25-3200-000-41300	32.52
VFW	DUES 2026	03/30/2026	FY27 MEMBERSHIP	0001-25-3200-000-48000	45.00
				Depart 25 - GENERAL ASSISTANCE Total:	**3,698.44**
Depart: 28 - MEDICAL EXAMINER					
IACME	DUES 2026	03/30/2026	2026 IACME MEMBERSHIP DUES (9)	0001-28-1110-000-42232	900.00
				Depart 28 - MEDICAL EXAMINER Total:	**900.00**
Depart: 30 - COURT SERVICES					
MUSCATINE LEGAL SERVICES	1045	03/30/2026	GUARDIANSHIP JGJV007077	0001-30-1620-000-42500	709.40
				Depart 30 - COURT SERVICES Total:	**709.40**
Depart: 31 - BOARD OF HEALTH					
TRINITY MUSCATINE	5884CO70 2/26	03/30/2026	LOCAL PH SERVICES GRANT FEB 2026	0001-31-3000-000-32000	10,618.47
TRINITY MUSCATINE	PHTHOCC26620 2/26	03/30/2026	CARE FOR YOURSELF GRANT FEB 2026	0001-31-3000-000-30749	3,162.18
TRINITY MUSCATINE	PHTHOIP26070 2/2026	03/30/2026	IMMUNIZATIONS/TB GRANT FEB 2026	0001-31-3000-000-30750	392.48
				Depart 31 - BOARD OF HEALTH Total:	**14,173.13**
Depart: 51 - GENERAL SERVICES					
CROSSROADS INC	2603-SH18	03/30/2026	SHREDDING SERVICE	0001-51-9100-000-47510	45.32
SCHUMACHER ELEVATOR CO	90675558	03/30/2026	ADMIN ELEVATOR MAINT CONTRACT APR-JUN 2026	0001-51-9100-788-61400	421.68
MENARDS	29546	03/30/2026	WASHERS, PVC, TAPE DISPENSER, WHITE BOARD, CLAMP	0001-51-9100-000-29000	28.17
MENARDS	29546	03/30/2026	WASHERS, PVC, TAPE DISPENSER, WHITE BOARD, CLAMP	0001-51-9100-755-44100	38.70
MENARDS	29546	03/30/2026	WASHERS, PVC, TAPE DISPENSER, WHITE BOARD, CLAMP	0001-51-9100-787-44100	16.99
MENARDS	29593	03/30/2026	RETUREND WHITE BOARD	0001-51-9100-000-29000	-18.58
MENARDS	29598	03/30/2026	METAL SEALS, HOLE SAW & LED LIGHTS	0001-51-9100-000-26005	15.97
MENARDS	29598	03/30/2026	METAL SEALS, HOLE SAW & LED LIGHTS	0001-51-9100-000-29000	17.49

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MENARDS	29598	03/30/2026	METAL SEALS, HOLE SAW & LED LIGHTS	0001-51-9100-787-44100	34.99
MARK'S PLUMBING PARTS	INV002269183	03/30/2026	JAIL PLUMBING - SHOWER HEADS	0001-51-9100-755-44100	624.12
CITY OF MUSCATINE	0028201	03/30/2026	CH IT REMOVAL	0001-51-9100-787-44100	7.00
MENARDS	29702	03/30/2026	AIR FILTER	0001-51-9100-787-44100	13.28
CENTURYLINK QC	333772290 3/26	03/30/2026	CS/DHS ELEVATOR 3/13-4/21/26	0001-51-9100-751-41400	36.06
CENTURYLINK QC	333772290 3/26	03/30/2026	CS/DHS ELEVATOR 3/13-4/21/26	0001-51-9100-754-41400	37.53
GRAINGER	9840984943	03/30/2026	REFRIGERANT CAP LOCK MULTI-KEY	0001-51-9100-000-29000	54.59
VAN METER INC	S014324045.001	03/30/2026	SNAKE REPAIR KIT	0001-51-9100-000-29000	91.46
MENARDS	29867	03/30/2026	ELECTRICAL BOXES & ALUMINUM RIVETS	0001-51-9100-755-44100	15.15
PLUMB SUPPLY CO	S101508426.002	03/30/2026	BEVELED WASHERS	0001-51-9100-000-26005	61.60
MUSCATINE POWER & WATER	105922 3/26	03/30/2026	CH UTILITIES 2/1-3/1/26	0001-51-9100-787-43000	2,484.06
MUSCATINE POWER & WATER	112443 3/26	03/30/2026	CS UTILITIES 2/1-3/1/26	0001-51-9100-751-43000	883.65
MUSCATINE POWER & WATER	112443 3/26	03/30/2026	CS UTILITIES 2/1-3/1/26	0001-51-9100-754-43000	919.71
MUSCATINE POWER & WATER	118558 3/26	03/30/2026	ADMIN UTILITIES 2/1/-3/1/26	0001-51-9100-788-43000	2,845.68
CENTURYLINK QC	334019934 3/26	03/30/2026	ADMIN ELEVATOR 3/7-4/6/26	0001-51-9100-788-41400	81.53
PLUMB SUPPLY CO	S101525456.001	03/30/2026	TOILET PLUMBING REPAIR KIT	0001-51-9100-788-44100	15.53
				Depart 51 - GENERAL SERVICES Total:	**8,771.68**
Depart: 52 - INFORMATION SERVICES					
LUCAS COMMUNICATIONS INC	F23560	03/30/2026	PROVIDE & INSTALL FIBER PATCH CABLE-JL & MUSCOM	0001-52-9110-000-44600	285.00
LUCAS COMMUNICATIONS INC	F23560	03/30/2026	PROVIDE & INSTALL FIBER PATCH CABLE-JL & MUSCOM	0001-52-9110-000-44600	175.00
Level 3 Communications	776243470	03/30/2026	BACKUP FIBER & INTERNET CONNECTION	0001-52-9110-000-41458	720.70
XENTEGRA ONE, LLC	INV-007896	03/30/2026	PARALLELS RAS PROFESSIONAL SERVICES	0001-52-9110-000-42100	65.00
ADVANCED BUSINESS SYSTEM...	INV467347	03/30/2026	ADMIN COPIER	0001-52-9110-000-42162	39.00
ADVANCED BUSINESS SYSTEM...	INV467348	03/30/2026	ENGINEERING COPIER MAINTENANCE	0001-52-9110-000-42162	43.14
ADVANCED BUSINESS SYSTEM...	INV467349	03/30/2026	ZONING COPIER MAINTENANCE	0001-52-9110-000-42162	20.50
ADVANCED BUSINESS SYSTEM...	INV467350	03/30/2026	CA COPIER	0001-52-9110-000-42162	78.50
ADVANCED BUSINESS SYSTEM...	INV467351	03/30/2026	MANAGED PRINT & USAGE	0001-52-9110-000-42161	424.92
ADVANCED BUSINESS SYSTEM...	INV467352	03/30/2026	AUDITOR COPIER	0001-52-9110-000-42162	55.32
ADVANCED BUSINESS SYSTEM...	INV467353	03/30/2026	SO COPIER MAINTENANCE	0001-52-9110-000-42162	32.05
ADVANCED BUSINESS SYSTEM...	INV467354	03/30/2026	TREASURER COPIER MAINTENANCE	0001-52-9110-000-42162	39.00
ADVANCED BUSINESS SYSTEM...	INV467355	03/30/2026	CS COPIERS	0001-52-9110-000-42162	40.07
ADVANCED BUSINESS SYSTEM...	INV467356	03/30/2026	RECORDER COPIER MAINTENANCE	0001-52-9110-000-42162	9.48
ADVANCED BUSINESS SYSTEM...	INV467357	03/30/2026	CONSERVATION COPIER MAINTENANCE	0001-52-9110-000-42162	50.39
MUSCATINE POWER & WATER	172805 3/2026	03/30/2026	MAGIC MAN NETWORK & INTERNET 2/20-3/19/26	0001-52-9110-000-41458	425.00
XENTEGRA ONE, LLC	INV-007939	03/30/2026	PARALLELS RAS PROFESSIONAL SERVICES	0001-52-9110-000-42100	562.50
MUSCATINE POWER & WATER	109195 3/26	03/30/2026	JAIL MAN & BACKUP INTERNET 2/5-3/4/26	0001-52-9110-000-41451	541.67
MUSCATINE POWER & WATER	109195 3/26	03/30/2026	JAIL MAN & BACKUP INTERNET 2/5-3/4/26	0001-52-9110-000-41458	112.97
MUSCATINE POWER & WATER	117923 3/26	03/30/2026	DISC. CENTER MAN & BACKUP INTERNET 2/5-3/4/26	0001-52-9110-000-41451	541.67
MUSCATINE POWER & WATER	117923 3/26	03/30/2026	DISC. CENTER MAN & BACKUP INTERNET 2/5-3/4/26	0001-52-9110-000-41458	112.97
ICIT	RENEWAL 3/2026	03/30/2026	ICIT MEMBERSHIP RENEWAL (3)	0001-52-9110-000-48000	150.00
MASTERS TELECOM LLC	77265	03/30/2026	JL FIRE ALARM AUTO DIALER	0001-52-9110-000-41400	25.72

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SHI INTERNATIONAL CORP	B20905598	03/30/2026	FOXIT PDF EDITOR MAINTENANCE RENEWAL	0001-52-9110-000-42100	1,462.47
SOUTHERN COMPUTER WAR...	INV00863972	03/30/2026	REPLACEMENT LAPTOP BATTERIES (2)	0001-52-9110-000-44600	140.38
SOUTHERN COMPUTER WAR...	INV00863973	03/30/2026	150' PATCH CABLE - CH BASEMENT GIS	0001-52-9110-000-44600	55.09
SOUTHERN COMPUTER WAR...	INV00863974	03/30/2026	UPS REPLACEMENT BATTERY	0001-52-9110-000-44600	118.20
				Depart 52 - INFORMATION SERVICES Total:	**6,326.71**
Depart: 53 - PHYSICAL PLANNING-ZONING					
EXCEL AUTO GLASS INC	8132945	03/30/2026	WINDSHIELD CHIP REPAIR - 2022 GMC SIERRA	0011-53-6300-000-44000	79.95
				Depart 53 - PHYSICAL PLANNING-ZONING Total:	**79.95**
Depart: 70 - EMERGENCY MANAGEMENT					
COLUMN SOFTWARE PBC	4FE146EO-0024	03/30/2026	USER GROUP/MCJCC COMBINED MEETING 2/25/26	4000-70-1210-000-40000	172.27
				Depart 70 - EMERGENCY MANAGEMENT Total:	**172.27**
Depart: 71 - E-911					
MOBILE COMMUNICATIONS ...	1072003156.-1	03/30/2026	SRT RADIO PROGRAMMING/ENCRYPTION	4010-71-0515-000-44605	300.00
CENTURYLINK COMMUNICAT...	776656319	03/30/2026	MONTHLY SERVICES 3/16-4/15/26	4010-71-0515-000-41400	833.69
				Depart 71 - E-911 Total:	**1,133.69**
Depart: 75 - MEDICAL					
WAGEWORKS, INC	INV8760783	03/30/2026	FEB 2026 HC FSA ADMIN FEE	8500-75-0420-000-11300	251.25
WAGEWORKS, INC	INV8760783	03/30/2026	FEB 2026 DC FSA ADMIN FEE	8500-75-0420-000-11300	15.00
WAGEWORKS, INC	INV8760783	03/30/2026	DEC 2025 HC/DC FSA ADMIN FEE	8500-75-0420-000-11300	33.75
WAGEWORKS, INC	INV8858970	03/30/2026	DEC 2025 HC FSA ADMIN FEES	8500-75-0420-000-11300	33.75
WAGEWORKS, INC	INV8858970	03/30/2026	MAR 2026 DC FSA ADMIN FEES	8500-75-0420-000-11300	15.00
WAGEWORKS, INC	INV8858970	03/30/2026	MAR 2026 HC FSA ADMIN FEES	8500-75-0420-000-11300	251.25
				Depart 75 - MEDICAL Total:	**600.00**
Depart: 97 - MUSCOM					
IOWA DEPARTMENT OF PUBLI...	2951	03/30/2026	IA ONLINE WARRENTS & ARTICLES 1/26-3/26 MUSCOM	4050-97-1040-000-45500	3,012.00
IOWA DEPARTMENT OF PUBLI...	2952	03/30/2026	IA ONLINE WARRENTS & ARTICLES 1/26-3/26 APD	4050-97-1040-000-45500	300.00
IOWA DEPARTMENT OF PUBLI...	2953	03/30/2026	IA ONLINE WARRENTS & ARTICLES 1/26-3/26 CPD	4050-97-1040-000-45500	300.00
IOWA DEPARTMENT OF PUBLI...	2954	03/30/2026	IA ONLINE WARRENTS & ARTICLES 1/26-3/26 MCSO	4050-97-1040-000-45500	1,761.00
IOWA DEPARTMENT OF PUBLI...	2955	03/30/2026	IA ONLINE WARRENTS & ARTICLES 1/26-3/26 MPD	4050-97-1040-000-45500	1,488.00
IOWA DEPARTMENT OF PUBLI...	2956	03/30/2026	IA WARRENTS & ARTICLES 1/26-3/26 NPD	4050-97-1040-000-45500	300.00
IOWA DEPARTMENT OF PUBLI...	2957	03/30/2026	IA ONLINE WARRENTS & ARTICLES 1/26-3/26 WLPD	4050-97-1040-000-45500	300.00
IOWA DEPARTMENT OF PUBLI...	2958	03/30/2026	IA ONLINE WARRENTS & ARTICLES 1/26-3/26 WPD	4050-97-1040-000-45500	300.00
WINSOR CONSULTING GROUP...	26765	03/30/2026	SHIELDWARE UPDATE PROJECT	4050-97-1040-000-44600	1,152.00
ADVANCED BUSINESS SYSTEM...	INV467368	03/30/2026	COPIER CONTRACT	4050-97-1040-000-26000	13.04
PRIORITY DISPATCH CORP	SIN434111	03/30/2026	RECERTIFICATION (2)	4050-97-1040-000-42232	165.00
CCATT LLC	51148532	03/30/2026	CONESVILLE TOWER LEASE APR 2026	4050-97-1040-000-45510	2,497.60
				Depart 97 - MUSCOM Total:	**11,588.64**
Depart: 98 - DRAINAGE DISTRICTS					
REEVES BATTERY SALES	140044	03/30/2026	BATTERY, EYE TERMINAL, HEAT SHRINK	6000-98-6000-000-44200	65.00

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THE WAPELLO MORNING SUN	2/26/26	03/30/2026	1-9-26 MINUTES & CLAIMS APPROVED	6000-98-6000-000-44200	56.31
FARMERS ELEVATOR & EXCH…	00251310 2/28/26	03/30/2026	GALV NIPPLE, BALL VALVE, ELBOW	6000-98-6000-000-44200	40.08
LOUISA COMMUNICATIONS	3/10/26	03/30/2026	INTERNET MARCH 2026	6000-98-6000-000-44200	69.95
KELLY HEATING COOLING & P…	40654	03/30/2026	REPAIR THERMOSTAT WIFI	6000-98-6000-000-44200	385.10
KELLY HEATING COOLING & P…	40654	03/30/2026	THERMOSTAT WIFI	6000-98-6000-000-44200	180.00
				Depart 98 - DRAINAGE DISTRICTS Total:	**796.44**
Depart: 99 - NONDEPARTMENTAL					
UNITYPOINT HEALTH at WORK	710002028 2/4/26	03/30/2026	PRE EMPLOYMENT DRUG TEST	0001-99-9000-000-42800	62.00
MUSCATINE POWER & WATER	172805 3/2026	03/30/2026	MAGIC MAN NETWORK & INTERNET 2/20-3/19/26	0060-99-9110-000-42910	425.00
UNITYPOINT HEALTH at WORK	710000301 2/2026	03/30/2026	PRE EMPLOYMENT DRUG TESTS (2)	0001-99-9000-000-42800	124.00
UNITYPOINT HEALTH at WORK	710000301 2/2026	03/30/2026	PRE EMPLOYMENT PHYSICAL (1)	0001-99-9000-000-42800	292.00
UNITYPOINT HEALTH at WORK	710000301 2/2026	03/30/2026	PRE EMPLOYMENT RANDOM COLLECTIONS (5)	0001-99-9000-000-42800	165.00
				Depart 99 - NONDEPARTMENTAL Total:	**1,068.00**
				Grand Total:	**333,054.37**

Report Summary

Fund Summary

Fund	Expense Amount
0001 - GENERAL BASIC	78,690.59
0002 - GENERAL SUPPLEMENTAL	19,552.71
0011 - RURAL SERVICES BASIC	79.95
0020 - SECONDARY ROAD	173,333.56
0027 - CONSERVATION LAND AQUISITION	699.39
0029 - DTF ACCOUNT	2,026.36
0030 - JAIL COMMISSARY FUND	12,818.78
0034 - FIREARM PURCHASE FUND	625.00
0038 - FINE COLLECTIONS-ATTY SHARE	1,900.00
0060 - GIS	425.00
4000 - EMERGENCY MANAGEMENT	172.27
4010 - E-911 TRUST	1,133.69
4050 - MUSCOM	11,588.64
5093 - MONTHLY TAX ACH PLAN	5,178.00
5200 - ANNUITY PAY OUT	23,433.99
6000 - DRAINAGE DISTRICTS	796.44
8500 - GROUP INSURANCE TRUST	600.00
Grand Total:	**333,054.37**

Account Summary

Account Number	Account Name	Expense Amount
0001-01-9000-000-26000	OFFICE SUPPLIES	39.87
0001-01-9000-000-40000	PUBLICATIONS & NOTIC…	973.44
0001-02-9010-000-26000	OFFICE SUPPLIES	73.00
0001-02-9010-000-41300	MILEAGE	93.87
0001-02-9010-000-42233	MEALS & LODGING	200.89
0001-03-8100-000-41200	POSTAGE/MAILING	1,659.68
0001-03-8100-000-41300	MILEAGE	208.53
0001-03-8100-000-42100	MV RENEWAL NOTICES	394.39
0001-03-8100-000-42233	MEALS & LODGING	224.99
0001-04-1100-000-41300	MILEAGE	349.02
0001-04-1100-000-42232	TUITION/REGISTRATION	1,031.00
0001-04-1100-000-42233	MEALS & LODGING	95.45
0001-04-1100-000-42617	DEPOSITION/INTERPRET	719.40
0001-04-1100-000-42618	SERV OF PAPERS	43.08
0001-04-1100-000-47510	RECYCLING/SHREDDING	50.99
0001-05-1000-000-44000	VEHICLE MAINT/REPAIR	4,377.86
0001-05-1000-000-44100	BUILDING MAINT & REP…	380.00
0001-05-1003-000-63893	EQUIPMENT-GTSB	1,100.65
0001-05-1011-000-26000	SUPPLIES	131.56
0001-06-1050-000-29410	CLOTHING-INMATES	255.90
0001-06-1050-000-42620	MAINT AGMT-GENERAT…	1,307.54
0001-06-1050-000-42871	MEDICAL SUPPLIES	525.98
0001-06-1050-000-43000	UTILITIES	1,759.62
0001-06-1050-000-44000	VEHICLE MAINT/REPAIR	678.89
0001-06-1050-000-47500	WASTE DISPOSAL SERV	21.00
0001-06-1050-000-48000	DUES & MEMBERSHIPS	30.00
0001-06-1050-000-63800	EQUIPMENT	2,565.86
0001-06-1052-000-23000	FOOD & PROVISIONS	20,037.37
0001-06-1052-000-63800	EQUIPMENT/SUPPLIES	1,550.85
0001-07-8110-000-41300	MILEAGE	207.90
0001-07-8110-000-42233	MEALS & LODGING	314.89
0001-22-6110-000-21000	CONSTR/MAINT SUPPLIES	250.96
0001-22-6110-000-23200	CUSTODIAL SUPPLIES	96.24
0001-22-6110-000-29000	EQUIPMENT & HAND T…	240.15
0001-22-6110-000-43200	WELL SAMPLING/SERVICE	19.00
0001-22-6110-000-44600	EQUIP MAINT-REPAIR	5.99

Account Summary

Account Number	Account Name	Expense Amount
0001-22-6110-000-47500	WASTE DISPOSAL SERV	971.73
0001-22-6120-000-20000	FEED	95.98
0001-24-3100-000-26000	OFFICE SUPPLIES	89.16
0001-24-3100-000-26200	DATA PROCESSING EQUI…	112.97
0001-24-3100-000-41200	POSTAGE/MAILING	182.58
0001-25-3100-000-41400	TELEPHONE SERVICE	78.49
0001-25-3110-000-30600	PRESCRIPTIONS/MEDS	72.89
0001-25-3110-000-39000	FUNERAL SERVICES	2,865.00
0001-25-3200-000-12100	VA COMMISSIONERS	100.00
0001-25-3200-000-26800	SOFTWARE	475.94
0001-25-3200-000-41300	MILEAGE	61.12
0001-25-3200-000-48000	DUES & MEMBERSHIPS	45.00
0001-28-1110-000-42232	TUITION/REGISTRATION	900.00
0001-30-1620-000-42500	COURT/ATTY-JUVENILES	709.40
0001-31-3000-000-30749	CARE FOR YOURSELF GR…	3,162.18
0001-31-3000-000-30750	IMMUNIZATIONS/TB	392.48
0001-31-3000-000-32000	LOCAL PH SERVICES GR…	10,618.47
0001-51-9100-000-26005	MAINTENANCE SUPPLIES	77.57
0001-51-9100-000-29000	EQUIPMENT/TOOLS	173.13
0001-51-9100-000-47510	RECYCLING/SHREDDING	45.32
0001-51-9100-751-41400	ELEVATOR PHONE-DHS	36.06
0001-51-9100-751-43000	UTILITIES-DHS	883.65
0001-51-9100-754-41400	ELEVATOR PHONE-CS	37.53
0001-51-9100-754-43000	UTILITIES-CS	919.71
0001-51-9100-755-44100	BUILDING MAINT-JAIL	677.97
0001-51-9100-787-43000	UTILITIES-CTHSE	2,484.06
0001-51-9100-787-44100	BUILDING MAINT-CTHSE	72.26
0001-51-9100-788-41400	ELEVATOR PHONE-ADM…	81.53
0001-51-9100-788-43000	UTILITIES-ADMIN	2,845.68
0001-51-9100-788-44100	BUILDING MAINT-ADMIN	15.53
0001-51-9100-788-61400	ELEVATOR MAINT-ADMIN	421.68
0001-52-9110-000-41400	TELEPHONE SERVICE	25.72
0001-52-9110-000-41451	METRO AREA NETWORK	1,083.34
0001-52-9110-000-41458	INTERNET SERV	1,371.64
0001-52-9110-000-42100	SERVICE AGREEMENTS	2,089.97
0001-52-9110-000-42161	PRINTER MAINTENANCE	424.92
0001-52-9110-000-42162	COPIER MAINTENANCE	407.45
0001-52-9110-000-44600	EQUIP MAINT-REPAIR	773.67
0001-52-9110-000-48000	DUES & MEMBERSHIPS	150.00
0001-99-9000-000-42800	MEDICAL & HEALTH SER…	643.00
0002-02-8000-000-41200	POSTAGE/MAILING	1.90
0002-02-8000-000-44600	EQUIP MAINT-REPAIR	19,514.81
0002-02-8000-000-48200	ELECTION WORKERS	36.00
0011-53-6300-000-44000	VEHICLE MAINT/REPAIR	79.95
0020-20-0201-320-62000	BRIDGES	15,365.18
0020-20-0201-351-62400	CLEARING/GRUBBING	3,690.00
0020-20-0201-352-62400	EXCAVATION & ENTRAN…	6,779.19
0020-20-0201-361-62100	GRANULAR	779.58
0020-20-0201-367-62100	PCC	72,160.60
0020-20-0201-382-62600	EROSION CONTROL ROW	142.49
0020-20-0201-384-62600	EROSION CONTROL-STR…	19,741.02
0020-20-0201-390-62300	TRAFFIC CONTROLS	25,724.00
0020-20-7000-120-63600	OFFICE EQUIP/FURNITU…	142.70
0020-20-7130-595-44810	LIGHTING	10.96
0020-20-7140-490-44800	ROAD CLEARING	215.29
0020-20-7210-621-44300	PARTS	5,824.49
0020-20-7210-623-44300	OUTSIDE SERVICE	4,484.07
0020-20-7210-631-25000	GASOLINE	9,342.66

Account Summary

Account Number	Account Name	Expense Amount
0020-20-7210-632-25000	DIESEL	7,799.72
0020-20-7210-637-25400	FILTERS-OIL/AIR	80.70
0020-20-7210-650-49500	EQUIPMENT OPERATIO…	1,000.11
0020-20-7220-655-29000	EQUIPMENT & HAND T…	50.80
0027-22-6110-000-63800	NON CAPITAL EXPENSES	699.39
0029-05-1010-000-26700	DTF OPERATING ACCOU…	2,026.36
0030-06-1053-000-23087	ITEMS FOR RESALE	11,510.06
0030-06-1053-000-63800	EQUIPMENT	1,308.72
0034-05-1000-000-63782	HANDGUN PURCHASE A…	625.00
0038-04-1100-000-39900	FINE COLLECTION	1,900.00
0060-99-9110-000-42910	MUNICIPAL AREA NETW…	425.00
4000-70-1210-000-40000	PUBLICATIONS & NOTIC…	172.27
4010-71-0515-000-41400	911 TELEPHONE LINES	833.69
4010-71-0515-000-44605	RADIO MAINT/REPAIR	300.00
4050-97-1040-000-26000	OFFICE SUPPLIES	13.04
4050-97-1040-000-42232	TUITION/REGISTRATION	165.00
4050-97-1040-000-44600	EQUIP MAINT/REPAIR-P…	1,152.00
4050-97-1040-000-45500	NCIC SYSTEM	7,761.00
4050-97-1040-000-45510	TOWER LEASE-CROWN …	2,497.60
5093-00-9050-000-99900	CLEARING ACCT EXP	5,178.00
5200-00-9000-000-11700	ANNUITY	23,433.99
6000-98-6000-000-44200	DRAINAGE LINES & MAI…	796.44
8500-75-0420-000-11300	HEALTH INS	600.00
	Grand Total:	**333,054.37**

Project Account Summary

Project Account Key	Expense Amount
None	188,672.31
BROS71-320	15,365.18
BROS71-351	90.00
BROS71-352	1,302.54
BROS71-361	779.58
BROS71-382	142.49
BROS71-384	1,600.43
BROS71-390	586.50
FR6-351	3,600.00
FR6-352	5,476.65
FR6-367	72,160.60
FR6-384	18,140.59
FR6-390	25,137.50
Grand Total:	**333,054.37**

March 30, 2026
Agenda Packet
Item #4

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Muscatine County Satellite Facility

BUILDING CODE SUMMARY

APPLICABLE CODES AND ORDINANCES
2015 IBC: ALL APPLICABLE CHAPTERS
ANSI 117.1, 2009 EDITION: ALL APPLICABLE CHAPTERS

PROJECT SCOPE:
NEW SATELLITE FACILITY SHED (LOW HAZARD STORAGE)

BUILDING AND PROJECT DATA

BUILDING DESCRIPTION AND USE	1 STORY BLDG.	Vehicle garage, storage

	IBC 2015	REQUIRED/ALLOWED	PROVIDED
USE AND OCCUPANCY	CHAPTER 3		S-2
CONSTRUCTION TYPE	SECTION 602 AND TABLE 601		IIB
AUTOMATIC SPRINKLER SYSTEM	SECTION 903	NOT REQUIRED	NO
BUILDING HEIGHT	TABLE 504.3	55' MAX.	APPX. 25'-0"
BUILDING STORIES	TABLE 504.4	3	1
GROSS BUILDING AREA			4,391 SQ. FT.
LARGEST FLOOR AREA / STORY	TABLE 506.2	26,000 SQ. FT. (S-2 OCCUPANCY)	4,391 SQ. FT.
1ST FLOOR AREA			4,391 SQ. FT.

OCCUPANCY CALCS	AREA	REQUIRED	OCCUPANT LOAD
FACILITIES STORAGE	4,416 SQ. FT. (GROSS)	300 SQ. FT. / PERSON (GROSS)	15

FIRE RESISTANCE RATINGS	IBC 2015	REQUIRED	PROVIDED
PRIMARY STRUCTURAL FRAME	TABLE 601 AND SECTION 704	0 HOURS	0 HOURS
BEARING WALLS			
EXTERIOR	TABLE 601, 602 & SECTION 705	0 HOURS	0 HOURS MIN (IBC TABLE 721.1(2))
INTERIOR	TABLE 601	0 HOURS	0 HOURS
NONBEARING WALLS AND PARTITIONS			
EXTERIOR	TABLE 601, 602 & SECTION 705	0 HOURS	0 HOURS
INTERIOR	TABLE 601	0 HOURS	0 HOURS
FLOOR CONSTRUCTION	TABLE 601	0 HOURS	0 HOURS
ROOF CONSTRUCTION	TABLE 601	0 HOURS	0 HOURS
EXTERIOR WALL OPENINGS			
UNPROTECTED	TABLE 705.8.3	NOT REQUIRED	NOT REQUIRED
PROTECTED	TABLE 705.8.2	NOT REQUIRED	NOT REQUIRED

MEANS OF EGRESS	IBC 2015	REQUIRED	PROVIDED
MAXIMUM PATH OF COMMON EGRESS TRAVEL	SECTION 1006	100'	30'
MAXIMUM EXIT ACCESS TRAVEL DISTANCE	SECTION 1017 & TABLE 1017.2	200'	50' MAX FROM CENTER OF BAY
MINIMUM CORRIDOR WIDTH	SECTION 1020	44"	N/A
MAXIMUM DEAD END	SECTION 1020	20'	N/A
MINIMUM NUMBER OF EXITS	SECTION 1006 & TABLE 1006.3.2	2	3

PLUMBING CLACULATIONS	IBC 2015 SECTION 2902.1	
CLASSIFICATION/DESCRIPTION	BAR	
	REQUIRED	PROVIDED
WATER CLOSETS	1	1
LAVATORIES	1	1
DRINKING FOUNTAINS	IPC 2018 410.4 NOT REQUIRED	N/A
OTHER	1 SERVICE SINK	1 SERVICE SINK

I HEREBY CERTIFY THAT THE PORTION OF THIS TECHNICAL SUBMISSION DESCRIBED HEREIN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND RESPONSIBLE CHARGE. I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF IOWA.

DATE

LICENSE NUMBER

MY LICENSE RENEWAL DATE IS

PAGES OR SHEETS COVERED BY THIS SEAL:



5 PROJECT LOCATION MAP
SCALE: 1" =200'

0 200' 400'

ABBREVIATIONS

A.D.	AREA DRAIN	DN	DOWN	HORIZ.	HORIZONTAL	PL. LAM	PLASTIC LAMINATE	U.L.	UNDERWRITERS LABORATORIES
ABV.	ABOVE	DWG.	DRAWING	HT.	HEIGHT	QTY.	QUANTITY	VEST.	VESTIBULE
ADA	ACCESSIBLE / AMERICANS WITH DISABILITIES ACT	DEPT.	DEPARTMENT	INSUL.	INSULATION / INSULATING	R	RISER	V.C.T.	VINYL COMPOSITION TILE
ADJ.	ADJUSTABLE	DBL.	DOUBLE	I.D.	INSIDE DIAMETER	R.W.C.	RAIN WATER CONDUCTOR	W/	WITH
A.o.R.	AREA OF REFUGE	DIM.	DIMENSION	INCAND.	INCANDESCENT	REINF.	REINFORCING / REINFORCED	W.C.	WATER CLOSET
ALUM.	ALUMINUM	DR.	DOOR	JAN.	JANITOR	REQ.	REQUIRED	WD	WOOD
ALT.	ALTERNATE	EXIST.	EXISTING	JT.	JOINT	R.O.	ROUGH OPENING		
A.F.F.	ABOVE FINISHED FLOOR	EQ.	EQUAL	LBS.	POUNDS	REV.	REVISED / REVISION	&	AND
AC.	ACOUSTIC / ACOUSTICAL	E.C.	ELECTRICAL CONTRACTOR	LAV.	LAVATORY	REFL.	REFLECTED	@	AT
A.F.	ALUMINUM FACE	ELEV.	ELEVATION	LAM.	LAMINATE	REC.	RECESSED	±	PLUS OR MINUS
APPX.	APPROXIMATE / APPROXIMATELY	ELEC.	ELEVATOR	L.P.	LOW POINT	RAD.	RADIUS	°	DEGREE
BD.	BOARD	EXP.	ELECTRIC / ELECTRICAL EXPANSION	MAX.	MAXIMUM	S.S.	STAINLESS STEEL	∠	ANGLE
BLK.	BLOCK / BLOCKING	EXT.	EXTERIOR	MFR.	MANUFACTURER / MANUFACTURED	ST.	STREET	[	CHANNEL
BLDG.	BUILDING	EA.	EACH	MTL.	METAL	SIM.	SIMILAR	#	NUMBER
B.O.	BOTTOM OF	F.D.	FLOOR DRAIN	MIN.	MINIMUM	STL.	STEEL	□	SQUARE
B.O.S.	BOTTOM OF STEEL	F.E.	FIRE EXTINGUISHER	MIRR.	MIRRORED	SQ.	SQUARE	Ø	ROUND / DIAMETER
CAB.	CABINET	F.E.C.	FIRE EXTINGUISHER CABINET	MTD.	MOUNTED	SAN.	SANITARY	℄ / C.L.	CENTER LINE
C.C.	CENTER-TO-CENTER	FIN.	FINISH / FINISHED	M.O.	MASONRY OPENING	SUSP.	SUSPENDED	▯ / PL.	PLATE
CLG.	CEILING	FLR.	FLOOR	MISC.	MISCELLANEOUS	STD.	STANDARD	Π	U-BAR
CLOS.	CLOSET	F.O.	FACE OF	MECH.	MECHANICAL	SPEC.	SPECIFICATION	L	LEG-BAR
C.M.	CONSTRUCTION MANAGER	FT.	FEET / FOOT	N.I.C.	NOT IN CONTRACT	TEL.	TELEPHONE		
CMU	CONCRETE MASONRY UNIT	FLUOR.	FLUORESCENT	NO.	NUMBER	T.O.	TOP OF		
C.J.	CONTROL JOINT	GYP.	GYPSUM	N.T.S.	NOT TO SCALE	T.O.S.	TOP OF STEEL		
CONC.	CONCRETE	GALV.	GALVANIZED	O.C.	ON CENTER	T.O.W.	TOP OF WALL		
CORR.	CORRIDOR	GA.	GAUGE	O.D.	OUTSIDE DIAMETER	TOIL	TOILET		
COL.	COLUMN	G.C.	GENERAL CONTRACTOR	OPP.	OPPOSITE	TYP.	TYPICAL		
CONT.	CONTINUE / CONTINUOUS	HR.	HOUR	OPG.	OPENING	THK.	THICK		
CONTR.	CONTRACTOR	H.P.	HIGH POINT	P.C.	PLUMBING CONTRACTOR	TMP.	TEMPERED		
DIA.	DIAMETER	HVAC	HEAT, VENTILATION, AIR-CONDITIONING	P.F.	PANEL FACE	T.S.G.	TEMPERED SAFETY GLASS		
DTL.	DETAIL			PR.	PAIR	U.O.N.	UNLESS OTHERWISE NOTED		
				P.T.	PRESSURE TREATED				

VERIFY SCALE
BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING
0 1
IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

GRAPHIC SYMBOLS

WINDOW MARKER — W01

SKYLIGHT MARKER — S01

DOOR IDENTIFIERS

DOOR IDENTIFIER (ELEVATIONS/SECTIONS) — D01.1

6" TYPICAL, UNLESSOTHERWISE NOTED

DOOR IDENTIFIER (PLANS) — D01.1

SECTION / DETAIL MARKER
INDICATES SECTION LOCATION ON SHEET
INDICATES SHEET ON WHICH DRAWING IS SHOWN

INTERIOR ELEVATION MARKER
INDICATES ELEVATION LOCATION ON SHEET
INDICATES SHEET ON WHICH ELEVATION IS SHOWN

ELEVATION / SECTION MARKER
INDICATES ELEVATION LOCATION ON SHEET
INDICATES SHEET ON WHICH DRAWING IS SHOWN

DETAIL / ENLARGED PLAN MARKER
INDICATES DETAIL LOCATION ON SHEET
INDICATES SHEET ON WHICH DETAIL IS SHOWN

SPACE DESIGNATION
OFFICE
003
1/A-201
SPACE NAME
SPACE NUMBER
ENLARGED PLAN REFERENCE

WALL TYPE MARKER — 4C

KEYNOTE IDENTIFIER
1.01.01 — KEYNOTE: SEE KEYNOTE LEGEND ON DRAWING'S LAYOUT
1.01.01 — ALTERNATE KEYNOTE; SEE KEYNOTE LEGEND ON DRAWING'S LAYOUT

N

ID	Name
G-101	COVER SHEET
C-001	CIVIL NOTES & QUANTITIES
C-010	OVERVIEW MAP & CONTROL POINTS
C-101	SITE PLAN
C-102	ENLARGED SITE PLAN
C-201	PROFILES
C-501	WELL AND SEPTIC DETAILS
G-102	LIFE SAFETY PLAN
S-001	STRUCTURAL NOTES AND DETAILS
S-101	FOUNDATION PLAN
A-101	FIRST FLOOR PLAN
A-102	CEILING PLAN
A-103	ROOF PLAN
A-104	PARTITION SCHEDULE
A-201	ELEVATIONS
A-202	ELEVATIONS
A-301	BUILDING SECTIONS
A-302	WALL SECTIONS
A-401	ENLARGED RESTROOMS
A-402	DETAILS
A-501	DOOR DETAILS
H01	HVAC PLAN
H02	MECHANICAL DETAILS
H03	MECHANICAL NOTES AND SCHEDULES
P01	UNDERFLOOR PLUMBING PLAN
P02	PLUMBING PLAN
P03	PLUMBING DETAILS
P04	PLUMBING NOTES AND SCHEDULES
UE1	ELECTRCIAL SITE PLAN
E01	POWER PLAN
E02	LIGHTING PLAN
E03	ELECTRICAL DETAILS AND ONE-LINE
E04	ELECTRICAL SCHEDULES

horizon. original. architecture.

INDEPENDENCE AVENUE
MUSCATINE, IA 52761

Muscatine County Satellite Facility

MARK	DATE	DESCRIPTION

PROJECT NO: #Pln
DATE: 3/19/2026
DRAWN BY: LM
COPYRIGHT

SHEET TITLE
COVER SHEET

G-101

CONSTRUCTION DOCUMENTS - ISSUED FOR BIDDING

C:\Users\LenaMichalek\OneDrive - Horizon Architecture\Documents - Horizon Architecture\Projects\General Projects\G24-030 Muscatine County Satellite Facility\1 - Model and Design\Muscatine County Satelite Facility2.pln

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C:\Users\LenaMichalek\Horizon Architecture\Horizon Architecture - Documents\Projects\General Projects\G23-006 Muscatine Engineer and Zoning\1 - Model and Design\Engineering Campus.pln

LEGEND

- W — PROPOSED WATER MAIN
- W_x — EXISTING WATER MAIN
- G_x — NATURAL GAS
- FO — FIBER OPTIC
- ES_x — OVERHEAD ELECTRIC
- E_x — BURIED ELECTRIC
- PROPERTY LINE
- SS_x — SANITARY SEWER
- ST — STORM SEWER
- PERIMETER EROSION BARRIER
- WV — VALVE
- HYDRANT
- CURB STOP AND BOX
- REDUCER
- MANHOLE
- AREA LIGHT
- STREET LIGHT
- UTILITY POLE
- CONTROL POINTS
- PROPERTY CORNER
- TREE

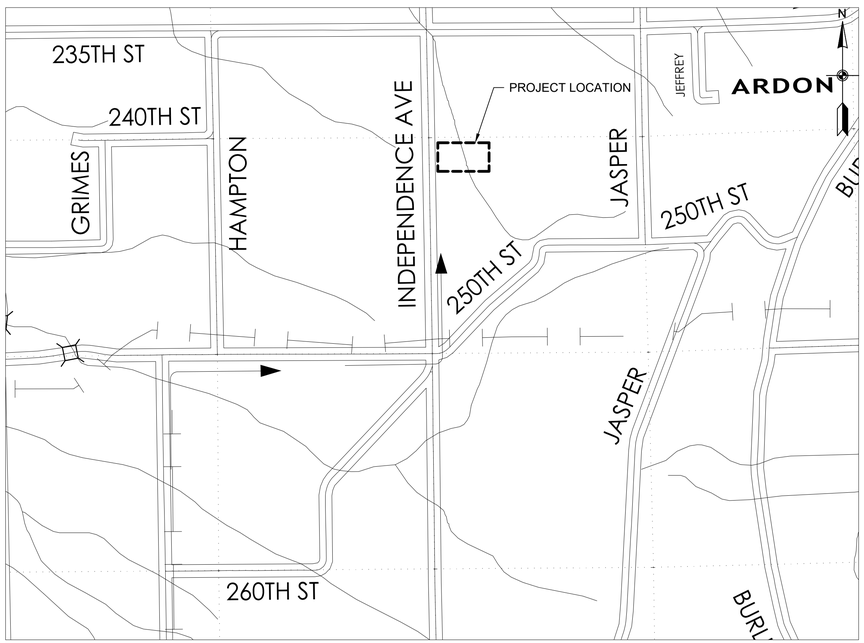
ABBREVIATIONS

APPROX	APPROXIMATE
AVE	AVENUE
DI	DUCTILE IRON
DR	DRIVE
EXST	EXISTING
INV	INVERT
LF	LINEAR FEET
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
N	NORTH
PH	PHASE
PROP	PROPOSED
S	SOUTH
SAN	SANITARY
ST	STREET
STA	STATION
TYP	TYPICAL

CIVIL NOTES

1. ALL BURIED UTILITY LOCATIONS ARE APPROXIMATE AND SHALL BE FIELD LOCATED PRIOR TO EXCAVATION. SEWER, NATURAL GAS, TELECOM, AND OTHER HOUSE SERVICE LINES ARE NOT SHOWN ON PLANS. THERE MAY BE OTHER EXISTING UTILITY LINES, STRUCTURES, AND SERVICE CONNECTIONS NOT KNOWN AND NOT SHOWN ON THE DRAWINGS. IN ADDITION, CONTRACTOR SHALL USE POTHOLING OR OTHER METHODS AT KNOWN UTILITY CROSSINGS FOR VISUAL CLEARANCE CHECK DURING DIRECTIONAL DRILLING OPERATIONS.
2. CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES, DRIVES, STREETS AND OTHER ITEMS TO REMAIN, INCLUDING ANY NOT SPECIFICALLY SHOWN IN THE DRAWINGS. DAMAGE TO EXISTING UTILITIES, DRIVES, STREETS AND OTHER ITEMS SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE.
3. CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY OF ANY CONFLICTS BETWEEN THE DRAWINGS AND EXISTING FEATURES.
4. CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY OF UNEXPECTED SUB-SURFACE CONDITIONS. DISCONTINUE WORK IN AREA UNTIL NOTIFIED BY OWNER TO RESUME WORK.
5. CONTRACTOR IS RESPONSIBLE FOR PROVIDING CONSTRUCTION LAYOUT FOR ALL GRADES AND FEATURES.
6. SPECIFICATIONS: SUDAS 2025.

LOCATION MAP



CIVIL QUANTITIES

FOR USE AS REFERENCE ONLY. THESE QUANTITIES ARE ESTIMATES ONLY. PROJECT TO BE BID AS LUMP SUM. ITEMS REQUIRED BY SPECIFICATIONS OR DRAWINGS BUT NOT LISTED ARE CONSIDERED INCIDENTAL TO ITEMS LISTED. CONTRACTOR TO VERIFY QUANTITIES.

BID ITEM	SUDAS ITEM CODE	DESCRIPTION	UNIT	PLAN QUANTITY
1	2010-D1	TOPSOIL, ONSITE - STRIP 12" TOPSOIL, STOCKPILE ON-SITE, BACKFILL	CY	835
2	2010-E	EXCAVATION CLASS 10 (OVER EXCAVATION AND ENGINEERED FILL)	CY	800
3	2010-J	SUBBASE, GRANULAR, 6" (BENEATH CONCRETE APPROACHES)	SY	500
4	2010-G	SUBGRADE PREPARATION (BENEATH DRIVEWAY AND APPROACHES)	SY	1285
5	2010-H	GRANULAR STABILIZATION (DRIVEWAY FILL BENEATH GRANULAR SURFACING)	TONS	430
6	2010-M	COMPACTION TESTING	LS	1
7	7030-E	SIDEWALK, PCC, 4"	SY	15
8	7030-H1	DRIVEWAY, PAVED, PCC, 8"	SY	485
9	7030-H2	GRANULAR SURFACING, 12" (DRIVEWAY)	SY	785
10	9010-B	SEEDING, PRAIRIE MIX	LS	1
11	9040-N	SILT FENCE, INCLUDES INSTALLATION AND REMOVAL	LF	1500
12	9040-N	SILT FENCE DITCH CHECK	LF	25
13	11010-A	CONSTRUCTION SURVEY	LS	1
14	11050-A	CONCRETE WASHOUT	LS	1
15		CONCRETE BOLLARDS	EA	8
16		WATER WELL AND PUMP	LS	1
17		SEPTIC AND PUMP TANK SAND FILTER, SEWER PIPE	LS	1
18		DIESEL TANK PAD	LS	1

IOWA ONE CALL UTILITY CONTACTS

MIDAMER-FIBER
Company name : MIDAMER-FIBER
Design contact: Telecom On Call
Phone: 5152812313
Email: telecomoncall@midamerican.com

WINDSTREAM COMMUNICATIONS
Company name : WINDSTREAM COMMUNICATIONS Design contact: LOCATE DESK
Phone: 8002891901
Email: LOCATE.DESK@WINDSTREAM.COM

811 Know what's below. Call before you dig.

LICENSED PROFESSIONAL ENGINEER — BRADLEY W. ROETH 16536 — IOWA

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

3/12/26

Signature — Date
Bradley W. Roeth — My license renewal date is
License Number 16536 — December 31, 2026

Sheets covered by this seal: C-001, C-010, C-101, C-102, C-201 and C-501

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CIVIL NOTES AND QUANTITIES

C-001

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CONTROL POINTS				
POINT	N (FT)	E (FT)	ELEV. (FT)	DESCRIPTION
CP01	513,140.38	2,267,475.43	747.16	MAG NAIL
CP02	513,139.81	2,267,531.12	747.32	MAG NAIL



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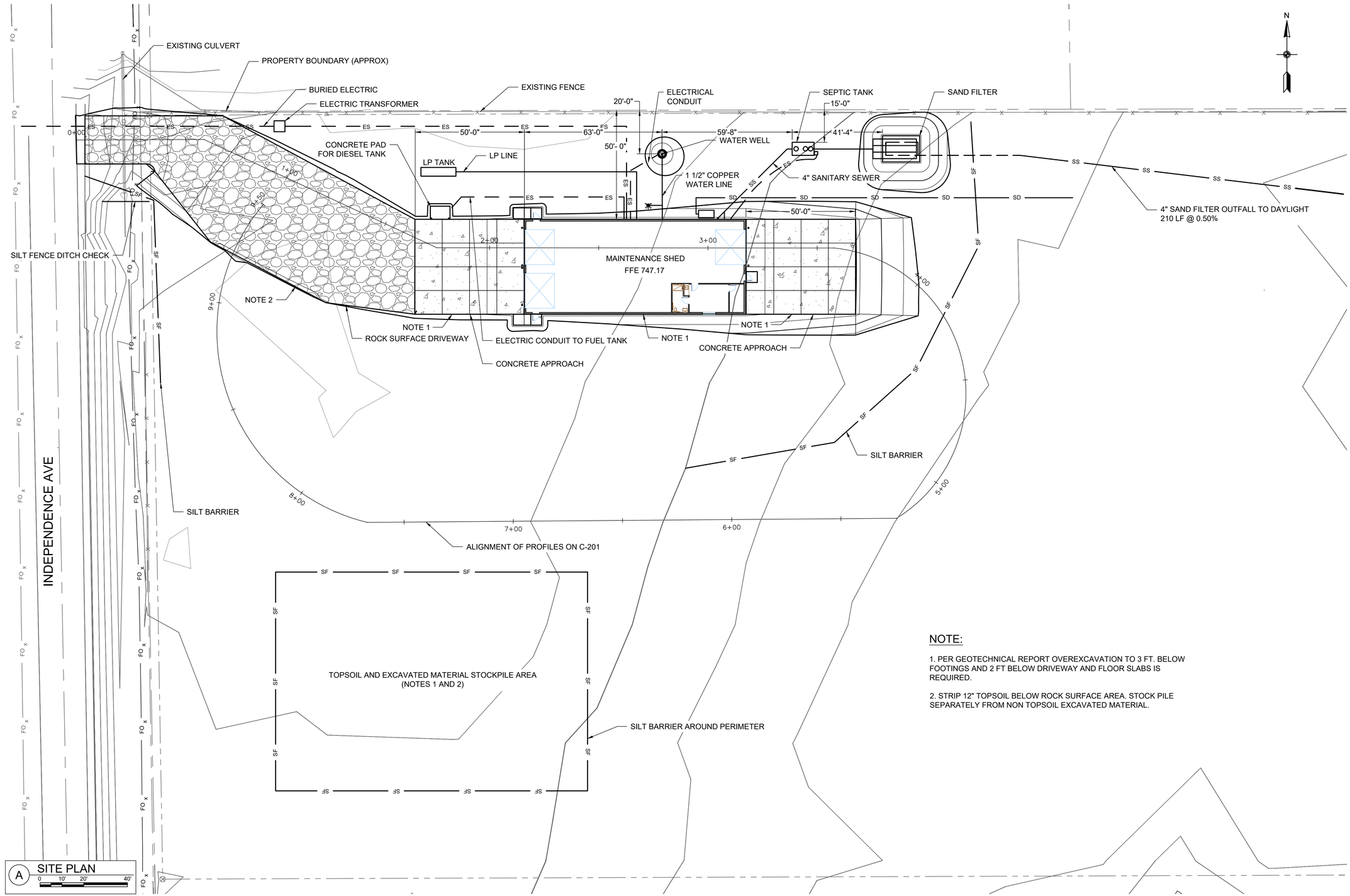
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OVERVIEW MAP AND CONTROL POINTS

C-010

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A SITE PLAN
0 10' 20' 40'

NOTE:

1. PER GEOTECHNICAL REPORT OVEREXCAVATION TO 3 FT. BELOW FOOTINGS AND 2 FT BELOW DRIVEWAY AND FLOOR SLABS IS REQUIRED.

2. STRIP 12" TOPSOIL BELOW ROCK SURFACE AREA. STOCK PILE SEPARATELY FROM NON TOPSOIL EXCAVATED MATERIAL.

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SITE PLAN

C-101

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N

PROPERTY BOUNDARY (APPROX)
BURIED ELECTRIC
EXISTING FENCE
ELECTRIC TRANSFORMER
ELECTRICAL CONDUIT
BERM AT WELL HEAD
WATER WELL
SEPTIC AND PUMP TANK
INV EL 742.50
4" SANITARY SEWER @1.00%
DISTRIBUTION BOX INV EL 745.65
BERM AT SAND FILTER
SAND FILTER
INV EL 742.55
4" SAND FILTER OUTFALL TO DAYLIGHT
8" PCC CONCRETE PAD FOR DIESEL TANK
LP TANK
LP LINE
ELECTRIC CONDUIT TO FUEL TANK
1 1/2" COPPER WATER LINE
1 1/2" x 3/4" TEE
4" PVC STORM TO DAYLIGHT
INV EL 742.95
TOE OF 4:1 FILL (TYP)
EL 746.67
EL 747.17
EL 746.17
YARD HYDRANT
3/4" HYDRANT LINE
SAND/OIL INTERCEPTOR LOCATION, REFER TO PLUMBING DRAWINGS
SEWER CLEANOUT
10:1 SLOPE AT END OF CONCRETE APPROACH
MAINTENANCE SHED FFE 747.17
CONCRETE BOLLARD (TYP FOR 8)
43'-6"
SUDAS L-2 JOINT (TYP)
SUDAS CD JOINT (TYP)
CONCRETE APPROACH
CONCRETE STOOP (REFER TO STRUCTURAL PLANS)
4" PCC SIDEWALK
8" PCC CONCRETE APPROACH
50'-0"
63'-0"
59'-8"
20'-0"
15'-0"
41'-4"
50'- 0"
13'-0"
9'-0"
5'-0"
6'-0"
12'-6" (TYP)
10'-10" (TYP)
1+00
2+00
3+00
4+00
746
745
744
SF

A SITE PLAN
0 10' 20'

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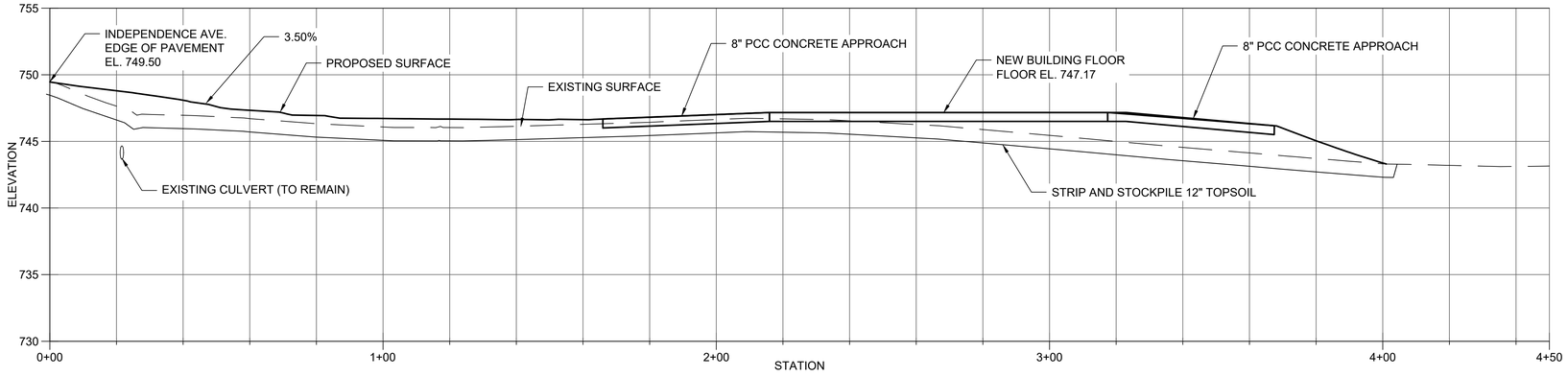
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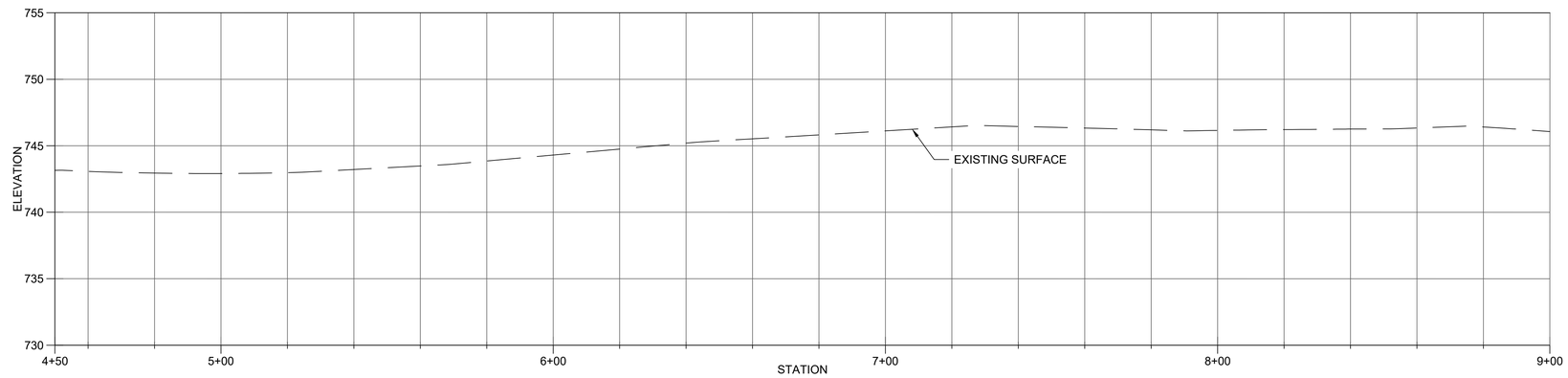
ENLARGED SITE PLAN

C-102

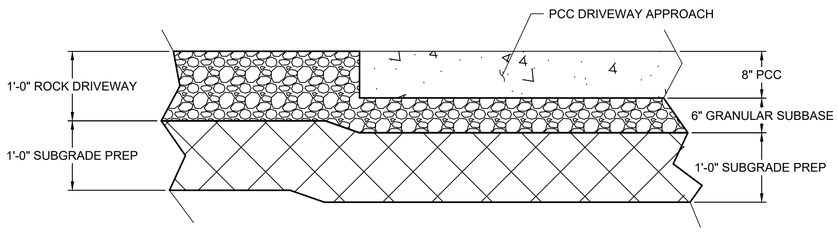
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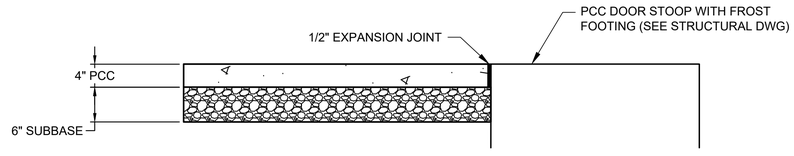
A DRIVEWAY PROFILE 0+00 TO 4+50



B DRIVEWAY PROFILE 4+50 TO 9+00



C DRIVEWAY APPROACH- SECTION
0 1' 2'



D SIDEWALK- SECTION
0 1' 2'

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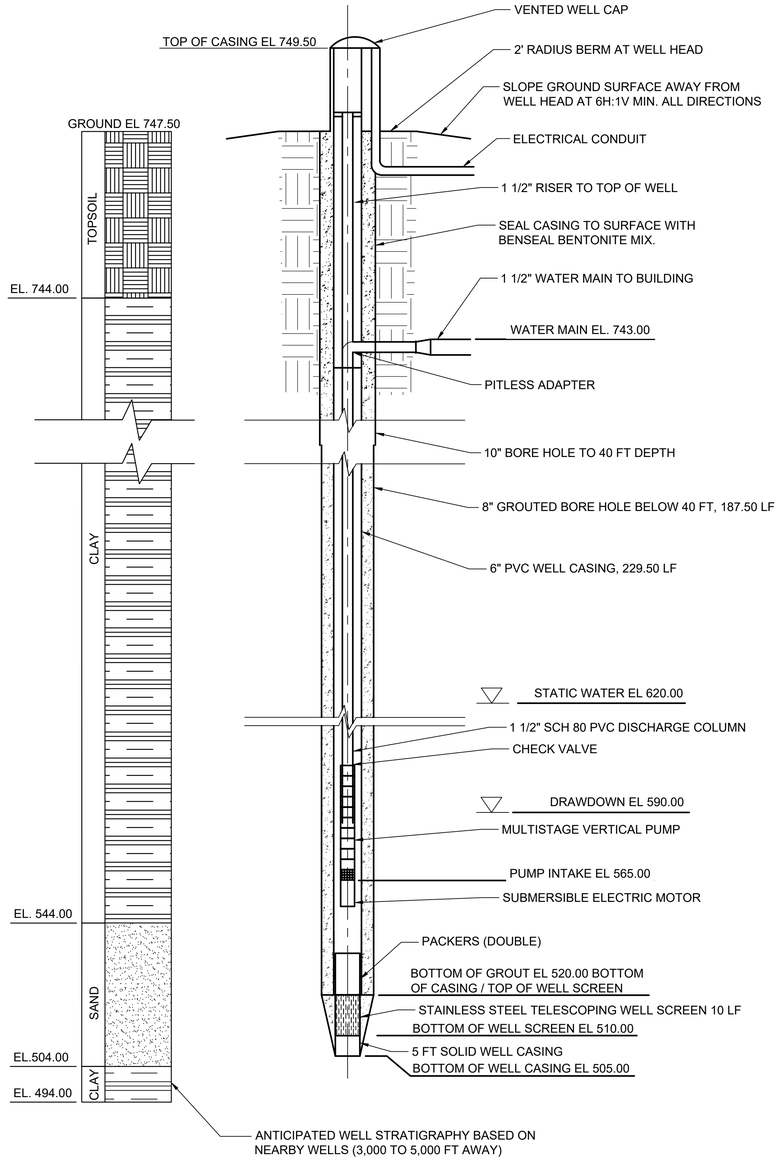
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PROFILES

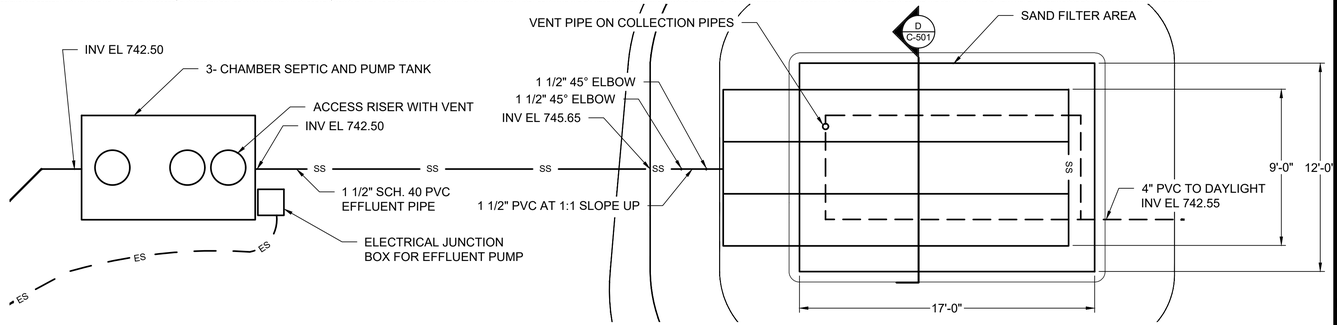
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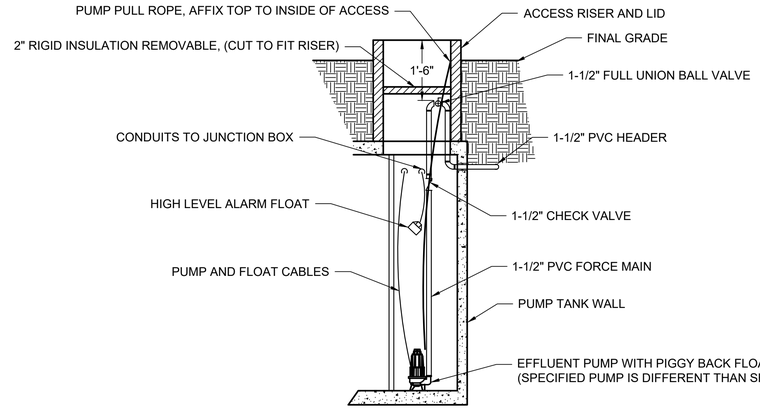
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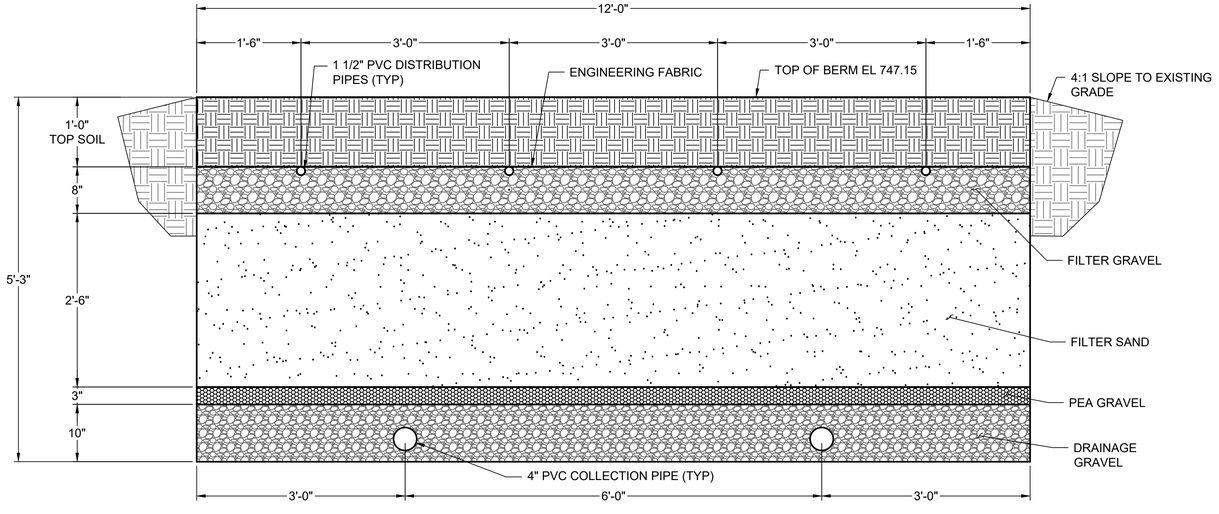
A POTABLE WATER WELL SECTION
NOT TO SCALE



B SEPTIC SYSTEM PLAN
0 2' 4' 8'



C PARTIAL SECTION AT PUMP TANK



D SAND FILTER SECTION

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WELL AND SEPTIC DETAILS

C-501

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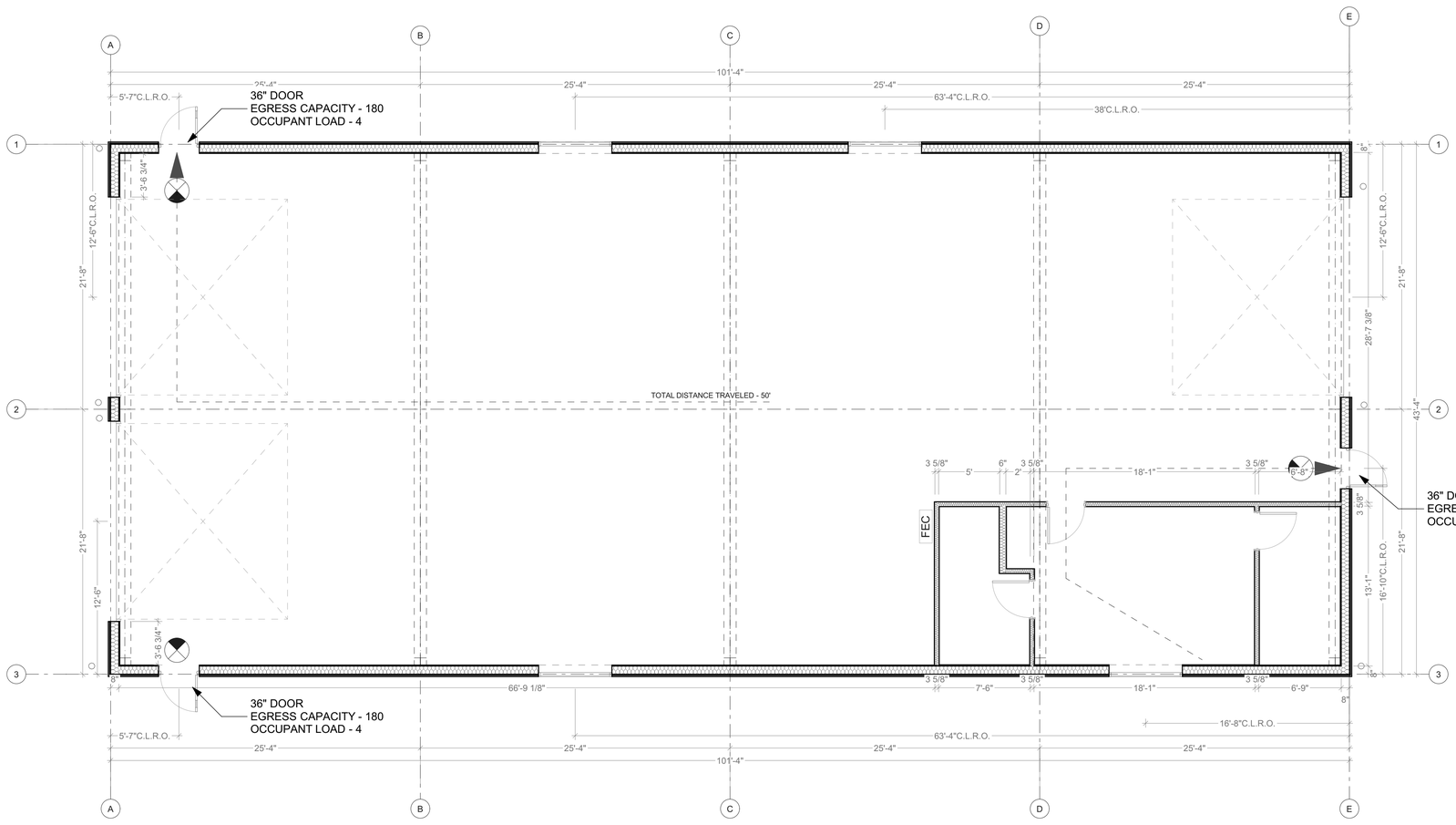
LIFE SAFETY LEGEND

EXIT TRAVEL PATH AND DISTANCE (250' MAX) — TOTAL DISTANCE TRAVELED - XXX'

EGRESS COMPONENT CAPACITY — XX" STAIR, EGRESS CAPACITY - XX, OCCUPANT LOAD - X

FIRE EXTINGUISHER CABINET — FEC

EXIT SIGN



2 FIRST FLOOR
SCALE: 3/16" = 1'-0"

N

0 4' 8' 12'

CONSTRUCTION DOCUMENTS - ISSUED FOR BIDDING

horizon. original. architecture.

Muscatine County Satellite Facility

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LIFE SAFETY PLAN

G-102

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GENERAL STRUCTURAL NOTES

1. Design Code: International Building Code, 2021 Edition (IBC–2021), Building Risk Category "II".

2. Design Loads:

   Roof Live Loads:
   Ground Snow Load (Pg)..... 25 psf
   Snow Exposure Factor (Ce) 1.0
   Snow Load Importance Factor (I) ... 1.1
   Thermal Factor (Ct) 1.0
   Min. Flat Roof Snow Load (Pf)..... 20 psf + Snow Drift
   (Use Minimum 30 psf Balanced Snow Load)

   Wind:
   Ultimate Wind Speed ..... 115 MPH (3–Second Gust)
   Risk Category III
   Wind Exposure ..... "C"
   Internal Pressure Coefficient ... +/–0.18

   Component and Cladding Design Pressures (asd):
   Typical ..... 20 psf inward
   20 psf outward
   Corners ..... 20 psf inward
   25 psf outward

   Seismic:
   Seismic Use Occupancy II
   Importance Factor (I) 1.00
   Mapped Spectral Response Accelerations:
   Ss 0.085
   S1 ..... 0.064

   Site Class: D

   Spectral Response Coefficients:
   SDS 0.091
   SD1 ..... 0.103

   Seismic Design Category: B

   Basic Seismic–Force–Resisting System:
   Steel systems not specifically detailed for seismic resistance.

   Seismic Response Coefficient (Cd): 3.00
   Response Modification Factor (R): 3.00
   Analysis Procedure: Equivalent Lateral Force
   Design Base Shear = 0.0217W

3. Special Inspection:

   The following types of work require special inspection.

   - Foundation allowable bearing pressure
   - Rebar installation for concrete
   - Cast–in–place concrete

   All special inspections shall be performed by qualified independent testing/inspection agencies specializing in the field of inspection services provided.

   Special inspection agencies shall make written records indicating: Phase of work being inspected, what portion of the phase of work is being inspected, extent of inspected work performed during inspection visit, indicate work inspected was performed in conformance with the Construction Documents or corrective measures taken as a result of the inspections. Written progress reports of each category of special inspection shall be provided to the Architect/Engineer and Owner as construction progresses.

   Discrepancies found during special inspection services shall be brought to the immediate attention of the Contractor for correction. If discrepancies are not corrected, the discrepancies shall be brought to the attention of the Architect/Engineer prior to the completion of that phase of work.

4. Refer to Architectural Floor Plans for dimensional location of non–bearing partition walls, door and window locations, and dimensions not shown on the structural plans.

5. Unless otherwise noted, elevations are to the TOP of beams, footings, slabs, etc.

6. Building drainage, insulation, flashings, vapor/moisture protection, and fireproofing are not shown on the structural plans. Refer to the Architectural/Mechanical drawings and specifications for requirements.

7. All sections, details and notes shown on the structural drawings are intended to be typical and shall apply to similar situations unless otherwise shown.

8. The structural integrity of the building addition shown on these plans is dependent upon completion according to the Contract Documents. It is the Contractor's responsibility to furnish all temporary bracing and/or support that may be required as a result of construction methods and sequences.

GENERAL FOUNDATION NOTES

1. Foundation design is based on geotechnical report prepared for this project by Braun Intertec of Cedar Rapids, Iowa, dated September 24, 2025. (Braun Intertec Project B2506637).

2. The building foundations are to bear on properly placed/compacted structural fill extending to suitable native clay/trace sand soils to provide a minimum net allowable foundation bearing pressure of 2,500 psf. This minimum bearing pressure is to be verified by the Owner's hired Geotechnical firm (GEOTECH) prior to placing concrete.

3. Preparation of the building site for new construction is to include removal of all existing foundations, slabs, pavements and removal of all topsoil, vegetation/root systems and existing uncontrolled fill down to suitable native clay/trace sand soils as determined by the GEOTECH. Additionally remove material as required to provide minimum 2–feet of compacted structural fill beneath building foundations and minimum 2–feet of compacted structural fill beneath floor slabs–on–grade.

4. Fill material required to bring the rough subgrade to bearing elevation is to be tested and approved by the GEOTECH prior to placement. Fill material shall be placed in loose lifts not to exceed 8–inches in thickness when heavy, self–propelled compaction equipment is utilized, 4–inches in thickness if hand held compaction equipment is required.

5. All fill material shall be compacted as follows:

   Below Foundations: Granular or cohesive material compacted to at least 98% of its maximum Standard Proctor Dry Density (ASTM D–698).

   Above Foundation Bearing: Granular or Cohesive Material compacted to at least 95% of its maximum Standard Proctor Dry Density (ASTM D–698).

6. Overexcavation for compacted structural fill placement below footings shall extend laterally beyond all edges of the footings at least 12–inches per foot of overexcavation depth below the footing base elevation.

7. Excavations shall be kept free of water and loose soil prior to concrete placement. Any unsuitable material, as identified by the GEOTECH is to be removed and replaced with compacted structural fill material.

8. Provide minimum 6–inches of properly compacted structural granular free–draining fill beneath all slabs–on–grade. See typical slab–on–grade detail for requirements.

9. Building addition excavations to comply with OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches."

10. Unsuitable subgrade conditions may develop during general construction operations. An effective means of soils stabilization may be required by the Contractor such as scarification and recompaction and/or addition of a crushed stone subbase.

11. Foundation walls to be backfilled on both sides are to have backfill placed simultaneously on each side of the wall to prevent unbalanced loading.

12. Foundation walls that are to have uneven backfill are to have backfill placed simultaneously on each side up to height of start of unequal backfill. Uneven backfill shall be compacted utilizing hand held compaction equipment.

13. Locate, verify and mark the location of underground utilities prior to excavation for foundations.

CONCRETE NOTES

1. Except where modified by these Plans and Specifications, all concrete work shall conform to the requirements of ACI 301–11, "Specifications for Structural Concrete for Buildings and ACI 318–11, "Building Code Requirements for Reinforced Concrete".

2. Reinforcing is to be detailed in accordance with ACI 315–latest, "Manual of Standard Practice for Detailing Reinforced Concrete Structures".

3. Minimum Concrete 28 Day Compressive Strengths:

   Footings ..... 3500 PSI
   Foundation Walls/Piers ..... 4500 PSI
   Interior Slabs–on–grade ..... 4000 PSI
   Exterior Slabs–on–grade ..... 4500 PSI

4. Concrete reinforcing steel shall be in accordance with the following standards:

   Reinforcing bars ..... ASTM A615, Grade 60
   Welded wire fabric ..... ASTM A1064, Plain Type

5. The following lap–splices shall be maintained including dowel extension and embedment, unless noted otherwise:

   Reinforcing bars:
   Horizontal Bars ..... 58 bar diameters
   Vertical Bars ..... 46 bar diameters

   Welded wire fabric: 9–inches

   All lap–splices shall be contact splices, unless noted otherwise.

6. Maintain the minimum concrete coverage for reinforcing as indicated, unless noted otherwise on the drawings.

   Concrete deposited directly against earth ..... 3 inches

   Concrete Exposed to earth or weather: #6 and larger ..... 2 inches
   #5 and smaller ..... 1 1/2 inches

   Concrete not exposed to earth or weather:
   Slabs and walls ..... 1 inch
   Column/pier ties ..... 1 1/2 inches

7. Place the reinforcing bars as near to the surface as these minimums permit, unless specifically noted otherwise.

8. Unless noted otherwise, provide 2–#5 x 4'–0" bars, each face, at 45 degrees to main reinforcing at corners of wall openings.

9. Unless noted otherwise, provide 2–#4 x 4'–0" at 45 degrees at all corners of openings and at all inside corners of floor slabs.

10. Shift reinforcing to clear anchor bolts and embedded items, cutting of reinforcing bars is not permitted.

11. Vertical construction joints in walls shall have keyways 1 1/2 inch x one third the wall thickness. Horizontal construction joints in walls are not permitted, unless specifically indicated on the drawings.

12. Maximum spacing between construction joints at foundation walls shall not exceed 40 feet. All horizontal reinforcing shall run continuous through construction joints.

13. Provide horizontal reinforcing continuous around all corners unless shown otherwise. Provide corner bars with minimum 58–bar diameter lap splices at all intersections of footings, and walls, same size and spacing as horizontal reinforcing, unless shown otherwise.

14. Where doweling into new or existing concrete is indicated to be adhesive bonded, use "HILTI" HIT–HY 200–R V3 adhesive or equivalent. Hole size, hole cleaning– preparation and adhesive installation shall be in accordance with manufacturer's written instructions.

15. No electrical, mechanical or pluming conduits, ducts or pipe shall be placed in concrete walls or slabs–on–grade other than to pass vertically through the slabs or horizontally perpendicular through the wall.

16. No pipes, conduits or ducts are to be placed in concrete columns, piers, joists or beams without review and approval from the Architect and Structural Engineer prior to placement.

17. Hot weather concrete operations shall be in accordance with ACI 305. Cold weather concrete operations shall be in accordance with ACI 306.

19. Cast–in–place concrete shall be inspected/tested at start of each phase of concrete construction and periodically throughout remainder of construction:
   –Reinforcing steel shall be visual inspected for correct sizes, quantities, spacing, location, clear covers and lap–splices.
   –Concrete shall be tested for correct mix design, slump, air entrainment, strength and hot/cold weather placement requirements. For concrete strength each test shall consist of four test cylinders with one cylinder break test performed at 7–days, two at 28–days. Remaining cylinder shall be tested at 56–days, only if 28–day tests do not meet specified requirements.

COLD–FORMED METAL FRAMING NOTES:

1. All structural metal studs shall be designed in accordance with American Iron and Steel Institute (AISI) "specification for the Design of Cold–Formed Structural Steel Members, latest edition.

2. Structural cold–formed metal studs shall be the depth and gauge indicated on the structural plans and details. Studs shall have a minimum flange width of 1–5/8 inches with minimum1/2–nch returns, unless specifically indicated otherwise.

3. Structural cold–formed metal framing and accessories shall be hot–dip galvanized with a minimum yield strength equal to 33,000 psi, 50,000 psi for member depths equal to or greater than 8–inches with gauge thickness of 16 gauge or more.

4. Top and bottom runner tracks shall be of the same gage as the studs with a flange height not less than 1 1/4 inches, unless noted otherwise.

5. Provide continuous 1 1/2 inch, 16 gauge, galvanized, horizontal cold–rold channel bridging through pre–punched holes in the studs at 4–feet on–center maximum. Attach channel to the stud in accordance with the manufacturer's requirements for the given height and loading conditions.

6. Provide a layer of non–shrink leveling grout beneath the bottom of the runner track where smooth uniform bearing has not been provided.

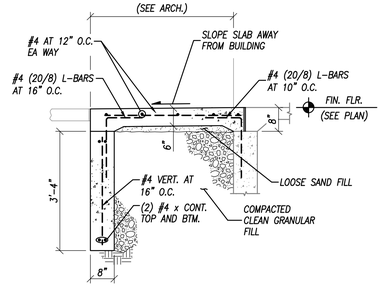
7. Splices in framing, other than runner track, shall not be permitted, unless specifically indicated otherwise.

8. Fasten all components securely with approved self–drilling screws or by welding as required by the metal stud supplier for the height and loading conditions shown.

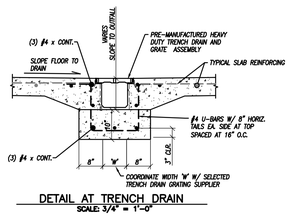
9. Provide insulation equal to that specified elsewhere in all multiple studs and header members which will not be accessible to the Insulation Contractor.

10. Refer to the Architectural drawings and specifications for non–structural wall framing requirements.

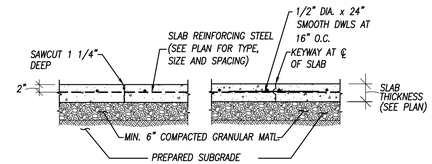
11. Cold formed metal framing shall be inspected at the start of construction and periodically throughout this phase of work. Inspections shall consist of visually inspection of member sizes, gauges, spacing. Connections shall be visually inspected for correct connector size, fastener spacing and quantity.



TYPICAL STOOP (STOOP ON PLAN)
NOT TO SCALE



DETAIL AT TRENCH DRAIN
SCALE: 3/4" = 1'–0"



CONTROL JOINT (C.J.) CONSTRUCTION JOINT (C.S.J.)

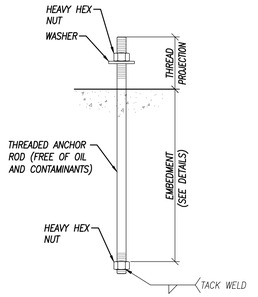
FLOOR SLAB NOTES:

1. Granular material shall be clean, well graded material (1" maximum size with less than 5 percent passing #200 sieve) compacted to 95% standard proctor density (ASTM D–698)
2. TUnless otherwise noted or detailed, provide minimum 1/2" expansion joint material with elastomeric sealant where slabs–on–grade abut vertical surfaces including walls, piers and column bases.
3. Refer to the Foundation Plan for recommended control/ construction joint locations.
4. Refer to the Architectural drawings and the specifications for below slab moisture protection requirements.

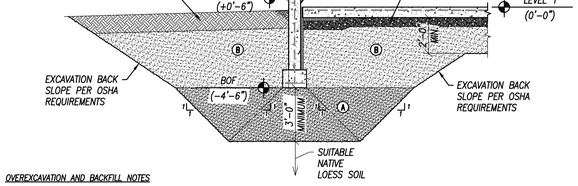
TYPICAL FLOOR SLAB DETAILS
SCALE: NOT TO SCALE

ANCHOR ROD NOTES

1. MATERIALS:
   ANCHOR RODS.....ASTM F1554, GRADE 36
   WASHERS.....ASTM F436
   NUTS.....ASTM A563 HEAVY HEX
2. THREADED PROJECTION SHALL BE OF SUFFICIENT LENGTH TO PERMIT FULL ENGAGEMENT OF THE NUT.
3. ANCHOR RODS SHALL BE INSTALLED USING SETTING TEMPLATES. ANCHOR RODS SHALL BE SET SECURELY IN PLACE PRIOR TO POURING CONCRETE FOR FOOTING OR PIER.
4. REFER TO THE FINAL PRE–ENGINEERED BASE PLATE/ANCHOR ROD SETTING PLANS FOR ANCHOR ROD QUANTITIES, DIAMETERS AND SPACING. REFER TO THE FOUNDATION PIER DETAILS FOR ANCHOR ROD EMBEDMENT REQUIREMENTS.



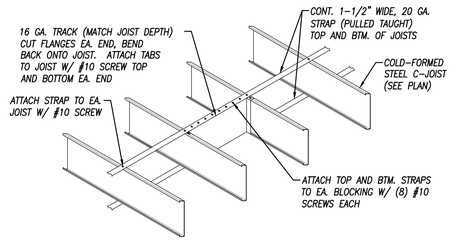
TYPICAL ANCHOR ROD DETAIL
SCALE: NOT–TO–SCALE



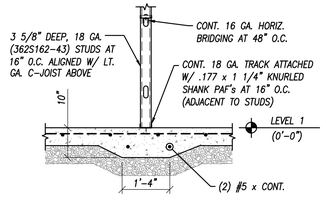
OVEREXCAVATION AND BACKFILL NOTES

1. BASIC BUILDING PAD EXCAVATION TO INCLUDE REMOVAL OF ALL TOPSOIL AND UNCONTROLLED FILL. ADDITIONALLY OVEREXCAVATE BELOW BUILDING FOOTINGS AND SLABS–ON–GRADE AS INDICATED ABOVE. THE EXPOSED SOILS AT THE BASE OF EXCAVATION TO BE VISUALLY INSPECTED AND TEST PROBED BY THE OWNER'S HIRED GEOTECHNICAL CONSULTANT (GEOTECH). ADDITIONALLY REMOVE ANY UNSUITABLE SOILS AS DIRECTED BY THE GEOTECH WITH GEOTECH QUANTIFYING AMOUNT OF MATERIAL ADDITIONALLY REMOVED.
2. THE EXPOSED SUBGRADE IS TO BE SCARIFIED, MOISTURE CONDITIONED AND SURFICALLY COMPACTED TO 98% OF THE MATERIALS STANDARD PROCTOR DRY DENSITY PER ASTM D698. THE SURFICALLY COMPACTED SOILS TO BE VISUALLY INSPECTED AND TEST PROBED BY THE OWNER'S HIRED GEOTECHNICAL CONSULTANT. ADDITIONALLY REMOVE ANY UNSUITABLE SOILS AS DIRECTED BY THE GEOTECH WITH GEOTECH QUANTIFYING AMOUNT OF MATERIAL ADDITIONALLY REMOVED.
3. STRUCTURAL FILL AT AREAS INDICATED AS (A) IS TO BE A WELL GRADED GRANULAR OR COHESIVE MATERIAL, APPROVED BY THE OWNER'S HIRED GEOTECH PRIOR TO PLACEMENT, PROPERLY PLACED AND COMPACTED TO MINIMUM 98% OF THE MATERIAL'S STANDARD PROCTOR DRY DENSITY PER ASTM D698 STANDARD PROCTOR.
4. STRUCTURAL FILL AT AREAS INDICATED AS (B) IS TO BE A WELL GRADED GRANULAR OR COHESIVE MATERIAL, APPROVED BY THE OWNER'S HIRED GEOTECH PRIOR TO PLACEMENT, PROPERLY PLACED AND COMPACTED TO MINIMUM 95% OF THE MATERIAL'S STANDARD PROCTOR DRY DENSITY PER ASTM D698 STANDARD PROCTOR.

TYPICAL FOUNDATION OVER EXCAVATION DETAIL
SCALE: NOT–TO–SCALE



TYPICAL LT. GA. C–JOIST STRAP BRACING DETAIL
SCALE: NOT–TO–SCALE



1 S–001 THICKENED SLAB AT LT. GA. STUD WALL
SCALE: 1/2" = 1'–0"

I hereby certify that this engineering document was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

MICHAEL D. BRENNEMAN DATE

Licence Number 13013

My license renewal date is December 31, 2025.

Pages or sheets covered by this seal: S–001 and S–101

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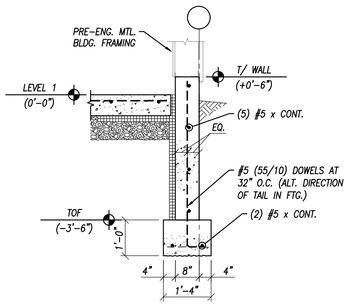
MARK	DATE	DESCRIPTION

PROJECT NO: M2B No. 25411
DATE: 10/02/2025
DRAWN BY: MDB
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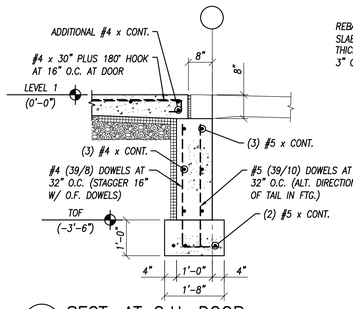
SHEET TITLE
STRUCTURAL NOTES AND DETAILS

S–001

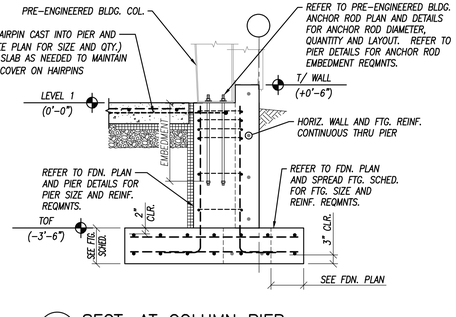
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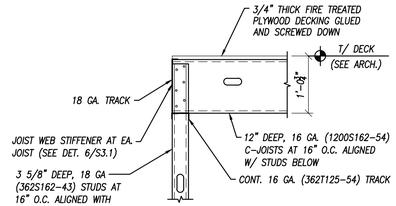
1 S-101 TYP. FDN WALL
SCALE: 1/2" = 1'-0"



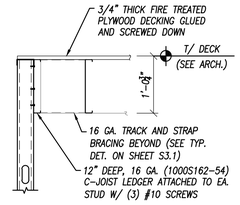
2 S-101 SECT. AT O.H. DOOR
SCALE: 1/2" = 1'-0"



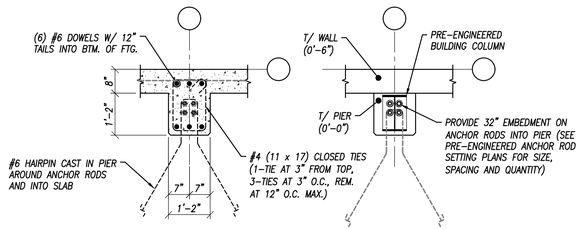
3 S-101 SECT. AT COLUMN PIER
SCALE: 1/2" = 1'-0"



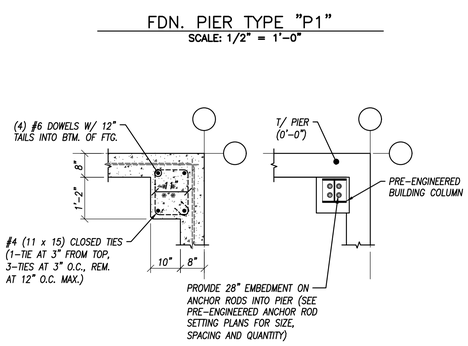
4 S-101 SECTION
SCALE: 3/4" = 1'-0"



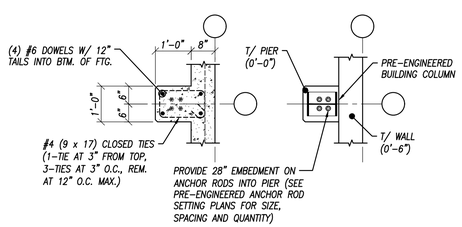
5 S-101 SECTION
SCALE: 3/4" = 1'-0"



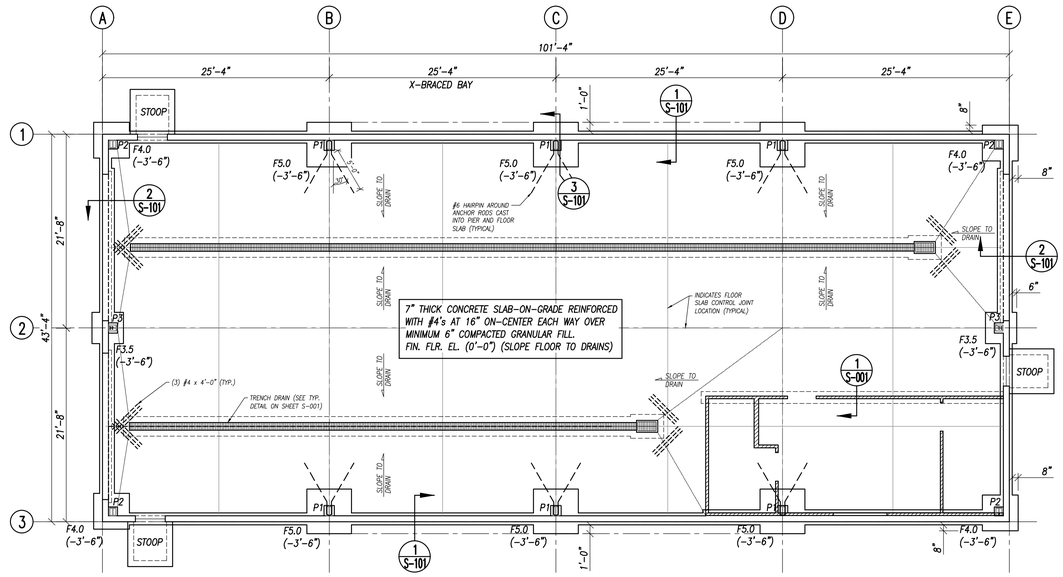
FDN. PIER TYPE "P1"
SCALE: 1/2" = 1'-0"



FDN. PIER TYPE "P2"
SCALE: 1/2" = 1'-0"



FDN. PIER TYPE "P3"
SCALE: 1/2" = 1'-0"



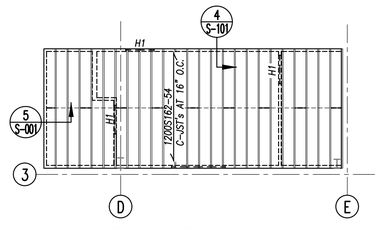
FOUNDATIN PLAN
SCALE: 1/8" = 1'-0"

PLAN NOTES:

1. LEVEL 1 FLOOR ELEVATION (0'-0") EQUALS SITE PLAN ELEVATION 747.17', VERIFY WITH CIVIL PRIOR TO START OF CONSTRUCTION.
2. REFER TO SHEET S-001 FOR TYPICAL FOUNDATION/FLOOR SLAB OVER EXCAVATION DETAIL.
3. REFER TO THE ARCHITECTURAL DRAWINGS FOR FLOOR SLOPES TO TRENCH DRAINS.
4. REFER TO THE ARCHITECTURAL DRAWINGS FOR DOOR/WINDOW SIZES AND THERE RESPECTIVE LOCATIONS AS WELL AS FOR DIMENSIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS.

SPREAD FOOTING SCHEDULE

MARK	SIZE	THICKNESS	REINFORCING
F3.5	3'-6" SQUARE	1'-0"	(5) #5 x 3'-2" BTM. EA. WAY
F4.0	4'-0" SQUARE	1'-0"	(6) #5 x 3'-8" TOP AND BTM. EA. WAY
F5.0	5'-0" SQUARE	1'-0"	(7) #5 x 4'-8" TOP AND BTM. EA. WAY



OFFICE CIELING PLAN
SCALE: 1/8" = 1'-0"

PLAN NOTES:

1. REFER TO THE ARCHITECTURAL DRAWINGS FOR LIGHT GAUGE STUD

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Muscatine County Satellite Facility

INDEPENDENCE AVENUE
MUSCATINE, IA 52761

MARK	DATE	DESCRIPTION

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DATE: 10/02/2025
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SHEET TITLE

FOUNDATION PLAN

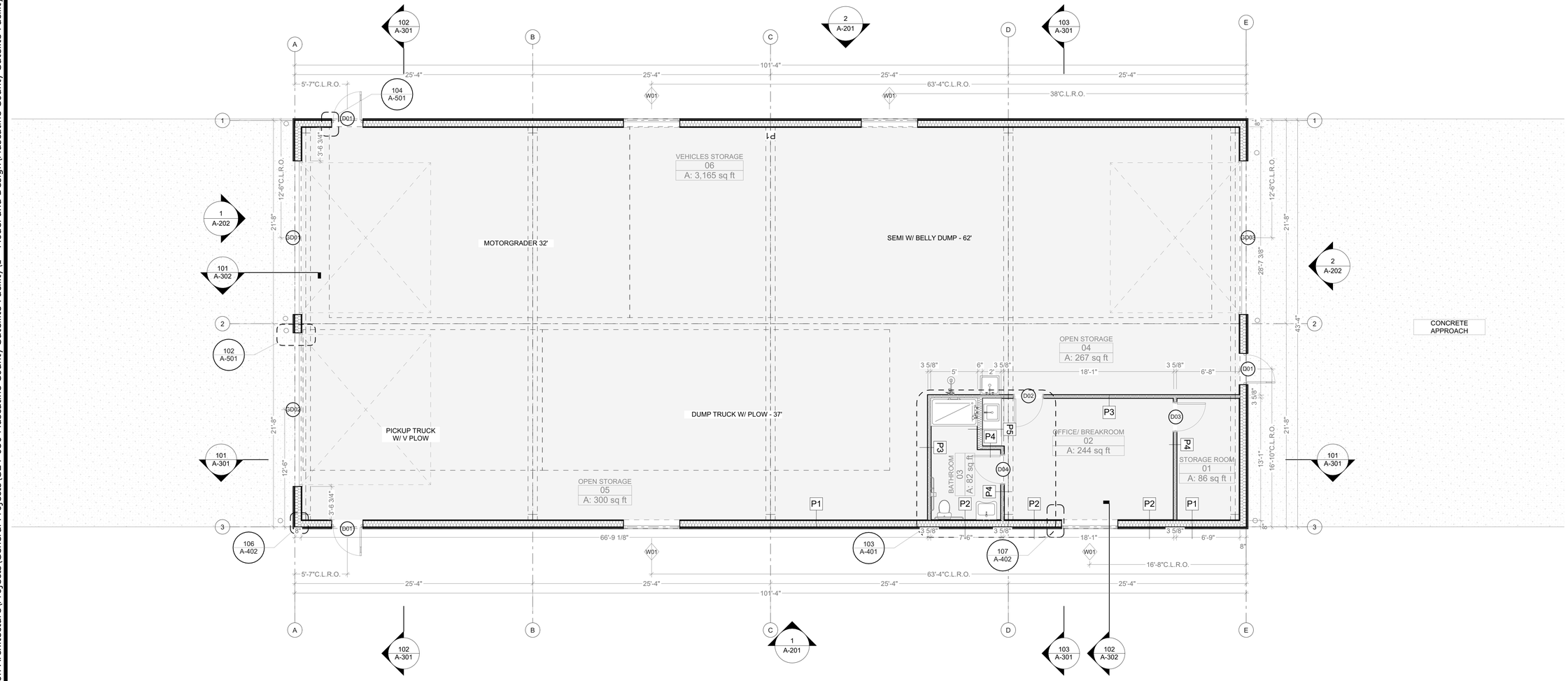
S-101

M2B Structural Engineers LLP
422 Second Avenue S.E., Suite B, Cedar Rapids, Iowa 52401-1330
Phone: 319/364-0666 Fax: 319/364-1456

M2B PROJECT NO: 254111 PLOT DATE: 10-01-2025

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1 FIRST FLOOR
SCALE: 3/16" = 1'-0"

0 4' 8' 12'

CONSTRUCTION DOCUMENTS - ISSUED FOR BIDDING

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Muscatine County Satellite Facility

INDEPENDENCE AVENUE
MUSCATINE, IA 52761

MARK	DATE	DESCRIPTION

PROJECT NO: #Pln
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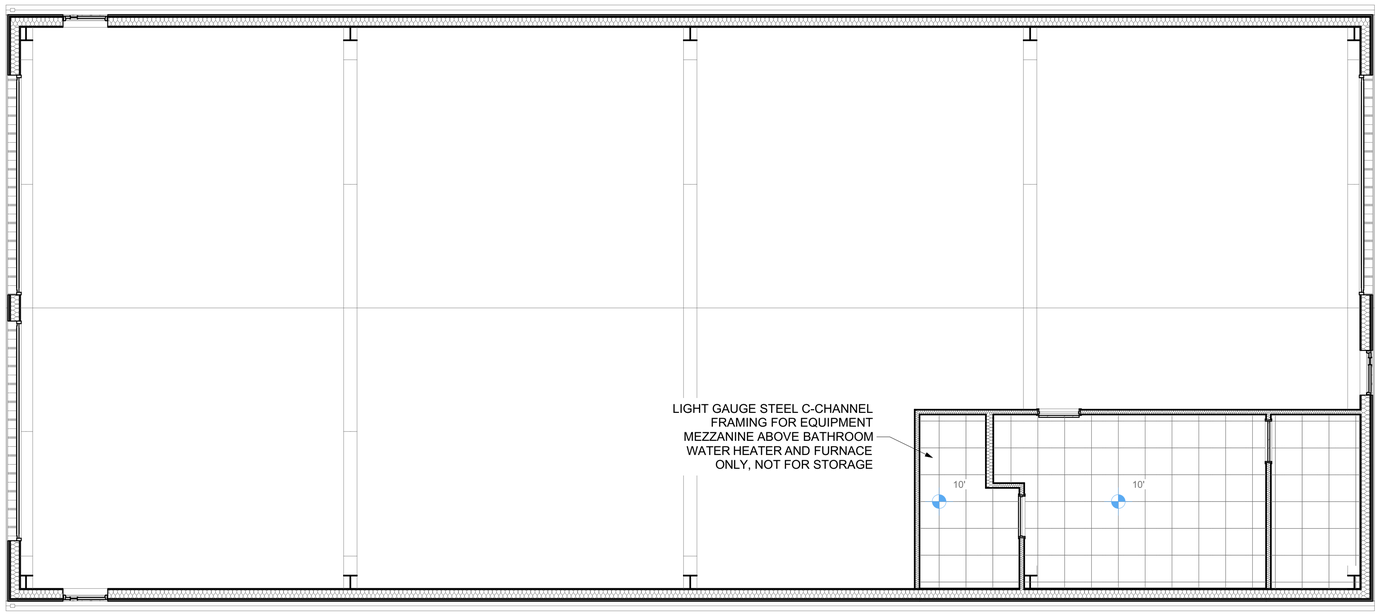
SHEET TITLE

FIRST FLOOR PLAN

A-101

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1 REFLECTED CEILING PLAN
SCALE: 3/16" = 1'-0"

0 4' 8' 12'

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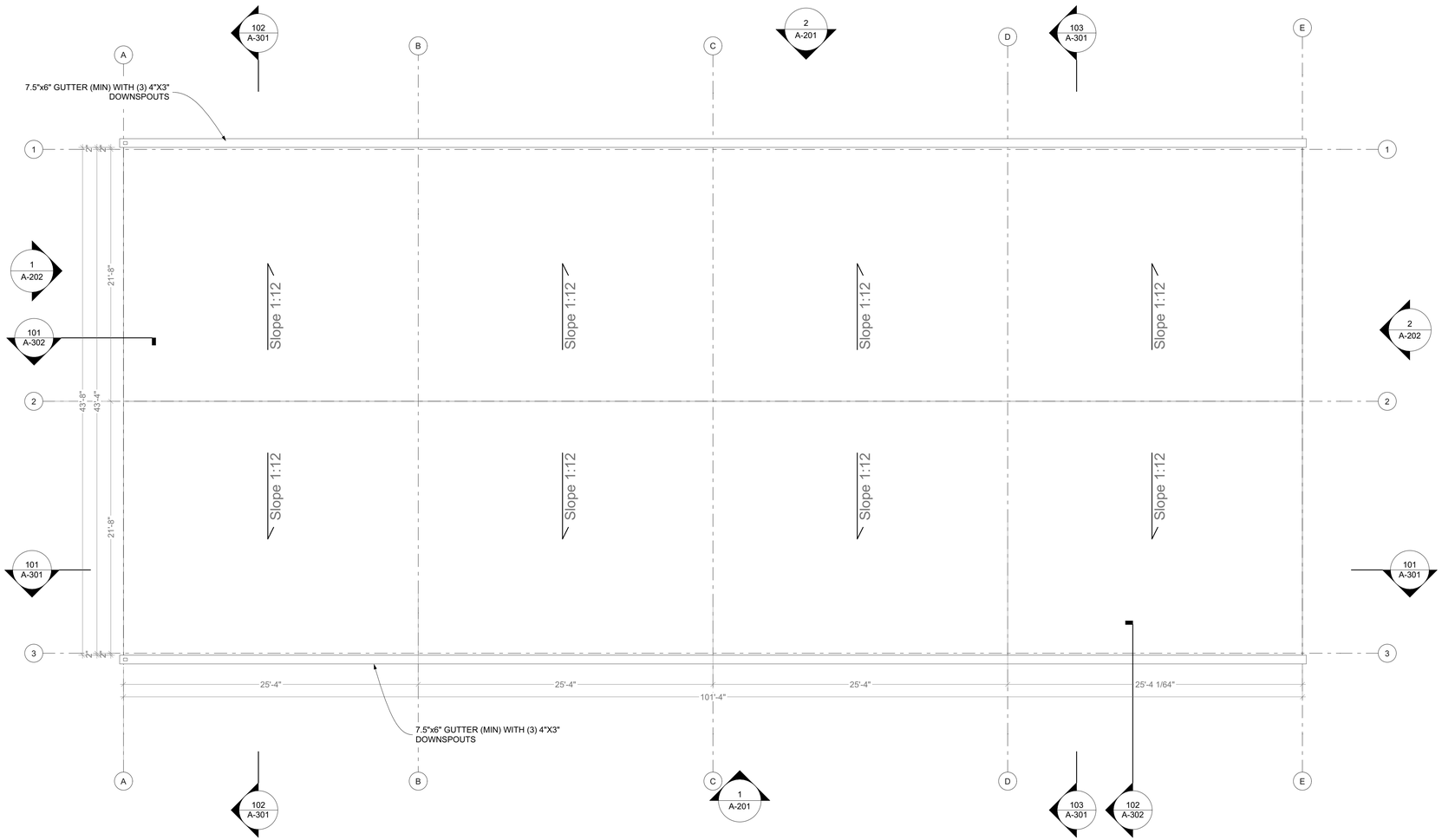
SHEET TITLE

CEILING PLAN

A-102

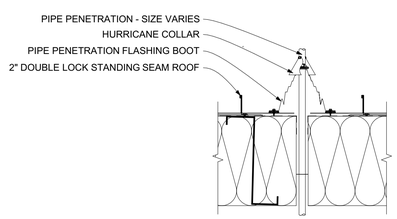
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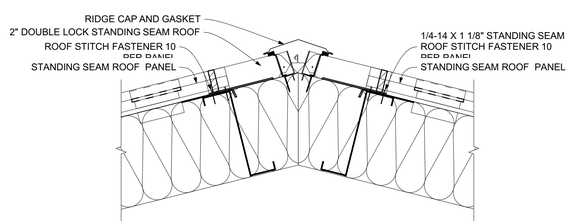
1 ROOF
SCALE: 3/16" = 1'-0"

0 4' 8' 12"



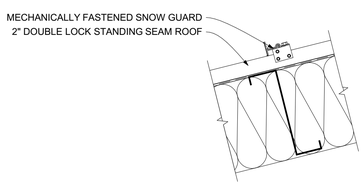
2 PIPE PENETRATION
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"



3 ROOF RIDGE
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"



4 SNOW GUARD DETAIL
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"

CONSTRUCTION DOCUMENTS - ISSUED FOR BIDDING

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Muscatine County Satellite Facility

INDEPENDENCE AVENUE
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MARK	DATE	DESCRIPTION

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DATE: **3/19/2026**
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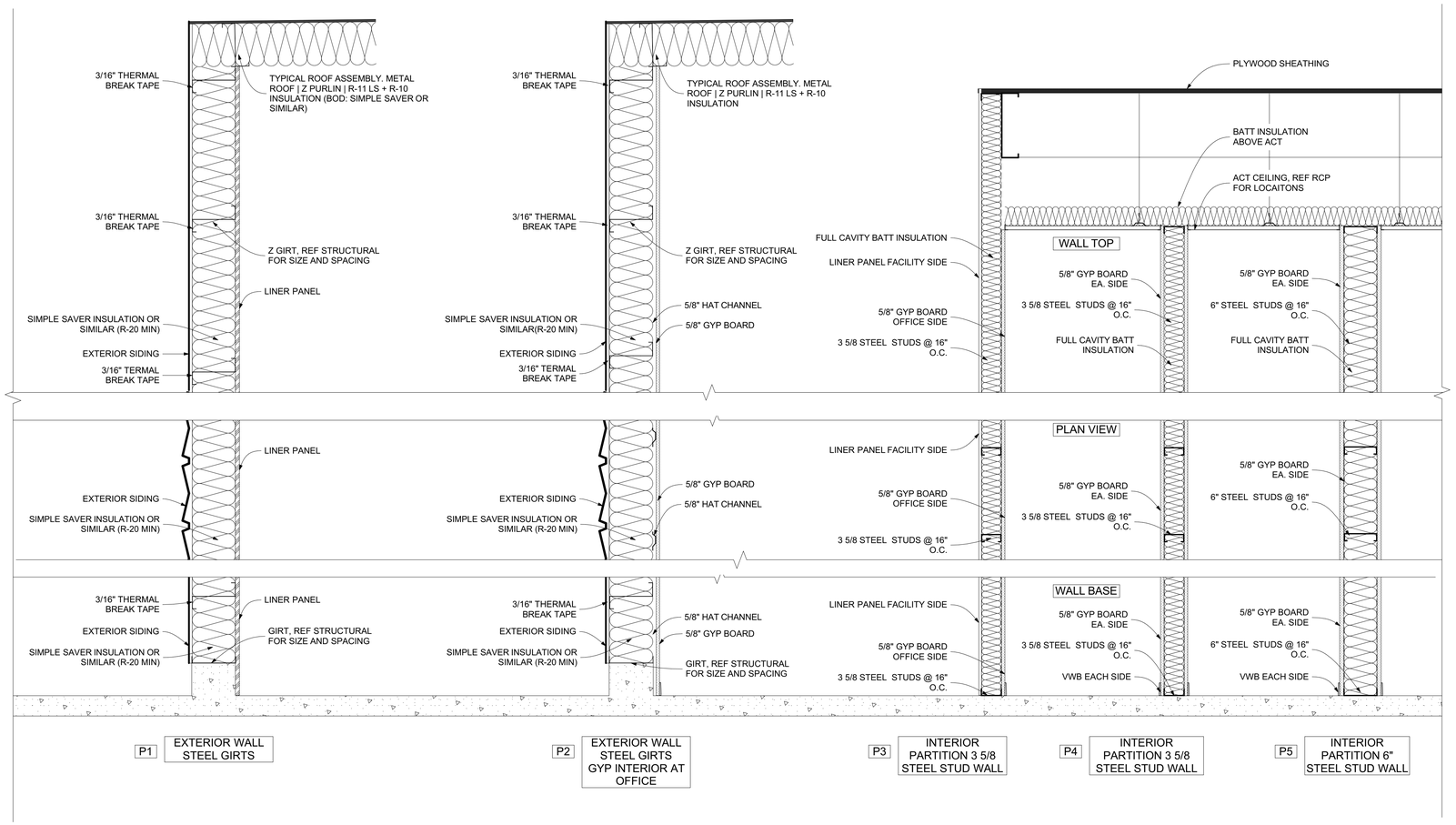
SHEET TITLE

ROOF PLAN

A-103

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1 PARTITION SCHEDULE
SCALE: 1" = 1'-0"

0 6" 1' 2'

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horizon. original. architecture.

Muscatine County Satellite Facility

INDEPENDENCE AVENUE
MUSCATINE, IA 52761

MARK	DATE	DESCRIPTION

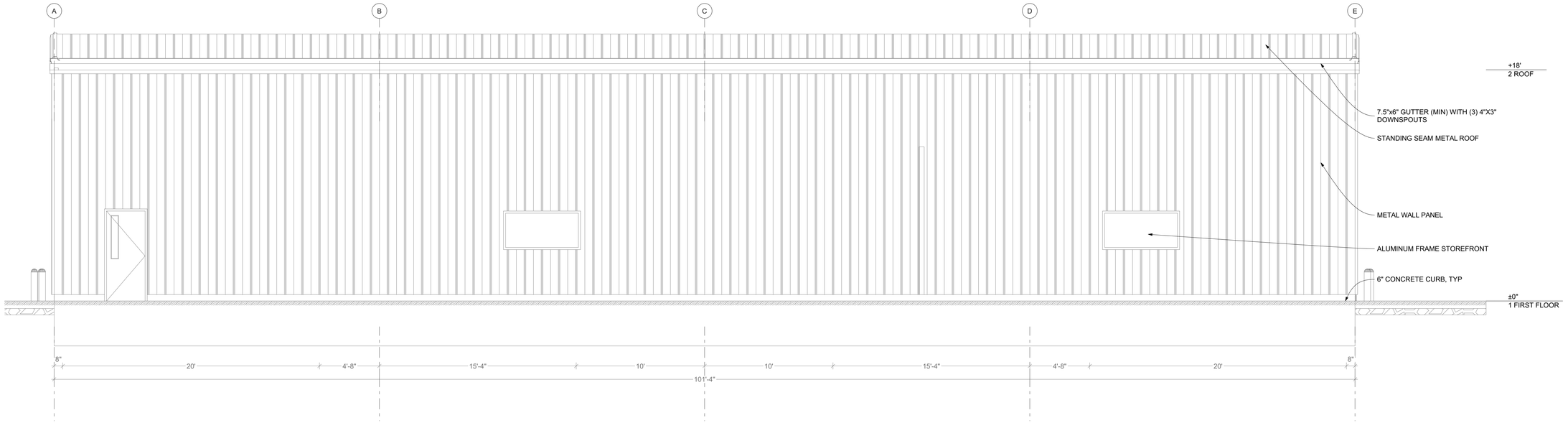
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PARTITION SCHEDULE

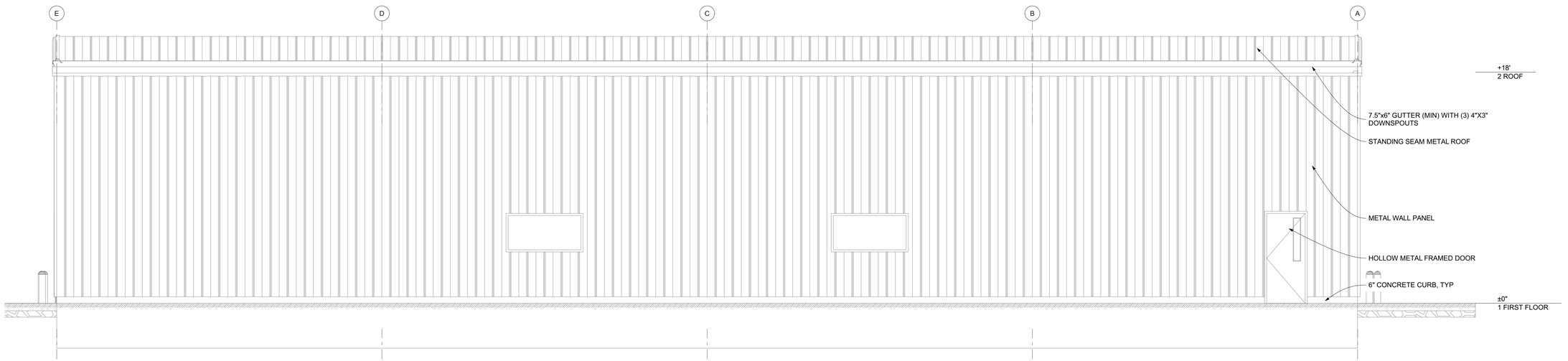
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1 SOUTH ELEVATION
SCALE: 1/4" = 1'-0"

0 2' 4' 8'



2 NORTH ELEVATION
SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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Muscatine County Satellite Facility

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MUSCATINE, IA 52761

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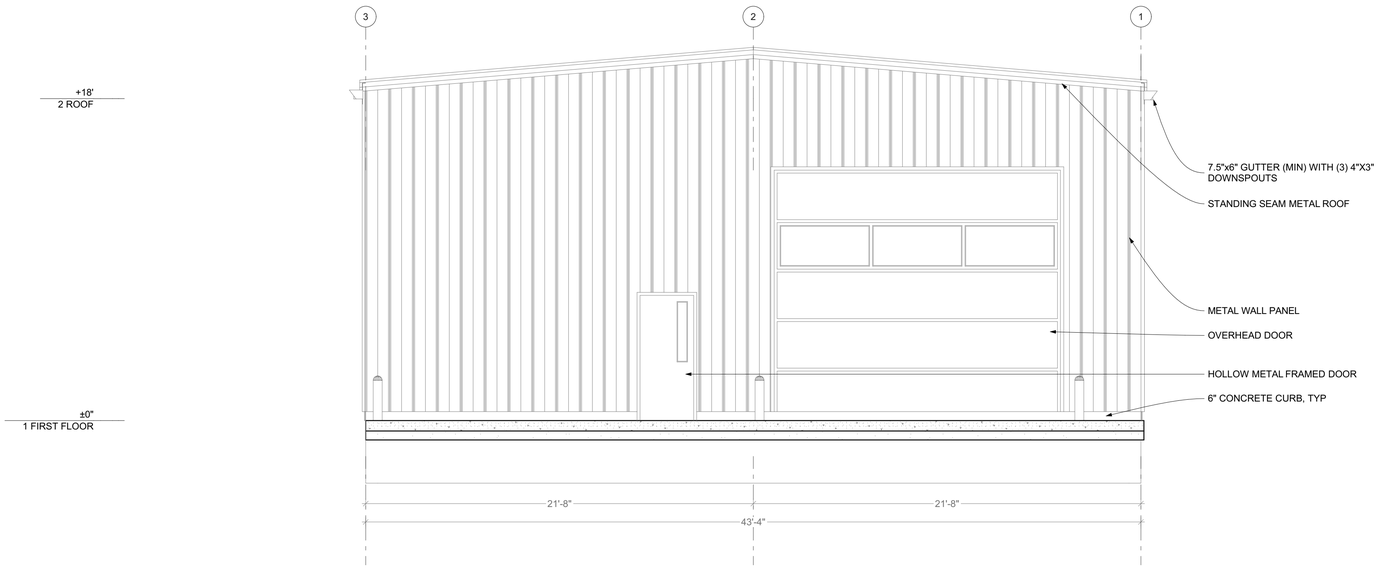
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ELEVATIONS

A-201

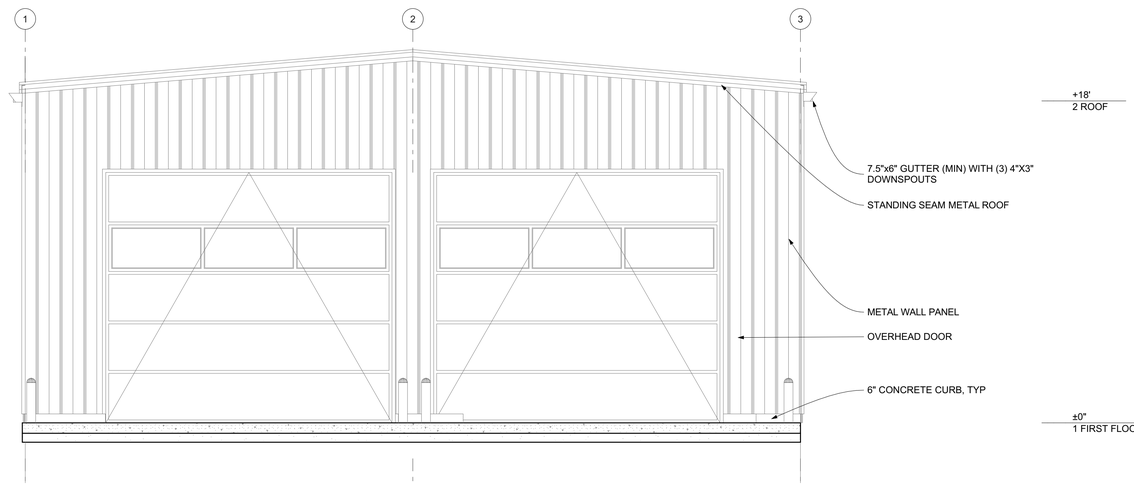
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2 EAST ELEVATION
SCALE: 1/4" = 1'-0"

0 2' 4' 8'



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

0 2' 4' 8'

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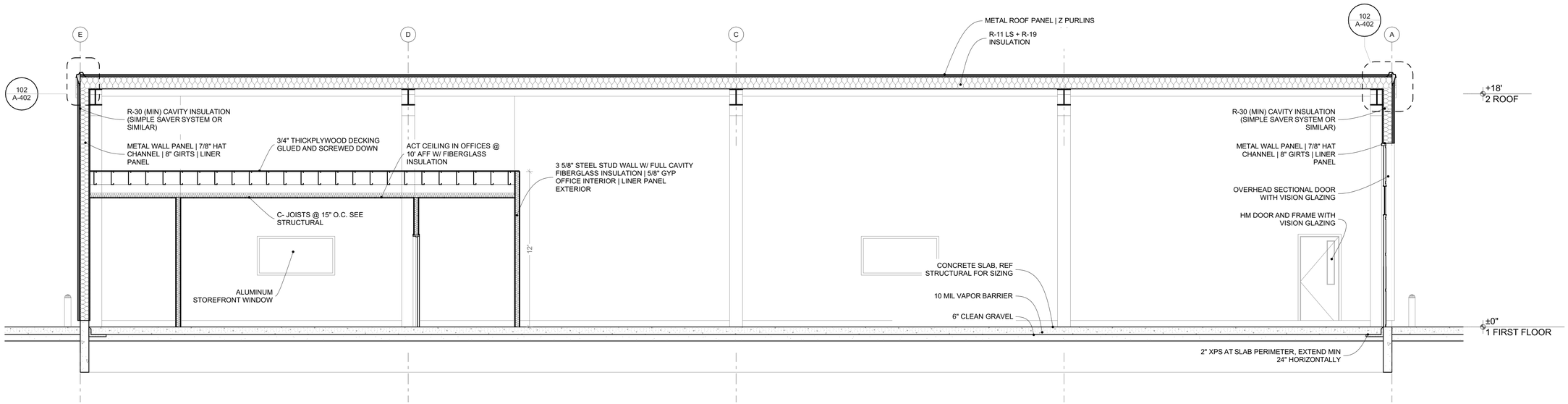
SHEET TITLE

ELEVATIONS

A-202

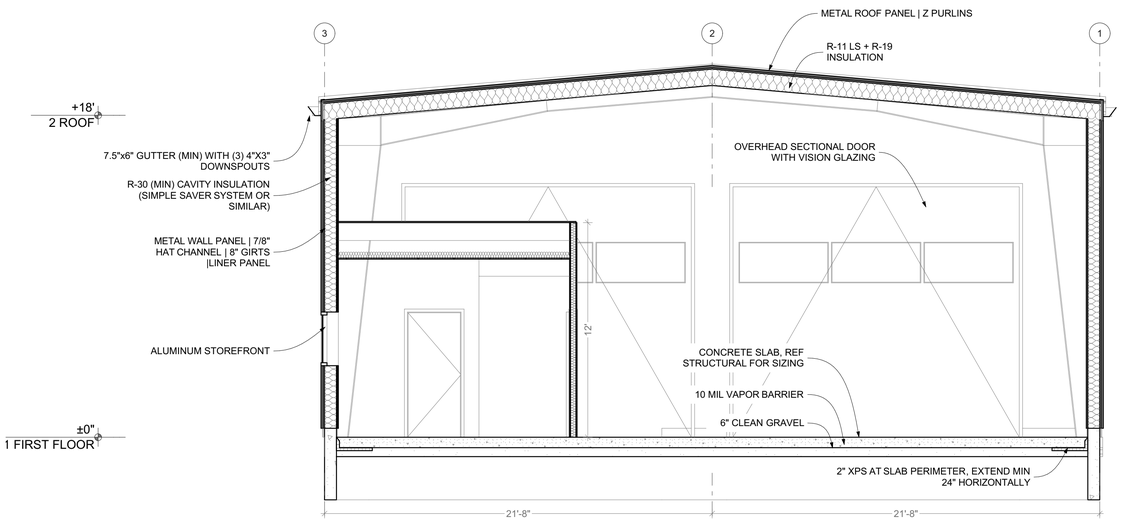
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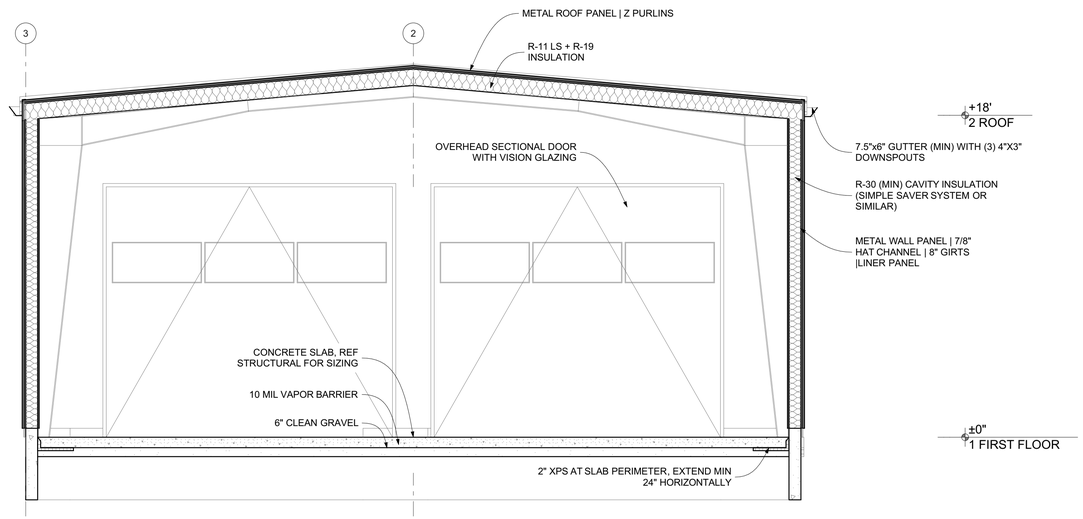
101 LONG BUILDING SECTION
SCALE: 1/4" = 1'-0"

0 2' 4' 8'



103 SHORT BUILDING SECTION
SCALE: 1/4" = 1'-0"

0 2' 4' 8'



102 SHORT BUILDING SECTION
SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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Muscatine County Satellite Facility

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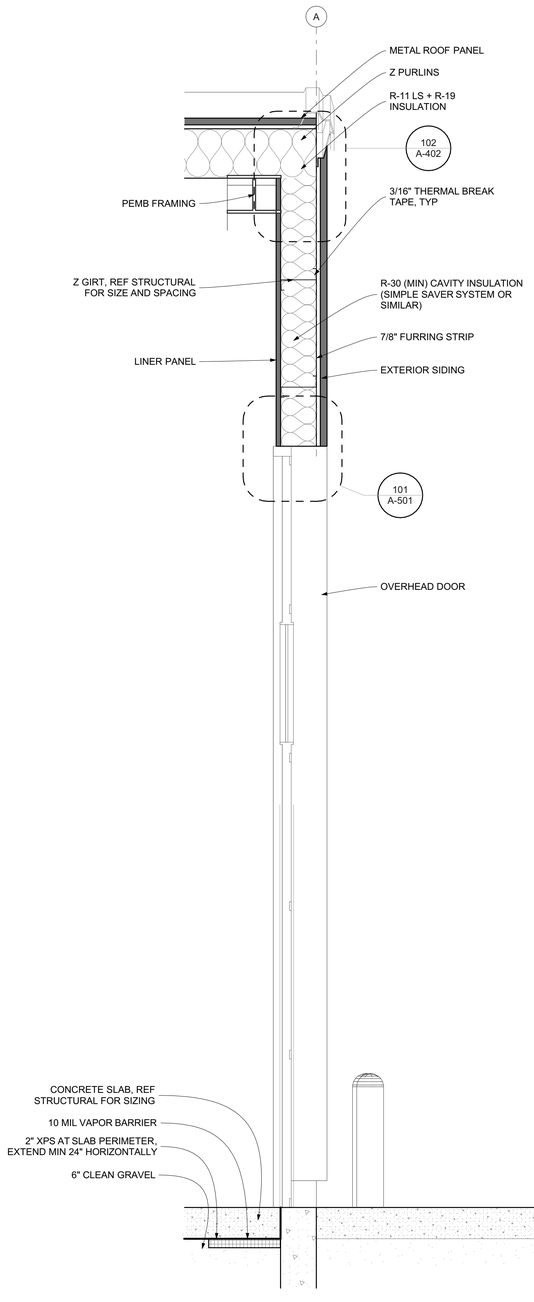
BUILDING SECTIONS

A-301

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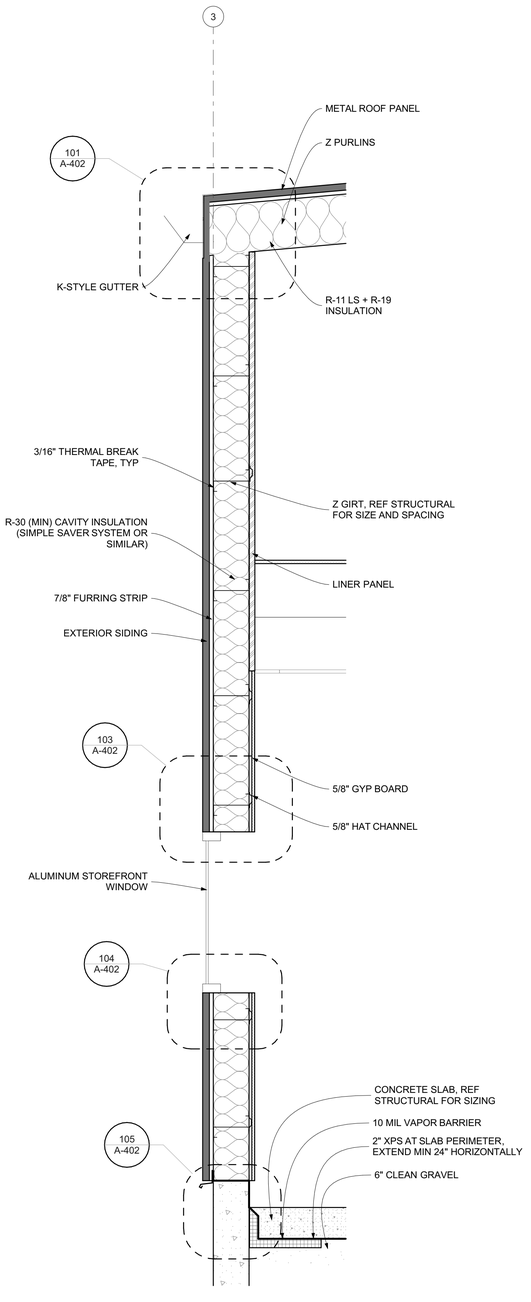
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101 OVERHEAD DOOR SECTION
SCALE: 3/4" = 1'-0"

0 1' 2' 3'



102 SIDEWALL SECTION
SCALE: 3/4" = 1'-0"

0 1' 2' 3'

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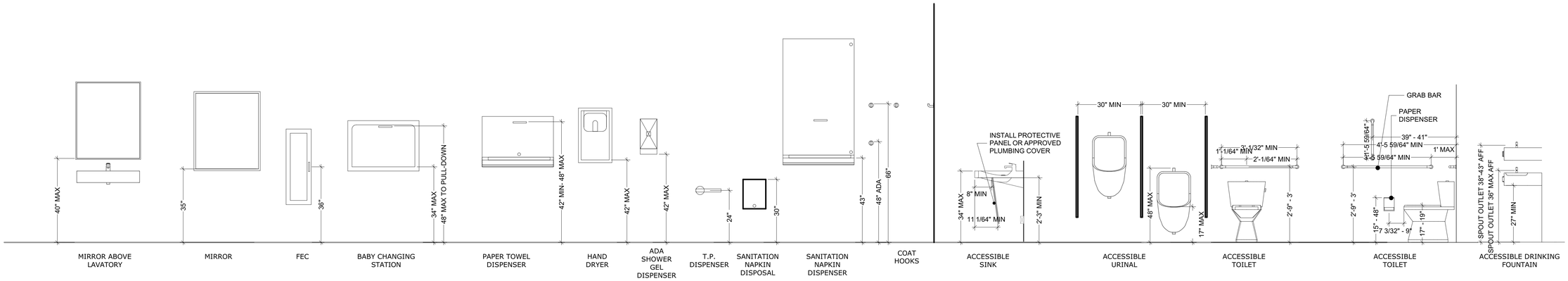
WALL SECTIONS

A-302

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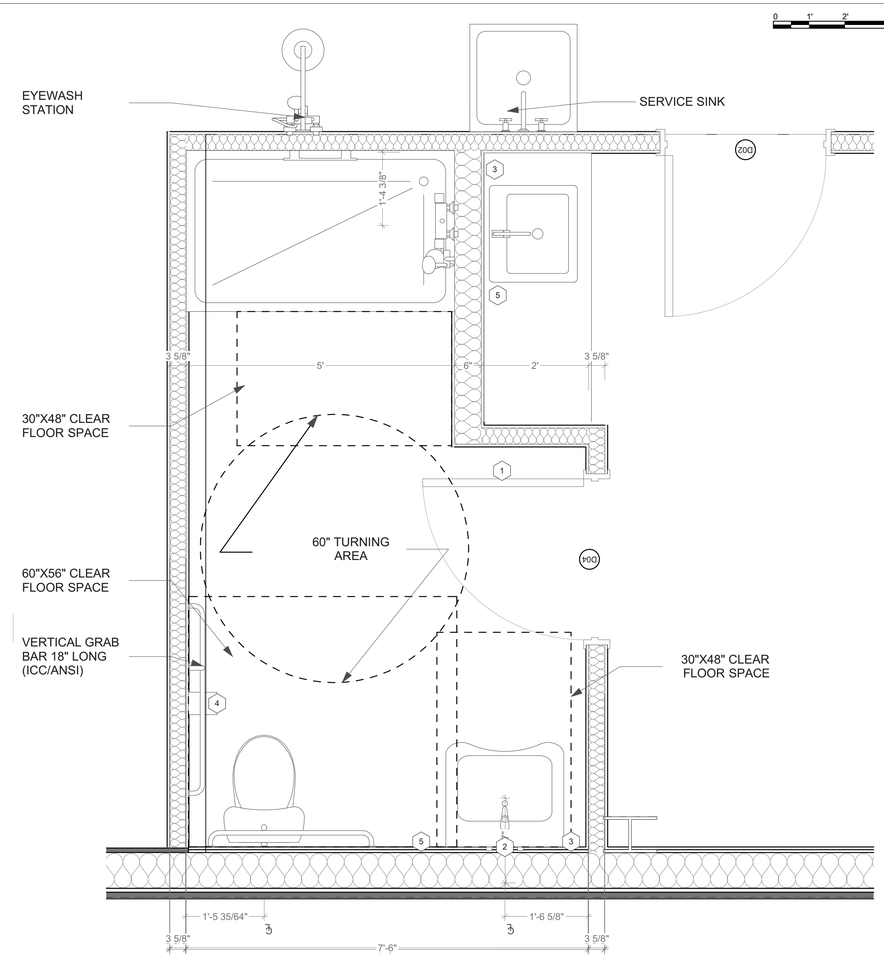
101 ADA MOUNTING HEIGHTS
SCALE: 1/2" = 1'-0"

TOILET ACCESSORY KEY

1. COAT HOOK (MOUNT AT 48" AFF)
2. MIRROR - 24"X48" (BOTTOM OF MIRROR 40" AFF MAX)
3. SOAP DISPENSER (MOUNT 44" - 48" AFF)
4. TOILET PAPER DISPENSER (MOUNT 18" AFF MIN)
5. PAPER TOWEL DISPENSER (DISCHARGE 44" - 48" AFF)



102 BATHROOM SIGNAGE
SCALE: 3" = 1'-0"



103 ENLARGED RESTROOM PLAN
SCALE: 3/4" = 1'-0"

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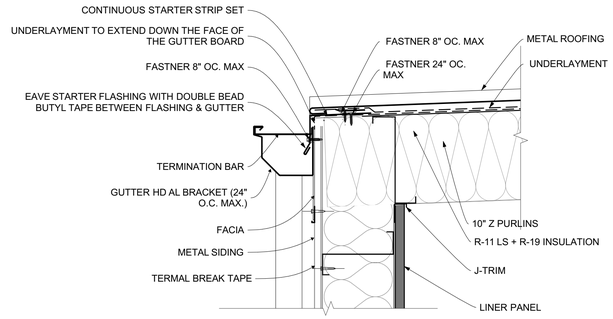
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ENLARGED RESTROOMS

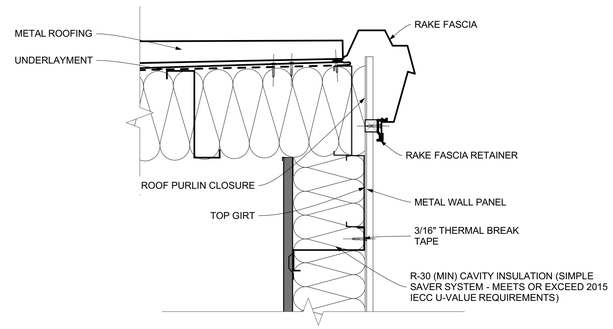
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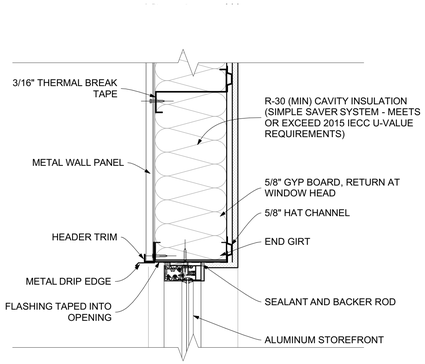
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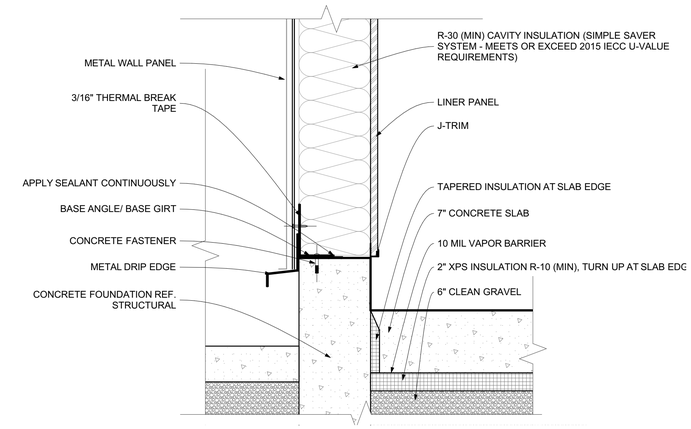
101 GUTTER DETAIL
SCALE: 1 1/2"= 1'-0"



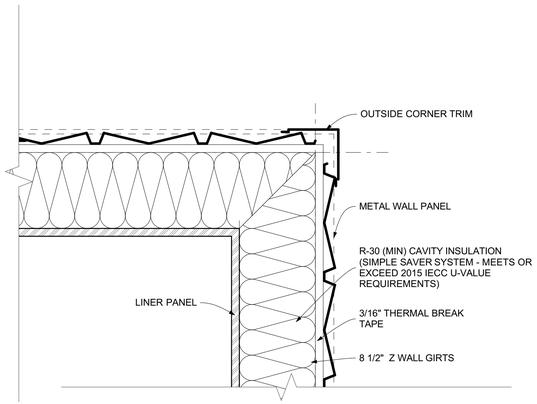
102 RAKE DETAIL
SCALE: 1 1/2"= 1'-0"



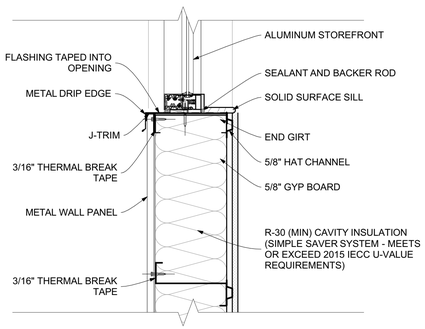
103 WINDOW HEAD
SCALE: 1 1/2"= 1'-0"



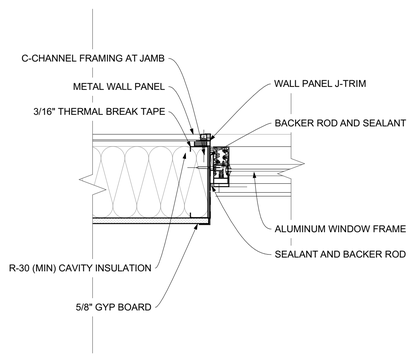
105 SLAB CONNECTION
SCALE: 1 1/2"= 1'-0"



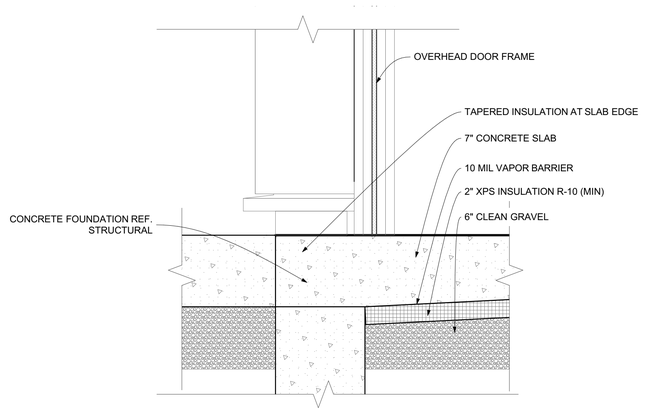
106 CORNER DETAIL
SCALE: 1 1/2"= 1'-0"



104 WINDOW SILL
SCALE: 1 1/2"= 1'-0"



107 WINDOW JAMB
SCALE: 1 1/2"= 1'-0"



108 SLAB AT O.H.DOOR DETAIL
SCALE: 1 1/2"= 1'-0"

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horizon. original. architecture.

Muscatine County Satellite Facility

INDEPENDENCE AVENUE
MUSCATINE, IA 52761

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FINISHES SCHEDULE

ROO...	ROOM NAME	CEILING F.	FLOOR F.	WALL BASE...	NORTH WA...	SOUTH WA...	EAST WALL	WEST WALL
01	STORAGE ROOM	-	CONC	VWB	PNT1	PNT1	PNT1	PNT1
02	OFFICE/ BREAKROOM	ACT	CONC	VWB	PNT1	PNT1	PNT1	PNT1
03	BATHROOM	ACT	CONC	VWB	PNT1	FRP	FRP	FRP
04	OPEN STORAGE	-	CONC	-	-	LINER	LINER	LINER
05	OPEN STORAGE	-	CONC	-	-	LINER	LINER	LINER
06	VEHICLES STORAGE	-	CONC	-	LINER	LINER	LINER	LINER

DOOR SCHEDULE

ID	Quantity	DOOR				HW SET	NOTES
		W	HT	THK	GLZ		
D01	3	3'	7'	1 3/4"	1/4	01	INSULATED STEEL EXTERIOR DOOR
D02	1	3'	7'	1 3/4"	NONE	02	INTERIOR STEEL DOOR
D03	1	3'	7'	1 3/4"	NONE	03	INTERIOR STEEL DOOR
D04	1	3'	7'	1 3/4"	NONE	04	INTERIOR STEEL DOOR
GD01	1	16'	14'	2"	1 PANEL		SEGMENTAL OVERHEAD DOOR
GD02	1	16'	14'	2"	1 PANEL		SEGMENTAL OVERHEAD DOOR
GD03	1	16'	14'	2"	1 PANEL		SEGMENTAL OVERHEAD DOOR

WINDOW SCHEDULE

ID	Quantity	SIZE		NOTES
		WIDTH	HEIGHT	
W01	4	6'	3'	FIXED ALUMINUM STOREFRONT

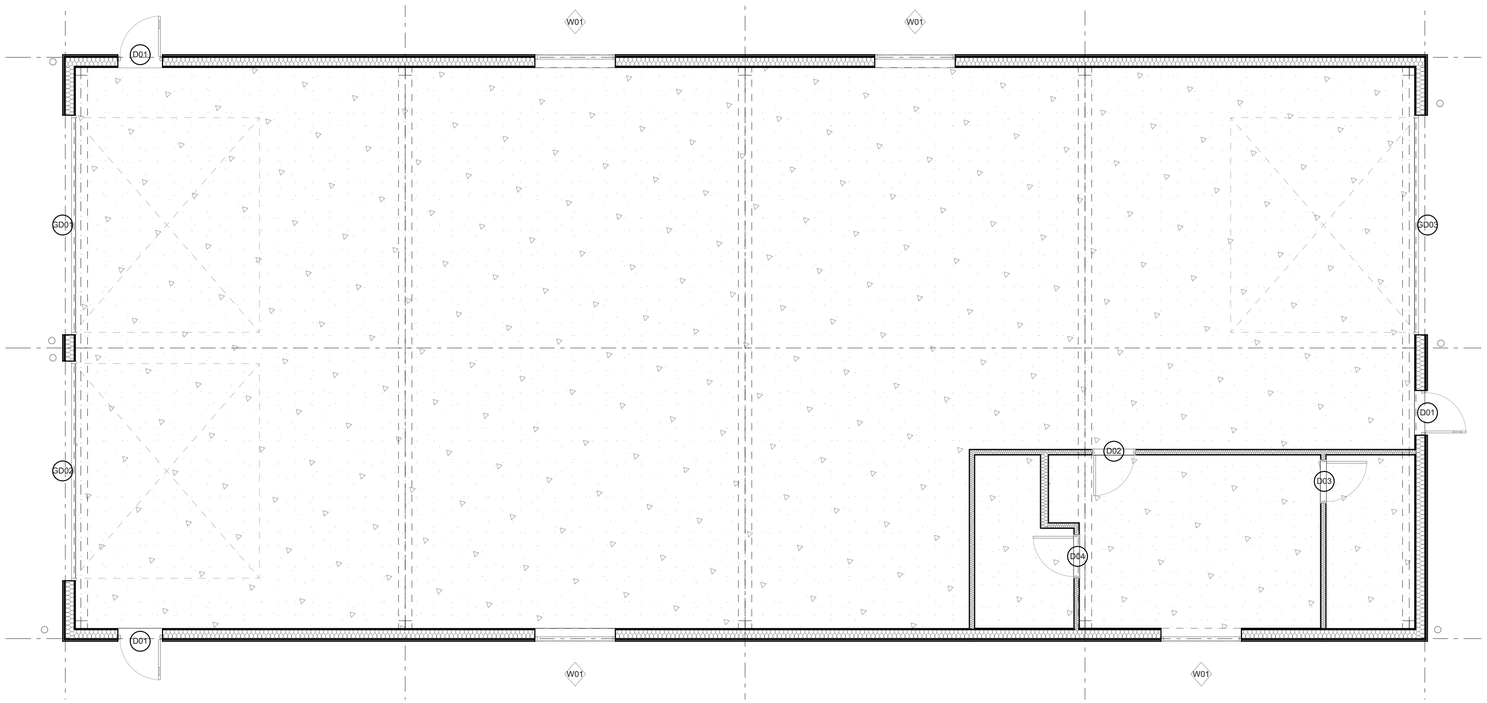
HARDWARE SET

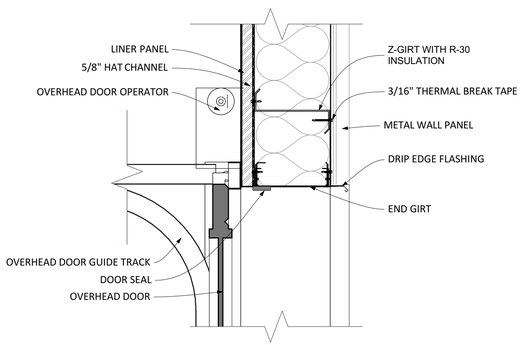
SET 1 - EXTERIOR SINGLE DOOR WITH CLOSER
(3) HEAVY DUTY HINGES
(1) MOTISE DEADBOLT SET
(1) STANDARD CORE
(1) WALL OR FLOOR STOP
(1) OVERHEAD CLOSER
(1) THRESHOLD
(1) KICKPLATE
(1) WEATHERSTRIPPING

SET 2 - INTERIOR SINGLE DOOR
(3) HEAVY DUTY HINGES
(1) MORTISE OFFICE SET
(1) WALL OR FLOOR STOP
(1) KICKPLATE

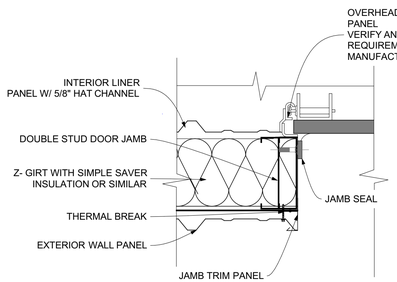
SET 3 - INTERIOR SINGLE DOOR
(3) HEAVY DUTY HINGES
(1) MORTISE STOREROOM SET
(1) WALL OR FLOOR STOP
(1) KICKPLATE

SET 4 - INTERIOR SINGLE DOOR
(3) HEAVY DUTY HINGES
(1) MORTISE PRIVACY SET
(1) WALL OR FLOOR STOP
(1) KICKPLATE

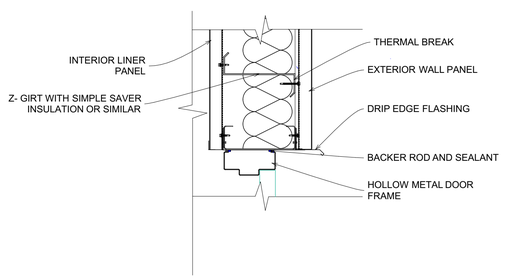




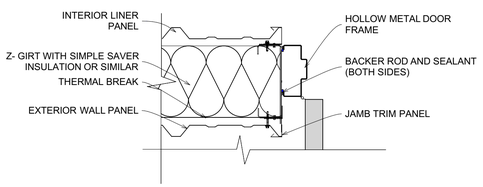
101 OVERHEAD DOOR DETAIL (1)
SCALE: 1 1/2"= 1'-0"



102 OVERHEAD DOOR JAMB
SCALE: 1 1/2"= 1'-0"



103 HM DOOR HEAD
SCALE: 1 1/2"= 1'-0"



104 HM DOOR JAMB
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"

horizon. original. architecture.

Muscatine County Satellite Facility

INDEPENDENCE AVENUE
MUSCATINE, IA 52761

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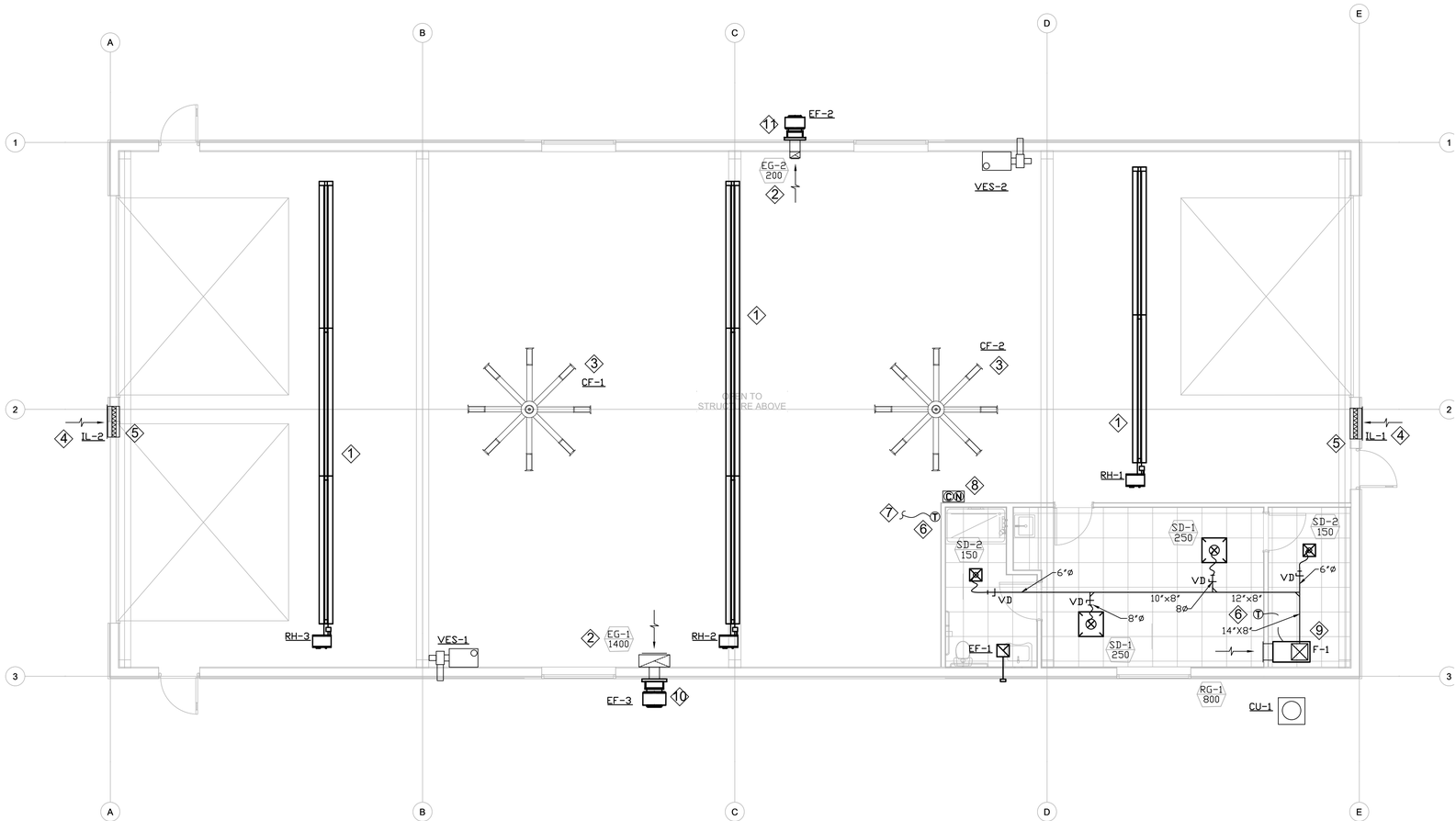
DOOR DETAILS

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A H01 **HVAC PLAN**

SCALE 3/16" = 1'-0"

N

GENERAL HVAC NOTES:

1. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL HVAC SYSTEMS ACCORDING TO ALL APPLICABLE STATE AND LOCAL CODES AND ORDINANCES.
2. CONTRACTOR SHALL PAY ALL PERMIT FEES, PLAN REVIEW FEES, LICENSE FEES, INSPECTIONS, AND APPLICABLE TAXES.
3. HVAC CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, AND TOOLS FOR COMPLETE INSTALLATION OF ALL WORK SHOWN ON THE PLANS AND DESCRIBED HEREIN. INCLUDING ALL DEVICES, CONTROLS, AND APPURTENANCES REQUIRED TO SET THE NEW SYSTEMS INTO OPERATION.
4. HVAC CONTRACTOR TO COORDINATE INSTALLATION OF ALL HVAC SYSTEMS WITH ALL OTHER TRADES.
5. HVAC CONTRACTOR IS ADVISED THAT ALL LOCATIONS ARE APPROXIMATE. COORDINATE FINAL LOCATIONS WITH ALL OTHER TRADES AND WITH OWNER WHERE REQUIRED.
6. HVAC CONTRACTOR TO VERIFY EXISTING CONDITIONS IN AREAS WHERE EXISTING SYSTEMS ARE TO REMAIN.
7. HVAC CONTRACTOR SHALL BE RESPONSIBLE FOR HIS OWN WORK AND SHALL PROTECT THE WORK OF OTHER TRADES ALREADY INSTALLED FROM DAMAGE. ANY DAMAGE TO THE WORK OF OTHERS INCURRED BY THE HVAC CONTRACTOR IS TO BE REPLACED AT THE HVAC CONTRACTOR'S EXPENSE.
8. THESE DRAWINGS ARE NECESSARILY DIAGRAMMATIC IN NATURE AND INDICATE DESIGN INTENT. NOT ALL FITTINGS, OFFSETS, VENTS, DRAINS, ETC., ARE SHOWN. THE CONTRACTOR SHALL INCLUDE ALL FITTINGS, OFFSETS, DRAINS, AND ACCESSORIES AS REQUIRED TO PROVIDE A COMPLETE AND FUNCTIONING HVAC SYSTEM.
9. HVAC CONTRACTOR IS RESPONSIBLE FOR SCHEDULING DELIVERY, RECEIVING, UNLOADING, UNPACKING, STORING, SETTING IN PLACE, AND PROTECTING FROM DAMAGE, VANDALISM, THEFT, OR WEATHER DURING CONSTRUCTION FOR ALL NEW EQUIPMENT FURNISHED BY THE HVAC CONTRACTOR.
10. DO ALL CUTTING AND PATCHING OF BUILDING MATERIALS AS REQUIRED FOR INSTALLATION OF COMPLETE AND WORKABLE SYSTEMS. PATCHING SHALL MATCH EXISTING FINISHES AND CONSTRUCTION TO THE GREATEST EXTENT POSSIBLE.
11. HVAC CONTRACTOR IS TO INSURE THAT ALL ABOVE CEILING EQUIPMENT IS ACCESSIBLE FOR MAINTENANCE. WHERE DAMPERS OR OTHER EQUIPMENT IS LOCATED ABOVE HARD CEILINGS, HVAC CONTRACTOR TO PROVIDE AND INSTALL ACCESS PANELS TO ALLOW ACCESS FOR MAINTENANCE.
12. ALL DUCTWORK TO BE INSULATED WITH FIBERGLASS BATT.
13. ALL REQUIRED ROOF PENETRATIONS ARE TO BE PERFORMED AND REPAIRED BY LANDLORD'S APPROVED ROOFING CONTRACTOR.

HVAC KEYED NOTES

1. MOUNT RADIANT HEATERS APPROXIMATELY 17 FEET A.F.F.
2. TWO EXHAUST GRILLS REQUIRED. SEE DETAIL ON SHEET H02.
3. MOUNT CIRCULATION FANS APPROXIMATELY 17 FEET A.F.F.
4. MOUNT BOTTOM OF INTAKE AIR LOUVER APPROXIMATELY 8 FEET A.F.F.
5. INTERLOCK DAMPER ACTUATOR WITH EF-3.
6. MOUNT THERMOSTAT APPROXIMATELY 54 INCHES A.F.F.
7. THERMOSTAT TO CONTROL ALL THREE RADIANT HEATERS.
8. INSTALL CONSPEC OPTIO V CO AND NOx GAS DETECTOR.
9. ROUTE FURNACE FLUE GAS EXHAUST OUT SIDEWALL. PROVIDE 4 INCH DIAMETER FRESH AIR INTAKE TO RETURN DUCT ON FURNACE.
10. EXHAUST FAN TO BE CONTROLLED BY CO/NOx DETECTOR MODULE.
11. EXHAUST FAN TO RUN CONTINUOUSLY.

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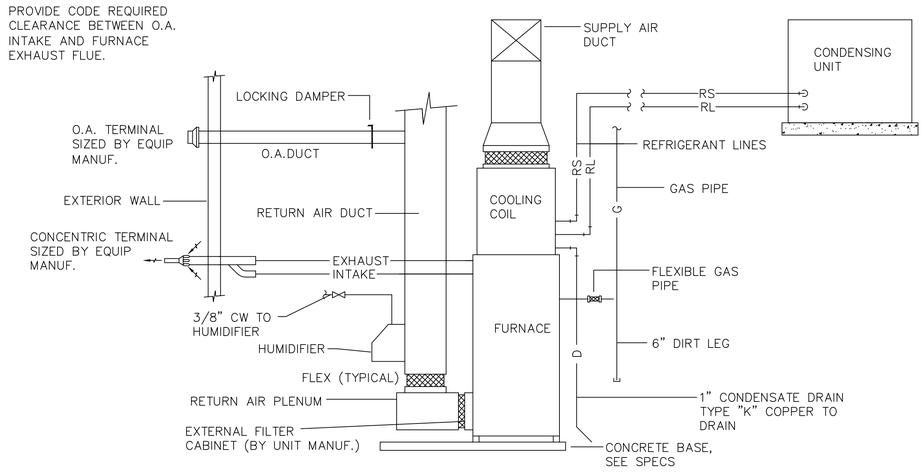
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HVAC PLAN

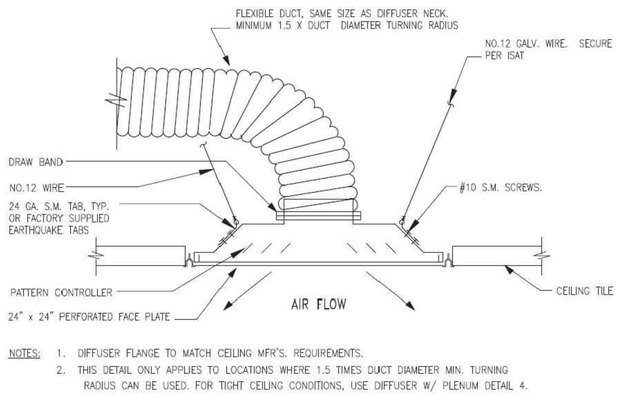
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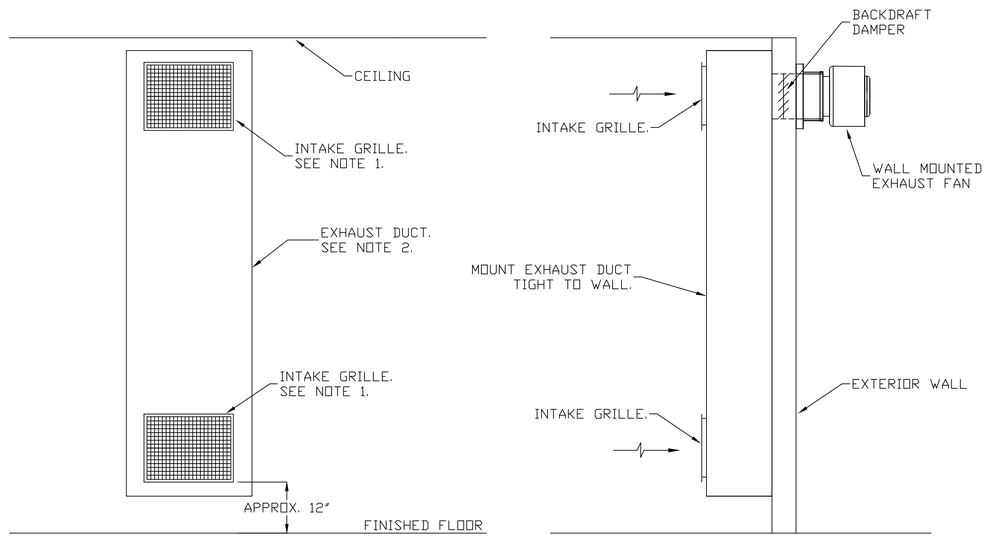
NOTES:
1. INSULATE REFRIG. SUCTION & GAS LINES W/ 3/4" ARMAFLEX PIPE INSULATION. USE RIGID ARMAFLEX AT ALL PIPE HANGAR LOCARION. WEATHERPROOF ARMAFLEX EXPOSED TO THE WEATHER OUTDOORS.
2. REFRIG. LINES SHALL BE SIZED BY THE EQUIPMENT MANUFACTURER.

TYPICAL FURNACE DETAIL
NO SCALE:



NOTES: 1. DIFFUSER FLANGE TO MATCH CEILING MFR'S. REQUIREMENTS.
2. THIS DETAIL ONLY APPLIES TO LOCATIONS WHERE 1.5 TIMES DUCT DIAMETER MIN. TURNING RADIUS CAN BE USED. FOR TIGHT CEILING CONDITIONS, USE DIFFUSER W/ PLENUM DETAIL 4.

TYPICAL DIFFUSER CONNECTION DETAIL
NO SCALE:



FRONT ELEVATION

SIDE ELEVATION

NOTES:
1. MOUNT INTAKE GRILLES LOW AND HIGH FOR INTERMITTENT EXHAUST. CONTINUOUS EXHAUST REQUIRES ONLY ONE INTAKE GRILLE MOUNTED LOW.
2. MOUNT EXHAUST DUCT TIGHT TO WALL.

GENERAL FACILITY EXHAUST DETAIL
NO SCALE:

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GRILLES REGISTERS & DIFFUSERS SCHEDULE

SYMBOL	MAT'L	TYPE	MARGIN (NOTE 1)	INLET SIZE (INCH)	FACE SIZE (INCH)	VOLUME DAMPER REQ'D	FINISH	MANUFACTURER	MODEL	REMARKS
SD-1	STEEL	PANEL FACE	LAY-IN	SEE DWG.	24x24	YES	WHITE	TITUS	OMNI	FLUSH FACE PANEL
SD-2	STEEL	PANEL FACE	LAY-IN	SEE DWG.	12X12	YES	WHITE	TITUS	OMNI	FLUSH FACE PANEL
RG-1	STEEL	EGG CRATE	SURFACE	N/A	28X14	NO	WHITE	TITUS	50F	
EG-1	STEEL	EGG CRATE	1 1/4"	SEE DWG.	24X16	NO	WHITE	TITUS	50F	TWO REQUIRED
EG-2	STEEL	EGG CRATE	1 1/4"	SEE DWG.	8X8	NO	WHITE	TITUS	50F	

NOTES:
1. CONTRACTOR SHALL DETERMINE PROPER MARGIN STYLE TO MATCH CEILING CONSTRUCTION.
2. ALL RUN OUT DUCTWORK TO DIFFUSERS SHALL BE NECK SIZE UNLESS OTHERWISE NOTED.

LOUVER SCHEDULE

SYMBOL	SERVICE	CFM	SIZE W x H (IN.)	FREE AREA VEL. FPM	S.P. IN. W.C.	FINISH	MANUFACTURER	MODEL	REMARKS
IL-1	VENT AIR	1,500	30X30	490	0.1	MILL	GREENHECK	ESD-435	
IL-2	VENT AIR	1,500	30X30	490	0.1	MILL	GREENHECK	ESD-435	

FAN SCHEDULE

SYMBOL	SERVICE	CFM	S.P. IN. W.C.	FAN RPM (NOTE F)	DRIVE	MAX. AMCA SONES	BACKDRAFT DAMPER	MHP	VOLT-PHASE	DISCONNECT BY	DISCONNECT TYPE	MANUFACTURER	MODEL	REMARKS
EF-1	BATHROOM	75	.25	NA	DIRECT	1.5	GRAVITY	20.9 WATT	120/1	EC	N/A	BROAN	BE-8	NOTE 1
EF-2	GARAGE	200	.2	1,300	DIRECT	2.8	GRAVITY	0.100	120/0	EC	NON-FUSED	GREENHECK.	CUE-070	NOTE 2
EF-3	GARAGE	2,800	.2	1,081	BELT	13.6	GRAVITY	0.500	120/0	EC	NON-FUSED	GREENHECK.	CUBE-160	NOTE 3
EF-4	EXHAUST EXTRACTION	770	4	3,450	DIRECT	83 DBA	NA	1.000	208/1	EC	NON-FUSED	MONOXIVENT	D10-SS	NOTE 4
EF-5	EXHAUST EXTRACTION	770	4	3,450	DIRECT	83 DBA	NA	1.000	208/1	EC	NON-FUSED	MONOXIVENT	D10-SS	NOTE 4
CF-1	CIRCULATION FAN	N/A	NA	139	DIGITAL	<55	NA	1.000	208/1	EC	NON-FUSED	HUNTER	ECO-10	NOTE 5
CF-2	CIRCULATION FAN	N/A	NA	139	DIGITAL	<55	NA	1.000	208/1	EC	NON-FUSED	HUNTER	ECO-10	NOTE 5

NOTES:
1. INTERLOCK WITH BATHROOM LIGHT SWITCH.
2. FAN TO RUN CONTINUOUSLY. PROVIDE MANUAL SWITCH.
3. INTERLOCK WITH CONSPEC OPTIO V CO/NOx DETECTOR.
4. PROVIDE WITH MONOXIVENT MODEL 9000-W HOSE REEL AND 6" DIAMETER HOSE
5. PROVIDE WITH VARIABLE SPEED FAN CONTROLLER.

HVAC SYMBOLS

- 12 X 6 — AIR DUCT, W X H
- SUPPLY AIR UP
- SUPPLY AIR DN
- RETURN AIR UP
- RETURN AIR DN
- EXHAUST AIR UP
- EXHAUST AIR DN
- SUPPLY AIR OUTLET
- RETURN AIR INLET
- EXHAUST AIR INLET
- SD-A / 150 — TYPE (SEE SCHEDULE), GRILLES, REGISTERS, AND DIFFUSERS TAG, CFM
- TH — TEMPERATURE & HUMIDITY SENSOR
- TS — TEMPERATURE SENSOR
- T — THERMOSTAT
- MANUAL BALANCING DAMPER
- CONNECT TO EXISTING

RADIANT TUBE HEATER SCHEDULE

TAG	DESCRIPTION	HEATING: TUBE LENGTH FT	HEATING: PRES. IN.W.C.	HEATING: FUEL TYPE	HEATING: CONTROL	HEATING: INPUT BTU/H	HEATING: EMISSIVITY MIN.	ELECTRICAL: VOLT VOLTS	ELECTRICAL: FREQ HZ	ELECTRICAL: PHASE	ELECTRICAL: MCA AMPS	ELECTRICAL: MOP AMPS	BASIS OF DESIGN: MAKE	BASIS OF DESIGN: MODEL	BASIS OF DESIGN: WEIGHT LBS	REMARKS
RH-1	LOW INTENSITY, TWO-STAGE, INFRARED TUBE HEATER	30	14	LP	TWO-STAGE	75,000	0.92	120	60	1	1.7	15	RE-VERBER-RAY	DET-30-75	160	1, 2
RH-2	LOW INTENSITY, TWO-STAGE, INFRARED TUBE HEATER	40	14	LP	TWO-STAGE	125,000	0.92	120	60	1	1.7	15	RE-VERBER-RAY	DET-40-125	190	
RH-3	LOW INTENSITY, TWO-STAGE, INFRARED TUBE HEATER	40	14	LP	TWO-STAGE	125,000	0.92	120	60	1	1.7	15	RE-VERBER-RAY	DET-30-75	190	1, 2

1. PROVIDE WALL MOUNTED THERMOSTAT, ALUMINUM REFLECTORS (BLACK), MOUNTING HARDWARE, AND COMBUSTION AND EXHAUST AIR PIPING THROUGH THE EXTERIOR WALL.
2 SET THERMOSTATS TO MAINTAIN A SETPOINT OF 65°F.

FURNACE SCHEDULE

SYMBOL	SERVICE	FAN/BLOWER: CFM (HIGH SPEED)	FAN/BLOWER: EXT. S.P. IN. W.C. (NOT INCLUDING COIL)	FAN/BLOWER: MAX. COIL A.P.D. IN. W.C.	FAN/BLOWER: HP	FAN/BLOWER: RPM	FAN/BLOWER: AIR FLOW TYPE	ELECTRICAL: VOLT-PHASE	ELECTRICAL: DISCONNECT BY	ELECTRICAL: CONTROLLER/ STARTER BY (NOTE A)	HEATING: MBTUH INPUT HIGH FIRE	HEATING: MBTUH OUTPUT HIGH FIRE	HEATING: MBTUH INPUT LOW FIRE	HEATING: MBTUH OUTPUT LOW FIRE	EVAPORATOR: EAT °FDB	EVAPORATOR: EAT °FWB	EVAPORATOR: TOTAL MBH	CONDENSING UNIT - CU-1: AMBIENT AIR °F	CONDENSING UNIT - CU-1: MBH	CONDENSING UNIT - CU-1: SEER	CONDENSING UNIT - CU-1: VOLT-PHASE	CONDENSING UNIT - CU-1: FLA/ RLA	CONDENSING UNIT - CU-1: MCA	CONDENSING UNIT - CU-1: MOCP AMPS	CONDENSING UNIT - CU-1: DISCONNECT BY (NOTE A)	CONDENSING UNIT - CU-1: DISCONNECT TYPE (NOTE B)	MANUFACTURER	FURNACE MODEL	COND. UNIT MODEL	EVAP. COIL MODEL	REMARKS
F-1	OFFICE	1,080	1.25	0.2	0.5	VAR.	UPFLOW	120/1	EC	THERMOSTAT	60	58.2	30	29.1	80	67	24	95/60	24	15	208/1	41.2/8.2	10.9	15.0	EC	NON-FUSED	AMANA	ARVM97040	ALXS5NA	CAPFA24	

SCHEDULE ABBREVIATIONS:			
BHP	BRAKE HORSE POWER	MAX.	MAXIMUM
BTUH	BRITISH THERMAL UNIT PER HOUR	MBH	THOUSANDS OF BTU/HOUR
CAP.	CAPACITY	MCA	MINIMUM CIRCUIT AMPACITY
CFM	CUBIC FEET PER MINUTE	MHP	MOTOR HORSEPOWER
DIM.	DIMENSION	MIN.	MINIMUM
EFF	EFFICIENCY	MOCP	MAXIMUM OVERCURRENT PROTECTION
EWT	ENTERING WATER TEMPERATURE	NO.	NUMBER
FLA	FULL LOAD AMPS	OA	OUTSIDE AIR
FPM	FEET PER MINUTE	OCP	OVER-CURRENT PROTECTION
FT.	FEET	PSI	POUNDS PER SQUARE INCH
GAL	U.S. GALLON	PSIG	POUNDS PER SQUARE INCH GAUGE
GPM	GALLON PER MINUTE	REQ'D	REQUIRED
H	HEIGHT	RLA	RATED LOAD AMPS
HP	HORSEPOWER	RPM	REVOLUTIONS PER MINUTE
HR	HOUR	SCFM	STANDARD CUBIC FEET PER MINUTE
IN.	INCH	SQ. FT.	SQUARE FEET
KW	KILOWATTS	TEMP	TEMPERATURE
L	LENGTH	VOLT	VOLTAGE
LB	POUNDS	W	WIDTH
LF	LINEAR FEET	WC	WATER COLUMN
LWT	LEAVING WATER TEMPERATURE		

APPLICABLE CODES

CONTRACTOR SHALL COMPLY WITH APPLICABLE CODES AND LOCAL AMENDMENTS

BUILDING CODE:	INTERNATIONAL BUILDING CODE 2015
MECHANICAL CODE:	INTERNATIONAL MECHANICAL CODE 2021
PLUMBING CODE:	UNIFORM PLUMBING CODE 2021-AMENDED
LIFE SAFETY CODE:	NFPA 101 2021
MODEL ENERGY CODE:	IECC 2012
ELECTRICAL CODE:	NEC 2020 EDITION

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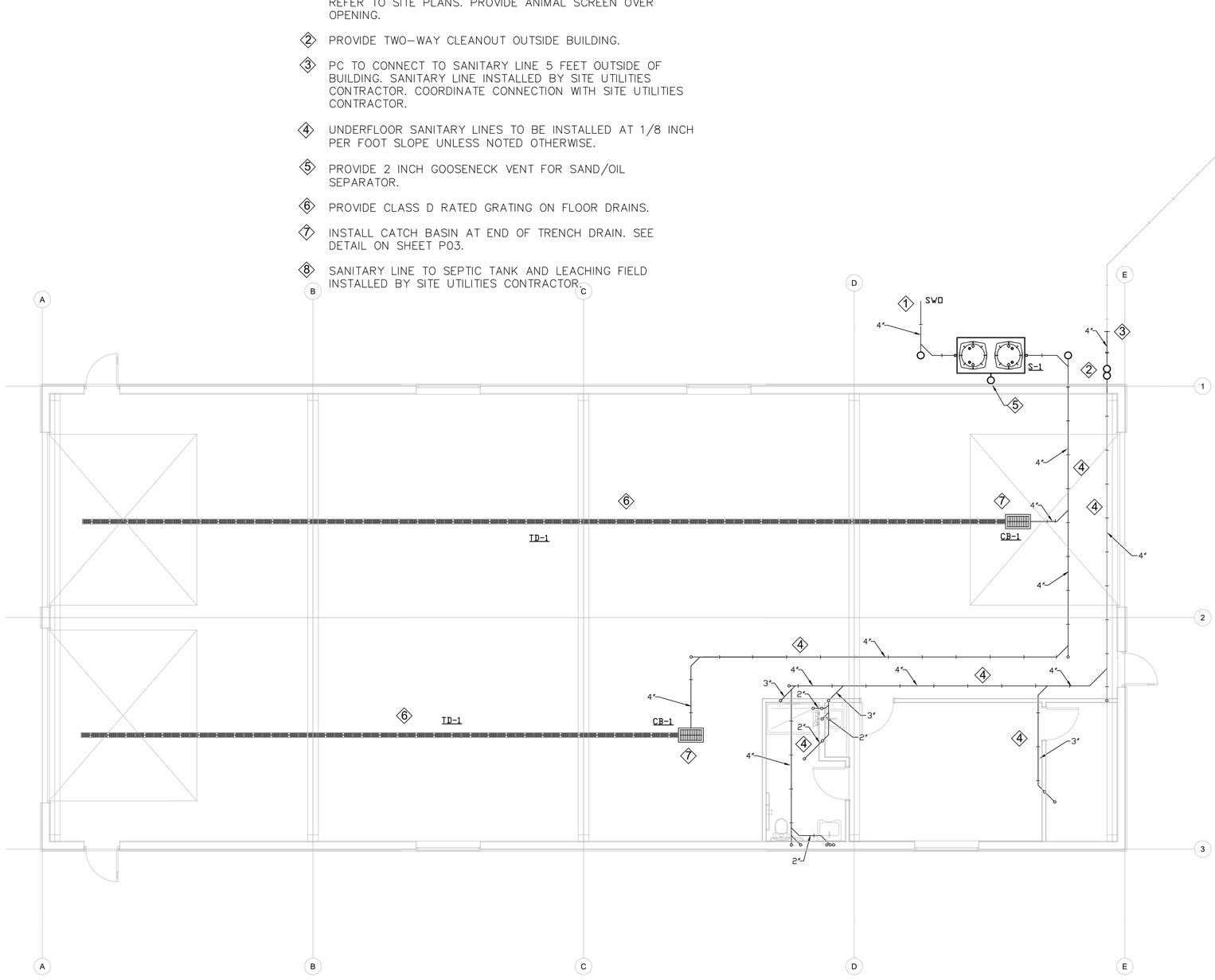
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PLUMBING KEYED NOTES

1. DAYLIGHT STORM DRAINAGE ON EXTERIOR SLOPED BANK. REFER TO SITE PLANS. PROVIDE ANIMAL SCREEN OVER OPENING.
2. PROVIDE TWO-WAY CLEANOUT OUTSIDE BUILDING.
3. PC TO CONNECT TO SANITARY LINE 5 FEET OUTSIDE OF BUILDING. SANITARY LINE INSTALLED BY SITE UTILITIES CONTRACTOR. COORDINATE CONNECTION WITH SITE UTILITIES CONTRACTOR.
4. UNDERFLOOR SANITARY LINES TO BE INSTALLED AT 1/8 INCH PER FOOT SLOPE UNLESS NOTED OTHERWISE.
5. PROVIDE 2 INCH GOOSENECK VENT FOR SAND/OIL SEPARATOR.
6. PROVIDE CLASS D RATED GRATING ON FLOOR DRAINS.
7. INSTALL CATCH BASIN AT END OF TRENCH DRAIN. SEE DETAIL ON SHEET P03.
8. SANITARY LINE TO SEPTIC TANK AND LEACHING FIELD INSTALLED BY SITE UTILITIES CONTRACTOR.



UNDERFLOOR PLUMBING PLAN

SCALE 3/16" = 1'-0"

GENERAL PLUMBING NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR INSTALLING PLUMBING SYSTEMS ACCORDING TO ALL APPLICABLE STATE AND LOCAL CODES AND ORDINANCES.
2. CONTRACTOR SHALL PAY ALL PERMIT FEES, PLAN REVIEW FEES, LICENSE FEES, INSPECTIONS, AND APPLICABLE TAXES.
3. PLUMBING CONTRACTOR TO COORDINATE INSTALLATION OF PLUMBING PIPING AND SYSTEMS WITH ALL OTHER TRADES.
4. DO ALL CUTTING AND PATCHING OF BUILDING MATERIALS AS REQUIRED FOR INSTALLATION OF COMPLETE AND WORKABLE SYSTEM. PATCHING SHALL MATCH EXISTING FINISHES AND CONSTRUCTION TO THE GREATEST EXTENT POSSIBLE.
5. ALL UNDERGROUND SANITARY PIPING TO BE SCHEDULE 80 PVC UNLESS OTHERWISE NOTED.
6. PLUMBING CONTRACTOR IS ADVISED THAT ALL LOCATIONS ARE APPROXIMATE. COORDINATE FINAL LOCATIONS WITH ALL OTHER TRADES AND THE OWNER WHERE REQUIRED.
7. ALL REQUIRED ROOF PENETRATIONS ARE TO BE PERFORMED AND REPAIRED BY OWNER'S APPROVED ROOFING CONTRACTOR.
8. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR HIS OWN WORK AND SHALL PROTECT THE WORK OF OTHER TRADES ALREADY INSTALLED FROM DAMAGE. ANY DAMAGE TO THE WORK OF OTHERS INCURRED BY THE PLUMBING CONTRACTOR IS TO BE REPLACES AT THE PLUMBING CONTRACTOR'S EXPENSE.
9. PLUMBING CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWINGS TO FAMILIARIZE HIMSELF WITH THE EXTENT OF THE PROJECT AND MORE SPECIFICALLY TO NOTE WHERE ARCHITECTURAL DETAILS MAY AFFECT THE PLUMBING INSTALLATION.
10. THESE DRAWINGS ARE NECESSARILY DIAGRAMMATIC IN NATURE AND INDICATE DESIGN INTENT. NOT ALL FITTINGS, OFFSETS, VENTS, DRAINS, ETC., ARE SHOWN. THE CONTRACTOR SHALL INCLUDE ALL FITTINGS, OFFSETS, DRAINS, HARDWARE AND ACCESSORIES AS REQUIRED TO PROVIDE A COMPLETE AND FUNCTIONING SYSTEM.
11. PC IS TO FIELD VERIFY LOCATION OF EXISTING SEWER AND CONNECT ALL NEW WORK ACCORDINGLY.
12. PC TO COORDINATE THE CUTTING AND PATCHING OF ALL EXISTING CONCRETE FLOORS WITH GC TO FACILITATE THE INSTALLATION OF NEW UNDERFLOOR SANITARY PIPING. ALL PATCHED SURFACES ARE TO MATCH EXISTING FINISHES.

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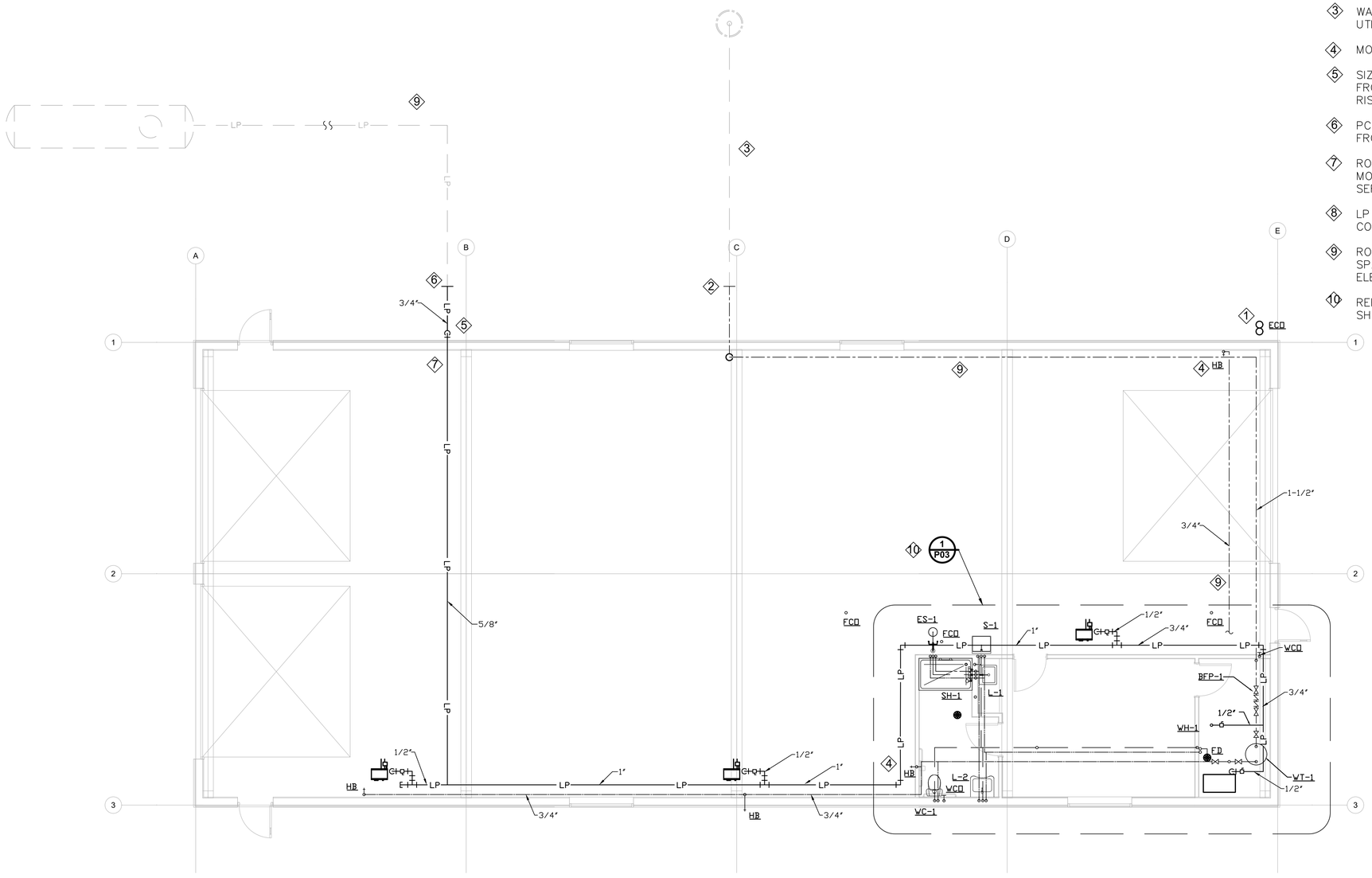
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A P02 **PLUMBING PLAN**

SCALE 3/16" = 1'-0"

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GENERAL PLUMBING NOTES:

1. SEE GENERAL PLUMBING NOTES ON SHEET P–01.

PLUMBING KEYED NOTES

1. PROVIDE TWO–WAY CLEANOUT OUTSIDE BUILDING.
2. PC TO CONNECT MAIN WATER LINE TO WELL WATER LINE 5 FEET OUTSIDE OF BUILDING. WELL WATER LINE INSTALLED BY SITE UTILITIES CONTRACTOR. COORDINATE CONNECTION WITH SITE UTILITIES CONTRACTOR.
3. WATER WELL AND WELL WATER LINE INSTALLED BY SITE UTILITIES CONTRACTOR.
4. MOUNT HOSE BIBB APPROXIMATELY 2 FEET A.F.F.
5. SIZING OF LP PIPING BASED ON ASSUMPTION OF 10 PSI LP FROM TANK. INSTALL SECONDARY PRESSURE REDUCER AT RISER TO FURNISH 14 INCHES W.C. TO APPLIANCES.
6. PC TO CONNECT LP SUPPLY LINE TO BURIED LP LINE 5 FEET FROM BUILDING. PC TO COORDINATE WITH LP CONTRACTOR.
7. ROUTE LP LINE UP FROM SECONDARY PRESSURE REDUCER. MOUNT HIGH IN CEILING SPACE. COORDINATE WITH OTHER SERVICE PIPING AND ELECTRICAL.
8. LP TANK AND BURIED SUPPLY PIPING INSTALLED BY LP CONTRACTOR.
9. ROUTE POTABLE WATER SUPPLY LINE HIGH IN CEILING SPACE. COORDINATE WITH OTHER SERVICE PIPING AND ELECTRICAL.
10. REFER TO ENLARGED OFFICE PLUMBING DETAILS 1 AND 2 SHEET P03.

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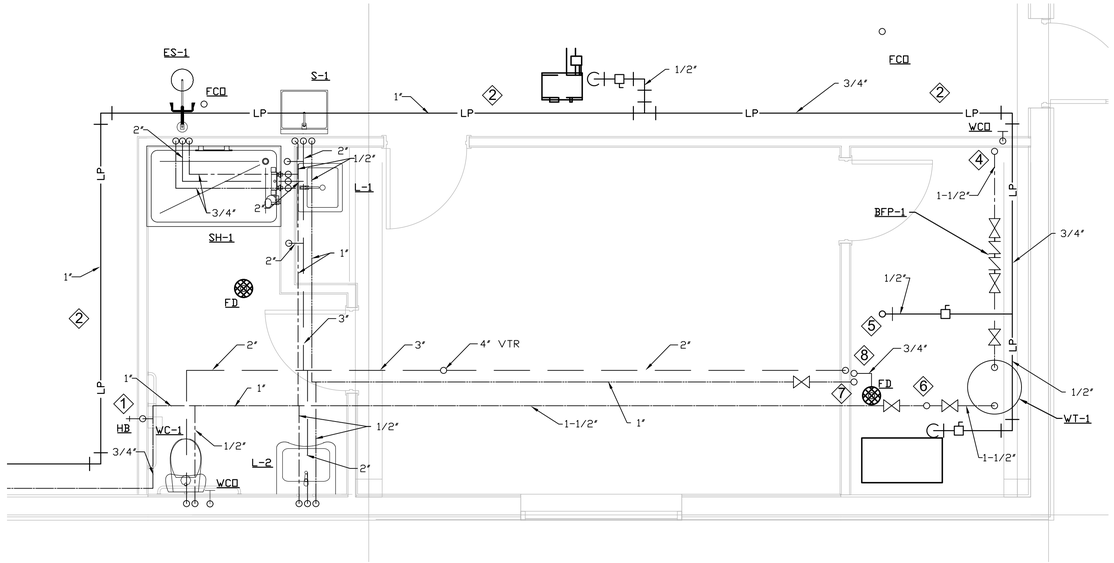
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PLUMBING PLAN

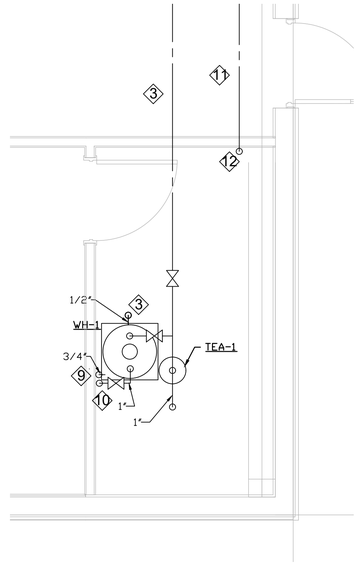
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1 P03 ENLARGED PLUMBING DETAIL
3/8"=1'-0"



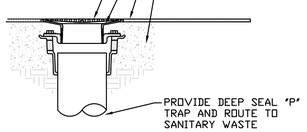
2 P03 MEZZANINE PLUMBING DETAIL
3/8"=1'-0"

GENERAL PLUMBING NOTES:

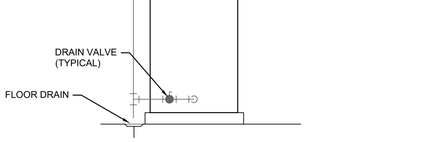
1. SEE GENERAL PLUMBING NOTES ON SHEET P-01.

3 PLUMBING KEYED NOTES

1. MOUNT HOSE BIBB APPROXIMATELY 2 FEET A.F.F. (TYP.)
2. SIZING OF LP PIPING BASED ON ASSUMPTION OF 10 PSI LP FROM TANK. SECONDARY PRESSURE REDUCER AT RISER TO FURNISH 14 INCHES W.C. TO APPLIANCES.
3. ROUTE POTABLE WATER SUPPLY LINE HIGH IN CEILING SPACE. COORDINATE WITH OTHER SERVICE PIPING AND ELECTRICAL.
4. 1-1/2" WELL WATER DOWN FROM ABOVE.
5. ROUTE 1/2" LP GAS UP TO MEZZANINE.
6. ROUTE 1" COLD WATER UP TO MEZZANINE.
7. 1" HOT WATER FROM ABOVE.
8. 3/4" DRAIN FROM ABOVE. ROUTE TO FLOOR DRAIN.
9. PROVIDE CATCH PAN AND ROUTE 3/4" DRAIN DOWN TO FLOOR DRAIN BELOW.
10. 1" HOT WATER DOWN.
11. ROUTE WELL WATER SUPPLY LINE HIGH IN CEILING SPACE. COORDINATE WITH OTHER SERVICE PIPING AND ELECTRICAL.
12. 1-1/2" WELL WATER DOWN.

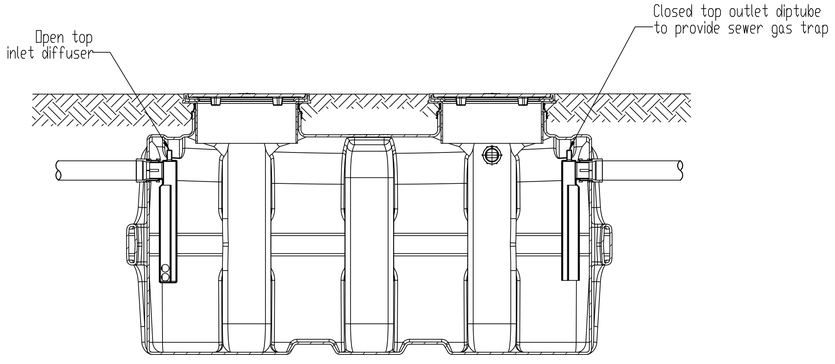


3 P03 FLOOR DRAIN DETAIL
N.T.S.

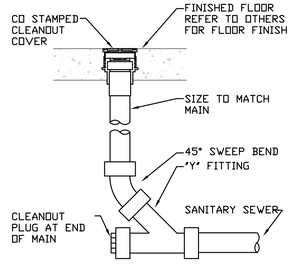


NOTES:
1. CONTRACTOR SHALL PROVIDE ALL PIPE, VALVES, AND ACCESSORIES AS REQUIRED BY WATER HEATER MANUFACTURER RECOMMENDATIONS.

5 P03 DOMESTIC WATER HEATER CONNECTION DETAIL
N.T.S.

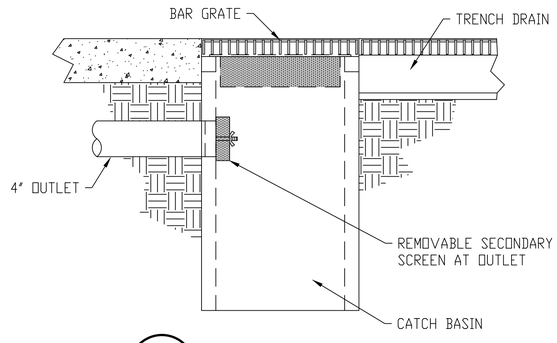


7 P03 SAND/OIL INTERCEPTOR DETAIL
N.T.S.



NOTE:
PIPE MATERIAL TO BE SAME AS SEWER LINE

4 P03 INTERIOR CLEANOUT DETAIL
N.T.S.



6 P03 TRECH DRAIN CATCH BASIN DETAIL
N.T.S.

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SAND AND OIL INTERCEPTOR SCHEDULE

TAG	DESCRIPTION	MAX. FLOWRATE	CAPACITY	LENGTH	MAX. DEPTH	MATERIAL	BASIS OF DESIGN MAKE	BASIS OF DESIGN MODEL	REMARKS
S-1	350 GALLON POLYETHYLENE, TWO COMPARTMENT, GARAGE SYSTEM	35 GPM	350 LB	72 IN	50 IN	STEEL	HIGHLAND TANK	OSI-350-2	1

REMARKS: 1. PROVIDE POWDER COATED STEEL COVERS AND EXTENSION RINGS AS NEEDED TO MATCH SANITARY SEWER AND FINISHED GRADE ELEVATIONS.

TRENCH DRAIN SCHEDULE

TAG	DESCRIPTION	LENGTH IN	WIDTH IN	DEPTH IN	GRATE RATING	GRATE TYPE	MAKE	MODEL	REMARKS
TD-1	TRENCH DRAIN SYSTEM W/ HEAVY-DUTY GALVANIZED FRAME	80	6	VAR.	CLASS C	ALVANIZED DUCTILE SLOTTE	ZURN	Z806	1
CB-1	TRENCH DRAIN CATCH BASIN SYTEM WITH TOP GRATE	24	12	38	CLASS C	ALVANIZED DUCTILE SLOTTE	ZURN	Z887	2

REMARKS 1. SLOPE TO CATCH BASIN.
2. ROUTE DISCHARGE TO SAND/OIL SEPARATOR.

BACKFLOW PREVENTER SCHEDULE (BFP)

PLAN MARK	SIZE (IN.)	SYSTEM	MAX. PRESSURE (PSI)	DESIGN FLOW (GPM)	Pd (PSIG)	TYPE	MANUFACTURER & MODEL
BFP-1	1-1/2	DOMESTIC WATER	175	20	4	DOUBLE CHECK	WATTS LF719

THERMAL EXPANSION ABSORBER SCHEDULE (TEA)

PLAN MARK	SIZE (IN.)	SYSTEM	MAX. PRESSURE (PSI)	TANK VOLUME (GAL.)	TANK ACCEPTANCE (GAL.)	TYPE	MANUFACTURER & MODEL
TEA-1	14" X 8"D	110° DOMESTIC HW	150	2	0.45	VERTICAL-DIAPHRAGHM	AMTROL THERM-X-TROL ST-5C

WATER HEATER SCHEDULE

UNIT NO	MANUFACTURER'S DESIGNATION	MODEL	LOCATION	SERVES	STORAGE CAPACITY	FUEL	INPUT MBTUH	RECOVERY RATE	TEMP. RISE	REMARKS
WH-1	A.O. SMITH PROLINE	GPDL 40	MECH RM	OFFICE	40 GAL.	LP	40	45 GAL.	90°F	NOTE 1, 2

NOTES: 1. PROVIDE WITH AMTROL THERM-X-TROL EXPANSION TANK.
2. SEALED COMBUSTION, DIRECT VENT UNIT.

PLUMBING FIXTURE SCHEDULE

TAG	ADA	TYPE	DESCRIPTION	CONNECTION SIZE CW	CW	HW	SAN	V	MAKE	MODEL	REMARKS
WC-1	YES	WATER CLOSET	COMMERCIAL, VITREOUS CHINA, FLOOR MOUNT, ADA HEIGHT WITH FULLY GLAZED 2-1/8" TRAPWAY	1"			4"	2"	AMERICAN STANDARD	3043.001	PROVIDE SLOAN ROYAL, 1.6 GPF EXPOSED FLUSH VALVE WITH ANGLE STOP AND SOFT CLOSE OPEN FRONT SEAT
SH-1	NO	SHOWER		1/2"	1/2"		2"	2"			
ES-1	YES	EMERGENCY EYEWASH/SHOWER	EMERGENCY EYEWASH/SHOWER COMBINATION, FLOOR MOUNTED, STAINLESS STEEL		1-1/2"				HAWS	8300	INCLUDE STAINLESS STEEL DUST COVER AND THERMOSTATIC MIXING VALVE
S-1	YES	SINK	STAINLESS STEEL, SELF-RIMMING, ADA COMPLIANT, 18 GAUGE 304 STAINLESS STEEL	1/2"	1/2"	1-1/2"		2"	ELKAY	LRAD2155	PROVIDE 8" CENTER SET GOOSENECK FAUCET WITH 4" WRIST BLADE HANDLES, ADA COMPLIANT WITH POINT-OF-USE THERMOSTATIC MIXING VALVE SET TO LIMIT HOT WATER TO 120°F.
L-1	YES	LAVATORY	COMMERCIAL, VITREOUS CHINA, WALL MOUNT, 21"x18", CONCEALED ARM SUPPORT	1/2"	1/2"	1-1/2"	1-1/4"		AMERICAN STANDARD	0356-041	SENSOR OPERATED FAUCET WITH SELF CHARGING BATTERY, 0.5 GPM, POINT-OF-USE THERMOSTATIC MIXING VALVE SET TO 100°F AND INCLUDE LAV GUARD ON P-TRAP
HB-1	NO	HOSE BIB	INTERIOR, WALL MOUNT WITH BACKFLOW PREVENTER	3/4"					WOODFORD	24	
FD-1	YES	FLOOR DRAIN	EPOXY COATED CAST IRON BODY WITN POLISHED NICKEL BRONZE STRAINER				2"	2"			SET GRATE 1/16" BELOW FINISHED FLOOR ELEVATION
ECO	NO	EXTERIOR CLEANOUT	EPOXY COATED CAST IRON BODY WITH DUCTILE IRON COVER				4"		ZURN	Z1400	
WCO	NO	WALL CLEANOUT	CAST IRON BODY, TAPERED THREAD PLUG, POLISHED STAINLESS COVER				4"		ZURN	Z1440	ROUND COVER WITH SET SCREW
FCO	YES	FLOOR CLEANOUT	EPOXY COATED CAST IRON BODY WITH 5" ROUND, GASKETED POLISHED NICKEL BRONZE TOP WITH BRASS PLUG				4"		ZURN	Z1400	SET TOP FLUSH WITH FINISHED FLOOR.

TANK SCHEDULE (TK)

MARK	CAPACITY (GAL.)	DIM. (DIA.X HT. IN.)	ACCEPTANCE (GAL)	MATERIAL	MANUFACTURER & MOD. NO.	REMARKS
WT-1	55	26 X 47	46.4	STEEL	AMTRO WELL-X-TROL MOD. WX-302D	1,2

REMARKS:
1. Heavy duty butyl diaphragm and antimicrobial lining.
2. Provide 12" High tank stand.

PLUMBING SYMBOL LIST

SYMBOL	DESCRIPTION
⋈	VALVE
—▷⋈⋈▷⋈—	BACKFLOW PREVENTER
◉	FLOOR DRAIN
—┼○	HOSE BIBB
—LP—	LP GAS
— - - —	COLD WATER
— - - —	HOT WATER
- - - - -	VENT
—⊣——⊣—	SANITARY
FD-4	MECHANICAL EQUIPMENT TAG
—○	ELBOW UP
—⊖	ELBOW DOWN
WCO	WALL CLEANOUT
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
VTR	VENT TO ROOF
SWO	STORM WATER OUTLET

SCHEDULE ABBREVIATIONS:

BHP	BRAKE HORSE POWER	MAX.	MAXIMUM
BTUH	BRITISH THERMAL UNIT PER HOUR	MBH	THOUSANDS OF BTU/HOUR
CAP.	CAPACITY	MCA	MINIMUM CIRCUIT AMPACITY
CFM	CUBIC FEET PER MINUTE	MHP	MOTOR HORSEPOWER
DIM.	DIMENSION	MIN.	MINIMUM
EFF	EFFICIENCY	MOCP	MAXIMUM OVERCURRENT PROTECTION
EWT	ENTERING WATER TEMPERATURE	NO.	NUMBER
FLA	FULL LOAD AMPS	OA	OUTSIDE AIR
FPM	FEET PER MINUTE	OCP	OVER-CURRENT PROTECTION
FT.	FEET	PSI	POUNDS PER SQUARE INCH
GAL	U.S. GALLON	PSIG	POUNDS PER SQUARE INCH GAUGE
GPM	GALLON PER MINUTE	REQ'D	REQUIRED
H	HEIGHT	RLA	RATED LOAD AMPS
HP	HORSEPOWER	RPM	REVOLUTIONS PER MINUTE
HR	HOUR	SCFM	STANDARD CUBIC FEET PER MINUTE
IN.	INCH	SQ. FT.	SQUARE FEET
KW	KILOWATTS	TEMP	TEMPERATURE
L	LENGTH	VOLT	VOLTAGE
LB	POUNDS	W	WIDTH
LF	LINEAR FEET	WC	WATER COLUMN
LWT	LEAVING WATER TEMPERATURE		

APPLICABLE CODES

CONTRACTOR SHALL COMPLY WITH APPLICABLE CODES AND LOCAL AMENDMENTS

BUILDING CODE:	INTERNATIONAL BUILDING CODE 2015
MECHANICAL CODE:	INTERNATIONAL MECHANICAL CODE 2021
PLUMBING CODE:	UNIFORM PLUMBING CODE 2021-AMENDED
LIFE SAFETY CODE:	NFPA 101 2021
MODEL ENERGY CODE:	IECC 2012
ELECTRICAL CODE:	NEC 2020 EDITION

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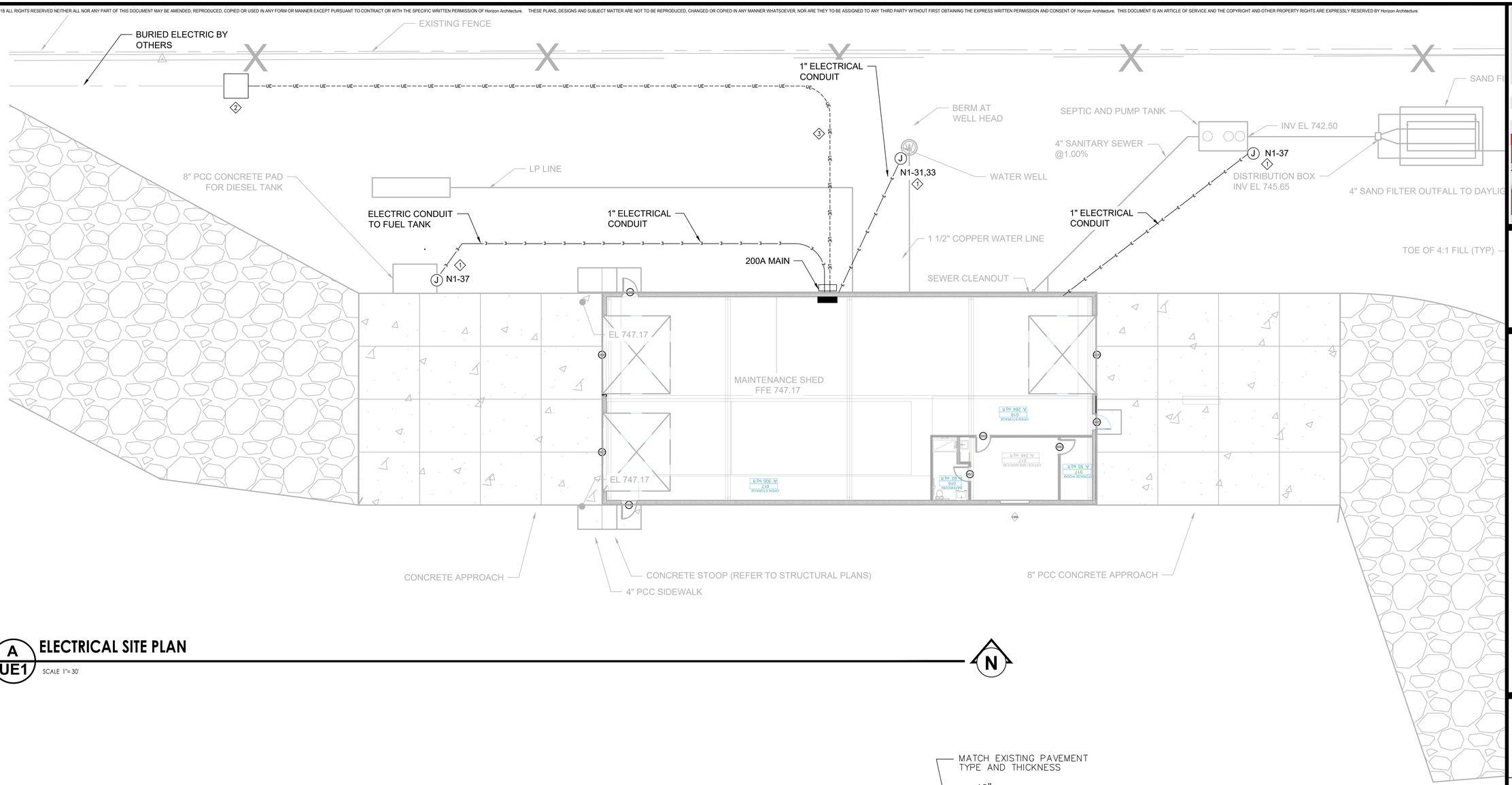
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PLUMBING NOTES AND SCHEDULES

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A UE1 ELECTRICAL SITE PLAN

SCALE 1"= 30'

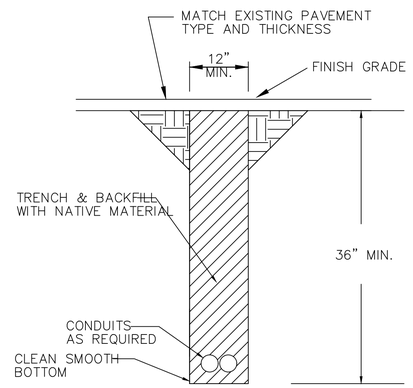
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GENERAL ELECTRICAL SITE NOTES:

1. IT IS RECOMMENDED THAT THE CONTRACTOR VISIT THE SITE BEFORE SUBMITTING COST PROPOSAL TO BECOME FAMILIAR WITH EXISTING CONDITIONS.
2. CONTRACTOR SHALL COORDINATE SITE WORK WITH OTHER TRADES.
3. REFERENCE ONE-LINE DIAGRAM AND FEEDER SCHEDULE FOR SETS AND SIZE OF CONDUIT AND WIRE.

SPECIFIC ELECTRICAL KEYED NOTES – DETAIL A :

1. PROVIDE (2) #10 CU & (1) #10 CU GND. IN 1" CONDUIT. FEED FROM PANEL N1. PROVIDE FINAL CONNECTIONS. REFERENCE PANEL SCHEDULE
2. PRIMARY CONDUIT AND CONDUCTORS ARE PROVIDED BY UTILITY. TRENCH AND BACKFILL IS BY UTILITY COMPANY. METERING IS BY UTILITY COMPANY. TRANSFORMER AND PAD IS BY THE UTILITY COMPANY. REFERENCE ONE-LINE ON SHEET E03 FOR ADDITIONAL INFORMATION.
3. SECONDARY CONDUIT, WIRING, TRENCH AND BACK FILL IS BY THE CONTRACTOR.



B UE1 TYPICAL TRENCH DETAIL

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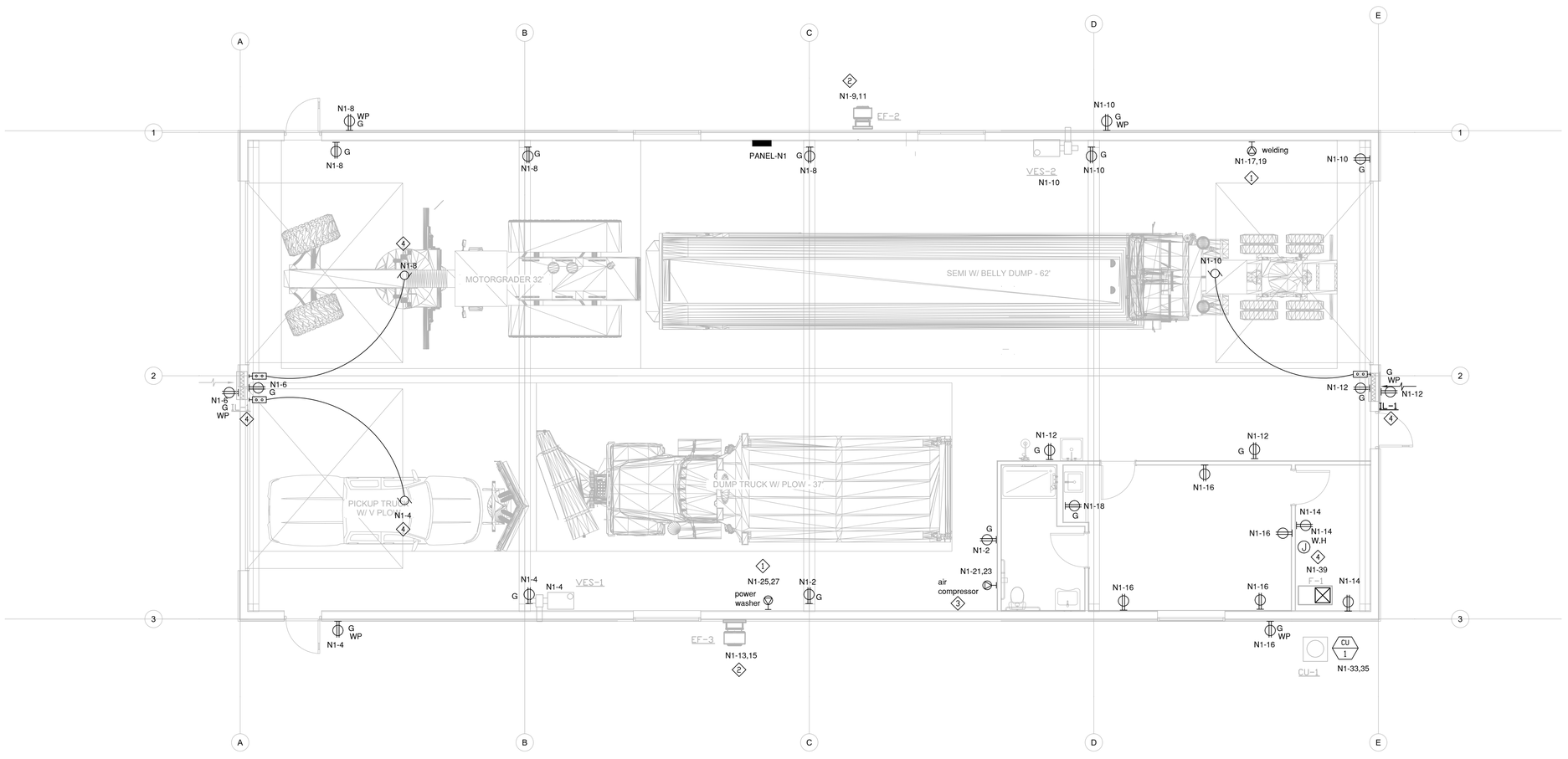
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ELECTRICAL SITE PLAN

UE1

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A E01 POWER PLAN

SCALE 3/16" = 1' - 0"

N

GENERAL NOTES:

1. CONTRACTOR SHALL INSTALL DISCONNECT SWITCHES SUCH THAT NEC CLEARANCES ARE MET. LOCATIONS OF DISCONNECTS ARE DIAGRAMMATIC.
2. ALL BRANCH CIRCUITS SHALL HAVE GROUND CONDUCTORS.
3.
4. PROVIDE SEPARATE NEUTRAL FOR EACH BRANCH CIRCUIT PHASE CONDUCTOR.
5. MAXIMUM OF THREE (3) CURRENT CARRYING CONDUCTORS TO CONDUIT.
6. HOMERUN CIRCUITS SHALL CONTAIN NO MORE THAN THREE (3) HOT CONDUCTORS PER CONDUIT.

SPECIFIC ELECTRICAL KEYED NOTES - DETAIL A :

1. PROVIDE (2) #10 CU & (1) #10 CU GND. IN 3/4" CONDUIT. FEED FROM PANEL N1. VERIFY EXACT POWER REQUIREMENTS. REFERENCE PANEL SCHEDULE
2. PROVIDE (3) #12 CU & (1) #12 CU GND. IN 3/4" CONDUIT. FEED FROM PANEL N1. REFERENCE PANEL SCHEDULE
3. PROVIDE (2) #6 CU & (1) #8 CU GND. IN 1" CONDUIT. FEED FROM PANEL N1. VERIFY EXACT POWER REQUIREMENTS. REFERENCE PANEL SCHEDULE
4. FRACTIONAL HP. 120V, PROVIDE (2) #12 CU & (1) #12 CU GND. IN 3/4" CONDUIT. FEED FROM PANEL N1. REFERENCE PANEL SCHEDULE

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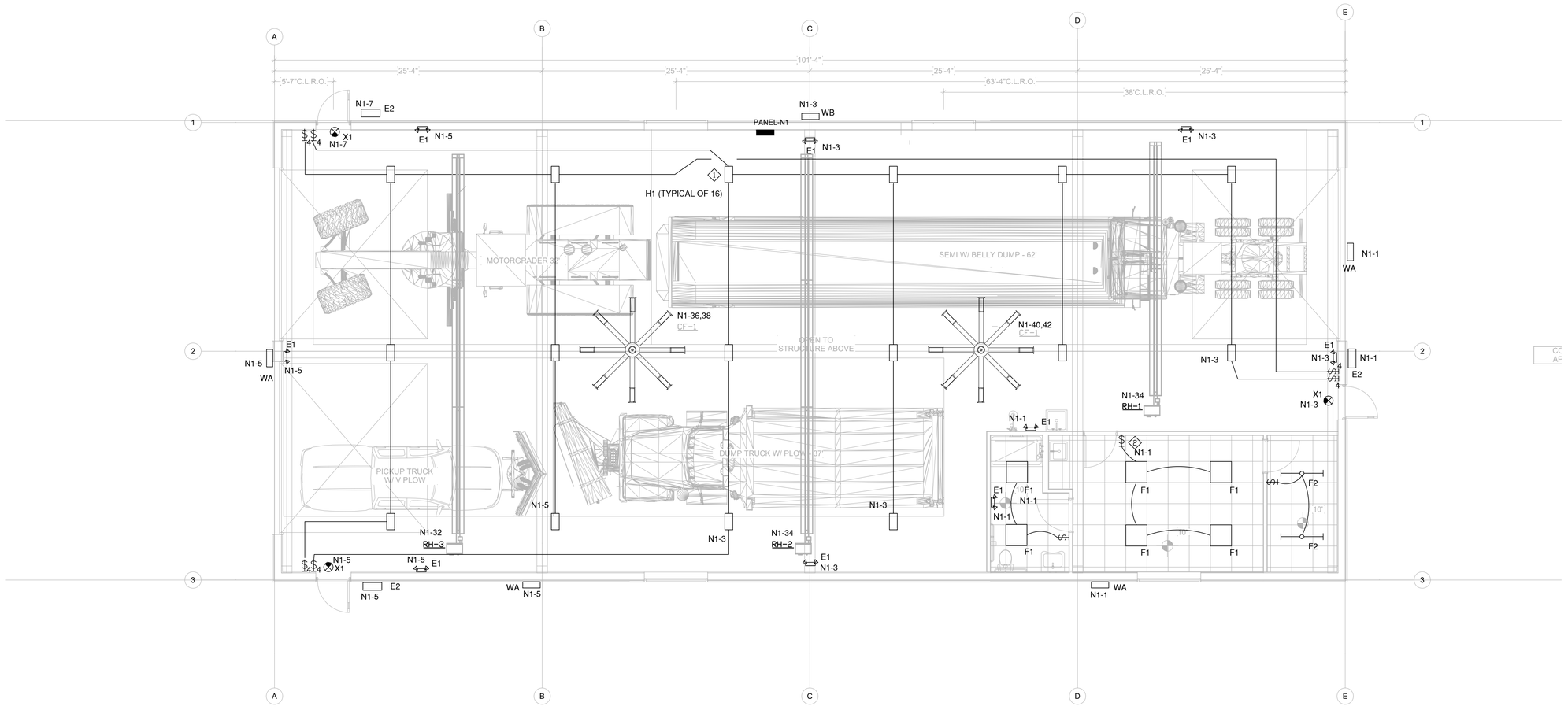
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POWER PLAN

E01

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A E02 LIGHTING PLAN

SCALE 3/16" = 1' - 0"

N

GENERAL LIGHTING NOTES:

1. TYPICAL LIGHTING HOMERUN CIRCUITS SHALL BE #12 PHASE WIRE, #12 NEUTRAL WIRE, #12 GND, 3/4"C. FOR 120V, 20A HOMERUN CIRCUITS THAT EXCEED 75 FOOT FEEDER LENGTH, OVERSIZE CONDUCTOR TO #10 DUE TO VOLTAGE DROP.
2. 120V LIGHTING HOMERUN CIRCUITS SHALL CONTAIN NO MORE THAN (3) HOT OR SWITCHED CONDUCTORS PER CONDUIT.
3. EXIT SIGNS THAT ARE NOT WALL MOUNTED SHALL BE PENDANT OR CEILING MOUNTED. CONTRACTOR SHALL SUPPLY WALL MOUNT, CEILING MOUNT, OR PENDANT MOUNT ACCESSORIES AS REQUIRED.
4. LIGHTING CIRCUITS SHALL HAVE DEDICATED NEUTRALS.
5. EXIT SIGNS SHALL BE CONNECTED TO UNSWITCHED LIGHTING CIRCUITS SERVING AREA.
6. CONTRACTOR SHALL DEMOLISH AND DISPOSE OF ALL EXISTING ABANDONED CONDUIT, WIRING & CABLING.

SPECIFIC ELECTRICAL KEYED NOTES - DETAIL A :

1. PROVIDE NEW LIGHT FIXTURE(S). REFERENCE LIGHT FIXTURE SCHEDULE FOR ADDITIONAL INFORMATION. (TYPICAL)
2. PROVIDE DIMMING SWITCHES. (TYPICAL)

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LIGHTING PLAN

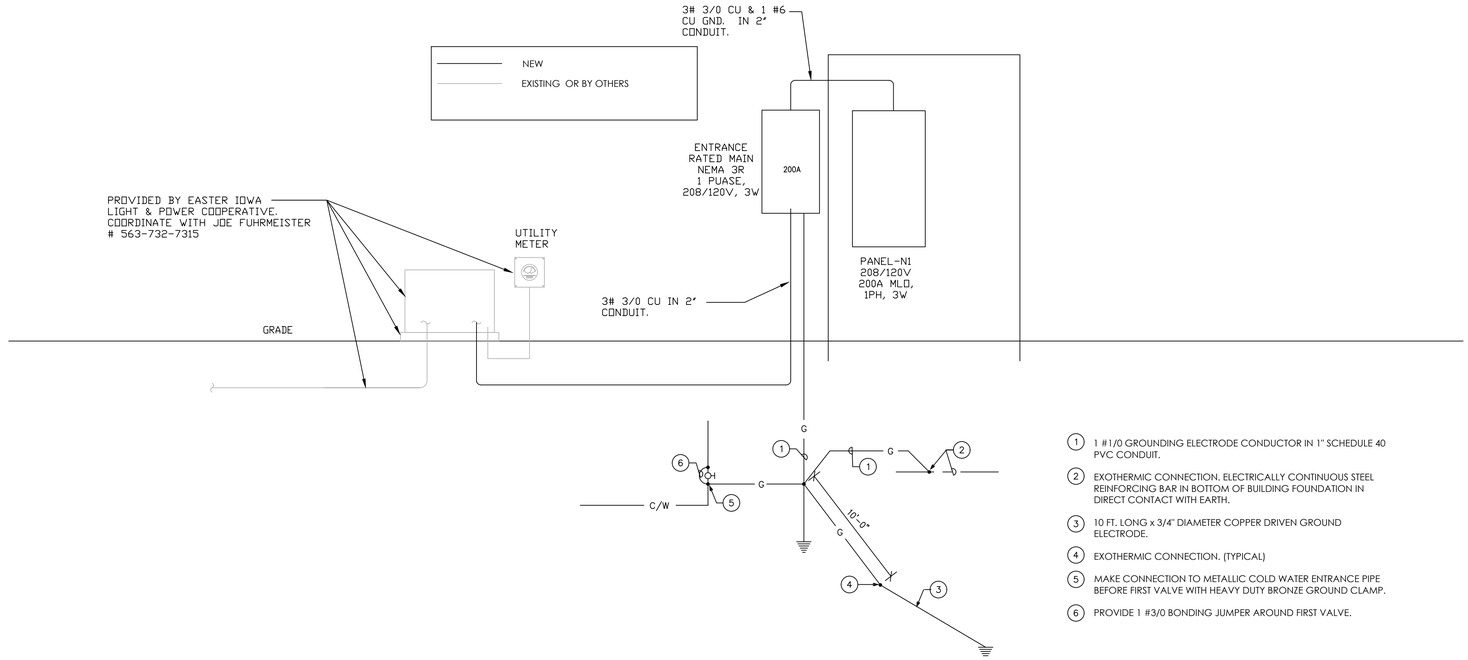
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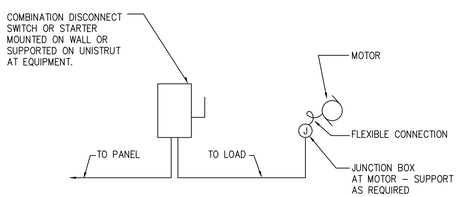
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GENERAL ELECTRICAL NOTES

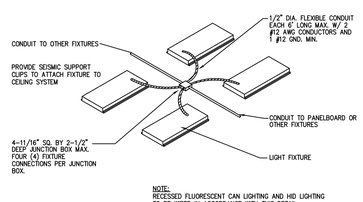
1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (N.E.C.) AND GOVERNING MUNICIPAL, STATE AND LOCAL CODES. ALL MATERIAL SHALL BE NEW AND SHALL BEAR THE U.L. LABEL WHERE APPLICABLE.
2. CONTRACTOR SHALL MAKE ALL NECESSARY, CUTTING AND DO ALL THE REPATCHING AS NECESSARY FOR THE PROPER EXECUTION OF THIS WORK.
3. AFTER COMPLETION OF THE INSTALLATION, THE SYSTEM SHALL TEST FREE FROM SHORT CIRCUITS AND GROUNDS.
4. WHERE ELECTRICAL CONDUCTORS ARE INSTALLED IN CONDUIT, THE CONDUIT SHALL COMPLY WITH THE N.E.C. REQUIREMENTS.
5. ALL CONDUCTOR SHALL BE COPPER. NO CONDUCTOR SHALL BE SMALLER THAN #12 AWG AND SHALL BE RATED FOR 600VOLTS THWN OR THHN INSULATION. INSTALL A GROUNDING CONDUCTOR WITH ALL CIRCUITS, UNLESS NOTED OTHERWISE, SIZED PER N.E.C.250-122.
6. VERIFY BREAKER AND CORRESPONDING WIRE SIZES FOR ALL ELECTRICAL EQUIPMENT. DONOT ORDER MATERIAL BEFORE VERIFYING BREAKER & WIRE SIZE. REPORT ANY DISCREPANCY IMMEDIATLY TO THE ENGINEER OF RECORD.
7. VERIFY AVAILABLE INTERRUPTING CURRENT(AIC) WITH POWER COMPANY. EQUIPMENT AIC RATING MUST BE LARGER THAN THE POWER COMPANY AIC OR MUST BE PROTECTED ON THE LINE SIDE WITH A CURRENT LIMITING DEVICE.
8. SAFETY SWITCHES SHALL BE SQUARE 'D', GENERAL ELECTRIC, OR WESTINGHOUSE, FUSED OR NON-FUSED AND SIZED AS INDICATED. NEMA 3R WHEN EXPOSED TO WEATHER
9. PANELS SHALL BE SQUARE 'D', GENERAL ELECTRIC OR EQUAL, TYPE AND NUMBER OF BREAKERS AS INDICATED ON PANEL SCHEDULE. STENCIL PANEL DESIGNATION ON INSIDE OF PANEL. ALL TWO-POLE BREAKERS SHALL BE COMMON TRIP. PROVIDE TYPE WRITTEN SCHEDULE IN EACH LOAD CENTERS. CONNECTION TO MAIN BUS SHALL BE WITH BURNDY ANNULAR COMPRESSION LUGS.
10. ALL EXTERIOR ELECTRICAL EQUIPMENT SHALL BE ANCHORED TO COMPLY WITH LOCAL CODE FOR WIND RESISTANCE.
11. IT IS NOT THE INTENT OF THESE PLANS TO SHOW EVERY MINOR DETAIL OF CONSTRUCTION. THE CONTRACTOR IS EXPECTED TO FURNISH AND INSTALL ALL ITEMS FOR A COMPLETE ELECTRICAL SYSTEM AND PROVIDE ALL REQUIREMENTS NECESSARY FOR EQUIPMENT TO BE PLACED IN PROPER WORKING ORDER.
12. ALL WORK SHALL BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR IN A FIRST CLASS WORKMANLIKE MANNER. THE COMPLETED SYSTEM SHALL BE FULLY OPERATIVE AND ACCEPTED BY THE OWNER.
13. LOAD DATA IS BASED ON INFORMATION GIVEN ENGINEER AT TIME OF DESIGN. VERIFY ALL EQUIPMENT AND PANEL SIZES BEFORE ORDERING AND BEFORE INSTALLATION.
14. ALL BRANCH CIRCUITS SHALL HAVE GROUND CONDUCTORS.
15. THE ELECTRICAL CONTRACTOR SHALL PROVIDE, IF REQUIRED, ADJUSTMENTS (±) 6'-0" IN THE LOCATION OF ALL SYSTEM DEVICES, FIXTURES, OUTLETS, PANELS, ETC. IN ORDER TO EXPEDITE THE ELECTRICAL WORK. THE POSITION OF ALL WORK AS SHOWN IS INTENDED TO BE FIXED AND IN THE PROPER LOCATION. SUCH REQUIRED ADJUSTMENT SHALL BE DETERMINED BY THE A/E.
16. PROVIDE SEPARATE NEUTRAL FOR EACH BRANCH CIRCUIT PHASE CONDUCTOR.



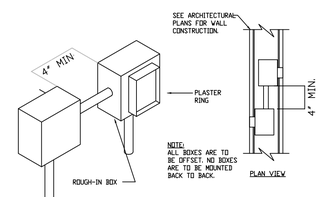
POWER SYSTEMS	
SYMBOL	DESCRIPTION
SWBD 1	LARGE ELECTRICAL EQUIPMENT WITH DESIGNATION
	DISTRIBUTION PANEL WITH DESIGNATION
	BRANCH PANEL WITH DESIGNATION
EF 3	MECHANICAL EQUIPMENT CONNECTION WITH DESIGNATION
	MOTOR WITH DESIGNATION
	DISCONNECT SWITCH
	MOTOR STARTER
	COMBINATION MOTOR STARTER / DISCONNECT SWITCH
VFD	VARIABLE FREQUENCY DRIVE
J	JUNCTION BOX
F1 — FIXTURE TYPE 23-1 — CIRCUIT-RELAY a — CONTROL DEVICE	
	DUPLEX RECEPTACLE
G	GROUND FAULT CIRCUIT INTERRUPTER
	CEILING MOUNTED DUPLEX RECEPTACLE
	SIMPLEX SPECIAL RECEPTACLE
	DATA/TELEPHONE ROUGH-IN, WALL MOUNTED



A / E03 **EQUIPMENT WIRING - TYPICAL**
SCALE = NTS



B / E03 TYPICAL RECESSED LIGHT FIXTURE WIRING DETAIL
SCALE = NTS



C / E03 ELECTRIC OUTLETS SIDE BY SIDE DETAIL
SCALE = NTS

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MICHAEL@HORIZON-ARCHITECTURE.COM
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PROFESSIONAL ENGINEER — MOHAMMED N. BUHASAN — IOWA
EXPIRES DEC. 31, 2027

Muscatine County Satellite Facility

INDEPENDENCE AVENUE
MUSCATINE, IA 52761

MARK	DATE	DESCRIPTION
1	3/5/2026	OUT FOR BID

PROJECT NO: #Pln
DATE: 3/5/2025
DRAWN BY: MAH
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SHEET TITLE
ELECTRICAL DETAILS AND ONE-LINE

E03

MEP ENGINEER:
INNOVATIVE ENGINEERS, INC.
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LIGHTING FIXTURE SCHEDULE

MARK	FIXTURE		VOLT.	LAMP		MOUNTING		MANUFACTURER		REMARKS
	TYPE	DIFFUSER		# & WATTS	TYPE	TYPE	HT.	NAME	SERIES NO.	
F1	2 X 2 TROFFER	ACRYLIC	UNV	3000LM	LED 4000K	RECESS.	CEILG.	XTRALIGHT COLUMBIA WILLIAMS	LPR LCAT LT	
F2	STRIP LIGHT 4'	ACRYLIC PRISMATIC	UNV	4100LM	LED 4000K	SURFACE	CEILG.	XTRALIGHT COLUMBIA WILLIAMS	LRS CSL FS	
H1	HIGH BAY	ACRLYIC, FROSTED LENS	UNV	18000LM	LED 4000K	CABLE	CEILG.	XTRALIGHT COLUMBIA ALBEO	SHB PELA ABC1	PROVIDE OCCUPANCY SENSOR TO COMMUNICATE WIRELESSLY WITH OTHER FIXTURES
WA	WALL PACK		UNV	4500LM 48L-35	LED 4000K	SURFACE	WALL	XTRALIGHT COLUMBIA BEACON	VNTW EQUAL RWL1	TYPE IV DISTRIBUTION PROVIDE WITH A PHOTO SENSOR COORDINATE COLOR SELECTION WITH ARCHITECT
WB	WALL PACK		UNV	13000LM 160L-95	LED 4000K	SURFACE	WALL	XTRALIGHT COLUMBIA BEACON	VNTW EQUAL RWL2	TYPE IV DISTRIBUTION PROVIDE WITH A PHOTO SENSOR COORDINATE COLOR SELECTION WITH ARCHITECT
E1	EMERGENCY LIGHT	N/A	UNV	2-5W	LED	SURFACE	WALL	BARRON COLUMBIA COMPASS	NFT EQUAL CU2HL	WITH BATTERY BACKUP SELF DIAGNOSTIC
E2	OUTDOOR EGRESS	N/A	UNV	2-5W	LED	SURFACE	WALL	BARRON COLUMBIA COMPASS	TRL EQUAL CUW	WITH BATTERY BACKUP SELF DIAGNOSTIC COLD WEATHER BATTERY
X1	SINGLE FACE EXIT SIGN	N/A	UNV	N/A	LED	SURFACE	CEILG	BARRON COLUMBIA COMPASS	400S EQUAL CCE	RED PANEL COLOR, SINGLE FACE EMERGENCY (NICad Battery) SELF DIAGNOSTIC

ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR TRIM TYPES, COORDINATE WITH REFLECTED CEILING PLANS

BRANCH PANEL NAME	VOLTAGE	PHASE	WIRE		MAIN OCP	AIC RATING
PANEL N1	120/ 208	1	3	200A	MLO	22,000
200% NEUTRAL	DE: L=LIGHTING, R=RECEPTACLES, M=MOTORS, K=KITCH					SURFACE MOUNTING
NEMA 1	COPPER GROUND BAR, ISOLATED GROUND BAR					DOUBLE MAIN LUGS

LOAD	CODE	POLE	BKR	CKT#	A	B	CKT#	BKR	POLE	CODE	LOAD
LIGHTS	L	1	20	1	1,300						
					180		2	20	1	R	RECEPTACLES
LIGHTS	L	1	20	3		1,100					
						360	4	20	1	R	RECEPTACLES
LIGHTS	L	1	20	5	1,000						
						360	6	20	1	R	RECEPTACLES
SPARE		1	20	7							
					720		8	20	1	R	RECEPTACLES
EF-2	M	2	20	9		800					
						540	10	20	1	R	RECEPTACLES
	M	2	20	11	800						
						900	12	20	1	R	RECEPTACLES
EF-3	M	2	20	13	800						
					360		14	20	1	R	RECEPTACLES
	M	2	20	15		800					
						720	16	20	1	R	RECEPTACLES
WELDING OUTLET	R	2	30	17	2,000						
						1,500	18	20	1	R	MICROWAVE
	R	2	30	19	2,000						
							20	25	1		SPARE
AIR COMPRESSOR	M	2	40	21		2,300					
							22	25	1		SPARE
	M	2	40	23	2,300						
							24	20	1		SPARE
POWER WASHER	M	2	30	25	2,800						
							26	20	1		SPARE
	M	2	30	27		2,800					
							28	20	1		SPARE
WATER WELL HEAD PUMP	M	2	20	29	1,000						
							30	20	1		SPARE
	M	2	20	31	1,000						
					500		32	20	1	R	RADIANT HEAT
ACU-1	M	2	20	33		1,300					
						500	34	20	1	R	RADIANT HEAT
	M	2	20	35	1,300						
							36	20	1	R	HUNTER FAN
FUEL TANK PUMP	M	1	20	37	1,200						
							38	20	1	R	
FURNACE F-1	M	1	20	39		500					
							40	20	1	R	HUNTER FAN
SPARE		1	20	41							
							42	20	1	R	

19,260	PHASE A	RECEPT-VA @	per NEC	TCL VA	33,740
		LIGHTS-VA @	100%	DEMAND VA	21,865
14,480	PHASE B	MOTOR-VA @	95%	HI-PH CONN. A	93
33,740	TCL	KITCHEN-VA @	80%	DEMAND A	105

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PROFESSIONAL ENGINEER
MOHAMMED N. BUHASAN
EXPIRES DEC. 31, 2027

Muscatine County Satellite Facility

INDEPENDENCE AVENUE
MUSCATINE, IA 52761

MARK	DATE	DESCRIPTION
1	3/5/2026	OUT FOR BID

PROJECT NO: **#Pln**
DATE: **3/5/2025**
DRAWN BY: **MAH**
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SHEET TITLE

ELECTRICAL SCHEDULES

MEP ENGINEER:
INNOVATIVE ENGINEERS, INC.
2871 Heinz Rd. Suite B, Iowa City, IA 52240
T 319.855.4115 I F 319.351.0070
www.InnovativeEngineersInc.com

E04

Muscatine Satellite Building

Date: 3/26/2026

Quantity	Description	Unit	Unit cost	Total O&P	Notes
	Civil Site Work				
			Subtotal	**$ 183,000.00**	
	Exterior Shell and Finishes				
			Subtotal	**$ 266,357.36**	
	Interior Fitout and Finishes				
			Subtotal	**$ 24,521.55**	
	MECHANICAL, ELECTRICAL AND PLUMBING				
			Subtotal	**$ 87,649.00**	

Project subtotal	$	561,527.91
General conditions, overhead and profit, and contingency	$	168,458.37
Total Opinion of Probable Costs	**$**	**729,986.28**

PROJECT MANUAL

MUSCATINE COUNTY SATELLITE FACILITY

INDEPENDENCE AVENUE
MUSCATINE IA 52761

owner
MUSCATINE COUNTY
414 EAST THIRD STREET
SUITE 101
MUSCATINE, IA 52761

architect
HORIZON ARCHITECTURE
3116 ALPINE COURT
IOWA CITY, IA 52245
(563) 506-4965
Michael Nolan: michael@horizon-architecture.com

HA PROJECT NO. G24-030

JANUARY 23RD, 2026

Section	Title	
000010	Cover	
000020	Project Manual Title Sheet	
000050	Project Manual Index	
000060	Schedule of Drawings	
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002213	SUPPLEMENTARY INSTRUCTIONS TO BIDDERS	
002215	BID FORM FOR GENERAL CONSTRUCTION	
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012500	SUBSTITUTION PROCEDURES	
012600	CONTRACT MODIFICATION PROCEDURES	
012900	PAYMENT PROCEDURES	
013100	PROJECT MANAGEMENT AND COORDINATION	
013300	SUBMITTAL PROCEDURES	
014000	QUALITY REQUIREMENTS	
014050	STRUCTURAL TEST AND SPECIAL INSPECTIONS	
014200	REFERENCES	
015000	TEMPORARY FACILITIES AND CONTROLS	
016000	PRODUCT REQUIREMENTS	
017300	EXECUTION	
017419	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL	
017700	CLOSEOUT PROCEDURES	
ATTACHMENTS		
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DIVISION 05 - METALS		
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061000	ROUGH CARPENTRY	
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072100	THERMAL INSULATION	
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083613	SECTIONAL DOORS	
084313	ALUMINUM-FRAMED STOREFRONT	
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092900	GYPSUM BOARD	
095123	ACOUSTICAL TILE CEILINGS	

096513	RESILIENT BASE AND ACCESSORIES	
099123	INTERIOR PAINTING	
DIVISION 10 - SPECAILITES		
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104413	FIRE PROTECTION CABINETS	
DIVISON 13 – SPECIAL CONSTRUCTION		
133419	METAL BUILDING SYSTEMS	
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220523.12	BALL VALVES FOR PLUMBING PIPING	
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221319.13	SANITARY DRAINS	
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230529	HANGERS AND SUPPORTS FOR HVAC	
233700	AIR OUTLETS AND INLETS	
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC	
230713	DUCTWORK INSULATION	
230923.12	CONTROL DAMPERS	
231126	FACILITY LIQUEFIED-PETROLEUM GAS PIPING	
232300	REFRIGERANT PIPING	
233113	METAL DUCTS	
233300	AIR DUCT ACCESSORIES	
233346	FLEXIBLE DUCTS	
233713.13	AIR DIFFUSERS	
233713.23	REGISTERS AND GRILLES	
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E01	POWER PLAN
E02	LIGHTING PLAN
E03	ELECTRICAL DETAILS AND ONE-LINE
E04	ELECTRCIAL SCHEDULES

000060 – SCHEDULE OF DRAWINGS

END OF SECTION 000060

DRAFT

AIA® Document A701™ – 2018

Instructions to Bidders

for the following Project:
(Name, location, and detailed description)

Muscatine County Engineer and Zoning Building
3610 Park Avenue West
Muscatine, IA 52761

THE OWNER:
(Name, legal status, address, and other information)

« Muscatine County
414 East Third Street, Suite 101
Muscatine, IA 52761

THE ARCHITECT:
(Name, legal status, address, and other information)

« Michael Nolan, AIA »« Horizon Architecture »
«3116 Alpine Court »
« Iowa City, IA 52245 »
« 563-506-4965
michael@horizon-architecture.com »« »

TABLE OF ARTICLES

1 DEFINITIONS

2 BIDDER'S REPRESENTATIONS

3 BIDDING DOCUMENTS

4 BIDDING PROCEDURES

5 CONSIDERATION OF BIDS

6 POST-BID INFORMATION

7 PERFORMANCE BOND AND PAYMENT BOND

8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

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User Notes: (1333086519)

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- **.1** the Bidder has read and understands the Bidding Documents;
- **.2** the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- **.3** the Bid complies with the Bidding Documents;
- **.4** the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- **.5** the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- **.6** the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

«Digital documents available by request. »

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper

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documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

«Email to michael@horizon-architecture.com »

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

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§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

«Addenda will be issued as required via direct email to interested bidders. »

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Insert the form and amount of bid security.)

«See bid Form Section 00 2215 »

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

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§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning«60»days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

«See Supplemental Instructions Sectio 00 2213 »

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:
(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

« n/a »

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

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§ 5.2 Rejection of Bids
Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)
§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION
§ 6.1 Contractor's Qualification Statement
Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability
A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals
§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

.1 a designation of the Work to be performed with the Bidder's own forces;

.2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and

.3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND
§ 7.1 Bond Requirements
§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

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§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

« See Supplemental Instructions Section 00 2213 »

§ 7.2 Time of Delivery and Form of Bonds
§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

« »

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

« n.a »

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

« »

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

« n/a »

.5 Drawings

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Number	Title	Date
33 Total Pages	Set Issued for Bidding	3/20/2026

.6 Specifications

Section	Title	Date	Pages
See Project Manual		3/20/2026	494

.7 Addenda:

Number	Date	Pages

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017.)

«n/a »

[« N/A »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents listed below:
(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

«n/a »

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SECTION 002213 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

ARCHITECT:

Horizon Architecture
3116 Alpine Court
Iowa City, IA 52245
michael@horizon-architecture.com

PROJECT ADDRESS:

Muscatine County Community Services Building
315 Iowa Avenue
Muscatine, IA 52761

OWNER:

Muscatine County
414 East Third Street, Suite 101
Muscatine, IA 52761

To be considered, Bids must be made in accordance with these Instructions to Bidders.

1.1 DOCUMENTS:

A. Bona fide Prime Contract Bidders may obtain a complete set of Drawings and Project Manual from the issuing office designated in the Advertisement or Invitation to Bid.

1.2 EXAMINATION:

A. Bidders shall CAREFULLY EXAMINE the Documents and the construction Site to obtain first-hand knowledge of existing condition and limitations. FAILURE TO VISIT THE SITE WILL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR SAME nor will extra payment requests be considered for conditions which could have been determined by examination of the Site and Documents.

B. Existing Conditions: It is highly encouraged that all prime Contract Bidders visit the site to become familiar with existing conditions which affect the Work. Subcontract Bidders are encouraged to visit the site also.

C. The site is available for review at any time, no appointment is required.

D. Pre-Bid Conference**:** A pre-bid conference will be held at 9 am, Wednesday, July 9th, 2025; meet at the lower lobby of the Muscatine County Community Services Building (door on lower level, south side of building), 315 Iowa Avenue, Muscatine, IA 52761. **All Contract Bidders are encouraged to attend. Representatives of the Architect and the Owner will be in attendance.**

1. A primary focus of the conference is to review project requirements, ask questions, and permit Bidders' inspection of the existing conditions.

E. Hard copy project documents are available upon request. For each copy requested, the bidder shall provide a $100/set deposit (check) or an MBI Plan Card. Deposits will be returned to bidders who return the documents within 14 calendar days of bid opening.

1.3 QUESTIONS:

A. Submit all questions about the Drawings and Project Manual to the Architect, in writing at michael@horizon-architecture.com. Replies will be issued to all Prime Bidders of record as Addenda to the Drawings and Specifications and will become part of the Contract. If any item of Work is shown on the Drawings and not specified or mentioned in the Specifications and not shown on the Drawings, the matter should be brought to the attention of the Architect during bidding so an addendum can be issued correcting the omission. If such correction is not made, the Work in question shall be considered to be required as if it has been specified and shown on the Drawings. The Architect WILL NOT BE RESPONSIBLE FOR ORAL CLARIFICATION. Questions received less than four (4) working days before the bid opening cannot be answered.

1.4 PRE-BID SUBSTITUTIONS:

A. Bids shall be based on the products or manufacturers specified. This is not intended to eliminate competition from other manufacturers other than those specified. Any bidder who desires to substitute materials or equipment which he believes to be equal to those specified, must submit a written request for substitution to the Architect as specified in Section 016000 at least 7 days prior to the bid due date.

1.5 BASIS OF BID:

A. No combination of Bids or assignments will be considered unless so noted in the bidding documents.

B. Failure to acknowledge any addendum or any other item listed on the BID FORM may be cause for rejection of the bid.

1.6 PREPARATION OF BIDS:

A. Bids shall be made on unaltered BID FORMS. **Fill in all blank spaces and submit PDF file via email.**

B. Bids shall be signed in ink with name typed below signature. Where Bidder is a corporation, Bids must be signed with the legal name of the corporation followed by the name of the State of incorporation and the legal signature of an officer authorized to bind the corporation to a contract. ALL UNSIGNED BIDS SHALL BE REJECTED.

C. Bidders shall submit, with their bid, two fully executed copies of

1. Contractor’s Qualification Statement, AIA Document A305 or similar. (Note: Financial Statement need not be submitted with bid but may be required prior to award.)

1.7 BID SECURITY:

A. Bid Security shall be made payable to Muscatine County, in the amount of 10 percent (10%) of the Base Bid sum. Security shall be CERTIFIED CHECK, BANK CASHIERS CHECK or AIA A310 BID BOND issued by the Surety licensed to conduct business in the state in which the Project is being constructed. The Owner reserves the right to approve the sufficiency of the required bid security.

B. The successful bidder's Security will be retained until it has signed the Contract and furnished the required PAYMENT and PERFORMANCE BONDS. The Owner reserves the right to retain the Security of the next three (3) lowest bidders until the lowest Bidder enters into a Contract or until sixty (60) days after bid opening, whichever is the shorter. All other Bid Security will be returned as soon as practical. If any Bidder refuses to enter into a Contract, the Owner will retain its Bid Security as liquidated damages, but not as a penalty.

C. The Bid Security is to be submitted and attached to the BID FORM at the time of submission of Bids.

1.8 PERFORMANCE BOND, PAYMENT BOND AND INSURANCE:

A. Successful Bidders shall be required to furnish and pay for Bonds covering faithful performance of the Contract and payment of all obligations arising there under. Furnish Bonds in the amount of 100% of Bid sum and in such form as the Owner may prescribe and with Surety Company acceptable to the Owner. The bond cost must be included in the bid amount.

B. The Contractor shall deliver said Bonds to the Owner not later than ten (10) days after issuance of the Intention to Award or Notice to Proceed and prior to executing the Agreement. Failure or neglecting to deliver said Bonds, as specified, shall be considered as having abandoned the Contract and the Bid Security will be retained as liquidated damages.

C. The Contractor shall hold a current insurance policy as required by Iowa State Law. Additionally, the contractor shall provide Builders Risk Coverage and provide the owner a Certificate of Insurance identifying the owner as the certificate holder prior to commencement of construction activities.

D. At all times while performing Work under this Agreement, Contractor must maintain the following insurance coverage:

1. Minimum **General Liability**: $1,000,000 each occurrence and $2,000,000 general aggregate

2. Minimum Commercial **Automobile Liability**: $1,000,000 combined single limit i. Non owned autos & hired autos coverage only if Contractor uses subcontractors

3. Minimum **Umbrella Liability**: $1,000,000

4. Minimum **Workers Compensation**: (a) statutory limits and / or (b) $500,000 for: i. Each accident; ii. Disease – each employee; and iii. Disease – policy limit.

5. Builder's Risk – Up to Project Bid, $50,000 ea for offsite storage and transit

1.9 NO-LIEN:

A. This is property of a public Owner and, as such, may not be liened. For the protection of sub-contractors and the contractor's suppliers, a payment bond will be required.

1.10 SUBMITTAL:

A. Submit **a digital PDF containing Bid form, bid bond and qualifications statement with optional password protection to michael@horizon-architecture.com and administration@co.muscatine.ia.us** no later than 2:00 p.m. on Thursday, April 23, 2026. Transmit the password (optional) to open the document at or after 2:00 p.m. on Thursday, April 23, 2026. An informal bid opening will take place beginning at 2:00 p.m. on Thursday, April 23, 2026 via Zoom meeting. The meeting can be attended by all interested using the following:

https://us02web.zoom.us/j/86383066458?pwd=KxMyAapEBXBfix7WTsJu5sKOuWsXah.1

Meeting ID: 863 8306 6458

Passcode: 892195

1.11 MODIFICATION AND WITHDRAWAL**:**

A. Bids may not be modified after submittal. Bidders may withdraw Bids at any time up to the scheduled time for opening of bids.

B. A Bid may not be modified, withdrawn or canceled by the Bidder for sixty (60) days after the opening of the bids and each Bidder so agrees in submitting its Bid, unless the award of the Contract is delayed due to required approvals of other governmental agencies, in which case, Bids shall be irrevocable for one hundred twenty (120).

1.12 DISQUALIFICATION AND REJECTION OF BIDS:

A. The Owner reserves the right to disqualify Bids, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices upon the part of the Bidder.

B. The Owner has the right to reject bids, which are not responsive, and to not award to any bidder which is deemed to be not responsible.

1.13 OPENING BIDS:

A. An informal bid opening will be held at 2:00 p.m. on Thursday, April 23, 2026. See instructions for access in section 1.10. Bids will be publicly announced at 9:00 a.m. on Monday, April 27, 2026 at the Muscatine County Supervisor's Meeting. Bid results will not be official until all information is reviewed, tabulated, and presented to and approved by the Muscatine County Board of Supervisors.

1.14 AWARD:

A. The Contract will be awarded on the basis of the lowest responsive base bid as may appear on the Bid Form.

1.15 EXECUTION OF CONTRACT:

A. The Owner reserves the right to accept any Bid, and to reject any or all Bids.

B. Each Bidder shall be prepared, if so requested by the Owner, to present evidence of his experience, qualifications, and financial ability to carry out the terms of the Contract.

C. Notwithstanding any delay in the preparation and execution of the formal Contract Agreement, the Contractor shall be prepared and agrees to commence work within thirty (30) days after notice to proceed is given, or on date stipulated in such order.

D. The accepted Contractor shall assist and cooperate with the Owner in preparing the formal Contract Agreement, and within five (5) days following its presentation shall execute same and return it to the Owner.

1.16 TIME OF COMPLETION:

A. The Contractor shall begin the Work on the date of commencement as defined in subparagraph 8.1.2 of the General Conditions or as identified in the Notice to Proceed issued by the Architect and carry the Work forward expeditiously to achieve Substantial Completion of the work in accordance with the project schedule developed for the project.

B. The Contractor understands and agrees that TIME IS OF THE ESSENCE and that all schedule dates are minimum performance dates. Notwithstanding anything to the contrary contained in the Contract Documents, should the progress of the Project be ahead of scheduled dates, the Contractor agrees to coordinate and complete its Work in accordance with the actual Project progress and the actual pace of the Project without additional compensation. In said case, contractor waives any right to claim that it has been accelerated.

1. The date for Award of Contracts for construction is anticipated on Monday, April 27, 2026, with the Notice to Proceed being issued no later than May 4, 2026.

a. Submittals, shop drawings, ordering of materials and equipment are to be submitted in a timely manner following the Notice to Proceed. Coordination and cooperation of all contractors is required to insure that products and equipment needed by various contracts shall be available as work progresses to meet the schedule for completion of the project.

2. Construction Activities at the site:

a. No date is set for substantial completion but a Fall 2026 completion is highly desired.

1.17 GOVERNING LAWS AND REGULATIONS:

A. The Bidder's attention is directed to the fact that all applicable Federal and State laws, municipal ordinances and codes, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and the following paragraphs B and C are deemed to be included in the Contract the same as though herein written in full.

B. FEDERAL OCCUPATIONAL SAFETY & HEALTH ACT OF 1970 (O.S.H.A.):

1. The Contractor is required to promptly perform all reporting and recording as required by said Act.

C. PROHIBITION OF CASH ALLOWANCES:

1. Cash allowances are not to be included in the bid specification.

END OF SECTION 002213

SECTION 002215 - BID FORM

BID FORM

FOR

GENERAL CONSTRUCTION CONTRACT

Name of Contractor _____

Contact Name and Title _____

Contact's Telephone Number_____

Owner's Name and Title_____

Owner's Telephone Number _____

In conformity with the Plans and Specifications as prepared by Horizon Architecture, 3116 Alpine Court, Iowa City, IA 52245, after an examination of the site and the Bidding and Contract Documents, the undersigned submits this proposal and enclosed herewith a bond in an amount of not less than ten percent (10%) of the total of the hereinafter stated Base Bid, made payable to or indemnifying Muscatine County 414 East Third Street, Suite 101, Muscatine, IA 52761 which it is understood will be held by the Owner, as security as provided in the Instructions to Bidders, if this proposal or any part thereof is accepted by the Owner, and the undersigned shall fail to furnish approved bonds and execute the Agreement within ten (10) days from the date of issuance of the award. Should the Owner fail to make an award on this project through no fault or failure on the part of the Bidder, then the Owner shall return said bid security.

It is hereby certified that the undersigned is the only person(s) interested in this proposal as principal, and that the proposal is made without collusion with any person, firm or corporation.

Bidder hereby agrees to execute the Agreement and furnish surety company bonds in the amount of one hundred percent (100%) of the Contract Price for the Performance Bond and Labor and Material Payment Bond, within ten (10) days after mailing by the Owner of notice of award, and to begin work with ten (10) days after date of Notice to Proceed.

Bidder guarantees that, if awarded contract, he will furnish and deliver all materials, tools, equipment, tests transportation, secure all permits and licenses, do and perform all labor, supervision and all means of construction, pay all fees and do all incidental work, and to execute, construct and finish, in an expeditious, substantial and workmanlike manner, in accordance with the plans and specifications, to the complete satisfaction and acceptance of the Owner, for the Work of this Contract.

It is understood that the Owner, reserves the right to reject any or all proposals, or part thereof, or items therein and to waive technicalities required for the best interest of the Owner. It is further understood that competency and responsibility of bidders will receive consideration before the award of the contract. A certified copy of the Contractor's Qualification Statement, AIA Document A-305 must be submitted with the Bid Form.

Contractor/Bidder acknowledges that time is of the essence and that the scope of work to be performed is to be commenced and completed in a reasonable timeframe. The County desires project completion in Fall of 2027. Contractor/Bidder acknowledges that with the submission of this bid the schedule for project, identified in the Supplementary Instructions to Bidders, will be maintained.

The bidder agrees that he will not assign his bid or any of his rights or interests thereunder without the written consent of the Owner. In the event of a discrepancy between the verbiage (words) and numbers entered here below, the verbiage shall govern.

Bid Withdrawal

This proposal is submitted with the definite understanding that it will not be withdrawn for a period of sixty (60) days after Bids are due, or any authorized postponement thereof.

THE BID, as called for, is submitted as follows:

A. BASE BIDS:

1. For all **General Construction Work**, as shown and specified in the Contract Documents for the lump sum of:

   _____

   Dollars ($ _____)

B. UNIT COSTS:

a. Replacement of Limestone Veneer (8”x24”) to match existing. Unit cost includes removal of existing, provide new unit and install including all anchoring and grouting. Cost is per unit:

   _____

   Dollars ($ _____)/Unit

C. ATTACHMENTS:

The following documents, having been executed by the Undersigned, are attached and are made a condition of this Bid:

1. Contractor's Qualification Statement.

D. ACCEPTANCE OF ADDENDA:

In submitting this proposal, I have received and included in this bid, the instructions and information contained in the following Addenda:

Addendum No.	**Dated**
_____	_____
_____	_____
_____	_____

E. BID SECURITY:

The Bid Security attached in the sum of

_____ Dollars ($)

is to become the property of the Owner, in the event the Contract is not executed within the time set forth in the Supplemental Instructions to Bidders, as liquidated damages for the delay and additional expenses to the Owner caused thereby.

F. SIGNATURES:

The Undersigned here certifies that this Proposal is genuine and not a sham, collusive or fraudulent or made in the interest of or in behalf of any person, firm or corporation not herein named; and that the Undersigned has not, directly or indirectly, inducted or solicited any bidder to submit a sham bid, or any other person, firm or corporation from bidding, and that the Undersigned has not, in any manner, sought by collusion to secure for himself any advantage over any other Bidder.

Respectfully submitted:

* _____
(Company)

_____
(Business Address)

By: _____
(SEAL) (Signature)

Name/Title: _____
(Typed)

Telephone Number: _____

Individual to Contact for this Contract:

_____
(Typed Name)

Attest:

By: _____
(Title)

*When the bidder is a corporation: The _____ is a

Corporation organized and existing under the laws of _____.

END OF BID FORM

SECTION 011000
SUMMARY

PART 1 - GENERAL

1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

B. Related Requirements:

1. Division 1 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Muscatine County Satellite Facility

B. Project Location: Independence Ave, Muscatine, Iowa 52761

C. Owner: Muscatine County Engineer and Highway Department

1. Owner's Representative: Bryan Horesowsky bryan.horesowsky@co.muscatine.ia.us

D. Architect: Horizon Architecture 3116 Alpine Court Iowa City, IA 52245 (563) 506-4965

1. Michael Nolan, AIA

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

B. The work to be performed consists of the construction of a new Pre-engineered Metal Building for the storage of commercial vehicles for use by the Muscatine County Engineer and Highway Department. The structure consists of concrete foundations and flatwork, metal framed walls and roof, standing seam metal roofing, metal siding, aluminum storefront windows, sectional doors, and hollow metal doors. Interior work includes metal stud framing with batt insulation, installation of drywall, painting, installation of kitchen and bathroom fixtures and finishes. Mechanical work includes the installation of heating and cooling ductwork and appliances for the office and storage space. Electrical work includes installation of lighting and electrical

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equipment. Site work consists of well and septic installation, retaining walls, concrete flatwork, re-grading of the driveway, concrete paving.

C. Contract Type: Single Prime Contract.

1.5 ACCESS TO SITE

A. General: Contractor shall have unlimited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limited to areas within the construction limits. Avoid any operations that shall disrupt the Owner’s property or neighboring properties.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction (AHJ).

B. On-Site Work Hours: As allowed by AHJ.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 1 General Requirements: Requirements of Sections in Division 1 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and /or scheduled on Drawings.

END OF SECTION

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SECTION 012900
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

    a. Application for Payment forms with continuation sheets.
    b. Submittal schedule.
    c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Construction Manager as Agent at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.

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b. Name of Construction Manager as Agent or Architect's project number.
c. Contractor's name and address.
d. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

1) Labor.
2) Materials.
3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
b. At a minimum the following line items shall be shown and “broken out” as part of the General Conditions portion of the Contract as a separate line item:

1) Insurance and Bonds
2) Temporary Protection
3) Continuous Cleaning
4) Final Cleaning
5) Shop Drawings and Product Submittals
6) Construction Meeting Attendance
7) Punch List

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

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1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Construction Manager as Agent or Architect and Construction Manager and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Submit Application for Payment to Construction Manager as Agent by the 25th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Construction Manager as Agent.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

1. Include Iowa Title Guaranty Commercial forms with each Application for Payment: General Contractor's Sworn Statement, Unconditional Lien Waver from Contractor, Unconditional Lien Wavers from Subcontractors, and Conditional Lien Wavier for the current Application for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager as Agent will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
5. Each Application for Payment is subject to a 5% retainage to be released at the completion of the project.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.

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c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager as Agent by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Certificates of insurance and insurance policies.
5. Performance and payment bonds.

H. Application for Payment at Substantial Completion: After Construction Manager as Agent and Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
2. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
3. AIA Document G707, "Consent of Surety to Final Payment."
4. Evidence that claims have been settled.

PART 2 - PART 2 PRODUCTS (Not Used)
PART 3 - PART 3 EXECUTION (Not Used)

END OF SECTION

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SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

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d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within ten days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for

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change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

    a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    b. Requested substitution provides sustainable design characteristics that specified product provided.
    c. Substitution request is fully documented and properly submitted.
    d. Requested substitution will not adversely affect Contractor's construction schedule.
    e. Requested substitution has received necessary approvals of authorities having jurisdiction.
    f. Requested substitution is compatible with other portions of the Work.
    g. Requested substitution has been coordinated with other portions of the Work.
    h. Requested substitution provides specified warranty.
    i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

C. Substitutions for Convenience-1: Architect will consider requests for substitution if received within 10 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

    a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    b. Requested substitution does not require extensive revisions to the Contract Documents.
    c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    d. Requested substitution provides sustainable design characteristics that specified product provided.
    e. Substitution request is fully documented and properly submitted.
    f. Requested substitution will not adversely affect Contractor's construction schedule.
    g. Requested substitution has received necessary approvals of authorities having jurisdiction.
    h. Requested substitution is compatible with other portions of the Work.
    i. Requested substitution has been coordinated with other portions of the Work.
    j. Requested substitution provides specified warranty.
    k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

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PART 3 - PART 1 EXECUTION (Not Used)

END OF SECTION

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SECTION 012600
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1.3 MINOR CHANGES IN THE WORK

A. Construction Manager as Agent or Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Construction Manager as Agent or Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Construction Manager as Agent or Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to the

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Construction Manager as Agent.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Construction Manager as Agent will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Construction Manager as Agent may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PART 2 PRODUCTS (Not Used)
PART 3 - PART 3 EXECUTION (Not Used)

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SECTION 012900
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

    a. Application for Payment forms with continuation sheets.
    b. Submittal schedule.
    c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Construction Manager as Agent at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.

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b. Name of Construction Manager as Agent or Architect's project number.
c. Contractor's name and address.
d. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

1) Labor.
2) Materials.
3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
b. At a minimum the following line items shall be shown and “broken out” as part of the General Conditions portion of the Contract as a separate line item:

1) Insurance and Bonds
2) Temporary Protection
3) Continuous Cleaning
4) Final Cleaning
5) Shop Drawings and Product Submittals
6) Construction Meeting Attendance
7) Punch List

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

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1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Construction Manager as Agent or Architect and Construction Manager and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Submit Application for Payment to Construction Manager as Agent by the 25th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Construction Manager as Agent.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

1. Include Iowa Title Guaranty Commercial forms with each Application for Payment: General Contractor's Sworn Statement, Unconditional Lien Waver from Contractor, Unconditional Lien Wavers from Subcontractors, and Conditional Lien Wavier for the current Application for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager as Agent will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
5. Each Application for Payment is subject to a 5% retainage to be released at the completion of the project.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.

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c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager as Agent by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Certificates of insurance and insurance policies.
5. Performance and payment bonds.

H. Application for Payment at Substantial Completion: After Construction Manager as Agent and Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
2. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
3. AIA Document G707, "Consent of Surety to Final Payment."
4. Evidence that claims have been settled.

PART 2 - PART 2 PRODUCTS (Not Used)
PART 3 - PART 3 EXECUTION (Not Used)

END OF SECTION

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SECTION 013100
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Digital project management procedures.
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
2. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request for Information. Request from Owner, Construction Manager as Agent and Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular

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telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and in prominent location inbuilt facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Construction Manager as Agent or Architect will return without response those RFIs submitted to Construction Manager as Agent or Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Name of Contractor.
4. Name of Construction Manager as Agent or Architect.
5. RFI number, numbered sequentially.
6. RFI subject.
7. Specification Section number and title and related paragraphs, as appropriate.
8. Drawing number and detail references, as appropriate.
9. Field dimensions and conditions, as appropriate.
10. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
11. Contractor's signature.

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12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Construction Manager as Agent or Architect.

1. Attachments shall be electronic files in PDF format.

D. Construction Manager as Agent and Architect's Action: Construction Manager as Agent and Architect will review each RFI, determine action required, and respond. Allow seven working days for Construction Manager as Agent and Architect's response for each RFI. RFIs received by Construction Manager as Agent and Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Construction Manager as Agent and Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Construction Manager as Agent and Architect's action may include a request for additional information, in which case Construction Manager as Agent and Architect's time for response will date from time of receipt by Construction Manager as Agent and Architect of additional information.
3. Construction Manager as Agent and Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Construction Manager as Agent and Architect in writing within 5 days of receipt of the RFI response.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Construction Manager as Agent and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including

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Owner and Construction Manager as Agent and Architect, within three days of the meeting.

B. Preconstruction Conference: Construction Manager as Agent will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Construction Manager as Agent and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner Construction Manager as Agent and Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including but not limited to the following:

a. Responsibilities and personnel assignments.
b. Tentative construction schedule.
c. Phasing.
d. Critical work sequencing and long lead items.
e. Designation of key personnel and their duties.
f. Lines of communications.
g. Use of web-based Project software.
h. Procedures for processing field decisions and Change Orders.
i. Procedures for RFIs.
j. Procedures for testing and inspecting.
k. Procedures for processing Applications for Payment.
l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Preparation of Record Documents.
o. Use of the premises and existing building.
p. Work restrictions.
q. Working hours.
r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Procedures for moisture and mold control.
u. Procedures for disruptions and shutdowns.
v. Construction waste management and recycling.
w. Parking availability.
x. Office, work, and storage areas.
y. Equipment deliveries and priorities.
z. First aid.
aa. Security.
bb. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Construction Manager as Agent and Architect of scheduled meeting dates.

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2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including but not limited to requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility requirements.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written instructions.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Project Coordinator shall schedule and conduct a project closeout conference, at a time convenient to Owner and Construction Manager as Agent and Architect, but no later than 45 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Construction Manager as Agent and Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of Record Documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Procedures for completing and archiving web-based Project software site data

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files.
d. Submittal of written warranties.
e. Requirements for completing sustainable design documentation.
f. Requirements for preparing operations and maintenance data.
g. Requirements for delivery of material samples, attic stock, and spare parts.
h. Requirements for demonstration and training.
i. Preparation of Contractor's punch list.
j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
k. Submittal procedures.
l. Coordination of separate contracts.
m. Owner's partial occupancy requirements.
n. Installation of Owner's furniture, fixtures, and equipment.
o. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Construction Manager as Agent and Architect shall conduct progress meetings at biweekly intervals.

1. Attendees: In addition to representatives of Owner and Construction Manager as Agent and Architect, Contractor, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

a. Attendance by Contractor is mandatory at the regular scheduled Progress Meetings and shall, at a minimum, include the Project Manager and Project Superintendent assigned to the project.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site use.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.

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11) Status of correction of deficient items.
12) Field observations.
13) Status of RFIs.
14) Status of Proposal Requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

3. Minutes: Construction Manager as Agent will record and distribute the meeting minutes to each party present and to parties requiring information.
4. Schedule Updating: Project Coordinator shall revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PART 2 PRODUCTS (Not Used)
PART 3 - PART 3 EXECUTION (Not Used)

END OF SECTION

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SECTION 013300
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Construction Manager as Agent and Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Construction Manager as Agent and Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so

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processing will not be delayed because of need to review submittals concurrently for coordination.

a. Construction Manager as Agent and Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Construction Manager as Agent and Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager as Agent and Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Construction Manager as Agent and Architect's consultants, Owner, or other parties is indicated, allow 15 days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Construction Manager as Agent and Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Construction Manager before being returned to Contractor.

C. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Construction Manager as Agent and Architect.
3. Include the following information for processing and recording action taken:

a. Project name.
b. Name of Architect.
c. Name of Construction Manager.
d. Name of Contractor.
e. Name of subcontractor.
f. Name of supplier.
g. Name of manufacturer.
h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and

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unless Construction Manager as Agent or Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Construction Manager as Agent or Architect will return without review submittals received from sources other than Contractor.

    a. Transmittal Form for Paper Submittals: Use AIA Document G810 or CSI Form 12.1A.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., MCCS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., MCCS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Construction Manager as Agent and Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:

    a. Project name.
    b. Name and address of Architect.
    c. Name of Construction Manager.
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Submittal purpose and description.
    i. Specification Section number and title.
    j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Related physical samples submitted directly.
    n. Indication of full or partial submittal.
    o. Transmittal number, numbered consecutively.
    p. Submittal and transmittal distribution record.
    q. Other necessary identification.
    r. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

    a. Project name.
    b. Number and title of appropriate Specification Section.
    c. Manufacturer name.
    d. Product name.

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E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Construction Manager as Agent and Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Construction Manager as Agent and Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Construction Manager as Agent and Architect's FTP site specifically established for Project.

    a. Construction Manager as Agent and Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Construction Manager as Agent and Architect will return one copy.
3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Construction Manager as Agent and Architect will not return copies.
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

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1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

    a. PDF electronic file.
    b. Three paper copies of Product Data unless otherwise indicated. Construction Manager as Agent and Architect will return one copy.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:

    a. PDF electronic file.
    b. Three opaque copies of each submittal. Construction Manager as Agent and Architect will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

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1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Construction Manager as Agent and Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit two sets of Samples. Construction Manager as Agent and Architect will retain one Sample set; remainder will be returned.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

F. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

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G. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

H. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

I. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Construction Manager as Agent and Architects and owners, and other information specified.

J. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

K. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

L. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

M. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

N. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Construction Manager as Agent and Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Construction Manager will review each submittal, make marks to indicate corrections or revisions required, and forward to Architect. Architect will review and stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

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1. Final Unrestricted Release: When the Architect marks a submittal "Reviewed," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
2. Final-But-Restricted Release: When the Architect marks a submittal "Reviewed" and "Make Corrections Noted" the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
3. Returned for Resubmittal: When the Architect marks a submittal "Not Approved" and/or "Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

    a. Do not use, or allow others to use, submittals marked "Not Approved and/or "Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION

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SECTION 014000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g.,

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plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

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1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

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1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

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1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

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4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PART 2 PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

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C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

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SECTION 014050
STRUCTURAL TESTS AND SPECIAL INSPECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Define and coordinate special structural testing and inspection services to be paid by the owner.

B. Provide greater confidence that the specified work is constructed in compliance with the contract documents and the special inspection section of the applicable building code (ex. Ch 17- IBC) as adopted by the local building official, or the state. These services do not relieve the Contractor of responsibility for compliance with the requirements of the contract documents.

C. Related Sections include the following:

1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Division 1 Section "Quality Requirements"
3. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
4. Division 1 Section 01400- "Quality Control"

1.3 REFERENCES

A. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

B. ASTM C1093 - Practice for Accreditation of Testing Agencies for Unit Masonry.

C. ASTM D3740 - Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

D. ASTM E43 - Standard Practice for Agencies Performing Nondestructive Testing.

E. ASTM E48 - Standard Guide for General Criteria Used for Evaluating Laboratory Competence.

F. ASTM E329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

G. Applicable building code as adopted by local building official.

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1.4 DEFINITIONS

A. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

B. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

C. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

D. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

E. Testing: Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.

F. Inspection: Evaluation of systems, primarily requiring observation and technical judgment.

G. Special Structural Testing and Inspection: Special Structural Testing and Inspection Services herein include items required by the building code as adopted by the local building official, and

1. other items identified which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure. These are required of the materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards.

H. Architect of Record: The prime consultant in charge of overall design and coordination of the project.

I. Structural Engineer of Record (SER): The Registered Engineer in responsible charge of the structural design for the project.

J. Testing Agency (TA): The testing agency shall be an established and approved independent testing agency acceptable to the Owner and building official and as noted below:

1. Authorized to operate in the state in which the project is located and experienced with the requirements and testing methods specified in the technical scope sections of PART 3.
2. Meeting applicable requirements of "Reference".
3. Testing equipment shall be calibrated at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.

K. Special Inspector (SI): An experienced employee of the Testing Agency who is educated in conducting, supervising, and evaluating tests and/or inspections.

1. The special inspector shall be under the direct supervision of a registered civil/structural engineer, experienced with the type of work requiring special structural testing and inspection.
2. Unique special inspector requirements, for specific materials and system, are noted in related technical specification sections.

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L. Fabricator: contractor who fabricates structural load-bearing or lateral-load-resisting members and assemblies on the premises of the contractor's shop.

M. Building Official: The Officer or its duly authorized representative charged with the administration and enforcement of the adopted building code.

N. Continuous: Full time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

O. Periodic: Part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.

P. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1.5 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 SUBMITTALS

A. Qualification Data: Supply letter from the local building official stating that the testing agency meets criteria listed herein, and other criteria by the building official, for materials in question.

B. Schedule of Tests and Inspections: Prepared in tabular form by testing agency, to submit to the contractor and design professional, and including the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests, inspections, and submittal of reports.
7. Requirements for obtaining samples.
8. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.

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4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

D. Submit Reports to Owner, Building Official, Architect, Contractor, and Structural Engineer. A final report of inspections documenting required special inspections and correction of discrepancies shall be submitted periodically.

E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. The Owner's representative may require testing and inspection of the work at the plant, before shipment. The Owner reserves the right to reject material not complying with the contract documents.

C. Testing and inspection shall be performed in accordance with the industry standard used as the reference for the specific material or procedure unless other criteria are specified. In the absence of a referenced standard, tests shall be accomplished in accordance with generally accepted industry standards.

D. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection if defective work or materials are discovered, nor shall it obligate Owner to accept such work.

E. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

F. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

G. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

H. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services

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of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

I. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

J. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 and ASTM D 3666; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

K. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.8 RESPONSIBILITES

A. Special Inspector

1. Attend a pre-construction meeting to review the scope of special structural testing and inspection.
2. Test and/or inspect the work listed herein for conformance with the approved design drawings, specifications, and applicable material and workmanship provisions of the Code.
3. Perform testing and inspection in a timely manner to avoid delay of work. Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
4. Schedule times for tests, inspections, obtaining samples, and similar activities.
5. Bring discrepancies to the immediate attention of the contractor for correction, then, if uncorrected after a reasonable period of time, to the attention of the Structural Engineer of Record, the Building Official, and to the Architect.
6. Submit test and/or inspection reports to the Building Official, Contractor, the Structural Engineer of Record, and other designated persons.

B. Architect of Record

1. Identify non-structural items requiring special structural testing and inspection.
2. If appropriate, attend a pre-construction meeting to review the scope of special structural testing and inspection. Include Contractor, Building Official, SER, Testing Agency and other parties concerned.
3. Coordinate the flow of reports and related information to expedite resolution of construction issues

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C. Structural Engineer of Record (SER):

1. Identify structural items requiring special structural testing and inspection as listed in section 3.
2. If requested, attend a pre-construction meeting to review the scope of special structural testing and inspection.
3. Review summary reports submitted by special inspectors.

D. Testing Agency

1. Attend a pre-construction meeting to review the scope of special structural testing and inspection.
2. Prepare and submit Schedule of Tests and Inspections.
3. Provide special structural testing and inspection services as previously described.

E. Contractor

1. Attend a pre-construction meeting to review the scope of special structural testing and inspection.
2. Provide the special inspectors access to the approved drawings and specifications at the job site.
3. Review reports submitted by special inspectors.
4. Retain at the job site all reports submitted by the special inspectors for review by the building official upon request.
5. Correct in a timely manner, deficiencies identified in inspection and/or testing reports. Allow adequate time for corrective work, reinspection, and documentation.
6. Provide the special inspector safe access to the work requiring inspection and/or testing.
7. Provide labor and facilities to provide access to the work and to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
8. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.
9. Contractor is responsible for costs of retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents.
10. Maintain a log of Tests and Inspection at the site.

F. Building Official (Typical responsibilities noted for information only):

1. Determine work which, in the Building Officials opinion, involves unusual hazards or conditions in accordance with the IBC.
2. Approve fabricators of load-bearing assemblies as the Building Official deems fit.
3. Review and approve special inspector qualifications.
4. Review reports and recommendations submitted by the special inspectors.
5. Review the "final signed reports" submitted by the special inspector(s). These documents should be accepted and approved by the building department prior to issuance of a Certificate of Occupancy.

G. Owner:

1. Establish direct funding to provide for cost of special structural testing and inspection services.
2. Provide special inspector with approved design drawings, specifications and approved shop drawings.
3. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged

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to perform.

1.9 NOTICE OF INSPECTIONS

A. Contractor shall provide adequate notice for inspections performed by the Building Official, as required by the building code and other local codes.

B. Contractor shall provide adequate notice for inspections performed by the Special Inspector.

1.10 PERIODIC SITE OBSERVATIONS BY DESIGN CONSULTANTS

A. Special structural testing and inspection, conventional testing and inspection, and periodic inspections by the Building Official do not preclude the normal field involvement and site observations by Architect or Structural Engineer of Record, nor shall it relieve the Contractor of any responsibility to complete the work in accordance with the approved drawings and specifications in a timely manner.

1.11 LIMITS OF AUTHORITY

A. Testing agents and/or special inspectors may not waive or alter contract requirements, or approve or accept any portion of the work unless specifically authorized by the Owner through the Architect or Structural Engineer of Record. They may not assume any duties of the Contractor, and they have no authority to stop or reject "Work".

1.12 PAYMENT

A. Unless noted otherwise, the Contractor shall provide and pay for all materials, samples, mock-ups, and assemblies required for testing and inspection and shall pay for all shipping costs related to delivery of this work. Testing agency will pay for shipping costs of samples transported from site to lab.

B. If exploratory work is required to determine the cause of defects, the cost of such work shall be paid by the Contractor, if the work is found to be defective, in the judgment of the Architect/Engineer. Contractor shall reimburse the Owner for all costs incurred in this event.

C. Any tests required to qualify the Contractor or the workers for any phase of the work, shall be paid by the Contractor.

1.13 PROTECTION AND REPAIR

A. Upon completion of testing, sample-taking, or inspection, the Contractor shall repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the Architect/Engineer of Record. Protect work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing and/or inspection.

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1.14 TESTS TO DEMONSTRATE QUALIFICATIONS

A. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect may require applicable tests, to establish a basis for acceptance or rejection. These tests will be paid for by the Contractor.

B. The Architect/Engineer of Record reserves the right to require certification or other proof that the system proposed, is in compliance with any tests, criteria or standards called for. The certificate shall be signed by a representative of an independent testing agency.

1.15 REFERENCE STANDARDS

A. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2024.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.

PART 2 - PART 2 PRODUCTS (NOT USED) (Not Used)
PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Contractor shall prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

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3.3 EARTHWORK - GRADING, EXCAVATION, FILING

A. General:

1. (Not Used)

B. Structural Testing and Special Inspection Requirements.

1. Classification of materials used and encountered during construction per ASTM:D2488 and ASTM:D2487. - Periodic.
2. Performance of laboratory testing of materials, as needed (Proctor, Sieve Analysis, Atterberg Limits, Consolidation Test, etc.). - Periodic.
3. During fill placement and compaction of the fill material, the special inspector shall determine that the material being used and the maximum lift thickness comply with the approved report. This includes in-field density tests complying with the requirements of the approved report. - Periodic.
4. Prior to placement of the prepared fill, the special inspector shall determine that the site has been prepared in accordance with the Contract Documents and Geotechnical Report.

    a. - Periodic.

5. Observe all sub-grades/excavation bases below footings and slabs and verify design bearing capacity is achieved. - Periodic.
6. Document presence of groundwater within excavations. - Periodic.
7. Provide reports of subgrade observations for general compliance with Contract Documents and Geotechnical Report. - Periodic.
8. Verify cut and fill slopes as specified in the contract documents. - Periodic.

3.4 CAST-IN-PLACE CONCRETE

A. Special Structural Testing and Inspection Requirements

1. Sample and test all cast in place concrete- Periodic.

    a. Prepare compression test specimens (ASTM C31), one set of four standard cylinders of concrete for each compressive strength test, mold and store cylinders for laboratory cured specimens.
    b. Perform compressive strength tests (ASTM C39). One set of four cylinders for each day's pour between one and 25 cubic yards. If a day's pour exceeds 25 cubic yards, one set of four cylinders for each additional 50 cubic yards, or fraction thereof. One specimen at seven days, two at 28 days, and one specimen retained in reserve for later testing if required.
    c. Slump (ASTM C143); one test at point of discharge for each set of compression test specimens; additional tests when concrete consistency appears to have changed.
    d. Air entrainment (ASTM 231); test the first batch of air entrained concrete and one additional test for each set of compression test specimens.
    e. Test concrete temperature hourly when air temperature is 40F and below and when 80F and above; and each time a set of compression test specimens is made.

2. Perform concrete mix verification- Periodic.

    a. Verify use of approved mix.

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b. Verify that total water added to mix on site does not exceed that allowed by concrete mix design.
c. Verify that concrete quality is indicative of adequate mixing time, consistency, and relevant time limits.

3. Inspect preparation and placement of all concrete, excluding the above conditions- Periodic.

a. Verify acceptable general condition of concrete base prior to placement.
b. Verify that concrete conveyance and depositing avoids segregation and contamination.
c. Verify that concrete is properly consolidated.
d. Verify reinforcement remains at proper location.
e. Verify bolts to be embedded into concrete are of correct size and embedment depth.

4. Observe protection and curing methods for all concrete, excluding the above conditions- Periodic.

a. Verify that specified hot and cold weather procedures are followed.

5. Inspect location and condition of reinforcing steel.

a. Verify reinforcing is free of materials which would prevent bonding with concrete. - periodic.
b. Verify location and size of reinforcing matches that shown on the shop and construction documents. - periodic.
c. Welding of reinforcing steel. Confirm weldability of steel- periodic.

3.5 MASONRY

A. General

1. Special inspection of masonry is required for all masonry indicated on the structural drawings. Other non-structural masonry walls shown on the architectural drawings will not need inspection.

B. Level 1 Inspection of Masonry in accordance with IBC and ACI standards:

1. As masonry construction begins, the following shall be verified to ensure compliance:

a. Proportions of site-prepared mortar.

2. The special inspector shall verify the following during construction:

a. Size and location of structural elements – Periodic.
b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction – Periodic.
c. Specified size, grade and type of reinforcement – Periodic.
d. Welding of reinforcing bars – Continuous.
e. Protection of masonry during cold weather (temperature below 40 degrees F) or hot weather (temperature above 90 degrees F) – Periodic.

3. Prior to grouting, the following shall be verified to ensure compliance:

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a. Grout space is clean – Periodic.
b. Placement of reinforcement and connectors – Periodic.
c. Construction of mortar joints – Periodic.

4. Grout placement shall be verified to ensure compliance with code and construction document provisions – Continuous.

3.6 STRUCTURAL STEEL

A. General

1. Special inspection of structural steel is required per IBC.

B. Inspection of Structural Steel in accordance with AISC and IBC standards:

1. Field welding of any structural member shall be visually inspected- Continuous. Exceptions:

a. Single pass fillet welds less than 5/16”- Periodic.
b. Floor and Deck welding- Periodic.
c. Headed studs- Periodic.
d. Welding of light-gage metal studs- Periodic.
e. Welding of railing systems- Periodic.

2. 100% of all welded connections shall be inspected where those welds support vertical loads from floor or roof.
3. 100% of moment connections.
4. 25% of all bearing-type bolted connections shall be inspected. 100% of bolted connections indicated as fully-tensioned or slip critical shall be inspected. 100% of bolts in moment connections.
5. 100% of all welding of light-gage metal studs/ joists shall be inspected where those welds support vertical loads from floor or roof.
6. All partial and full penetration welds shall be inspected by the owner’s special inspector- Continuous.
7. Verification of weldability of welded reinforcing bars. Welding of reinforcing bars- periodic.
8. For those manufacturers not registered and approved by the building official to fabricate items without special inspection:

a. Verify the fabricator maintains detailed fabrication and quality control procedures.- Periodic.
b. Item B1 listed above shall have the word “Field” deleted.

3.7 POST-INSTALLED ANCHORS

A. General

1. Special inspection of post-installed anchors is required for all post-installed anchors indicated on the structural drawings. Other non-structural anchors shown on the architectural drawings will not need inspection.

B. Inspection of Post-Installed Anchors in accordance with that product’s current ICC report, as listed on www.icc-es.org.

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3.8 STRUCTURAL WOOD TFRAMING

A. General

1. Special inspection of wood trusses fabricated off site is required per IBC, unless manufacturer is registered and approved by the Authority Having Jurisdiction to perform this Work without inspections.

B. Inspection of Structural Wood Framing in accordance with IBC standards.

1. Wood member type, size and spacing – Periodic.
2. Sheathing thickness, type and ratings – Periodic.
3. Fastener types and spacings – Periodic.
4. Top plate splices for location and spacing – Periodic.
5. Pre-Engineered truss placement for location and connections – Periodic
6. Blocking panels for location, spacing and attachments – Periodic.

END OF SECTION

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SECTION 014200
REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

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C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PART 2 PRODUCTS (Not Used)
PART 3 - PART 3 EXECUTION (Not Used)

END OF SECTION

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SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Construction Manager as Agent and Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges so long as the services are not abused. Provide connections and extensions of services as required for construction operations. Note that existing water service is to be demolished and relocated so water may not be available depending on the phase of construction.

C. Electric Power Service from Existing System: Electric power from Owner's existing 120 Volt system is available for use without metering and without payment of use charges so long as the services are not abused. Provide connections, extensions and circuit breakers and grounding of services as required for construction operations. Note that existing electrical service is to be demolished and relocated so building electric may not be available depending on the phase of construction.

1. Contractor or Sub-Contractors requiring 240 volt of higher requirements must provide their own generator(s).
2. Contractor or Sub-Contractors requiring electricity for arc welding must provide their own generator(s)

D. Sewer Service from Existing System: Contractor is to provide temporary sanitary facilities on site for contractor’s use.

1.3 INFORMATIONAL SUBMITTALS

A. Erosion- and Sedimentation-Control Plan: Show compliance with Best Practices Recommendations of EPA authorities having jurisdiction.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

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1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.
2. Location of temporary unit to be acceptable to Contractor and Owner prior to placement.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

B. Jobsite Office: Contractor may provide a job trailer at Contractor’s discretion.

C. Water Service: Contractor to provide temporary water service. Clean and maintain water service facilities in a condition acceptable to Owner.

D. Sanitary Facilities: Contractor is to provide temporary sanitary facilities on site for contractor’s use.

E. Electric Power Service: Contractor to provide temporary electric power service. Maintain

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equipment in a condition acceptable to Owner.

F. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
3. Provide barricades, cones, signage, flagger personnel, and any other means to direct or impede vehicular traffic and pedestrian traffic as necessary and safely around construction area(s).

G. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

1. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

E. Barricades and Warning Signs: Comply with requirements of authorities having jurisdiction for

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erecting structurally adequate barricades, including warning signs.

3.4 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."
3. Re-establish or replace plant beds, turf areas and other vegetative growth disturbed by construction and storage operations to conditions matching existing conditions prior to construction start as judged by the Construction Manager as Agent and Architect.

END OF SECTION

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SECTION 016000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable

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Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity,

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ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

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PART 3 - PART 1 EXECUTION (Not Used)

END OF SECTION

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SECTION 017300
EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Installation of the Work.
2. Cutting and patching.
3. Coordination of Owner-installed products.
4. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting product information.
3. Section 017700 "Closeout Procedures."
4. Section 024119 "Selective Demolition" for demolition and removal of existing windows select exterior doors.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.

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1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
2. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Equipment supports.
d. Piping, ductwork, vessels, and equipment.
e. Noise- and vibration-control elements and systems.

3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of utilities and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Construction Manager as Agent and Architect.

3.3 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

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D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Allow for building movement, including thermal expansion and contraction.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

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1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Proceed with patching after construction operations requiring cutting are complete.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

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D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions.

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SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. The Owner supports sustainable design and construction methods and initiatives. The work planned under this specification does not include specific requirements for salvage and recycling of construction and demolition waste. It is the desire of the Owner to achieve end-of-project rates for salvage/recycling 50 percent by weight of total non-hazardous solid waste generated by the work.

B. Contractors are encouraged to practice efficient waste management in the use of materials in the course of the work of this project. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

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PART 2 - PART 2 PRODUCTS (Not Used)
PART 3 - EXECUTION

3.1 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Provide owner with all salvaged materials.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of

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accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

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SECTION 017700
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 012900 “Payment Procedures” for requirements for Applications for Payment for Substantial and Final Completion.
2. Section 017300 "Execution" for progress cleaning of Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior

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to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Participate with Owner in conducting inspection.
2. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
3. Complete final cleaning requirements, including touchup painting.
4. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Construction Manager as Agent or Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Construction Manager as Agent or Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Construction Manager as Agent or Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Construction Manager as Agent or Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Construction Manager as Agent or Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of

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10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Construction Manager as Agent or Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Construction Manager as Agent or Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Construction Manager as Agent or Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

PART 2 - PART 2 PRODUCTS – NOT USED (Not Used)
PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." and Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

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Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

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EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve

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Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

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ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment. *(Federal, state or local laws may require payment within a certain period of time.)*

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

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(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

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(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:

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(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with a building information modeling exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with a building information modeling exhibit, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 Building information modeling exhibit, dated as indicated below:
(Insert the date of the building information modeling exhibit incorporated into this Agreement.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

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Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. See Division 2 Section "Earthwork for Buildings and Structures" for drainage fill under slabs-on-grade.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For steel reinforcement.

D. Material certificates.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specification for Structural Concrete"
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

C. Provide winter protection and heat sources for installation for footings, as required to maintain project construction schedule.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 1064/A 1064M, plain fabricated from as-drawn steel wire into flat sheets.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement: ASTM C 150, Type I.
2. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, graded.
1. Maximum Course-Aggregate Size: 1-inch (25 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M, potable

D. Air-Entraining Admixture: ASTM C 260.
1. Do not use air-entraining admixture in concrete floors to receive troweled finish.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class C, except with maximum water-vapor permeance of 002. Include manufacturer’s recommended adhesive or pressure sensitive tape.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Stego Industries, LLC.
   b. Architect Approved Equivalent

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
   1. Manufacturers: Subject to the compliance with requirements, provide products by one of the following:
      a. AWRC Corporation
      b. BASF Corporation; Construction Systems.
      c. ChemMasters, Inc.
      d. Dayton Supierior.
      e. Euclid Chemical Company; an RPM Company.
      f. SpecChem, LLC.
      g. W.R. Meadows, Inc.

F. Expansion- and Isolation-Joint-Filler Strips: Flexible, lightweight, non-staining, closed cell polyethylene, chemical resistant, ultraviolet stable, non-absorbent, low density.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: As indicated on the structural drawings.
   2. Maximum Water-Cementitious Materials Ratio: 0.45.
   3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
   4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
   5. Air Content: Do not allow air content of interior troweled finished floors to exceed 3 percent.

2.7 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer corners of permanently exposed concrete.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
   1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
   3. Saw-cut joints to be installed within 12-hours after concrete has been placed.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
   1. Apply scratch finish to surfaces indicated.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
   1. Apply float finish to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing or membrane roofing.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, paint or another thin film-finish coating system.
   2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 3/16 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic tile is to be installed. While concrete is still plastic, slightly scarify surface with a fine broom.
   1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete stoops and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
   1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION 03300

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Interior load-bearing wall framing as shown in the Structural Drawings.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Product Data: For each type of product and accessory indicated.
B. Product Test Reports: Submit only if specifically requested by the Architect/Engineer.
C. Research Reports: Submit only if specifically requested by the Architect/Engineer.

1.4 QUALITY ASSURANCE

A. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.
B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
C. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.

   1. Fire-Resistance Ratings: Indicated by GA File Numbers in GA-600, "Fire Resistance Design Manual," or by design designations from UL's "Fire Resistance Directory" or from the listings of another testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Clark Steel Framing Industries.
   2. Dale Industries, Inc.
   3. Dietrich Industries, Inc.
   4. MarinoWare; Div. of Ware Industries, Inc.
   13. Steel Network, Inc. (The).

14. Steeler, Inc.
15. Super Stud Building Products, Inc.
16. Unimast, Inc.
17. United Metal Products, Inc.

2.2 PERFORMANCE REQUIRMENTS

A. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

B. Fire-Resistance Ratings: Comply with ASTM E 119; Testing by a qualified testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 ACCESSORIES AND MISCELLANEOUS MATERIALS

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230 MPa), of manufacturer's standard thickness and configuration, unless otherwise indicated.

B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to ASTM C 1007, manufacturer's written recommendations, and requirements in this Section.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

3. Install framing members in one-piece lengths.
4. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed.
5. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
6. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

B. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

C. Load-Bearing Wall Installation: Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends. Squarely seat studs against webs of top and bottom tracks. Space studs as indicated, set plumb, align, and fasten both flanges of studs to top and bottom tracks.

1. Align studs vertically where wall-framing continuity is interrupted by framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.
2. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
3. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
4. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
5. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings.
6. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
7. Install horizontal bridging in stud system, spaced as indicated on Shop Drawings. Fasten at each stud intersection.
8. Install miscellaneous framing and connections, including supplementary framing, blocking, bracing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

END OF SECTION 054000

SECTION 055000
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Miscellaneous steel trim.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Fasteners.
2. Shop primers.
3. Shrinkage-resisting grout.

B. Shop Drawings: Show fabrication and installation details. [Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.] Provide Shop Drawings for the following:

1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
2. Miscellaneous steel trim including steel angle corner guards and steel edgings.

1.4 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

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D. Research Reports: For post-installed anchors.

E. Delegated design engineer qualifications.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces] .

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Channels, Angles, and Bars: ASTM A36/A36M.

C. Steel Wide Flange Sections: ASTM A992/A99sM

D. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.

E. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.

F. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

G. Steel Pipe: ASTM A53/A53M, Grade B, Standard Weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use

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and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening aluminum stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.

D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.

E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

F. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer that contains pigments that make it easily distinguishable from zinc-rich primer.

B. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

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2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing [and contour of welded surface matches that of adjacent surface].

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

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2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize and prime miscellaneous steel trim.

D. Prime exterior miscellaneous steel trim with zinc-rich primer.

2.8 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.9 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.10 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

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3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.11 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

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1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.

3.3 INSTALLATION OF MISCELLANEOUS STEEL TRIM

A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.4 REPAIRS

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

    a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

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SECTION 061000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood products.
2. Fire-retardant-treated lumber.
3. Miscellaneous lumber.
4. Plywood subfloor.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

D. Lumber grading agencies, and abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

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PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 19 percent.
2. Dimension Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. As required by IBC Chapter 6.
2. Including plywood subfloors.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment is not to promote corrosion of metal fasteners.
2. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency and other information required by authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to bleed through, contain colorants, or otherwise adversely affect finishes.

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F. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Framing for stages.
3. Concealed blocking.
4. Framing for non-load-bearing partitions.
5. Framing for non-load-bearing exterior walls.
6. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
7. Plywood backing panels.
8. Plywood subfloor.

2.3 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine or southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

C. Utility Shelving: Lumber with 19 percent maximum moisture content of any of the following species and grades:

1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
2. Mixed southern pine or southern pine; No. 2 grade; SPIB.
3. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
4. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA,

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NLGA, WCLIB, or WWPA.
4. Eastern softwoods; No. 2 Common grade; NeLMA.
5. Northern species; No. 2 Common grade; NLGA.
6. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

E. Roofing Nailers: Structural- or No. 2-grade lumber or better; kiln-dried Douglas fir, southern pine, or wood having similar decay-resistant properties.

F. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

B. Plywood subfloor: Plywood, DOC PS 1 Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.5 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329.
2. For redwood, use hot-dip galvanized-steel fasteners.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

2.6 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets:

1. Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
2. Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

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3. Self-adhering sheet consisting of 64 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side [; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction].

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. [Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.]

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

F. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

G. Do not splice structural members between supports unless otherwise indicated.

H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at

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ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.

3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

J. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

K. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

L. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

M. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

N. Securely attach roofing nailers to substrates by anchoring and fastening to withstand bending, shear, or other stresses imparted by Project wind loads and fastener-resistance loads as designed in accordance with ASCE/SEI 7.

O. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for [screeding or] attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach wood blocking to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Attach wood roofing nailers securely to substrate to resist the designed outward and upward wind loads indicated on Drawings and in accordance with ANSI/SPRI ED-1, Tables A6 and A7.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not

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less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

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SECTION 064100
ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad casework.
2. Wood materials.
3. Casework hardware.
4. Shop finishing.
5. Plastic-laminate countertops.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud-framing required for anchoring cabinets.

1.2 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include panel material description and finish.
2. Include glazing.
3. Include accessories.
4. Include hardware.
5. Include shop finishing.

B. Shop Drawings:

1. Plans, elevations, sections, and attachment details.

a. Show large-scale details.
b. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
c. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.

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1.4 INFORMATIONAL SUBMITTALS

A. Test Reports: Valid AWI "Performance Quality Test Report" indicating compliance with specified ANSI/AWI 0641 Structural Performance Duty Level.

B. Certification Reports:

1. Provide labels from AWI QCP indicating woodwork and installation comply with requirements of aesthetic grade and duty level specified.

C. Product Certificates: For the following:

1. Composite wood products.
2. Thermally fused laminate (TFL) panels.
3. Glass.
4. Adhesives.

D. Field quality control reports.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 65 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field

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measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Unless otherwise indicated, comply with ANSI/AWI 0641 for duty level and grade of architectural cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels from AWI QCP indicating that woodwork and installation comply with requirements of aesthetic grade and duty level specified.
2. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of the Contract Documents in addition to those of the referenced quality standard.

2.2 PLASTIC-LAMINATE-CLAD CASEWORK

A. Architectural Woodwork Institute (AWI) Standard:

1. Structural Performance Duty Level: 2 .
2. Aesthetic Performance Grade: Premium .

a. Hardwood Plywood: 0.05 ppm.
b. Particleboard: 0.09 ppm.
c. MDF More Than 5/16 Inch (8 mm) Thick: 0.11 ppm.
d. MDF 5/16 Inch (8 mm) or Less in Thickness: 0.13 ppm.

B. Casework Construction Type: Face frame .

C. Door and Drawer-Front:

1. Design: Flush panel .
2. Style: Flush overlay.

a. Reveal Dimension: 1/2 inch .

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by laminate manufacturer's designations.
2. Match Architect's sample.
3. As selected by Architect from laminate manufacturer's full range in the following categories:

a. Solid colors, gloss finish.
b. Solid colors with core same color as surface, gloss finish.
c. Wood grains, gloss finish.

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d. Patterns, gloss finish.

E. Exposed Exterior Surfaces:

1. Plastic-Laminate Grade: HGS .
2. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels .
3. Edgebanding: High-pressure decorative laminate (HDPL) .

F. Exposed Interior Surfaces: High-pressure decorative laminate (HDPL) the same color and pattern as exposed exterior surfaces .

1. Edgebanding: High-pressure decorative laminate (HDPL) .

G. Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate (HDPL) cabinet liner Grade CLS, ISO 4586-3 .
2. Drawer Sides and Backs: Thermally fused laminate (TFL) panels with PVC or polyester edgebanding .
3. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate (HDPL), ISO 4583-3, grade to match exposed surface.
4. Drawer Bottoms: Thermally fused laminate (TFL) panels .
5. Shelves: Adjustable .

a. Loading Capacity: 40 lb/sq. ft .

6. Edgebanding: High-pressure decorative laminate (HDPL) .

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
2. Wood Moisture Content:

a. Non-Climate-Controlled Environments: 9 to 15 percent.
b. Climate-Controlled Environments: 6 to 10 percent.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130 .
2. Particleboard (Medium Density): ANSI A208.1, Grade M-2 .
3. Softwood Plywood: DOC PS 1 , medium-density overlay .
4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
5. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of AWI 300 .

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2.4 CASEWORK HARDWARE

A. Cabinet Hardware: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."

B. Hinges:

1. Butt Hinges: 2-3/4-inch, Grade 1 five-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:

a. Semi-Concealed Hinges, Back Mounted, for Flush Doors: ANSI/BHMA A156.9, B01361.
b. Semi-Concealed Hinges, Back Mounted, for Overlay Doors: ANSI/BHMA A156.9, B01511.

2. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 115-140 degrees of opening , self-closing .

C. Pulls and Knobs:

1. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011, 3-inch centers.
2. Wire Pulls: Back mounted, solid metal , 4 inches long, 5/16 inch in diameter .
3. Back-Mounted Knobs: ANSI/BHMA A156.9, B02041.

D. Catches and Latches:

1. Magnetic Catches: ANSI/BHMA A156.9, B03141.
2. Push-in Magnetic Catches: ANSI/BHMA A156.9, B03132.
3. Roller Catches, Double Rollers: ANSI/BHMA A156.9, B03072.
4. Ball Friction Catches: ANSI/BHMA A156.9, B03013.

E. Shelf Rests and Standards:

1. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081 .
2. Shelf Rests: ANSI/BHMA A156.9, B04013; two-pin plastic with shelf hold-down clip .

F. Drawer Slides: ANSI/BHMA A156.9.

1. Standard Duty (Grade 1 and Grade 2): Side mount .
2. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount .

a. Type: Full extension.
b. Material: Aluminum slides.
c. Motion Feature: self-closing mechanism .

3. Drawer Types:

a. Pencil drawers not more than 3 inches high and not more than 24 inches wide provide 50 lb load capacity.
b. General-purpose drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide 75 lb load capacity.

G. Locks for Drawer and Hinged-Doors: Mortise type, five-pin tumbler, brass with chrome-plated

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finish, and complying with ANSI/BHMA A156.11, Grade 1.

1. Provide a minimum of two keys per lock and six master keys.
2. Provide locks .

H. Door Bumpers: Manufacturer's standard self-adhering clear silicone pads.

I. Hardware Finish:

1. Exposed Hardware: Provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.

    a. Dark, Oxidized, Satin Bronze, Oil Rubbed: ANSI/BHMA 613 for bronze base; ANSI/BHMA 640 for steel base.
    b. Bright Brass, Clear Coated: ANSI/BHMA 605 for brass base; ANSI/BHMA 632 for steel base.
    c. Bright Brass, Vacuum Coated: ANSI/BHMA 723 for brass base; ANSI/BHMA 729 for zinc-coated-steel base.
    d. Satin Brass, Blackened, Bright Relieved, Clear Coated: ANSI/BHMA 610 for brass base; ANSI/BHMA 636 for steel base.
    e. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.
    f. Bright Chromium Plated: ANSI/BHMA 625 for brass or bronze base; ANSI/BHMA 651 for steel base.
    g. Satin Stainless Steel: ANSI/BHMA 630.

2. Concealed Hardware: Manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.5 PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with ANSI/AWI 1236 for grades of plastic-laminate-clad countertops indicated for construction, fishes, installation, and other requirements.

B. Grade: premium

C. High-Pressure Decorative Laminate: ISO 4586-3, Grade HGS.

1. Manufactures: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Formica Corporation
    b. Wilsonart LLC

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by manufacturer's designations.
2. As selected by Architect from manufacturer’s full range in the following categories:

    a. Solid colors, gloss finish.
    b. Solid colors with care same color as surface, gloss finish.
    c. Wood grains, gloss finish with grain running parallel to length of countertop.

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d. Patterns, gloss finish.

E. Edge Treatment: Same as laminate cladding on horizontal surface

F. Core Material: Particleboard or MDF.

G. Core Material at Sinks: Particle board made with exterior glue or MDF made with exterior glue.

H. Core Thickness: ¾ inch

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
2. Provide drip groove 1/8 inch by 1/8 inch set back 3/8 inch from front edge of countertop

I. Baker Sheet: Provide plastic-laminate backer sheet, ISO 4586-3, grade to match exposed surface, on underside of countertop substrate.

J. Adhesives

1. Adhesive for Bonding Plastic Laminate: Type I, waterproof type as selected by fabricator to comply with requirements.

a. Adhesive for Bonding Edges: Hot-melt adhesive.

2. Installation Adhesive: Manufacturer’s standard product that is recommended for application indicated.

2.6 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease sharp edges and corners.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.
2. Verify size and locations of cutouts for appliances, special equipment, sinks, plumbing, and other items to be mounted in or adjacent to casework.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.3 INSTALLATION OF CASEWORK

A. Install casework to comply with requirements of the structural and aesthetic performance specified.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Maintain veneer sequence matching of cabinets with transparent finish.

D. Anchor cabinets in accordance with AWI requirements or tested method to anchors or blocking built in or directly attached to framing or substrates.

E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

    a. Use filler matching finish of items being installed.

F. Field Finishing: See Section 099123 "Interior Painting" for finishing of installed architectural cabinets.

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3.4 INSTALLATION OF PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assembly countertops and complete fabrication at Project site to extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners, recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Located field joints where indicated in Shop Drawings.

1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer’s written instructions to exert a constant, heavy-clamping pressure at joints.

D. Countertop Installation:

1. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
3. Anchor wall cleating necessary for proper setting for countertops not supported by casework
4. Install countertops level and true in line. Use concealed ships as required to maintain not more than 1/8-inch-in96-inch variation from a straight, level plane.
5. Secure backsplashes to walls with adhesive
6. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.5 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that casework, including installation, complies with requirements of ANSI/AWI 0620 for the specified grade.

1. AWI QCP Inspector to prepare and submit inspection report.

3.6 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, and countertops where possible, to eliminate functional and visual defects. Where impossible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware and other moving parts to function smoothly.

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C. Clean cabinets on exposed and semiexposed surfaces. Touch up finishes to restore damaged or soiled areas.

D. Clean countertops on exposed and semiexposed surfaces.

E. Protection: Provide kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

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SECTION 072100
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Glass-fiber blanket insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

1. For blown-in or sprayed fiberglass and cellulosic-fiber loose-fill insulation, indicate initial installed thickness, settled thickness, settled R-value, installed density, coverage area, and number of bags installed.
2. Sign, date, and post the certification in a conspicuous location on Project site.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Research Reports: For foam-plastic insulation, from ICC-ES.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than Class A, 25 and 450 when tested in accordance with ASTM E84.

B. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

D. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

E. Thermal-Resistance Value (R-Value): R-value as indicated on Drawings in accordance with ASTM C518.

2.2 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION (XPS)

A. Extruded Polystyrene Board Insulation, Type IV: ASTM C578, Type IV, 25 psi minimum compressive strength; unfaced.

2.3 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed; SAINT-GOBAIN
b. Johns Manville; a Berkshire Hathaway company
c. Owens Corning

B. Mineral-Wool Board Insulation, Type IVA : ASTM C612, Type IVA; [unfaced][with black mat facer]<Insert facer material>.

1. Nominal Density:
[4 lb/cu. ft.][6 lb/cu. ft.][8 lb/cu. ft.][10 lb/cu. ft.][11 lb/cu. ft.][12 lb/cu. ft.]<Insert value>.

C. Mineral-Wool Board Insulation, Type IVB : ASTM C612, Type IVB; [unfaced][with black mat facer]<Insert facer material>.

1. Nominal Density:
[4.3 lb/cu. ft.][6 lb/cu. ft.][8 lb/cu. ft.][10 lb/cu. ft.][11 lb/cu. ft.][12 lb/cu. ft.][6.2 lb/cu.

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ft. outer layer and 3.8 lb/cu. ft. inner layer]<Insert value>.

D. Insulation Fastener Accessories: Provide double-pointed weld pins, lagging pins, quilting pins, duct liner pins, insulation hangers, specialty washers, special caps, j-hooks, capacitor discharge annular weld pins, capacitor discharge acoustical lagging pins, and other accessory materials that are recommended in writing by insulation fastener manufacturer to produce complete insulation supports.

2.4 ACCESSORIES

1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

B. Miscellaneous Application Accessories:

1. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
2. Detailing Foam Insulation for Voids: Urethane foam complying with AAMA 812, low expansion pressure suitable for filling insulation gaps and voids adjacent to openings to protect against water, air, and sound intrusion.
3. Tapes for Reflective Insulation and Barriers:

a. Aluminum-foil tape for repairs or splicing material.
b. Double-sided tape for adhering to metal framing or overlapping material.
c. Reinforced-foil tape for sealing tears or cuts in sheet vapor barrier.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or those that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products, applications and applicable codes.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths,

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and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive in accordance with manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units in accordance with manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members in accordance with the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install unfaced blanket insulation over ceiling area in thickness indicated. Where partitions occur, extend insulation up either side of partition.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
2. Detailing Foam Insulation for Voids: Apply in accordance with manufacturer's written instructions.

3.5 INSTALLATION OF BOARD INSULATION

A. Install board insulation in accordance with manufacturer's written instructions per project applications and conditions.

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3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

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SECTION 074213.13
FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal liner panels.

1.2 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

1. Exposed-fastener, lap-seam metal wall panels.
2. Concealed-fastener, lap-seam metal wall panels.
3. Metal liner panels.

B. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.

1. Include Samples of trim and accessories involving color selection.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For exposed-fastener, lap-seam metal wall panels, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

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1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.7 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: [As indicated on Drawings]<Insert loads>.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
4. <Insert serviceability requirements>.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 METAL LINER PANELS

A. Provide factory-formed metal liner panels designed for interior side walls and field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for a complete installation.

B. Metal Liner Panels: Solid panels formed with [intermediate stiffening ribs symmetrically spaced][a flat pan] between panel edges; with a flush joint between panels.

1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

a. Nominal Thickness: 0.022 inch.
b. Exterior Finish: Two-coat fluoropolymer.

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c. Color: As indicated by manufacturer's designations.

2. Stainless Steel Sheet: ASTM A240/A240M, Type 316, fully annealed.

a. Nominal Thickness: 0.0250 inch.
b. Exterior Finish: ASTM A480/A480M No. 4.

3. Panel Coverage: 24 inches.
4. Seam Profile: Flush.
5. Seam Height: 1.5 inches.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

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2.4 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

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1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [for seacoast and severe environments].

D. Stainless Steel Panels and Accessories:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.
b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
c. Directional Satin Finish: ASTM A480/A480M No. 4.

3. Bright, Cold-Rolled, Unpolished Finish: ASTM A480/A480M No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF METAL PANELS

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor

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metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
4. Stainless Steel Panels: Use stainless steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Metal Liner Panels: Install panels on interior side of girts with flush appearance on the inside.

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G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Water-Spray Test: After installation, test area of assembly [shown on Drawings][as directed by Architect]<Insert area> for water penetration according to AAMA 501.2.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.

D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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END OF SECTION

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SECTION 079200

JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.2 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015 (Reapproved 2022).

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.

D. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid- Applied Sealants 2018.

1.3 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Nonsag Sealants:
   1. Dow; www.dow.com/#sle.
   2. Master Builders Solutions; www.master-builders-solutions.com/en-us/#sle.
   3. Pecora Corporation; www.pecora.com/#sle.
   4. Sika Corporation; www.usa.sika.com/#sle.
   5. Tremco Commercial Sealants & Waterproofing; www.tremcosealants.com/#sle.
   6. Substitutions: Architect Pre-Approved Equal.

2.2 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be

sealed include, but are not limited to:
a. Masonry joints in lieu of grout (where indicated on plan)
b. Wall expansion and control joints.
c. Joints between door, window, and other frames and adjacent construction.
d. Joints between different exposed materials.
e. Other joints indicated below.

2. Do not seal the following types of joints:
a. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
c. Joints where installation of sealant is specified in another section.
d. Joints between suspended panel ceilings/grid and walls.

B. Type S - Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.

2.3 JOINT SEALANTS - GENERAL

2.4 NONSAG JOINT SEALANTS

A. Nonsag Traffic-Grade Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 20 to 30, Shore A, when tested in accordance with ASTM C661.
3. Color: Match adjacent finished surfaces.

2.5 SELF-LEVELING JOINT SEALANTS

A. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
1. Movement Capability: Plus and minus 25 percent, minimum.

B. Self-Leveling Polysulfide Sealant: ASTM C920, Grade P, Uses M and A; multicomponent; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
1. Movement Capability: Plus and minus 25 percent.

2.6 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi- Cellular Polyethylene.
2. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 081113
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

D. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color

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finishes.

E. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 4 for [basic][enhanced] protection.

1. Large-Missile Test: For glazed openings located within [30 feet]<Insert dimension> of grade.

B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.38 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C1363 or ASTM E1423.

2.2 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Standard-Duty Doors and Frames: ANSI/SDI A250.8, Level 1; ANSI/SDI A250.4, Level C. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule on Drawings.

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b. Thickness: 1-3/4 inches.
c. Face: Uncoated steel sheet, minimum thickness of 0.032 inch.
d. Edge Construction: Model 1, Full Flush.
e. Edge Bevel: Bevel lock and hinge edges 1/8 inch in 2 inches.
f. Core: Manufacturer's standard.

2. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.042 inch.
b. Construction: Knocked down.

3. Exposed Finish: Factory.

2.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule on Drawings.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 coating.
d. Edge Construction: Model 1, Full Flush.
e. Edge Bevel: Bevel lock and hinge edges 1/8 inch in 2 inches.
f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
h. Core: Manufacturer's standard.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
b. Construction: Knocked down.

3. Exposed Finish: Prime.

2.4 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

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2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.6 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.7 FABRICATION

A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

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1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, complying with ANSI/SDI A250.3.

1. Color and Gloss: As indicated by manufacturer's designations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

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a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
b. Install frames with removable stops located on secure side of opening.

2. Floor Anchors: Secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.

3.3 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint in accordance with manufacturer's written instructions.

C. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish in accordance with manufacturer's written instructions.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

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SECTION 083613
SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sectional-door assemblies.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
2. For power-operated doors, include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Samples for Initial Selection: For units with factory-applied finishes.

1. Include Samples of accessories involving color selection.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For manufacturer's warranty and finish warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sectional doors to include in maintenance manuals.

B. Manufacturer's warranty.

C. Finish warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

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B. Regulatory Requirements: Comply with provisions in the U.S. Department of Transportation's "ADA Standards for Transportation Facilities" applicable to sectional doors.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Failure of components or operators before reaching required number of operation cycles.
c. Faulty operation of hardware.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
e. Delamination of exterior or interior facing materials.

2. Warranty Period: Five years from date of Substantial Completion.

B. Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain sectional doors from single source from single manufacturer.

1. Obtain operators and controls from sectional door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Provide sectional doors that comply with performance requirements specified without failure from defective manufacture, fabrication, installation, or other defects in construction .

B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.

1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
2. Testing: In accordance with ASTM E330/E330M or DASMA 108 for garage doors and complying with DASMA 108 acceptance criteria.
3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.

a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of door width.
b. Deflection of horizontal track assembly shall not exceed 1/240 of door height.

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4. Operability under Wind Load: Design sectional doors to remain operable under uniform pressure (velocity pressure) of 30 lbf/sq. ft. wind load, acting inward and outward.

C. Windborne-Debris Impact Resistance: Provide sectional doors complying with the following requirements:

1. Glazed Openings: Pass ASTM E1886 Large Missile Test and cyclic-pressure tests in accordance with ASTM E1996 for basic protection and Wind Zone applicable to basic design wind speed indicated on Drawings.
2. Garage-Door Glazed Openings: Pass DASMA 115.

2.3 SECTIONAL-DOOR ASSEMBLY

A. Sectional Door: Provide steel sectional door formed with hinged sections and fabricated so that finished door assembly is rigid and aligned with tight hairline joints; free of warp, twist, and deformation; and complies with requirements in DASMA 102.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. C.H.I. Overhead Doors, Inc.
b. Clopay Building Products
c. Raynor Garage Doors
d. Architect Approved Equal
e. Insert Manufacturers Name

B. Operation Cycles: Door components and operators capable of operating for not less than 50,000 operation cycles. One operation cycle is complete when door is opened from closed position to the open position and returned to closed position.

C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. when tested in accordance with ASTM E283 or DASMA 105.

D. U-Value: 0.052 Btu/sq. ft. x h x deg F.

E. Steel Door Sections: ASTM A653/A653M, zinc-coated (galvanized), cold-rolled, commercial steel sheet with G60 zinc coating.

1. Door-Section Thickness: 2 inches.
2. Section Faces:

a. Thermal-Break Construction: Provide sections with continuous thermal-break construction separating the exterior and interior faces of door.
b. Exterior Face: Fabricated from single sheets, not more than 24 inches high; with horizontal meeting edges rolled to continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove, weather- and pinch-resistant seals and reinforcing flange return.

1) Steel Sheet Thickness: 0.022-inch nominal coated thickness.
2) Surface: Manufacturer's standard, ribbed.

c. Interior Face: Enclose insulation completely within steel exterior facing and interior

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facing material, with no exposed insulation. Provide the following interior-facing material:

1) Zinc-Coated (Galvanized) Steel Sheet: With minimum nominal coated thickness of 0.022 inch.
2) Plastic: Manufacturer's standard vinyl material complying with DASMA 107 requirements.

3. End Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.040-inch nominal coated thickness and welded to door section.
4. Intermediate Stiles: Provide intermediate stiles formed from not less than 0.040-inch-thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches apart.
5. Section Reinforcing: Horizontal and diagonal reinforcement as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. [Ensure that reinforcement does not obstruct vision lites.]

   a. Bottom Section: Reinforce section with a continuous channel or angle conforming to bottom-section profile [and allowing installation of astragal (weatherseal)].
   b. Hardware Locations: Provide reinforcement for hardware attachment.

6. Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free insulation of type indicated below:

   a. Board Insulation: Polystyrene or polyurethane, secured to exterior face sheet.
   b. Foamed-in-Place Insulation: Polyurethane, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load.
   c. Fire-Resistance Characteristics: Maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, in accordance with ASTM E84.

F. Track: Manufacturer's standard, galvanized-steel, standard-lift track system. Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides.

1. Material: Galvanized steel, ASTM A653/A653M, minimum G60 zinc coating.
2. Size: As recommended in writing by manufacturer for door size, weight, track configuration and door clearances indicated on Drawings.
3. Track Reinforcement and Supports: Provide galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches apart for door-drop safety device.

   a. Horizontal Track: Provide continuous reinforcing angle from curve in track to end of track, attached to track and supported at points by laterally braced attachments to overhead structural members.

G. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom top jambs of door. [Provide combination bottom weatherseal and sensor edge for bottom seal.]

H. Hardware: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless steel, or other corrosion-resistant fasteners, to suit door type.

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1. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch nominal coated thickness at each end stile and at each intermediate stile, in accordance with manufacturer's written recommendations for door size.

    a. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible.
    b. Provide double-end hinges where required for doors more than 16 ft. wide unless otherwise recommended by door manufacturer in writing.

2. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Match roller-tire diameter to track width.

    a. Roller-Tire Material: Manufacturer's standard.

3. Push/Pull Handles: Equip each door with galvanized-steel lifting handles on each side of door, finished to match door.

I. Locking Device:

1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.

J. Counterbalance Mechanism:

1. Torsion Spring: Adjustable-tension torsion springs complying with requirements of DASMA 102 for number of operation cycles indicated, mounted on torsion shaft.
2. Cable Drums and Shaft for Doors: Cast-aluminum cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised.

    a. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft.
    b. Provide one additional midpoint bracket for shafts up to 16 ft. long and two additional brackets at one-third points to support shafts more than 16 ft. long unless closer spacing is recommended in writing by door manufacturer.

3. Cables: Galvanized-steel, multistrand, lifting cables with cable safety factor of at least 7 to 1.
4. Cable Safety Device: Include a spring-loaded steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if lifting cable breaks.
5. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
6. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.

K. Electric Door Operator: Electric door operator assembly of size and capacity recommended by door manufacturer for door and operation cycles specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with

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NFPA 70, Class 2 control circuit, maximum 24 V ac or dc.

3. Safety: Listed in accordance with UL 325 by a qualified testing agency for commercial or industrial use ; moving parts of operator enclosed or guarded if exposed and mounted at 8 ft. or lower.
4. Usage Classification: Medium duty, up to 12 cycles per hour and up to 50 cycles per day.
5. Operator Type: Manufacturer's standard for door requirements.
6. Motor: Reversible-type with controller (disconnect switch) for interior, clean, and dry motor exposure. Use adjustable motor-mounting bases for belt-driven operators.

    a. Motor Size: As required to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
    b. Electrical Characteristics:

        1) Phase: Single phase.

7. Limit Switches: Equip motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
8. Obstruction Detection: Automatic external entrapment protection consisting of automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

    a. Monitored Entrapment Protection: Photoelectric sensor designed to interface with door-operator control circuit to detect damage to or disconnection of sensor and complying with requirements in UL 325.

9. Control Station: Surface mounted, three-position (open, close, and stop) control.

    a. Operation: Push button interior and key exterior.
    b. Interior-Mounted Unit: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
    c. Exterior-Mounted Unit: Full-guarded, surface-mounted, standard-duty, weatherproof type, NEMA ICS 6, Type 4 enclosure.
    d. Features: Provide the following:

        1) Vehicle detection operation.

10. Emergency Manual Operation: Push-up type designed so required force for door operation does not exceed 25 lbf.
11. Emergency Operation Disconnect Device: Hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
12. Motor Removal: Design operator so motor can be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

L. Metal Finish: Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

1. Factory Prime Steel Finish: Compatible with field-applied finish and in manufacturer's standard color. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
2. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's

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written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

a. Aluminum Finish: Comply with AAMA 2603 requirements for pigmented organic coatings applied to aluminum extrusions and panels.
b. Color and Gloss: As indicated by manufacturer's designations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; in accordance with manufacturer's written instructions.

B. Tracks:

1. Fasten vertical track assembly to opening jambs and framing with fasteners spaced not more than 24 inches apart.
2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Power-Operated Doors: Install automatic garage doors openers in accordance with UL 325.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

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B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.

D. Touchup Painting Galvanized Material: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780/A780M.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION

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SECTION 084313
ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum-framed storefront systems.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Initial Selection: For units with factory-applied color finishes.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed storefronts to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AGM) contractors [and that employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program].

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

C. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of storefront systems that include structural glazing.

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1.5 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals , metal finishes, and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

C. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D 4214.
c. Cracking, peeling, or chipping.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed storefronts shall withstand movements of supporting structure,

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including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:

    a. Thermal stresses transferring to building structure.
    b. Glass breakage.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.
    e. Failure of operating units.

B. Deflection of Framing Members Supporting Glass: At design wind load, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of length of span of the framing member for lengths of up to 13 feet 6 inches and to 1/240 of length of span of the framing member plus 1/4 inch for lengths greater than 13 feet 6 inches.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.

C. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, storefront assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

D. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

E. Water Penetration under Dynamic Pressure: Test in accordance with AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
2. Maximum Water Leakage: In accordance with AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

F. Energy Performance: Certified and labelled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor):

    a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.45 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.

2. Solar Heat Gain Coefficient (SHGC):

    a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.40 as determined in accordance with NFRC 200.

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3. Air Leakage:

    a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. when tested in accordance with ASTM E283.

4. Condensation Resistance Factor (CRF):

    a. Fixed Glazing and Framing Areas: CRF for the system of not less than 55 as determined in accordance with AAMA 1503.

G. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 4 for [basic][enhanced] protection.

H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.

    a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
    b. Low Exterior Ambient-Air Temperature: 0 deg F.
    c. Interior Ambient-Air Temperature: 75 deg F.

I. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.

J. Structural Sealant: ASTM C1184. Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed, aluminum-framed storefronts without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate, because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 ALUMINUM-FRAMED STOREFRONT SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Kawneer Company, Inc.; Arconic Corporation
2. Manko Window Systems, Inc.
3. Tubelite Inc.
4. YKK AP America Inc.
5. Architect Approved Equal

B. Source Limitations: Obtain all components of aluminum-framed storefront system, including

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framing and accessories, from single manufacturer.

C. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Exterior Framing Construction: Thermally broken.
2. Interior Vestibule Framing Construction: Nonthermal.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane: Front.
5. Finish: Clear anodic finish.
6. Fabrication Method: Field-fabricated stick system.
7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
8. Steel Reinforcement: As required by manufacturer.

D. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.3 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

D. Structural Glazing Sealants: ASTM C1184 chemically curing silicone formulation that is compatible with system components with which it comes in contact; specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in storefront system indicated.

1. Color: As selected by Architect from manufacturer's full range of colors.

E. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

1. Color: Match structural sealant.

2.4 MATERIALS

A. Sheet and Plate: ASTM B209.

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

C. Structural Profiles: ASTM B308/B308M.

D. Steel Reinforcement:

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1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.5 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads , finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

E. Rigid PVC Filler.

2.6 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

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D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.8 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Seal perimeter and other joints watertight unless otherwise indicated.

G. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

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H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

I. Install joint filler behind sealant as recommended by sealant manufacturer.

J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF OPERABLE UNITS

A. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

3.4 INSTALLATION OF STRUCTURAL GLAZING

A. Prepare surfaces that will contact structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

B. Set glazing into framing in accordance with sealant manufacturer and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.

C. Set glazing with proper orientation, so that coatings face exterior or interior as specified.

D. Hold glazing in place using temporary retainers of type and spacing recommended by manufacturer, until structural sealant joint has cured.

E. Apply structural sealant to completely fill cavity, in accordance with sealant manufacturer and framing manufacturers written instructions and in compliance with local codes.

F. Apply structural sealant at temperatures indicated by sealant manufacturer for type of sealant.

G. Allow structural sealant to cure in accordance with manufacturer's recommendations.

H. Clean and protect glass as indicated in Section 088000 "Glazing."

3.5 INSTALLATION OF WEATHERSEAL SEALANT

A. After structural sealant has completely cured, remove temporary retainers and insert backer rod between lites of glass as recommended by sealant manufacturer.

B. Install weatherseal sealant to completely fill cavity, according to sealant manufacturer's written instructions, to produce weatherproof joints.

3.6 ERECTION TOLERANCES

A. Install aluminum-framed storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

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a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

END OF SECTION

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SECTION 087100
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hinges.
2. Mortise locks.
3. Surface closers.
4. Wall- and floor-mounted stops.
5. Door gasketing.
6. Thresholds.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for door silencers provided as part of hollow-metal frames.
2. Section 081213 "Hollow Metal Frames" for door silencers provided as part of hollow-metal frames.

1.2 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.3 PREINSTALLATION MEETINGS

A. Keying Conference: Conduct conference at Project site.

1. Conference participants must include Installer's Architectural Hardware Consultant and Owner's security consultant.
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system, including, but not limited to, the following:

a. Flow of traffic and degree of security required.
b. Preliminary key system schematic diagram.
c. Requirements for key control system.
d. Requirements for access control.
e. Address for delivery of keys.

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1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of product data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

a. Identification number, location, hand, fire rating, size, and material of each door and frame.
b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
e. Fastenings and other installation information.
f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
g. Mounting locations for door hardware.
h. List of related door devices specified in other Sections for each door and frame.

C. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and keying schedule.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved

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by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lockup for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:

a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.
b. Exit Devices: Two years from date of Substantial Completion.
c. Manual Closers: 10 years from date of Substantial Completion.
d. Concealed Floor Closers: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of door hardware from single manufacturer.

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2.2 PERFORMANCE REQUIREMENTS

A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "2010 ADA Standards for Accessible Design" ICC A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 HINGES

A. Hinges: ANSI/BHMA A156.1. [Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.]

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hager Companies
b. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY
c. STANLEY; dormakaba USA, Inc.

2. Hinges: Comply with BHMA A156.1, Grade 1.

a. Provide Hinges on every swing door.
b. Provide ball-bearing hinges at each door with closer.
c. Provide non-removable pins on exterior outswing doors.
d. Provide the following quantity of butt hinges for each door:

1) Doors from 60 inches high up to 90 inches high: 3 hinges

3. Basis-of-Design Product: Subject to compliance with requirements, provide <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

a. Hager Companies
b. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY
c. STANLEY; dormakaba USA, Inc.

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2.4 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
3. Deadbolts: Minimum 1.25-inch bolt throw.

C. Lock Backset: 2-3/4 inches unless otherwise indicated.

D. Lock Trim:

1. Description: As indicated on Drawings.
2. Levers: Cast.
3. Escutcheons (Roses): Cast.
4. Dummy Trim: Match lever lock trim and escutcheons.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

F. Mortise Locks: ANSI/BHMA A156.13, Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. BEST Access Solutions, Inc.; dormakaba USA Inc.
b. Corbin Russwin, Inc.; an ASSA ABLOY Group company
c. Hager Companies
d. STANLEY; dormakaba USA, Inc.

2. Basis-of-Design Product: Subject to compliance with requirements, provide <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

a. BEST Access Solutions, Inc.; dormakaba USA Inc.
b. Corbin Russwin, Inc.; an ASSA ABLOY Group company
c. Hager Companies
d. STANLEY; dormakaba USA, Inc.

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2.5 LOCK CYLINDERS

A. Standard Lock Cylinders: ANSI/BHMA A156.5, Grade 1 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable.

B. High-Security Lock Cylinders: ANSI/BHMA A156.30, Grade 1 permanent cores that are removable; face finished to match lockset.

1. Type M, mechanical.

C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.6 KEYING

A. Keying System: Factory registered, complying with guidelines in ANSI/BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.

1. Master Key System: Change keys and a master key operate cylinders.

a. Provide three cylinder change keys and five master keys.

2. Keyed Alike: Key all cylinders to same change key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: Information to be furnished by Owner.

2.7 SURFACE CLOSERS

A. Surface Closers: ANSI/BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Corbin Russwin, Inc.; an ASSA ABLOY Group company
b. dormakaba USA Inc.
c. Hager Companies
d. STANLEY; dormakaba USA, Inc.

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B. Clo

C. Comply with BHMA A156.4, Grade 1

2.8 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: ANSI/BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hager Companies
b. Rockwood Manufacturing Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY

2. Basis-of-Design Product: Subject to compliance with requirements, provide <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

a. Hager Companies
b. Rockwood Manufacturing Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY

2.9 DOOR GASKETING

A. Door Gasketing: ANSI/BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hager Companies
b. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY

2. Basis-of-Design Product: Subject to compliance with requirements, provide <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

a. Hager Companies
b. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY

B. Maximum Air Leakage: When tested in accordance with ASTM E283/E283M with tested pressure differential of 0.3 inch wg, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
3. Gasketing on Double Doors: 0.50 cfm per ft. of door opening.

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2.10 THRESHOLDS

A. Thresholds: ANSI/BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hager Companies
b. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY

2. Basis-of-Design Product: Subject to compliance with requirements, provide <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

a. Hager Companies
b. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY

2.11 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and ANSI/BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended; however, aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

a. Wood or Machine Screws: For the following:

1) Hinges mortised to doors or frames [; use threaded-to-the-head wood screws for wood doors and frames].
2) Strike plates to frames.
3) Closers to doors and frames.

b. Steel Through Bolts: For the following unless door blocking is provided:

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1) Surface hinges to doors.
2) Closers to doors and frames.
3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.12 FINISHES

A. Provide finishes complying with ANSI/BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION OF DOOR HARDWARE

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

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B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.
2. Furnish permanent cores to Owner for installation.

F. Key Control System:

1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
2. Key Lock Boxes: Install where indicated or approved by Architect to provide controlled access for fire and medical emergency personnel.
3. Key Control System Software: Set up multiple-index system based on final keying schedule.

G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to

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operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

3.7 DOOR HARDWARE SCHEDULE

A. Hardware Set 1: Each door to have the following: Exterior Single Door with Closer

1. (3) Heavy Duty Hinges
2. (1) Mortise Deadbolt Set
3. (1) Standard Core
4. (1) Floor or wall stop
5. (1) Overhead Closer
6. (1) Threshold
7. (1) Kickplate
8. (1) Weatherstripping

B. Hardware Set 2: Each door to have the following: Interior single door

1. (3) Heavy Duty Hinges
2. (1) Mortise Office Set
3. (1) Wall or Floor sto
4. (1) Kickplate

C. Hardware Set 3: Each door to have the following: Interior single door

1. (3) Heavy Duty Hinges
2. (1) Mortise Storeroom Set
3. (1) Wall or Floor Stop
4. (1) Kickplate

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D. Hardware Set 4: Each door to have the following: Interior single door

1. (3) Heavy Duty Hinges
2. (1) Mortise Privacy set
3. (1) Wall or Floor stop
4. (1) Kickplate

END OF SECTION

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SECTION 088000
GLAZING

PART 1 - GENERAL

1.1 SUMMARY

1. Insulating glass.
2. Glazing tapes.
3. Miscellaneous glazing materials.

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site or by web conference.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

1. Tinted glass.
2. Coated glass.
3. Laminated glass.

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4. Insulating glass.
5. Spandrel glass.
6. Bird-friendly glass.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.

B. Product Test Reports: For fabricated glass and glazing sealants, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

C. Preconstruction adhesion and compatibility test report.

D. Qualification Statements: For manufacturers of fabricated glass units.

E. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.

B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors and who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than three Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

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1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

D. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent (3/1000) within specified warranty period. Coverage for any other cause is excluded.

1. Warranty Period: 10 years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Glass: Obtain tinted and coated glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems to withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing to withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Basic Wind Speed: 110 mph.
    b. Importance Factor: 1.0.
    c. Exposure Category: C.

2. Probability of Breakage for Sloped Glazing: For glass sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
4. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Windborne-Debris-Impact Resistance: Exterior glazing must pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 4 for basic protection.

1. Large-Missile Test: For glazing located within 30 ft. of grade.
2. Small-Missile Test: For glazing located between 30 ft. and 60 ft. above grade.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

2.3 GLASS, GENERAL

A. Glazing Publications: Comply with written instructions of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Glazing Manual."

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2. AAMA Publications: AAMA GDSG-1 and AAMA TIR A7.
3. IGMA Publication for Sloped Glazing: IGMA TB-3001.
4. IGMA Publication for Insulating Glass: IGMA TM-3000.

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label indicates manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 INSULATING GLASS

A. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 2188/E2189 for and with requirements specified.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements.
2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated or required.
3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulation-glass units are nominal and the overall thickness of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
4. Sealing System: Comply with the requirements in Section 07920 Joint Sealants. Dual seal, with primary and secondary sealants of polyisobutylene and silicone.
5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

    a. Spacer Material: Aluminum with mill or clear anodic finish.
    b. Desiccant: molecular sieve or silica gel or blend of both.
    c. Corner Construction: Manufacturer's standard corner construction.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Vitro Low-E Clear Insulating Glass - Clear, low-reflective exterior appearance or comparable product by one of the following:

1. Vitro, Architectural Glass
2. Guardian Glass

C. Type: Low-E Clear Insulating Glass - Clear, low-reflective exterior appearance.

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1. Solarban 70 with Clear by Vitro Architectural Glass
2. Performance Values: VLT 64 percent; SHGC 0.27; shading coefficient 0.32; exterior reflectance 13 percent; U-value winter 0.28; U-value summer 0.26.
3. Insulating Glass Unit Construction: 1/4 inch (6mm) Starphire glass, Solarban 70 solar control (sputtered) on second surface (2), 1/2 inch (13 mm) air space, 1/4" inch (6mm) Clear glass.

2.5 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC or acrylic foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. Type: EPDM with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Type: Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. Type: EPDM with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and

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density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

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B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 INSTALLATION OF GLAZING TAPES

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

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E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 INSTALLATION OF GLAZING GASKET (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 INSTALLATION OF GLAZING SEALANT

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in

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writing by glass manufacturer.

3.8 PROTECTION

A. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

B. Remove and replace glass that is damaged during construction period.

END OF SECTION

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SECTION 092216
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonstructural steel framing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For code-compliance certification of studs and track.

B. Evaluation Reports: From an agency acceptable to authorities having jurisdiction showing compliance with Project requirements, for the following:

1. Studs and track.
2. High-strength steel studs and track.
3. Equivalent corrosion-resistant coating on steel framing.
4. Firestop track.
5. Post-installed anchors.
6. Power-actuated fasteners.

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Track: Provide documentation that framing members are certified in accordance with product-certification program of the Steel Framing Industry Association the Steel Stud Manufacturers Association the Supreme Steel Framing System Association.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Protect materials from corrosion, deformation, and other damage during delivery, storage, and handling in accordance with AISI S202.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: Where indicated on Drawings, provide assemblies incorporating nonstructural framing identical to those of assemblies tested in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

B. Horizontal Deflection: For composite wall assemblies, limited to 1/360 of the wall height based on the following horizontal loading:

1. Horizontal Loading: 5 lbf/sq. ft..

2.2 NONSTRUCTURAL STEEL FRAMING

A. Framing Members, General: Comply with requirements in AISI S220 for conditions indicated on Drawings.

1. Protective Coating: ASTM A653/A653M, G40 or coating with demonstrated equivalent corrosion resistance. Galvannealed products are unacceptable.

a. Equivalent Corrosion-Resistant Coating: Evaluation report acceptable to authorities having jurisdiction demonstrates corrosion resistance equivalent to specified protective coating.

B. Studs and Track: Conventional members, roll-formed into standard shapes without surface deformations to stiffen framing members.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. ClarkDietrich

2. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection.
3. Minimum Yield Strength: 33 ksi.
4. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated on Drawings, provide [one of] the following:

D. Rigid Hat-Shaped Furring Channels:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ClarkDietrich
b. Architect Approved Equal

2. Minimum Base-Steel Thickness: 0.0179 inch.
3. Depth: As indicated on Drawings.

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2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Adjustable Wall-Furring Brackets: ASTM A653/A653M G40 hot-dip galvanized steel sheet in minimum 0.0329-inch- base-steel thickness with serrated edges for attaching furring channels to exterior masonry or concrete walls.

C. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.

1. Adjustable Wall-Furring Brackets for Tie Wire: Use minimum double strand of 0.0625-inch- diameter wire, or triple strand of 0.0475-inch- diameter wire to attach furring channels.
2. Suspended-Ceiling Systems:

a. Splicing Carrying Channels and Furring Members: Use double loops of minimum 0.0625-inch- diameter wire.
b. Saddle Tying Main Runners and Cross Furring: Use minimum 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

D. Post-Installed Anchors: Fastener systems with an evaluation report, acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

1. Securing Hangers:

a. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated on Drawings.
b. Stainless Steel Material for Exterior or Interior Locations: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

E. Power-Actuated Anchors: Fastener systems with an evaluation report, acceptable to authorities having jurisdiction, based on ICC-ES AC70.

F. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.162 inch in diameter.

G. Flat Hangers: ASTM A653/A653M G40 hot-dip galvanized steel sheet, in size indicated on Drawings.

H. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, substrates, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices required to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION OF NONSTRUCTURAL METAL FRAMING, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with framing members. Frame both sides of joints independently.

3.4 INSTALLATION OF NONSTRUCTURAL STEEL FRAMING

A. Install framing system components at spacings indicated on Drawings, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated on Drawings.
2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated on Drawings.

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3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated on Drawings.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install track at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated on Drawings to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    a. Install two studs at each jamb unless otherwise indicated on Drawings.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure unless otherwise indicated on Drawings.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated on Drawings. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated on Drawings and support closures to make partitions continuous from floor to underside of solid structure.
5. STC-Rated Partitions: Install framing to comply with STC-rated assembly indicated on Drawings.
6. Curved Partitions:
    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of at least two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Wall-Furring Bracket Systems: Install brackets with serrated edges facing upward spaced at minimum 48 inches o.c. vertically with 6 inches maximum from floor and ceiling, and minimum 36 inches o.c. horizontally with 4 inches maximum from abutting construction, unless otherwise indicated on Drawings.

G. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in

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place with Z-shaped furring members spaced 24 inches o.c.

2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

H. Suspended Assemblies: Isolate suspension assemblies from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

1. Hangers: Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system spaced Insert requirements.

a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
b. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

1) Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

c. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
d. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
e. Do not attach hangers to steel roof deck.
f. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
g. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
h. Do not connect or suspend framing from ducts, pipes, or conduit.

I. Installation Tolerances for Nonstructural Steel Framing:

1. Framing Members: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.
2. Suspended Assemblies: Install suspension systems that are level to within 1/8 inch in 12 ft. measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

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SECTION 092900
GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings in accordance with

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ASTM E119; tested by a qualified testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings in accordance with ASTM E90 and classified in accordance with ASTM E413; tested by a qualified testing agency.

2.3 GYPSUM BOARD, GENERAL

A. Size: Provide panel products in maximum lengths and widths available that will minimize joints in each area and that correspond with support system specified or indicated on Drawings.

2.4 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Gypsum
    b. CertainTeed; SAINT-GOBAIN
    c. Georgia-Pacific Gypsum LLC
    d. USG Corporation

2. Thickness: As indicated on Drawings.
3. Long Edges: .

B. Mold-Resistant Gypsum Board: ASTM C1396/C1396M; manufactured with moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Gypsum
    b. CertainTeed; SAINT-GOBAIN
    c. Georgia-Pacific Gypsum LLC
    d. USG Corporation

2. Core: As indicated on Drawings.
3. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M requirements.

1. Mold-Resistant Joint Compound: Use mold-resistant formulations with mold-resistant panel products.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

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2. Tile Backing Panels: As recommended in writing by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints , rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 4 finish, use setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended in writing by manufacturer for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise specified or indicated on Drawings.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended in writing by panel manufacturer.

D. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840 requirements.

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B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 requirements and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound-attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Gypsum Wallboard: As indicated on Drawings.
2. Mold-Resistant Gypsum Board: behind all plumbing fixtures.

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B. Single-Layer Application:

1. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise specified or indicated on Drawings or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

2. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLICATION OF JOINT TREATMENT MATERIALS

A. Finishing Panel Products: Treat joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare panel surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints , rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over panel joints, except for trim products specifically indicated as not intended to receive tape.

D. Interior Gypsum Board: Finish panels to levels indicated below and in accordance with ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: [Panels that are substrate for tile][Panels that are substrate for acoustical tile][Where indicated on Drawings]<Insert locations>.
3. Level 3: [Where indicated on Drawings]<Insert locations>.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: [Where indicated on Drawings]<Insert locations>.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.5 PROTECTION

A. Protect adjacent surfaces from joint compound and promptly remove from floors and other non-

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gypsum board surfaces. Repair surfaces stained, marred, or otherwise damaged during gypsum board installation and finishing.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

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SECTION 095123
ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical tiles.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

B. Samples for Initial Selection: For components with factory-applied finishes.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Evaluation Reports: For each acoustical tile ceiling suspension system and anchor and fastener type, from ICC-ES.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials [, from the same production run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

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B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Suspended Acoustical Tile Ceiling System: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.

B. Source Limitations for Directly Attached Acoustical Tile Ceiling Tile: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A in accordance with ASTM E1264.
2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL TILES

A. Acoustical Tiles:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Armstrong World Industries
    b. CertainTeed; SAINT-GOBAIN
    c. Rockfon; ROCKWOOL International
    d. USG Corporation

2. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
3. Color: White.
4. Light Reflectance (LR): Not less than 0.70.
5. Ceiling Attenuation Class (CAC): Not less than 20.
6. Noise Reduction Coefficient (NRC): Not less than 0.60.
7. Articulation Class (AC): Not less than 170.
8. Edge/Joint Detail: As indicated by manufacturer's designation.

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9. Thickness: 5/8 inch.
10. Modular Size: As indicated on Drawings.
11. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested in accordance with ASTM D3273, ASTM D3274, or ASTM G21 and evaluated in accordance with ASTM D3274 or ASTM G21.

2.4 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
2. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
3. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch- diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

2.5 MISCELLANEOUS MATERIALS

A. Acoustical Tile Adhesive: Type recommended in writing by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.

B. Staples: 5/16-inch- long, divergent-point staples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-

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place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

C. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. Install suspended acoustical tile ceilings in accordance with ASTM C636/C636M and manufacturer's written instructions.

1. Fire-Rated Assembly: Install fire-rated ceiling systems in accordance with tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

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D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Arrange directionally patterned acoustical tiles as follows:

1. As indicated on reflected ceiling plans.
2. Install tiles with pattern running in one direction parallel to [long][short] axis of space.
3. Install tiles in a basket-weave pattern.

G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.

1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches o.c.
3. Protect lighting fixtures and air ducts in accordance with requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of [1/8 inch in 12 feet]<Insert dimensions>, non-cumulative.

B. Directly Attached Ceilings: Install bottom surface of tiles to a tolerance of [1/8 inch in 12 feet and not exceeding 1/4 inch cumulatively]<Insert requirement>.

C. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of [1/8 inch in 12 feet]<Insert dimensions>, non-cumulative.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids in accordance with ASCE/SEI 7.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling

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suspension systems on each floor has reached 20 percent completion, but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.

1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Acoustical tile ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

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SECTION 096513
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl base.
2. Rubber molding accessories.
3. Vinyl molding accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation instructions for each type of substrate.

B. Samples for Initial Selection: For each type of exposed product.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials , from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear ft. for every 500 linear ft. or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

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B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by testing identical products in accordance with ASTM E648 or ASTM E662 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RESILIENT BASE

A. Vinyl Base:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Flexco Corporation
b. Shaw Industries Group, Inc.; Berkshire Hathaway Company

2. Classification: ASTM F1861, Type TV (vinyl, thermoplastic), Group I (solid, homogeneous) or II (layered).
3. Style and Location:

a. Style A, Straight: Provide in areas with carpet.
b. Style B, Cove: Provide in areas with resilient floor coverings.

4. Minimum Thickness: 0.125 inch.
5. Height: 4 inches.
6. Lengths: Cut lengths 48 inches long.
7. Outside Corners: Job formed or preformed.
8. Inside Corners: Job formed or preformed.
9. Colors and Patterns: As indicated by manufacturer's designations.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended in writing by resilient-product manufacturer for resilient products and substrate conditions indicated.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates in accordance with manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 INSTALLATION OF RESILIENT BASE

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

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H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Miter corners to minimize open joints.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

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SECTION 099123
INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation of interior substrates and application of the following:

1. Primers.
2. Water-based finish coatings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples: For each type of topcoat product.

C. Samples for Initial Selection: For each type of topcoat product.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match paint products applied and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

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PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each paint product from single source from single manufacturer.

2.2 INTERIOR PAINTS, GENERAL

A. Interior Paints: Subject to compliance with requirements, available products that may be incorporated into the Work include but are not limited to products listed in product types below and applicable interior painting schedule articles for the paint category indicated.

B. Material Compatibility:

1. Materials for use within each paint system must be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

C. Colors: As selected by Architect from manufacturer's full range.

2.3 WATER-BASED FINISH COATINGS

A. Interior Latex Paint: Pigmented, water-based coating for use on interior primed/sealed plaster and gypsum board, and on primed wood and metals.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Behr Paint Company (Behr Process LLC)
b. Benjamin Moore & Co.
c. Sherwin-Williams Company (The)

2. Gloss and Sheen Level: Manufacturer's standard semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Gypsum Board: 12 percent. Verify that finishing compound is dry and sanded smooth.

C. Verify suitability of substrates, including surface conditions and compatibility, with finishes and

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primers. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove loose rust, loose mill scale, loose shop primer, and other loose foreign matter. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 2.
2. SSPC-SP 3.
3. SSPC-SP 7/NACE No. 4.
4. SSPC-SP 11.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized Metal Substrates: Remove grease and oil residue from galvanized metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Aluminum Substrates: Remove loose surface oxidation.

H. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for interior use in paint system indicated.
2. Sand surfaces that will be exposed to view and remove sanding dust.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

I. Canvas and Cotton Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

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J. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION OF INTERIOR PAINT PRODUCTS

A. Apply paints in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in the applicable interior painting schedule articles may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.

1. Touch up and restore painted surfaces damaged by testing.
2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.
3. Cost of retesting is Contractor's responsibility.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.

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3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE, GYPSUM-BASED SUBSTRATES

A. Gypsum Board and Plaster Substrates:

1. Latex over Latex Sealer System :

   a. Prime Coat: Interior latex primer sealer.
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Interior latex paint, semigloss.

2. Institutional Low-Odor/VOC Latex System :

   a. Prime Coat: Interior, institutional low-odor/VOC primer sealer.
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Interior, latex, institutional low odor/VOC, .

3. Water-Based Light Industrial Coating System :

   a. Prime Coat: Interior latex primer sealer.
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Interior, water-based, light industrial coating, semigloss.

END OF SECTION

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SECTION 102800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Public-use shower room accessories.

1.2 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Toilet-Compartment Occupancy-Indicator Systems: Manufacturer agrees to repair or replace toilet-compartment occupancy-indicator systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
2. Shower Seats: Installed units are able to resist [250 lbf][360 lbf]<Insert load> concentrated load applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Toilet Tissue (Roll) Dispenser:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc

2. Description: Double-roll dispenser.
3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with standard spindle.
5. Capacity: Designed for 5-inch- diameter tissue rolls.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

C. Paper Towel (Roll) Dispenser:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc

2. Description: Pull-towel-actuated mechanism that permits controlled delivery of paper rolls in preset lengths.
3. Mounting: Surface mounted.
4. Minimum Capacity: 8-inch- wide, 800-foot- long roll.
5. Material and Finish: ABS plastic, gray, with translucent front cover.
6. Lockset: Tumbler type.

D. Soap Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

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a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc

2. Description: Designed for manual operation and dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Refill Indicator: Window type.

E. Grab Bar:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc

2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) on ends and slip-resistant texture in grip area.

4. Configuration and Length: As indicated on Drawings.

F. Mirror Unit:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc

2. Frame: Stainless steel channel.

a. Corners: Manufacturer's standard.

3. Size: 18 inches wide by 24 inches tall.
4. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

G. Hook:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc

2. Description: Combination door bumper and coat hook.
3. Mounting: Exposed.
4. Material and Finish: Polished chrome-plated zinc alloy (zamac).

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2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Source Limitations: Obtain public-use shower room accessories from single source from single manufacturer.

B. Shower Curtain Rod:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc

2. Description: 1-1/4-inch- OD, straight rod.
3. Configuration: As indicated on Drawings.
4. Mounting Flanges: Exposed fasteners; in material and finish matching rod.
5. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

2.4 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.

C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.5 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of [six]<Insert number> keys to Owner's representative.

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PART 3 - EXECUTION

3.1 INSTALLATION OF TOILET, BATH, AND LAUNDRY ACCESSORIES

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements.

C. Shower Seats: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION

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SECTION 104413
FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Samples for Initial Selection: For each type of exposed finish required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

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B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 FIRE-PROTECTION CABINET

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Guardian Fire Equipment, Inc
2. Nystrom, Inc.

B. Fire-Protection Cabinet Type: Suitable for fire extinguisher.

C. Cabinet Construction: Nonrated.

D. Cabinet Material: Cold-rolled steel sheet.

E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.

F. Cabinet Trim Material: Steel sheet.

G. Door Material: Steel sheet.

H. Door Style: Fully glazed panel with frame.

I. Door Glazing: Clear float glass.

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

K. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

a. Identify fire extinguisher in fire-protection cabinet with the words " FIRE EXTINGUISHER."

1) Location: Applied to cabinet glazing.
2) Application Process: Silk-screened.
3) Lettering Color: Red.
4) Orientation: Horizontal.

4. Alarm: Manufacturer's standard alarm that actuates when fire-protection cabinet door is opened and that is powered by batteries.

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L. Materials:

1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.

   a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
   b. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   c. Color: As selected by Architect from manufacturer's full range.

2. Clear Float Glass: ASTM C1036, Type I, Class 1, Quality q3, 3 mm thick.

2.4 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Miter corners and grind smooth.
3. Provide factory-drilled mounting holes.
4. Prepare doors and frames to receive locks.
5. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for hose [valves][racks] and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where and semirecessed cabinets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed and fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION OF FIRE-PROTECTION CABINETS

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at height indicated below:

1. Fire-Protection Cabinet Mounting Height: 42 inches above finished floor to top of fire extinguisher.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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END OF SECTION

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SECTION 133419
METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal building systems.
2. Structural-steel framing.
3. Metal roof panels.
4. Metal wall panels.
5. Thermal insulation.
6. Accessories.

B. Related Requirements:

1. Section 083613 "Sectional Doors" for sectional vehicular doors in metal building systems.

1.2 DEFINITIONS

A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

1.3 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Division 03 concrete Sections.

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conferences: Conduct conferences at Project site.

1. Metal Building Systems Conference: Review methods and procedures related to metal building systems including, but not limited to, the following:

a. Condition of foundations and other preparatory work performed by other trades.
b. Structural load limitations.
c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
d. Required tests, inspections, and certifications.
e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.

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2. Metal Building Roof Panel Conference: Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

    a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
    b. Structural limitations of purlins and rafters during and after roofing.
    c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
    d. Temporary protection requirements for metal roof panel assembly during and after installation.
    e. Roof observation and repair after metal roof panel installation.

3. Metal Building Wall Panel Conference: Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

    a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
    b. Structural limitations of girts and columns during and after wall panel installation.
    c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
    d. Temporary protection requirements for metal wall panel assembly during and after installation.
    e. Wall observation and repair after metal wall panel installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: By manufacturer of metal building systems. Indicate components by others. Include full building plan, elevations, sections, details, and the following:

1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
2. Structural-Framing Drawings: Indicate complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
3. Metal Panel Layout Drawings: Indicate roof and wall. layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; indicate locations of exposed fasteners.

    a. Indicate roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
    b. Indicate wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
    c. Indicate translucent panels.

4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

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a. Flashing and trim.
b. Gutters.
c. Downspouts.
d. Service walkways.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

D. Delegated Design Submittals: For metal building systems, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:

1. Name and location of Project.
2. Order number.
3. Name of manufacturer.
4. Name of Contractor.
5. Building dimensions including width, length, height, and roof slope.
6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
7. Governing building code and year of edition.
8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, in accordance with governing building code.
10. Building-Use Category: Indicate category of building use and its effect on load importance factors.

B. Welding certificates. Maintain current welding certificates for all welders at the jobsite. Submit certificates for Architect/Engineer review only if specifically requested.

C. Qualification Statements: For manufacturer erector.

D. Delegated Design Engineer Qualifications: For metal building system.

E. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes [and door hardware].

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Accreditation: Manufacturer's facility accredited in accordance with IAS AC472.
2. Engineering Responsibility: Metal building system design and preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who

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is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of the type indicated.

B. Delegated Design Engineer Qualifications: A professional engineer who is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of the type indicated.

C. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

D. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.3/D1.3M.

E. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies is to comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and with the following:

1. DHI Fire and Egress Door Assembly Inspector (FDAI) certification.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of foam-plastic materials as rapidly as possible in each area of construction.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed in accordance with manufacturers' written installation instructions and warranty requirements.

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1.11 WARRANTY

A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 25 years from date of Substantial Completion.

B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal building system.

B. Structural Performance: Metal building systems to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated in accordance with procedures in MBMA's "Metal Building Systems Manual":

1. Design Loads: As indicated on Drawings.
2. Deflection and Drift Limits:

a. Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC's "Design Guide No. 3: Serviceability Design Considerations for Steel Buildings."
b. Deflection to be no greater than the following:

1) Purlins and Rafters: Vertical deflection of 1/360 of the span.
2) Girts: Horizontal deflection of 1/240 of the span.
3) Metal Roof Panels: Vertical deflection of 1/360 of the span.
4) Metal Wall Panels: Horizontal deflection of 1/240 of the span.
5) Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.

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6) Lateral Drift: Maximum of 1/200 of the building height.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Structural Performance for Metal Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E1592:

1. Wind Loads: As indicated on Drawings.

E. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested in accordance with ASTM E1680 or ASTM E283/E283M at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

F. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested in accordance with ASTM E283/E283M at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

G. Water Penetration for Metal Roof Panels: No water penetration when tested in accordance with ASTM E1646 or ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

H. Water Penetration for Metal Wall Panels: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

I. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

J. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Approvals' "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A- 120.
2. Hail Resistance: SH.

K. Thermal Performance for Opaque Elements: Provide the following maximum U-factors and minimum R-values when tested in accordance with ASTM C1363 or ASTM C518:

1. Roof: As indicated on drawings
2. Walls: As indicated on drawings.

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2.3 METAL BUILDING SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Buildings Company; a Nucor company
2. BlueScope Buildings North America, Inc.
3. Ceco Building Systems; part of the Cornerstone Building Brands
4. Nucor Building Systems; a Nucor company
5. Varco-Pruden Buildings; a division of BlueScope Buildings North America, Inc.
6. Architect Approved Equal

B. System Description: Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

1. Primary-Frame Type:

    a. Rigid Clear Span: Solid-member, structural-framing system without interior columns.

2. End-Wall Framing:

    a. Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, and end-wall columns.

3. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.
4. Eave Height: Manufacturer's standard height, as indicated by nominal height on Drawings.
5. Bay Spacing: As indicated on Drawings.
6. Roof Slope: As indicated on the Drawings.
7. Roof System: Manufacturer's standard standing-seam, vertical-rib, metal roof panels.

    a. Liner Panels: Tapered rib.

8. Exterior Wall System: Manufacturer's standard exposed-fastener, tapered-rib, metal wall panels.

    a. Liner Panels: Tapered rib.

2.4 STRUCTURAL-STEEL FRAMING

A. Structural Steel: Comply with AISC 360.

B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

C. Cold-Formed Steel: Comply with AISI S100 for design requirements and allowable stresses.

D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to

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frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

    a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.

2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
3. Frame Configuration: Single gable.
4. Exterior Column: Tapered.
5. Rafter: Tapered.

E. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:

1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.

F. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:

1. Purlins:

    a. C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch- wide flanges.

2. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
3. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch- diameter, cold-formed structural tubing to stiffen primary-frame flanges.
4. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
5. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, fabricated from zinc-coated (galvanized) steel sheet.
6. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
7. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
8. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

G. Bracing: Provide adjustable wind bracing using any method as follows:

1. Rods: ASTM A36/A36M; ASTM A572/A572M, Grade 50; or ASTM A529/A529M, Grade 50; minimum 1/2-inch- diameter steel; threaded full length or threaded a minimum of 6 inches at each end.

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2. Cable: ASTM A475, minimum 1/4-inch- diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
5. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.

H. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.

I. Materials:

1. W-Shapes: ASTM A992/A992M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
3. Plate and Bar: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55; or ASTM A529/A529M, Grade 50 or 55.
4. Steel Pipe: ASTM A53/A53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A1008/A1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
7. Metallic-Coated Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.

    a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.
    b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, SS, Grade 50 or 80; with Class AZ50 coating.

9. Non-High-Strength Bolts, Nuts, and Washers: ASTM A307, Grade A, carbon-steel, hex-head bolts; ASTM A563/A563M carbon-steel hex nuts; and ASTM F844 plain (flat) steel washers.

    a. Finish: Hot-dip zinc coating, ASTM F2329, Class C.

10. High-Strength Bolts, Nuts, and Washers, Grade A325 (Grade A325M): ASTM F3125/F3125M, Type 1, heavy-hex steel structural bolts; ASTM A563/A563M, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

    a. Finish: Hot-dip zinc coating, ASTM F2329, Class C.

11. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M,

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Grade F1852, Type 1, heavy-hex or round head assemblies consisting of steel structural bolts with splined ends; ASTM A563/A563M, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1 hardened carbon-steel washers.

a. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.

12. Unheaded Anchor Rods: ASTM F1554, Grade 36.

a. Configuration: Straight.
b. Nuts: ASTM A563/A563M, heavy- hex carbon steel.
c. Plate Washers: ASTM A36/A36M carbon steel.
d. Washers: ASTM F436/F436M, hardened carbon steel.
e. Finish: Hot-dip zinc coating, ASTM F2329, Class C.

13. Threaded Rods: ASTM A193/A193M.

a. Nuts: ASTM A563/A563M, heavy- hex carbon steel.
b. Washers: ASTM F436/F436M, hardened carbon steel.
c. Finish: Hot-dip zinc coating, ASTM F2329, Class C.

J. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.

1. Clean and prepare in accordance with SSPC-SP2.
2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil.

a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.

2.5 METAL ROOF PANELS

A. Roof Solar Reflectance: Provide roof panels with one of the following when tested in accordance with CRRC-1:

1. Three-year, aged, solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
2. Three-year, aged, Solar Reflectance Index (SRI) of not less than 64 when calculated in accordance with ASTM E1980.

B. Standing-Seam, Vertical-Rib, Metal Roof Panels : Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

a. Exterior Finish: Two-coat fluoropolymer.
b. Color: As indicated by manufacturer's designations.

2. Clips: One-piece fixed to accommodate thermal movement.
3. Joint Type: Mechanically seamed.
4. Panel Coverage: 16 inches.

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5. Panel Height: 2 inches.

C. Finishes:

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.6 METAL WALL PANELS

A. Exposed-Fastener, Tapered-Rib, Metal Wall Panels : Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

a. Exterior Finish: Two-coat fluoropolymer.
b. Color: As indicated by manufacturer's designations.

2. Major-Rib Spacing: 6 inches o.c.
3. Panel Coverage: 36 inches.
4. Panel Height: 1.125 inches.

B. Tapered-Rib, Metal Liner Panels : Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

a. Exterior Finish: Siliconized polyester.
b. Color: As selected by Architect from manufacturer's full range.

2. Major-Rib Spacing: 6 inches o.c.
3. Panel Coverage: 36 inches.
4. Panel Height: 1.25 inches.

C. Finishes:

1. Exposed Coil-Coated Finish:

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a. Two-Coat Fluoropolymer: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.7 THERMAL INSULATION

A. Basis-of-Design Product: Subject to compliance with requirements, provide GDP Silvercote; Energy Saver FP System or comparable product by one of the following:

1. Bay Insulation Systems; a division of Bay Industries
2. Thermal Design, Inc.

B. General: High R-value insulation and leading-edge fall protection system consisting of a network of straps (white painted galvannealed banding), a bright white support fabric and unfaced fiberglass blanket insulation. The fabric is fastened to the underside of the roof framing and inside face of wall framing and is supported by the banding. Unfaced fiberglass insulation is installed above and outside the fabric in varying thicknesses to obtain desired insulating values.

C. Roof System:

1. Insulation Installed thickness as required to completely fill cavity from the fabric surface to the underside of roof panels. Roof system shall be a double layer system.
2. Thermal block: R-5 minimum thermal block shall be installed
3. R-Value as indicated on the Drawings.

D. Wall System Without Metal Liner Panels:

1. Insulation installed thickness as required to completely fill cavity from the fabric surface to the back of wall panels. Wall system shall be a double layer system.
2. Steel Strap and Fall Protection Fabric Insulation System required.

E. Wall System with Metal Liner Panels:

1. Insulation Installed thickness as required to completely fill cavity from the fabric surface to the back of wall panels. Wall system shall be a double layer system.
2. Fall protection fabric not required.
3. Vapor Retarder: 6 mil polyethylene.

F. 'Steel Strap and Fall Protection Fabric Insulation System' Components:

1. Steel Strap: 50 KSI tempered, high-tensile-strength steel, galvannealed, primed, and painted white. Minimum size shall be 0.22" thick by 1" wide by continuous length.
2. Fasteners: Use 12-14 TY3 3/4" self-drilling fasteners with 3/4" OD washers, for up to 1/4" thick, light gauge steel (typically purlins). For heavier gauge steel (typically primary framing), up to 3/8", use 12-24 TY5 1-1/4" self-drilling fasteners with a banding clip. All fasteners shall be colored to match fabric color.
3. Sealants: Shall be fast-tack solvent-based synthetic rubber adhesive for sealing fabric laps and edges. Two-sided tape approved by system manufacturer may be substituted for synthetic rubber adhesive.

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4. Insulation: Shall be fiberglass blanket insulation meeting ASTM C991, Type 1 (unfaced) and ASTM E136, or other insulation form as may be recommended and submitted by system manufacturer and approved by the Architect during submittals. Fiberglass blanket shall be rated FHC25/50 with a flame spread rating of 25 or less and a smoke developed rating of 50 or less tested in accordance with ASTM # 84. R-value will vary per description above.
5. Insulation Hangers: Shall be coils for supporting insulation between wall girts at frequency specified by system manufacturer.
6. Fabric: Woven reinforced high-density polyethylene yarns coated on both sides with a continuous white polyethylene film. This material shall be manufactured in large custom-fit pieces by hot air welding from roll goods. Pieces shall be fabricated to substantially fit the large defined building areas with minimum practical sealing to be done on the job site. Fabric shall be folded or rolled to allow for rapid pullout on the strap support system. Fabric data as follows:

    a. Coating Thickness: 1.5 VVFR WHT (+/- 10%.)
    b. Weight: 4.65 oz./sq. yd. (+/- 10% ASTM D-1910).
    c. Tensile Strength: 175 lbs. warp x 156 lbs. weft (ASTM D-751, Grab).
    d. Elongation: 31% warp x 26% fill.
    e. Tear Strength: 56 lbs. warp x 51 lbs. weft (ASTM D-751, Tounge).
    f. Moisture Vapor Transmission: 0.015 (ASTM E-96 Method A)
    g. Thickness: 7.5 mils (+/- 10%).
    h. Mullen Burst: 270 PSI (ASTM D-751).
    i. Puncture Resistance: 81 lbs. (ASTM D-4833).
    j. Flame Resistance: Flame Spread – 5 / Smoke Developed – 20 (ASTM E-84).
    k. Sound Absorption: NRC Rating 0.70 (ASTM C-423 – 02a).
    l. UV Weathering: UV stabilizers added for extra protection.

G. Unfaced Metal Building Insulation: ASTM C991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch- wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.

H. Retainer Strips: For securing insulation between supports, 0.025-inch nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.

2.8 PERSONNEL DOORS AND FRAMES

A. Swinging Personnel Doors and Frames:

1. As specified in Section 081113 "Hollow Metal Doors and Frames."

2.9 WINDOWS

A. Aluminum Windows:

1. As specified in Section 084313 "Aluminum-Framed Storefronts"

2.10 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with

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dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch standoff; fabricated from extruded polystyrene.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.030-inch nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized in accordance with

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manufacturer's written instructions.

1. Gutter Supports: Fabricated from same material and finish as gutters.
2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-ft.- long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters.

G. Roof Curbs: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch nominal uncoated steel thickness prepainted with coil coating; finished to match metal roof panels; with welded top box and bottom skirt, and integral full-length cricket; capable of withstanding loads of size and height indicated.

1. Curb Subframing: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.060-inch nominal uncoated steel thickness, angle-, C-, or Z-shaped metallic-coated steel sheet.
2. Insulation: 1-inch- thick, rigid type.

H. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

I. Materials:

1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
2. Fasteners for Metal Roof Panels:

    a. Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless steel cap or zinc-aluminum-alloy head and EPDM sealing washer.
    b. Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.

3. Fasteners for Metal Wall Panels:

    a. Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws [, with EPDM sealing washers bearing on weather side of metal panels].
    b. Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless steel or zinc-alloy-steel hex washer head [, with EPDM sealing washers bearing on weather side of metal panels].

4. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
5. Blind Fasteners: High-strength aluminum or stainless steel rivets.
6. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
7. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
8. Metal Panel Sealants:

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a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
b. Joint Sealant: ASTM C920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.11 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members to be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

1. Make shop connections by welding or by using high-strength bolts.
2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
5. Shop Priming: Prepare surfaces for shop priming in accordance with SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

1. Make shop connections by welding or by using non-high-strength bolts.
2. Shop Priming: Prepare uncoated surfaces for shop priming in accordance with SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

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2.12 SOURCE QUALITY CONTROL

A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.

1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.

a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed in accordance with Contract requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted in accordance with manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system in accordance with manufacturer's written instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, in accordance with AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

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D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.

a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors and windows.
3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.4 INSTALLATION OF METAL PANELS, GENERAL

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and

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structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate in accordance with equipment manufacturer's written instructions and to comply with details shown.

C. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

D. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate metal panel splices over structural supports with end laps in alignment.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

E. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

F. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types used in tested assemblies meeting "Performance Requirements" Article.

1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

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3.5 INSTALLATION OF METAL ROOF PANELS

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

1. Install ridge caps as metal roof panel work proceeds.
2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.

1. Install clips to supports with self-drilling or self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
6. Provide metal closures at peaks rake edges each side of ridge [and hip] caps.

C. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with exposed fasteners at each lapped joint, at location and spacing recommended by manufacturer.

1. Provide metal-backed sealing washers under heads of exposed fasteners bearing on weather side of metal roof panels.
2. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
3. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps and on side laps of nesting-type metal panels, on side laps of ribbed or fluted metal panels, and elsewhere as needed to make metal panels weatherproof to driving rains.
4. At metal panel splices, nest panels with minimum 6-inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

D. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

E. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 ft. on slope and location lines and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 INSTALLATION OF METAL WALL PANELS

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.

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2. Shim or otherwise plumb substrates receiving metal wall panels.
3. When two rows of metal panels are required, lap panels 4 inches minimum.
4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
5. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.
6. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
7. Install screw fasteners in predrilled holes.
8. Install flashing and trim as metal wall panel work proceeds.
9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.
10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer using sealants and gaskets as required for a watertight installation.

C. Insulated Metal Wall Panels: Install insulated metal wall panels on exterior side of girts. Attach panels to supports at each panel joint using concealed clip and fasteners at maximum 42 inches o.c., spaced not more than manufacturer's written instruction. Fully engage tongue and groove of adjacent insulated metal wall panels.

1. Install clips to supports with self-tapping fasteners.
2. Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels as weather seal.

D. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 ft., noncumulative; level, plumb, and on location lines; and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 INSTALLATION OF THERMAL INSULATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, in accordance with manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install

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layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.

a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
2. Apply thermal break tape to exterior of girts and sheet building.
3. Install Insulation. Care should be taken to completely fill the wall cavity to avoid condensation.
4. Install steel straps or wall liner panel where indicated on Drawings.

3.8 INSTALLATION OF DOORS AND FRAMES

A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place in accordance with manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.

B. Personnel Doors and Frames: Install doors and frames in accordance with NAAMM-HMMA 840. Fit non-fire-rated doors accurately in their respective frames, with the following clearances:

1. Between Doors and Frames at Jambs and Head: 1/8 inch.
2. Between Edges of Pairs of Doors: 1/8 inch.
3. At Door Sills with Threshold: 3/8 inch.
4. At Door Sills without Threshold: 3/4 inch.
5. At fire-rated openings, install frames in accordance with, and doors with clearances specified in, NFPA 80.

C. Field Glazing: Comply with installation requirements in Section 088000 "Glazing."

D. Door Hardware:

1. Install surface-mounted items after finishes have been completed at heights indicated in DHI's TDH-009.
2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
4. Set thresholds for exterior doors in full bed of sealant complying with requirements for concealed mastics specified in Section 079200 "Joint Sealants."

3.9 INSTALLATION OF WINDOWS

A. General: Install windows plumb, rigid, properly aligned, without warp or rack of frames or sash, and securely fasten in place in accordance with manufacturer's written instructions. Coordinate

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installation with wall flashings and other components. Seal perimeter of each window frame with elastomeric sealant used for metal wall panels.

1. Separate dissimilar materials from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in AAMA/WDMA/CSA 101/I.S.2/A440.

B. Set sill members in bed of sealant or with gaskets, for weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Mount screens directly to frames with tapped screw clips.

3.10 INSTALLATION OF ACCESSORIES

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements and manufacturer's written installation instructions. Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

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1. Provide elbows at base of downspouts to direct water away from building.
2. Tie downspouts to underground drainage system indicated.

E. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

F. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.11 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.

B. Prepare test and inspection reports.

3.12 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

C. Windows: Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and at weather stripping to ensure smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.13 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting:

1. After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing [, bearing plates,] and accessories.

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a. Clean and prepare surfaces by SSPC-SP 2 or SSPC-SP 3.
b. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.

1. Immediately before final inspection, remove protective wrappings from doors and frames.

F. Windows: Clean metal surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances. Clean factory-glazed glass immediately after installing windows.

G. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

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SECTION 220518
ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Escutcheons.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Delta Faucets

B. American Standard

C. Kohler

D. Moen

E. Approved equivalent

2.2 ESCUTCHEONS

A. One-Piece, Steel Type: With chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass or steel with polished, chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With polished, chrome-plated finish and spring-clip fasteners.

D. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; exposed-rivet hinge; and spring-clip fasteners.

2.3 FLOOR PLATES

A. Split Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
b. Chrome-Plated Piping: One-piece steel or split-casting brass with polished, chrome-plated finish.
c. Insulated Piping: One-piece stamped steel or split-plate, stamped steel with concealed hinge or split-plate, stamped steel with exposed-rivet hinge with polished, chrome-plated finish.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece stamped steel or split-plate, stamped steel with concealed hinge or split-plate, stamped steel with exposed-rivet hinge with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 220518

SECTION 220523.12
BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Bronze ball valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

   1. Certification that products comply with NSF 61 and NSF 372.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

   1. ASME B1.20.1 for threads for threaded end valves.
   2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
   3. ASME B16.18 for solder-joint connections.
   4. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valves in Insulated Piping:

   1. Include stem extensions as required.

2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.

2.2 BRONZE BALL VALVES

A. Bronze Ball Valves, One-Piece:

1. Manufacturers:

a. Nibco
b. Apollo
c. Parker Hannefin
d. Milwaukee Valve
e. Approved equivalent

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 400 psig (2760 kPa).
c. Body Design: One piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE.
g. Stem: Bronze.
h. Ball: Chrome-plated brass.
i. Port: Full.

B. Bronze Ball Valves, Two-Piece with Full Port, and Bronze or Brass Trim, Threaded or Soldered Ends:

1. Description:

a. Standard: MSS SP-110 or MSS-145.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Bronze or brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

C. Bronze Ball Valves, Two-Piece with Full Port, and Bronze or Brass Trim, Press Ends:

1. Description:

a. Standard: MSS SP-110 or MSS-145.
b. CWP Rating: Minimum 200 psig.

c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Press.
f. Press Ends Connections Rating: Minimum 200 psig.
g. Seats: PTFE or RTPFE.
h. Stem: Bronze or brass.
i. Ball: Chrome-plated brass.
j. Port: Full.
k. O-Ring Seal: EPDM or Buna-N.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.

3.3 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Bronze ball valve, one piece with bronze trim. Provide with threaded or solder-joint ends.
2. Brass ball valves, two-piece with full port and brass trim. Provide with threaded, solder or press connection-joint ends.
3. Bronze ball valves, two-piece with full port and bronze or brass trim. Provide with threaded, solder or press-connection-joint ends.

END OF SECTION 220523.12

SECTION 220523.14
CHECK VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bronze swing check valves.
2. Bronze swing check valves, press ends.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 and NSF 372.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B16.18 for solder joint.
5. ASME B31.9 for building services piping valves.

C. Drinking Water System Components - Health Effects and Drinking Water System Components - Lead Content Compliance: NSF 61 and NSF 372.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE SWING CHECK VALVES

A. Bronze Swing Check Valves with Bronze Disc, Class 125:

1. Manufacturers:

a. Nibco
b. Apollo
c. Parker Hannefin
d. Milwaukee Valve
e. Approved equivalent

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B62, bronze.
e. Ends: Threaded or soldered. See valve schedule articles.
f. Disc: Bronze.

B. Bronze Swing Check Valves with Nonmetallic Disc, Class 125:

1. Manufacturers:

a. Nibco
b. Apollo
c. Parker Hannefin
d. Milwaukee Valve
e. Approved equivalent

2. Description:

a. Standard: MSS SP-80, Type 4.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B62, bronze.
e. Ends: Threaded or soldered. See valve schedule articles.
f. Disc: PTFE.

C. Bronze Swing Check Valves, Press Ends:

1. Manufacturers:

a. Nibco
b. Apollo
c. Parker Hannefin
d. Milwaukee Valve
e. Approved equivalent

2. Description:

    a. Standard: MSS SP-80 and MSS SP-139.
    b. CWP Rating: Minimum 200 psig.
    c. Body Design: Horizontal flow.
    d. Body Material: ASTM B584, bronze.
    e. Ends: Press.
    f. Press Ends Connection Rating: Minimum 200 psig.
    g. Disc: Brass or bronze.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install swing check valves for proper direction of flow in horizontal position with hinge pin level.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Pump-Discharge Check Valves:

    a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with bronze or nonmetallic disc.

B. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

C. End Connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded or soldered or press-ends.

2. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded.

3.4 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Bronze swing check valves bronze or nonmetallic disc, Class 125, with soldered or threaded end connections.
2. Bronze swing check valves with press-end connections.

END OF SECTION 220523.14

SECTION 220523.15
GATE VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bronze gate valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 and NSF 372.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B16.18 for solder joint.
5. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. RS Valves in Insulated Piping: With stem extensions as required.

H. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE GATE VALVES

A. Bronze Gate Valves, Class 125:

1. Manufacturers:

a. Nibco
b. Apollo
c. Parker Hannefin
d. Milwaukee Valve
e. Approved equivalent

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: Bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

B. Bronze Gate Valves, Press Ends:

1. Manufacturers:

a. Nibco
b. Apollo
c. Parker Hannefin
d. Milwaukee Valve
e. Approved equivalent

2. Description:

a. Standard: MSS SP-80 and MSS SP-139.
b. CWP Rating: Minimum 200 psig (1380 kPa).
c. Body Material: Bronze with integral seat and union-ring bonnet.
d. Ends: Press.
e. Press Ends Connection Rating: Minimum 200 psig (1380 kPa).
f. Stem: Brass or bronze.
g. Disc: Solid wedge; bronze.
h. Packing: Graphite.
i. Port: Full.
j. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. Use gate valves for shutoff service only.

B. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

3.4 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Bronze gate valves, Class 125 with soldered or threaded ends.
2. Bronze gate valves, press ends.

END OF SECTION 220523.15

SECTION 220529
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Fastener systems.
3. Equipment supports.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details and include calculations.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe supports, capable of supporting combined weight of supported systems, system contents, and test water.

2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated or epoxy powder coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

B. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

C. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

D. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. Ramset
b. Hilti
c. Redhead

d. DeWalt
e. Approved equivalent

B. Mechanical-Expansion Anchors: Insert-wedge-type anchors, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:
   a. Fastener Technology Corp.
   b. AFT Fasteners
   c. U.S. Bolt Manufacturing
   d. Approved equivalent

2. Indoor Applications: Zinc coated steel.
3. Outdoor Applications: Stainless steel.

2.5 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-carbon-steel shapes.

2.6 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M).

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A36/A36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel.

J. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal hanger-shield inserts may be used.

3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal hanger-shield inserts may be used.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.

5. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment, and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.6 PAINTING

A. Touchup: Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded, shop-painted areas on miscellaneous metal are specified in Section 099123 "Interior Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

G. Use thermal hanger-shield inserts for insulated piping and tubing.

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
4. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
5. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).
6. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
7. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
8. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
9. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).
10. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
11. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
12. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
13. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction occurs.

I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11 split pipe rings.
2. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
5. C-Clamps (MSS Type 23): For structural shapes.
6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
7. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
8. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
9. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
10. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
11. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

12. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
13. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
14. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal Hanger-Shield Inserts: For supporting insulated pipe.

M. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).

3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

N. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

P. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220716 –
PLUMBING EQUIPMENT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing equipment that is not factory insulated:

1. Domestic water storage tanks.

B. Related Sections:

1. Section 220719 "Plumbing Piping Insulation."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail removable insulation at equipment connections.
2. Detail application of field-applied jackets.
3. Detail application at linkages of control devices.
4. Detail field application for each equipment type.

C. Samples: For each type of insulation and jacket indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material test reports

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency

acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less and smoke-developed index of 150 or less.

1.5 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with equipment Installer for equipment insulation application.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Indoor Equipment Insulation Schedule" Article for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C534/C534M, Type II for sheet materials.

1. Manufacturers:

    a. Armacell
    b. Aeroflex
    c. K-Flex
    d. Approved equivalent

G. Mineral-Fiber Blanket: Mineral or glass fibers. Comply with ASTM C553, Type II, and ASTM C1290, Type III, with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers:

    a. Owens Corning
    b. Knauf
    c. Johns Manville
    d. Approved equivalent

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Solvent-based adhesive.

1. Maufacturers:
    a. Armacell
    b. Aeroflex
    c. 3M
    d. Approved equivalent
2. Flame-spread index shall be 25 or less and smoke-developed index shall be 50 or less as tested in accordance with ASTM E84.
3. Wet Flash Point: Below 0 deg F (minus 18 deg C)
4. Service Temperature Range: 40 to 200 deg F (4 to plus 93 deg C).
5. Color: Black.

C. FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Maufacturers:
    a. 3M
    b. IPG
    c. Approved equivalent

2.3 MASTICS AND COATINGS

A. Materials shall be compatible with insulation materials, jackets, and substrates.

B. Vapor-Retarder Mastic, Water Based: Suitable for indoor use on below-ambient services.

1. Manufacturers:
   a. Stego Industries
   b. H.B. Fuller
   c. Childers
   d. Approved equivalent
2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
5. Color: White.

2.4 SEALANTS

A. Materials shall be as recommended by the insulation manufacturer and shall be compatible with insulation materials, jackets, and substrates.

B. Joint Sealants:

1. Manufacturers:
   a. 3M
   b. Childers
   c. Foster
   d. Approved equivalent
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 150 to plus 250 deg F (Minus 101 to plus 121 deg C).
4. Color: White or gray.

2.5 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C1136, Type I, unless otherwise indicated.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Manufacturers:
   a. 3M
   b. Owens Corning
   c. DuPont
   d. Approved equivalent
2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).

4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.`
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.

1. Manufacturers:
   a. 3M
   b. Avery Dennison
   c. Shurtape
   d. Approved equivalent
2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers:
   a. 3M
   b. Hisco
   c. ABI
   d. Approved equivalent
2. Width: 2 inches (50 mm).
3. Thickness: 6 mils (0.15 mm).
4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers:
   a. 3M
   b. All Foils
   c. Stockwell
   d. Approved equivalent
2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of equipment, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 2 inches (50 mm) o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints.

L. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

O. For above-ambient services, do not install insulation to the following:

1. Testing agency labels and stamps.
2. Nameplates and data plates.
3. Cleanouts.

3.4 INSTALLATION OF EQUIPMENT, TANK, AND VESSEL INSULATION

A. Mineral-Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives in accordance with manufacturer's recommended coverage rates per unit area, for 100 percent coverage of tank and vessel surfaces.
2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
3. Protect exposed corners with secured corner angles.
4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:

    a. Do not weld anchor pins to ASME-labeled pressure vessels.
    b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
    c. On tanks and vessels, maximum anchor-pin spacing is 3 inches (75 mm) from insulation end joints and 16 inches (400 mm) o.c. in both directions.
    d. Do not over-compress insulation during installation.
    e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
    f. Impale insulation over anchor pins, and attach speed washers.
    g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

5. Secure each layer of insulation with stainless steel or aluminum bands. Select band material compatible with insulation materials.
6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches (150

mm) from each end. Install wire or cable between two circumferential girdles 12 inches (300 mm) o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches (1200 mm) o.c. Use this network for securing insulation with tie wire or bands.

7. Stagger joints between insulation layers at least 3 inches (75 mm).
8. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.

B. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels.

1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
2. Seal longitudinal seams and end joints.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

3.7 FINISHES

A. Equipment Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless steel jackets.

3.8 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Engage a qualified testing agency to perform tests and inspections.

C. All insulation applications will be considered defective if they do not pass final inspections.

3.9 INDOOR EQUIPMENT INSULATION SCHEDULE

A. Insulate indoor and outdoor equipment that is not factory insulated.

B. Domestic water storage tank insulation shall be one of the following:

1. Flexible Elastomeric: **1 inch (25 mm)** thick.
2. Mineral-Fiber Blanket: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m)** nominal density.
3. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.

END OF SECTION 220716

SECTION 220719
PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.

B. Related Sections:

1. Section 220716 "Plumbing Equipment Insulation" for equipment insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material test reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less and smoke-developed index of 50 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.5 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C534/C534M, Type I for tubular materials.

1. Manufacturers:
   a. Armacell
   b. Aeroflex
   c. K-Flex

d. Approved equivalent

G. Mineral-Fiber, Preformed Pipe: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C547.

1. Manufacturers:
   a. Johns Manville
   b. Rockwool
   c. K-Flex
   d. Approved equivalent
2. Preformed Pipe Insulation: Type I, Grade A, with factory-applied ASJ.
3. Factory fabricate shapes in accordance with ASTM C450 and ASTM C585.
4. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric Adhesive: Solvent-based adhesive.

1. Manufacturers:
   a. 3M
   b. K-Flex
   c. H.B. Fuller
   d. Approved equivalent
2. Flame-spread index shall be 25 or less and smoke-developed index shall be 50 or less as tested in accordance with ASTM E84.
3. Wet Flash Point: Below 0 deg F (minus 18 deg C).
4. Service Temperature Range: 40 to 200 deg F (4 to plus 93 deg C).
5. Color: Black.

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers:
   a. Foster
   b. Childers
   c. Chemique
   d. Approved equivalent

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 4 inches (100 mm) o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

P. For above-ambient services, do not install insulation to the following:
1. Testing agency labels and stamps.
2. Nameplates and data plates.
3. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation made from same material and density as that of adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt

each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges, mechanical couplings, and unions, using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as that of pipe insulation.

4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as that of pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as that of straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as that of straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD QUALITY CONTROL

3.8 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.9 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Cold Water:

1. NPS 1 (DN 25) and Smaller: Insulation shall be one of the following:

a. Flexible Elastomeric: 1/2 inch (13 mm) thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.

2. NPS 1-1/4 (DN 32) and Larger: Insulation shall be one of the following:

a. Flexible Elastomeric: 1 inch (25 mm) thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

B. Domestic Hot Water:

1. NPS 1-1/4 (DN 32) and Smaller: Insulation shall be one of the following:

a. Flexible Elastomeric: 3/4 inch (19 mm) thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.

2. NPS 1-1/2 (DN 40) and Larger: Insulation shall be one of the following:

a. Flexible Elastomeric: 1 inch (25 mm) thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
c. Polyolefin: 1 inch (25 mm) thick.

END OF SECTION 220719

SECTION 221116
DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Ductile-iron pipe and fittings.
3. Galvanized steel pipe and fittings.
4. CPVC piping.
5. PEX tube and fittings.
6. PVC pipe and fittings.
7. PP pipe and fittings.
8. Piping joining materials.
9. Transition fittings.
10. Dielectric fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.3 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B) and ASTM B 88, Type M (ASTM B 88M, Type C) water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) and ASTM B 88, Type L (ASTM B 88M, Type B) water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

G. Copper, Brass, or Bronze Pressure-Seal-Joint Fittings:

1. Manufacturers:
   a. NIBCO
   b. ProPress
   c. Apollo Press
   d. Approved equivalent.
2. Fittings: Cast-brass, cast-bronze, or wrought-copper with EPDM O-ring seal in each end. Sizes NPS 2-1/2 (DN 65)and larger with stainless steel grip ring and EPDM O-ring seal.
3. Minimum 200-psig (1379-kPa) working-pressure rating at 250 deg F (121 deg C).

H. Copper Push-on-Joint Fittings:

1. Manufacturers”
   a. NIBCO
   b. Apollo Valves
   c. Vega
   d. Approved equivalent.
2. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
3. Stainless-steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

2.3 CPVC PIPING

A. CPVC Pipe: ASTM F 441/F 441M, Schedule 40 and Schedule 80.

1. CPVC Socket Fittings: ASTM F 438 for Schedule 40 and ASTM F 439 for Schedule 80.
2. CPVC Threaded Fittings: ASTM F 437, Schedule 80.

B. CPVC Piping System: ASTM D 2846/D 2846M, SDR 11, pipe and socket fittings.

C. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.

2.4 PEX TUBE AND FITTINGS

A. Manufacturers:
   1. Rehau
   2. Uponor
   3. Apollo
   4. NIBCO
   5. Approved equivalent

B. Tube Material: PEX plastic according to ASTM F 876 and ASTM F 877.

C. Fittings: ASTM F 1807, metal insert and copper crimp rings.

D. Fittings: ASSE 1061, push-fit fittings.

   1. Manufacturers:
      a. NIBCO
      b. Uponor
      c. PEX Press
      d. Approved equivalent

E. Manifold: Multiple-outlet, plastic or corrosion-resistant-metal assembly complying with ASTM F 876; with plastic or corrosion-resistant-metal valve for each outlet.

2.5 PVC PIPE AND FITTINGS

A. PVC Pipe: ASTM D 1785, Schedule 40 and Schedule 80.

B. PVC Socket Fittings: ASTM D 2466 for Schedule 40 and ASTM D 2467 for Schedule 80.

C. PVC Schedule 80 Threaded Fittings: ASTM D 2464.

2.6 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

   1. AWWA C110/A21.10, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
   2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

F. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656. .

G. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.7 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Plastic-to-Metal Transition Fittings:

1. Manufacturers:
   a. Charlotte Pipe and Foundry
   b. NIBCO
   c. Poux
   d. Approved equivalent.
2. Description:

   a. CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
   b. One end with threaded brass insert and one solvent-cement-socket or threaded end.

D. Plastic-to-Metal Transition Unions:

1. Manufacturers:
   a. `
   b. Spears
   c. GF Piping Systems
   d. Approved equivalent.
2. Description:

   a. CPVC or PVC four-part union.
   b. Brass or stainless-steel threaded end.
   c. Solvent-cement-joint or threaded plastic end.
   d. Rubber O-ring.
   e. Union nut.

2.8 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers:
   a. A.Y. MacDonald
   b. Swagelok
   c. Zurn
   d. Approved equivalent
2. Standard: ASSE 1079.
3. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F.
4. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers:
   a. CTS Flange
   b. Zurn
   c. Watts Water Technologies
   d. Approved equivalent
2. Standard: ASSE 1079.
3. Factory-fabricated, bolted, companion-flange assembly.
4. Pressure Rating: [125 psig (860 kPa) minimum at 180 deg F (82 deg C).
5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers:
   a. GPT Industries
   b. Ramco
   c. Stepco Products
   d. Approved equivalent
2. Nonconducting materials for field assembly of companion flanges.
3. Pressure Rating: 150 psig (1035 kPa).
4. Gasket: Neoprene or phenolic.
5. Bolt Sleeves: Phenolic or polyethylene.
6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Manufacturers:
   a. Watts
   b. Eastman
   c. Matco-Norca
   d. Approved equivalent
2. Standard: IAPMO PS 66.

3. Electroplated steel nipple complying with ASTM F 1545.
4. Pressure Rating and Temperature: 300 psig (2070 kPa) at 225 deg F (107 deg C).
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

G. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

L. Install piping to permit valve servicing.

M. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

N. Install piping free of sags and bends.

O. Install fittings for changes in direction and branch connections.

P. Install PEX tubing with loop at each change of direction of more than 90 degrees.

Q. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

R. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."

S. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

H. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Piping: Join according to ASTM D 2855.

I. Joints for PEX Tubing: Join according to ASTM F 1807 for metal insert and copper crimp ring fittings and ASTM F 1960 for cold expansion fittings and reinforcing rings.

J. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 (DN 40) and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 (DN 50) and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 (DN 50) and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric couplings or nipples.

C. Dielectric Fittings for [NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flange kits.

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for hangers, supports, and anchor devices in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install hangers for copper tubing and piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Install vinyl-coated hangers for CPVC and PVC piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

E. Install vinyl-coated hangers for PEX tubing, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

F. Support horizontal piping within 12 inches (300 mm) of each fitting.

G. Support vertical runs of copper tubing and piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

H. Support vertical runs of CPVC and PVC piping to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

I. Support vertical runs of PEX tubing to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 3 (DN 80) and smaller shall be one of the following:

1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A) wrought-copper, solder-joint fittings; and brazed copper pressure-seal fittings; and pressure-sealed joints.
2. PVC, Schedule 80; socket fittings; and solvent-cemented joints.

E. Under-building-slab, domestic water piping, NPS 2 (DN 50) and smaller range, shall be[one of] the following:

1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); wrought-copper, solder-joint fittings; and brazed copper pressure-seal-joint fittings; and pressure-sealed joints.
2. PVC, Schedule 80; socket fittings; and solvent-cemented joints.

F. Aboveground domestic water piping, NPS 2 (DN 50) and smaller, shall be one of the following:
1. Hard copper tube, ASTM B 88, Type M (ASTM B 88M, Type C); cast or wrought-copper, solder-joint fittings; and brazed joints.
2. CPVC, Schedule 80; socket fittings; and solvent-cemented joints.
3. CPVC, Schedule 80 pipe; CPVC, Schedule 80 threaded fittings; and threaded joints.
4. CPVC Tubing System: CPVC tube; CPVC socket fittings; and solvent-cemented joints. NPS 1-1/2 (DN 40) and NPS 2 (DN 50) CPVC pipe with CPVC socket fittings may be used instead of tubing.]
5. PEX tube, NPS 1 (DN 25) and smaller.

    a. Fittings for PEX tube:

        1) ASTM F 1807, metal insert and copper crimp rings.
        2) ASTM F 1960, cold expansion fittings and reinforcing rings.
        3) ASSE 1061, push-fit fittings.

6. PVC, Schedule 40; socket fittings; and solvent-cemented joints.

END OF SECTION 221116

SECTION 221119
DOMESTIC WATER PIPING SPECIALTIES

PART 1 - \GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Backflow preventers.
2. Temperature-actuated, water mixing valves.
3. Hose bibbs.

B. Related Requirements:
1. Section 224500 "Emergency Plumbing Fixtures" for water tempering equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 and NSF 14.

B. Comply with NSF 372 for low lead.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: **125 (860)** psig (kPa) unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

A. Double-Check, Backflow-Prevention Assemblies

1. Manufacturers:
   a. Watts
   b. Zurn
   c. Apollo
   d. FEBCO
   e. Approved equivalent
2. Standard: ASSE 1015.
3. Operation: Continuous-pressure applications unless otherwise indicated.
4. Pressure Loss: 4 (27.6 kPa) psig maximum, through middle third of flow range.
5. Size: 1-1/2 NPS (40 DN).
6. Design Flow Rate: 20 gpm (1.26 L/s).
7. Selected Unit Flow Range Limits: 0-50 gpm (0–3.15 L/s).
8. Pressure Loss at Design Flow Rate: 4 psig (27.6 kPa) for sizes NPS 1-1/2 (DN 40) and smaller; 4 psig (27.6 kPa) for NPS 2 (DN 50) and larger.
9. Body: Lead free bronze for NPS 2 (DN 50) and smaller; stainless steel for NPS 2-1/2 (DN 65) and larger.
10. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
11. Configuration: Designed for horizontal, straight-through flow.
12. Accessories:

    a. Valves NPS 2 (DN 50) and Smaller: Ball type with threaded ends on inlet and outlet.
    b. Valves NPS 2-1/2 (DN 65) and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

2.4 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Thermostatic temperature mixing control valves.:
1. See Section 224500 – Emergency Plumbing Fixtures for temperature limiting device specifications Standard: ASSE 1017.
2. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
3. Type: Cabinet-type, thermostatically controlled, water mixing valve.
4. Material: Bronze body with corrosion-resistant interior components.
5. Connections: Threaded union inlets and outlet.
6. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Tempered-Water Setting: 85 deg F (29.4 deg C).
8. Tempered-Water Design Flow Rate: 31 gpm (1.95 L/s).
9. Valve Finish: Rough bronze.
10. Piping Finish: Copper.
11. Cabinet: Factory fabricated, stainless steel, for surface mounting and with hinged, stainless-steel door.

2.5 HOSE BIBBS

A. Hose Bibbs:

1. Manufacturers:
   a. Woodford
   b. NIBCO
   c. American Valve
   d. Approved equivalent
2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze.`
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig (860 kPa).
8. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
9. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
10. Finish for Service Areas: Rough bronze.
11. Finish for Finished Rooms: Chrome or nickel plated.
12. Operation for Service Areas: Wheel handle.
13. Include integral wall flange with each chrome- or nickel-plated hose bibb.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Backflow Preventers: Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified.

3.2 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

C. Comply with requirements for grounding equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

3.3 IDENTIFICATION

A. Plastic Labels for Equipment: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Dual-check-valve backflow preventers.
   2. Primary water tempering valves.
   3. Outlet boxes.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

   1. Test each according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 221119

SECTION 221223.11
FACILITY INDOOR POTABLE-WATER STORAGE TANKS

PART 1 - GENERAL

1.1 `

A. Section Includes:

1. Steel, pressure, potable-water storage tanks.
2. Steel, nonpressure, potable-water storage tanks.
3. Steel, precharged, potable-water storage tanks.
4. Insulated, steel, potable-water storage tanks.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Source quality-control reports.

C. Purging and disinfecting reports.

1.4 QUALITY ASSURANCE

A. Comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects," for potable-water storage tanks. Include appropriate NSF marking.

PART 2 - PRODUCTS

2.1 STEEL, PRECHARGED, POTABLE-WATER STORAGE TANKS

A. Steel, Precharged, Diaphragm, Water Storage Tanks:

1. Manufacturers:
   a. Amtrol
   b. Pentair
   c. Reliance
   d. A.O. Smith
   e. Approved equivalent

2. Description: Steel, vertical, pressured-rated tank with cylindrical sidewalls and with air-charging valve and air precharge.
3. Operation: Factory-installed, butyl-rubber diaphragm.

B. Construction: Steel, constructed with nontoxic welded joints, for 125-psig (860-kPa) working pressure.

C. Tappings: Factory-fabricated steel, welded to tank before testing and labeling.

1. NPS 2 (DN 50) and Smaller: ASME B1.20.1, with female thread.
2. NPS 2-1/2 (DN 65) and Larger: ASME B16.5, flanged.

D. Specialties and Accessories: Include tappings in tank and the following:

1. Pressure gage.
2. Pressure fill valve.

E. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank before testing and labeling.

F. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

1. Lining Material: Antimicrobial polpropylene.

G. Exterior Coating: Manufacturer's standard enamel paint.

2.2 SOURCE QUALITY CONTROL

A. Test and inspect potable-water storage tanks according to the following tests and inspections and prepare test reports:
1. Pressure Testing for Non-ASME-Code, Pressure, Potable-Water Storage Tanks: Hydrostatically test to ensure structural integrity and freedom from leaks at pressure of 50 psig (345 kPa) above system operating pressure, but not less than 125 psig (860 kPa). Fill tanks with water, vent air, pressurize tanks, disconnect test equipment, hold pressure for two hours with no drop in pressure, and check for leaks.

B. Repair or replace tanks that fail test with new tanks, and repeat until test is satisfactory.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water storage tanks on concrete bases, level and plumb, firmly anchored. Arrange so devices needing servicing are accessible.

B. Anchor tank supports and tanks to substrate.

C. Install pressure gages on water storage tanks and piping if indicated.

D. Install the following devices on tanks where indicated:

1. Pressure relief valves.

E. After installing tanks with factory finish, inspect finishes and repair damages to finishes.

3.2 CONNECTIONS

A. Piping installation requirements are specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to potable-water storage tanks to allow service and maintenance.

C. Connect water piping to water storage tanks with unions or flanges and with shutoff valves. Connect tank drains with shutoff valves and discharge over closest floor drains.

1. General-duty valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping," and "Gate Valves for Plumbing Piping."

a. Valves NPS 2 (DN 50) and Smaller: Gate or ball.
b. Valves NPS 2-1/2 (DN 65) and Larger: Gate.
c. Drain Valves: NPS 3/4 (DN 20) gate or ball valve. Include outlet with, or nipple in outlet with, ASME B1.20.7, 3/4-11.5NH thread for garden-hose service, threaded cap, and chain.

2. Water Piping Connections: Make connections to dissimilar metals with dielectric fittings. Dielectric fittings are specified in Section 221116 "Domestic Water Piping."

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following final checks before filling:

1. Verify that air precharge in precharged tanks is correct.
2. Test operation of tank accessories and devices.
3. Verify that pressure relief valves have correct setting.

a. Manually operate pressure relief valves.

b. Adjust pressure settings.

4. Verify that vacuum relief valves are correct size.

a. Manually operate vacuum relief valves.
b. Adjust vacuum settings.

B. Filling Procedures: Follow manufacturer's written procedures. Fill tanks with water to operating level.

3.5 CLEANING

A. Clean and disinfect potable-water storage tanks.

B. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, use procedure described in AWWA C652 or as described below:

1. Purge water storage tanks with potable water.
2. Disinfect tanks by one of the following methods:

a. Fill tanks with water-chlorine solution containing at least 50 ppm (50 mg/L) of chlorine. Isolate tanks and allow to stand for 24 hours.
b. Fill tanks with water-chlorine solution containing at least 200 ppm (200 mg/L) of chlorine. Isolate tanks and allow to stand for three hours.

3. Flush tanks, after required standing time, with clean, potable water until chlorine is not present in water coming from tank.
4. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination made by authorities having jurisdiction shows evidence of contamination.

C. Prepare written reports for purging and disinfecting activities.

END OF SECTION 221223.11

SECTION 221316
SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Copper tube and fittings.
3. PVC pipe and fittings.
4. Specialty pipe fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 WARRANTY

A. Listed manufacturers to provide labeling and warranty of their respective products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

2.2 PIPING MATERIALS

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers:
1. Charlotte Pipe and Foundry

2. Tyler Pipe
3. Approved equivalent.

B. Pipe and Fittings: ASTM A 74, Service class.

C. Gaskets: ASTM C 564, rubber.

D. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 COPPER TUBE AND FITTINGS

A. Copper Type DWV Tube: ASTM B 306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

C. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

D. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.

1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

E. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 PVC PIPE AND FITTINGS

A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

C. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

E. Adhesive Primer: ASTM F 656.

F. Solvent Cement: ASTM D 2564.

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
2. Unshielded, Nonpressure Transition Couplings:

    a. Manufacturers:
        1) Fernco
        2) Mission Rubber
        3) Poux
        4) Approved equivalent.
    b. Standard: ASTM C 1173.
    c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    d. End Connections: Same size as and compatible with pipes to be joined.
    e. Sleeve Materials:

        1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
        2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
        3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

3. Shielded, Nonpressure Transition Couplings:

    a. Manufacturers:
        1) Fernco
        2) Mission Rubber
        3) Poux
    b. Standard: ASTM C 1460.
    c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
    d. End Connections: Same size as and compatible with pipes to be joined.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of waste piping in direction of flow is prohibited.

K. Lay buried building waste piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.

2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

L. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; **1** percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

N. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

O. Install aboveground PVC piping according to ASTM D 2665.

P. Install underground PVC piping according to ASTM D 2321.

Q. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.

a. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install drains in sanitary waste gravity-flow piping.

a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

R. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

S. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install sleeve seals for piping penetrations of concrete walls and slabs.

U. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

C. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

D. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Waste Drainage Piping: Unshielded, nonpressure transition couplings.

3.5 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel or fiberglass pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install hangers for cast-iron or copper soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

C. Install hangers for PVC piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting and coupling.

E. Support vertical runs of cast iron and copper soil piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

F. Support vertical runs of PVC piping to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

    a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.

    a. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.

    a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa).
    b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
    c. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.

a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa).
b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
c. Air pressure must remain constant without introducing additional air throughout period of inspection.
d. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

E. Repair damage to adjacent materials caused by waste and vent piping installation.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Copper Type DWV tube, copper drainage fittings, and soldered joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

C. Aboveground, soil and waste piping NPS 5 (DN 125) and larger shall be any **of** the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

D. Aboveground, vent piping NPS 4 (DN 100) and smaller shall be **any of** the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Copper Type DWV tube, copper drainage fittings, and soldered joints.

    a. Option for Vent Piping, NPS 2-1/2 and NPS 3-1/2 (DN 65 and DN 90): Hard copper tube, Type M (Type C); copper pressure fittings; and soldered joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.
5. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
6. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

E. Underground, soil, waste, and vent piping NPS 4 (DN 100) and smaller shall be any of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Unshielded nonpressure transition couplings.
4. Service class, cast-iron soil piping; gaskets; and gasketed joints.

END OF SECTION 221316

SECTION 221319
SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cleanouts.
   2. Miscellaneous sanitary drainage piping specialties.

B. Related Requirements:
   1. Section 221323 "Sanitary Waste Interceptors" for metal and concrete interceptors outside the building, grease interceptors, grease-removal devices, oil interceptors, and solids interceptors.
   2. Section 221423 "Storm Drainage Piping Specialties" for trench drains for storm water, channel drainage systems for storm water, roof drains, and catch basins.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

   1. Show fabrication and installation details for frost-resistant vent terminals.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sanitary waste piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

A. Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

2.2 CLEANOUTS

A. Cast-Iron Exposed Wall Cleanouts:

1. Manufacturers”
   a. Zurn
   b. Jay R. Smith
   c. Mifab
   d. Approved equivalent
2. Standard: ASME A112.36.2M.
3. Size: Same as connected drainage piping
4. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Exposed Floor Cleanouts :

1. Manufacturers:
   a. Zurn
   b. Jay R. Smith
   c. Mifab
   d. Approved ewquivalent
2. Standard: ASME A112.36.2M for cast-iron soil pipe with cast-iron ferrule cleanout.
3. Size: Same as connected branch.
4. Body or Ferrule: Cast iron.
5. Clamping Device: Not required.
6. Outlet Connection: Spigot.
7. Closure: Brass plug with tapered threads.
8. Adjustable Housing Material: Cast iron with threads, setscrews or other device].
9. Frame and Cover Material and Finish: Stainless steel.
10. Frame and Cover Shape: Round.
11. Top-Loading Classification: Medium Duty.
12. Riser: ASTM A74, Service Class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts
1. Manufacturers:
   a. Zurn
   b. Jay R. Smith
   c. Mifab
   d. Approved ewquivalent
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure Plug:

a. Brass.
b. Countersunk head.
c. Drilled and threaded for cover attachment screw.
d. Size: Same as or not more than one size smaller than cleanout size.

6. Wall Access, Cover Plate: Round, flat, chrome-plated brass or stainless steel cover plate with screw.
7. Wall Access, Frame and Cover: Round wall-installation frame and cover.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Stack Flashing Fittings :

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install air-gap on draining-type backflow preventers and on indirect-waste piping discharge to

E. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 PIPING CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, to allow service and maintenance.

3.3 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

1. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 221319.13
SANITARY DRAINS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Floor drains.
2. Trench drains.

1.2 DEFINITIONS

A. ABS: Acrylonitrile-butadiene styrene.

B. FRP: Fiberglass-reinforced plastic.

C. HDPE: High-density polyethylene.

D. PE: Polyethylene.

E. PP: Polypropylene.

F. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 DRAIN ASSEMBLIES

A. Sanitary drains shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary piping specialty components.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers:
   a. Jay R. Smith

b. Zurn
c. Mifab
d. Approved equivalent
2. Standard: ASME A112.6.3.
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Seepage Flange: Not required.
6. Anchor Flange: Required.
7. Clamping Device: Not required.
8. Outlet: Bottom.
9. Backwater Valve: Not required.
10. Coating on Interior and Exposed Exterior Surfaces: Not required.
11. Top or Strainer Material: Nickel bronze.
12. Top of Body and Strainer Finish: Polished bronze.
13. Top Shape: Round.
14. Dimensions of Top or Strainer: 6 inch diameter.
15. Funnel: Not required

2.3 TRENCH DRAINS

A. Trench Drains:

1. Manufacturers:
   a. Zurn
   b. Jay R. Smith
   c. Neenah Foundry
   d. ABT Drains
   e. Approved equivalent
2. Standard: ASME A112.6.3 for trench drains.
3. Material: Ductile or gray iron.
4. Flange: Anchor.
5. Clamping Device: Not required.
6. Outlet: End.
7. Grate Material: Ductile iron.
8. Grate Finish: Galvanized.
9. Width of Frame and Grate: 6”
10. Top Loading Classification: Class D

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.

3. Set with grates depressed according to the following drainage area radii:

    a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
    b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
    c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.

4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

B. Install trench drains at low points of surface areas to be drained.

1. Set grates of drains flush with finished surface, unless otherwise indicated.
2. Install on support devices, so that top will be flush with adjacent surface.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements in Section 221323 "Sanitary Waste Interceptors" for combined sand/oil interceptors.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319.13

SECTION 221413
FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. PVC pipe and fittings.
2. Specialty pipe and fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Field quality-control reports.

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water (30 kPa).

2.2 PVC PIPE AND FITTINGS

A. Manufacturers:
1. Charlotte Pipe
2. Westlake Pipe
3. LASCO
4. Approved equivalent

B. NSF Marking: Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic storm drain and "NSF-sewer" for plastic storm sewer piping.

C. Solid-Wall PVC Pipe: ASTM D 2665; drain, waste, and vent.

D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

2.3 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in ODs or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
3. Unshielded, Nonpressure Transition Couplings:

B. Manufacturers:
1. Charlotte Pipe
2. Westlake Pipe
3. LASCO
4. Approved equivalent
   a. Standard: ASTM C 1173.
   b. Description: Elastomeric sleeve, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
   c. Sleeve Materials:
      1) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
      2) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
5. Shielded, Nonpressure Transition Couplings:

   a. Manufacturers:
      1) Charlotte Pipe
      2) Westlake Pipe
      3) LASCO
      4) Approved equivalent
   b. Standard: ASTM C 1460.
   c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
   d. End Connections: Same size as and compatible with pipes to be joined.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for piping using appropriate branches, bends, and long-sweep bends.

1. Do not change direction of flow more than 90 degrees.
2. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

L. Install piping at the following minimum slopes unless otherwise indicated:
1. Horizontal Storm Drainage Piping: 2 percent downward in direction of flow.

M. Install underground PVC piping according to ASTM D 2321.

N. Plumbing Specialties:

1. Install cleanouts at grade and e connect to building storm sewers in storm drainage gravity-flow piping.

a. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."

2. Install drains in storm drainage gravity-flow piping.

a. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."

O. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

A. PVC, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Drainage Piping: Unshielded, nonpressure transition couplings.

B. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

3.5 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

    a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved.

    a. Expose work that was covered or concealed before it was tested.

3. Test Procedure:

    a. Test storm drainage piping, except outside leaders, on completion of roughing-in.
    b. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.

4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

C. Piping will be considered defective if it does not pass tests and inspections.

3.6 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.7 PIPING SCHEDULE

A. Underground storm drainage piping NPS 6 (DN 150) and smaller shall be the following:
    1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
    2. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

END OF SECTION 221413

SECTION 221423
STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Trench drains.
2. Cleanouts

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

2.2 CLEANOUTS

A. Cast-Iron Exposed Floor Cleanouts :

1. Manufacturers:
   a. Zurn
   b. Jay R. Smith
   c. Mifab
   d. Approved equivalent
2. Standard: ASME A112.36.2M.
3. Size: Same as connected branch.
4. Type: Heavy-duty, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Clamping Device: Not required.
7. Outlet Connection: No hub or Hub with gasket.
8. Closure: Brass plug with tapered threads.
9. Adjustable Housing Material: Cast iron with setscrews or other device].
10. Frame and Cover Material and Finish: Painted cast iron .
11. Frame and Cover Shape: Round.
12. Top Loading Classification: Extra Heavy Duty.

13. Riser: ASTM A74, Extra-Heavy class, cast-iron drainage pipe fitting and riser to cleanout.

2.3 TRENCH DRAINS

A. Trench Drains:

1. Manufacturers:
   a. Zurn
   b. Jay R. Smith
   c. Neenah Foundry
   d. Approved equivalent
2. Standard: ASME A112.6.3.
3. Body Material: Polymer concete.
4. Flange: Not required.
5. Clamping Device: Not required.
6. Outlet: End.
7. Outlet Type: Inside caulk.
8. Grate Material: Ductile iron or stainless steel.
9. Grate Finish: Not required.
10. Drain width: 6 inches
11. Top-Loading Classification: Extra-Heavy Duty.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts building drain piping according to the following instructions unless otherwise indicated:

1. Use cleanouts the same size as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
3. Locate cleanouts at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface unless otherwise indicated.

D. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.2 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221423

SECTION 223400
FUEL-FIRED, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Commercial, direct-vent, gas-fired, storage, domestic-water heater.
2. Domestic-water heater accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Equipment room drawing or BIM model, drawn to scale and coordinated with all building trades.

B. Product Certificates: For each type of commercial, gas-fired, domestic-water heater.

C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

D. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Warranty Periods: From date of Substantial Completion.

a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:

1) Storage Tank: Five.
2) Controls and Other Components: One year.

b. Expansion Tanks: Five years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.

B. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

C. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 and NSF 372.

D. Commercial, Direct-Vent, Gas-Fired, Storage, Domestic-Water Heaters:

1. Manufacturers:
   a. A.O. Smith
   b. Rheem
   c. Bradford White
   d. State
   e. Approved equivalent
2. Standard: ANSI Z21.10.1/CSA 4.1.
3. Storage-Tank Construction: Steel.

a. Tappings: ASME B1.20.1 pipe thread.
b. Pressure Rating: 150 psig (1035 kPa).

c. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending lining material into tappings.

4. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
c. Drain Valve: Corrosion-resistant metal with hose-end connection.
d. Insulation: Comply with ASHRAE/IES 90.1.
e. Jacket: Steel with enameled finish.
f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
g. Burner: For use with direct-vent, gas-fired, domestic-water heaters and LP-gas fuel.
h. Ignition: ANSI Z21.20/CSA C22.2 No. 60730-2-5, electric, automatic, gas-ignition system.
i. Temperature Control: Adjustable thermostat.
j. Combination Temperature-and-Pressure Relief Valve: ANSI Z21.22/CSA 4.4. Include relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of domestic-water heater. Select relief valve with sensing element that extends into storage tank.

5. Direct-Vent System: Through roof, coaxial- or double-channel vent assembly with domestic-water heater manufacturers' outside intake/exhaust screen.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Expansion Tanks:

1. Manufacturers:
   a. Amtrol
   b. Watts
   c. Zilmet
   d. Approved equivalent.
2. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:

   a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
   b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
   c. Air-Charging Valve: Factory installed.

4. Capacity and Characteristics:

a. Working-Pressure Rating: 150 psig (1035 kPa)
b. Capacity Acceptable: 2 gal. (7.6 L) minimum.
c. Air Precharge Pressure: 12 psi.

B. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1, manually operated. Furnish for installation in piping.

C. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type. Include 1/2-psig (3.5-kPa) pressure rating as required to match gas supply.

D. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.

E. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of domestic-water heater. Select relief valves with sensing element that extends into storage tank.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4.

F. Pressure Relief Valves: Include pressure setting less than working-pressure rating of domestic-water heater.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4.
2. Oil-Fired, Domestic-Water Heaters: ASME rated and stamped.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect assembled domestic-water heaters[and storage tanks] specified to be ASME-code construction, in accordance with ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters and storage tanks to minimum of one and one-half times pressure rating before shipment.

C. Domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."

1. Exception: Omit concrete bases for commercial domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor domestic-water heaters to substrate.

B. Install domestic-water heaters level and plumb, in accordance with layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

C. Install gas-fired, domestic-water heaters in accordance with NFPA 54.

1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.

D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

E. Assemble and install inlet and outlet piping manifold kits for multiple domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each domestic-water heater outlet. Comply with requirements for valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping,".

F. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.

G. Fill domestic-water heaters with water.

H. Charge domestic-water expansion tanks with air to required system pressure.

I. Install dielectric fittings in all locations where piping of dissimilar metals is to be joined. The wetted surface of the dielectric fitting contacted by potable water shall contain less than 0.25 percent of lead by weight.

J. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.2 PIPING CONNECTIONS

A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."

B. Comply with requirements for gas piping specified in Section 231126 "Facility Liquefied-Petroleum Gas Piping."

C. Drawings indicate general arrangement of piping, fittings, and specialties.

D. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, storage, domestic-water heaters. Training shall be a minimum of one hour.

END OF SECTION 223400

SECTION 224216.13
COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.
3. Supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, COUNTER-MOUNTED LAVATORIES

A. Lavatory: Rectangular, self-rimming, vitreous china, counter mounted.

1. Manufacturers:
   a. American Standard
   b. Kohler
   c. Delta
   d. Moen
   e. Approved equivalent
2. Fixture:

   a. Standard: ASME A112.19.2/CSA B45.1.
   b. Type: Self-rimming for above-counter mounting.
   c. Nominal Size: Rectangular, [19 by 24 inches (483 by 609 mm)].

d. Faucet-Hole Punching: One hole
e. Faucet-Hole Location: Top.
f. Color: White.
g. Mounting Material: Sealant.

2.2 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory: Vitreous china, wall mounted, with back.
1. Manufacturers:
a. American Standard
b. Kohler
c. Delta
d. Moen
e. Approved equivalent
2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.
b. Type: For wall hanging.
c. Nominal Size: Rectangular, 17 by 19 inches (432 by 483 mm)
d. Faucet-Hole Punching: One hole]
e. Faucet-Hole Location: Top.
f. Color: White.
g. Mounting Material: Chair carrier.
3. Support: Type II, concealed-arm lavatory carrier. Include rectangular, steel uprights.
4. Lavatory Mounting Height: Handicapped/elderly according to ICC A117.1.

2.3 SOLID-BRASS, MANUALLY OPERATED FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets: Manual-type, single-control mixing commercial, solid-brass valve.

1. Manufacturers:
a. American Standard
b. Kohler
c. Delta
d. Moen
e. Approved equivalent
2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Type: Single hole.
5. Body Material: Commercial, solid brass.
6. Finish: Polished chrome plate.
7. Maximum Flow Rate: 0.5 gpm (1.5 L/min.).

8. Mounting Type: Deck, exposed.
9. Valve Handle: Single lever.
10. Spout: Rigid type.
11. Spout Outlet: Aerator.
12. Operation: Manual.
13. Drain: Grid strainer.

2.4 SUPPORTS

A. Type II Lavatory Carrier:

1. Manufacturers:
   a. Zurn
   b. Josam
   c. Jay R. Smith
   d. Mifab
   e. Approved equivalent
2. Standard: ASME A112.6.1M.

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle.

F. Risers:

1. NPS 3/8 (DN 10).
2. ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

2.6 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 (DN 32) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/4 (DN 32).

2. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories and counters and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

SECTION 224216.16
COMMERCIAL SINKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Service basins.
2. Handwash sinks.
3. Supply fittings.
4. Waste fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 SERVICE BASINS

A. Service Basins: Cast Polymer, floor mounted.

1. Manufacturers:
a. Fiat
b. Mustee
c. Zurn
d. Elkay
e. Approved equivalent
2. Fixture:

a. Standard: IAPMO/ANSI Z124.6.
b. Material: Cast polymer.
c. Nominal Size: 24 by 24 by 10 inches (610 by 610 mm by 255 mm).
d. Tiling Flange: Not required.
e. Rim Guard: On all top surfaces.
f. Color: Not applicable.
g. Drain: Grid with NPS 3 (DN 80) outlet.

3. Mounting: On floor and flush to wall.

2.2 HANDWASH SINKS

A. Handwash Sinks: Stainless steel, wall mounted.

1. Manufacturers:
   a. Elkay
   b. Just Manufacturing
   c. Kohler
   d. Approved equivalent
2. Fixture:

   a. Standards: ASME A112.19.3/CSA B45.4 and NSF/ANSI 2.
   b. Type: Basin with radius corners, back for faucet, and support brackets.
   c. Nominal Size: 17 by 16 by 5 inches (432 by 406 by 127 mm).
3. Supply Fittings: Comply with requirements in "Supply Fittings" Article.
4. Waste Fittings: Comply with requirements in "Waste Fittings" Article.
5. Support: Type II sink carrier.
6. Lavatory Mounting Height: Standard.

2.3 HANDWASH SINK FAUCETS

A. NSF Standard: Comply with NSF 372 for faucet-spout materials that will be in contact with potable water.

B. Service Sink Faucets: Manual type, two-lever-handle with mixing valve.

1. Commercial, Solid-Brass Service Faucets:

   a. Manufacturers:
      1) Chicago Faucets
      2) T&S
      3) Central Brass
      4) Approved equivalent.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
4. Body Type: Widespread.
5. Body Material: Commercial, solid brass.
6. Finish: Chrome plated.
7. Handle(s): Lever
8. Mounting Type: Back/wall, exposed.
9. Spout Type: Rigid, solid brass with wall brace.
10. Vacuum Breaker: Required for hose outlet.
11. Spout Outlet: Hose thread according to ASME B1.20.7.

C. Handwash Sink Faucets: Manual type, two-lever-handle with mixing valve.

1. Commercial, Solid-Brass Faucets.

a. Manufacturers:
   1) Chicago Faucets
   2) T&S Brass
   3) Central Brass
   4) Approved equivalent.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
4. Body Type: Three hole.
5. Body Material: Commercial, solid brass.
6. Finish: Chrome plated.
7. Mounting Type: Back/wall.
8. Spout Type: Rigid spout.
9. Spout Outlet: Aerator.

2.4 SUPPORTS

A. Type II Sink Carrier:

1. Manufacturers:
   a. Zurn
   b. Jay R. Smith
   c. Josam
   d. Mifab
   e. Approved equivalent
2. Standard: ASME A112.6.1M.

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF 372 for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle.

F. Risers:

1. NPS 3/8 (DN 10).
2. ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

2.6 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 (DN 40) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 (DN 40).
2. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Set floor-mounted sinks in leveling bed of cement grout.

D. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball or gate valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

E. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.16

SECTION 224223
COMMERCIAL SHOWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Individual showers.
2. Shower faucets.
3. Grout.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 INDIVIDUAL SHOWERS

A. Individual FRP Showers:

1. Manufacturers:
   a. Kohler
   b. Delta
   c. Dreamline
   d. Basco
   e. Approved equivalent
2. General: FRP accessible, shower enclosure with faucet and receptor and appurtenances.
3. Standard: ANSI Z124.1.2.
4. Type: One-piece unit with top.
5. Style: Standard residential.
6. Nominal Size and Shape: rectangular 60 by 36 inches (1524 by 915 mm)
7. Color: White.
8. Bathing Surface: Slip resistant according to ASTM F462.
9. Outlet: Drain with NPS 2 (DN 50) outlet.
10. Shower Rod and Curtain: Required.
11. Grab Bar: ASTM F446, mounted on support area back wall.

2.2 SHOWER FAUCETS

A. NSF Standard: Comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects," for shower materials that will be in contact with potable water.

B. Shower Faucets

1. Manufacturers:
   a. American Standard
   b. Kohler
   c. Delta
   d. Moen
   e. Approved equivalent
2. Description: Single-handle, pressure-balance mixing valve with hot- and cold-water indicators; check stops; and shower head.
3. Faucet:

   a. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
   b. Body Material: Solid brass.
   c. Finish: Polished chrome plate.
   d. Shower-Arm, Flow-Control Fitting: 1.5 gpm (5.7 L/min.)
   e. Mounting: Exposed.
   f. Operation: Single-handle, push-pull or twist or rotate control.
   g. Antiscald Device: Integral with mixing valve.
   h. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.

4. Supply Connections: NPS 1/2 (DN 15).
5. Shower Head:

   a. Standard: ASME A112.18.1/CSA B125.1.
   b. Type: Ball joint with arm and flange.
   c. Shower Head Material: Metallic with chrome-plated finish.
   d. Spray Pattern: Fixed.
   e. Integral Volume Control: Not required.

2.3 GROUT

A. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Assemble shower components according to manufacturers' written instructions.

B. Install showers level and plumb according to roughing-in drawings.

C. Install water-supply piping with stop on each supply to each shower faucet.

1. Exception: Use ball or gate valves if supply stops are not specified with shower. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

D. Install shower flow-control fittings with specified maximum flow rates in shower arms.

E. Set shower receptors in leveling bed of cement grout.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheons requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between showers and floors and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.2 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with traps and soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.3 ADJUSTING

A. Operate and adjust showers and controls. Replace damaged and malfunctioning showers, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.4 CLEANING AND PROTECTION

A. After completing installation of showers, inspect and repair damaged finishes.

B. Clean showers, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed fixtures and fittings.

D. Do not allow use of showers for temporary facilities unless approved in writing by Owner.

END OF SECTION 224223

SECTION 224500
EMERGENCY PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Emergency showers.
2. Eyewash equipment.
3. Eye/face wash equipment.
4. Combination units.
5. Water-tempering equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: Submit certificates of performance testing specified in "Source Quality Control" Article.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. ISEA Standard: Comply with ISEA Z358.1.

B. NSF Standard: Comply with NSF 61 and NSF 372, for fixture materials that will be in contact with potable water.

C. Regulatory Requirements: Comply with requirements in ICC A117.1, ; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

2.2 COMBINATION UNITS

A. Standard, Plumbed Emergency Shower with Eyewash Combination Unit:

1. Manufacturers:
   a. Haws
   b. Speakman
   c. Bradley
   d. Approved equivalent.
2. Piping:

   a. Material: Chrome-plated brass or stainless steel.
   b. Unit Supply:NPS 1-1/2 (DN 40).
   c. Unit Drain: Outlet at back or side near bottom.

3. Shower:

   a. Capacity: Not less than 20 gpm (76 L/min.) for at least 15 minutes.
   b. Supply Piping: NPS 1 (DN 25) with flow regulator and stay-open control valve.
   c. Control-Valve Actuator: Pull rod
   d. Shower Head: 8-inch- (200-mm-) minimum diameter, chrome-plated brass or stainless steel.
   e. Mounting: Pedestal.

4. Eyewash Unit:

   a. Capacity: Not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.
   b. Supply Piping: NPS 1/2 (DN 15) with flow regulator and stay-open control valve.
   c. Control-Valve Actuator: Paddle.
   d. Spray-Head Assembly: Two receptor-mounted spray heads.
   e. Receptor: Chrome-plated brass or stainless-steel bowl.
   f. Mounting: Attached shower pedestal.

2.3 WATER-TEMPERING EQUIPMENT

A. Hot- and Cold-Water, Water-Tempering Equipment:

1. Manufacturers:
   a. Haws
   b. Acorn

c. Approved equivalent.

2. Description: Factory-fabricated equipment with thermostatic mixing valve.

a. Thermostatic Mixing Valve: Designed to provide 85 deg F (29 deg C) tepid, potable water at emergency plumbing fixtures, to maintain temperature at plus or minus 5 deg F (3 deg C) throughout required 15-minute test period, and in case of unit failure to continue cold-water flow, with union connections, controls, metal piping, and corrosion-resistant enclosure.

b. Supply Connections: For hot and cold water.

2.4 SOURCE QUALITY CONTROL

A. Certify performance of emergency plumbing fixtures by independent testing organization acceptable to authorities having jurisdiction.

2.5 INSTALLATION OF EMERGENCY PLUMBING FIXTURE

A. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.

B. Install fixtures level and plumb.

C. Fasten fixtures to substrate.

D. Install shutoff valves in water-supply piping to fixtures, to facilitate maintenance of the equipment. Use ball or gate valve if specific type valve is not indicated. Install valves chained or locked in open position if permitted. Install valves in locations where they can easily be reached for operation. Comply with requirements for valves specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."

1. Exception: Omit shutoff valve on supply to group of plumbing fixtures that includes emergency equipment.
2. Exception: Omit shutoff valve on supply to emergency equipment if prohibited by authorities having jurisdiction.

E. Install dielectric fitting in supply piping to emergency equipment if piping and equipment connections are made of different metals. Comply with requirements for dielectric fittings specified in Section 221116 "Domestic Water Piping."

F. Install trap and waste piping on drain outlet of emergency equipment receptors that are indicated to be directly connected to drainage system. Comply with requirements for waste piping specified in Section 221316 "Sanitary Waste and Vent Piping."

G. Install indirect waste piping on drain outlet of emergency equipment receptors that are indicated to be indirectly connected to drainage system. Comply with requirements for waste piping specified in Section 221316 "Sanitary Waste and Vent Piping."

H. Install escutcheons on piping wall and ceiling penetrations in exposed, finished locations. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

I. Fill self-contained fixtures with flushing fluid.

2.6 CONNECTIONS

A. Connect cold-water-supply piping to plumbed emergency plumbing fixtures not having water-tempering equipment. Comply with requirements for cold-water piping specified in Section 221116 "Domestic Water Piping."

B. Connect hot- and cold-water-supply piping to hot- and cold-water, water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures. Comply with requirements for hot- and cold-water piping specified in Section 221116 "Domestic Water Piping."

C. Directly connect emergency plumbing fixture receptors with trapped drain outlet to sanitary waste and vent piping. Comply with requirements for waste piping specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Indirectly connect emergency plumbing fixture receptors without trapped drain outlet to sanitary waste or storm drainage piping.

E. Where installing piping adjacent to emergency plumbing fixtures, allow space for service and maintenance of fixtures.

2.7 IDENTIFICATION

A. Install equipment nameplates or equipment markers on emergency plumbing fixtures and equipment and equipment signs on water-tempering equipment.

2.8 FIELD QUALITY CONTROL

A. Mechanical-Component Testing: After plumbing connections have been made, test for compliance with requirements. Verify ability to achieve indicated capacities.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Emergency plumbing fixtures and water-tempering equipment will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

2.9 ADJUSTING

A. Adjust or replace fixture flow regulators for proper flow.

B. Adjust equipment temperature settings.

END OF SECTION 224500

SECTION 23 05 00
COMMON WORK RESULTS FOR HEATING, VENTILATING & AIR CONDITIONING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work to be performed under this Division shall include all labor, materials, equipment, transportation, construction plant and facilities necessary to provide a complete and satisfactory system ready to use. Examine all drawings and all sections of specifications to ascertain to what extent other contracts affect work.

1.02 QUALITY ASSURANCE

A. Qualifications of contractor: All materials and equipment shall be new and all work shall be executed with maximum speed consistent with current accepted trade practices. Furnish materials and equipment promptly after authorization to proceed, and proceed with work in progress with contractor on project. Perform all work included in contract in a manner that will not cause interferences or delays to, or interfere with, progress of contractor.

B. Requirements of regulatory agencies:
   1. Permits: Arrange and pay for all permits, inspections and utility connections required.
   2. Referenced standards:
      a. Comply with specified codes and standards. If conflict exists between codes or standards and drawings, project manual or addenda requirements, request clarification from Architect/Engineer.
      b. Conform to installation rules and regulations of standards listed including all subsequently published amendments thereto issued prior to date of bidding documents.
      c. Conform to requirements of all local, state and federal agencies, which have authority over this project. Include all items of labor and material required to meet such requirements regardless of failure to specify in project manual or indicate on drawings each individual item.
      d. All equipment, apparatus and systems shall be rated, tested, fabricated and installed with applicable industry standards.
      e. Applicable portions of latest editions of following standards form a part of this project manual to same force and effect as if repeated herein.
         1) American Gas Association, Inc. (AGA)
         2) American Society for Testing Materials (ASTM)
         3) American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
         4) American Society of Mechanical Engineers (ASME)
         5) American Water Works Association (AWWA)
         6) National Electrical Code (NEC)
         7) National Electric Manufacturers Association (NEMA)
         8) National Fire Protection Association (NFPA)
         9) Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

10) Underwriters Laboratories, Inc. (UL)
11) Environmental Protection Agency (EPA)
12) Department of Public Health (DPH)
13) Iowa Plumbing Code, Current Edition

1.03 COORDINATION & SUBMITTALS

A. Contractor shall resolve all conflicts before actual installation begins. Order of space preference throughout building shall be:
   1. Recessed light fixtures
   2. Duct work
   3. Soil, waste, vent and storm piping
   4. Domestic water piping
   5. Sprinkler piping
   6. Electrical conduit
   7. Exception: Plumbing lines below or behind plumbing fixtures shall have precedence over all other work. Electrical conduit above or below switchgear, panel boards and control panels shall have precedence over all other work. Do not install any fluid conveying piping over electrical or elevator equipment.
   8. Submit following Certifications:
      a. Fire Protection
      b. Welding
      c. Insulation
      d. Air & Water Balance
      e. Domestic Water Disinfection

1.04 STARTING, TESTING, ADJUSTING & BALANCING

A. See sections 23 05 93 Testing, Adjusting, and Balancing

1.05 WARRANTY

A. Guarantee all work including labor, material and equipment for this project for a period of one (1) year from date of acceptance by Owner.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 EXISTING CONDITIONS

A. In order to become familiar with scope of work involved, visit existing site, before submitting bid, and carefully examine existing condition in order to have full knowledge and understanding of conditions and restrictions affecting performance of work required. Include in bid all work which is reasonably inferred by contract drawings and specifications, whether specifically shown or not, as a result of existing conditions, construction, irregularities and interferences which may affect work. No additional compensation will be considered for misunderstanding conditions to be met.

B. Layout shown on drawings is necessarily diagrammatic but shall be followed as closely as other work will permit. Changes from these drawings required to make this work conform to building construction shall be made only with prior written approval of Architect/Engineer. All proposed changes shall be shown on shop drawings. All

measurements shall be verified by actual observation and all work shall fit in place meeting approval of Architect/Engineer.

C. Contractor shall provide openings required in new and existing construction that may be necessary for installation of mechanical work and all patching and workmen competent in trade required, at expense of contractor shall do repairing. Contractor shall be responsible for arranging work so that minimum cutting will be required. All rubbish and excess materials involved in such cutting shall be promptly removed from site and disposed of by contractor. Cutting through floor or roof systems or load bearing walls shall be done only with prior written approval of Architect/Engineer so as to avoid damaging structural system.

D. Sequencing, scheduling:
   1. Confer with contractor regarding location and size of pipes, equipment, ducts, openings and special architectural treatments in order that there may be no interferences between installation or progress of work of contractor on project. order of space preference shall be as listed above.
   2. In case of interconnection of work of two or more contractors, verify at site or on shop drawings all dimensions relating to such work. All errors due to failure to so verify any such dimensions shall be promptly rectified.
   3. All line voltage wiring and final connections to complete mechanical systems shall be provided by Electrical Contractor. All electrical conduit, wire, and connections relating to mechanical equipment controls and all wiring associated with starter holding coils, shall be responsibility of contractor installing mechanical equipment unless otherwise indicated on drawings. Contractor installing mechanical equipment shall be responsible for magnetic motor starters where such starters are part of control package of equipment supplied. All other starters shall be furnished and installed by Electrical Contractor. Contractor installing starters that are part of a control package shall coordinate starter requirements with Division 26 of specifications.
   4. Items of equipment may be specified in singular however, provide and install number of items of equipment as indicated on drawings and as required for a complete system.
   5. Each contractor shall provide excavating, pumping, backfilling, and compacting required for installation of their respective work as shown on drawings.
   6. Equipment and devices furnished and installed by mechanical contractors, which have factory prime coat, or final surface finish shall be replaced, repaired or refinished if defective or damaged during installation.
   7. Arrange all work so a minimum period of interruption or outages will occur in temporary or permanent transfer of services as required for all mechanical revisions. Not less than 48 hours notification to Owner shall be required before approval will be granted for any disruption of gas, water, or sanitary services. Outage request shall include extent of work to be done, length of outage time required, and time at which outage is to begin. No allowance will be made for extra payment as a result of scheduling “overtime” work necessary to perform before or after normal or regular working hours to accomplish work intended.
   8. Submit a “Sequence of Work Schedule” in respect to all temporary and permanent utility and service cutovers after final determination. This schedule shall be submitted for approval to Architect/Engineer. Submittal shall designate priority order, service or utility affected, date of cutover, and time of day to start and finish.

3.02 CLEANING

A. Upon completion of contract all remaining materials and rubbish shall be removed from building and premises and work areas shall be left clean and free from stains, mortar, paint spots, etc.

B. All switches, controls, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation and shall be tested in presence of Owner's designated representative to insure that their function and purpose is understood.

C. Upon completion of work, put systems into service maintaining responsibility for equipment during all testing operations including lubricating and turning on and off of such apparatus.

END OF SECTION

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SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hangers and supports for heating and ventilating systems.

1.02 REFERENCES

A. American Concrete Institute, ACI:
1. ACI 301: Specifications for Structural Concrete for Buildings.
2. ACI 304: Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
3. ACI 347: Recommended Practice for Concrete Formwork.
4. American Society of Testing and Materials, ASTM:
a. ASTM A82: Cold Drawn Steel Wire for Concrete Reinforcement.
b. ASTM A185: Welded Steel Wire Fabric For Concrete Reinforcement.
c. ASTM C33: Concrete Aggregates.
d. ASTM C150: Portland Cement.
e. ASTM C171: Sheet Materials for Curing Concrete.
f. ASTM C260: Air-Entraining Admixtures for Concrete.
g. ASTM C309: Liquid Membrane Forming Compounds for Curing Concrete.
h. ASTM C404: Aggregates for Masonry Group.
1) American National Standards Institute, ANSI:
a) ANSI B31, 1: Power Piping.
(1) Concrete Reinforcing Steel Institute, CRSI:
(2) CRSI Manual of Standard Practice.
(3) Sheet Metal & Air Conditioning Contractor's National Association, Inc., SMACNA:
(4) Duct Hangers: SMACNA Duct Manuals.

1.03 REGULATORY REQUIREMENTS

A. National Fire Protection Association, NFPA:
1. NFPA 90A: Installation of Air Conditioning and Ventilating Systems.
2. Underwriter's Laboratories/Factory Mutual, UL/FM:
a. Provide products UL listed and FM approved.

PART 2 `

2.01 MANUFACTURERS

A. Hangers and Supports
1. Mason Industries
2. Nibco.
3. PHD Mfg, Inc.
4. ITT Grinnell Corp.

2.02 HANGER ROD ATTACHMENTS

A. Type:
   1. Steel Turnbuckles: MSS Type 13.

B. Provide factory fabricated hanger rod attachments, in compliance with ANSI/MSS SP-58 and ANSI/MSS SP-69.
   1. Use only one type by one manufacturer for each piping service.
   2. Select Size of hanger rod attachments to suit hanger rods.
   3. Provide copper plated hanger rod attachments for copper piping systems.

2.03 BUILDING ATTACHMENTS

A. Types:
   1. C-Clamps: MSS Type 23.
   2. Steel Brackets: One of following for indicated loading:
      a. Light Duty: MSS Type 31.
      b. Medium Duty: MSS Type 32.
      c. Heavy Duty: MSS Type 33.

B. Provide factory fabricated building attachments, in compliance with ANSI/MSS SP-58 and ANSI/MSS SP-69.
   1. Select size of building attachments to suit hanger rods.

2.04 DUCT HANGERS AND SUPPORTS

A. Hangers: Galvanized steel band iron or 1-1/4 inch x 3/16 inch angle and 3/8 inch rods.

B. Wall Supports: Galvanized steel band iron or fabricated angle bracket.

C. Vertical Support at Floor: Rolled 1-1/4 inch x 3/16 inch angle.

2.05 MISCELLANEOUS SUPPORT MATERIALS

A. Metal Framing: NEMA Standard ML 1.

B. Steel Plates, Shapes and Bars: ANSI/ASTM A36.

C. Hanger Rods: Steel; threaded both ends, threaded 1 end, or continuously threaded.

D. Cement Grout: Portland cement: ANSI/ASTM C150, Type I or Type III; clean uniformly grades, natural sand, ANSI/ASTM C404, Size No. 2; mix ration of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water for placement and hydration.

E. Heavy Duty Steel Trapezes.
   1. Fabricate from steel shapes selected for loads specified.
   2. Weld steel in accordance with AWS standards.

PART 3 EXECUTION

3.01 INSTALLATION PERFORMANCE

A. Comply with MSS SP-69 for installation of hangers, supports, and anchors.

B. Install in accordance with manufacturer's recommendations.

C. Install hangers, supports clamps, and attachments directly from building structure complete with inserts, bolts rods, nuts and washers, and accessories.

3.02 DUCT HANGERS AND SUPPORTS INSTALLATION

A. Low Velocity Ducts:
   1. Hanger Minimum Sizes:
      a. Up to 30 inches wide: 1-1/4 inch x 3/16 inch angle at 10 feet spacing.
      b. 31 inches to 48 inches wide: 1-1/2 inches x 3/16 inch angle at 10 feet spacing.
      c. Over 48 inches wide: 1-1/2 inches x 3/16 inch angle at 8 feet spacing.
   2. Horizontal Duct on Wall Supports Minimum Sizes:
      a. Up to 18 inches wide: 1-1/2 inches x 16 gauge or 1 inch x 1 inch x 1/8 inch at 8 feet spacing.
      b. 19 inches to 40 inches wide: 1-1/2 inches x 1-1/2 inches x 1/8 inch at 4 feet spacing.
   3. Vertical Duct on Wall Supports Minimum Sizes:
      a. At 12 feet spacing.
      b. Up to 24 inches wide: 1-1/4 inches x 3/16 inch angle.
      c. 25 inches to 36 inches wide: 1-1/2 inch x 3/16 inch angle.
      d. 37 inches to 48 inches wide: 1-1/2 inch x 1/4 inch angle.
   4. Covered Ducts: Install hangers below insulation with rod hangers.
   5. Lined Ducts: Install hangers below duct; sheet metal duct not punctured.
   6. Install hangers, supports to permit free, noiseless expansion and contraction.
   7. Round Duct Hangers Minimum Sizes:
      a. At 10 feet spacings.
      b. Up to 18 diameter: 1 inch x 16 gauge.
      c. 19 inches to 36 inches diameter: 1 inch x 12 gauge.
      d. 37 inches to 50 inches diameter: 1-1/2 inches x 12 gauge.
      e. 51 inches to 84 inches diameter: 2 at 1-1/2 inches x 12 gauge from girth reinforcing angle.
   8. Angle reinforcing may be used for support omitting trapeze.

3.03 EQUIPMENT BASES AND SUPPORTS

A. Concrete:
   1. Provide for major equipment concrete bases poured directly on structural floor slab 4 inches thick minimum, extended 4 inches minimum beyond machinery bedplates.
   2. Formwork: ACI 347.
      a. Chamfer external corners of exposed concrete work.
      b. Provide openings required by others.
      c. Use manufacturer's templates or certified setting diagrams for placement of equipment anchor bolts and other mounting accessories.
      d. Install accessories: Waterstops, expansion joints, and moisture barrier.
   3. Concrete Placement: ACI 301, 304.
   4. Concrete Curing : ACI 301.
   5. Concrete Finishing:
      a. Horizontal Surfaces: Float and trowel to level, smooth, uniform, dense finish; leave struck off surface untroweled; or scratch struck off surfaces.
      b. Depress top of concrete where supported work is set in mortar or sand bed.
      c. Curbs: Strip form while concrete is green; steel trowel to hard dense finish with corners, intersections and terminations slightly rounded and coved.
   6. Concrete Grouting: Grout openings and recesses as indicated, around mechanical work using grouting mix, tamped, screeded, troweled and cured.
      a. See individual equipment Sections for specification for fine grouting (nonshrink grout) of equipment base plates on foundation bases.

7. Field Quality Control: Contractor engages testing laboratory to take on site slump or compression tests to ensure compliance with specifications.

B. Steel: Brace and fasten with flanges bolted to structure.
   1. Supports: Structural steel members or steel pipe and fittings.
   2. Provide rigid anchors for ducts and pipes immediately after vibration connections to equipment.

3.04 ADJUSTING AND CLEANING

A. Adjust hangers and supports and place grout under supports to bring piping and ductwork to proper levels and elevations.

END OF SECTION

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SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers and grilles.

1.02 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc.; 2007.

B. ASHRAE Std 70 - Method of Testing for Rating Performance of Air Outlets and Inlets; American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.; 2006.

C. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

1.03 SUBMITTALS

A. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Manufacturer Qualifications: Company specializing in manufacturing type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Diffusers, Registers, and Grilles:
1. Titus:.
2. Carnes Company HVAC: .
3. Krueger:
4. Price Industries:
5. Metal*aire
6. Nailor
7. Tuttle and Bailey.
8. Approved equivalent

2.02 RECTANGULAR CEILING DIFFUSERS

A. Basis of design, Titus OMNI.

B. Fabrication: Aluminum with factory off-white enamel finish.

C. Type: Square, panel ceiling diffuser to discharge air in 360 degree pattern with sectorizing baffles where indicated.

D. Frame: Hard ceiling type. In plaster ceilings, provide plaster frame and ceiling frame.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.

E. All screws and fastening hardware to be concealed where available. Fasteners exposed to chlorine environment, provide 316L stainless steel hardware.

3.02 SCHEDULES

A. See plan drawings for schedule.

B. Verify plan drawings for all duct connection sizes and ceiling types prior to final selection.

END OF SECTION

SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.

1.2 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

F. TDH: Total dynamic head.

1.3 ACTION SUBMITTALS

A. TAB Report: Documentation indicating that Work complies with ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

B. Certified TAB reports.

1.4 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB or TABB.
2. TAB Technician: Employee of the TAB specialist and certified by NEBB or TABB as a TAB technician.

B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

I. Examine heat-transfer coils for correct connections and for clean and straight fins.

J. Examine operating safety interlocks and controls on HVAC equipment.

K. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Duct systems are complete with terminals installed.
b. Volume dampers are open and functional.
c. Clean filters are installed.
d. Fans are operating, free of vibration, and rotating in correct direction.
e. Automatic temperature-control systems are operational.
f. Ceilings are installed.
g. Windows and doors are installed.
h. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, [NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.

C. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check dampers for proper position to achieve desired airflow path.

H. Check for airflow blockages.

I. Check condensate drains for proper connections and functioning.

J. Check for proper sealing of air-handling-unit components.

K. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Where duct conditions allow, measure airflow by main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses, close to the fan and prior to any outlets, to obtain total airflow.
    c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.

2. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.
    d. Report artificial loading of filters at the time static pressures are measured.

3. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
4. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.

2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

3.6 TOLERANCES

A. Set HVAC system's airflow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.

3.7 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.

11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fan performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Other system operating conditions that affect performance.

D. Gas- and Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

    a. System identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Fuel type in input data.
    g. Output capacity in Btu/h (kW).
    h. Ignition type.
    i. Burner-control types.
    j. Motor horsepower and rpm.
    k. Motor volts, phase, and hertz.
    l. Motor full-load amperage and service factor.
    m. Sheave make, size in inches (mm), and bore.
    n. Center-to-center dimensions of sheave and amount of adjustments in inches (mm).

2. Test Data (Indicated and Actual Values):

    a. Total airflow rate in cfm (L/s).
    b. Entering-air temperature in deg F (deg C).
    c. Leaving-air temperature in deg F (deg C).
    d. Air temperature differential in deg F (deg C).
    e. Low-fire fuel input in Btu/h (kW).
    f. High-fire fuel input in Btu/h (kW).
    g. Manifold pressure in psig (kPa).
    h. High-temperature-limit setting in deg F (deg C).
    i. Operating set point in Btu/h (kW).

j. Motor voltage at each connection.
k. Motor amperage for each phase.

E. Fan Test Reports: For supply and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Make and type.
c. Model number and size.
d. Manufacturer's serial number.
e. Arrangement and class.
f. Sheave make, size in inches (mm), and bore.
g. Center-to-center dimensions of sheave and amount of adjustments in inches (mm).

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches (mm), and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm (L/s).
b. Total system static pressure in inches wg (Pa).
c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).
e. Suction static pressure in inches wg (Pa).

F. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and unit number.
b. Location.
c. Traverse air temperature in deg F (deg C).
d. Duct static pressure in inches wg (Pa).
e. Duct size in inches (mm).
f. Duct area in sq. ft. (sq. m).
g. Indicated airflow rate in cfm (L/s).
h. Indicated velocity in fpm (m/s).
i. Actual airflow rate in cfm (L/s).
j. Actual average velocity in fpm (m/s).

k. Barometric pressure in psig (Pa).

3.8 VERIFICATION OF TAB REPORT

A. Construction Manager shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

B. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

C. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

D. If TAB work fails, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
3. If the second verification also fails, design professional may contact AABC Headquarters regarding the AABC National Performance Guaranty.

E. Prepare test and inspection reports.

3.9 ADDITIONAL TESTS

A. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and` winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713
DUCTWORK INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:
1. Drawings and general provisions of the Subcontract apply to this Section.
2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes:
1. Ductwork insulation.
2. Insulation jackets.
3. Insulation vapor barriers.

C. Related Sections:
1. Division 01 Section "General Requirements."
2. Division 01 Section "Special Procedures."
3. Division 23 Section "Ductwork".
4. Division 23 Section "Identification for HVAC Piping and Equipment".

1.2 REFERENCES

A. General:
1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
4. Refer to Division 23 Section "Common Results for HVAC" for codes and standards, vibration and noise, and other general requirements.

B. ASTM International:
1. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
2. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation
3. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

C. Code of Federal Regulations 29 CFR 1910.7 Definitions and Requirements for a A nationally Recognized Testing Laboratory (NRTL)

D. NFPA - National Fire Protection Association:
1. NFPA 255 Surface Burning Characteristics of Building Materials

E. Underwriters Laboratory (UL):
   1. UL Building Materials List
   2. UL 723 Surface Burning Characteristics of Building Materials

1.3 INSULATION WORK REQUIREMENTS

A. Insulate HVAC ductwork as follows:
   1. Unless indicated otherwise, new HVAC supply and return air ductwork shall be externally insulated.
      a. Insulate cold room supply and exhaust ducts.
   2. If ducts are internally insulated, they are not externally insulated unless specifically directed.
   3. Transfer and exhaust ducts are internally insulated only if specifically directed.
   4. Install an insulation jacket on externally-insulated HVAC ductwork located outdoors; and indoors except in mechanical rooms and above ceilings.
   5. Insulate outside air intake ducts if located in non-mechanical room indoors space.

1.4 SUBMITTALS

A. Submit under provisions of Division 23 Section "Common Results for HVAC - Review of Materials" and Division 01 Section "General Requirements."

B. Product Data: Include product description, list of materials, coating sample, and thickness for each service, manufacturer's installation instructions, and locations.

1.5 QUALITY ASSURANCE

A. Applicator: Assure that applicator is a company specializing in ductwork insulation application with 3 years relevant experience.

B. Materials: Listed by a nationally recognized testing laboratory (NRTL) recognized under 29 CFR 1910.7; flame-spread/fuel-contributed/smoke-developed ratings of 25/50/50 in accordance with UL 723.

PART 2 - PRODUCTS

2.1 Manufacturers:

A. Titus:.
B. Carnes Company HVAC: .
C. Krueger:
D. Price Industries:
E. Approved equivalent

F. Substitutions: Under provisions Division 01 Section "General Requirements - Materials and Equipment".

2.2 MATERIALS

A. Type A: For externally-insulated, round or rectangular ductwork, insulation shall be flexible glass fiber; ASTM C612; commercial grade; "k" value of 0.29 at 75 deg F (24 deg C); 0.002-inch (0.05 mm) foil-scrim facing.

B. Vapor Barrier: Non-flammable, fire-resistant, polymeric resin, compatible with the insulation.

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
   1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Impale Anchors: Galvanized steel, 12 gauge (2.5mm), self-adhesive pad.

E. Tie Wire: Annealed steel, 16 gauge (1.5mm).

F. The use of products with asbestos content is prohibited.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install materials after ductwork has been tested and approved.

B. Clean surfaces for adhesives.

C. Install materials in accordance with manufacturer's instructions.

D. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging.

E. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.

F. Exterior Insulation (Type A) Application
   1. Secure insulation with vapor barrier with wires. Secure insulation without vapor barrier with staples, tape, or wires.
   2. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
   3. Seal jacket joints with vapor barrier adhesive or tape to match jacket.
   4. Continue insulation with vapor barrier through penetrations.

END OF SECTION 230713

SECTION 230923.12
CONTROL DAMPERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes control dampers and actuators for HVAC systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include diagrams for power and control wiring.

C. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASME Compliance: Fabricate and label products to comply with ASME Boiler and Pressure Vessel Code where required by authorities having jurisdiction.

C. Ground Fault: Products shall not fail due to ground fault condition when suitably grounded.

1. Fail positions unless otherwise indicated:
   a. Outdoor Air: Open.
   b. Exhaust Air: Open.

2.2 RECTANGULAR CONTROL DAMPERS

A. General Requirements:

1. Unless otherwise indicated, use parallel blade configuration for two-position control, equipment isolation service, and when mixing two airstreams. For other applications, use opposed blade configuration.
2. Factory assemble multiple damper sections to provide a single damper assembly of size required by the application.

B. Rectangular Dampers with Aluminum Flat Blades:

1. Manufacturers:
   a. Greenheck
   b. Ruskin
   c. Naylor
   d. Potorff
   e. Approved equivalent
2. Performance:

   a. Leakage: Leakage shall not exceed 3.2 cfm/sq. ft. (16.2 L/s per sq. m) against 1-in. wg (250-Pa) differential static pressure.
   b. Pressure Drop: 0.07-in. wg (17.5 Pa) at 1500 fpm (7.6 m/s) across a 24-by-24-inch (600-by-600-mm) damper when tested according to AMCA 500-D, figure 5.3.
   c. Velocity: Up to 2000 fpm (10 m/s).
   d. Temperature: Minus 50 to plus 250 deg F (Minus 46 to plus 121 deg C).
   e. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/200 of blade length, not to exceed 3-in. wg (750 Pa).
   f. Damper shall have AMCA seal for both air leakage and air performance.

3. Construction:

   a. Frame:

      1) Material: ASTM B211, Alloy 6063 T5 extruded-aluminum profiles, 0.12 inch (3.2 mm) thick.
      2) Hat-shaped channel with integral flanges.
      3) Width not less than 5 inches (125 mm).

   b. Blades:

      1) Flat blades of extruded aluminum.
      2) Parallel or opposed blade configuration as required by application.
      3) Material: ASTM B211, Alloy 6063 T5 extruded-aluminum profiles, 0.12 inch (3.2 mm) thick.
      4) Width not to exceed 6 inches (150 mm).
      5) Length as required by close-off pressure, not to exceed 48 inches (1200 mm).

   c. Seals:

      1) Blades: Replaceable, mechanically attached extruded silicone, vinyl or plastic composite.
      2) Jambs: Stainless steel, compression type.

   d. Axles: 0.5-inch- (13-mm-)diameter plated or stainless steel, mechanically attached to blades.
   e. Bearings:

      1) Molded-synthetic sleeve, mounted in frame.

2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Concealed in frame.
2) Constructed of plated or stainless steel.
3) Hardware: Stainless steel.

g. Transition:

1) For round and flat oval duct applications, provide damper assembly with integral transitions to mate to adjoining field connection.
2) Factory mount damper in a sleeve with a close transition to mate to field connection.
3) Damper size and sleeve shall be connection size plus 2 inches (50 mm).
4) Sleeve length shall be not less than 12 inches (300 mm) for dampers without jackshafts and shall be not less than 16 inches (450 mm) for dampers with jackshafts.
5) Sleeve material shall match adjacent duct.

2.3 GENERAL CONTROL-DAMPER ACTUATORS REQUIREMENTS

A. Actuators shall operate related damper(s) with sufficient reserve power to provide smooth modulating action or two-position action and proper speed of response at velocity and pressure conditions to which the damper is subjected.

B. Actuators shall produce sufficient power and torque to close off against the maximum system pressures encountered. Actuators shall be sized to close off against the fan shutoff pressure as a minimum requirement.

C. The total damper area operated by an actuator shall not exceed 80 percent of manufacturer's maximum area rating.

D. Provide one actuator for each damper assembly where possible. Multiple actuators required to drive a single damper assembly shall operate in unison.

E. Avoid the use of excessively oversized actuators which could overdrive and cause linkage failure when the damper blade has reached either its full open or closed position.

F. Use jackshafts and shaft couplings in lieu of blade-to-blade linkages when driving axially aligned damper sections.

G. Provide mounting hardware and linkages for connecting actuator to damper.

H. Select actuators to fail in desired position in the event of a power failure.

I. Actuator Fail Positions:

1. Exhaust Air: Open.
2. Outdoor Air: Open.

2.4 ELECTRIC AND ELECTRONIC ACTUATORS

A. Type: Motor operated, with or without gears, electric and electronic.

B. Voltage:

1. 120 V, single phase.
2. Actuator shall deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage.
3. Actuator shall function properly within a range of 85 to 120 percent of nameplate voltage.

C. Construction:

1. Less Than 120°F: Fiber or reinforced nylon gears with steel shaft, copper alloy or nylon bearings, and pressed steel enclosures.

D. Field Adjustment:

1. Spring return actuators shall be easily switchable from fail open to fail closed in the field without replacement.
2. Provide gear-type actuators with an external manual adjustment mechanism to allow manual positioning of the damper when the actuator is not powered.

E. Two-Position Actuators: Single direction, spring return or reversing type.

F. Fail-Safe:

1. Where indicated, provide actuator to fail to an end position.
2. Internal spring return mechanism to drive controlled device to an end position (open or close) on loss of power.
3. Batteries, capacitors, and other non-mechanical forms of fail-safe operation are acceptable only where uniquely indicated.

G. Integral Overload Protection:

1. Provide against overload throughout the entire operating range in both directions.
2. Electronic overload, digital rotation sensing circuitry, mechanical end switches, or magnetic clutches are acceptable methods of protection.

H. Damper Attachment:

1. Unless otherwise required for damper interface, provide actuator designed to be directly coupled to damper shaft without need for connecting linkages.
2. Attach actuator to damper drive shaft in a way that ensures maximum transfer of power and torque without slippage.

3. Bolt and set screw method of attachment is acceptable only if provided with at least two points of attachment.

I. Temperature and Humidity:

1. Temperature: Suitable for operating temperature range encountered by application with minimum operating temperature range of minus 20 to plus 120 deg F (minus 29 to plus 49 deg C).
2. Humidity: Suitable for humidity range encountered by application; minimum operating range shall be from 5 to 95 percent relative humidity, non-condensing.

J. Enclosure:

1. Suitable for ambient conditions encountered by application.
2. NEMA 250, Type 2 for indoor and protected applications.
3. NEMA 250, Type 4 or Type 4X for outdoor and unprotected applications.
4. Provide actuator enclosure with a heater and controller where required by application.

K. Stroke Time:

1. Operate damper from fully closed to fully open within 15 seconds.
2. Move damper to failed position within 15 seconds.
3. Select operating speed to be compatible with equipment and system operation.
4. Actuators operating in smoke control systems comply with governing code and NFPA requirements.

L. Sound:

1. Spring Return: 62 dBA.

PART 3 - EXECUTION

3.1 CONTROL-DAMPER APPLICATIONS

A. Control Dampers:

B. Select from damper types indicated in "Control Dampers" Article to achieve performance requirements and characteristics indicated while subjected to full range of system operation encountered.

1. Rectangular Exhaust Air Duct Applications: Rectangular dampers with aluminum flat blades.
2. Rectangular Outdoor Air Duct Applications: Rectangular dampers with aluminum flat blades.

3.2 INSTALLATION, GENERAL

A. Furnish and install products required to satisfy most stringent requirements indicated.

B. Properly support dampers and actuators, wiring, and conduit to comply with requirements indicated.

C. Provide ceiling, floor, roof, and wall openings required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

D. Fastening Hardware:

1. Stillson wrenches, pliers, or other tools that will cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

E. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for Owner's access, confirm unrestricted ladder placement is possible under occupied condition.

3.3 ELECTRIC POWER

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install circuit breakers. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers."

C. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Furnish and install raceways. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems."

3.4 CONTROL DAMPERS

A. Install smooth transitions, not exceeding 15 degrees, to dampers smaller than adjacent duct. Install transitions as close to damper as possible but at distance to avoid interference and impact to performance. Consult manufacturer for recommended clearance.

B. Clearance:

1. Locate dampers for easy access and provide separate support of dampers that cannot be handled by service personnel without hoisting mechanism.
2. Install dampers with at least 24 inches (600 mm) of clear space on sides of dampers requiring service access.

C. Service Access:

1. Dampers and actuators shall be accessible for visual inspection and service.
2. Install access door(s) in duct or equipment located upstream of damper to allow service personnel to hand clean any portion of damper, linkage, and actuator. Comply with requirements in Section 233300 "Air Duct Accessories."

D. Install dampers straight and true, level in all planes, and square in all dimensions. Install supplementary structural steel reinforcement for large multiple-section dampers if factory support alone cannot handle loading.

E. Attach actuator(s) to damper drive shaft.

F. For duct-mounted and equipment-mounted dampers installed outside of equipment, install a visible and accessible indication of damper position from outside.

G. Connect electrical devices and components to electrical grounding system. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

H. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing shall have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 CHECKOUT PROCEDURES

A. Control-Damper Checkout:

1. Check installed products before continuity tests, leak tests, and calibration.
2. Check dampers for proper location and accessibility.
3. Verify that control dampers are installed correctly for flow direction.
4. Verify that proper blade alignment, either parallel or opposed, has been provided.
5. Verify that damper frame attachment is properly secured and sealed.
6. Verify that damper actuator and linkage attachment are secure.
7. Verify that actuator wiring is complete, enclosed, and connected to correct power source.
8. Verify that damper blade travel is unobstructed.

3.6 ADJUSTMENT, CALIBRATION, AND TESTING:

A. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed back to 100 percent open.

B. Check and document open and close cycle times for applications with a cycle time of less than 30 seconds.

C. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

END OF SECTION 230923.12

SECTION 231126
FACILITY LIQUEFIED-PETROLEUM GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.
6. Storage containers.
7. Transport truck unloading facility specialties.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. For Piping Containing Only Vapor:

a. Piping and Valves: 125 psig (862 kPa) unless otherwise indicated.

2. For Piping Containing Liquid:

a. Piping between Shutoff Valves: 350 psig (2413 kPa) unless otherwise indicated.
b. Piping Other Than Above: 250 psig (1723 kPa) unless otherwise indicated.
c. Valves and Fittings: 250 psig (1723 kPa) unless otherwise indicated.

B. LPG System Pressure within Buildings: One pressure range. 0.5 psig (3.45 kPa) or less.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Delegated-Design Submittal: For LPG piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed by the qualified professional responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A53/A53M, black steel, Schedules 40 and 80, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A234/A234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

    a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

B. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.

1. Manufacturers:
    a. Omegaflex
    b. Ward
    c. Gastite
    d. Approved equivalent.
2. Tubing: ASTM A240/A240M, corrugated, Series 300 stainless steel.
3. Coating: PE with flame retardant.

    a. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

        1) Flame-Spread Index: **25** or less.
        2) Smoke-Developed Index: **50** or less.

4. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
5. Striker Plates: Steel, designed to protect tubing from penetrations.
6. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
7. Operating-Pressure Rating: 5 psig (34.5 kPa).

C. Annealed-Temper Copper Tube: Comply with ASTM B88, Type L (ASTM B88M, Type B).

1. Copper Fittings: ASME B16.22, wrought copper, and streamlined pattern.
2. Flare Fittings: Comply with ASME B16.26 and SAE J513.

    a. Copper fittings with long nuts.
    b. Metal-to-metal compression seal without gasket.
    c. Dryseal threads complying with ASME B1.20.3.

D. PE Pipe: ASTM D2513, SDR 11.

1. PE Fittings: ASTM D2683, socket-fusion type or ASTM D3261, butt-fusion type with dimensions matching PE pipe.
2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D2513, SDR 11; and steel pipe complying with ASTM A53/A53M, black steel, Schedule 40, Type E or S, Grade B.
3. Anodeless Service-Line Risers: Factory fabricated and leak tested.

    a. Underground Portion: PE pipe complying with ASTM D2513, SDR 11 inlet.
    b. Casing: Steel pipe complying with ASTM A53/A53M, Schedule 40, black steel, Type E or S, Grade B with corrosion-protective coating covering.
    c. Aboveground Portion: PE transition fitting.
    d. Outlet shall be threaded suitable for welded connection.
    e. Tracer wire connection.
    f. Ultraviolet shield.
    g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

4. Transition Service-Line Risers: Factory fabricated and leak tested.

    a. Underground Portion: PE pipe complying with ASTM D2513, SDR 11 inlet connected to steel pipe complying with ASTM A53/A53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
    b. Outlet shall be threaded suitable for welded connection.
    c. Bridging sleeve over mechanical coupling.
    d. Factory-connected anode.
    e. Tracer wire connection.
    f. Ultraviolet shield.
    g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

2.2 PIPING SPECIALTIES

A. Flexible Piping Joints:

1. Approved for LPG service.
2. Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
3. Minimum working pressure of 250 psig (1723 kPa) and 250 deg F (121 deg C) operating temperature.
4. Threaded-end connections to match equipment connected and shall be capable of minimum 3/4-inch (20-mm) misalignment.
5. Maximum 36-inch (914-mm) length for liquid LPG lines.

B. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig (3.45 kPa).
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 72 inches (1830 mm.)

C. Quick-Disconnect Devices: Comply with ANSI Z21.41.

1. Copper-alloy convenience outlet and matching plug connector.
2. Nitrile seals.
3. Hand operated with automatic shutoff when disconnected.
4. For indoor or outdoor applications.
5. Adjustable, retractable restraining cable.

D. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for LPG.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F (540 deg C) complying with AWS A5.8/A5.8M.

2.4 MANUAL GAS SHUTOFF VALVES

A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. Metallic Valves, NPS 2 (DN 50) and Smaller for Liquid Service: Comply with ASME B16.33 and UL 842.

1. CWP Rating: 250 psig (1723 kPa).
2. Threaded Ends: Comply with ASME B1.20.1.
3. Socket ends for brazed joints.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing by CSA or agency acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
6. Valves 1-1/4 inch (32 mm) and larger shall be suitable for LPG service, with "WOG" indicated on valve body.

C. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller for Vapor Service: Comply with ASME B16.33.

1. CWP Rating: 125 psig (862 kPa).
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
6. Service Mark: Valves 1-1/4 inch (32 mm) to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.

D. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.

1. Manufacturers:
   a. NIBCO
   b. Apollo Valve
   c. Approved equivalent.
2. Body: Bronze, complying with ASTM B584.
3. Ball: Chrome-plated brass.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Separate packnut with adjustable-stem packing threaded ends.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig (4143 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.

10. Service: Suitable for LPG service with "WOG" indicated on valve body.

E. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers:
   a. NIBCO
   b. Apollo Valve
   c. Approved equivalent.
2. Body: Bronze, complying with ASTM B584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig (4143 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for LPG service with "WOG" indicated on valve body.

F. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers:
   a. Nibco
   b. Apollo Valve
   c. Approved eqivalent.
2. Body: Bronze, complying with ASTM B584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig (4140 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for LPG service with "WOG" indicated on valve body.

G. Bronze Plug Valves: MSS SP-78.

1. Manufacturers:
   a. NIBCO
   b. Apollo Valve
   c. Approved equivalent.
2. Body: Bronze, complying with ASTM B584.
3. Plug: Bronze.
4. Ends: Threaded or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.

5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig (862 kPa).
7. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for LPG service with "WOG" indicated on valve body.

H. PE Ball Valves: Comply with ASME B16.40.

1. Manufacturers:
   a. Gemini Valve
   b. Polyvalve
   c. AVK
   d. Approved equivalent
2. Body: PE.
3. Ball: PE.
4. Stem: Acetal.
5. Seats and Seals: Nitrile.
6. Ends: Plain or fusible to match piping.
7. CWP Rating: 80 psig (552 kPa).
8. Operating Temperature: Minus 20 to plus 140 deg F (Minus 29 to plus 60 deg C).
9. Operator: Nut or flat head for key operation.
10. Include plastic valve extension.
11. Include tamperproof locking feature for valves where indicated on Drawings.

I. Valve Boxes:

1. Cast-iron, two-section box.
2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and barrel a minimum of 5 inches (125 mm) in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head and with stem of length required to operate valve.

2.5 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for LPG.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller.

B. Appliance Pressure Regulators: Comply with ANSI Z21.18.

1. Manufacturers:
   a. Fisher
   b. Swagelok
   c. Maxitrol
   d. Approved equivalent.

2. Body and Diaphragm Case: Die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber.
6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
7. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
9. Maximum Inlet Pressure: 5 psig (34.5 kPa-).

PART 3 - EXECUTION

3.1 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of LPG piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Verify final equipment locations for roughing-in.

K. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

L. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where readily accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

M. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

N. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

O. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

P. Connect branch piping from top or side of horizontal piping.

Q. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment.

R. Do not use LPG piping as grounding electrode.

S. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

T. Install pressure gage downstream from each line regulator. Pressure gages are specified in Section 230519 "Meters and Gages for HVAC Piping."

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.2 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install earthquake valves aboveground outside buildings according to listing.

E. Install anode for metallic valves in underground PE piping.

3.3 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full ID of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Ch. 22, "Pipe and Tube."

F. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

G. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hangers, and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install hangers for steel piping, with maximum spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

C. Install hangers for corrugated stainless-steel tubing, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Support horizontal piping within 12 inches (300 mm) of each fitting.

E. Support vertical runs of steel piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

F. Support vertical runs of corrugate stainless-steel tubing to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.5 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install LPG piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches (1830 mm) of each gas-fired appliances and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.6 LABELING AND IDENTIFYING

A. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for piping and valve identification.

3.7 FIELD QUALITY CONTROL

A. Test, inspect, and purge LPG according to NFPA 58, NFPA 54, and the International Fuel Gas Code and requirements of authorities having jurisdiction.

B. LPG piping will be considered defective if it does not pass tests and inspections.

3.8 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG (3.45 kPa)

A. Aboveground, branch piping NPS 1 (DN 25) and smaller shall be one of the following:

1. Corrugated stainless-steel tubing with mechanical fittings having socket or threaded ends to match adjacent piping.
2. Annealed-temper copper tube with wrought-copper fittings and brazed joints.
3. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be the following:
1. Schedule 40, steel pipe with wrought-steel fittings and welded joints.

3.9 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Distribution piping valves for pipe NPS 2 (DN 50) and smaller shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.
3. Bronze plug valve.

B. Valves in branch piping for single appliance shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.
3. Bronze plug valve.

END OF SECTION 231126

SECTION 232300
REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Refrigerant pipes and fittings.
2. Refrigerant piping valves and specialties.
3. Refrigerants.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve, refrigerant piping, and refrigerant piping specialty.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-134a:

1. Suction Lines for Air-Conditioning Applications: 115 psig (793 kPa).
2. Suction Lines for Heat-Pump Applications: 225 psig (1551 kPa).
3. Hot-Gas and Liquid Lines: 225 psig (1551 kPa).

B. Line Test Pressure for Refrigerant R-407C:

1. Suction Lines for Air-Conditioning Applications: 230 psig (1586 kPa).
2. Suction Lines for Heat-Pump Applications: 380 psig (2620 kPa).
3. Hot-Gas and Liquid Lines: 380 psig (2620 kPa).

C. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).
2. Suction Lines for Heat-Pump Applications: 535 psig (3689 kPa).
3. Hot-Gas and Liquid Lines: 535 psig (3689 kPa).

2.2 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type K or L (ASTM B 88M, Type A or B)

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8/A5.8M.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
4. Working Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

G. Copper Pressure-Seal Fitting for Refrigerant Piping:

1. Manufacturers:
   a. Pro-Press
   b. NIBCO
   c. ACR
   d. Meuller Streamline
   e. Approved equivalent
2. Standard: UL 207; certified by UL for field installation. Certification as a UL-recognized component alone is unacceptable.
3. Housing: Copper.
4. O-Rings: HNBR or compatible with specific refrigerant.
5. Tools: Manufacturer's approved special tools.
6. Minimum Rated Pressure: 700 psig (48 bar).

2.3 VALVES AND SPECIALTIES

A. Diaphragm Packless Valves:

1. Manufacturers:
    a. Parker Hannifin
    b. Danfoss
    c. Emerson
    d. Honeywell
    e. Approved equivalent
2. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
3. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
4. Operator: Rising stem and hand wheel.
5. Seat: Nylon.
6. End Connections: Socket, union, or flanged.
7. Working Pressure Rating: 500 psig (3450 kPa).
8. Maximum Operating Temperature: 275 deg F (135 deg C).

B. Packed-Angle Valves:

1. Manufacturers:
    a. Parker Hannifin
    b. Danfoss
    c. Emerson
    d. Honeywell
    e. Approved equivalent
2. Body and Bonnet: Forged brass or cast bronze.
3. Packing: Molded stem, back seating, and replaceable under pressure.
4. Operator: Rising stem.
5. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
6. Seal Cap: Forged-brass or valox hex cap.
7. End Connections: Socket, union, threaded, or flanged.
8. Working Pressure Rating: 500 psig (3450 kPa).
9. Maximum Operating Temperature: 275 deg F (135 deg C).

C. Check Valves:

1. Manufacturers:
    a. Parker Hannifin
    b. Danfoss
    c. Emerson
    d. Honeywell
    e. Approved equivalent
2. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
3. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
4. Piston: Removable polytetrafluoroethylene seat.
5. Closing Spring: Stainless steel.
6. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
7. End Connections: Socket, union, threaded, or flanged.
8. Maximum Opening Pressure: 0.50 psig (3.4 kPa).
9. Working Pressure Rating: 500 psig (3450 kPa).
10. Maximum Operating Temperature: 275 deg F (135 deg C).

D. Service Valves:
   1. Manufacturers:
      a. Parker Hannifin
      b. Danfoss
      c. Emerson
      d. Honeywell
      e. Approved equivalent
   2. Body: Forged brass with brass cap including key end to remove core.
   3. Core: Removable ball-type check valve with stainless-steel spring.
   4. Seat: Polytetrafluoroethylene.
   5. End Connections: Copper spring.
   6. Working Pressure Rating: 500 psig (3450 kPa).

E. Safety Relief Valves: Comply with 2010 ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
   1. Manufacturers:
      a. Parker Hannifin
      b. Danfoss
      c. Emerson
      d. Honeywell
      e. Approved equivalent
   2. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
   3. Piston, Closing Spring, and Seat Insert: Stainless steel.
   4. Seat: Polytetrafluoroethylene.
   5. End Connections: Threaded.
   6. Working Pressure Rating: 400 psig (2760 kPa).
   7. Maximum Operating Temperature: 240 deg F (116 deg C).

F. Thermostatic Expansion Valves: Comply with AHRI 750.
   1. Manufacturers:
      a. Parker Hannifin
      b. Danfoss
      c. Emerson
      d. Honeywell
      e. Approved equivalent
   2. Body, Bonnet, and Seal Cap: Forged brass or steel.
   3. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
   4. Packing and Gaskets: Non-asbestos.
   5. Capillary and Bulb: Copper tubing filled with refrigerant charge.
   6. Suction Temperature: 40 deg F (4.4 deg C).
   7. Superheat: Nonadjustable.
   8. End Connections: Socket, flare, or threaded union.
   9. Working Pressure Rating: 450 psig (3100 kPa).

G. Straight-Type Strainers:
   1. Body: Welded steel with corrosion-resistant coating.
   2. Screen: 100-mesh stainless steel.
   3. End Connections: Socket or flare.
   4. Working Pressure Rating: 500 psig (3450 kPa).
   5. Maximum Operating Temperature: 275 deg F (135 deg C).

H. Angle-Type Strainers:
1. Manufacturers:
   a. Parker Hannifin
   b. Danfoss
   c. Emerson
   d. Honeywell
   e. Approved equivalent
2. Body: Forged brass or cast bronze.
3. Drain Plug: Brass hex plug.
4. Screen: 100-mesh monel.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig (3450 kPa).
7. Maximum Operating Temperature: 275 deg F (135 deg C).

I. Moisture/Liquid Indicators:
1. Manufacturers:
   a. Parker Hannifin
   b. Danfoss
   c. Emerson
   d. Honeywell
   e. Approved equivalent
2. Body: Forged brass.
3. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
4. Indicator: Color coded to show moisture content in parts per million (ppm).
5. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
6. End Connections: Socket or flare.
7. Working Pressure Rating: 500 psig (3450 kPa).
8. Maximum Operating Temperature: 240 deg F (116 deg C).

J. Permanent Filter Dryers: Comply with AHRI 730.
1. Manufacturers:
   a. Parker Hannifin
   b. Danfoss
   c. Emerson
   d. Honeywell
   e. Approved equivalent
2. Body and Cover: Painted-steel shell.
3. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
4. Desiccant Media: Activated alumina or charcoal.
5. Designed for reverse flow (for heat-pump applications).
6. End Connections: Socket.
7. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
8. Maximum Pressure Loss: 2 psig (14 kPa).
9. Rated Flow: 2 tons (kW)>.
10. Working Pressure Rating: 500 psig (3450 kPa).
11. Maximum Operating Temperature: 240 deg F (116 deg C).

2.4 REFRIGERANTS

A. ASHRAE 34, R-134a: Tetrafluoroethane.

B. ASHRAE 34, R-407C: Difluoromethane/Pentafluoroethane/1,1,1,2-Tetrafluoroethane.

C. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-134a

A. Suction Lines: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

B. Hot-Gas and Liquid Lines: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

C. Safety-Relief-Valve Discharge Piping: Copper, Type L (B), drawn-temper tubing and wrought-copper fittings with soldered joints.

3.2 PIPING APPLICATIONS FOR REFRIGERANT R-407C

A. Suction Lines: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

B. Hot-Gas and Liquid Lines: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

C. Safety-Relief-Valve Discharge Piping: Copper, Type L (B), drawn-temper tubing and wrought-copper fittings with soldered joints.

3.3 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

B. Hot-Gas and Liquid Lines: Copper, Type L (B), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

C. Hot-Gas and Liquid Lines: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

D. Hot-Gas and Liquid Lines: Copper, Type L (B), drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.

E. Hot-Gas and Liquid Lines: Copper, L (B), drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

F. Safety-Relief-Valve Discharge Piping: Copper, Type L (B), annealed- or drawn-temper tubing and wrought-copper fittings with [brazed] [or] [soldered] joints.

3.4 VALVE AND SPECIALTY APPLICATIONS

A. Install diaphragm packless or packed-angle valves in suction and discharge lines of compressor.

B. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.

C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.

D. Except as otherwise indicated, install diaphragm packless or packed-angle valves on inlet and outlet side of filter dryers.

E. Install a full-size, three-valve bypass around filter dryers.

F. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.
2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

G. Install safety relief valves where required by 2010 ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.

H. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

I. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for the device being protected:

1. Solenoid valves.
2. Thermostatic expansion valves.
3. Compressor.

J. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.

K. Install flexible connectors at compressors.

3.5 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

L. Install refrigerant piping in protective conduit where installed belowground.

M. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

N. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Liquid lines may be installed level.

O. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

P. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors.

R. Install sleeve seals for piping penetrations of concrete walls and slabs.

S. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.6 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

3.7 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Support horizontal piping within 12 inches (300 mm) of each fitting.

E. Support vertical runs of copper tubing to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.9 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
4. Charge system with a new filter-dryer core in charging line.

3.10 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.

3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 233113+
METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following products:
1. Sealants and gaskets.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top and bottom of ducts.
5. Dimensions of all duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Equipment installation based on equipment being used on Project.

10. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
11. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

B. Welding certificates.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."

C. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

D. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.

B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches (914 mm), select joint types in accordance with Figure 2-1.

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." All longitudinal seams shall be Pittsburgh lock seams unless otherwise specified for specific application.

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Galvanized Coating Designation: G60 (Z180).
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Carbon-Steel Sheets: Comply with ASTM A1008/A1008M, with oiled, matte finish for exposed ducts.

D. Stainless-Steel Sheets: Comply with ASTM A480/A480M, Type 304 or 316, as indicated in "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in "Duct Schedule" Article.

E. Aluminum Sheets: Comply with ASTM B209 (ASTM B209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

F. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

G. Tie Rods: Galvanized steel, 1/4-inch- (6-mm-) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch- (10-mm-) minimum diameter for lengths longer than 36 inches (900 mm).

H. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel; with beveled edge sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) in diameter.

I. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.

2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches (76 mm).
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. Sealant shall have a VOC content of 420 g/L or less.

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.

4. Class: 25.
5. Use: O.
6. Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for10-inch wg (2500-Pa) static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A603.

D. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A492.

E. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

G. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to

size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.

B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).

J. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.

K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

L. Elbows: Use long-radius elbows wherever they fit.

1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches (300 mm) and smaller and a minimum of five segments for 14 inches (350 mm) and larger.

M. Branch Connections: Use lateral or conical branch connections.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

C. Building Attachments: Powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

D. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1220 mm) of each branch intersection.

E. Hangers Exposed to View: Threaded rod and angle or channel supports.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.4 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.5 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.

2. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
3. Testing of each duct section is to be performed with access doors, coils, filters, dampers, and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

    a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

3.7 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use duct cleaning methodology as indicated in NADCA ACR.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Furnace internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
5. Provide drainage and cleanup for wash-down procedures.
6. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.

3.8 STARTUP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated below.

B. Supply Ducts:

1. Ducts Connected to Furnaces and Air Supply Diffusers:

a. Pressure Class: Positive 1- (250) inch wg (Pa).
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 2.
d. SMACNA Leakage Class for Round: 2.

C. Return Ducts:

1. Ducts Connected to Furnaces:

a. Pressure Class: Positive or negative 1- (250) inch wg (Pa).
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 2.
d. SMACNA Leakage Class for Round: 2.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting ASHRAE 62.1, Class 1 and 2 Air:

a. Pressure Class: Negative 1- (250) inch wg (Pa).
b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 2.
d. SMACNA Leakage Class for Round: 2.

END OF SECTION 233113

SECTION 233300
AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backdraft dampers.
2. Control dampers.
3. Turning vanes.
4. Flexible connectors.
5. Duct accessory hardware.

B. Related Requirements:

1. Section 233346 "Flexible Ducts" for insulated and non-insulated flexible ducts.

1.2 ACTION SUBMITTALS

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Galvanized Coating Designation: G60 (Z180).
2. Exposed-Surface Finish: Mill phosphatized.

B. Aluminum Sheets: Comply with ASTM B209 (ASTM B209M), Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

C. Extruded Aluminum: Comply with ASTM B221 (ASTM B221M), Alloy 6063, Temper T6.

D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers:
1. Greenheck
2. Nailor
3. Tamco
4. Approved equivalent

B. Description: Gravity balanced.

C. Maximum Air Velocity: 2000 fpm (10 m/s).

D. Maximum System Pressure: 1-inch wg (0.25 kPa)]

E. Frame: Hat-shaped, 0.05-inch- (1.3-mm-) thick, galvanized sheet steel, with welded corners or mechanically attached and mounting flange.

F. Blades: Multiple single-piece blades, end pivoted, maximum 6-inch (150-mm) width, with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: Neoprene, mechanically locked.

I. Blade Axles:

1. Material: Galvanized steel or stainless steel.
2. Diameter: 0.20 inch (5 mm).

J. Tie Bars and Brackets: Aluminum or galvanized steel.

K. Return Spring: Adjustable tension.

L. Bearings: Synthetic pivot bushings.

M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.

2. Counterweights and spring-assist kits for vertical airflow installations.
3. Electric actuators.

4. Screen Mounting: Rear mounted.
5. Screen Material: Galvanized steel or aluminum.
6. Screen Type: Insect.
7. 90-degree stops.

2.4 MANUAL VOLUME DAMPERS

A. Standard, Steel or Aluminum, Manual Volume Dampers:

1. Manufacturers:
   a. Greenheck
   b. Nailor
   c. Ruskin
   d. Potorff
   e. Approved manufacturers
2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Frames:

   a. Frame: Hat-shaped, 0.094-inch- (2.4-mm-) thick, galvanized sheet steel.
   b. Mitered and welded corners.
   c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

   a. Multiple or single blade.
   b. Parallel- or opposed-blade design.
   c. Stiffen damper blades for stability.
   d. Galvanized] or stainless-steel, 0.064 inch (1.62 mm) thick.

6. Blade Axles: Galvanized steel or Stainless steel.
7. Bearings:

   a. Molded synthetic.
   b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

2.5 CONTROL DAMPERS

A. Manufacturers:
1. Manufacturers:
   a. Greenheck
   b. Nailor

c. Ruskin
d. Potorff
e. Approved equivalent.

B. Frames:

1. Hat shaped.
2. 0.094-inch- (2.4-mm-) thick, galvanized sheet steel.
3. Mitered and welded corners.

C. Blades:

1. Multiple blade with maximum blade width of 6 inches (152 mm).
2. Parallel-blade design.
3. Galvanized-steel or aluminum.
4. 0.064 inch (1.62 mm) thick single skin.
5. Blade Edging: Closed-cell neoprene.

D. Blade Axles: 1/2-inch- (13-mm-) diameter; galvanized steel or stainless steel blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F (minus 40 to plus 93 deg C).

E. Bearings:

1. Molded synthetic.
2. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.6 TURNING VANES

A. Manufacturers:
1. Ductmate
2. Elgen
3. Aero Dyne
4. Approved equivalent.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

D. Vane Construction: Single wall.

2.7 FLEXIBLE CONNECTORS

A. Manufacturers:
   1. Ductmate
   2. Elgen
   3. Aero Dyne
   4. Approved equivalent.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches (89 mm) wide attached to two strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized sheet steel or 0.032-inch- (0.8-mm-) thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

   1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
   2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
   3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).

2.8 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft and control dampers at inlet of exhaust fans or exhaust ducts or louvers as close as possible to equipment unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install flexible connectors to connect ducts to equipment.

H. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SECTION 233346
FLEXIBLE DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Insulated flexible ducts.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

C. Comply with the Air Diffusion Council's "ADC Flexible Air Duct Test Code FD 72-R1."

D. Comply with ASTM E96/E96M, "Test Methods for Water Vapor Transmission of Materials."

2.2 INSULATED FLEXIBLE DUCTS

A. Manufacturers:
1. Thermaflex
2. Metal Fab
3. Novaflex Industries
4. Hercules Industries
5. Approved equivalent

B. Insulated, Flexible Duct: UL 181, Class 1, two-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; [polyethylene] [aluminized] vapor-barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
4. Insulation R-Value: Comply with ASHRAE/IES 90.1

2.3 FLEXIBLE DUCT CONNECTORS

A. Clamps: Nylon strap in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install flexible ducts according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install in indoor applications only. Flexible ductwork should not be exposed to UV lighting.

C. Connect diffusers to ducts directly or with maximum 60-inch (1500-mm) lengths of flexible duct clamped or strapped in place.

D. Connect flexible ducts to metal ducts with bands.

E. Install duct test holes where required for testing and balancing purposes.

F. Installation:

1. Install ducts fully extended.
2. Do not bend ducts across sharp corners.
3. Bends of flexible ducting shall not exceed a minimum of one duct diameter.
4. Avoid contact with metal fixtures, water lines, pipes, or conduits.
5. Install flexible ducts in a direct line, without sags, twists, or turns.

G. Supporting Flexible Ducts:

1. Suspend flexible ducts with bands 1-1/2 inches (38 mm) wide or wider and spaced a maximum of 48 inches (1200 mm) apart. Maximum centerline sag between supports shall not exceed 1/2 inch (13 mm) per 12 inches (300 mm).
2. Install extra supports at bends placed approximately one duct diameter from center line of the bend.
3. Ducts may rest on ceiling joists or truss supports. Spacing between supports shall not exceed the maximum spacing per manufacturer's written installation instructions.

4. Vertically installed ducts shall be stabilized by support straps at a maximum of 72 inches (1800 mm) o.c.

END OF SECTION 233346

SECTION 233713.13
AIR DIFFUSERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Square ceiling diffusers.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers.
2. Section 233713.23 "Air Registers and Grilles" for adjustable-bar register and grilles, fixed-face registers and grilles, and linear bar grilles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SQUARE CEILING DIFFUSERS

A. Manufacturers:
1. Titus
2. Krueger
3. Hart & Cooley
4. Approved equivalent

B. Devices shall be specifically designed for variable-air-volume flows.

C. Material: Steel.

D. Finish: Baked enamel, white.

E. Face Size: 24 by 24 inches (600 by 600 mm) and 12 by 12 inches (300 by 300 mm).

F. Face Style: Plaque.

G. Mounting: T-bar or surface.

H. Pattern: Fixed.

I. Accessories:

1. Plaster ring.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install diffusers level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.13

SECTION 233713.23
REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fixed face grilles.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
2. Section 233713.13 "Air Diffusers" for various types of air diffusers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 GRILLES

A. Fixed Face Grille:

1. Manufacturers:
   a. Titus
   b. Kreuger
   c. Hart & Cooley
   d. Approved equivalent.
2. Material: Steel.
3. Finish: Baked enamel, white
4. Face Blade Arrangement: Horizontal and vertical; spaced 1/2 inch (13 mm) apart.
5. Face Arrangement: Egg crate.
6. Core Construction: Integral.
7. Frame: 1-1/4 inches (32 mm) > wide.
8. Mounting: Countersunk screw.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install registers and grilles level and plumb.

B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.23

SECTION 235416.13
GAS-FIRED FURNACES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Gas-fired, noncondensing furnaces and accessories complete with controls.
2. Air filters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace the following components of furnaces that fail in materials or workmanship within specified warranty period:

1. Warranty Period, Commencing on Date of Substantial Completion:

a. Furnace Heat Exchanger: 10 years.
b. Integrated Ignition and Blower Control Circuit Board: Five years.
c. Draft-Inducer Motor: Five years.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a qualified testing agency, and marked for intended location and application.

B. General Requirements for Noncondensing Gas-Fired Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.47/CSA 2.3 and NFPA 54.

2.2 GAS-FIRED FURNACES, NONCONDENSING

A. Manufacturers:
1. Amana
2. Carrier
3. Trane
4. Lennox
5. Approved equivalent.

B. Cabinet: Steel

1. Cabinet interior around heat exchanger shall be factory-installed insulation.
2. Lift-out panels shall expose burners and all other items requiring access for maintenance.
3. Factory paint external cabinets in manufacturer's standard color.
4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

C. Fan: Centrifugal, factory balanced, resilient mounted, direct or belt drive.

1. Fan Motors: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Special Motor Features, ECM: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.

D. Type of Gas: Propane.

E. Heat Exchanger: Aluminized steel.

F. Burner:

1. Gas Valve: 100 percent safety modulating main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.

G. Gas-Burner Safety Controls:

1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.

H. Combustion-Air Inducer: Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.

I. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.

J. Vent Materials: Comply with requirements in Section 235123 "Gas Vents" for Type B metal vents.

K. Capacities and Characteristics:

1. Airflow Configuration: Upflow.
2. Gas:

    a. Type: Propane.
    b. Venting Type: Power venter with combustion-air intake.
    c. Minimum Efficiency AFUE: 97 percent.
    d. Input: 60 MBh .
    e. Heat Output: 58.2 MBh .
    f. Gas Connection Size: 1/2 NPS.
    g. Combustion-Air Inlet Size: 2 inches.
    h. Combustion-Air Inlet Material: Stainless steel.
    i. Heat-Exchanger Condensate Drain Size: 3/4 inches.
    j. Vent Size: 2 inches.

3. Fan:

    a. Airflow: 800 cfm.
    b. External Static Pressure: 1.5 inches.

4. Furnace Electrical Connection:

    a. Volts: 120V.
    b. Phase: 1 Ph.
    c. Hertz: 60 Hz.
    d. Minimum Circuit Ampacity: 8.1A.
    e. Maximum Overcurrent Protection: 15A.

2.3 THERMOSTATS

A. Controls shall comply with requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air Conditioning."

B. Solid-State Thermostat: Wall-mounted, programmable, microprocessor-based unit with automatic switching from heating to cooling, preferential rate control, seven-day programmability with minimum of four temperature presets per day, vacation mode, and battery backup protection against power failure for program settings.

C. Two-Stage, Heating-Cooling Thermostat: Adjustable, heating-cooling, wall-mounted unit with fan on-automatic selector.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gas-fired furnaces and associated fuel and vent features and systems according to NFPA 54.

B. Suspended Units: Suspend from structure using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

C. Base-Mounted Units: Secure units to substrate. Provide optional bottom closure base if required by installation conditions.

D. Controls: Install thermostats and humidistats at mounting height of 60 inches (1500 mm) above floor.

E. Wiring Method: Install control wiring in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal control wiring except in unfinished spaces.

3.2 PIPING CONNECTIONS

A. Gas piping installation requirements are specified in Section 231126 "Facility Liquefied-Petroleum Gas Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect gas piping with union or flange and appliance connector valve.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Vent Connection, Noncondensing, Gas-Fired Furnaces: Connect Type B vents to furnace vent connection and extend outdoors. Type B vents and their installation requirements are specified in Section 235123 "Gas Vents."

3.3 DUCTWORK CONNECTIONS

A. Connect ducts to furnace with flexible connector. Comply with requirements in Section 233300 "Air Duct Accessories."

3.4 ELECTRICAL CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Perform electrical test and visual and mechanical inspection.
2. Leak Test: After installation, charge systems with refrigerant and test for leaks. Repair leaks, replace lost refrigerant, and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
4. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

END OF SECTION 235416.13

SECTION 236313
AIR-COOLED REFRIGERANT CONDENSERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Packaged air-cooled refrigerant condensers.

1.2 ACTION SUBMITTALS

A. Product Data: For each air-cooled refrigerant condenser.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

C. Coordinate location of refrigerant piping and electrical rough-ins.

PART 2 - PRODUCTS

2.1 Manufacturers:

A. Manufacturers:
1. Amana
2. Carrier
3. Trane
4. Lennox
5. Approved equivalent

2.2 PACKAGED AIR-COOLED REFRIGERANT CONDENSERS

A. Description: Factory assembled and tested; consisting of casing, condenser coils, condenser fans and motors, and unit controls.

B. Refrigerant: R-134A, R-404A, R-407C, or R-410A.

C. Condenser Coil: Factory tested at 425 psig (2930 kPa).

1. Tube: 1/2-inch- (13-mm-) diameter seamless copper.
2. Coil Fin: Aluminum.
3. Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

    a. Enclosure Type: Totally enclosed, air-over (TEAO)
    b. Motor Sizes: Minimum size as indicated. If not indicated, large enough, so driven load will not require motor to operate in service factor range above 1.0.
    c. Mount unit-mounted disconnect switches on exterior of unit.

D. Condenser Fans and Drives:

1. Directly driven propeller fans with aluminum or galvanized-steel fan blades, for vertical air discharge; manufactured with permanently lubricated ball-bearing motors with integral current- and thermal-overload protection.

    a. Fan on steel shaft with self-aligning ball bearings.
    b. V-belt drive with minimum of two belts; variable-pitch drive pulley.
    c. Motor mounted on adjustable slide base.

2. Fan Motors:

    a. Weather-proof motors with rain shield and shaft slinger.
    b. Totally enclosed air-over (TEAO).
    c. Constant speed.

E. Operating and Safety Controls: Include condenser fan motor thermal and overload cutouts; 24-V control transformer, if required; magnetic contactors for condenser fan motors and a nonfused factory-mounted and -wired disconnect switch for single external electrical power connection.

1. Fan Cycling Control:Ambient thermostats.

F. Casings: Galvanized-steel or zinc-coated-steel treated and finished with manufacturer's standard paint coating, designed for outdoor installation with weather protection for components and controls, and with the following:

1. Removable panels for access to controls, condenser fans, motors, and drives.
2. Coating: Corrosion resistant.
3. Plated steel fan guards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.

B. Equipment Mounting:

1. Install air-cooled condenser refrigerant condensers on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

C. Maintain manufacturer's recommended clearances for service and maintenance.

D. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

3.2 PIPING CONNECTIONS

A. Piping installation requirements are specified in Section 232300 "Refrigerant Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

C. Refrigerant Piping: Where indicated on Drawings, connect piping to unit with pressure-relief, service valve, filter-dryer, and moisture indicator on each refrigerant-circuit liquid line.

3.3 ELECTRICAL CONNECTIONS

A. Install field power to each condenser unit electrical power connection.

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

E. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

3.4 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

C. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

3.5 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions and perform the following:

    a. Inspect for physical damage to unit casing.
    b. Verify that access doors move freely and are weathertight.
    c. Clean units and inspect for construction debris.
    d. Verify that all bolts and screws are tight.
    e. Adjust vibration isolation and flexible connections.
    f. Verify that controls are connected and operational.

2. Lubricate bearings on fan motors.
3. Verify that fan is rotating in the correct direction and is not vibrating or binding.
4. Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.
5. Measure and record airflow and air-temperature rise over coils.
6. Verify proper operation of capacity control device.
7. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
8. After startup and performance test, lubricate bearings.

3.6 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Perform electrical test and visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Complete manufacturer's starting checklist.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
5. Verify proper airflow over coils.

B. Air-cooled refrigerant condensers will be considered defective if they do not pass tests and inspections.

END OF SECTION 236313

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 WORK INCLUDES

A. All labor, materials, equipment, tools and services required to perform all work and services for execution, installation and completion of all electrical work including all parts lists, operating instructions, wiring and control diagrams as shown on the drawings and as specified and completely coordinated with work of all other trades.

B. All supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete electrical installation, although such work is not specifically indicated.

C. Complete, in operative condition and to approval of Engineer, materials contemplated herein and shown on drawings.

D. Equipment, materials and accessories for electrical systems as shown and noted on the drawings including but not limited to the following:
   1. A complete rough-in system including conduit, outlet boxes, pull boxes, junction boxes, sleeves and hangers.
   2. Complete wiring system.
   3. All cutting and patching.
   4. Wiring devices and coverplates.
      a. Interconnecting power raceway and wiring for specified heating and refrigeration equipment, unless otherwise shown.
      b. Interconnecting power raceway and wiring for specified ventilating equipment, unless otherwise shown.
      c. Starters, controllers and interconnecting power and control raceway and wiring for specified pumps unless otherwise shown.
      d. Flashing and sealing of all raceway roof penetration.

1.02 DELIVERY, STORAGE AND HANDLING

A. Manufacturer to prevent damage during shipment shall suitably package materials. Damaged materials will not be acceptable for use.

B. Store materials on site in clean, dry storage area; when outside, elevated above grade and enclosed with durable watertight wrapping.

C. Handle all materials carefully to prevent damage. Minor scratches, marks or blemishes to finish shall be repaired to satisfaction of Engineer.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Permits: Arrange and pay for all permits, inspections and utility connections required.
   2. Comply with ANSI C1, National Electrical Code, 2023.
   3. Reference Publications:
      a. American National Standards Institute, ANSI.
         1) C80.1 - Specification for Rigid Steel Conduit, zinc coated.

2) C80.3 - Specification for Electrical Metallic Tubing, zinc coated.
3) C80.4 - Specification for fittings for Rigid Metal Conduit and EMT.

b. National Electrical Manufacturers Association, NEMA.
1) OS-1 - Sheet steel outlet boxes, device boxes, covers and box supports.
2) 250 Enclosures for electrical equipment.
3) WC-5 - Thermoplastic insulated wire and cable.
4) WD-1, WD-5 - General Purpose Wiring Devices.
5) FB-1 - Conduit and cable assemblies.
6) KS-1 - Switches.

c. Manufacturer's Catalog.
1) Catalogs of specified manufactures current at date of contract documents are incorporated by reference to same force and effect as if repeated herein. In conflicts between catalogs and project manual. Project Manual governs.

4. Provide all new materials, without blemish or defect, in accord with standards specified and NRTL (Nationally Recognized Testing Laboratory) listed or labeled.

1.04 STANDARDS

A. Provide materials, perform work and install materials in strict accordance with the latest requirements of the following:
1. National Electrical Code (NEC) of National Fire Protection Association (NFPA).
2. Other applicable codes and standards of NFPA.
3. Factory Mutual System (FM).
4. American National Standards Institute (ANSI).
5. Occupational Safety and Health Act (OSHA).
6. Federal, state and local codes, laws, ordinances; and rules and regulations of authorities having jurisdiction.
7. In case of conflict or disagreement between codes, laws, ordinances, rules and regulations or within either document itself, the more stringent condition shall govern.
8. Use electrical materials tested, listed and labeled by NRTL and bearing the NRTL label.
a. All fabricated assemblies, manufactured items or electrically operated equipment shall have NRTL approval or NRTL re-examination listing in every case where such approval has been established for the particular type of materials or devices in question.

1.05 DEFINITIONS

A. Wherever the words “the Contractor”, “this Contractor” or “Electrical Contractor”, appear in this section, they refer to the Contractor for Electrical Work.

B. The term “provide” includes such labor, methods, materials, equipment and transportation or other facilities required to complete the Contract, and the performance of all duties thereby upon the Contractor.

1.06 GUARANTEE

A. In entering into a contract covering this work, the contractor accepts the specifications and guarantees that the work will be carried out in accordance with the requirements of this specification or such modifications as may be made under the contract documents.

B. Contractor further guarantees that the workmanship and material will be of the best procurable and that none but experienced workmen familiar with each particular class of work will be employed.

C. Contractor further guarantees to replace and make good at his own expense all defects, which may develop within 1 year after final payment and acceptance by the Engineer, due to faulty workmanship or material, upon, receipt of written notification from the Owner.

1.07 JOB CONDITIONS

A. Existing conditions:
   1. In order to become familiar with the scope of the work involved, visit the existing site, before submitting bid, and carefully examine the existing condition in order to have full knowledge and understanding of the conditions and restrictions affecting the performance of the work required. Include in bid all work which is reasonably inferred by the contract drawings and specifications, whether specifically shown or not, as a result of existing conditions, construction, irregularities and interferences which may affect work. No additional compensation will be considered for misunderstanding the conditions to be met.
   2. The layout shown on the drawings is necessarily diagrammatic but shall be followed as closely as other work will permit. Changes from these drawings required to make this work conform to the building construction shall be made only with prior written approval of the Engineer. All proposed changes shall be shown on shop drawings. All measurements shall be verified by actual observation and all work shall fit in place meeting the approval of the Engineer.
   3. The contractor shall provide openings required in new and existing construction that may be necessary for the installation of electrical work and all patching and workmen competent in the trade required, at the expense of the contractor shall do repairing. The contractor shall be responsible for arranging the work so that minimum cutting will be required. All rubbish and excess materials involved in such cutting shall be promptly removed from the site and disposed of by the contractor. Cutting through the floor or roof systems or load bearing walls shall be done only with the prior written approval of Engineer so as to avoid damaging the structural system.
   4. Sequencing, scheduling:
      a. Confer with the contractor regarding the location and size of conduits, equipment, rough-in openings and special architectural treatments in order that there may be no interferences between the installation or the progress of the work of the contractor on the project. The order of space preference shall be as listed above.
      b. In the case of interconnection of the work of two or more contractors, verify at the site or on shop drawings all dimensions relating to such work. All errors due to the failure to so verify any such dimensions shall be promptly rectified.
      c. All line voltage wiring and final connections to complete mechanical systems shall be provided by the Electrical Contractor. All electrical conduit, wire, and connections relating to mechanical equipment controls and all wiring associated with starter holding coils, shall be the responsibility of the contractor installing the mechanical equipment unless otherwise indicated on the drawings. The contractor installing the mechanical equipment shall be responsible for magnetic motor starters where such starters are part of the control package of the equipment supplied. All other starters shall be furnished and installed by the Electrical Contractor.
      d. Access panels, in walls or ceilings, required for access and maintenance shall be provided by the respective contractor. Access panels are not required in areas where the ceiling system is lay-in tile; however, sufficient space must be available in and through the ceiling system to allow maintenance and adjustment of equipment. Access panels shall be approximately 15 inches by 18 inches wherever possible and shall be provided with flush trim and an allen key operated cam lock fastener. Karp, Milcor, or Bilco shall manufacture panels.

e. Items of equipment may be specified in the singular however, provide and install the number of items of equipment as indicated on the drawings and as required for a complete system.
f. Each contractor shall provide excavating, pumping, backfilling, and compacting required for the installation of their respective work as shown on the drawings.
g. Equipment and devices furnished and installed by electrical contractors, which have factory prime coat, or final surface finish shall be replaced, repaired or refinished if defective or damaged during installation.
h. Arrange all work so a minimum period of interruption or outages will occur in the temporary or permanent transfer of services as required for all electrical revisions. Not less than 10 Day notification to the Owner shall be required before approval will be granted for any disruption of gas, electric, or telephone services. The outage request shall include the extent of the work to be done, length of outage time required, and the time at which the outage is to begin.
i. Submit a "Sequence of Work Schedule" in respect to all temporary and permanent utility and service cutovers after final determination. This schedule shall be submitted for approval to the Engineer. The submittal shall designate priority order, service or utility affected, date of cutover, and time of day to start and finish.

PART 2 - PRODUCTS

2.01 RACEWAYS AND CONDUIT

A. Electrical Metallic Tubing (thin wall conduit, EMT)
1. All electrical metallic tubing shall be hot dipped galvanized coated, bear a NRTL label and shall conform to Federal Specifications WW-C-563, ANSI C80-3, and UL 797.
2. Allied Tube and Conduit Corp., Republic Steel Corp., Wheatland Tube Co., Southwire Co. shall manufacture all electrical metallic tubing, or Engineer approved equal.

B. Rigid Steel Conduit
1. All rigid steel conduits shall be hot dipped galvanized coated plus a secondary coat with galvanized threads bears a NRTL label and shall conform to Federal Specifications WW-C-581d, ANSI C80-1.
2. Allied Tube and Conduit Corp., Republic Steel Corp, Wheatland Tube Co., Southwire Co. shall manufacture all rigid steel conduits, or Engineer approved equal.

C. Intermediate Metal Conduit (IMC)
1. Intermediate metal conduit shall be hot dipped galvanized coated; galvanized coated threads bear a NRTL label and shall conform to a NRTL standard for IMC.
2. Allied Tube and Conduit Corp., Republic Steel Corp., Wheatland Tube Co., Southwire Co. shall manufacture intermediate metal conduit or Engineer approved equal.

D. Flexible Steel Conduit
1. All flexible steel conduits shall be hot dipped galvanized coated bears a NRTL label and shall conform to Federal Specifications WW-C-566C.
2. Triangle PWC, American Flexible Conduit Co., Inc., Anaconda Metal Hose, shall manufacture all flexible steel conduits or Engineer approved equal.

E. Liquid-tight Flexible Steel Conduit
1. All liquid-tight flexible steel conduit shall be interlocking flexible galvanized steel conduit with a special polyvinyl chloride covering extruded over the flexible conduit to make the conduit liquid-tight resistant to moisture, oil, chemicals and corrosive fumes.

2. Anaconda Metal Hose, O-Z/Gedney, Triangle PWC shall manufacture all liquid-tight flexible steel conduits, or Engineer approved equal.

F. PVC Plastic Conduit
1. All PVC conduits shall be schedule 40 heavy wall duct. Conduit shall be composed of high impact PVC (Polyvinyl Chloride-C-200 compound) and shall conform to industry NEMA Standards and be NRTL listed for underground and exposed use. Material shall have tensile strength of 7,000 psi at 73.4°F, flexural strength of 11,000 psi, compression strength of 8,600 psi, and minimum wall thickness in various sizes.
2. All conduit fittings, couplings, terminal adapters, junction boxes and necessary fittings shall be of the solvent welding material.
3. Carlon, Can-Tex, Triangle PWC Inc., shall manufacture all PVC conduits or Engineer approved equal.

2.02 CONDUIT HANGERS AND SUPPORTS

A. Surface Mounted Conduits
1. Rigid steel, IMC and EMT conduits 1 inch and smaller shall be supported with hot dipped galvanized one hole steel pipe straps.
2. Rigid steel, IMC and EMT conduits 1 1/4 inches and larger shall be supported with hot dipped galvanized one hole malleable iron pipe straps with pipe spacers.
3. Raco, Efcor, T & B, Appleton shall manufacture all pipe straps, or Engineer approved equal.

B. Suspended Conduits
1. Individual rigid steel, IMC and EMT conduit 1 inch and smaller shall be supported with conduit clips of high carbon spring steel or zinc plated steel and support 100 pounds static load. Conduit clip shall be provided with 1/4” 20 threaded impression for attachment to 1/4 inch 20 threaded rod.
2. Individual rigid steel, IMC and EMT conduit 1 1/4 inches and larger shall be supported with stamped steel conduit clamps with 1/4 inch 20 bolt and nut and support 150 pounds static load. Provide conduit clamps with 3/8 inch 16 threaded boss for attachment to 3/8 inch 16 threaded rod.
3. Support two or more rigid steel, IMC or EMT conduits adjacent to each other by 1 5/8 inches by 1 5/8 inches metal framing channel with minimum of two 1/2 inch 13 threaded rod at each end. Attach conduits to metal framing channel with electro-galvanized split pipe clamps with screw and nut.
4. Raco, Efcor, T & B, Appleton shall manufacture conduit clips and clamps, or Engineer approved equal.
5. Unistrut, Super Strut, Kindorf shall manufacture metal framing channel and split pipe clamps, or Engineer approved equal.
6. Conduit shall not be supported from plumbing lines or ductwork.

C. Anchors
1. Toggle bolts or spider type expansion anchors shall be used for hollow masonry.
2. Lead expansion anchors or preset anchors shall be used for solid masonry.
3. Self-drilling anchors or preset anchors shall be used for concrete.
4. Machine screws, bolts, self-tapping screws or welded studs shall be used for metal.
5. Wood screws shall be used for wood.

2.03 CONDUIT FITTINGS

A. All conduit fittings and box connectors shall be strong in construction and shall be of such material and finish as not to cause any chemical reaction between itself and the conduit or

outlet box which it is fastened or supported.

B. All conduit fittings and box connectors shall be listed by a NRTL.

C. Insulated throat fittings are only required on conduits 2” and larger.

D. All conduit fittings, box connectors and lock nuts shall be of steel or malleable iron materials.

E. Fittings for EMT shall be set compression type, rain-tight and concrete-tight. Connectors, couplings, locknuts and other fittings for rigid steel heavy wall and IMC conduit shall be threaded type.

F. Connectors specified in this paragraph can be zinc plated steel in lieu of malleable iron.

G. Liquid-tight flexible conduit connectors shall be steel or malleable iron compression type with insulated throat and “O” ring assembly.

H. Fittings for flexible conduit or liquid-tight flexible conduit shall be of the straight 45 degree or 90 degree connectors and approved for grounding purposes.

I. Provide expansion joint fittings where expansion joints are shown on architectural drawings.

2.04 BOXES AND COVERS

A. All junction boxes pull boxes, fixture outlet boxes and switch boxes shall be listed by a NRTL.

B. All boxes and covers shall meet all requirements of the National Electrical Code.

C. All boxes and covers shall be made of code gauge steel.

D. All boxes shall be of proper size and shape for all conduits and conductors entering them.

E. Install device boxes with bracket attached to box and wall stud to eliminate movement of box in wall.

F. All boxes installed in poured concrete, block, brick or tile shall be masonry type.

G. All multiple gang switch boxes of more than three-gang shall be solid gang box.

H. Surface mount boxes on the ceiling are note required to be FS or FD type boxes. Stamped steel boxes are acceptable for boxes on the ceiling.

II. Where two or more conduits enter a box, the minimum size of boxes shall be 4 inches by 4 inches by 1 1/2 inches minimum depth. For single device installation, install square cut single device cover.

J. Install all device boxes with square cut device covers for number of devices required.

K. All boxes shall have tapped hole for 10-32 ground screw.

L. Raco, Steel City, Appleton shall manufacture boxes and covers, or Engineer approved equal.

2.05 CABLE AND WIRE

A. All wire shall have copper conductors and be listed by a NRTL.

B. Service entrance conductors shall be 600 volts insulation type XHHW-2 90°C. All other wire shall be 600 volts insulation type THWN 90°C insulation for sizes No. 6 to 500 MCM and type THHN 90°C insulation for sizes No. 12 to No. 8.

C. Under ground wire to pole mounted light fixtures shall be type USE in conduit.

D. Provide long barrel, NEMA 2 hole copper compression connectors for all cables connected to the padmounted transformer. Make all connections with stainless steel hardware.

E. All pulling lubricants shall be water based, no exceptions.

F. Minimum wire size shall be No. 12 except for internal fixture wire that shall be minimum size of No. 14 type AF, CF or TFN, 300 volt.

G. All wire (excluding fire alarm and low voltage wiring) shall be stranded, including #12 AWG and #10 AWG branch circuit wiring.

H. All branch circuit wiring and feeder cables for circuits over 20 amperes shall be sized as noted on the drawings. If size is not specifically noted, size all branch circuit wiring and feeder cables in accordance with the National Electrical Code.

I. Cable and wire not installed in conduit shall be #12 AWG SO or SJO type grounded cord. Cord shall terminate at junction boxes and devices with strain relief cord grids.

J. Triangle, Crescent, Colleyer, and General Cable shall manufacture all wire, or Engineer approved equal.

2.06 METAL CLAD CABLE

A. MC cable is not allowed.

2.07 ELECTRICAL WIRING DEVICES

A. All devices are specified as having black finish in wood, white finish if in drywall. The Engineer reserves the right to change the color.

B. Furnish all special outlets with mating caps with cord grips.

C. Schedule of all electrical devices:
   1. Single Pole Switch - 20 amperes at 120 volts
      a. Hubbell DS120 (P&S and Plug tail approved equal)
   2. Three Way Switch - 20 amperes at 120 volts
      a. Hubbell DS320 (P&S and Plug tail approved equal)
   3. Four Way Switch - 20 amperes at 120 volts
      a. Hubbell DS420 (P&S and Plug tail approved equal)
   4. Duplex Convenience Outlet - 20 amperes at 120 volts
      a. Hubbell DR20 (P&S and Plug tail approved equal)
   5. Duplex Convenience Tamper Resistant Outlet - 20 amperes at 120 volts
      a. Hubbell D20TR
   6. Duplex Convenience Outlet - GFI - 20 amperes at 120 volts
      a. Hubbell GF20

D. Forward submittals to Engineer for review.

2.08 WIRING DEVICE PLATES

A. All device plates shall be furnished with proper openings for the device with which it is being used. Where required, multiple gang plates for correct combination shall be used.

B. Device plates shall fit tight against the finished walls and shall completely cover the openings in the walls for the boxes.

C. Device plates shall be attached and adjusted so they finish straight and level.

D. Where more than one light switch is gained or a light switch and outlet are installed in a two gang box, install multiple gang device plates with proper openings.

E. Provide 1/2 inch raised galvanized device covers where used for exposed conduit work.

F. All device plates shall be black if located on wood and stainless steel if located on drywall, with the proper openings for the device with which they are being used.

G. All device plates for exterior weatherproof outlets and switches shall be lockable. Cover shall meet NRTL WDL “in use” listing requirement. Cover shall be suitable for standard boxes or FS type boxes.

H. Mounting screws for all plates shall have the same finish as the plate.

I. The same manufacturer shall furnish all device plates as devices for proper color match except stainless steel covers.

J. Forward submittals to Engineer for review.

2.09 SEALS

A. Fire Seal:
   1. Seal penetrations of fire-rated walls, floors or ceilings by raceways for compliance with NEC 300-21. Fill void around raceway. Sleeves shall be heavy wall steel pipe, anchored to building construction and finished plug with wall or ceiling. Fire stop material shall be Dow Corning #-6548 Silicone RTV Foam, Chase Technology Corp, CTC PR-855 fire resistant foam sealant, 3M 303 Fire Barrier, T & B S-101 Fire Barrier or Nelson Flameseal.
   2. Must be listed as part of a NRTL approved assembly.

B. Water Seal:
   1. Seal penetrations of perimeter walls or floors below grade to prevent entry of water. Use materials compatible with wall or floor construction and approved by Engineer.
   2. Seal all conduit penetrating air handling units air tight including conduit installed by the air handling unit manufacturer.

PART 3 - EXECUTION

3.01 SPACE PREFERENCE

A. Carefully verify and coordinate the location and level of all lines. Run preliminary levels and check with all other contractors so that conflict in location may be avoided.

B. If conflicts occur, the following preference schedule shall be followed:
   1. Recessed electric fixtures
   2. High-pressure duct work

3. Soil and waste piping
4. Domestic water piping
5. Low-pressure ductwork
6. Domestic water storm and vent lines.
7. Electric conduits

C. No other work shall have preference over plumbing lines below fixtures.

D. No other work shall have preference over conduit above or below electric switchgear and above or below panels.

E. No piping conveying fluids shall be provided directly over electrical, communications or elevator equipment.

3.02 FIELD CORRECTIONS AND CHANGES

A. Carefully and accurately record on field set of drawings, any deviations or changes in location of conduit, wiring and/or equipment made in the field and shall keep the Engineer informed on all deviations and changes.

B. At the completion of the job, furnish the Engineer three complete sets (not the field set) of drawings indicating these deviations or changes. Extra sets of drawings will be provided to the contractor for this purpose. Any changes in the exterior work shall be recorded by dimension.

3.03 LOCATION OF EQUIPMENT

A. The approximate location of all equipment is shown on the drawings.

B. The Engineer reserves the right to change the location of all equipment 5 feet in any direction without these changes being made the subject of an extra charge provided such changes are made before final installation.

3.04 LINES AND LEVELS

A. Determine all grades, maintain necessary lines and levels throughout the progress of the work, and assume full responsibility for their correctness. Where levels are indicated on the drawings, work shall be installed at those levels unless prior written approval to change is obtained from the Engineer.

3.05 CLEANING

A. Upon completion of the contract all remaining materials and rubbish shall be removed from the building and premises and the work areas shall be left clean and free from stains, mortar, paint spots, etc.

B. All switches, controls, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation and shall be tested in the presence of the Owner's designated representative to insure that their function and purpose is understood.

C. Upon completion of the work, put systems into service maintaining responsibility for the equipment during all testing operations including turning on and off of such apparatus.

3.06 OPENINGS IN NEW CONSTRUCTION

A. Openings required in new construction for Division 26 Work will be provided by the General Contractor at the request of and in accordance with information furnished by the Electrical Contractor. The General Contractor will advise the Electrical Contractor in advance so that he may lay out the required openings. If said Electrical Contractor fails to lay out required openings, he shall be financially responsible for the necessary cutting, patching and repairing. The General Contractor will do the patching and repairing.

3.07 WALL AND FLOOR SLEEVE INSTALLATION

A. Set all wall and floor sleeves during the construction of the portion of the new construction through which the piping is to pass.

B. Provide sleeves of black iron pipe and of proper size to accommodate raceway. Install sleeves flush with walls and ceilings. Coordinate locations of sleeves with other trades to avoid interferences with their work.

C. Anchor all sleeves properly to the building construction.

D. Set floor sleeves plumb, wall sleeves level and center all piping in sleeves.

E. Care shall be taken to set sleeves in formwork and check all dimensions before concrete is poured.

F. Extend floor sleeves in finished areas 1/2 inch above finished floor and neatly level top of sleeve.

G. Finish all wall sleeves flush with wall lines unless otherwise specified.

H. Where sleeves occur in exterior walls above grade, caulk sleeves with sealant.

I. Where sleeves occur in exterior walls below grade, caulk sleeves with oakum and lead wool.

J. Openings between sleeves and conduit through fire or smoke barriers shall be closed with fire stop material to maintain fire or smoke barrier rating.

K. All occupied and unoccupied conduit sleeves in closet shall be fire stop after cable or conduit is in place. Occupied conduit sleeves shall be fire stopped with fire stop material and unoccupied conduit sleeves shall be fire stopped with metal caps on both ends.

3.08 PROTECTION OF WORK

A. Protect work from damage by keeping all conduit and boxes capped and plugged or otherwise protected. This includes damage by freezing and/or stoppage from building materials, sand, dirt or concrete.

3.09 INSTALLATION

A. Coordinate with other contractors engaged in project. Execute work in a manner not to interfere with other contractors or Owner's operation.

B. Coordinate work with other contractors regarding location and size of pipes, raceways, ducts, openings, switches, outlets, so there is no interference between installations or of progress of any contractor.

C. Install all equipment with ample space allowed for removal, repair, or changes to

equipment. Provide ready accessibility to removable parts of equipment and to all wiring without moving equipment installed or already in place. Provide access panels for all devices installed above non-accessible ceilings or within walls or partitions.

D. At project completion, clean all equipment to the original finish. Remove all shipping labels.

E. Provide touch-up painting of all equipment marred in any way during shipment or installation.

3.10 INSTALLATION OF RACEWAYS AND CONDUITS

A. All raceways shall be concealed in wall construction and/or above ceiling construction except in mechanical equipment rooms, where it may be exposed at the ceiling or on walls.

B. There shall not be any branch circuit conduits installed horizontally in the concrete floor slabs throughout the building, except where specifically shown on the drawings.

C. In mechanical and electrical equipment spaces, expose ceiling outlets and conduit with due consideration to ventilating ducts and mechanical piping. Where numerous ducts occur, install conduits and outlets after ventilating ducts. Puncturing of ductwork or hanging equipment such as light fixtures, ceiling hangers, conduit, from ductwork, is prohibited, unless specifically noted otherwise.

D. Lay out all partitions on the project, for proper rough-in locations of all boxes and conduits. Verify all partition locations, door swings, cabinet locations before roughing in, and make any/all changes necessary to ensure that all switches, outlets, systems equipment, rough-ins are located properly. Any changes necessary in locations and rough-ins, due to a partition change and this contractor's failure to coordinate and verify same, shall be made.

E. The routing of conduit shown on the drawings is diagrammatic only, and this contractor shall install conduit as required to complete the systems so as not to interfere with other trades in both elevation and location.

F. The location of all conduit, boxes, fixtures, etc., in all areas finished and unfinished shall be coordinated.

G. Route conduit through roof openings for piping and ductwork where possible. Provide flashing making waterproof joints where conduits pass through roof or roofing membrane.

H. Provide conduit expansion joints at building expansion joints for conduit runs 1 1/2 inches and larger. Provide conduit expansion joints or flexible conduit connection at building expansion joints for conduits less than 1 1/2 inches.

I. Conduit shall be a minimum of 3/4 inch unless otherwise noted on the drawings.

J. All conduit bends shall be long radius with not more than the equivalent of three 90-degree bends between pull points.

K. Provide all open ends of conduit with bush caps to exclude any foreign material during construction.

L. All conduits installed in or under concrete or underground shall have joints sealed to exclude all water or other foreign material.

M. Coordinate the installation of all conduits in mechanical equipment spaces or where large

amounts of ductwork and piping are present, with the other contractors so as to avoid interferences.

N. Unless otherwise noted on the drawings, size all conduits according to the National Electrical Code.

O. Install all exposed conduits parallel or perpendicular to adjacent walls, ceilings or floors.

P. All conduit couplings and fittings shall be made up wrench tight.

Q. Make all conduit systems mechanically and electrically continuous from source of current to all outlets, and ground in accordance with the National Electrical Code.

R. Where building construction or other conditions make it impossible to use standard threaded couplings, install watertight threaded unions.

S. Install rigid steel conduit for the following:
   1. All conduit in poured concrete construction (unless noted as PVC).
   2. All conduit underground (unless noted as PVC).
   3. All conduit exposed in exterior areas.
   4. All conduit installed through foundation or basement wall, below grade, to a minimum of 10'0” beyond wall.
   5. All service entrance conduit and all exterior conduit larger than 2” trade size.

T. Install electrical metallic tubing (thin wall) conduit for the following:
   1. All conduits in block, brick, tile or stud walls.
   2. All feeders for panelboards and distribution equipment.
   3. All conduit exposed in interior areas.

U. Install flexible steel conduit for the following:
   1. Final connections for all recessed lighting fixtures (fluorescent and incandescent).
   2. All vibration generating equipment except where flexible liquid-tight is specifically called for.
   3. A maximum length of flexible steel conduit shall be limited to 6'0”.

V. Install liquid-tight flexible steel conduit for the following:
   1. Final connections to all motors, except exhaust fans in ceiling space and wall 1/8 horsepower and less.
   2. All vibration generating equipment exposed to exterior conditions.
   3. Maximum length of liquid-tight flexible conduit shall be limited to 6'0”.

W. Install PVC conduit for the following:
   1. All conduit for underground exterior circuits 2” and smaller. PVC conduit shall be complete with all accessories, such as, couplings, male and female adapters, expansion couplings, elbows and support straps. Install one expansion coupling for every 100 feet of run, or in any run solidly connected at both ends. Use solvent welding cement recommended by the duct manufacturer, for all conduit terminations at fittings of all types to seal and secure the connections. Support the plastic conduit horizontal conduit runs 4 feet on center and vertical runs every 8 feet.

X. Communications
   1. Minimum communications raceway size to be 1" conduit, unless otherwise noted on drawings.
   2. Provide one conduit from each communications box. Horizontal conduit runs between wall boxes are not allowed.

3. Provide insulated grounding bushings on end of conduit.
4. Provide flush two-gang box with single gang plaster ring for each communications outlet or as noted on drawings.
5. Conduit bends to be no less than 10 times outside diameter of conduit.
6. Conduits shall have no more that (2) 90 degree bends or total of 180 degree bends or offsets without a pull box. Pull boxes shall be installed in accessible locations.
7. No underslab installations allowed.

3.11 RACEWAY SUPPORTS AND HANGERS

A. Securely fasten raceways in place and support from ceiling or walls.

1. Maximum Spacing of Supports	Material
a. 1/2" through 1” trade size	6 feet
b. 1 1/4" through 1 1/2" trade size	8 feet
c. 2” through 4” trade size	10 feet
d. Flexible metal conduit	4 1/2 feet

B. Support IMC or EMT conduit within three feet of every outlet box, junction box, pull box, cabinet or termination. Support flexible conduit within 12 inches of every outlet box or fitting.

C. Support vertical runs or conduits at each floor level and at interval not to exceed ten feet.

D. Support conduits by pipe straps, wall brackets, hangers, or ceiling trapeze. The use of perforated iron on wire for supporting conduits is prohibited. Fasten with wood screws or screw nails to wood; by toggle bolts on hollow masonry units, by concrete inserts, or expansion steel conduits on steel. Do not weld conduits or pipe straps to steel structures unless specifically indicated.

E. The load applied to fasteners shall not exceed one-third the proof test load of the fasteners.

F. For fasteners attached to concrete, use vibration and shock resistant.

G. In partitions of light steel construction, use sheet metal screws.

H. Conduit shall not be supported from suspended ceiling hangers, ductwork or plumbing lines.

I. Where two or more conduits one inch trade size or larger run parallel, trapeze hangers may be used consisting of threaded solid rods, washers, nuts and galvanized “L” angle or channel iron. Individually fasten conduits to the cross member of every other trapeze hanger with one hole straps or clamp backs with proper size bolts, washers and nuts. When adjustable trapeze hangers are used, use U-bolt type clamps at end of conduit runs, at each elbow and at each third intermediate hanger to fasten each conduit.

J. Make hangers of durable materials suitable for the application involved. Applied loads shall not exceed one-third of their loading capacity.

K. Fabricate all screws, bolts, washers and miscellaneous hardware used for conduit supports from rust-resisting metal. Trapeze hangers shall have hanger assemblies' protected galvanized finish.

3.12 INSTALLATION OF BOXES

A. Provide pull boxes, junction boxes or outlet boxes as shown on the drawings and/or in all runs of conduit having the equivalent of three 90 degree bends or more than 100 feet in length.
   1. Communications conduit runs shall have no more than 100 linear feet and/or no more than two (2) 90-degree bends without a pull box.
   2. Do not provide pull box in lieu of 90-degree bend for communications cable.
   3. LB type fittings are not to be used for communications cable.

B. Location of outlets shown on the drawings is diagrammatic only. Coordinate exact location of outlets with architectural details, equipment connection requirements and all ceiling outlets with due consideration to clearance from ventilating ducts and piping.

C. Locations of all junction boxes shall be verified on the job.

D. All junction boxes shall be installed so that they are accessible by removing an access door, recessed fixture, coverplate, etc.

E. Where flush coverplates are required in finished areas, they shall be painted to match adjacent wall or ceiling finishes.

F. All junction boxes, other than for power or lighting, shall be identified as to their usage; such as, television, telephone, door security, fire alarm, etc., by permanently attached labels on the inside or outside of the coverplate.

G. Power and communication outlets shall not be installed in the same junction box.

3.13 METHOD OF WIRING

A. Install all the conductors in conduits.

B. Equipment and devices installed and not constructed with cases especially suited for mounting and enclosing all live parts shall be installed in metal cabinets.

C. A complete metal raceway or enclosure shall be provided for all circuiting throughout the extent of the systems specified.

D. Make conductors continuous from outlet to outlet. Do not make splices except in outlet or junction boxes. Make all feeder cables continuous from origin to panel or equipment terminations without running splices in intermediate pull or boxes, unless specifically indicated on the drawings or approved in writing by Engineer.

E. Blow out and swab all conduit until all moisture and grit is removed before any wires are pulled or installed. Use water-based pulling lubricant, compatible with insulation and covering, that will not cause deterioration of insulation or jacket covers of cables on conductors. Use pulling lubricant recommended by wire manufacturer.

F. Provide each cable or conductor in panels, pullboxes or troughs with a permanent pressure-sensitive label with suitable numbers or letter for easy identification. Identify control wires at each end and in junction boxes with designated wire numbers corresponding to control schematic drawings.

G. Provide wires and cables entering equipment or panels with enough slack to eliminate stretched, angular connection. Neatly arrange wiring, bundle and fan out to termination panels. Make minimum bending radius for conductors in accord with National Electrical Code.

H. Support all conductors in vertical raceways in accord with National Electrical Code.

I. Leave at least six-inch loops or ends at each outlet for installation of devices or fixtures. Roll up all wires in outlet boxes not for connection to fixture or device at that outlet, connect together and tape.

J. Size all branch circuit wiring for circuits over 20 amperes as shown on the drawings and/or as required by the National Electrical Code. All home run branch circuit wiring from the first outlet, fixture or device on 120 volt, 1 phase, or 277 volt, 1 phase circuit to the panelboard shall conform to the following wire sizes for amp circuits unless otherwise noted on the drawings:
   1. 120-VOLT CIRCUITS
      a. 0 to 50 feet #12 wire
      b. 51 to 100 feet #10 wire
      c. 101 to 150 feet # 8 wire
      d. 151 to 200 feet #6 wire

K. Clarification to the color-coding of conductors is as follows: For all voltages and systems equipment grounds shall be green, isolated grounds shall be green with yellow stripe or with yellow tape bands and travelers for 3-way switches shall be violet.

L. At the Electrical Contractor's option, the three phase power circuits and feeder cables can be installed with color-coded conductors or with three conductors of the same color. If they are installed with the same color of insulation, mark with colored tape in the panelboard and starter.

M. Phase all distribution equipment left-to-right, A, B, and C for continuity of phasing throughout the installation.

N. All stranded cables shall terminate into mechanical type or compression type lugs at termination points.

O. Neatly group all circuits in all distribution equipment and tie with Seine Twine, Ty-Rap or Wrap Tabs.

P. Special care shall be taken to balance connections of circuit wires on different phases at the lighting panelboards using distinguishing colors for identifying the particular phase on which the circuit belongs.

Q. In general, lighting and outlet circuits shall distribute from single pole 20-ampere breakers, 2 wire with solid neutral. Where noted on drawings, run single phase or 3 phase power circuits from two or three pole breakers.

R. A separate neutral conductor shall be pulled for each phase conductor for all 120 volt and 277 volt branch circuits. Common neutrals are not allowed. Provide color tracer matching phase conductor.

3.14 WIRING JOINTS

A. Joints in conductors shall be as few in number as practicable and where they are necessary they shall be mechanically strong, well made and shall provide complete electrical contact.

B. Joints shall be so made that they have an electrical resistance not in excess of that of two feet of the conductor.

C. Make all branch circuit joints for wire up to and including No. 10 AWG with expandable steel spring and polypropylene body type connectors and wire nuts manufactured by Ideal, Scotch, Buchanan or Engineer approved equal.

D. Make all wire splices in wire No. 6 and larger with mechanical compression crimp type connectors of proper size and wire configuration. Cover all connectors with a minimum of three layers of 600 volts tape or heat shrinkable insulation equivalent to 150 percent conductor insulation.

E. Neutral conductors in outlet boxes at receptacles shall be jointed and pigtailed to the outlet. The removal of a receptacle from the circuit shall not affect the continuity of the neutral conductor.

3.15 HEIGHTS OF WALL SWITCHES AND RECEPTACLES

A. Determine the exact height of each light, receptacle outlets, and outlet boxes on the premises and examine the general drawings and details to see that outlets are properly spaced and located with relation to the interior finish and treatment.

B. In order that all outlets may be located in proper relation to paneling and decorated areas, become familiar with the details of these areas. Consult with the other contractors on the project and procure all details of the various areas so as to make the outlet boxes and panelboards come in proper relation to the work of all other contractors. Be responsible for the exact and proper location of the various portions of work. Such work must be entirely satisfactory to the Engineer.

C. Mounting heights of devices shall comply with ADA. The following is a list of mounting heights for equipment:
   1. Locate wall switches 3'6” above the floor, except where special treatment requires a higher or lower setting.
   2. Locate receptacles as follows:
      a. In general, locate 18 inches above finished floor except as hereinafter specified or as indicated on the architectural drawings.
      b. In block walls, locate either in the bottom or top of the nearest block course.
      c. In brick walls, mount in the horizontal position, in the fourth brick course.
      d. In spaces where noted to be above counters, mount in the horizontal position, 4 inches from backsplash to bottom of box.
      e. In rooms that house mechanical and electrical equipment, locate 40 inches above finished floor.
      f. Locate weatherproof receptacles 24 inches above finished grade.
   3. F.A. Speakers and Visual Indicators: 84” above finished floor to bottom of device.
   4. F.A. Pull Stations: 3'6” above finished floor to center of device.
   5. Disconnect Switches: 5'0” above finished floor.
   6. Manual and Magnetic Starters or Pushbutton Controls: 5'0” above finished floor.
   7. Telephone/Data Outlets: Same as receptacles above.

D. All of the above mounting heights shall be held as near as possible to the center line of the equipment.

E. The above list is general in nature. Examine all Architectural Drawings and consult with the Engineer and vary mounting heights as directed.

3.16 TESTING 600 VOLT

A. After wires and cables are in place and before connection to the devices and equipment is made, test the system for shorts and grounds by means of an approved type of constant potential “Megger”, which is to be furnished by the Electrical Contractor.

B. Remove and replace all hot wires if shorted or grounded.

END OF SECTION

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SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Base Bid:

1. Contractor: Provide a completely grounded system. Electrical equipment, conduits, supports, cabinets and panels shall be grounded in accord with NEC and as shown on the drawings.

1.2 QUALITY ASSURANCE

A. Codes & Standards:
1. UL listed.
2. NFPA 70 (NEC), 2017
3. NEMA
4. NEC Articles 250 and 680

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 INSTALLATION

A. Electrical System shall be grounded. Grounding shall be in accord with NEC 250 and NEC 680. By reference herein, NEC Sections 250 and 680 shall become a part of this specification and shall be adhered to strictly.

B. All conduit, raceways, equipment, enclosures, panel housings, fixture housings, bus ducts, shall be grounded back to the service equipment location utilizing the continuous metallic conduit system as the grounding means. Discontinuity of the metallic conduit grounding system will not be acceptable.

C. All connections to motors, receptacles and equipment shall contain a separate grounding conductor bonded to the panelboard grounding bus at one end and the motor frame, receptacles, or equipment at the other end.

E. In accordance with NEC 680, all connections to motors, equipment, lights, receptacles, enclosures, piping, all metallic materials (see NEC 680) shall be grounded. Provide a copper ground conductor for bonding of all metallic equipment, devices, and components on project. All connections shall be exothermic welded unless the manufacturer supplies equipment or device with lug.

F. Provide a ground wire in all lighting circuits. Ground all lighting equipment.

G. Provide a ground wire to all cable trays.

H. Provide a ground wire for all 120V receptacle outlet circuits.

I. See Section 26 05 00 for ground type duplex receptacle.

J. See Section 26 05 00 for ground fault interrupting receptacles in wet locations.

K. Transformer neutrals and grounds shall be grounded for “separately derived” systems in accordance with NEC.

L. See Sections 26 05 00 for fittings for continuous conduit grounding system.

M. All ground wires shall be run in conduit except where otherwise indicated on the drawings.

N. Color code of ground wire shall be green.

O. Exterior grade mounted equipment shall have enclosures grounded directly to a separate driven ground at the equipment in addition to the building ground connection. This includes grade mounted light fixtures.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Provide identification as listed below.

1.02 QUALITY ASSURANCE

A. Provide proper identification in accordance with NFPA 70- (NEC), 2023.

1.03 GENERAL

A. Provide identification of electrical system components. All conduits shall be EZ-Pull True Color Metallic Tubing (EMT/Rigid)
   1. Standard codes for junction boxes and covers:
      a. Normal Power – Blue
      b. Critical Power – Yellow
      c. Life Safety Power – Green
      d. Equipment Emergency Power – Orange
      e. Fire Alarm – Red
      f. Communications – Black
      g. Fire Doors – Brown
      h. Building Controls - White

B. Provide the following items with nameplates:
   1. All motor starters, motor controls, motor control centers, push-button stations, control panels and time switches.
   2. Switchboards, disconnect switches, circuit breakers, contactors or relays in separate enclosures. Power receptacles where the nominal voltage between any contact is greater than 150V to ground. Use at least 1-1/8” x 2-1/4” signs
   3. Special electrical systems shall be properly identified at junction and pull boxes, terminal cabinets and equipment racks.
   4. Nameplate inscription: Nameplate shall adequately describe the function or use of the particular equipment involved. Nameplate for panelboards and switchboards shall include the panel designation, voltage and phase of the supply, and where the circuit-feeding panel originates, i.e.:
      a. Panel A
      b. 208/120 V.
      c. 3 Phase - 4 W.
      d. FED from “MDS”
   5. When equipment has more than one source of power, i.e.: separate control power source. The location of all power sources shall be CLEARLY identified at the equipment location. I.e.: Nameplate on door, etc.
   6. Mark all wires in panelboards with the circuit number they serve.
   7. Legibly mark feeder conduits entering and leaving a panelboard or switchboard with their destination.

1.04 MAIN SWITCHBOARD

A. The main switchboard shall have all switches or breakers labeled with load served or feeder served as directed by the Architect/Engineer. Labeling shall be engraved plastic signage with 1/8 inch to 1/4 inch lettering. Information shall include load or feeder served, amperage, and phase.

B. The switchboard shall contain a label with system voltage, phase amperage, cycles, and manufacturer's name.

1.05 PANELBOARDS

A. Provide a typed card directory for each panel. Directory shall designate breaker number and load served. Panel shall have all breakers individually numbered and panel shall have an interior nameplate provided by manufacturer with voltage, amperage, phase and hertz listed. Provide an exterior engraved plastic signage with the panel name or number or letter designation., and where the panel is served from.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Nameplate construction shall be laminated phenolic plastic, black front and back with white core, with lettering engraved through the outer covering. Lettering shall be 3/16 inches high at push-button station starter, receptacles and similar devices where the nameplate is attached to the device plate. At all other locations, lettering shall be 1/4 inch high unless otherwise detailed on the drawings.

B. Other types and sized of signage may be used where appropriate.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install labels on motor starters, TT switches, relays, disconnect switches, main distribution switchboard, power distribution panels, branch power panels, branch lighting panels and cable trays.

B. Special outlets and receptacles shall be clearly labeled to identify the utilization equipment.

C. Overcurrent devices in panels clearly identify what they feed. This may be accomplished by means of the typewritten panel schedules mounted inside of the front cover doors under glass or plastic.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Base Bid:

1. Contractor: Provide panelboards specified and indicated on the drawings.

1.2 RELATED WORK

A. Specified elsewhere:

1. 26 05 00 - Common Work Results for Electrical
2. 26 05 26 - Grounding and Bonding for Electrical Systems
3. 26 28 00 - Low-Voltage Circuit Protective Devices

1.3 QUALITY ASSURANCE

A. All panelboards shall conform to and be manufactured to the standards of: UL50, UL67, UL489, UL873, UL891 and have the UL label as well as NEMA Standards PB1-1977, PB1.2-1977, PB2-1978 and ANSI C33.38 and C84.1.

B. Comply with:

1. National Electrical Code (NEC), 2017

PART 2 - PRODUCT

2.1 MATERIALS

A. Panels shall have the voltage characteristics, bus size, main lugs only or main switch/breakers, flush or surface cabinet, and number and size of branch circuit switch/breakers as scheduled on the drawings.

B. Panel cabinets shall be not less than 20 inches wide, 5-3/4 inches deep and shall have gutters at each side and at top and bottom of ample width to accommodate branch circuit feeder conductors. All gutters shall be minimum 5-inch width except that gutters where cables are connected to panelboard main lugs and gutters used for through feed of feeder conductors shall be sized in accordance with ANSI Standards.

C. Cabinets for panels shall comply with all NEMA Standards and shall be of the dead front type suitable for surface or flush mountings. Enclosure shall be of code gauge steel with ample wiring space on all sides. Trim and door shall be of #12 gauge steel fastened to the tub with adjustable clamps. Door shall be provided with flush type hinges and

chrome plated flush type combination catch and cylinder lock master. GE-75 keyed Panel shall be provided with a circuit directory under glass or plastic cover in a metal frame. Panelboard tub shall be galvanized.

D. Bus bars for all panels shall be hard drawn electrolytic silver plated copper of 98 percent conductivity rated in accord with UL 67 for heat rise and shall be of sizes in strict accordance with NEMA and UL requirements and shall have ratings established by heat rise tests conducted in accordance with UL 67. A ground bus bonded to the panel cabinet shall be provided. Provide proper main lugs to receive incoming feeder cables.

E. Neutrals shall be grouped on a common bar and each terminal on the neutral bar shall be stamped or tagged with the number of the circuit with which it is associated. Neutral bus shall be insulated from cabinet. In addition, provide a ground bus bonded to cabinet. All panels shall have ground bus.

2.2 BRANCH PANELBOARDS

A. Branch panelboards shall be circuit breaker type with bolt-on type branch circuit breakers. Panels shall be Square D.

B. Panelboard short circuit interrupting capacity shall be 22,000 amperes minimum and depending on the devices used shall not be below the lowest rated interrupting capacity for any branch or main breaker.

2.3 DISTRIBUTION PANELBOARDS (BREAKER TYPE)

A. Distribution panelboards (circuit breaker type) shall be Square D.

B. Panelboard short circuit interrupting capacity shall be 22,000 amperes minimum and depending on the devices used shall not be below the lowest rated interrupting capacity for any branch or main breaker. Bus shall accommodate bolt-on breakers.

2.4 BREAKERS

A. Breakers for all panelboards shall be thermal-magnetic with each pole providing inverse time delay and instantaneous circuit protection.

B. All breakers shall be completely enclosed in a molded case and be operated by a toggle type handle. Breakers shall be quick-make, quick-break with all poles constructed to open, close and trip simultaneously.

C. The minimum interrupting capacity of the circuit breakers shall be 240 or 600 volt rated, 3 phase, molded case, thermal magnetic and rated a minimum of 22,000 amperes.

D. Breakers shall be back connected to bus bars with studs. All spaces for future breakers in all panels shall be equipped with proper bus connecting links to facilitate the installation of future breakers. Breakers shall have trip elements calibrated in accordance with the drawings. The trip element shall ensure constant calibration and be capable of withstanding excessive short current conditions without injury to the breaker.

E. Breakers 250 amperes and greater shall have adjustable magnetic trip.

F. Breakers, which are required to be ground fault type, shall be GFCI type, Class A, UL FE48340 and 943. Breakers shall have noise suppression circuit, push to test, and trip indication. Note: Splices will not be allowed in circuits fed from GFCI breakers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Panelboards shall be installed level and plumb with respect to surrounding surfaces with the top of the panel 6’0” above the finished floor.

B. Cabinets shall be installed, conduits connected, and all wires pulled before the interior is installed. Every flush mounted panelboard shall have a minimum of five spare 3/4-inch EMT conduits stubbed above the ceiling.

C. Branch wiring shall be neatly arranged in the panelboard gutters and all conductors shall be of sufficient length to reach any breaker located adjacent to the same gutter containing the conductor.

3.2 PROTECTION DURING CONSTRUCTION

A. During the construction period the panel interior shall be protected with a suitable cover to prevent dirt or damage to the interior. After energizing, the panel shall have all live exposed parts covered with an approved barrier and a temporary sign shall be posted indicating that the panel is “HOT”. Temporary sign shall be removed upon completion of work.

END OF SECTION

SECTION 26 28 00
LOW VOLTAGE CIRCUIT PROTECTIVE DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Circuit breakers

1.02 QUALITY ASSURANCE

A. Comply with:
   1. UL listed
   2. NFPA 70 (NEC), 2023.
   3. ANSI
   4. NEMA

1.03 SUBMITTALS

A. Submit manufacturer's data demonstrating compliance with the drawings and these specifications.

B. Shop drawings shall clearly indicate type of breaker, size, trip, characteristics, interrupting capacity, with features listed and identified.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Breakers:
   1. Square D

2.02 CIRCUIT BREAKERS

A. Circuit breakers shall meet the following:
   1. Be quick-make, quick-break type.
   2. Have toggle mechanism insuring full contact pressure until time of opening whether manually or automatically operated.
   3. Have inverse time tripping characteristics with fixed thermal trip action to hold on harmless momentary overload.
   4. A short circuit condition shall cause the magnetic trip element to instantly trip without damage or injury.
   5. Have non-welding, non-corroding contacts.
   6. Have mechanism enclosed in molded bake-lite case, sealed to prevent tampering or unauthorized changes in calibration.
   7. Be NRTL listed.
   8. Meet NEMA standards.
   9. Be bolt-on type unless otherwise specified for use in common bus equipment.
   10. Have contacts operate in a multiple plate arc quenching chamber vented to load side of breaker - UL listed.
   11. Be fully rated for panel or switchboard bus they are to be used in as scheduled on the drawings.
   12. Be calibrated for operation in a minimum ambient temperature of 40°C.

13. Multi-pole breakers shall have common trip molded inside breaker housing.
14. Twenty ampere minimum unless otherwise specifically called for.
15. When used as main breaker be minimum 65,000 AIC rated and sized in accordance with UL 67 unless otherwise noted on drawings.
16. Multi-pole breakers shall not require more space than the equivalent number of single pole breakers.
17. Have operating handle that visually indicates “on”, “off”, or “tripped”.
18. Clearly indicate ampacity and frame size.
19. Be labeled as to what circuit number or numbers and load they serve.
20. All circuit breakers shall be rated “SWD” indicating they are suitable for switching loads.
21. “HID” shall indicate circuit breaker rated for high intensity discharge lighting.
22. Single breakers per one-pole space only.

PART 3 - EXECUTION

3.01 INSTALLATION

A. No equipment shall be electrically activated without proper overcurrent protection.

B. Breakers shall indicate clearly their size; must clear panel doors and be mounted on frame allowing outward and inward adjustment. The depth of the tubs shall also permit adjustment.

C. Breakers shall be provided with a numerical designation strip.

D. 120V lighting and receptacle circuits shall be run from 20 A. single pole breakers. Unless specifically called for, or NEC required, no breakers less than 20 A. shall be allowed.

E. Snap switch type breakers only.

F. Breakers shall be fully rated.

G. Breakers rated 250 amps and above shall be provided with adjustable magnetic trip

END OF SECTION

SECTION 26 51 00
LIGHTING

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Light fixtures.

B. Lamps.

C. Ballast.

D. Fixture bases.

E. Fixture lens.

F. Accessories.

1.02 QUALITY ASSURANCE

A. All fixtures shall have UL label.

B. Ballasts shall be in accord with ANSI Standards.

C. Comply with:
1. NFPA - 70
2. I.E.S.

D. Verify the ceiling trim requirements for fixtures to assure proper installation for the type of ceiling construction.

1.03 SUBMITTALS

A. Submit in accord with Division 01.

B. Submit manufacturer's data demonstrating compliance with this specification and the schedule on the drawings.

C. Shop Drawings:
1. Include data specified herein including fixture “mark” corresponding to the Drawings.
2. Clearly indicate type and color of each lamp(s) to be used for each fixture type.
3. Submit shop drawings for each type of lamp.

D. Submittals will be reviewed a maximum of three revisions. If after the third submission submittal package does not conform to Specifications herein, CONTRACTOR will be billed at Electrical Engineer's standard hourly rate.

E. Maintenance data for fixtures to include in the operation and maintenance manual specified in Division 1.

PART 2 - PRODUCTS

2.01 FIXTURE SCHEDULE

A. Light fixtures shall be as listed on the drawing Fixture Schedule.

B. The various types of fixtures to be provided are indicated on the drawings. A fixture shall be provided for each ceiling outlet, bracket outlet and other lighting fixture outlets. Where a fixture type is not indicated, provide a fixture of the same type used in similar areas.

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2.02 FIXTURES

A. Where installed on combustible surfaces, fixtures shall be specifically UL listed for this condition or be spaced not less than 1-1/2-inch from the combustible surface.

B. All glassware shall be high quality, homogeneous in texture and free from streaks, cords, stones, or blisters and of uniform thickness and properly annealed.

C. Enamel finish shall be baked. The finish of each fixture shall be uniform in quality, durable and free from defects.

D. All plastic molded lenses shall be acrylic prismatic K19, 0.156” type.

E. Disconnecting Means:
   1. All applicable luminaires must be provided with means to comply with luminaire disconnect requirements specified in NEC 410.130(G), 2011 Edition.

PART 3 - EXECUTION

3.01 FIXTURE INSTALLATION

A. Light fixtures for all outlets shown on the drawings shall be furnished and installed complete including the assembly, wiring, support materials, and installation of each unit in place. All lenses, glassware and metal parts shall be thoroughly cleaned just prior to final acceptance.

B. Lighting fixtures shall be mounted as specified, and shall include all necessary fittings for a complete installation. Provide all materials to adequately and safely support all fixture installations.

C. Verify ceiling suspension material and systems in the various areas and provide plaster frames and proper fixture trims.

3.02 FIXTURE LOCATION

A. Space fixtures as indicated on the drawings and in keeping with ceiling patterns, air inlets and outlets.

B. Light fixtures recessed in ceiling shall be coordinated with ceiling construction. Recessed fixtures as scheduled serve only as a guide as to the type of fixture, lamp, and lens. Supply fixture that shall integrate with the type of ceiling as scheduled on architectural drawings approved for construction. Recessed light fixtures installed in grid ceiling shall have tee grid clamps.

C. Exit lights shall be coordinated with adjacent architectural work and shall be located and modified as to type of mounting, as directed by Architect/Engineer.

3.03 FIXTURE SUPPORT

A. Conduits run to recessed fixtures shall terminate in a suitable box adjacent to fixture opening with final connections to fixture made with flexible conduit and Type AF wire. Airtight fiberglass gaskets shall be provided around recessed fixtures to eliminate light leakage or hot air dirt streaks between fixture trim and finished ceiling. Fixtures shall be

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designed, insulated and ventilated to prevent scorching of adjacent construction. Plaster or other special frames, including extension pan for exposed conduit installation, shall be provided.

B. Light fixtures shall have proper supports, flanges, and plaster frames to integrate with the type of ceiling construction. All fixtures shall be constructed so that they may be securely supported. All fixtures shall be supported from 3/8-inch stud in outlet box. Outlet boxes shall have fixture studs and shall be securely hung independently of conduits.

C. Provide auxiliary supports for mounting fixtures in areas without ceilings (i.e., exposed beams and slabs), for proper installation of fixtures. Such supports shall span a minimum of 2 beams for each individual fixture and shall be securely and suitably anchored.

D. Fixtures shall be supported with a stem and “L” hanger on one end and pipe stem on the other end. When conduit is used to support fixtures, 1-inch rigid heavy wall shall be the minimum size. When conduits are used as stems, locknuts and washers shall be employed. Conduit may not be reduced in size between fixtures.

E. Fixtures installed adjacent to unit heaters or mechanical equipment, which may cause fixtures to vibrate, shall be installed so not to sway.

F. Fixtures shall not be supported from underside of metal roof decks, except where specifically noted otherwise on the drawings.

G. Compression or indenter type couplings will not be acceptable for fixtures supports.

H. Recessed grid fixtures shall be provided with T-bar clips. Install 4 per fixture.

I. Fixtures installed in continuous rows shall be supported a minimum of 8'-0” on center. Where fixtures are mounted in continuous rows over 16 feet long, support from Kindorf, Unistrut, or Storack which will limit deflection to acceptable values. When channels are used for a wireway, thus eliminating conduit shown on the drawings as running parallel to the channels. Channels shall have closure plates if used as wireways. Continuous wireways may be used in place of conduit when approved in writing by Architect/Engineer for the installation.

J. In general, support all fluorescent fixtures from the building structure and not from the ceiling suspension system (such as tee bar system for a suspended acoustical tile ceiling.)

K. At the Electrical Contractor's option recessed fluorescent fixtures can be supported from the ceiling suspension system if the Electrical Contractor makes arrangements and pays for additional ceiling hanger wires of adequate strength and quantity to support the fixtures. Where recessed fixtures occur in grid system, install tie wires on all four corners of the grid system about the fixture. Fixtures so supported shall be securely fastened to the grid system members with safety tee bar clips.

3.04 MISCELLANEOUS REQUIREMENTS

A. Color of exit light lettering shall be green LED. All letters shall be 6 inches high by 3/4-inch stroke. Exit signs at an egress shall read “EXIT”.

B. Fixtures marked “WP” shall be waterproof with special waterproof boxes and gaskets as required to keep rain or hose spray from coming into contact with wiring.

C. Letters “a”, “b”, “c”, etc., indicate associated switch or switches. Figures “1”, “2”, “3', etc., indicate associated branch circuit. “F1”, “F2”, “F3”, etc. indicate fixture type.

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3.05 LAMP INSTALLATION

A. Provide all lamps for all outlets and fixtures. All fixtures shall be complete with lamps and in operating condition when the building is turned over to the Using Agency. All “burnt out” or broken lamps that occur during the construction period shall be replaced.

B. All fixtures, reflectors, lenses, and lamps shall be cleaned.

END OF SECTION

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SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparing subgrades for slabs-on-grade, walks pavements, foundations, grass and plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 QUALITY ASSURANCE

A. Preexcavation, Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

B. Do not commence earth moving operations until plant-protection measures specified in Division 01 Section "Temporary Tree and Plant Protection" are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

1. Liquid Limit: less than 45
2. Plasticity Index: less than 23.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Drainage Course: Well graded mixture of clean crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve andless than 5 percent passing a No. 200 (.075-mm) sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.4 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck, with the presence of the Owner's geotechnical testing agency representative to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.5 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.6 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.7 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:
1. Under steps and ramps, use engineered fill.
2. Under building slabs, use engineered fill.
3. Under footings and foundations, use engineered fill.

3.8 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.9 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 9 inches (228 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Beneath foundations and within 1-foot (305 mm) of finished pavement subgrade: 98 percent.
2. Above foundations and more than 1-fot 9305 mm) below pavement subgrade: 95 percent.
3. Under turf or unpaved areas: 92 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.10 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Walks: Plus or minus 1 inch (25 mm).
3. Pavements: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

1.2 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

D. Place drainage course on subgrades free of mud, frost, snow, or ice.

E. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 3 inches (75 mm) thick or less than 3 inches (75 mm) thick.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than **95** percent of maximum dry unit weight according to ASTM D 698.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.12 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

NOTICE TO BIDDERS

ARCHITECT:

Horizon Architecture
3116 Alpine Court
Iowa City, IA 52245
michael@horizon-architecture.com

PROJECT ADDRESS:

Muscatine County Satellite Facility
2445 Independence Avenue
Muscatine, IA 52761

OWNER:

Muscatine County
414 East Third Street, Suite 101
Muscatine, IA 52761

PROJECT DESCRIPTION

1.1 The work to be performed consists of the construction of a new Pre-engineered Metal Building for the storage of commercial vehicles for use by the Muscatine County Engineer and Highway Department. The structure consists of concrete foundations and flatwork, metal framed walls and roof, standing seam metal roofing, metal siding, aluminum storefront windows, sectional doors, and hollow metal doors. Interior work includes metal stud framing with batt insulation, installation of drywall, painting, installation of kitchen and bathroom fixtures and finishes. Mechanical work includes the installation of heating and cooling ductwork and appliances for the office and storage space. Electrical work includes installation of lighting and electrical equipment. Site work consists of well and septic installation, retaining walls, concrete flatwork, re-grading of the drive, and concrete paving.

A. Single Prime Contract.

PROJECT TIMELINE

A. Pre-Bid Conference**:** A pre-bid conference will be held at 10 am, Wednesday, April 8th, 2026; meet on site at 2445 Independence Ave, Muscatine IA. **All Contract Bidders are encouraged to attend. Representatives of the Architect and the Owner will be in attendance.**

1. A primary focus of the conference is to review project requirements, ask questions, and permit Bidders' inspection of the existing conditions.

B. The date for Award of Contracts for construction is anticipated on Monday, April 27th, 2026, with the Notice to Proceed being issued no later than May 4th, 2026.

C. Construction Activities at the site:

1. The contractor will have full access to the site during the project. The owner will maintain continuous occupancy and operation of adjacent spaces and the remainder of the facility and phased construction may be required to maintain egress during construction. No date is set for substantial completion but a 2027 completion is highly desired.

SUBMITTAL:

A. Submit **a digital PDF containing Bid form, bid bond and qualifications statement with optional password protection to michael@horizon-architecture.com and administration@co.muscatine.ia.us** no later than 2:00 p.m. on Thursday, April 23, 2026. Transmit the password (optional) to open the document at or after 2:00 p.m. on Thursday, April 23, 2026. An informal bid opening will take place beginning at 2:00 p.m. on Thursday, April 23, 2026 via Zoom meeting. The meeting can be attended by all interested using the following:

https://us02web.zoom.us/j/86383066458?pwd=KxMyAapEBXBfix7WTsJu5sKOuWsXah1

Meeting ID: 863 8306 6458

Passcode: 92195

BID ANNOUNCEMENT:

A. Bids will be publicly announced at 9 a.m. on Monday, April 27, 2026 at the Muscatine County Board of Supervisors Meeting. Bid results will not be official until all information is reviewed, tabulated, and presented to and approved by the Muscatine County Board of Supervisors

BID SECURITY:

A. Bid Security shall be made payable to the Muscatine County Iowa, in the amount of 10 percent (10%) of the Base Bid sum. Security shall be CERTIFIED CHECK, BANK CASHIERS CHECK or AIA A310 BID BOND issued by the Surety licensed to conduct business in the state in which the Project is being constructed. The Owner reserves the right to approve the sufficiency of the required bid security.

B. The successful bidder's Security will be retained until it has signed the Contract and furnished the required PAYMENT and PERFORMANCE BONDS. The Owner reserves the right to retain the Security of the next three (3) lowest bidders until the lowest Bidder enters into a Contract or until sixty (60) days after bid opening, whichever is the shorter. All other Bid Security will be returned as soon as practical. If any Bidder refuses to enter into a Contract, the Owner will retain its Bid Security as liquidated damages, but not as a penalty.

C. The Bid Security is to be submitted and attached to the BID FORM at the time of submission of Bids.

Please review the bid drawings and project manual for complete project details and bidding instructions.

RESOLUTION #03-30-26-01
APPROVING PLANS, SPECIFICATIONS, FORM OF CONTRACT AND COST ESTIMATE FOR THE MUSCATINE COUNTY ENGINEER SATELLITE FACILITY PROJECT

WHEREAS, the Muscatine County Board of Supervisors has retained Horizon Architecture to provide consulting architectural/engineering services for the Muscatine County Engineer Satellite Facility Project; and

WHEREAS, Horizon Architecture has prepared plans, specifications, form of contract and estimated cost for the project, which documents have been on file and available for public inspection in the Muscatine County Zoning Office since Monday, March 23, 2026; and

WHEREAS, following notice of public hearing published in accordance with the law, a public hearing was held on Monday, March 30, 2026 at 9:00 a.m. in the Muscatine County Administration Building at which members of the public were allowed to be heard on the issue of the Muscatine County Engineer Satellite Facility Project, and on the documents prepared in connection therewith.

NOW, THEREFORE, BE IT HEREBY RESOLVED by the Muscatine County Board of Supervisors:

1. That the plans, specifications, form of contract and estimated cost of the Muscatine County Engineer Satellite Facility Project are hereby approved.
2. That Muscatine County shall solicit sealed bids for the proposed improvement in accordance with the law.
3. That bids must be received as described in the Notice to Bidders on or before the 23rd day of April, 2026.
4. That bids shall be publicly announced at 9:00 a.m. on Monday, April 27, 2026 at the Muscatine County Board of Supervisors meeting.
5. That the sealed bids must be accompanied by a bid security equal to ten (10) percent of the bid.

PASSED AND APPROVED this 30th day of March, 2026.

ATTEST:

Tibe Vander Linden
Muscatine County Auditor

Danny Chick, Chairperson
Muscatine County Board of Supervisors

March 30, 2026

Agenda Packet

Item #5

SECONDARY ROADS FIVE YEAR PROGRAM

Iowa Department of Transportation

County: **Muscatine County**
Fiscal Year: **2027**
Version: **Original**
Status: **DOT Approved**
DOT Approved: **3/24/2026**

COUNTY CERTIFICATION
The detailed construction program for the secondary road system was adopted by the Board of Supervisors on _____ Date
ATTESTED
_____ County Auditor _____ Date
_____ County Engineer _____ Date
_____ Chairperson, Board of Supervisors _____ Date

Generated on 3/24/2026 8:58 AM

SECONDARY ROADS FIVE YEAR PROGRAM

						Accomp Year	Priority Years				
							1st	2nd	3rd	4th	
Project Number Project Name Project ID	**Location Description of Work Section / Township / Range**	**AADT Length Federal ID**	**Status FM Transfer**	**Day Labor Type of Work Project Type**	**Fund**	**FY 2027**	**FY 2028**	**FY 2029**	**FY 2030**	**FY 2031**	**Total**
L-(FYROW)--73-70 FY ROW 2389	 ACQUIRE ROW	 miles	Previous	$0 311 Right of way Local	Local FM Special FA SWAP	$25					$25
L-(CUL27)--73-70 CULVERTS 27 51132	41st St 0.7mi E of Burlington and 260th St 0.1mi W of Echo and Vail Ave 0.1mi N of Hwy 61 and 102nd St 0.1mi W of Lotus REPLACEMENT CULVERTS	 miles	Previous	$0 331 Pipe Culverts Local	Local FM Special FA SWAP	$900					$900
FM-C070(78)--55-70 OR-8 44947	On 230TH STREET G28, From Louisa County Line to Iowa 70 PCC RECONSTRUCTION W/2FT WIDENING EACH LANE 7 / 76 / 04	900 1.100 miles	Previous	$0 367 PCC Paving FM	Local FM Special FA SWAP	$2,000					$2,000
BROS-C070(80)--5F-70 BL-3 Bridge 214 44948	On 180TH STREET G14, Near NW Corner, S18 T77 R1W CONSTRUCT TRRCB	310 miles 257430	Previous	$0 332 Box Culverts FA	Local FM Special FA	$1,850					$1,850

SECONDARY ROADS FIVE YEAR PROGRAM

	18 / 77 / 01				SWAP						

SECONDARY ROADS FIVE YEAR PROGRAM

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Project Number Project Name Project ID	**Location Description of Work Section / Township / Range**	**AADT Length Federal ID**	**Status FM Transfer**	**Day Labor Type of Work Project Type**	**Fund**	**FY 2027**	**FY 2028**	**FY 2029**	**FY 2030**	**FY 2031**	**Total**
BRS-C070(74)--60-70 WI-3 Bridge 121A 51133	On F58, Over ELKHORN CREEK, S4 T78 R01 CONSTRUCT CCS BRIDGE OR TWRCB 4 / 78 / 01	2232 miles 37910	Previous	$0 320 Bridges FA	Local						$1,500
					FM						
					Special						
					FA	$1,200					
					SWAP	$300					
STP-S-C070(79)--5E-70 WI-5 47050	On F58, from Wilton Corp. Line NE 1.9 miles to Cedar County PCC RECONSTRUCTION W/2FT WIDENING EACH LANE 5 / 78 / 01	2340 1.900 miles	Previous	$0 367 PCC Paving FA	Local						$5,000
					FM	$1,517					
					Special						
					FA	$3,483					
					SWAP						
L-(CUL28)--73-70 CULVERTS 28 53006	Various Locations NEW AND REPLACEMENT CULVERTS	miles	Previous	$0 331 Pipe Culverts Local	Local		$100				$100
					FM						
					Special						
					FA						
					SWAP						
FM-C070()--55-70 SW-2 44951	On SWEETLAND ROAD, from Iowa 22 to New Era Road PCC RECONSTRUCTION	550 1.500 miles	Previous	$0 367 PCC Paving FM	Local		$1,700				$3,400
					FM		$1,700				
					Special						
					FA						

	W/2FT WIDENING EACH LANE										
	21 / 77 / 01				SWAP						

SECONDARY ROADS FIVE YEAR PROGRAM

						Accomp Year	Priority Years				
							1st	2nd	3rd	4th	
Project Number Project Name Project ID	**Location Description of Work Section / Township / Range**	**AADT Length Federal ID**	**Status FM Transfer**	**Day Labor Type of Work Project Type**	**Fund**	**FY 2027**	**FY 2028**	**FY 2029**	**FY 2030**	**FY 2031**	**Total**
BHS-C070(76)--63-70 GO-5 Bridge 143 2323	On F 70, Over CEDAR RIVER, S36 T78 R03 BRIDGE DECK OVERLAY, JOINT REPAIRS, & REPLACE BRIDGE RAILING 36 / 78 / 03	918 miles 258340	Previous	$0 320 Bridges FA	Local						$2,100
					FM						
					Special						
					FA		$1,680				
					SWAP		$420				
L-(CUL29)--73-70 CULVERTS 29 55097	Various Locations NEW AND REPLACEMENT CULVERTS	miles	Previous	$0 331 Pipe Culverts Local	Local			$100			$100
					FM						
					Special						
					FA						
					SWAP						
BROS-C070(75)--5F-70 PI-5 Bridge 237 53005	On BANCROFT AVE, Over HOCKEYS SLOUGH, S17 T77 R04 CONSTRUCT CCS BRIDGE 17 / 77 / 04	45 miles 257760	Previous	$0 320 Bridges FA	Local						$750
					FM						
					Special						
					FA			$750			
					SWAP						
STP-S-C070()--5E-70 BL-4 55171	On N. Mulberry X54, from Muscatine Corp. Line NW 4 miles to 155th St, then east 0.8 miles just past Moscow Rd Int. HMA OVERLAY	1780 4.800 miles	Previous	$0 366 HMA Paving FA	Local						$5,000
					FM			$1,000			
					Special						
					FA			$4,000			

	w/HIR & 2' WIDENING EACH LANE										
	21 / 77 / 02				SWAP						

SECONDARY ROADS FIVE YEAR PROGRAM

						Accomp Year	Priority Years				
							1st	2nd	3rd	4th	
Project Number Project Name Project ID	**Location Description of Work Section / Township / Range**	**AADT Length Federal ID**	**Status FM Transfer**	**Day Labor Type of Work Project Type**	**Fund**	**FY 2027**	**FY 2028**	**FY 2029**	**FY 2030**	**FY 2031**	**Total**
L-(CUL30)--73-70 CULVERTS 30 57469	Various Locations NEW AND REPLACEMENT CULVERTS	miles	Previous	$0 331 Pipe Culverts Local	Local				$100		$100
					FM						
					Special						
					FA						
					SWAP						
L-(MO-8)--73-70 MO-8 57472	On NOBLE AVENUE, from US HWY 6 NE 0.9 miles GRADE & HMA RECONSTRUCTION W/2FT WIDENING EACH LANE 8 / 78N / 02W	1070 0.900 miles	Previous	$0 366 HMA Paving Local	Local				$2,700		$2,700
					FM						
					Special						
					FA						
					SWAP						
FM-C070()--55-70 WA-5 57468	On 121ST STREET, from ELIASON AVENUE E 0.8 miles to WEST LIBERTY CORP. GRADE & PCC RECONSTRUCTION W/2FT WIDENING EACH LANE 11 / 78N / 04W	920 0.800 miles	Previous	$0 367 PCC Paving FM	Local						$2,250
					FM				$2,250		
					Special						
					FA						
					SWAP						
BROS-C070(77)--8J-70 WA-4 Bridge 152 57467	On 115TH ST, Over WAPSINONOC CREEK, S7 T78N R03W	170 miles 258250	Previous	$0 320 Bridges FA	Local						$1,500
					FM						
					Special						

	CONSTRUCT PPCB BRIDGE 7 / 78N / 03W				FA				$1,500		
					SWAP						

SECONDARY ROADS FIVE YEAR PROGRAM

						Accomp Year	Priority Years				
							1st	2nd	3rd	4th	
Project Number Project Name Project ID	**Location Description of Work Section / Township / Range**	**AADT Length Federal ID**	**Status FM Transfer**	**Day Labor Type of Work Project Type**	**Fund**	**FY 2027**	**FY 2028**	**FY 2029**	**FY 2030**	**FY 2031**	**Total**
L-(CUL31)--73-70 CULVERTS 31 58382	Various Locations NEW AND REPLACEMENT CULVERTS	miles	New	$0 331 Pipe Culverts Local	Local					$100	$100
					FM						
					Special						
					FA						
					SWAP						
BRS-C070()--60-70 WI-6 Bridge 112 58529	On VAIL AVENUE Y26, Over MUD CREEK, near NW CORNER, S6 T78 R01E CONSTRUCT CCS OR PPCB BRIDGE 6 / 78N / 01E	1634 miles 257871	New	$0 320 Bridges FA	Local						$2,050
					FM						
					Special						
					FA					$1,640	
					SWAP					$410	
BROS-C070()--8J-70 FL-10 Bridge 110 58530	On VINE AVE, Over CREEK, near NW CORNER S21 T78 R01E CONSTRUCT CCS BRIDGE OR TWRCB 21 / 78N / 01E	51 miles 257910	New	$0 320 Bridges FA	Local						$700
					FM						
					Special						
					FA					$700	
					SWAP						

SECONDARY ROADS FIVE YEAR PROGRAM

Fund	2027	2028	2029	2030	2031	Total
SWAP	$300,000	$420,000			$410,000	**$1,130,000**
FM	$3,517,174	$1,700,000	$1,000,000	$2,250,000		**$8,467,174**
Local	$925,000	$1,800,000	$100,000	$2,800,000	$100,000	**$5,725,000**
FA	$6,532,826	$1,680,000	$4,750,000	$1,500,000	$2,340,000	**$16,802,826**
Total	**$11,275,000**	**$5,600,000**	**$5,850,000**	**$6,550,000**	**$2,850,000**	**$32,125,000**

SECONDARY ROADS BUDGET

Iowa Department of Transportation

County: **Muscatine County**
Fiscal Year: **2027**
Version: **Original**
Status: **DOT Approved**
DOT Approved: **3/23/2026**

COUNTY CERTIFICATION
This Secondary Road Budget was adopted by the Board of Supervisors on _____ Date
ATTESTED
_____ County Auditor _____ Date
_____ County Engineer _____ Date
_____ Chairperson, Board of Supervisors _____ Date

SECONDARY ROADS BUDGET

		Actual Receipts Prior Years		Estimated Receipts	
		2nd Prior	1st Prior	Current	Next
		FY 2024	FY 2025	FY 2026	FY 2027
1. County Auditor's Beginning Balance		$9,256,689.65	$10,459,210.72	$12,847,755.92	$5,862,819.00
Receipts from Property Tax Levies	**2.14399** Dollars on all taxable property in county except on property within cities and towns. (Max. $3.00375)	$2,420,000.00	$2,802,290.00	$2,580,000.00	$2,610,000.00
	0.12185 Dollars on all taxable property in the county. (Max. $0.16875)				
2A. Local Option Sales Tax		$2,344,420.27	$2,403,433.54	$2,200,000.00	$2,200,000.00
3. Regular Road Use Tax Received	(Doesn't include transfer of local R.U.T. to FM account for const. on FM routes)	$3,581,181.35	$3,665,135.97	$3,591,181.00	$3,610,981.00
3b. Amount for 306.4(a3)	(Senate File 451 - FM Ext. in City <=500)	$13,390.54	$13,465.43	$13,321.00	$13,274.00
3c. Time 21		$401,994.97	$402,523.60	$400,861.00	$400,331.00
4. RISE Funds		$0.00	$0.00	$0.00	$0.00
5. FA Bridge Replacement Funds		$0.00	$610,239.35	$20,000.00	$0.00
5a. SWAP Bridge Replacement Funds		$0.00	$0.00	$0.00	$0.00
6. Proposed transfer of FM funds to Local Secondary Fund.(Section 309.10)		$0.00	$0.00	$0.00	$0.00
7.Tax Refunds (-) and/or Credits (+).(Section 309.10 - Code of Iowa)		$16,177.80	$15,902.10	$16,000.00	$16,000.00
8. Miscellaneous Receipts *Donations, sale of used materials, Special Assessments, etc* *Itemized for 2027*	DTF Utility Reimbursement			$5,000.00	$5,000.00
	flood prevention	$11,378.41	$11,157.22	$10,000.00	$10,000.00
	Fuel Reimbursement			$59,100.00	$95,000.00
	licensesAndPermits	$28,833.34	$35,599.19	$23,000.00	$23,000.00
	Miscellaneous			$2,900.08	$3,400.00
	All Other	$3,802.69	$1,103,302.00	$4,000.00	$4,000.00
9. Total Miscellaneous Receipts		$44,014.44	$1,150,058.41	$104,000.08	$140,400.00
10. TOTAL RECEIPTS		$18,077,869.02	$21,522,259.12	$21,773,119.00	$14,853,805.00

11. Road Use Tax Funds or other local funds not transferred to Secondary Roads to be transferred to FM fund for construction.	0	0	$0.00	$0.00

SECONDARY ROADS BUDGET

	Actual Expenditures Prior Years		Estimated Expenditures	
	Prior 2	Prior 1	Current	Next
70X * Administration and Engineering	FY 2024	FY 2025	FY 2026	FY 2027
700 Administration Expenditures	$220,118.88	$228,958.03	$259,000.00	$275,000.00
701 Engineering Expenditures	$652,437.68	$783,442.41	$928,000.00	$1,028,123.00
TOTAL ADMINISTRATION AND ENGINEERING	**$872,556.56**	**$1,012,400.44**	**$1,187,000.00**	**$1,303,123.00**
020* Construction				
Adjusted Construction Program Expenditures (300) on FM and Local Sec. Roads *(With other than FM funds ---See Accomplishment Year projects)*	$1,046,274.43	$1,235,218.90	$5,899,000.00	$2,850,000.00
71X* Roadway Maintenance				
710 Bridges and Culverts (420, 430)	$128,712.13	$78,734.61	$167,000.00	$323,000.00
711 Roads (4250, 460, 480)	$2,393,357.95	$3,774,976.44	$3,390,000.00	$4,109,000.00
712 Snow and Ice Control (520)	$214,939.56	$181,243.33	$288,000.00	$293,000.00
713 Traffic Controls (590)	$451,348.12	$134,933.54	$756,300.00	$343,300.00
714 Road Clearing (490)	$330,175.88	$409,473.02	$433,000.00	$425,000.00
TOTAL ROADWAY MAINTENANCE	**$3,518,533.64**	**$4,579,360.94**	**$5,034,300.00**	**$5,493,300.00**
72X * General Roadway				
720 New Equipment (610)	$1,234,568.05	$919,104.00	$859,000.00	$1,461,000.00
721 Equipment Operations (620, 630, 650)	$872,127.04	$873,622.41	$1,314,000.00	$1,330,000.00
722 Tools, Materials and Supplies (655, 660, 670, 680, 690)	$38,621.72	$16,532.08	$50,000.00	$60,000.00
723 Real Estate and Buildings (800)	$35,976.86	$38,264.43	$1,567,000.00	$492,000.00
TOTAL GENERAL ROADWAY	**$2,181,293.67**	**$1,847,522.92**	**$3,790,000.00**	**$3,343,000.00**
TOTAL EXPENDITURES (70X + 020 + 71X + 72X)	**$7,618,658.30**	**$8,674,503.20**	**$15,910,300.00**	**$12,989,423.00**
County Auditor's balance at end of fiscal year	$10,459,210.72	$12,847,755.92	$5,862,819.00	$1,864,382.00
TOTAL (Must equal receipts) [Does not include transfer of Road Use Tax to FM Fund]	$18,077,869.02	$21,522,259.12	$21,773,119.00	$14,853,805.00

FY 2027
L-(FYROW)--73-70
Various Projects
Right of Way Purchase
Local Funding = $25,000

FY 2028
BHS-C070(76)--63-70
155th Street F70 (Bridge 143)
Bridge Rehabilitation, Deck Overlay, Joint Repairs, & Replace Bridge Railing
SWAP Funding = $420,000
HBP Funding = $1,680,000

FY 2027
BRS-C070(74)--60-70
Old Hwy 927 F58 (Bridge 121A)
Bridge Replacement, CCS/TWRCB
SWAP Funding = $300,000
HBP Funding = $1,200,000

FY 2027
STP-S-C070(79)--5E-70
Old Hwy 927 F58
PCC Reconstruction
FM Funding = $1,517,174
STBG Funding = $3,482,826

FY 2031
BRS-C070()--60-70
Vail Avenue Y26 (Bridge 112)
Bridge Replacement, CCS/PPCB
SWAP Funding = $410,000
HBP Funding = $1,640,000

FY 2030
L-(MO-8)--73-70
Noble Avenue
HMA Grade & Replace
Local Funding = $2,700,000

FY 2030
BROS-C070(77)--8J-70
115th Street (Bridge 152)
Bridge Replacement, PPCB
HBP Funding = $1,500,000

FY 2030
FM-C070()--55-70
121st Street F62
PCC Grade & Replace
FM Funding = $2,250,000

FY 2031
BROS-C070()--8J-70
Vine Avenue (Bridge 110)
Bridge Replacement, CCS/TWRCB
HBP Funding = $700,000

FY 2029
BROS-C070(75)--5F-70
Bancroft Avenue (Bridge 237)
Bridge Replacement, CCS/TWRCB
HBP Funding = $750,000

FY 2027
FM-C070(78)--55-70
230th Street G28
PCC Reconstruction
FM Funding = $2,000,000

FY 2027
L-(CUL27)--73-70
Various Locations
Culvert Replacements/Repair
Local Funding = $900,000

FY 2028
L-(CUL28)--73-70
Various Locations
Culvert Replacements/Repair
Local Funding = $100,000

FY 2029
L-(CUL29)--73-70
Various Locations
Culvert Replacements/Repair
Local Funding = $100,000

FY 2030
L-(CUL30)--73-70
Various Locations
Culvert Replacements/Repair
Local Funding = $100,000

FY 2031
L-(CUL31)--73-70
Various Locations
Culvert Replacements/Repair
Local Funding = $100,000

FY 2028
FM-C070()--55-70
Sweetland Road
PCC Reconstruction
Local Funding = $1,700,000
FM Funding = $1,700,000

FY 2027
BROS-C070(80)--5F-70
180th Street (Bridge 214)
Bridge Replacement, TWRCB
HBP Funding = $1,850,000

FY 2029
STP-S-C070()--5E-70
N. Mulberry Road X54 &
155th Street X54/F70
HMA Overlay w/Widening
FM Funding = $1,000,000
STBG Funding = $4,000,000

MAP SCALE
0 1 2
MILES

LEGEND
BRIDGE
CULVERT
GRADING
HMA PAVING
HMA OVERLAY
PCC PAVING
PCC OVERLAY
OTHER TYPES

MUSCATINE COUNTY
FIVE YEAR CONSTRUCTION PROGRAM
FY 2027 TO FY 2031

March 30, 2026

Agenda Packet

Item #6

Muscatine County Board of Supervisors
Monday, March 23, 2026

The Muscatine County Board of Supervisors met in regular session at 9:00 A.M. with Chick, Kirchner, Mather, Sauer and Sorensen present. Chairperson Chick presiding.

On a motion by Sorensen, second by Sauer, the agenda was approved as presented. Ayes: All.

On a motion by Mather, second by Sorensen, the Board approved Resolution #03-23-26-01 Suspending the Collection of Taxes. Roll call vote: Ayes: All.

RESOLUTION #03-23-26-01
SUSPENDING THE COLLECTION OF TAXES

WHEREAS, notice from the Director of Human Services has been received regarding the eligibility of David Bowers, Muscatine, Iowa, (the 'recipient') for medical and facility care; and

WHEREAS, as such recipient of such assistance is deemed to be unable to contribute to the public revenue pursuant to Section 427.9, Code of Iowa; and

WHEREAS, the recipient is the owner of property described as follows:

Address:	1541 West Acre Dr., Muscatine, IA 52761
Parcel No:	0834176028
Legal Description:	34-77-2W Lot 35 Beach West Acres 4 PL 217

NOW, THEREFORE, BE IT HEREBY RESOLVED by the Muscatine County Board of Supervisors:

1. That the County Treasurer is hereby ordered to suspend the collection of all taxes, including special assessments, rates or charges, interest, fees and costs for the current year and those unpaid from prior years. As long as the petitioner is authorized by DHS no interest accrues during suspension, but payments can be made.
2. If the parcel is sold, passes by bequest or inheritance to any person other than the spouse or minor child of the petitioner, all taxes and special assessments become due and payable by the next semi-annual installment date. Interest at the rate of 1 ½% per month will start on the next delinquency date after the suspended taxes become due.

Passed and approved this 23rd day of March, 2026.

ATTEST:

/s/Tibe Vander Linden
Muscatine County Auditor

/s/Danny Chick, Chairperson
Muscatine County Board of Supervisors

On a motion by Sorensen, second by Kirchner, approved the proposed special events schedule for Ardon Creek Vineyard & Winery. Ayes: All.

County Development Director Eric Furnas stated construction groundbreaking for the Engineering and Zoning building began last week.

On a motion by Sorensen, second by Sauer, the Board approved a renewal application for a Special Class "C" Native Retail Wine License, Beer and Outdoor Service Permit for Ardon Creek Vineyard & Winery, 2399 Independence Avenue, Letts, Iowa. Ayes: All.

On a motion by Sauer, second by Sorensen, the Board approved an ownership amendment application for a Class "E" Retail Alcohol License (LE) for Casey's General Stores, Inc., 1334 Highway 22, Nichols, Iowa. Ayes: All.

On a motion by Sorensen, second by Kirchner, the Board approved a renewal application for a Class "C" Retail Alcohol License (LC) and Outdoor Service Permit for West Liberty Golf & Country Club, 1248 Country Heights Lane, West Liberty, Iowa. Ayes: All.

On a motion by Mather, second by Sorensen, the Board approved a renewal application for a Special Class "C" Retail Alcohol License and Outdoor Service Permit for Muscatine Municipal Golf Course, 1820 Highway 38, Muscatine, Iowa. Ayes: All.

On a motion by Sauer, second by Sorensen, the Board approved the minutes of the March 16, 2026 regular meeting. Ayes: All.

Correspondence:

Sauer received a call from a resident regarding property taxes.

All Supervisors received an email from a citizen regarding the suspension of collection of taxes per agenda item #3 of today's meeting.

All Supervisors received an email regarding an open house to be held by Pearl Button Solar on March 26, 2026, 6:00 p.m. to 8:00 p.m. at 821 5th Street, Durant, Iowa.

Committee & Meeting Reports:

Kirchner attended a Muscatine County Fair Board meeting on March 19, 2026.

Sorensen attended an Emergency Management group meeting on March 18, 2026.

Sorensen attended a Muscatine Center for Social Action (MCSA) 21-unit open house on March 19, 2026.

Sauer attended Muscatine County Conservation Board meeting on March 16, 2026 and a Muscatine County Conservation Board Special meeting on March 20, 2026 for change orders for the maintenance building remodel.

Sauer attended a Riverbend Transit meeting on March 18, 2026.

On a motion by Sorensen, second by Sauer, the Board approved to accept the March 2026 payroll claims. Ayes: All.

County Engineer Bryan Horesowsky updated the Board on secondary road projects.

County Treasurer Amy Zybarth reminded property tax owners that the second half of property taxes are due March 31, 2026. The payments can be made online, in person, by mail or left in the drop box at the front of the Administration Building.

The meeting was adjourned at 9:18 A.M.

ATTEST:

Tibe Vander Linden County Auditor	Danny Chick, Chairperson Board of Supervisors

Muscatine County Board of Supervisors
Monday, March 23, 2026

The Muscatine County Board of Supervisors met in special session at 10:00 A.M. with Chick, Kirchner, Mather, Sorensen and Sauer present. Chairperson Chick presiding.

On a motion by Sorensen, second by Sauer, the agenda was approved as presented. Ayes: All.

A Public Hearing was called to order by Chairperson Chick at 10:01 A.M. on the FY26/27 Muscatine County Proposed Property Tax Levy.

Budget and Administrative Services Director Kala Naber presented the Public Hearing Notice with the current year certified property tax of $16,762,364.00 and the proposed budget for FY26/27 of $17,052,414.00. Naber reviewed a graph of the services the county provides and reviewed each service area. Naber reviewed the county expenditures for secondary roads and the jail and how each expenditure is funded. Mather stated the federal and other county reimbursements the county receives for housing federal or other county inmates help to defray some of the costs for our jail. Naber presented slides showing a 10% and 5% assumed property value increase comparison, which showed a county urban and rural tax decrease for the 5% example.

Naber reviewed a tool on the county website for citizens to estimate property taxes per tax parcel. Naber stated citizens can input their assessed property value for 2024 and 2025 (found on the MAGIC website) and proposed tax rates for school, county and city to estimate property taxes. Naber stated the rollback (state limitation on growth assessment) is included in the estimator with the FY26/27 rollback having been set by the state at 44,535% and current year is set at 47,432%.

Steven Dierckx, 1711 Vail Avenue, Muscatine, stated he expected a larger public attendance at the meeting. Dierckx asked if budget items are ever turned down and if anything ever changes with the budgets at a public hearing. Mather stated the budget process starts in January with four meetings to evaluate the department and outside agency budget requests. Sorensen reviewed the current 1.9% increase in property valuation with a 12% commercial property valuation, due to the equalization percentage increase ordered by the state. Dierckx asked questions regarding the districts listed on his tax statement and the difference between general basic, general supplemental budgets and debt service. The Board held discussions to review the questions presented. Dierckx recommended a DOGE volunteer committee for the county to screen budget items stating Muscatine has the highest property taxes and it needs to be a median rate. Dierckx asked how the property tax reform bill is going. Sorensen explained the current rollback of taxes and the proposed tax bill. Dierckx stated he feels we need to elect board members who can cut spending.

Charles Lorensen, 1808 Briarwood Lane, Muscatine, stated he thinks he will move out of the county and never come back. Lorensen questioned the current tax rate vs. the effective tax rate on the budget year statement. Naber reviewed the budget year statement. Lorensen stated the tax process is confusing and stated he will be attending the city and school public hearing meetings, where in the past they only give three minutes to speak. Lorensen questioned the updates at Deep Lake Park and asked if the money spent on improvements has been a good

thing. Chick stated the dollars made are hard to capture. Sorensen reviewed the funding that was used for the improvements. Lorensen stated communication from the county and other entities is bad. Sorensen stated the county spends approximately $38,000 annually with required publishing in the two legal newspapers. The Board held discussion stating the state laws have imposed some costs to the county and all notices are published on the county website and newspapers (Muscatine Journal and Wilton/Durant Advocate). Lorensen stated Muscatine Power & Water local cable station does not post the meeting agenda.

Emergency Management Director Chris Jasper stated the increase for Emergency Management/911 Communications is due to new legislation passed last year which changed for the state to take additional surcharge funding. Jasper stated cell phone service charges previously allowed 60 cents for every dollar charged on a user's bill to be given to emergency management and now the state is sending a bill each quarter for providing 911 services. Therefore, increases in tax dollars are necessary to fund radio dispatch equipment and 911 dispatchers.

Sorensen reviewed the general basic and general supplemental budget and the restrictions and obligations the state has set on what the county can fund. Sorensen stated the reimbursement fees the county receives from the state for required services do not cover the cost of the services. Sorensen stated he has a conversation each year with legislators on how to fix this problem.

Peggy Gordon, 802 Wier Street, Muscatine, stated there is a legislative bill going through the funnel that will charge $5 per posting for electronic agendas and postings for government entities and first-class mail may increase up to $1.00.

Mather reviewed the Board has cut funding of $50,000 to $60,000 to outside agencies, such as libraries. Mather stated matching funding to the agencies has been presented to some.

Sauer stated Muscatine County is fortunate with the industry, corporations and jobs we have in our community compared to other river towns in Iowa which lack industrialization. Sauer stated citizens should be thankful for what has been built and maintained here.

On a motion by Sorensen, second by Mather, the public hearing was closed at 10:57 A.M. Roll call vote: Ayes: All.

The meeting was adjourned at 10:57 A.M.

ATTEST:

Tibe Vander Linden	Danny Chick, Chairperson
County Auditor	Board of Supervisors

March 30, 2026

Agenda Packet

Item #9c

RESOLUTION #03-30-26-02

RESOLUTION TAKING ACTION TO SET A PUBLIC HEARING AND ADDITIONAL ACTION ON PROPOSAL TO ENTER INTO GENERAL OBLIGATION LOAN AGREEMENT AND TO BORROW MONEY THEREUNDER TO FACILITATE THE REPURPOSING OF PRIOR BOND PROCEEDS

WHEREAS, the Board of Supervisors (the "Board") of Muscatine County, Iowa (the "County"), proposes to enter into a General Obligation Loan Agreement (the "Loan Agreement") and to borrow money thereunder in a principal amount not to exceed $1,025,000 pursuant to the provisions of Section 331.402 and Section 331.441(2)(b)(5) of the Code of Iowa for the purpose of paying the costs, to that extent, of: (a) renovating the Deep Lakes Park Maintenance Facility ($100,000; (b) undertaking general physical plant maintenance and repairs to County facilities ($200,000); (c) undertaking repairs to the Community Services Building ($275,000); and (d) improving the County geothermal field for heating and cooling County buildings ($450,000) (the "Projects"), and it is now necessary to fix a date of meeting of the Board of Supervisors at which it is proposed to take action to enter into the Loan Agreement and to give notice thereof as required by such law; and

WHEREAS, in lieu of entering into an additional credit facility, the Board intends to use the borrowing authority relative to the Loan Agreement to repurpose proceeds remaining from the prior issuance of the County's General Obligation Levee Improvements Note, Series 2022 to pay costs of the Projects;

NOW, THEREFORE, Be It Resolved by the Board of Supervisors of Muscatine County, Iowa, as follows:

Section 1. This Board will meet on April 13, 2026, at the Muscatine County Administration Building, Muscatine, Iowa, at 9 o'clock a.m., at which time and place the hearing will be held and proceedings will be instituted and action taken to enter into the Loan Agreement to facilitate the repurposing of prior bond proceeds.

Section 2. The County Auditor is hereby directed to give notice of the proposed action on the Loan Agreement and setting forth the amount and purpose thereof, the time when and place where the said meeting will be held by publication at least once and not less than 4 and not more than 20 days before the date selected for the meeting, in a legal newspaper which has a general circulation in the County. The notice shall be in substantially the following form:

NOTICE OF PUBLIC HEARING ON PROPOSED ACTION TO INSTITUTE PROCEEDINGS TO ENTER INTO A LOAN AGREEMENT AND TO BORROW MONEY THEREUNDER TO FACILITATE THE REPURPOSING OF PRIOR BOND PROCEEDS IN A PRINCIPAL AMOUNT NOT TO EXCEED $1,025,000

(GENERAL OBLIGATION)

The Board of Supervisors of Muscatine County, Iowa (the "County"), will meet on April 13, 2026, at the Muscatine County Administration Building, Muscatine, Iowa, at 9 o'clock a.m., for the purpose of instituting proceedings and taking action on a proposal to enter into a loan agreement (the "Loan Agreement") and to borrow money thereunder to facilitate the repurposing of prior bond proceeds in a principal amount not to exceed $1,025,000 for the purpose of paying the costs, to that extent, of: (a) renovating the Deep Lakes Park Maintenance Facility ($100,000); (b) undertaking general physical maintenance and repairs to County facilities ($200,000); (c) undertaking repairs to the Community Services Building ($275,000); and (d) improving the geothermal field for heating and cooling County buildings ($450,000).

The Loan Agreement is proposed to be entered into, and bonds will be issued thereunder, pursuant to authority contained in Section 331.402 of the Code of Iowa. To the extent and additional credit facility were to be undertaken, the Loan Agreement would constitute a general obligation of the County.

The County intends to use its borrowing authority under the Loan Agreement to repurpose a portion of the proceeds of a prior issuance of General Obligation Levee Improvements Note, Series 2022, dated July 21, 2022. As a result, there will be no annual increase in property taxes on a residential property with an actual valuation of one hundred thousand dollars resulting from the County entering into the Loan Agreement.

At that time and place, oral or written objections may be filed or made to the proposal to enter into the Loan Agreement to facilitate the repurposing of prior bond proceeds. After receiving objections, the County may determine to enter into the Loan Agreement, in which case, the decision will be final unless appealed to the District Court within fifteen (15) days thereafter.

By order of the Board of Supervisors of Muscatine County, Iowa.

Tibe Vander Linden
County Auditor

Section 3. All resolutions or parts of resolutions in conflict herewith are hereby repealed to the extent of such conflict.

Section 4. This resolution shall be in full force and effect immediately after its adoption and approval, as provided by law.

PASSED AND APPROVED this 30th day of March, 2023.

ATTEST:

Tibe Vander Linden Muscatine County Auditor	Dann Chick, Chairperson Muscatine County Board of Supervisors