Board of Education Regular Meeting
Monday, March 9, 2020 7:00 PM

Board of Education Room
302 W. Plum
Doniphan, NE 68832

Agenda

1. Call to Order
2. Determination of Legality of the Regular Meeting and Roll Call
3. Consent Agenda
    1. Approval or Amendment of Agenda
    2. Approval of the Minutes
    3. Approval of General Fund claims totaling $63,588.94 , Lunch Fund claims totaling $13,595.22 , Special Building Fund claims totaling $33,567.50 , and QCPUF Fund claims totaling $0 ;
4. Open Forum
5. Principal & Athletic Director Reports-
6. Old Business
7. Superintendent's Report
8. New Business
    1. Superintendent contract extension and amendment
    2. Adopt school calendar for 2020-21 school year
    3. Classified staff wages
    4. Option enrollment
    5. Classified retirement package
    6. Teacher resignations
    7. Principal contract
    8. Teacher Contract
9. Statistical (Financial) Report
10. Next Meeting Date
11. Adjournment

Notice of legality- Determination of Legality of the Special Hearing and Roll Call – President Vincent acknowledges that the notice of the hearing was given in advance by publication in accordance with the Board approved method for giving notice of meetings or hearings. Notice of this hearing was given in advance to all members of the Board of Education. The availability of the agenda was communicated in the publicized notice and a current copy of the Agenda was maintained as stated in the publicized notice. All proceedings of the Board of Education, except as may be hereinafter noted, were taken while the convened meeting or hearing is open to the attendance of the public.

Doniphan-Trumbull Public School
February School Board Meeting

Date: March 9, 2020
Regular Board Meeting 7:00 P.M.
Location: 302 W. Plum St., Board of Education Room
To: Board of Education Members and General Public

Agenda: Regular Meeting
From: Stan Hendricks, Superintendent

1. Call Regular Meeting to Order;

2 Determination of Legality of the Regular Meeting and Roll Call

Determination of Legality. President Vincent acknowledges that the notice of the meeting was given in advance by publication in accordance with the Board approved method for giving notice of meetings. Notice of this meeting was given in advance to all members of the Board of Education. The availability of the agenda was communicated in the publicized notice and a current copy of the Agenda was maintained as stated in the publicized notice. All proceedings of the Board of Education, except as may be hereinafter noted, will be taken while the convened meeting is open to the attendance of the public. Please call the Roll: **Attached: Notice of Legality.**

Brent Rainforth	Present. Absent	Chris Sullivan.	Present, Absent
Steph Roach	Present, Absent	Zach Van Diest	Present, Absent
John Schultz	Present, Absent	Craig Vincent	Present, Absent

3. **Consent Agenda**

Recommended Action: Approval of consent agenda as presented.
Note: Items on the consent agenda are considered routine and will be acted under one motion. There will be no separate discussion of these items at the meeting unless a Board member requests an item to be removed from the agenda for separate action.

3.1. **Approval or Amendment of Agenda**

There have been no additional items added to the agenda since the agenda was distributed to the Board of Education. **Attached: March 9, 2020 BOE Agenda**

3.2. **Approval of the Minutes**

Attached: February 10, 2020 regular board meeting minutes.

3.3. **Approval of: General Fund claims totaling $63,588.94; Food Service claims totaling $13,595.22; Building Fund Claims totaling $33,567.50; Depreciation Fund totaling $0 and QCPUF claims totaling $0.**

Attached: February 2020 Claims

Brent Rainforth	Yes	No	Chris Sullivan.	Yes	No
Steph Roach	Yes	No	Zach Van Diest	Yes	No
John Schultz	Yes	No	Craig Vincent	Yes	No

4. Open Forum

5. **Principal Report's and presentations**
   a. Mr. Engel
   b. Mrs. Niles
   c. Mr. Lavaley
   d. Mr. Breckner

6. Old Business and Reports

7. Superintendent Report Attached: Superintendent report March 9, 2020

8. **New Business: Take all necessary discussion and/or action**

8.1 Superintendent contract extension and amendment
Recommended motion: Extend superintendent contract for 2 years through June 30, 2022 and amend annual salary to $144,200 for the 2020-21 school year.

Note: proposed contract and superintendent transparency act worksheet have been posted since March 4 on school website.

Brent Rainforth	Yes	No	Chris Sullivan.	Yes	No
Steph Roach	Yes	No	Zach Van Diest	Yes	No
John Schultz	Yes	No	Craig Vincent	Yes	No

8.2 Adopt school calendar for 2020-21 school year
Recommended motion: Approve 2020-21 school calendar as presented

Brent Rainforth	Yes	No	Chris Sullivan	Yes	No
Steph Roach	Yes	No	Zach Van Diest	Yes	No
John Schultz	Yes	No	Craig Vincent	Yes	No

8.3 Classified staff wages

Recommended motion: Approve 3% wage increase to classified staff positions.

Brent Rainforth	Yes	No	Chris Sullivan	Yes	No
Steph Roach	Yes	No	Zach Van Diest	Yes	No
John Schultz	Yes	No	Craig Vincent	Yes	No

8.4 Option enrollment 2020-21

Rationale: Recommend no classes closed to option enrollment due to class size
Rationale: special education program closed to option enrollment due to program size
Rationale: Speech Language Therapy only open to option enrollment

Recommended motion: Approve option enrollment caps as presented.

Brent Rainforth	Yes	No	Chris Sullivan	Yes	No
Steph Roach	Yes	No	Zach Van Diest	Yes	No
John Schultz	Yes	No	Craig Vincent	Yes	No

8.5. Classified retirement

Recommended motion: Approve purchase of one year employee/spouse health insurance for Gretchen Beck.

Brent Rainforth	Yes	No	Chris Sullivan	Yes	No
Steph Roach	Yes	No	Zach Van Diest	Yes	No
John Schultz	Yes	No	Craig Vincent	Yes	No

8.6 Employee resignations

Information only: Resignations at end of 2010-20 school year: Erik Ausk, social studies teacher; Kelly Armes, FACS; Caleb Goecken, mathematics; Jason Lavaley, secondary principal. Classified resignation effective March 6, 2020: Nancy Griffiths, cook.

Brent Rainforth	Yes	No	Chris Sullivan	Yes	No
Steph Roach	Yes	No	Zach Van Diest	Yes	No
John Schultz	Yes	No	Craig Vincent	Yes	No

8.7 Principal Contract

Recommended motion: Offer principal contract for the 2020-21 school year to _____ at a salary of $97,375.

8.8 Teacher Contract

Recommended motion: Approve teacher contract to :

9. Financials **Attached: February 2020 financials.**

10. Next Board Meeting- Monday, April 13, 2020 at 7 p.m.

11. President Vincent adjourned the meeting at _____ P.M.

Board of Education Regular Meeting

Monday, February 10, 2020 7:30 PM Central

Board of Education Room
302 W. Plum
Doniphan, NE 68832

Brent Rainforth:	Present
Steph Roach:	Present
John Schultz:	Present
Chris Sullivan:	Present
Zach VanDiest:	Present
Mr. Craig Vincent:	Present

Present: 6.

1. Call to Order

2. Determination of Legality of the Regular Meeting and Roll Call

3. Consent Agenda

3.1. Approval or Amendment of Agenda

3.2. Approval of the Minutes

3.3. Approval of General Fund claims totaling $63,959.65 , Lunch Fund claims totaling $17,354.01 , Special Building Fund claims totaling $11,162.50 , and QCPUF Fund claims totaling $0 ;

Motion to approve General Fund claims totaling $63,959.65 , Lunch Fund claims totaling $17,354.01 , Special Building Fund claims totaling $11,162.50 , and QCPUF Fund claims totaling $0 Passed with a motion by Brent Rainforth and a second by Mr. Craig Vincent.
Brent Rainforth: Yea, Steph Roach: Yea, John Schultz: Yea, Chris Sullivan: Yea, Zach VanDiest: Yea, Mr. Craig Vincent: Yea
Yea: 6, Nay: 0

4. Open Forum

5. Principal & Athletic Director Reports-
Mr. Lavaley, Mr. Engel, Ms. Niles and Mr. Breckener gave an update on all current events and activites

6. Old Business

6.1. Reports

6.1.1. COMMITTEE REPORTS

7. Superintendent’s Report

8. New Business

8.1. Assistant golf coach

Approve adding an assistant golf coach for 2020 for one year only if participation number is over 15 Passed with a motion by John Schultz and a second by Chris Sullivan.
Brent Rainforth: Yea, Steph Roach: Yea, John Schultz: Yea, Chris Sullivan: Yea, Zach VanDiest: Yea, Mr. Craig Vincent: Yea
Yea: 6, Nay: 0

8.2. Storage facility proposal

Approval of Storage Facility engineered plans to request public bids for construction Passed with a motion by Chris Sullivan and a second by Zach VanDiest.
Brent Rainforth: Yea, Steph Roach: Yea, John Schultz: Yea, Chris Sullivan: Yea, Zach VanDiest: Yea, Mr. Craig Vincent: Yea
Yea: 6, Nay: 0

8.3. Kayl Heating and Air

Approve contracting with Kayl Heating and Air for facility customized scheduled service program for an annual rate of $22,400 Passed with a motion by Brent Rainforth and a second by Steph Roach.
Brent Rainforth: Yea, Steph Roach: Yea, John Schultz: Yea, Chris Sullivan: Yea, Zach VanDiest: Yea, Mr. Craig Vincent: Yea
Yea: 6, Nay: 0

8.4. Approve Control Management Inc.

Contract with Control Management Inc. to install their control system integration process for HVAC control at completed cost of $51,250 Passed with a motion by Chris Sullivan and a second by John Schultz.
Brent Rainforth: Yea, Steph Roach: Yea, John Schultz: Yea, Chris Sullivan: Yea, Zach VanDiest: Yea, Mr. Craig Vincent: Yea
Yea: 6, Nay: 0

8.5. Gym Floor Refinishing

Approve bid from Midwest Floors to refurbish gym floor at a contracted cost of $16,850 Passed with a motion by Mr. Craig Vincent and a second by Zach VanDiest.
Brent Rainforth: Yea, Steph Roach: Yea, John Schultz: Yea, Chris Sullivan: Yea, Zach VanDiest: Yea, Mr. Craig Vincent: Yea
Yea: 6, Nay: 0

8.6. Principal's Salaries 2020-21

Approve 3% total package increases for all three principals for 2020-21 school year Passed with a motion by Brent Rainforth and a second by Steph Roach.
Brent Rainforth: Yea, Steph Roach: Yea, John Schultz: Yea, Chris Sullivan: Yea, Zach VanDiest: Yea, Mr. Craig Vincent: Yea
Yea: 6, Nay: 0

8.7. Discuss Operating procedure for placing messages on electronic sign

8.8. Superintendent Evaluation Review

8.9. Superintendent contract discussion

8.10. Staffing announcement

9. Statistical (Financial) Report

9.1. Reports

9.1.1. Doniphan-Trumbull School's Treasurer's Report

10. Next Meeting Date
Next board meeting March 9, 2020

11. Adjournment
Meeting Adjourned at 9:30pm

DONIPHAN-TRUMBULL PUBLIC SCHOOL

FEBRUARY 1, 2020 to FEBRUARY 28 ,2020

03/09/2020 Board Meeting

GENERAL FUND

			MTD	YTD
Beginning Balance			$2,885,366.77	
Investments (CD's)				$200,000.00
NSDLAF		$ 165,143.61	**$175.35**	**$165,318.96**
Receipts			$978,044.56	
Disbursements	Lst Mo Clai	$74,299.99	$616,348.23	
	Lst Mo Pay	$542,048.24		
		$616,348.23		
Adjustments	adj			
		Adjusted Exp		$0.00
Ending Balance			**$3,247,238.45**	

DEPRECIATION FUND

	MTD	YTD
Beginning Balance	$161,375.93	
Investments (CD)	$0.00	$0.00
Adjusted Begin Bal	**$161,375.93**	**$0.00**
Receipts		
Interest	$12.38	
Adjusted Receipts	$12.38	$0.00
Disbursements		
Ending Balance	**$161,388.31**	**$0.00**

EMPLOYEE BENEFIT FUND

	MTD	YTD
Beginning Balance	$30,398.70	
Receipts	$2.33	
Disbursements	$0.00	$0.00
Ending Balance	**$30,401.03**	**$0.00**

BUILDING FUND	MTD	YTD
Beginning Balance	$2,892,497.24	
Receipts	$79,467.30	
Disbursements	$11,162.50	
Ending Balance	**$2,960,802.04**	**$0.00**

DONIPHAN-TRUMBULL PUBLIC SCHOOL
FEBRUARY 1, 2020 to FEBRUARY 28 ,2020
03/09/2020 Board Meeting

STUDENT FEES FUND	7 MTD	YTD
Beginning Balance	$1,191.43	
Receipts		
Disbursements	$0.00	
Ending Balance	**$1,191.43**	**$0.00**

GRAND TOTAL ALL FUNDS

QCPUF FUND	MTD	YTD
Beginning Balance	$414,351.91	
Receipts	$27,089.74	
Check Int		
Disbursements		
Ending Balance	**$441,441.65**	**$0.00**

IMPRESS FUND	MTD	YTD
Beginning Balance	$3,902.06	
Receipts	$1,091.47	
Expenditures	$615.55	
Ending Balance	**$4,377.98**	**$0.00**

FOOD SERVICE FUND

			MTD	YTD
Beginning Balance			$51,204.92	
Audit Adjustment			$0.00	$0.00
Adjusted Beginning Balance			$51,204.92	$0.00
Receipts			$28,481.13	
Disbursements	Lst Mo Clai	$17,354.01	$29,687.52	
	Lst Mo Pay	$12,333.51		
		$29,687.52		
	Adj-VOID CK			
Ending Balance			**$49,998.53**	**$0.00**

HIGH SCHOOL ACTIVITY FUNDS

	MTD	YTD
Beginning Balance	$70,229.64	
Receipts	$30,404.95	
Disbursements	$30,654.91	
Ending Balance	**$69,979.68**	**$0.00**

ELEMENTRY ACTIVITY FUNDS

	MTD	YTD
Beginning Balance	$13,619.91	
Receipts	$1,049.70	
Disbursements	$1,056.39	
Ending Balance	**$13,613.22**	**$0.00**

Account Number	Account Description	Current Month	Year to Date	Budget	Budget Balance	% of Budget Spent
01	GENERAL FUND					
1100	REGULAR INSTRUCTIONAL PROGRAMS	$247,538.23	$1,525,542.61	$3,091,120.00	$1,565,577.39	49.35
1150	ENGLISH LANGUAGE LEARNERS	$0.00	$661.25	$0.00	($661.25)	0.00
1160	POVERTY PROGRAMS	$280.21	$1,666.11	$12,940.00	$11,273.89	12.88
1190	EARLY CHILDHOOD ED	$6,318.03	$41,078.35	$74,590.00	$33,511.65	55.07
1200	SPED SCHOOL AGE	$67,838.79	$428,945.94	$812,340.00	$383,394.06	52.80
1300	SUMMER SCHOOL	$0.00	$0.00	$0.00	$0.00	0.00
2120	GUIDANCE SERVICES	$15,260.13	$92,079.19	$195,843.00	$103,763.81	47.02
2130	HEALTH SERVICES	$3,043.82	$21,186.60	$33,300.00	$12,113.40	63.62
2140	PSYCHOLOGICAL SERVICES	$8,424.98	$46,231.00	$0.00	($46,231.00)	0.00
2141	PSY SERV;SPED SCH AGE	$0.00	$1,091.58	$80,510.00	$79,418.42	1.36
2151	SPEECH THERAPY-SCH AGE	$95.88	$1,486.38	$96,060.00	$94,573.62	1.55
2161	OT-SPED SCH AGE	$1,563.27	$6,631.85	$24,000.00	$17,368.15	27.63
2162	OT-SPED AGE 3-5	$571.10	$2,971.20	$0.00	($2,971.20)	0.00
2163	OT-SPED BIRTH-AGE 2	$0.00	$384.85	$0.00	($384.85)	0.00
2170	PT - ALL CONDITIONS	$0.00	$352.00	$0.00	($352.00)	0.00
2171	PT-SPED SCHOOL AGE	$512.00	$2,808.08	$24,000.00	$21,191.92	11.70
2172	PT - AGE 3-5	$552.24	$2,817.28	$0.00	($2,817.28)	0.00
2173	PT- BIRTH - AGE 2	$248.08	$1,405.28	$0.00	($1,405.28)	0.00
2190	OTHER PUPIL SUPPORT SERV	$26,702.57	$149,209.21	$287,160.00	$137,950.79	51.96
2211	REGULAR ED IN-SERVICE	$0.00	$2,583.50	$1,700.00	($883.50)	151.97
2212	INST STAFF TRNG AND CURR DEV	$0.00	$0.00	$0.00	$0.00	0.00
2213	INSTRUCTIONAL STAFF TRAINING	$0.00	$130.00	$12,160.00	$12,030.00	1.07
2220	LIBRARY/MEDIA	$8,417.37	$46,887.65	$101,010.00	$54,122.35	46.42
2230	INSTRUCTION RELATED TECH ETC.	$3,136.51	$19,377.82	$0.00	($19,377.82)	0.00
2310	GENERAL/BOARD ADMINISTRATION	$298.86	$6,493.88	$27,300.00	$20,806.12	23.79
2320	OFFICE OF THE SUPERINTENDENT	$18,706.73	$111,673.35	$239,140.00	$127,466.65	46.70
2330	LEGAL SERVICE	$443.74	$593.74	$8,000.00	$7,406.26	7.42
2410	OFFICE OF THE PRINCIPAL	$30,297.42	$179,822.32	$378,735.00	$198,912.68	47.48
2510	FISCAL SERVICES	$13,847.27	$87,988.65	$182,400.00	$94,411.35	48.24
2580	ADMIN. TECHNOLOGY SERVICES	$0.00	$0.00	$7,400.00	$7,400.00	0.00
2610	BUILDINGS/SITES OPERATIONS	$37,896.43	$195,560.19	$458,976.00	$263,415.81	42.61
2620	BUILDINGS/SITES MAINTENANCE	$6,181.13	$64,978.97	$236,470.00	$171,491.03	27.48
2630	CARE&UPKEEP OF GROUNDS	$0.00	$8,531.36	$0.00	($8,531.36)	0.00
2650	VEHICLE - NOT BUSES	$1,634.83	$6,734.77	$32,769.00	$26,034.23	20.55
2660	SAFETY & SECURITY	$0.00	$793.59	$8,000.00	$7,206.41	9.92
2710	REGULAR PUPIL TRANSPORTATION	$17,538.18	$104,845.81	$241,800.00	$136,954.19	43.36
2712	SCHOOL AGE SPEC ED TRANSPORT	$829.73	$4,532.80	$15,552.00	$11,019.20	29.15
2713	BELOW AGE 5 PUPIL TRANSP-sped	$1,698.98	$8,103.28	$16,460.00	$8,356.72	49.23
2900	OTHER SUPPORT SERVICES	$910.70	$2,933.58	$0.00	($2,933.58)	0.00
3535	HIGH ABLI. LEARNER	$0.00	$0.00	$5,989.00	$5,989.00	0.00
3540	NDE GRANT $$ AGE3-5	$0.00	$0.00	$0.00	$0.00	0.00
4300	TITLE V	$0.00	$0.00	$0.00	$0.00	0.00
4425	PRE SCHOOL FLEX FUNDING	$0.00	$0.00	$0.00	$0.00	0.00
6200	TITLE I CURRENT YEAR	$5,833.33	$35,572.41	$74,026.00	$38,453.59	48.05
6404	IDEA PART B BASE AGE 0-4	$6,567.02	$39,398.65	$108,054.00	$68,655.35	36.46
6406	IDEA PRESCHOOL SPED	$1,592.98	$8,212.60	$9,360.00	$1,147.40	87.74
6408	IDEA $$	$0.00	$0.00	$59,561.00	$59,561.00	0.00
6410	IDEA ENROLLMENT/POVERTY FLOW THRU	$5,990.99	$35,944.66	$0.00	($35,944.66)	0.00
6414	IDEA PART C BELOW AGE 3	$0.00	$0.00	$0.00	$0.00	0.00
6967	TITLE IV STUD. SUPPORT ACADEMIN ENR	$1,980.18	$5,940.55	$10,000.00	$4,059.45	59.41

Account Number	Account Description	Current Month	Year to Date	Budget	Budget Balance	% of Budget Spent
6992	REAP GRANT	$0.00	$0.00	$40,000.00	$40,000.00	0.00
8000	TRANSFERS	($4,871.24)	$934,266.16	$55,000.00	($879,266.16)	1,698.67
01	GENERAL FUND	$537,880.47	$4,238,449.05	$7,061,725.00	$2,823,275.95	60.02
02	**BUILDING AND SITES FUND**					
2515	BUILDING & SITES	$0.00	$65,743.30	$0.00	($65,743.30)	0.00
2620	BUILDINGS/SITES MAINTENANCE	$11,162.50	$99,169.22	$3,642,642.00	$3,543,472.78	2.72
4600	SITE IMPROVEMENTS	$0.00	$2,500.00	$0.00	($2,500.00)	0.00
02	BUILDING AND SITES FUND	$11,162.50	$167,412.52	$3,642,642.00	$3,475,229.48	4.60
03	**DEPRECIATION FUND**					
2620	BUILDINGS/SITES MAINTENANCE	$0.00	$0.00	$148,126.00	$148,126.00	0.00
03	DEPRECIATION FUND	$0.00	$0.00	$148,126.00	$148,126.00	0.00
04	**EMPLOYEE BENEFIT FUND**					
1100	REGULAR INSTRUCTIONAL PROGRAMS	$0.00	$0.00	$30,377.00	$30,377.00	0.00
04	EMPLOYEE BENEFIT FUND	$0.00	$0.00	$30,377.00	$30,377.00	0.00
07	**STUDENT FEES FUND**					
2190	OTHER PUPIL SUPPORT SERV	$0.00	$0.00	$4,189.00	$4,189.00	0.00
07	STUDENT FEES FUND	$0.00	$0.00	$4,189.00	$4,189.00	0.00
08	**QUALIFIED CAPITAL PURPOSE FUND**					
2190	OTHER PUPIL SUPPORT SERV	$0.00	$0.00	$449,243.00	$449,243.00	0.00
5000	DEBT SERVICES	$0.00	$192,338.75	$0.00	($192,338.75)	0.00
08	QUALIFIED CAPITAL PURPOSE FUND	$0.00	$192,338.75	$449,243.00	$256,904.25	42.81
	Grand Total:	$549,042.97	$4,598,200.32	$11,336,302.00	$6,738,101.68	40.56

Account Number	Account Description	CURRENT MONTH	YEAR TO DATE	BUDGET	BUDGET BALANCE	% OF BUDGET
01 GENERAL FUND						
01 1100	PROPERTY TAXES	$0.00	$0.00	$5,676,110.00	$5,676,110.00	0.00
01 1100 001	LOCAL PROPERTY TAXES ADAMS CO	$88,288.62	$293,924.87	$0.00	($293,924.87)	0.00
01 1100 002	LOCAL PROPERTY TAXES HALL COUNTY	$466,541.98	$1,901,787.97	$0.00	($1,901,787.97)	0.00
01 1100 003	LOCAL PROPERTY TAXES HAMILTON COUNTY	$81,492.44	$320,020.13	$0.00	($320,020.13)	0.00
01 1100 004	LOCAL PROPERTY TAXES CLAY COUNTY	$135,051.44	$511,349.85	$0.00	($511,349.85)	0.00
1100 Local property tax		$771,374.48	$3,027,082.82	$5,676,110.00	$2,649,027.18	53.33
01 1115	CARLINE TAX	$0.00	$0.00	$1,000.00	$1,000.00	0.00
01 1115 001	CARLINE TAX ADAMS COUNTY	$0.00	$35.24	$0.00	($35.24)	0.00
01 1115 003	CARLINE TAX HAMILTON COUNTY	$0.00	$54.99	$0.00	($54.99)	0.00
01 1115 004	CARLINE TAX CLAY COUNTY	$0.00	$56.01	$0.00	($56.01)	0.00
1115 CARLINE TAX		$0.00	$146.24	$1,000.00	$853.76	14.62
01 1125	MOTOR VEHICLE TAXES	$0.00	$0.00	$275,000.00	$275,000.00	0.00
01 1125 001	MOTOR VEHICLE TAXES ADAMS COUNTY	$6,696.18	$22,180.97	$0.00	($22,180.97)	0.00
01 1125 002	MOTOR VEHICLE TAXES HALL COUNTY	$32,792.12	$129,961.74	$0.00	($129,961.74)	0.00
01 1125 003	MOTOR VEHICLE TAXES HAMILTON COUNTY	$2,467.99	$6,765.37	$0.00	($6,765.37)	0.00
01 1125 004	MOTOR VEHICLE TAXES CLAY COUNTY	$16,167.46	$23,831.72	$0.00	($23,831.72)	0.00
1125 MOTOR VEHICLE TAXES		$58,123.75	$182,739.80	$275,000.00	$92,260.20	66.45
01 1190	LICENSE & FEES	$0.00	$0.00	$1,000.00	$1,000.00	0.00
1190 LICENSE & FEES		$0.00	$0.00	$1,000.00	$1,000.00	0.00
01 1370	TUITION-OTHER DISTR(SPED PRE)	$1,435.00	$10,860.00	$8,000.00	($2,860.00)	135.75
1370 TUITION-OTHER DISTR(SPED PRE)		$1,435.00	$10,860.00	$8,000.00	($2,860.00)	135.75
01 1510	INTEREST ON INVESTME	$724.77	$7,455.18	$8,000.00	$544.82	93.19
1510 INTEREST on INVESTMENTS		$724.77	$7,455.18	$8,000.00	$544.82	93.19
01 1740	FEES(LAPTOPS)	$0.00	$7,335.00	$0.00	($7,335.00)	0.00
1740 FEES(LAPTOPS)		$0.00	$7,335.00	$0.00	($7,335.00)	0.00
01 1990	OTHER LOCAL RECEIPTS	$0.00	$0.00	$500.00	$500.00	0.00
1990 OTHER LOCAL RECEIPTS		$0.00	$0.00	$500.00	$500.00	0.00
01 2110	CO FINES & LICENSES	$0.00	$0.00	$20,000.00	$20,000.00	0.00
01 2110 001	COUNTY FINES AND LICENSE FEES ADAMS CO	$225.17	$1,136.76	$0.00	($1,136.76)	0.00
01 2110 002	COUNTY FINES AND LICENSE FEES HALL CO	$1,892.66	$10,207.56	$0.00	($10,207.56)	0.00
2110 COUNTY FINES AND LICENSE FEES		$2,117.83	$11,344.32	$20,000.00	$8,655.68	56.72
01 3110	STATE AID	$16,252.00	$97,512.00	$162,523.00	$65,011.00	60.00
3110 STATE AID		$16,252.00	$97,512.00	$162,523.00	$65,011.00	60.00
01 3120	SPECIAL ED PROGRAMS	$58,447.00	$175,341.00	$400,000.00	$224,659.00	43.84
3120 SPECIAL ED SCHOOL AGE		$58,447.00	$175,341.00	$400,000.00	$224,659.00	43.84
01 3125	SPECIAL ED TRANSPORT	$0.00	$0.00	$14,000.00	$14,000.00	0.00
3125 SCHOOL AGE SPECIAL ED TRANSPOR		$0.00	$0.00	$14,000.00	$14,000.00	0.00
01 3130	HOMESTEAD EXEMPT	$0.00	$0.00	$17,000.00	$17,000.00	0.00
3130 HOMESTEAD EXEMPTION		$0.00	$0.00	$17,000.00	$17,000.00	0.00
01 3131 002	TAX CREDIT HALL COUNTY	$4,762.40	$4,762.40	$0.00	($4,762.40)	0.00
3131 TAX CREDIT		$4,762.40	$4,762.40	$0.00	($4,762.40)	0.00
01 3180	Pro rate	$0.00	$0.00	$10,500.00	$10,500.00	0.00
01 3180 001	PRO-RATE MOTOR VEHICLE ADAMS COUNTY	$0.00	$381.01	$0.00	($381.01)	0.00
01 3180 002	PRO-RATE MOTOR VEHICLE HALL COUNTY	$0.00	$2,409.31	$0.00	($2,409.31)	0.00
01 3180 003	PRO-RATE MOTOR VEHICLE HAMILTON CO	$0.00	$233.44	$0.00	($233.44)	0.00
01 3180 004	PRO-RATE MOTOR VEHICLE CLAY COUNTY	$0.00	$18.96	$0.00	($18.96)	0.00
3180 PRO-RATE MOTOR VEHICLE		$0.00	$3,042.72	$10,500.00	$7,457.28	28.98

Account Number	Account Description	CURRENT MONTH	YEAR TO DATE	BUDGET	BUDGET BALANCE	% OF BUDGET
01 3200	STATE APPORTIONMENT	$0.00	$0.00	$60,000.00	$60,000.00	0.00
3200 STATE APPORTIONMENT		$0.00	$0.00	$60,000.00	$60,000.00	0.00
01 3300	IN LIEU OF SCHOOL LAND TAX	$0.00	$0.00	$30,000.00	$30,000.00	0.00
3300 IN LIEU OF SCHOOL LAND TAX		$0.00	$0.00	$30,000.00	$30,000.00	0.00
01 3400	STATE APPORTIONMENT	$66,038.56	$66,038.56	$0.00	($66,038.56)	0.00
3400 STATE APPORTIONMENT		$66,038.56	$66,038.56	$0.00	($66,038.56)	0.00
01 3512	DIST ED INCENTIVE	$1,857.57	$3,547.95	$1,700.00	($1,847.95)	208.70
3512 DIST ED INCENTIVE		$1,857.57	$3,547.95	$1,700.00	($1,847.95)	208.70
01 3535	PYMTS HIGH ABILITY LEARNERS	$0.00	$2,667.00	$2,880.00	$213.00	92.60
3535 PAYMTS HIGH ABILITY LEARNERS		$0.00	$2,667.00	$2,880.00	$213.00	92.60
01 4505	TITLE 1	$0.00	$0.00	$42,302.00	$42,302.00	0.00
4505 TITLE 1 PART A ESSA		$0.00	$0.00	$42,302.00	$42,302.00	0.00
01 4511	TITLE V PART B REAP	$0.00	$0.00	$40,000.00	$40,000.00	0.00
4511 TITLE V PART B REAP		$0.00	$0.00	$40,000.00	$40,000.00	0.00
01 4708	TITLE VI-D MEDICAID	$0.00	$0.00	$8,000.00	$8,000.00	0.00
4708 MEDICAID IN PUBLIC SCH		$0.00	$0.00	$8,000.00	$8,000.00	0.00
01 4709	MEDICAID ADMIN (MAAPS)	$0.00	$3,549.63	$2,000.00	($1,549.63)	177.48
4709 MEDICAID ADMIN (MAAPS)		$0.00	$3,549.63	$2,000.00	($1,549.63)	177.48
01 5690	OTHER NON-REVENUE RECEIPTS	$1,673.60	$27,559.40	$0.00	($27,559.40)	0.00
5690 OTHER NON-REVENUE RECEIPTS		$1,673.60	$27,559.40	$0.00	($27,559.40)	0.00
01 6200	TITLE I PART A	$0.00	$44,061.68	$0.00	($44,061.68)	0.00
6200 TITLE I PART A		$0.00	$44,061.68	$0.00	($44,061.68)	0.00
01 6310	TITLE II PART A	$0.00	$211.00	$0.00	($211.00)	0.00
6310 TITLE II PART A		$0.00	$211.00	$0.00	($211.00)	0.00
01 6404	IDEA BASE	$0.00	$52,529.00	$0.00	($52,529.00)	0.00
6404 IDEA BASE		$0.00	$52,529.00	$0.00	($52,529.00)	0.00
01 6406	IDEA PRESCHOOL	$0.00	$8,692.00	$8,743.00	$51.00	99.42
6406 IDEA PRESCHOOL		$0.00	$8,692.00	$8,743.00	$51.00	99.42
01 6408	TITLE IV REVENUE	$0.00	$0.00	$110,291.00	$110,291.00	0.00
6408 TITLE IV REVENUE		$0.00	$0.00	$110,291.00	$110,291.00	0.00
01 6410	IDEA ENROLLMENT/POVERTY	$0.00	$75,070.00	$0.00	($75,070.00)	0.00
6410 IDEA ENROLLMENT/POVERTY		$0.00	$75,070.00	$0.00	($75,070.00)	0.00
01 6992	REAP $	$0.00	$36,939.00	$0.00	($36,939.00)	0.00
6992 REAP $		$0.00	$36,939.00	$0.00	($36,939.00)	0.00
01 GENERAL FUND		$982,806.96	$3,848,486.70	$6,899,549.00	$3,051,062.30	55.78
02 BUILDING AND SITES FUND						
02 1100	LOCAL PROPERTY TAXES	$0.00	$0.00	$3,537,062.00	$3,537,062.00	0.00
02 1100 001	LOCAL PROPERTY TAXES ADAMS COUNTY	$9,047.10	$34,141.27	$0.00	($34,141.27)	0.00
02 1100 002	LOCAL PROPERTY TAXES HALL COUNTY	$47,665.58	$231,567.77	$0.00	($231,567.77)	0.00
02 1100 003	LOCAL PROPERTY TAXES HAMILTON CO	$8,252.39	$37,764.83	$0.00	($37,764.83)	0.00
02 1100 004	LOCAL PROPERTY TAXES CLAY COUNTY	$13,713.96	$58,942.08	$0.00	($58,942.08)	0.00
1100 Local property tax		$78,679.03	$362,415.95	$3,537,062.00	$3,174,646.05	10.25
02 1115	CARLINE TAX	$0.00	$0.00	$180.00	$180.00	0.00
02 1115 001	CARLINE TAX ADAMS COUNTY	$0.00	$4.73	$0.00	($4.73)	0.00
02 1115 003	CARLINE TAX HAMILTON COUNTY	$0.00	$7.38	$0.00	($7.38)	0.00
02 1115 004	CARLINE TAX CLAY COUNTY	$0.00	$7.52	$0.00	($7.52)	0.00
1115 CARLINE TAX		$0.00	$19.63	$180.00	$160.37	10.91
02 1510	INTEREST	$788.27	$3,398.55	$2,200.00	($1,198.55)	154.48
1510 INTEREST on INVESTMENTS		$788.27	$3,398.55	$2,200.00	($1,198.55)	154.48

Account Number	Account Description	CURRENT MONTH	YEAR TO DATE	BUDGET	BUDGET BALANCE	% OF BUDGET
02 1910	RENTAL OF SCHOOL FACILITIES	$0.00	$0.00	$600.00	$600.00	0.00
1910 RENTAL OF SCHOOL FACILITIES		$0.00	$0.00	$600.00	$600.00	0.00
02 3130	HOMESTEAD EXEMPTION	$0.00	$0.00	$5,000.00	$5,000.00	0.00
3130 HOMESTEAD EXEMPTION		$0.00	$0.00	$5,000.00	$5,000.00	0.00
02 3131	TAX CREDIT	$0.00	$0.00	$35,000.00	$35,000.00	0.00
3131 TAX CREDIT		$0.00	$0.00	$35,000.00	$35,000.00	0.00
02 3180	PRO-RATE MOTOR VEHICLE	$0.00	$0.00	$2,600.00	$2,600.00	0.00
02 3180 001	PRO-RATE MOTOR VEHICLE ADAMS CO	$0.00	$51.14	$0.00	($51.14)	0.00
02 3180 002	PRO-RATE MOTOR VEHICLE HALL COUNTY	$0.00	$323.36	$0.00	($323.36)	0.00
02 3180 003	PRO-RATE MOTOR VEHICLE HAMILTON CO	$0.00	$28.25	$0.00	($28.25)	0.00
02 3180 004	PRO-RATE MOTOR VEHICLE CLAY COUNTY	$0.00	$168.80	$0.00	($168.80)	0.00
3180 PRO-RATE MOTOR VEHICLE		$0.00	$571.55	$2,600.00	$2,028.45	21.98
02 3300	IN LIEU OF SCHOOL LAND TAX	$0.00	$0.00	$60,000.00	$60,000.00	0.00
3300 IN LIEU OF SCHOOL LAND TAX		$0.00	$0.00	$60,000.00	$60,000.00	0.00
02 5690	OTHER NON-REVENUE RECEIPTS	$0.00	$752,856.42	$0.00	($752,856.42)	0.00
5690 OTHER NON-REVENUE RECEIPTS		$0.00	$752,856.42	$0.00	($752,856.42)	0.00
02 BUILDING AND SITES FUND		$79,467.30	$1,119,262.10	$3,642,642.00	$2,523,379.90	30.73
03 DEPRECIATION FUND						
03 1510	INTEREST	$12.38	$110.58	$500.00	$389.42	22.12
1510 INTEREST on INVESTMENTS		$12.38	$110.58	$500.00	$389.42	22.12
03 5200	TRANSFERS FROM OTHER FUNDS	$0.00	$30,000.00	$147,626.00	$117,626.00	20.32
5200 TRANSFERS FROM OTHER FUNDS		$0.00	$30,000.00	$147,626.00	$117,626.00	20.32
03 DEPRECIATION FUND		$12.38	$30,110.58	$148,126.00	$118,015.42	20.33
04 EMPLOYEE BENEFIT FUND						
04 1510	INTEREST	$2.33	$20.90	$300.00	$279.10	6.97
1510 INTEREST on INVESTMENTS		$2.33	$20.90	$300.00	$279.10	6.97
04 5200	TRANSFERS FROM OTHER FUNDS	$0.00	$0.00	$30,077.00	$30,077.00	0.00
5200 TRANSFERS FROM OTHER FUNDS		$0.00	$0.00	$30,077.00	$30,077.00	0.00
04 EMPLOYEE BENEFIT FUND		$2.33	$20.90	$30,377.00	$30,356.10	0.07
07 STUDENT FEES FUND						
07 1510	INTEREST	$0.00	$0.00	$200.00	$200.00	0.00
1510 INTEREST on INVESTMENTS		$0.00	$0.00	$200.00	$200.00	0.00
07 1741	EXTRA CURR ACTIVITIES FEES	$0.00	$0.00	$3,989.00	$3,989.00	0.00
1741 EXTRA CURR ACTIVITIES FEES		$0.00	$0.00	$3,989.00	$3,989.00	0.00
07 STUDENT FEES FUND		$0.00	$0.00	$4,189.00	$4,189.00	0.00
08 QUALIFIED CAPITAL PURPOSE FUND						
08 1100	LOCAL PROPERTY TAXES	$0.00	$0.00	$447,943.00	$447,943.00	0.00
08 1100 001	LOCAL PROPERTY TAXES-ADAMS	$3,089.19	$10,475.22	$0.00	($10,475.22)	0.00
08 1100 002	LOCAL PROPERTY TAXES-HALL	$11,555.48	$63,817.75	$0.00	($63,817.75)	0.00
08 1100 003	LOCAL PROPERTY TAXES-HAMILTON	$2,847.10	$11,416.48	$0.00	($11,416.48)	0.00
08 1100 004	LOCAL PROPERTY TAXES-CLAY	$4,719.95	$18,046.21	$0.00	($18,046.21)	0.00
1100 Local property tax		$22,211.72	$103,755.66	$447,943.00	$344,187.34	23.16
08 1115	CARLINE TAX	$0.00	$0.00	$100.00	$100.00	0.00
08 1115 001	CARLINE TAX	$0.00	$1.28	$0.00	($1.28)	0.00
08 1115 004	CARLINE TAX	$0.00	$2.04	$0.00	($2.04)	0.00
1115 CARLINE TAX		$0.00	$3.32	$100.00	$96.68	3.32
08 1510	INTEREST	$115.62	$486.76	$500.00	$13.24	97.35
1510 INTEREST on INVESTMENTS		$115.62	$486.76	$500.00	$13.24	97.35
08 1990	OTHER LOCAL RECEIPTS	$4,762.40	$229,381.64	$0.00	($229,381.64)	0.00

Account Number	Account Description	CURRENT MONTH	YEAR TO DATE	BUDGET	BUDGET BALANCE	% OF BUDGET
1990 OTHER LOCAL RECEIPTS		$4,762.40	$229,381.64	$0.00	($229,381.64)	0.00
08 3130 001	HOMESTEAD EXEMPTION	$0.00	$13.13	$0.00	($13.13)	0.00
08 3130 002	HOMESTEAD EXEMPTION	$0.00	$184.61	$0.00	($184.61)	0.00
08 3130 003	HOMESTEAD EXEMPTION	$0.00	$29.22	$0.00	($29.22)	0.00
08 3130 004	HOMESTEAD EXEMPTION	$0.00	$25.47	$0.00	($25.47)	0.00
3130 HOMESTEAD EXEMPTION		$0.00	$252.43	$0.00	($252.43)	0.00
08 3131 001	TAX CREDIT	$0.00	$49.99	$0.00	($49.99)	0.00
08 3131 002	TAX CREDIT	$0.00	$181.99	$0.00	($181.99)	0.00
08 3131 003	TAX CREDIT	$0.00	$33.37	$0.00	($33.37)	0.00
08 3131 004	TAX CREDIT	$0.00	$56.40	$0.00	($56.40)	0.00
3131 TAX CREDIT		$0.00	$321.75	$0.00	($321.75)	0.00
08 3180	PRO-RATE MOTOR VEHICLE	$0.00	$0.00	$700.00	$700.00	0.00
08 3180 001	PRO-RATE MOTOR VEHICLE	$0.00	$8.21	$0.00	($8.21)	0.00
08 3180 002	PRO-RATE MOTOR VEHICLE	$0.00	$87.63	$0.00	($87.63)	0.00
08 3180 003	PRO-RATE MOTOR VEHICLE	$0.00	$8.36	$0.00	($8.36)	0.00
08 3180 004	PRO-RATE MOTOR VEHICLE	$0.00	$12.60	$0.00	($12.60)	0.00
3180 PRO-RATE MOTOR VEHICLE		$0.00	$116.80	$700.00	$583.20	16.69
08 QUALIFIED CAPITAL PURPOSE FUND		$27,089.74	$334,318.36	$449,243.00	$114,924.64	74.42
	Grand Total:	$1,089,378.71	$5,332,198.64	$11,174,126.00	$5,841,927.36	47.72

Checking Account: 01 General Fund

Check Number	Check Type	Check Date	Vendor		Check Total
34634	Check	03/09/2020	ALLOIL	ALLIED OIL & TIRE CO.	347.28

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
483586-00	03/04/2020	ALLOIL	SUPPLIES FOR BUSES	01 2710 610 000 0 000	347.28

Check Number	Check Type	Check Date	Vendor		Check Total
34635	Check	03/09/2020	ALPREH	ALPHA REHABILITATION, P.C.	394.25

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2807	03/04/2020	ALPHA	SLP HRS	01 2151 340 001 0 000	285.00
2807	03/04/2020	ALPHA	SLP MLG	01 2151 580 001 0 000	16.39
2807	03/04/2020	ALPHA	OT HRS	01 2161 340 001 0 000	87.78
2807	03/04/2020	ALPHA	OT MLG	01 2161 580 001 0 000	5.08

Check Number	Check Type	Check Date	Vendor		Check Total
34636	Check	03/09/2020	ARMELE	ARMBRUSTER ELECTRIC	957.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
200301	03/04/2020	ARMBRUSTER	BULBS	01 2620 610 000 0 000	837.00
200302	03/04/2020	ARMBRUSTER	ELECTRICAL REPAIRS	01 2620 430 000 0 000	120.00

Check Number	Check Type	Check Date	Vendor		Check Total
34637	Check	03/09/2020	ARMKEL	KELLIE ARMES	169.51

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2/13/20	03/04/2020		FCS SUPPL	01 1100 610 001 0 000	169.51

Check Number	Check Type	Check Date	Vendor		Check Total
34638	Check	03/09/2020	AUGLEX	AUTO GLASS EXPERTS LLC	430.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
33553	03/04/2020	AUTOGLASS	SPED VAN WINDSHIELD REPAIR	01 2712 340 001 0 000	430.00

Check Number	Check Type	Check Date	Vendor		Check Total
34639	Check	03/09/2020	BARSTE	STEPHANIE BARTHEL	163.62

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
FEBR2020	03/04/2020		F/R MLG TO PARENT	01 1100 332 002 0 000	163.62

Check Number	Check Type	Check Date	Vendor		Check Total
34640	Check	03/09/2020	BINJOR	JORDAN BINFIELD	92.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2/14/2020	03/04/2020		MILEAGE	01 1100 580 001 0 000	92.00

Check Number	Check Type	Check Date	Vendor		Check Total
34641	Check	03/09/2020	BHEN	BLACK HILLS ENERGY	1,576.86

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2.14.20	03/04/2020	BLACKHILLS	NATURAL GAS	01 2610 621 000 0 000	1,436.74
2/14/20	03/04/2020	BLACKHILLS	NATURAL GAS	01 2610 621 000 0 000	140.12

Check Number	Check Type	Check Date	Vendor		Check Total
34642	Check	03/09/2020	BLIARTMAT	BLICK ART MATERIALS	176.34

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
3005955	03/05/2020	BLICK	ART SUPPL	01 1100 610 000 0 000	176.34

Check Number	Check Type	Check Date	Vendor		Check Total
34643	Check	03/09/2020	BCBS	BLUE CROSS BLUE SHIELD	732.45

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
273168	03/04/2020	5019-S	HEALTH INS	01 1100 238 002 0 000	732.45

Check Number	Check Type	Check Date	Vendor		Check Total
34644	Check	03/09/2020	BOSENE	BOSSELMAN ENERGY INC.	244.90

Checking Account: 01 General Fund

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
4127039	03/04/2020	1222MT	FUEL TANK FOR MT	01 2620 610 000 0 000	244.90

Check Number: 34645 Check Type: Check Check Date: 03/09/2020 Vendor: CAPBUS CAPITAL BUSINESS SYSTEMS, INC. Check Total: 372.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
958792	03/04/2020	CAPBUSINSTR	COPIERS FOR TEACHERS	01 1100 734 000 0 000	180.00
960570	03/04/2020	CAPBUSINSTR	COPIERS FOR TEACHERS	01 1100 734 000 0 000	192.00

Check Number: 34646 Check Type: Check Check Date: 03/09/2020 Vendor: CAPLEASE CAPITAL BUSINESS SYSTEMS, INC. Check Total: 242.38

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
26420468MAR	03/04/2020	CAPBUSSUPT	SUPT OFFICE COPIER	01 2320 734 000 0 000	242.38

Check Number: 34647 Check Type: Check Check Date: 03/09/2020 Vendor: CCCGI CENTRAL COMMUNITY COLLEGE GI Check Total: 216.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
001738541	03/04/2020	4922-S	CPR STUDENTS	01 1200 340 001 0 000	216.00

Check Number: 34648 Check Type: Check Check Date: 03/09/2020 Vendor: GIPHTH CENTRAL NEBRASKA REHABILITATION SERVICES Check Total: 3,853.68

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
01/2020	03/04/2020	5002-S	OT SPED SCHOOL AGE / HRS	01 2161 340 000 0 000	1,776.00
01/2020	03/04/2020	5002-S	OT SPED AGE 3-5/ HRS	01 2162 340 000 0 000	642.00
01/2020	03/04/2020	5002-S	OT SPED AGE 3-5/ MILEAGE	01 2162 580 000 0 000	27.36
01/2020	03/04/2020	5002-S	PT SPED SCHOOL AGE / HRS	01 2171 340 000 0 000	672.00
01/2020	03/04/2020	5002-S	PT SPED AGE 3-5/ HRS	01 2172 340 000 0 000	422.00
01/2020	03/04/2020	5002-S	PT SPED AGE 3-5/ MILEAGE	01 2172 580 000 0 000	66.24
01/2020	03/04/2020	5002-S	PT SPED BIRTH - AGE 2/ HRS	01 2173 340 000 0 000	226.00
01/2020	03/04/2020	5002-S	PT SPED BIRTH - AGE 2/ MILEAGE	01 2173 580 000 0 000	22.08

Check Number: 34649 Check Type: Check Check Date: 03/09/2020 Vendor: GIPHTH CENTRAL NEBRASKA REHABILITATION SERVICES Check Total: 102.19

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
02/20ATH	03/06/2020	5002-S	PT FOR ATHLETES	01 2190 340 001 0 000	102.19

Check Number: 34650 Check Type: Check Check Date: 03/09/2020 Vendor: COINCO COMPUTER INFORMATION CONCEPTS, INC Check Total: 7,978.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
PSI30395	03/04/2020	5008-S	ANNUAL FEE;INFINITE CAMPUS	01 1100 735 000 0 000	7,978.00

Check Number: 34651 Check Type: Check Check Date: 03/09/2020 Vendor: COOP COOPERATIVE PRODUCERS, INC. Check Total: 501.73

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2/29/20	03/04/2020	1112MT	FUEL TIRES	01 2710 626 000 0 000	501.73

Check Number: 34652 Check Type: Check Check Date: 03/09/2020 Vendor: CULLIG CULLIGAN Check Total: 198.10

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
1/2020	03/04/2020	CULLIGAN	WATER SOFTNER SALT	01 2610 610 000 0 000	130.85

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2.17.20	03/05/2020	CULLIGAN	WATER SOFTNER SALT	01 2610 610 000 0 000	67.25

Check Number: 34653 Check Type: Check Check Date: 03/09/2020 Vendor: DESFLI DESIGN FLIGHT/DIAMOND TRUCK WASH Check Total: 146.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
498428	03/05/2020	DESIGNFL	BUS WASH	01 2710 420 000 0 000	31.00
498486	03/05/2020	DESIGNFL	BUS WASH	01 2710 420 000 0 000	21.00
498553	03/05/2020	DESIGNFL	BUS WASH	01 2710 420 000 0 000	21.00
502055	03/05/2020	DESIGNFL	BUS WASH	01 2710 420 000 0 000	21.00
502128	03/05/2020	DESIGNFL	BUS WASH	01 2710 420 000 0 000	21.00
502205	03/05/2020	DESIGNFL	BUS WASH	01 2710 420 000 0 000	31.00

Check Number: 34654 Check Type: Check Check Date: 03/09/2020 Vendor: DIVDRU DIVERSIFIED DRUG TESTING, LLC Check Total: 109.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
7378	03/04/2020	DRUGTEST	DRIVERS DRUG TESTINGS	01 2710 490 000 0 000	109.00

Check Number: 34655 Check Type: Check Check Date: 03/09/2020 Vendor: DONHER DONIPHAN HERALD Check Total: 214.89

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2/29/20	03/04/2020	DONHER	LIBR. SUBSR.	01 2220 540 000 0 000	29.50
2/29/20	03/04/2020	DONHER	ELE SUBSCR	01 2410 442 002 0 000	29.50
2/29/20	03/04/2020	DONHER	ADV./SUBSR.	01 2510 540 000 0 000	155.89

Check Number: 34656 Check Type: Check Check Date: 03/09/2020 Vendor: IMPRES DONIPHAN-TRUMBULL IMPRESS FUND Check Total: 474.97

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
02/2020	03/05/2020	IMPRESS	NILES TRVL MEAL	01 1200 580 000 0 000	36.43
02/2020	03/05/2020	IMPRESS	CCC ACTIONS DAY	01 2190 890 001 0 000	424.00
02/2020	03/05/2020	IMPRESS	TRVL MEAL SUPT	01 2320 580 000 0 000	14.54

Check Number: 34657 Check Type: Check Check Date: 03/09/2020 Vendor: DONHOT HOT LUNCH FUND DONIPHAN-TRUMBULL SCHOOL Check Total: 770.75

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
FEBR2020	03/04/2020	DONHOT	GEN FUND REIMB LUNCH FOR FOOD	01 2211 610 000 0 000	356.00
GUEST20192020	03/04/2020	DONHOT	GEN FUND REIMB LUNCH FOR FOOD	01 2211 610 000 0 000	414.75

Check Number: 34658 Check Type: Check Check Date: 03/09/2020 Vendor: EAKES2 EAKES OFFICE PLUS Check Total: 1,971.81

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
7976443-0	03/04/2020	EAKESSUPPL	COPY PAPER	01 1100 610 000 0 000	1,399.60
INV186907	03/04/2020	EAKESSUPPL	COPIERS	01 1100 340 000 0 000	572.21

Check Number: 34659 Check Type: Check Check Date: 03/09/2020 Vendor: ECOLAB ECOLAB PEST ELIMINATION DIVISION Check Total: 78.26

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
8613713	03/04/2020	ECOLAB	PEST CONTROL	01 2610 431 000 0 000	78.26

Check Number: 34660 Check Type: Check Check Date: 03/09/2020 Vendor: ESU9 EDUCATIONAL SERVICE UNIT #9 Check Total: 4,835.11

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
30468	03/05/2020	ESU9	KSB LAW WKSHOP	01 2310 330 001 0 000	112.50

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30468	03/05/2020	ESU9	KSB LAW WKSHOP	01 2310 330 002 0 000	112.50
30482	03/05/2020	ESU9	QUIZ BOWL	01 2190 810 001 0 000	750.00
30522	03/05/2020	ESU9	SPED SERVICES	01 1200 340 002 0 000	1,819.03
30522	03/05/2020	ESU9	MENTAL HEALTH SERV.	01 6967 340 001 0 000	1,020.54
30522	03/05/2020	ESU9	MENTAL HEALTH SERV.	01 6967 340 002 0 000	1,020.54

Check Number: 34661 Check Type: Check Check Date: 03/09/2020 Vendor: EGANS EGANS Check Total: 2,675.30

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
313872	03/04/2020	EGANS	SUPPLIES	01 2610 610 000 0 000	1,945.27
314565	03/04/2020	EGANS	SUPPLIES	01 2610 610 000 0 000	730.03

Check Number: 34662 Check Type: Check Check Date: 03/09/2020 Vendor: FLESER FLEET SERVICES Check Total: 2,818.03

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
02/2020	03/04/2020	FLEETSERVICES	NON STUDENT VECHICLE FUEL	01 2650 626 000 0 000	565.18
02/2020	03/04/2020	FLEETSERVICES	BUS FUEL	01 2710 626 000 0 000	2,011.17
02/2020	03/04/2020	FLEETSERVICES	SCH AGE SPED VECHICLES	01 2712 626 000 0 000	44.45
02/2020	03/04/2020	FLEETSERVICES	EARL ED BUS FUEL	01 2713 626 000 0 000	197.23

Check Number: 34663 Check Type: Check Check Date: 03/09/2020 Vendor: HAMILT HAMILTON TELEPHONE Check Total: 930.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
10546955	03/04/2020	HAMILTON	EARLY ED	01 1190 530 002 0 000	36.95
10546955	03/04/2020	HAMILTON	BLDG	01 2510 530 000 0 000	388.25
10546964	03/04/2020	HAMILTON	ETHERNET	01 2510 530 000 0 000	504.80

Check Number: 34664 Check Type: Check Check Date: 03/09/2020 Vendor: HOLDEE DEE HOLLISTER Check Total: 144.60

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
MAR2020	03/04/2020	DEEHOL	MEDICARE DEDUCT/INS BENEFIT	01 2710 280 000 0 000	144.60

Check Number: 34665 Check Type: Check Check Date: 03/09/2020 Vendor: HOMLEA HOMETOWN LEASING Check Total: 542.88

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
3-2020	03/04/2020	HOMLEA3	SHARP COPIERS HS AUG 2019	01 1100 443 001 0 000	274.69
3.20.20	03/04/2020	HOMLEA1	HS COPIER LEASE NEW 3/2018-S/N 7501724X	01 2410 443 001 0 000	110.00
3/20/20	03/04/2020	HOMLEA2	MODULAR -S/N 55002166	01 1100 443 001 0 000	52.73
3/20/20	03/04/2020	HOMLEA2	6TH GRADE HALLWAY-S/N55002116	01 1100 443 002 0 000	52.73
3/20/20	03/04/2020	HOMLEA2	MODULAR HS SPED-S/N 55002166	01 1200 443 001 0 000	52.73

Check Number: 34666 Check Type: Check Check Date: 03/09/2020 Vendor: HANSEN INTERNATIONAL INC. Check Total: 539.06

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
C80450	03/05/2020	HANSEN	BUS REPAIRS/SERVICE/19	01 2710 430 000 0 000	539.06

Check Number: 34667 Check Type: Check Check Date: 03/09/2020 Vendor: JWPEPP J W PEPPER Check Total: 48.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
277589259	03/05/2020	951-HS	MUSIC SUPPLIES	01 1100 610 001 0 000	3.00
281483768	03/05/2020	951-HS	MUSIC SUPPLIES	01 1100 610 001 0 000	45.00

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Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34668	Check	03/09/2020	KULPIST	Kully Pipe & Steel	32.77

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
725258	03/05/2020	KULLY	MT SUPPLIES	01 2620 610 000 0 000	32.77

Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34669	Check	03/09/2020	MSAUT	M&S AUTO TECH	92.98

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
357169	03/05/2020	1157MT	MT VAN	01 2650 340 001 0 000	92.98

Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34670	Check	03/09/2020	MARJON	JONI MARTIN	22.21

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
3/4/20	03/05/2020		EARLY ED LUNCH EXP	01 1190 610 002 0 000	22.21

Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34671	Check	03/09/2020	MASCAR	MASTERCARD	1,649.73

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
02/2020	03/04/2020	MASTERCARD	HS SUPPL	01 1100 610 001 0 000	584.22
02/2020	03/04/2020	MASTERCARD	COMPUTER EQ	01 1100 734 000 0 000	111.08
02/2020	03/04/2020	MASTERCARD	QB PIZZA	01 2190 610 000 0 000	208.57
02/2020	03/04/2020	MASTERCARD	LIBR BOOKS	01 2220 640 000 0 000	309.35
02/2020	03/04/2020	MASTERCARD	POSTAGE	01 2510 531 000 0 000	116.40
02/2020	03/04/2020	MASTERCARD	MT DISTR WIDE	01 2620 610 000 0 000	320.11

Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34672	Check	03/09/2020	LINWEL	MATHESON-LINWELD	53.44

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
51587145	03/05/2020	635-HS	Classroom supplies for Shop/Ag i.e. jac	01 1100 610 001 0 034	53.44

Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34673	Check	03/09/2020	MENHAS	MENARDS	639.76

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
93685	03/05/2020	1131MT	MT SUPPLIES	01 2620 610 000 0 000	225.92
93799	03/05/2020	1131MT	MT SUPPLIES	01 2620 610 000 0 000	97.35
94427	03/05/2020	1131MT	MT SUPPLIES	01 2620 610 000 0 000	18.90
94723	03/05/2020	869-HS	AG SUPPLIES	01 1100 610 001 0 000	19.30
94863	03/05/2020	1131MT	MT SUPPLIES	01 2620 610 000 0 000	278.29

Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34674	Check	03/09/2020	MINEDI	MID-NE DISPOSAL	640.40

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2182-139	03/05/2020	1133MT	GARBAGE SERVICE	01 2620 420 000 0 000	640.40

Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34675	Check	03/09/2020	MISTCO	MID-STATE COMM TV	106.65

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
10551051	03/05/2020	MIDSTTV	COBALT TV	01 1100 382 000 0 000	106.65

Check Number	Check Type	Check Date	Vendor	Vendor Name	Check Total
34676	Check	03/09/2020	NASB	NE ASSOC. SCHOOL BOARDS	4,016.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
20/21	03/05/2020	NASB	ANNUAL MEMBERSHIP	01 2310 810 000 0 000	4,016.00

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Check Number: 34677 Check Type: Check Check Date: 03/09/2020 Vendor: NCSA NE CO.OF SCHOOL ADMINISTRATORS Check Total: 125.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
63204	03/05/2020	NCSA	SAFETY AND SEC TRAINING	01 2320 810 000 0 000	125.00

Check Number: 34678 Check Type: Check Check Date: 03/09/2020 Vendor: NEDEPARTME NE DEPARTMENT OF EDUCATION-SPECIAL ED Check Total: 45.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
73208	03/06/2020	4907-S	WORKSHOP	01 1190 640 002 0 000	45.00

Check Number: 34679 Check Type: Check Check Date: 03/09/2020 Vendor: NEFISP NE FIRE SPRINKLER CORP. Check Total: 293.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
5411	03/05/2020	NEFISP	NON TECH REPAIRS	01 2620 431 000 0 000	293.00

Check Number: 34680 Check Type: Check Check Date: 03/09/2020 Vendor: NEPEFO NE PETERBILT FORD Check Total: 2,117.41

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
234690	03/05/2020	NPF	BUS/JS BUS	01 2710 430 000 0 000	1,064.52
235079	03/05/2020	NPF	NON STUDENT VEHICLES/MALIBU	01 2650 430 000 0 000	146.74
235115	03/05/2020	NPF	NON STUDENT VEHICLES/17B VAN	01 2650 430 000 0 000	63.00
235122	03/05/2020	NPF	BUS/19	01 2710 430 000 0 000	307.21
235155	03/05/2020	NPF	BUS/12B	01 2710 430 000 0 000	126.00
235173	03/05/2020	NPF	BUS WT BUS	01 2710 430 000 0 000	285.74
235177	03/05/2020	NPF	BUS/STARMAN	01 2710 430 000 0 000	124.20

Check Number: 34681 Check Type: Check Check Date: 03/09/2020 Vendor: NESACE NE SAFETY CENTER Check Total: 200.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
57-7428BUS	03/05/2020	NESAFETY	BUS DRIVER CLASSES/DH;CL	01 2710 490 000 0 000	200.00

Check Number: 34682 Check Type: Check Check Date: 03/09/2020 Vendor: NMCAT NMC Exchange LLC Check Total: 397.20

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
INV368129	03/05/2020	NECAT	EARLY ED BUS	01 2713 430 002 0 000	100.00
INV369492	03/05/2020	NECAT	REG BUS 07	01 2710 430 000 0 000	297.20

Check Number: 34683 Check Type: Check Check Date: 03/09/2020 Vendor: NRCSA NRCSA Check Total: 80.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2020LEG.FORUM	03/05/2020	4566-S	MEMBERSHIPS/DUES ETC.	01 2310 810 000 0 000	80.00

Check Number: 34684 Check Type: Check Check Date: 03/09/2020 Vendor: PERGUT PERRY GUTHERY HAASE & GESSFORD Check Total: 315.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
301	03/05/2020	4545-S	LEGAL SERVICES	01 2330 317 000 0 000	315.00

Check Number: 34685 Check Type: Check Check Date: 03/09/2020 Vendor: PLUBES PLUM BEST INC. Check Total: 917.24

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
1/21/20	03/05/2020	PLUMBEST	PLUMBING REPAIRS	01 2620 430 000 0 000	182.20
11/22/19	03/05/2020	PLUMBEST	PLUMBING REPAIRS	01 2620 430 000 0 000	735.04

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Check Number: 34686 Check Type: Check Check Date: 03/09/2020 Vendor: RUTPAU PAULA RUTTEN Check Total: 70.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2/17/20	03/05/2020		INTERPRETER	01 2190 340 001 0 000	70.00

Check Number: 34687 Check Type: Check Check Date: 03/09/2020 Vendor: SAMS SAM'S CLUB Check Total: 157.04

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
001927	03/06/2020	SAMS	ELE SUPPL/KGTN	01 1100 610 002 0 000	98.62
003851	03/06/2020	SAMS	EARLY ED SUPPL	01 1190 610 002 0 000	19.20
007128	03/06/2020	SAMS	HS SUPPL/FCS	01 1100 610 001 0 000	39.22

Check Number: 34688 Check Type: Check Check Date: 03/09/2020 Vendor: SCHSPEC School Specialty Check Total: 171.34

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
208124561002	03/05/2020	1018E	SEE ATTACHED	01 1100 610 002 0 000	124.19
208124561002	03/05/2020	1018E	SEE ATTACHED	01 1190 610 002 0 000	47.15

Check Number: 34689 Check Type: Check Check Date: 03/09/2020 Vendor: SCHOIN SCHOOLSIN.COM Check Total: 173.06

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
21099323	03/05/2020	5020-S	LIBRARY BOOKS	01 2220 640 000 0 000	157.54
21136971	03/06/2020	5020-S	LIBRARY BOOKS	01 2220 640 000 0 000	15.52

Check Number: 34690 Check Type: Check Check Date: 03/09/2020 Vendor: SHOPOI SHOUTPOINT Check Total: 690.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
19097	03/05/2020	4847-S	PARENT CALLING ENHANCEMENTS;VOICE,TEXT	01 1100 340 000 0 000	690.00

Check Number: 34691 Check Type: Check Check Date: 03/09/2020 Vendor: SOUTH SOUTHERN POWER Check Total: 5,999.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2/2020	03/05/2020	SOPOWER	ELECTRICITY	01 2610 622 000 0 000	5,999.00

Check Number: 34692 Check Type: Check Check Date: 03/09/2020 Vendor: SPOSAF SPORT SAFE TESTING SERVICE, INC. Check Total: 450.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
3/3/20	03/06/2020	SPOSAF	SUBSTANCE ABUSE TESTING	01 1100 340 001 0 000	450.00

Check Number: 34693 Check Type: Check Check Date: 03/09/2020 Vendor: STNEAS DAS STATE ACCOUNTING STATE OF NEBRASKA Check Total: 229.32

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
1205003	03/05/2020	STNE	NETWORK SERVER FEES	01 1100 382 000 0 000	229.32

Check Number: 34694 Check Type: Check Check Date: 03/09/2020 Vendor: STRIV STRIV, INC. Check Total: 1,975.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2745	03/05/2020	4682-S	LIVE STREAMING BRONZEPKG	01 2190 733 001 0 000	1,975.00

Check Number: 34695 Check Type: Check Check Date: 03/09/2020 Vendor: TELSYS TELEPHONE SYSTEMS OF NE Check Total: 95.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2115	03/05/2020	4649-S	PHONE SYSTEM SERVICE CALL/REPAIR	01 2510 382 001 0 000	47.50
2115	03/05/2020	4649-S	PHONE SYSTEM SERVICE CALL/REPAIR	01 2510 382 002 0 000	47.50

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Check Number	Check Type	Check Date	Vendor		Check Total
34696	Check	03/09/2020	TIFFS	Tiff's Tavern	663.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
476547	03/05/2020	TIFFS	MEALS FOR INSERVICES;MTSS 10/23/19	01 1100 610 000 0 000	330.00
476550	03/05/2020	TIFFS	MEALS FOR INSERVICES;MTSS 2/19/20	01 1100 610 000 0 000	333.00

Check Number	Check Type	Check Date	Vendor		Check Total
34697	Check	03/09/2020	TMS	TIME MANAGEMENT SYSTEMS	104.95

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
233650	03/05/2020	TMS	TIME CLOCK FEES	01 2510 530 000 0 000	104.95

Check Number	Check Type	Check Date	Vendor		Check Total
34698	Check	03/09/2020	TOBWEN	WENDELL TOBEN	161.30

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
MAR2020	03/05/2020	WENTOB	MEDICARE DEDUCT/INS BENEFIT	01 2710 280 000 0 000	161.30

Check Number	Check Type	Check Date	Vendor		Check Total
34699	Check	03/09/2020	TRANE	TRANE U.S. INC	4,401.31

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
7755857	03/05/2020	TRANEREP	FILTERS FOR HVAC	01 2620 610 000 0 000	4,401.31

Check Number	Check Type	Check Date	Vendor		Check Total
34700	Check	03/09/2020	VERIZO	VERIZON	167.85

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
5051021602001	03/05/2020	VERIZLD	LONG DISTANCE	01 2510 530 000 0 000	167.85

Check Number	Check Type	Check Date	Vendor		Check Total
34701	Check	03/09/2020	VILOFD	VILLAGE OF DONIPHAN	300.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
1360	03/05/2020	VILLAGE	BLDG RENT/MTSS	01 1100 890 000 0 000	300.00

Check Number	Check Type	Check Date	Vendor		Check Total
34702	Check	03/09/2020	VISA	CARDMEMBER SERVICE VISA	31.58

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
02/2020	03/05/2020	VISA	SUPT OFFICE SUPPL	01 2320 610 000 0 000	31.58

Check Number	Check Type	Check Date	Vendor		Check Total
34703	Check	03/09/2020	WALMAR	WALMART COMMUNITY	519.77

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
02/2020	03/05/2020	WALMAR	HS SUPPL	01 1100 610 001 0 000	92.77
02/2020	03/05/2020	WALMAR	FCS	01 1100 610 001 0 000	357.41
02/2020	03/05/2020	WALMAR	EARLY ED SUPPL	01 1190 610 002 0 000	26.60
02/2020	03/05/2020	WALMAR	SPED SUPPL	01 1200 610 000 0 000	42.99

Check Number	Check Type	Check Date	Vendor		Check Total
34704	Check	03/09/2020	WINDST	WINDSTREAM	356.18

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
2/2020	03/05/2020	WINDSTR	LONG DISTANCE SERVICE/INTERNET	01 2510 530 000 0 000	356.18

Check Number	Check Type	Check Date	Vendor		Check Total
34705	Check	03/09/2020	WOOD	WOODWARD'S	47.50

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
8911-790	03/05/2020	WOODWSHRED	SPED SHREDDING	01 1200 420 000 0 000	23.75
8911-790	03/05/2020	WOODWSHRED	ALL OTHER SHREDDING	01 2610 420 000 0 000	23.75

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Check Number: 34706 Check Type: Check Check Date: 03/09/2020 Vendor: YANMUS YANDAS MUSIC Check Total: 35.00

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
438727	03/05/2020	1028-HS	BAND SUPPLIES 2019-2020 SCHOOL YEAR	01 1100 610 001 0 000	35.00

*Denotes Expensed Invoice Item

Checking Account ID: 01 Total without Voids: 63,588.94

Checking Account: 06 lunch acct

Check Number	Check Type	Check Date	Vendor		Check Total
10222	Check	03/09/2020	METBAK	EARTH GRAINS	581.86

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
54333727101	03/03/2020	EARTHGRAINS	FOOD	06 3100 630 000 0 000	192.00
54333727144	03/03/2020	EARTHGRAINS	FOOD	06 3100 630 000 0 000	234.86
54333727239	03/03/2020	EARTHGRAINS	FOOD	06 3100 630 000 0 000	155.00

Check Number	Check Type	Check Date	Vendor		Check Total
10223	Check	03/09/2020	HAMILT	HAMILTON TELEPHONE	37.32

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
10548958	03/03/2020	PHONE	PHONE SERVICE	06 3100 340 000 0 000	37.32

Check Number	Check Type	Check Date	Vendor		Check Total
10224	Check	03/09/2020	ROBERT	HILAND DAIRY FOODS CO., LLC	2,668.49

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
1117793-2020	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	373.12
1117852	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	305.38
1117898	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	407.09
1117953	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	309.27
1117999	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	233.92
1118057	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	297.31
1118103	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	390.40
1118158	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	354.57
1118159	03/03/2020	HILANDDAIRY	FOOD	06 3100 630 000 0 000	(2.57)

Check Number	Check Type	Check Date	Vendor		Check Total
10225	Check	03/09/2020	PEGLER	PEGLER SYSCO	6,722.71

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
261967751	03/03/2020	SYSCO	SUPPLIES	06 3100 610 000 0 000	245.06
261967751	03/03/2020	SYSCO	FOOD	06 3100 630 000 0 000	1,687.78
261979516	03/03/2020	SYSCO	SUPPLIES	06 3100 610 000 0 000	190.57
261979516	03/03/2020	SYSCO	FOOD	06 3100 630 000 0 000	1,041.94
261979516	03/03/2020	SYSCO	EQUIPMENT	06 3100 733 000 0 000	10.45
261990821	03/03/2020	SYSCO	SUPPLIES	06 3100 610 000 0 000	564.95
261990821	03/03/2020	SYSCO	FOOD	06 3100 630 000 0 000	1,285.25
361003475	03/03/2020	SYSCO	SUPPLIES	06 3100 610 000 0 000	337.01
361003475	03/03/2020	SYSCO	FOOD	06 3100 630 000 0 000	1,359.70

Check Number	Check Type	Check Date	Vendor		Check Total
10226	Check	03/09/2020	PEPCOLA	PEPSI-COLA	498.36

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
49042506	03/03/2020	PEPSI	FOOD	06 3100 630 000 0 000	498.36

Check Number	Check Type	Check Date	Vendor		Check Total
10227	Check	03/09/2020	THOCOM	US FOODS -GRAND ISLAND	3,086.48

Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount
3256543	03/03/2020	THOMPSON	SUPPLIES	06 3100 610 000 0 000	76.11
3256543	03/03/2020	THOMPSON	FOOD	06 3100 630 000 0 000	443.92
3310367	03/03/2020	THOMPSON	SUPPLIES	06 3100 610 000 0 000	37.92

Checking Account: 06 **lunch acct**

3310367	03/03/2020	THOMPSON	FOOD		06 3100 630 000 0 000	46.76
3387327	03/03/2020	THOMPSON	FOOD		06 3100 630 000 0 000	635.29
3515498	03/03/2020	THOMPSON	FOOD		06 3100 630 000 0 000	1,123.22
3650812	03/03/2020	THOMPSON	FOOD		06 3100 630 000 0 000	723.26

*Denotes Expensed Invoice Item

Checking Account ID: 06

Total without Voids: 13,595.22

Checking Account: **021** **BLDG REPO**

Check Number: 1703	Check Type: Check	Check Date: 03/09/2020	Vendor: ESU9	EDUCATIONAL SERVICE UNIT #9	Check Total:	4,965.00
Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount	
30512	03/06/2020		CUBICLES FOR ROOMS	02 2620 531 000 0 000	4,965.00	
Check Number: 1704	Check Type: Check	Check Date: 03/09/2020	Vendor: GSIENG	GSI ENGINEERING, LLC	Check Total:	2,250.00
Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount	
1038	03/06/2020		GEIOTECH EXPLORATION	02 2515 340 000 0 000	2,250.00	
Check Number: 1705	Check Type: Check	Check Date: 03/09/2020	Vendor: KAYHEA	KAYL HEATING & AIR, INC.	Check Total:	22,400.00
Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount	
WO-2514	03/06/2020		HVAC MT CONTRACT	02 2620 340 000 0 000	22,400.00	
Check Number: 1706	Check Type: Check	Check Date: 03/09/2020	Vendor: KPE	KPE ENGINEERS	Check Total:	3,952.50
Invoice Number	Invoice Date	PO Number	Detail Description	Chart of Account Number	Detail Amount	
6822	03/06/2020		ASR FANS AND SINK	02 2620 340 000 0 000	3,952.50	

*Denotes Expensed Invoice Item

Checking Account ID: 021

Total without Voids: 33,567.50

March 2020
Elementary Board Report
Rodney Engel

Math Resource Review
We are still waiting on our resource samples to arrive. We have one set that we are looking at as an intervention but waiting on a core sample. We will go through an alignment to our curriculum/standards (priority and essential), look at the design of the program (chapter-based Vs Spiral), assessments and more. We will work with the vendors so they can present, via webinar, to the group as we dig into the resources. We hope to do this late in March if materials arrive soon.

ESU 9 Science Olympiad
On Friday, February 21 we sent 10 elementary students to the ESU 9 Science Olympiad. This was the first year the elementary students were able to participate. Since we added this day back to our calendar we decided to send a group of students to participate. We selected students based on NWEA MAP scores. Mrs. Stratton sponsored the group and took three 6th graders and seven 5th graders participate. Events included the Straw Challenge, Sink or Float, Fossil Build, Classification Investigation, Fill Your Cup, Ping Pong Challenge and Catapults. We had a number of students recognized for being good leaders and teammates. One of our groups won the Catapult Contest.

Team Members:
Mrs. Stratton – Sponsor

5th Grade:
Joe Schuler
Jose Vega
Hunter Fowler
Makenzie Carmin
Camden Carter
Faith Hohlen
Brayden Rader

6th Grade:
Ben Rainforth
Preston Sjuts
Johnathan Kovanda

Evaluation System – Digital/Online Tool
We will be meeting with a representative from Network Educator Effectiveness (NEE) out of the University of Missouri to explore the use of a new online tool for evaluation. This will not change our evaluation model (Danielson) but it would be a different tool to possibly use for observations and evaluations. I know of two Nebraska schools that have switched to this platform and are extremely happy with the system. Our current system is through Frontline and it is very labor intensive and not user friendly. Frontline bought out Teachscape, who we initially purchased but were forced to move to the Frontline system as they no longer supported the Teachscape online program.

Parent-Teacher Conference Report

Grade	# STS	#CONF	% Attended
PreK	26	25	96.15%
Kind	28	25	89.29%
1st Grade	39	38	97.44%
2nd Grade	28	28	100.00%
3rd Grade	32	30	93.75%
4th Grade	25	24	96.00%
5th Grade	35	35	100.00%
6th Grade	37	37	100.00%
Total	**250**	**242**	**96.80%**

Pennies for Patients (from Mrs. Breckner)
Leukemia & Lymphoma Society
DT Elementary participated in the Pennies for Patients fundraiser the entire month of February. We ended the month with a grand total of $6,255.39! We had 7 classrooms earn a GOLD pennant, which means they each raised over $300 per room. We are currently in first place for the top school in Nebraska! We have our celebration Friday from 1-1:30 where Mr. Engel will be taped to a wall and multiple teachers will kiss a pig! We are so proud of the kids, staff, and community for their support!

Other Events

Tuesday, March 10	5th Grade Field Trip – Hastings Planetarium & Library
Thursday, March 19	TEAM Carnival
Tuesday, March 24	Kindergarten Field Trip – Rowe Sanctuary in Gibbon

3-9-20 Niles Board Report

Preschool Applications for 20-21

- 3 year old students = 8
    - Three families did not return applications & PK staff is going to call them
- 4 year old students = 9
    - One 4 year old student living outside the district we may consider
    - One student will not be attending due to lack of daycare

Special Education

- Acadience Math Training
    - Mr. Pfeifer & Ms. Starman
- March 6th
    - All SPED staff completed Alternative Assessment Training
- April 8th
    - Youth First Conference in Kearney
    - Justice Baker will be introducing the keynote speaker

March Board Meeting
Secondary

1. ReVision
    a. ReVision steering committee meeting March 18th.
2. John Baylor Test Prep
    a. We are down to the last month of ACT Prep.
    b. We will take a Mock ACT March 28th
3. Open FCS, Math, Social Studies/PE positions
4. Upcoming events
    a. March 10th - Band and Choir
    b. March 11th - Actions Day at CCC (Hastings)
        - Sophomores to CCC for Career Awareness day (GI)
    c. March 16th - Hall Co Registrar - Talk to Gov't class and register students to vote
    d. March 18th - District Speech at GICC
    e. March 19th - FCCLA Blood Mobile at Community Center
    f. March 21st - LPC Band and Art Show
    g. March 26th - State Speech
    h. March 28th - All-State Band
        - Mock ACT
    i. April 1st - State FFA
        - John Baylor Live Session
    j. April 3rd - Senior Skip Day, Juniors decorate for Prom, Sophomore Community Service Day
    k. April 4th - Prom
    l. April 7th - State ACT

STADIUM STORAGE FACILITY

DONIPHAN-TRUMBULL PUBLIC SCHOOLS

302 WEST PLUM, P.O.BOX 300, DONIPHAN, NE 68832

COORDINATING PROFESSIONAL

I, MICHAEL J. MCLENNAN, AM THE COORDINATING PROFESSIONAL ON THE STADIUM STORAGE FACILITY PROJECT



PROJECT TEAM

OWNER

DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 W. PLUM STREET
P.O. BOX 300
DONIPHAN, NE 68832
P: (402) 845-2730

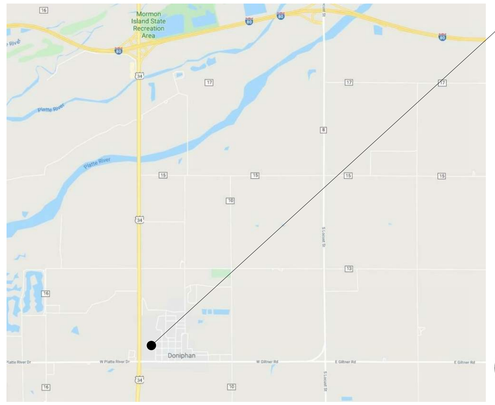
A/E DESIGN TEAM

KPE ARCHITECTUR-ENGINEERING-FORENSICS
1016 LEAVENWORTH STREET
OMAHA, NE 68102
P: (402) 291-1444

CIVIL ENGINEER

MILLER & ASSOCIATES CONSULTING ENGINEERS, P.C.
1111 CENTRAL AVENUE
GRAND ISLAND, NEBRASKA 68847
P: (308) 234-1146

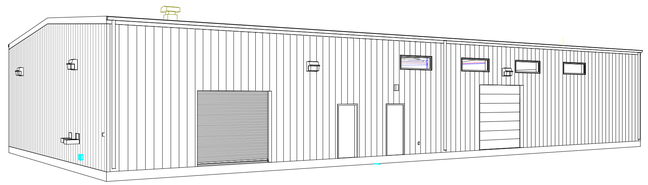
PROJECT LOCATION



DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 W. PLUM STREET
P.O. BOX 300
DONIPHAN, NE 68832

NORTH

VICINITY MAP



SCHEDULE OF DRAWINGS

GENERAL

G000	COVER SHEET
G001	ABBREVIATIONS, GENERAL NOTES, TYP. WALL TYPES, DETAILS
G002	GENERAL NOTES
G101	CODE REVIEW PLAN

CIVIL

C001	GENERAL NOTES
C002	EXISTING SITE PLAN & REMOVALS
C003	GEOMETRICS PLAN
C004	GRADING PLAN
C005	UTILITY PLAN
C006	SEPTIC SYSTEM PLAN
C007	EROSION CONTROL PLAN
C008	TYPICAL DETAILS (1 OF 2)
C009	TYPICAL DETAILS (2 OF 2)

ARCHITECTURAL

A111	FLOOR PLAN - FIRST / MEZZANINE LEVEL
A131	REFLECTED CEILING PLANS & ROOF PLAN
A201	EXTERIOR BUILDING ELEVATION
A301	BUILDING AND WALL SECTIONS
A401	ENLARGED STAIR PLANS
A601	ROOM FINISH & DOOR SCHEDULES, FRAME ELEVATIONS & DETAILS

STRUCTURAL

S001	GENERAL STRUCTURAL NOTES
S002	GENERAL STRUCTURAL DETAILS
S101	FOUNDATION PLAN
S201	MEZZANINE FRAMING PLAN
S401	FOUNDATION DETAILS

MECHANICAL

MP001	GENERAL MECHANICAL NOTES AND SYMBOL LEGEND
M301	MECHANICAL PLAN
M901	MECHANICAL SCHEDULES

PLUMBING

P301	PLUMBING PLAN
P901	PLUMBING FIXTURE DESCRIPTIONS

ELECTRICAL

E001	GENERAL ELECTRICAL NOTES AND SYMBOL LEGEND
E101	ELECTRICAL SITE PLAN
E111	ELECTRICAL PLANS
E801	ELECTRICAL DETAILS
E901	ELECTRICAL SCHEDULES

DRAWN: RWV
DESIGNED: MJM
CHECKED: MJM
PROJ. MNGR: SKK

NO.	DESCRIPTION	DATE	BY
0	BID SET	03-06-2020	KPE

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STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O.BOX 300, DONIPHAN, NE 68832

COVER SHEET

KPE
ENGINEERS - ARCHITECTS
FORENSIC EXPERTS
1016 LEAVENWORTH ST.
OMAHA, NE 68102
PHONE: (402) 291-1444
TOLL FREE: (888) 484-4939
www.kpe-inc.com
OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020
JOB NUMBER: 535-002
SHEET: G000

ABBREVIATIONS

DEGREE	°
POUND OR NUMBER	#
AND	&
AT	@
A	
ANCHOR BOLT	A.B.
ABOVE	ABV
ABOVE FINISH FLOOR	A.F.F.
ACOUSTICAL TILE CEILING	ATC
ADJUSTABLE	ADJ.
AIR CONDITIONING	A/C
AIR HANDLING UNIT	AHU
ALIGN	AL.
ALTERNATE	ALT.
ALUMINUM	ALUM.
ANCHOR	ANCH.
ANCHOR BOLT	AB.
APPROXIMATE(LY)	APPROX.
ARCHITECT(URAL)	ARCH.
AREA DRAIN	A.D.
ASHPALT	ASPH.
B	
BACK TO BACK	B/B
BACK OF CURB	B.C.
BASE BID	B.B.
BASEMENT	BSMT.
BEAM	BM
BEARING	BRG.
BENCHMARK	BMK.
BLOCKING	BLKG
BOARD	BD.
BOTTOM	BOT.
BOTTOM OF	B.O.
BOTTOM OF CURB	B.O.C.
BOTTOM OF WALL	B.O.W.
BRICK EXPANSION JOINT	B.E.J.
BUILDING	BLDG.
BUILDING LINE	B.L.
C	
CABINET UNIT HEATERCUH	
CANTILEVER	CANT.
CARPET	CPT.
CAST IN PLACE	CIP
CAST IRON	CI
CATCH BASIN	C.B.
CAVITY	CAV.
CEILING	CLG.
CEMENT	CEM.
CENTER	CENT.
CENTER LINE	CL
CENTER TO CENTER	C/C
CERAMIC TILE	CT
CHALKBOARD	CB
CLEAN OUT	C.O.
CLEAR	CLR
CLEAR FLOAT GLASS	CFG
CLEAR TEMPERED	CTIG
INSULATED GLASS	
CLEAR MIRROR GLASS	CMG
COLUMN	COL.
COMPRESSIBLE	COMP.
CONCRETE	CONC.
CONCRETE MASONRY UNIT	CMU
CONDITION	COND.
CONNECT(ION)	CONN.
CONSTRUCTION CONST.	
CONTINUOUS	CONT.
CONTRACTOR	CONTR.
CONTROL JOINT	C.J.
CORNER GUARD	C.G.
CORRIDOR	CORR.
CUBICLE CURTAN TRACK	C.C.T.
D	
DEAD LOAD	D.L.
DEEP	D
DETAIL	DET
DIAGONAL	DIAG.
DIAMETER	DIA.
DIMENSION	DIM.
DISPENSER	DISP.
DOOR	DR.
DOWN	DN.
DOWNSPOUT	D.S.
DRAIN TILE	DT
DRAWING	DWG.
DRINKING FOUNTAIN	DF
E	
EACH	EA.
EACH FACE	E.F.
EACH WAY	EW
ELECTRIC(AL)	ELEC.
ELECTRIC WATER COOLER	EWC
ELEVATION	EL
ELEVATOR	ELEV.
EQUAL	EQ.
EQUIPMENT	EQUIP.
EXCAVATE	EXC.
EXISTING	EXIST. OR EXG
EXISTING ROOF DRAIN	E.R.D.
EXPANSION JOINT	EJ
EXPANSION JOINT COVER	E.J.C.
EXPOSED	EXP.
EXTERIOR	EXT.
F	
FABRIC WALL COVERING	FWC
FEET	FT.
FINISH	FIN.
FINISHED FLOOR	F.F.
FINISH FLOOR ELEVATION	F.F.E.
FIRE ALARM	F.A.
FIRE EXTINGUISHER	F.E.
FIRE EXTINGUISHER CABINET	F.E.C.
FIRE HOSE CABINET	F.H.C.
FIRE HYDRANT	FH
FIREPROOF(ING)	FRPF.
FIRE RATED GLASS CERAMIC FIRE RATED, SAFETY RATED GLASS CERAMIC	FRGC FRSRGC
FLASHING	FLASH'G
FLEXIBLE	FLEX.
FLOOR	FL.
FLOOR DRAIN	FD
FLOORING	FLG.
FOLDING PANEL PARTITION	F.P.P.
FOOTING	FTG.
FOUNDATION	FDN.
FRAME	FR.
FURRING	FUR'G
FIELD VERIFY	F.V.
FIXTURE	FIXT.

G	
GALVANIZED	GALV.
GAUGE	GA.
GLASS FIBER REINFORCED GYPSUM	G.F.R.G.
GLU-LAM BEAM	G.L.B.
GRAB BAR	GB
GRADE	GR
GRANULAR	GRAN.
GROUND FACE CONCRETE MASONRY UNIT	GFCMU
GUTTER	G.
GYPSUM WALLBOARD	GWB
GYPSUM	GYP.
H	
HAND DRYER	H.D.
HANDICAPPED	HC
HARDWARE	HDWE
HEIGHT	HT.
HEAVY CLEAR TEMPERED GLASS	HCTG
HIGH	H.
HIGH POINT	HP
HOLLOW CORE	HC
HOLLOW METAL	H.M.
HORIZONTAL	HORIZ.
I	
INCH	IN.
INFORMATION	INFO
INSIDE/INTERIOR DIAMETER	I.D.
INSIDE FACE	I.F.
INSULATION	INSUL.
INTERIOR	INT.
INVERT ELEVATION	I.E.
INSULATED TRANSLUCENT PANEL SYSTEM	I.T.P.S.
J	
JANITOR	JAN.
JOINT	JT.
JOIST	JST.
JOIST BEARING	JST. BRG.
K	
KEYBOARD TRAY	K.B.
KEYED CONSTRUCTION JOINT	K.C.J.
KITCHEN	KIT.
L	
ANGLE	L OR ∠
LANDSCAPE ARCHITECT	LA
LAVATORY	LAV.
LIGHT	LT.
LIGHT WEIGHT	LT. WT.
LINEAL/LINEAR FOOT	L.F.
LIVE LOAD	L.L.
LOCATION	LOC.
LONG LEG HORIZONTAL	L.L.H.
LONG LEG VERTICAL	L.L.V.
LOW POINT	LP
M	
MANAGEMENT	MGMT
MANHOLE	M.H.
MANUFACTURER	MANF.
MARKERBOARD	M.B.
MASONRY	MAS
MASONTRY OPENING	M.O.
MATERIAL	MAT'L
MAXIMUM	MAX.
MECHANICAL	MECH.
METAL	MTL.
MINIMUM	MIN.
MIRROR	MR
MISCELLANEOUS	MISC.
MOP/BROOM HOLDER MOUNT	M.B.H.
MOUNTED	MT.
MULLION	MTD.
	MULL.
N	
NAPKIN DISPENSER	ND
NAPKIN DISPOSAL	NDL
NOMINAL	NOM.
NOT IN CONTRACT	NIC
NOT TO SCALE	NTS
NUMBER	NO.
O	
OCCURRING	OCCUR'G
OFFICE	OFF.
ON CENTER(S)	O.C.
ON CENTER EACH WAY	O.C.E.W.
ON CENTER	O/C
OPENING	OPNG.
OPPOSITE	OPP.
OUTSIDE DIAMETER	O.D.
OUTSIDE FACE	O.F.
OVERFLOW DRAIN	O.D.
OVERHEAD	OVHD
P	
PAINT	P
PAIR	PR.
PANEL	PNL.
PAPER HOLDER	PH
PAPER TOWEL DISPENSER	P.T.D.
PAPER TOWEL RECEPTACLE	P.T.R.
PARTITION	PTN.
PAVEMENT	PVMT.
PERIMETER	PERIM.
PLATE	PL. OR P
PLASTER	PLAS.
PLASTIC LAMINATE	PLAM.
PLYWOOD	PLYWD.
POLISHED	POL.
POLYVINYL CHLORIDE	PVC
PORCELAIN TILE	PT
PRECAST CONCRETE	P.C.
PREFINISHED	PF
PROJECT(ION)	PROJ.
PROPERTY	PROP.
Q	
QUARRY TILE	Q.T.
R	
RADIUS	R.
RADIOUS POINT	RP
RECESSED	REC.
REFERENCE	REF.
REFLECTED CEILING PLAN	RCP.
REFRIGERATOR	REFR.
REINFORCING	REINF.
REMOVABLE	REM.
REQUIRED	REQ'D.
RETURN AIR	R.A.
RETAINING	RET
RIGHT-OF-WAY	R.O.W.
RIM ELEVATION	RE
RISER	R.
ROOF DRAIN	RD
ROOF TOP UNIT	RTU
ROOF HATCH	R.H.
ROOM	RM.
ROUGH OPENING	R.O.
RUBBER	RUB.
S	
SANITARY SEWER	SAN
SAW JOINT	S.J.
SCHEDULE	SCHED.
SEALANT	SEAL.
SECTION	SECT.
SERVICE	SERV.
SHEET VINYL	S.V.
SHEATHING	SHTH'G
SHEET	SHT.
SHEET METAL	S.M.
SLAB-ON-GRADE	S.O.G.
SOAP DISPENSER	SD
SOLID CORE	S.C.
SPACE	SP.
SPECIFICATIONS	SPEC.
SPECIFIED	SPEC'D.
SQUARE	SQ.
SQUARE FEET	S.F.
STAGGERED	STAG'D.
STAIN	ST
STAINLESS STEEL	S.S.
STANDARD	STD.
STEEL	STL.
STORAGE	STOR.
STRUCTURE(AL)	STRUCT.
STRUCTURAL GLAZED FACING TILE	S.G.F.T.
SUPPLY AIR	S.A.
SURFACE	SURF.
SUSPENDED	SUSP.
SYMMETRICAL	SYM.
T	
TACKBOARD	TB.
TACK WALL	T.W.
TELEPHONE	TEL., TELE
TELEVISION	TV.
TEMPERATURE	TEMP.
TERRAZZO	TERR.
THICK	T. OR THK.
THRESHOLD	THR.
THROUGH WALL FLASHING	T.W.F.
THROUGH	THRU
TINTED INSULATING GLASS	TIG
TINTED TEMPERED LAMINATED INSULATING GLASS	TTLIG
TOILET	TLT.
TOILET PAPER DISPENSER	T.P.D.
TONGUE & GROOVE	T & G
TOP OF	T.O.
TOP OF CURB	T.O.C.
TOP OF FOOTING	T.O.F.
TOP OF SLOPE	TOE
TOP OF STEEL	T.O.S.
TOP OF WALL	TW
TOPOGRAPHY	TOPO.
TOWEL BAR	T.B.
TOWEL DISPENSER	TD
TOWEL DISPENSER/DISPOSAL	TDDL
TREAD	T.
TUBE STEEL	T.S.
TYPICAL	TYP.
U	
UNDERGROUND	UG
UNDERGROUND ELECTRICAL	UGE
UNDERGROUND TELEPHONE	UGT
UNIT HEATER	UH
UNLESS NOTED OTHERWISE	U.N.O.
URINAL	UR.
UTILITY UTIL.	
V	
VERTICAL	VERT.
VESTIBULE	VEST.
VINYL	VIN.
VINYL BASE	VB
VINYL COMPOSITION TILE	VCT
VINYL WALL COVERING	VWC
VISUAL DISPLAY BOARD	V.D.B.
W	
WAINSCOT	WSCT.
WALL COVERING	WC
WALL HYDRANT	WH
WALL PROTECTION PANEL	WPP
WASTE RECEPTACLE	WR
WATER CLOSET	W.C.
WEIGHT	WT.
WELDED WIRE FABRIC	WWF
WIDE FLANGE	WF.
WIDE	W.
WINDOW	WIN.
WITH	W/
WITHOUT	W/O
WIRE GLASS	WG
WOOD	WD.
WOOD BASE	WB
WORKING POINT	WP
Y	
YARD	YD.
YARD HYDRANT	Y.H.

GENERAL NOTES

1. THE SUB-CONTRACTOR SHALL PERFORM ALL TESTS AS SPECIFIED OR AS NECESSARY TO DEMONSTRATE COMPLETE AND SATISFACTORY INSTALLATIONS OF ALL SYSTEMS PROVIDED UNDER THIS CONTRACT.
2. VERIFY MECHANICAL AND ELECTRICAL CONDITIONS FOR SCOPE AND INTERFACE. SUB-CONTRACTOR SHALL COORDINATE LOCATION FOR ALL MECHANICAL AND ELECTRICAL ITEMS WITH GENERAL CONSTRUCTION. REVIEW ANY DISCREPANCIES WITH ARCHITECT PRIOR TO INSTALLATION AND/OR FABRICATION.
3. PRIOR TO BIDDING, SUB-CONTRACTOR SHALL VISIT THE SITE AND REVIEW CONDITIONS. SUB-CONTRACTOR SHALL FIELD VERIFY ALL SITE CONDITIONS FOR WORKABILITY, ADJACENT CONDITIONS, EFFECTS AND ACCESSIBILITY. SUB-CONTRACTOR SHALL FIELD VERIFY DIMENSIONS PRIOR TO ORDERING RELATED MATERIALS OF CONSTRUCTION.
4. PROTECT ALL SITE LOCATIONS THAT ARE NOT DESIGNATED FOR REMOVAL. ANY DAMAGE CAUSED BY THE SUB-CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT THE SUB-CONTRACTOR'S EXPENSE.
5. SUB-CONTRACTOR SHALL CONTACT THE ARCHITECT IN THE EVENT THAT UNFORESEEN CONDITIONS ARE ENCOUNTERED.
6. PROVIDE WOOD BLOCKING BEHIND ALL WALL STOPS, FINISH TRIM, BUILDING HARDWARE AND TOILET ACCESSORIES TO BE MOUNTED ON WALLS. PROVIDE CONTINUOUS WOOD BLOCKING HORIZONTALLY AND VERTICALLY, BEHIND ALL WALL HUNG EQUIPMENT, ACCESSORIES, COUNTERS AND ANY OTHER BUILDING MATERIALS REQUIRING ANCHORING TO WALLS, CEILINGS AND FLOORS. VERIFY WITH ALL TRADES FOR THESE ITEMS PRIOR TO COVERING THE STRUCTURE.
7. AREAS NOTED AS N.I.C. ARE NOT IN CONTRACT.
8. ALL MATERIALS SHALL BE NEW UNLESS SPECIFICALLY NOTED OTHERWISE.
9. ALL MECHANICAL OPENINGS AND OTHER OPENINGS OR PENETRATIONS THROUGH RATED WALLS SHALL BE SEALED TO MAINTAIN RATINGS.
10. ALL WORK SHALL COMPLY WITH APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
11. WHERE FIRE EXTINGUISHER CABINETS OCCUR IN GWB/METAL STUD PARTITIONS, PROVIDE AND INSTALL GWB ENCLOSURE BEHIND FIRE EXTINGUISHER CABINET TO PROVIDE CONTINUOUS SOUND BARRIER (OR IF THE WALL IS A FIRE WALL, TO PROVIDE A CONTINUOUS FIRE BARRIER.)
12. ALL STUDS SHALL BE HELD AT LEAST 1/4" AWAY FROM STRUCTURAL STEEL COLUMNS.
13. IN SOME INSTANCES, THERMAL AND SOUND BATT INSULATION HAS BEEN OMITTED FROM THE DETAILS FOR CLARITY. SEE WALL TYPES.
14. ALL CEILING HEIGHTS LISTED ON THE REFLECTED CEILING PLANS ARE FROM THE FINISH FLOOR OF THE LISTED ROOM UNLESS NOTED OTHERWISE. BULKHEADS ARE TYPICALLY 2" BELOW ATC, UNLESS DETAILED OTHERWISE. SEE REFLECTED CEILING PLANS AND SECTIONS FOR ADDITIONAL DETAILS.
15. ALL ANGLES ON PLAN ARE 90 DEGREES OR 45 DEGREES UNLESS NOTED OTHERWISE.
16. WHERE WALL TYPES ARE INDICATED ON LARGE SCALE PLAN DETAILS, NOT ALL STUDS AND/OR FURRING ARE SHOWN ON THE DETAIL, IN SOME INSTANCES, FOR CLARITY. CONTRACTOR SHALL FRAME USING NORMAL FRAMING METHODS AND SHALL ALSO COMPLY WITH THOSE OUTLINED IN THE SPECIFICATIONS.
17. PROVIDE METAL FURRING AND GYPSUM WALLBOARD (GWB) AS REQUIRED TO CONCEAL ELECTRICAL, MECHANICAL AND PLUMBING IN OCCUPIED ROOMS. PROVIDE CHASES IN CORNERS FOR VERTICAL RUNS. COORDINATE ACTUAL LOCATIONS WITH ARCHITECT AND WITH SCOPE OF WORK, REGARDLESS IF SHOWN ON THE PLANS.
18. PROTECT ALL EXISTING SURFACES, MATERIALS AND EQUIPMENT SHOWN TO REMAIN. SUB-CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR / REPLACE ANY DAMAGED SURFACES, EQUIPMENT AND MATERIALS.
19. PROVIDE SEALANT AT ALL VERTICAL AND HORIZONTAL JOINTS BETWEEN DISSIMILAR MATERIALS, I.E. WHERE DRYWALL ABUTS MASONRY, HOLLOW METAL FRAME PERIMETER AND AS SPECIFIED OR AS DETAILED.
20. IT IS THE INTENT OF THIS SUB-CONTRACT THAT ALL AREAS AFFECTED BY CONSTRUCTION BE A FINISHED AND COMPLETE PROJECT. SUB-CONTRACTOR SHALL PATCH, REPAIR AND ADJUST AS REQUIRED TO ACHIEVE A FINISHED PRODUCT. SUB-CONTRACTOR SHALL PATCH AND REPAIR ALL EXISTING WORK AFFECTED OR DAMAGED BY DEMOLITION TO MATCH NEW CONSTRUCTION. FINISH ALL SURFACES IN THEIR ENTIRETY, I.E. CORNER TO CORNER.
21. PROVIDE CONTROL JOINTS IN GWB WALL (BOTH SIDES OF FRAME) ABOVE CORNERS AT ALL THREE SIDED DOOR FRAMES. CONTROL JOINT SHALL EXTEND TO 4" +/- ABOVE THE CEILING.
22. PROVIDE CONTROL JOINTS IN GWB WALLS AND CEILINGS AT A MAXIMUM SPACING OF 30 FEET IF THERE IS NO PERIMETER RELIEF. IF THERE IS PERIMETER RELIEF, THE MAXIMUM SPACING CAN BE 50 FEET.

REFERENCE SYMBOLS

DETAIL — # / A#-# — detail number; sheet where detail is found

ELEVATION — # / A#-# — detail number; sheet where detail is found; A, B, C, D

WALL SECTION REFERENCE — # / A#-#

BUILDING SECTION REFERENCE — # / A#-#

HEIGHT ELEVATION — T.O. MASONRY, EL. = #'-#"

COLUMN LINE — R

WALL TYPE — #.##

ROOM NAME AND NUMBER — ROOM NAME / ROOM #

NORTH ARROW

DOOR OPENING — ###

WINDOW OPENING — #

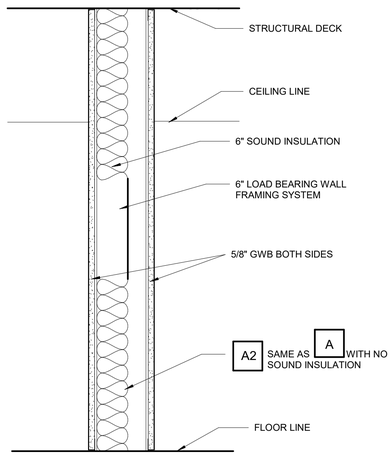
KEYNOTE - SEE SHEET FOR DESCRIPTION — #

MATERIALS

EARTH
GRANULAR FILL
CONCRETE
CONCRETE MASONRY
MASONRY UNIT
CUT STONE
COMPRESSIBLE FILLER
STEEL
DIMENSION LUMBER
PLYWOOD
FINISH WOOD
PARTICLE BOARD
ROOF OR RIGID INSULATION
CAULKING OR SEALANT
BATT OR LOOSE INSULATION
GYPSUM BOARD OR PLASTER
CERAMIC OR QUARRY TILE
ACOUSTICAL TILE
CARPET
MORTAR NET

INTERIOR PARTITION NOTES:

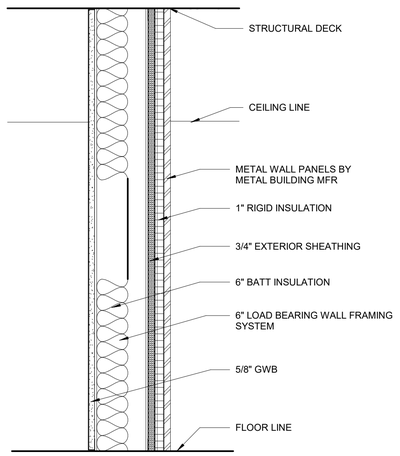
1. PROVIDE AND INSTALL ALL STIFFENERS, BRACING, BACK-UP PLATES AND SUPPORTING BRACKETS REQUIRED FOR THE INSTALLATION OF ALL FLOOR MOUNTED OR SUSPENDED MECHANICAL, ELECTRICAL OR EQUIPMENT.
2. WHERE HVAC OR OTHER MECHANICAL, ELECTRICAL AND PLUMBING ITEMS PENETRATE PARTITIONS, STUDS SHALL BE BRACED AND FRAMED TO STRUCTURE AS REQUIRED TO PROVIDE ADEQUATE SUPPORT. ALL PENETRATIONS THROUGH RATED WALLS SHALL BE SEALED TO PROVIDE FIRE, SMOKE, AND / OR ACOUSTICAL ISOLATION OF SPACES WITH APPROPRIATE FIRESTOP MATERIAL.
3. COORDINATE METAL STUD GAUGE WITH PRE-APPROVED EQUIPMENT ANCHORAGE. WHERE A DISCREPANCY OCCURS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.
4. WHERE COLUMN FURRING STUDS EXCEED THE MANUFACTURER'S RECOMMENDATION LIMITING HEIGHTS, STUDS SHALL BE BRACED BACK TO THE STRUCTURE AS REQUIRED.
5. WALL BASE NOT SHOWN ON WALL TYPES FOR CLARITY.
6. PROVIDE SOUND INSULATION AS REQUIRED TO MEET STC RATING INDICATED ON WALL TYPE. PROVIDE SOUND INSULATION IN WALLS AROUND THE FOLLOWING SPACES: CLASSROOMS, CONFERENCE ROOMS, OFFICES, COMMUNICATION AND ELECTRICAL ROOMS, MECHANICAL ROOMS, AND TOILETS. SOUND INSULATION IS NOT REQUIRED IN CALLS WITH CASED OPENINGS OR OTHER UNENCLOSED OPENINGS. SOUND INSULATION IS NOT REQUIRED ABOVE-CEILING WALL CAVITIES LOCATED OVER DOORS AND BORROWED LITES.



SECTION

RATING INFORMATION
FIRE RATING - NON-RATED
STC RATING - NON-RATED

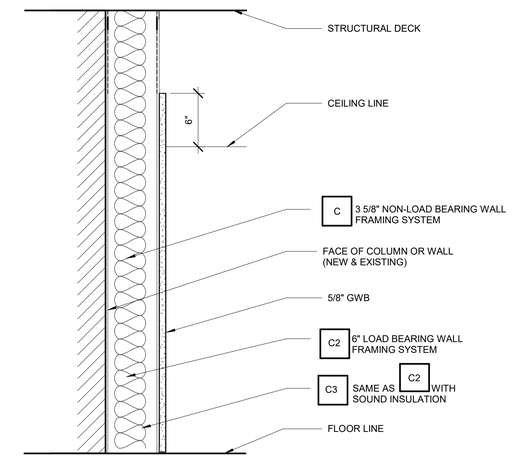
NON-FIRE RATED — NO SCALE — A | A2



SECTION

RATING INFORMATION
FIRE RATING - NON-RATED
STC RATING - NON-RATED

NON-FIRE RATED — NO SCALE — B



SECTION

RATING INFORMATION
FIRE RATING - NON-RATED

STUD FURRING — NO SCALE — C | C2 | C3

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DESIGNED:	MJM
CHECKED:	MJM
PROJ. MNGR:	SKK

NO.	DATE	DESCRIPTION	BY
0	03-06-2020	BID SET	KPE

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ABBREVIATIONS, GENERAL NOTES, TYP. WALL TYPES, DETAILS

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DATE: 03-06-2020

JOB NUMBER: 535-002

SHEET: G001

GENERAL NOTES:

PRE-BID INSTRUCTIONS:

1. SUB-CONTRACTOR SHALL BE REQUIRED TO VISIT SITE PRIOR TO BID AND CAREFULLY EXAMINE THE EXISTING CONDITIONS. SUB-CONTRACTOR SHALL NOT BE ALLOWED EXTRA COST DUE TO FAILURE TO VISIT SITE, AND TO INQUIRE WITH OWNER AND DESIGN PROFESSIONALS AS TO CLARIFICATIONS OF DISCREPANCIES AND UNKNOWNS.
2. SUB-CONTRACTOR SHALL REVIEW ENTIRE SET OF DRAWINGS AND SPECIFICATIONS TO DETERMINE THE SCOPE OF WORK. SUB-CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE REQUIREMENTS ON ALL CONTRACT DOCUMENTS INCLUDING CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION, AND ELECTRICAL DRAWINGS. EXTRA COST SHALL NOT BE ALLOWED DUE TO FAILURE TO REVIEW AND COORDINATE SCOPE OF WORK ENTIRE SET OF DRAWINGS AND SPECIFICATIONS.
3. DATA PRESENTED ON THE DRAWINGS ARE AS ACCURATE AS PRELIMINARY SURVEYS AND PLANNING CAN DETERMINE, BUT ACCURACY IS NOT GUARANTEED AND FIELD VERIFICATION OF ALL DIMENSIONS IS DIRECTED. SPECIFICATIONS, DISTANCES AND LEVELS WILL BE GOVERNED BY ACTUAL FIELD CONDITIONS. REVIEW CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION AND ELECTRICAL DRAWINGS AND ADJUST WORK TO CONFORM TO ALL CONDITIONS SHOWN THEREON. ACTUAL QUANTITY AND LOCATION OF DEVICES MAY VARY BASED ON CONDITIONS ENCOUNTERED DURING ORIGINAL CONSTRUCTION.
4. SUB-CONTRACTOR SHALL REFERENCE SPECIFICATIONS FOR CONSTRUCTION MATERIALS AND INSTALLATION PROCEDURES. THE SPECIFICATIONS ARE PART OF THE CONTRACT DOCUMENTS. IN THE EVENT OF CONFLICT BETWEEN SPECIFICATIONS AND DRAWINGS, SUCH CONFLICT SHALL BE BROUGHT TO THE ATTENTION OF ARCHITECT/ENGINEER AND CONSTRUCTION MANAGER FOR RESOLUTION.
5. THESE DOCUMENTS ARE DIAGRAMMATIC AND DO NOT NECESSARILY SHOW MATERIALS FOR COMPLETE INSTALLATION.

PROVIDE COMPLETE, COMPLIANT, AND OPERATIONAL SYSTEMS:

1. DRAWINGS AND SPECIFICATIONS (CONTRACT DOCUMENTS) HAVE BEEN PREPARED TO COMPLEMENT EACH OTHER. PROVIDE ITEMS SHOWN ON ONE AND NOT THE OTHER AS THOUGH SHOWN AND CALLED OUT IN BOTH. IF AN APPARENT CONFLICT EXISTS WITHIN THE CONTRACT DOCUMENTS, PRESUME TO PROVIDE THE MORE COSTLY CHOICE, AND WRITE REQUEST TO ARCHITECT/ENGINEER AND CONSTRUCTION MANAGER FOR CLARIFICATION.
2. PROVIDE, LABOR, MATERIALS, EQUIPMENT, FEES, AND PERMITS NECESSARY TO CONSTRUCT A COMPLETE, OPERATIONAL SYSTEM FOR THE ENTIRE PROJECT AS SHOWN ON THESE CONTRACT DOCUMENTS.
3. CONTRACT DOCUMENTS PRESENT THE GENERAL DESIGN, ARRANGEMENT AND EXTENT OF SYSTEMS. COMPLETE DETAIL IS NOT PRESENTED. DRAWINGS ARE DIAGRAMMATIC. BECAUSE OF THEIR SMALL SCALE, THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW NECESSARY FOR THE COMPLETE INSTALLATION. PROVIDE SYSTEMS COMPLETE AND OPERATIONAL AND IN COMPLIANCE WITH DESIGN INTENT. OBTAIN PERMISSION FROM ARCHITECT/ENGINEER PRIOR TO MAKING MAJOR DEVIATIONS FROM CONTRACT DOCUMENTS. EXAMPLES OF MAJOR DEVIATIONS ARE CHANGES IN COMPONENT SIZES, WEIGHTS, QUANTITIES, OR MATERIALS.
4. INSTALL EQUIPMENT IN STRICT ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S WRITTEN RECOMMENDATIONS. PROVIDE FITTINGS, AND OTHER SIMILAR DEVICES AND ACCESSORIES REQUIRED FOR A COMPLETE, WORKABLE INSTALLATION.
5. REPAIR OR REPLACE PARTS OF THIS WORK THAT FAIL OR BECOME DAMAGED DURING CONSTRUCTION WITH NO CHANGE TO THE CONTRACT PRICE.
6. EQUIPMENT SHALL BE LISTED AND LABELED BY AN APPROVED TESTING AGENCY.

PAY FEES / ADDITIONAL DESIGN FEES:

1. OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED FOR THE WORK; ARRANGE FOR INSPECTIONS REQUIRED FOR THE WORK; FURNISH A CERTIFICATE OF FINAL INSPECTION AND APPROVAL BY ENFORCEMENT AUTHORITIES.
2. WHEN ADJUSTMENTS, ALTERATIONS, OR CHANGES TO THE PROJECT ARE REQUIRED TO ACCOMMODATE PRODUCTS OTHER THAN “BASIS OF DESIGN”; THE SUB-CONTRACTOR WILL BE REQUIRED TO PAY PROFESSIONAL/DESIGN FEES REQUIRED TO MAKE SUCH ADJUSTMENTS, ALTERATIONS, AND CHANGES (INCLUDING BUT NOT LIMITED TO ARCHITECTURAL, MECHANICAL, ELECTRICAL, STRUCTURAL SUPPORT, AND CHANGES TO ACCOMMODATE MAINTENANCE NEEDS AND DESIGN INTENT).
3. PAY PROFESSIONAL/DESIGN FEES ASSOCIATED WITH SUB-CONTRACTOR INITIATED CHANGES OCCURRING AFTER SEALED CONTRACT DOCUMENTS ARE SUBMITTED FOR APPROVAL TO AUTHORITY HAVING JURISDICTION.
4. PAY PROFESSIONAL DESIGN FEES ASSOCIATED WITH SUB-CONTRACTOR'S FAILURE TO FOLLOW SUBMITTAL REQUIREMENTS.

SAVE AND PROTECT:

1. SAVE AND PROTECT EXISTING FINISHES, STRUCTURE, SYSTEMS AND EQUIPMENT TO REMAIN DURING THE EXECUTION OF THIS CONTRACT.
2. REPAIR AREAS AFFECTED BY WORK TO THEIR ORIGINAL CONDITION OR BETTER.
3. COORDINATE ADDITIONAL REQUIREMENTS WITH DEMOLITION NOTES.

MAKE SUBMITTALS:

1. INDIVIDUAL SUBMITTALS ARE TO BE PREPARED ELECTRONICALLY IN ADOBE "PDF" FORMAT. ELECTRONIC FILES SHALL BE ORIGINAL VENDOR-PREPARED ELECTRONIC FILES AND NOT SCANNED COPIES OF CATALOG PAGES OR FACSIMILES. INDIVIDUAL EQUIPMENT ITEMS SHALL BE TAGGED WITH EQUIPMENT IDENTIFIERS AS SHOWN ON THE DRAWINGS. ILLEGIBLE ELECTRONIC FILES ARE SUBJECT TO "REVISE AND RESUBMIT" ACTION. PAPER SUBMITTALS ARE SUBJECT TO "REVISE AND RESUBMIT" ACTION. REFER TO DIVISION 01 SECTION "SUBMITTAL PROCEDURES."
2. ELECTRONIC SUBMITTALS SHALL CONTAIN FULL PERFORMANCE, MATERIAL AND INSTALLATION INFORMATION ABOUT EQUIPMENT, PIPING, COMPONENTS AND ACCESSORIES TO BE USED. PROVIDE SUBMITTALS GROUPED INDIVIDUALLY BY SPECIFICATION SECTION. MULTIPLE SECTIONS INCLUDED WITHIN ONE SUBMITTAL ARE SUBJECT TO “REVISE AND RESUBMIT” ACTION. ARCHITECT/ENGINEER WILL REVIEW SUBMITTALS UP TO TWO TIMES.
3. INCLUDE WITH SUBMITTALS SPECIFIC WRITTEN NOTICE OF EACH VARIATION A SUBMITTAL HAS FROM THE REQUIREMENTS OF CONTRACT DOCUMENTS. ARCHITECT/ENGINEER REVIEW OF SUBMITTALS SHALL NOT RELIEVE SUB-CONTRACTOR FROM RESPONSIBILITY FOR COMPLIANCE WITH CONTRACT DOCUMENTS UNLESS THE ARCHITECT/ENGINEER HAS SPECIFICALLY ACCEPTED THE VARIATION IN WRITING.
4. SUBMIT SUBSTITUTION REQUESTS FOR APPROVAL. SUBSTITUTED EQUIPMENT SHALL MEET OR EXCEED STANDARDS SET BY ITEMS SPECIFIED.
5. SUBMIT A SCHEDULE OF CONSTRUCTION DOCUMENT CHANGES REQUIRED DUE TO 1) DIFFERENCES (BETWEEN PRELIMINARY DESIGN DATA AND SUBMITTAL DATA) IN “BASIS OF DESIGN” EQUIPMENT OR 2) SUBSTITUTED EQUIPMENT FOR REVIEW PRIOR TO INITIATING WORK. WHEN ADJUSTMENTS, ALTERATIONS, OR CHANGES TO THE PROJECT ARE REQUIRED TO ACCOMMODATE SUBSTITUTED PRODUCTS, THE SUB-CONTRACTOR SHALL PAY PROFESSIONAL/DESIGN FEES REQUIRED TO MAKE SUCH ADJUSTMENTS, ALTERATIONS, AND CHANGES.
6. SUBSTITUTION REQUESTS SHALL SHOW ENERGY CONSERVATION FEATURES OF SUBSTITUTED EQUIPMENT EQUAL OR EXCEED THAT OF SPECIFIED EQUIPMENT.
7. CONTRACTOR TO SUBMIT SCHEDULE FOR REQUIRED SUBMITTALS WITH CONSTRUCTION SCHEDULE AT TIME OF PRE-CONSTRUCTION MEETING.

DEFINITIONS:

1. ACTION SUBMITTALS: WRITTEN AND GRAPHIC INFORMATION THAT REQUIRES DESIGN PROFESSIONAL'S RESPONSIVE ACTION. ACTION SUBMITTALS INCLUDE PRODUCT DATA, SHOP DRAWINGS, SAMPLES, PRODUCT SCHEDULE OR LIST.
2. INFORMATIONAL SUBMITTALS: WRITTEN INFORMATION THAT DOES NOT REQUIRE DESIGN PROFESSIONAL'S RESPONSIVE ACTION. SUBMITTALS MAY BE REJECTED FOR NOT COMPLYING WITH REQUIREMENTS. INFORMATION SUBMITTALS INCLUDE COORDINATION DRAWINGS, WELDING CERTIFICATES, QUALIFICATION DATA, INSTALLER CERTIFICATES, MANUFACTURER CERTIFICATES, PRODUCT CERTIFICATES, MATERIAL CERTIFICATIONS, MATERIAL TEST REPORTS, PRODUCT TEST REPORTS, FIELD TEST REPORTS, OPERATION AND MAINTENANCE DATA, MANUFACTURER'S INSTRUCTIONS, MANUFACTURER'S FIELD REPORTS, INSURANCE CERTIFICATES AND BONDS, MATERIAL SAFETY DATA SHEETS AND RECOMMENDED SPARE PARTS LISTS.
3. FURNISH: OBTAIN AND DELIVER TO ON-SITE STORAGE IN ORIGINAL FACTORY PACKAGING.
4. INSTALL: UNPACK, MOVE TO FINAL LOCATION, MAKE CONNECTIONS, AND PLACE INTO FINAL SERVICE ACCORDING TO PROCEDURES IDENTIFIED IN PART 3 OF APPLICABLE SPECIFICATION SECTION(S).
5. PROVIDE: FURNISH AND INSTALL.

KEEP RECORDS:

1. DURING CONSTRUCTION, MAINTAIN A SET OF AS-BUILT, RED-LINED, RECORD DRAWINGS AT THE PROJECT SITE. RECORD CHANGES IN LAYOUT, ROUTING, EQUIPMENT, COMPONENTS, AND ACCESSORIES. RECORD CHANGES DUE TO CHANGES IN SUPPLIED EQUIPMENT. AFTER ARCHITECT/ENGINEER'S FINAL REVIEW, SUB-CONTRACTORS SHALL; PROVIDE RECORD DRAWINGS TO ARCHITECT/ENGINEER.

COORDINATE:

1. PRIOR TO ORDERING, FABRICATING, OR INSTALLING WORK, COORDINATE WORK WITH WORK OF OTHER SUB-CONTRACTORS. EXAMPLES OF WORK BY OTHERS INCLUDE BUT ARE NOT LIMITED TO CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION, REFRIGERATION, AND ELECTRICAL WORK. WHERE CONFLICTS OCCUR, RESOLVE THEM PRIOR TO FABRICATION AND INSTALLATION.
2. DURING INSTALLATION, RESOLVE CONFLICTS AND MAKE CHANGES RESULTING FROM LACK OF SUB-CONTRACTOR COORDINATION WITH NO CHANGE TO THE CONTRACT PRICE.
3. LOCATIONS AND SIZES OF SERVICE CONNECTIONS TO EQUIPMENT, FLOOR AND WALL OPENINGS, SUPPORTS, CONCRETE PADS, FOUNDATIONS, SPACE ARRANGEMENTS, ELECTRICAL POWER, AND OTHER SIMILAR PROVISIONS FOR EQUIPMENT ARE BASED ON PRELIMINARY INFORMATION, WHICH WAS AVAILABLE DURING DESIGN, TO SHOW DESIGN INTENT AND SPACE ALLOCATION. ACTUAL CONDITIONS MAY VARY DEPENDING ON CONFIGURATION OF PURCHASED EQUIPMENT. PRIOR TO INITIATING WORK, VERIFY ABOVE TYPES OF INFORMATION FROM EQUIPMENT DRAWINGS CERTIFIED FOR MANUFACTURE BY RESPECTIVE EQUIPMENT MANUFACTURERS. MAKE MODIFICATIONS FROM WHAT IS SHOWN IN CONTRACT DOCUMENTS TO PROVIDE SUCCESSFUL EQUIPMENT INSTALLATION WITH NO CHANGE IN CONTRACT PRICE. SUBMIT A SCHEDULE OF SUCH CHANGES FOR REVIEW PRIOR TO INITIATING WORK. DOCUMENT REVIEWED CHANGES ON RECORD DRAWINGS.
4. NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF EXISTING CONDITIONS THAT DIFFER FROM THOSE SHOWN IN CONTRACT DOCUMENTS. THE ARCHITECT/ENGINEER WILL EVALUATE THE DIFFERENCES, AND IF NECESSARY, REDESIGN FOR THE CONDITIONS FOUND.
5. DO NOT SCALE OFF CONTRACT DOCUMENTS. COORDINATE INSTALLATION WITH FIELD CONDITIONS.
6. WHERE BUILDING ELEMENTS (FOR EXAMPLE, DOOR FRAMES, PORTIONS OF WALLS, PORTIONS OF FLOORS, ETC.) HINDER REMOVAL OF EXISTING OR INSTALLATION OF NEW EQUIPMENT, REMOVE AND REPLACE SUCH ELEMENTS. UPON SUBSTANTIAL COMPLETION, ENSURE THAT BUILDING ELEMENTS MATCH THE ORIGINAL CONDITIONS AND/OR ADJACENT FINISHED CONDITIONS.
7. COORDINATE ALL WORK ON EXISTING ROOFS WITH OWNER TO MAINTAIN ROOFING SYSTEM WARRANTY.

CONTROL QUALITY:

1. WORK SHALL BE COMPLETED IN ACCORDANCE WITH APPROPRIATE LOCAL, STATE, AND NATIONAL BUILDING CODES.
2. TAKE RESPONSIBILITY FOR EQUIPMENT CHECK-IN, SAFEKEEPING, AND DAMAGE PREVENTION.
3. UNSPECIFIED EQUIPMENT OR SYSTEMS SHALL BE REPRESENTED BY DULY AUTHORIZED DISTRIBUTORS WITH SERVICE DEPARTMENTS REGULARLY ENGAGED IN THE MAINTENANCE AND INSTALLATION OF THESE SYSTEMS AND EQUIPMENT. SUCH SERVICE DEPARTMENTS SHALL REGULARLY STOCK STANDARD REPLACEMENT PARTS AND EQUIPMENT AND SHALL BE LOCATED WITHIN A REASONABLE DISTANCE FROM THE INSTALLATION SITE.
4. WHENEVER A MATERIAL, ARTICLE, OR PIECE OF EQUIPMENT IS IDENTIFIED ON THE DRAWINGS BY REFERENCE TO MANUFACTURERS, VENDORS NAMES, TRADE NAMES, CATALOG NUMBERS, OR THE LIKE, IT IS SO IDENTIFIED FOR THE PURPOSE OF ESTABLISHING A STANDARD. MATERIALS, ARTICLES, OR PIECES OF EQUIPMENT FROM OTHER MANUFACTURERS OR VENDORS, WHICH WILL ADEQUATELY PERFORM THE DUTIES IMPOSED BY THE GENERAL DESIGN, WILL BE CONSIDERED EQUALLY ACCEPTABLE PROVIDED THEY ARE OF EQUAL SUBSTANCE, APPEARANCE, AND FUNCTION.
5. MEASURE INDICATED MOUNTING HEIGHTS TO BOTTOM OF UNIT FOR SUSPENDED ITEMS AND TO CENTER OF UNIT FOR WALL-MOUNTING ITEMS.
6. IF MOUNTING HEIGHTS OR OTHER LOCATION CRITERIA ARE NOT INDICATED, ARRANGE AND INSTALL COMPONENTS AND EQUIPMENT TO PROVIDE MAXIMUM POSSIBLE HEADROOM PROVIDE SERVICEABILITY:
   a. PROVIDE ACCESS PANELS TO ENABLE ACCESS TO DEVICES REQUIRING SERVICE OR OPERATION. ACCESS PANELS ARE NOT REQUIRED WHERE ACCESS IS READILY ACCOMPLISHABLE THROUGH NORMALLY REMOVABLE FEATURES SUCH AS LAY-IN CEILINGS PANELS.
   b. PROVIDE SERVICE CLEARANCES AROUND EQUIPMENT AS RECOMMENDED BY EQUIPMENT MANUFACTURER.

ADDRESS PENETRATIONS:

1. IN FIRE AND SMOKE RATED BARRIERS, PROVIDE FIRE STOPPING ASSEMBLIES LISTED BY A RECOGNIZED INDEPENDENT TESTING LABORATORY AND MATCHED TO FIELD CONDITIONS. (COORDINATE WITH DIVISION 7.)

CLOSEOUT:

1. GUARANTEE SYSTEMS (PARTS AND LABOR) FOR A MINIMUM PERIOD OF ONE YEAR AFTER THE DATE OF SUBSTANTIAL COMPLETION.
2. PROVIDE ONE DIGITAL (SEARCHABLE PDF) AND TWO OPERATING AND MAINTENANCE MANUALS IN HARD BACK LOOSE LEAF BINDERS. MANUALS SHALL CONTAIN PRODUCT CUT SHEETS AND OPERATING AND MAINTENANCE INSTRUCTIONS FOR EQUIPMENT, ACCESSORIES, FIXTURES, VALVES, ETC. SEE DIVISIONAL SPECS FOR OTHER REQUIREMENTS.
3. IMMEDIATELY BEFORE TURNING SYSTEMS OVER TO OWNER, DEMONSTRATE FULL AND PROPER SYSTEMS OPERATIONS TO ENGINEER AND OWNER. IMMEDIATELY BEFORE DEMONSTRATION, PROPERLY AND FULLY RE-LUBRICATE EQUIPMENT.
4. UPON COMPLETION OF WORK, REMOVE SURPLUS MATERIALS AND RUBBISH. MAKE REQUIRED PATCHING AND REPAIRS OF OTHER TRADES' WORK THAT YOU DAMAGED. LEAVE THE PREMISES IN A CLEAN AND ORDERLY CONDITION.
5. UPON SUBSTANTIAL COMPLETION OF THE PROJECT, THE ARCHITECT/ENGINEER WILL PERFORM A WALK-THROUGH TO PREPARE A PUNCH LIST OF INSUFFICIENTLY COMPLETED ITEMS. THE ARCHITECT/ENGINEER WILL SUBMIT THIS PUNCH LIST TO THE SUB-CONTRACTOR WHO SHALL COMPLETE THE ITEMS INDICATED ON THE PUNCH LIST AND SUBSEQUENTLY REQUEST A RE-INSPECTION. UPON RE-INSPECTION, IF THE ARCHITECT/ENGINEER DETERMINES THAT ITEMS ALREADY IDENTIFIED REMAIN INSUFFICIENTLY COMPLETE, THE ARCHITECT/ENGINEER'S COSTS ASSOCIATED WITH ADDITIONAL RE-INSPECTIONS WILL BE BILLED TO THE SUB-CONTRACTOR ON A TIME AND MATERIALS BASIS.

DRAWN: RWV
DESIGNED: MJM
CHECKED: MJM
PROJ. MNGR: SKK

NO.	DESCRIPTION	DATE	BY
0	BID SET	03-06-2020	KPE

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DONIPHAN, NE 68832

ARCHITECT / ENGINEER:
KPE – ARCHITECTURE-ENGINEERING-FORENSICS
1016 LEAVENWORTH STREET
OMAHA, NE 68102

APPLICABLE CODES:
2012 INTERNATIONAL BUILDING CODE (IBC)
2012 INTERNATIONAL FIRE CODE (IFC)
2012 UNIFORM MECHANICAL CODE (UFC)
2012 UNIFORM PLUMBING CODE (UPC)
2017 NATIONAL ELECTRICAL CODE (NEC)
2009 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)
2012 INTERNATIONAL FUEL GAS CODE (IFGC)
2014 HALL COUNTY ZONING RESOLUTION
2010 ADA STANDARDS FOR ACCESSIBLE DESIGN NEBRASKA ACCESSIBILITY REQUIREMENTS
2000 NFPA 101 - LIFE SAFETY CODE (LSC)

2009 IECC

TABLE 301.1:
DONIPHAN, NEBRASKA IS A CLIMATE ZONE 5A.

TABLE 502.2:
METAL BUILDINGS (WITH R-5 THERMAL BLOCKS) REQUIRE R-13 + R-13 (SEE TABLE 502.2(2)
METAL BUILDING WALLS REQUIRE R-13 + R-5.6 CI (SEE TABLE 502.2(2)
UNHEATED SLAB ON GRADE FLOORS HAVE NO REQUIREMENTS
SWINGING DOORS REQUIRE U-0.70
ROLL-UP OR SLIDING REQUIRE U-0.50

2012 IBC
USE AND OCCUPANCY CLASSIFICATION (IBC CHAPTER 3):
OCCUPANCY CLASSIFICATION: STORAGE - GROUP S-1

BUILDING HEIGHT AND AREAS (IBC CHAPTER 5):

BASIC ALLOWABLE (TABLE 503):

OCCUPANCY TYPE:	S-1
CONSTRUCTION TYPE:	II-B
ALLOWABLE BUILDING HEIGHT:	55 FEET
ALLOWABLE # OF STORIES:	2
ALLOWABLE SQUARE FOOTAGE:	17,500 (PER FLOOR)

SECTION 506 BUILDING AREA MODIFICATIONS:

506.1 GENERAL (TOTAL ALLOWABLE AREA) (EQUATION 5-1)
Aa = { At + [At x If] + [At x Is] }
Aa = {17,500 + [17,500 x .42] + [17,500 x 0]}
Aa = 17,500 SF + 7,350F + 0 SF = 24,850 SF

506.2 FRONTAGE INCREASE (EQUATION 5-2)
EVERY BUILDING SHALL ADJOIN OR HAVE ACCESS TO A PUBLIC WAY TO RECEIVE A BUILDING AREA INCREASE FOR FRONTAGE. WHERE A BUILDING HAS MORE THAN 25 PERCENT OF ITS PERIMETER ON A PUBLIC WAY OR OPEN SPACE HAVING A WIDTH OF NOT LESS THAN 20 FEET, THE FRONTAGE INCREASE SHALL BE DETERMINED IN ACCORDANCE WITH EQUATION 5-2.

EQUATION 5-2:

If = [F/P - 0.25] W/30
If = [200/300 - 0.25] 30/30 = 0.67
If = [.67 - 0.25] (1) = 0.42

	ALLOWED	PROPOSED
BUILDING AREA:	24,850 SF	5,019 SF
BUILDING HEIGHT IN FEET:	55 FEET	19 FEET
BUILDING HEIGHT IN STORIES:	2 STORIES	1 STORY

TYPES OF CONSTRUCTION (IBC CHAPTER 6):

CONSTRUCTION TYPE: II-B

STRUCTURAL FIRE RATINGS (TABLE 601)

PRIMARY STRUCTURAL FRAMING:	0 HOUR
BEARING WALLS - EXTERIOR:	0 HOUR
BEARING WALLS - INTERIOR:	0 HOUR
NON BEARING WALLS & PART. - EXT:	0 HOUR
NON BEARING WALLS & PART. - INT:	0 HOUR
FLOOR CONSTRUCTION	0 HOUR
ROOF CONSTRUCTION	0 HOUR

FIRE AND SMOKE PROTECTION FEATURES (IBC CHAPTER 7):

706 FIRE WALLS:	NOT REQUIRED / NOT PROVIDED
707 FIRE BARRIERS:	NOT REQUIRED / NOT PROVIDED
708 FIRE PARTITIONS:	NOT REQUIRED / NOT PROVIDED
709 SMOKE BARRIERS:	NOT REQUIRED / NOT PROVIDED
710 SMOKE PARTITIONS:	NOT REQUIRED / NOT PROVIDED
713 SHAFT ENCLOSURES:	NOT REQUIRED / NOT PROVIDED
714 PENETRATIONS:	NOT REQUIRED / NOT PROVIDED
716 OPENING PROTECTIVES	NOT REQUIRED / NOT PROVIDED

FIRE PROTECTION SYSTEMS (IBC CHAPTER 9):

903 AUTOMATIC SPRINKLER SYSTEM: NOT REQUIRED / NOT PROVIDED

906 PORTABLE FIRE EXTINGUISHERS: REQUIRED / PROVIDED
3,000 SF / UNIT OF A
MAX TRAVEL = 75 FEET

907 FIRE ALARM AND DETECTION SYSTEMS:

MANUAL FIRE ALARM:	NOT REQUIRED / NOT PROVIDED
AUTOMATIC FIRE ALARM:	NOT REQUIRED / NOT PROVIDED
FACP:	NOT REQUIRED / NOT PROVIDED
REMOTE ANNUNCIATOR PANEL:	NOT REQUIRED / NOT PROVIDED
SMOKE DETECTION:	NOT REQUIRED / NOT PROVIDED
HEAT DETECTION:	NOT REQUIRED / NOT PROVIDED
FIRE PUMP:	NOT REQUIRED / NOT PROVIDED
BACKUP POWER:	NOT REQUIRED / NOT PROVIDED

MEANS OF EGRESS (IBC CHAPTER 10)

1004 DESIGN OCCUPANT LOADS
TOTAL OCCUPANTS: 18
EGRESS WIDTH REQUIRED: 18 x 0.20 = 3.6 TOTAL INCHES (32 TOTAL INCHES MINIMUM)
EGRESS WIDTH PROVIDED: 2 DOORS x 32 INCHES EACH = 64 TOTAL INCHES

1006 MEANS OF EGRESS ILLUMINATION
THE MEANS OF EGRESS, INCLUDING THE EXIT DISCHARGE, SHALL BE ILLUMINATED AT ALL TIMES THE BUILDING SPACES SERVED BY THE MEANS OF EGRESS IS OCCUPIED.

1007.1 ACCESSIBLE MEANS OF EGRESS
2 REQUIRED = 2 PROVIDED

1008.1.1 SIZE OF DOORS
MIN. CLEAR WIDTH OF 32" MEASURED FROM THE FACE OF THE DOOR AND THE STOP WITH THE DOOR OPEN 90 DEGREES

1008.1.2 DOOR SWING
DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHERE SERVING AN OCCUPANT LOAD OF 50 OR MORE

1011.1 EXIT SIGNS
REQUIRED EVERY 100 FEET OR VIEWABLE.

1011.2 ILLUMINATION
EXIT SIGNS SHALL BE INTERNALLY OR EXTERNALLY ILLUMINATED.

1015.1 EXIT AND EXIT ACCESS DOORWAYS
TWO EXITS OR EXIT ACCESS DOORWAYS FROM ANY SPACE SHALL BE PROVIDED IF THERE IS MORE THAN 49 OCCUPANTS IN THAT SPACE (TABLE 1015.1).

1016.1 TRAVEL DISTANCE
MAXIMUM TRAVEL DISTANCE = 117'-0" ACTUAL > 200'-0" ALLOWED*
*(MAXIMUM TRAVEL DISTANCE ALLOWED BY NFPA 101.)

1021.2 NUMBER OF EXITS
2 REQUIRED = 2 PROVIDED

1027.1 EXIT DISCHARGE
EXITS SHALL DISCHARGE DIRECTLY TO THE EXTERIOR OF THE BUILDING.

ACCESSIBILITY (IBC CHAPTER 11):
SITES, BUILDINGS, STRUCTURES, FACILITIES, ELEMENTS AND SPACES, TEMPORARY OR PERMANENT, SHALL BE ACCESSIBLE TO PERSONS WITH PHYSICAL DISABILITIES.

1104.1 SITE ARRIVAL POINTS
ACCESSIBLE ROUTES WITHIN THE SITE SHALL BE PROVIDED FROM PUBLIC TRANSPORTATION STOPS; ACCESSIBLE PARKING; ACCESSIBLE PASSENGER LOADING ZONES; AND PUBLIC STREETS OR SIDEWALKS TO THE ACCESSIBLE BUILDING ENTRANCE SERVED.

1104.2 WITHIN A SITE
AT LEAST ONE ACCESSIBLE ROUTE SHALL CONNECT ACCESSIBLE BUILDINGS, ACCESSIBLE FACILITIES, ACCESSIBLE ELEMENTS AND ACCESSIBLE SPACES THAT ARE ON THE SAME SITE.

1110.1 SIGNS
SIGNS ARE REQUIRED FOR ACCESSIBLE ELEMENTS.

INTERIOR ENVIRONMENT (IBC CHAPTER 12):
VENTILATION IS IN ACCORDANCE WITH THE UNIFORM MECHANICAL CODE

ENERGY EFFICIENCY (IBC CHAPTER 13):
BUILDING SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE INTERNATIONAL ENERGY CONSERVATION CODE.

EXTERIOR WALLS (IBC CHAPTER 14):
EXTERIOR WALLS SHALL BE DESIGNED IN ACCORDANCE TO THIS CHAPTER.

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES (CHAPTER 15):
ROOF COVERING WILL BE CLASS 'A' OR BETTER (FLAME SPREAD)

PLUMBING SYSTEMS (CHAPTER 29):

PLUMBING FIXTURES (TABLE 2902.1):

	# REQUIRED	#PROVIDED
FEMALE - WATER CLOSETS	6	6
FEMALE - LAVATORIES	4	4
MALE - WATER CLOSETS	3	3
MALE - URINALS	3	3
MALE - LAVATORIES	3	3
DRINKING FOUNTAINS:	2	2

2000 NFPA 101 - LIFE SAFETY REQUIREMENTS:

OCCUPANCY CLASSIFICATION: (NFPA 101: CH 6)

NFPA CH 42 – NEW STORAGE OCCUPANCY

CHAPTER 4 - GENERAL

4.5.3 MEANS OF EGRESS:
- 4.5.3.1 – A MINIMUM OF TWO MEANS OF EGRESS IS REQUIRED IN THE BUILDING
- 4.5.3.2 – MEANS OF EGRESS FROM ALL PARTS OF THE BUILDING SHALL BE MAINTAINED FREE AND UNOBSTRUCTED.
- 4.5.3.3 – EVERY EXIT SHALL BE CLEARLY VISIBLE OR THE ROUTE TO REACH EVERY EXIT SHALL BE CONSPICUOUSLY INDICATED.

CHAPTER 6 – CLASSIFICATION OF OCCUPANCY AND HAZARD OF CONTENTS

6.1.13 STORAGE:
- THE BUILDING WILL BE CLASSIFIED AS A STORAGE OCCUPANCY AND FOLLOW THE REQUIREMENTS OF CHAPTER 42

CHAPTER 7 - MEANS OF EGRESS

7.2.1 DOORS:
- 7.2.1.2.3 - DOOR WIDTH - DOORS COMPLY WITH THE 32" MIN. WIDTH REQUIREMENT
- 7.2.1.4.3 - DOOR SWING - EGRESS DOORS SWING IN THE DIRECTION OF EGRESS TRAVEL
- 7.2.1.7.1 - PANIC HARDWARE - EGRESS DOORS HAVE PANIC HARDWARE

7.3.3 CAPACITY OF MEANS OF EGRESS:
- 7.3.1.2 OCCUPANT LOAD – 18 = TOTAL OCCUPANT LOAD OF NEW BUILDING.

7.4 NUMBER OF EXITS:
- 7.4.1.2 NUMBER OF EXITS - 2 REQUIRED = 2 PROVIDED

7.6 TRAVEL DISTANCE TO EXITS:
- 7.6.2 TO 7.6.5 - SEE FLOOR PLAN

7.8 ILLUMINATION OF MEANS OF EGRESS:
- PROVIDED - COORDINATE WITH ELECTRICAL DRAWINGS.

7.9 EMERGENCY LIGHTING:
- PROVIDED - COORDINATE WITH ELECTRICAL DRAWINGS.

7.10 MARKING OF MEANS OF EGRESS:
- 7.10.1.2 - PROVIDED - COORDINATE WITH ELECTRICAL DRAWINGS.

CHAPTER 9 BUILDING SERVICE AND FIRE PROTECTION EQUIPMENT:

9.7 AUTOMATIC SPRINKLERS AND OTHER EXTINGUISHING EQUIPMENT:
- 9.7.1 – THE BUILDING IS NOT REQUIRED TO HAVE AUTOMATIC SPRINKLERS.
- 9.7.4 – THE BUILDING WILL HAVE PORTABLE FIRE EXTINGUISHERS.

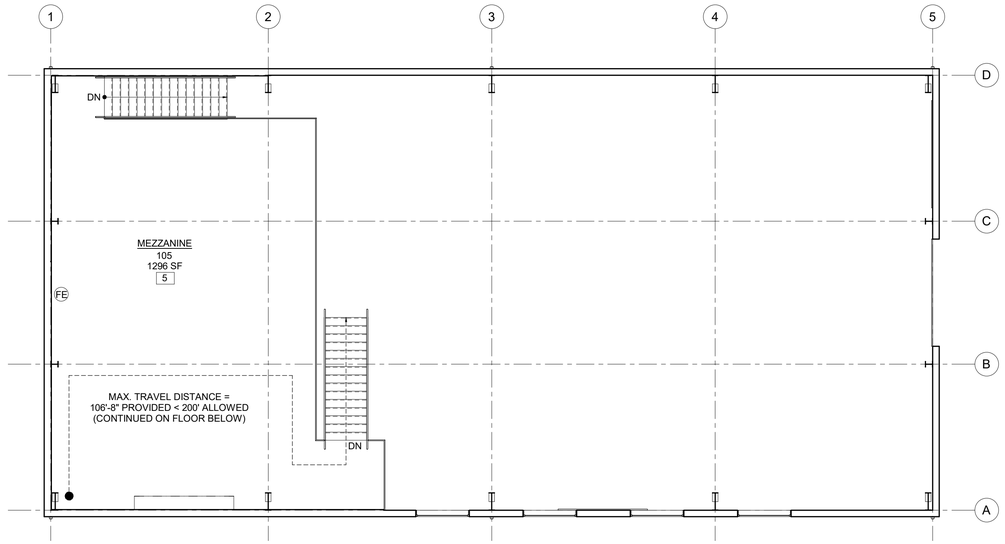
CHAPTER 10 INTERIOR FINISH, CONTENTS, AND FURNISHINGS
- THE BUILDING WILL CONFORM TO THIS SECTION.

CHAPTER 42 NEW STORAGE OCCUPANCY
- THE BUILDING WILL CONFORM TO THIS SECTION.

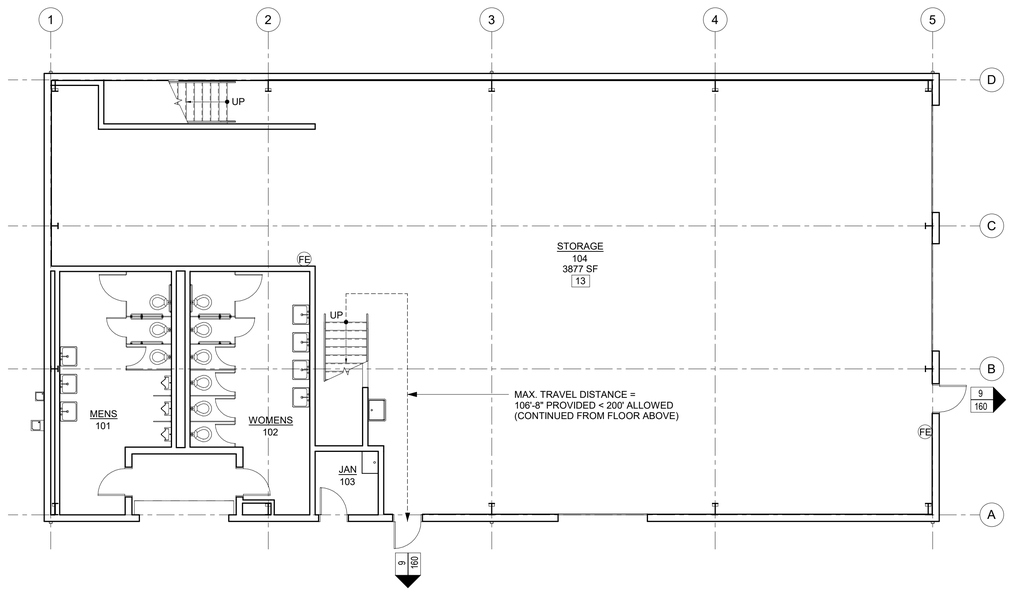
OCCUPANCY TYPE:	S-1
CONSTRUCTION TYPE:	II B
BUILDING AREA:	5,019 SF
TOTAL OCCUPANTS:	18
BUILDING HEIGHT IN FEET:	19'-0"
BUILDING HEIGHT IN STORIES:	1 STORY

0 / 0 -COMBINED OCCUPANT LOAD AT GIVEN DOOR OR STAIR
-TOTAL EXIT CAPACITY OF DOOR OR STAIR
(THE CAPACITY OF DOORS ARE DETERMINED AS FOLLOWS:
CLEAR OPENING WIDTH IN INCHES DIVIDED BY 0.2
THE CAPACITY OF STAIRS ARE DETERMINED AS FOLLOWS
WIDTH IN INCHES DIVIDED BY 0.3

[##] -OCCUPANCY LOAD



2 / G101 CODE REVIEW PLAN - MEZZANINE
1/8" = 1'-0"
NORTH



1 / G101 CODE REVIEW PLAN - FIRST LEVEL
1/8" = 1'-0"
NORTH

DRAWN:	RWV					KPE	BY
DESIGNED:	MJM						
CHECKED:	MJM						
PROJ. MNGR:	SKK	BID SET	0	03-06-2020	DESCRIPTION	NO.	DATE

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ARCHITECT
PROFESSIONAL ENGINEER
MICHAEL JAY MCLENNAN
A-1468
STATE OF NEBRASKA
03/06/2020

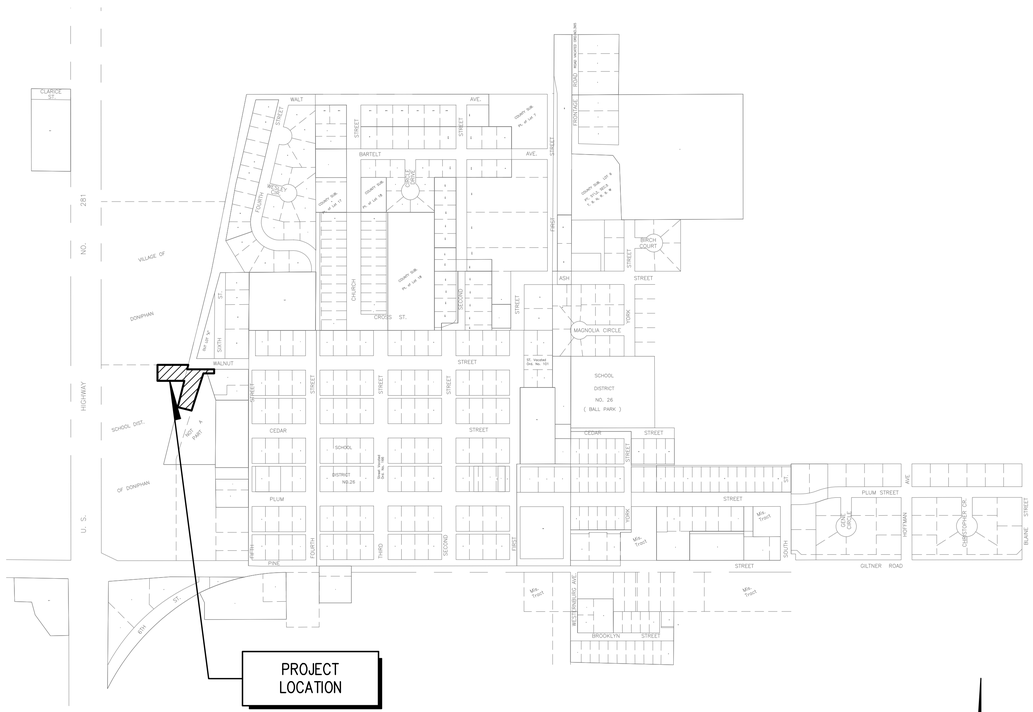
STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O.BOX 300, DONIPHAN, NE 68832

CODE REVIEW PLAN

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DATE: 03-06-2020
JOB NUMBER: 535-002
SHEET: G101

M&A DWG. NO. 36422



DONIPHAN, NEBRASKA

SYMBOL	DESCRIPTION
	HEDGES, BUSHES, SHRUBS OR WOODS
	DECIDUOUS TREE
	CONIFEROUS TREE
	TREE STUMP
	CONCRETE, ASPHALT STREETS, ROADS OR DRIVES
	GRAVEL STREETS, ROADS OR DRIVES
	CONCRETE WALKS OR SLABS
	CURB AND GUTTER
	CATCH BASIN
	POWER POLE
	LIGHT POLE
	GUY WIRE
	STREET SIGN
	TELEPHONE RISER
	FLAG POLE
	EXISTING STRUCTURE
	MAILBOX
x x x	FENCE–LIGHT WOOD OR WIRE
	CULVERT
	RAILROAD TRACKS
	PROPERTY PIN
	CENTERLINE
	PROPERTY OR ROW LINE
	RECOVERY WELL/MONITORING WELL
	PROPOSED CONCRETE PAVEMENT
	PROPOSED CRUSHED ROCK SURFACING
	PROPOSED ABSORPTION FIELD TRENCH
	PROPOSED STRUCTURE
	PROPOSED SEPTIC TANK

SYMBOL	DESCRIPTION
	BASE LINE
	BASE LINE WITH POINT OF INTERSECTION
	PERMANENT EASEMENT
	TEMPORARY EASEMENT
	GAS METER OR REGULATOR
	WATER METER
	PROPOSED WATER VALVE
	EXISTING WATER VALVE
	FIRE HYDRANT
	CURB STOP
	YARD HYDRANT
	PROPOSED WATER SERVICE
	EXISTING WATER SERVICE
W	EXISTING WATER MAIN
Stm	EXISTING STORM SEWER
San	EXISTING SANITARY SEWER
	MANHOLE
	CLEANOUT
OHE	OVERHEAD ELECTRICAL LINE
UGE	UNDERGROUND ELECTRICAL LINE
FO	UNDERGROUND FIBER OPTIC LINE
GAS	UNDERGROUND GAS LINE
	DRAINAGE COURSE OR FLOW LINE
	EXISTING GROUND CONTOUR
	NEW GROUND CONTOUR
	LIMITS OF CONSTRUCTION
	PROPOSED SILT FENCE
	PROPOSED RIDGE LINE
	PROPOSED VALLEY LINE

BASIS OF BEARINGS:

ALL BEARINGS ARE BASED ON HALL COUNTY LOW DISTORTION PROJECTION FROM NEBRASKA STATE SURVEYOR'S OFFICE.

PROJECTION	= TRANSVERSE MERCATOR
SCALE FACTOR	= 1.0000868
CENTRAL MERIDIAN	= 98°26'00" WEST
STANDARD PARALLEL	= 40°52'00" NORTH
FALSE N/E	= 25000/30000 (METERS)
SPHEROID – DATUM	= GRS80 – NAD83

GENERAL NOTES:

1. CONTRACTOR IS TO COORDINATE ALL STREET CLOSINGS WITH THE VILLAGE OF DONIPHAN. NOTIFY FIRE/RESCUE DEPARTMENT, AND ALL ADJOINING PROPERTY OWNERS 72 HOURS PRIOR TO CLOSING STREETS OR DRIVES.
2. THE LOCATION OF ALL AERIAL AND UNDERGROUND UTILITY FACILITIES MAY NOT BE INDICATED IN THESE DRAWINGS. UNDERGROUND UTILITIES, WHETHER INDICATED OR NOT, WILL BE LOCATED AND FLAGGED BY THE UTILITIES AT THE REQUEST OF THE CONTRACTOR.
3. NO EXCAVATION WILL BE PERMITTED IN THE AREA OF UNDERGROUND UTILITY FACILITIES UNTIL ALL SUCH FACILITIES HAVE BEEN LOCATED AND IDENTIFIED TO THE SATISFACTION OF ALL PARTIES AND THEN ONLY WITH EXTREME CARE TO AVOID ANY POSSIBILITY OF DAMAGE TO THE UTILITY FACILITY.
4. ALL SIGNS, MAILBOXES, CULVERTS, GUY WIRES, FENCES, AND PROPERTY PINS ENCOUNTERED DURING THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
5. SAW CUTTING OF PAVEMENT IS REQUIRED FOR REMOVAL AND IS INCIDENTAL TO THE PROJECT. ADDITIONAL SAW CUTTING BEYOND THAT WHICH IS INDICATED ON THE DRAWINGS MAY BE REQUIRED.
6. TOPSOIL SHALL BE REMOVED, STOCKPILED AND REPLACED FOR ALL EXCAVATION AREAS.
7. PERMITS AND VILLAGE COORDINATION FOR ALL WORK, INCLUDING OPERATIONS WITHIN VILLAGE RIGHT–OF–WAY AND INVOLVING VILLAGE–OWNED OR VILLAGE–OPERATED FACILITIES, ARE THE RESPONSIBILITY OF THE CONTRACTOR.

GRADING NOTES:

8. PRIOR TO STARTING EARTHWORK, THE CONTRACTOR SHALL PROVIDE SAMPLES OF BOTH ONSITE AND PROPOSED BORROW SOIL MATERIALS TO AN INDEPENDENT SOIL TESTING LABORATORY TO PERFORM PROCTOR TESTING.
9. COMPACT SOIL MATERIALS TO NOT LESS THAN THE FOLLOWING PERCENTAGES (PER ASTM D 698):
   A. UNDER STRUCTURES, BUILDING SLABS, AND STEPS, SCARIFY AND RECOMPACT TOP 12 INCHES OF EXISTING SUBGRADE AND EACH LAYER OF BACKFILL OR FILL SOIL MATERIAL TO AT LEAST 95 PERCENT.
   B. UNDER PAVEMENTS, DRIVING SURFACES, AND WALKWAYS, SCARIFY AND RE–COMPACT TOP 6 INCHES BELOW SUBGRADE AND COMPACT EACH LAYER OF BACKFILL OR FILL SOIL MATERIAL TO AT LEAST 95 PERCENT.
   C. UNDER LAWN OR UNPAVED AREAS, SCARIFY AND RE–COMPACT TOP INCHES BELOW SUBGRADE AND COMPACT EACH LAYER OF BACKFILL OR FILL SOIL TO AT LEAST 90 PERCENT.
   D. FOR UTILITY TRENCHES, COMPACT EACH LAYER OF BACKFILL SOIL MATERIALS TO AT LEAST 95 PERCENT.
10. MOISTEN OR AERATE SUBGRADE AND EACH SUBSEQUENT FILL OR BACKFILL SOIL LAYER PRIOR TO COMPACTION TO WITHIN –2% TO +3% OF OPTIMUM MOISTURE. DO NOT USE SOILS WHICH ARE MUDDY, FROZEN, OR CONTAIN FROST/ICE.
11. FILL AND BACKFILL LIFTS SHALL BE PLACED IN LAYERS NOT MORE THAN 8 INCHES IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HEAVY COMPACTION EQUIPMENT, AND NOT MORE THAN 4 INCHES IN LOOSE DEPTH FOR MATERIALS COMPACTED BY HAND–OPERATED EQUIPMENT.
12. BEFORE FINISH GRADING, VERIFY SUBGRADES AND BACKFILLS HAVE BEEN INSPECTED AND TESTED.
13. IN DISTURBED AREAS WHICH WILL BE VEGETATED OR LANDSCAPED, SCARIFY SURFACE TO DEPTH OF 3 INCHES AND SPREAD TOPSOIL FROM STOCKPILE TO A DEPTH OF APPROXIMATELY 6 INCHES.
14. TOPSOIL SHALL BE GRADED TO PROVIDE UNIFORM, GENTLE CONTOURS TO THE FINISH GRADES INDICATED ON THE DRAWINGS. FINE GRADE TO ELIMINATE UNEVEN AREAS AND LOW SPOTS.

PAVING NOTES:

15. ALL PARKING LOTS AND SIDEWALKS SHALL BE 6" THICK P.C. CONCRETE PAVEMENT.
16. PAVEMENT REMOVALS SHALL BE SAW–CUT TO FULL DEPTH OF PAVEMENT ALONG THE NEAREST EXISTING JOINT.
17. CONCRETE SHALL BE TYPE 47B PER THE 2017 VERSION OF THE NEBRASKA DEPARTMENT OF TRANSPORTATION (NDOT) STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
18. CONCRETE COMPRESSIVE STRENGTH SHALL BE AT LEAST 3500 PSI AT 28 DAYS.
19. CONCRETE MIX DESIGN SHALL UTILIZE TYPE IP CEMENT.
20. AIR, WATER, AND AGGREGATE SHALL BE PER NDOR SPECIFICATIONS FOR TYPE 47B CONCRETE.
21. CONCRETE SHALL BE CURED WITH SPRAY APPLIED WHITE WATERBORNE MEMBRANE–FORMING CURING COMPOUND PER ASTM C309, TYPE 2, CLASS B.
22. ALL JOINTS (EXPANSION, CONTRACTION, AND CONSTRUCTION) IN PARKING LOTS, DRIVEWAYS, AND ROADWAYS SHALL BE CLEANED WITH COMPRESSED AIR, DRIED, AND SEALED WITH HOT–APPLIED, BLACK, SINGLE–COMPONENT JOINT SEALANT PER ASTM 3405.
23. EXPANSION JOINTS IN SIDEWALKS/WALKWAYS SHALL BE SEALED WITH SINGLE–COMPONENT, SELF–LEVELING, POLYURETHANE SEALANT PER ASTM D–5893 TYPE SL.
24. PARKING LOTS, DRIVEWAYS, AND ROADWAYS SHALL HAVE A BURLAP FINISH. SIDEWALKS SHALL HAVE A LIGHT–BROOM FINISH.
25. AT ALL PAVEMENT JOINTS ABUTTING EXISTING CONCRETE PAVEMENT, TIE–BARS SHALL BE DRILLED AND GROUTED INTO EXISTING CONCRETE PAVEMENT AS SHOWN IN THE DETAILED DRAWINGS.
26. REINFORCING STEEL FOR TIE–BARS SHALL BE GRADE 60.
27. COLD WEATHER CONCRETING SHALL BE IN ACCORDANCE WITH THE NDOT STANDARD SPECIFICATIONS.
28. FIELD CONCRETE TESTING AND LABORATORY COMPRESSIVE STRENGTH TESTS SHALL BE CONDUCTED AT THE CONTRACTORS EXPENSE FOR EVERY 50 CUBIC YARDS PLACED, AND EVERY INDIVIDUAL POUR. RESULTS OF TESTS SHALL BE PROVIDED TO THE ENGINEER/ARCHITECT FOR REVIEW.
29. DURING PUNCH–LIST WALKTHROUGH, CONTRACTOR WILL BE REQUIRED TO REMOVE AND REPLACE (IN FULL PANELS) ANY CRACKED, DAMAGE, OR DEFECTIVE SECTIONS OF CONCRETE, AT NO ADDITIONAL COST TO THE OWNER. DEFECTIVE CONCRETE INCLUDES, BUT IS NOT LIMITED TO, POOR OR INCONSISTENT FINISHING AND LOCATIONS WHICH HAVE "BIRD BATHS".

STORM SEWER NOTES:

30. STORM SEWER PIPING LESS THAN 12" IN DIAMETER SHALL BE POLYVINYL CHLORIDE (PVC). STORM SEWER PIPING 12" OR GREATER IN DIAMETER SHALL BE HIGH–DENSITY POLYTHYLENE (HDPE).
31. HIGH–DENSITY POLYETHYLENE (HDPE) SHALL MEET THE REQUIREMENTS OF AASHTO M–252 TYPE S OR M–294 TYPE S, DOUBLE WALL, CORRUGATED EXTERIOR WITH SMOOTH INTERIOR, WATER–TIGHT. PIPE SHALL BE ADS N–12 WT OR APPROVED EQUAL. ALL HDPE PIPE SHALL BE BEDDED PER THE GRANULAR BEDDING DETAIL PROVIDED IN THESE DRAWINGS.
32. PVC STORM SEWER PIPING SHALL BE SDR 35 OR SDR 26.
33. ALL PIPE SHALL HAVE CLASS B GRANULAR BEDDING.
34. ALL PVC PIPE FITTINGS SHALL BE SOLVENT WELDED.
35. CONCRETE FOR STRUCTURES SHALL BE THE SAME AS SPECIFIED FOR PAVEMENT CONSTRUCTION. ALL EXPOSED EDGES SHALL BE CHAMFERED OR ROUNDED.

SANITARY SEWER NOTES:

36. NEW SANITARY SEWER PIPING SHALL BE POLYVINYL CHLORIDE (PVC) SDR 26 SEWER PIPE CONFORMING TO ASTM D–3034.
37. PVC SEWER PIPE SHALL UTILIZE A SINGLE RUBBER GASKET JOINT CONFORMING TO ASTM F–477.
38. ALL PIPE SHALL HAVE CLASS B GRANULAR BEDDING.
39. COORDINATE WITH PLUMBING PLANS FOR CONNECTION LOCATIONS/DEPTHS/SIZES/MATERIAL AT BUILDING.
40. SEPTIC APSORPTION FIELD TRENCH SIZES SHOWN ARE BASED ON A DESIGN FLOW OF 2,550 GALLONS PER DAY AND A PERCOLATION RATE OF 16.97 INCHES PER HOUR; PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PERFORM SOIL PERCOLATION TESTS AT THREE LOCATIONS WITHIN THE SEPTIC DRAIN FIELD AREA SHOWN ON THE PLAN IN ACCORDANCE WITH CHAPTER 6 OF NEBRASKA ADMINISTRATIVE CODE, TITLE 124 AND VERIFY ABSORPTION TRENCH SIZES IN ACCORDANCE WITH CHAPTER 14 OF NEBRASKA ADMINISTRATIVE CODE, TITLE 124. SOIL PERCOLATION TEST RESULTS SHALL BE RETAINED AND FURNISHED TO THE ENGINEER AND/OR THE NEBRASKA DEPARTMENT OF ENVIRONMENTAL QUALITY FOR PERMITTING. THE COST OF SOIL PERCOLATION TESTING SHALL BE INCIDENTAL TO THE BID.
41. THE CONTRACTOR MAY SUBSTITUTE THE CONDUIT AND FILTER MEDIA MATERIAL PRESCRIBED BY THESE PLANS WITH BUNDLED EXPANDED POLYSTYRENE CYLINDERS, SUCH AS INFILTRATOR EZFLOW, OR APPROVED EQUAL, AT THE DISCRETION OF THE ENGINEER AND THE NEBRASKA DEPARTMENT OF ENVIRONMENT AND ENERGY. CONTRACTOR SHALL BE REQUIRED TO SUBMIT ANY PROPOSED REVISIONS TO THE ABSORPTION TRENCH DESIGN TO THE ENGINEER AND/OR THE NEBRASKA DEPARTMENT OF ENVIRONMENT AND ENERGY FOR APPROVAL PRIOR TO CONSTRUCTION.
42. NO FLOOR DRAINS SHALL DISCHARGE INTO THE SEPTIC SYSTEM WITHOUT FULLY COMPLYING WITH THE REQUIREMENTS OF CHAPTER 19 OF NEBRASKA ADMINISTRATIVE CODE, TITLE 124.

WATER NOTES:

43. WATER SERVICE SHALL BE HIGH–DENSITY POLYETHYLENE (HDPE) PLASTIC TUBING (IPS) CONFORMING TO THE REQUIREMENTS OF HDPE 3608 CELL CLASS 345464C PER ASTM D3035, AND SHALL COMPLY WITH ANSI, NSF STANDARD 14/61 AND AWWA C901. TUBING SHALL CONFORM TO ASTM 2239 FOR IRON PIPE SIZE (IPS) INSIDE DIAMETER CONTROLLED, SIDR 7 (200 PSI).
44. EXISTING WATER SERVICES SHALL BE UNCLASSIFIED AS TO SIZE AND MATERIAL. CONTRACTOR SHALL DETERMINE SIZE AND MATERIAL OF EXISTING WATER SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION. APPROPRIATE ADAPTERS, FITTINGS, AND MEANS OF CONNECTION SHALL BE USED TO RE–ESTABLISH ALL EXISTING SERVICES.
45. ALL PIPE SHALL HAVE CLASS C BEDDING.
46. INSERT STIFFENERS SHALL BE USED WITH ALL FITTINGS AND POLYETHYLENE PIPE AND SHALL BE SOLID 304 TUBULAR STAINLESS STEEL.
47. SERVICE LINE SHALL INCLUDE TRACER WIRE.
48. WATER SERVICE SHALL HAVE A 5–FOOT MINIMUM BURY DEPTH FOR FROST PROTECTION.
49. COORDINATE WITH PLUMBING PLANS FOR CONNECTION LOCATIONS/DEPTHS/SIZES/MATERIAL AT BUILDING.
50. PROVIDE POLYETHYLENE ENCASEMENT ON ALL CORPORATION STOPS.
51. TAPPING SADDLE SHALL BE BRASS SADDLE WITH THREADS COMPATIBLE WITH CORPORATION STOP. SADDLE SHALL HAVE A MAXIMUM WORKING PRESSURE RATING OF 200 PSI AND SHALL BE USED ON ALL PIPE.
52. SERVICE STOP SHALL COMPLY WITH AWWA STANDARD SPECIFICATION C–800. ALL WETTED PARTS SHALL COMPLY WITH NSF–61–6.
53. PROVIDE POLYETHYLENE ENCASEMENT ON CURB STOP.

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BML	BML		KPE

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03/03/2020
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E-15851
STATE OF NEBRASKA

STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE 68832

GENERAL NOTES

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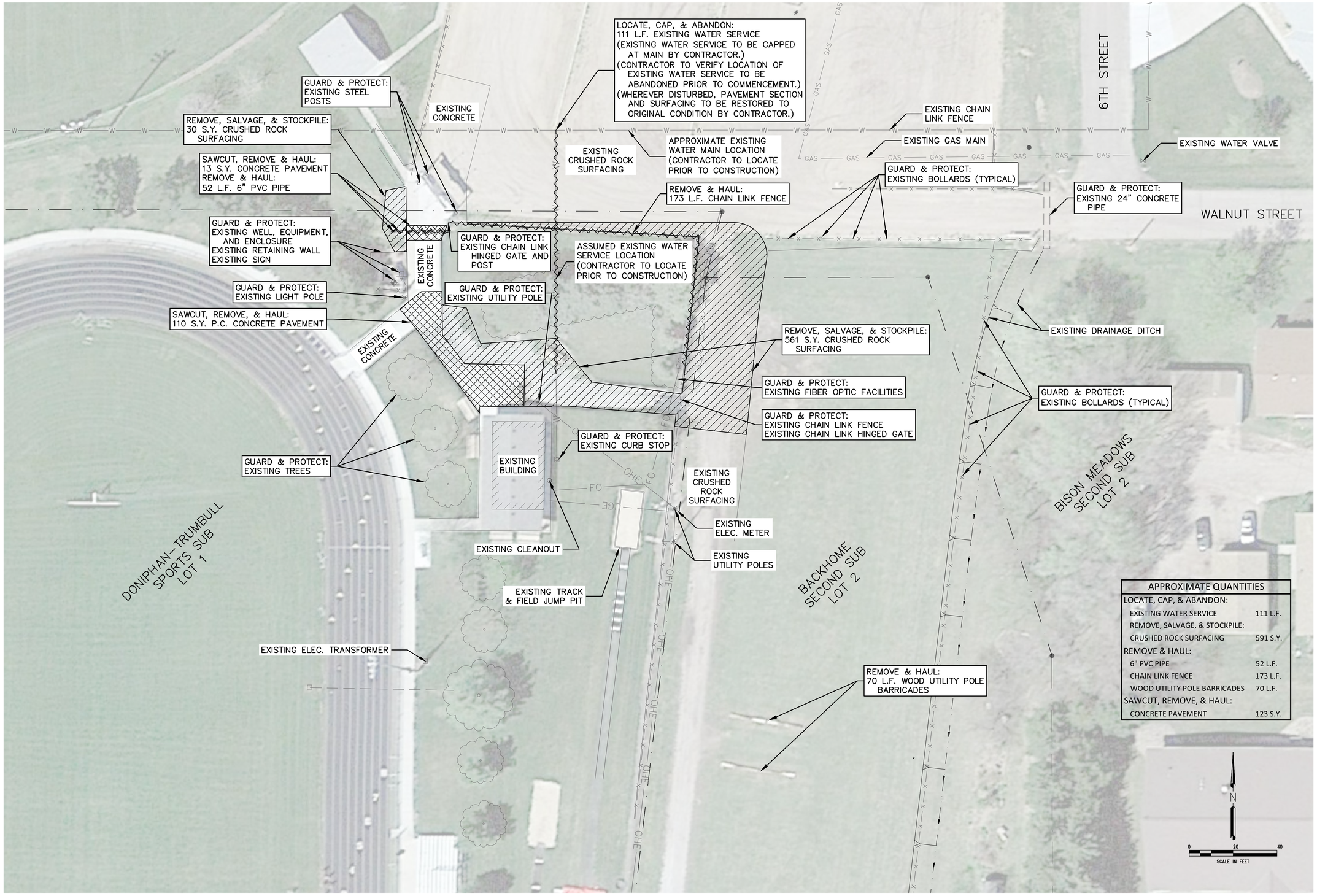
JOB NUMBER: 535-002

SHEET: C-001

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APPROXIMATE QUANTITIES	
LOCATE, CAP, & ABANDON:	
EXISTING WATER SERVICE	111 L.F.
REMOVE, SALVAGE, & STOCKPILE:	
CRUSHED ROCK SURFACING	591 S.Y.
REMOVE & HAUL:	
6" PVC PIPE	52 L.F.
CHAIN LINK FENCE	173 L.F.
WOOD UTILITY POLE BARRICADES	70 L.F.
SAWCUT, REMOVE, & HAUL:	
CONCRETE PAVEMENT	123 S.Y.

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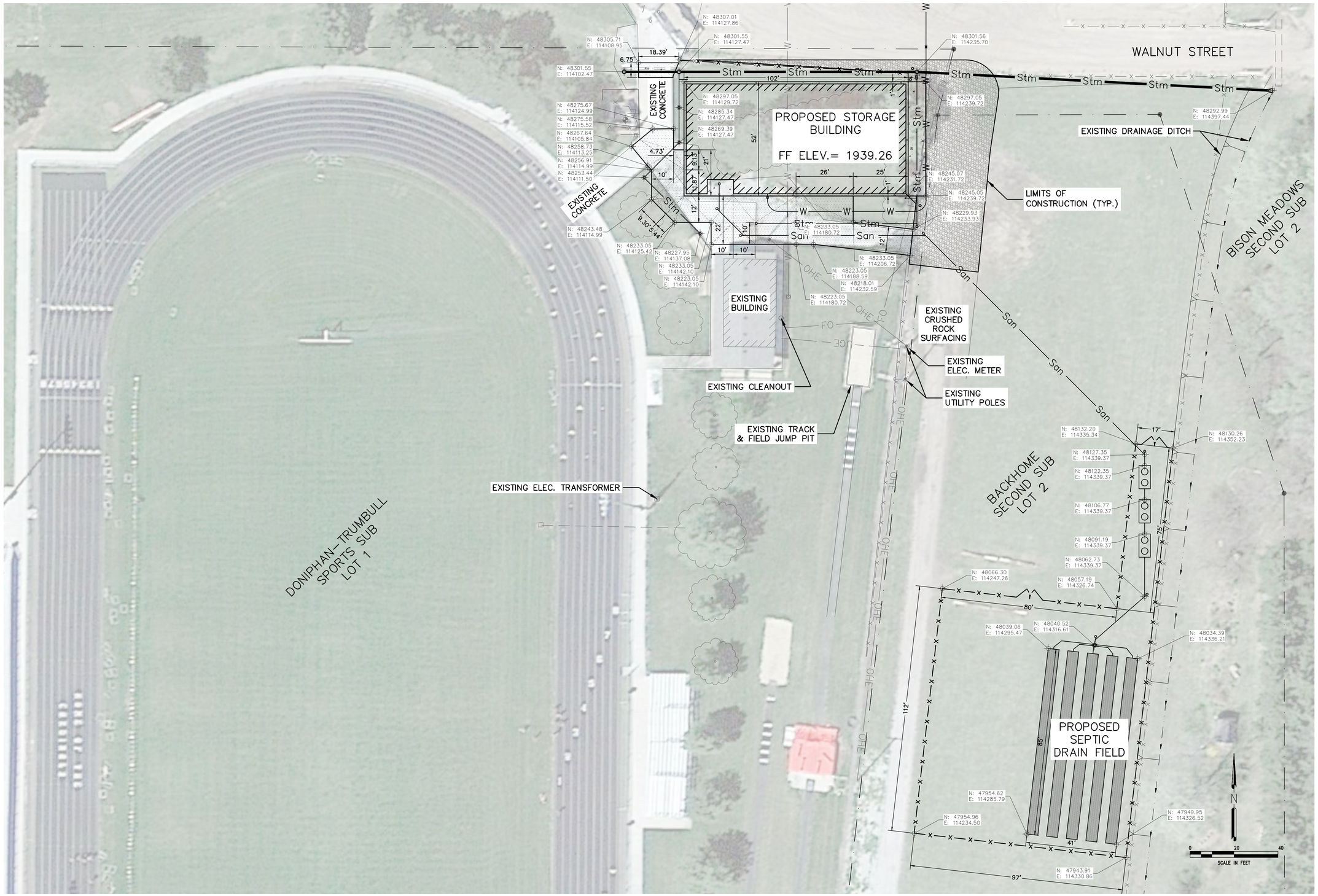
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302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE
EXISTING SITE PLAN & REMOVALS

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M&A DWG. NO. 36420



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GEOMETRICS PLAN

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M&A DWG. NO. 36419

FURNISH & INSTALL:
1 EA. 18" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 18" PEDESTRIAN GRATE
RIM ELEV. = 1938.68
12" INV. ELEV. (E) = 1936.56

EXISTING STEEL POLES

FURNISH & INSTALL:
1 EA. 18" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 18" STANDARD GRATE
25 L.F. 12" HDPE PIPE (W) @ 0.22%
13 L.F. 8" PVC PIPE (S) @ 0.40%
RIM ELEV. = 1938.65
12" INV. ELEV. (W & E) = 1936.50
8" INV. ELEV. (S) = 1936.83

FURNISH & INSTALL:
1 EA. BOLLARD

FURNISH & INSTALL:
1 EA. 8"X6" PVC TEE
7 L.F. 8" PVC PIPE (S)
3 L.F. 6" PVC PIPE (E)
1 EA. DOWNSPOUT LEAD CONNECTION
8" INV. ELEV. (S, E, & N) = 1936.85

FURNISH & INSTALL:
1 EA. 18" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 18" SOLID COVER
108 L.F. 12" HDPE PIPE (W) @ 0.22%
58 L.F. 8" PVC PIPE (S) @ 0.40%
RIM ELEV. = 1938.75
12" INV. ELEV. (W & S86°57'49"E) = 1936.26
8" INV. ELEV. (S) = 1936.28

WALNUT STREET

EXISTING 24" CONCRETE PIPE

FURNISH & INSTALL:
159 L.F. 12" HDPE PIPE (N86°57'49"W) @ 0.22%
12" INV. ELEV. (N86°57'49"W) = 1935.91
(CONTRACTOR TO PLACE MINIMUM 1 FOOT COVER OVER PIPE)

CONSTRUCT:
5 S.Y. P.C. CONCRETE PAVEMENT (6" THICK)

FURNISH & INSTALL:
1 EA. 12" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 12" DOMED GRATE
16 L.F. 8" PVC PIPE (S) @ 0.40%
RIM ELEV. = 1938.86
8" INV. ELEV. (S & N) = 1936.88

FURNISH & INSTALL:
109 L.F. CHAIN LINK FENCE

CONSTRUCT:
46 S.Y. P.C. CONCRETE PAVEMENT (6" THICK)

FURNISH & INSTALL:
1 EA. BOLLARD

PROPOSED STORAGE BUILDING
FF ELEV.= 1939.26

FURNISH & INSTALL:
1 EA. 12" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 12" DOMED GRATE
23 L.F. 8" PVC PIPE (S45°W) @ 0.40%
RIM ELEV. = 1939.08
8" INV. ELEV. (S45°W & N) = 1936.98

CONSTRUCT:
280 S.Y. P.C. CONCRETE PAVEMENT (6" THICK)

FURNISH & INSTALL:
1 EA. 8"X6" PVC TEE (S)
1 EA. 8"X6" PVC REDUCER (S)
13 L.F. 6" PVC PIPE (S) @ 1.00%
5 L.F. 6" PVC PIPE (W) @ 1.00%
1 EA. DOWNSPOUT LEAD CONNECTION
8" INV. ELEV. (N) = 1936.52
6" INV. ELEV. (W & S) = 1936.61

N: 48292.99
E: 114397.44

FURNISH & INSTALL:
1 EA. 12" HDPE FLARED END SECTION WITH CONCRETE PAD (N86°57'49"W)
12" INV. ELEV. (W) = 1935.90

TOP OF DITCH SLOPE

DITCH FLOWLINE

FURNISH & INSTALL:
1 EA. 12" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 12" DOMED GRATE
36 L.F. 8" PVC PIPE (S45°E) @ 0.40%
RIM ELEV. = 1938.88
8" INV. ELEV. (S45°E & N45°E) = 1937.07

FURNISH & INSTALL:
7 L.F. CHAIN LINK FENCE

FURNISH & INSTALL:
1 EA. BOLLARD

FURNISH & INSTALL:
1 EA. 12" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 12" DOMED GRATE
RIM ELEV. = 1938.82
8" INV. ELEV. (N45°W) = 1937.21

FURNISH & INSTALL:
1 EA. 12" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 12" STANDARD GRATE
RIM ELEV. = 1939.10
6" INV. ELEV. (E) = 1937.47

RESTORE:
364 S.Y. CRUSHED ROCK SURFACING (2" THICK)

FURNISH & INSTALL:
1 EA. 6"X6" PVC TEE (S)
1 EA. 6" STANDARD CLEANOUT (S)
73 L.F. 6" PVC (W) @ 1.00%
6" INV. ELEV. (W & N) = 1936.74

EXISTING BUILDING

ACCESS ROAD

DONIPHAN-TRUMBULL SPORTS SUB LOT 1

BACKHOME SECOND SUB LOT 2

BISON MEADOWS SECOND SUB LOT 2

SPECIAL NOTE:

1. CONTRACTOR TO VERIFY BUILDING DOWNSPOUT LOCATIONS PRIOR TO STORM PIPE INSTALLATION TO ENSURE ALL DOWNSPOUTS CAN BE CONNECTED TO STORM SEWER SYSTEM.

APPROXIMATE QUANTITIES

FURNISH & INSTALL:	
12" HDPE PIPE	292 L.F.
8" PVC PIPE	153 L.F.
6" PVC PIPE	94 L.F.
18" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 18" SOLID COVER	1 EA.
18" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 18" STANDARD GRATE	1 EA.
18" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 18" PEDESTRIAN GRATE	1 EA.
12" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 12" DOMED GRATE	4 EA.
12" NYLOPLAST DRAIN BASIN WITH SUMP INSERT AND 12" STANDARD GRATE	1 EA.
12" HDPE FLARED END SECTION WITH CONCRETE PAD	1 EA.
8"X6" PVC TEE	2 EA.
6"X6" PVE TEE	1 EA.
8"X6" PVC REDUCER	1 EA.
6" STANDARD CLEANOUT	1 EA.
DOWNSPOUT LEAD CONNECTION	2 EA.
BOLLARD	3 EA.
CHAIN LINK FENCE	116 L.F.
CONSTRUCT:	
P.C. CONCRETE PAVEMENT (6" THICK)	331 S.Y.
RESTORE:	
CRUSHED ROCK SURFACING (2" THICK)	364 S.Y.

N

0 10 20
SCALE IN FEET

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PROJ. MNGR:	

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03/03/2020
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GRADING PLAN

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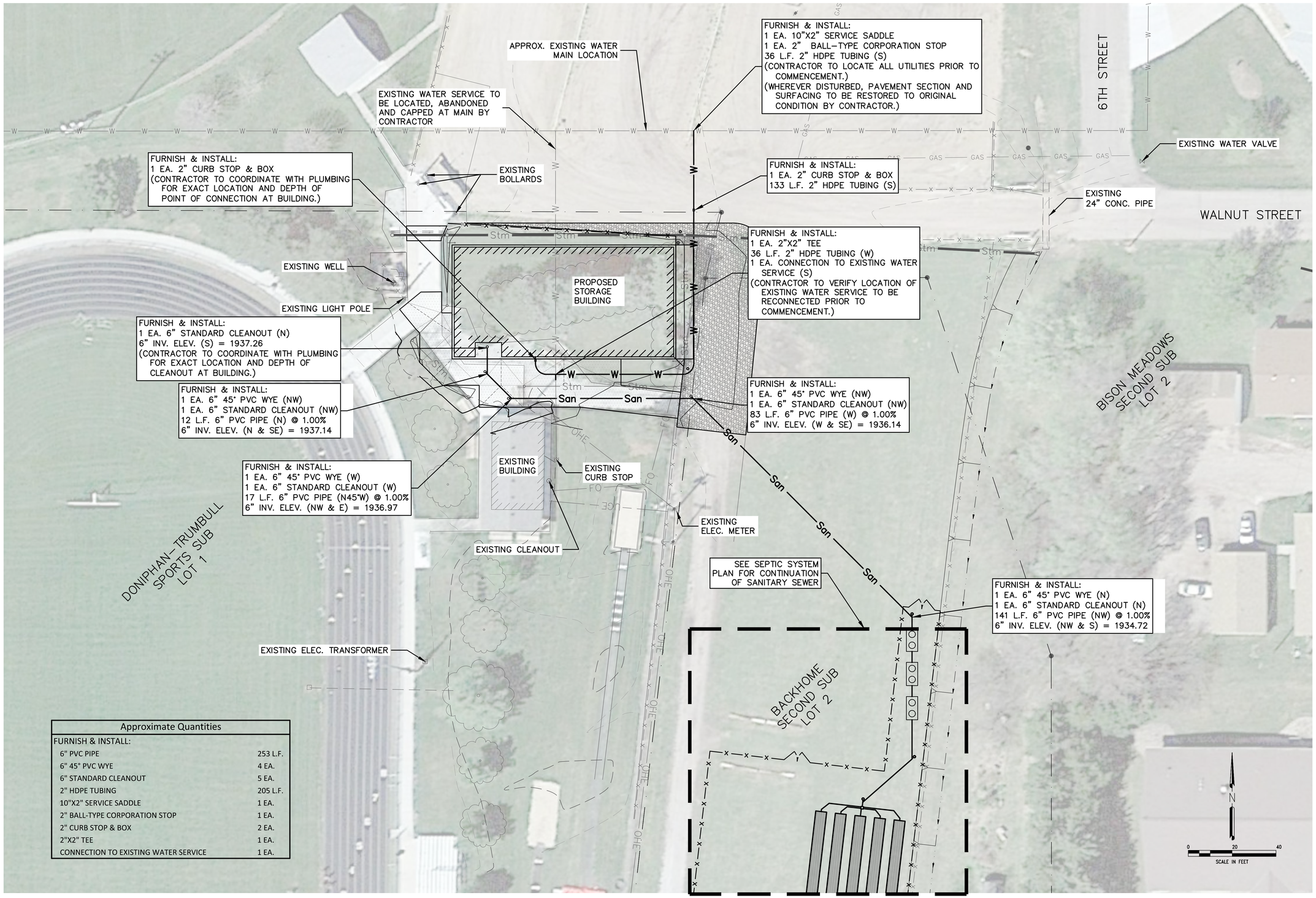
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JOB NUMBER: 535-002

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M&A DWG. NO. 36418



Approximate Quantities	
FURNISH & INSTALL:	
6" PVC PIPE	253 L.F.
6" 45° PVC WYE	4 EA.
6" STANDARD CLEANOUT	5 EA.
2" HDPE TUBING	205 L.F.
10"X2" SERVICE SADDLE	1 EA.
2" BALL-TYPE CORPORATION STOP	1 EA.
2" CURB STOP & BOX	2 EA.
2"X2" TEE	1 EA.
CONNECTION TO EXISTING WATER SERVICE	1 EA.

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DESIGNED:	BML			
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PROJ. MNGR:				
BY	DESCRIPTION	NO.	DATE	
KPE	BID SET	0	03-06-2020	

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UTILITY PLAN

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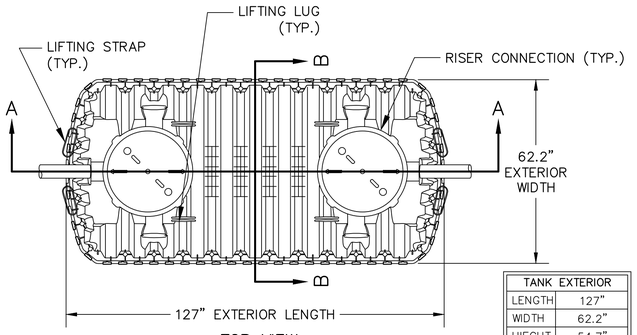
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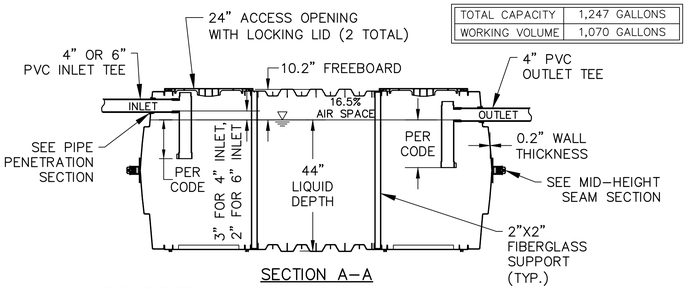
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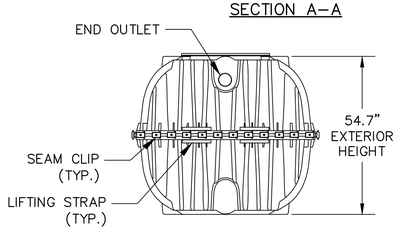
TOP VIEW

TANK EXTERIOR	
LENGTH	127"
WIDTH	62.2"
HIEGHT	54.7"

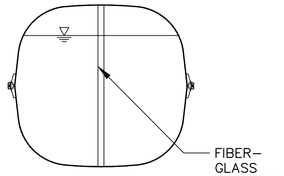
TOTAL CAPACITY	1,247 GALLONS
WORKING VOLUME	1,070 GALLONS



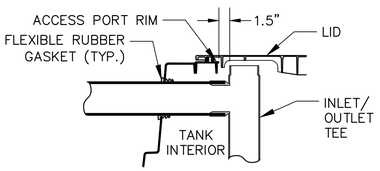
SECTION A–A



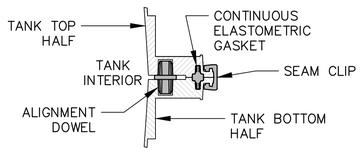
END VIEW



SECTION B–B



PIPE PENETRATION SECTION



MID–HEIGHT SEAM SECTION

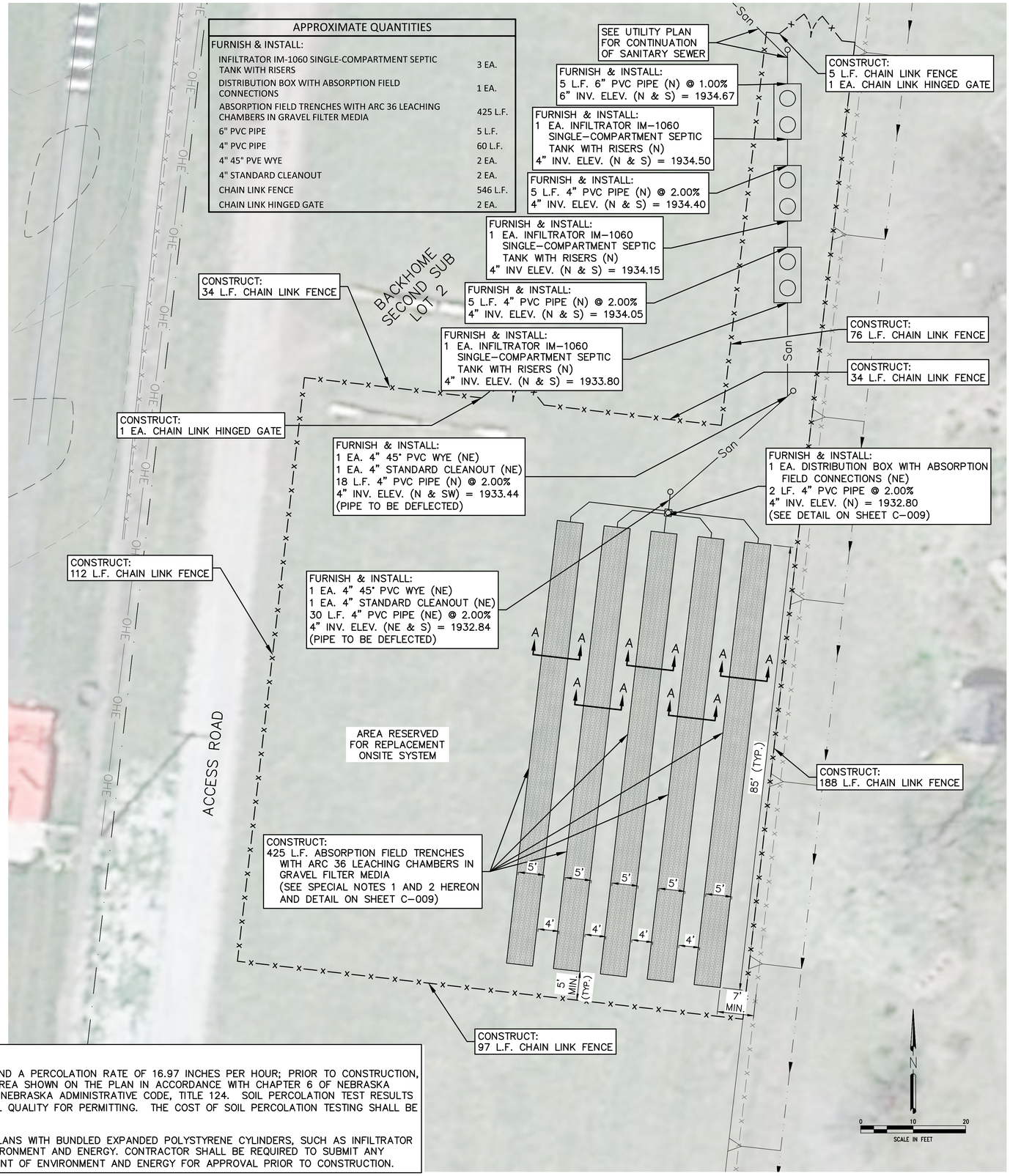
NOTES:
1. EXTERIOR OF ACCESS OPENING LID INCLUDES THE FOLLOWING WARNING IN ENGLISH, FRENCH & SPANISH: "DANGER DO NOT ENTER: POISON GASES."
2. TANK MARKINGS WILL INCLUDE: MANUFACTURER NAME, MODEL NUMBER, LIQUID CAPACITY, DATE OF MANUFACTURE, MAXIMUM BURIAL DEPTH, INLET, AND OUTLET.
3. THE TANK MAY BE BACKFILLED WITH SUITABLE NATIVE SOIL. SEE INSTALLATION INSTRUCTIONS FOR GUIDANCE. IF THE NATIVE SOIL DOES NOT MEET THE INSTALLATION INSTRUCTIONS GUIDANCE THEN BACKFILLING WITH SELECT MATERIAL WILL BE REQUIRED.
4. MAXIMUM BURIAL DEPTH IS 48".
5. MINIMUM BURIAL DEPTH IS 6".
6. MAXIMUM VEHICLE LOAD IS 4,500 POUNDS AXLE LOAD.
7. TANK IS FOR NON–TRAFFIC APPLICATIONS.
8. AIRSPACE IS 16.5%.
9. OUTLET TEE IS COMPATIBLE WITH EFFLUENT FILTER.
10. INTERIOR LENGTH TO WIDTH RATIO IS 2.3:1 (118.8" INTERIOR LENGTH / 51.7" INTERIOR WIDTH = 2.3).

LIQUID DEPTH	44"
INVERT DROP	3" FOR 4" INLET 2" FOR 6" INLET
FREEBOARD	10.2"

INFILTRATOR IM–1060 SINGLE–COMPARTMENT TANK

NO SCALE

APPROXIMATE QUANTITIES	
FURNISH & INSTALL:	
INFILTRATOR IM-1060 SINGLE-COMPARTMENT SEPTIC TANK WITH RISERS	3 EA.
DISTRIBUTION BOX WITH ABSORPTION FIELD CONNECTIONS	1 EA.
ABSORPTION FIELD TRENCHES WITH ARC 36 LEACHING CHAMBERS IN GRAVEL FILTER MEDIA	425 L.F.
6" PVC PIPE	5 L.F.
4" PVC PIPE	60 L.F.
4" 45° PVE WYE	2 EA.
4" STANDARD CLEANOUT	2 EA.
CHAIN LINK FENCE	546 L.F.
CHAIN LINK HINGED GATE	2 EA.



SPECIAL NOTES:

1. SEPTIC APSORPTION FIELD TRENCH SIZES SHOWN ARE BASED ON A DESIGN FLOW OF 2,550 GALLONS PER DAY AND A PERCOLATION RATE OF 16.97 INCHES PER HOUR; PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PERFORM SOIL PERCOLATION TESTS AT THREE LOCATIONS WITHIN THE SEPTIC DRAIN FIELD AREA SHOWN ON THE PLAN IN ACCORDANCE WITH CHAPTER 6 OF NEBRASKA ADMINISTRATIVE CODE, TITLE 124 AND VERIFY ABSORPTION TRENCH SIZES IN ACCORDANCE WITH CHAPTER 14 OF NEBRASKA ADMINISTRATIVE CODE, TITLE 124. SOIL PERCOLATION TEST RESULTS SHALL BE RETAINED AND FURNISHED TO THE ENGINEER AND/OR THE NEBRASKA DEPARTMENT OF ENVIRONMENTAL QUALITY FOR PERMITTING. THE COST OF SOIL PERCOLATION TESTING SHALL BE INCIDENTAL TO THE BID.

2. THE CONTRACTOR MAY SUBSTITUTE THE TRENCH CONDUIT AND FILTER MEDIA MATERIAL PRESCRIBED BY THESE PLANS WITH BUNDLED EXPANDED POLYSTYRENE CYLINDERS, SUCH AS INFILTRATOR EZFLOW, OR APPROVED EQUAL, AT THE DISCRETION OF THE ENGINEER AND THE NEBRASKA DEPARTMENT OF ENVIRONMENT AND ENERGY. CONTRACTOR SHALL BE REQUIRED TO SUBMIT ANY PROPOSED REVISIONS TO THE ABSORPTION TRENCH DESIGN TO THE ENGINEER AND/OR THE NEBRASKA DEPARTMENT OF ENVIRONMENT AND ENERGY FOR APPROVAL PRIOR TO CONSTRUCTION.

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BML	BML		

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03/03/2020
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SEPTIC SYSTEM PLAN

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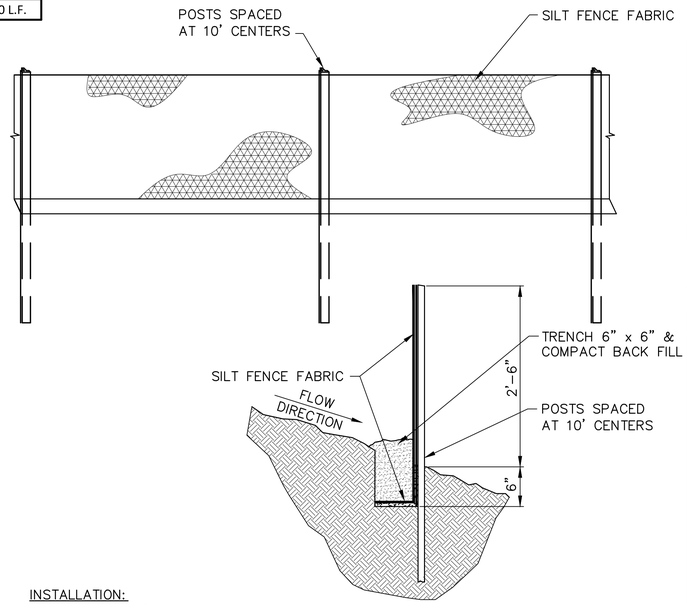
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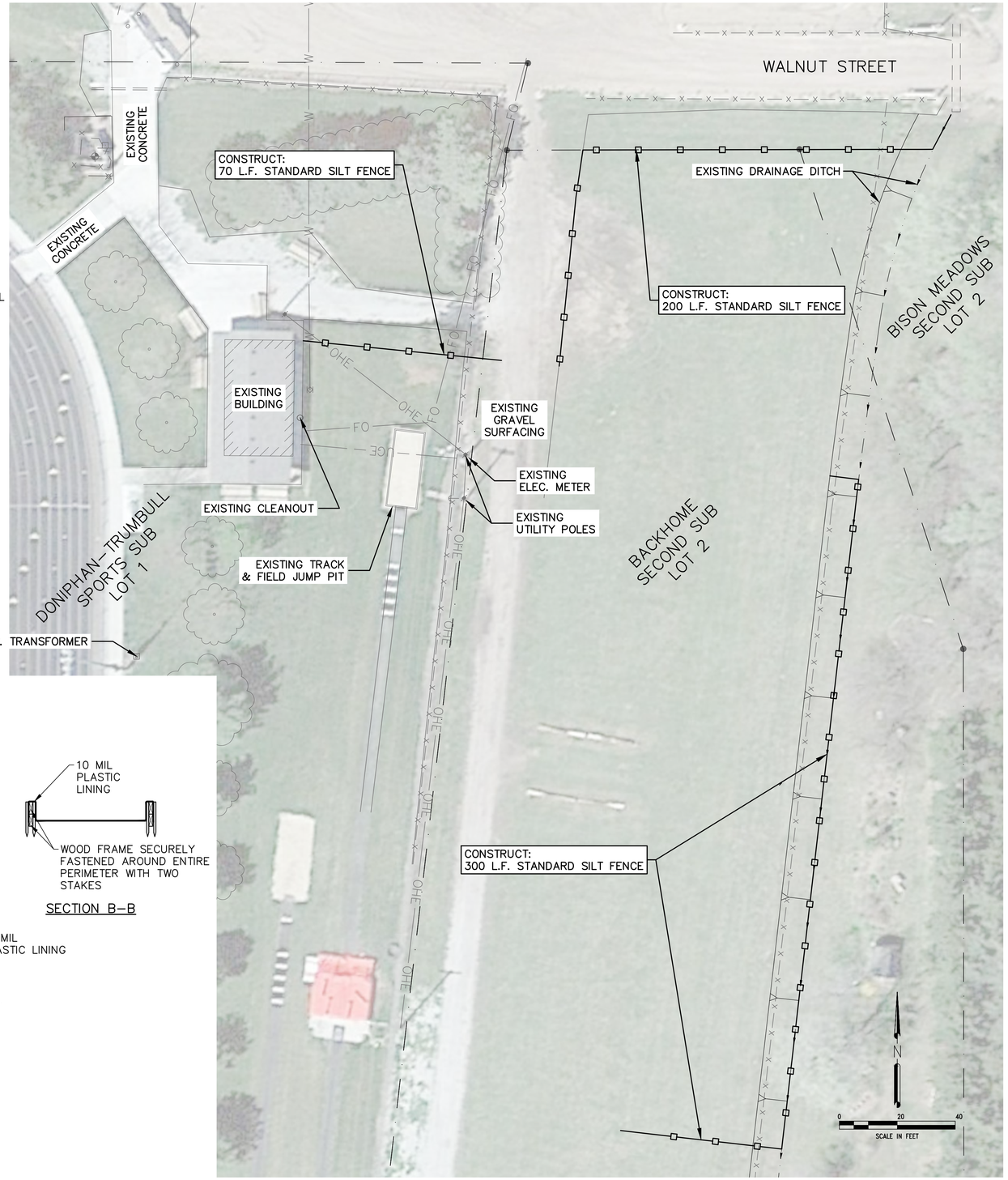
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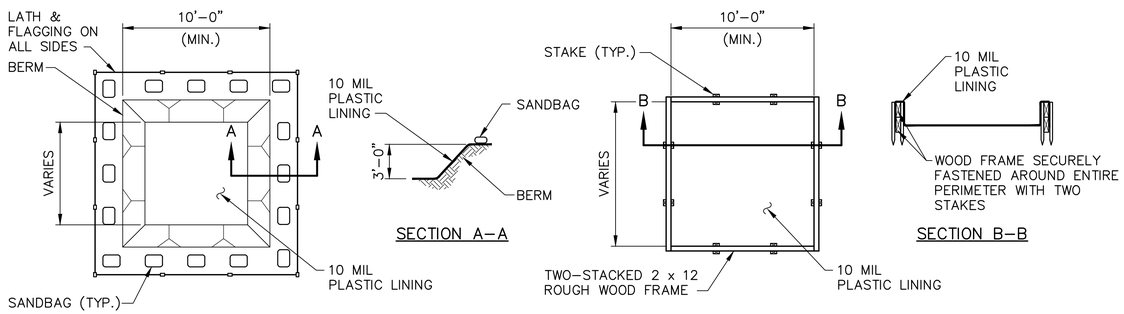
APPROXIMATE QUANTITIES	
FURNISH & INSTALL:	
STANDARD SILT FENCE	570 L.F.



INSTALLATION:
1. DIG A 6" X 6" TRENCH.
2. PLACE POSTS INTO GROUND WITH FABRIC ON UPSTREAM SIDE OF POST, PLACE FABRIC IN TRENCH.
3. USE EXCAVATED SOIL TO BACK FILL TRENCH.
4. WHEN CONNECTING TWO SECTIONS OF FABRIC OVERLAP A MINIMUM OF 6' AND USE 2 COMMON POSTS ON SPLICE.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL SHALL BE REMOVED WHEN 1/3 OF THE EXPOSED FABRIC IS COVERED.

STANDARD SILT FENCE
NO SCALE





TYPE "BELOW GRADE" PLAN

TYPE "ABOVE GRADE" PLAN

NOTES:
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FEET OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
3. CONTRACTOR TO DETERMINE ACTUAL SIZE REQUIRED TO MEET THE NEEDS FOR THE VOLUME OF CONCRETE TRUCK WASHOUT WATER ANTICIPATED PLUS RAINFALL.

CONCRETE WASHOUT PIT
NO SCALE

NO.	DATE	DESCRIPTION	BY
0	03-06-2020	BID SET	KPE

DRAWN: BML
DESIGNED: BML
CHECKED:
PROJ. MNGR:

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03/05/2020
BRANDON M. LOUGHRIN
E-15851
STATE OF NEBRASKA

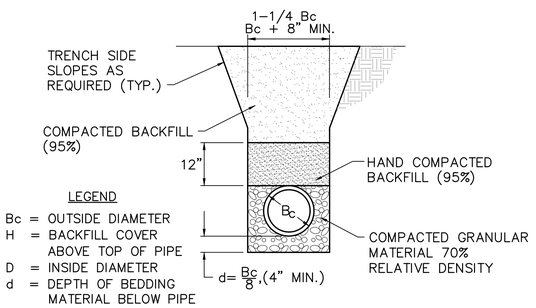
STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE 68832

EROSION CONTROL PLAN

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TOLL FREE: (888) 484-4939
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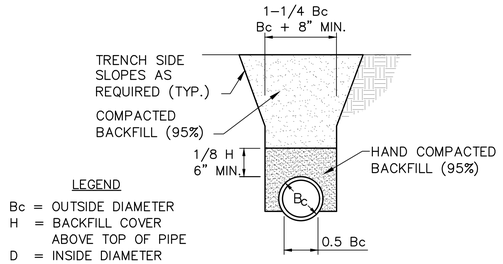
DATE: 03-06-2020
JOB NUMBER: 535-002
SHEET: C-007

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GRANULAR FOUNDATION
(FOR STORM SEWER, SANITARY SEWER, AND SEPTIC SYSTEM)

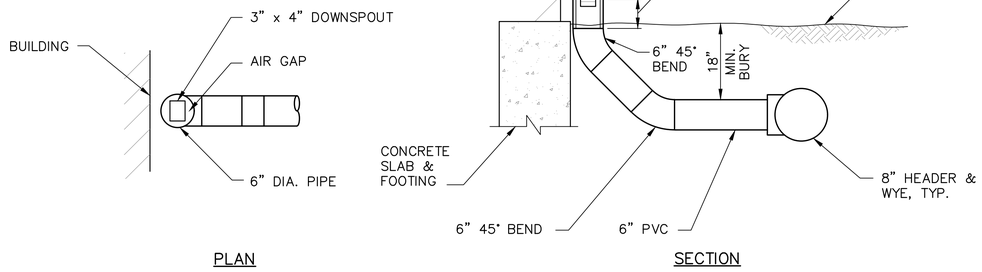
CLASS "B" BEDDING
NO SCALE



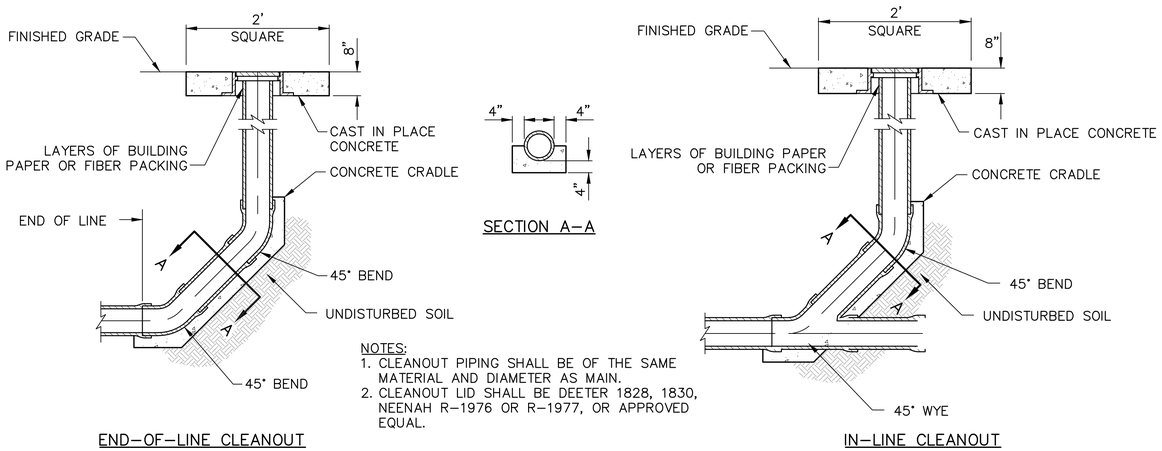
SHAPED SUBGRADE
(FOR WATER)

CLASS "C" BEDDING
NO SCALE

MINIMUM PIPE SLOPES
6" = 1.0% (1/8" PER FT.)
8" = 0.5% (1/16" PER FT.)

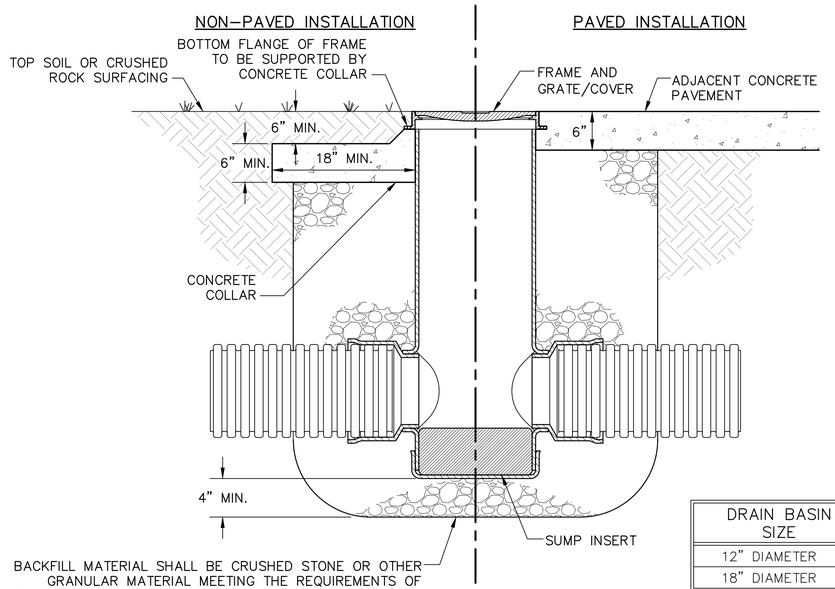


DOWNSPOUT LEAD CONNECTION
NO SCALE



NOTES:
1. CLEANOUT PIPING SHALL BE OF THE SAME MATERIAL AND DIAMETER AS MAIN.
2. CLEANOUT LID SHALL BE DEETER 1828, 1830, NEENAH R-1976 OR R-1977, OR APPROVED EQUAL.

STANDARD CLEANOUT
NO SCALE

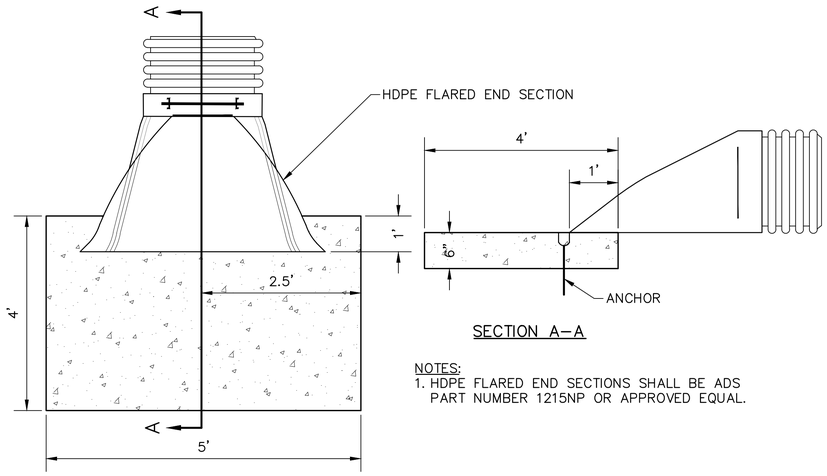


DRAIN BASIN SIZE	PART NO.
12" DIAMETER	2812AG3
18" DIAMETER	2818AG3

GRATE/COVER SIZE AND TYPE	PART NO.
12" STANDARD GRATE	1299CGS
12" DOMED GRATE	1299CGD
18" STANDARD GRATE	1899CGS
18" PEDESTRIAN GRATE	1899CGP
18" SOLID COVER	1899CGC

NOTES:
1. DRAIN BASINS SHALL BE ADS NYLOPLAST PART NUMBERS 2812AG3 OR 2818AG3 FOR 12" AND 18" DRAIN BASINS, RESPECTIVELY, OR APPROVED EQUAL.
2. ALL DRAIN BASINS SHALL BE PRE-FABRICATED TO MATCH THE RIM ELEVATIONS, INVERT ELEVATIONS, PIPE MATERIALS, PIPE DIAMETERS, AND INLET/OUTLET DIRECTIONS SPECIFIED ON THE PLAN.
3. ALL DRAIN BASINS SHALL BE FURNISHED WITH PRE-FABRICATED SUMP INSERTS AS SHOWN, OR FILLED WITH CONCRETE TO THE ELEVATION OF THE LOWEST OUTLET INVERT AND FINISHED WITH A SMOOTH SURFACE FREE OF IRREGULARITIES.
4. DRAIN BASIN GRATES AND COVERS SHALL BE ADS NYLOPLAST PART NUMBERS 1299CGS, 1299CGD, 1899CGS, 1899CGP, OR 1899CGC, CONSISTENT WITH THE TYPE OF GRATE OR COVER SPECIFIED ON THE PLAN, OR APPROVED EQUAL.

NYLOPLAST DRAIN BASIN WITH SUMP INSERT
NO SCALE



NOTES:
1. HDPE FLARED END SECTIONS SHALL BE ADS PART NUMBER 1215NP OR APPROVED EQUAL.

HDPE FLARED END SECTION WITH CONCRETE PAD
NO SCALE

NO.	DESCRIPTION	DATE	BY
0	BID SET	03-06-2020	KPE

DRAWN: BML
DESIGNED: BML
CHECKED:
PROJ. MNGR:

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03/03/2020
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STATE OF NEBRASKA

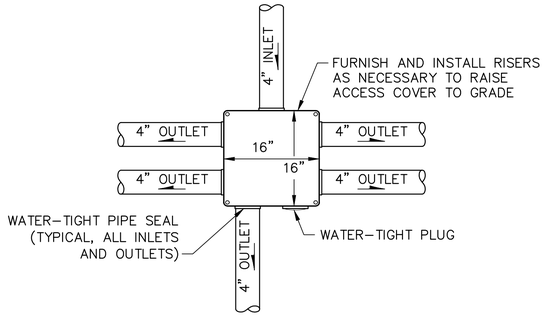
STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE 68832

TYPICAL DETAILS (1 OF 2)

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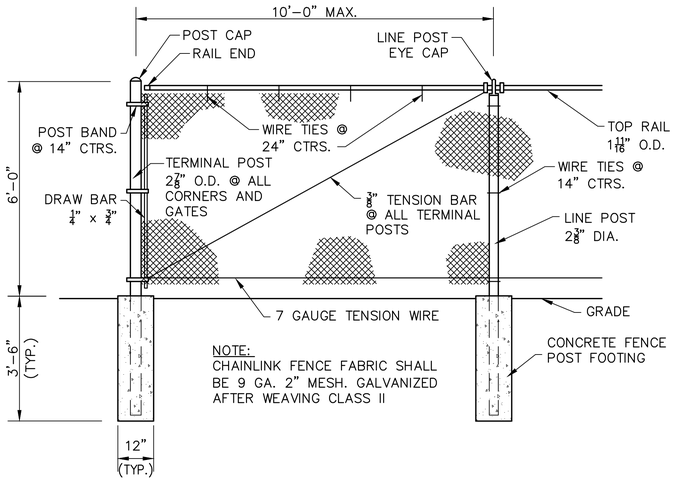
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JOB NUMBER: 535-002
SHEET: C-008

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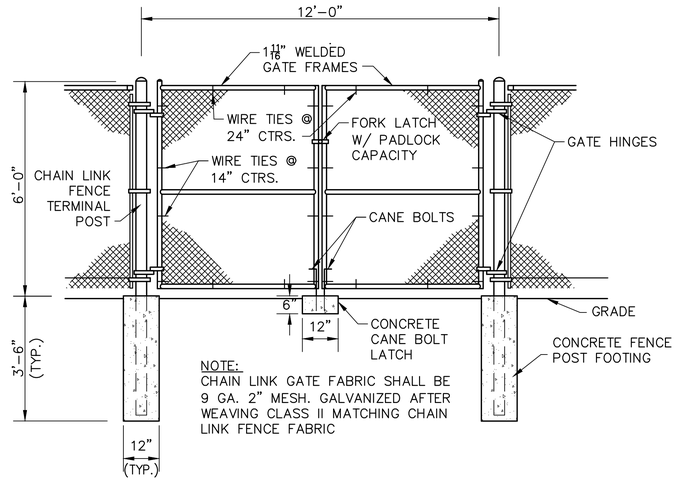
NOTES
1. DISTRIBUTION BOX SHALL BE TUF-TITE 7-HOLE DISTRIBUTION BOX, OR APPROVED EQUAL, AND SHALL INCLUDE AN ACCESS PORT OF AT LEAST 12 INCHES IN DIAMETER.
2. DISTRIBUTION BOX SHALL BE PLACED ON LEVEL NATIVE SOIL.
3. EACH INDIVIDUAL ABSORPTION FIELD TRENCH SHALL BE CONNECTED TO AN INDIVIDUAL OUTLET OF THE DISTRIBUTION BOX WITH A WATER-TIGHT SEAL; UNUSED OUTLETS SHALL BE CAPPED WITH A WATER-TIGHT SEAL.
4. ALL OUTLET INVERT ELEVATIONS WITHIN THE DISTRIBUTION BOX SHALL BE 2 INCHES BELOW THE INLET INVERT ELEVATION.
5. OUTLET LINES SHALL BE CONSTRUCTED USING 4" PVC PIPE. FITTINGS SHALL BE FURNISHED AND INSTALLED AS NECESSARY TO FIT PIPES TO ABSORPTION FIELD CHAMBER END CAPS; NO BENDS IN EXCESS OF 45° SHALL BE CONSTRUCTED IN LINES CONNECTING THE DISTRIBUTION BOX TO THE ABSORPTION FIELD TRENCHES.

DISTRIBUTION BOX WITH ABSORPTION FIELD CONNECTIONS
NOT TO SCALE



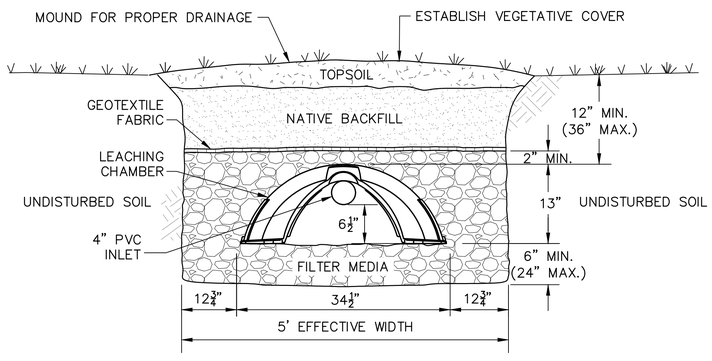
NOTE:
CHAINLINK FENCE FABRIC SHALL BE 9 GA. 2" MESH. GALVANIZED AFTER WEAVING CLASS II

CHAIN LINK FENCE
NO SCALE



NOTE:
CHAIN LINK GATE FABRIC SHALL BE 9 GA. 2" MESH. GALVANIZED AFTER WEAVING CLASS II MATCHING CHAIN LINK FENCE FABRIC

CHAIN LINK HINGED GATE
NO SCALE

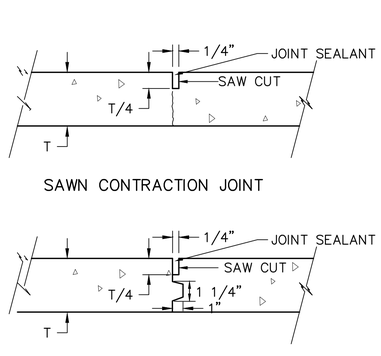


SECTION A-A

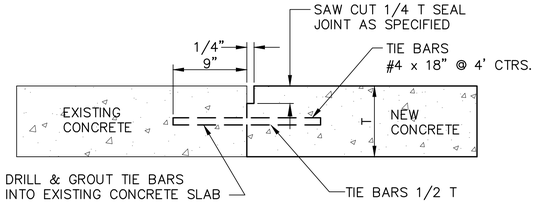
NOTES
1. THE BOTTOM OF EACH TRENCH SHALL BE LEVEL.
2. THE BOTTOM AND SIDES OF EACH TRENCH SHALL BE EXCAVATED IN SUCH A MANNER AS TO PRESERVE THE SOIL IN A NATURAL, UNCOMPACTED CONDITION. EXCAVATION SHALL ONLY BE PERFORMED WHEN THE SOIL MOISTURE CONTENT IS AT OR BELOW THE PLASTIC LIMIT.
3. THE SOIL ABSORPTION AREA SHALL BE KEPT FREE OF EXCAVATION EQUIPMENT AND OTHER VEHICULAR TRAFFIC.
4. LEACHING CHAMBERS SHALL BE ADS ARC 36, OR APPROVED EQUAL.
5. CHAMBERS SHALL BE SET IN PLACE BY RESTING CORNERS OF EACH CHAMBER SECTION ON CONCRETE BLOCKS PLACED PRIOR TO THE ADDITION OF FILTER MEDIA.
6. FIT CHAMBER OPENINGS AT EACH END OF ALL ABSORPTION FIELD TRENCHES WITH ARC 36 CHAMBER END CAP, OR APPROVED EQUAL.
7. PUNCH INLET OPENINGS IN END CAPS PER MANUFACTURER RECOMMENDATIONS AS NECESSARY TO CONNECT 4" PVC INLET PIPES.
8. EACH TRENCH SHALL BE PLACED WITH A MINIMUM OF 48 INCHES OF UNDISTURBED SOIL BETWEEN ITSELF AND THE NEAREST ADJACENT TRENCH.
9. GEOTEXTILE FABRIC SHALL BE MIRAFI 140N NONWOVEN GEOTEXTILE OR APPROVED EQUAL.
10. FILTER MEDIA SHALL BE WASHED, NATURALLY-ROUNDED PEA GRAVEL CONFORMING TO THE GRADATION REQUIREMENTS SHOWN BELOW.
11. THE CONTRACTOR MAY SUBSTITUTE THE CONDUIT AND FILTER MEDIA MATERIAL PRESCRIBED BY THESE PLANS WITH BUNDLED EXPANDED POLYSTYRENE CYLINDERS, SUCH AS INFILTRATOR EZFLOW, OR APPROVED EQUAL, AT THE DISCRETION OF THE ENGINEER AND THE NEBRASKA DEPARTMENT OF ENVIRONMENT AND ENERGY. CONTRACTOR SHALL BE REQUIRED TO SUBMIT ANY PROPOSED REVISIONS TO THE ABSORPTION TRENCH DESIGN TO THE ENGINEER AND/OR THE NEBRASKA DEPARTMENT OF ENVIRONMENT AND ENERGY FOR APPROVAL PRIOR TO CONSTRUCTION.

SIEVE DESIGNATION	PERCENT PASSING
1/2"	100
3/8"	89
#4	5
#10	1

ABSORPTION FIELD TRENCH
NOT TO SCALE

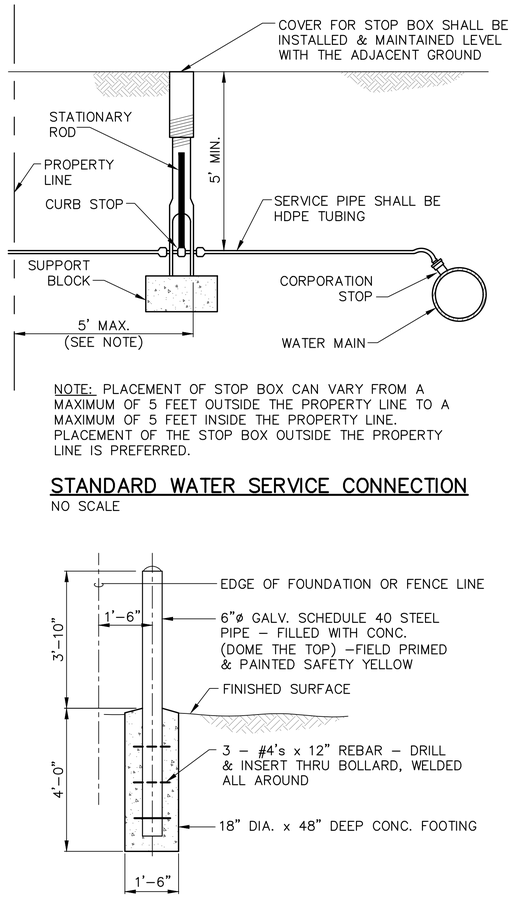


CONCRETE JOINTS
NO SCALE



T = THICKNESS OF NEW CONCRETE

CONCRETE TIE BAR
NO SCALE



NOTE: PLACEMENT OF STOP BOX CAN VARY FROM A MAXIMUM OF 5 FEET OUTSIDE THE PROPERTY LINE TO A MAXIMUM OF 5 FEET INSIDE THE PROPERTY LINE. PLACEMENT OF THE STOP BOX OUTSIDE THE PROPERTY LINE IS PREFERRED.

STANDARD WATER SERVICE CONNECTION
NO SCALE

BOLLARD
NO SCALE

M&A DWG. NO. 36414

PLOTTED:3/5/2020 3:43 PM SAVED:3/5/2020 2:11 PM C:\Projects\129-P36-001\Cad-Dwgs\Sheet Drawings\SH-SITE PLAN.dwg

DRAWN: BMW
DESIGNED: BMW
CHECKED:
PROJ. MNGR:

NO.	DATE	DESCRIPTION	BY
0	03-06-2020	BID SET	KPE

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PROFESSIONAL CIVIL ENGINEER
03/05/2020
BRANDON M. LOUGHRIN
E-15851
STATE OF NEBRASKA

STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE 68832

TYPICAL DETAILS (2 OF 2)

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DATE: 03-06-2020
JOB NUMBER: 535-002
SHEET: C-009

FLOOR PLAN GENERAL NOTES:

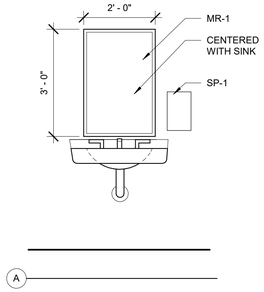
1. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO ARCHITECT BEFORE PROCEEDING.
2. REFER TO SHEET G001 FOR SYMBOLS AND ABBREVIATIONS. SEE WALL TYPE NOTES FOR SPECIFIC WALL TYPE INFORMATION.
3. INTERIOR PARTITIONS ARE DIMENSIONED TO FACE OF GYPSUM WALL BOARD, UNLESS NOTED OTHERWISE.
4. EXTERIOR WALLS ARE DIMENSIONED TO OUTSIDE FACE OF COLUMN, UNLESS NOTED OTHERWISE
5. PROVIDE BLOCKING AS NECESSARY FOR OWNER'S FURNISHINGS OR EQUIPMENT AT LOCATIONS AS DIRECTED.

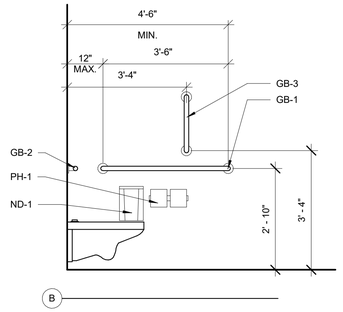
TOILET ACCESSORIES SCHEDULE

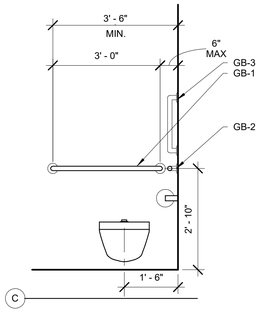
ABBR.	DESCRIPTION	MOUNTING HEIGHT
MR-1	MIRROR - BEVELED EDGED	40" MAX. (B.O. REFLECTIVE SURFACE)
PTD-1	PAPER TOWEL DISPENSER	40" (B.O. DISPENSER)
TPD-1	TOILET PAPER DISPENSER	28" (TO CENTER)
SP-1	SOAP DISPENSER	40" (B.O. DISPENSER)
ND-1	NAPKIN DISPOSAL(WOMENS ONLY)	4" LEFT OR RIGHT OF MIRROR, U.N.O. 28" (TO TOP)
GB-1	42" LONG GRAB BAR	34" (TO CENTER)
GB-2	36" LONG GRAB BAR	34" (TO CENTER)
GB-3	18" VERTICAL GRAB BAR	40" (TO CENTER OF BOTTOM PIPE)

GENERAL NOTES:

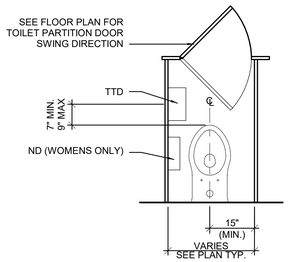
1. BLOCKING SHALL BE INSTALLED AT ALL STUD WALLS TO RECEIVE ACCESSORIES. CONTRACTOR SHALL VERIFY ALL BLOCKING PRIOR TO COVERING WALLS.
2. SP, ND, PTD, & TPD ARE PROVIDED BY THE OWNER & INSTALLED BY THE CONTRACTOR.

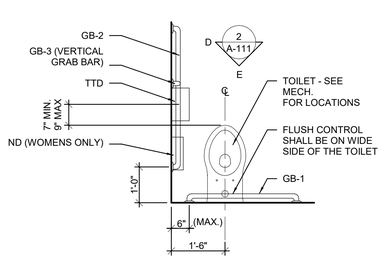






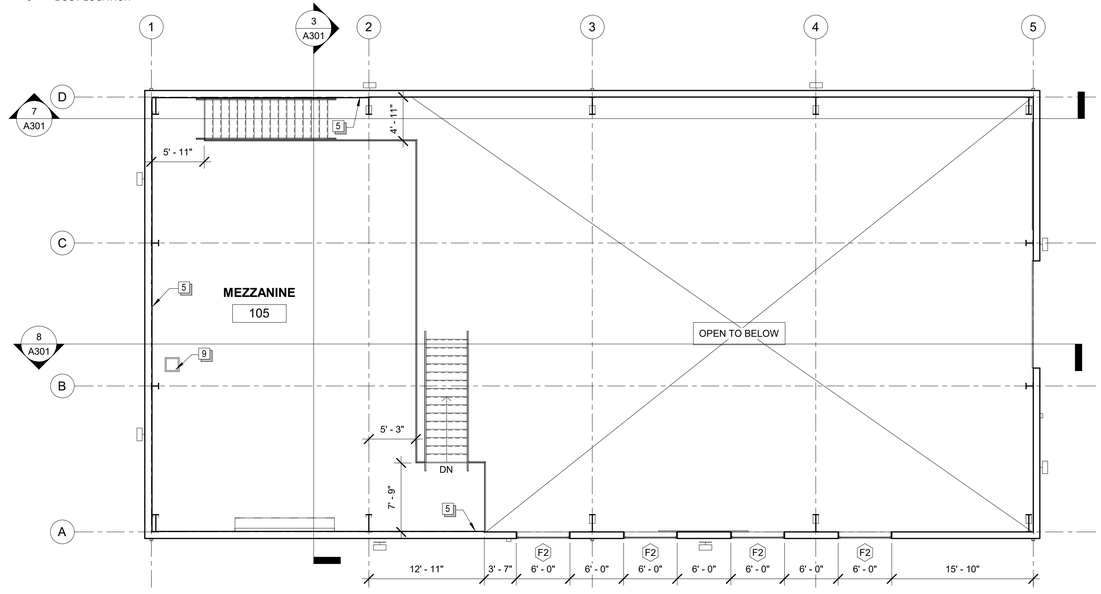






KEYNOTES

#	DESCRIPTION
1	BOX OUT COLUMN AS CLOSE TO COLUMN AS POSSIBLE
2	TRENCH DRAIN - COORD. W/ PLUMBING DRAWINGS. SLOPE FLOOR 1/8" PER FOOT TOWARDS DRAIN
3	ACCESS PANEL - COORD. LOCATION WITH MECH.
4	PRE-FINISHED METAL LINER PANEL UP TO 8'-0" A.F.F.
5	PRE-FINISHED METAL LINER PANEL UP TO STRUCTURE
6	STOOP - SEE STRUCT.
7	DRINKING FOUNTAINS - SEE MECH.
8	STAIR FABRICATOR TO PROVIDE METAL CLOSURE PLATE BETWEEN STAIR AND WALL - COORDINATE DUCT PLACEMENT W/ MECH. DRAWINGS
9	DUCT LOCATION

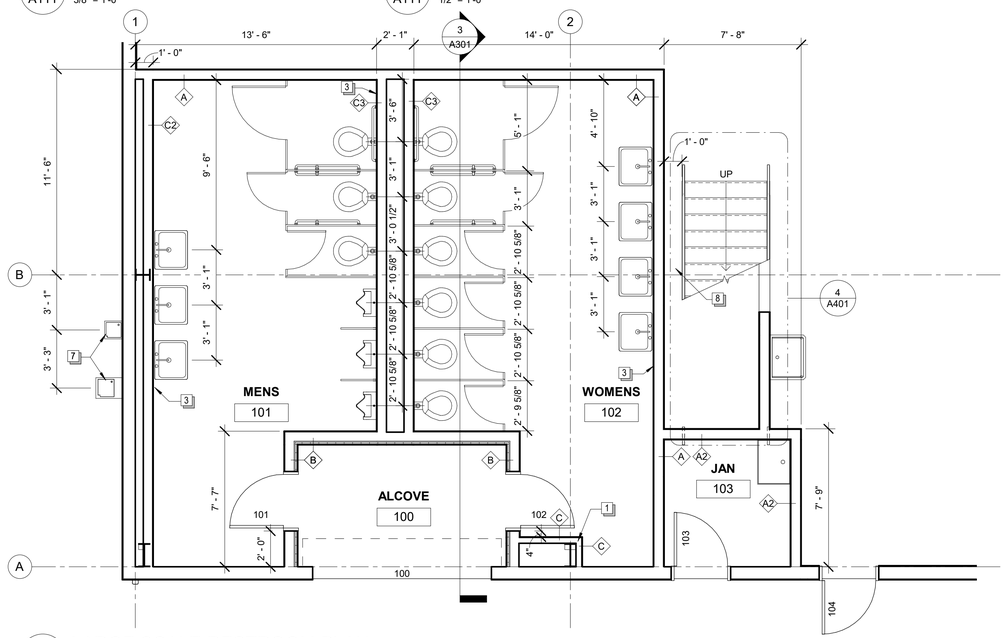


3 A111 MEZZANINE FLOOR PLAN
1/8" = 1'-0"

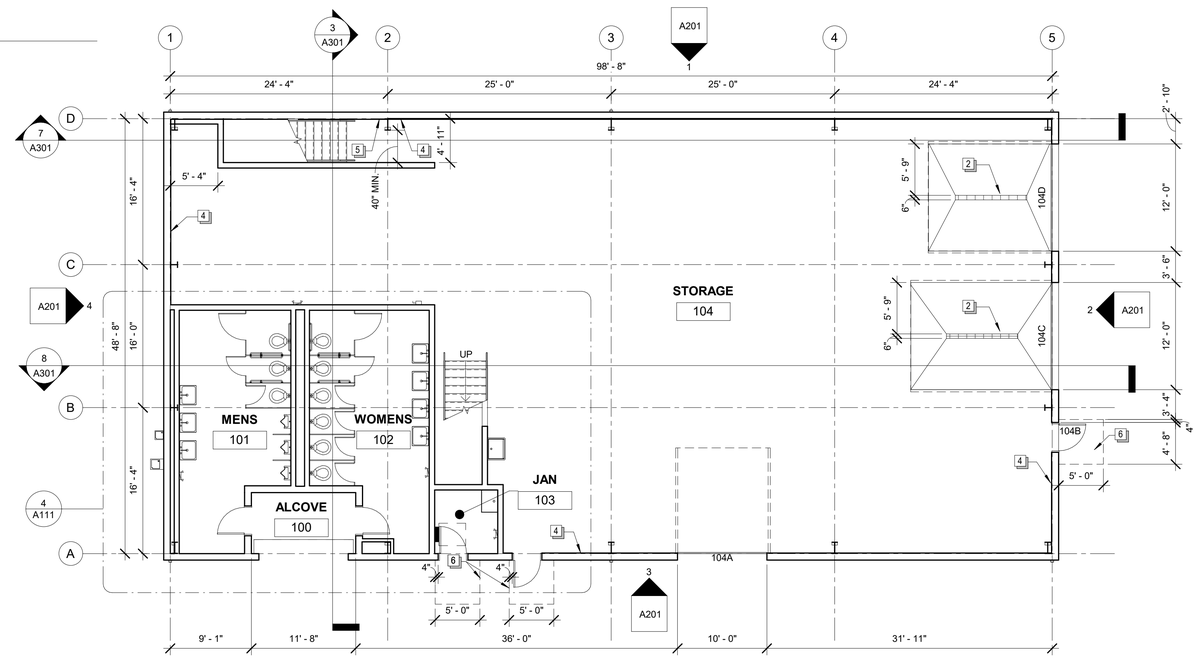
NORTH

1 A111 MOP SINK
3/8" = 1'-0"

2 A111 TYPICAL TOILET ELEVATIONS/ ACCESSORIES
1/2" = 1'-0"



4 A111 LARGE SCALE RESTROOM PLAN
1/4" = 1'-0"



5 A111 FIRST FLOOR PLAN
1/8" = 1'-0"

NORTH

DRAWN:	RWV
DESIGNED:	MJM
CHECKED:	MJM
PROJ. MNGR:	SKK

NO.	DATE	DESCRIPTION	BY
0	03-06-2020	BID SET	KPE

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302 WEST PLUM, P.O.BOX 300, DONIPHAN, NE 68832

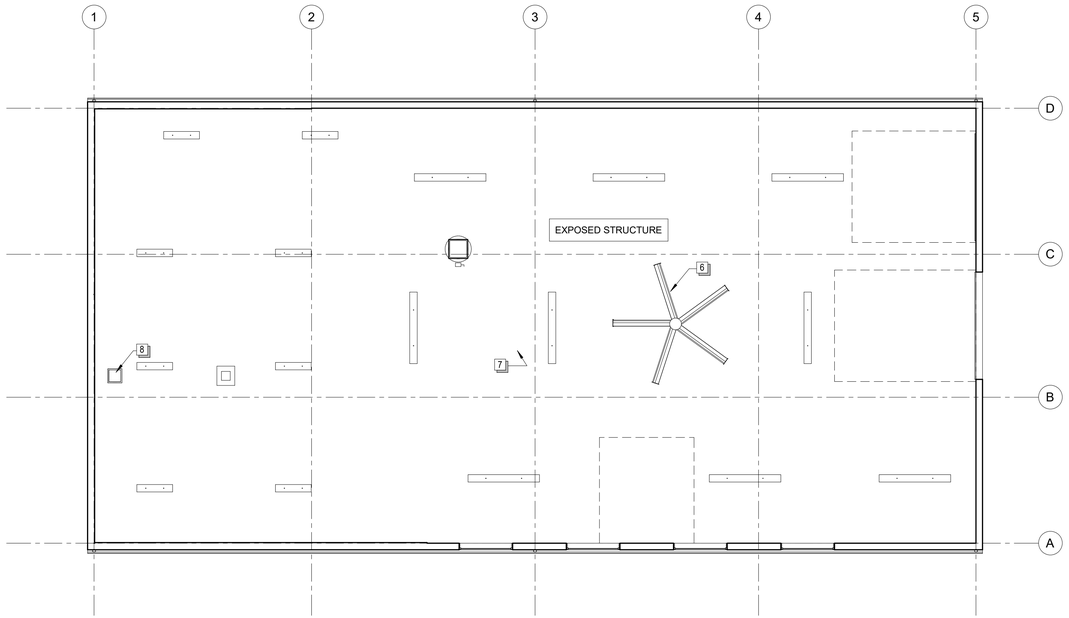
FLOOR PLAN - FIRST / MEZZANINE LEVEL

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OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020

JOB NUMBER: 535-002

SHEET: A111



1 A131 REFLECTED CEILING PLAN - MEZZANINE

1/8" = 1'-0"

NORTH

REFLECTED CEILING PLAN GENERAL NOTES:

A. PROVIDE DIAGONAL BRACING OR SUPPORT WIRING TO STRUCTURE AS REQUIRED.
B. REFER TO MECHANICAL DRAWINGS (M SERIES) FOR QUANTITY & TYPE OF DIFFUSERS, RETURN AIR GRILLS, & EXHAUST GRILLES. SCRIBE CEILING MATERIALS CAREFULLY FOR TIGHT FIT.
C. REFER TO ELECTRICAL DRAWINGS (E SERIES) FOR QUAINTLY & TYPE OF LIGHTS, SPEAKERS, DETECTORS, POWER OUTLETS, ETC. SCRIBE CEILING MATERIALS CAREFULLY. WHERE NO DEVICES ARE SHOWN ON PLAN, FIELD VERIFY LOCATION & QUANTITY OF DEVICES IN EXISTING CEILING. THESE DEVICES WILL BE RELOCATED TO THE NEW CEILING.

REFLECTED CEILING PLAN LEGEND

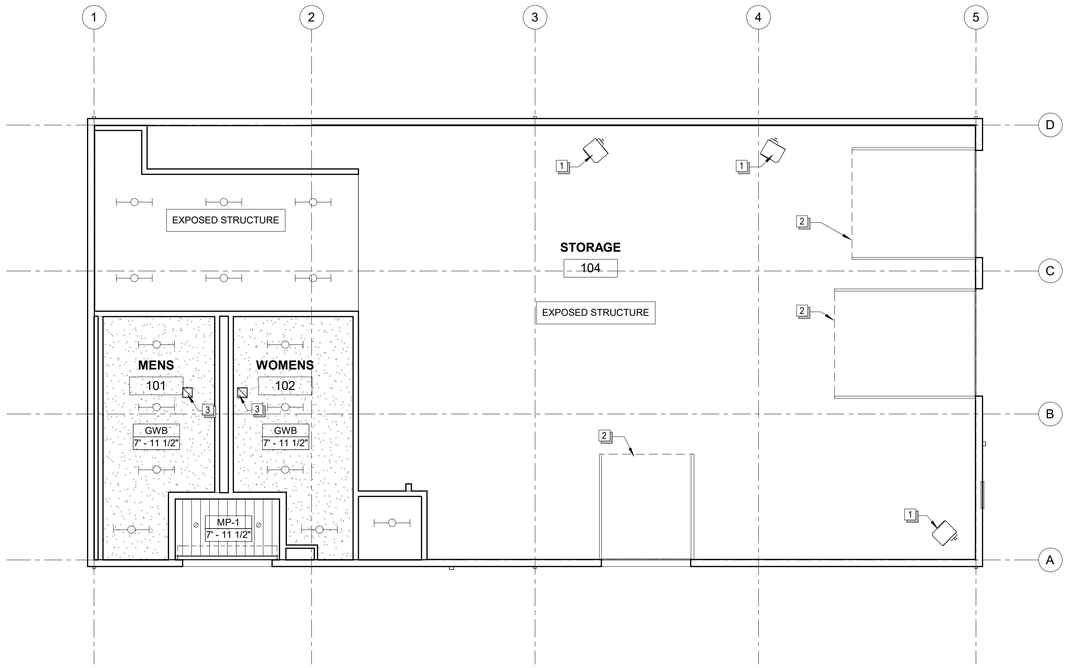
- X — CEILING TYPE
- X'-0" — CEILING HEIGHT A.F.F.
- 10" X 8' PENDANT LIGHT
- 10" X 4' PENDANT LIGHT
- 4' WRAP AROUND STRIPLIGHT
- ⌀ 6" RECESSED DOWN LIGHT
- EXHAUST FAN
- GYPSUM WALL BOARD

GENERAL NOTES - ROOF PLAN:

A. SUB-CONTRACTOR SHALL PROTECT THE SITE (PAVING, LANDSCAPING, GRASSY AREAS). REPAIR ALL DAMAGED / DISTURBED AREAS TO ORIGINAL CONDITIONS.
B. SUB-CONTRACTOR SHALL REVIEW CONTRACT REQUIREMENTS AND PROCEDURES OUTLINED IN THE SPECIFICATIONS. THE SUB-CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MATERIALS, METHODS AND MEANS REQUIRED TO EXECUTE THE GENERAL CONTRACT AND PROVIDE A FINISHED PRODUCT.
C. VERIFY MECHANICAL AND ELECTRICAL CONDITIONS FOR SCOPE AND INTERFACE. REVIEW ANY DISCREPANCIES OR COORDINATION CONCERNS WITH ARCHITECT.
D. PRIOR TO BIDDING, SUB-CONTRACTOR IS STRONGLY ENCOURAGED TO VISIT THE SITE AND REVIEW CONDITIONS. SUB-CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS FOR WORKABILITY, ADJACENT CONDITIONS, EFFECTS AND ACCESSIBILITY. SUB-CONTRACTOR SHALL FIELD VERIFY DIMENSIONS PRIOR TO ORDERING MATERIALS FOR CONSTRUCTION.
E. SUB-CONTRACTOR SHALL CONTACT THE ARCHITECT IN THE EVENT THAT UNFORESEEN CONDITIONS ARE ENCOUNTERED.
F. ALL WORK SHALL COMPLY WITH APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
G. THE SUB-CONTRACTOR SHALL PERFORM ALL TESTS AS SPECIFIED OR AS NECESSARY TO DEMONSTRATE COMPLETE AND SATISFACTORY INSTALLATIONS OF ALL SYSTEMS PROVIDED UNDER THESE CONTRACT DOCUMENTS. COORDINATE REQUIREMENTS WITH SPECIFICATIONS, DRAWINGS, AND MANUFACTURER REQUIREMENTS.
H. THE ROOF SHALL SLOPE IN THE DIRECTION INDICATED BY ARROWS (ARROWS POINT TO LOW POINT). ROOF SLOPES TO BE PROVIDED THROUGH THE USE OF SLOPED STRUCTURE.
I. ALL WORK AND DETAILING SHALL BE IN CONFORMANCE WITH MANUFACTURER STANDARDS FOR THE SYSTEM AND WARRANTY PERIOD SPECIFIED.

KEYNOTES #

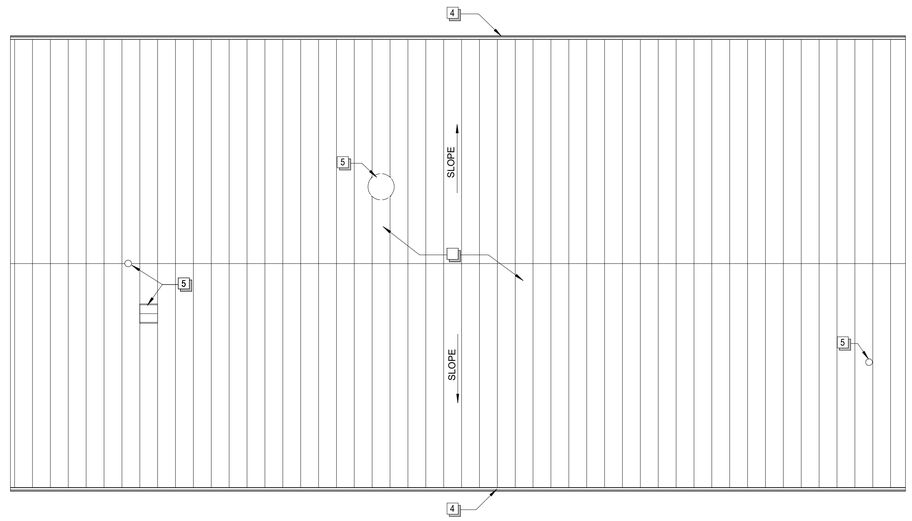
#	DESCRIPTION
1	GAS-FIRE UNIT HEATER - SEE MECH.
2	LIMITS OF OVERHEAD SECTIONAL DOOR SHOWN AS DASHED
3	BOX GWB AROUND PROJECTING EXHAUST FAN
4	PRE-FINISHED SHEET METAL GUTTER AND DOWNSPOUT. COLOR TO MATCH BUILDING TRIM. PROVIDE CONTROL JOINTS AT 60'-0" O.C. SEE BUILDING ELEVATIONS FOR DOWNSPOUT LOCATIONS
5	PLUMBING VENTS - COORD. LOCATIONS WITH MECHANICAL DRAWINGS. PROVIDE ROOF JACK PER MANUFACTURERS' STANDARD DETAILS.
6	AIR CIRCULATION FAN - SEE MECH.
7	EXPOSED CEILING TO HAVE FABRIC LINER
8	DUCT LOCATION



2 A131 REFLECTED CEILING PLAN

1/8" = 1'-0"

NORTH



3 A131 ROOF PLAN

1/8" = 1'-0"

NORTH

DRAWN:	RWV
DESIGNED:	MJM
CHECKED:	MJM
PROJ. MNGR:	SKK

BY	DESCRIPTION	NO.	DATE
KPE	BID SET	0	03-06-2020

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MICHAEL J. MCLENNAN
A-1568
STATE OF NEBRASKA
03/06/2020

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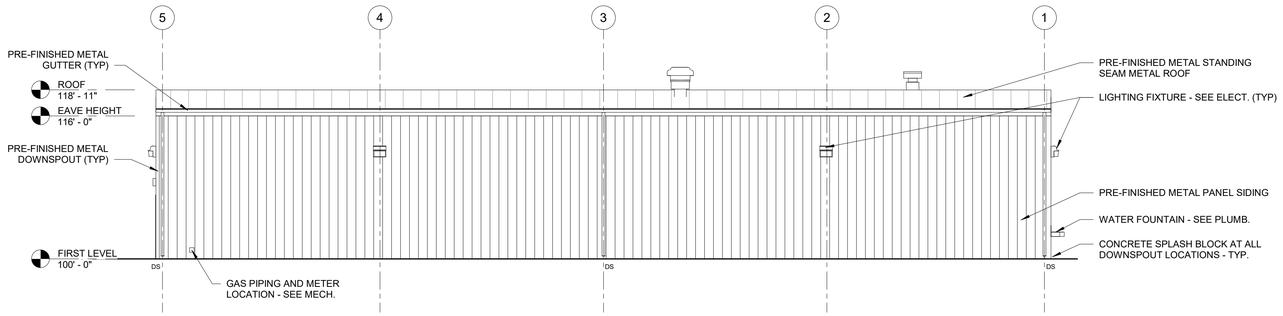
REFLECTED CEILING PLANS & ROOF PLAN

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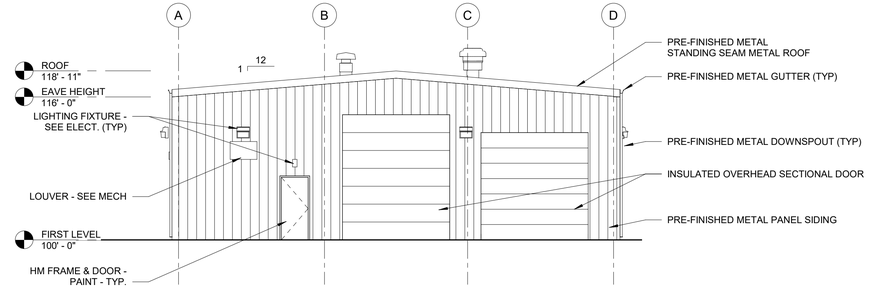
DATE: 03-06-2020

JOB NUMBER: 535-002

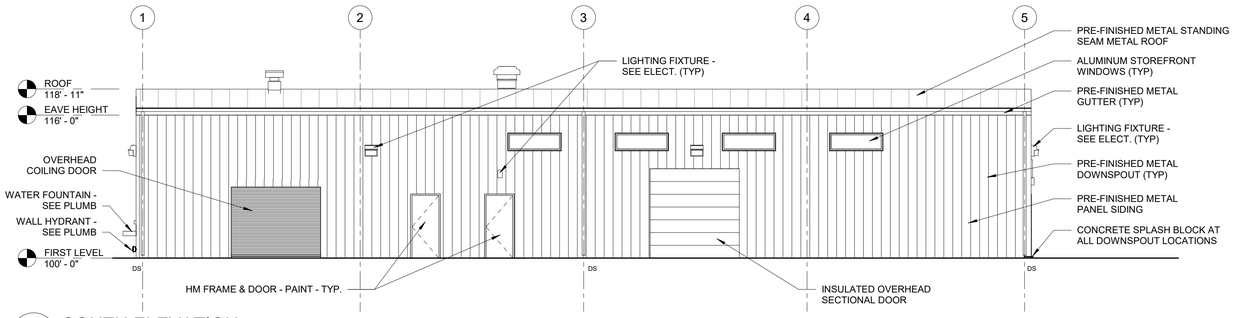
SHEET: A131



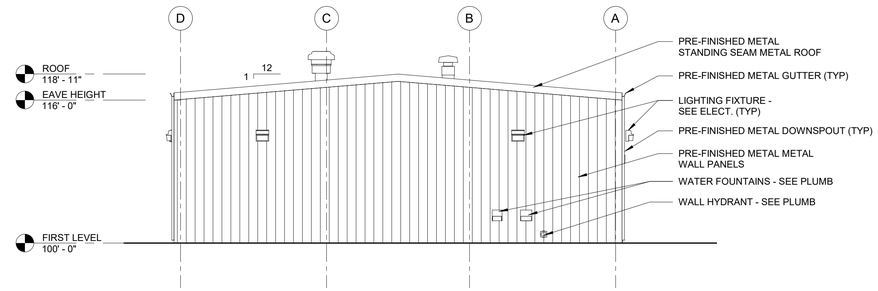
1 A201 NORTH ELEVATION
1/8" = 1'-0"



2 A201 EAST ELEVATION
1/8" = 1'-0"



3 A201 SOUTH ELEVATION
1/8" = 1'-0"



4 A201 WEST ELEVATION
1/8" = 1'-0"

DRAWN:	RWV
DESIGNED:	MJM
CHECKED:	MJM
PROJ. MNGR:	SKK

NO.	DESCRIPTION	BY
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DATE: 03-06-2020

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03/06/2020

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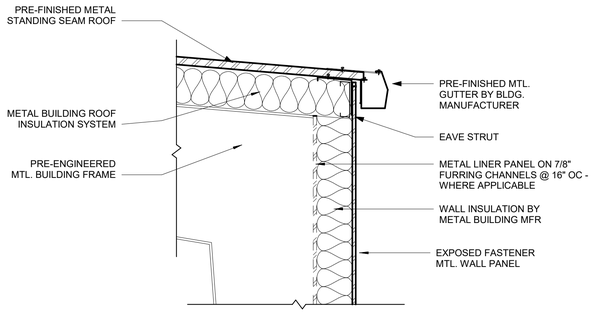
EXTERIOR BUILDING ELEVATION

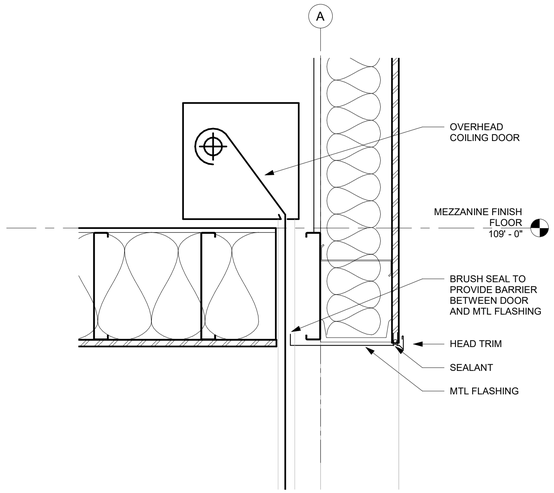
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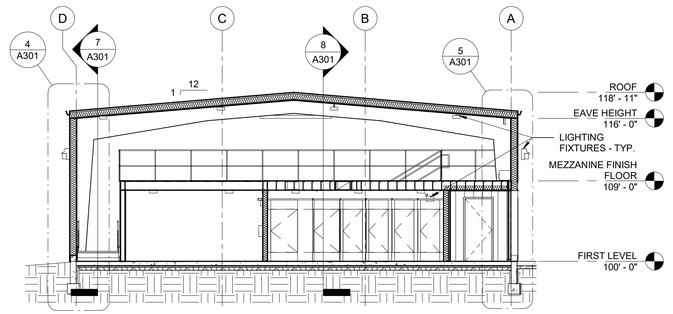
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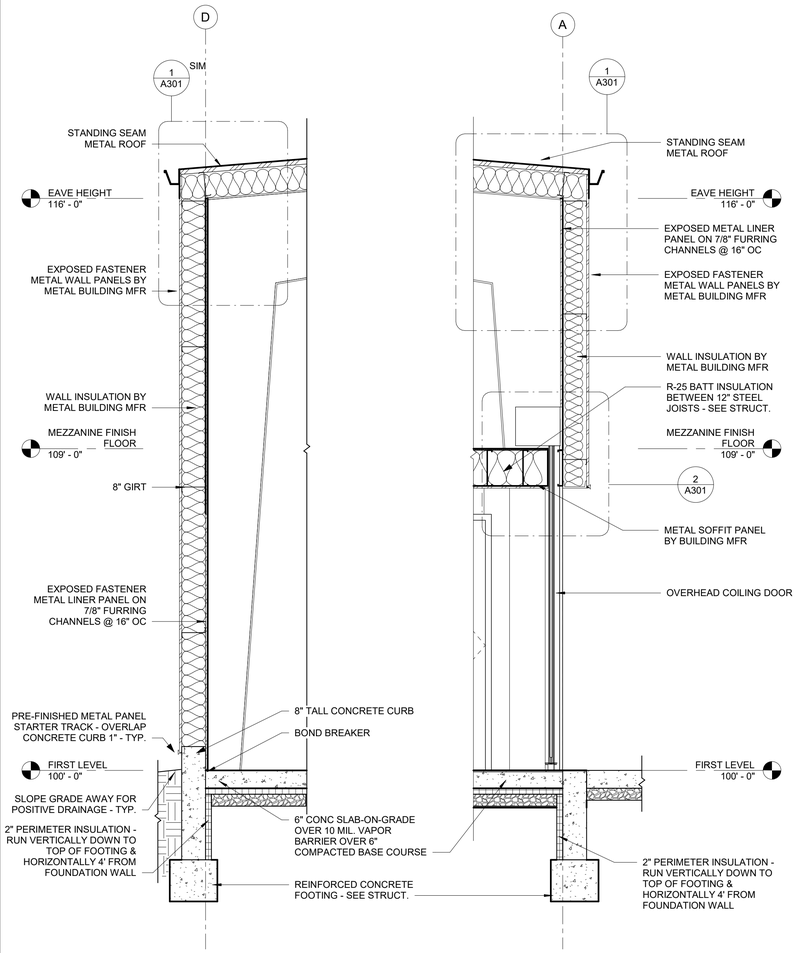
SHEET: A201



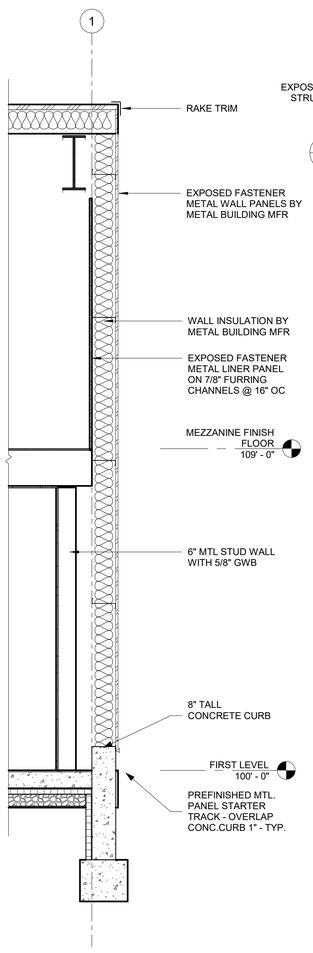




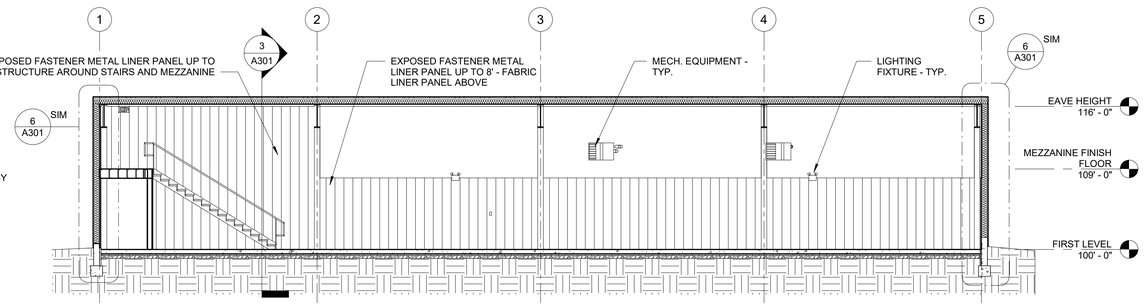
1 A301 EAVE DETAIL
3/4" = 1'-0"



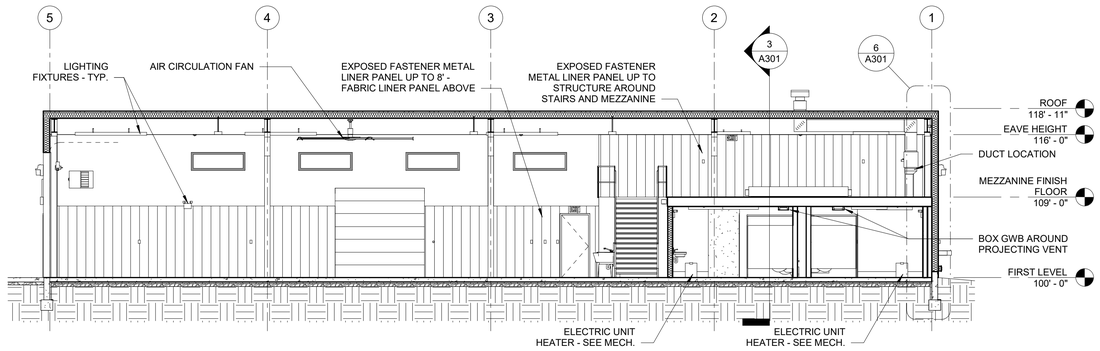
2 A301 OVERHEAD DOOR DETAIL
1 1/2" = 1'-0"



3 A301 BUILDING SECTION
1/8" = 1'-0"



7 A301 BUILDING SECTION
1/8" = 1'-0"



4 A301 WALL SECTION
1/2" = 1'-0"

5 A301 WALL SECTION
1/2" = 1'-0"

6 A301 WALL SECTION
1/2" = 1'-0"

8 A301 BUILDING SECTION
1/8" = 1'-0"

DRAWN:	RWV
DESIGNED:	MJM
CHECKED:	MJM
PROJ. MNGR:	SKK

NO.	DESCRIPTION	DATE	BY
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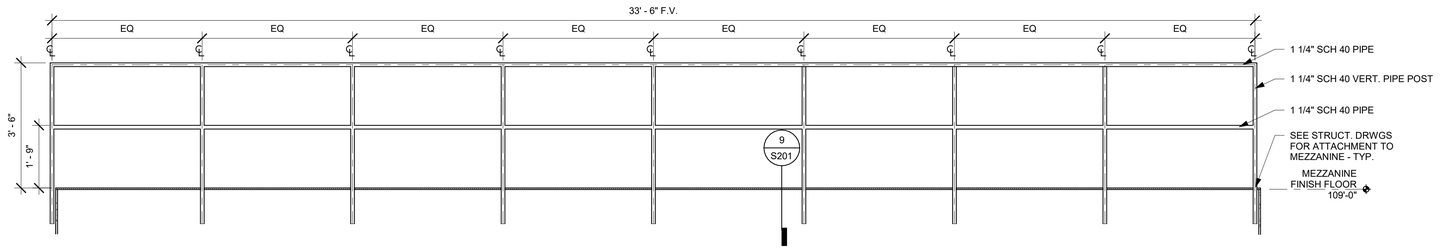
BUILDING AND WALL SECTIONS

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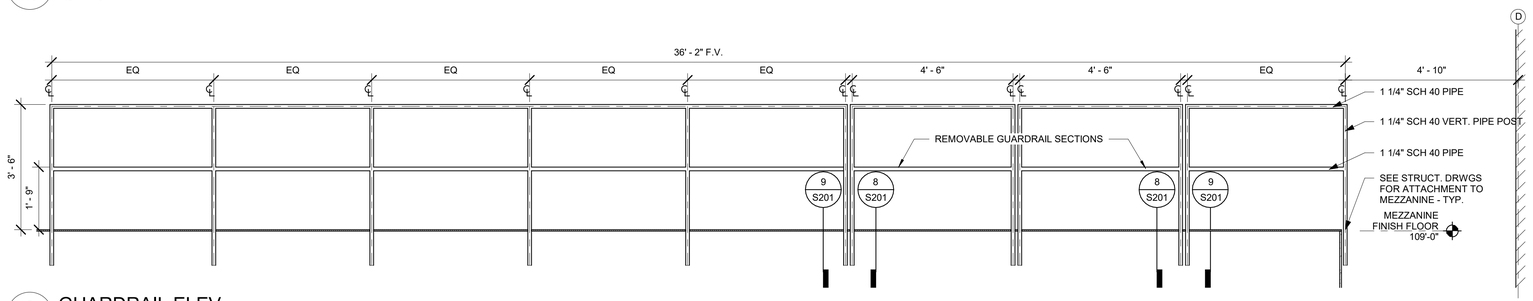
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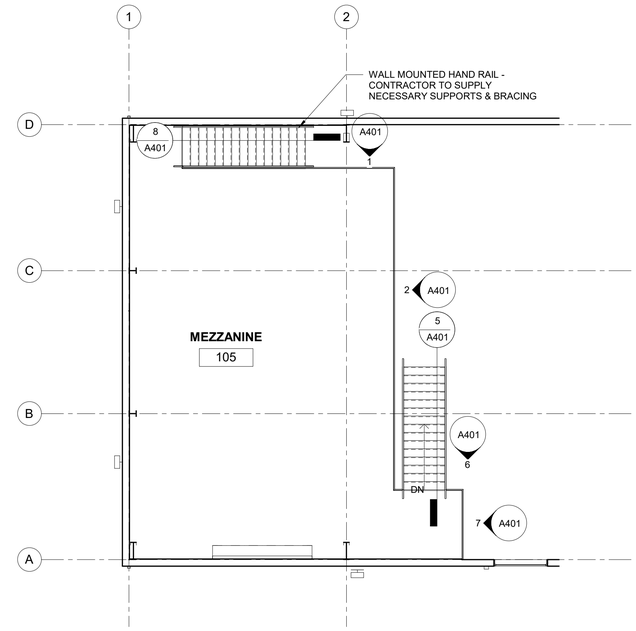
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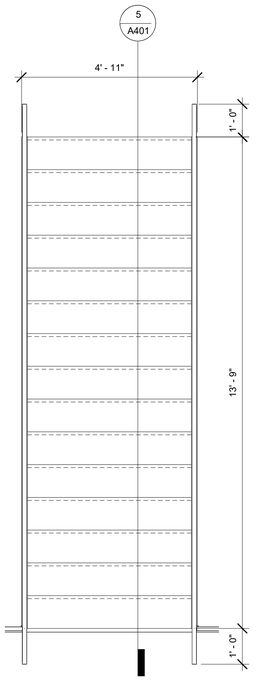
1 A401 GUARDRAIL ELEV.
1/2" = 1'-0"



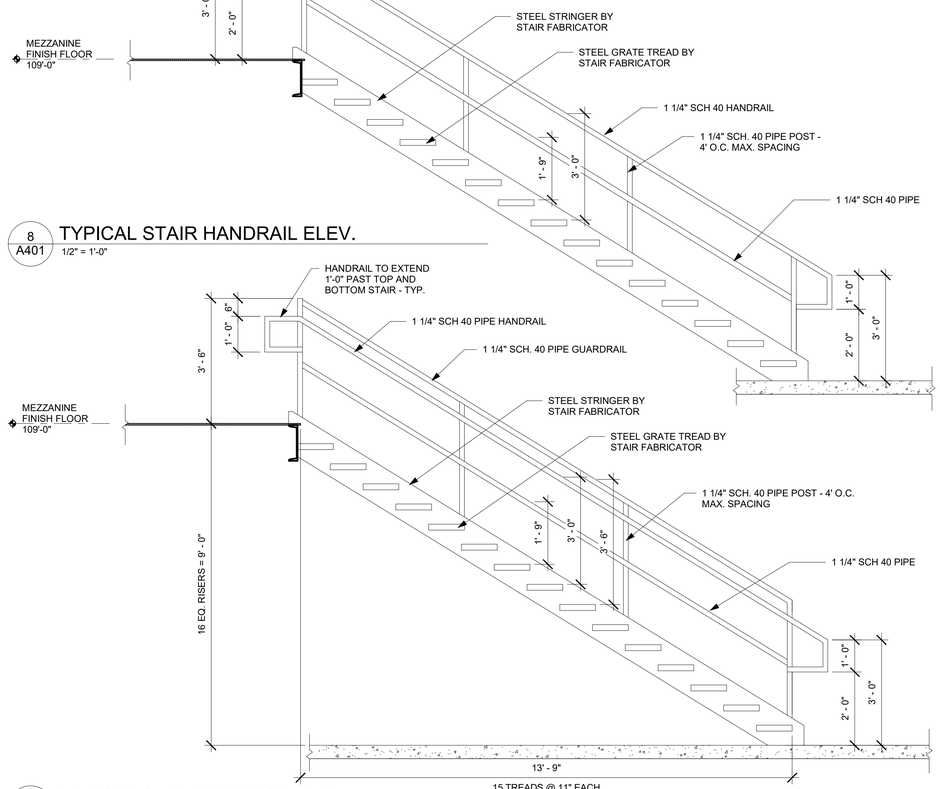
2 A401 GUARDRAIL ELEV.
1/2" = 1'-0"



3 A401 MEZZANINE RAILING PLAN
1/8" = 1'-0"
NORTH

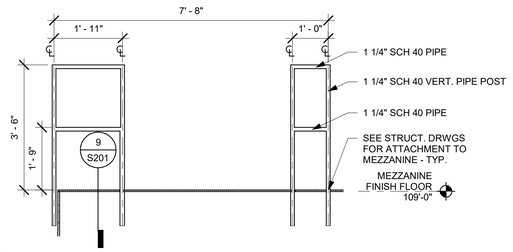


4 A401 TYPICAL STAIR PLAN
1/2" = 1'-0"

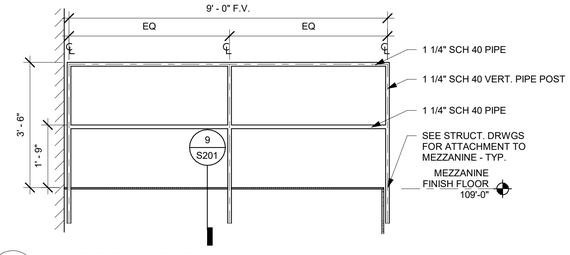


8 A401 TYPICAL STAIR HANDRAIL ELEV.
1/2" = 1'-0"

5 A401 TYPICAL STAIR RAILING ELEV.
1/2" = 1'-0"



6 A401 GUARDRAIL ELEV.
1/2" = 1'-0"



7 A401 GUARDRAIL ELEV.
1/2" = 1'-0"

DRAWN:	RWV
DESIGNED:	MJM
CHECKED:	MJM
PROJ. MNGR:	SKK

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ENLARGED STAIR PLANS

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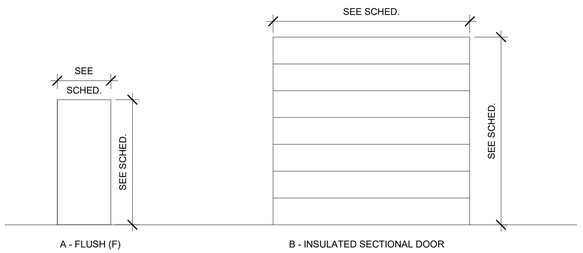
SHEET: A401

ROOM FINISH SCHEDULE									
ROOM NO.	DESCRIPTION	FLOOR	BASE	WALLS NORTH	WALLS EAST	WALLS SOUTH	WALLS WEST	CLG MATERIAL	REMARKS
100	ALCOVE	CONC.	-	MP	MP	MP	MP	METAL SOFFIT	
101	MENS	SC	VB-1	PT	PT	PT	PT	GWB1	
102	WOMENS	SC	VB-1	PT	PT	PT	PT	GWB1	
103	JAN	SC	FRP	FRP	FRP	FRP	FRP	EXPOSED	
104	STORAGE	SC	MP	LP	LP	LP	LP	FABRIC LINER	METAL LINER PANEL UP TO 8' / FABRIC LINER FULL HEIGHT
105	MEZZANINE	PLYWD	MP	LP	LP	LP	LP	FABRIC LINER	METAL LINER PANEL UP TO 8' / FABRIC LINER FULL HEIGHT

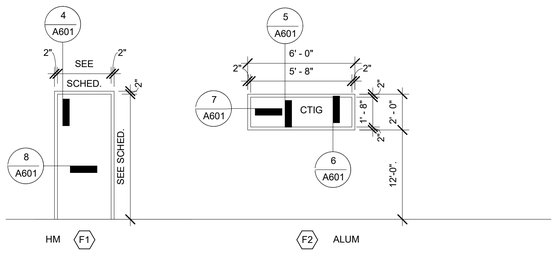
DOOR AND FRAME SCHEDULE											
DOOR NO.	DOORS WIDTH	HEIGHT	TYPE	MAT.	FINISH	FRAMES TYPE	DEPTH	MAT.	FINISH	HDWR TYPE	REMARKS
100	10' - 0"	8' - 10"	B		PF	-			PF		PULL UP OVERHEAD COILING DOOR
101	3' - 0"	7' - 0"	A	HM	GALV.	F1		HM	GALV.	2	
102	3' - 0"	7' - 0"	A	HM	GALV.	F1		HM	GALV.	2	
103	3' - 0"	7' - 0"	A	HM	GALV.	F1		HM	GALV.	2	
104	3' - 0"	7' - 0"	A	HM	GALV.	F1		HM	GALV.	1	
104A	10' - 0"	10' - 0"	B		PF				PF		POWERED OVERHEAD SECTIONAL DOOR
104B	3' - 0"	7' - 0"	A	HM	GALV.	F1		HM	GALV.	1	
104C	12' - 0"	14' - 0"	B		PF				PF		POWERED OVERHEAD SECTIONAL DOOR
104D	12' - 0"	12' - 0"	B		PF				PF		POWERED OVERHEAD SECTIONAL DOOR

DOOR & FINISH SCHEDULE LEGEND

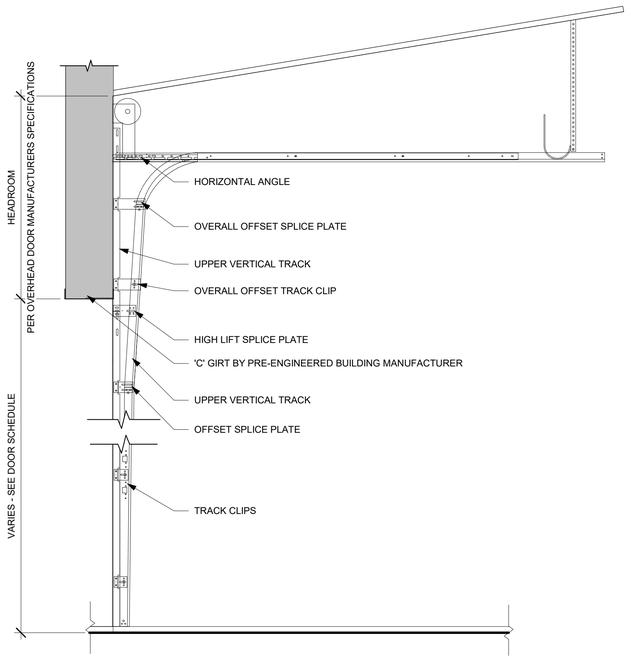
CTIG	CLEAR TEMPERED INSULATED GLAZING
FRP	FIBERGLASS REINFORCED PLASTIC
GALV.	GALVANIZED
GWB	GYPSUM WALL BOARD
HM	HOLLOW METAL
LP	LINER PANEL
MP	METAL PANEL
PLYWD	PLYWOOD - FIRE TREATED
PT	PAINT
PF	PREFINISHED
SC	SEALED CONCRETE
U.N.O.	UNLESS NOTED OTHERWISE
VB	VINYL BASE



1 A601 DOOR TYPES
1/4" = 1'-0"



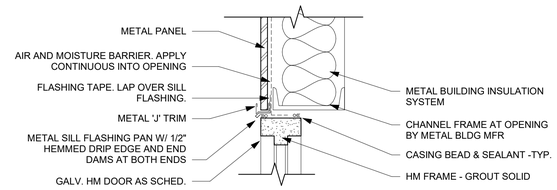
2 A601 HM FRAME ELEVATIONS
1/4" = 1'-0"



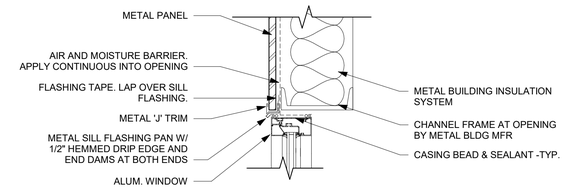
3 A601 OVERHEAD DOOR DETAIL
3/4" = 1'-0"

DOOR, FRAME, AND GLASS GENERAL NOTES

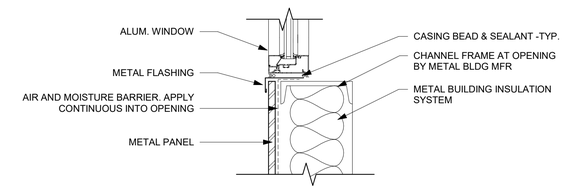
1. ALL HOLLOW METAL FRAMES SHALL BE GROUTED SOLID.
2. INSTALL EXTERIOR FRAMES WITH 1/4 INCH SHIM AND JOINT SEALANT AROUND PERIMETER OF FRAME.
3. GLASS TYPES FOR FRAMES ARE INDICATED ON FRAME ELEVATIONS OR IN SPECIFICATIONS.
4. EXTERIOR WINDOW FRAME TYPES ARE INDICATED ON FLOOR PLAN WITH HEXAGON SYMBOL.
5. OVERHEAD COILING DOORS, GRILLES AND SECTIONAL DOORS WIDTH AND HEIGHT DIMENSIONS INDICATED IN DOOR AND FRAME SCHEDULE REPRESENT FURNISHED OPENING SIZE. CONTRACTOR TO COORDINATE EXACT SIZE OF DOOR WITH MANUFACTURER.
6. SEE SPECIFICATIONS 087100 HARDWARE FOR HARDWARE SET NOTED IN DOOR SCHEDULE.



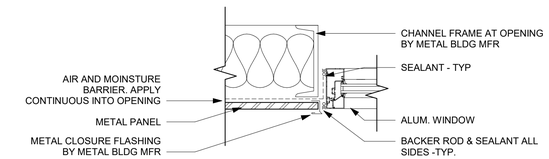
4 A601 HM FRAME HEAD DETAIL
1 1/2" = 1'-0"



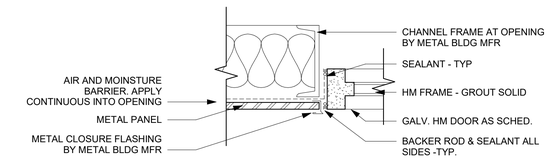
5 A601 ALUM. FRAME HEAD DETAIL
1 1/2" = 1'-0"



6 A601 ALUM. FRAME SILL DETAIL
1 1/2" = 1'-0"



7 A601 ALUM. FRAME JAMB DETAIL
1 1/2" = 1'-0"



8 A601 HM FRAME JAMB DETAIL
1 1/2" = 1'-0"

DRAWN:	RWV
DESIGNED:	MJM
CHECKED:	MJM
PROJ. MNGR:	SKK

NO.	DESCRIPTION	BY
0	BID SET	KPE

DATE: 03-06-2020

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ROOM FINISH & DOOR SCHEDULES, FRAME ELEVATIONS & DETAILS

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OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020

JOB NUMBER: 535-002

SHEET: A601

GENERAL NOTES

1. DESIGN DATA
1.1 BUILDING CODE: 2012 INTERNATIONAL BUILDING CODE (IBC) WITH LOCAL AMENDMENTS
1.2 DESIGN LOADS:

ROOF LOADS:
DEAD LOAD: SELF WEIGHT(5 PSF) + 5 PSF COLLATERAL
ROOF LIVE LOAD: 20 PSF

SNOW LOAD:
GROUND SNOW LOAD: 25 PSF
SNOW IMPORTANCE FACTOR: 1.1
EXPOSURE FACTOR: 1.0
FLAT ROOF SNOW LOAD: 22 PSF

MEZZANINE LOADS:
DEAD LOAD: 15 PSF
LIVE LOAD (LIGHT STORAGE): 125 PSF

STAIR LOADS:
DEAD LOAD: SELF WEIGHT
LIVE LOAD: 100 PSF

WIND LOAD:
WIND SPEED (3 SEC GUST): 120 MPH
WIND EXPOSURE: C
RISK CATEGORY: III
WIND VELOCITY PRESSURE: 27.0 PSF
DESIGN WIND PRESSURES AT WALLS (LOAD COMBINATION FACTOR NOT INCLUDED)
BASED ON 100 SF AREA
INTERIOR ZONE 27.3 PSF
END ZONE 30.3 PSF (5'-WIDE)

DESIGN WIND PRESSURES AT ROOFS (LOAD COMBINATION FACTOR NOT INCLUDED)
BASED ON 100 SF AREA
INTERIOR ZONE 29.1 PSF
END ZONE 34.5 PSF (5'-WIDE)

SEISMIC:

SPECTRAL RESPONSE ACCELERATIONS:	SS=0.097	S1=0.042
SPECTRAL RESPONSE COEFFICIENTS:	SDS=0.1035	SD1=0.067
SEISMIC IMPORTANCE FACTOR:	1.25	
OCCUPANCY CATEGORY:	III	
SITE CLASS:	D	
SEISMIC DESIGN CATEGORY:	B	
SEISMIC BASE SHEAR:	0.0259*W	
ANALYSIS PROCEDURE:	EQUIVALENT LATERAL FORCE	

2. GENERAL
2.1 THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE THE PROJECT AS SHOWN ON THE CONSTRUCTION DOCUMENTS.
2.2 NOTIFY THE ENGINEER IN WRITING OF EXISTING CONDITIONS THAT DIFFER FROM THOSE SHOWN IN CONTRACT DOCUMENTS. THE ENGINEER WILL EVALUATE THE DIFFERENCES, AND IF NECESSARY, REDESIGN FOR THE CONDITIONS FOUND.
2.3 THE CONTRACTOR SHALL VISIT THE SITE AND EXAMINE ALL EXISTING CONDITIONS PRIOR TO BID. ANY CLARIFICATION OF DISCREPANCY AND UNKNOWN AFFECTING THE WORK SHALL BE REPORTED TO THE OWNER AND DESIGN PROFESSIONALS. CONTRACTOR SHALL NOT BE PERMITTED EXTRA COST DUE TO FAILURE TO VISIT SITE.
2.4 THE CONTRACTOR SHALL REFERENCE SPECIFICATIONS FOR ADDITIONAL INFORMATION. THE SPECIFICATIONS ARE PART OF THE CONSTRUCTION DOCUMENTS. IN THE EVENT OF CONFLICT BETWEEN SPECIFICATIONS AND DRAWINGS, SUCH CONFLICT SHALL BE REPORTED TO THE ARCHITECT/ENGINEER FOR RESOLUTION.
2.5 THE STRUCTURE DETAILED ON THESE DRAWINGS REPRESENTS THE COMPLETED STRUCTURE. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING MEASURES REQUIRED TO PROTECT THE STRUCTURE DURING CONSTRUCTION. THIS INCLUDES PROVIDING SHORING, BRACING, OR TEMPORARY SUPPORTS AS NECESSARY FOR BUILDING ELEMENTS DURING CONSTRUCTION TO RESIST DESTABILIZING FORCES SUCH AS WIND AND UNBALANCED SOIL LOADING DUE TO CONSTRUCTION.
2.6 SUBMITTALS SHALL BE PROVIDED FOR REVIEW BY THE ENGINEER PRIOR TO CONSTRUCTION. INCLUDE WITH SUBMITTALS SPECIFIC WRITTEN NOTICE OF ANY VARIATION A SUBMITTAL HAS FROM THE REQUIREMENTS OF CONSTRUCTION DOCUMENTS. ENGINEER'S REVIEW OF SUBMITTALS SHALL NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FROM COMPLIANCE WITH CONSTRUCTION DOCUMENTS UNLESS THE ENGINEER HAS SPECIFICALLY ACCEPTED THE VARIATION IN WRITING.

3. FOUNDATIONS
3.1 FOUNDATION DESIGNS ARE BASED ON A NET ALLOWABLE SOIL BEARING PRESSURE OF 1500 PSF UNO. CONTRACTOR SHALL ARRANGE FOR TESTING AGENCY TO VERIFY COMPACTION AND APPROVE FOOTING SUBGRADES PRIOR TO PLACING CONCRETE. CONTACT ENGINEER IF SUITABLE BEARING CAPACITY IS NOT ENCOUNTERED.
3.2 EXTERIOR FOUNDATIONS SHALL BEAR AT OR BELOW A MINIMUM BEARING DEPTH OF 3'-6" BELOW ADJACENT FINISHED GRADE.
3.3 PROVIDE OVEREXCAVATION AND BACKFILL AT FOUNDATION EXCAVATIONS REQUIRED DUE TO UNSUITABLE MATERIALS.
3.4 PROPER SITE DRAINAGE SHALL BE MAINTAINED DURING CONSTRUCTION TO ENSURE SURFACE RUNOFF AWAY FROM STRUCTURES TO PREVENT PONDING OF RUNOFF NEAR THE STRUCTURES.
3.5 LONGITUDINAL BARS IN FOOTINGS AND CONCRETE STEM WALLS SHALL BE CONTINUOUS. PROVIDE LAP SPLICES AND CORNER BARS, UNO. SEE LAP SPLICE SCHEDULE AND CORNER BAR DETAIL FOR ADDITIONAL INFORMATION.

4. CONCRETE AND REINFORCING STEEL.
4.1 ALL CONCRETE CONSTRUCTION SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE STANDARD BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318) AND THE APPLICABLE BUILDING CODE.
4.2 CONCRETE USED DURING CONSTRUCTION SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) AT 28 DAYS OF 3000 PSI FOR FOUNDATIONS AND 4000 PSI FOR FOUNDATION WALLS AND SLABS.
4.3 MATERIALS USED IN CONCRETE MIX SHALL MEET:
A. CEMENT - ASTM C150 TYPE I OR II
B. AGGREGATE - ASTM C33
C. WATER - POTABLE
4.4 CHLORIDES IN ANY FORM OR CONCENTRATION SHALL NOT BE PERMITTED IN ANY CONCRETE. CONCRETE SHALL NOT BE CAST IN WATER OR ON FROZEN GROUND. CONCRETE MIXES SHALL HAVE A SLUMP OF 4" +/- 1" UNLESS NOTED OTHERWISE.
4.5 ALL EXTERIOR CONCRETE FOUNDATIONS AND EXPOSED EXTERIOR CONCRETE SHALL CONTAIN AIR ENTRAINMENT.
4.6 CONCRETE CONSTRUCTION EXECUTED IN HOT OR COLD WEATHER CONDITIONS SHALL CONFORM TO THE REQUIREMENTS OF ACI 305 OR ACI 306, RESPECTIVELY. CONCRETE CONSTRUCTION SHALL COMPLY WITH HOT WEATHER PROCEDURES WHEN AIR TEMPERATURE EXCEEDS 90 DEG F. CONCRETE PLACEMENT SHALL COMPLY WITH COLD WEATHER PROCEDURES WHEN AIR TEMPERATURE FALLS BELOW 40 DEG F.
4.7 REINFORCING STEEL SHALL MEET ASTM A 615 DEFORMED BAR, GRADE 60. SEE LAP SPLICE SCHEDULE AT REINFORCING BAR SPLICES. ALL VERTICAL AND CONTINUOUS REINFORCEMENT SHALL BE LAP SPLICED UNLESS NOTED OTHERWISE.
4.8 LAP SPLICES FOR REINFORCING BARS IN CONCRETE SHALL BE PROVIDED ACCORDING TO THE FOLLOWING SCHEDULE, UNLESS NOTED OTHERWISE IN THE DRAWINGS:

BAR SIZE	CLASS B LAP (3000 PSI)	CLASS B LAP (4000 PSI)
#3	16"	14"
#4	17"	15"
#5	22"	19"
#6	26"	23"

4.9 ADDITIONAL REINFORCEMENT IS REQUIRED AT THE CORNERS OF ALL WALLS, CONTINUOUS FOUNDATIONS AND GRADE BEAMS. SEE CORNER REINFORCEMENT DETAIL FOR ADDITIONAL INFORMATION.
4.10 ADDITIONAL REINFORCEMENT IS REQUIRED AT ALL OPENINGS IN CONCRETE SLABS AND WALLS. SEE OPENING REINFORCEMENT AND RE-ENTRANT DETAIL FOR ADDITIONAL INFORMATION. CUTTING OR CORING OF CONCRETE SHALL NOT BE PERMITTED.

5. STRUCTURAL STEEL
5.1 FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF AISC MANUAL OF STEEL CONSTRUCTION.
5.2 STRUCTURAL STEEL SHALL MEET THE FOLLOWING SPECIFICATIONS AND MINIMUM YIELD STRENGTHS:
MISCELLANEOUS STRUCTURAL SHAPES AND PLATES (ASTM A 36) 36 KSI
5.3 ANCHOR RODS SHALL BE ASTM F1554 GRADE 36 (OR ASTM A 36) UNLESS NOTED OTHERWISE.
5.4 ALL WELDING SHALL MEET THE AMERICAN WELDING SOCIETY STRUCTURAL WELDING CODE AND BE PERFORMED BY WELDERS CERTIFIED FOR THE WELD BEING EXECUTED. USE E-70 ELECTRODES FOR ALL SHOP AND FIELD WELDING.
5.5 THE STRUCTURAL STEEL FABRICATOR SHALL DESIGN ALL CONNECTIONS NOT FULLY DETAILED ON THE CONTRACT DOCUMENTS.
5.6 WHERE GROUT IS REQUIRED AT COLUMN BASE PLATES, PROVIDE NON-SHRINK GROUT PER ASTM C1107.

6. LIGHT GAUGE STEEL
6.1 ALL LIGHT GAUGE STEEL FRAMING SHALL CONFORM TO THE LATEST EDITION OF THE AMERICAN IRON AND STEEL INSTITUTE (AISI) "SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS".
6.2 LIGHT GAUGE STEEL SHALL MEET THE SPECIFICATIONS OF ASTM A 653 AND THE FOLLOWING MINIMUM YIELD STRESSES:
16 GAUGE AND HEAVIER FRAMING 50 KSI
18 GAUGE AND LIGHTER FRAMING 33 KSI
6.3 LIGHT GAUGE STEEL FRAMING CONNECTIONS SHALL BE MADE USING SELF-DRILLING SCREWS OR POWDER ACTUATED FASTERS UNLESS NOTED OTHERWISE.
6.4 LIGHT GAUGE STEEL COMPONENTS SHALL BE CUT FOR FLUSH FIT AGAINST ABUTTING MEMBERS. TRACKS SHALL BE INSTALLED SO THAT THEIR INSIDE WEBS ARE SET AGAINST THE END OF STUDS. EACH FLANGE OF TRACK SHALL BE FASTENED TO EACH FLANGE OF STUD, UNLESS NOTED OTHERWISE ON THE DRAWINGS. ABUTTING LENGTHS OF TRACK SHALL BE FASTENED OR ANCHORED TO A COMMON STRUCTURAL ELEMENT OR SPLICED TOGETHER.
6.5 BRIDGING SHALL BE PROVIDED AT 4'-0" MAXIMUM SPACING UNLESS NOTED OTHERWISE AND INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
6.6 ALL LIGHT GAUGE STRUCTURAL STEEL FRAMING SHALL BE PAINTED, OR GALVANIZED, IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

7. PRE-MANUFACTURED STEEL BUILDING
7.1 PRE-MANUFACTURED STEEL BUILDING TO BE PROVIDED BY A MANUFACTURER WITH FACILITY ACCREDITED TO PRODUCE THE BUILDING COMPONENTS AND DESIGNED ACCORDING TO MBMA'S 'METAL BUILDING SYSTEMS MANUAL' AND AISC STEEL DESIGN GUIDE NO. 3 ' SERVICEABILITY DESIGN CONSIDERATIONS FOR STEEL BUILDINGS'.
7.2 THE STEEL BUILDING MANUFACTURER SHALL BE RESPONSIBLE FOR THE ENTIRE DESIGN OF SUPERSTRUCTURE AND RELATED WORK.
7.3 FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AISC MANUAL OF STEEL CONSTRUCTION.
7.4 ALL LIGHT GAUGE STEEL FRAMING SHALL CONFORM TO THE LATEST EDITION OF THE AMERICAN IRON AND STEEL INSTITUTE (AISI) "SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS".
7.5 THE PRE-MANUFACTURED STEEL BUILDING SHALL BE DESIGNED IN ACCORDANCE WITH THE DESIGN DATA PROVIDED IN THE STRUCTURAL GENERAL NOTES.
7.6 PRE-MANUFACTURED STEEL BUILDING SUPPLIER SHALL REFER TO GENERAL AND/OR ARCHITECTURAL CONTRACT DOCUMENTS FOR ADDITIONAL COORDINATION ITEMS AND DESIGN REQUIREMENTS.
7.7 DRAWINGS AND CALCULATIONS FOR PRE-MANUFACTURED STEEL BUILDING AND RELATED ACCESSORIES SHALL BE PREPARED BY THE BUILDING MANUFACTURE AND SUBMITTED FOR REVIEW TO THE PROJECT ARCHITECT AND ENGINEER.
7.8 THE ENGINEER RESERVES THE RIGHT TO REDESIGN FOOTINGS, PIERS, OR OTHER SUPPORTING STRUCTURE DEPENDING ON FINAL BUILDING REACTIONS PROVIDE BY THE BUILDING MANUFACTURER.

6. ROUGH CARPENTRY
6.1 ALL DESIGN AND CONSTRUCTION SHALL CONFORM TO ANSI/AF+PA NDS THE NATIONAL DESIGN SPECIFICATIONS FOR WOOD CONSTRUCTION AND THE APPLICABLE BUILDING CODE.
6.2 FLOOR SHEATHING SHALL BE THE THICKNESS INDICATED ON THE DRAWING AND SPAN-RATED, AS REQUIRED BY THE DRAWINGS.
6.3 WOOD STRUCTURAL PANELS - SHEATHING TO BE APA RATED AND EXPOSURE 1. PANELS TO BE MANUFACTURED PER U.S. DEPARTMENT OF COMMERCE PRODUCT STANDARDS PS1 OR PS2.
6.4 ALL METAL ATTACHMENTS IN CONTACT WITH TREATED MATERIAL SHALL BE EITHER HOT-DIPPED GALVANIZED OR STAINLESS STEEL. PREFABRICATED CONNECTORS SHALL BE SIMPSON STRONG TIE, AS SPECIFIED, OR APPROVED EQUAL.
6.5 ALL NAILS SHALL BE "COMMON" UNLESS NOTED OTHERWISE.
8d = 0.131" DIA x 2 1/2
10d = 0.148" DIA x 3"
12d = 0.148" DIA x 3 1/4"
16d = 0.162" DIA x 3 1/2"

8. SPECIAL INSPECTIONS
8.1 SPECIAL INSPECTIONS AND OBSERVATIONS SHALL BE PERFORMED IN ACCORDANCE WITH CHAPTER 17 OF THE INTERNATIONAL BUILDING CODE (IBC). THE AGENCY PROVIDING SPECIAL INSPECTIONS SHALL BE APPROVED BY THE BUILDING OFFICIAL. SPECIAL INSPECTORS SHALL BE QUALIFIED FOR I NSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION REQUIRING SPECIAL INSPECTION AND SHALL PERFORM THE DUTIES AND RESPONSIBILITIES OUTLINED IN CHAPTER 17 OF THE IBC. REPORTS SHALL BE SUBMITTED TO THE BUILDING OFFICIAL AND ENGINEER OF RECORD IN A TIMELY MANNER.
8.2 TYPES OF WORK REQUIRING SPECIAL INSPECTION:
CONCRETE (IBC SECTION 1705.3):
A. PERIODIC INSPECTION;
1) REINFORCING STEEL AND PLACEMENT
2) VERIFY USE OF REQUIRED DESIGN MIX
3) MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES
4) VERIFY IN-SITU CONCRETE STRENGTH
5) FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED
B. CONTINUOUS INSPECTION;
1) BOLTS TO BE INSTALLED IN CONCRETE PRIOR TO AND DURING CONCRETE PLACEMENT
2) AT THE TIME FRESH CONCRETE IS SAMPLED TO FACBRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF CONCRETE
3) CONCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUE
SOILS (IBC SECTION 1705.6)
A. PERIODIC INSPECTION;
1) VERIFY MATERIALS BELOW FOOTINGS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY
2) VERIFY EXCAVATIONS ARE EXTENDED TO THE PROPER DEPTH AND HAVE REACHED PROPER MATERIAL
3) PERFORM CLASSIFICATION AND TESTING OF CONTROLLED FILL MATERIALS
4) PRIOR TO PLACEMENT OF CONTROLLED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY
B. CONTINUOUS INSPECTION;
1) VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF CONTROLLED FILL
POST-INSTALLED ANCHORS; VERIFY INSTALLATION OF EXPANSION, EPOXY OR OTHER TYPES OF POST-INSTALLED ANCHOR SYSTEMS.
INSPECTION OF FABRICATORS (IBC SECTION 1704.2.5.1); SPECIAL INSPECTION IS NOT REQUIRED WHERE WORK IS PERFORMED ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED TO PERFORM SUCH WORK WITHOUT SPECIAL INSPECTION. AT COMPLETION OF FABRICATION, THE APPROVED FABRICATOR SHALL SUBMIT A CERTIFICATE OF COMPLIANCE TO THE BUILDING OFFICIAL STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH THE APPROVED CONSTRUCTION DOCUMENTS.

ABBREVIATIONS

AB	ANCHOR BOLT	GA	GAUGE	PMEJ	PREMOLDED EXPANSION JOINT
ACI	AMERICAN CONCRETE INSTITUTE	GC	GENERAL CONTRACTOR	PSF	POUNDS PER SQUARE FOOT
AFF	ABOVE FINISH FLOOR	H	HEIGHT	PSI	POUNDS PER SQUARE INCH
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	HORIZ	HORIZONTAL	QTY	QUANTITY
AISI	AMERICAN IRON AND STEEL INSTITUTE	HSA	HEADED STUD ANCHOR	REF	REFER TO
ARCH	ARCHITECTURAL	HSS	HOLLOW STRUCTURAL SHAPE	REINF	REINFORCING
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	INFO	INFORMATION	REQD	REQUIRED
AWS	AMERICAN WELDING SOCIETY	ISO	ISOLATION	REV	REVERSE
BCX	BOTTOM CHORD EXTENTION	JBE	JOIST BEARING ELEVATION	RO	ROUGH OPENING
BFF	BELOW FINISHED FLOOR	JST	JOIST	RTU	ROOF TOP UNIT
BL	BLOCK LINTEL	KSI	KIPS PER SQUARE INCH	SCHED	SCHEDULE
BM	BEAM	L	LENGTH	SDS	SELF DRILLING SCREW
BO	BOTTOM OF	LB	POUNDS	SDI	STEEL DECK INSTITUTE
BOS	BOTTOM OF STEEL	LLH	LONG LEG HORIZONTAL	SIM	SIMILAR
BOT	BOTTOM	LLV	LONG LEG VERTICAL	SJI	STEEL JOIST INSTITUTE
BRG	BEARING	LONG	LONGITUDINAL	SPECS	SPECIFICATIONS
CIP	CAST-IN-PLACE	MATL	MATERIAL	STL	STEEL
CJ	CONTROL JOINT	MAX	MAXIMUM	STRUC	STRUCTURAL
CLR	CLEAR	MECH	MECHANICAL	T&B	TOP AND BOTTOM
CMU	CONCRETE MASONRY UNIT	MFR	MANUFACTURER	TBE	TRUSS BEARING ELEVATION
COL	COLUMN	MIN	MINIMUM	THK	THICKNESS
CONC	CONCRETE	MISC	MISCELLANEOUS	TO	TOP OF
CONN	CONNECTION	MO	MASONRY OPENING	TOC	TOP OF CONCRETE
CONST	CONSTRUCTION	MTL	METAL	TOF	TOP OF FOOTING
CONT	CONTINUOUS	NIC	NOT IN CONTRACT	TOGB	TOP OF GRADE BEAM
DIA	DIAMETER	NO	NUMBER	TOM	TOP OF MASONRY
EA	EACH	NS	NEAR SIDE	TOP	TOP OF PAVING
EJ	EXPANSION JOINT	NTS	NOT TO SCALE	TOS	TOP OF STEEL
EL	ELEVATION	OC	ON CENTER	TOW	TOP OF WALL
ELEC	ELECTRICAL	OD	OUTSIDE DIAMETER	TRANS	TRANSVERSE
EQ	EQUAL	OH	OPPOSITE HAND	TYP	TYPICAL
EW	EACH WAY	OPNG	OPENING	UNO	UNLESS NOTED OTHERWISE
FDN	FOUNDATION	OSL	OUTSTANDING LEG	VERT	VERTICAL
FF	FINISHED FLOOR	PAF	POWDER ACTUATED FASTENER	W	WIDTH
FS	FAR SIDE	PCF	POUNDS PER CUBIC FOOT	WP	WORK POINT
FTG	FOOTING	PC	PRECAST	WWF	WELDED WIRE FABRIC
		PL	PLATE		
		PLF	POUNDS PER LINEAR FOOT		

NO.	DESCRIPTION	DATE	BY
0	BID SET	03-06-2020	KPE

DRAWN: JMP
DESIGNED: JMP
CHECKED: SJU
PROJ. MNGR: SKK

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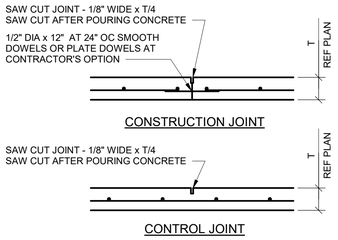
PROFESSIONAL STRUCTURAL ENGINEER
JOSHUA M. PEARCE
E-17798
STATE OF NEBRASKA
03-06-2020

STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE 68832

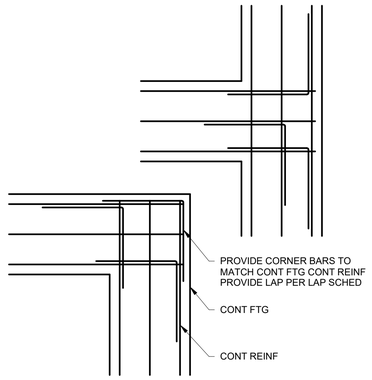
GENERAL STRUCTURAL NOTES

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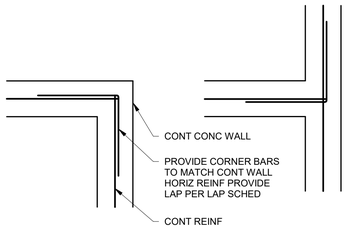
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JOB NUMBER: 535-002
SHEET: S001



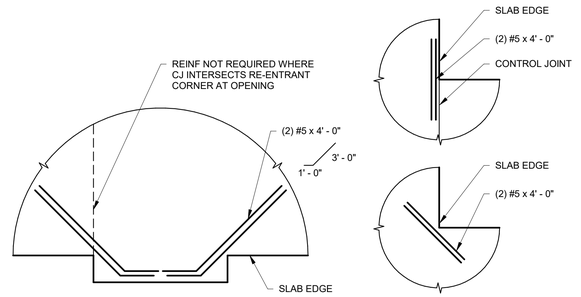
1 S002 TYPICAL SLAB JOINTS
3/4" = 1'-0"



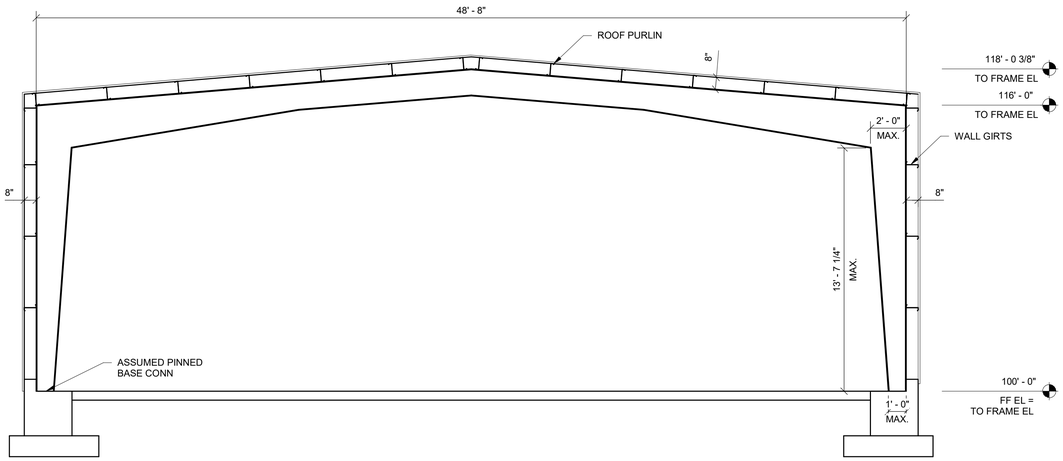
2 S002 CONT FOOTING CORNER REINF
3/4" = 1'-0"



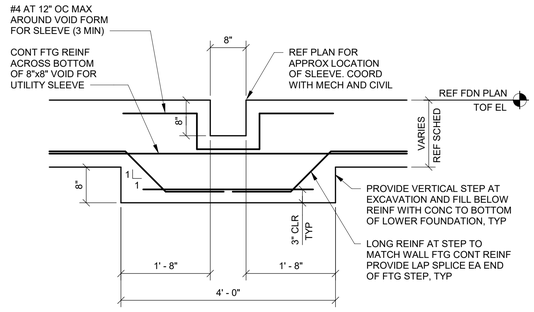
3 S002 STEM WALL CORNER REINF
3/4" = 1'-0"



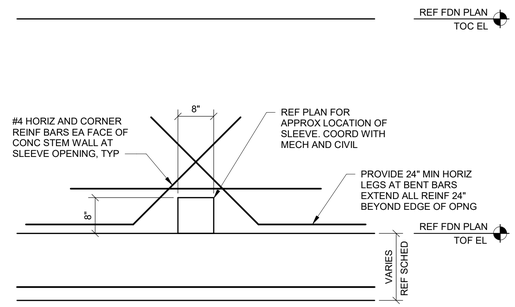
4 S002 SLAB CORNER AND DOOR REINF
3/4" = 1'-0"



5 S002 BUILDING FRAME
1/4" = 1'-0"

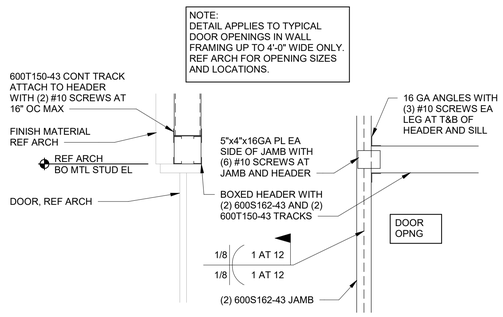


UTILITY SLEEVE AT FOOTING

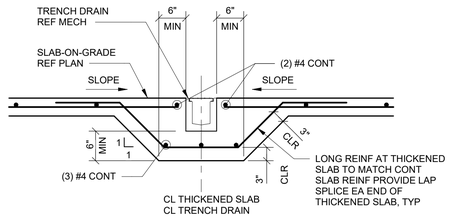


UTILITY SLEEVE AT STEM WALL

6 S002 UTILITY SLEEVE AT FOUNDATION AND STEM WALL DETAIL
3/4" = 1'-0"



7 S002 TYPICAL WALL OPENING FRAMING
3/4" = 1'-0"



8 S002 SLAB AT TRENCH DRAIN
3/4" = 1'-0"

DRAWN:	JMP
DESIGNED:	JMP
CHECKED:	SJU
PROJ. MNGR:	SKK

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0	BID SET	KPE
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PROFESSIONAL STRUCTURAL ENGINEER
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E-17798
STATE OF NEBRASKA
03-06-2020

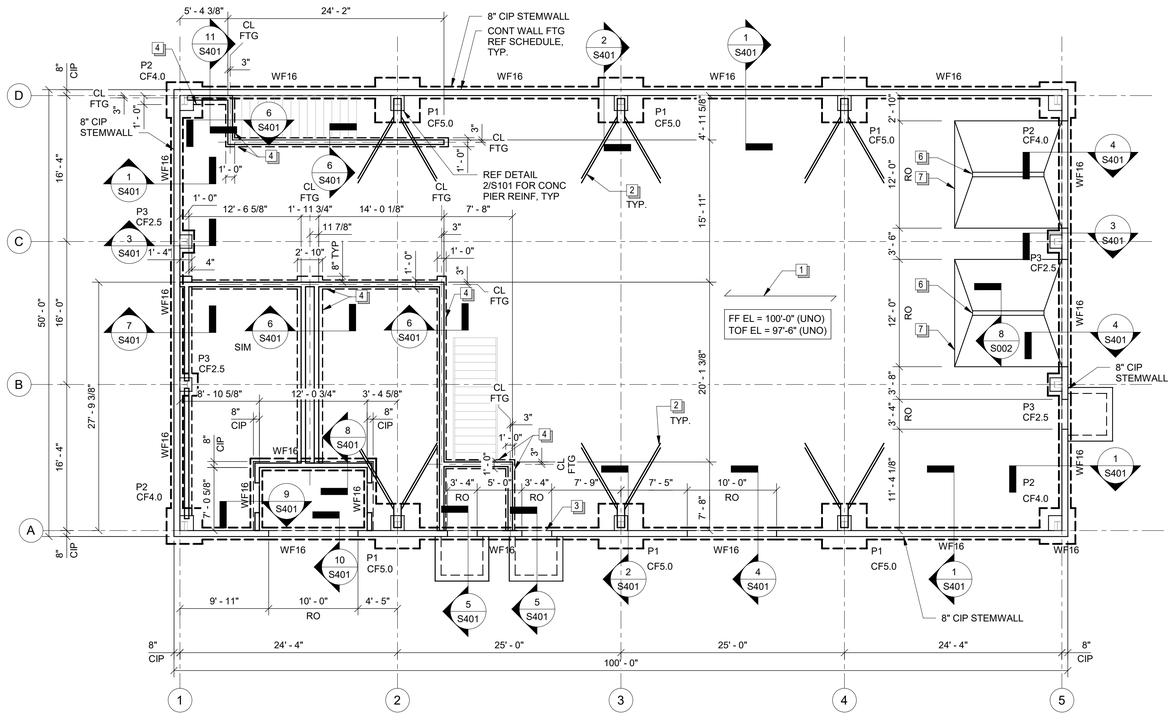
STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE 68832
GENERAL STRUCTURAL DETAILS

KPE
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1016 LEAVENWORTH ST.
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TOLL FREE: (888) 484-4939
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OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020

JOB NUMBER: 535-002

SHEET: S002



1 S101 FOUNDATION PLAN

1/8" = 1'-0"

PLAN NORTH

GENERAL NOTES

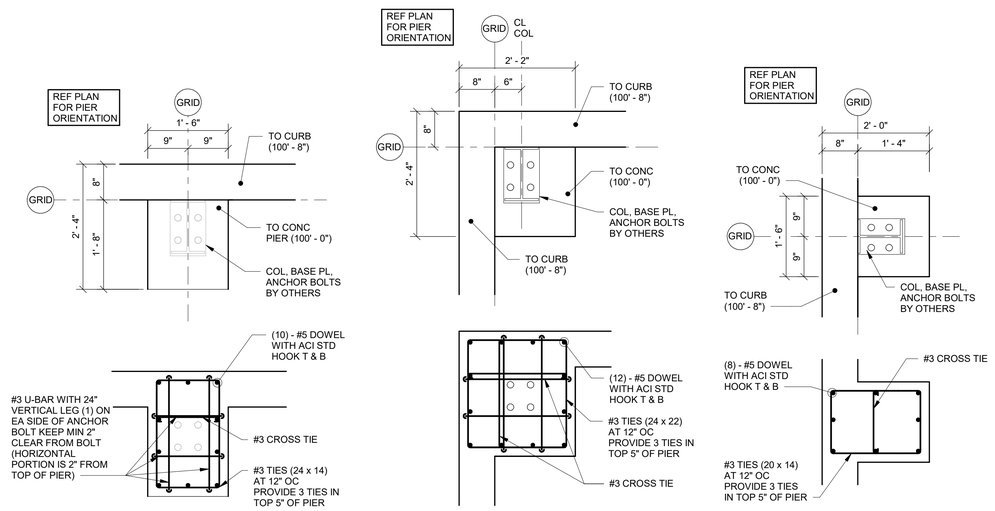
1. SEE SHEET S001 FOR GENERAL STRUCTURAL NOTES.
2. DIMENSIONS SHOWN ON PLANS ARE TO COLUMN CENTERLINES OR FACE OF WALL STRUCTURE, UNO. SEE ARCHITECTURAL FOR DIMENSIONS NOT SHOWN AND WALL FINISHES.
3. SEE ARCHITECTURAL FOR WINDOW, DOOR, AND OTHER OPENINGS THROUGH PRE-ENGINEERING METAL PANELS OF BUILDING.
4. REFER TO CIVIL DRAWINGS FOR GRADING PLAN.
5. REFER TO DETAILS 1/S002 FOR CONSTRUCTION JOINTS IN SLABS-ON-GRADE.
6. ELEVATIONS SHOWN AT FOOTINGS ARE TO TOP OF FTG UNLESS NOTED OTHERWISE.
7. REF 6/S002 FOR UTILITY OPENINGS THROUGH FDN WALLS.

KEYNOTES

1 6" CONCRETE SLAB-ON-GRADE OVER 10 MIL VAPOR RETARDER OVER 4" COMPACTED BASE COURSE. REINF CONC SLAB WITH #4 @ 16" EA WAY. PROVIDE CONTROL JOINTS IN SLAB AT NO GREATER THAN 18' AND INDIVIDUAL PANELS SHALL HAVE A LENGTH TO WIDTH RATIO LESS THAN 1.25.
2 (2) - #5 HAIRPINS AROUND ANCHOR BOLTS WITH 8'-0" LEGS TYP
3 REF 4/S002 FOR SLAB REINFORCING AT CORNER AND DOOR TYP
4 THICKENED SLAB REF 6/S401
5 STEEL STAIR REF ARCH DWGS AND SPECIFICATIONS
6 TRENCH DRAIN SLOPE SLAB TO TRENCH TOP OF DRAIN EL = 99'-11 1/4". REF ARCH AND MECH DWF FOR ADDITIONAL INFORMATION. REF 8/S002 FOR SLAB AT TRENCH DRAIN DETAIL.
7 CONSTRUCTION JOINT AT SLOPED SLAB PERIMETER, REF 1/S002 FOR TYPICAL SLAB JOINT DETAIL.

COLUMN FOUNDATION SCHEDULE				
MARK	LENGTH	WIDTH	THICKNESS	REINFORCEMENT
CF2.5	2' - 6"	2' - 6"	1' - 2"	(3) #5 BARS EA WAY BOT
CF4.0	4' - 0"	4' - 0"	1' - 2"	(4) #5 BARS EA WAY TOP & BOT
CF5.0	5' - 0"	5' - 0"	1' - 2"	(5) #5 BARS EA WAY TOP & BOT

WALL FOUNDATION SCHEDULE				
MARK	WIDTH x CONT	THICKNESS	REINF LONGITUDINAL	REINF TRANSVERSE
WF16	1' - 4"	1' - 2"	(2) #5 CONT	



P1 CONCRETE PIER

P2 CONCRETE PIER

P3 CONCRETE PIER

2 S101 PIER DETAILS

3/4" = 1'-0"

DRAWN: JMP
DESIGNED: JMP
CHECKED: SJU
PROJ. MNGR: SKK

NO.	DESCRIPTION	DATE	BY
0	BID SET	03-06-2020	KPE

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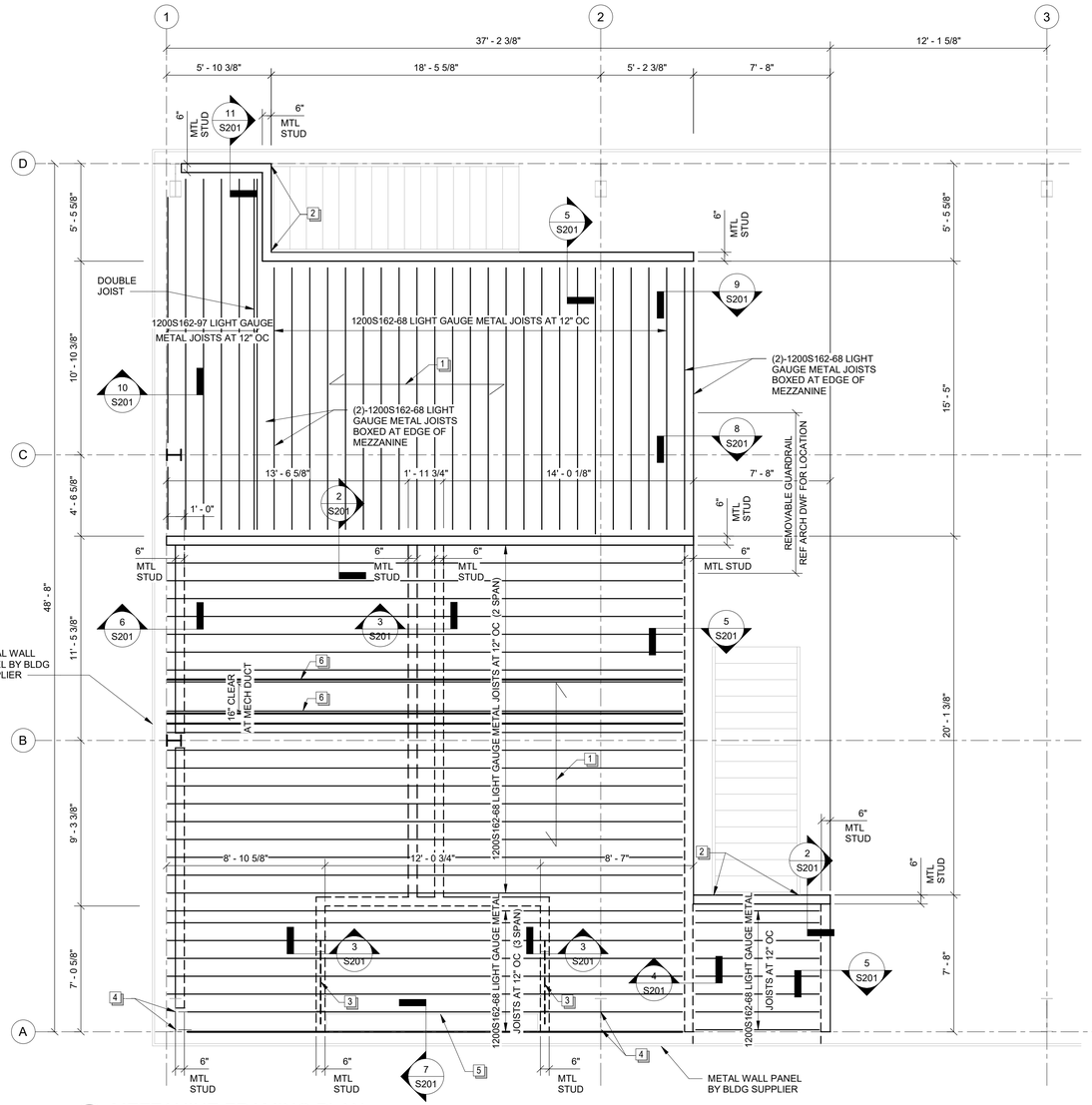
FOUNDATION PLAN

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OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020

JOB NUMBER: 535-002

SHEET: S101



1 S201 MEZZANINE FRAMING PLAN

1/4" = 1'-0"

GENERAL NOTES

1. SEE SHEET S001 FOR GENERAL STRUCTURAL NOTES.
2. DIMENSIONS SHOWN ON PLANS ARE TO COLUMN CENTERLINES OR FACE OF WALL STRUCTURE, UNO. SEE ARCHITECTURAL FOR DIMENSIONS NOT SHOWN AND WALL FINISHES.
3. SEE ARCHITECTURAL FOR WINDOW, DOOR, AND OTHER OPENINGS THROUGH PRE-ENGINEERING METAL PANELS OF BUILDING OR LIGHT GAUGE WALL FRAMING.
4. REFER TO CIVIL DRAWINGS FOR GRADING PLAN.

KEYNOTES

1 1/2" APA PLYWOOD FLOOR SHEATHING FIRE TREATED 32/16 SPAN RATING. FASTEN TO JOISTS WITH #10 TEK SCREWS AT 12" OC

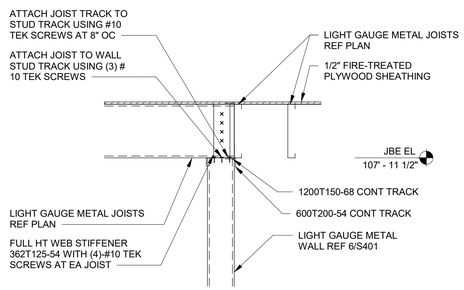
2 PROVIDE (2) - 600S162-43 BOXED WALL STUDS WITH (2) - 600T150-43 TRACK AT EA SIDE BELOW STAIR STRINGER BEARING. FASTEN TOGETHER AT EACH TRACK FLANGE WITH #10 TEK SCREWS AT 16" OC. TOP TRACK OF HEADER WILL CONTINUE ALONG REMAINDER OF WALL.

3 LIGHT GAUGE METAL HEADER TYPICAL WALL OPENING FRAMING REF 7/S002

4 ATTACH LIGHT GAUGE JOIST TO PRE-ENGINEERED COLUMN WITH 14 GAGE 3"X3"X0'-10" CLIP ANGLE. ATTACH TO JOIST WITH (5) - #12 SCREWS AND TO COLUMN WITH (5) - 0.157" DIA PAF

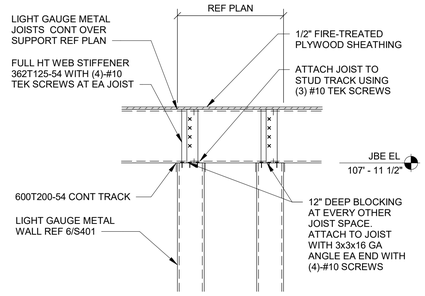
5 OVERHEAD DOOR EQUIPMENT REF ARCH DWG FOR ADDITIONAL INFORMATION.

6 DOUBLE JOIST AT EACH SIDE OF MECHANICAL DUCT



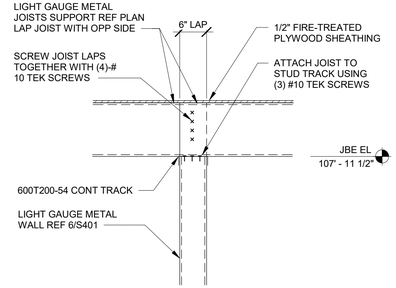
2 S201 GUARDRAIL PARALLEL TO JOIST

3/4" = 1'-0"



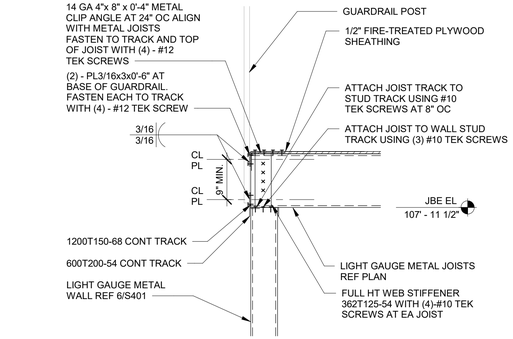
3 S201 JST BRG AT INTERIOR WALL CONT JST

3/4" = 1'-0"



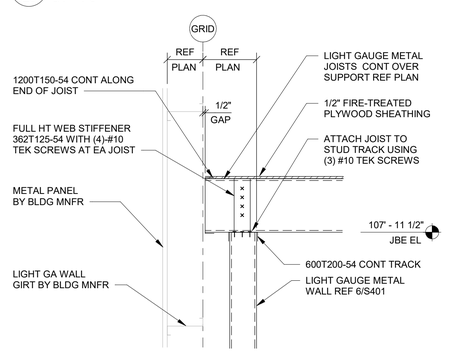
4 S201 JST BRG AT INTERIOR WALL LAP JST

3/4" = 1'-0"



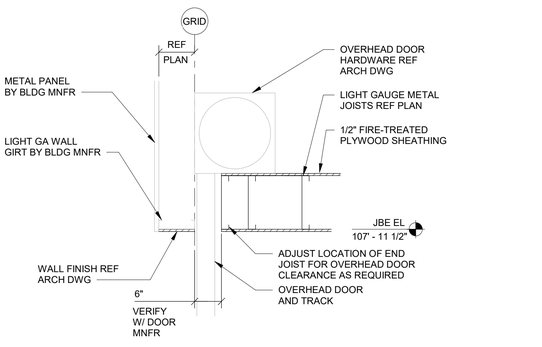
5 S201 JST BRG AT EDGE OF MEZZANINE

3/4" = 1'-0"



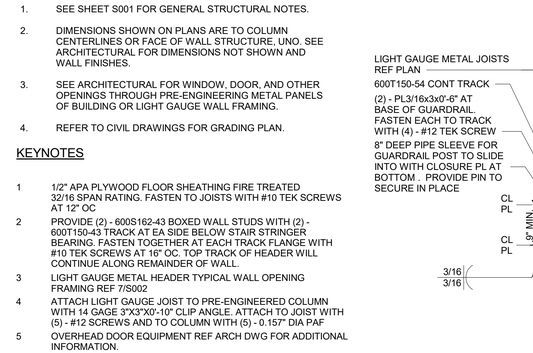
6 S201 JST BRG AT EXTERIOR WALL

3/4" = 1'-0"



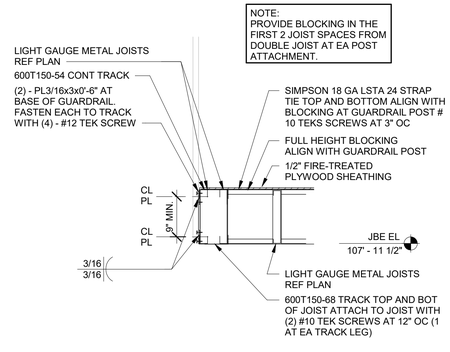
7 S201 JSTS PARALLEL TO BLDG WALL AT OPNG

3/4" = 1'-0"



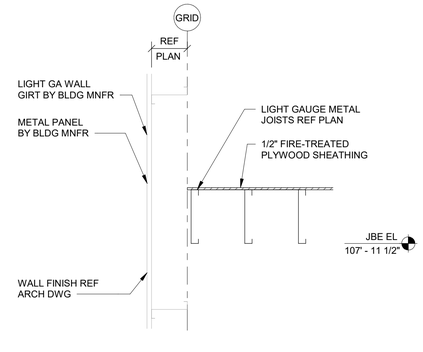
8 S201 REMOVABLE GUARDRAIL PARALLEL TO JOIST

3/4" = 1'-0"



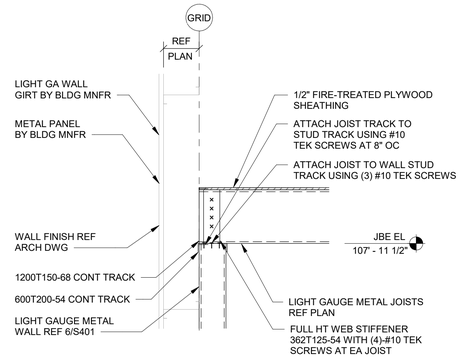
9 S201 GUARDRAIL PARALLEL TO JOIST NO WALL

3/4" = 1'-0"



10 S201 JSTS PARALLEL TO BLDG WALL

3/4" = 1'-0"



11 S201 JST BRG AT EXTERIOR WALL

3/4" = 1'-0"

DRAWN:	JMP
DESIGNED:	JMP
CHECKED:	SJU
PROJ. MNGR:	SKK

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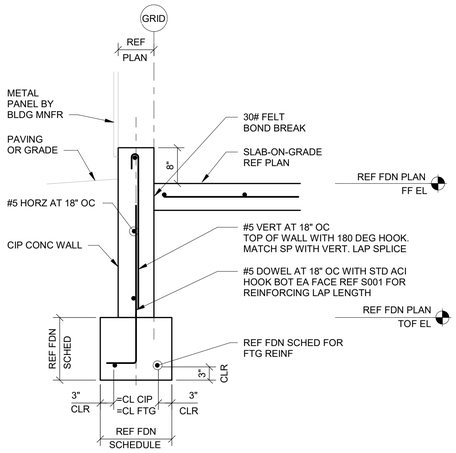
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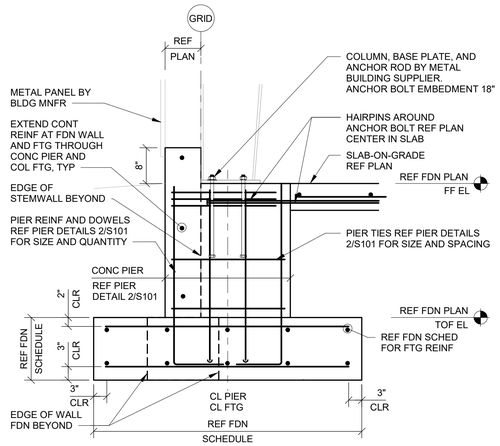
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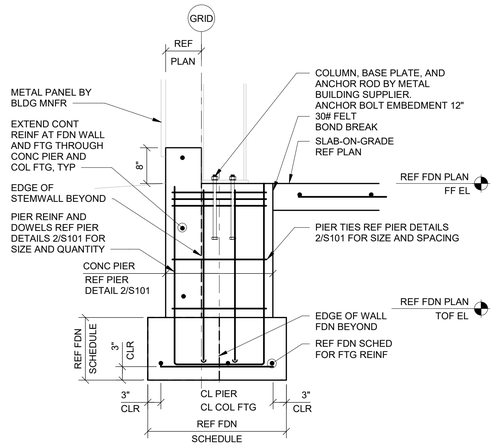
SHEET: S201



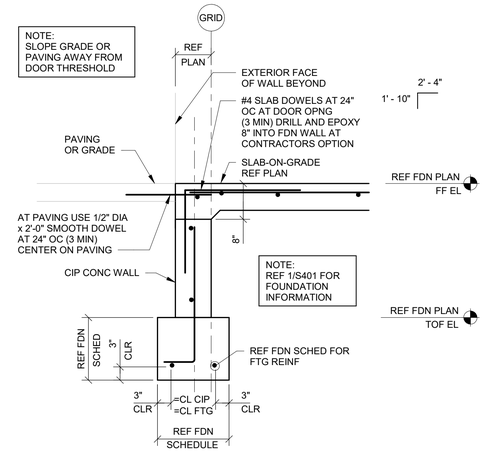
1 S401 FDN WALL WITH CURB
3/4" = 1'-0"



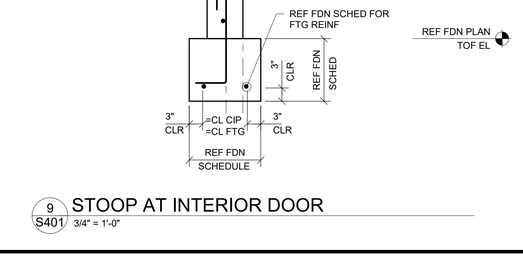
2 S401 FTG AT FRAME COL
3/4" = 1'-0"



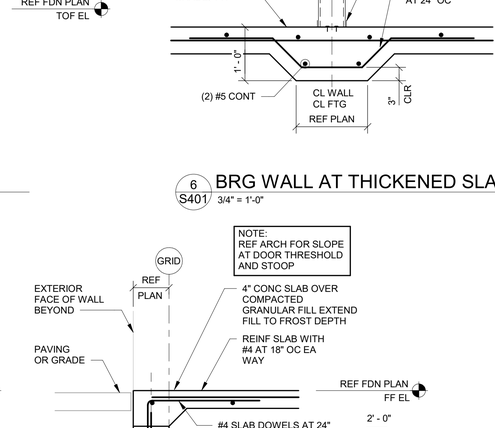
3 S401 FTG AT END WALL COL
3/4" = 1'-0"



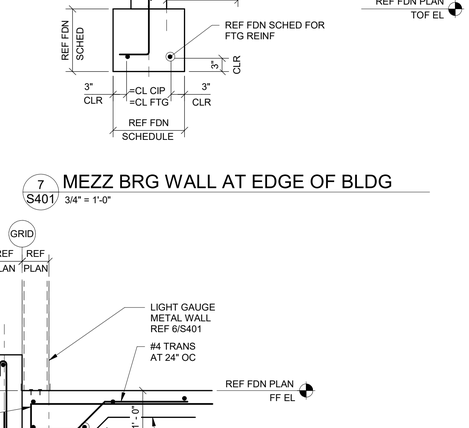
4 S401 SLAB AT OVERHEAD DOOR OPENING
3/4" = 1'-0"



5 S401 FDN WALL AT STOOP
3/4" = 1'-0"

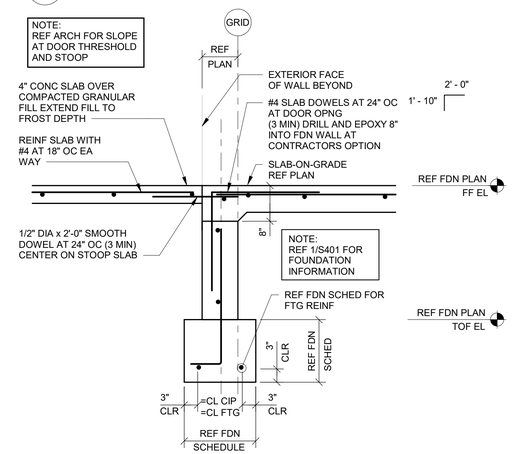


6 S401 BRG WALL AT THICKENED SLAB
3/4" = 1'-0"

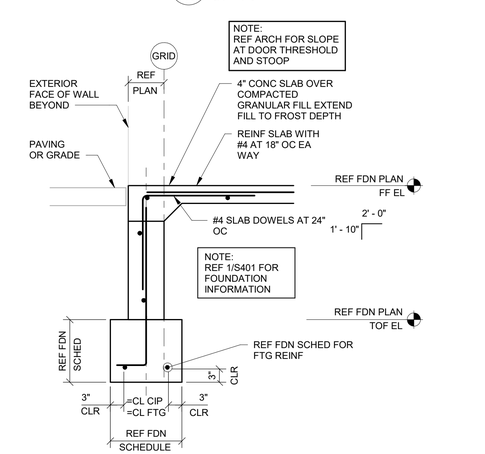


7 S401 MEZZ BRG WALL AT EDGE OF BLDG
3/4" = 1'-0"

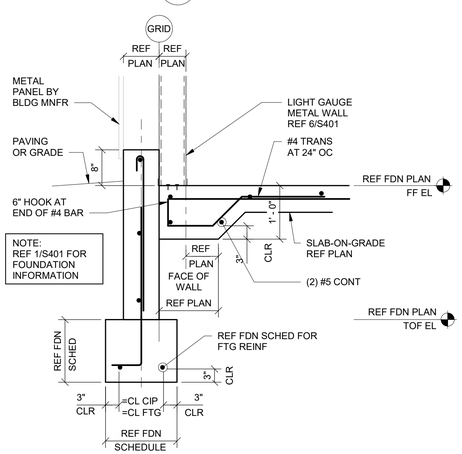
8 S401 STOOP AT INTERIOR WALL
3/4" = 1'-0"



9 S401 STOOP AT INTERIOR DOOR
3/4" = 1'-0"



10 S401 STOOP AT EXTERIOR WALL
3/4" = 1'-0"



11 S401 MEZZ BRG WALL AT EDGE OF BLDG
3/4" = 1'-0"

	DRAWN:	DESIGNED:	CHECKED:	PROJ. MNGR:
	JMP	JMP	SJU	SKK

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SHEET: S401

DRAFTING SYMBOLS

X / X — **PLAN/DETAIL TITLE**
SCALE: XXX
DRAWING NO. THAT THIS VIEW RESIDES ON. (TYPICAL)

X / XX — **SECTION**
SCALE: 1/4"= 1'-0"

X / XX — **ELEVATION**

DETAIL OR SECTION NO. BEGINNING WITH NO. 1 FOR EACH DRAWING (TYPICAL).
X / XX — **EXPLANATION (OPTIONAL)/ETAIL CALL OUT**
DRAWING NO. THAT THIS VIEW RESIDES ON. (TYPICAL)

X / XX — **PHOTO REFERENCE CALLOUT**

NORTH — **NORTH ARROW**

XXX / EL. = XXX'-X" — **ELEVATION INDICATOR**

1 — **BUILDING COLUMN**

— **KEYNOTE**

— **REVISION DELTA**

TO-BE-DEMOLISHED (BOLD) / TO-REMAIN (LIGHT)

EXISTING WORK (LIGHT) / NEW WORK (BOLD)

REDUCED SIZE PRINT
SCALE: X = X
0" 1" 2" 3" 4"
GRAPHICSCALE

ABBREVIATIONS

ABBR	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
BOB	BOTTOM OF BEAM
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
CMU	CONCRETE MASONRY UNIT
CO	CLEANOUT
DVEX	DIRECT-VENT EXHAUST
DVIN	DIRECT-VENT INTAKE
EA	EXHAUST AIR
EF	EXHAUST FAN
EXIST, EXIST.	EXISTING
FCO	FLOOR CLEANOUT
FFE	FINISHED FLOOR ELEVATION
IE, I.E.	INVERT ELEVATION
NIC, N.I.C.	NOT IN CONTRACT
OA	OUTSIDE AIR
OC, O.C.	ON CENTER
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
PT	PRESSURE-TEMPERATURE
RA	RETURN AIR
RD	ROOF DRAIN
RLFA	RELIEF AIR
RF	RETURN FAN
SA	SUPPLY AIR
SF	SUPPLY FAN
SWH	SERVICE WATER HEATER
TA	TRANSFER AIR
TOD	TOP OF DUCT
TYP	TYPICAL
VA	VENTILATION AIR
VTR	VENT THROUGH ROOF (SANITARY SEWER)
W/	WITH
WCO	WALL CLEANOUT

HVAC - AIR SIDE

SYMBOL (1 - LINE)	SYMBOL (2 - LINE)	DESCRIPTION
10"	10"	ROUND DUCT SIZE - DIAMETER
10/6	10/6	RECTANGULAR DUCT SIZE - 1ST NUMBER IS DIMENSION OF SIDE SHOWING
		LINED DUCT (RECTANGULAR / ROUND) (ALSO SEE SPECIFICATIONS FOR LINING REQUIREMENTS - LINING MAY NOT BE SHOWN ON DRAWINGS)
M	M	MOTORIZED DAMPER
		SPLITTER
		TRANSITION - SIZE CHANGE (RECTANGULAR, ROUND, OR FLAT-OVAL)
		TRANSITION - RECTANGULAR TO ROUND, OR RECTANGULAR TO FLAT-OVAL
45°		RECTANGULAR DUCT TAKE-OFF
		ROUND-DUCT CONICAL TAKE-OFF FROM RECTANGULAR OR ROUND
		SQUARE-THROAT 90° ELBOW: PROVIDE TURNING VANES WHETHER OR NOT VANES ARE ILLUSTRATED
		R=1.0xD 90° ELBOW: PROVIDE TURNING VANES WHETHER OR NOT VANES ARE ILLUSTRATED
		R=1.5xD 90° ELBOW - TURNING VANES ARE NOT REQUIRED
		FLEXIBLE DUCT CONNECTION
		SQUARE-THROAT TEE: PROVIDE TURNING VANES WHETHER OR NOT VANES ARE ILLUSTRATED
		R=1.5xD ROUND TEE - TURNING VANES ARE NOT REQUIRED

SYMBOL	DESCRIPTION
SIZE TYPE / XXX CFM	DIFFUSER (CEILING MOUNTED)
	RISER OR END OF DUCT - SUPPLY AIR (SA)
SIZE TYPE / XX CFM	RETURN OR EXHAUST REGISTER OR GRILLE (CEILING MOUNTED)
	RISER OR END OF DUCT - RETURN AIR (RA) OR EXHAUST AIR (EA)
SIZE TYPE / XXX CFM	SUPPLY REGISTER OR GRILLE (WALL MOUNTED)
SIZE TYPE / XX CFM	RETURN OR EXHAUST REGISTER OR GRILLE (WALL MOUNTED)
	POWER OR GRAVITY ROOF EXHAUST
	POWER OR GRAVITY ROOF VENTILATOR SUPPLY
	VOLUME DAMPER
BD	BACKDRAFT DAMPER
	LINED TRANSFER DUCT THROUGH WALL (ABOVE CEILING UNLESS INDICATED OTHERWISE)
T H	THERMOSTAT / HUMIDISTAT
TS HS PS	SENSOR: TEMPERATURE, HUMIDITY, PRESSURE
	DIRECTION OF AIRFLOW

GENERAL MECHANICAL

SYMBOL	DESCRIPTION
UP / DN	RISE UP / DROP DOWN
D E	FIELD DISCONNECTION
N E	FIELD CONNECTION
EQ-#	EQUIPMENT MARK NUMBER (WITHOUT ELECT. CONNECTION)
	ELEC. PANELBOARD (SURFACE MOUNT) (BY ELECTRICAL)
	ELEC. PANELBOARD (FLUSH MOUNT) (BY ELECTRICAL)
GRATING / SPAN	BAR GRATING SPAN
SLOPE / SLOPE	SLOPE DIRECTION (DOWN)
EQ 2	EQUIPMENT MARK NUMBER (WITH ELECT. CONNECTION)
	GAS REGULATOR
	DISTRIBUTION PANEL / SWITCHBOARD (BY ELECTRICAL)

PLUMBING

SYMBOL	DESCRIPTION	INSULATION CATEGORY
S	SANITARY DRAIN	AMBIENT
	VENT LINE	NONE
	COLD WATER (POTABLE)	COLD
	HOT WATER SUPPLY (110° F)	HOT
NG	NATURAL GAS	NONE
P	INLINE PUMP	--
	TO FLOOR DRAIN	--
C.O. C.O.	CLEAN OUT	--
	DOUBLE GRADE CLEAN OUT	--
2" FD-1	FLOOR DRAIN SIZE - TYPE	--
@4" RD-1	ROOF DRAIN SIZE - TYPE	--
HB	HOSE BIB	--
WH	WALL HYDRANT	--
4" VTR	SANITARY VENT THRU ROOF ON RISER	--

VALVES AND FITTINGS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SHUTOFF VALVE		CONCENTRIC REDUCER
	CHECK VALVE		ECCENTRIC REDUCER
	BALANCING VALVE		CAP
	THROTTLING VALVE		BUSHING
	QUICK CONNECT		HOSE COUPLING / THREADS
	2-WAY CONTROL VALVE		UNION
	3-WAY CONTROL VALVE		ELBOW DOWN OR AWAY
	PRESSURE REDUCING VALVE		ELBOW UP OR TOWARDS
	RELIEF VALVE (SEE SPECS FOR TYPE)		TEE UP OR TOWARDS
	STRAINER		TEE DOWN OR AWAY
	PRESSURE-TEMPERATURE TEST PLUG		VENT TO ATMOSPHERE
	AIR VENT: MANUAL / AUTOMATIC	FI TI PI	INDICATOR: FLOW, TEMPERATURE, PRESSURE
	TO FLOOR DRAIN	DV	DRAIN VALVE

VALVE OPERATOR ACTION

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
FO	FAIL OPEN	LO	LOCKED OPEN
FC	FAIL CLOSED	LC	LOCKED CLOSED
NO	NORMALLY OPEN		
NC	NORMALLY CLOSED		

LIST OF CODES

ENERGY	IECC - 2018
MECHANICAL	IMC - 2012
PLUMBING	UPC - 2012
FUEL/GAS	IFGC - 2012

MECHANICAL DRAWING INDEX

MP001	GENERAL MECHANICAL NOTES AND SYMBOL LEGEND
M301	MECHANICAL PLAN
M901	MECHANICAL SCHEDULES
P301	PLUMBING PLAN
P901	PLUMBING FIXTURE DESCRIPTIONS

GENERAL DIVISION 21, 22, & 23 NOTES

PRE-BID INSTRUCTIONS:

1. MECHANICAL CONTRACTOR SHALL BE REQUIRED TO VISIT SITE PRIOR TO BID AND CAREFULLY EXAMINE THE EXISTING CONDITIONS. CONTRACTOR SHALL NOT BE ALLOWED EXTRA COST DUE TO FAILURE TO VISIT SITE, AND TO INQUIRE WITH OWNER AND DESIGN PROFESSIONALS AS TO CLARIFICATIONS OF DISCREPANCIES AND UNKNOWNS.
2. MECHANICAL CONTRACTOR SHALL REVIEW ENTIRE SET OF DRAWINGS AND SPECIFICATIONS TO DETERMINE THE SCOPE OF WORK. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR INFORMATION ON ALL OTHER CONSTRUCTION DOCUMENTS INCLUDING ARCHITECTURAL, STRUCTURAL, FIRE PROTECTION, AND ELECTRICAL DRAWINGS. EXTRA COST SHALL NOT BE ALLOWED DUE TO FAILURE TO REVIEW ENTIRE SET OF DRAWINGS AND SPECIFICATIONS.
3. DATA PRESENTED ON THE DRAWINGS ARE AS ACCURATE AS PRELIMINARY SURVEYS AND PLANNING CAN DETERMINE, BUT ACCURACY IS NOT GUARANTEED AND FIELD VERIFICATION OF ALL DIMENSIONS IS DIRECTED. SPECIFICATIONS, DISTANCES AND LEVELS WILL BE GOVERNED BY ACTUAL FIELD CONDITIONS. REVIEW ARCHITECTURAL, STRUCTURAL, FIRE PROTECTION, PLUMBING, AND MECHANICAL PLANS AND ADJUST WORK TO CONFORM TO ALL CONDITIONS SHOWN THEREON. ACTUAL QUANTITY AND LOCATION OF DEVICES MAY VARY BASED ON CONDITIONS ENCOUNTERED DURING ORIGINAL CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR REMOVING OR REUSING EXISTING DEVICES. UNUSED EXISTING DEVICES, ASSOCIATED WIRING, CONDUIT AND FITTINGS SHALL BE REMOVED.
4. CONTRACTOR SHALL REFERENCE SPECIFICATIONS FOR CONSTRUCTION MATERIALS AND INSTALLATION PROCEDURES. THE SPECIFICATIONS ARE PART OF THE CONSTRUCTION DOCUMENTS. IN THE EVENT OF CONFLICT BETWEEN SPECIFICATIONS AND DRAWINGS, SUCH CONFLICT SHALL BE BROUGHT TO THE ATTENTION OF ARCHITECT / ENGINEER FOR RESOLUTION.
5. THESE DOCUMENTS ARE DIAGRAMMATIC AND DO NOT NECESSARILY SHOW MATERIALS FOR COMPLETE INSTALLATION.

DEMOLITION NOTES

1. SEE ALSO SYMBOLS, ABBREVIATIONS, AND NOTES SHEET
2. COORDINATE ALL MECHANICAL DEMOLITION WITH ELECTRICAL DEMOLITION. COORDINATE DEMOLITION WITH OWNER TO ELIMINATE DISRUPTION OF FACILITY'S FUNCTIONS.
3. REMOVE AND DISPOSE OF ITEMS INDICATED TO BE DEMOLISHED. BEFORE REMOVAL, COORDINATE WITH THE OWNER WHICH ITEMS THE OWNER WISHES TO KEEP. COORDINATE DELIVERY OF OWNER'S CHOSEN ITEMS TO OWNER. DISPOSE OF ITEMS THE OWNER DOES NOT CHOOSE TO KEEP.
4. PROTECT EXISTING STRUCTURES AND EQUIPMENT THROUGHOUT THE DURATION OF THE WORK.
5. COORDINATE DEMOLITION WORK SO THAT ELECTRICAL CONNECTIONS ARE REMOVED PRIOR TO MECHANICAL DEMOLITION.
6. REPAIR AREAS AFFECTED BY DEMOLITION TO THEIR ORIGINAL CONDITION OR BETTER.

PROVIDE COMPLETE, COMPLIANT, AND OPERATIONAL SYSTEMS:

1. DRAWINGS AND SPECIFICATIONS (CONSTRUCTION DOCUMENTS) HAVE BEEN PREPARED TO COMPLEMENT EACH OTHER. PROVIDE ITEMS SHOWN ON ONE AND NOT THE OTHER AS THOUGH SHOWN AND CALLED OUT IN BOTH. IF AN APPARENT CONFLICT EXISTS WITHIN THE CONSTRUCTION DOCUMENTS, PRESUME TO PROVIDE THE MORE COSTLY CHOICE, AND WRITE REQUEST TO ENGINEER FOR CLARIFICATION.
2. PROVIDE, LABOR, MATERIALS, EQUIPMENT, FEES, AND PERMITS NECESSARY TO CONSTRUCT A COMPLETE, OPERATIONAL SYSTEM FOR THE ENTIRE PROJECT AS SHOWN ON THESE CONSTRUCTION DOCUMENTS.
3. CONSTRUCTION DOCUMENTS PRESENT THE GENERAL DESIGN, ARRANGEMENT AND EXTENT OF SYSTEMS. COMPLETE DETAIL IS NOT PRESENTED. DRAWINGS ARE DIAGRAMMATIC. BECAUSE OF THEIR SMALL SCALE, THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW NECESSARY FOR THE COMPLETE INSTALLATION. PROVIDE SYSTEMS COMPLETE AND OPERATIONAL AND IN COMPLIANCE WITH DESIGN INTENT. OBTAIN PERMISSION FROM ENGINEER PRIOR TO MAKING MAJOR DEVIATIONS FROM CONSTRUCTION DOCUMENTS. EXAMPLES OF MAJOR DEVIATIONS ARE CHANGES IN COMPONENT SIZES, WEIGHTS, QUANTITIES, OR MATERIALS.
4. PROVIDE CONTROL ITEMS NECESSARY TO SATISFY THE FUNCTIONAL REQUIREMENTS OF THE SEQUENCE OF OPERATION AND SPECIFICATIONS. (CONTROL SYSTEM DIAGRAMS SHOWN ON THE DRAWINGS ARE SCHEMATIC REPRESENTATIONS.) PROVIDE SYSTEMS COMPLETE IN ALL RESPECTS, COMMISSIONED INTO OPERATION AND CALIBRATED UNDER OPERATING CONDITIONS.
5. INSTALL EQUIPMENT IN STRICT ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S WRITTEN RECOMMENDATIONS. PROVIDE FITTINGS, TRANSITIONS, VALVES, DAMPERS, AND OTHER SIMILAR DEVICES AND ACCESSORIES REQUIRED FOR A COMPLETE, WORKABLE INSTALLATION.
6. ASSEMBLE EQUIPMENT SHIPPED IN SECTIONS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION.
7. PROPERLY AND FULLY LUBRICATE EQUIPMENT BEFORE OPERATING IT.
8. PROPERLY AND FULLY CHARGE EQUIPMENT BEFORE OPERATING IT.
9. REPAIR OR REPLACE PARTS OF THIS WORK THAT FAIL, ARE UNFIT, OR BECOME DAMAGED DURING CONSTRUCTION WITH NO CHANGE TO THE CONTRACT PRICE.
10. EQUIPMENT SHALL PROVIDE THE SCHEDULED PERFORMANCE AT THE SITE ALTITUDE.
11. EQUIPMENT SHALL BE LISTED AND LABELED BY AN APPROVED TESTING AGENCY.

PAY FEES:

1. OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED FOR THE MECHANICAL WORK; ARRANGE FOR INSPECTIONS REQUIRED FOR THE MECHANICAL WORK; FURNISH A CERTIFICATE OF FINAL INSPECTION AND APPROVAL BY ENFORCEMENT AUTHORITIES.
2. WHEN ADJUSTMENTS, ALTERATIONS, OR CHANGES TO THE PROJECT ARE REQUIRED TO ACCOMMODATE PRODUCTS OTHER THAN "BASIS OF DESIGN", PAY ENGINEERING/DESIGN FEES REQUIRED TO MAKE SUCH ADJUSTMENTS, ALTERATIONS, AND CHANGES (INCLUDING BUT NOT LIMITED TO ELECTRICAL, STRUCTURAL SUPPORT, AND CHANGES TO ACCOMMODATE MAINTENANCE NEEDS AND DESIGN INTENT).
3. PAY PROFESSIONAL ENGINEERING/DESIGN FEES ASSOCIATED WITH CONTRACTOR-INITIATED CHANGES OCCURRING AFTER SEALED CONSTRUCTION DOCUMENTS ARE SUBMITTED FOR APPROVAL TO AUTHORITY HAVING JURISDICTION.
4. PAY PROFESSIONAL ENGINEERING FEES ASSOCIATED WITH CONTRACTOR'S FAILURE TO FOLLOW SUBMITTAL REQUIREMENTS.

PROTECT:

1. PROTECT EXISTING STRUCTURES AND EQUIPMENT DURING THE EXECUTION OF THIS CONTRACT.
2. REPAIR AREAS AFFECTED BY WORK TO THEIR ORIGINAL CONDITION OR BETTER.

MAKE SUBMITTALS:

1. INDIVIDUAL SUBMITTALS ARE TO BE PREPARED ELECTRONICALLY IN 'PDF' FORMAT. ELECTRONIC FILES SHALL BE ORIGINAL VENDOR-PREPARED ELECTRONIC FILES AND NOT SCANNED COPIES OF CATALOG PAGES OR FACSIMILES. INDIVIDUAL EQUIPMENT ITEMS SHALL BE TAGGED WITH EQUIPMENT IDENTIFIERS AS SHOWN ON THESE DRAWINGS. ILLEGIBLE ELCTRONIC FILES ARE SUBJECT TO "REVISE AND RESUBMIT" ACTION.
2. INCLUDE WITH SUBMITTALS SPECIFIC WRITTEN NOTICE OF EACH VARIATION A SUBMITTAL HAS FROM THE REQUIREMENTS OF CONSTRUCTION DOCUMENTS. ENGINEER'S REVIEW OF SUBMITTALS SHALL NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FROM COMPLIANCE WITH CONSTRUCTION DOCUMENTS UNLESS THE ENGINEER HAS SPECIFICALLY ACCEPTED THE VARIATION IN WRITING.
3. SUBMIT SUBSTITUTION REQUESTS FOR APPROVAL. SUBSTITUTED EQUIPMENT SHALL MEET OR EXCEED STANDARDS SET BY ITEMS SPECIFIED. WHEN ADJUSTMENTS, ALTERATIONS, OR CHANGES TO THE PROJECT ARE REQUIRED TO ACCOMMODATE SUBSTITUTED PRODUCTS, PAY ENGINEERING/DESIGN FEES REQUIRED TO MAKE SUCH ADJUSTMENTS, ALTERATIONS, AND CHANGES (INCLUDING BUT NOT LIMITED TO ELECTRICAL, STRUCTURAL SUPPORT, AND CHANGES TO ACCOMMODATE MAINTENANCE NEEDS AND DESIGN INTENT).
4. SUBMIT A SCHEDULE OF CONSTRUCTION DOCUMENT CHANGES REQUIRED DUE TO 1) DIFFERENCES (BETWEEN PRELIMINARY DESIGN DATA AND SUBMITTAL DATA) IN "BASIS OF DESIGN" EQUIPMENT OR 2) SUBSTITUTED EQUIPMENT FOR REVIEW PRIOR TO INITIATING WORK. WHEN ADJUSTMENTS, ALTERATIONS, OR CHANGES TO THE PROJECT ARE REQUIRED TO ACCOMMODATE SUBSTITUTED PRODUCTS, PAY ENGINEERING/DESIGN FEES REQUIRED TO MAKE SUCH ADJUSTMENTS, ALTERATIONS, OR CHANGES.
5. SUBSTITUTION REQUESTS SHALL SHOW ENERGY CONSERVATION FEATURES OF SUBSTITUTED EQUIPMENT EQUAL OR EXCEED THAT OF SPECIFIED EQUIPMENT.

DEFINITIONS:

1. ACTION SUBMITTALS: WRITTEN AND GRAPHIC INFORMATION THAT REQUIRES DESIGN PROFESSIONAL'S RESPONSIVE ACTION. ACTION SUBMITTALS INCLUDE PRODUCT DATA, SHOP DRAWINGS, SAMPLES, PRODUCT SCHEDULE OR LIST.
2. INFORMATIONAL SUBMITTALS: WRITTEN INFORMATION THAT DOES NOT REQUIRE DESIGN PROFESSIONAL'S RESPONSIVE ACTION. SUBMITTALS MAY BE REJECTED FOR NOT COMPLYING WITH REQUIREMENTS. INFORMATION SUBMITTALS INCLUDE COORDINATION DRAWINGS, WELDING CERTIFICATES, QUALIFICATION DATA, INSTALLER CERTIFICATES, MANUFACTURER CERTIFICATES, PRODUCT CERTIFICATES, MATERIAL CERTIFICATIONS, MATERIAL TEST REPORTS, PRODUCT TEST REPORTS, FIELD TEST REPORTS, OPERATION AND MAINTENANCE DATA, MANUFACTURER'S INSTRUCTIONS, MANUFACTURER'S FIELD REPORTS, INSURANCE CERTIFICATES AND BONDS, MATERIAL SAFETY DATA SHEETS AND RECOMMENDED SPARE PARTS LISTS.
3. FURNISH: OBTAIN AND DELIVER TO ON-SITE STORAGE IN ORIGINAL FACTORY PACKAGING.
4. INSTALL: UNPACK, MOVE TO FINAL LOCATION, MAKE CONNECTIONS, AND PLACE INTO FINAL SERVICE ACCORDING TO PROCEDURES IDENTIFIED IN PART 3 OF APPLICABLE SECTION(S).
5. PROVIDE: FURNISH AND INSTALL.
6. ROOF-CURB HEIGHT: VERTICAL DISTANCE FROM HIGHEST POINT OF ADJACENT FINISHED ROOF TO LOWEST POINT OF SUPPORTED EQUIPMENT (INCLUDING ITS STRUCTURAL SUPPORT). PROVIDE MINIMUM HEIGHT OF 8 INCHES UNLESS INDICATED TO BE TALLER.

KEEP RECORDS:

1. DURING CONSTRUCTION, MAINTAIN A SET OF AS-BUILT, RED-LINED, RECORD DRAWINGS AT THE PROJECT SITE. RECORD CHANGES IN LAYOUT, ROUTING, EQUIPMENT, COMPONENTS, AND ACCESSORIES. RECORD CHANGES DUE TO CHANGES IN SUPPLIED EQUIPMENT. AFTER ENGINEER'S FINAL INSPECTION PROVIDE RECORD DRAWINGS TO ENGINEER.

COORDINATE:

1. PRIOR TO ORDERING, FABRICATING, OR INSTALLING WORK, COORDINATE MECHANICAL WORK WITH WORK OF OTHER SUBCONTRACTORS AND WITH CONTRACTORS HIRED DIRECTLY BY THE OWNER. EXAMPLES OF WORK BY OTHERS INCLUDE BUT ARE NOT LIMITED TO CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION, REFRIGERATION, AND ELECTRICAL WORK. WHERE CONFLICTS OCCUR, RESOLVE THEM PRIOR TO FABRICATION AND INSTALLATION.
2. DURING INSTALLATION, RESOLVE CONFLICTS AND MAKE CHANGES RESULTING FROM LACK OF CONTRACTOR COORDINATION WITH NO CHANGE TO THE CONTRACT PRICE.
3. LOCATIONS AND SIZES OF SERVICE CONNECTIONS TO EQUIPMENT, FLOOR AND WALL OPENINGS, SUPPORTS, CONCRETE PADS, FOUNDATIONS, SPACE ARRANGEMENTS, ELECTRICAL POWER, AND OTHER SIMILAR PROVISIONS FOR EQUIPMENT ARE BASED ON PRELIMINARY INFORMATION, WHICH WAS AVAILABLE DURING DESIGN, TO SHOW DESIGN INTENT AND SPACE ALLOCATION. ACTUAL CONDITIONS MAY VARY DEPENDING ON CONFIGURATION OF PURCHASED EQUIPMENT. PRIOR TO INITIATING WORK, VERIFY ABOVE TYPES OF INFORMATION FROM EQUIPMENT DRAWINGS CERTIFIED FOR MANUFACTURE BY RESPECTIVE EQUIPMENT MANUFACTURERS. MAKE MODIFICATIONS FROM WHAT IS SHOWN IN CONSTRUCTION DOCUMENTS TO PROVIDE SUCCESSFUL EQUIPMENT INSTALLATION WITH NO CHANGE IN CONTRACT PRICE. SUBMIT A SCHEDULE OF SUCH CHANGES FOR REVIEW PRIOR TO INITIATING WORK. DOCUMENT REVIEWED CHANGES ON RECORD DRAWINGS.
4. NOTIFY THE ENGINEER IN WRITING OF EXISTING CONDITIONS THAT DIFFER FROM THOSE SHOWN IN CONTRACT DOCUMENTS. THE ENGINEER WILL EVALUATE THE DIFFERENCES, AND IF NECESSARY, REDESIGN FOR THE CONDITIONS FOUND.
5. DO NOT SCALE OFF CONSTRUCTION DOCUMENTS. COORDINATE INSTALLATION WITH FIELD CONDITIONS.
6. WHERE BUILDING ELEMENTS (FOR EXAMPLE, DOOR FRAMES, PORTIONS OF WALLS, PORTIONS OF FLOORS, ETC.) HINDER REMOVAL OF EXISTING OR INSTALLATION OF NEW EQUIPMENT, REMOVE AND REPLACE SUCH ELEMENTS. UPON SUBSTANTIAL COMPLETION, ENSURE THAT BUILDING ELEMENTS MATCH THEIR ORIGINAL CONDITIONS.
7. PROVIDE MOTORS THAT ARE INTEGRAL WITH EQUIPMENT. PROVIDE MOTOR STARTERS FOR MOTORS THAT ARE INTEGRAL WITH EQUIPMENT. MOTOR STARTERS FOR MOTORS ARE THAT ARE NOT INTEGRAL WITH EQUIPMENT WILL BE PROVIDED BY UNDER DIVISION 26.
8. ROUTE NOTHING DIRECTLY ABOVE ELECTRICAL-PANEL FOOTPRINTS. PROVIDE CLEAR, FULL-WIDTH, 4-FT ZERO-INCH DEEP BY 6-FT 6-INCH HIGH ACCESS SPACE IN FRONT OF ELECTRICAL PANELS.
9. ROUTE NEITHER DUCTS NOR PIPES INTO OR THROUGH ELECTRICAL ROOMS EXCEPT FOR DUCTS AND PIPES SERVING THE ROOM.
10. ROUTE NEITHER DUCTS NOR PIPES INTO OR THROUGH ELEVATOR SHAFTS OR ELEVATOR EQUIPMENT ROOMS EXCEPT FOR DUCTS AND PIPES SERVING THE SHAFT OR ROOM.
11. REVIEW CONSTRUCTION DOCUMENT'S EQUIPMENT AND SYSTEM SCHEMATICS AND DIAGRAMS FOR CONNECTIONS TO AND ARRANGEMENTS OF MECHANICAL DEVICES AND EQUIPMENT. PROVIDE VALVES, FITTINGS, SENSORS, GAUGES, AND OTHER SIMILAR DEVICES SHOWN IN SCHEMATICS AND DIAGRAMS THAT ARE NOT SHOWN ON PLANS. (FOR CLARITY, MANY SUCH DEVICES ARE NOT SHOWN ON PLANS.)
11. PROVIDE LINE-VOLTAGE AND LOW VOLTAGE CONTROL WIRING. POWER AND INTERLOCK WIRING WILL BE INSTALLED UNDER DIVISION 26.
12. DO NOT USE STEEL ROOF DECK TO SUPPORT LOADS FROM PIPING, DUCTWORK, OR EQUIPMENT UNLESS NOTED OTHERWISE. HANGER LOADS LESS THAN 50 LBS MAY BE HUNG FROM THE STEEL ROOF DECK IN CASES WHEN HANGING FROM THE STEEL ROOF DECK CANNOT BE AVOIDED. THE ATTACHMENT METHOD SHALL DISTRIBUTE THE LOAD ACROSS THE DECK AS APPROVED BY THE STRUCTURAL ENGINEER.
13. INSTALL FLOOR-MOUNTED EQUIPMENT ON CONCRETE PADS WITH A MINIMUM THICKNESS OF 4-INCHES. FOR FLOOR-MOUNTED EQUIPMENT WITH TRAPS, INCREASE THICKNESS OF CONCRETE PAD TO ACCOMMODATE REQUIREMENTS OF TRAP. CONSTRUCT CONCRETE PAD 3 INCHES WIDER (IN EACH DIRECTION) THAN EQUIPMENT FOOT PRINT.
14. PROVIDE APPROPRIATE PROVISIONS FOR EXPANSION OR MOVEMENT OF PIPING.
15. SECURE PIPING HANGERS BY DOUBLE NUTTING AT BOTH THE PIPE HANGER AND THE HANGER ROD ATTACHMENT TO STRUCTURE.
16. CEILING SPACES WILL BE USED AS AIR PLENUMS. PRELIMINARY DESIGN INSPECTION REVEALED A COMPLIANT SPACE (NO COMBUSTIBLES). WATCH FOR COMBUSTIBLES DURING CONSTRUCTION AND REPORT DISCOVERY OF COMBUSTIBLES TO ENGINEER IN WRITING IMMEDIATELY UPON DISCOVERY.
17. COORDINATE ROOF WORK WITH OWNER TO MAINTAIN WARRANTY OF ROOFING SYSTEM.

CONTROL QUALITY:

1. MECHANICAL WORK SHALL BE COMPLETED IN ACCORDANCE WITH APPROPIATE LOCAL AND NATIONAL MECHANICAL BUILDING CODES.
2. TAKE RESPONSIBILITY FOR EQUIPMENT CHECK-IN, SAFEKEEPING, AND DAMAGE PREVENTION.
3. UNSPECIFIED EQUIPMENT OR SYSTEMS SHALL BE REPRESENTED BY DULY AUTHORIZED DISTRIBUTORS WITH SERVICE DEPARTMENTS REGULARLY ENGAGED IN THE MAINTENANCE AND INSTALLATION OF THESE SYSTEMS AND EQUIPMENT. SUCH SERVICE DEPARTMENTS SHALL REGULARLY STOCK STANDARD REPLACEMENT PARTS AND EQUIPMENT AND SHALL BE LOCATED WITHIN A REASONABLE DISTANCE FROM THE INSTALLATION SITE.
4. WHENEVER A MATERIAL, ARTICLE, OR PIECE OF EQUIPMENT IS IDENTIFIED ON THE DRAWINGS BY REFERENCE TO MANUFACTURERS, VENDORS NAMES, TRADE NAMES, CATALOG NUMBERS, OR THE LIKE, IT IS SO IDENTIFIED FOR THE PURPOSE OF ESTABLISHING A STANDARD. MATERIALS, ARTICLES, OR PIECES OF EQUIPMENT FROM OTHER MANUFACTURERS OR VENDORS, WHICH WILL ADEQUATELY PERFORM THE DUTIES IMPOSED BY THE GENERAL DESIGN, WILL BE CONSIDERED EQUALLY ACCEPTABLE PROVIDED THEY ARE OF EQUAL SUBSTANCE, APPEARANCE, AND FUNCTION.
5. MEASURE INDICATED MOUNTING HEIGHTS TO BOTTOM OF UNIT FOR SUSPENDED ITEMS AND TO CENTER OF UNIT FOR WALL-MOUNTING ITEMS.
6. IF MOUNTING HEIGHTS OR OTHER LOCATION CRITERIA ARE NOT INDICATED, ARRANGE AND INSTALL COMPONENTS AND EQUIPMENT TO PROVIDE MAXIMUM POSSIBLE HEADROOM.

PROVIDE SERVICEABILITY:

1. PROVIDE ACCESS PANELS TO ENABLE ACCESS TO DEVICES REQUIRING SERVICE OR OPERATION. ACCESS PANELS ARE NOT REQUIRED WHERE ACCESS IS READILY ACCOMPLISHABLE THROUGH NORMALLY REMOVABLE FEATURES SUCH AS LAY-IN CEILINGS PANELS.
2. PROVIDE SERVICE CLEARANCES AROUND EQUIPMENT AS RECOMMENDED BY EQUIPMENT MANUFACTURER.
3. ADDRESS PENETRATIONS:
4. IN FIRE AND SMOKE RATED BARRIERS, PROVIDE FIRE STOPPING ASSEMBLIES LISTED BY A RECOGNIZED INDEPENDENT TESTING LABORATORY AND MATCHED TO FIELD CONDITIONS. (COORDINATE WITH DIVISION 7.)

CLOSEOUT:

1. GUARANTEE SYSTEMS (PARTS AND LABOR) FOR A MINIMUM PERIOD OF ONE YEAR AFTER THE DATE OF SUBSTANTIAL COMPLETION.
2. PROVIDE TWO OPERATING AND MAINTENANCE MANUALS IN HARD BACK LOOSE LEAF BINDERS. MANUALS SHALL CONTAIN PRODUCT CUT SHEETS AND OPERATING AND MAINTENANCE INSTRUCTIONS FOR EQUIPMENT, ACCESSORIES, FIXTURES, VALVES, ETC.
3. IMMEDIATELY BEFORE TURNING SYSTEMS OVER TO OWNER, DEMONSTRATE FULL AND PROPER SYSTEMS OPERATIONS TO ENGINEER AND OWNER. IMMEDIATELY BEFORE DEMONSTRATION, PROPERLY AND FULLY RE-LUBRICATE EQUIPMENT, AND REPLACE FILTERS USED DURING CONSTRUCTION.
4. UPON COMPLETION OF WORK, REMOVE SURPLUS MATERIALS AND RUBBISH. MAKE REQUIRED PATCHING AND REPAIRS OF OTHER TRADES' WORK THAT YOU DAMAGED. LEAVE THE PREMISES IN A CLEAN AND ORDERLY CONDITION.
5. UPON SUBSTANTIAL COMPLETION OF THE PROJECT, THE ENGINEER WILL PERFORM A WALK-THROUGH TO PREPARE A PUNCH LIST OF INSUFFICIENTLY COMPLETED ITEMS. THE ENGINEER WILL SUBMIT THIS PUNCH LIST TO THE CONTRACTOR WHO SHALL COMPLETE THE ITEMS INDICATED ON THE PUNCH LIST AND SUBSEQUENTLY REQUEST A RE-INSPECTION. UPON RE-INSPECTION, IF THE ENGINEER DETERMINES THAT ITEMS ALREADY IDENTIFIED REMAIN INSUFFICIENTLY COMPLETE, THE ENGINEER'S COSTS ASSOCIATED WITH ADDITIONAL RE-INSPECTIONS WILL BE DEDUCTED FROM THE AMOUNT OWED TO THE CONTRACTOR ON A TIME AND MATERIALS BASIS.

TESTING, ADJUSTING, & BALANCING:

1. EMPLOY AND PAY FOR THE SERVICES OF AN OWNER-APPROVED, INDEPENDENT TESTING AGENCY FOR TESTING, ADJUSTING, AND BALANCING HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC) SYSTEMS.
2. TESTING, ADJUSTING, AND BALANCING (TAB) OF HVAC SYSTEMS SHALL BE PERFORMED BY AN IMPARITAL INDEPENDENT TECHNICAL FIRM WHOSE OPERATIONS ARE DEDICATED TO THE FIELD OF PROFESSIONAL TAB. TAB WORK SHALL BE DONE UNDER DIRECT SUPERVISION OF A PROFESSIONAL ENGINEER EMPLOYED BY THE TAB FIRM.
3. COOPERATE WITH TAB FIRM; PROVIDE NECESSARY DATA ON DESIGN AND PROPER APPLICATION OF SYSTEM COMPONENTS; FURNISH LABOR AND MATERIALS REQUIRED TO ELIMINATE DEFICIENCES OR LACK OF PERFORMANCE.
4. TAB FIRM SHALL ACT AS LIAISON BETWEEN OWNER, ARCHITECT, AND CONTRACTOR. TAB FIRM SHALL INSPECT INSTALLATION OF HVAC SYSTEMS, INCLUDING PIPING, SHEET METAL, TEMPERATURE CONTROLS, AND OTHER COMPONENT

GENERAL NOTES:

1. SEE ALSO SYMBOLS, ABBREVIATIONS, AND NOTES SHEET
2. FIRE DAMPERS SHOWN ARE 1-1/2 HOUR UNLESS OTHERWISE NOTED.
3. DO NOT INSTALL CEILING TILES IN ROOM UNTIL ROOM'S HVAC SYSTEM HAS OPERATED CONTINUOUSLY AT OCCUPIED SETTING FOR AT LEAST ONE WEEK.
4. PROVIDE VOLUME DAMPERS IN DUCT BRANCHES TO AIR OUTLETS. PROVIDE NECESSARY DAMPERS TO BALANCE THE AIR DISTRIBUTION SYSTEM TO WITHIN +/- 5% OF THE AIR QUANTITIES SHOWN ON CONSTRUCTION DOCUMENTS. DAMPERS ARE REQUIRED EVEN WHERE AIR-OUTLET DEVICES HAVE INTEGRAL DAMPERS.
5. PROVIDE NO MORE THAN ONE THREE-FOOT LONG RUN (MAXIMUM) OF FLEXIBLE DUCT TURNING NO MORE THAN NINETY DEGREES BETWEEN AN INDIVIDUAL AIR-DISTRIBUTION DEVICE AND HARD DUCTWORK CONNECTING TO THE OUTLET OF AN AIR-TERMINAL UNIT. FLEXIBLE DUCT IS ALLOWED ONLY TO EASE THE FINAL CONNECTION OF AIR-DISTRIBUTION DEVICES TO HARD DUCTWORK.
6. PAINT VISIBLE INTERIOR PORTIONS OF DUCTWORK AND AIR TERMINALS FLAT BLACK UNLESS OTHERWISE NOTED.
7. DUCT DIMENSIONS SHOWN ON CONSTRUCTION DOCUMENTS ARE CLEAR, INSIDE DIMENSIONS UNLESS INDICATED OTHERWISE. INCREASE OUTSIDE DUCT DIMENSIONS TO ACCOMMODATE INDICATED THICKNESS OF DUCT LINER.
8. UNLESS NOTED OTHERWISE, ELEVATIONS FOR RECTANGULAR DUCTWORK INDICATE BOTTOM OF DUCT, AND ELEVATIONS FOR ROUND DUCTWORK INDICATE CENTERLINE OF DUCT.
9. CONSTRUCT DUCTWORK IN ACCORDANCE WITH THE LATEST EDITION OF SMACNA STANDARDS EXCEPT PROVIDE TURNING VANES IN SQUARE-THROAT ELBOWS.
10. ENCLOSE DUCT AND FLUE PENETRATIONS THROUGH 1-HOUR ROOF ASSEMBLY WITH TWO LAYERS OF SHEET ROCK. EXTEND SHEET-ROCK ENCLOSURE FROM SHEET ROCK AT BOTTOM OF ROOF TRUSSES TO ROOF DECK.
11. MOUNT ROOM SENSORS AT A HEIGHT APPROVED BY APPLICABLE CODE OR REGULATIONS. IF NOT REGULATED, MOUNT ROOM SENSORS FOUR FEET ABOVE FINISHED FLOOR LEVEL.
12. TAKE SPECIAL CARE TO MOUNT EXPOSED DEVICES SQUARELY AND IN A COMPLEMENTARY MANNER TO ROOM FINISHES.
13. COORDINATE LOCATIONS OF CEILING DIFFUSERS AND GRILLES WITH ARCHITECTURAL REFLECTED CEILING PLAN.

KEYNOTES

1. ROUTE DUCTWORK BETWEEN JOISTS. COORDINATE WITH DOMESTIC SUPPLY PIPING.
2. DUCTWORK SHALL BE ROUTED DOWN AND TURN. FIELD VERIFY LOCATION OF EXHAUST FAN.
3. PROVIDE SIDEWALL CONCENTRIC VENT AND INSTALL PER MANUFACTURERS REQUIREMENTS, FIELD VERIFY LOCATION.
4. SEE 2/M301 FOR CONTINUATION.
5. COORDINATE PIPE ROUTING WITH GARAGE DOORS.
6. SEE CIVIL PLANS FOR CONTINUATION.
7. MOUNT BOTTOM OF UNIT HEATER AT 10'0" AFF.
8. ROUTE DUCT AS HIGH AS POSSIBLE TO STRUCTURE.
9. MOUNT THERMOSTAT TO STRUCTURAL COLUMN, FIELD VERIFY LOCATION.
10. MOUNT FAN AT 16'0" AFF. INSTALL FAN PER MANUFACTURERS REQUIREMENTS. FIELD VERIFY FAN LOCATION.
11. BUILDING MANUFACTURER SHALL PROVIDE REQUIRED STRUCTURAL MEMBERS TO SUPPORT FAN. MECHANICAL CONTRACTOR SHALL COORDINATE WITH BUILDING MANUFACTURER TO PROVIDE FAN MOUNTING KIT.
12. BOTTOM OF LOUVER SHALL BE MOUNTED AT 7'2" AFF.

CONTROL SEQUENCES

DEFINITIONS
ABBREVIATIONS
- OAD - OUTSIDE AIR DAMPER.
- EAD - EXHAUST AIR DAMPER.
- OAT - OUTSIDE AIR TEMPERATURE.
- OA - OUTSIDE AIR.
- TUC - TERMINAL UNIT CONTROLLER
- T - THERMOMETER
- V - VALVE
- TYP - TYPICAL

ELECTRIC UNIT HEATER (EUH-#): CONTROL SEQUENCES
SYSTEM NOTES:
1. EUHS RESPOND BY THERMOSTAT IN UNIT.
2. INITIAL SETPOINT: 60 DEG F (ADJUSTABLE).

MODES OF OPERATION:
1. ON A DROP IN TEMPERATURE, EUH TURNS ON UNTIL SETPOINT IS ACHIEVED.

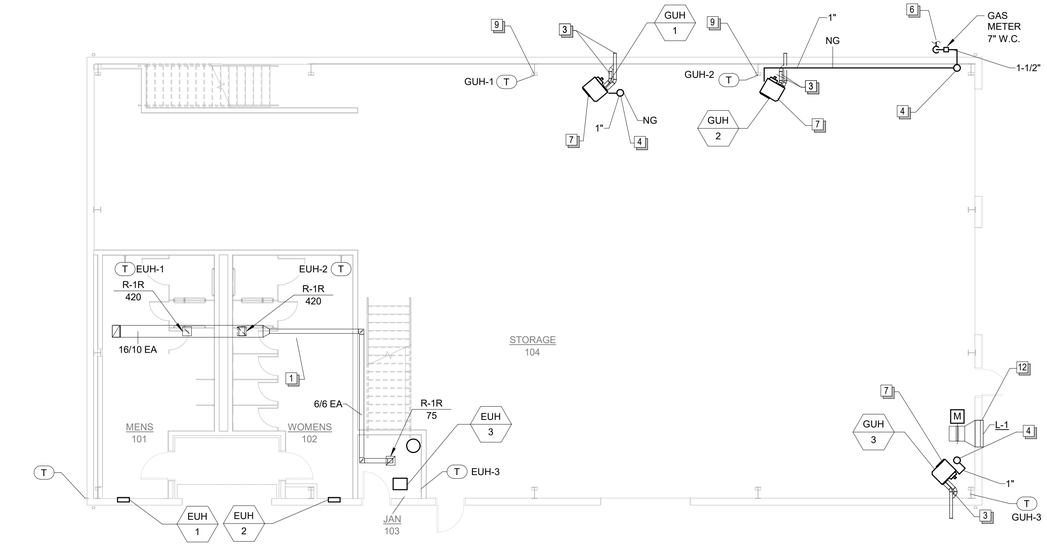
GAS UNIT HEATER (GUH-#): CONTROL SEQUENCES
SYSTEM NOTES:
1. GUHS RESPOND BY WALL MOUNTED THERMOSTAT.
2. INITIAL SETPOINT: 55 DEG F (ADJUSTABLE).

MODES OF OPERATION:
1. ON A DROP IN TEMPERATURE, GUH TURNS ON UNTIL SETPOINT IS ACHIEVED.

EXHAUST FAN (EF-#): CONTROL SEQUENCES

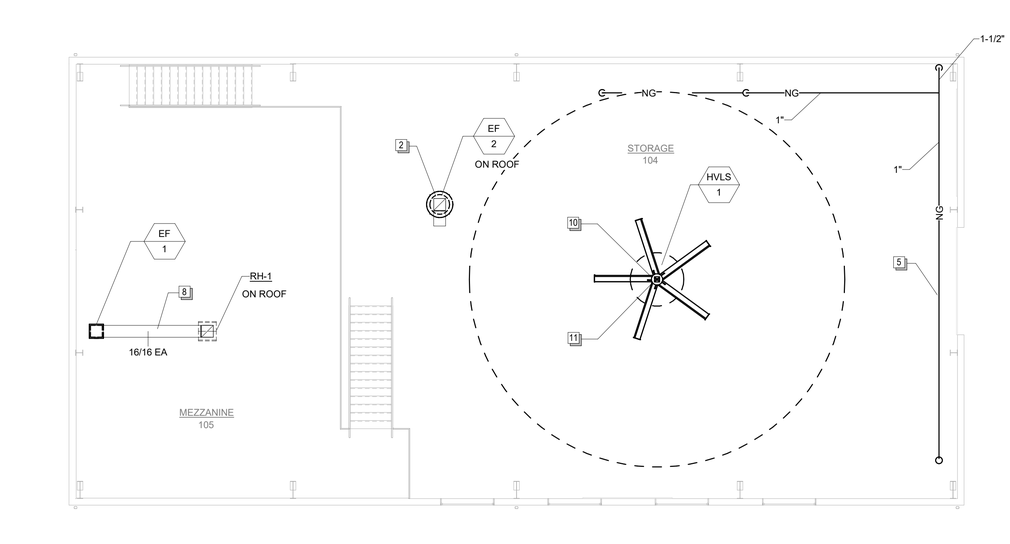
MODES OF OPERATION: EF-1
1. OCCUPIED: FAN SHALL RUN CONTINUOUSLY WHEN EITHER MENS 101 OR WOMENS 102 IS OCCUPIED (OCCUPANCY SENSOR).
2. UNOCCUPIED: FAN SHALL STOP WHEN UNOCCUPIED (SEE ELECTRICAL FOR OCCUPANCY SENSOR).

MODES OF OPERATION: EF-2
1. FAN OPERATION TO BE ON/OFF BY USER INTERFACE (SWITCH).
2. EF-2 SHALL BE ELECTRICALLY INTERLOCKED WITH MOTORIZED DAMPER FOR L-1.



1 M301 MECHANICAL PLAN - FIRST LEVEL
1/8" = 1'-0"

NORTH



2 M301 MECHANICAL PLAN - MEZZANINE LEVEL
1/8" = 1'-0"

NORTH

DRAWN:	AJL
DESIGNED:	AJL
CHECKED:	DMS
PROJ. MNGR:	SKK

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OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020

JOB NUMBER: 535-002

SHEET: M301

FAN SCHEDULE

MARK	SERVES	LOCATION	FAN DATA					ELECTRICAL DATA		MAXIMUM SONES (NOTES 1)	BASIS OF DESIGN	NOTES
			FAN TYPE	WHEEL TYPE	CFM	TSP (INWC)	FAN RPM	DRIVE TYPE	HP | V | PH			
EF-1	MENS 101/WOMENS 102	MEZZANINE 9	INLINE	BI	900	0.65	1558	DIRECT	SEE ME CONN SCHEDULE	9	GREENHECK SQ	1-5,7
EF-2	STORAGE 104	ROOF	ROOF	BI	2500	0.25	1638	DIRECT	SEE ME CONN SCHEDULE	14	GREENHECK AE	1-4,6,7

NOTES:
1) SOUND POWER LEVEL, REFERENCE 10-12 WATTS
2) PROVIDE WITH FACTORY CONNECTED DISCONNECT SWITCH
3) PROVIDE WITH BACKDRAFT DAMPER
4) PROVIDE SPEED CONTROLLER FOR MEANS OF BALANCING. LOCATE CONTROLLER IN REMOTE PLACE NEAR FAN
5) PERFORMANCE RATING IS FOR DUCTED INLET, DUCTED OUTLET AND INCLUDES BACKDRAFT DAMPER
6) PERFORMANCE RATING IS FOR DUCTED INLET, FREE OUTLET AND INCLUDES BACKDRAFT DAMPER
7) PROVIDE ROOF CURB WITH A MINIMUM HEIGHT OF 12 INCHES.

ROOF HOOD GRAVITY VENTILATOR SCHEDULE

MARK	CFM	MAX PRESS DROP	HOOD OVERALL SIZE (L x W x H) (IN)	THROAT SIZE (W x L) (IN)	CURB HT (IN)	BASIS OF DESIGN	NOTES
RH-1	900	0.25	27 x 26 x 16	12 x 12	12	GREENHECK FGR	1

NOTES:
1) ROOF-CURB HEIGHT IS MEASURED FROM LOWEST POINT OF EQUIPMENT'S STRUCTURE TO HIGHEST POINT OF ADJACENT FINISHED ROOF. COORDINATE WITH EQUIPMENT AND ROOF CONSTRUCTIONS. PROVIDE MINIMUM HEIGHT OF 12 INCHES UNLESS INDICATED TO BE TALLER.

UNIT-HEATER SCHEDULE (ELECTRIC)

MARK	SERVES ROOM	CFM	KW	MOTOR DATA	CABINET DATA	WEIGHT (LBS)	BASIS OF DESIGN	NOTES
				AMPS | V | PH	CONFIGURATION			
EUH-1	MENS 101	100	2	SEE ME CONN SCHEDULE	RECESSED	25	QMARK AWH	1-3,5
EUH-2	WOMENS 102	100	2	SEE ME CONN SCHEDULE	RECESSED	25	QMARK AWH	1-3,5
EUH-3	JAN 103	100	1.5	SEE ME CONN SCHEDULE	CEILING MOUNTED	25	QMARK EFF	1-5

NOTES:
1) COLOR SHALL BE WHITE.
2) PROVIDE PILOT LIGHT TO INDICATE "ENERGIZED"
3) PROVIDE REMOTE THERMOSTAT (SHOWN ON PLANS).
4) PROVIDE MOUNTING BRACKET.
5) PROVIDE FACTORY MOUNTED DISCONNECT SWITCH.

DIFFUSER, REGISTER, AND GRILLE SCHEDULE2

MARK	STATIC PD (INWC)	MAX NC (NOTE 1)	FACE/PANEL SIZE (IN)	MAXIMUM CFM PER NECK SIZE	DUCT RUNOUT SIZE (IN)	SPACING & DEFLECTION (IN X DEGREES)	THROW			DAMPER (Y/N)	MATERIAL	COLOR/FINISH	BASIS OF DESIGN (NOTE 3)	NOTES
							DIRECTION	PATTERN	DISTANCE (NOTE 2)					
R-1R	0.1	30	12x12	SEE PLANS	SEE PLANS	3/4 x 35	HORIZONTAL	N/A	N/A	NO	STEEL	WHITE	TITUS 350RL	--

NOTES:
1. NOISE CRITERIA VALUES ARE BASED ON A ROOM ABSORPTION OF 10 db, re 10-12 WATTS
2. PROVIDE FRAMES APPROPRIATE FOR MOUNTING REQUIREMENTS. COORDINATE WITH ARCHITECTURAL

LOUVER SCHEDULE

MARK	SERVES	TYPE	MATERIAL	CFM	MIN FREE AREA (SF)	MAX PD (INWC)	SIZE			BASIS OF DESIGN	NOTES
							WIDTH	HEIGHT	DEPTH		
L-1	STORAGE 104	STATIONARY	GALV. STEEL	2500	2.5	0.1	36	24	4	RUSKIN L375D	1-5

NOTES:
1) BLADE ORIENTATION SHALL BE HORIZONTAL UNLESS NOTED OTHERWISE
2) PROVIDE ALUMINUM BIRD SCREEN
3) LOUVERS SHALL BE AMCA CERTIFIED AND AMCA TESTED TO SHOW A MINIMUM BEGINNING POINT OF WATER PENETRATION OF 739 FPM FREE-AREA VELOCITY
4) COORDINATE COLOR SELECTION WITH ARCHITECT
5) PROVIDE MOTORIZED DAMPER AT LOUVER

UNIT-HEATER SCHEDULE (GAS)

MARK	SERVES	PERFORMANCE				MOTOR DATA	CABINET DATA	FUEL TYPE	WEIGHT (LBS)	BASIS OF DESIGN	NOTES
		CFM	INPUT (MBH)	OUTPUT (MBH)	EFFICIENCY (%)	AMPS | V | PH	CONFIGURATION				
GUH-1	STORAGE 104	450	30	24.6	82	SEE ME CONN SCHEDULE	HORIZONTAL	NATURAL GAS	55	REZNOR UDAS	1-5
GUH-2	STORAGE 104	450	30	24.6	82	SEE ME CONN SCHEDULE	HORIZONTAL	NATURAL GAS	55	REZNOR UDAS	1-5
GUH-3	STORAGE 104	450	30	24.6	82	SEE ME CONN SCHEDULE	HORIZONTAL	NATURAL GAS	55	REZNOR UDAS	1-5

NOTES:
1) PROVIDE MANUFACTURER APPROVED SIDEWALL CONCENTRIC VENT.
2) PROVIDE THERMOSTAT
3) PROVIDE PILOT LIGHT TO INDICATE "ENERGIZED"
4) PROVIDE WITH GAS VALVE WITH 100% SAFETY SHUTOFF AND DIRECT SPARK IGNITION.
5) PROVIDE FACTORY MOUNTED DISCONNECT SWITCH.

MECHANICAL EQUIPMENT CONNECTION SCHEDULE

MARK	GENERAL ELECTRICAL DATA									DISCONNECT				STARTER				CONTROL (NOTE 4)												NOTES
	APPROX HP (KW)	ELEC HEAT KW	FULL LOAD AMP (FLA)	MIN CIR AMPACITY (MCA)	MAX OCPD SIZE (MOCP)	NAMEPLATE VOLTAGE	PHASE	FEEDER (SEE ELECTRICAL FLOOR & CONDUIT SCHEDULE)	AVAILABLE AIC (NOTE 1)	SIZE	NEMA ENCLOSURE TYPE	RESPONSIBILITY	LOCATION	SWITCH TYPE (NOTE 2)	SIZE	NEMA ENCLOSURE TYPE	RESPONSIBILITY	LOCATION	STARTER TYPE (NOTE 3)	H-O-A	TOGGLE SWITCH	OCCUPANCY SENSOR	SWITCHED LTG CIRCUIT	AUXILIARY CONTACT	TIMECLOCK	BAS	TIME DELAY SWITCH	DUCT SMOKE DETECTOR	CO2/TEMP SENSOR	THERMOSTAT	CONTROL WIRING BY	
GUH-1	FRAC	--	1.9	2.4	15	120	1	A20	<5k	15A	1	X	U	TS	--	1	X	U	INT											M	M	
GUH-2	FRAC	--	1.9	2.4	15	120	1	A20	<5k	15A	1	X	U	TS	--	1	X	U	INT											M	M	
GUH-3	FRAC	--	1.9	2.4	15	120	1	A20	<5k	15A	1	X	U	TS	--	1	X	U	INT											M	M	
EUH-1	--	2	8.3	10.4	20	240	1	A20	<5k	20A	1	X	U	TS	--	1	X	U	INT											M	M	
EUH-2	--	2	8.3	10.4	20	240	1	A20	<5k	20A	1	X	U	TS	--	1	X	U	INT											M	M	
EUH-3	--	1.5	12.5	15.6	20	120	1	A20	<5k	20A	1	X	U	TS	--	1	X	U	INT											M	M	
SWH-1	--	2.5	20.8	26.0	30	120	1	A30	<5k	30/1	1	E	U	NF	--	1	X	U	INT											X	M	
EF-1	1/4	--	5.8	7.3	15	120	1	A20	<5k	15A	1	E	U	PF	--	1	X	U	INT			E	E								E	
EF-2	1/2	--	9.8	12.3	20	120	1	A20	<5k	30/1	3R	E	U	NF	--	3R	X	U	INT	E											E	
HVLS-1	--	--	5	6.3	20	120	1	A20	<5k	20A	1	M	R	TS	--	1	X	U	INT	M											E	

GENERAL NOTES:
A. RESPONSIBILITY PROVISIONS: E = BY ELECTRICAL; M = BY MECHANICAL; X = BY MANUFACTURER.
B. LOCATION DESIGNATIONS: U = INTEGRAL OR NEAR UNIT; R = REMOTE LOCATION, SEE ADDITIONAL NOTES.
C. ELECTRICAL CONTRACTOR TO PROVIDE ELECTRICAL CONNECTIONS FOR ALL 120V CONTROL DEVICES. MECHANICAL CONTRACTOR TO FURNISH AND COORDINATE ALL CONNECTIONS OF DEVICES.

SCHEDULE NOTES:
1.) MANUFACTURER TO PROVIDE EQUIPMENT WITH A LISTED AND LABELED SHORT CIRCUIT CURRENT (KAIC) RATING GREATER THAN THE AVAILABLE FAULT CURRENT SHOWN PER NEC 440.4(B).
2.) DISCONNECT SWITCH TYPE CODE DESIGNATORS: F = FUSED; NF = NONFUSED; PF = PLUG FUSE BOX COVER UNIT; CP = CORD AND PLUG; CB = CIRCUIT BREAKER; TS = MOTOR-RATED TOGGLE SWITCH.
3.) STARTER TYPE CODE DESIGNATORS: M = MANUAL; INT = INTEGRAL; VFD = VARIABLE FREQUENCY DRIVE; FVNR = FULL VOLTAGE NON-REVERSING; FVR = FULL VOLTAGE REVERSING; SSR = SOFT START REVERSING; SSNR = SOFT START NON-REVERSING.
4.) MECHANICAL AND ELECTRICAL CONTRACTORS SHALL COORDINATE EQUIPMENT CONNECTION AND CONTROL REQUIREMENTS.

HVLS SCHEDULE

MARK	SERVES	FAN DATA				MOTOR DATA	MAXIMUM DB(A) (NOTE 1)	WEIGHT (LBS)	BASIS OF DESIGN	NOTES
		CFM	COVERAGE AREA (SQ.FT)	IMPELLER DIAMETER (FT)	CLEARANCE TO WALL (FT)	WATTS | V | PH				
HVLS-1	STORAGE 104	55,800	12,500	14	21	SEE ME CONN SCHEDULE	45	107	GREENHECK DC-5	1-5

NOTES:
1) SOUND PRESSURE LEVEL AT 5 FEET OFF THE GROUND AT 20 FEET FROM THE CENTER OF THE FAN.
2) COLOR SHALL BE OFF WHITE.
3) FAN BLADES SHALL HAVE 3 FEET OF CLEARANCE AROUND THE ENTIRE BLADE.
4) PROVIDE MOUNTING KIT, COORDINATE WITH BUILDING MANUFACTURER.
5) MECHANICAL CONTRACTOR SHALL FURNISH SURFACE MOUNTED HVLS FAN CONTROLLER BY MANUFACTURER, INSTALLATION SHALL BE COMPLETED BY ELECTRICAL CONTRACTOR.

DRAWN: AJL
DESIGNED: AJL
CHECKED: DMS
PROJ. MNGR: SKK

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03-06-2020		

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OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020
JOB NUMBER: 535-002
SHEET: M901

GENERAL NOTES:

1. SEE ALSO SYMBOLS, ABBREVIATIONS, AND NOTES SHEET
2. COORDINATE FINAL LOCATION OF EQUIPMENT TO COMPLY WITH LOCAL CODES AND HEALTH-DEPARTMENT AND CITY REQUIREMENTS.
3. COORDINATE ROUTING OF SITE UTILITIES WITH LOCAL SITE CONDITIONS.
4. COORDINATE INVERTS WITH CIVIL DRAWINGS PRIOR TO INSTALLATION. (INVERTS SHOWN ON PLUMBING DRAWINGS MAY BE REFERENCED TO ARCHITECTURAL, FINISHED-FLOOR ELEVATION.)
5. PROVIDE CLEANOUTS IN ACCORDANCE WITH THE REQUIREMENTS OF APPLICABLE CODES. LOCATE FLOOR CLEANOUTS OUT OF TRAFFIC AREAS.
6. LOCATE PLUMBING VENTS AT LEAST 3 FEET ABOVE OR 10 FEET AWAY FROM OUTSIDE AIR INTAKES INTO THE BUILDING.
7. SEE "PLUMBING FIXTURE SCHEDULE" FOR FIXTURE TYPE AND SIZES OF INDIVIDUAL WASTES, VENTS AND DOMESTIC WATER PIPING CONNECTIONS TO FIXTURES.
8. EQUIPMENT AND INSTALLATION SHALL MEET NATIONAL SANITATION FOUNDATION (NSF) STANDARDS OR EQUIVALENT.
9. IN ACCORDANCE WITH WRITTEN INSTRUCTIONS PUBLISHED BY THE PLUMBING AND DRAINAGE INSTITUTE (PDI), PROVIDE WATER HAMMER ARRESTORS (SHOCK ABSORBERS) AT PIPE LOCATIONS NEAR FLUSHOMETER VALVES AND ELSEWHERE AS SHOWN. WATER HAMMER ARRESTORS SHALL COMPLY WITH PUBLISHED PDI NOMENCLATURE.
10. INSTALL 4-INCH AND LARGER SANITARY PIPING AT 1/8-INCH PER FOOT SLOPE; INSTALL SMALLER SIZES AT ¼-INCH PER FOOT SLOPE. INSTALL VENT PIPING SO IT WILL DRAIN.
11. DO NOT INSTALL WATER SUPPLY PIPING IN SPACES SUBJECT TO FREEZING SUCH AS ATTICS AND CRAWL SPACES.
12. PROVIDE 2-INCH MINIMUM WASTE PIPING BELOW GRADE.
13. COORDINATE EXACT LOCATION OF FIXTURES AND DRAINS WITH ARCHITECTURAL DRAWINGS.
14. PROVIDE 4-INCH MINIMUM VENT THRU ROOF. INCREASE VENT TO 4-INCH TWELVE INCHES BELOW ROOF INSULATION IN CLIMATES WHERE WINTER TEMPERATURES ARE EXPECTED TO FALL BELOW 33 DEGF.
15. DEAD END PIPES ARE PROHIBITED. (DEAD-END PIPES ARE BRANCHES LEADING FROM A DRAIN, VENT OR POTABLE-WATER PIPE AND TERMINATING AT A DEVELOPED LENGTH OF 2 FEET OR MORE BY MEANS OF A PLUG, CAP OR OTHER CLOSED FITTING.)
16. PIPE AND FITTINGS EXPOSED TO VIEW IN FINISHED SPACES SHALL BE CHROME PLATED BRASS.

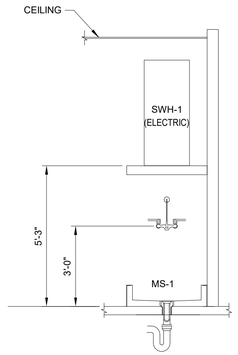
KEYNOTES

1. SEE 2/P301 FOR VENT PIPING CONTINUATION.
2. SEE CIVIL PLANS FOR CONTINUATION OF BUILDING MAIN.
3. COORDINATE VENT PIPING ROUTING WITH DUCTWORK AND JOISTS.
4. COORDINATE VENT PIPING ROUTING WITH GARAGE DOORS.
5. ROUTE SUPPLY PIPING WITHIN CHASE TO PLUMBING FIXTURE, SEE P901 FOR RISER DIAGRAM. COORDINATE ROUTING WITH JOISTS, MINIMIZE ROUTING THROUGH JOISTS AS POSSIBLE. DRAWN FOR CLARITY.
6. ROUTE SUPPLY PIPING WITHIN WALL TO FIXTURE. MINIMIZE PIPING ROUTED THROUGH JOISTS. DRAWN FOR CLARITY.
7. ROUTE SUPPLY PIPING BETWEEN JOISTS.
8. PROVIDE REMOVABLE HANDLE SHUTOFF VALVE W/HOSE CONNECTION AT END OF LINE TO ALLOW FOR DRAINING OF SYSTEM (BOTH HOT AND COLD WATER PIPING).
9. PROVIDE 12" X 12" ACCESS PANEL

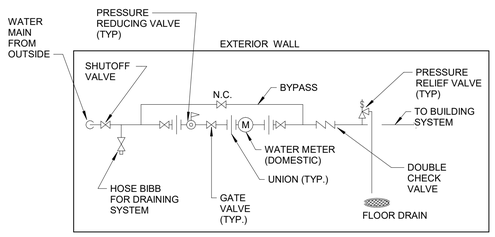
SERVICE WATER HEATER SCHEDULE (ELECTRIC)

MARK	SERVES	LOCATION	TANK CAPACITY (GALLONS)	RECOVERY (GALS/HR) (NOTE 1)	EWT (DEGF)	LWT (DEGF)	ELECTRICAL DATA				OPERATING WEIGHT (LBS)	ASME	BASIS OF DESIGN (NOTE 2)	NOTES
							KW TOTAL	V	PH	NO. OF STAGES				
SWH-1	MENS 1/ WOMENS 2	JAN 3	19	11	40	120	2.5	SEE ME CONN SCHEDULE			68	YES	AO SMITH EJCS	1-2

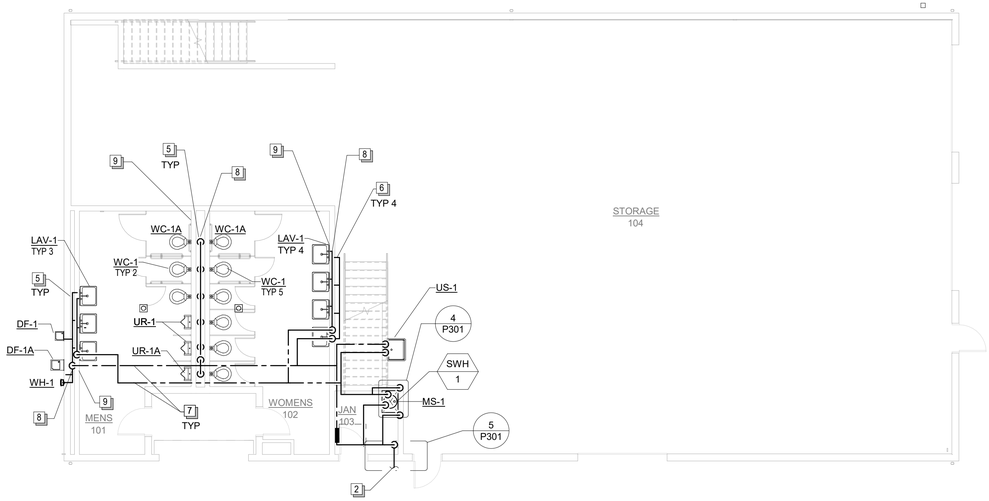
NOTES:
1) RECOVERY IS FOR TEMPERATURE RISE INDICATED BY EWT AND LWT
2) PROVIDE TEMPERATURE-PRESSURE RELIEF VALVE, AND PIPE DISCHARGE TO DRAIN RECEPTACLE. PROVIDE AIR GAP



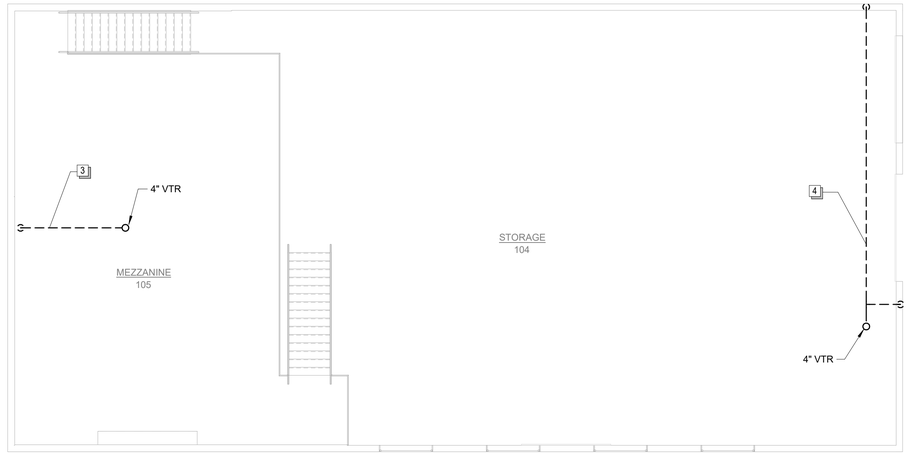
4 P301 SWH AND MS DETAIL
NO SCALE



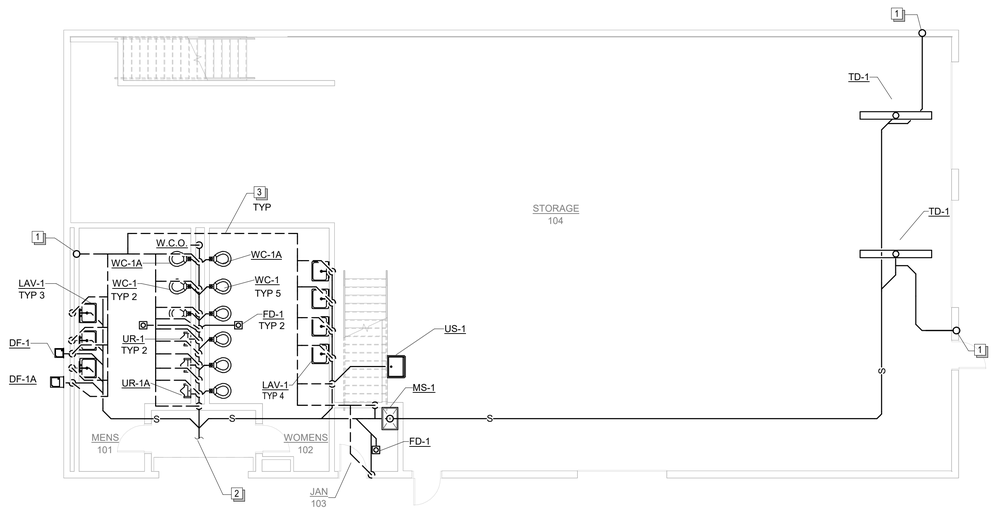
5 P301 WATER SERVICE ENTRANCE
NO SCALE



1 P301 PLUMBING PLAN - FIRST LEVEL - SUPPLY
1/8" = 1'-0"
NORTH



2 P301 PLUMBING PLAN - MEZZANINE LEVEL
1/8" = 1'-0"
NORTH



3 P301 PLUMBING PLAN - FIRST LEVEL - WASTE
1/8" = 1'-0"
NORTH

DRAWN:	AJL
DESIGNED:	AJL
CHECKED:	DMS
PROJ. MNGR:	SKK

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SHEET: P301

PLUMBING DESCRIPTIONS

SEE SPECIFICATIONS FOR DEFINITIONS, SUBMITTAL REQUIREMENTS, QUALITY ASSURANCE REQUIREMENTS, EXTRA MATERIALS REQUIREMENTS, LISTS OF ACCEPTABLE MANUFACTURERS, FIXTURE SUPPORTS, CLEANOUTS, AND OTHER RELEVANT INFORMATION. PROVIDE PRODUCTS IN COMPLIANCE WITH WRITTEN REQUIREMENTS. EXAMPLE-PRODUCT INFORMATION IS PROVIDED ONLY FOR GENERAL DIRECTION. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PRODUCTS FROM MANUFACTURERS OTHER THAN THOSE GIVEN AS EXAMPLES MAY BE INCORPORATED INTO THE WORK.

SAMPLES: PROVIDE SAMPLES OF LAVATORY FIXTURE AND FAUCET. PROVIDE SAMPLES OF FLUSHVALVES. PROVIDE SAMPLES OF SINKS AND FAUCETS PRIOR TO ORDERING OF PRODUCT FOR OWNER TO INSPECT AND APPROVE.

MATCH FIXTURE FAUCET DRILLINGS TO SPECIFIED FAUCET. FAUCET AND MIXING-VALVE MINIMUM STANDARDS (UNLESS NOTED OTHERWISE):
FAUCETS SHALL BE CHROME-PLATED CAST BRASS WITH NEITHER PLASTIC NOR POT-METAL COMPONENTS ALLOWED EXCEPT FAUCET AND VALVE CARTRIDGES MAY HAVE PLASTIC HOUSINGS (TUBULAR FAUCET SPOUTS ARE NOT ALLOWED.)

FIXTURE TRIM MINIMUM STANDARDS (UNLESS NOTED OTHERWISE)

P-TRAPS, DRAINS, CONTINUOUS WASTES, TAIL PIECES:
RETURN BENDS SHALL BE CHROME-PLATED CAST-BRASS WITH CLEANOUTS. TUBULAR WASTE TRIM SHALL BE 17-GA, CHROME-PLATED BRASS. JAM NUTS SHALL BE CHROME-PLATED CAST BRASS. DRAINS SHALL BE CHROME-PLATED CAST BRASS. REMOVABLE PVC IS TAILPIECES IS ACCEPTABLE WHEN HIDDEN FROM VIEW.

WATER SUPPLIES:
RISERS SHALL BE CHROME PLATED SOFT COPPER WHERE EXPOSED TO VIEW. FLEXIBLE BRAIDED RISERS ARE ALLOWED WHERE HIDDEN FROM VIEW. SHUT-OFFS SHALL BE CHROME PLATED WITH BRASS BODIES, BRASS STEMS, AND LOOSE-KEY STOPS.

SEAL JOINTS BETWEEN FIXTURES AND WALLS, FLOORS, AND COUNTERTOPS USING SANITARY-TYPE, ONE-PART, MILDEW-RESISTANT SILICONE SEALANT. MATCH SEALANT COLOR TO FIXTURE COLOR.

DRINKING FOUNTAINS:

DF-1:

FIXTURE: SELF-CONTAINED, NON-REFRIGERATED, SINGLE-LEVEL, WALL-MOUNTED WATER COOLER DESIGNED FOR READY ACCESSIBILITY BY THE HANDICAPPED. PROVIDE STAINLESS STEEL PANELS AND PUSH-BUTTON ACTIVATED, VANDAL-RESISTANT BUBBLER.
EXAMPLE: ELKAY ECD
P-TRAP AND COLD-WATER SUPPLY.
SUPPORT: MOUNT ACCORDING TO MANUFACTURER'S INSTRUCTIONS AND ADA.



FLOOR DRAINS:

FD-1:

FIXTURE: 2" MODERATE SERVICE FLOOR DRAIN WITH FLASHING COLLAR, WEEP HOLES, AND 5 INCH, MEDIUM DUTY BRONZE SQUARE STRAINER.
MATERIAL: CAST IRON
EXAMPLE: WATTS FD100-M



TD-1:

INTERCONNECTING CHANNEL SECTIONS MADE WITH OR WITHOUT SLOPE. CHANNEL SUPPORT BRACKETS CAPABLE OF ACCEPTING RE-BAR, END OUTLETS, BOTTOM OUTLETS, ENDCAPS AND CORNER CONNECTORS. GRATE OPTIONS FOR SEPARATE LOADING CLASSES A-E WITH PRESSURE OR LOCKING BOLT SECURING DEVICES AND DUCTILE IRON TRAIL TO PROTECT EDGES. INCLUDE SILT BOX WITH SEDIMENT BUCKET.
EXAMPLE: MEA-JOSAM 100C



LAVATORIES:

L-1:

FIXTURE: WALL HUNG LAVATORY, VITREOUS CHINA, FRONT OVERFLOW D-SHAPED BOWL WITH BACKSPLASH AND FAUCET LEDGE, 20.5" X 18". MOUNT AT ADA HEIGHT.
EXAMPLE: AMERCIAN STANDARD LUCERNE
FAUCET: SINGLE CONTROL 4" CENTERSET FAUCET, 0.5 GPM, VANDAL-RESISTANT, BRASS BODY, CHROME PLATED, AND 4-5/8" SPOUT.
EXAMPLE: AMERICAN STANDARD MONTERREY.
TRIM: DRAINS, SUPPLIES AND UMV. PROVIDE WITH ADA INSULATION SHIELDS.
DRAIN: GRID.



SINKS:

MS-1:

FIXTURE: UNIT SHALL HAVE OUTSIDE DIMENSIONS OF 24" X 24" X 10", THE MOLDING SHALL BE DONE IN MATCHED METAL DIES UNDER HEAT AND PRESSURE RESULTING IN A ONE-PIECE HOMOGENOUS PRODUCT. THE UNIT SHALL HAVE 10" HIGH WALLS NOT LESS THAN 1" WIDE.
EXAMPLE: FLORESTONE MODEL MSR 2424.
FAUCET: POLISHED CHROME, 8"-SPREAD, WALL MOUNTED FAUCET WITH INTEGRAL STOPS, INTEGRAL VACUUM BREAKER, WALL SUPPORT FOR SPOUT, LEVER HANDLES, 3/4" HOSE THREAD SPOUT OUTLET WITH PAIL HOOK ON END OF SPOUT. SPOUT OUTLET SHALL BE ABOUT 9" FROM WALL.
EXAMPLE: CHICAGO FAUCETS 897 SERIES.
DRAIN: PROVIDE NICKEL-BRASS STRAINER. CONNECTION SIZE AS INDICATED ON DRAWINGS.



US-1:

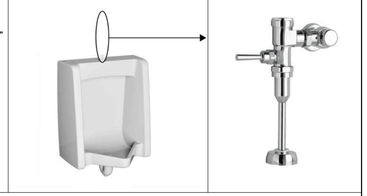
FIXTURE: SINGLE BOWL, 14 GAUGE STAINLESS STEEL COMPARTMENT SINK. 27" X 27" X 14" FLOOR MOUNT WITH LEGS, CENTER DRAIN 3.5".
WITH 8" BACKSPLASH FOR MOUNT OF FAUCET.
EXAMPLE: ELKAY WELDBILT WNSF
FAUCET: 8" CENTERSET DECK/WALL MOUNT FAUCET WITH 8" SPOUT AND 2-INCH LEVERS, CHROME PLATED BRASS, QUARTER TURN VALVES,
AND 2 FAUCET HOLES.
EXAMPLE: ENCORE KL54
TRIM: DRAINS AND SUPPLIES
DRAIN: GRID



URINALS:

UR-1

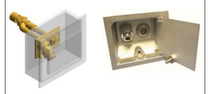
FIXTURE: VITREOUS CHINA LOW CONSUMPTION (1.0 G.P.F.) WALL HUNG URINAL WITH SIPHON JET AND 3/4" INLET SPUD, 2" FEMALE OUTLET CONNECTION. WALL HANGERS.
EXAMPLE: AMERICAN STANDARD WASHBROOK
FLUSHOMETER: MANUAL FLUSH, EXPOSED 3/4" TOP SPUD ADA, 1.0 GPF, CHROME FLUSHOMETER.
EXAMPLE: AMERICAN STANDARD SELECTRONIC



WALL HYDRANTS

WH-1:

3/4" LOOSE KEY FREEZELESS WALL HYDRANT WITH INTEGRAL VACUUM BREAKER BACKFLOW PREVENTOR, 3/4" HOSE THREAD OUTLET, POLISHED BRASS FINISH ON BRASS CASTING AND WALL CLAMP. LOOSE TEE KEY TO BE FURNISHED WITH EACH HYDRANT, WITH BOX AND DOOR COVER.
EXAMPLE: WOODFORD B65.
NOTE: PROVIDE WITH INTERIOR ISOLATION BALL VALVE AT EACH LOCATION



WATER CLOSETS:

WC-1:

FIXTURE: WALL-HANGING, BACK-OUTLET, VITREOUS CHINA FIXTURE, 1.5" SPUD, SIPHON JET, 1.6 GPF.
EXAMPLE: AMERICAN STANDARD AFWALL
FLUSHOMETER: MANUAL FLUSH, EXPOSED, CHROME PLATED, 1.5" SPUD ADA, 1.6 GPF
EXAMPLE: AMERICAN STANDARD SELECTRONIC
SEAT: WHITE, SOLID-PLASTIC, OPEN-FRONT, ELONGATED, COVERLESS SEAT WITH CHECK HINGE.
TRIM: CLOSET-BOLT CAPS



PLUMBING FIXTURE CONNECTION SCHEDULE

2012 UNIFORM PLUMBING CODE

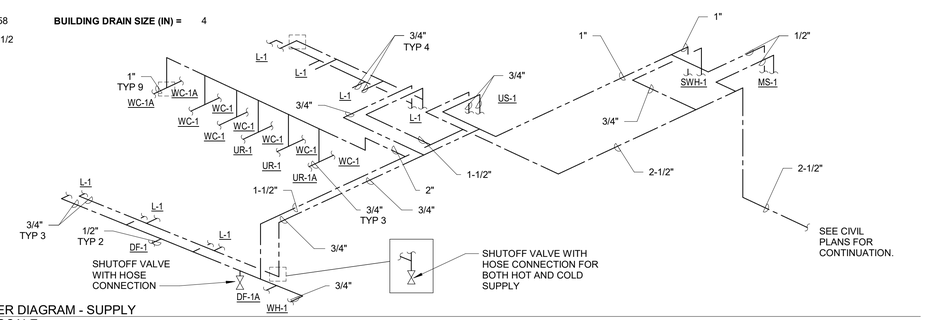
FIXTURE DESCRIPTION	MARK	QTY	TOTAL SFU EACH	CW SFU EACH	HW SFU EACH	TOTAL SFU	TOTAL CW SFU	TOTAL HW SFU	DFU EACH	DFU TOTAL	MINIMUM CONNECTION SIZE CW (IN)	HW (IN)	WASTE (IN)	VENT (IN)	REMARKS
DRINKING FOUNTAIN	DF	2	0.5	0.5	0	1	1	0	0.5	1	1/2	--	1 1/4	1 1/4	SEE PLUMBING FIXTURES THIS SHEET
FLOOR DRAIN / TRENCH DRAIN	FD/TD	5	0	0	0	0	0	0	2	10	--	--	2	1 1/2	SEE PLUMBING FIXTURES THIS SHEET
LAVATORY	L	7	1	0.75	0.75	7	5.25	5.25	1	7	1/2	1/2	1 1/4	1 1/4	SEE PLUMBING FIXTURES THIS SHEET
MOP SINK	MS	1	3	2.25	2.25	3	2.25	2.25	3	3	1/2	1/2	1 1/2	2	SEE PLUMBING FIXTURES THIS SHEET
SINK - UTILITY	US	1	3	2.25	2.25	3	2.25	2.25	3	3	1/2	1/2	1 1/2	2	SEE PLUMBING FIXTURES THIS SHEET
URINAL (1.- GPF)	UR	3	4	4	0	12	12	0	2	6	3/4	--	2	1 1/2	SEE PLUMBING FIXTURES THIS SHEET
WATER CLOSET (1.6-GPF FLUSH VALVE)	WC	9	5	5	0	45	45	0	4	36	1	--	4	2	SEE PLUMBING FIXTURES THIS SHEET
WATER HYDRANT	WH	1	2.5	2.5	0	2.5	2.5	0	0	0	3/4	--	--	--	SEE PLUMBING FIXTURES THIS SHEET
TOTAL															

TOTAL SFUs = 74 **TOTAL DFUs =** 66

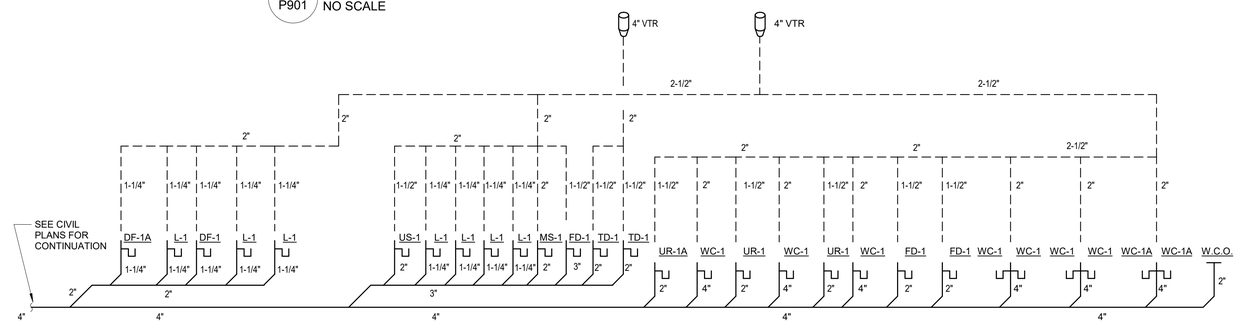
TOTAL GPM = 60

TOTAL COLD WATER SUPPLY (GPM) = 58 **BUILDING DRAIN SIZE (IN) =** 4

BUILDING WATER MAIN SIZE (IN) = 2-1/2



1 P901 RISER DIAGRAM - SUPPLY
NO SCALE



2 P901 RISER DIAGRAM - WASTE
NO SCALE

DRAWN: AJL
DESIGNED: AJL
CHECKED: DMS
PROJ. MNGR: SKK

NO.	DESCRIPTION	DATE	BY
0	BID SET	03-06-2020	KPE

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DATE: 03-06-2020

JOB NUMBER: 535-002

SHEET: P901

GENERAL DIVISION 26 NOTES

PRE-BID INSTRUCTIONS:

1. ELECTRICAL CONTRACTOR SHALL VISIT SITE PRIOR TO BID AND CAREFULLY EXAMINE THE EXISTING CONDITIONS. CONTRACTOR SHALL NOT BE ALLOWED EXTRA COST DUE TO FAILURE TO VISIT SITE OR TO INQUIRE WITH OWNER AND DESIGN PROFESSIONALS AS TO CLARIFICATIONS OF DISCREPANCIES AND UNKNOWNS.

2. ELECTRICAL CONTRACTOR SHALL REVIEW ENTIRE SET OF DRAWINGS AND SPECIFICATIONS TO DETERMINE THE SCOPE OF WORK. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR INFORMATION ON ALL OTHER CONSTRUCTION DOCUMENTS INCLUDING ARCHITECTURAL, STRUCTURAL, FIRE PROTECTION, PLUMBING AND MECHANICAL DRAWINGS. EXTRA COST SHALL NOT BE ALLOWED DUE TO FAILURE TO REVIEW ENTIRE SET OF DRAWINGS AND SPECIFICATIONS.

3. DATA PRESENTED ON THE DRAWINGS ARE AS ACCURATE AS PRELIMINARY SURVEYS AND PLANNING CAN DETERMINE, BUT ACCURACY IS NOT GUARANTEED AND FIELD VERIFICATION OF ALL DIMENSIONS IS DIRECTED. SPECIFICATIONS, DISTANCES AND LEVELS WILL BE GOVERNED BY ACTUAL FIELD CONDITIONS. REVIEW ARCHITECTURAL, STRUCTURAL, FIRE PROTECTION, PLUMBING, AND MECHANICAL PLANS AND ADJUST WORK TO CONFORM TO ALL CONDITIONS SHOWN THEREON. ACTUAL QUANTITY AND LOCATION OF DEVICES MAY VARY BASED ON CONDITIONS ENCOUNTERED DURING ORIGINAL CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR REMOVING OR REUSING EXISTING DEVICES. UNUSED EXISTING DEVICES, ASSOCIATED WIRING, CONDUIT AND FITTINGS SHALL BE REMOVED.

4. CONTRACTOR SHALL REFERENCE SPECIFICATIONS FOR CONSTRUCTION MATERIALS AND INSTALLATION PROCEDURES. THE SPECIFICATIONS ARE PART OF THE CONSTRUCTION DOCUMENTS. IN THE EVENT OF CONFLICT BETWEEN SPECIFICATIONS AND DRAWINGS, SUCH CONFLICT SHALL BE BROUGHT TO THE ATTENTION OF ARCHITECT / ENGINEER FOR RESOLUTION.

5. THESE DOCUMENTS ARE DIAGRAMMATIC AND DO NOT NECESSARILY SHOW MATERIALS FOR COMPLETE INSTALLATION. JUNCTION BOXES AND PULL BOXES ARE NOT ALL SHOWN IN THESE DOCUMENTS. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING REQUIRED JUNCTION / PULL BOXES TO MEET REQUIREMENTS OF APPROPRIATE LOCAL AND NATIONAL ELECTRICAL CODES.

PROVIDE COMPLETE, COMPLIANT, AND OPERATIONAL SYSTEMS:

1. DRAWINGS AND SPECIFICATIONS HAVE BEEN PREPARED TO COMPLEMENT EACH OTHER. PROVIDE ITEMS SHOWN ON ONE AND NOT THE OTHER AS THOUGH SHOWN AND CALLED OUT IN BOTH. IF AN APPARENT CONFLICT EXISTS WITHIN THE CONSTRUCTION DOCUMENTS, PRESUME TO PROVIDE THE MORE COSTLY CHOICE, AND REQUEST CLARIFICATION FROM ARCHITECT / ENGINEER IN WRITING.

2. PROVIDE, LABOR, MATERIALS, EQUIPMENT, FEES, AND PERMITS NECESSARY TO CONSTRUCT A COMPLETE, OPERATIONAL SYSTEM FOR THE ENTIRE PROJECT AS SHOWN ON THESE CONSTRUCTION DOCUMENTS.

3. CONSTRUCTION DOCUMENTS PRESENT THE GENERAL DESIGN, ARRANGEMENT AND EXTENT OF SYSTEMS. COMPLETE DETAIL IS NOT PRESENTED. DRAWINGS ARE DIAGRAMMATIC. BECAUSE OF THEIR SMALL SCALE, THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW NECESSARY FOR THE COMPLETE INSTALLATION. PROVIDE SYSTEMS COMPLETE AND OPERATIONAL AND IN COMPLIANCE WITH DESIGN INTENT. OBTAIN PERMISSION FROM ENGINEER PRIOR TO MAKING MAJOR DEVIATIONS FROM CONSTRUCTION DOCUMENTS. EXAMPLES OF MAJOR DEVIATIONS ARE CHANGES IN COMPONENT SIZES, WEIGHTS, QUANTITIES, OR MATERIALS.

4. INSTALL EQUIPMENT IN STRICT ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S WRITTEN RECOMMENDATIONS. PROVIDE FITTINGS AND OTHER SIMILAR DEVICES AND ACCESSORIES REQUIRED FOR A COMPLETE, WORKABLE INSTALLATION.

5. REPAIR OR REPLACE PARTS OF THIS WORK THAT FAIL, ARE UNFIT, OR BECOME DAMAGED DURING CONSTRUCTION WITH NO CHANGE TO THE CONTRACT PRICE.

PAY FEES:

1. OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED FOR THE ELECTRICAL WORK; ARRANGE FOR INSPECTIONS REQUIRED FOR THE ELECTRICAL WORK; FURNISH A CERTIFICATE OF FINAL INSPECTION AND APPROVAL BY ENFORCEMENT AUTHORITIES.

2. WHEN ADJUSTMENTS, ALTERATIONS, OR CHANGES TO THE PROJECT ARE REQUIRED TO ACCOMMODATE PRODUCTS OTHER THAN "BASIS OF DESIGN", PAY ENGINEERING/DESIGN FEES REQUIRED TO MAKE SUCH ADJUSTMENTS, ALTERATIONS, OR CHANGES (INCLUDING BUT NOT LIMITED TO MECHANICAL, STRUCTURAL SUPPORT, AND CHANGES TO ACCOMMODATE MAINTENANCE NEEDS AND DESIGN INTENT).

3. PAY PROFESSIONAL ENGINEERING AND DESIGN FEES ASSOCIATED WITH CONTRACTOR-INITIATED CHANGES OCCURRING AFTER SEALED CONSTRUCTION DOCUMENTS ARE SUBMITTED FOR APPROVAL TO AUTHORITY HAVING JURISDICTION.

4. PAY PROFESSIONAL ENGINEERING FEES ASSOCIATED WITH CONTRACTOR'S FAILURE TO FOLLOW SUBMITTAL REQUIREMENTS.

MAKE SUBMITTALS:

1. INDIVIDUAL SUBMITTALS ARE TO BE PREPARED ELECTRONICALLY IN 'PDF' FORMAT. ELECTRONIC FILES SHALL BE ORIGINAL VENDOR-PREPARED ELECTRONIC FILES AND NOT SCANNED COPIES OF CATALOG PAGES OR FACSIMILES. INDIVIDUAL EQUIPMENT ITEMS SHALL BE TAGGED WITH EQUIPMENT IDENTIFIERS AS SHOWN ON THESE DRAWINGS. ILLEGIBLE ELECTRONIC FILES ARE SUBJECT TO "REVISE AND RESUBMIT" ACTION.

2. INCLUDE WITH SUBMITTALS SPECIFIC WRITTEN NOTICE OF EACH VARIATION A SUBMITTAL HAS FROM THE REQUIREMENTS OF CONSTRUCTION DOCUMENTS. ENGINEER'S REVIEW OF SUBMITTALS SHALL NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FROM COMPLIANCE WITH CONSTRUCTION DOCUMENTS UNLESS THE ENGINEER HAS SPECIFICALLY ACCEPTED THE VARIATION IN WRITING.

3. SUBMIT SUBSTITUTION REQUESTS FOR APPROVAL. SUBSTITUTED EQUIPMENT SHALL MEET OR EXCEED STANDARDS SET BY ITEMS SPECIFIED.

4. SUBMIT A SCHEDULE OF CONSTRUCTION DOCUMENT CHANGES REQUIRED DUE TO 1) DIFFERENCES (BETWEEN PRELIMINARY DESIGN DATA AND SUBMITTAL DATA) IN "BASIS OF DESIGN" EQUIPMENT OR 2) SUBSTITUTED EQUIPMENT FOR REVIEW PRIOR TO INITIATING WORK. WHEN ADJUSTMENTS, ALTERATIONS, OR CHANGES TO THE PROJECT ARE REQUIRED TO ACCOMMODATE SUBSTITUTED PRODUCTS, PAY ENGINEERING/DESIGN FEES REQUIRED TO MAKE SUCH ADJUSTMENTS, ALTERATIONS, OR CHANGES.

5. SUBSTITUTION REQUESTS SHALL SHOW ENERGY CONSERVATION FEATURES OF SUBSTITUTED EQUIPMENT EQUAL OR EXCEED THAT OF SPECIFIED EQUIPMENT.

KEEP RECORDS:

1. DURING CONSTRUCTION, MAINTAIN A SET OF AS-BUILT, REDLINED, RECORD DRAWINGS AT THE PROJECT SITE. RECORD ALL CHANGES FROM, BUT NOT LIMITED TO, ADDENDA, CHANGE ORDERS, SUPPLEMENTAL INSTRUCTIONS, AND DESIGN CLARIFICATIONS. RECORD CHANGES IN LAYOUT, ROUTING, EQUIPMENT, COMPONENTS, AND ACCESSORIES. RECORD CHANGES DUE TO CHANGES IN SUPPLIED EQUIPMENT. AFTER ENGINEER'S FINAL INSPECTION PROVIDE RECORD DRAWINGS TO ENGINEER.

2. AT COMPLETION OF PROJECT PROVIDE NEW PANEL DIRECTORIES INDICATING WHICH BREAKERS ARE NOW SPARE. INCLUDE LISTING OF BREAKERS FROM OLD PANEL DIRECTORIES FOR CIRCUITS NOT DISTURBED. CONSULT WITH OWNER FOR CIRCUITS NOT ADEQUATELY MARKED.

DEFINITIONS:

1. ACTION SUBMITTALS: WRITTEN AND GRAPHIC INFORMATION REQUIRING DESIGN PROFESSIONAL'S RESPONSIVE ACTION. ACTION SUBMITTALS INCLUDE PRODUCT DATA, SHOP DRAWINGS, SAMPLES, PRODUCT SCHEDULE OR LIST.

2. INFORMATIONAL SUBMITTALS: WRITTEN INFORMATION NOT REQUIRING DESIGN PROFESSIONAL'S RESPONSIVE ACTION. SUBMITTALS MAY BE REJECTED FOR NOT COMPLYING WITH REQUIREMENTS. INFORMATION SUBMITTALS INCLUDE COORDINATION DRAWINGS, WELDING CERTIFICATES, QUALIFICATION DATA, INSTALLER CERTIFICATES, MANUFACTURER CERTIFICATES, PRODUCT CERTIFICATES, MATERIAL CERTIFICATIONS, MATERIAL TEST REPORTS, PRODUCT TEST REPORTS, FIELD TEST REPORTS, OPERATION AND MAINTENANCE DATA, MANUFACTURER'S INSTRUCTIONS, MANUFACTURER'S FIELD REPORTS, INSURANCE CERTIFICATES AND BONDS, MATERIAL SAFETY DATA SHEETS AND RECOMMENDED SPARE PARTS LISTS.

3. FURNISH: OBTAIN AND DELIVER TO ON-SITE STORAGE IN ORIGINAL FACTORY PACKAGING.

4. INSTALL: UNPACK, MOVE TO FINAL LOCATION, MAKE CONNECTIONS, AND PLACE INTO FINAL SERVICE ACCORDING TO PROCEDURES IDENTIFIED IN PART 3 OF APPLICABLE SECTION(S).

5. PROVIDE: FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.

PROTECT:

1. PROTECT EXISTING STRUCTURES AND EQUIPMENT DURING THE EXECUTION OF THIS CONTRACT.

2. REPAIR AREAS AFFECTED BY WORK TO THEIR ORIGINAL CONDITION OR BETTER

COORDINATE:

1. PRIOR TO ORDERING, FABRICATING, OR INSTALLING WORK, COORDINATE ELECTRICAL WORK WITH WORK OF OTHER SUBCONTRACTORS AND WITH CONTRACTORS HIRED DIRECTLY BY THE OWNER. EXAMPLES OF WORK BY OTHERS INCLUDE BUT ARE NOT LIMITED TO CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION, AND REFRIGERATION. WHERE CONFLICTS OCCUR, RESOLVE THEM PRIOR TO FABRICATION AND INSTALLATION.

2. COORDINATE ARRANGEMENT, MOUNTING, AND SUPPORT OF ELECTRICAL EQUIPMENT SO CONNECTING RACEWAYS WILL BE CLEAR OF OBSTRUCTIONS AND OF THE WORKING AND ACCESS SPACE OF OTHER EQUIPMENT.

3. REFER TO THE MECHANICAL SHEETS FOR THE EXACT LOCATION OF THE MECHANICAL EQUIPMENT. COORDINATE LOCATION OF ALL MECHANICAL EQUIPMENT WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. VERIFY EXACT REQUIREMENTS (E.C., BREAKER, BRANCH CIRCUIT, DISCONNECT, ETC.) NEEDED FOR EACH PIECE OF MECHANICAL EQUIPMENT WITH THE MECHANICAL PLANS AND WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

4. DURING INSTALLATION, RESOLVE CONFLICTS AND MAKE CHANGES RESULTING FROM LACK OF CONTRACTOR COORDINATION WITH NO CHANGE TO THE CONTRACT PRICE.

5. LOCATIONS AND SIZES OF SERVICE CONNECTIONS TO EQUIPMENT, FLOOR AND WALL OPENINGS, SUPPORTS, CONCRETE PADS, FOUNDATIONS, SPACE ARRANGEMENTS, ELECTRICAL POWER, AND OTHER SIMILAR PROVISIONS FOR "BASIS OF DESIGN" EQUIPMENT ARE BASED ON PRELIMINARY INFORMATION AVAILABLE DURING DESIGN TO SHOW DESIGN INTENT AND SPACE ALLOCATION. ACTUAL CONDITIONS MAY VARY DEPENDING ON CONFIGURATION OF PURCHASED EQUIPMENT. PRIOR TO INITIATING WORK, VERIFY ABOVE TYPES OF INFORMATION FROM EQUIPMENT DRAWINGS CERTIFIED FOR MANUFACTURE BY RESPECTIVE EQUIPMENT MANUFACTURERS. MAKE MODIFICATIONS FROM WHAT IS SHOWN IN CONSTRUCTION DOCUMENTS TO PROVIDE SUCCESSFUL EQUIPMENT INSTALLATION WITH NO CHANGE IN CONTRACT PRICE. SUBMIT A SCHEDULE OF SUCH CHANGES FOR REVIEW PRIOR TO INITIATING WORK. DOCUMENT REVIEWED CHANGES ON RECORD DRAWINGS.

6. NOTIFY THE ENGINEER IN WRITING OF EXISTING CONDITIONS DIFFERING FROM THOSE SHOWN IN CONTRACT DOCUMENTS. THE ENGINEER WILL EVALUATE THE DIFFERENCES, AND IF NECESSARY, REDESIGN FOR THE CONDITIONS FOUND.

7. DO NOT SCALE OFF CONSTRUCTION DOCUMENTS. COORDINATE INSTALLATION WITH FIELD CONDITIONS.

8. WHERE BUILDING ELEMENTS (FOR EXAMPLE, DOOR FRAMES, PORTIONS OF WALLS, PORTIONS OF FLOORS, ETC.) HINDER REMOVAL OF EXISTING OR INSTALLATION OF NEW EQUIPMENT, REMOVE AND REPLACE SUCH ELEMENTS. UPON SUBSTANTIAL COMPLETION, ENSURE BUILDING ELEMENTS MATCH THEIR ORIGINAL CONDITIONS.

9. PROVIDE APPROPRIATE PROVISIONS FOR EXPANSION OR MOVEMENT OF RACEWAYS.

10. GIVE RIGHT OF WAY TO PIPING AND OTHER SYSTEMS INSTALLED AT A REQUIRED SLOPE.

11. COORDINATE ROOF WORK WITH OWNER TO MAINTAIN WARRANTY OF ROOFING SYSTEM.

12. COORDINATE ANY FIRE DETECTION WITH OWNER AND AUTHORITY HAVING JURISDICTION.

13. PROVIDE POWER WIRING TO EQUIPMENT SUPPLIED BY OTHER DIVISIONS. PROVIDE LINE-VOLTAGE SUPPLY AND INTERLOCK WIRING TO CONTROL EQUIPMENT SUPPLIED BY OTHER DIVISIONS. WHERE REQUESTED BY OTHER DIVISIONS, PROVIDE LOW-VOLTAGE CONTROL AND INTERLOCK WIRING TO CONTROL EQUIPMENT SUPPLIED BY THOSE DIVISIONS.

PROVIDE SERVICEABILITY:

1. PROVIDE CEILING ACCESS PANELS TO ENABLE ACCESS TO DEVICES REQUIRING SERVICE OR OPERATION. COORDINATE LOCATION OF ACCESS PANELS AND DOORS FOR ELECTRICAL ITEMS THAT ARE BEHIND FINISHED SURFACES OR OTHERWISE CONCEALED.

2. PROVIDE SERVICE CLEARANCES AROUND EQUIPMENT AS RECOMMENDED BY EQUIPMENT MANUFACTURER.

ADDRESS PENETRATIONS:

1. IN FIRE RATED BARRIERS, PROVIDE FIRE STOPPING ASSEMBLIES LISTED BY A RECOGNIZED INDEPENDENT TESTING LABORATORY AND MATCHED TO FIELD CONDITIONS. MAINTAIN FIRE RATING OF SURFACE PENETRATED.

CONTROL QUALITY:

1. RECORD ALL DRAWING MODIFICATIONS AND SPECIFICATION MODIFICATIONS IN ADDENDUM(S) ON THE APPROPRIATE DRAWING(S) AND IN THE APPROPRIATE SPECIFICATION SECTION(S), RESPECTIVELY.

2. ELECTRICAL WORK SHALL BE COMPLETED IN ACCORDANCE WITH NECA 1 AND APPROPRIATE LOCAL AND NATIONAL ELECTRICAL AND BUILDING CODES.

3. TAKE RESPONSIBILITY FOR EQUIPMENT CHECK-IN, SAFEKEEPING, AND DAMAGE PREVENTION.

4. UNSPECIFIED EQUIPMENT OR SYSTEMS SHALL BE REPRESENTED BY DULY AUTHORIZED DISTRIBUTORS WITH SERVICE DEPARTMENTS REGULARLY ENGAGED IN THE MAINTENANCE AND INSTALLATION OF THESE SYSTEMS AND EQUIPMENT. SUCH SERVICE DEPARTMENTS SHALL REGULARLY STOCK STANDARD REPLACEMENT PARTS AND EQUIPMENT AND SHALL BE LOCATED WITHIN A REASONABLE DISTANCE FROM THE INSTALLATION SITE.

5. WHENEVER A MATERIAL, ARTICLE, OR PIECE OF EQUIPMENT IS IDENTIFIED ON THE DRAWINGS BY REFERENCE TO MANUFACTURERS, VENDORS NAMES, TRADE NAMES, CATALOG NUMBERS, OR THE LIKE, IT IS SO IDENTIFIED FOR THE PURPOSE OF ESTABLISHING A STANDARD. MATERIALS, ARTICLES, OR PIECES OF EQUIPMENT FROM OTHER MANUFACTURERS OR VENDORS, WHICH WILL ADEQUATELY PERFORM THE DUTIES IMPOSED BY THE GENERAL DESIGN, WILL BE CONSIDERED EQUALLY ACCEPTABLE PROVIDED THEY ARE OF EQUAL SUBSTANCE, APPEARANCE, AND FUNCTION.

6. MEASURE INDICATED MOUNTING HEIGHTS TO BOTTOM OF UNIT FOR SUSPENDED ITEMS AND TO CENTER OF UNIT FOR WALL-MOUNTING ITEMS.

7. IF MOUNTING HEIGHTS OR OTHER LOCATION CRITERIA ARE NOT INDICATED, ARRANGE AND INSTALL COMPONENTS AND EQUIPMENT TO PROVIDE MAXIMUM POSSIBLE HEADROOM.

8. INSTALL EQUIPMENT TO FACILITATE SERVICE, MAINTENANCE, AND REPAIR OR REPLACEMENT OF COMPONENTS OF BOTH ELECTRICAL EQUIPMENT AND OTHER NEARBY INSTALLATIONS. CONNECT IN SUCH A WAY AS TO FACILITATE FUTURE DISCONNECTING WITH OTHER ITEMS IN THE VICINITY.

9. ALL LIGHTING, RECEPTACLE AND EQUIPMENT BRANCH CIRCUITS SHALL BE 2 NO. 12 AND 1 NO. 12 GROUND UNLESS OTHERWISE SPECIFIED ON THE PLANS OR SCHEDULES. SIZE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR PER NEC 250.122.

10. ALL MECHANICAL EQUIPMENT IS SHOWN ON THE PLANS WITH A DISCONNECTING MEANS. THIS DISCONNECT MAY BE SUPPLIED BY THE MECHANICAL EQUIPMENT SUPPLIER OR BY THE ELECTRICAL CONTRACTOR. SEE EQUIPMENT CONNECTION SCHEDULES FOR ACTUAL SUPPLIER OF DISCONNECT.

11. MARK ALL RECEPTACLES WITH A TAG IDENTIFYING THE PANEL AND BREAKER SUPPLYING EACH RECEPTACLE. TAG SHALL BE PLACED ON INSIDE-FACE OF RECEPTACLE COVERPLATE.

12. ALL MULTIPLE CIRCUIT CONDUITS SHALL INCLUDE AN INDIVIDUAL NEUTRAL AND EQUIPMENT GROUNDING CONDUCTOR FOR EACH CIRCUIT.

13. ALL CONDUCTORS SHALL BE COPPER. ALUMINUM CONDUCTORS ARE NOT ACCEPTABLE.

14. TWIST-ON WIRE CONNECTORS SHALL BE USED FOR 40 AMP OR LESS CIRCUITS IDEAL "WING-NUT" OR EQUAL CONNECTORS.

15. GROUND-FAULT PROTECTED RECEPTACLES SHALL NOT BE SLAVED.

16. MINIMUM RACEWAY SIZE SHALL BE 3/4" TRADE SIZE, UNDERGROUND 1" TRADE SIZE. NO EXCEPTIONS.

17. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL BE 6 FT. NO EXCEPTIONS.

18. CONDUIT SHALL BE SUPPORTED AT REQUIRED DISTANCES WITH RUST-PROOF ONE-HOLE STRAPS. TIE-WRAP SUPPORTS ARE NOT ALLOWED.

19. ALL HVAC UNITS TO HAVE DEDICATED RACEWAYS FOR CONTROLS. RACEWAYS TO BE COLORED BLUE.

20. FIRE ALARM SYSTEM DETECTION AND NOTIFICATION APPLIANCES TO HAVE DEDICATED RACEWAYS. RACEWAYS TO BE COLORED RED.

21. ELECTRICAL CONTRACTOR TO PROVIDE POWER AS REQUIRED TO ALL ANCILLARY SYSTEM COMPONENTS INCLUDING, BUT NOT LIMITED TO, HVAC DAMPERS, FIRE PROTECTION DAMPERS, DOOR HOLD-OPEN DEVICES, TRAP PRIMER SYSTEMS AND PLUMBING FIXTURES.

22. ALL OUTDOOR WEATHERPROOF CONVENIENCE RECEPTACLES TO BE PROVIDED WITH IN-USE COVER PER NEC 406.9(B)(1). PROVIDE DIE-CAST IN-USE COVERS, PLASTIC COVERS ARE NOT ACCEPTABLE.

23. INSTALL FLOOR-MOUNTED EQUIPMENT ON CONCRETE PADS WITH A MINIMUM THICKNESS OF 4 INCHES. CONSTRUCT CONCRETE PAD 4 INCHES WIDER (IN EACH DIRECTION) THAN EQUIPMENT FOOT PRINT.

24. THE NUMBER OF CURRENT CARRYING CONDUCTORS INSTALLED IN A SINGLE RACEWAY SHALL NOT EXCEED SIX.

25. DIRECT BURIED CONDUCTORS AND CONDUCTORS IN BELOW-GRADE RACEWAYS AND BOXES SHALL NOT BE SPLICED.

26. CONDUITS SHALL NOT BE PLACED IN CONCRETE FLOOR SLABS UNLESS SPECIFICALLY NOTED ON DRAWINGS. CONDUITS SHALL BE PERMITTED TO STUB UP THROUGH SLABS. CONDUITS PLACED UNDERNEATH CONCRETE FLOOR SLABS SHALL BE A MINIMUM OF 36" BELOW FINISHED GRADE.

CLOSEOUT:

1. GUARANTEE SYSTEMS (PARTS AND LABOR) FOR A MINIMUM PERIOD OF ONE YEAR AFTER THE DATE OF SUBSTANTIAL COMPLETION.

2. PROVIDE OPERATING AND MAINTENANCE MANUALS IN PDF FORMAT. MANUALS SHALL INCLUDE, BUT ARE NOT LIMITED TO, PRODUCT DATA SHEETS, SHOP DRAWINGS, WIRING DIAGRAMS, OPERATING AND MAINTENANCE INSTRUCTIONS FOR EQUIPMENT, ACCESSORIES, LIGHTING FIXTURES, OCCUPANCY CONTROLS AND RECOMMENDED SPARE PARTS LISTS.

3. IMMEDIATELY BEFORE TURNING SYSTEMS OVER TO OWNER, DEMONSTRATE FULL AND PROPER SYSTEMS OPERATIONS TO ENGINEER AND OWNER. IMMEDIATELY BEFORE DEMONSTRATION, PROPERLY AND FULLY RE-LUBRICATE EQUIPMENT.

4. UPON COMPLETION OF WORK, REMOVE ALL SURPLUS MATERIALS AND RUBBISH. MAKE REQUIRED PATCHING AND REPAIRS OF OTHER TRADES' WORK THAT YOU DAMAGED. LEAVE THE PREMISES IN A CLEAN AND ORDERLY CONDITION.

5. UPON SUBSTANTIAL COMPLETION OF THE PROJECT, THE ENGINEER WILL PERFORM A WALK-THROUGH TO PREPARE A PUNCH LIST OF INCOMPLETE ITEMS. THE ENGINEER WILL SUBMIT THIS PUNCH LIST TO THE CONTRACTOR WHO SHALL COMPLETE THE ITEMS INDICATED ON THE PUNCH LIST AND SUBSEQUENTLY REQUEST A RE-INSPECTION. UPON RE-INSPECTION, IF THE ENGINEER DETERMINES ITEMS ALREADY IDENTIFIED REMAIN INCOMPLETE, THE ENGINEER'S COSTS ASSOCIATED WITH ADDITIONAL RE-INSPECTIONS WILL BE DEDUCTED FROM THE AMOUNT OWED TO THE CONTRACTOR ON A TIME AND MATERIALS BASIS.

WIRING DEVICE SYMBOLS

MOUNTING			DESCRIPTION (NEMA 5-20R UNLESS NOTED OTHERWISE)
CEILING	WALL	FLOOR	
			TAMPER-RESISTANT SIMPLEX RECEPTACLE
C		F	TAMPER-RESISTANT DUPLEX RECEPTACLE
			TAMPER-RESISTANT FOURPLEX RECEPTACLE
	G		TAMPER-RESISTANT GFCI DUPLEX RECEPTACLE
	G		TAMPER-RESISTANT GFCI FOURPLEX RECEPTACLE
			DEAD-FRONT GFCI RECEPTACLE REMOTE RESET DEVICE
	WP		WEATHERPROOF DUPLEX RECEPTACLE
C		F	SPECIAL PURPOSE RECEPTACLE (NEMA CONFIGURATION SHOWN)
			WELDING RECEPTACLE (NEMA CONFIGURATION SHOWN)
	T		ELECTRONIC CONTROL TRANSFORMER
J		J F	JUNCTION BOX

CONTROL DEVICE SYMBOLS

SYMBOL		DESCRIPTION
CEILING	WALL	
	S	SINGLE-POLE SWITCH
	S_3	THREE-WAY SWITCH
	S_4	FOUR-WAY SWITCH
	S_M	SINGLE-POLE MOTOR-RATED SWITCH
		OCCUPANCY SENSOR SWITCH
		VACANCY SENSOR SWITCH
		PHOTOELECTRIC CELL
		STOP/START STATION
		PUSH BUTTON STATION
		BOX COVER UNIT FOR PLUG FUSES/FUSTAT, (120V, 1Ø, 1-POLE) 1-GANG BOX, COVER, ON/OFF SWITCH, 15A FUSE, (COOPER BOX COVER: #SSU, OR APPROVED EQUAL)
	M	CONTACTOR (AS NOTED OR SCHEDULED)
		TIME CLOCK

LIGHTING SYMBOLS

MOUNTING			DESCRIPTION # INDICATES TYPE IN FIXTURE SCHEDULE
CEILING	WALL	POLE	
#			1x4 LENSED LUMINAIRE
#	#		INDUSTRIAL STRIP LUMINAIRE
	#		WALL BRACKET LUMINAIRE
#	#		DOWNLIGHT / SCONCE LUMINAIRE
#			HIGHBAY / LOWBAY STYLE LUMINAIRE
			SHADING INDICATES EMERGENCY STYLE LUMINAIRE ON LIFE SAFETY
#	#		BATTERY EMERGENCY LIGHT LUMINAIRE
	#		EXIT LIGHT WITH BATTERY EMERGENCY LIGHT LUMINAIRE
#	#		SINGLE FACE EXIT SIGN (ARROW INDICATES DIRECTION)
	#		WALL PACK LUMINAIRE

POWER DISTRIBUTION SYMBOLS

SYMBOL	DESCRIPTION
	NEW PANELBOARD
XX/3 XX/AF	FUSED DISCONNECT SWITCH
NF	NON-FUSED DISCONNECT SWITCH
M	MOTOR

CONDUIT SYMBOLS

MOUNTING			DESCRIPTION
CEILING	WALL	FLOOR	
			CONDUIT HOMERUN TO PANEL (ARROWS DENOTE CIRCUITS)
			CONCEALED CONDUIT
			EXPOSED CONDUIT
			CONDUIT STUB LOCATION
			CONDUIT RISER (TURNED UP)
			CONDUIT TURNED DOWN

ELECTRICAL ANNOTATION SYMBOLS

SYMBOL	DESCRIPTION
N E	NEW TO EXISTING CONNECTION
X	KEYNOTE
XXX	CALCULATED AVAILABLE FAULT CURRENT

GENERAL NOTES:

1. THIS PROJECT MAY NOT USE EVERY SYMBOL OR DEVICE APPEARING IN THESE LEGENDS.
2. ELECTRICAL WORK SHALL BE COMPLETED IN ACCORDANCE WITH APPROPRIATE LOCAL AND NATIONAL ELECTRICAL AND BUILDING CODES.
3. CONTRACTOR SHALL REFERENCE SPECIFICATIONS FOR CONSTRUCTION MATERIALS AND INSTALLATION PROCEDURES. THE SPECIFICATIONS ARE PART OF THE CONSTRUCTION DOCUMENTS. IN THE EVENT OF CONFLICT BETWEEN SPECIFICATIONS AND DRAWINGS, SUCH CONFLICT SHALL BE BROUGHT TO THE ATTENTION OF ARCHITECT / ENGINEER FOR RESOLUTION.
4. THESE DOCUMENTS ARE DIAGRAMMATIC AND DO NOT NECESSARILY SHOW MATERIALS FOR COMPLETE INSTALLATION.
5. JUNCTION BOXES AND PULL BOXES ARE NOT ALL SHOWN WITHIN THESE DOCUMENTS. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING REQUIRED JUNCTION / PULL BOXES TO MEET REQUIREMENTS OF APPROPRIATE LOCAL AND NATIONAL ELECTRICAL CODES.

SYMBOL MODIFIERS:

E,EX	EXISTING	WG	WIRE-GUARD
R	RELOCATED	WP	WEATHERPROOF
IG	ISOLATED GROUND	##"	MOUNTING HEIGHT
G	GROUND FAULT CURRENT INTERRUPTER		

DRAWN:	CRM
DESIGNED:	CRM
CHECKED:	PDS
PROJ. MNGR:	SKK

NO.	DATE	DESCRIPTION	BY
0	03-06-2020	BID SET	KPE

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GENERAL ELECTRICAL NOTES AND SYMBOL LEGEND

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DATE: 03-06-2020

JOB NUMBER: 535-002

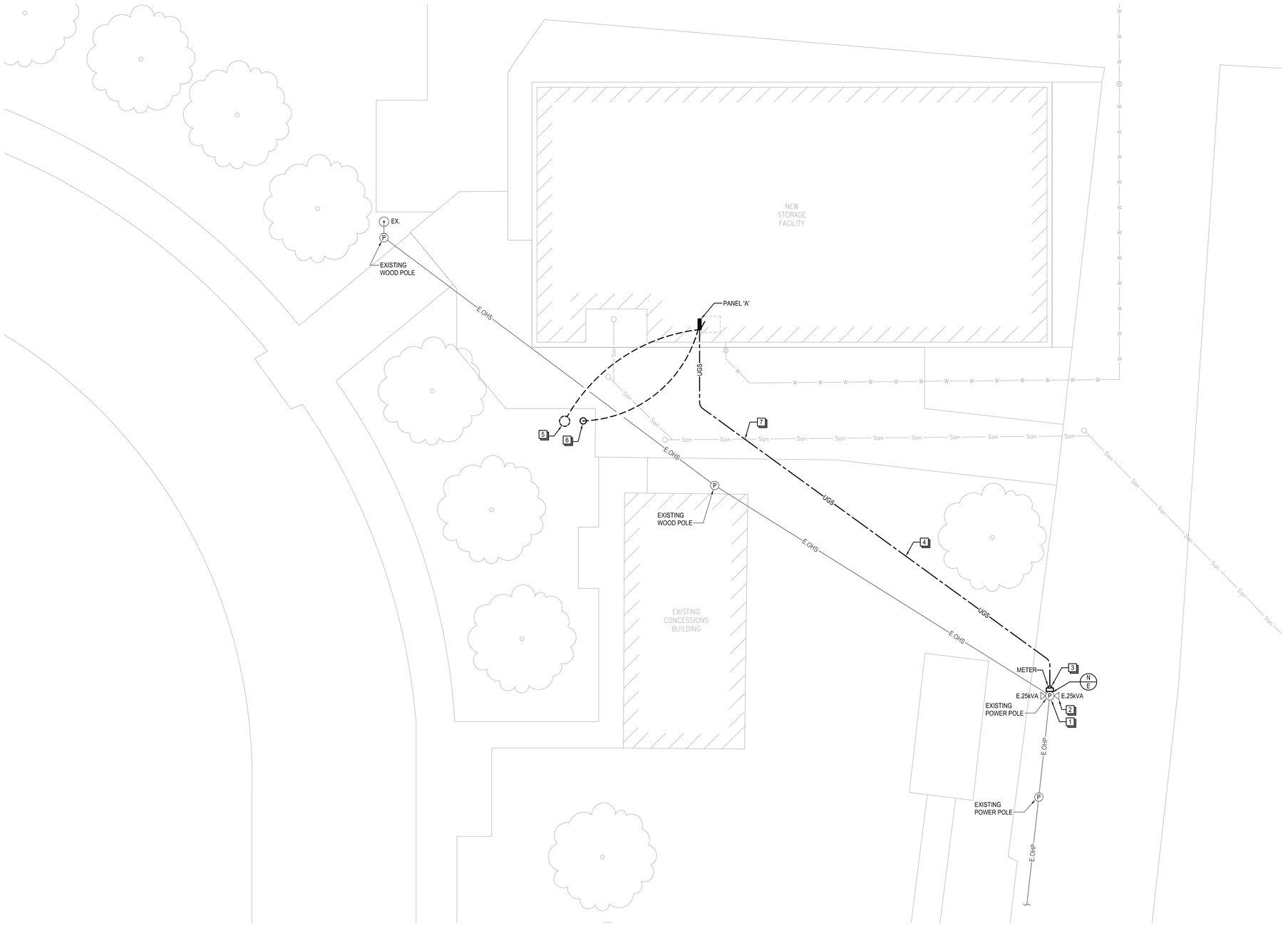
SHEET: E001

GENERAL NOTES:

1. ANY EXISTING CONDITIONS INDICATED ARE BASED ON INFORMATION PROVIDED BY OTHERS AND POSSIBLE LIMITED FIELD VERIFICATION. THE CONTRACTOR SHALL ADJUST FOR ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO THE OWNER.
2. THE CONTRACTOR SHALL VISIT THE PROJECT SITE, REVIEW EXISTING CONDITIONS AGAINST THE PLANS, AND FAMILIARIZE HIMSELF WITH THE WORK PRIOR TO BIDDING AND START OF THE WORK.
3. LIGHT-LINED ITEMS ARE EXISTING TO REMAIN OR FURNISHED AND INSTALLED BY UTILITY COMPANY, WITH REQUIREMENTS AS NOTED. HEAVY-LINED ITEMS INDICATE NEW WORK FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR AS INDICATED.
4. COORDINATE SERVICE ENTRANCE WORK WITH SOUTHERN PUBLIC POWER DISTRICT. CONTACT TODD WILSON, CELL PHONE: (308) 390-8731, FOR UTILITY COMPANY REQUIREMENTS.

KEYNOTES:

1. EXISTING UTILITY-OWNED WOOD POWER POLE.
2. EXISTING UTILITY-OWNED 120/240V, 1ϕ TRANSFORMER BANK ON EXISTING WOOD POWER POLE.
3. UTILITY TO FURNISH AND INSTALL NEW SECONDARY RISER WITH SECONDARY CONDUCTORS FROM EXISTING TRANSFORMER BANK DOWN TO METER SOCKET ON EXISTING WOOD POWER POLE. UTILITY TO FURNISH AND INSTALL NEW 320A METER SOCKET AND METER FOR NEW STORAGE BUILDING ELECTRICAL SERVICE.
4. ELECTRICAL CONTRACTOR TO PROVIDE NEW UNDERGROUND SECONDARY CONDUIT AND CONDUCTORS FROM NEW METER SOCKET TO NEW ELECTRICAL PANEL 'A' IN STORAGE BUILDING. SEE FIRST FLOOR POWER PLAN ON SHEET E111 FOR CONTINUATION. SEE ONE LINE DIAGRAM ON SHEET E801 FOR ADDITIONAL INFORMATION ON SIZING.
5. PROVIDE CONCRETE ENCASED GROUNDING ELECTRODE. SEE DETAIL 2/E801. CONNECT TO GROUND BAR IN NEW PANEL 'A,' SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION. UFER GROUND SHALL BE INSTALLED IN UNDISTURBED SOIL AT LEAST 10'-0" AWAY FROM BUILDING. COORDINATE EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN. SHOWN HERE FOR PLAN CLARITY ONLY.
6. PROVIDE 3/4" x 20'-0" COPPER-CLAD GROUND ROD AND GROUND ACCESS WELL PER DETAIL 3/E801. GROUND ROD SHALL BE DRIVEN INTO UNDISTURBED SOIL AT LEAST 10'-0" AWAY FROM BUILDING. COORDINATE EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN. SHOWN HERE FOR PLAN CLARITY ONLY.
7. COORDINATE UNDERGROUND UTILITY LINE DEPTHS AND PATHS WITH OTHER TRADES IN FIELD AND MAKE PROVISIONS AS REQUIRED.



1 E101 ELECTRICAL SITE PLAN
SCALE: 1" = 10'-0"
NORTH

DRAWN:	DESIGNED:	CHECKED:	PROJ. MNGR:
CRM	CRM	PDS	SKK

NO.	DESCRIPTION	DATE	BY
0	BID SET	03-06-2020	KPE

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ELECTRICAL SITE PLAN

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OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020
JOB NUMBER: 535-002
SHEET: E101

GENERAL ELECTRICAL NOTES:

1. ANY EXISTING CONDITIONS INDICATED ARE BASED ON INFORMATION PROVIDED BY OTHERS AND POSSIBLE LIMITED FIELD VERIFICATION. THE CONTRACTOR SHALL ADJUST FOR ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO THE OWNER.
2. THE CONTRACTOR SHALL VISIT THE PROJECT SITE, REVIEW EXISTING CONDITIONS AGAINST THE PLANS, AND FAMILIARIZE HIMSELF WITH THE WORK PRIOR TO BIDDING AND START OF THE WORK.
3. ALL CEILING AND WALL MOUNTED OCCUPANCY SENSORS SHOWN ON LIGHTING PLAN SHALL BE DUAL-TECHNOLOGY TYPE.

KEYNOTES

1 CONNECT TO EXHAUST FAN SERVING THIS ROOM. EXHAUST FAN SHALL TURN ON AND OPERATE, VIA CEILING OCCUPANCY SENSOR AND MANUAL SINGLE-POLE SWITCH, WHEN EITHER REST ROOM IS OCCUPIED. PROVIDE RELAYS AS REQUIRED FOR A COMPLETE AND OPERABLE INSTALLATION. SEE MEZZANINE POWER PLAN ON THIS SHEET FOR LOCATION OF EXHAUST FAN.

2 MOUNT LIGHT FIXTURES TO UNDERSIDE OF MEZZANINE FLOOR STRUCTURE. TYPICAL OF SIX.

3 PROVIDE LIGHTING CONTROL SWITCHBANK. LOWERCASE LETTERS ADJACENT TO LUMINAIRES ON PLAN CORRESPOND TO THE ASSOCIATED SWITCH IN THE SWITCHBANK. CONFIRM SWITCHBANK WILL FIT WITH THIS DESIGNATED AREA AND STACK MULTIPLE SWITCHBANKS AT THIS LOCATION IF A SINGLE SWITCHBANK WILL NOT FIT WITHIN ALLOTTED AREA.

4 CONNECT LIGHTING CIRCUIT VIA SWITCH(ES) LOCATED IN LIGHTING CONTROL SWITCHBANK. LOWERCASE LETTERS ADJACENT TO LUMINAIRES INDICATE CORRESPONDING CONTROL SWITCH.

5 PROVIDE PHOTOCELL ON NORTH SIDE OF BUILDING, MOUNTED AS HIGH AS POSSIBLE AND POINTED NORTH. PROVIDE INSTALLATION AND CONNECTION TO THE EXTERIOR LIGHTING CIRCUIT.

6 ROUTE EXTERIOR LIGHTING CIRCUIT THROUGH PHOTOCELL FOR AUTOMATIC CONTROL.

7 SUSPEND LOW-BAY STYLE LUMINAIRE APPROXIMATELY +16'-0" A.F.F. IN STORAGE GARAGE AREA.

8 CONNECT THREE-WAY SWITCH-LEG CONDUCTORS TO LIGHT FIXTURES SERVING MEZZANINE LEVEL. SEE MEZZANINE LIGHTING PLAN ON THIS SHEET FOR CONTINUATION.

9 INSTALL LUMINAIRES SERVING MEZZANINE LEVEL TIGHT TO STRUCTURE ABOVE. MOUNT TO UNDERSIDE OF ROOF ASSEMBLY OR SUSPEND APPROXIMATELY 6" BELOW STRUCTURAL ROOF FRAMING.

10 CONNECT TO THREE-WAY LIGHT SWITCH AT BOTTOM OF MEZZANINE STAIRWELL. SEE FIRST FLOOR LIGHTING PLAN ON THIS SHEET FOR CONTINUATION.

11 PROVIDE FINAL CONNECTION TO AUTOMATIC DOOR OPERATOR AND INTERLOCK WITH ALL ASSOCIATED PUSHBUTTONS AND MOTION SENSING APPURTENANCES. COORDINATE ALL REQUIREMENTS WITH EQUIPMENT MANUFACTURER PRIOR TO ROUGH-IN.

12 DISCONNECT SWITCH IS PROVIDED BY EQUIPMENT MANUFACTURER INTEGRAL WITH EQUIPMENT. THE ELECTRICAL CONTRACTOR SHALL PROVIDE CIRCUIT AND FINAL CONNECTION TO DISCONNECT SWITCH AS INDICATED. COORDINATE ALL REQUIREMENTS WITH EQUIPMENT MANUFACTURER PRIOR TO ROUGH-IN.

13 PROVIDE NEMA 6-50R RECEPTACLE FOR CONNECTION OF GARAGE WELDING MACHINE. WELDING MACHINE TO BE FURNISHED BY OWNER. VERIFY EXACT NEMA CONFIGURATION REQUIRED IN FIELD AND MAKE PROVISIONS FOR A COMPLETE AND OPERABLE INSTALLATION.

14 PROVIDE FINAL CONNECTION TO GARAGE AIR COMPRESSOR. AIR COMPRESSOR TO BE FURNISHED BY OWNER. COORDINATE ALL REQUIREMENTS AND EXACT LOCATION WITH EQUIPMENT MANUFACTURER AND OWNER PRIOR TO ROUGH-IN.

15 CONNECT TO SWITCHED LIGHTING CIRCUIT SERVING RESTROOMS BELOW. EXHAUST FAN SHALL TURN ON AND OPERATE WHEN EITHER REST ROOM IS OCCUPIED. PROVIDE RELAYS, AS REQUIRED, FOR A COMPLETE AND OPERABLE INSTALLATION. SEE FIRST FLOOR LIGHTING PLAN ON THIS SHEET FOR CONTINUATION TO SWITCHED LIGHTING CIRCUIT.

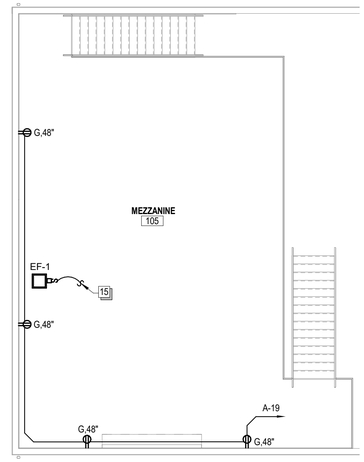
16 PROVIDE EMERGENCY EGRESS LIGHT ABOVE EXTERIOR EGRESS DOOR AND INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. CONNECT FIXTURE WITH UNSWITCHED HOT CONDUCTOR. LIGHT FIXTURE SHALL NORMALLY BE OFF AND TURN ON UPON LOSS OF BUILDING POWER.

17 PROVIDE UNDERGROUND SECONDARY CONDUIT AND CONDUCTORS. SEE ELECTRICAL SITE PLAN ON SHEET E101 AND ONE LINE DIAGRAM ON SHEET E801 FOR ADDITIONAL INFORMATION.

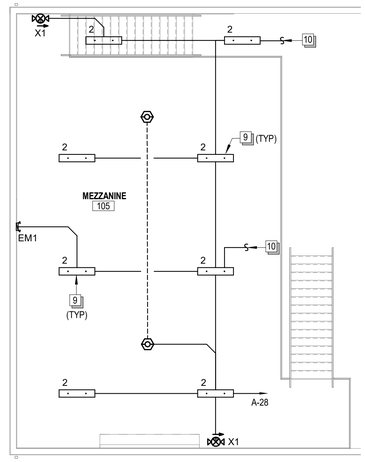
18 PROVIDE SINGLE-POLE MOTOR RATED SWITCH FOR OCCUPANT MANUAL ON/OFF CONTROL OF ROOF EXHAUST FAN 'EF-2'.

19 PROVIDE RELAY AND FINAL CONNECTION TO MOTORIZED DAMPER. CONNECT MOTORIZED DAMPER TO NEAREST CONTINUOUS 120 VOLT CONVENIENCE RECEPTACLE CIRCUIT VIA RELAY AND INTERLOCK RELAY WITH ROOF EXHAUST FAN 'EF-2'. PROVIDE LOW VOLTAGE TRANSFORMER FOR MOTORIZED DAMPER POWER, IF REQUIRED. COORDINATE ALL REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

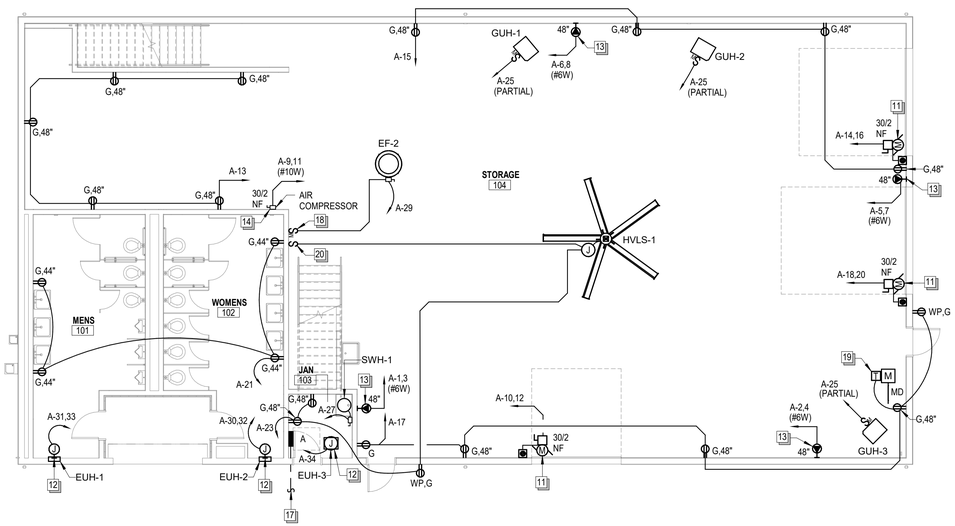
20 HIGH VOLUME LOW-SPEED (HVLS) CONTROLLER SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR. FAN AND CONTROLLER SHALL BE INSTALLED AND INTERCONNECTED WITH MANUFACTURER PROVIDED CAT-5E CABLE. COORDINATE REQUIREMENTS WITH MANUFACTURER INSTALLATION INSTRUCTIONS FOR ADDITIONAL INFORMATION. COORDINATE FINAL CONTROLLER LOCATION WITH OWNER PRIOR TO ROUGH-IN.



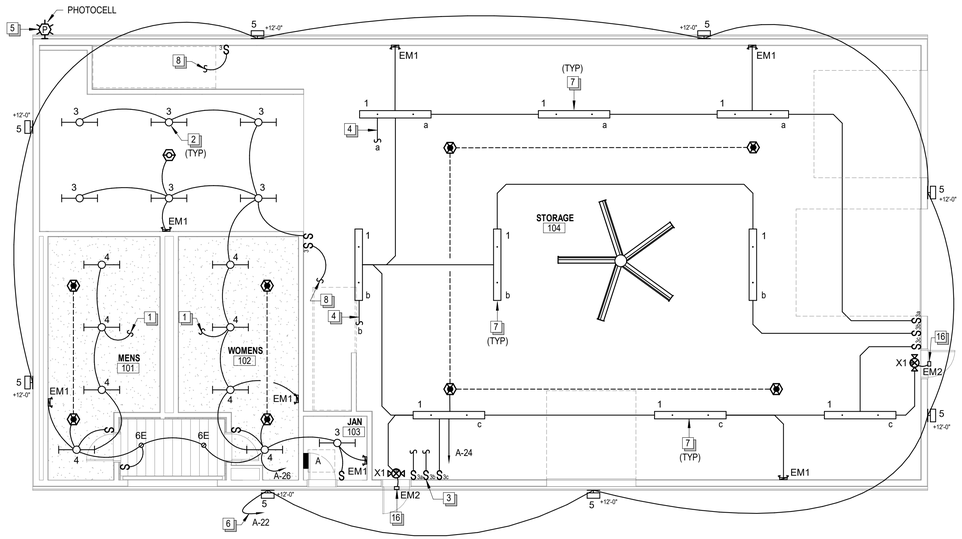
3 E111 MEZZANINE POWER PLAN
1/8" = 1'-0"
NORTH



4 E111 MEZZANINE LIGHTING PLAN
1/8" = 1'-0"
NORTH



1 E111 FIRST FLOOR POWER PLAN
1/8" = 1'-0"
NORTH



2 E111 FIRST FLOOR LIGHTING PLAN
1/8" = 1'-0"
NORTH

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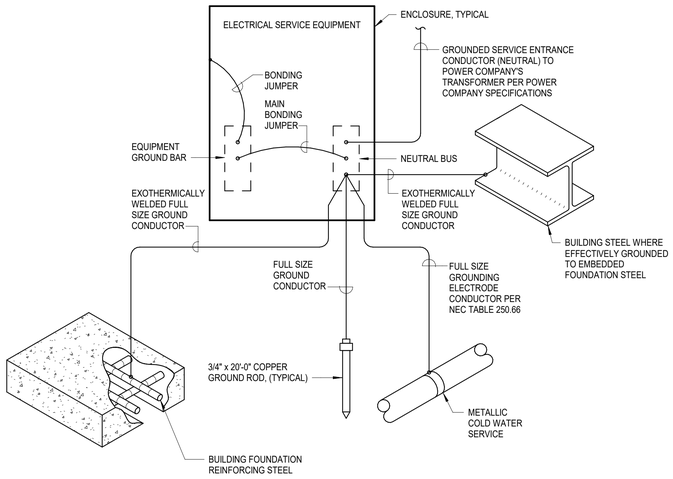
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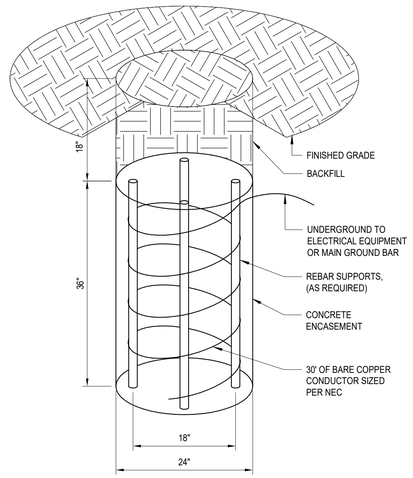
JOB NUMBER: 535-002

SHEET: E111

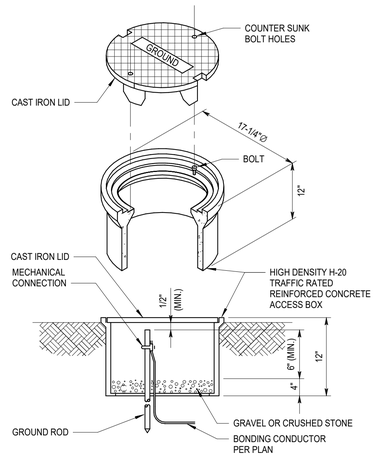


NOTE:
1.) WHEN AVAILABLE, CONTRACTOR SHALL PROVIDE ALL GROUNDING MEANS INDICATED WITH AT LEAST TWO MINIMUM MEANS SHOWN. CONTRACTOR SHALL REFER TO ELECTRICAL ONE LINE DIAGRAM FOR GROUNDING ELECTRODE CONDUCTOR SIZE. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

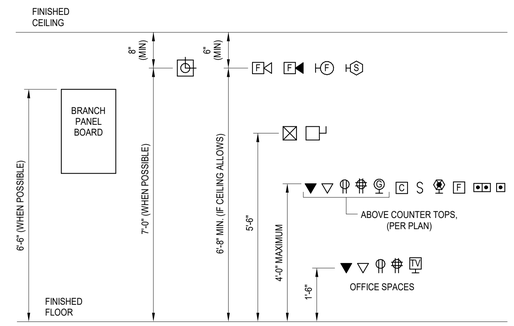
1 E801 GROUNDING DETAIL
NOT TO SCALE



2 E801 CONCRETE ENCASED GROUNDING ELECTRODE DETAIL
NOT TO SCALE



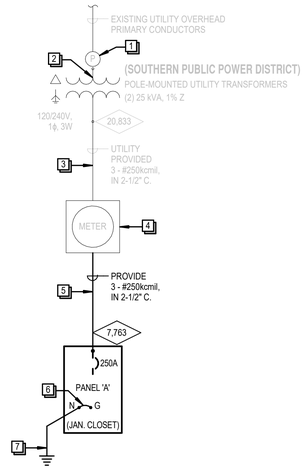
3 E801 GROUND ROD INSTALLATION DETAIL
NOT TO SCALE



NOTES:

1. ELECTRICAL CONTRACTOR SHALL COORDINATE ALL DEVICE MOUNTING HEIGHTS AND EXACT LOCATIONS WITH ARCHITECTURAL INTERIOR ELEVATIONS. REPORT CONFLICTS TO ARCHITECT/ENGINEER **PRIOR TO ROUGH-IN**.
2. ALL SWITCHES TO BE MOUNTED AS CLOSE TO DOORJAMB AS POSSIBLE. COORDINATE ALL SWITCH LOCATIONS WITH ARCHITECTURAL PLANS AND DETAILS.
3. GENERAL MOUNTING HEIGHTS ARE AS INDICATED, UNLESS NOTED OTHERWISE ON PLANS.
4. MOUNTING HEIGHTS INDICATED ARE ABOVE FINISHED FLOOR TO HORIZONTAL CENTERLINE OF DEVICE, UNLESS NOTED OTHERWISE.

4 E801 TYPICAL DEVICE MOUNTING DETAIL
NOT TO SCALE



GENERAL ELECTRICAL NOTES:

1. ANY EXISTING CONDITIONS INDICATED ARE BASED ON INFORMATION PROVIDED BY OTHERS AND POSSIBLE LIMITED FIELD VERIFICATION. THE CONTRACTOR SHALL ADJUST FOR ACTUAL FIELD CONDITIONS AT NO ADDITIONAL EXPENSE TO THE OWNER.
2. THE CONTRACTOR SHALL VISIT THE PROJECT SITE, REVIEW EXISTING CONDITIONS AGAINST THE PLANS, AND FAMILIARIZE HIMSELF WITH THE WORK PRIOR TO BIDDING AND START OF THE WORK.
3. LIGHT-LINED ITEMS ARE EXISTING TO REMAIN OR FURNISHED AND INSTALLED BY UTILITY COMPANY, WITH REQUIREMENTS AS NOTED. HEAVY-LINED ITEMS INDICATE NEW WORK FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR AS INDICATED.
4. COORDINATE SERVICE ENTRANCE WORK WITH SOUTHERN PUBLIC POWER DISTRICT. CONTACT TODD WILSON, CELL PHONE: (308) 390-8731, FOR UTILITY COMPANY REQUIREMENTS.
5. DIAMOND TAGS INDICATE CALCULATED AVAILABLE FAULT-CURRENT IN AMPS (A.I.C.). ALL DISTRIBUTION EQUIPMENT SHALL EXCEED THESE MINIMUMS. CONTACT ENGINEER WITH CONFLICT OR LACK OF CLARITY FOR RESOLUTION PRIOR TO PROCUREMENT OR INSTALLATION.

ONE LINE DIAGRAM KEYNOTES:

1. EXISTING UTILITY-OWNED WOOD POWER POLE.
2. EXISTING UTILITY-OWNED 120/240V, 1ϕ TRANSFORMER BANK ON EXISTING WOOD POWER POLE.
3. UTILITY TO FURNISH AND INSTALL NEW SECONDARY RISER WITH SECONDARY CONDUCTORS FROM NEW TRANSFORMER BANK DOWN TO METER SOCKET ON EXISTING WOOD POWER POLE.
4. UTILITY TO FURNISH AND INSTALL NEW 320A METER SOCKET AND METER ON EXISTING WOOD POWER POLE FOR NEW STORAGE BUILDING ELECTRICAL SERVICE.
5. ELECTRICAL CONTRACTOR TO PROVIDE NEW UNDERGROUND SECONDARY CONDUIT AND CONDUCTORS FROM NEW METER SOCKET TO NEW ELECTRICAL PANEL 'A' IN STORAGE BUILDING. SEE ELECTRICAL SITE PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.
6. ELECTRICAL CONTRACTOR TO PROVIDE NEW MAIN BONDING JUMPER SIZED PER NEC TABLE 250.66.
7. ELECTRICAL CONTRACTOR TO PROVIDE CONNECTION TO ALL AVAILABLE GROUNDING ELECTRODES PER NEC 250.29. SEE DETAIL 1/E801 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

5 E801 ONE LINE DIAGRAM
NOT TO SCALE

DRAWN: CRM | DESIGNED: CRM | CHECKED: PDS | PROJ. MNGR: SKK

NO.	DESCRIPTION	BY
0	BID SET	KPE
DATE: 03-06-2020		

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PROFESSIONAL ELECTRICAL & COMPUTER ENGINEER
PATRICK D. STRAATMANN E-13979
STATE OF NEBRASKA

STADIUM STORAGE FACILITY

DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE 68832

ELECTRICAL DETAILS

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OMAHA, NE 68102
PHONE: (402) 291-1444
TOLL FREE: (888) 484-4939
www.kpe-inc.com
OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020

JOB NUMBER: 535-002

SHEET: E801

LIGHTING FIXTURE SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	LAMP	WATTAGE	VOLTAGE	MOUNTING	DESCRIPTION	QUANTITY	REMARKS
1	LITHONIA	TMSL-16000LM-L/LV-MVOLT-GZ10-40K-80CRI-WH-HC36	LED	149 VA	120V	CEILING/SUSPENDED	8' LINEAR LOW-BAY	9	PROVIDE WITH MANUFACTURER ACCESSORY HANGER CHAIN.
2	LITHONIA	MSL-4000LM-L/LV-MVOLT-GZ10-40K-80CRI-WH-HC36	LED	29 VA	120V	CEILING/SUSPENDED	4' LINEAR LOW-BAY	8	PROVIDE WITH MANUFACTURER ACCESSORY HANGER CHAIN.
3	LITHONIA	CLX-L48-4000LM-SEF-RDL-WD-MVOLT-GZ10-40K-80CRI-WH	LED	28 VA	120V	CEILING/SURFACE	4' LENSED WRAPAROUND	7	
4	LITHONIA	STL4-48L-EZ1-LP840	LED	46 VA	120V	CEILING/SURFACE	4' LENSED WRAPAROUND	8	
5	LITHONIA	TWR1-LED-P2-40K-MVOLT-DDBTXD	LED	30 VA	120V	WALL/SURFACE	EXTERIOR WALLPACK	8	
6E	LITHONIA	LDN6-40/15-LO6-AR-LS-MVOLT-GZ10-EL	LED	18 VA	120V	CEILING/RECESSED	6" DOWNLIGHT W/EM	2	PROVIDE UNSWITCHED HOT CONDUCTOR TO FIXTURE BATTERY.
EM1	LITHONIA	ELM2L-UVOLT-SDRT	LED	2 VA	120V	WALL/SURFACE	EMERGENCY LIGHT	8	PROVIDE UNSWITCHED HOT CONDUCTOR TO FIXTURE BATTERY.
EM2	LITHONIA	AFB-OEL-DDBTXD-UVOLT-N-WT-CW	LED	3 VA	120V	WALL/SURFACE	NORMALLY OFF EGRESS LIGHT	2	PROVIDE UNSWITCHED HOT CONDUCTOR TO FIXTURE BATTERY.
X1	LITHONIA	LHQM-LED-R-HO-SD	LED	4 VA	120V	WALL/SURFACE	COMBINATION EXIT/EMERGENCY SIGN	4	PROVIDE DIRECTIONAL CHEVRONS AS INDICATED ON LIGHTING PLANS.

PANEL NAME: A

STATUS: New Construction

LOCATION: JAN 103

MANUFACTURER / TYPE: SQUARE-D, NQ
ENCLOSURE: NEMA 1
MOUNTING: SURFACE
NO. OF POLES: 42
BUS MATERIAL: COPPER

VOLTAGE: 120/240 Single
PHASES: 1
WIRES: 3
SUPPLIED FROM: UTILITY OWNED POWER POLE

A.I.C. RATING: 7,763
MAIN TYPE: MCB
MAIN BUS RATING: 400 A
MCB RATING: 250 A

CKT	CIRCUIT DESCRIPTION	NOTES	CB	POLES	A		B		POLES	CB	NOTES	CIRCUIT DESCRIPTION	CKT
1	GARAGE 50A WELDING RECEPT.	3	50 A	2	3000 VA	0 VA			2	50 A	2,3	GARAGE 50A WELDING RECEPT.	2
3	--	3	--	--			3000 VA	0 VA	--	--	2,3	--	4
5	GARAGE 50A WELDING RECEPT.	3	50 A	2	3000 VA	0 VA			2	50 A	2,3	GARAGE 50A WELDING RECEPT.	6
7	--	3	--	--			3000 VA	0 VA	--	--	2,3	--	8
9	GARAGE AIR COMPRESSOR		30 A	2	1440 VA	832 VA			2	20 A		MOTORIZED O.H. GARAGE DOOR	10
11	--		--	--			1440 VA	832 VA	--	--		--	12
13	PERIMETER STOR. GARAGE REC		20 A	1	900 VA	832 VA			2	20 A		MOTORIZED O.H. GARAGE DOOR	14
15	PERIMETER STOR. GARAGE REC		20 A	1			720 VA	832 VA	--	--		--	16
17	PERIMETER STOR. GARAGE REC		20 A	1	900 VA	832 VA			2	20 A		MOTORIZED O.H. GARAGE DOOR	18
19	MEZZANINE RECEPTS		20 A	1			720 VA	832 VA	--	--		--	20
21	RESTROOM RECEPTS		20 A	1	720 VA	240 VA			1	20 A	1	EXTERIOR LIGHTING	22
23	JANITOR CLOSET REC/HVLS-1 FAN		20 A	1			1140 VA	1375 VA	1	20 A		STORAGE GARAGE HIGHBAY LTG	24
25	GAS UNIT HEATERS - GUH-1,2,3		15 A	1	684 VA	1304 VA			1	20 A		STORAGE/REST RM LTG/EF-1	26
27	WATER HEATER - SWH-1		30 A	1			2500 VA	256 VA	1	20 A		MEZZANINE LIGHTING	28
29	ROOF EXHAUST FAN - EF-2		20 A	1	1176 VA	1000 VA			2	20 A		ELECTRIC WALL HEATER - EUH-2	30
31	ELECTRIC WALL HEATER - EUH-1		20 A	2			1000 VA	1000 VA	--	--		--	32
33	--		--	--	1000 VA	1500 VA			1	20 A		ELECTRIC UNIT HEATER - EUH-3	34
35	SPARE		20 A	1			1000 VA	1000 VA	1	20 A		SPARE	36
37	SPARE		20 A	1	1000 VA	1000 VA			1	20 A		SPARE	38
39	PREPARED SPACE		--	--			0 VA	0 VA	--	--		PREPARED SPACE	40
41	PREPARED SPACE		--	--	0 VA	0 VA			--	--		PREPARED SPACE	42
			TOTAL LOAD:		21360 VA		20648 VA						
			TOTAL AMPS:		178 A		172 A						

LOAD CLASSIFICATION:	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
Equipment	12000 VA	100.00%	12000 VA		
Heating	6184 VA	125.00%	7730 VA	**TOTAL CONN. LOAD:**	42008 VA
Lighting	2480 VA	125.00%	3100 VA	**TOTAL EST. DEMAND:**	44894 VA
Motor	10344 VA	106.96%	11064 VA	**TOTAL CONN. SPARE CAPACITY:**	17 A
Other	2500 VA	100.00%	2500 VA	**TOTAL CONN. CURRENT:**	175 A
Receptacle	4500 VA	100.00%	4500 VA	**TOTAL EST. DEMAND CURRENT:**	187 A
Spare	4000 VA	100.00%	4000 VA	**NON-COINCIDENTAL HVAC:**	0 A
				TOTAL EST. DEMAND (-) NC:	187 A

PANEL SCHEDULE NOTES:
1.) ROUTE LIGHTING CIRCUIT THROUGH PHOTOCELL FOR AUTOMATIC CONTROL.
2.) LOAD IS CALCULATED AS NON-COINCIDENTAL TO OTHER WELDING RECEPTACLES IN GARAGE.
3.) PROVIDE GFCI STYLE CIRCUIT BREAKER.

MECHANICAL EQUIPMENT CONNECTION SCHEDULE

MARK	GENERAL ELECTRICAL DATA									DISCONNECT				STARTER				CONTROL (NOTE 4)												NOTES
	APPROX HP (KW)	ELEC HEAT KW	FULL LOAD AMP (FLA)	MIN CIR AMPACITY (MCA)	MAX OCPD SIZE (MOCP)	NAMEPLATE VOLTAGE	PHASE	FEEDER (SEE CONDUCTOR & CONDUIT SCHEDULE)	AVAILABLE AIC (NOTE 1)	SIZE	NEMA ENCLOSURE TYPE	RESPONSIBILITY	LOCATION	SWITCH TYPE (NOTE 2)	SIZE	NEMA ENCLOSURE TYPE	RESPONSIBILITY	LOCATION	STARTER TYPE (NOTE 3)	H-O-A	TOGGLE SWITCH	OCCUPANCY SENSOR	SWITCHED LTG CIRCUIT	AUXILIARY CONTACT	TIMECLOCK	BAS	TIME DELAY SWITCH	DUCT SMOKE DETECTOR	CO2/TEMP SENSOR	THERMOSTAT	CONTROL WIRING BY	
GUH-1	FRAC	--	1.9	2.4	15	120	1	A20	<5k	15A	1	X	U	TS	--	1	X	U	INT										M	M	
GUH-2	FRAC	--	1.9	2.4	15	120	1	A20	<5k	15A	1	X	U	TS	--	1	X	U	INT										M	M	
GUH-3	FRAC	--	1.9	2.4	15	120	1	A20	<5k	15A	1	X	U	TS	--	1	X	U	INT										M	M	
EUH-1	--	2	8.3	10.4	20	240	1	A20	<5k	20A	1	X	U	TS	--	1	X	U	INT										M	M	
EUH-2	--	2	8.3	10.4	20	240	1	A20	<5k	20A	1	X	U	TS	--	1	X	U	INT										M	M	
EUH-3	--	1.5	12.5	15.6	20	120	1	A20	<5k	20A	1	X	U	TS	--	1	X	U	INT										M	M	
SWH-1	--	2.5	20.8	26.0	30	120	1	A30	<5k	30/1	1	E	U	NF	--	1	X	U	INT										X	M	
EF-1	1/4	--	5.8	7.3	15	120	1	A20	<5k	15A	1	E	U	PF	--	1	X	U	INT			E	E							E	
EF-2	1/2	--	9.8	12.3	20	120	1	A20	<5k	30/1	3R	E	U	NF	--	3R	X	U	INT	E										E	
HVLS-1	--	--	5	6.3	20	120	1	A20	<5k	20A	1	M	R	TS	--	1	X	U	INT	M										E	

GENERAL NOTES:
A. RESPONSIBILITY PROVISIONS: E = BY ELECTRICAL; M = BY MECHANICAL; X = BY MANUFACTURER.
B. LOCATION DESIGNATIONS: U = INTEGRAL OR NEAR UNIT; R = REMOTE LOCATION, SEE ADDITIONAL NOTES.
C. ELECTRICAL CONTRACTOR TO PROVIDE ELECTRICAL CONNECTIONS FOR ALL 120V CONTROL DEVICES. MECHANICAL CONTRACTOR TO FURNISH AND COORDINATE ALL CONNECTIONS OF DEVICES.

SCHEDULE NOTES:
1.) MANUFACTURER TO PROVIDE EQUIPMENT WITH A LISTED AND LABELED SHORT CIRCUIT CURRENT (KAIC) RATING GREATER THAN THE AVAILABLE FAULT CURRENT SHOWN PER NEC 440.4(B).
2.) DISCONNECT SWITCH TYPE CODE DESIGNATORS: F = FUSED; NF = NONFUSED; PF = PLUG FUSE BOX COVER UNIT; CP = CORD AND PLUG; CB = CIRCUIT BREAKER; TS = MOTOR-RATED TOGGLE SWITCH.
3.) STARTER TYPE CODE DESIGNATORS: M = MANUAL; INT = INTEGRAL; VFD = VARIABLE FREQUENCY DRIVE; FVNR = FULL VOLTAGE NON-REVERSING; FVR = FULL VOLTAGE REVERSING; SSR = SOFT START REVERSING; SSNR = SOFT START NON-REVERSING.
4.) MECHANICAL AND ELECTRICAL CONTRACTORS SHALL COORDINATE EQUIPMENT CONNECTION AND CONTROL REQUIREMENTS.

DRAWN: CRM | DESIGNED: CRM | CHECKED: PDS | PROJ. MNGR: SKK

NO.	DESCRIPTION	BY	DATE
	BID SET	KPE	
0			03-06-2020

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PROFESSIONAL ELECTRICAL & COMPUTER ENGINEER
PATRICK D. STRAATMANN E-13979
STATE OF NEBRASKA
3-6-2020

STADIUM STORAGE FACILITY
DONIPHAN-TRUMBULL PUBLIC SCHOOLS
302 WEST PLUM, P.O. BOX 300, DONIPHAN, NE 68832

ELECTRICAL SCHEDULES

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www.kpe-inc.com
OMAHA - DES MOINES - BISMARCK

DATE: 03-06-2020
JOB NUMBER: 535-002
SHEET: E901

Project Manual

DONIPHAN-TRUMBULL PUBLIC SCHOOLS

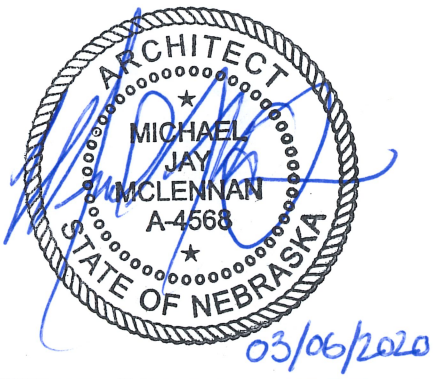
Stadium Storage Facility

KPE Project No. 535-002
Combined Contract

March 6, 2020

KPE
ARCHITECTURE ENGINEERING
FORENSICS

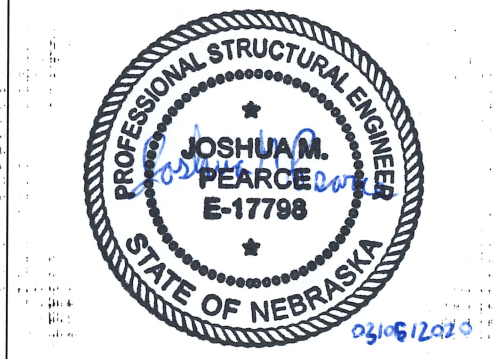
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402-291-1444 office ▪ kpe-inc.com



I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly Registered Architect under the laws of the State of Nebraska.

03/06/2020

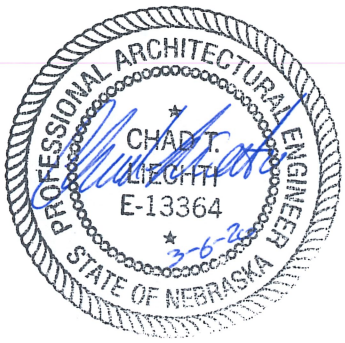
Michael J. McLennan — Date
Registration No.: A-4568
Renewal Date: December 31, 2020
Specification Sections: Divisions 01-13 (except where indicated as prepared by other design professionals of record)



I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly Registered Professional Engineer under the laws of the State of Nebraska.

Joshua M Pearce 03/06/2020

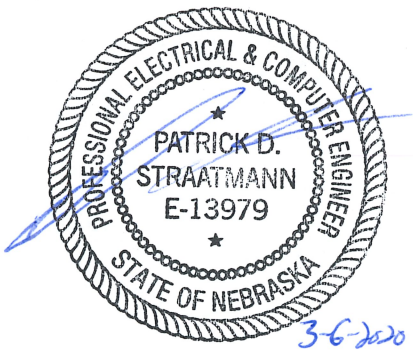
Joshua M. Pearce — Date
Registration No.: E-17798
Renewal Date: December 31, 2020
Specification Sections: Divisions 3, 5



I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly Registered Professional Engineer under the laws of the State of Nebraska.

3-6-20

Chad T. Liechti — Date
Registration No.: E-13364
Renewal Date: December 31, 2020
Specification Sections: Divisions 22, 23



I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly Registered Professional Engineer under the laws of the State of Nebraska.

3-6-2020

Patrick D. Straatmann — Date
Registration No.: E-13979
Renewal Date: December 31, 2020
Specification Sections: Division 26

Title Page
000107 Certification Seals
000110 Table of Contents
000115 List of Drawing Sheets

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS
001113 Advertisement for Bid
002113 Instructions to Bidders
004000 Substitution Request Form
004100 Bid Form
007000 General Conditions
008000 Supplemental Conditions

DIVISION 01 – GENERAL REQUIREMENTS
011000 Summary
012600 Contract Modification Procedures
012900 Payment Procedures
013100 Project Management and Coordination
013300 Submittal Procedures
014000 Quality Requirements
015000 Temporary Facilities and Controls
016000 Product Requirements
017000 Execution Requirements
017700 Closeout Procedures
017823 Operation and Maintenance Data
017839 Project Record Documents

DIVISION 03 – CONCRETE
033000 Cast-In-Place Concrete

DIVISION 5 – METALS
054000 Cold-Formed Metal Framing
055213 Pipe and Tube Railings

DIVISION 6 – WOOD, PLASTICS, AND COMPOSITES
061053 Miscellaneous Rough Carpentry
061600 Sheathing

DIVISION 7 - THERMAL AND MOISTURE PROTECTION
072100 Thermal Insulation
072500 Weather Barriers
079200 Joint Sealants

DIVISION 08 – OPENINGS
081113 Hollow Metal Doors and Frames
083113 Access Doors and Frames
083323 Overhead Coiling Doors
083613 Sectional Doors
084113 Aluminum-Framed Storefront

087100 Door Hardware
088000 Glazing

DIVISION 09 – FINISHES
092216 Non-Structural Metal Framing
092900 Gypsum Board
096513 Resilient Base and Accessories
097720 Fiberglass Reinforcement Laminated Panels
099123 Interior Painting

DIVISION 10 - SPECIALTIES
102113.119 Plastic Toilet Compartments
102800 Toilet Accessories
104413 Fire Protection Specialties

DIVISION 13 – SPECIAL CONSTRUCTION
133419 Metal Building Systems

DIVISION 22 – PLUMBING
220529 Hangers and Supports for Plumbing Piping and Equipment
220553 Identification for Plumbing Piping and Equipment
220719 Plumbing Piping Insulation
221116 Domestic Water Piping
221119 Domestic Water Piping Specialties
221316 Sanitary Waste and Vent Piping
221319 Sanitary Waste Piping Specialties
223300 Electric, Domestic Water Heaters
224213.13 Commercial Water Closets
224216.13 Commercial Lavatories
224216.16 Commercial Sinks
224713 Drinking Fountains

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING
231123 Facility Natural-Gas Piping
233113 Metal ducts
233300 Air duct accessories
233423 HVAC Power Ventilators
233713.23 Registers and Grilles
233723 HVAC Gravity Ventilators
235533.16 Gas Fired unit Heaters
238239.19 Wall and Ceiling Unit Heaters
239119 Fixed Louvers

DIVISION 26 – ELECTRICAL
260519 Low-Voltage Electrical Power Conductors and Cables
260523 Control-Voltage Electrical Power Cables
260526 Grounding and Bonding for Electrical Systems
260529 Hangers and Supports for Electrical Systems
260533 Raceways and Boxes for Electrical Systems
260543 Underground Ducts and Raceways for Electrical Systems
260553 Identification for Electrical Systems

260923 Lighting Control Devices
262416 Panelboards
262726 Wiring Devices
262816 Enclosed Switches and Circuit Breakers
265119 LED Interior Lighting
265619 LED Exterior Lighting

END OF SECTION 000110

DIVISION 00 – BIDDING AND CONSTRUCTION

SECTION 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled STADIUM STORAGE FACILITY, dated 03/06/2020, as modified by subsequent Addenda and Contract modifications.

B. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

C. Drawings identified for reference only.

GENERAL DRAWINGS

G000	COVER SHEET
G001	ABBREVIATIONS, GENERAL NOTES, TYP. WALL TYPES & DETAILS
G002	GENERAL NOTES
G101	CODE REVIEW PLAN

CIVIL DRAWINGS

C001	GENERAL NOTES
C002	EXISTING SITE PLAN & REMOVALS
C003	GEOMETRICS PLAN
C004	GRADING PLAN
C005	UTILITY PLAN
C006	SEPTIC SYSTEM PLAN
C007	EROSION CONTROL PLAN
C008	TYPICAL DETAILS (1 OF 2)
C009	TYPICAL DETAILS (2 OF 2)

ARCHITECTURAL DRAWINGS

A111	FLOOR PLAN – FIRST / MEZZANINE LEVEL
A131	REFLECTED CEILING PLAN & ROOF PLAN
A201	EXTERIOR BUILDING ELEVATIONS
A301	BUILDING AND WALL SECTIONS
A401	ENLARGED STAIR PLANS
A601	ROOM FINISH & DOOR SCHEDULES, FRAME ELEVATIONS & DETAILS

STRUCTURAL DRAWINGS

S001	GENERAL STRUCTURAL NOTES
S002	GENERAL STRUCTURAL DETAILS
S101	FOUNDATION PLAN
S201	MEZZANINE FRAMING PLAN

S401 FOUNDATION DETAILS

MECHANICAL DRAWINGS

MP001 GENERAL MECHANICAL NOTES AND SYMBOL LEGEND

M301 MECHANICAL PLAN

M901 MECHANICAL SCHEDULES

PLUMBING DRAWINGS

P301 PLUMBING PLANS

P901 PLUMBING FIXTURE DESCRIPTIONS

ELECTRICAL DRAWINGS

E001 GENERAL ELECTRICAL NOTES & SYMBOL LEGEND

E101 ELECTRICAL SITE PLAN

EL111 ELECTRICAL PLANS

E801 ELECTRICAL DETAILS

E901 ELECTRICAL SCHEDULES

END OF DOCUMENT 000115

SECTION 001113 – ADVERTISEMENT FOR BID

Sealed bids will be received for the Construction of a Stadium Storage Facility for Doniphan-Trumbull Public Schools, at 302 West Plum Street, P.O. Box 300, Doniphan, Nebraska, 68832, until Tuesday April 07, 2020 at 2:00 PM local time, at which time they will be publicly opened and read aloud. All bids received after the scheduled time will be returned to the bidder unopened.

All work and materials are to be in strict compliance with the bidding documents prepared by KPE Architecture Engineering Forensics, 1016 Leavenworth Street, Omaha, Nebraska 68102.

Bidding Documents are available in digital format (PDF) and for viewing at the following locations:

OFFICE OF THE ARCHITECT: KPE Architecture-Engineering-Forensics, 1016 Leavenworth Street, Omaha, Nebraska 68102. Telephone: (402) 291-1444, Email: mmclennan@kpe-inc.com

'I' SqFt: Telephone (800) 364-2059, ext#8283 Email: projectinquiries@isqft.com CONTACT: Adam – Andrew.bohardt@constructconnect.com

A&D TECHNICAL SUPPLY: 4320 So. 89th Street, Omaha, NE 68127, Telephone (800) 228-2753, Email: raechel@adtechsupply.com CONTACT: Rachel

COLUMBUS CHAMBER OF COMMERCE: P.O. Box 515 753 33rd Avenue Columbus, Nebraska 68601, Telephone: (402) 564-2769, Fax: (402) 564-2026, Email: chamber@megavision.com

Dodge Data & Analytics: 800-393-6343, Email: support@construction.com

FREMONT CHAMBER OF COMMERCE: 128 E. 6th St., Fremont, Nebraska 68026-0182, Telephone: (402) 721-2641, FAX: (402) 721-9359, Email: laura@fremontne.org

GRAND ISLAND AREA CHAMBER OF COMMERCE: 309 West 2nd Street, Grand Island, Nebraska 68801- 5933, Telephone: (308) 382-9210; FAX: (308) 382-1154, Email: info@gichamber.com

HASTINGS BUILDERS BUREAU: 301 S. Burlington Ave., Hastings, NE 68902, Telephone: (402) 462-4159; FAX: Telephone: (402) 461-4400, Email: nrundle@hastingschamber.com

KEARNEY AREA CHAMBER OF COMMERCE: 1007 2nd Avenue P.O. Box 607, Kearney, Nebraska 68847-7305, Telephone: (308)237-3102; FAX: (308) 237-3103, Email: mberry@kearneycoc.org.

LINCOLN BUILDERS BUREAU: 5910 South 58th Street, Suite C, Lincoln, Nebraska 68516-3639, Telephone: (402) 421-8332, FAX: (402) 421-8334, Email: builders@cornhusker.net

MASTER BUILDERS OF IOWA: 903 6th Street, Sioux City, IA 51101, Telephone: (712) 255-9533, FAX: (712) 255-9571, Email: mbiplanroom-dsm@mbionline.com

McGRAW-HILL CONSTRUCTION/F.W. DODGE PLAN ROOM: 3315 Central Ave. Hot Springs, AK 71903 Telephone: (800) 393-6343, or (877) 903-1909

NORFOLK BUILDERS EXCHANGE: 609 W. Norfolk, Ave., Norfolk, Nebraska 68701, Telephone: (402) 371-4862, FAX: (402) 371-0182, Contact: Karina; Email: info@norfolkareachamber.com

OMAHA BUILDERS EXCHANGE: 4159 South 94th Street, Omaha, Nebraska 68127-1223 Telephone: (402) 991-6906, FAX: (402) 884-7055, Email: lisa.schockey@omahaplanroom.com, or plans@omahaplanroom.com

SIOUX CITY CONSTRUCTION LEAGUE: 3900 Stadium Drive, Sioux City, Iowa 51106, Telephone: (712) 255-9730, FAX: (712) 255-3915, Email: scplanroom@siouxlan.net.

There is **no** scheduled pre-bid meeting/site walk-through for this project. If you need to look at the project/site - Please contact Stan Hendricks, Superintendent by calling (402) 845-2282 so a time can be set up.

Each bid must contain a bond, cashiers or certified check, or certified share draft in the amount of five percent (5%) of the base bid, including alternates in a separate attached envelope. Bid security shall be made payable to the School District. Performance Bond and Labor, Material and Payment Bond will be required by the successful bidder in the full amount of the contract. Should the successful bidder fail or neglect to furnish satisfactory Performance/Payment Bonds, refuse to enter into a contract on the basis of the bid, or fail to meet the requirements of this Notice and the specifications regulating the award, the bidder's security may be retained as liquidated damages. No bidder may withdraw its bid for a period of forty-five (45) calendar days after the date and hour set for receiving bids.

The Project will commence upon a Notice to Proceed or as soon after the award that the contract, bond documents, and insurance are received from the contractor and reviewed for compliance with the bid specifications.

The School Board may make the contract award to the lowest responsive, responsible bidder meeting the Contract Documents. The right is reserved to reject any or all bids, or any part thereof, and to waive informalities, and to enter into such contract or contracts as shall be deemed in the best interests of the School District.

END OF SECTION 001113

SECTION 002113 - INSTRUCTIONS TO BIDDERS

1. DEFINITIONS:

Bidding Documents include the Advertisement for Bid, Instructions to Bidders, the Bid Forms, and the proposed Contract Documents including any addenda issued prior to receipt of bids.

Addenda are written or graphic instruments issued by the owner prior to the execution of the Contract, which modify or interpret the bidding documents by addition, deletions, clarifications or corrections.

A Bid is a complete and properly signed proposal to do the work or designated portion thereof for the sums stipulated therein supported by data called for in the Bidding Documents.

Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described as the base.

A Bidder is one who submits a Single Prime Bid for the Bid Package indicated on the Bid Form.

A Sub-Bidder is one who submits a bid to a Bidder for materials or labor for a portion of the Work.

2. BIDDERS REPRESENTATION:

Each Bidder by making his/her bid represents:

He/she has read and understands the Bidding Documents and his Bid is made in accordance therewith.

He/she has visited the site and familiarized him/herself with the local conditions under which the Work is to be performed.

His/her Bid is based upon the materials, systems and equipment described in the Bidding Documents without exceptions, unless noted on the Bid Form.

3. BIDDING DOCUMENTS:

Bidding Documents are available electronically from KPE Architecture-Engineering-Forensics.

Phone: (402) 291-1444
Contact: Mike McLennan
E-mail: mmclennan@kpe-inc.com

Costs for reproduction of Bidding Documents are at the Bidder’s expense.

Complete sets of bidding documents shall be used in preparing bids; neither the Owner nor the Architect assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

The Owner, or Architect, in making copies of the Bidding Documents available on the above terms, does so only for the purpose of obtaining bids on the Work and does not confer a license or grant for any other use.

Specifications:

The Specifications are included only as a reference to establish the minimum acceptable design standards and construction methods.

Interpretation or Correction of Bidding Documents:

Bidders shall promptly notify the Owner of any ambiguity, inconsistency or error, which they may discover upon examination of the Bidding Documents or the site and local conditions.

Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect, at least five (5) days prior to the date for receipt of bids.

Any interpretation, correction or change of the Bidding Documents will be made by Addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.

Substitutions:

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.

No substitution will be considered unless written request for approval has been submitted by the Bidder to the Architect as part of the Bid form under “Substitutions”. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data, and any other information necessary for an evaluation.

If the Architect approves any written request for substitution, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

Addenda:

Addenda will be emailed, mailed or delivered to all who are known by the Owner to have received a complete set of Bidding Documents.

Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

Each Bidder shall ascertain prior to submitting their bid they have received all Addenda issued, and he shall acknowledge their receipt with his bid.

Plan Holder List:

Contact KPE for a list of the bidding contractors. If you wish to be included on the bidders list, provide your information to Mike McLennan at KPE.

4. BIDDING PROCEDURE:

Form and Style of Bids:

Bids shall be submitted on the forms provided in this project manual.

All blanks on the Bid Forms shall be filled in by typewriter or manually in ink.

Where so indicated by the make-up of the Bid Form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written amount shall govern.

The signer of the Bid must initial any interlineations, alteration or erasure.

All requested alternates shall be bid.

Each copy of Bid shall include legal name of Bidder and statement that Bidder is sole proprietor, partnership, corporation, or some other legal entity. Each copy shall be signed by person or persons legally authorized to bind Bidder to a contract. Bid by a corporation shall further give state of incorporation and have corporate seal affixed. Bid submitted by an agent shall have current power of attorney attached certifying agent's authority to bind Bidder.

Bid Security:

Each bid must contain a bond, cashiers or certified check, or certified share draft in the amount of five percent (5%) of the base bid, including alternates in a separate attached envelope. Bid security shall be made payable to the School District. Performance Bond and Labor, Material and Payment Bond will be required by the successful bidder in the full amount of the contract. Should the successful bidder fail or neglect to furnish satisfactory Performance/Payment Bonds, refuse to enter into a contract on the basis of the bid, or fail to meet the requirements of this Notice and the specifications regulating the award, the bidder's security may be retained as liquidated damages.

Security deposits of the unsuccessful bidders will be returned promptly after the School Board has approved a successful bidder.

Submission of Bids:

All copies of Bid, Bid Security, and any other documents required to be submitted with Bid shall be enclosed in sealed opaque envelope. Envelope shall be addressed to party receiving Bids. Place following information at lower left-hand corner of envelope:

Doniphan-Trumbull Public Schools
Stadium Storage Facility Project
Bidder's Name
Return Address

If Bid is sent by mail, sealed envelope shall be enclosed in separate mailing envelope with notation "SEALED BID ENCLOSED" on face thereof.

Bids shall be deposited at designated location prior to the time and date for receipt of Bids indicated in Invitation to Bid or any extension thereof made by Addendum. Bids received after time and date for receipt of Bids will be returned unopened.

Bidder shall assume full responsibility for timely delivery at location designated for receipt of Bids.

Modification or Withdrawal of Bid:

Bid may not be modified, withdrawn or canceled by Bidder during stipulated time period following time and date designated for receipt of Bids, and each Bidder so agrees in submitting his Bid.

Prior to time and date designated for receipt of Bids, any Bid submitted may be modified or withdrawn by notice to party receiving Bids at place designated for receipt of Bids. Such notice shall be in writing over signature of the Bidder or by e-mail; if by e-mail, written confirmation over signature of Bidder shall be mailed and postmarked on or before date and time set for receipt of Bids, and it shall be so worded as not to reveal amount of original Bid.

Withdrawn Bids may be resubmitted up to time designated for receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

Bid security shall be in amount sufficient for Bid as modified or re-submitted.

Rejections of Bids:

Bidder acknowledges right of Owner to reject any and all Bids and in particular to reject Bid not accompanied by any required bid security, or date required by Bidding Documents or Bid which is in any way incomplete or irregular.

Acceptance of Bid (Award):

It is the intent of Owner to award Contract to the lowest responsible bidder, provided Bids have been submitted in accordance with requirements of the Bidding Documents and do not exceed funds available. Owner shall have right to waive any informality or irregularity in any Bid received and to accept Bids which, in his/her judgment, are in his/her own best interest. The Owner may accept or reject Alternates in any order or combination and will determine successful Bidder on basis of sum of Base Bid and accepted Alternates, and qualifications.

The award and notice to proceed will be conditioned upon receipt of a Performance and a Payment Bond in the amount of one hundred percent (100%) of the total bid.

END OF SECTION 002113

SECTION 004000 - SUBSTITUTION REQUEST FORM

To: KPE Architecture-Engineering-Forensics
Attn: Mike McLennan
1016 Leavenworth St.
Omaha, NE 68102
Phone: (402) 291-1444
Email: mmclennan@kpe-inc.com

We hereby submit for your consideration the following product as a substitute for the specified item for the above project.

_____

Section Name and Number | Page No. | Article, Paragraph, Subparagraph | Specified Item

Proposed Substitution: _____

Attach complete product description, drawings, photographs, performance, and test data, warranty, information and other information necessary for evaluation. Identify specific model numbers, finishes, etc.

A. Will change be required to building design or drawing dimensions in order to properly install proposed substitution? Yes_____ No_____. If yes, explain.

   _____

B. Will the undersigned pay for changes to the building design, including engineering and drawing cost, caused by the requested substitution? Yes_____ No_____

C. Differences between proposed substitution and specified item.

   _____

D. What affect does substitution have on other trades?

   _____

E. Does manufacturer's warranty of the proposed substitution differ from that specified? Yes_____ No_____ If yes, explain.

   _____

Submitted by: _____
Signature: _____
Firm: _____
Address: _____
_____
Date: _____
Telephone: _____
Email Address: _____

For Architect's Use Only
___Accepted ___Accepted as Noted
___Not Accepted ___Received too Late
By: _____
Date: _____
Remarks: _____
_____

Approved substitutions will be set forth in an addendum, substitution requests will not be returned to bidders.

END OF SECTION 004000

SECTION 004100 - BID FORM

DATE _____

COMPANY _____

ADDRESS _____

CITY, STATE, ZIP CODE _____

TELEPHONE _____

Attention: Stan Hendricks; Superintendent
Doniphan-Trumbull Public Schools
302 West Plum Street
P.O. Box 300
Doniphan, NE 68832

Subject: Stadium Storage Facility Project

Bids Due: April 07, 2020 at 2:00pm
Doniphan-Trumbull Public Schools
302 West Plum Street
P.O. Box 300
Doniphan, NE 68832

The undersigned, having familiarized themselves with the local conditions affecting the cost of the Work, the contract Documents, the Drawings, and the Specifications, all on file at the Owner's Office, hereby proposes and agrees, if this Proposal is accepted, to enter into an agreement with the Owner, in the form specified, to perform everything required and to provide and furnish engineering, project management, labor, materials, necessary tools, expendable equipment, design documents, and utility and transportation services necessary to complete in full, and in complete accord with the Contract Documents all of the work specified.

1. PROJECT BID

BASE BID – Stadium Storage Facility (Include all Material, Labor, Overhead and Profit)	Bid Amount
TOTAL LUMP SUM BASE BID:	$

2. THE UNDERSIGNED acknowledges the receipt of the following ADDENDA: List all Addenda:

_____

3. SUBSTITUTIONS

Submit complete description of the proposed substitution, drawings, cut sheets, performance and test data, and any other data or information necessary for a complete evaluation. Include a statement setting forth any changes in other materials, equipment, or work that incorporation of the substitute would require.

4. VOLUNTARY ALTERNATES

Voluntary Alternate No. 1:

Description: _____

_____

Add $ _____ Deduct $ _____

8. BONDING

The Contractor must pay for and provide a “Payment and Performance Bond” for the full bid price of the Contract.

9. SECURITY DEPOSIT

A bid security in the amount of five percent (5%) of bid total must accompany the bid in a separate attached envelope. The bidder and an acceptable surety company authorized to do business in the State of Nebraska should in the form of a certified check or a bid bond execute bid security. A certified or cashier’s check drawn on a solvent Nebraska bank or a bank chartered under the laws of the United States. The bid security shall be made payable to Doniphan-Trumbull Public Schools.

Dated this _____day of April 2020.

Signed by _____

Bid of _____
(Company Name)

_____
(Address)

_____
(City, State, Zip Code) (Telephone)

a corporation organized and existing under the State of _____, a partnership or an individual.

END OF SECTION 004100

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ARTICLE 1 - CONTRACT DOCUMENTS

1.1 DEFINITIONS

1.1.1 The Contract Documents

The Contract Documents consist of the Owner-Contractor Agreement, Conditions of the contract (these General Conditions, Supplementary and other conditions), the Drawings and Specifications, all Addenda issued prior to and all Modifications issued after the execution of the Contract. A Modification is (1) a written amendment to the Contract Documents signed by both parties, (2) a Change Order, or (3) a written order for a minor change in the Work issued by Owner pursuant to Subparagraph 11.4.1. A Modification may be made only after execution of the Contract.

1.1.2 The Contract

The Contract Documents form the Contract. The Contract represents the entire and integrated agreement between the parties hereto and supersedes, except as otherwise provided in the Owner-Contractor Agreement, all prior negotiations, representations, or agreements, either written or oral, including the bidding documents. The Contract may be amended or modified only by a Modification as defined in Paragraph 1 of the Owner-Contractor Agreement.

Nothing contained in the Contract Documents shall create any contractual relationship between Owner and any subcontractor or sub-subcontractor.

1.1.3 The work includes the completed construction required by the Contract Documents and all labor and service necessary to product such construction, and all materials and equipment incorporated or to be incorporated in such construction.

1.2 EXECUTION, CORRELATION, INTENT AND INTERPRETATIONS

1.2.1 The Contract Documents shall be initialed in not less than duplicate by the Owner and Contractor.

1.2.2 By executing the Contract, Contractor represents that it has visited the Site, familiarized itself with the local conditions under which the Work is to be performed, and correlated its observations with the requirements of the Contract Documents.

1.2.3 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required any one shall be as binding as if required by all. The intention of the Contract Documents is to include all labor, services, materials, equipment and other items as provided in Subparagraph 3.4.1 necessary for the proper execution and completion of the work, and also to include those things which may be reasonably inferable from the Contract Documents as being necessary to produce the intended results. Words which have well-known technical or trade meanings are used herein in accordance with such recognized meanings.

1.2.4 The organization of the Specifications into divisions, sections and articles, and the arrangement of Drawings shall not control Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

1.2.5 Terms used in these General Conditions, which are defined in the Owner-Contractor Agreement, shall have the meanings designated in the Owner-contractor Agreement.

ARTICLE 2 - OWNER

2.1 DEFINITION

2.1.1 Owner is the person or organization identified as such in the Owner-Contractor Agreement. The term Owner means Owner or its authorized representative.

2.2 INFORMATION AND SERVICES REQUIRED OF OWNER

2.2.1 Owner shall secure and pay for all required easements for permanent structures or permanent changes in existing facilities.

2.2.2 Owner shall furnish information, decisions, or services under Owner's control with reasonable promptness to avoid delay in the orderly progress of the Work.

2.2.3 The foregoing are in addition to other duties and responsibilities of Owner enumerated herein and especially those in respect to Work by Owner or by Separate Contracts, Payments and Completion and Insurance in Articles 5, 8, 10 respectively.

2.2.4 If Owner observes or otherwise becomes aware of any fault or defect in the Work or non-conformance with the Contract Documents, it shall give written notice thereof to Contractor; however, Owner shall not be responsible for detecting any defects.

2.2.5 Owner shall have authority to reject any Work, which is defective or does not conform to the Contract Documents. All disputes as to the requirements of the Contract Documents or any rejection of the defective work by Owner pursuant to this Paragraph 2.2.5 shall be subject to arbitration as provided in Paragraph 6.8

2.3 OWNER'S RIGHT TO STOP WORK

2.3.1 If Contractor fails to correct defective Work as required by Paragraph 12.2 or persistently fails to carry out the Work in accordance with the Contract Documents, Owner, by written order signed personally or by an agent specifically so empowered by Owner in writing, may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor or any other person or entity, except to the extent required in Subparagraph 5.1.4.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

2.4.1 If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within seven days after receipt of written notice from Owner to commence and continue correction of such default or neglect with diligence and promptness, Owner may, after seven days following receipt by Contractor of an additional written notice and without prejudice to any other remedy it may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due Contractor, the cost of correcting such deficiencies.

2.5 INSPECTION OF WORK

2.5.1 Owner shall at all times have access to the Work wherever it is in preparation and progress. Contractor shall provide facilities for such access so Owner may perform its functions under the Contract Documents.

2.6 OWNER'S REPRESENTATIVE

2.6.1 Owner shall appoint a personal representative who shall have the power to represent it in all matters encompassed by the Contract Documents. All limitations, if any, upon this power shall be communicated in writing to Contractor

2.7 ADDITIONAL RIGHTS AND RESPONSIBILITIES OF OWNER

2.7.1 Based on Owner's observation and an evaluation of Contractor's Applications for Payment, Owner will issue, subject to the provisions of article 8 of these General Conditions, Certificates for payment in such amounts requested by Contractor unless the Work has not progressed to the stage indicated in Contractor's Agreement.

2.7.2 Owner will have authority to reject Work, which does not conform to the Contract Documents.

2.7.3 Owner may review and approve or take other appropriate action upon Contractor's submittals such as Designs, Shop Drawings, Product Data and Samples, but only for conformance with the design concept of the Work and with the information given in the Contract Documents. Any such action, if taken, shall be taken with reasonable promptness so as to cause no delay. Owner's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

2.7.4 Owner will prepare Change Orders in accordance with Article 11 and will have authority to order minor changes in the Work as provided in Subparagraph 11.4.1

2.7.5 Owner will conduct inspections to determine the dates of Substantial Completion and Final Completion, will receive and review written warranties and related documents required by the Contract and assembled by Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of Paragraph 8.6 hereof and Article 7 of the Owner-Contractor Agreement.

ARTICLE 3 – CONTRACTOR

3.1 DEFINITION

3.1.1 Contractor is the person or organization identified as such in the Owner-Contractor Agreement. The term Contractor means Contractor or its authorized representative.

3.2 CONSTRUCTION DOCUMENTS

3.2.1 Contractor shall at once report to Owner any error, inconsistency or omission it might discover in the Contract Documents. Contractor shall be liable to Owner for any damage resulting from such errors, inconsistencies and omissions in the Contractor Documents. Contractor shall perform no portion of the Work at any time without Contract Documents.

3.2.2 Contractor shall, in accordance with the Owner-Contractor Agreement, prepare any necessary Designs, Drawings, Specifications and Shop Drawings setting forth in detail the requirements for the construction of the entire project, and shall provide all copies of the Drawings and Specifications reasonably necessary for execution of the Work.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 Contractor shall supervise and direct the Work using its best skill and attention. It shall be solely responsible for all construction means, methods and techniques, sequences and procedures, and for coordinating all portions of the Work under the Contract.

3.3.2 Contractor shall be responsible to the Owner for the acts and omissions of Contractor's employees, Subcontractors, Sub-subcontractors and their agents and employees, and other persons performing any of the Work under a contract with Contractor.

3.4 ENGINEERING, PROJECT MANAGEMENT, LABOR AND MATERIALS

3.4.1 Unless otherwise provided in the Contract Documents, Contractor shall provide and pay for all engineering, project management, labor, materials, equipment, tools, construction equipment and machinery, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated into the Work.

3.4.2 Contractor shall at all times enforce strict discipline and good order among its employees, Subcontractors and Sub-subcontractors and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him.

3.4.3 The Contractor shall provide and pay for all engineering services and labor required for complete design, detailed design drawings and specifications required for the entire project. The Contractor shall furnish qualified, experienced and competent engineering personnel.

3.4.4 The Contractor's Engineer represents that he has authority to do business and render professional services required in the State where the Work is to be performed. Furthermore, The Contractor's Engineer shall perform the Work in a good, workmanlike, and industry accepted manner in accordance with the prevailing standards and practices of the profession and to the reasonable satisfaction of the Owner, and shall, in the performance of the Work contemplated hereunder, comply with all valid applicable federal, state and local laws, ordinances, codes, resolutions, local and/or national standards and regulations, and regulations issued or promulgated by units of government and regulatory bodies with jurisdiction over any aspect of the Work.

3.4.5 All services performed by Contract Engineers will be in accordance with sound and accepted industry practice by individuals qualified and experienced in the specified technical areas. All drawings, specifications and other materials delivered to Owner by the Contractor's Engineering staff will be accurate and correct and will meet all applicable, legal requirements. All documents, including drawings and specifications, prepared or finished to Owner by Engineer pursuant to this agreement are the sole and exclusive property of Owner, and reproducible copies thereof shall be delivered by Contractor to Owner upon completion of contract.

3.4.6 Contractor to provide and pay for project management services for the entire project including planning, scheduling, cost control, review meetings, etc., in accordance with sound and accepted industry practice by individuals qualified and experienced in the field.

3.4.7 The Contractor to provide and pay for all procurement activities required to complete entire project. Procurement policies, procedures and records to be administered in accordance with sound and accepted industry practice. Copies of all purchase orders to be bound and provided to the Owner at the completion of the Contract.

3.5 WARRANTY

3.5.1 Contractor warrants to Owner that all materials and equipment furnished under this Contract incorporated into the Work will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All Work not so conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by Owner, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. The warranties provided in this Paragraph 3.5 and elsewhere in the Contract Documents shall be in addition to

and not in limitation of any other warranty or remedy required by law and/or by the Contract Documents, including without limitation Paragraph 12.2 hereof. Contractor shall remain responsible for furnishing and installing all materials and assuring that the same conform to all requirements and specifications of the Contract Documents. No such purchase of any material and equipment directly by the Owner shall relieve the Contractor from his obligation and warranties under this Paragraph 3.5.1 and Paragraph 12.2 hereof.

3.6 TAXES

3.6.1 All applicable Local, State and Federal taxes shall be included.

3.6.2 Contractors in submitting a bid DO NOT include Nebraska taxes due. Tax exemption certificates will be furnished to the successful contractor and sub-contractors. A copy of this document must be presented to your supplier(s) prior to purchasing your materials.

3.6.2.1 Tax exemption certificates will be issued by the District one time only. It is the responsibility of the general contractor to submit a list of all sub-contractors requiring tax exemption certificates to the District project manager for review. All certificates will be sent to the general contractor. It will be the responsibility of the general contractor to record and distribute the certificates to his/her subcontractors.

3.6.2.2 A contractor/subcontractor shall not allow another contractor/subcontractor to use the certificate issued by the School District on another project.

3.6.2.3 Complete information on qualifying materials can be found on the Nebraska Department of Revenue website. https://revenue.nebraska.gov/

3.6.2.4 Out of state taxes need to be included on purchases of materials and/or services made out of the State of Nebraska.

3.7 PERMITS, FEES AND NOTICES

3.7.1 Contractor shall secure and pay for all permits and governmental fees, licenses, and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the contract and which are legally required at the time of execution of the Owner-Contractor Agreement.

3.7.2 Contractor shall give all notices and comply with all laws, statutes, building codes, ordinances, rules, regulations, governmental approvals and orders which are in effect as of the date of execution of the Owner-Contractor Agreement bearing on the performance of the Work. Contractor shall also give all notices and comply with the terms and conditions of all permits and approvals bearing on the performance of the Work.

3.7.3 If Contractor performs any Work, which is contrary to such laws, ordinances, rules and regulations or the terms and conditions of any permit or governmental approval, then Contractor shall assume full responsibility therefore and shall bear all costs attributable thereto.

3.8 ALLOWANCE

3.8.1 Not Used

3.9 SUPERINTENDENT

3.9.1 Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Site during progress of the Work. The superintendent shall represent contractor and all communications given to the superintendent shall be binding as if given to

Contractor. Important communications will be confirmed in writing. Other communications will be so confirmed on written request in each case.

3.10 PROGRESS SCHEDULE

3.10.1 Contractor will prepare and submit to Owner a construction Progress Schedule upon execution of this agreement and also an analysis or updated schedule on request of Owner. Progress schedules to be updated at a minimum of monthly or as required to ensure timely completion.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

3.11.1 Contractor shall maintain at the Site for Owner, one (1) copy of all Drawings and Specifications, Addenda, Change Orders and other Modifications, in good order and legibly marked currently to record all changes made during construction and approved Shop Drawings, Product Data and Samples. These shall be made available to Owner and considered “as-builts” of the project for purposes of allowing the owner to update the project document on CAD at project completion.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.1 Design and shop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by Contractor or any Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor, which illustrate some portion of the Work.

3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by Contractor to illustrate a material, product or system for some portion of the Work.

3.12.3 Samples are physical examples furnished by Contractor to illustrate materials, equipment or workmanship, and to establish standards by which the Work will be judged.

3.12.4 Contractor shall, with reasonable promptness and in such sequence so as to cause no delay in the Work or the work of any Separate Contractor, prepare and/or review and stamp with its approval all Design Drawings, Shop Drawings, Product Data and Samples required by the contract Documents or subsequently by Modifications. Design Drawings, Shop Drawings, Product Data and Samples shall be properly identified as specified.

3.12.5 By approving and submitting Design Drawings, Shop Drawings, Product Data and Samples, Contractor thereby represents that it has determined and verified all designs, materials, catalog numbers and similar data, field measurements, and field construction criteria related thereto, or will do so, and that it has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

3.12.6 Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by Owner’s approval of Drawings, Product Data or Samples under Subparagraph 2.7.3 unless Contractor has specifically informed Owner in writing of such deviation at the time of submission and Owner has given written approval to the specific deviation. Contractor shall not be relieved from responsibility for errors or omissions in the Drawings, Product Data or Samples by Owner’s approval thereof.

3.12.7 Contractor shall direct specific attention, in writing or on resubmitted Drawings, Product Data or Samples, to revisions other than those requested by Owner on previous submittals.

3.12.8 No portion of the Work requiring submission of Drawings, Product Data or Samples shall be commenced until the submittal has been approved by Owner as provided in Subparagraph 2.7.3. All such portions of the Work shall be in accordance with approved submittals.

3.13 USE OF SITE

3.13.1 Contractor shall confine operations to the Site and in connection with the use of the Site shall comply with all applicable laws, rules, “Special Conditions for Construction Contracts”, ordinances, permits and Contract Documents and shall not unreasonably encumber the Site with any materials or equipment.

3.14 CUTTING AND PATCHING OF WORK

3.14.1 Contractor shall do all cutting, fitting or patching of its Work that may be required to make its several parts fit together properly, and shall not endanger any Work by cutting, excavating or otherwise altering the Work or any part of it.

3.14.2 Contractor shall not damage or endanger any portion of the Work or the work of Owner or any Separate Contractors by cutting, patching or otherwise altering any work, or by excavation. Contractor shall not cut or otherwise alter the work of Owner or any Separate Contractor. Contractor shall not unreasonably withhold from the Owner or any Separate Contractor its consent to cutting or otherwise altering the Work. All contracts with Separate Contractor shall contain provisions requiring such Separate Contractors to not unreasonably withhold their consent to cutting or otherwise altering the work of such Separate Contractors.

3.15 CLEANING UP

3.15.1 Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by its operations. At the completion of the Work, it shall remove all waste materials and rubbish from and about the Work as well as all its tools, construction equipment, machinery, and surplus materials, and shall clean all glass surfaces and leave the Work “broom-clean” or its equivalent except as otherwise specified.

3.15.2 If Contractor fails to clean up, Owner may do so and the cost thereof shall be charged to Contractor.

3.16 ROYALTIES AND PATENTS

3.16.1 Not Used.

3.17 INDEMNIFICATION

3.17.1 To the fullest extent permitted by law, Contractor shall indemnify and hold harmless Owner and its agents, engineers and employees from and against all claims, damages, losses and expenses including attorney’s fees resulting from or arising out of or in connection with the performance of the Work of this Contract provided that any such claim, damage loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss or use resulting there from is caused in whole or in part by any act or omission of Contractor, any Subcontractor, and Sub-subcontractor, anyone directly or indirectly employed by any of them or any one for whose acts any of them may be liable, whether or not is caused in part by a party indemnified hereunder or (b) is based upon or results from a breach of any of Contractor’s convenient, agreements, representations or warranties contained herein.

3.17.2 In any and all claims against Owner or any of its agents, engineers or employees by any employee of Contractor, any Subcontractor or Sub-subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Paragraph 3.17 shall not be limited in anyway by any limitation on the amount or type of damage, compensation or benefits payable by or for

Contractor or any Subcontractor or Sub-subcontractor under worker's or workmen's compensation acts, disability benefits or other employee benefit acts.

3.17.3 The Obligation of Contractor under this Paragraph 3.17 shall extend to the liability of Contractor, its agents or employees, arising out of preparation or approval of Drawings, Product Data, Samples, opinions, reports, surveys and Change Order.

ARTICLE 4 – SUBCONTRACTORS

4.1 DEFINITIONS

4.1.1 A subcontractor is a person or organization that has a direct contract with contractor to perform any of the Work at the Site. The term Subcontractor is referred to throughout the Contract Documents as if singular in number and masculine or neuter in gender and means a Subcontractor or its authorized representative. The term Subcontractor does not include any Separate Contractor of his subcontractors.

4.1.2 A Sub-subcontractor is a person or organization who has a direct or indirect contract with a Subcontractor to perform any other Work at the Site. The term Sub-subcontractor is referred to throughout the Contract Documents as if singular is number and masculine or neuter in gender and means a Sub-subcontractor or its authorized representative thereof.

4.1.3 Nothing contained in the Contract Documents shall create any contractual relation between Owner and any Subcontractor or Sub-subcontractor.

4.2 AWARD OF SUBCONTRACTS

4.2.1 Contractor warrants that due care shall be exercised in the selection of Subcontractors and that Contractor is as fully responsible for the acts and omissions of Subcontractors, Sub-subcontractors and persons employed by them as Contractor is for the acts and omissions of persons directly or indirectly employed by Contractor. Unless otherwise required by the Contact Documents, Contractor, as soon as practical after the award of the Contract, shall furnish to Owner in writing the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work. Owner will promptly reply to Contractor in writing stating whether or not Owner, after due investigation, has reasonable objection to any such proposed person or entity. Failure of Owner to reply promptly shall constitute notice of no reasonable objection.

4.2.2 Contractor shall not contract with any such proposed person or entity to whom Owner has made reasonable objection under the provisions of Subparagraph 4.2.1. Contractor shall not be required to contract with anyone to whom it has reasonable objection.

4.2.3 If Owner has reasonable objection to any such proposed person or entity, Contractor shall submit a substitute to whom Owner has no reasonable objection, and the "Lump Sum Contract Amount" shall be increased or decreased by the difference in cost caused by such substitution and an appropriate Change Order shall be issued; however, no increase in the "Lump Sum Contract Amount" shall be allowed for any such substitution unless Contractor has acted promptly and responsively in submitting names as required by Subparagraph 4.2.1 and this Subparagraph 4.2.3.

4.2.4 Contractor shall make no substitution for any Subcontractor, person or entity previously selected if Owner makes reasonable objection to such substitution.

4.2.5 Except as otherwise provided in the Owner-Contractor agreement, Contractor shall pay each Subcontractor, upon receipt of payment from Owner, an amount equal to the percentage of

completion allowed to Contractor on account of such subcontractor's Work. Contractor shall also require each Subcontractor to make similar payments to its Sub-subcontractors.

4.2.6 Owner shall not have any obligation to pay or to see to the payment of any moneys to any Subcontractor except as any otherwise by required by law.

4.2.7 All Work performed for Contractor by a Subcontractor shall be pursuant to an appropriate agreement between Contractor and such Subcontractor (and where appropriate, between a Subcontractor and Sub-subcontractor) which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance described in Paragraph 10.3, except such rights as they may have to the proceeds of such insurance held by Owner as trustee under Paragraph 10.3.

4.3 SUBCONTRACTUAL RELATIONS

4.3.1 By an appropriate agreement, written where legally required for validity, Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward Contractor all obligations and responsibilities which Contractor, by these documents, assumes toward Owner.

Said agreement shall preserve and protect the rights of Owner under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Contractor-Subcontractor agreement, the benefit of all rights, remedies and redress against Contractor that Contractor, by these Documents, has against Owner. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with its Sub-subcontractors. Contractor shall make available to each proposed Subcontractor, prior to the execution of the Subcontract, copies of the contract Documents to which the Subcontractor will be bound by this Paragraph 4.3, and identify to the Subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract documents. Each Subcontractor shall similarly make copies of such Documents available to its Sub-subcontractors.

ARTICLE 5 – SEPARATE CONTRACTS

5.1 OWNER'S RIGHTS AND OBLIGATIONS WITH RESPECT TO SEPARATE CONTRACTS

5.1.1 Owner reserves the right to award other contracts related to but beyond the scope of the work under this Contract and award Separate Contracts in connection with other work on the Project Site and within the Work itself under these or similar conditions of contract.

5.1.2 When Separate Contracts are awarded, the "Contractor" in the Contract Documents in each case shall be the Contractor who signs each Separate Contract.

5.1.3 Promptly after award of any Separate contract, Owner shall notify Contractor of the name of the separate contractor and the general scope of anticipated schedule for performance of the work covered thereby.

5.1.4 Owner will provide for the coordination of the Work of its own forces and each separate contractor with the Work of the Contractor, who shall cooperate therewith as provided in Paragraph 5.2

5.2 MUTUAL RESPONSIBILITY OF CONTRACTORS

5.2.1 Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall properly coordinate and connect its Work with theirs.

5.2.2 If any part of Contractor's Work depends for proper execution or results upon the work of any separate contractor, Contractor shall inspect and promptly report to Owner any apparent discrepancies or defects in such work that render it unsuitable for such proper execution and results. Failure of Contractor to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper to receive its Work, except as to defects which do not manifest themselves in the Separate Contractor's work until after the execution of Contractor's Work.

5.2.3 Any cost caused by defective or ill-timed work shall be borne by the party responsible therefore.

5.2.4 Should Contractor wrongfully cause damage to the Work or property of Owner, or any other work on the Site, Contractor shall promptly remedy such damage as provided in Paragraph 12.2.

5.2.5 Should Contractor cause damage to the work or property of any separate contractor, Contractor shall, upon due notice, settle with such other contractor by agreement or otherwise resolve the dispute. If such separate contractor sues or initiates an arbitration proceeding against Owner on account of any damage alleged to have been so sustained, Owner shall notify Contractor who shall defend such proceedings at Contractor's expense, and if any judgment or award against Owner arises therefrom, Contractor shall pay or satisfy it and shall reimburse Owner for all attorney's fees and court costs or arbitration costs which Owner has incurred.

5.3 CUTTING AND PATCHING UNDER SEPARATE CONTRACTS

5.3.1 Contractor shall do all cutting, fitting or patching of its Work that may be required to fit it to receive the Work of other contractors shown in the Contract Documents. Contractor shall not endanger any work of any other contractors by cutting, excavation, or otherwise altering any work and shall not cut or alter the work of any other contractor except with the written consent of the Owner.

5.3.2 Any direct costs caused by defective or ill-times work shall be borne by the party responsible therefore. This Subparagraph 5.3.2 shall not be deemed to exclude Owner.

5.4 OWNER'S RIGHT TO CLEAN UP

5.4.1 If a dispute arises between Contractor and separate contractors as to their responsibility for cleaning up as required by Paragraph 3.15 hereof, Owner may clean up and charge the cost thereof to the several contractors.

6.1 LAW OF THE PLACE

6.1.1 The Contract shall be governed by the law of the place where the Site is located

6.2 SUCCESSORS AND ASSIGNS

6.2.1 Owner and Contractor each binds itself, its partners, successors, assign and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. Contractor shall not assign the Contract or sublet it as a whole without the written consent of Owner, nor shall Contractor assign any moneys due or to become due it hereunder, without the prior written consent of Owner.

6.2.2 The Owner shall not assign rights hereunder and/or delegate any or all of its duties and obligations without the prior consent of the Contractor. The Owner shall give Contractor prompt notice of any proposed assignments and upon Contractors' receipt of such notice and a copy of an agreement whereby the assignee assumes and agrees to perform all duties and obligations hereunder, contractor shall give prompt consent, if without reasonable object, and the prior

Owner shall be relieved of all further liability and obligation under this Contract and such assignee shall be substituted as Owner hereunder.

6.3 NOTICES

6.3.1 All notices or other communications required or permitted to be given under any provisions of the Contract Documents and all other notices which are given by either party pursuant to or in connection with the Contract Documents, shall be in writing, except for any such notice or communication as to which the contrary is specifically provided in the Contract Documents. Each such notice shall be deemed to have been duly served if delivered in person to the individual or member of the firm or to an officer of the corporation for whom it was intended, or if delivered at or sent by registered or certified mail to the last business address known to the person who gives thee notice. Not withstanding any terms or conditions herein to the contrary, all such notices or communications required or permitted to be given to Owner herein shall be delivered to the name and address of the Owner Representative as set forth I Paragraph 2.1 of the Owner-Contractor Agreement unless contractor is otherwise notified in writing by Owner of a different name and address.

6.4 CLAIMS FOR DAMAGES

6.4.1 Should either party to the Contract suffer injury or damage to person or property because of any act of omission of the other party or of any of its employees, agents or others for whose acts it is legally liable, claim shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage.

6.5 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

6.5.1 Owner, at his option, may request Contractor to furnish bonds governing the faithful performance of this contract, and payment of all obligations arising there under.

6.6 TESTS

6.6.1 If the Contact Documents, laws, ordinances, rules, regulations or orders or any public authority having jurisdiction require any portion of the work to be inspected, tested or approved, Contractor shall give Owner timely notice of its readiness so Owner may observe such inspection, testing or approval. Contractor shall bear all cost of such inspections as a cost of work.

6.6.2 If Owner reasonable determines that any Work requires special inspection, testing, or approval which Subparagraph 6.6.1 does not include, it will instruct Contractor in writing to order such special inspection, testing or approval. Contractor shall give Owner written notice of its readiness so that Owner may observe such inspection testing or approval. If such special inspection or testing reveals a failure of the Work to comply with the requirements of the Contract Documents, Contractor shall bear all costs thereof; otherwise Owner shall bear such costs, and an appropriate Change Order shall be issued.

6.6.3 Required certificates of inspection, testing or approval shall be secured by Contractor and delivered by it to Owner.

6.6.4 Inspections, tests or approvals by persons other than Contractor, shall not relieve Contractor from its obligations to perform the work in accordance with the Contract Documents.

6.7 RIGHTS AND REMEDIES

6.7.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available there under shall be in addition to and not in limitation of any duties, obligations, rights and remedies otherwise imposed or available by the law.

6.7.2 No action or failure to act by Owner or Contractor shall constitute a waiver of any right or duty afforded either of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach there under, except as may be specifically agreed in writing.

6.8 ARBITRATION

6.8.1 Except as otherwise provided in Subparagraph 6.8.7, all claims, disputes and other matters in question between Owner and Contractor arising out of or relating to the Contract Documents or the breach thereof, except for claims which have been waived by the making or acceptance of final payment as provided by Subparagraphs 8.5.5 and 8.6.6, shall be decided by arbitration in accordance with the Construction Industry arbitration Rules of the American Arbitration Association, unless the parties mutually agree to the contrary in writing. Notice of the Demand for Arbitration shall be made within a reasonable time after the claim, dispute or other matter in question has arisen, and in no event shall be made after the date when the applicable statute of limitations would provide a good and sufficient defense to legal or equitable proceedings based on such claim, dispute or other matter in question.

6.8.2 The parties will attempt to agree upon a single arbitrator to determine such dispute. In the event the parties are unable to so agree within five days after the Notice of Demand is given, each party shall have an additional three days in which each shall select an arbitrator. Within fifteen days after their selection, the party-appointed arbitrators will select a third arbitrator form the National Panel of Construction Arbitrators who shall be a professional experience in the matters of the type in dispute. This third arbitrator, or if the acceptable arbitrator is unable to act, or if for any other reason, the appointment cannot be made, the American Arbitration Association shall have the power to make the appointment from other members of the Panel.

6.8.3 Any arbitration commenced pursuant to this Agreement will take place in the State where the Work is performed. Any arbitration hereunder may include by consolidation, joiner or otherwise, any person or entity not a party hereto if it is shown that at the time the Demand for Arbitration is filed (I) such person of entity is substantially involved in a common question of fact or law (ii) the presence of such person or entity is required if complete relief is to be accorded in the arbitration and (iii) the interest or responsibility of such person or entity in the matter is not insubstantial; and with the consent of each such person or entity, such person or entity shall be joined as a party to such arbitration.

This agreement to arbitrate set forth in Paragraph 6.8, including without limitation, the foregoing Agreement to arbitrate with such other persons and entities, shall be specifically enforceable. The decisions made by the arbitrators shall be final and incontestable binding upon the parties, and judgment may be entered upon them in any court having jurisdiction thereof.

6.8.4 Contractor shall carry on the work and maintain the time schedule provided in the Contract Documents during any arbitration proceedings, but it shall not continue with any part of the work which may be altered by the outcome of the arbitration unless Owner otherwise directs in writing. Any delays in the work pending arbitration shall be treated in accordance Paragraph 7.3 hereof and no carrying on of the Work pending arbitration proceedings or any direction to do so by the Owner shall constitute or result in the release or waiver of any claim that either party may have against the other, including, but not limited to, the claims and disputes which are the subject of the arbitration and all other claims related thereto or arising out of the same facts and circumstances.

6.8.5 Upon petition approved by the arbitrator (or the chair person if the matter is to be heard by a panel of arbitrators appointed pursuant to Paragraph 6.8.2), the parties may obtain discovery with respect to all claims, disputes, and other matters subject to arbitration hereunder and all defenses relating thereto, by the following methods: depositions upon oral examination, and production of documents or things or permission to enter upon the Project Site and/or other property, for inspection and other purposes. The discovery contemplated by this subparagraph shall pertain to any matter, not privileged, which is involved in the dispute and shall be available for use as evidence in same manner and for the same reasons as provided by law in suits or proceedings conducted under the Federal Rules of Civil Procedure. All requests for discovery shall be delivered by certified mail to the opposing party and to the Chicago Regional Office of the American Arbitration Association not alter than ten days after the selection of the single arbitrator or the chair person of the panel of arbitrators, whichever is applicable. All responses to discovery shall be returned within five days after the decision granting such request. Except upon order from the arbitrator/chairperson shall resolve all disputed related to discovery and any such decision shall be final. The discovery provisions of this subparagraph shall apply only to the parties to the dispute and nothing in this paragraph shall conflict with the authority of the arbitrator or the chairperson to subpoena witnesses or documents for use at a haring, or to receive and consider the evidence of witnesses by affidavit.

6.8.6 The same arbitrator(s) shall hear all claims, which are related or dependent upon each other.

6.8.7 Not withstanding anything to the contrary provided in Subparagraph 6.8.1, neither party shall be compelled to arbitrate or complete or be bound by any arbitration proceedings with respect to any claim, dispute, or other matter described is Subparagraph 6.8.1, as to which a Notice if the Demand of Arbitration has not been filed in accordance with Subparagraph 6.8.1 by the date of Substantial Completion; and with respect to any such claim, dispute or other matter in question both parties shall be permitted to exercise all rights and remedies available at law, in equity, by statute or in the Contract Documents, including arbitration in accordance with this Paragraph 6.8 if both parties so agree.

ARTICLE 7 - TIME

7.1 DEFINITIONS

7.1.1 The Contract Time is the period of time allotted in the Contract Documents for “Substantial Completion of the Work” as defined in Subparagraph 7.1.3, including authorized adjustments thereto.

7.1.2 The date if commencement of the Work is the date established in a note to proceed. If there is no notice to proceed, it shall be the date of the Owner-Contract Agreement or such other date as may be established therein.

7.1.3 The date of Substantial Completion of the Work is the date when construction is sufficiently complete in accordance with the Contractor Documents, so that Owner may fully occupy the Work for the use for which it is intended. Section 3.3 of the Owner-Contractor Agreement addressed the definition and dates of the Project.

7.1.4 The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically designated.

7.2 PROGRESS AND COMPLETION

7.2.1 All time limits stated in the Contract Documents are of the essence of the Contract.

7.2.2 Contractor shall begin the Work on the date of commencement as defined in Subparagraph 7.1.2 It shall carry the Work forward expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

7.3 DELAYS AND EXTENSIONS OF TIME

7.3.1 If Contractor is delayed at any time in the progress of the Work by any act or neglect of Owner, or by any Employee of the Owner, or by any separate contractor by Owner, or by changes ordered in the Work by Owner or by labor disputes, fire, adverse weather conditions not reasonably anticipatable, unavoidable casualties or any other causes beyond Contractor's control (other than delays caused by the fault or neglect of any subcontractor or sub-subcontractor), or by delay authorized by Owner pending arbitration, then the Contract Time shall be extended and the "Lump Sum Contract Amount" shall be adjusted by Change Order for such reasonable period of time as Owner and Contractor may agree

7.3.2 Any claim for extension of time shall be made in writing to the Owner not more than twenty days after the commencement of the delay; otherwise it shall be waived. In the case of a continuing delay only one claim is necessary, Contractor shall provide an estimate of the probably effect of such delay on the progress of the Work.

ARTICLE 8 - PAYMENTS AND COMPLETION

8.1 LUMP SUM CONTRACT AMOUNT

8.1.1 The "Lump Sum Contract Amount" is stated in the Owner-Contractor Agreement and, including authorized adjustments thereto.

8.2 SCHEDULE OF VALUES

8.2.1 Before the first Application for Payment, Contractor shall submit to Owner a Schedule of Values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy.

8.3 PROGRESS PAYMENTS

8.3.1 Before each Progress Payment falls due, Contractor shall submit to Owner any information, documentation or other items required to be submitted as provided in Article 6 of the Owner-Contractor Agreement, and an itemized Application for Payment.

8.3.2 If payments are to be made on account of materials or equipment not incorporated in the Work but delivered and suitable stored at the Site, or at some other location agreed upon in writing, then in addition to any conditions upon payment set forth in the Owner-Contractor Agreement, such payments shall be conditions upon submission by Contractor of bills of sale or such other documents and procedures satisfactory to Owner to establish Owner's title to such materials or equipment or otherwise protect Owner's interest including applicable insurance and transportation to the Site for those materials and equipment stored off site.

8.3.3 Contractor warrants and guarantees that title to all Work, materials, and equipment covered by and Application for Payment will pass to Owner either upon incorporation in the construction, or receipt or payment therefore by Contractor, whichever first occurs, free and clear of all liens, rights to take liens, claims, security interests or encumbrances hereinafter referred to in this Article 8 "Liens"; and that no Work, materials, equipment covered by Application for Payment will have been acquired by Contractor or by any other person performing the Work at the sire or furnishing materials and equipment to the Work subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

8.3.4 Owner shall not have any obligation to pay or to see to the payment of any moneys to any Subcontractor or Sub-Subcontractor except as may otherwise be required by law

8.3.5 No payment, nor any partial or entire use of occupancy of the Work by Owner, shall constitute an acceptance of any Work not in accordance with the Contract Document.

8.4 PAYMENT WITHHELD

8.4.1 Owner may withhold payment in whole or in part if:

8.4.1.1 Work has not progressed as far as indicated in Contractor's Application for Payment;

8.4.1.2 Quantity and quality of Work is not in accordance with the Contract Documents; or

8.4.1.3 Any condition to payment specified in Article 6 of the Owner-Contractor Agreement is not satisfied.

8.4.2 Owner may withhold payment as may be necessary to protect itself from loss because of:

8.4.2.1 Defective work not remedied;

8.4.2.2 Third party claims, liens filed or reasonable evidence indicating probable filing of any such claims or liens;

8.4.2.3 Failure of Contractor to make payments properly to Subcontractors for labor, materials, or equipment;

8.4.2.4 Damage to Owner or another contract for which Contractor may be liable to Owner under terms of the Contract Documents and/or as a matter of law; and

8.4.2.5 Persistent failure to carry out the Work in accordance with the Contract Documents.

8.4.3 When the above grounds in Subparagraph 8.4.1 and 8.4.2, are removed, payment shall be made for amounts withheld there under.

8.5 FAILURE OF PAYMENT

8.5.1 Unless payment is withheld pursuant to Subparagraphs 8.4.1 or 8.4.2, if Owner, through no fault of Contractor, fails to pay Contractor within five days after the due date of payment established in the Owner-Contractor Agreement any amount due under the Contract, then Contractor may, upon five additional days' written notice to Owner, stop the Work until payment of the amount owing has been received.

8.6 FINAL PAYMENT

8.6.1 When Contractor is of the opinion that the Work has been substantially completed, in accordance with the terms of the Contract Documents, Contractor shall notify Owner. Contractor and Owner shall then promptly conduct the performance testing, as specified, make a thorough inspection of the Work, and prepare a punch list setting forth all items that are found not to be done in accordance with the Contract Documents and Performance Requirements, arrange a meeting with appropriate Subcontractors to identify and explain all items, and Contractor shall promptly undertake to perform all Wok so listed. The failure to include any items on such list does not alter responsibility of the Contractor to complete all Work in accordance with the Contract Documents. When the work is Substantially Complete:

8.6.1.1 Owner shall assume responsibility for maintenance, heat, utilities, security, and property insurance; and

8.6.1.2 Owner and Contractor shall fix the time within the Contractor shall complete the items to be completed or corrected, such time to be within the Contract Times unless extended pursuant to Paragraph 7.3 hereof.

8.6.2 Upon receipt of written notice that performance has been achieved, any such punch list items are completed and the Work is ready for final inspection. Owner will promptly make such inspection as it deems necessary and if the Work, including punch list items have been completed in accordance with the Contract Documents, Contractor shall then make Application for Final Payment.

8.6.3 In addition to Contractor's satisfaction of all conditions to Final Payment as set forth in Article 5 of the Owner-Contractor Agreement, neither final payment not the remaining retained percentages shall become due until Contractor submits to Owner (1) an Affidavit of Contractor stating and such other evidence as is satisfactory to Owner that all payrolls, bills for material and equipment, and other indebtedness, connected with the Work for which Owner or its property might in any way be responsible, have been paid or otherwise satisfied, (2) Contractor's, Subcontractor's and Sub-Subcontractor's sworn statements and affidavits and such releases of lien and materialmen's certificates as Owner may require with respect to the entirety of the work all labor, material , services, equipment and work furnished or installed in connection therewith, (3) consent of all sureties to final payment, and (4) if required by Owner, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Contract to the extent and in such form as may be designated by Owner. If any subcontractor refuses to furnish any statement, release or waiver required by Owner, Contractor shall refund to Owner all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable attorney's fees.

8.6.4 If after Substantial Completion of the Work final completion thereof is materially delayed through no fault of Contractor or by the issuance of Change Orders affecting final completion, Owner shall, without terminating Contract, make payment of the balance due for that portion of the Work fully completed and accepted.

8.6.5 The making if final payment shall constitute a waiver of all claims by Owner except those arising from:

8.6.5.1 Unsettled liens and other claims;

8.6.5.2 Faulty or defective Work;

8.6.5.3 Failure of the Work to comply with the requirements of the Contract Documents;

8.6.5.4 Terms if any special guarantee, warranty, or other guarantee required by the Contract Documents, including, but not limited to, those contained in Paragraph 3.5 and 12.2 hereof.

ARTICLE 9 - PROTECTION OF PERSONS AND PROPERTY

9.1 SAFETY PRECAUTIONS AND PROGRAMS

9.1.1 Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.

9.2 SAFETY OF PERSONS AND PROPERTY

9.2.1 Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury, or loss to:

9.2.1.1 All employees on the Work and all other persons who may be affected thereby, inclusive but not limited to, all employees, separate contractors, or independent contractors of Owner and invites of Owner;

9.2.1.2 All the work and all material and equipment to be incorporated therein, whether in storage on or off the Site, under the care, custody, in control of Contractor or any of its Subcontractors or Sub-subcontractors; and

9.2.1.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavement, roadways, structures and utilities not designed for removal, relocation or replacement in the course of construction.

9.2.2 Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and orders of any public authority bearing on the safety of persons or property or to protect them from damage, injury, or loss.

9.2.3 Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting of danger signs and other warnings against hazards, promulgating safety regulations and notifying Owners and users of adjacent utilities.

9.2.4 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel. All hazardous or explosive materials used on site will have a MSDS on file at the job site.

9.2.5 Contractor shall promptly remedy all damage or loss to any property referred to in Paragraph 9.2.1.2 and 9.2.1.3 cause in whole or in part by Contractor, any Subcontractor, or Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and for which Contractor is responsible under Paragraph 9.2.1.2 and 9.2.1.3, except damage or loss attributable to the acts or omissions of Owner or anyone employed by it or for whose acts it may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations are in addition to its obligations under Paragraph 3.17.

9.2.6 Contractor shall designate a responsible member of its organization at the site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to Owner.

9.2.7 Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.

9.3 EMERGENCIES

9.3.1 In any emergency affecting the safety of persons or property, Contractor shall act, at its discretion, to prevent threatened damage, injury, or loss. An additional compensation or extension of time claimed by Contractor on account of emergency work shall be determined as provided in Article 11 hereof for changes in the Work.

ARTICLE 10 - INSURANCE

10.1 CONTRACTOR'S LIABILITY INSURANCE

10.1.1 Contractor shall purchase and maintain such insurance as will protect it from claims set forth below which may arise out of or result from Contractor's operations under the Contract, whether such operation be by itself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

10.1.1.1 Claims under worker's or workmen's compensations, disability benefit and other similar employee benefit acts;

10.1.1.2 Claims for damages because of bodily injury, sickness, or disease or any person other than its employees;

10.1.1.3 Claims for damages because of bodily injury sickness or disease of any person other than its employees;

10.1.1.4 Claims insured by usual personal injury liability coverage which are sustained (i) by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor or (ii) by any other persons;

10.1.1.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property including loss of use resulting there from.

10.1.1.6 Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance of use of any motor vehicle.

10.1.2 The insurance required by Subparagraph 10.1.1 hereof shall be written for not less than any limits of liability specified in the Contractor Documents, or required by law, whichever is greater

10.1.3 The insurance required by Subparagraph 10.1.1 shall include contractual liability and completed operations liability insurance as applicable to Contractor's obligations under Paragraph 3.17 hereof.

10.1.4 Certificates of Insurance acceptable to Owner shall be filed with Owner prior to commencement of the Work. These certificates shall contain a provision that coverage's afforded under the policies will not be canceled until at least thirty days' prior written notice has been given to Owner.

10.1.5 TYPE OF COVERAGE

1.	Commercial General Liability	
	General Aggregate	2,000,000
	Products/Complete Operations Aggregate	2,000.000
	Personal/Advertising Injury	1,000,000
	Each Occurrence	1,000,000
2.	Business Automobile Liability	
	Each Person	1,000,000
	Each Accident	1,000,000
3.	Employers Liability	Statutory Amount
4.	Umbrella policies are acceptable to reach these limits of liability.	
5.	Builder's Risk	Contract Price

Certificates of Insurance shall be furnished by the Contractor to the owner and such certificates shall provide 30 days prior notice by registered mail of any material change in, or cancellation of, this insurance.

The Contractor must require the subcontractors to furnish all certificates of insurance. The Contractor shall require his Subcontractors to take out and maintain the same coverage as above.

Certificates of Insurance shall be furnished to the District within ten (10) days after Notice of Award is issued to the successful bidder. Notice to Proceed will not be issued until the certificate

has been reviewed by the Owner. All insurance shall name the District as an additional insured and shall waive subrogation as to the District.

10.2 OWNER'S LIABILITY INSURANCE

10.2.1 Owner shall be responsible for maintaining its own liability insurance to insure Owner's sole negligence in protecting it against claims, which may arise against Owner as a result of operations under the Contract. Owner's liability insurance shall not protect the Contractor or any Subcontractor or Sub-subcontractor.

10.3 PROPERTY INSURANCE

10.3.1 Owner shall purchase and maintain property insurance upon the entire Work at the Site in an amount equal to the full replacement value thereof. This insurance shall include the interest of Owner, Contractor, Subcontractors, and Sub-subcontractors in the Work and shall insure "all risk" insurance for physical loss or damage, including without duplication of coverage, theft, vandalism and malicious mischief.

Owner shall also be responsible for paying the amount of any deductible under the terms of such policy(ies) of insurance. Such insurance arranged by Owner shall not protect or insure Contractor's personal property, including but not limited to scaffolds, tools and other personal property consumed in the completion of the Contract. If Owner does not intend to purchase such insurance for the full replacement value of the entire Work, it shall inform Contractor in writing prior to commencement of the Work. Contractor shall then effect insurance which will protect the interests of itself, it Subcontractors and the Sub-subcontractors in the Work and by appropriate Change Order and the cost thereof shall be charged to Owner. If Contract is damaged by failure of Owner to purchase or maintain such insurance and to so notify Contractor, then Owner shall bear all reasonable costs properly attributable thereto.

If not covered under the all-risk insurance or otherwise provided in the Contract Documents, Contractor shall effect and maintain similar property insurance on all portions of the Work stored off the site or in transit when such portions of the Work are to be included in an Application for Payment under Subparagraph 8.3.2.

10.3.2 Owner shall purchase and maintain such boiler and machinery insurance as may be required by the Contractor Documents or by law. This insurance shall include the interest of Owner, Contractor, Subcontractors, and Sub-subcontractors in the Work.

10.3.3 Any insured loss is to be adjusted with Owner and made payable to Owner as trustee for the insured's, as their interests may appear.

10.3.4 If Contractor requests in writing that insurance for risks other than those described in 10.3.2 or other special hazards be included in the property insurance policy, Owner shall, if possible include such insurance, and the cost thereof shall be charged to Contractor by appropriate change Order.

10.3.5 Owner and Contractor in behalf of themselves and all other claiming under them, including without limitation any insurer, waive all claims and rights against each other and against any Subcontractors, Sub-subcontractors, agents and employees of each other (including but not limited to all rights of subrogation) for loss or damage to the Work or any of their other property, respectively, arising from fire, flood, earthquake, water damage, or any of the other perils insured against in an "all-risk" of physical loss insurance policy excepting only war, nuclear reaction, inherent vice, normal wear and tear and intentional acts, excepting however any claims and rights as they may have to the proceeds of any insurance held by Owner as trustee. The foregoing waiver afforded Contractor, its agents and employees shall not extend to the liability

imposed by any provision of Paragraph 3.17. Owner or Contractor, as appropriate, shall require of separate contractors, Subcontractors, and Sub-Subcontractors by appropriate agreements, written where legally required for validity, similar waivers each in favor of all parties enumerated in this Subparagraph 10.3.5. If either Contractor or Owner so requests, the other shall obtain from its respective insurer may have against Contractor or Owner and Contractor and Owner herby agree to indemnify the other against all loss and expense, including but not limited to attorney's fees, that the other may incur as a result of a failure to obtain any such written waiver.

10.3.6 Owner as trustee shall have the power to adjust and settle any loss with the insurers. Promptly after the occurrence of any insured loss, Contractor shall restore and reconstruct the damaged work and thereafter complete the Work in accordance with the Contract Documents.

10.3.7 Upon the occurrence of an insured loss, Owner shall hold all insurance proceeds received, and as restoration and reconstruction progresses shall disburse it in accordance with Owner-Contractor Agreement.

10.3.8 If Owner finds it necessary to occupy or use a portion or portions or the Work prior to Substantial Completion thereof, such occupancy or use shall not commence prior to a time mutually agreed to by Owner and Contractor and to which the insurance have consented by endorsement to the policy or policies. This insurance shall not be canceled or lapsed on account of such partial occupancy or use. This insurance shall not be canceled and the insurance company or companies to such occupancy or use shall not be unreasonably withheld. Owner shall be responsible for all utilities consumed in the portions of the Work which Owner occupies prior to Substantial Completion.

ARTICLE 11 - CHANGES IN THE WORK

11.1 CHANGE ORDERS

11.1.1 A Change Order is a written order to Contractor signed by Owner, issued after the execution of the Contract authorizing a Change in the Work or an adjustment in the "Lump Sum Contract Amount" to the Contract Time. The "Lump Sum contract Amount" and the Contract Time may be changed only by a Change Order. A Change Order signed by Contractor indicates its agreement therewith, including the adjustment in the "Lump Sum Contract Amount" or Contract Time.

11.1.2 Owner, without invalidating the Contract, may order Changes in the Work within the general scope of the Contract consisting of additions, deletion or other revision, the "Lump Sum Contract Amount" and the Contract Time being adjusted accordingly. All such Changes in the Work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contractor Documents. Promptly after receipt of each Change Order, Contractor shall pursue to completion the work necessary to implement the change specified therein. If the parties are unable to agree on the adjustment to be made to the Contract Time, or the "Lump Sum contract Amount", if any, within 10 days after the Change Order is submitted to Contractor, the dispute shall be determined by arbitration as provided in Paragraph 6.8 hereof. Prior to the initiation of a Change Order, Owner will consult with Contractor regarding the change for purposes of determining the feasibility and the estimated cost thereof and any extension in the Contract Time that may be necessitated thereby.

When requested by Owner, Contractor will secure and submit to Owner written lump sum proposals from the appropriate Subcontractors and/or Sum-subcontractors for each change in the Work which Owner desires to make. If Owner is not satisfied with the proposals submitted for any addition or modification to the Work, it shall notify Contractor and Contractor shall promptly secure and submit to Owner bids from other trade contractors and/or material and equipment suppliers. After it approves proposals for the changes, Owner shall execute and deliver to contractor a Change Order which shall adjust the "Lump Sum Contract Amount" by an

amount equal to the increase or decrease in the cost of the Work occasioned by such change as set forth in the approved proposal.

11.1.3 The provisions of Subparagraph 11.1.2 to the contrary notwithstanding, if unit prices are stated in the Contract Documents or subsequently agreed upon, and in a proposed Change Order, the adjustment in the “Lump Sum Contract Amount” pursuant to each such Change Order shall be computed on the basis of the unit prices rather than in the manner specified in 11.1.2

11.2 CONCEALED CONDITIONS

11.2.1 Should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the Contract Documents, or should unknown physical conditions below the surface of the ground (including by way of illustration but not in limitation, underground water which must be pumped or otherwise disposed of in order to properly proceed with construction), or should concealed or unknown conditions in an existing structure of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, be encountered, the “Lump Sum Contract Amount” shall be equitably adjusted by Change Order upon claim by either party made within twenty days (20) after the first observance of the conditions.

11.3 CLAIMS FOR ADDITIONAL COST OR TIME

11.3.1 If Contractor wishes to make a claim for an increase in the “Lump Sum Contract Amount” or an extension in the Contract Time, it shall give Owner notice thereof within a reasonable time, not to exceed 20 days, after the occurrence of the event giving rise to such claim. This notice shall be given by Contractor before proceeding to execute the Work, except in an emergency endangering life or property in which case Contractor shall proceed in accordance with Subparagraph 9.3.1 hereof. No claim shall be valid unless so made. Any change in the “Lump Sum Contract Amount” or Contract Time, resulting from such claim, shall be authorized by Change Order.

11.3.2 If Contractor claims that additional cost is involved because of, but not limited to, (1) any order by Owner to stop the Work pursuant to Subparagraph 2.3.1 where Contractor was not at fault, (2) any written order for a minor change in the Work issued pursuant to Sub-paragraph 11.4.1 or (3) failure of payment by Owner pursuant to Subparagraph 8.5.1, Contractor shall make such claim as provided in Subparagraph 11.3.1

11.4 MINOR CHANGES IN THE WORK

11.4.1 Owner will have authority to order minor changes in the work not involving an adjustment in the “Lump Sum Contract Amount” or an extension of the Contract Time and not inconsistent with the intent or the Contract Documents. Such changes shall be effected by written order, and shall be binding on Owner and Contractor. Contractor shall carry out such written orders promptly.

ARTICLE 12 – UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.1 If any Work should be covered contrary to the reasonable request of Owner or to requirements expressed in the Contract Documents, it must, if required by Owner, be uncovered for its observation and replaced, at Contractor’s expense.

12.1.2 If any other Work has been covered which Owner has not specifically requested to observe prior to being covered, Owner may request to see such Work and it shall be uncovered by Contractor. If such Work is found in accordance with the Contract Documents, the cost of uncovering and

replacement shall, by appropriate Change Order, be charged to Owner. If such Work is found not to be in accordance with the Contract Documents, Contractor shall pay such costs unless it is found that this condition was caused by a separate contactor employed as provided in Article 5 hereof, and in that event Owner shall be responsible for the payment of such costs.

12.2 CORRECTION OF WORK

12.2.1 Contractor shall promptly correct all Work which is defective or fails to conform to the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The cost of correcting such defective or non-conforming Work shall be in accordance Paragraph 10.2 of the Agreement.

12.2.2 If, within one year after the Date of Substantial Completion of the Work or designated portion thereof or within one year after acceptance by Owner of designed equipment or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, Contractor shall correct it promptly, in accordance with the Contract Documents, after receipt of a written notice from Owner to do so unless Owner has previously given Contractor a written acceptance of such condition. This obligation shall survive termination of the Contract. Owner shall give notice promptly after discovery of the condition.

12.2.3 Contractor shall remove from the Site all portions of the Work which are defective or non-conforming and which have not been corrected under Subparagraph 3.2.1, 12.2.1 and 12.2.2 hereof unless removal is waived by Owner.

12.2.4 If Contractor fails to correct defective or non-conforming Work as provided in Subparagraphs 3.5.1, 12.2.1 and 12.2.2, Owner may correct it in accordance with Paragraph 2.4 and pursue any other remedies available to it hereunder.

12.2.5 If Contractor does not proceed with correction of such defective or non-confirming Work within a reasonable time fixed by Owner's notice, Owner may remove it and may store the materials or equipment at the expense of Contractor. If Contractor does not pay the cost of such removal and storage within ten days thereafter, Owner may upon ten days' additional written notice sell such Work at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs that should have been borne by Contractor. If such proceeds of sale do not cover all costs which Contractor should have borne, the difference shall be charged to Contractor and an appropriate Change Order shall be issued. If the payments then or thereafter due Contractor are not sufficient to cover such amount, Contractor shall pay the difference to Owner.

12.2.6 Contractor shall bear the cost of making good all work of separate contractors destroyed or damaged by such removal or correction

12.2.7 The obligations of Contractor under this Paragraph 12.2 shall be in addition to and not in limitation of any obligations imposed upon it by special guarantee required by the Contract Documents or otherwise prescribed by law, including those contained in Paragraph 3.5 hereof.

12.2.8 Nothing contained in this Paragraph 12.2 shall be construed to establish a period of limitation with respect to any other obligation which Contractor may have under the Contract Documents, including Paragraph 3.5 hereof. The establishment of the time period of one year after the Date of Substantial Completion or such longer period of time as may be prescribed by law or the terms of any warranty required by the Contract Documents relates only to the specified obligation of Contractor to correct the Work and has no relationship to the time within which his obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which

proceedings may be commenced to establish the Contractor's liability with respect to its obligations other than specifically to correct the Work.

12.3 ACCEPTANCE OF DEFECTIVE OR NON-CONFORMING WORK

12.3.1 If Owner prefers to accept defective or non-conforming Work, it may do so instead of requiring its removal and correction, it which case a Change Order will be issued to reflect an appropriate reduction in the "Lump Sum Contract Amount", or, if the amount is determined after final payment, it shall be paid by Contractor.

ARTICLE 13 – TERMINATION OF THE CONTRACT

13.1 TERMINATION OF CONTRACTOR

13.1.1 If (i) the Work is stopped for a period of thirty days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as declaration of national emergency making materials unavailable, through no act or fault of Contractor, a Subcontractor, a Sub-subcontractor or their agents or employees or any other persons performing any of the Work under a contract with Contractor, or (ii) the Work should be stopped for a period of sixty days by Contractor because Owner has wrongfully failed to issue a Certificate for Payment or to make payment thereon as provided in Article 8 hereof.

Then Contractor may, upon seven additional days' written notice to Owner, terminate the Contract and recover from Owner payment for all Work executed and if terminated by reason of a cause described in clause (ii) above, then in addition, Contractor may recover any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit and damages.

13.2 TERMINATION BY OWNER

13.2.1 Termination for Cause:

If Contractor is adjudged a bankrupt, or if it makes a general assignment for the benefit of its creditors, or if a receiver is appointed on account of its insolvency, or if it persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if it fails to make prompt payment to Subcontractors or for material or labor, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority any material respect, any representation, warranty, covenant or agreement made or to be observed or performed by Contractor under or pursuant to the Contract, the Contract Documents, then Owner may, without prejudice to any right or remedy and after giving Contractor and its surety, if any, seven days' written notice, terminate the employment of 'Contractor and take possession of the Site and of all materials, equipment, tools, construction equipment, and machinery thereon owned by Contractor and may finish the Work by whatever method it may deem expedient. In such case Contractor shall not be entitled to receive any further payment until the Work is finished.

13.2.2 Termination at Option of Owner:

The Contract is subject to termination by Owner at any time at its sole discretion in accordance with terms and conditions of Article 9 of the Owner-Contractor Agreement.

END OF SECTION 007000

SECTION 008000 - SUPPLEMENTARY CONDITIONS

14.0 SUPPLEMENTAL CONDITIONS

The following supplements modify, change, delete from, or add to the General Conditions of the Contract. Where any part of the General Conditions is modified or voided by these Articles, the unaltered provisions of that part shall remain in effect.

14.1 The Specifications is the manual, the volume that includes the bidding requirements, sample forms and certain items of the Contract Documents such as the conditions of the contract and the specifications.

14.2 “All manufactured articles, materials and equipment shall be applied, installed, connected, erected, supported, used, cleaned and conditioned as directed by the manufacturers, unless otherwise provided by the Contract Documents.”

14.3 The Contractor must provide for his own temporary office space at the site.

14.4 Contractor is responsible for telephone lines.

14.5 The Owner will pay for all temporary electrical service consumed until the completion of the project. The contractor is responsible for his own temporary power and lighting distribution requirements.

14.6 The Contractor, immediately after being awarded the contract, shall create and review the submittal log and propose additions / deletions to log for the Architect’s approval. The contractor shall indicate the dates and all required drawings will be submitted to the Architect for approval.

14.7 The Contractor shall upload digital PDF documents of outline dimension drawings and all such assembly and detail drawings and diagrams of materials as are required to demonstrate to the Architect the provisions and intent of the specifications are being complied with. The Architect will return to the Contractor digital prints of each drawing marked with his approval or required changes.

14.8 All shop drawings and samples shall be accompanied by the Architect’s transmittal form. The form shall be properly executed by the Contractor. This transmittal shall be numbered consecutively in the space provided for “Transmittal Number”. This number will form a serial number for identifying each submittal. If initial submittal, indicate by check mark; if resubmitted, indicate by inserting transmittal number of prior submission.

14.9 Replace all broken and damaged glass. Repair all lines and equipment damaged. Remove all labels, identification marks, spots, stains, foreign material, etc., from all finished surfaces. Contractor shall keep the project free of stored or unattended combustible material.

14.10 SUBSTITUTIONS

14.10.1 When products are specified or noted, “Equal to” one or more products or manufacturers, the Bidder may request approval from the Architect to substitute an unlisted product he considers equal. All proposed substitutions shall be submitted for approval in accordance with “Substitutions” of INSTRUCTIONS TO BIDDERS. Any additional Engineering or design fees associated with the substitution shall be calculated by the Architect and added to the net cost of the project.

14.10.2 All Standard Specifications referred to in the Contract Documents shall be the latest revisions in effect, are a part of this contract, and are incorporated herein as fully as if here set-forth.

14.11 EXAMINATION OF THE SITE

14.11.1 The Contractor shall examine the site, the Owner's drawings, and other parts of the Contract Documents, and shall familiarize himself with conditions of the proposed Work. Lack of knowledge concerning the requirements of the work shall not relieve the Contractor of responsibility to fulfill his contract.

14.11.2 The Contractor shall be responsible for the verification of measurements in the field, for his own work and that of his subcontractors, before ordering materials or equipment or doing any work. Any discrepancy in dimensions, which may be found, shall be reported to the Architect for his consideration, in writing, before the Contractor proceeds with the work in the effected area.

14.11.3 No extra compensation or extra charge will be allowed on account of any difference between actual measurements and the dimensions indicated on the Owner's drawings, and the Contractor shall assume full responsibility for the accuracy of the measurements that he obtains at the site.

14.12 COOPERATION

14.12.1 The Contractor shall cooperate with the Owner's representative and with all other contractors engaged on the premises in order to facilitate the progress of work as a whole.

14.12.2 Contractor shall coordinate contractor's work with the work of the Owner's asbestos contractor so as not to adversely affect the schedule of the contract.

14.12.3 The Contractor agrees to remove any workman or supervisor from the job who has repeatedly proven to be uncooperative with the Owner, his representative, his Architect, or with other contractors.

14.13 INTENT OF PLANS AND SPECIFICATIONS

14.13.1 The Contract Documents are complementary, and whatever is required by any one shall be as binding as if required by all. The intention of the Documents is to include all labor, materials, equipment and other items necessary for the proper execution and completion of the Work.

14.13.2 In the event of any inconsistencies in the Contract, unless otherwise provided herein, the inconsistencies shall be resolved by giving precedence in the following order:

14.13.2.1 The Contract.
14.13.2.2 The General Provisions.
14.13.2.3 The other provisions of this Contract whether incorporated by reference or otherwise.
14.13.2.4 The Specifications and Drawings.

14.13.3 Anything that may be called for in the Specifications and not shown on the Drawings, or shown on the Drawings and not called for by the Specification, shall be of like effect as if called for and shown in both. In case of conflict between the Drawings and Specifications, it is the Contractor's responsibility to ask the Architect for clarification. Nor withstanding this clause, the Contractor shall

nevertheless report immediately discovered errors, inconsistencies or other discrepancies in the Contract Documents to the Architect.

14.14 DRAWINGS

14.14.1 The scope of work is indicated on the Owner's drawings and specifications. The Contractor is responsible for all design and drawings to meet the performance specifications.

14.14.2 At the completion of the contract, the Contractor shall furnish to the Owner a set of prints corrected to reflect as-built conditions.

14.14.3 Should conflict occur in or between the drawings and specifications, the Contractor is deemed to have estimated the more expensive way of doing work unless Contractor asked for and obtained a written decision before submission of proposal as to method or materials to be required.

14.15 OWNER'S RESPONSIBILITY

14.15.1 The Owner assumes no responsibility of liability for the Contractor's equipment, supplies or materials while on the site or being installed.

14.16 MATERIALS, EQUIPMENT AND WORKMANSHIP

14.16.1 Contractor furnished material shall be determined by the Drawings and Specifications. All material and equipment shall be Contractor furnished.

14.16.2 All materials and equipment that are furnished by the Contractor and are incorporated in the completed construction shall be new and not previously used. If requested by the Owner, the Contractor shall provide satisfactory evidence of the kind and quality of materials and equipment to be furnished.

14.16.3 *Storage of Material and Equipment:* If any materials or equipment are stored, they shall be stored so as to ensure the preservation of their quality and fitness. Materials and equipment shall be placed on platforms or other hard, clean surfaces, and not on the ground, and shall be placed under cover and heated adequately to prevent condensation or freezing. Stored materials and equipment shall be located so as to facilitate observation. The Contractor shall be responsible for all damage or loss that occurs as a result of its fault or negligence in connection with the care and protection by the Owner.

14.16.4 *Manufacturer's Instructions:* All instructions and directions of the manufacturer of material and equipment furnished shall be strictly followed.

14.16.5 *Workmanship:* All construction shall be such that its several components parts function as a workable system, with all accessories necessary for its proper operation, and the construction shall be furnished with all components tested, properly adjusted, and in operation. The construction shall be furnished in a first class manner and in conformance with the normally accepted standard practice of the trade so as to contribute to maximum efficiency of operation, maintenance and construction of future alterations and additions. It shall also be so furnished that the completed construction will conform and adjust to and operate in a coordinated manner with existing installation.

14.17 FINAL

14.17.1 Contractor accepts these specifications as covering ALL work (although every item may not be specially mentioned) that is necessary to complete this work according to the true and intended meaning of the Contract Documents in a first-class manner to the full satisfaction of the Owner. The Contractor shall promptly make any necessary corrections at no expense to the Owner.

END OF SECTION 008000

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 011000 - SUMMARY

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:

1. Project Information.
2. Work Sequence.
3. Work Covered by Contract Documents.
4. Work Covered by Owner.
5. Access to Site.
6. Coordination with Occupants.
7. Work Restrictions.
8. Specification and Drawing Conventions.

1.3 PROJECT INFORMATION

A. Project Identification: STADIUM STORAGE FACILITY

1. Project Location: 302 W. Plum Street, Doniphan, NE 68832

B. Owner: Doniphan-Trumbull Public Schools

C. Architect/Engineer: KPE Architecture-Engineering-Forensics

1. Project Manager: Shane Keplinger
2. Architect: Michael McLennan
3. Structural Engineer: Josh Pearce
4. Electrical Engineer: Patrick Straatmann
5. Mechanical Engineer: Chad Liechti

D. Engineering Consultants: The Architect/Engineer has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Civil Engineer: Miller & Associates

1.4 WORK SEQUENCE

A. Award of Contract to be approved at the next scheduled school board meeting.

B. Notice to Proceed and Contracts to be executed immediately following approval of bid.

C. Substantial completion by December 4, 2020.

D. Final completion by December 18, 2020.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

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

1. The project consists of a new, single story pre-manufactured metal storage building with restrooms that is approximately 5,000 sf. The building is located in the Northeast corner of the Doniphan-Trumbull Stadium grounds and to the Northwest of the existing school.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

2. Form of contract: AIA A105 – 2017 – Standard Short Form of Agreement Between Owner and Contractor.

1.6 WORK COVERED BY OWNER

A. Type of Work Covered by the Owner:

1. Security.
2. Phone & Data Wiring.
3. Bathroom Accessories (Owner Provided & Contractor Installed).
    a. Toilet Paper Holders (PH-1).
    b. Paper Towel Dispensers (TD-1).
    c. Soap Dispensers (SP-1).
    d. Napkin Disposal (ND-1).

1.7 ACCESS TO SITE

A. General: Contractor shall have full use of the 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: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to Project site.
    a. Schedule deliveries to minimize use of public streets by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.8 COORDINATION WITH OCCUPANTS

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with

completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. Maintain access to existing walkways and other adjacent occupied or used facilities. Do not close or obstruct walkways or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
3. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
4. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
5. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
6. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.9 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.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 9 p.m., Monday through Friday, unless otherwise indicated.

1. Weekend Hours: Coordinate with Owner.
2. Early Morning Hours: Confirm with authorities having jurisdiction for restrictions on noisy work.
3. Hours for Utility Shutdowns: Notify Owner to confirm time schedule.
4. Utility tie-ins and shutdowns may need to be performed during evenings, nights or weekends.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

H. All Contractors will be required to provide the following Criminal Background Check / Sex Offender Registry check.

1. The Contractor shall be responsible for conducting a criminal background check on the U.S. Department of Justice National Sex Offender Public Website (NSOPW) as to all persons working on District property or in District buildings. This includes all employees of the Contractor or any sub-contractor, all Independent Contractors, Casual Laborers, Workers obtained through Union Halls or Hiring Halls, and all other individuals present on District property at any time during the performance of the Contract. No person shall be permitted to work on District property who has been convicted of a felony or who is on the Sex Offender Registry for any State. The Contractor must have records available for the District to inspect upon request to verify that background/sex offender checks have been performed on all persons working on District property. The District reserves the right to order the Contractor to remove any person from the District's work who the District determines to be a threat to safety of students, District employees, other workers, parents, visitors, or otherwise. All workers must follow District regulations and rules as to building access and security.

1.10 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 01 General Requirements: Requirements of Sections in Division 01 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

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.

1.3 MINOR CHANGES IN THE WORK

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

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect 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 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 Architect.

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.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

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. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

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 Architect at earliest possible date, but no later than 7 days before the date scheduled for submittal of initial Applications for 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.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. 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.

3. 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 5 percent of the Contract Sum.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. 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.

6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
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.

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 Architect 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: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement. Pay applications shall be submitted to the Architect no later than the 1st day of each month for review and processing.

C. Application for Payment Forms: Use forms acceptable to Architect and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect may 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 issued before last day of construction period covered by application.

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.
    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 3 signed and notarized original copies of each Application for Payment to Architect 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. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or proceeded by conditional final waivers from every entity involved with performance of the Work covered by the application that is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

H. 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. Products list (preliminary if not final).
5. List of Contractor's staff assignments.
6. Report of preconstruction conference.
7. Certificates of insurance and insurance policies.
8. Performance and payment bonds.
9. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After 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.

J. 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. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

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. Requests for Information (RFIs).
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 017000 "Execution Requirements" 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 from Owner, 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, and telephone number 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 telephone numbers, including home, office, and cellular 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 by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors 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.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop

Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1.7 REQUESTS FOR INFORMATION (RFIs)

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

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
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. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. 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 Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect Action: Architect will review each RFI, determine action required, and respond. Allow 3 working days for Architect’s response for each RFI. RFIs received by 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 Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. 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 Division 01 Section "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: A log will be maintained by the Contractor.

F. On receipt of Architect's action, immediately distribute the RFI response to affected parties. Review response and notify Architect within 3 days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

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 Architect of scheduled meeting dates and times.
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 Owner and Architect, within 3 days of the meeting.

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

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, 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.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Preparation of record documents.

m. Use of the premises.
n. Work restrictions.
o. Working hours.
p. Owner's occupancy requirements.
q. Responsibility for temporary facilities and controls.
r. Procedures for moisture and mold control.
s. Procedures for disruptions and shutdowns.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.

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

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires 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 Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including 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: Schedule and conduct a project closeout conference, at a time convenient to Owner, but no later than 15 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, 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. Submittal of written warranties.
    d. Requirements for preparing operations and maintenance data.
    e. Requirements for delivery of material samples, attic stock, and spare parts.
    f. Requirements for demonstration and training.
    g. Preparation of Contractor's punch list.
    h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    i. Submittal procedures.
    j. Coordination of separate contracts.
    k. Owner's partial occupancy requirements.
    l. Installation of Owner's furniture, fixtures, and equipment.
    m. Responsibility for removing temporary facilities and controls.

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

E. Progress Meetings: Conduct progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, each contractor, subcontractor, supplier, 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.
3. 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 utilization.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.
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.
19) Status of “As-built Drawings” (Shop Drawing Submittal)

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: 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 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013100 "Project Management and Coordination" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 017823 "Operation and Maintenance Data" (in Section 017700 “Closeout Procedures”) for submitting operation and maintenance manuals
4. Section 017839 "Project Record Documents" (in Section 017700 “Closeout Procedures”) for submitting record Drawings, record Specifications, and record Product Data.

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.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require 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 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. 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 PROCEDURES

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

a. 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 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. Days are listed below are Business Days.

1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. 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 5 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 days for initial review of each submittal.
5. Submittals for Long-lead items shall be processed before any other submittals. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
6. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, 10 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

C. 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., DTPS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., DTPS-061000.01.A).

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. Electronic submittals shall be submitted to the Architect in electronic PDF format files.
   a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
   b. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
   c. The electronic submittal process is not intended for color samples, color charts, or physical material samples.
   d. Electronic Submittals shall be submitted via Submittal Exchange.
2. Submittal Preparation – Contractor may use any or all of the following options:

a. Contractor provide electronic (PDF) submittals to the Architect via the Submittal Exchange website.
b. Contractor provide paper submittals to Scanning Service which electronically scans and converts to PDF format.

3. 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 notarized statement on original paper copy certificates and certifications where indicated.

4. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
5. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.

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

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.

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.

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 Architect 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, but no larger than 30 by 42 inches.
3. Submit Shop Drawings in any of the following formats:

a. PDF electronic file.

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.

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. 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 1 full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. 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 3 sets of Samples. Architect will retain 2 Sample sets; 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 3 sets of paired units that show approximate limits of variations.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

    a. PDF electronic file.

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

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

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

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

J. 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 Architects and owners, and other information specified.

K. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

L. 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.

M. 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.

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

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

P. 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.

Q. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

R. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

U. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

W. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

X. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service 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.

Y. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

Z. Material Safety Data Sheets (MSDSs): Submit information directly to The Construction Manager; to be kept in the job trailer.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

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 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: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

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 013300

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 0 and 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This 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-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 quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Divisions 03 through 26 for specific test and inspection requirements.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described 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.

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

C. 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, assembly, 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).

D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. In-place Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements or as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.
2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.

E. 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.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

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

I. 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.

J. 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. Contractor's quality-control services do not include contract administration activities performed by the Architect.

1.4 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements 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 direction 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. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

D. 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.

E. 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.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, 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.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including Subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 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, telephone number, and email address 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 inspection.
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, telephone number, and email address 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, telephone number, and email address 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.

1.8 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

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, applying, 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 inspection indicated, as documented according to [ASTM E 329] <Insert standard>; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

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.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   f. When testing is complete, remove test specimens and test assemblies; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.

   a. Allow seven days for initial review and each re-review of each mockup.

7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
8. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings and/or as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.

1.9 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.

1. 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.

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

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

C. 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.

D. 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 locations 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.
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 duties of Contractor.

E. 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."

F. 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.

G. Associated Services: Cooperate with agencies and representatives 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 inspection. 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 inspection equipment at Project site.

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

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

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Contractor will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of, as indicated in the Specifications and Drawings, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, through Contractor, with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

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.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

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 Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Section 017310 "Cutting and Patching."

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

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

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 0 and 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary facilities, support facilities, and security and protection facilities.

1.3 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, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use.

C. Electric Power Service from Existing System: Limited electric power from Owner's existing system may be available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

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.

1.5 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

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.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. 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: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Use of Owner's existing water service facilities will be permitted.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

D. Electric Power Service: Use of Owner's existing electric power service may be permitted, as long as equipment is maintained in a condition acceptable to Owner.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste.

C. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 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.

C. 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.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

3.5 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. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. 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 the property of Contractor.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 017700 Section "Closeout Procedures." Review final draft of this Section with Owner. Advise Owner that any exceptions to its provisions might translate into costs borne by Owner.

END OF SECTION 015000

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 0 and 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:

1. Section 017700 "Closeout Procedures" for submitting warranties for contract closeout.
2. Divisions 03 through 26 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased 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, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, 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. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," 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 other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Form: Tabulate information for each product under the following column headings:
    a. Specification Section number and title.
    b. Generic name used in the Contract Documents.
    c. Proprietary name, model number, and similar designations.
    d. Manufacturer's name and address.
    e. Supplier's name and address.
    f. Installer's name and address.
    g. Projected delivery date or time span of delivery period.
    h. Identification of items that require early submittal approval for scheduled delivery date.
3. Initial Submittal: Within 10 days after date of commencement of the Work, submit a digital copy via email. Include a written explanation for omissions of data and for variations from Contract requirements.
    a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
4. Completed List: Within 30 days after date of commencement of the Work, submit a digital copy via email of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect’s response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect’s response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. 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 form in Section 004000 “Substitution Request Form”.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    a. Statement indicating why specified material or product cannot be provided.
    b. Coordination information, including a list of changes or modifications 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. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
i. 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 lack of availability or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
l. 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 one week of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 7 days of receipt of request, or 3 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

C. 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, product selected shall be 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. Comply with manufacturer's written instructions.

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 ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.

6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

B. Storage: 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.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
3. Refer to Divisions 03 through 26 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 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect’s.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.

   a. Substitutions may be considered.

2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.

   a. Substitutions may be considered.

3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

   a. Substitutions may be considered.

4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

   a. Substitutions may be considered.

5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Subparagraphs above and below correspond to nonrestrictive specifications described in CSI's "Manual of Practice" and require inclusion of requirements specifying salient features of products desired.
7. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
8. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.
9. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Products are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

   a. Substitutions may be considered.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: 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.

B. 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:

1. 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.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. 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.

2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive 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.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 0 and 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. General installation of products.
3. Progress cleaning.
4. Protection of installed construction.
5. Correction of the Work.

B. Related Sections include the following:

1. Section 013100 "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting surveys.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical, electrical and network communication systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Acceptance of Conditions: 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

a. Description of the Work.
b. List of detrimental conditions, including substrates.
c. List of unacceptable installation tolerances.
d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than 2 days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

C. 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.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the existing room. If discrepancies are discovered, notify Architect promptly.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise 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.

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. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.

F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

G. 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.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. 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 materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

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.

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. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

F. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

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 for temperature and relative humidity.

3.7 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

END OF SECTION 017000

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 017000 "Execution" for progress cleaning of Project site.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Divisions 03 through 26 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

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.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 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 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 Divisions 03 through 26 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Divisions 03 through 26 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

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. Advise Owner of pending insurance changeover requirements.
2. Participate with Owner in conducting inspection and walkthrough.
3. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
4. Complete final cleaning requirements, including touchup painting.
5. 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, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. 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 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.

1.7 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 Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by 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.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. 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.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.
4. Submit list of incomplete items in any of the following format:
    a. PDF electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of 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.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

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. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Remove tools, construction equipment, machinery, and surplus material from Project site.
    d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    f. Remove labels that are not permanent.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

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 preparing operation and maintenance manuals, including the following:

1. Maintenance documentation directory.
2. Product maintenance manuals.
3. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Divisions 03 through 26 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Manual Content: Maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file and email to Architect.
    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.
2. One paper copy. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will forward to Owner.

PART 2 - PRODUCTS

2.1 MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents.

2.2 REQUIREMENTS FOR MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

2.3 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

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 project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 017000 "Execution Requirements" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Divisions 03 and 26 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit 1set of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:
    a. Initial Submittal:
        1) Submit 1 paper-copy set of marked-up record prints.
        2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    b. Final Submittal:
        1) Submit 1 digital PDF set of marked-up record prints.
        2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit digital PDF copy of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit digital PDF copy of each submittal.

E. Reports: Submit written report indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.
2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Mark important additional information that was either shown schematically or omitted from original Drawings.
5. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:
    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as digital copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as digital copy.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

DIVISION 03 – CONCRETE

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: fly ash; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Steel reinforcement and accessories.
4. Vapor retarders.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates.

D. Field quality-control reports.

1.5 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.

B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.7 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

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.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.

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," of greater compressive strength than concrete.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
2. Fly Ash: ASTM C 618, Class F or C.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do 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.

F. Water: ASTM C 94/C 94M and potable.

2.6 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates. Hardens and densifies concrete surfaces.

1. Acceptable Manufacturers:

a. BASF Corporation – MasterKure HD 200WB.
b. Euclid Chemical – Euco Diamond Hard.
c. Prosoco – Consolideck LS.
d. W.R. Meadows – Liqui-Hard.
e. Or approved equal.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.10 CONCRETE MIXTURES, GENERAL

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.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

B. Foundation Walls: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

C. Exterior Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 470 lb/cu. yd..
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

D. Interior Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd..
4. Slump Limit: 5 inches, plus or minus 1 inch.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 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 INSTALLATION

A. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

B. Construct forms tight enough to prevent loss of concrete mortar.

C. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

D. Chamfer exterior corners and edges 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.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.3 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder 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 fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

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.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.7 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 one 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 indicated.

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.

2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. 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 platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.8 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. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

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 with the following materials:

a. Water.
b. Continuous water-fog spray.
c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Curing Compound: Apply uniformly in 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. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

3.9 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.

2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

DIVISION 05 – METALS

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Load-bearing wall framing.
2. Non-load-bearing wall framing.
3. Mezzanine floor framing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

E. Evaluation Reports: For nonstandard cold-formed steel framing, post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

B. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

B. Fire-Resistance Ratings: Comply with ASTM E 119; 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 acceptable to authorities having jurisdiction.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: as indicated.
2. Coating: G60, A60, AZ50, or GF30.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

2.3 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: as indicated.
2. Flange Width: as indicated.
3. Section Properties: as indicated.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs, unless noted otherwise.
2. Flange Width: 1-1/4 inches, unless noted otherwise.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: as indicated.
2. Flange Width: as indicated.
3. Section Properties: as indicated.

2.4 NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: as indicated.
2. Flange Width: as indicated.
3. Section Properties: as indicated.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs, unless noted otherwise.
2. Flange Width: 1-1/4 inches, unless noted otherwise.

C. Vertical Deflection Clips: Manufacturer's standard clips, where indicated, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: as indicated.
2. Flange Width: 1 inch plus the design gap for one-story structures.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

    a. Minimum Base-Metal Thickness: as indicated.
    b. Flange Width: 1 inch plus the design gap for one-story structures.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 MEZZANINE-FLOOR FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: as indicated.
2. Flange Width: as indicated, minimum.
3. Section Properties: as indicated.

2.6 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor or adhesive anchor.

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780/A 780M.

B. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.9 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing 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 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

G. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: as indicated.

B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch between the end of wall-framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: As indicated on Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
2. Install 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.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically 48 inches. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges, and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges; terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

E. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 ERECTION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055213 - PIPE AND TUBE RAILINGS

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. Steel pipe railings.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. 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.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 STEEL AND IRON

A. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations.

B. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.4 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. 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.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

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 flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
5. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

I. Form Changes in Direction as Follows:

1. As detailed.
2. By bending or by inserting prefabricated elbow fittings.

J. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of railing members with prefabricated end fittings.

L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

O. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.5 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

DIVISION 06 – WOODS, PLASTICS, AND COMPOSITES

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

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. Wood blocking
2. Plywood backing panels

B. Related Requirements:

1. Section 061600 “Sheathing” for sheathing.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded 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.

B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b for exterior construction not in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat all miscellaneous carpentry unless otherwise indicated.

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Wood Blocking.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

C. Concealed Boards: 15 percent maximum moisture content of any:

D. 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.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. 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, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

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 or as appropriate for the substrate.

2.6 METAL FRAMING ANCHORS

A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking 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.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. 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.

G. 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.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

J. 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 WOOD BLOCKING INSTALLATION

A. Install where indicated and where required for 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 items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600 - SHEATHING

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. Wall sheathing.
2. Floor sheathing.

B. Related Requirements:

1. Section 061053 “Miscellaneous Rough Carpentry” for plywood backing panels.
2. Section 072500 “Weather Barriers” for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

B. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

B. Application: Treat plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying 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.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, 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. Use treatment that does not promote corrosion of metal fasteners.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat plywood indicated on Drawings, and the following:

1. Wall sheathing at electrical switchgear and panel boards.
2. Floor sheathing at Mezzanine Level.

2.5 WALL SHEATHING

A. Plywood Sheathing: Exterior, Exposure 1 sheathing.

1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than 1/2 inch.

B. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corporation.
   b. Georgia-Pacific Building Products.
   c. National Gypsum Company.
   d. United States Gypsum Company.
   e. Or Approved Equal.
2. Type and Thickness: Type X, 5/8 inch thick.
3. Size: 48 by 96 inches, 48 by 108 inches, 48 by 120 inches.

2.6 FLOOR SHEATHING

A. Plywood Sheathing: Exterior, Exposure 1 sheathing.

1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than 1/2 inch.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
2. For floor sheathing, provide fasteners as indicated on drawings.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Wood Sheathing to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

E. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.

1. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

E. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.3 WOOD SHEATHING INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Floor Sheathing:

a. Screw to cold-formed metal framing.
b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 072100 - THERMAL INSULATION

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. Extruded polystyrene foam-plastic board.
2. Glass-fiber blanket.

B. Related Requirements:

1. Section 061600 "Sheathing" for foam-plastic board sheathing installed over gypsum sheathing or steel framing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 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.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD - XPS (Exterior Walls, Perimeter, Underslab, and Foundations)

A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.

B. Extruded Polystyrene Board, Type X: ASTM C 578, Type X, 15-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. DiversiFoam Products.
   b. Dow Chemical Company (The).
   c. Owens Corning.

2.2 GLASS-FIBER BLANKET

A. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. CertainTeed Corporation.
   b. Johns Manville; a Berkshire Hathaway company.
   c. Knauf Insulation.
   d. Owens Corning.
   e. Or Approved Equal.

B. Glass-Fiber Blanket, Kraft Faced: ASTM C 665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. CertainTeed Corporation.
   b. Johns Manville; a Berkshire Hathaway company.
   c. Knauf Insulation.
   d. Owens Corning.
   e. Or Approved Equal.

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 that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

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. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, 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 PERIMETER, UNDERSLAB, AND BELOW-GRADE INSULATION

A. On vertical surfaces, set insulation units loosely laid according to manufacturer's written instructions.

1. Extend insulation from the top of the footing to the underside of floor slab.
2. Minimum R-Value of insulation to be R-10.
3. Contractor option on insulation type (EPS OR XPS identified in Part 2)

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 48 inches in from exterior walls.
2. Minimum R-Value of insulation to be R-10.
3. Contractor option on insulation type (EPS OR XPS identified in Part 2)
4. Place insulation below vapor barrier.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to 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.

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.

3.5 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. 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 072100

SECTION 072500 - WEATHER BARRIERS

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. Building wrap.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

B. Shop Drawings: Show details of building wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

C. Provide manufacturer installation instruction and/or best practices manual.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

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. Dow Chemical Company (The).
b. DuPont Building Innovations: E. I. du Pont de Nemours and Company.
c. Typar, A Berry Global Brand.
d. Or Approved Equal.

2. Drainability: 98 percent or greater when tested in accordance with ASTM E 2273.
3. Water-Vapor Permeance: Not less than 20 perms per ASTM E 96/E 96M, Desiccant Method (Procedure A).
4. Air Permeance: Not more than 0.004 cfm/sq. ft. at 1.57 lbf/sq. ft. when tested according to ASTM E 2357.
5. Allowable UV Exposure Time: Not less than nine months when tested in accordance with ASTM G 155 (Accelerated Weathering).

6. Flame Propagation Test: Materials and construction shall be as tested in accordance with NFPA 285.

B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements.

B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.

1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.

C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.

1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

3.3 WATER-RESISTIVE BARRIER INSTALLATION

A. General: Comply with weather barrier manufacturer’s written instructions and warranty requirements.

B. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

1. Maintain continuity of air and water barrier assemblies.
2. Start weather barrier installation at a building corner, leaving 12 inches of weather barrier extended beyond corner to overlap.
3. Install weather barrier horizontally starting at lower portion of wall surface.
4. Provide minimum 6 inches overlap at horizontal and vertical wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.

C. Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.

1. Shiplap horizontal seams in weather barrier to facilitate proper drainage.

D. Fasteners: Use weather barrier manufacturer’s recommended fasteners to secure weather barrier and install fasteners according weather barrier manufacturer’s installation guidelines.

1. Do not use temporary fasteners to permanently attach weather barrier.
2. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
3. Install fasteners with gasketing washers through flashing where recommended by manufacturer.

E. Openings: Completely cover openings with weather barrier, then cut weather barrier membrane to openings according to weather barrier manufacturer's installation guidelines.

1. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
2. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
3. Install flashing according to weather barrier manufacturer's installation guidelines.

3.4 CLEANING

A. Immediately remove release paper and scrap from work area and dispose of material in accordance with requirements of Section 017300 "Execution".

3.5 PROTECTION

A. Protect installed weather barrier from the following:

1. Damage from cladding, structure, or a component of the structure (e.g., window, door, or wall system).
2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
4. UV exposure in excess of products' stated limits.

END OF SECTION 072500

SECTION 079200 - JOINT SEALANTS

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. Silyl-terminated polyether (STPE) joint sealants
2. Latex joint sealant
3. Urethane joint sealants
4. Silicone joint sealants.

B. Related Requirements:

1. Section 088000 “Glazing” for glazing sealants.
2. Section 092900 “Gypsum Board” for sealing perimeter joints.

1.3 PREINSTALLATION MEETING

A. Preinstallation Conference: Conduct conference at project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application and joint location.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class and uses related to exposure and joint substrates.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

A. Single-Component, Non-sag, Silyl-Terminated Polyether Joint Sealant, ASTM C 920, Type S, Grade NS, Class 50, Use NT, M, A and O.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Tremco – Dymonic FC
b. BASF Building Systems – MasterSeal NP 150
c. Sika – SikaHyflex 150 LM
d. Or approved equal

2.3 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic Latex or Siliconized Acrylic Latex, ASTM C 834, Type OP, Grade NF, Paintable.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Tremco – Tremflex 834
b. BASF Building Systems – MasterSeal NP 520
c. Pecora – AC-20+
d. Or approved equal

2.4 URETHANE JOINT SEALANTS

A. Single-Component, Polyurethane Joint Sealant, Self-Leveling, ASTM C 920, Type S, Grade P, Class 35, Use NT, T, M, A, O and I.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Tremco – Vulkem 45SSL
b. BASF – MasterSeal SL-1
c. Sika – Sikaflex-1c SL
d. Or approved equal

2.5 SILICONE JOINT SEALANTS

A. Single-Component, Non-Sag, Non-Staining, Neutral-Curing, Silicone Joint Sealant, ASTM C 920, Type S, Grade NS, Class 50, Use NT, M, G, A and O.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Tremco – Spectrem 2 or Spectrem 3
b. Dow Corning Corporation – DowSil 791 or DowSil 795
c. Sika – Sikasil WS-295
d. Or approved equal

B. Mildew-Resistant, Single-Component, Non-Sag, Non-Staining, Neutral-Curing, Silicone Joint Sealant, ASTM C 920, Type S, Grade NS, Class 50, Use NT, G, A and O.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Tremco – Tremsil 200
b. Dow Corning Corporation – DowSil 786
c. Sika – Sikasil – N Plus Us
d. Or approved equal

2.6 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Joint Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with surface skin) or any of the proceeding types, as approved in writing by joint-sealant manufacturer for joint application indicated and or size and density to control sealant depth and otherwise continue to producing optimum sealant performance.

C. Bond Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT SEALANT SCHEDULE

A. Joint Sealant Application:

1. Joint Locations

a. Concealed sealant bead in sheet metal work.
b. Other joints as indicated.

2. Joint Sealant: Silyl-Terminated Polyether (STPE)
3. Color: To be selected by Architect from manufacturer's standard range.

B. Joint Sealant Application

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings
c. Other interior joints for which no other sealant is indicated.

2. Joint Sealant: Latex
3. Color: To be selected by Architect from manufacturer's standard range.

C. Joint Sealant Application: Interior joints in horizontal traffic surfaces

1. Joint Locations:

a. Expansion or Isolation joints in cast-in-place concrete slabs.
b. Other joints as indicated.

2. Joint Sealant: Urethane.
3. Color: Match adjacent surfaces

D. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete
b. Joints between metal panels.
c. Joints between different materials listed above.
d. Perimeter joints between materials listed above and frames of doors, windows and louvers.
e. Other exterior joints for which no other sealant is indicated.

2. Joint Sealant: Silicone
3. Color: To be selected by Architect from manufacturer's standard range.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal non-traffic surfaces.

1. Joint Locations:

a. Joints between plumbing fixtures and adjoining walls, floors and counters.
b. Other joints as indicated.

2. Joint Sealant: Mildew-Resistant Silicone
3. Color: To be selected by Architect from manufacturer's standard range.

END OF SECTION 079200

DIVISION 08 – OPENINGS

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

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. Exterior standard steel doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 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.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, and finishes.

B. 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.

C. 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.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.7 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 non-vented 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 MANUFACTURERS

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. Black Mountain Door, LLC.
2. Ceco Door; an ASSA ABLOY brand.
3. Curries Company; an ASSA ABLOY brand.
4. Mesker Door Inc.
5. Republic Doors and Frames.
6. Steelcraft; an Allegion brand.
7. Or Approved Equal.

B. Source Limitations: Obtain hollow-metal work from single source for single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.37 BTU/F x h x sq. ft. when tested according to ASTM C 518.

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. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A 250.4.
2. Doors:
    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches.
    c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
    d. Edge Construction: Model 2, Seamless.
    e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
    f. 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.
    g. Core: Polystyrene, Polyurethane, Polyisocyanurate, or Mineral Board.
3. Frames:
    a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
    b. Construction: Full profile welded.
    c. Kerf Frame: Provide a 1/8-inch integral kerf, formed into the frame jambs and soffit, to receive a gasket composed of a cellular modified foam core clad in an embossed, non-vinyl, paint-resistant liner, which is UV stabilized. Gasket is to be provided by the Hollow Metal Door and Frame supplier, as part of this section. Do not install until frame has been finish field painted.
        1) Gasket Basis-of-Design Product: Curries; CURRISEAL.
        2) Or Approved Equal.
4. Exposed Finish: Prime.
5. Apply “Rusco Permanent Sealer” to soffits, stops, and rabbets of corner joints that will be exposed to the exterior side.

2.4 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. Post-installed 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. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

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 C 665, 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 E 136 for combustion characteristics.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Bituminous Coating: Cold-applied asphaltic 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.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026-inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
3. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
4. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.

5. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
4. Jamb Anchors: Provide number and spacing of anchors as follows:
    a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    b. Compression Type: Not less than two anchors in each frame.
    c. Post-installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
5. 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.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.7 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 SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.8 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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.

B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames for doors and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    b. Install frames with removable stops located on secure side of opening.
    c. Install door silencers in frames before grouting.
    d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    f. Field apply bituminous coating to backs of frames that will be filled with grout containing anti-freezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.

3. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb 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 hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    b. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
    c. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. 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.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 083113 - ACCESS DOORS AND FRAMES

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 access doors and frames for walls and ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.

B. Product Schedule: For access doors and frames.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Exposed Flanges:

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. Acudor Products, Inc.
    b. Babcock-Davis.
    c. JL Industries, Inc.; a division of the Activar Construction Products Group.
    d. Karp Associates, Inc.
    e. Larsens Manufacturing Company.
    f. Milcor; Commercial Products Group of Hart & Cooley, Inc.
    g. Nystrom, Inc.
    h. Or Approved Equal.
2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Locations: Wall and ceiling (as noted on plans or as required for working access).
    a. Install above grab bars to open side of toilet
4. Door Size: As noted on plans or as required for working access
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
6. Latch and Lock: Cam latch, key operated.

2.2 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Frame Anchors: Same material as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

D. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.

2.4 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. 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.

D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates 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

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 083323 – OVERHEAD COILING DOORS

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. Overhead coiling doors.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Overhead coiling doors:

1. Wind Loads: Design door assembly to withstand wind/suction load of so psf without damage to door or assembly components in conformance with ASTM E 330.
2. Operation: Design door assembly to operate for not less than 20,000 cycles. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

1.5 CLOSEOUT SUBMITTALS

A. Warranty Information

B. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.6 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.

1.7 WARRANTY

A. Manufacturer’s limited door warranty for 2 years for all parts and components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.

1. Obtain operators and controls from coiling counter door manufacturer.

2.2 OVERHEAD COILING DOOR ASSEMBLY

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. Cookson Company.
b. Cornell Iron Works, Inc.
c. McKeon Rolling Steel Door Company, Inc.
d. Overhead Door Corporation.
e. Raynor.
f. Wayne-Dalton Corp.
g. Or Approved Equal.

2. Basis of Design: Model 610 (Overhead Door Company).

A. Door Curtain Material: 20 ga. galvanized steel.

B. Door Curtain Slats: Flat profile slats.

C. Weatherseals:

a. Vinyl bottom seal.
b. Guide weatherseal.

D. Bottom Bar: Manufacturer's standard galvanized steel angles, finished to match door.

E. Curtain Jamb Guides: Three structural steel angles.

F. Hood: Match curtain material and finish.

1. Shape: Round or Square.
2. Mounting: Face of wall.

G. Sill Configuration: No sill.

H. Locking Devices: Equip door with cylinder lock.

I. Manual Door Operator: Push-up operation.

1. Provide operator with through-wall shaft operation.
2. Provide operator with manufacturer's standard removable operating arm.

J. Curtain Accessories: Equip door with push/pull handles.

K. Door Finish:

1. Manufacturer’s standard exterior colors.

2.3 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.4 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. 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.

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. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.

3.3 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083323

SECTION 083613 - SECTIONAL DOORS

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 electrically operated sectional doors.

1.3 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. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied finishes.

1. Include Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sectional doors to include in maintenance manuals.

1.6 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.

1.7 WARRANTY

A. Special 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. Special 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 MANUFACTURERS, GENERAL

A. Source Limitations: 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: Sectional doors shall comply with performance requirements specified without failure due to 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. (960 Pa), acting inward and outward.
2. Testing: According to ASTM E 330.
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 the door width.
b. Deflection of horizontal track assembly shall not exceed 1/240 of the door height.

4. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

2.3 DOOR ASSEMBLY (INSULATED STEEL SECTIONAL OVERHEAD DOOR)

A. Steel Sectional Door: Sectional door formed with hinged sections and fabricated according to DASMA 102 unless otherwise 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. Overhead Door Corporation
b. Raynor.
c. Wayne-Dalton Corp.
d. Or Approved Equal

B. Operation Cycles: Door components and operators capable of operating for not less than 100,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Air Infiltration: 0.08 cfm at 15 and 25 mph when tested according to ASTM E 283.

D. R-Value: 14.86 (U-value of 0.067).

E. Door Assembly: Metal / foam / metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.

1. Basis of Design: Thermacore 591.
2. Panel Thickness: 1-5/8 inches.
3. Exterior Surface: Ribbed, Textured.
4. Exterior-Face, Steel Sheet Thickness: 0.015 inch, hot dipped galvanized.
5. End Stiles: 16 Gauge.
6. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
7. Insulation: CFC free and HCFC free polyurethane, fully encapsulated.

F. Track Configuration:

1. Size: As recommend by manufacturer.
2. Type: Standard-lift.

G. Weather seals: Fitted to bottom and top and around entire perimeter of door.

H. Roller-Tire Material: Case-hardened steel.

I. Locking Devices: Equip door with slide bolt for padlock.

J. Counterbalance Type: Torsion spring.

K. Electric Door Operator:

1. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operational life specified, complete with electric motor and factory pre-wired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door and accessories required for proper operation.
2. Comply with NFPA 70
3. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation.
4. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1
5. Safety: Listed according to UL 325 or by a qualified testing agency for commercial or industrial use.
6. Motor Exposure: Exterior, dusty, wet, or humid.
7. Obstruction-Detection Device: Provide motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
8. Remote Control: Door shall be remote control. Provide a complete operation. Provide antennae for door through the wall of the metal building. Coordinate location with other trades and where indicated on the drawings.

L. Door Finish:

1. Baked-Enamel or Powder-Coat Finish: Color and gloss as selected by Architect from manufacturer's full range.
2. Finish of Interior Facing Material: Finish as selected by Architect from manufacturer's full range.

2.4 MATERIALS, GENERAL

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.

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. Examine locations of electrical connections.

C. 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; according to manufacturer's written instructions and as specified.

B. Tracks:

1. Fasten vertical track assembly to opening jambs and framing, 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. Power-Operated Doors: Install according to UL 325.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to 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.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.

D. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780/A 780M.

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 083613

SECTION 084113 – ALUMINUM-FRAMED STOREFRONT

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. Aluminum storefront framing for punched openings.

1.3 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: For aluminum-framed storefront. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed storefront, showing the following:
    a. Joinery, including concealed welds.
    b. Anchorage.
    c. Expansion provisions.
    d. Glazing.
    e. Flashing and drainage.
3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: For aluminum-framed storefront, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed storefront.

B. Product Test Reports: For aluminum-framed storefront, for tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed storefront to include in maintenance manuals.

1.6 WARRANTY

A. Special Warranty: Written warranty jointly signed by fabricator, installer, and Contractor agreeing to repair or replace components of aluminum-framed storefront 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.
2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: 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 Hunter units when tested according to ASTM D 2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Warranty Period: Five 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 storefront 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 including, but not limited to, story drift, 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.

B. Structural Loads:

1. Wind Loads: As indicated on Drawings.

C. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

D. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, 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.

E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

G. Water Penetration under Dynamic Pressure: Test according to 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: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

H. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 as determined according to NFRC 200.
2. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 25 as determined according to NFRC 500.

I. 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.

2.2 MANUFACTURERS

A. Subject to compliance with the Construction Documents, the following manufacturers are acceptable:

1. Kawneer Co, Inc.
2. Efco Corporation
3. Manko Window Systems
4. Tubelite, Inc.
5. Or Approved Equal

B. Source Limitations: Obtain all components of aluminum-framed storefront system, including framing and accessories, from single manufacturer.

C. Basis of Design: Trifab 451T by Kawneer Co., Inc.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally improved.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: High-performance organic finish.
5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B 209.
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
d. Structural Profiles: ASTM B 308/B 308M.

2.4 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.

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.

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 A 123/A 123M or ASTM A 153/A 153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

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.

D. Storefront Framing: Fabricate components for assembly using shear-block system.

E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm.

1. Color: Architect to choose from manufacturer’s standard colors.

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

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. 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.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified in Section 088000 "Glazing."

3.3 ERECTION TOLERANCES

A. Erection Tolerances: 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:
    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 084113

SECTION 087100 - DOOR HARDWARE

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 CONDITIONS

A. This section includes all material, and related service necessary to furnish all finish hardware indicated on the drawings or specified herein.

B. Furnish UL listed hardware for all labeled and 20 min. openings in conformance with the requirements for the class of opening scheduled. Underwriters' requirements shall have precedence over specification where conflicts exist.

C. All work shall be in accordance with all applicable state and local building codes. Code requirements shall have precedence over this specification where conflicts exist.

1.3 SUMMARY

A. Section includes:

1. Mechanical door hardware for the for the following:

    a. Swinging doors

2. Furnish door hardware (for hollow metal) specified herein, listed in the hardware schedule, and/or required by the drawings.

B. Where items of hardware are not definitely or correctly specified and is required for the intended service, such omission, error or other discrepancy should be directed to the Architect prior to the bid date for clarification by addendum. Otherwise furnish such items in the type and quantity established by this specification for the appropriate service intended.

1.4 RELATED SECTIONS

A. This section includes coordination with related work in the following sections:

1. Section 081113 "Hollow Metal Doors and Frames" for door silencers provided as part of hollow metal frames.

1.5 REFERENCES

A. Publications of agencies and organizations listed below form a part of this specification section to the extent referenced.

1. DHI - Recommended Locations for Builders' Hardware.
2. NFPA 80 - Standards for Fire Doors and Windows.
3. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
4. UL - Building Material Directory.
5. DHI - Door and Hardware Institute
6. WHI - Warnock Hersey
7. BHMA - Builders Hardware Manufacturers Association
8. ANSI – American National Standards Institute
9. IBC - International Building Code Current Edition

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components, profiles and finishes.

B. Submit detailed hardware schedule in quantities as required by Division 01 - General Conditions.

C. Schedule format shall be consistent with recommendations for a vertical format as set forth in the Door & Hardware Institute's (DHI) publication "Sequence and Format for the Hardware Schedule". Hardware sets shall be consolidated to group multiple door openings which share similar hardware requirements. Schedule shall include the following information:

1. Door number, location, size, handing, and rating.
2. Door and frame material, handing.
3. Degree of swing.
4. Manufacturer
5. Product name and catalog number
6. Function, type and style
7. Size and finish of each item
8. Mounting heights
9. Explanation of abbreviations, symbols, etc.
10. Numerical door index, indicating the hardware set/ group number for each door.

D. When universal type door closers are to be provided, the schedule shall indicate the application method to be used for installation at each door: (regular arm, parallel arm, or top jamb).

E. Check the specified hardware for suitability and adaptability to the details and surrounding conditions.

F. Review drawings from related trades as required to verify compatibility with specified hardware. Indicate unsuitable or in compatible items, and proposed substitutions in the hardware schedule.

G. Furnish manufacturers' catalog data for each item of hardware in quantities as required by Division 01 - General Conditions.

H. Submit a sample of each type of hardware requested by the architect. Samples shall be of the same finish, style, and function as specified herein. Tag each sample with its permanent location so that it may be used in the final work.

I. Furnish with first submittal, a list of required lead times for all hardware items.

J. After final approved schedule is returned, transmit corrected copies for distribution and field use in quantities as required by Division 01 - General Conditions.

K. Furnish approved hardware schedules, template lists, and pertinent templates as requested by related trades.

L. Furnish necessary diagrams, schematics, voltage and amperage requirements for all electro-mechanical devices or systems as required by related trades. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

M. After receipt of approved hardware schedule, Hardware supplier shall initiate a meeting including the owner's representative to determine keying requirements. Upon completion of the initial key meeting, hardware supplier shall prepare a proposed key schedule with symbols and abbreviations as set forth in the door and hardware institute's publication "Keying Procedures, Systems, and Nomenclature". Submit copies of owner approved key schedule for review and field use in quantities as required by Division 01 - General Conditions. Wiring diagrams shall be included in final submittals transmitted for distribution and field use.

1.7 QUALITY ASSURANCE

A. Manufacturers and model numbers listed are to establish a standard of function and quality. Similar items by approved manufacturers that are equal in design, function, and quality, may be considered for prior approval of the architect, provided the required data and physical samples are submitted for approval as set forth in Division One General Requirements.

B. Where indicated in this specification, products shall be independently certified by ANSI for compliance with relevant ANSI/BHMA standards A156.1 - A156.36 – Standards for Hardware and Specialties. All products shall meet or exceed certification requirements for the respective grade indicated within this specification. Supplier shall provide evidence of certification when requested by the architect.

C. Obtain each type of hardware (hinges, latch & locksets, exit devices, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. All hardware items shall be manufactured no earlier than 6 months prior to delivery to site.

E. Hardware supplier shall be factory trained and certified by the manufacture to provide and support all computer managed locks and system components. Supplier shall have an Architectural Hardware Consultant “AHC” or Door and Hardware Consultant “DHC” on staff.

F. Installation of hardware shall be installed or directly supervised and inspected by a skilled installer certified by the manufacturer of locksets, door closers, and exit devices used on the project, or with not less than 3 years’ experience in successful completion of projects similar in size and scope.

G. Comply with all applicable provisions of the standards referenced within section 1.5 of this specification.

H. Hardware supplier shall participate when reasonably requested to meet with the contractor and or architect to inspect any claim for incorrect or non-functioning materials; following such inspection, the hardware supplier shall provide a written statement documenting the cause and proposed remedy of any unresolved items.

1.8 DELIVERY, STORAGE AND HANDLING

A. Hardware supplier shall deliver hardware to the job site unless otherwise specified.

B. All hardware shall be delivered in manufacturers' original cartons and shall be clearly marked with set and door number.

C. Coordinate with contractor prior to hardware delivery and recommend secure storage and protection against loss and damage at job site.

D. Contractor shall receive all hardware and provide secure and proper protection of all hardware items to avoid delays caused by lost or damaged hardware. Contractor shall report shortages to the Architect and hardware supplier immediately after receipt of material at the job site.

E. Coordinate with related trades under the direction of the contractor for delivery of hardware items necessary for factory installation.

1.9 WARRANTY

A. All hardware items shall be warranted against defects in material and workmanship as set forth in Division One General Requirements.

B. Repair, replace, or otherwise correct deficient materials and workmanship without additional cost to owner.

PART 2 - PRODUCTS

2.1 FASTENERS

A. All exposed fasteners shall be Phillips head or as otherwise specified and shall match the finish of the adjacent hardware. All fasteners ex-posed to the weather shall be non-ferrous or stainless steel. Furnish correct fasteners to accommodate surrounding conditions.

B. Coordinate required reinforcements for doors and frames. Seek approval of the architect prior to furnishing through-bolts. Furnish through-bolts as required for materials not readily reinforced.

C. Unless otherwise specified, furnish the following hinge quantities for each door leaf.

1. 3 hinges for doors up to 90 inches.

2. 1 additional hinge for every 30 inches on doors over 90 inches.

3. 4 hinges for Dutch door applications.

D. Unless otherwise specified, top and bottom hinges shall be located as specified in division 8 Section "Hollow Metal Doors and Frames". Intermediate hinges shall be located equidistant from others.

E. Unless otherwise specified, furnish hinges in the following sizes:

1. 4-1/2” X 4-1/2” 1-3/4” Thick Doors

F. Furnish hinges with sufficient width to accommodate trim and allow for 180-degree swing.

G. Unless otherwise specified, furnish hinges with flat button tips with non-rising pins at interior doors, non-removable loose pins (NRP) at exterior and out-swinging interior doors.

H. Unless otherwise specified, furnish all hinges to template standards.

2.2 LOCKS AND LATCHES

A. Bored locks shall be independently certified by ANSI for compliance with ANSI A156.2 (2011). Interconnected locks shall be independently certified by ANSI for compliance with ANSI A156.12 (2013). Mortise locks shall be independently certified by ANSI for compliance with ANSI A156.13 (2012).

B. Unless otherwise specified, all locks and latches to have:

1. 2-3/4" Backset

2. 1/2" minimum throw latchbolt

3. 1" throw deadbolt

4. ANSI A115.2 strikes

C. Provide guarded latch bolts for all locksets, and latch bolts with sufficient throw to maintain fire rating of both single and paired door assemblies.

D. Length of strike lip shall be sufficient to clear surrounding trim.

E. Provide wrought boxes for strikes at inactive doors, wood frames, and metal frames without integral mortar covers.

2.3 KICK PLATES AND MOP PLATES

A. Furnish protective plates as specified in hardware groups.

B. Where specified, provide 10" kick plates, 34" armor plates, and 4" mop plates. Unless otherwise specified, metal protective plates shall be .050" thick; plastic plates shall be 1/8" thick.

C. Protective plates shall be 2" less door width, or 1" less door width at pairs. All protective plates shall be beveled 4 sides and counter sunk. Protection plates over 16" shall not be provided for labeled doors unless specifically approved by door manufacturers listing.

D. Where specified, provide surface mounted door edges. Edges shall butt to protective plates. Provide edges with cutouts as required adjacent hardware.

E. Adjust dimensions of protection plates to accommodate stile and rail dimensions, lite and louver cutouts, and adjacent hardware. Where required by adjacent hardware, protection plates shall be factory drilled for cylinders or other mortised hardware.

2.4 WEATHERSTRIP AND GASKETING

A. Where specified in the hardware groups, furnish the above products unless otherwise detailed in groups.

B. Provide weatherstripping on all exterior doors and where specified.

C. Provide intumescent and other required edge sealing systems as required by individual fire door listings to comply with positive pressure standards UL 10C.

D. Provide smoke gaskets at all fire rated doors and smoke and draft control assemblies.

E. Provide gasketing for all meeting edges on pairs of fire doors. Gasketing shall be compatible with astragal design provided by door supplier as required for specific fire door listings.

2.5 THRESHOLDS

A. Hardware supplier shall verify all finish floor conditions and coordinate proper threshold as required to insure a smooth transition between threshold and interior floor finish.

B. Threshold Types:

1. Unless otherwise specified, provide saddle threshold for all exterior openings with an interior floor finish less than or equal to 1/4" in height.

2. Unless otherwise specified, provide half saddle threshold for all exterior openings with an interior floor finish greater than 1/4" in height. Threshold height shall match thickness of interior floor finish.

2.6 FINISHES AND BASE MATERIALS

A. Unless otherwise indicated in the hardware groups or herein, hardware finishes shall be applied over base metals as specified in the following finish schedule:

	HARDWARE ITEM	BHMA FINISH AND BASE MATERIAL
1.	Butt Hinges: Exterior, or Non-Ferrous	630 (US32D - Satin Stainless Steel)
2.	Locks and Latches	626 (US26D - Satin Chromium)
3.	Protective Plates	630 (US32D - Satin Stainless Steel)
4.	Thresholds	628 (Mill Aluminum)
5.	Weather-strip, Sweeps Drip Caps	Aluminum Anodized

2.7 KEYING

A. Provide all locks and cylinders utilizing a patented keyway to prevent manufacturing and distribution of aftermarket key blanks by anyone other than factory authorized dealers if a new key system.

B. If matching an existing key system, owner to provide a copy of key records or sample key to match keying.

C. Keying shall be by lock manufacturer where permanent records shall be kept.

D. Furnish a total of 2 keys per cylinder. Actual cut keys to be determined by owner.

E. Master keys and control keys to be delivered by registered mail to the owner. Change keys shall be delivered in a set up key cabinet. Construction keys shall be delivered to the contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, installer shall examine door frame installation to insure frames have been set square and plumb. Installer shall examine doors, door frames, and adjacent wall, floor, and ceiling for conditions, which would adversely affect proper operation and function of door assemblies. Do not proceed with hardware installation until such deficiencies have been corrected.

3.2 INSTALLATION

A. Before hardware installation, general contractor/construction manager shall coordinate a hardware installation seminar with a 1 week notice to all parties involved. The seminar is to be conducted on the installation of hardware, specifically of locksets, closers, exit devices, continuous hinges and overhead stops. Manufacturer's representative of the above products to present seminar. Seminar to be held at the job site and attended by installers of hardware (including low voltage hardware) for aluminum, hollow metal and wood doors. Training to include use of installation manuals, hardware schedule, templates and physical products samples.

B. Install all hardware in accordance with the approved hardware schedule and manufacturers instructions for installation and adjustment.

C. Set units level, plumb and true to the line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accord with industry standards.

E. Drill appropriate size pilot holes for all hardware attached to wood doors and frames.

F. Shim doors as required to maintain proper operating clearance between door and frame.

G. Unless otherwise specified, locate all hardware in accordance with the recommended locations for builders hardware for standard doors and frames as published by the Door and Hardware Institute.

H. Use only fasteners supplied by or approved by the manufacturer for each respective item of hardware.

I. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.

J. Conceal push and pull bar fasteners where possible. Do not install through bolts through push plates.

K. Apply self-adhesive gasketing on frame stop at head & latch side and on rabbet of frame at hinge side.

L. Install hardware in accordance with supplemental "S" label instructions on all fire rated openings.

M. Where necessary, adjust doors and hardware as required to eliminate binding between strike and latchbolt. Doors should not rattle.

N. Install "hardware compatible" (bar stock) type weatherstripping continuously for an uninterrupted seal. Adjust templating for parallel arm door closers, exit devices, etc., as required to accommodate weatherstripping.

O. Unless otherwise specified or detailed, install thresholds with the bevel in vertical alignment with the outside door face. Notch and closely fit thresholds to frame profile. Set thresholds in full bed of sealant.

P. Compress sweep during installation as recommended by sweep manufacturer to facilitate a water resistant seal.

Q. Deliver to the owner 1 complete set of installation and adjustment instructions, and tools as furnished with the hardware.

3.3 FIELD QUALITY CONTROL

A. After installation has been completed, the hardware supplier for locksets shall check the project and verify compliance with installation instructions, adjustment of all hardware items, and proper application according to the approved hardware schedule. Hardware supplier shall submit a list of all hardware that has not been installed correctly.

B. After installation has been completed, the hardware supplier shall meet with the owner to explain the functions, uses, adjustment, and maintenance of each item of hardware. Hardware supplier shall provide the owner with a copy of all wiring diagrams. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

3.4 ADJUSTMENT AND CLEANING

A. At final completion installer shall make final adjustments to and verify proper operation of all items of hardware. Lubricate moving parts with type lubrication recommended by the manufacturer.

B. All hardware shall be left clean and in good operation. Hardware found to be disfigured, defective, or inoperative shall be repaired or replaced.

3.5 EXTRA STOCK

A. All extra hardware items, fasteners, and special installation tools are to be turned over to the owner at completion of the project.

3.6 HARDWARE MANUFACTURERS AND SCHEDULE

A. The following list of manufacturers have been approved for use on this project:

	SPECIFIED	APPROVED
HINGES	MCKINNEY	IVES
LOCKS	CORBIN RUSSWIN	SARGENT, SCHLAGE
EXIT DEVICES	CORBIN RUSSWIN	SARGENT, VON DUPRIN
CYLINDERS	SCHLAGE C KEYWAY	NO SUB.
CLOSERS	NORTON	SARGENT, LCN
FLAT GOODS, PULLS, STOPS	ROCKWOOD	IVES
WEATHERPROOFING, SEALS	PEMKO	REESE

B. The following schedule of hardware groups will be furnished for the project:

HARDWARE SET NO. 1
(DOOR NO. 104, 104B)

3	Each	Hinges	T4A3386 NRP 4.5 x 4.5	US26D
1	Each	Exit Device	ED5200 P957	630
1	Each	Device Cylinder	20-022 C	626
1	Each	Door Closer	CPS7500	689
1	Each	Kick Plate	K1050 8” x 2” LDW	US32D
1	Each	Rain Guard	346C (Frame Width + 4”)	
1	Each	Gasketing	294AV (Head & Jambs)	
1	Each	Sweep	345ANB x Door Width	
1	Each	Threshold	2005AT	

HARDWARE SET NO. 2
(DOOR NO. 101, 102, 103)

3	Each	Hinges	T4A3386 NRP 4.5 x 4.5	US26D
1	Each	Storeroom Lock	CL3357 NZD C	626
1	Each	Door Closer	CPS7500	689
1	Each	Kick Plate	K1050 8” x 2” LDW	US32D
1	Each	Rain Guard	346C (Frame Width + 4”)	
1	Each	Gasketing	294AV (Head & Jambs)	

1	Each	Sweep	345ANB x Door Width
1	Each	Threshold	2005AT

END OF SECTION 087100

SECTION 088000 - GLAZING

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. Glass for aluminum-framed storefront punched openings.
2. Glazing sealants and accessories.

1.3 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 according to ASTM C 1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.4 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.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1. Coated glass.
2. Insulating glass.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.

B. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 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.

1.9 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 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 the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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. Cardinal Glass Industries
2. Guardian Industries Corp.; SunGuard.
3. Oldcastle BuildingEnvelope™.
4. Pilkington North America.

5. PPG Flat Glass; PPG Industries, Inc.
6. Viracon, Inc.
7. Or Approved Equal.

B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

1. Obtain tinted glass from single source from single manufacturer.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: 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 shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

1. Design Wind Pressures: As indicated on Structural Drawings.
2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Wind Design Data: As indicated on Structural Drawings.
    b. Basic Wind Speed: 110 mph.
    c. Importance Factor: III
    d. Exposure Category: C.

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. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations 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. GANA Publications: "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

C. Thickness: Where glass thickness is indicated, it is a minimum.

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 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.

2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.7 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 C 1281 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 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 the 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.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of 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: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.9 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.

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.

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 according to 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 by gasket manufacturer.

3.4 TAPE GLAZING

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.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. 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.

3.5 GASKET GLAZING (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 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 by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

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 AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. 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 come into 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.

C. Remove and replace glass that is damaged during construction period.

D. 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 writing by glass manufacturer.

3.8 MONOLITHIC GLASS SCHEDULE

A. Glass Type CFG: Clear annealed float glass.

1. Minimum Thickness: 6 mm.

B. Glass Type CTG: Clear fully tempered float glass.

1. Minimum Thickness: 6 mm.

3.9 INSULATING GLASS SCHEDULE

A. Glass Type CTIG: Low-E-coated, clear tempered insulating glass.

1. Basis of Design: Viracon, Inc.
    a. 1” Insulating Vision Glass: VE 1-48
        1) Exterior Glass: ¼” Fully Tempered Float Glass (6mm min.)
        2) Coating: Low-E Coating: Sputtered on #2 Surface
        3) Space: ½” aluminum, black, air filled
        4) Silicone: Black
        5) Interior Glass: ¼” Fully Tempered Float Glass (6mm min.)
        6) Performance Requirements:
            a) Visible Light Transmittance: 47% min.
            b) Exterior Reflectance: 17%
            c) Interior Reflectance: 11%
            d) Solar Energy Reflectance: 22%
            e) Winter U-Value: 0.31 max
            f) Summer U-Value: 0.29 max
            g) Shading Coefficient: 0.43
            h) Solar Heat Gain Coefficient: 0.37 max
            i) UV Transmittance: 19% max
            j) Shading Coefficient: 0.43
            k) Safety Glazing Required

END OF SECTION 088000

DIVISION 09 – FINISHES

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

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. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Studs and Runners: Provide documentation that framing members certification is according to SIFA’s “Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members.”

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

B. Horizontal Deflection: For wall assemblies, limited to 1/360 of the wall height based on horizontal loading of 5 lbf/sq. ft.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C 645. Use either steel studs and tracks or embossed steel studs and tracks.

1. Steel Studs and Tracks:

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) ClarkDietrich.
2) MarinoWARE.
3) MBA Building Supplies.
4) Telling Industries.
5) Or Approved Equal.

b. Minimum Base-Metal Thickness: 0.0296 inch (20 gauge non-structural).
c. Depth: As indicated on Drawings.

2. Embossed Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally equivalent to conventional ASTM C 645 steel studs and tracks.

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) ClarkDietrich.
2) MarinoWARE.
3) MBA Building Supplies.
4) Telling Industries.
5) Or Approved Equal.

b. Minimum Base-Metal Thickness: 0.20 inch (20 gauge equivalent)
c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch minimum vertical movement.
2. Single Long-Leg Track System: ASTM C 645 top track with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.0329 inch (20 gauge structural).

E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.0296 inch.
2. Depth: As indicated on Drawings.

G. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.

1. Configuration: hat shaped.

H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

I. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. At contractor’s option, provide either conventional ceiling suspension systems or grid suspension systems as specified in this article.

B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.

1. Depth: As indicated on Drawings.

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
2. Steel Studs and Tracks: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.0179 inch.
b. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

   a. Minimum Base-Metal Thickness: 0.0296 inch.

4. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.

   a. Configuration: hat shaped.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Armstrong World Industries; Drywall Grid System.
   b. Chicago Metallic Corp; 640/660 Drywall Ceiling Suspension.
   c. USG Corp; Drywall Suspension System.

2.4 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. Isolation Strip at Exterior Walls: Provide the following:

1. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, 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 indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 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 non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

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 tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated 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.
    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.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. 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.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. 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.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. 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.
4. 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.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

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. Interior gypsum board.

B. Related Requirements:

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 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.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board 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, 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Gypsum.
    b. CertainTeed Corporation.
    c. Georgia-Pacific Gypsum LLC.
    d. National Gypsum Company.
    e. USG Corporation.
    f. Or Approved Equal.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered.
4. Abuse-Resistant Type: At all exposed walls below 8-feet.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

    a. Cornerbead.
    b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    c. L-Bead: L-shaped; exposed long flange receives joint compound.
    d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    e. Expansion (control) joint.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

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 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

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 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

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. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
1. Type X: Vertical/Horizontal surfaces unless otherwise indicated.
2. Abuse-Resistant Type: At all exposed walls below 8-feet.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated 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.

b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. 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 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. U-Bead: Use at exposed panel edges where indicated.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board 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 gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Where indicated on Drawings.
3. 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."

4. Level 5: Where indicated on Drawings (Gloss or Semi-gloss walls).

a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

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 092900

SECTION 096513 – RESILIENT BASE AND ACCESSORIES

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. Resilient base

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

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. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile 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. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg For more than 95 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL BASE VB-1

A. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style B, Cove: Provide in areas, as listed in the room finish schedule.

B. Minimum Thickness: 0.125 inch.

C. Height: 4 inches.

D. Lengths: Min. 50 ft. coils.

E. Outside Corners: Job formed.

F. Inside Corners: Job formed.

G. Colors and Patterns: Architect to choose from manufacturer’s standard colors.

2.2 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 by resilient-product manufacturer for resilient products and substrate conditions indicated.

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 according to 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 they are the same temperature as the 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 RESILIENT BASE INSTALLATION

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.

H. Job-Formed Corners:

1. Outside Corners: ‘V’ cut back of base strip to 2/3 of its thickness, heat and fold; no joint to access within 24” of corner.

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 exposed surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

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.

END OF SECTION 096513

SECTION 097720 - FIBERGLASS REINFORCED LAMINATED PANELS

PART 1 – GENERAL

1.1 DESCRIPTION

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

B. This section describes the requirements for furnishing and installing fiberglass reinforced laminated plastic panels according to manufacturer's recommendations.

1.2 SUBMITTALS

A. Submit in accordance with Section 013300.

1. Two samples of each type of laminated panel, each type of trim and fastener.
2. Shop Drawings: Indicate the location and dimension of joints and fastener attachment.
3. Manufacturer's Installation Guide.

1.3 QUALITY ASSURANCE

A. Provide panels and molding only from the same manufacturer to ensure warranty and color harmonization of accessories.

B. Qualifications of installers:

1. Use only thoroughly trained and experienced installers who are completely familiar with the requirements of this Work and the recommendations contained in the referenced standards.
2. In acceptance or rejection of installed work, no allowance will be made for lack of skill on the part of the installer.

C. Codes and Standards: In addition to complying with all pertinent codes and regulations:

1. Meet ASTM E-84, flame spread less than 200, smoke developed less than 450.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Package sheets on skids or pallets for shipment to project site.

B. Storage of Materials: Store panels indoors in a dry place at the project site.

C. Handling: Remove foreign matter from face of panel by use of a soft bristle brush, avoiding abrasive action.

1.5 PROJECT CONDITIONS

A. Installation shall not begin until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from concrete work has dissipated.

B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.

C. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

PART 2 – PRODUCTS

2.1 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Crane Composites
   b. Graham
   c. Marlite
   d. Nudo
   e. Or Approved Equal.

B. Laminated Panel Material:

   a. Basis of Design: Marlite, Standard FRP
   b. Finish: Interior (face) skin shall be pebbled .090” (FRP) reinforced fiberglass.
   c. Color: P 199 Bright White Class A (or from manufacturer’s standard color selection).
   d. Stabilizer sheet under face shall be 6-mm thick non-asbestos fiber reinforced cement sheet.
   e. Antimicrobial
   f. Size tolerance:
   1. Width: plus or minus 1/8”.
   2. Length: plus or minus 1/8”.
   3. Thickness: plus or minus 1/16”.

C. Adhesive:
   a. The adhesive used should be the manufacturers recommended standard, that complies with ASTM C 557.
   b. The entire composite shall be pressed with maximum pressure under controlled and consistent pressure to develop the maximum possible tensile strength.

D. Sealants: Panels to be sealed with Class A grade sealant.

E. Division Bars, Corner Trim, Moldings: Panel manufacturer's standard length extruded aluminum pieces; longest length possible - to eliminate end joints. Anodized Aluminum.

F. Fasteners: Non-corrosive drive rivets in harmonizing colors. Refer to Manufacturer's Installation Guide for rivet pattern and installation instructions.

PART 3 – EXECUTION

3.1 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.

B. Do not begin installation until backup surfaces are put into satisfactory condition.

3.2 APPLICATION

A. Do all cutting and drilling with carbide tipped saw blades or drill bits or cut with snips.

B. Install laminated panels with manufacturer's recommended gap for panel field and corner joints.

C. Fastener holes in the panels must be predrilled 1/8” oversize.

D. Using products acceptable to manufacturer, install the FRP panel system in accordance with panel manufacturer's printed instructions.

3.3 CLEANING

A. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by panel manufacturer.

END OF SECTION 097720

SECTION 099123 - INTERIOR PAINTING

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 surface preparation and the application of paint systems on interior substrates.

1. Steel and iron.
2. Galvanized metal.
3. Aluminum (not anodized or otherwise coated).
4. Gypsum board.
5. Spray-textured walls and ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square or 8-1/2-inch by 11-inch Mead Mark I cover paper.
2. Label each coat of each Sample.

1.4 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. Paint: 1 gal. of each material and color applied in sealed and unused containers.
2. Provide paint mixing formula for each material and color in writing.

1.5 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.

1.6 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 less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Sherwin-Williams Company (The).
2. Benjamin Moore & Co.
3. Diamond Vogel Paints.
4. Glidden Professional.
5. Kwal Paint; Comex Group.
6. PPG Architectural Finishes, Inc.
7. Or Approved Equal.

B. Products: Subject to compliance with requirements, provide products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As selected by the Architect from the manufacturers standard colors.

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. Concrete: 12 percent.
2. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Spray-Textured Substrates: Verify that surfaces are dry.

E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

F. 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 and recommendations in "MPI Architectural Painting Specification Manual" 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 rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 3.

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 sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

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. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. 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.

D. Painting Plumbing, HVAC and Electrical Work:

1. Paint the following work where exposed in equipment rooms:

a. Uninsulated metal piping.
b. Pipe hangers and supports.
c. Metal conduit.
d. Plastic conduit.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

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. Contractor shall 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, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

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 PAINTING SCHEDULE

PS-1 NEW EXTERIOR FERROUS METAL (Other items, i.e., metal doors, frames, etc.)

1 coat	Sherwin Williams	Kem Bond HS Primer
2 coats	Sherwin Williams	Industrial Urethane Alkyd

PS-2 NEW INTERIOR SURFACES OF EXTERIOR METAL DOORS AND FRAMES

1 coat	Sherwin Williams	Kem Bond HS Primer
2 coats	Sherwin Williams	Industrial Urethane Alkyd

PS-3 NEW INTERIOR FERROUS METAL (Other items, i.e., metal doors, frames, etc.)

1 coat	Sherwin Williams	Pro Industrial Pro-Cryl Universal Primer
2 coats	Sherwin Williams	Water-based Industrial Enamel

PS-4 NEW GYPSUM BOARD

1 coat	Sherwin Williams	Pro-Green 200 Low VOC Primer
2 coats	Sherwin Williams	Pro-Green 200 Low VOC Semi-gloss

PS-5 NEW GYPSUM BOARD (EPOXY)

1 coat	Sherwin Williams	Pro-Green 200 Low VOC Primer
2 coats	Sherwin Williams	Pro Industrial Hi-Bild WB Catalyzed Epoxy

END OF SECTION 099123

DIVISION 10 – SPECIALTIES

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

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. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for blocking.
2. Section 102800 "Toilet Accessories" for toilet tissue dispensers, grab bars, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet and shower compartments.

1. Include plans, elevations, sections, details, and attachment details.

C. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-square Samples of same thickness and material indicated for Work.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.5 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 and source.

1. Door Hinges: Two hinges with associated fasteners.

2. Latch and Keeper: Two latches and keepers with associated fasteners.
3. Door Bumper: Two bumpers with associated fasteners.
4. Door Pull: Two door pulls with associated fasteners.
5. Fasteners: Ten fasteners of each size and type.
6. Clothing Hook: Two clothing hooks with associated fasteners.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 SOLID-PLASTIC TOILET COMPARTMENTS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

1. Accurate Partitions Corp.; ASI Group.
2. Bradley Corporation.
3. General Partitions Mfg. Corp.
4. Global Partitions; ASI Group.
5. Scranton Products.
6. Or Approved Equal.

B. Toilet-Enclosure Style: Overhead braced, Floor anchored.

C. Urinal-Screen Style: Wall hung.

D. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

1. Hinges: 8” Aluminum Wrap Around Hinges.
2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.

E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.

F. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard double ear design; extruded aluminum.

G. Dimensions: Manufacturer standard (or top of overhead brace at 82” AFF, Door/wall panels to be 58” tall and mounted 12” AFF).

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.

1. Material: Clear-anodized aluminum.
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door.
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M.

B. Aluminum Extrusions: ASTM B 221.

C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

D. Stainless-Steel Castings: ASTM A 743/A 743M.

2.5 FABRICATION

A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels: 1/2 inch.
b. Panels and Walls: 1 inch.

2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.

a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.19

SECTION 102800 – TOILET ACCESSORIES

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. Public-use washroom accessories.
2. Custodial accessories.

1.3 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.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of manufacture.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED / CONTRACTOR INSTALLED MATERIALS

A. Owner-Furnished Materials:

1. Toilet Paper Holders
2. Paper Towel Dispensers
3. Soap Dispensers
4. Napkin Disposal

2.2 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.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. 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 Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. Or Approved Equal.

2.4 TOILET / WASHROOM / CUSTODIAL ACCESSORIES

A. Grab Bars: Equal to Bradley 812 Series

B. Mirror Unit: Equal to Bradley 781 (24”x36”)

C. Mop and Broom Holder: Equal to Bradley 9954

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 four keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to 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.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION 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. Portable fire extinguishers.
2. Mounting brackets for fire extinguishers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles and finishes for fire extinguishers and mounting brackets.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size and capacity for each mounting bracket indicated.

1. Source limitations: Obtain fire extinguishers and accessories, from single source and from single manufacturer.
2. Valves: Manufacturer’s standard.
3. Handles and Levers: Manufacturer’s standard.

4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire-extinguisher location, inspections, maintenance and recharging.
5. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
6. 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. JL Industries, Inc.; a division of the Activar Construction Products Group.
    b. Larsens Manufacturing Company.
    c. Or Approved Equal.

2.3 MOUNTING BRACKETS

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. JL Industries, Inc.; a division of the Activar Construction Products Group.
2. Larsens Manufacturing Company.
3. Or Approved Equal.

B. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

    a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:

1. Mounting Brackets: Top of fire extinguisher to be 54 inches above finished floor.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb at locations indicated.

END OF SECTION 104413

DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 133419 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Metal soffit panels.
5. Thermal insulation.
6. Accessories.

B. Related Requirements:

1. Section 083323 "Overhead Coiling Doors" for coiling doors in metal building systems.
2. 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 Section 033000 "Cast-in-Place Concrete."

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 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Metal roof panels.
b. Metal wall panels.
c. Metal soffit panels.
d. Thermal insulation and vapor retarder facings.

B. Shop Drawings: 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: Show 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 Roof and Wall Panel Layout Drawings: Show 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; show locations of exposed fasteners.
    a. Show roof-mounted items including equipment supports, pipe supports and penetrations and items mounted on roof curbs.
    b. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
    a. Flashing and trim.
    b. Gutters.
    c. Downspouts.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For the following products:

1. Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.

E. Delegated-Design Submittal: For metal building systems.

1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For erector and manufacturer.

B. 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, according to governing building code.
10. Building-Use Category: Indicate category of building use and its effect on load importance factors.

C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.

B. 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.

1.8 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.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

1.10 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 according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 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 MANUFACTURERS

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. Behlen Manufacturing Company (Basis of Design)
2. BC Steel Buildings, Inc.
3. Butler Manufacturing Company; a division of BlueScope Buildings North America, Inc.
4. Nucor Building Systems.
5. Star Building Systems; a division of NCI Building Systems, Inc.
6. Varco-Pruden Buildings; a division of BlueScope Buildings North America, Inc.
7. Kirby Building Systems, A Nucor Company.
8. Sentinel Building Systems (AGI Brand).
9. Alliance Steel Building Systems.
10. Or Approved Equal.

B. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

2.2 SYSTEM DESCRIPTION

A. 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.

B. Primary-Frame Type:

1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.

C. End-Wall Framing: 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.

D. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.

E. Eave Height: As indicated on Drawings

F. Bay Spacing: As indicated on Drawings.

G. Roof Slope: As indicated on Drawings.

H. Roof System: Manufacturer's Architectural Standing Seam Metal Roof Panels.

1. Basis of Design: ZL-24 (Behlen Manufacturing Company).

I. Exterior Wall System: Manufacturer's standard exposed-fastener, tapered-rib, metal wall panels.

1. Basis of Design: ADP-2 (Behlen Manufacturing Company).

2.3 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 shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."

1. Design Loads: As indicated on Drawings.
2. Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
3. Deflection and Drift Limits: No greater than the following:
    a. Purlins and Rafters: Vertical deflection of 1/240 of the span.
    b. Girts: Horizontal deflection of 1/180 of the span.
    c. Metal Roof Panels: Vertical deflection of 1/240 of the span.
    d. Metal Wall Panels: Horizontal deflection of 1/180 of the span.
    e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
    f. Lateral Drift: Maximum of 1”.

C. 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: 120 deg F, ambient; 180 deg F, material surfaces.

D. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

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 according to ASTM E 1680 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

F. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

G. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft.

H. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft.

I. Thermal Performance: Provide the following minimum R-values when tested according to ASTM C 1363 or ASTM C 518:

1. Roof:
   a. R-Value: 38 (2 layers with R-5 thermal blocks).
2. Walls:
   a. R-Value: 25.

2.4 STRUCTURAL-STEEL FRAMING

A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."

B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" 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 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: Match existing.
5. Rafter: Match existing.

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: 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. Purlins: Steel joists of depths indicated on Drawings.
3. Girts: C or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch-wide flanges.
4. 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.
5. 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.
6. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
7. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, fabricated from zinc-coated (galvanized) steel sheet.
8. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
9. 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.
10. 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 A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch-diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
2. Cable: ASTM A 475, 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. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
6. 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 A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
4. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
5. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, 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 A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
6. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
7. 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 A 755/A 755M.
    a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, 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 A 792/A 792M, SS, Grade 50 or 80; with Class AZ50 coating.
8. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
    a. Finish: Plain.
9. Structural Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
    a. Finish: Plain.
10. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.
11. Unheaded Anchor Rods: ASTM F 1554, Grade 36; ASTM A 36/A 36M; ASTM A 307, Grade A.
    a. Configuration: Straight.
    b. Nuts: ASTM A 563hex carbon steel.
    c. Plate Washers: ASTM A 36/A 36M carbon steel.
    d. Washers: ASTM F 436 hardened carbon steel.
    e. Finish: Plain.
12. Headed Anchor Rods: ASTM F 1554, Grade 36; ASTM A 307, Grade A.
    a. Configuration: Straight.
    b. Nuts: ASTM A 563hex carbon steel.
    c. Plate Washers: ASTM A 36/A 36M carbon steel.
    d. Washers: ASTM F 436 hardened carbon steel.
    e. Finish: Plain.

13. Threaded Rods: ASTM A 36/A 36M; ASTM A 307, Grade A.

    a. Nuts: ASTM A 563hex carbon steel.
    b. Washers: ASTM F 436 hardened carbon steel.
    c. Finish: Plain.

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. Standing-Seam, Trapezoidal-Rib, Metal Roof Panels. Formed with raised trapezoidal 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, 24-gauge nominal uncoated steel thickness. Pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

    a. Exterior Finish: Two-coat fluoropolymer.
    b. Color: As selected by Architect from manufacturer's full range.

2. Basis of Design: ZL-24 (Behlen Manufacturing Company) or Approved Equal.

B. Finishes:

1. Exposed Coil-Coated Finish:

    a. Two-Coat Fluoropolymer: AAMA 621. 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, 26-gauge nominal uncoated steel thickness. Pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

    a. Exterior Finish: Two-coat fluoropolymer.
    b. Color: As selected by Architect from manufacturer's full range.

2. Basis of Design: ADP-2 (Behlen Manufacturing Company) or Approved Equal.

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, 26-gauge nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

a. Exterior Finish: Two-coat fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.

2. Basis of Design: ADP-1 (Behlen Manufacturing Company) or Approved Equal.

C. Finishes:

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. 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 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory applied sealant in side laps. Include accessories required for watertight installation.

B. Metal Soffit Panels: Match profile and material of metal wall panels.

1. Finish: Match finish and color of metal roof panels.

2.8 THERMAL INSULATION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide one of the following products:

1. Simple Saver System by Thermal Design.
2. Energy Saver FP by Silvercote.
3. Or Approved Equal.

B. Unfaced Metal Building Insulation: ASTM C 991, 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.

C. Steel Straps: 100KSI minimum yield strength, 0.02” X 1” X continuous length, white.

D. Vapor-Retarder: Woven reinforced high-density polyethylene yarns coated on both sides with a continuous white polyethylene film.

E. Accessories: Provide necessary fasteners, sealants, and thermal breaks as required to complete system as recommended by manufacture.

2.9 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 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.

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. Metal Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 28-guage 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, 24-guage nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
3. Lengths: Minimum 10 feet.
4. Overhead Coiling and Sectional Door Jamb Trim: Fabricated from 1 piece up to 10 feet in length.

E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 28-guage 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 according to SMACNA's "Architectural Sheet Metal Manual, Current Edition."

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, 28-guage nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot-long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters.

G. Pipe Flashing: Pre-molded, EPDM pipe collar with flexible aluminum ring bonded to base.

H. Ridge Vent: Manufacturer’s standard pre-engineered ridge cap or ridge lite, flashings, eave and gable trim. Field-fabricate minor flashings as indicated on approved Shop drawings.

1. Provide manufacturer’s standard ridge vents as indicated on Drawings.
    a. Continuous Vented Ridge: 12 square inches per lineal foot.
    b. Finish: Match finish and color of metal roof panels.

I. Closure Strips: Closed Cell, 2 psf density polyethylene foam. Pre-molded to match configuration of panels.

J. 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.
    a. Fasteners for Metal Wall Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with EPDM sealing washers bearing on weather side of metal panels.
    b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
    c. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
2. 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.

3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
4. Metal Panel Sealants:

    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 C 920; 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.

2.10 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 shall 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 according to 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 according to 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.

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.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to 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 according to manufacturer's written instructions and 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, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

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 according to 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 METAL PANEL INSTALLATION, 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 structural requirements.

B. 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.

C. 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.

D. 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.

E. 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.

F. 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 recommended by metal panel manufacturer.

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."

3.5 METAL ROOF PANEL INSTALLATION

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. 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.

C. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 METAL WALL PANEL INSTALLATION

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.
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.

C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet, noncumulative; level, plumb, and on location lines; and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to 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. Install per thermal insulation system manufacture’s recommended instructions.

3.8 DOOR AND FRAME INSTALLATION

A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to 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 according to 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 according to, and doors with clearances specified in, NFPA 80.

3.9 ACCESSORY INSTALLATION

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, 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. 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 feet 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.

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.

3.10 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M 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: 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.

1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

D. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

E. 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.

F. 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.

G. 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.

H. 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 133419

DIVISION 22 – PLUMBING

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

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. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Pipe stands.
6. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. 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 stands, 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.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 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 or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
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. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe 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.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, 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.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:
   1. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
   2. Standard: MFMA-4.
   3. Channels: Continuous slotted steel channel with inturned lips.
   4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
   5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
   6. Metallic Coating: Electroplated zinc.

B. Non-MFMA Manufacturer Metal Framing Systems:
   1. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
   2. Standard: Comply with MFMA-4.
   3. Channels: Continuous slotted steel channel with inturned lips.
   4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
   5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
   6. Coating: Zinc.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 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.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Plastic.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.9 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, 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, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. 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 A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.

D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

E. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled fiberglass struts.

F. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

G. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches 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.

H. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

I. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

J. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

K. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

L. 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.

M. Install lateral bracing with pipe hangers and supports to prevent swaying.

N. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

O. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

P. 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.

Q. 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. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

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. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.

6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 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.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.

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; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 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.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as 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.

B. Touchup: Clean and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 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 finish.

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 metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers and attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. 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.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.

15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. 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.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.

9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. 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.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. 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.

O. 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.
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.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

R. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

S. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

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. Warning signs and labels.
2. Pipe labels.
3. Valve tags.
4. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS AND WARNING LABELS.

A. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.

8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link chain or beaded chain or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

C. Pipe Label Color Schedule:

1. Domestic Water Piping

    a. Background: Safety green.
    b. Letter Colors: White.

2. Sanitary Waste and Storm Drainage Piping:

a. Background Color: Safety black.
b. Letter Color: White.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches, round.
b. Hot Water: 1-1/2 inches, round.

2. Valve-Tag Colors:

a. Cold Water: Natural.
b. Hot Water: Safety green.

3. Letter Colors:

a. Cold Water: White.
b. Hot Water: White.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

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 insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 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 according to ASTM E 84 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.

C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.

1. Piping Mockups:

a. One 10-foot section of NPS 2 straight pipe.
b. One each of a 90-degree threaded, welded, and flanged elbow.
c. One each of a threaded, welded, and flanged tee fitting.
d. One NPS 2 or smaller valve, and one NPS 2-1/2 or larger valve.
e. Four support hangers including hanger shield and insert.
f. One threaded strainer and one flanged strainer with removable portion of insulation.
g. One threaded reducer and one welded reducer.
h. One pressure temperature tap.
i. One mechanical coupling.

2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting insulation application.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

D. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 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.

C. Coordinate installation and testing of heat tracing.

1.8 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 in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Aeroflex USA, Inc.

b. Armacell LLC.
c. K-Flex USA.

G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.
b. Johns Manville; a Berkshire Hathaway company.
c. Knauf Insulation.
d. Owens Corning.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Knauf Insulation.
c. Owens Corning.

2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. 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 and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Aeroflex USA, Inc.
b. Armacell LLC.
c. Foster Brand; H. B. Fuller Construction Products.
d. K-Flex USA.

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

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. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.

2.3 SEALANTS

A. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

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. Childers Brand; H. B. Fuller Construction Products.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

2.4 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.5 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.6 SECUREMENTS

A. Bands:
   1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
   2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

2.7 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:
   1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

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 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. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: 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 thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. 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 with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade 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 piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and 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 application and finishing.

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 at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install 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-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. 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 [**2 inches**] [**4 inches**] o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to 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 75 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 beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 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 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.
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."

3.5 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, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as 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 or sectional pipe insulation of same material and thickness as 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 or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two 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 or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two 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 and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
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.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

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.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 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 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 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.

3.7 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 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, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as 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 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.

3.8 FINISHES

A. Insulation with ASJ, 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.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 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.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 and Smaller: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

2. NPS 1-1/4 and Larger: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Domestic Hot Water:

1. NPS 1-1/4 and Smaller: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

2. NPS 1-1/2 and Larger: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

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. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
2. Encasement for piping.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

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 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K 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.

2.3 PEX TUBE AND FITTINGS

A. PEX Distribution System: ASTM F 877, SDR 9 tubing.

B. Fittings for PEX Tube: ASTM F 1807, metal-insert type with copper or stainless-steel crimp rings and matching PEX tube dimensions.

C. Manifold: Multiple-outlet, plastic or corrosion-resistant-metal assembly complying with ASTM F 877; with plastic or corrosion-resistant-metal valve for each outlet.

2.4 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch 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 A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

F. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.5 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. Standard: ASSE 1079.
2. Pressure Rating: 125 psig minimum at 180 deg F.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Nipples:
1. Standard: IAPMO PS 66.
2. Electroplated steel nipple complying with ASTM F 1545.

3. Pressure Rating and Temperature: 300 psig at 225 deg F.
4. End Connections: Male threaded or grooved.
5. 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 without pitch 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 piping 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 thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."

T. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

U. 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."

V. 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."

W. 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. 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."

E. Joints for PEX Piping: Join according to ASTM F 1807.

F. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings or nipples.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation 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 and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
6. NPS 6: 10 feet with 5/8-inch rod.
7. NPS 8: 10 feet with 3/4-inch rod.

E. Install supports for vertical copper tubing every 10 feet.

F. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6: 12 feet with 3/4-inch rod.
8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.

G. Install supports for vertical steel piping every 15 feet.

H. Install hangers for stainless-steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6: 12 feet with 3/4-inch rod.
8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.

I. Install supports for vertical stainless-steel piping every 15 feet.

J. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
3. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
4. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
5. NPS 6: 48 inches with 3/4-inch rod.
6. NPS 8: 48 inches with 7/8-inch rod.

K. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

L. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.

M. Install hangers for vertical PEX piping every 48 inches.

N. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.
2. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6: 48 inches with 3/4-inch rod.
5. NPS 8: 48 inches with 7/8-inch rod.

O. Install supports for vertical PVC piping every 48 inches.

P. Install vinyl-coated hangers for PP piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
3. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
4. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
5. NPS 6: 48 inches with 3/4-inch rod.
6. NPS 8: 48 inches with 7/8-inch rod.

Q. Install supports for vertical PP piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

R. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.6 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 and larger.

3.7 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.

3.8 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 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.

3.9 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.

3.10 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 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 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. Clean non-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 procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.11 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 and smaller, shall be the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.

E. Under-building-slab, combined domestic water, building-service, and fire-service-main piping, NPS 6 to NPS 12, shall be the following:

1. Mechanical-joint, ductile-iron pipe; standard- or compact-pattern, mechanical-joint fittings; and mechanical joints.
2. Push-on-joint, ductile-iron pipe; standard- or compact-pattern, push-on-joint fittings; and gasketed joints.

F. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.
2. PEX tube, NPS 1 and smaller; fittings for PEX tube; and crimped joints.

G. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be the following:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

3.12 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

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. Water pressure-reducing valves.
3. Balancing valves.
4. Temperature-actuated, water mixing valves.
5. Strainers.
6. Outlet boxes.
7. Wall hydrants.
8. Water-hammer arresters.

B. Related Requirements:

1. Section 220519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Section 221116 "Domestic Water Piping" for water meters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

1. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

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. Ames Co.
    b. FEBCO.
    c. Flomatic Corporation.
    d. Watts; a Watts Water Technologies company.
    e. Zurn Industries, LLC.

2. Standard: ASSE 1013.

3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle third of flow range.
5. Body: Bronze for NPS 2 and smaller; steel with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
7. Configuration: Designed for horizontal, straight-through flow.
8. Accessories:

    a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
    b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
    c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

B. Double-Check, Backflow-Prevention Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ames Fire & Waterworks.
    b. Apollo Valves; Conbraco Industries, Inc.
    c. FEBCO.
    d. Watts; a Watts Water Technologies company.
    e. Zurn Industries, LLC.

2. Standard: ASSE 1015.

3. Operation: Continuous-pressure applications unless otherwise indicated.
4. Pressure Loss: 5 psig maximum, through middle third of flow range.
5. Body: Bronze for NPS 2 and smaller; steel with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
7. Configuration: Designed for horizontal, straight-through flow.
8. Accessories:

    a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
    b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

2.4 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:

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. Cash Acme.
    b. Watts; a Watts Water Technologies company.
    c. Zurn Industries, LLC.

2. Standard: ASSE 1003.

3. Pressure Rating: Initial working pressure of 150 psig.
4. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
5. Valves for Booster Heater Water Supply: Include integral bypass.
6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

2.5 BALANCING VALVES

A. Copper-Alloy Calibrated Balancing Valves:

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 International, Inc.
    b. Flo Fab Inc.
    c. ITT Corporation.
    d. TACO Incorporated.
    e. Watts; a Watts Water Technologies company.

2. Type: Ball or Y-pattern globe valve with two readout ports and memory-setting indicator.

3. Body: Brass or bronze.
4. Size: Same as connected piping, but not larger than NPS 2.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.6 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Water-Temperature Limiting Devices:

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 International, Inc.
    b. Leonard Valve Company.
    c. TACO Incorporated.
    d. Watts; a Watts Water Technologies company.
    e. Zurn Industries, LLC.

2. Standard: ASSE 1017.

3. Pressure Rating: 125 psig.
4. Type: Thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded inlets and outlet.
7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Valve Finish: Rough bronze.

B. Manifold, Thermostatic, Water Mixing-Valve Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Leonard Valve Company.

2. Description: Factory-fabricated, exposed-mounted, thermostatically controlled, water mixing-valve assembly in two OR three-valve parallel arrangement.

3. Large-Flow Parallel: Thermostatic, water mixing valve and downstream-pressure regulator with pressure gages on inlet and outlet.
4. Intermediate-Flow Parallel: Thermostatic, water mixing valve and downstream-pressure regulator with pressure gages on inlet and outlet.
5. Small-Flow Parallel: Thermostatic, water mixing valve.
6. Thermostatic Mixing Valves: Comply with ASSE 1017. Include check stops on hot- and cold-water inlets and shutoff valve on outlet.
7. Water Regulator(s): Comply with ASSE 1003. Include pressure gage on inlet and outlet.
8. Pressure Rating: 125 psig minimum unless otherwise indicated.
9. Cabinet: Factory fabricated, stainless steel, for recessed or surface mounting and with hinged, stainless-steel door.
10. Selected Large-Flow, Tempered-Water Valve Size:
11. Thermostatic Mixing Valve and Water Regulator Finish: Chrome plated.
12. Piping Finish: Copper.

2.7 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers :

1. Pressure Rating: 125 psig minimum unless otherwise indicated.

2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:

    a. Strainers NPS 2 and Smaller: 0.020 inch.
    b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.

6. Drain: Pipe plug.

2.8 HOSE BIBBS

A. Hose Bibbs

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Jay R. Smith Mfg. Co.
    b. MIFAB, Inc.
    c. Prier Products, Inc.
    d. Woodford Manufacturing Company.
    e. Acorn

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 threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig
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: Chrome or nickel plated.
11. Finish for Finished Rooms: Chrome or nickel plated.
12. Operation for Equipment Rooms: Wheel handle or operating key.
13. Operation for Service Areas: Wheel handle or Operating key.
14. Operation for Finished Rooms: Wheel handle or Operating key.
15. Include operating key with each operating-key hose bibb.
16. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.9 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:

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. Jay R. Smith Mfg. Co.

b. Josam Company.
c. MIFAB, Inc.
d. Watts; a Watts Water Technologies company.
e. Woodford Manufacturing Company.
f. Zurn Industries, LLC.

2. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.

3. Pressure Rating: 125 psig.
4. Operation: Loose key.
5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
6. Inlet: NPS 3/4 or NPS 1.
7. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
8. Box: Deep, flush mounted with cover.
9. Box and Cover Finish: Polished nickel bronze.
10. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
11. Nozzle and Wall-Plate Finish: Polished nickel bronze.
12. Operating Keys(s): One with each wall hydrant.

2.10 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

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. Jay R. Smith Mfg. Co.
b. Josam Company.
c. MIFAB, Inc.
d. Sioux Chief Manufacturing Company, Inc.
e. Watts; a Watts Water Technologies company.
f. Zurn Industries, LLC.

2. Standard: ASSE 1010 or PDI-WH 201.

3. Type: Copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.11 SPECIALTY VALVES

A. Comply with requirements for general-duty metal valves in Section 220523.12 "Ball Valves for Plumbing Piping,"

PART 3 - EXECUTION

3.1 INSTALLATION

A. 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. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

C. Install water-control valves with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated, water mixing valves 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.

F. Install Y-pattern strainers for water on supply side of each control valve water pressure-reducing valve and pump.

G. Install outlet boxes recessed in wall or surface mounted on wall. Install 2-by-4-inch fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."

H. Install water-hammer arresters in water piping according to PDI-WH 201.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Pressure vacuum breakers.
2. Intermediate atmospheric-vent backflow preventers.

3. Reduced-pressure-principle backflow preventers.
4. Double-check, backflow-prevention assemblies.
5. Carbonated-beverage-machine backflow preventers.
6. Dual-check-valve backflow preventers.
7. Reduced-pressure-detector, fire-protection, backflow-preventer assemblies.
8. Double-check, detector-assembly backflow preventers.
9. Water pressure-reducing valves.
10. Calibrated balancing valves.
11. Primary, thermostatic, water mixing valves.
12. Manifold, thermostatic, water mixing-valve assemblies.
13. Photographic-process, thermostatic, water mixing-valve assemblies.
14. Primary water tempering valves.
15. Outlet boxes.
16. Hose stations.
17. Supply-type, trap-seal primer valves.
18. Trap-seal primer systems.

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 reduced-pressure-principle backflow preventer and double-check, detector-assembly backflow preventer 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.

C. Prepare test and inspection reports.

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 221316 - SANITARY WASTE AND VENT PIPING

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. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For hubless, single-stack drainage system. Include plans, elevations, sections, and details.

1.4 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.5 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.
2. Waste, Force-Main Piping: 50 psig.

1.6 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.

1.7 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Single-Stack Aerator Fittings: ASME B16.45, hubless, cast-iron aerator and deaerator drainage fittings.

C. CISPI, Hubless-Piping Couplings:

1. Standards: ASTM C 1277 and CISPI 310.
2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Cast-Iron, Hubless-Piping Couplings:

1. Standard: ASTM C 1277.
2. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

1.8 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. Hard Copper Tube: ASTM B 88, Type L and Type M, water tube, drawn temper.

D. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.

E. 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.

F. 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 maximum thickness unless thickness or specific material is indicated.
2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

G. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

1.9 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.

PART 2 - EXECUTION

2.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

2.2 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 and smaller; 1 percent downward in direction of flow for piping NPS 4 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."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

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. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."

1. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.

R. Install force mains at elevations indicated.

S. 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. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
b. 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."

T. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

U. 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."

V. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

2.3 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling 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. 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.

2.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. 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 carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42, clamps.
4. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
6. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
8. NPS 10 and NPS 12: 12 feet with 7/8-inch rod.

I. Install supports for vertical steel piping every 15 feet.

J. Install hangers for stainless-steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2: 84 inches with 3/8-inch rod.
2. NPS 3: 96 inches with 1/2-inch rod.
3. NPS 4: 108 inches with 1/2-inch rod.
4. NPS 6: 10 feet with 5/8-inch rod.

K. Install supports for vertical stainless-steel piping every 10 feet.

L. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 72 inches with 3/8-inch rod.
2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
3. NPS 2-1/2: 108 inches with 1/2-inch rod.
4. NPS 3 and NPS 5: 10 feet with 1/2-inch rod.
5. NPS 6: 10 feet with 5/8-inch rod.
6. NPS 8: 10 feet with 3/4-inch rod.

M. Install supports for vertical copper tubing every 10 feet.

N. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 48 inches with 7/8-inch rod.

O. Install supports for vertical PVC piping every 48 inches.

P. Support piping and tubing not listed above according to MSS SP-58 and manufacturer's written instructions.

2.5 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.
5. Equipment: Connect waste piping as indicated.

    a. Provide shutoff valve if indicated and union for each connection.
    b. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.
2. Sewage Pump: To sewage pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

2.6 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

2.7 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.
    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.
   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.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved.

   a. Expose work that was covered or concealed before it was tested.

2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials.

   a. Isolate test source and allow to stand for four hours.
   b. Leaks and loss in test pressure constitute defects that must be repaired.

3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

2.8 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.

2.9 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
   2. Copper Type DWV tube, copper drainage fittings, and soldered joints.
   3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

C. Aboveground, vent piping NPS 4 and smaller shall be any of the following:

   1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
   2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
   3. Copper Type DWV tube, copper drainage fittings, and soldered joints.

      a. Option for Vent Piping, NPS 2-1/2 and NPS 3-1/2: Hard copper tube, Type M; copper pressure fittings; and soldered joints.
   4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; CISPI cast-iron hubless-piping couplings; and coupled joints.
   2. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

E. Underground, soil and waste piping NPS 5 and larger shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; CISPI cast-iron hubless-piping couplings; coupled joints.
   2. Solid-wall PVC pipe; PVC socket fittings; and solvent-cemented joints.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE 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. Cleanouts.
   2. Miscellaneous sanitary drainage piping specialties.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene.

B. FOG: Fats, oils, and greases.

C. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rated capacities, operating characteristics, and accessories for the following:

   1. FOG disposal systems.

B. Shop Drawings:

   1. Show fabrication and installation details for frost-resistant vent terminals.
   2. Wiring Diagrams: Power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For FOG disposal systems, accessories, and components, from manufacturer.

   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 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.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing, and marked for intended location and application.

2.2 CLEANOUTS

A. Cast-Iron Exposed Cleanouts:

1. Standard: ASME A112.36.2M.
2. Size: Same as connected drainage piping
3. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
4. Closure: Countersunk, brass plug.
5. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Exposed Floor Cleanouts:

1. Standard: ASME A112.36.2M for adjustable housing cast-iron soil pipe with cast-iron ferrule cleanout.
2. Size: Same as connected branch.
3. Type: Adjustable housing.
4. Body or Ferrule: Cast iron.
5. Clamping Device: Not required.
6. Outlet Connection: Inside calk.
7. Closure: Brass plug with straight threads and gasket.
8. Adjustable Housing Material: Cast iron Plastic with threads.
9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Medium Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Standard: ASME A112.36.2M. Include wall access.
2. Size: Same as connected drainage piping.
3. Body: Hub-and-spigot, cast-iron soil pipe T-branch Hubless, cast-iron soil pipe test tee as required to match connected piping.
4. 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.

5. Wall Access: Round, deep, chrome-plated bronze cover plate with screw.
6. Wall Access: Round, nickel-bronze, copper-alloy, or stainless-steel wall-installation frame and cover.

D. Plastic Floor Cleanouts:

1. Size: Same as connected branch.
2. Body: PVC.
3. Closure Plug: PVC.
4. Riser: Drainage pipe fitting and riser to cleanout of same material as drainage piping.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains:

1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564 rubber gaskets.
2. Size: Same as connected waste piping.

B. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

C. Frost-Resistant Vent Terminals:

1. Description: Manufactured or shop-fabricated assembly constructed of copper, lead-coated copper, or galvanized steel.
2. Design: To provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

D. Expansion Joints:

1. Standard: ASME A112.6.4.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

2.4 MOTORS

A. General requirements for motors are specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, motor shall be large enough, so driven load will not require motor to operate in service factor range above 1.0.

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. Use NPS 4 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 for piping NPS 4 and smaller and 100 feet 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. Assemble open drain fittings and install with top of hub 2 inches above floor.

E. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

F. Install sleeve and sleeve seals with each riser and stack passing through floors with waterproof membrane.

G. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

H. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

I. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

J. Install wood-blocking reinforcement for wall-mounting-type specialties.

K. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

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. Install piping adjacent to equipment to allow service and maintenance.

C. 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."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections, and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled FOG disposal systems and their installation, including piping and electrical connections, and to assist in testing.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls 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 223300 - ELECTRIC, DOMESTIC-WATER HEATERS

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. Commercial, light-duty, storage, electric, domestic-water heaters.
   2. Domestic-water heater accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

   1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of commercial, electric, domestic-water heater, from manufacturer.

B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

C. Source quality-control reports.

D. Field quality-control reports.

E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

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: 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.

C. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Commercial, Electric, Storage, Domestic-Water Heaters:

1) Storage Tank: Three years.
2) Controls and Other Components: Three years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:

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. Bradford White Corporation.
b. Lochinvar, LLC.
c. PVI Industries, LLC.
d. Rheem Manufacturing Company.
e. Smith, A. O. Corporation.
f. State Industries.

2. Standard: UL 1453.

3. Storage-Tank Construction: Non-ASME-code, steel vertical arrangement.

   a. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.

      1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
      2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.

   b. Pressure Rating: 150 psig.
   c. Interior Finish: Comply with NSF 61 Annex G 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. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
   c. Insulation: Comply with ASHRAE/IESNA 90.1.
   d. Jacket: Steel with enameled finish.
   e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
   f. Temperature Control: Adjustable thermostat.
   g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
   h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

5. Special Requirements: NSF 5 construction.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AMTROL, Inc.
   b. Smith, A. O. Corporation.
   c. State Industries.
   d. Taco, Inc.

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 Annex G 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: 100 psig.
b. Capacity Acceptable: 2 gal. minimum.
c. Air Precharge Pressure: 12 psi.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.

D. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

E. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.

F. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.

G. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base. Comply with requirements for concrete bases.

1. bases for commercial, electric, 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 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 combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

C. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

D. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

E. Fill electric, domestic-water heaters with water.

F. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

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 tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
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 operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain commercial, electric, domestic-water heaters.

END OF SECTION 223300

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

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. Water closets.
2. Flushometer valves.
3. Toilet seats.
4. Supports.

1.3 DEFINITIONS

A. Effective Flush Volume: Average of two reduced flushes and one full flush per fixture.

B. Remote Water Closet: Located more than 30 feet from other drain line connections or fixture and where less than 1.5 drainage fixture units are upstream of the drain line connection.

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 for water closets.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

C. SAMPLES: For each type of watercloset flushometer indicated on plans. Provide one sample for Owner to view and approve prior to ordering.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS – See Plumbing drawings for further information.

2.1 WALL-MOUNTED WATER CLOSETS

A. Water Closets: Wall mounted, top spud, accessible.
1. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: Standard.
f. Rim Contour: Elongated.
g. Water Consumption: 1.6 gal. per flush.
h. Spud Size and Location: NPS 1-1/2; top.

2. Flushometer Valve: Manual.
3. Toilet Seat: Open front
4. Support: Water closet carrier.
5. Water-Closet Mounting Height: Standard and Handicapped/elderly according to ICC/ANSI A117.1.

2.2 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Sloan Valve Company.
b. Zurn Industries, LLC.

2. Standard: ASSE 1037.

3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Consumption: 1.6 gal. per flush.
10. Minimum Inlet: NPS 1.
11. Minimum Outlet: NPS 1-1/4.

2.3 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Standard America.
    b. Bemis Manufacturing Company.
    c. Church Seats; Bemis Manufacturing Company.
    d. Zurn Industries, LLC.

2. Standard: IAPMO/ANSI Z124.5.

3. Material: Plastic.
4. Type: Commercial (Standard).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining, check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: Not required.
9. Color: White.

2.4 SUPPORTS

A. Water Closet Carrier:
1. Standard: ASME A112.6.1M.
2. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture.

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 water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
2. Use carrier supports with waste-fitting assembly and seal.
3. Install floor-mounted, back-outlet water closets attached to building floor substrate, onto waste-fitting seals; and attach to support.
4. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations that are easy for people with disabilities to reach.
5. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

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."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224216.13 - COMMERCIAL LAVATORIES

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. Lavatories.
2. Faucets.
3. Supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

C. SAMPLES: For each type of lavatory and faucet indicated on plans. Provide one sample for Owner to view and approve prior to ordering. Provide lavatory fixture and matching faucet.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Servicing and adjustments of automatic faucets.

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. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory Vitreous china, wall mounted, with back.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard.
b. Crane Plumbing, L.L.C.
c. Kohler Co.
d. Sloan Valve Company.
e. Zurn Industries, LLC.

2. Fixture: See plans

2.2 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. Provide with Loose key

E. Operation: Loose key.

F. Risers:

1. NPS 3/8.
2. Chrome-plated, rigid-copper-pipe and brass straight or offset tailpieces Chrome-plated, soft-copper flexible tube ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

2.3 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 by NPS 1-1/4.
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated, brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-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, 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.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

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 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. Service sinks.
2. Handwash sinks.
3. Sink faucets.
4. Supply fittings.
5. Waste fittings.
6. Supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
2. Include rated capacities, operating characteristics and furnished specialties and accessories.

B. SAMPLES: For each type of sink and faucet indicated on plans. Provide one sample for Owner to view and approve prior to ordering. Include sink fixture as well as matching faucet.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sinks to include in maintenance manuals.

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. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.

2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 SERVICE SINKS

A. Service Sinks: floor mounted.
1. Fixture:

a. Standard: ASME A112.19.1/CSA B45.2.
b. Style: With front apron and raised back.
c. Nominal Size: 28 by 28 inches.
d. Color: White.
e. Drain: Grid with NPS 3 outlet.

2. Faucet: Wall mount faucet. See drawings.

2.2 HANDWASH SINKS

A. Handwash Sinks : Stainless steel, wall mounted.
1. 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: See Drawings.

2. Faucet: Manual two lever.
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 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

B. Sink Faucets: Manual type, two-lever-handle mixing valve.

1. Commercial, Solid-Brass Faucets.

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) Chicago Faucets; Geberit Company.
2) Elkay Manufacturing Co.
3) Kohler Co.
4) Moen Incorporated.
5) Sloan Valve Company.

6) JUST Manufacturing

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: Centerset Widespread.
5. Body Material: Commercial, solid brass.
6. Finish: Chrome plated.
7. Maximum Flow Rate: 2.2 gpm.
8. Handle(s): Wrist blade, 4 inches.
9. Mounting Type: Deck, concealed Deck, exposed.
10. Spout Type: Swing, round tubular Swivel gooseneck.
11. Vacuum Breaker: Not required for hose outlet.
12. Spout Outlet: Aerator.

2.4 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: Loose Key

F. Risers:

1. NPS 3/8.
2. Chrome-plated, soft-copper flexible tube ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

2.5 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2.
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.

2.6 GROUT

A. Standard: ASTM C 1107/C 1107M, 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, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

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. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. 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.

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 escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. 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."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

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 224713 - DRINKING FOUNTAINS

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 drinking fountains and related components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of drinking fountain.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

A. Drinking Fountains: Stainless steel, wall mounted.

1. Stainless-Steel Drinking Fountains:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Elkay.
2) Halsey Taylor.
3) Haws Corporation.

2. Standards:

a. Comply with ASME A112.19.3/CSA B45.4.
b. Comply with NSF 61 and NSF 372.
c. Comply with ICC A117.1.

3. Receptor Shape: Concave with projecting bowl.

4. Bubbler: One, with adjustable stream regulator, located on deck.
5. Control: Push button.
6. Drain: Grid type with NPS 1-1/4 tailpiece.
7. Supply: NPS 3/8 with shutoff valve.
8. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 brass P-trap.
9. Support: Mounting frame or brackets for attaching to wood blocking or substrate.

2.2 SUPPORTS

A. Type I Water Cooler Carrier:
   1. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.

B. Set pedestal drinking fountains on floor.

C. Install recessed drinking fountains secured to wood blocking in wall construction.

D. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

E. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."

F. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

G. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

H. Seal joints between fixtures 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 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. Install ball or gate shutoff valve on water supply to each fixture. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224713

DIVISION 23 – HVAC

SECTION 231123 - FACILITY NATURAL-GAS PIPING

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. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.
6. Service meters.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.
3. Minimum Operating Pressure of Service Meter: 5 psig.

B. Natural-Gas System Pressure within Buildings: More than 0.5 psig but not more than 2 psig.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Piping specialties.

2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Pressure regulators. Indicate pressure ratings and capacities.
4. Dielectric fittings.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pressure regulators to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. 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.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

D. Protect stored PE pipes and valves from direct sunlight.

1.10 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

1.11 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M 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. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

5. 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.

6. Mechanical Couplings:
    a. Steel flanges and tube with epoxy finish.
    b. Buna-nitrile seals.
    c. Steel bolts, washers, and nuts.
    d. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
    e. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.

2.2 PIPING SPECIALTIES

A. 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.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 72 inches

B. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

C. Basket Strainers:

1. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

D. T-Pattern Strainers:

1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
2. End Connections: Grooved ends.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
4. CWP Rating: 750 psig.

E. 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 natural gas.

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 complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

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. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
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 and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig.
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.
1. Body: Bronze, complying with ASTM B 584.
2. Ball: Chrome-plated brass.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Separate packnut with adjustable-stem packing threaded ends.
6. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. CWP Rating: 600 psig.
8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Bronze Plug Valves: MSS SP-78.
1. Body: Bronze, complying with ASTM B 584.
2. Plug: Bronze.
3. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Operator: Square head or lug type with tamperproof feature where indicated.
5. Pressure Class: 125 psig.
6. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
7. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Line Pressure Regulators: Comply with ANSI Z21.80.
1. Body and Diaphragm Case: Cast iron or die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.

3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
5. Orifice: Aluminum; interchangeable.
6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
7. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
8. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
9. Overpressure Protection Device: Factory mounted on pressure regulator.
10. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
11. Maximum Inlet Pressure: 2 psig.

C. Appliance Pressure Regulators: Comply with ANSI Z21.18.
1. Body and Diaphragm Case: Die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber.
5. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
6. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
7. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
8. Maximum Inlet Pressure: 1 psig.

2.6 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to NFPA 54 to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with NFPA 54 requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Install underground, natural-gas piping buried at least 54 inches or local code requirements below finished grade. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.

C. Install underground, PE, natural-gas piping according to ASTM D 2774.

D. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

E. Copper Tubing with Protective Coating:

1. Apply joint cover kits over tubing to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.

F. Install fittings for changes in direction and branch connections.

G. Install pressure gage downstream from each service regulator. Pressure gages are specified in Section 230519 "Meters and Gages for HVAC Piping."

3.4 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. 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.

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 natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where 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 long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

O. 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.

P. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
2. In Floors: Install natural-gas piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
3. In Floor Channels: Install natural-gas piping in floor channels. Channels must have cover and be open to space above cover for ventilation.
4. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.

    a. Exception: Tubing passing through partitions or walls does not require striker barriers.

5. Prohibited Locations:

    a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
    b. Do not install natural-gas piping in solid walls or partitions.

Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

R. Connect branch piping from top or side of horizontal piping.

S. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

T. Do not use natural-gas piping as grounding electrode.

U. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

V. 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."

W. 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."

X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.5 SERVICE-METER ASSEMBLY INSTALLATION

A. Install service-meter assemblies aboveground, on concrete bases.

B. Install metal shutoff valves upstream from service regulators. Shutoff valves are not required at second regulators if two regulators are installed in series.

C. Install strainer on inlet of service-pressure regulator and meter set.

D. Install service regulators mounted outside with vent outlet horizontal or facing down. Install screen in vent outlet if not integral with service regulator.

E. Install metal shutoff valves upstream from service meters. Install dielectric fittings downstream from service meters.

F. Install service meters downstream from pressure regulators.

G. Install metal bollards to protect meter assemblies. Comply with requirements in Section 055000 "Metal Fabrications" for pipe bollards.

3.6 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, 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.

3.7 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 inside diameter 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," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

G. 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.

H. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.8 HANGER AND SUPPORT INSTALLATION

A. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

B. Comply with requirements for pipe hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

C. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.

4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
5. NPS 4 and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

D. Install hangers for horizontal drawn-temper copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
2. NPS 1/2 and NPS 5/8: Maximum span, 72 inches; minimum rod size, 3/8 inch.
3. NPS 3/4 and NPS 7/8: Maximum span, 84 inches; minimum rod size, 3/8 inch.
4. NPS 1: Maximum span, 96 inches; minimum rod size, 3/8 inch.

E. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:

1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
2. NPS 1/2: Maximum span, 72 inches; minimum rod size, 3/8 inch.
3. NPS 3/4 and Larger: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.9 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas 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 of each gas-fired appliance 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.

3.10 LABELING AND IDENTIFYING

A. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for piping and valve identification.

B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.11 PAINTING

A. Comply with requirements in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for painting interior and exterior natural-gas piping.

B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel (flat).
d. Color: Gray.

C. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.12 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Use 3000-psig, 28-day, compressive-strength concrete and reinforcement.

3.13 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.14 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.15 OUTDOOR PIPING SCHEDULE

A. Underground natural-gas piping shall be the following:

1. PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.

B. Aboveground natural-gas piping shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

3.16 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND LESS THAN 5 PSIG

A. Aboveground, branch piping NPS 1 and smaller shall be the following:
   1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be the following:

   1. Steel pipe with malleable-iron fittings and threaded joints.

3.17 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 and smaller at service meter shall be the following:

   1. One-piece, bronze ball valve with bronze trim.
   2. Two-piece, full-port, bronze ball valves with bronze trim.

B. Valves for pipe sizes NPS 2-1/2 and larger at service meter shall be one of the following:

   1. Two-piece, full-port, bronze ball valves with bronze trim.
   2. Bronze plug valve.

C. Distribution piping valves for pipe sizes NPS 2 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.

END OF SECTION 231123

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 and flat-oval ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

B. Related Sections:
1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:
1. Liners and adhesives.
2. 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 of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.

9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Delegated-Design Submittal:
1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:
a. Lighting fixtures.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.
f. Perimeter moldings.
g. Fire notification/detection systems.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 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.

B. Transverse Joints: Select joint types and fabricate according to 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" and International Energy Conservation Code.

C. Longitudinal Seams: Select seam types and fabricate according to 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" and International Energy Conservation Code.

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 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" and International Energy Conservation Code.

2.2 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise 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. McGill AirFlow LLC.
      b. SEMCO Incorporated.
      c. Spiral Manufacturing Co., Inc.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to 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."
   1. Transverse Joints in Ducts Larger Than 60 Inchesin Diameter: Flanged.

D. Longitudinal Seams: Select seam types and fabricate according to 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."

1. Fabricate round ducts larger than 90 inchesin diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inchesin width (major dimension) with butt-welded longitudinal seams.

E. Tees and Laterals: Select types and fabricate according to 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."

2.3 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 A 653/A 653M.
1. Galvanized Coating Designation: G90
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 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 according to 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: 4 inches
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

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, 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. Solvent-Based Joint and Seam Sealant:
1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. VOC: Maximum 395 g/L.
10. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
11. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
12. Service: Indoor or outdoor.
13. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:
1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg 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.

2.5 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. 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 according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round and flat-oval ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. 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.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction".

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 the 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 according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, 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 thick.
   4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
   5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "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 of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

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.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 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.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Duct System Cleanliness Tests:
   1. Visually inspect duct system to ensure that no visible contaminants are present.

C. Duct system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.8 START UP

A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

B. Exhaust Ducts:
   1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
      a. Pressure Class: Negative 2-inch wg.
      b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
      c. SMACNA Leakage Class for Rectangular: 12.
      d. SMACNA Leakage Class for Round and Flat Oval: 12.
   2. Ducts Connected to Air-Handling Units:
      a. Pressure Class: Positive or negative 3-inch wg
      b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
      c. SMACNA Leakage Class for Rectangular12.
      d. SMACNA Leakage Class for Round and Flat Oval: 12.
   3. Ducts Connected to Equipment Not Listed Above:
      a. Pressure Class: Positive or negative 3-inch wg.
      b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
      c. SMACNA Leakage Class for Rectangular: 12.
      d. SMACNA Leakage Class for Round and Flat Oval: 12.

C. Intermediate Reinforcement:
   1. Galvanized-Steel Ducts: Galvanized steel.
   2. PVC-Coated Ducts:
      a. Exposed to Airstream: Match duct material.
      b. Not Exposed to Airstream: Match duct material.
   3. Stainless-Steel Ducts:
      a. Exposed to Airstream: Match duct material.
      b. Not Exposed to Airstream: Match duct material.
   4. Aluminum Ducts: Aluminum.

D. Elbow Configuration:
   1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
      a. Velocity 1000 fpm or Lower:
         1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
         2) Mitered Type RE 4 without vanes.
      b. Velocity 1000 to 1500 fpm:
         1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
         2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
         3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
      c. Velocity 1500 fpm or Higher:
         1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
         2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
         3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
   2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
      a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
      b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
      c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
    a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
        1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
        2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
        3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
        4) Radius-to Diameter Ratio: 1.5.
    b. Round Elbows, 12 Inchesand Smaller in Diameter: Stamped or pleated.
    c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam or Welded.

E. Branch Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
    a. Rectangular Main to Rectangular Branch: 45-degree entry.
    b. Rectangular Main to Round Branch: Spin in.
2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
    a. Velocity 1000 fpm or Lower: 90-degree tap.
    b. Velocity 1000 to 1500 fpm: Conical tap.
    c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

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. Backdraft and pressure relief dampers.
2. Manual volume dampers.
3. Control dampers.
4. Flange connectors.
5. Turning vanes.
6. Duct-mounted access doors.
7. Flexible connectors.
8. Flexible ducts.
9. Duct accessory hardware.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

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 AMCA 500-D testing for damper rating.

1.5 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. 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 A 653/A 653M.
1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.

C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and No. 4 finish for exposed ducts.

D. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

E. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.

F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

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. Air Balance Inc.; a division of Mestek, Inc.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.
5. Pottorff; a division of PCI Industries, Inc.
6. Ruskin Company.
7. SEMCO Incorporated.

B. Description: Gravity balanced.

C. Maximum Air Velocity: 2000 fpm.

D. Maximum System Pressure: 2-inch wg.

E. Frame: 0.052-inch- thick, galvanized sheet steel, with welded corners and mounting flange.

F. Blades: Multiple single-piece blades, center-pivoted, maximum 6-inch width, 0.025-inch- thick, roll-formed aluminum with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: Neoprene, mechanically locked.

I. Blade Axles:
1. Material: Nonferrous metal.
2. Diameter: 0.20 inch.

J. Tie Bars and Brackets: Galvanized steel.

K. Return Spring: Adjustable tension.

L. Bearings: Steel ball or 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. Chain pulls.
5. Screen Mounting: Front mounted in sleeve.
   a. Sleeve Thickness: 20-gage minimum.
   b. Sleeve Length: 6 inches minimum.
6. Screen Mounting: Rear mounted.
7. Screen Material: Galvanized steel.
8. Screen Type: Bird.
9. 90-degree stops.

2.3 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:
   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. Air Balance Inc.; a division of Mestek, Inc.
      b. American Warming and Ventilating; a division of Mestek, Inc.
      c. McGill AirFlow LLC.
      d. METALAIRE, Inc.
      e. Nailor Industries Inc.
      f. Pottorff; a division of PCI Industries, Inc.
      g. Ruskin Company.
   2. Standard leakage rating.
   3. Suitable for horizontal or vertical applications.
   4. Frames:
      a. Hat-shaped, galvanized-steel channels, 0.064-inch minimum thickness.
      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-steel, 0.064 inch thick.
   6. Blade Axles: Nonferrous metal.
   7. Bearings:
      a. Oil-impregnated bronze.
      b. Dampers in ducts with pressure classes of 3-inch wg 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.

B. Jackshaft:
   1. Size: 1-inch diameter.
   2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
   3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

C. Damper Hardware:
   1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
   2. Include center hole to suit damper operating-rod size.
   3. Include elevated platform for insulated duct mounting.

2.4 CONTROL DAMPERS

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 Warming and Ventilating; a division of Mestek, Inc.
   2. Cesco Products; a division of Mestek, Inc.
   3. Greenheck Fan Corporation.
   4. McGill AirFlow LLC.
   5. METALAIRE, Inc.
   6. Nailor Industries Inc.
   7. Ruskin Company.

B. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:
   1. Galvanized-steel channels, 0.064 inch thick.
   2. Mitered and welded corners.

D. Blades:
   1. Multiple blade with maximum blade width of 8 inches.
   2. Parallel and opposed-blade design.
   3. Galvanized steel.
   4. 0.064 inch thick.
   5. Blade Edging: Closed-cell neoprene edging.
   6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

E. Blade Axles: 1/2-inch- diameter; nonferrous metal; 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.

F. Bearings:
   1. Oil-impregnated bronze.
   2. Dampers in ducts with pressure classes of 3-inch wg 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.

2.5 FLANGE CONNECTORS

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. Ductmate Industries, Inc.
   2. Nexus PDQ; Division of Shilco Holdings Inc.
   3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.6 TURNING VANES

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. Ductmate Industries, Inc.
   2. METALAIRE, Inc.
   3. SEMCO Incorporated.
   4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

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.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."

D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

2.7 DUCT-MOUNTED ACCESS DOORS

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 Warming and Ventilating; a division of Mestek, Inc.
   2. Ductmate Industries, Inc.
   3. Greenheck Fan Corporation.
   4. McGill AirFlow LLC.
   5. Nailor Industries Inc.
   6. Pottorff; a division of PCI Industries, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."
   1. Door:
      a. Double wall, rectangular.
      b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
      c. Vision panel.
      d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
      e. Fabricate doors airtight and suitable for duct pressure class.
   2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
   3. Number of Hinges and Locks:
      a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
      b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
      c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches.
      d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:
   1. Door and Frame Material: Galvanized sheet steel.
   2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
   3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
   4. Factory set at 3-inch wg.
   5. Doors close when pressures are within set-point range.
   6. Hinge: Continuous piano.

7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.8 FLEXIBLE CONNECTORS

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. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ventfabrics, Inc.
4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

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 wide attached to 2 strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- 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..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

2.9 FLEXIBLE DUCTS

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. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Insulated, Flexible Duct: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2004.

C. Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2004.

D. Flexible Duct Connectors:
   1. Clamps: Nylon strap in sizes 3 through 18 inches, to suit duct size.

2.10 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 or control dampers (as indicated) at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan 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 fire and smoke dampers according to UL listing.

H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
   1. On both sides of duct coils.
   2. Upstream from duct filters.
   3. At outdoor-air intakes and mixed-air plenums.
   4. At drain pans and seals.
   5. Downstream from control dampers, backdraft dampers, and equipment.
   6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links.
      a. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
   7. At each change in direction and at maximum 50-foot spacing.
   8. Upstream from turning vanes.
   9. Control devices requiring inspection.

10. Elsewhere as indicated.

I. Install access doors with swing against duct static pressure.

J. Access Door Sizes (install largest size possible in duct, leaving 1 inch clearance between edges of door and duct):
1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

K. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

L. Install flexible connectors to connect ducts to equipment.

M. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

N. Connect diffusers or light troffer boots to ducts with maximum 36-inch lengths of flexible duct clamped or strapped in place.

O. Connect flexible ducts to metal ducts with draw bands.

P. Maximum length of flexible ducts is 5 feet.

Q. 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, smoke, and combination 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 233423 - HVAC POWER VENTILATORS

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. In-line centrifugal fans.
   2. Centrifugal roof ventilators

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base fan-performance ratings on actual Project site elevations.

B. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:

   1. Certified fan performance curves with system operating conditions indicated.
   2. Certified fan sound-power ratings.
   3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
   4. Material thickness and finishes, including color charts.
   5. Dampers, including housings, linkages, and operators.
   6. Roof curbs.
   7. Fan speed controllers.

B. Delegated-Design Submittal: For unit hangars and supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

   1. 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.
   2. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

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. Belts: One set(s) for each belt-driven unit.

1.7 QUALITY ASSURANCE

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. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.8 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 IN-LINE CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Carnes Company.
2. Greenheck Fan Corporation.
3. JencoFan.
4. Loren Cook Company.
5. PennBarry.
6. Twin City

B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.

D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

E. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

F. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
3. Companion Flanges: For inlet and outlet duct connections.
4. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

2.2 CENTRIFUGAL ROOF VENTILATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Carnes Company.
2. Greenheck Fan Corporation.
3. JencoFan.
4. Loren Cook Company.
5. PennBarry.
6. Twin City

B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
2. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.

C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

D. Accessories:
1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

E. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch-thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
1. Configuration: Self-flashing without a cant strip, with mounting flange.
2. Overall Height: 16 inches.
3. Pitch Mounting: Manufacture curb for roof slope.
4. Metal Liner: Galvanized steel.

2.3 MOTORS

A. 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."

1. 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.

B. Enclosure Type: Totally enclosed, fan cooled.

2.4 SOURCE QUALITY CONTROL

A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Secure roof-mounted fans to roof curbs with cadmium-plated hardware. See Section 077200 "Roof Accessories" for installation of roof curbs.

C. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

D. Support suspended units from structure using threaded steel rods and elastomeric hangers having a static deflection of 1 inch.

E. Install units with clearances for service and maintenance.

F. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

END OF SECTION 233423

SECTION 233713.23 - AIR REGISTERS AND GRILLES

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. Adjustable blade face registers and grilles.
2. Fixed face registers and 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.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Register and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 REGISTERS

A. Adjustable Blade Face Register:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Krueger.
    b. Nailor Industries Inc.
    c. Price Industries.
    d. Titus.
    e. Tuttle & Bailey.

2. Material: Steel.

3. Finish: Baked enamel, white.
4. Face Blade Arrangement: Vertical spaced 3/4 inch apart.
5. Core Construction: Integral.
6. Rear-Blade Arrangement: Horizontal spaced 3/4 inch apart.
7. Frame: 1-1/4 inches wide.
8. Mounting: Concealed.

2.2 GRILLES

A. Adjustable Blade Face Grille:

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. Krueger.
    b. Nailor Industries Inc.
    c. Price Industries.
    d. Titus.
    e. Tuttle & Bailey.

2. Material: Steel.

3. Finish: Baked enamel, white.
4. Face Blade Arrangement: see schedule.
5. Core Construction: Integral.
6. Rear-Blade Arrangement: Horizontal spaced 3/4 inch apart.
7. Frame: 1-1/4 inches wide.
8. Mounting: Countersunk screw or Lay in.

B. Fixed Face Grille:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Krueger.

b. Nailor Industries Inc.
c. Price Industries.
d. Titus.
e. Tuttle & Bailey.

2. Material: Steel.

3. Finish: Baked enamel, white.
4. Face Blade Arrangement: ; see schedule.
5. Core Construction: Integral.
6. Frame: 1-1/4 inches wide.
7. Mounting Frame: Filter.
8. Mounting: Countersunk screw or Lay in.
9. Accessory: Filter.

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate registers and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where registers and grilles are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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.

3.3 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 233723 - HVAC GRAVITY VENTILATORS

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. Roof hoods.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ventilators, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof framing plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

   1. Structural members to which roof curbs and ventilators will be attached.
   2. Sizes and locations of roof openings.

1.6 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 ROOF HOODS

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. Acme Engineering & Manufacturing Corp.
2. Greenheck Fan Corporation.
3. JencoFan.
4. Loren Cook Company.
5. PennBarry.
6. Twin City Fan & Blower.

B. Factory or shop fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figures 6-6 and 6-7.

C. Materials: Galvanized-steel sheet, minimum 0.064-inch-thick base and 0.040-inch-thick hood; suitably reinforced.

D. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; 1-1/2-inch-thick, rigid fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to fit roof opening and ventilator base.
   1. Overall Height: 16 inches.

E. Bird Screening: Galvanized-steel, 1/2-inch-square mesh, 0.041-inch wire or Aluminum, 1/2-inch-square mesh, 0.063-inch wire.

F. Galvanized-Steel Sheet Finish:

   1. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gravity ventilators level, plumb, and at indicated alignment with adjacent work.

B. Install gravity ventilators with clearances for service and maintenance.

C. Install perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Install concealed gaskets, flashings, joint fillers, and insulation as installation progresses.

E. Label gravity ventilators according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

G. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in Section 233113 "Metal Ducts" and Section 233116 "Nonmetal Ducts." Drawings indicate general arrangement of ducts and duct accessories.

3.3 ADJUSTING

A. Adjust damper linkages for proper damper operation.

END OF SECTION 233723

SECTION 235533.16 - GAS-FIRED UNIT HEATERS

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 gas-fired unit heaters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of gas-fired unit heater.

1. Include rated capacities, operating characteristics, and accessories.

B. Shop Drawings: For gas-fired unit heaters. Include plans, elevations, sections, and attachment details.

1. Prepare by or under the supervision of a qualified professional engineer detailing fabrication and assembly of gas-fired unit heaters, as well as procedures and diagrams.
2. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
4. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, elevations, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which equipment will be attached.
2. Items penetrating roof and the following:

a. Vent and gas piping rough-ins and connections.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For gas-fired unit heaters to include in emergency, operation, and maintenance manuals.

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. Fan Belts: One for each belt-driven fan size.

1.7 QUALITY ASSURANCE

A. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace heat exchanger of gas-fired unit heater that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lennox Industries, Inc.; Lennox International.
2. Modine Manufacturing Company.
3. REZNOR, a brand of Nortek Global HVAC.
4. Sterling HVAC Products; a Mestek company.
5. Trane.

2.2 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.

2.3 MANUFACTURED UNITS

A. Description: Factory assembled, piped, and wired, and complying with ANSI Z83.8/CSA 2.6.

B. Gas Type: Design burner for natural gas having characteristics same as those of gas available at Project site.

C. Type of Venting: Powered vented.

D. Housing: Steel, with integral draft hood and inserts for suspension mounting rods.

1. External Casings and Cabinets: Powder coating over corrosion-resistant-treated surface.
2. Discharge Louvers: Independently adjustable, horizontal blades.
3. Discharge Nozzle: Discharge at 25 to 65 degrees from horizontal.

E. Accessories:

1. Four-point suspension kit.
2. Power Venter: Centrifugal aluminized-steel fan, with stainless-steel shaft; 120-V ac motor.
3. Concentric, Terminal Vent Assembly: Combined combustion-air inlet and power-vent outlet with wall or roof caps. Include adapter assembly for connection to inlet and outlet pipes, and flashing for wall or roof penetration.

F. Heat Exchanger: Aluminized or Stainless steel.

G. Burner Material: Aluminized steel with stainless-steel inserts.

H. Propeller Unit Fan:

1. Formed-steel or Aluminum propeller blades riveted to heavy-gage steel spider bolted to cast-iron hub, dynamically balanced, and resiliently mounted.
2. Fan-Blade Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.

I. Centrifugal Unit Fan:

1. Steel, centrifugal fan dynamically balanced and resiliently mounted.
2. Belt-Driven Drive Assembly:

a. Resiliently mounted to housing, with the following features:

1) Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2) Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
3) Pulleys: Cast-iron, adjustable-pitch motor pulley.

J. Motors:

1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Enclosure Materials: Rolled steel.
3. Efficiency: Premium efficient.

K. Electrical Connection: Factory wire motors and controls for a single electrical connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and connect gas-fired unit heaters and associated gas and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written instructions.

3.2 EQUIPMENT MOUNTING

A. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

B. Substrate-Mounted Units: Provide supports connected to substrate. Secure units to supports.
   1. Threaded Rods, Spring Hangers, and Building Attachments: Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" and Section 230548 "Vibration and Seismic Controls for HVAC."
   2. Threaded Rods, Spring Hangers, Building Attachments, and Seismic Restraints: Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment." and Section 230548 "Vibration and Seismic Controls for HVAC."
   3. Anchor the unit to resist code-required horizontal acceleration.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to gas-fired unit heater, allow space for service and maintenance.

C. Gas Piping: Comply with Section 231126 "Facility Liquefied-Petroleum Gas Piping." Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.

D. Vent Connections: Comply with Section 235123 "Gas Vents."

E. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

F. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

   1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   2. Verify bearing lubrication.
   3. Verify proper motor rotation.
   4. Test Reports: Prepare a written report to record the following:

      a. Test procedures used.
      b. Test results that comply with requirements.
      c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Gas-fired unit heater will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Adjust burner and other unit components for optimum heating performance and efficiency.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain gas-fired unit heaters.

END OF SECTION 235533.16

SECTION 238239.19 - WALL AND CEILING UNIT HEATERS

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 wall and ceiling heaters with propeller fans and electric-resistance heating coils.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and 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. Include details of anchorages and attachments to structure and to supported equipment.
4. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.
5. Wiring Diagrams: Power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wall and ceiling unit heaters to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Berko; Marley Engineered Products.
2. Chromalox, Inc.

3. INDEECO.
4. Markel Products; TPI Corporation.
5. Marley Engineered Products.
6. Trane.
7. Redd-i

2.2 DESCRIPTION

A. Assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.

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 CABINET

A. Front Panel: Extruded-aluminum bar grille, with removable panels fastened with tamperproof fasteners.

B. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Architect, applied to factory-assembled and -tested wall and ceiling heaters before shipping.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

D. Surface-Mounted Cabinet Enclosure: Steel with finish to match cabinet.

2.4 COIL

A. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware, and limit controls for high-temperature protection. Provide integral circuit breaker for overcurrent protection.

2.5 FAN AND MOTOR

A. Fan: Aluminum propeller directly connected to motor.

B. Motor: Permanently lubricated, multispeed. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

2.6 CONTROLS

A. Controls: Unit-mounted thermostat.

B. Electrical Connection: Factory wire motors and controls for a single field connection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive wall and ceiling unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wall and ceiling unit heaters to comply with NFPA 90A.

B. Install wall and ceiling unit heaters level and plumb.

C. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 238239.19

SECTION 239119 - FIXED LOUVERS

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. Fixed extruded-aluminum louvers.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).

C. Vertical Louver: Louver with vertical blades (i.e., the axis of the blades are vertical).

D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven-rain performance, as determined by testing according to AMCA 500-L.

F. Windborne-Debris-Impact-Resistant Louver: Louver that provides specified windborne-debris-impact resistance, as determined by testing according to AMCA 540.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
2. Show mullion profiles and locations.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

B. Windborne-debris-impact-resistance test reports.

C. Sample Warranties: For manufacturer's special warranties.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M.
2. AWS D1.3/D1.3M.
3. AWS D1.6/D1.6M.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 WARRANTY

A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 FIXED EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Drainable-Blade Louver:

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. Carnes Company.
    b. Greenheck Fan Corporation.
    c. Pottorff.
    d. Ruskin Company.
2. Louver Depth: 6 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Mullion Type: Exposed.

5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.3 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Bird screening.

B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

C. Louver Screening for Aluminum Louvers:

1. Bird Screening: Aluminum, 1/2-inch-square mesh, 0.063-inch wire.
2. Bird Screening: Stainless steel, 1/2-inch-square mesh, 0.047-inch wire.

2.4 FABRICATION

A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.

1. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close-fitting blade splices designed to permit expansion and contraction.

2. Semirecessed Mullions: Where indicated, provide mullions partly recessed behind louver blades, so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.
3. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
4. Exterior Corners: Prefabricated corner units with mitered blades with concealed close-fitting splices and with fully recessed mullions at corners.

F. Provide subsills made of same material as louvers or extended sills for recessed louvers.

G. Join frame members to each other and to fixed louver blades with fillet welds unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.5 ALUMINUM FINISHES

A. Finish louvers after assembly.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.6 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

B. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat shaped.
2. 0.094-inch-thick, galvanized sheet steel.
3. Interlocking, gusseted corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Parallel-blade design.
3. Galvanized-steel.
4. 0.0747-inch-thick dual skin.
5. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

E. Blade Axles: 1/2-inch-diameter; 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.

F. Bearings:

1. Molded synthetic or Stainless-steel sleeve.
2. Dampers in ducts with pressure classes of 3-inch wg 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, 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 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B. 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.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

F. 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.

3.4 ADJUSTING AND CLEANING

A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers damaged during installation and construction, 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.

1. 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 239119

DIVISION 26 – ELECTRICAL

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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. Copper building wire rated 600 V or less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:
1. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

D. Conductor Insulation:
   1. Type THHN/Type THWN-2: Comply with UL 83.
   2. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Service: Copper; stranded.

C. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

E. Feeders Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.

F. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

I. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.

J. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inchesof slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.

2. Perform each of the following visual and electrical tests:

   a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
   b. Test bolted connections for high resistance using one of the following:

      1) A low-resistance ohmmeter.
      2) Calibrated torque wrench.
      3) Thermographic survey.

   c. Inspect compression-applied connectors for correct cable match and indentation.
   d. Inspect for correct identification.
   e. Inspect cable jacket and condition.
   f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
   g. Continuity test on each conductor and cable.
   h. Uniform resistance of parallel conductors.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

SECTION 260523 - CONTROL-VOLTAGE ELECTRICAL POWER CABLES

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. RS-485 cabling.
2. Low-voltage control cabling.
3. Control-circuit conductors.
4. Identification products.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

C. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

D. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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.

2.2 PERFORMANCE REQUIREMENTS

A. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.

1. Flame Travel Distance: 60 inches or less.
2. Peak Optical Smoke Density: 0.5 or less.
3. Average Optical Smoke Density: 0.15 or less.

B. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.

C. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

2.3 BACKBOARDS

A. Description: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels in Section 061000 "Rough Carpentry."

B. Painting: Paint plywood on all sides and edges with flat latex paint. Comply with requirements in Section 099123 "Interior Painting."

2.4 RS-485 CABLE

A. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262.

2.5 LOW-VOLTAGE CONTROL CABLE

A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: Comply with NFPA 262.

2.6 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

B. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

PART 3 - EXECUTION

3.1 INSTALLATION OF RACEWAYS AND BOXES

A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.

1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.
2. Flexible metal conduit shall not be used.

B. Comply with TIA-569-C for pull-box sizing and length of conduit and number of bends between pull points.

C. Install manufactured conduit sweeps and long-radius elbows if possible.

D. Raceway Installation in Equipment Rooms:

1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard if entering the room from overhead.
4. Extend conduits 4 inches bove finished floor.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

E. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA-568-C Series of standards.
2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
3. Terminate all conductors and optical fibers; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced.
5. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems.” Install lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.

9. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
10. Support: Do not allow cables to lay on removable ceiling tiles.
11. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.

C. UTP Cable Installation:

1. Comply with TIA-568-C.2.
2. Install termination hardware as specified in Section 271500 "Communications Horizontal Cabling" unless otherwise indicated.
3. Do not untwist UTP cables more than 1/2 inch at the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:

1. Install wiring in raceways. Comply with requirements specified in Section 260533 "Raceways and Boxes for Electrical Systems."

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
3. Cable shall not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-C recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

    a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches.
    b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches.
    c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches.

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

    a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
    b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches.
    c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches.

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

    a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
    b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches.

c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches.

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.3 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits; No. 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits; No. 12 AWG.

3.4 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-C, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.5 GROUNDING

A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.

B. For low-voltage control wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.6 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Identify data and communications system components, wiring, and cabling according to TIA-606-A; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.

END OF SECTION 260523

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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 grounding and bonding systems and equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, minimum 12 inches in length, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

G. Conduit Hubs: Mechanical type, terminal with threaded hub.

H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

I. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.

J. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.

K. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

L. Water Pipe Clamps:

1. Mechanical type, two pieces with zinc-plated bolts.

    a. Material: Die-cast zinc alloy.
    b. Listed for direct burial.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel 3/4 inch by 20 feet.

B. Concrete encased electrode: 30 feet of No. 2 AWG bare copper encased in concrete.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.5 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.

1. Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

G. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 30 feet of bare copper conductor not smaller than No. 2 AWG.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Hangers.
b. Steel slotted support systems.
c. Trapeze hangers.
d. Clamps.
e. Turnbuckles.
f. Sockets.
g. Eye nuts.
h. Saddles.
i. Brackets.

2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings For fabrication and installation details for electrical hangers and support systems.

1. Trapeze hangers. Include product data for components.
2. Steel slotted-channel systems.
3. Equipment supports.
4. 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.

C. Delegated-Design Submittal: For hangers and supports for electrical systems.

1. Include design calculations and details of trapeze hangers.
2. Include design calculations for seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which hangers and supports will be attached.
3. Size and location of initial access modules for acoustical tile.
4. Items penetrating finished ceiling, including the following:

a. Lighting fixtures.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.
f. Projectors.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M.
2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
1. Material: Galvanized steel.
2. Channel Width: 1-5/8 inches.
3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-
4. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
5. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser

conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps.

E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMTs, IMCs, and RMCs may be supported by openings through structure members, according to NFPA 70.

C. 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.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 4000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 "Cast-in-Place Concrete.

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as 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 minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements in Division 09 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

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. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. RMC: Rigid metallic conduit.

C. EMT: Electrical metallic tubing.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. EMT: Comply with ANSI C80.3 and UL 797.

D. FMC: Comply with UL 1; zinc-coated steel.

E. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

    a. Material: Steel.
    b. Type: compression.
    c. Set screw fittings for EMT are not permitted.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. RNC: Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

D. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Hinged type unless otherwise indicated.

D. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect

2.5 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Metal Floor Boxes:

1. Material: Cast metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

H. Gangable boxes are prohibited.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

J. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: RNC, Type EPC-80-PVC.
3. Underground Conduit: RNC, Type EPC-80-PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Gymnasiums.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 nonmetallic in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install surface raceways only where indicated on Drawings.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches of enclosures to which attached.

I. Raceways Shall Not Be Embedded in Slabs:

1. Run conduit under slabs. Feeder conduits shall be buried a minimum of 36 inches below the concrete slab.
2. If slab is on grade, change from RNC, Type EPC-40-PVC to GRC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or GRC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Surface Raceways:

1. Install surface raceway with a minimum 2-inch radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

S. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

U. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

V. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

W. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Locate boxes so that cover or plate will not span different building finishes.

BB. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

DD. Set metal floor boxes level and flush with finished floor surface.

EE. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 260533

SECTION 260543 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

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. Metal conduits and fittings, including GRC and PVC-coated steel conduit.
2. Rigid nonmetallic duct.
3. Flexible nonmetallic duct.

1.3 DEFINITIONS

A. Direct Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials such as concrete.

B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.

C. Duct Bank:

1. Two or more ducts installed in parallel, with or without additional casing materials.
2. Multiple duct banks.

D. GRC: Galvanized rigid (steel) conduit.

E. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include duct-bank materials, including spacers and miscellaneous components.
2. Include duct, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
3. Include accessories for handholes, boxes.
4. Include underground-line warning tape.
5. Include warning planks.

1.5 FIELD CONDITIONS

A. Ground Water: Assume ground-water level is at grade level unless a lower water table is noted on Drawings.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND FITTINGS

A. GRC: Comply with ANSI C80.1 and UL 6.

B. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

2.2 RIGID NONMETALLIC DUCT

A. Underground Plastic Utilities Duct: Type EPC-80-PVC and Type EPC-40-PVC RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.

B. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

C. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 DUCT ACCESSORIES

A. Underground-Line Warning Tape: Comply with requirements for underground-line warning tape specified in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of duct with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Architect if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.

B. Clear and grub vegetation to be removed and protect vegetation to remain according to Section 311000 "Site Clearing." Remove and stockpile topsoil for reapplication according to Section 311000 "Site Clearing."

3.2 UNDERGROUND DUCT APPLICATION

A. Duct for Electrical Feeders 600 V and Less: Type EPC-80-PVC RNC.

B. Duct for Electrical Branch Circuits: Type EPC-80-PVC RNC.

C. Bored Underground Duct: Type EPEC-40-HDPE unless otherwise indicated.

D. Underground Ducts Crossing Roadways: Type EPC-80 PVC RNC, encased in reinforced concrete.

E. Stub-ups: Concrete-encased GRC.

3.3 EARTHWORK

A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restoration: Replace area after construction vehicle traffic in immediate area is complete.

C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses" and Section 329300 "Plants."

E. Cut and patch existing pavement in the path of underground duct, duct bank, and underground structures according to "Cutting and Patching" Article in Section 017300 "Execution."

3.4 DUCT INSTALLATION

A. Where indicated on Drawings, install duct.

B. Install duct according to NEMA TCB 2.

C. Slope: Pitch duct a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from a high point between two manholes, to drain in both directions.

D. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations unless otherwise indicated.

1. Duct shall have maximum of two 90 degree bends or the total of all bends shall be no more 180 degrees between pull points.

E. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent duct do not lie in same plane.

F. Installation Adjacent to High-Temperature Steam Lines: Where duct is installed parallel to underground steam lines, perform calculations showing the duct will not be subject to environmental temperatures above 40 deg C. Where environmental temperatures are calculated to rise above 40 deg C, and anywhere the duct crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.

G. Building Wall Penetrations: Make a transition from underground duct to GRC at least 10 feet (3 m) outside the building wall, without reducing duct line slope away from the building and without

forming a trap in the line. Use fittings manufactured for RNC-to-GRC transition. Install GRC penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

H. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.

I. Pulling Cord: Install 200-lbf- (1000-N-) test nylon cord in empty ducts.

J. Direct-Buried Duct:

1. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inches (150 mm) in nominal diameter.
2. Width: Excavate trench 3 inches (75 mm) wider than duct on each side.
3. Depth: Install top of duct at least 36 inches (900 mm) below finished grade unless otherwise indicated.
4. Set elevation of bottom of duct bank below frost line.
5. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
6. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 feet (6 m) of duct. Place spacers within 24 inches (600 mm) of duct ends. Stagger spacers approximately 6 inches (150 mm) between tiers. Secure spacers to earth and to ducts to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
7. Install duct with a minimum of 3 inches (75 mm) between ducts for like services and 6 inches (150 mm) between power and communications duct.
8. Elbows: Install manufactured duct elbows for stub-ups, at building entrances, and at changes of direction in duct direction unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
9. Install manufactured GRC elbows for stub-ups, at building entrances, and at changes of direction in duct.

    a. Couple RNC duct to GRC with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
    b. Stub-ups to Outdoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches (1500 mm) from edge of base. Install insulated grounding bushings on terminations at equipment.

        1) Stub-ups shall be minimum 4 inches above finished floor and minimum 3 inches (75 mm)from conduit side to edge of slab.

    c. Stub-ups to Indoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches (1500 mm) from edge of wall. Install insulated grounding bushings on terminations at equipment.

        1) Stub-ups shall be minimum 4 inches above finished floor and no less than 3 inches (75 mm)from conduit side to edge of slab.

10. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches (100 mm) over duct and hand tamp.

Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earth Moving" for installation of backfill materials.

a. Place minimum 3 inches (75 mm) of sand as a bed for duct. Place sand to a minimum of 6 inches (150 mm) above top level of duct.
b. Place minimum 6 inches (150 mm) of engineered fill above concrete encasement of duct.

K. Underground-Line Warning Tape: Bury conducting underground line specified in Section 260553 "Identification for Electrical Systems" no less than 12 inches (300 mm) above all concrete-encased duct and duct banks and approximately 12 inches (300 mm) below grade. Align tape parallel to and within 3 inches (75 mm) of centerline of duct bank. Provide an additional warning tape for each 12-inch (300-mm) increment of duct-bank width over a nominal 18 inches (450 mm). Space additional tapes 12 inches (300 mm) apart, horizontally.

3.5 GROUNDING

A. Ground underground ducts and utility structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.6 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump.

1. Sweep floor, removing dirt and debris.
2. Remove foreign material.

END OF SECTION 260543

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.
8. Paint for identification.
9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

B. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

C. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Comply with NFPA 70E and Section 260574 "Overcurrent Protective Device Arc-Flash Study" requirements for arc-flash warning labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Color-Coding for Phase-Identification, 600 V or Less: Use colors listed below for ungrounded conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 480/277-V Circuits:

    a. Phase A: Brown.
    b. Phase B: Orange.
    c. Phase C: Yellow.

3.
4. Colors for 208/120-V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.
    c. Phase C: Blue.

5. Colors for 240-V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.

6. Color for Neutral: White.
7. Color for Equipment Grounds: Green.
8. Colors for Isolated Grounds: Green with white stripe.

B. Raceways and Cables Carrying Circuits at More Than 600 V:

1. Black letters on an orange field.
2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

C. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

D. Equipment Identification Labels:

1. Black letters on a white background.

E. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
3.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.
3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:
   a. 3-1/2 by 5 inchesfor equipment.
   b. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

C. Tape and Stencil: 4-inch- wide black stripes on 10-inch centers placed diagonally over orange background and is 12 inches wide. Stop stripes at legends.

D. Floor Marking Tape: 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

E. Underground-Line Warning Tape:

1. Tape:

a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
b. Printing on tape shall be permanent and shall not be damaged by burial operations.
c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:

a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE" .
c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

2.6 SIGNS

A. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:

a. For signs up to 20 sq. in., minimum 1/16 inch.
b. For signs larger than 20 sq. in., 1/8 inch thick.
c. Engraved legend with black letters on white face.
d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 CABLE TIES

A. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

1. Buildings supplied by multiple services or feeders shall have permanent signs at each service disconnect which describes the location of all services or feeders in accordance with NEC 230.2 (C).

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

M. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

P. Self-Adhesive Labels:

1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.

Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

W. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench [or concrete envelope]exceeds 16 inches overall.
2. Limit use of underground-line warning tape to direct-buried cables.
3. Install underground-line warning tape for direct-buried cables and cables in raceways.

X. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.

Y. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.

E. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.

F. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

G. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

H. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

I. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.
3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

J. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

K. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

    a. Power-transfer switches.
    b. Controls with external control power connections.

M. Arc Flash Warning Labeling: Self-adhesive labels.

N. Operating Instruction Signs: Self-adhesive labels or Laminated acrylic or melamine plastic signs.

O. Emergency Operating Instruction Signs: Laminated acrylic or melamine plastic signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

P. Equipment Identification Labels:

1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
2. Outdoor Equipment: Laminated acrylic or melamine sign.
3. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of an engraved, laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Switchgear.
    e. Switchboards.
    f. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    g. Substations.
    h. Emergency system boxes and enclosures.
    i. Motor-control centers.
    j. Enclosed switches.
    k. Enclosed circuit breakers.
    l. Enclosed controllers.
    m. Variable-speed controllers.
    n. Push-button stations.
    o. Power-transfer equipment.
    p. Contactors.
    q. Remote-controlled switches, dimmer modules, and control devices.
    r. Battery-inverter units.
    s. Battery racks.
    t. Power-generating units.

u. Monitoring and control equipment.
v. UPS equipment.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

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. Time switches.
2. Photoelectric switches.
3. Indoor occupancy and vacancy sensors.
4. Switchbox-mounted occupancy sensors.
5. Digital timer light switches.
6. Lighting contactors.

B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show installation details for the following:

a. Occupancy sensors.
b. Vacancy sensors.

2. Interconnection diagrams showing field-installed wiring.
3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranty: For manufacturer's warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: Provide names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty operation of lighting control software.
b. Faulty operation of lighting control devices.

2. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70 and marked for intended location and application.
2. Contact Configuration: SPS.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Programs: two channels; each channel is individually programmable with two on-off set points on a 24-hour schedule with a skip-a-day weekly schedule.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
6. Astronomic Time: all channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Description: Solid state, with SPST dry contacts rated for 1800 VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A, and compatible with ballasts and LED lamps.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Fifteen-second minimum, to prevent false operation.
4. Surge Protection: Metal-oxide varistor.
5. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
6. Failure Mode: Luminaire stays ON.

2.3 INDOOR OCCUPANCYAND VACANCY SENSORS

A. General Requirements for Sensors:

1. Wall or ceiling-mounted, solid-state indoor occupancy and vacancy sensors.
2. Dual technology.
3. Separate power pack.
4. Hardwired connection to switch.
5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Operation:

    a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

7. Sensor Output: Sensor is powered from the power pack.
8. Power:Line voltage.
9. Power Pack: Dry contacts rated for 20-A ballast or LED load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
10. Mounting:

    a. Sensor: Suitable for mounting in any position on a standard outlet box.
    b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
12. Bypass Switch: Override the "on" function in case of sensor failure.
13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

B. Dual-Technology Type: Wall or ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.

3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 square feet when mounted48 inches above finished floor.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox using hardwired connection.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
4. Switch Rating: Not less than 800-VA ballast or LED load at 120 V, and 800-W incandescent.

B. Wall-Switch Sensor:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of[900 sq. ft.
2. Sensing Technology: Dual technology - PIR and ultrasonic.
3. Switch Type: SP, field-selectable automatic "on," or manual "on," automatic "off.
4. Capable of controlling load in three-way application.
5. Voltage: Match the circuit voltage.
6. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
7. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
8. Concealed, "off" time-delay selector at 30 seconds and 5, 10, and 20 minutes.
9. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
10. Color: White.
11. Faceplate: Color matched to switch.

2.5 DIGITAL TIMER LIGHT SWITCH

A. Description: Combination digital timer and conventional switch lighting control unit. Switchbox-mounted, backlit LCD display, with selectable time interval in 10 minute increments.

1. Rated 960 W at 120-V ac for tungsten lighting, 10 A at 120-V ac or 10 amps at 277-V ac for ballast or LED, and 1/4 horsepower at 120-V ac.
2. Integral relay for connection to BAS.
3. Voltage: Match the circuit voltage.
4. Color: White.
5. Faceplate: Color matched to switch.

2.6 LIGHTING CONTACTORS

A. Description: Electrically operated and electrically held, combination-type lighting contactors with nonfused disconnect, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less THD of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SENSOR INSTALLATION

A. Comply with NECA 1.

B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

C. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.3 CONTACTOR INSTALLATION

A. Comply with NECA 1.

B. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.4 WIRING INSTALLATION

A. Comply with NECA 1.

B. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.5 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Notify Design Professional when devices are installed and have been operationally tested.

B. Design Professional shall accomplish functional testing as described in 2015 International Energy Conservation Code (IECC), section C408.3.1. Design Professional shall provide report as described in 2015 IECC, section C408.3.

C. Lighting control devices will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within two months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to one visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.

3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.8 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.

B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.9 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 260943.16 "Addressable-Luminaire Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls."

B. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 260923

SECTION 262416 - PANELBOARDS

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. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. HID: High-intensity discharge.

E. MCCB: Molded-case circuit breaker.

F. SPD: Surge protective device.

G. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.

5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of NRTL listing for SPD as installed in panelboard.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include wiring diagrams for power, signal, and control wiring.
9. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Include an Internet link for electronic access to downloadable PDF of the coordination curves.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 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. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.9 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
b. Altitude: Not exceeding 6600 feet.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. 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.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

F. Enclosures: Flush and Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
b. Outdoor Locations: NEMA 250, Type 3R.
c. Kitchen Areas: NEMA 250, Type 4X stainless steel.
d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2. Height: 84 inches maximum.
3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.

4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
5. Skirt for Surface-Mounted Panelboards, if indicated: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
6. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
7. Finishes:

    a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    b. Back Boxes: Galvanized steel.
    c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.

G. Incoming Mains:

1. Location: Top or Bottom dependent on panel location.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

H. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.

    a. Plating shall run entire length of bus.
    b. Bus shall be fully rated the entire length.

2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

I. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
7. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.

J. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

K. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

1. Percentage of Future Space Capacity: 25 percent.

L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.2 POWER PANELBOARDS

A. Panelboards: NEMA PB 1, distribution type.

B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

C. Mains: Circuit breaker or Lugs only, as indicated.

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

B. Mains: Circuit breaker or lugs only.

C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Circuit Breakers:

    a. RMS sensing.
    b. Field-replaceable rating plug or electronic trip.
    c. Digital display of settings, trip targets, and indicated metering displays.
    d. Multi-button keypad to access programmable functions and monitored data.
    e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
    f. Integral test jack for connection to portable test set or laptop computer.
    g. Field-Adjustable Settings:

        1) Instantaneous trip.
        2) Long- and short-time pickup levels.
        3) Long and short time adjustments.
        4) Ground-fault pickup level, time delay, and I squared T response.
4. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
5. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
6. Subfeed Circuit Breakers: Vertically mounted.
7. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Breaker handle indicates tripped status.
    c. UL listed for reverse connection without restrictive line or load ratings.
    d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
    f. Ground-Fault Protection: [Integrally mounted] [Remote-mounted] relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    g. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
    h. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
    i. Multipole units enclosed in a single housing with a single handle assembled to operate as a single unit.
    j. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
    k. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.5 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Machine printed directory card inside panelboard door, mounted in transparent card holder.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Comply with NECA 1.

C. Install panelboards and accessories according to NEMA PB 1.1.

D. Equipment Mounting:
   1. Attach panelboard to the vertical finished or structural surface behind the panelboard.

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Mount top of trim 90 inches above finished floor unless otherwise indicated.

G. Mount panelboard cabinet plumb and rigid without distortion of box.

H. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

I. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth.

J. Install overcurrent protective devices and controllers not already factory installed.

   1. Set field-adjustable, circuit-breaker trip ranges.
   2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

K. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

L. Install filler plates in unused spaces.

M. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

N. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Do not perform optional tests. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated.

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Architect. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

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. Straight-blade convenience and tamper-resistant receptacles.
2. GFCI receptacles.
3. Twist-locking receptacles.
4. Pendant cord-connector devices.
5. Cord and plug sets.
6. Toggle switches.
7. Wall-box dimmers.
8. Wall plates.
9. Floor service outlets.
10. Prefabricated multioutlet assemblies.

1.3 DEFINITIONS

A. Abbreviations of Manufacturers' Names:

1. Cooper: Cooper Wiring Devices; Division of Cooper Industries, Inc.
2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
3. Leviton: Leviton Mfg. Company, Inc.
4. Pass & Seymour: Pass& Seymour/Legrand.

B. BAS: Building automation system.

C. EMI: Electromagnetic interference.

D. GFCI: Ground-fault circuit interrupter.

E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

F. RFI: Radio-frequency interference.

G. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for final approval by Owner: One for each type of device and wall plate specified, in each color specified.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.7 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. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no fewer than two.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

D. Devices for Owner-Furnished Equipment:

1. Receptacles: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

B. Tamper-Resistant Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Description: Labeled and complying with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.
2. Comply with NEC 406.12.

2.3 GFCI RECEPTACLES

A. General Description:

1. 125 V, 20 A, straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles:

C. Tamper-Resistant, Duplex GFCI Convenience Receptacles:

2.4 TWIST-LOCKING RECEPTACLES

A. Twist-Lock, Single Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.

2.5 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.6 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.7 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Single Pole

2. Two Pole

3. Three Way

4. Four Way

C. Pilot-Light Switches: 120/277 V, 20 A.
1. Description: Single pole, with LED-lighted handle, illuminated when switch is off.

D. Key-Operated Switches: 120/277 V, 20 A.
1. Description: Single pole, with factory-supplied key in lieu of switch handle.

E. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.

F. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

2.8 WALL-BOX DIMMERS

A. Dimmer Switches: Solid-state units with quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.

C. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.9 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 0.05-inch-thick, anodized aluminum.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover. Plastic covers shall not be permitted.

2.10 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Rectangular with satin finish.

D. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

E. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for UTP cable complying with requirements in Section 271500 "Communications Horizontal Cabling."

2.11 PREFABRICATED MULTIOUTLET ASSEMBLIES

A. Description:

1. Two-piece surface metal raceway, with factory-wired multioutlet harness.
2. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

B. Raceway Material: Metal, with manufacturer's standard finish.

C. Multioutlet Harness:

1. Receptacles: 15-A, 125-V, NEMA WD 6 Configuration 5-15R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.
2. Receptacle Spacing: 12 inches.
3. Wiring: No. 12 AWG solid, Type THHN copper, two circuit, connecting alternating receptacles.

2.12 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Gray or As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles. Use dead-front GFCI devices in location where the receptacle is not accessible.

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Test Instruments: Use instruments that comply with UL 1436.
   2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

   1. Line Voltage: Acceptable range is 105 to 132 V.
   2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
   3. Ground Impedance: Values of up to 2 ohms are acceptable.
   4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
   5. Using the test plug, verify that the device and its outlet box are securely mounted.
   6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of a nationally recognized testing laboratory (NRTL) listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.7 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. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with NFPA 70.

2.2 FUSIBLE SWITCHES

A. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 240-V ac.
4. 1200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.3 NONFUSIBLE SWITCHES

A. Type HD, Heavy Duty, Three Pole, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Lugs: Mechanical type, suitable for number, size, and conductor material.
6. Service-Rated Switches: Labeled for use as service equipment.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

B. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

C. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated.

D. MCCBs shall be equipped with a device for locking in the isolated position.

E. Lugs shall be suitable for 167 deg F rated wire.

F. Standards: Comply with UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents.

G. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

H. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

I. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
5. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
6. Alarm Switch: One NC contact that operates only when circuit breaker has tripped.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1) or gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R, 12).

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 PREPARATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Owner's written permission.
4. Comply with NFPA 70E.

3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

3.4 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in fusible devices.

F. Comply with NFPA 70 and NECA 1.

3.5 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that the unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.
g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.

C. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, grounding, and clearances.
d. Verify that the unit is clean.
e. Operate the circuit breaker to ensure smooth operation.
f. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.
h. Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

1. Test procedures used.
2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.7 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges to values indicated on the Drawings.

END OF SECTION 262816

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - 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. Interior solid-state luminaires that use LED technology.
2. Lighting fixture supports.

B. Related Requirements:

1. Division 26 section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. LED: Light-emitting diode.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests.

a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

C. Samples for final approval by Owner: For each type of luminaire listed on the Lighting Fixture Schedule.

1. Samples of emergency battery variants are not required, e.g. if a Type 1 sample is submitted, then a Type 1E sample is not required.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

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. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.0 Subject to project requirements, the following are acceptable manufacturers: Lithonia Lighting, LSI Industries, Cooper Lighting, Columbia Lighting, Dual-Lite, Lumax Industries, H.E. Williams, Hubble.

2.1 LUMINAIRE 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. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. Recessed Fixtures: Comply with NEMA LE 4.

D. Bulb shape complying with ANSI C79.1.

E. Lamp base complying with ANSI C81.61.

F. CRI minimum of 80. CCT of 3500 K.

G. Rated lamp life of 35,000 hours.

H. Lamps dimmable from 100 percent to 0 percent of maximum light output.

I. Internal driver.

J. Nominal Operating Voltage: 120 V ac.

K. Housings:

1. Extruded-aluminum housing and heat sink.

2.2 DOWNLIGHT

A. Minimum 1,000 lumens. Minimum allowable efficacy of 80 lumens per watt.

B. Universal mounting bracket.

C. Integral junction box with conduit fittings.

2.3 HIGHBAY, LINEAR

A. Minimum 10,000 lumens. Minimum allowable efficacy of 80 lumens per watt.

2.4 LINEAR INDUSTRIAL

A. Minimum 5,000 lumens. Minimum allowable efficacy of 80 lumens per watt.

2.5 LOWBAY

A. Minimum 5,000 lumens. Minimum allowable efficacy of 80 lumens per watt.

B. Universal mounting bracket.

2.6 RECESSED LINEAR

A. Minimum 4000 lumens. Minimum allowable efficacy of 85 lumens per watt.

B. Integral junction box with conduit fittings.

2.7 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

a. Battery: Sealed, maintenance-free, nickel-cadmium type.
b. Charger: Fully automatic, solid-state type with sealed transfer relay.
c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.8 Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.9 EMERGENCY LIGHTING UNITS

A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures. Refer to lighting schedule.
7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
8. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.10 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. Prismatic acrylic clear or UV-stabilized acrylic.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI for all luminaires.

2.11 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.12 LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265119

SECTION 265619 - EXTERIOR LIGHTING

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. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire supports.

B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
5. Photometric data and adjustment factors based on laboratory tests, complying IES LM-80.

6. Wiring diagrams for power, control, and signal wiring.

7. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Samples for final approval by Owner: For each unique type of luminaire listed on the Exterior Lighting Fixture Schedule.

C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For luminaire supports.

1. Include design calculations for luminaire supports.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of the following:

1. Luminaire.

B. Source quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.7 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. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
2. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100] of each type and rating installed. Furnish at least one of each type.
3. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

A. Provide luminaires from a single manufacturer for each luminaire type.

B. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

C. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.10 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.11 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including luminaire support components.
b. Faulty operation of luminaires and accessories.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE 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. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet location.

E. Lamp base complying with ANSI C81.61.

F. Bulb shape complying with ANSI C79.1.

G. CRI of minimum 70.

H. L70 lamp life of 35,000 hours.

I. Internal driver.

J. Nominal Operating Voltage: 120 V ac. See luminaire schedule.

K. In-line Fusing: Separate in-line fuse for each luminaire.

L. Lamp Rating: Lamp marked for outdoor use.

M. Source Limitations: Obtain luminaires from single source from a single manufacturer.

N. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Corrosion-resistant aluminum or Epoxy-coated steel. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:

1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

G. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage and coating.
c. CCT and CRI for all luminaires.

2.3 FINISHES

A. Variations in Finishes: 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.

B. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.4 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls and roofs for suitable conditions where luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Install lamps in each luminaire.

D. Fasten luminaire to structural support.

E. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

F. Wall-Mounted Luminaire Support:

1. Attached to a minimum 1/8 inch backing plate attached to wall structural members.

G. Wiring Method: Install cables in raceways. Conceal raceways and cables.

H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.

I. Coordinate layout and installation of luminaires with other construction.

J. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

K. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.4 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections[with the assistance of a factory-authorized service representative]:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Verify operation of photoelectric controls.

C. Luminaire will be considered defective if it does not pass tests and inspections.

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires.

END OF SECTION 265619

ADVERTISEMENT FOR BIDS

Sealed bids for the **"Doniphan-Trumbull Public Schools – Stadium Storage Facility"** will be received by Doniphan-Trumbull Public Schools until **2:00 PM** on **Tuesday, April 07, 2020**. Bids shall be delivered to Doniphan-Trumbull Public Schools P.O. Box 300, 302 West Plum, Doniphan, NE 68832.

Bidding Documents have been prepared by **KPE Architecture-Engineering-Forensics** and may be obtained on or after March 09, 2020 from A&D Technical Supply Company, 4320 South 89th Street, Omaha, NE 68127, Phone (800) 228-2753, www.adtechsupply.com. Electronic plans will be made available from KPE at no cost.

Plans may be examined at Omaha Builders Exchange, 4159 S. 94th St., Omaha, NE 68127; Lincoln Builders Bureau, 5910 S. 58th St., Suite C, Lincoln, NE 68516; Columbus Chamber of Commerce, P.O. Box 515, 753 33rd Ave., Columbus, NE 68601; Grand Island Area Chamber of Commerce, 309 W. 2nd St., Grand Island, NE 68801; Hastings Builders Bureau, 301 S. Burlington Ave., Hastings, NE 68902; Kearney Area Chamber of Commerce, 1007 2nd Ave. P.O. Box 607, Kearney, NE 68847; Sioux City Construction League, 3900 Stadium Dr., Sioux City, IA 51106; and Master Builders Construction Update Plan Room, www.mbionline.com.

Contact **Mike McLennan** with **KPE Architecture-Engineering-Forensics** at (**402) 291-1444** with any questions.

Doniphan-Trumbull Public Schools

Superintendent Report
Submitted: March 2020

1. Calendar Updates:
   a. Feb. 20- Bi-weekly conference call with Sen. Halloran
   b. Feb. 26- Legislative Forum
   c. March 3- Coronavirus webinar
   d. March 5- Principal Interviews
   e. March 4-DT Ed. Foundation
   f. March 11- DEDC monthly meeting
   g. March 12- CMI will begin work to change over control system
   h. March 18- LPC spring meeting

2. Board Elections
   4 candidates for 3 openings: Zach, Brent, Christi Engel, Amanda Groff

3. 2020-21 Calendar
   On the agenda for approval later tonight

4. Storage facility bids are being posted in Doniphan Herald, and posted at Builders Bureaus in Omaha, Lincoln, Columbus, Grand Island, Kearney, Hastings, Sioux City, and online. Bids due April 7 at 2 p.m. Corey Hess is no longer on the job: Shane Klepinger is now my contact.

5. Summer projects
   List of summer projects being proposed.
   Carpeting-6 classrooms (4 elementary/2 high school) ($9,122)
   Tiling- 5th/6th hallway. ($5,777)
   Sink install 5th grade room.
   East Gym bleachers
   East Gym floor refinishing
   East Gym wall mat install
   Concrete work on south side walk
   Storage facility construction

6. Staffing

   Currently have open positions in mathematics, FACS, social studies

Superintendent Pay Transparency Notice—Proposed

Notice is hereby given that _Doniphan-Trumbull_School
contract/contract amendment on its agenda for the board mee
_7__ pm at the __D-T board Room in _

After the 2019/20 school year, how many years remain on the contract:

The estimated costs to the district for the 2019/20 year and futu

	2019/20 Base Pay, Additional Compensation & Benefits
Base Pay for the Total FTE	$ 140,000.00
Compensation for activities outside of	
● *Extended contracts / Activi*	$ -
● *Bonus/Incentive/Performa*	$ -
● *Stipends*	$ -
● *All other costs not mention*	$ -
Benefits and Payroll Costs Paid by	
● *Insurances (Health, Dental*	$ 21,538.00
● *Cafeteria Plan Stipend*	
● *Cash in lieu of insurance*	
retirement, deferred compensation, FICA and	$ -
retirement, FICA and	$ 24,542.00
● *IRS value of housing allowa*	
● *IRS value of vehicle allowa*	
● *Additional leave days*	
● *Annuities*	
● *Service credit purchase*	
● *Association / Membership*	$ 500.00
● *Cell Phone/Internet reimbu*	$ 1,000.00
● *Relocation reimbursement*	
● *Travel allowance/reimburs*	
● *Mileage Allowance*	
● *Educational tuition assistar*	
● *All other benefit costs not r*	$ 300.00
Totals:	**$ 187,880.00**

ł Contract : Stan Hendricks

s is proposing a superintendent employment
ting to be held on ____March 9_____, 2020___ at
_____Doniphan, Nebraska.

2

ure years are listed below:

Future Base Pay (2020-21), Additional Compensation & Benefits per Contract	TOTAL CONTRACT COST
$ 144,200.00	**$ 284,200.00**
	$ -
	$ -
	$ -
	$ -
22990	$ 44,528.00
	$ -
	$ -
	$ -
$ 25,277.00	$ 49,819.00
	$ -
	$ -
	$ -
	$ -
	$ -
$ 500.00	$ 1,000.00
$ 1,000.00	$ 2,000.00
	$ -
	$ -
	$ -
	$ -
$ 835.00	$ 1,135.00
$ 194,802.00	**$ 382,682.00**

CONTRACT OF EMPLOYMENT WITH SUPERINTENDENT

THIS CONTRACT is made by and between the Board of Education of the **Hall County School District 0126, a/k/a Doniphan-Trumbull Public Schools**, hereinafter referred to as "the Board," and **Mr. Stanford Hendricks**, hereinafter referred to as "the Superintendent." This contract shall supersede all prior contracts of employment between the parties.

WITNESSETH: That in accordance with action taken by the Board as recorded in the minutes of the Board meeting held on the **9th** day of **March, 2020,** the Board hereby agrees to employ the Superintendent, and the Superintendent hereby agrees to accept such employment, subject to the following terms and conditions:

1. Term of Contract.

a. This Contract is for a term of two (2) year, beginning on the 1st day of July, 2020, and expiring on the 30th day of June, 2022. A "contract year" for purposes of this Contract shall be from July 1 to June 30.

2. Salary.

a. Salary. The annual salary for the contract year of July 1, 2020 through June 30, 2021 shall be: **One Hundred and forty-four thousand two hundred Dollars ($144,200 .00).** The annual salary for the 2021-2022 contract year shall be agreed upon after completion of the teacher negotiations for the 2021-2022 contract year and not less than that in the 2020-2021 contract year.

b. Payment of Salary and Adjustments. The salary shall be paid in equal installments in accordance with the policy of the Board governing payment of other professional staff employees of the District. Salary payments shall be subject to state and federal withholding required by law, including without limitation retirement contributions, FICA, FUTA, Medicare, and state or federal unemployment contributions.

3. Benefits. As further consideration for the services to be performed by the Superintendent, it is agreed as follows:

a. Vacation and Leave Benefits.

i. Amount and Use. The Superintendent shall be allowed fifteen 15 working days of vacation, 10 days of annual leave each contract year, all exclusive of Saturdays, Sundays, and legal holidays. It is understood, however, that the Superintendent may from time to time be required to perform duties on Saturdays, Sundays, and legal holidays. Vacations days are to be used in a manner and at times selected by the Superintendent; provided that the Superintendent shall make reasonable efforts to not schedule leaves which would cause the Superintendent to not be able to attend regular scheduled meetings of the Board of Education or important school functions, and the Superintendent shall provide information such that the Superintendent may be contacted when necessary.

ii. Vacation Accumulation. Since the Board and the Superintendent agree that periodic vacation is beneficial to "recharge," the Superintendent shall use at least ten (10) days of vacation each year. The maximum accumulation of vacation days shall be fifteen (15). Once the maximum accumulation is reached, no additional vacation leave may be given. When the number of vacation days falls below the maximum, additional vacation days may be given to restore the vacation days to the maximum as of the beginning of any contract year.

iii. Accumulation of Other Leaves. Unused annual leave days may be carried over from one contract year to the next, subject to any maximum number of carryover days for annual leave days established in the negotiated agreement between the District and the D-TEA.

iv. Reimbursement Upon End of Employment. Reimbursement of unused vacation days will be made at the conclusion of the Superintendent's final contract year at the Superintendent's effective daily rate of pay established in the Superintendent's final contract year. Reimbursement of unused annual leave days will not be made.

v. Log. The Superintendent shall maintain a vacation and annual leave log which shall be available to the Board for review upon request of the Board President from time to time.

b. Health, Dental and LTD Insurance. The District will pay the Superintendent's group health insurance and dental insurance, for the Superintendent, the Superintendent's spouse and children, and long term disability insurance for the Superintendent, through the District's group insurance plan.

c. Life and ADD insurance. The Superintendent shall be provided basic term life insurance ($60,000) and basic ADD ($60,000).

d. Meetings and Dues. The Superintendent shall attend appropriate professional meetings at the local, state and national levels provided that such attendance does not interfere with the proper performance of Superintendent's duties. The reasonable and necessary expenses of such meetings shall be reimbursed by the District consistent with Board policies. In addition, the District shall pay the Superintendent's annual dues to the following organizations: NASA (NCSA), NRCSA, NASCD (ASCD). The Board may pay dues for other professional organizations suitable for the Superintendent's position upon the Superintendent's request.

e. Cell Phone. Cell phone monthly charges (phone and internet) will be reimbursed or paid by the District.

f. Transportation Expenses. The reasonable and necessary expenses of transportation required in the performance of Superintendent's official duties shall be reimbursed at the rate set by the Board for District travel.

g. Indemnification. The District shall, to the extent permitted by law, defend, hold harmless, and indemnify the Superintendent from any and all demands, claims, suits, actions, and legal proceedings brought against the Superintendent in the Superintendent's individual capacity or the Superintendent's official capacity as an agent or employee of the District, provided that the incident arose while the Superintendent was acting (or, in good faith, reasonably believed that the Superintendent was acting) within the scope of the Superintendent's employment with the District.

h. Other Benefits. The Superintendent may be provided such other benefits as are provided to certificated employees of the District in the Board's discretion, except as otherwise provided herein, provided the Superintendent meets the conditions and eligibility requirements for such benefits.

i. Avoidance of Fines or Penalties. The District may elect to not provide any benefit set forth herein in the event the District determines in its discretion that the provision of the benefit would result in a fine or penalty. In the event the District makes such an election, the District shall negotiate with the Superintendent to obtain a like-benefit that would not result in a fine or penalty, and in the event such is not available, the Superintendent's salary shall be grossed up in an amount equal to the cost savings from not providing the benefit (excluding the costs of fines and penalties).

4. Duties.

a. Specification of Duties. The Superintendent shall perform the duties of Superintendent as are regularly and customarily expected for such position and such duties and responsibilities as are set forth in Board Policy or Regulation for such position. The duties as prescribed in the Board of Education Policies shall not be substantially changed during this Contact without the consent of the Superintendent by an amendment to this Contract. The Superintendent shall be subject to such other duties as the Board may assign from time to time. The Superintendent shall not be responsible for performance of duties assigned by individual members of the Board of Education, or duties assigned without official action of the Board of Education, except as specifically set forth in the Board of Education Policies. In the event that the Superintendent is elected to any other office or offices of the Board of Education or in connection with the District, the Superintendent shall perform the duties of such other office or offices without remuneration other than that as provided in this Contract.

b. Use of Time. The Superintendent agrees to devote full time to the assigned duties, provided that with the advance agreement of the Board of Education, the Superintendent may undertake consultative work, speaking engagements, writing, lecturing or other professional duties.

c. Performance of Duties. In performing the assigned duties, the Superintendent shall be governed by the policies, regulations and directions of the Board of Education. The Superintendent shall in all respects to diligently and faithfully perform the assigned duties to the best of the Superintendent's professional ability. Regular dependable attendance at meetings of the Board and committees of the Board and other assigned duties is an essential function of the Superintendent's position.

5. Board-Superintendent Relationship. The Board shall have primary responsibility for formulating and adopting Board policy. The Superintendent shall be the chief administrative officer for the District, and shall have primary responsibility for implementation of Board policy. The Superintendent shall be responsible for development of policies for adoption by the Board and for development of regulations and rules consistent with Board policy. In the absence of Board policy on matters which require prompt action, the Superintendent shall have the authority to act using the Superintendent's professional judgment and consistent with legal requirements; provided that the Superintendent shall report the nature

of the matter and the action taken to the Board no later than the next regularly scheduled Board meeting. The parties agree, individually and collectively, to promptly refer all criticism, complaints and suggestions called to its attention to the Superintendent for action, study or recommendation, as appropriate.

6. Evaluation of the Superintendent. The Superintendent shall be evaluated twice during the first contract year and once during each subsequent contract year, unless the Board deems additional evaluations appropriate. The Superintendent shall receive a copy of the evaluation and shall have the right to submit a response to the evaluation, which response shall be placed in the Superintendent's personnel file. The Superintendent shall notify the President of the Board to remind the Board of the need to evaluate.

7. Contract Termination. In the event the Superintendent violates any of the provisions of this Contract or performs any act or does anything which is materially harmful to the District, or which substantially inhibits the Superintendent's ability to discharge the duties as set forth herein, including, but not limited to (1) becoming legally disqualified to perform as a superintendent or elementary principal in the State of Nebraska; (2) participation in any fraud; (3) causing any intentional damage to property; (4) engaging in any unlawful act; (5) any representations in this Contract being determined to be false or incorrect; (6) failure to return a Renewal Agreement by the required date, provided that such date not be prior to March 15 of the final year of the Contract or any extension of the Contract term; and (7) just cause, including: (a) incompetency, which includes, but is not limited to, demonstrated deficiencies or shortcomings in knowledge of subject matter or teaching or administrative skills; (b) neglect of duty; (c) unprofessional conduct; (d) insubordination; (e) immorality; (f) physical or mental incapacity; (g) failure to give evidence of professional growth as required by law; or (h) other conduct which interferes substantially with the continued performance of duties; then the Superintendent may be discharged in accordance with applicable law. Suspension or other disciplinary action may be enforced in accordance with applicable law.

Upon lawful termination of this Contract for any reason, the compensation to be paid hereunder shall be an amount which bears the same ratio to the annual salary specified as the number of months or fraction thereof to the date of such termination bears to the twelve months in the annual salary period in which termination occurs. Any portion of the salary paid, but not earned, prior to the date of termination of this Contract, and any sums owing to the District by the Superintendent, shall be set off from sums due to the Superintendent and, if the sums owing to the District are in excess of the sums due the Superintendent, the amount owing shall be immediately refunded by the Superintendent.

The Board of Education may require a certificate of health and physical fitness of Superintendent in accordance with applicable law at any time while this Contract is in force. Should the Superintendent be unable to perform the Superintendent's duties by reason of mental or physical capacity or any reason beyond the Superintendent's control, and said disability exists for a period exceeding the Superintendent's sick leave allowance, the Board of Education may, in its discretion, make a proportionate reduction from the salary and benefits, and if such disability continues or is permanent, or of such nature as to make the Superintendent unable to perform essential functions of the positions for which the Superintendent is employed, the Board of Education may, at its option, terminate this agreement whereupon the respective duties, rights and obligations hereof shall terminate.

8. Residency. The Superintendent shall reside within the School District during the term of this contract.

9. Representations and Legal Requirements. The Superintendent affirms that: (1) the Superintendent holds or will hold a valid and appropriate certificate to act as a certificated employee in the State of Nebraska to perform the assigned duties throughout the term of this Contract and any extensions of this Contract; (2) the required certificate to perform the assigned duties shall be registered as required by law; it being understood and agreed that this contract is not valid until the required certificate is registered in accordance with law and that the Superintendent shall not be compensated for any services performed prior to the date of registration of this certificate; and (3) the Superintendent is not under contract with another board of education within the State of Nebraska covering any part of or all of the same time of performance as provided for in this Contract.

The Superintendent further warrants and represents as follows: (1) all information set forth in the Superintendent's application for employment and other information provided by the Superintendent in seeking employment are true and accurate, and if said information ceases to be true, Superintendent will advise the Board of Education immediately; (2) Superintendent has never been convicted or plead no contest or otherwise been adjudicated as having committed a felony, any other offense involving moral turpitude or any other offense involving abuse, neglect, or sexual misconduct as defined in Sections 003.12 through 003.14 of 92 NAC 21; and (3) Superintendent has not suffered suspension or revocation of any educational professional license or certificate, nor voluntarily surrendered such a license or certificate where charges or potential charges were pending or imminent.

There shall be no penalty for release or resignation by the Superintendent from this Contract; provided no resignation shall become effective until expiration of the remaining term of the Contract unless the Board fixes an earlier effective date. This Contract is subject to provisions of the School Employees' Retirement Act.

9. Governing Laws. The parties shall be governed by all applicable Nebraska and federal laws, rules, and regulations in performance of their respective duties and obligations under this Contract.

10. Amendments & Severability. This Contract may be modified or amended only by a writing duly authorized and executed by the Superintendent and the Board. If any portion of this Contract shall be declared invalid or unenforceable by a court of competent jurisdiction, such declaration shall not affect the validity or enforceability of the remaining provisions of this Contract.

The failure to return a signed copy of this Contract to the President or Secretary of the Board of Education of the District on or before **March 23, 2020** shall constitute a rejection by the Superintendent of the offer of employment.

Executed this __9th_ day of March, 2020. _____ Stanford Hendricks, Superintendent	Executed this **__9th day of March, 2020** Board of Education of Hall County School District 0126, a/k/a Doniphan-Trumbull Public Schools By: _____ President Attest: _____ Secretary

2020-2021 School Calendar

Doniphan-Trumbull Public Schools

302 W Plum Doniphan NE 68832
402-845-2282 fax 402-845-6688

August 2020

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

18

September 2020

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27	28	29	30			

20

October 2020

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22

November 2020

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29	30					

18

December 2020

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16

January 2021

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24	25	26	27	28	29	30
31						

19

Aug 7	New Faculty
Aug 10-12	Opening In-Service Days
Aug 13	First Day K-12 Students
Sept 7	Labor Day - No School
Sept. 11	1:30 dismissal
Sept 17 (2:00-8:00)	P-T Conferences
Sept 18 (8:00-12:00)	P-T Conferences
Oct. 16	End of 1st Qtr.
Oct. 23	1:30 Dismissal
Nov. 25-27	Thanksgiving Vacation
Dec. 21-22	1:30 Dismissal
Dec. 22	End of 2nd Qtr. & 1st Semester
Dec. 23-Jan. 4	Winter Break
Jan. 4	No students/Teacher in-service
Jan. 5	School Resumes Students 2nd Sem.
Jan. 22	1:30 dismissal
Feb. 11 (2:00-8:00)	P-T Conferences
Feb. 12 (800-12:00)	P-T Conferences
Feb. 19	No School
March 4-5	Spring Break
March 12	1:30 dismissal/ End of 3rd Qtr
April 2 & 5	Good Friday & Easter; No School
May 8	Senior Graduation
May 19-21	built in snow days if needed
May 21	1:30 Dismissal
May 21	End of 4th Qtr. & 2nd Sem
May 21	Last Day Faculty

Category of Events

July 31	New Student Registration

Professional Develop Dates

Sept. 11	January 22
Oct. 23	March 12

1st Semester		2nd Semester	
St. Days	89	St. Days.	90
Contract Days.	93	Contract Days.	92
	179	Student Days	
	185	Contract Days	

May 19-21 are built in snow days; if not needed, school year will be shortened

February 2021

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21	22	23	24	25	26	27
28						

18

March 2021

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28	29	30	31			

21

April 2021

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May 2021

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23	24	25	26	27	28	29
30	31					

15

June 2021

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20	21	22	23	24	25	26
27	28	29	30			

July 2021

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4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Category of Events

Category of Events

Category of Events

School day
School Closed
No School, Teacher In-Serv

1:30 early outs for students
Report Cards

Parent Teacher Conferences
First & Last Day of Semsters
7th grade orientation